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C 99-F-1625
Copies:
Mr. P. Seidman
Mr. J. Smolinsky
Mr. H. Tabler
Ms D. Cooper
Mr. D. Drexler
Mr. C. Rugini

The Honorable Janet H. Deixler, Secretary
New York Sate Board on Electric Generation
Siting and the Environment
Three Empire State Plaza
Albany, New York 12223-1350

Subject: Case 99-F-1625, KeySpan-Ravenswood, Inc.
Compliance Filing in Accordance with the Article X Certificate
Architectural Drawings and Details

Dear Secretary Deixler:

In accordance with the Opinion and Order granting a Certificate of Environmental Compatibility and Public Need for the Ravenswood Cogeneration Facility, issued on September 7, 2001, enclosed please find seven (7) copies of architectural drawings and details as required by Certificate Condition IV.A. The enclosed drawings (11" x 17" format) consist of the following:

13069-EA-1A-1 Powerhouse Architectural Symbols, Abbreviations & General Notes
13069-EA-2A-4 Powerhouse Architectural North Elevation
13069-EA-2B-4 Powerhouse Architectural East Elevation
13069-EA-2C-5 Powerhouse Architectural South Elevation
13069-EA-2D-4 Powerhouse Architectural West Elevation
13069-EA-2F-2 Powerhouse Architectural Color Scheme Elevation
13069-EM-3D-2 Powerhouse General Arrangement Section 1-1
40151 C1, Rev. P General Arrangement of Chimney

Also included is a copy of the Standard Architectural Color Chart for FABRAL metal wall and roof systems. As depicted on the planned color scheme (Drawing 13069-EA-2F-2), the light field color will be Bright Silver and the accent color will be Slate Blue. This color scheme conforms to the renderings prepared in support of the Article X application. The drawing depicting the general arrangement of the chimney (40151 C1) shows the color scheme and lighting for the stack; a future compliance filing will provide the required lighting plan for the Facility.

Also included is a revised schedule of compliance filings, which identifies the individual certificate conditions that require a compliance filing and includes a corresponding description and schedule for each planned compliance filing submittal. By copy of this letter, the enclosed drawings and schedule are provided to the Department of Public Service staff and the Department of Environmental Conservation staff for their review.

1200 Wall Street West, 2nd Floor • Lyndhurst, New Jersey 07071
Telephone 201-933-5541 • Fax 201-933-5601

Sincerely,

TRC Environmental Corporation

Craig H. Wolfgang
Project Manager

Enclosure:

cc: P. Seidman, NYSDPS (w/ 5 copies, including 1 full-size copy)
J. Cole, NYSDEC (w/ 5 copies, including 1 full-size copy)
J. Marzonie, KeySpan
C. Corrado, KeySpan
A. Ratzkin, Arnold & Porter

Case 99-F-1625: Ravenswood Cogeneration Project – Application by KeySpan Energy

STATUS SCHEDULE OF COMPLIANCE FILINGS

Applicable Certificate Condition No.	Abbreviated Description	Description of Compliance Filing Submittal	Scheduled or Actual Submittal Date
I. Project Authorization			
I.C. (Same as Condition No. XIII.C)	Final Site Plan to demonstrate conformance with applicable provisions of the NYC Zoning Resolution	• Site plan drawing showing Facility structures and required property line setbacks	Initial Compliance Filing; Completed 7-Jan-02
II. General Conditions			
II.A.	The plant and/or plant site shall be constructed, operated, maintained, restored and monitored as set forth in the Application and other submissions	• Facility Response Plan and procedures (aka the Oil Spill Contingency Plan and procedures); • Spill Prevention Control and Countermeasure (SPCC) Plan • Hazardous Substance Facility Response Plan (currently a draft document) • Major Petroleum Facility License • NOx RACT Plan and NOx Budget • Best Management Practices Manual • Risk Management Plan for sulfuric acid • Chemical Bulk Storage Permit	No less than 60 days prior to commencement of commercial operations
II.B.	Certificate Holder shall submit a schedule of all plans, filings and other submissions to the Board required by the Certificate Conditions.	Schedule of compliance filings	2-Nov-01

Applicable Certificate Condition No.	Abbreviated Description	Description of Compliance Filing Submittal	Scheduled or Actual Submittal Date
II.F.	Certificate Holder shall submit an environmental compliance plan	• Name and statement of qualifications of the environmental inspector • Certification confirming the independence of the inspector including "stop work" authority • Provision for deployment of more than one inspector, as needed. • Compliance inspection checklist including inspection items, methods and criteria • Procedure for responding to and correcting problems • Schedule for monthly environmental audits and submission of audit checklists during construction • Schedule for annual audits during first two years of operation	Initial Compliance Filing; Completed 7-Jan-02
III. Construction Conditions - General			
III.C.	Certificate Holder shall describe in a licensing package a community liaison program for implementation prior to and during construction, continuing for a period of six months after start of operations	Ravenswood Expansion Project Community Liaison Program	Initial Compliance Filing; Completed 7-Jan-02
III.L. (Same as Condition No. XIV.E)	Certificate Holder shall submit a Grading and Drainage Plan and a Soil Erosion and Sediment Control Plan. Certificate Holder will complete and file a Notice of Intent to comply with the terms of the NYSDEC's SPDES General Permit for Storm Water Discharges During Construction.	Construction drawing and specifications for Best Management Practices (BMPs) Notice of Intent	Initial Compliance Filing; Completed 7-Jan-02
IV. Construction – Energy Facility			
IV.A.	An architectural drawing and detail plan will be submitted to the Siting Board as part of the Compliance Filing.	Construction drawing (elevation and details)	31-Oct-02

Applicable Certificate Condition No.	Abbreviated Description	Description of Compliance Filing Submittal	Scheduled or Actual Submittal Date
V. Construction – Gas, Waterline and Electrical Interconnects			
V.B.1 and 4.	Certificate Holder shall file a copy of the following documents with the Board and with the NYPSC:	• System Reliability Impact Study (SRIS) approved by the NYISO Operating Committee • Any requirements imposed by the New York State Reliability Council (NYSRC) • Class of 2001 annual transmission reliability study • All facilities agreements and interconnection agreements with Con Edison, NYSRC, and any successor Transmission Owners specific to the Facility	No less than 60 days prior to commencement of commercial operations
C.2	After execution of a gas transportation agreement with Con Edison, the agreement will be filed with the NYSPSC	Letter of agreement	No less than 60 days prior to commencement of commercial operation
VI. Operation and Maintenance			
VI.A. (Same as Condition No. XIV.D.)	Certificate Holder shall submit a Preliminary Spill Prevention Control and Countermeasures Plan	Ravenswood Generating Station SPCC Plan (revised)	No less than 60 days prior to commencement of commercial operation
VI.C.	Prior to conducting a post-construction noise monitoring program, the Certificate Holder will develop a monitoring protocol and submit it to the NYSDPS and NYSDEC for approval.	Noise monitoring protocol	No less than 60 days prior to commencement of commercial operation

Applicable Certificate Condition No.	Abbreviated Description	Description of Compliance Filing Submittal	Scheduled or Actual Submittal Date
VII. Decommissioning			
VII.A. (Same as Condition No. XIII.B)	Prior to commencing any construction, the Certificate Holder shall file with the Secretary a parent guarantee from KeySpan Corporation to assure funding for the restoration of any disturbed areas in the event that the Facility is not completed.	Parent Guarantee	Initial Compliance Filing; Completed 7-Jan-02
VII.B.	Certificate Holder shall file with the Secretary evidence that sufficient funds are available to cover the cost of decommissioning, dismantling, closing or reusing the plant when it has reached the end of its service life.	Performance bond, escrow, letter of credit, or other appropriate financial instrument	No less than 90 days prior to commencement of commercial operation
IX. Visual and Cultural Resources and Aesthetics			
IX.A.	Certificate Holder shall submit a detailed lighting plan.	Lighting Plan including: • Measures to prevent off-site glare; • Use of task lighting of component areas, as feasible; • Demonstration that illumination design conforms to applicable worker safety requirements while minimizing off-site impacts; • Report on the feasibility of synchronizing flashing lights on new and existing stacks.	No less than 60 prior to installation of permanent plant lighting system

Applicable Certificate Condition No.	Abbreviated Description	Description of Compliance Filing Submittal	Scheduled or Actual Submittal Date
IX.F.	Certificate Holder will consult with the NYC Department of Parks and Recreation and P.S. 76 regarding the planting of trees around the playground and report on any resulting agreement or understanding	Letter of agreement	No less than 60 days prior to commencement of commercial operation
XI. Noise			
XI.F.	Prior to conducting the post-construction ambient noise monitoring program, a noise monitoring protocol will be developed and submitted for approval as a Compliance Filing.	Noise monitoring protocol Noise monitoring results	No less than 60 days prior to commencement of commercial operation No more than 6 months from the start of commercial operations

FABRAL
METAL WALL AND ROOF SYSTEMS

STANDARD ARCHITECTURAL COLORS

KYNAR 500®/HYLAR 5000®

Regal White	Bone White	Sandstone	Surrey Beige	Seal Brown
Dark Bronze	Patina Green	Hemlock Green	Classic Green	Hartford Green
Colonial Red	Terra Cotta	Teal	Turquoise	Slate Blue
Regal Blue	Old Town Gray	Slate Gray	Charcoal Gray	Matte Black
Banner Red*	[redacted] PEWTER	Bright Silver*	Bright Copper*	

* Premium colors available at a higher price

Colors shown are as close to actual colors as allowed by the printing process. Actual metal samples are available.

Due to product improvements, changes and other factors, FABRAL reserves the right to change or delete information herein without prior notice.

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APPENDIX 5B

PSD Air Permit Application:
KeySpan Ravenswood Cogeneration Facility
Long Island City, Queens, New York

Revised November 2000

KeySpan Energy
PSD Air Permit Application For Proposed Ravenswood Cogeneration Facility

Prepared for:

KeySpan Energy
Long Island City, New York

Submitted to:

New York State
Department of Environmental Conservation

November 2000

KEYSPAN ENERGY
PSD AIR PERMIT APPLICATION FOR PROPOSED
RAVENSWOOD COGENERATION FACILITY

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1.0 INTRODUCTION

1.1 Project Overview

KeySpan Energy - Ravenswood Cogeneration Facility is proposing to construct and operate a nominal 250 megawatt (MW) electric generating facility, on a 2.5-acre parcel of land at its existing Ravenswood Generating Station in Long Island City, Queens. The Ravenswood Cogeneration Facility will consist of one General Electric (GE) Frame 7FA combustion turbine, one heat recovery steam generator (HRSG) equipped with a duct burner for supplementary firing and one steam turbine. This technology is called "combined cycle" since electricity is generated by both the combustion turbine and steam turbine. The majority of the steam created in the HRSG will be used to drive the steam turbine generator, while a portion of the steam will be sold to Con Edison. Selective Catalytic Reduction (SCR) will be used to control nitrogen oxide (NO_x) emissions. An oxidation catalyst will be used to control emissions of carbon monoxide (CO) and volatile organic compounds (VOC). Upon leaving the SCR, the turbine exhaust gases will be directed into a single stack. An air cooled condenser will be used to cool the steam exhausted from the steam turbine generator.

The proposed project site is a 2.5-acre, paved parking area located next to KeySpan's existing Ravenswood Generating Station. The proposed site is located within KeySpan's 27.6 acres of property, including an area leased by Con Edison upon which their existing steam generating plant, Boiler "A" House, is located. This property has been used by Con Edison since the early 1960's for the generation of electricity and steam. KeySpan completed acquisition of Con Edison's electric generating facilities at Ravenswood, including the 1,753 MW Ravenswood Units 10, 20 and 30, and the 415 MW gas turbine complex, in mid-1999. The proposed project will take advantage of the unique opportunities provided by the existing facilities and interconnections at the Ravenswood Generating Station including natural gas supply, electric transmission, steam transmission, fuel storage, and water intake and discharge facilities. No changes to existing generating unit equipment, operations or emissions are proposed as part of this project application.

The facility will operate in an economic dispatch mode wherein electricity will be provided to the New York Independent System Operator (NY ISO) on an on-demand basis. Although the plant is expected to operate at a "base load" exceeding 85% capacity, demand may also dictate operation at combustion turbine loads as low as 50%, as well as multiple start-ups and shutdowns per week. The combustion turbine will be fueled by natural gas and up to 30-days equivalent of low-sulfur kerosene per year; the duct burner will be fueled by natural gas only.

1.2 Application Summary

The proposed facility is considered a new major stationary source, and as such is subject to the Prevention of Significant Deterioration (PSD) regulations. Since the facility will be located in a classified severe ozone non-attainment area, the project is also subject to 6 NYCRR Part 231-2 Non-Attainment New Source Review (NSR) for emissions of oxides of nitrogen (NO_x) and VOC. Note that the New York City area is being re-designated as in attainment for CO, likely within the year 2001 (TRC, 2000). Since the air permit application is being filed prior to the re-designation, this application includes an evaluation of impacts and regulatory applicability to reflect the currently designated non-attainment status.

PSD review requirements include (for each pollutant that triggers PSD review):

- Best Available Control Technology (BACT) analysis;
- Air quality impacts analysis; and
- Additional impacts analysis.

Non-Attainment review requirements include:

- Lowest Achievable Emission Rate (LAER) analysis
- Emission offsets; and
- Alternatives analysis.

In addition to addressing the NSR requirements, this application demonstrates that the proposed facility will comply with all other applicable federal, state and city air quality requirements which include the following:

- The Federal New Source Performance Standards (NSPS) for the turbine and duct burner;
- The state limits for fuel sulfur content;
- The state limits for sulfur dioxide (SO_2), ammonia (NH_4), and particulate matter (PM/PM-10; PM-10 includes the condensable portion) from combustion; and
- The Reasonably Available Control Technology (RACT) requirements for VOC and NO_x.

Facility requirements with respect to Title IV (Acid Rain) SO_2 allowances and the NO_x Budget program allowance allocations are also addressed in this application. Finally, facility impacts to ambient air quality have been evaluated following a New York State Department of Environmental

Conservation (NYSDEC) approved modeling protocol. The following is a summary of the major elements of the application.

1.2.1 Facility Emissions and Control Requirements

Air emissions from the proposed facility are primarily products of combustion of natural gas and kerosene in the combustion turbine and natural gas in the HRSG duct burner. Pollutants regulated under federal and state programs include NO_x, CO, SO_2, VOC, PM, PM-10 and sulfuric acid mist. Combustion of kerosene results in emissions of trace elements present in the fuel. Emission limits and control requirements for these pollutants under federal and state programs are outlined in the following subsections.

1.2.1.1 Best Available Control Technology

A BACT analysis consists of evaluation of environmental, economic and energy impacts for technically feasible alternative control strategies for the project. BACT must be applied to control emissions of pollutants that are subject to PSD review. For the Ravenswood Cogeneration Facility, BACT is required for NO_x, SO_2, PM/PM-10 and sulfuric acid (H_2SO_4) mist. Since the proposed project is located in an ozone non-attainment area and NO_x emissions are a precursor to ozone, these emissions will be subject to the LAER requirement, which is more restrictive than BACT. The use of natural gas with the equivalent of up to 30-days of low-sulfur kerosene for the combustion turbine and only natural gas firing in the duct burner is proposed as BACT for particulates, SO_2 and sulfuric acid mist.

1.2.1.2 Lowest Achievable Emission Rate

The pollutants that are subject to non-attainment NSR include CO, NO_x and VOC (both as precursors to ozone formation). A component of NSR is a requirement to meet Lowest Achievable Emission Rate (LAER) limits. The GE Frame 7FA turbine, by design, is a low emitter of CO and with an oxidation catalyst the proposed limit for the turbine firing natural gas will not exceed 2.0 ppm (parts per million by volume on a dry basis, at 15% oxygen) without the duct burner and 3.9 ppm with the duct burner and turbine firing natural gas. The proposed limit is 5.0 ppm with the turbine firing kerosene without the duct burner and 5.4 ppm with the duct burner firing natural gas while the turbine is firing kerosene. These limits result in a potential to emit of less than 100 tons/yr for CO, below the non-attainment review threshold for projects with insignificant CO impacts;

therefore the project would be designed so as not to be subject to NSR requirements for CO, based on its controlled PTE.

LAER for NO_x is proposed to be 2.0 ppm for the turbine firing natural gas and 3.1 ppm for natural gas firing in the turbine and the duct burner. A limit of 9.0 ppm is proposed for the kerosene fired turbine and 9.0 ppm for kerosene firing in the turbine while natural gas is firing in the duct burner. These levels will be achieved through the use of a dry low- NO_x technology combustion turbine and the installation of an SCR system that further reduces the NO_x emissions.

To meet the LAER requirement for VOC emissions, the facility will install an oxidation catalyst in addition to using an inherently low emission combustion turbine. For LAER, VOC emissions are proposed to be limited to 1.2 ppm for the turbine firing natural gas and 10.7 ppm for both the turbine and duct burner firing natural gas. Proposed kerosene-fired limits are 3.0 ppm for the turbine without the duct burner and 9.7 ppm for kerosene firing in the turbine while natural gas is firing in the duct burner.

Since the facility is located in a severe ozone non-attainment area, the facility must also obtain offsets (also known as Emission Reduction Credits (ERCs)) from existing sources equal to 1.3 times its proposed allowable emissions of NO_x and VOC. Offsets can be obtained in New York and parts of Pennsylvania or Connecticut; however, the area where offsets (ERCs) are obtained must be classified as a severe ozone non-attainment area. The State of New York has an agreement with Pennsylvania and Connecticut which allows ERCs to be traded. The area around the facility where ERCs can be bought is defined by NYSDEC in Air Guide-26. This area encompasses metropolitan Philadelphia as well as Fairfield and Litchfield Counties in Connecticut which are all classified as severe ozone non-attainment.

1.2.1.3 NYSDEC Requirements

Pollutants emitted by the facility are subject to NYSDEC regulatory requirements in addition to the BACT and LAER requirements associated with the PSD and non-attainment NSR programs. Although certain state emission limits are superseded by stricter federal limits (i.e., the 6 NYCRR Subpart 227-2 NO_x RACT is exceeded by LAER), monitoring, reporting and record keeping requirements under 6 NYCRR Subpart 227-2 must still be followed. The state-specific limits and/or industrial guidelines include:

- To meet NYSDEC guidelines for ammonia (NH_3) "slip", combined cycle stack emissions of NH_3 will be limited to 10 ppm by controlling the NH_3 injection rate.

- Monitoring, reporting and record keeping requirements under 6 NYCRR Subpart 227-2 will be followed; compliance with the NO_x LAER limit will result in de facto compliance with the 6 NYCRR Subpart 227-2 NO_x RACT limit.

- Under 6 NYCRR Subpart 225-1.2, the facility is subject to the limit of 0.20% fuel sulfur content designated for distillate oil use in New York City (including Queens Borough and Long Island City); the proposed 0.04% sulfur kerosene to be used by the new unit meets this requirement.

- Under 6 NYCRR Subpart 227-1.2, particulate emissions for stationary combustion installations firing oil, and with a maximum heat input exceeding 250 mmBtu/hr, are limited to 0.10 pounds per million British thermal units (lb/mmBtu) heat input; the PSD BACT requirement results in a more stringent limit.

- Visible emissions are regulated under 6 NYCRR Subpart 227-1.3, which limits opacity to not greater than 20% (6-minute average), except for one 6-minute period per hour of not greater than 27%. Opacity is also regulated under Subpart 211.3 of 6 NYCRR, with a limit of 20% opacity (6-minute average) except for one continuous 6-minute period per hour of not more than 57% opacity. The limits imposed under Subpart 227-1.3 are stricter and, therefore, supersede the limits specified in Subpart 211.3.

- NO_x Budget program requirements are defined under Subpart 227-3 for ozone season operations prior to the year 2003 ozone season and under Part 204 for year 2003 and beyond. These regulations include information on allowance allocations, banking, trading, and account reconciliation, NO_x monitoring and reporting, and regulatory time lines (NO_x Budget program requirements are specifically addressed in Section 3.6 of this application).

- Under 6 NYCRR 257, New York's ambient air quality standards, facility emissions must be such as not to exceed state ambient air standards for SO_2, PM, CO, photo-chemical oxidants, NO_2, fluorides, beryllium and hydrogen sulfide.

Other NYSDEC requirements, not directly related to emissions from the proposed facility, but potentially related to the new facility in general, including 6 NYCRR Parts 202-1 (source testing), Part 202-2 (annual emission statement), Part 207 (air pollution episode control measures), Part 215 (open fires), and Part 221 (asbestos-containing surface coating material), will be addressed and/or incorporated into the existing facility Part 201-6 Title V permit pursuant to established regulatory deadlines.

1.2.1.4 NYCDEP Requirements

Since the project is to be located within the five-borough New York City area, it is subject to city regulations codified in the Administrative Code & Charter New York City, Title 24 Environmental Protection and Utilities and in Title 15 RCNY, Chapters 2 and 9. Requirements include the need for owners of gas- and oil-burning installations to acquire a Certificate of operation from the New York City Department of Environmental Protection (NYCDEP) Bureau of Air Resources. Additional NYCDEP requirements, including the need to perform an impact analysis at elevated "point-in-space" receptors and a local "extended" analysis pursuant to City Environmental Quality Review (CEQR) requirements, are addressed in this application.

1.2.2 Air Quality Impacts Analysis

The air quality impact analysis (presented in Section 7 of this document) was performed in accordance with the Modeling Protocol submitted to the NYSDEC on June 9, 2000 and approved on July 27, 2000. The protocol submitted represents the final version of a draft that was first submitted on February 24, 2000. Comments raised by the agencies were all addressed in the June 9, 2000 version. The dispersion modeling utilizes meteorological data collected by the National Weather Service at the LaGuardia Airport between 1991 and 1995, supplemented with mixing heights calculated based on National Weather Service upper air data for the Brookhaven National Laboratory and Atlantic City, N.J. airport. Background air quality data for the project are based on historical data from the NYSDEC ambient monitoring network. The U.S. EPA approved the request for monitoring exemption request on March 24, 2000, therefore, pre-construction ambient air quality monitoring will not be required for this project as predicted facility emissions and/or impacts are below PSD monitoring thresholds.

1.2.2.1 Area of Impact and Impact on Ambient Air Quality Standards and PSD Increments

Atmospheric dispersion modeling was performed in accordance with U.S. EPA modeling guidelines to estimate maximum expected air quality impacts from the facility. The results of this modeling show that predicted facility impacts are below PSD significant impact concentrations for all pollutants. Therefore, the facility will have no area of impact and does not have the potential to affect compliance with National Ambient Air Quality Standards (NAAQS), New York Ambient Air Quality Standards (NYAAQS) or PSD increments.

1.2.2.2 Class I Area Impacts

The closest Class I areas to the project site are the Edwin B. Forsythe National Wildlife Refuge (NWR) in Brigantine, New Jersey and the Lye Brook NWR in Lye Brook, Vermont. The Edwin B. Forsythe NWR is located approximately 115 km south of the project and the Lye Brook NWR is located approximately 280 km north-northeast of the project. Both of these areas are in excess of 100 km from the project site. At the request of the NYSDEC, a Level-1 screening analysis was conducted for the Edwin B. Forsythe NWR. Results are discussed in Section 7.6.2.

1.2.2.3 Impacts to Soils, Vegetation, Growth and Visibility

An analysis was performed to assess the facility's impact on soils, vegetation, industrial growth and visibility. This analysis demonstrated the project will have negligible effects on these special concerns.

1.3 Conclusions

The conclusions reached from the results of the engineering and air quality modeling analyses are that the Ravenswood Cogeneration Facility will: 1) not cause or contribute to a violation of the NAAQS or NYAAQS for any pollutant; 2) not consume any PSD increments; 3) meet BACT and LAER or exceed all control technology requirements; 4) not cause adverse impacts to soils, vegetation, growth and visibility; and 5) comply with all other applicable federal, state and city air quality regulatory requirements.

1.4 Application Forms and Supporting Data

The NYSDEC permit application forms are included as Appendix A of this document. Emission calculation spread sheets providing supporting calculations for the application forms are included as Appendix B.

1.5 Summary of Proposed Permit Limits

Table 1-1 presents a summary of the permit limits proposed for the Ravenswood Cogeneration Facility. These limits reflect the application of LAER or BACT control technology, as appropriate, and have been shown through atmospheric dispersion modeling to result in insignificant air quality impacts in the area around the plant.

1.6 Summary of Potential Compliance Provisions

The following defines the potential compliance provisions and measures proposed to ensure attainment thereof. These provisions were developed through review of applicable state and Federal regulations and taken, in part, from recent permits issued for similar facilities.

1) compliance provisions for the applicable regulatory requirements:
   - NSPS Subpart GG, (emission limits, stack testing, fuel monitoring and reporting for gas turbines);
   - NSPS Subpart Da, (PM, NO_x and SO_2 emission limits and continuous emission monitoring, opacity limits and continuous monitoring, stack testing and reporting for the duct burner);
   - Title IV Acid Rain Program (continuous emissions monitoring and SO_2 emission allowances);
   - NSR/PSD (emission limits, testing and NO_x and VOC emission offsets); and
   - NO_x Emissions Budget Program (NO_x emissions allowances during the ozone season).

2) Stack emission limits for all pollutants at part load and full load operations, on both fuels, with and without supplementary firing of the HRSG duct burners.

3) Monitoring (or surrogate) of turbine/duct burner exhaust gas for:

   nitrogen oxides (NO_x); carbon monoxide (CO);
   % carbon dioxide (CO_2); opacity.

4) Parameter monitoring (or surrogate) for:

   fuel sulfur content; fuel consumption;
   operating hours per unit; SCR operating data; and
   ammonia slip.

Exhaust flow rates and SO_2 mass emissions rates to be calculated based on alternative (to CEM) methods in accordance with 40 CFR Part 75.

5) Exhaust testing:

initial testing to verify exhaust parameters and emission rates of all emitted pollutants from the combined cycle units

6) Restrictions on fuel kerosene firing in the turbine:

consumption (11.32 million gallons per consecutive 12-month rolling period in the turbine).

7) Definitions:

Start-ups -

Cold start-up: refers to start-ups made more than 48 hours after shutdown; cold start-up periods shall not exceed 4.5 hours per occurrence.

Warm start-up: refers to start-ups made more than 8 hours, but less than or equal to 48 hours after shutdown; warm start-up periods shall not exceed 2.5 hours per occurrence.

Hot start-up: refers to start-ups made 8 hours or less after shutdown; hot start-up periods shall not exceed 2 hours per occurrence.

Shutdown - commences with the termination of fuel injection into the combustor chambers.

TABLE 1-1
RAVENSWOOD COGENERATION FACILITY
SUMMARY OF PROPOSED PERMIT LIMITS

POLLUTANT	SINGLE STACK LIMITS				COMBINED CYCLE PLANT ANNUAL LIMIT
	NATURAL GAS (TURBINE /HRSG)		KEROSENE (TURBINE ONLY)		
	(lb/mmBtu)	(ppm)	(lb/mmBtu)	(ppm)	(tpy)
LAER					
Nitrogen Oxides					142
Combined Cycle Unit w/duct burner	0.012	3.1	0.038	9.0	
Combined Cycle Unit w/o duct burner	0.0075	2.0	0.038	9.0	
Volatile Organic Compounds					99.2
Combined Cycle Unit w/duct burner	0.0099	10.7	0.0108	9.7	
Combined Cycle Unit w/o duct burner	0.0015	1.2	0.0036	3.0	
Carbon Monoxide					96
Combined Cycle Unit w/duct burner	0.0082	3.9	0.013	5.4	
Combined Cycle Unit w/o duct burner	0.0036	2.0	0.0085	5.0	
BACT					
Particulate Matter					203
Combined Cycle Unit w/duct burner	0.021	N/A	0.057	N/A	
Combined Cycle Unit w/o duct burner	0.021	N/A	0.057	N/A	
Sulfuric Acid Mist					34
Combined Cycle Unit w/duct burner	0.0022	N/A	0.014	N/A	
Combined Cycle Unit w/o duct burner	0.0022	N/A	0.014	N/A	
Sulfur Dioxide					105
Combined Cycle Unit w/duct burner	0.0071	N/A	0.044	N/A	
Combined Cycle Unit w/o duct burner	0.0071	N/A	0.044	N/A	
NYSDEC					
Ammonia					
All Operations	N/A	10	N/A	10	139

Notes:

1) "ppm" refers to ppmvd @ 15% O_2. "lb/mmBtu" limits are HHV basis. All ppm values are one-hour averages.
2) Compliance with annual limits will be demonstrated on a monthly rolling basis.
3) Facility may exceed short-term limits during defined start-up and shutdown periods.
4) Annual limits include 30-days/yr of kerosene firing in the turbine.
5) VOC limit includes 0.7 tons per year from kerosene tank breathing losses associated with increased throughput.

2.0 PROJECT DESCRIPTION

2.1 Facility Conceptual Design

Ravenswood Cogeneration Facility will be a combined cycle 250 MW (nominal) electric generating facility to be located at the existing Ravenswood Generating Station in Long Island City, Queens. Figure 2-1 shows a site map and the project location. The proposed plant would use a combined cycle process, incorporating a combustion turbine generator operating in conjunction with a heat recovery steam generator equipped with a duct burner for supplementary firing and a steam turbine generator to generate electricity and steam. By using the waste heat from the combustion turbine to produce steam and to generate additional electricity, the plant would operate with a higher thermal efficiency than other types of generating facilities. The unit will be equipped with an inlet air evaporative cooling system to further boost power and efficiency on hot days. As a result, the new facility will be dispatched on a near continuous basis, displacing older, less efficient generating facilities. A plot plan showing proposed equipment locations is presented in Figure 2-2. An elevation view of the facility is presented in Figure 2-3. A conceptual flow diagram for the proposed facility is presented in Figure 2-4. The turbine will be fired on natural gas and up to 30-days of kerosene. The duct burner will fire only natural gas.

Although the majority of the steam generated in the HRSG will be used to drive the steam turbine generator, the proposed unit will operate as a cogeneration facility with the potential export of a portion of the generated steam to Con Edison's Manhattan steam distribution system. This steam would displace the existing oil-fired Boiler "A" house owned by Con Edison at the Ravenswood Generating Station. The displacement of this oil-fired facility with a cleaner natural gas-fired facility would result in a potential reduction in air emissions from the site. In addition, during periods of steam export, cooling water requirements for the new facility will be significantly reduced, resulting in decreased withdrawals from the East River.

2.1.1 Combustion Turbine/Duct Burner Combined Cycle Units

KeySpan Energy is proposing to install one GE Frame 7FA combustion turbine as the primary electrical generating equipment. The maximum heat input for the turbine at -5 degrees Fahrenheit (°F) ambient temperature is 2,028 mmBtu/hr, Higher Heating Value (HHV) while firing kerosene. Because turbine performance and emissions are affected by ambient temperature and since performance increases during lower temperatures, an evaporative cooler will be used to cool the inlet air during the warmer seasons. Exhaust gas from the turbine will be exhausted through a HRSG equipped with a duct burner for supplementary firing. The duct burner will have a maximum rated capacity of 644 mmBtu/hr, Higher Heating Value (HHV) and will only fire natural gas. NO_x emissions from the turbine/duct burner will be controlled by an SCR system. An oxidation catalyst will be used to control emissions of CO and VOC. The majority of the steam created in the HRSG will be used to drive the steam turbine generator, while a portion of the steam will be sold to Con Edison. Upon leaving the SCR, the turbine/duct burner exhaust gases will be directed into a single 400-foot high, 18.5-foot diameter stack.

2.1.2 Kerosene Storage Tank

The new cogeneration facility will utilize an existing kerosene storage tank to provide the 30-day (potential basis) supply of kerosene to the turbine. VOC emissions associated with the increased throughput of kerosene required to serve the new facility are calculated and included in the new facility total VOC emissions.

2.1.3 Ammonia Storage Tank

Ammonia used in the combined cycle unit SCR control system will be supplied from an aqueous ammonia storage tank. The maximum aqueous ammonia concentration will be 19% by weight and will be stored in vessels with a maximum capacity of less than 20,000 pounds, each. The percentage concentration and the maximum vessel capacity are both below the 40 CFR Part 68 112(r) (Table 1) risk management planning applicability thresholds.

2.2 Fuel

KeySpan Energy is proposing to utilize natural gas as the primary fuel and up to the equivalent of 30-days per year of kerosene as the back-up fuel for the combustion turbine. Each fuel will be fired separately (i.e., there will be no co-firing or fuel mixing) and the duct burner will only fire natural gas. The natural gas is assumed to have a HHV of approximately 1,000 Btu/standard cubic foot (SCF) and will contain no more than 2.5 grains of sulfur per 100 SCF on an annual average basis. The kerosene is assumed to have a HHV of 135,000 Btu/gallon and is will contain no more than 0.04% sulfur by weight.

2.3 Facility Operating Modes

The facility will operate on an economic dispatch mode wherein electricity will be provided to the NY ISO on an on-demand basis, but will be designed to operate on a continuous basis. Due to the dispatchable nature of the facility operation, periods of part load operation and multiple startups/shutdowns per week could occur. KeySpan Energy anticipates that the proposed Ravenswood Cogeneration Facility will operate at a "base load" exceeding 85% capacity. However, the turbine may operate at maximum capacity (100% load) and part load, as low as 50% capacity. Therefore, a load screening analysis was performed for the turbine to determine impacts for the turbine operating at 50%, 75%, and 100% load conditions. These conditions represent the minimum, midpoint, and maximum operating loads. Additional operating scenarios are possible considering supplemental HRSG firing (to be done only when the turbine is operating at full load), fuel type and evaporative cooler use. These scenarios are detailed below, along with estimated emission rates.

As was previously indicated, the Ravenswood Cogeneration facility will utilize evaporative coolers to cool turbine inlet air in order to maintain peak operating efficiency during the warmer months. Considering fuels, loads, evaporative cooler and duct burner use, there are numerous operating scenarios to consider in evaluating potential facility emissions and ambient air quality impacts. The NYSDEC has developed guidelines for establishing minimum, average and maximum ambient temperature set-points for turbine performances. For a project located in New York City, NYSDEC guidance requires that the average annual temperature shall equal the climatological average (as specified in the local climatological database for the representative National Weather Service (NWS) office). The La Guardia Airport NWS station has been selected as representative (and agreed upon as so by NYSDEC during the pre-application meeting) of the Ravenswood site. The annual average temperature for La Guardia, based on historical data, is 54.6°F. The NYSDEC-recommended minimum and maximum temperatures for evaluating turbine emissions and impacts are –5°F and 100°F, respectively. The use of the evaporative coolers during warmer months will affect inlet air temperature. When the evaporative coolers are operating, the turbine emissions will be based on vendor data for the following three temperatures; –5°F, 45°F (cooled from 54.6°F) and 73°F (cooled from 100°F).

2.4 Source Emission Parameters

Emissions of air contaminants from the proposed Ravenswood Cogeneration Facility have been estimated based upon vendor emissions guarantees, emission factors presented in the U.S. EPA Guidance Manual AP-42, mass balance calculations and engineering estimates. Emission calculations used to develop the emission estimates presented in this application are presented in Appendix B of the application.

2.4.1 *Criteria Pollutant Emissions from the Combustion Turbine/Duct Burner*

Exhaust and emission parameters are presented for 3 (non-chilled) ambient temperatures (-5°F, 54.6°F and 100°F), three turbine loads (50%, 75%, 100%), the evaporative coolers operating at 54.6°F (cooled to 45°F) and 100°F (cooled to 73°F) without duct burner firing and two fuels (natural gas and kerosene) (a subtotal of 22 operating scenarios). Additional operating scenarios are considered including the turbine at full load (natural gas and kerosene) with duct burner firing (natural gas only) for the three (non-chilled) ambient temperatures (a subtotal of 6 operating scenarios). Four scenarios are included for cases where the duct burner and evaporative coolers are both operating. Therefore, estimated emissions have been provided for the 32 possible operating scenarios. Preliminary exhaust characteristics for the turbine/heat recovery steam generator are provided in Appendix B. Preliminary emission rates from the turbine/heat recovery steam generator combustion train are also provided in Appendix B.

Emission rates for VOC, NO_x, CO and PM-10 from the combustion turbine/HRSG have been estimated for natural gas and kerosene firing based upon vendor emission estimates. Control efficiencies for SCR NO_x conversion and oxidation catalyst CO and VOC reduction are based upon catalyst vendor guarantees for systems designed to achieve the prescribed LAER levels. Worst-case SO_2 emission rates have been estimated based upon worst-case mass balance of fuel sulfur loading (kerosene containing 0.04% sulfur by weight) at -5°F. The PM-10 emissions include an allowance for ammonia salt formation due to reaction of excess ammonia (NH_3) with sulfur trioxide (SO_3.) Note that the sulfur assumed to subsequently react with NH_3 has not been subtracted from the SO_2 estimate (likewise with sulfuric acid mist) in order that all estimates may be conservative.

2.4.2 *Other Pollutant Emissions from the Combustion Turbine/Duct Burner*

Potential emissions of sulfuric acid mist from the combustion turbine/duct burner have been predicted based upon factors presented in AP-42. Sulfuric acid mist emissions have been estimated based upon conversion of 20% of the fuel sulfur to sulfuric acid mist (with double-counting of the sulfur compounds as noted above). Potential annual emissions of hazardous air pollutants (HAPs) from the operation of the turbine on kerosene have been quantified based on AP-42 emission factors.

SCR control for NO_x involves the use of ammonia, which acts to remove NO_x as the flue gas passes through a catalyst. Some of the ammonia does not react with the NO_x and ends up being emitted into the atmosphere. The emission of un-reacted ammonia from an SCR is known as "ammonia slip". The maximum emission of ammonia slip will not exceed 10 parts per million (ppm).

HAP and ammonia slip emissions are quantified in Appendix B and impacts are assessed following methodologies presented in Section 7.

2.4.3 Potential Annual Emissions from the Combustion Turbine/Duct Burner/SCR

In calculating the facility's Potential to Emit (PTE), the annual combustion turbine/duct burner emissions were based on operating assumptions that include:

- Year round (8,760 hours), full load operation of the turbine/duct burner with up to 720 hours per year of kerosene firing in the turbine; and
- Average ambient temperature of 54.6 °F.

2.4.4 Potential Emissions from the Kerosene Storage Tank

KeySpan Energy will utilize an existing kerosene storage tank to serve the proposed cogeneration facility. Potential emissions of VOC from the storage tank as a result of increased throughput of kerosene are included in project total PTE for VOC, along with the VOC emissions from the turbine and duct burner. These potential VOC emissions have been calculated using the U.S. EPA computer program TANKS4 based upon current storage tank dimensions, color, throughput, and other parameters (above or below ground, local climatology, venting arrangements/controls). The kerosene fuel tank increased annual throughput is based upon the proposed annual amount of kerosene needed to operate the new turbine at full load for 30-days per year, plus the volume of the tank (i.e., for a year that begins with the tank empty and ends with the tank full). TANKS4 print-outs are presented in Appendix B.

2.4.5 Other Sources

At the present time, no combustion source auxiliary equipment, such as internal combustion engines emergency generators and fire pumps, is planned at the proposed Ravenswood Cogeneration Facility. Since the proposed project is being located at the existing Ravenswood Generating Station, auxiliary equipment already in place will be utilized to serve the proposed facility. If additional auxiliary equipment is needed, such equipment will be identified and characterized, following the methodologies presented herein, with the results included as an addendum to the PSD application.

3.0 APPLICABLE REQUIREMENTS AND REQUIRED ANALYSES

This section contains an analysis of the applicability of federal and state air quality regulations to the proposed Ravenswood Cogeneration Facility. The specific regulations included in this review are the federal NSPS, the NYSDEC regulations and policy, Non-Attainment NSR requirements, the PSD requirements, the Air Quality Impacts Analysis requirements, the Federal Acid Rain Program requirements and the NO_x Budget Program requirements.

3.1 Federal New Source Performance Standards

The NSPS are technology-based standards applicable to new and modified stationary sources. The NSPS requirements have been established for approximately 70 source categories. Two subparts are applicable to the proposed facility. These subparts are the Standards of Performance for Stationary Gas Turbines (40 CFR Part 60, Subpart GG) and Standards of Performance for Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978 (Subpart Da).

3.1.1 Subpart GG: Stationary Combustion Turbines

The combustion turbine is subject to the provisions of 40 CFR Part 60 Subpart GG by virtue of the maximum firing capacity of the turbine and date of installation. The air pollution emission standards (40 CFR Part 60.332 and 60.333) limit flue gas concentrations of NO_x to a value no more stringent than 75 ppm (based on the turbine heat rate and the fuel bound nitrogen) and SO_2 to a value no more stringent than 150 ppm (or 0.8% sulfur in fuel). The proposed emissions are well below these levels. Additionally, the provisions of this subpart require the installation of a Continuous Emission Monitoring System (CEMS) to monitor fuel consumption and water to fuel ratio. 40 CFR Part 60 Subpart GG also requires monitoring of fuel sulfur and nitrogen content and allows for the development of a custom schedule to monitor these parameters.

3.1.2 Subpart Da: New Electric Utility Steam Generating Units

The duct burners for supplementary firing of the HRSG are subject to the provisions of 40 CFR Part 60 Subpart Da as a result of the unit's 644 mmBtu/hr maximum firing rate (Subpart Da is applicable to each new electric utility steam generating unit that is capable of combusting more than 250 mmBtu/hr heat input of fossil fuel). Subpart Da limits emissions from the duct burner to 0.03 lb/mmBtu for particulate matter (40 CFR Part 60.42a), 0.20 lb/mmBtu for SO_2 (40 CFR Part 60.43a), and 0.15 lb/mmBtu for NO_x (40 CFR Part 60.44a(1)). Only emissions resulting from the combustion of fuels in the duct burner are subject to Subpart Da. Proposed emissions are well below these levels. Subpart Da also limits opacity to 20 percent (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity (40 CFR Part 60.42a). The monitoring of emissions regulated under Subpart Da is detailed in 40 CFR Part 60.47a and includes continuous emission monitoring requirements for NO_x as well as a flue gas O_2 or CO_2 content. 40 CFR Part 60.11(c) allows exceedances of the opacity standard that occur as a result of combustion unit startup, shutdown or malfunction. A similar exemption for NO_x is provided in 40 CFR Part 60.46a.

3.2 New York State Department of Environmental Conservation Regulations and Policy

Applicable regulations from NYSDEC Air Regulations are identified below:

- Part 200 defines general terms and conditions, requires sources to restrict emissions, allows U.S. EPA to enforce NSPS, PSD, and NESHAPS. Part 200 is a general applicable requirement; no action is required of the facility.

- Part 201 requires existing and new sources to evaluate minor or major source status and evaluate and certify compliance with all applicable requirements. The Ravenswood Cogeneration Facility will represent a new major Part 201 source.

- Part 202-1 requires a source to conduct emissions testing upon the request of NYSDEC. NYSDEC has the right to require stack testing of new or existing sources. Permit conditions covering the construction of the Ravenswood Cogeneration Facility will likely require stack testing as a condition of receiving permission to operate.

- Part 202-2 requires sources to submit annual emission statements for VOC and NO_x for emissions tracking and fee assessment. Pollutants are required to be reported in an emission statement if certain annual thresholds are exceeded. Emissions from the Ravenswood Cogeneration Facility will be reported as required.

- Part 204 regulates the NO_x Budget program for the year 2003 ozone season and beyond. Program requirements, including allowance allocations, new source set-asides, banking, trading, and account reconciliation, NO_x monitoring and reporting, and regulatory time lines are addressed in Part 204. (NO_x Budget program requirements are specifically addressed in Section 3.6 of this application).

- Part 211.3 defines general opacity limits for sources of air pollution in New York State. General applicable requirement facility-wide visible emissions are limited to 20% opacity (6-minute average) except for one continuous 6-minute period per hour of not more than 57% opacity. Note that the opacity requirements under Part 227-1 (see below) are more restrictive and supersede the requirements of Part 211.3.

- Part 225-1 regulates sulfur content of fossil fuels. For facilities located in New York City (including Queens Borough and Long Island City), fuel sulfur is limited to 0.20% by weight for distillate oil; it is anticipated, however, that 0.04% sulfur kerosene will be used by the facility. The new facility will not fire residual oil.

- Part 227-1.2 sets a 0.10 lb/mmBtu particulate limit for oil-fired stationary combustion installations with a maximum heat input capacity exceeding 250 mmBtu/hr.

- Part 227-1.3 sets opacity limits from stationary combustion installations. Facility stationary combustion installations must be operated so that the following opacity limits are not violated; 227-1.3(a) 20% opacity (6-minute average), except for one 6-minute period per hour of not more than 27% opacity.

- Part 227-2 sets NO_x RACT emission limits for combustion sources. Under 227-2.4(e), combined cycle combustion turbines must meet a NO_x RACT limit of 42 ppm dry volume (vd), corrected to 15% O_2, when firing natural gas and 65 ppmvd, corrected to 15% O_2, when firing oil. For units with a duct burner, compliance will be based on the combination of the turbine and the duct burner when both fire and the turbine alone when there is no duct firing. NO_x emission limits under LAER will be significantly more restrictive; however, record keeping and reporting requirements under Part 227-2 will apply.

- NO_x Budget program requirements are defined under Subpart 227-3 for ozone season operations prior to the year 2003 ozone season. This regulation includes information on allowance allocations, banking, trading, and account reconciliation, NO_x monitoring and reporting, and regulatory time lines (NO_x Budget program requirements are specifically addressed in Section 3.6 of this application).

- Part 231 requires new source review of new major sources and/or major modifications of existing facilities in non-attainment areas. Under Subpart 232-2, which regulates sources that were operational after November 14, 1992, the facility will need to address LAER and obtain emission offsets for NO_x and VOC since potential emission increases of these two pollutants will exceed the 25 ton per year significant net emission increase threshold. An oxidation catalyst will be used to control CO emissions to below the Part 231 applicability thresholds, therefore, CO offsets do not need to be obtained.

3.3 Attainment Status And Compliance With Air Quality Standards

The proposed project site is located in Queens County, NYSDEC Region 2, New York-New Jersey-Connecticut Air Quality Control Region (AQCR). The NYSDEC Bureau of Air Surveillance operates various air quality monitors for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), inhalable particulates (PM-10; particulate matter with a mean diameter less than 10 micrometers), total suspended particulates (PM), ozone (O_3), lead (Pb), nitric oxides (NO_x), sulfates and nitrates. According to 40 CFR 81.333 (updated June 13, 1998), Queens County is "attainment" or "unclassifiable" for all criteria pollutants. Therefore, for these pollutants, the facility is required to demonstrate compliance with the NAAQS and NYAAQS, which are shown in Table 3-1. Ozone is designated as severe non-attainment throughout a large portion of the New York-New Jersey-Connecticut AQCR. CO is designated as moderate non-attainment within the metropolitan New York City area and New York County is a designated PM-10 non-attainment area. As such, facility PM-10 and CO impacts to these areas cannot exceed significant impact concentrations. As was previously noted, the regulatory process has been started to have the CO non-attainment status re-designated to attainment.

Facilities with potential emissions exceeding 25 tons per year of NO_x or 25 tons per year of VOC in a severe ozone non-attainment area or 100 tons per year of CO in a non-attainment area are subject to Part 231 NSR for these pollutants, which includes the use of LAER controls and the emission offset requirements. Emissions of NO_x and VOC from the Ravenswood Cogeneration Facility will be greater than these thresholds and therefore will be subject to these NSR requirements. An oxidation catalyst will be used to control emissions of CO to below the NSR threshold.

3.4 Prevention of Significant Deterioration

The Ravenswood Cogeneration Facility will constitute a new major source. As is shown in Table 3-2, regulated criteria pollutant emissions will exceed the U.S. EPA PSD significant emission increase thresholds (NSR thresholds are presented for CO, NO_x and VOC). As such, the proposed Ravenswood Cogeneration Facility will be subject to PSD review.

The PSD regulations state that facilities subject to PSD review must perform an air quality analysis (which can include atmospheric dispersion modeling and pre-construction ambient air quality monitoring), a BACT analysis and an additional impact analysis for those pollutants which exceed the pollutant-specific significant emission rates identified in the regulations. Table 3-2 shows that PSD review is required for NO_x, SO_2, PM/PM-10 (air quality analysis for PM-10 only) and sulfuric acid mist. Note that since NO_x and VOC emissions are precursors to the non-attainment pollutant, ozone, NO_x and VOC emissions will be controlled to the more stringent LAER emission levels, rather than BACT. This will also be the case for emissions of CO.

In addition to assessing impacts on NAAQS, facilities subject to PSD review must demonstrate compliance with the PSD increments established for SO_2, NO_2, and PM-10. The proposed Ravenswood Cogeneration Facility site is located in a PSD Class II area and will be subject to the PSD Class II increments, as well as the NAAQS. The Class II PSD increments are presented in Table 3-3.

3.4.1 Ambient Air Quality Monitoring

Proposed facilities subject to PSD review may have to perform up to one year of preconstruction ambient air quality monitoring for those pollutants emitted in amounts exceeding the significant emission rates shown in Table 3-2, unless granted an exemption by the reviewing agency. The agency can grant an exemption from monitoring if the proposed source demonstrates that it will have maximum impacts below the pollutant-specific significant monitoring concentrations which are presented in Table 3-4. Ravenswood Cogeneration Facility has prepared a request for exemption from air quality pre-construction monitoring. This request was sent to the United States Environmental Protection Agency (U.S. EPA) on February 28, 2000 on the basis of preliminary facility design and modeling information that indicated facility emissions and/or predicted impacts to be well below the significant emission/impact levels specified in the PSD regulations for pre-construction ambient air quality monitoring. A copy of the request was also sent to NYSDEC. The U.S. EPA granted the request for exemption from pre-construction monitoring on March 27, 2000. Copies of all agency project correspondence are contained in Appendix C.

3.4.2 Impact Area Determination

The impact on air quality must be determined for each pollutant subject to PSD review. Modeled concentrations of applicable pollutants greater than the Significant Impact Concentration levels as shown in Table 3-5 are called significant impacts. The significant impact area is defined as the area within greatest distance from the facility at which the modeled concentrations are greater than the PSD significant impact concentrations.

3.4.3 Additional Impact Analyses

The major source status of the Ravenswood Cogeneration Facility means that certain additional analyses are required as part of the PSD review. These include modeling to assess potential for impacts to soils and vegetation, growth and visibility in the area surrounding the proposed plant.

3.4.4 Impacts on Class I Areas

Proposed major sources within 100 km of a Class I area must perform an assessment of potential impacts in this area. The Class I areas closest to the proposed Ravenswood Cogeneration Facility are the Edwin B Forsythe NWR in Brigantine, New Jersey and the Lye Brook NWR in Lye Brook, Vermont. The Edwin B. Forsythe NWR is located approximately 115 km south of the project and the Lye Brook NWR is located approximately 280 km north-northeast of the project. As was noted in Section 1.2.2.2, the NYSDEC requested that a Level-1 screening analysis be performed for the Edwin B. Forsythe NWR. The results of the analysis are presented in Section 7.6.2

3.5 Non-Attainment New Source Review Requirements

Since, the proposed site is in a classified severe ozone non-attainment area; NO_x and VOC emissions are subject to non-attainment review. In addition, CO emissions are also subject to non-attainment new source review as the area is currently designated as moderate non-attainment for CO.

The preconstruction review requirements for major new sources or major modifications located in areas designated non-attainment pursuant to Section 107 of the Clean Air Act Amendments of 1990 (CAAA) differ from the PSD requirements. First, the emission control requirement for non-attainment areas, LAER, is defined differently and is more stringent than the BACT emissions control requirement. Second, the source must obtain any required emission reductions (offsets) of the non-attainment pollutant precursors from other sources which impact the same area as the proposed source. For CO, an additional requirement is imposed in that a net benefit modeling analysis must be performed to demonstrate a net improvement in air quality as a result of the application of the offsets. (As was previously indicated, the use of an oxidation catalyst would reduce potential emissions to below the threshold that triggers the need for offsets and net benefit modeling.) Third, the applicant must certify that all other sources owned by the applicant in the State are complying with all applicable requirements of the CAA, including all applicable requirements in the SIP. See Section 5 of this document for additional details.

LAER determinations for NO_x and VOC are presented for the proposed facility in Sections 4.6 and 4.7 of this application. The emission offset requirements for the facility are discussed in Section 5.2.

3.6 NO_x Budget Program Requirements

On September 27, 1994 the Ozone Transport Commission (OTC) adopted a Memorandum of Understanding (MOU) committing the signatory states to develop and propose region-wide NO_x emission reductions in 1999 (Phase 2) and 2003 (Phase 3). The NO_x Budget Model Rule implements the OTC MOU NO_x emission reduction requirement through a market-based "cap and trade" program. This type of program sets a regulatory limit on mass emissions during the "ozone season" (May 1 through September 30) from a discrete group of sources, allocates allowances to the sources authorizing emissions up to the regulatory limit, and permits trading of allowances in order to effect cost-efficient compliance with the cap on the state's emissions. The number of allowances allocated are limited by the cap on the state's emissions; allowances are not considered surplus in the same manner as emission reductions in an emission reduction trading program.

To implement Phase 2 of the OTC MOU, the required emission reductions are applied to a 1990 baseline for NO_x emissions in the OTR to create a cap, or emissions budget, for each ozone season from 1999 through 2002. The budget would then be allocated as allowances to the emission units subject to the program (budget sources). Budget sources are defined as fossil fuel fired boilers and indirect heat exchangers of 250 mmBtu or greater, and electric generating units of 15 megawatts or greater. Budget sources are defined on a unit level, meaning that each boiler or utility generator is considered a separate budget source. Beginning in 1999, the sum of NO_x emissions from budget sources during the May through September control period cannot exceed the aggregate number of allowances allocated to the state. An allowance is equal to one ton of NO_x emissions. The budget sources are allowed to buy, sell, or trade allowances to meet their needs.

Regulations covering New York State's implementation of the Phase 3 Program were finalized late in 1999 and have been codified 6 NYCRR Part 204. Basically, allowances for an affected unit will be based on actual operations during specific, proceeding baseline periods, and will be "self-adjusting" based on the affected unit's operating history. Initially, NO_x allowances will be allocated by a formula that will consider an affected unit's maximum ozone season heat input over the 1995 through 1997 data period. In 2004, the data period will be 1996 through 1998. This scheme will last until 2005. In 2006, allowances will be allocated by considering an affected unit's heat input from four years back (i.e., 2006 will be based on the heat input from the 2002 ozone season). Quantities of NO_x allowances will be set aside for new sources and to reward energy efficiency measures. The allowances that have been set aside will be provided to new sources to cover actual NO_x emissions; new sources will continue to have these allowances provided until the new facility is able to establish a 3-year baseline of operations. At this point, the new facility is entered into the Phase 3 budget pool and will have allowances allocated to it following the formula applied to all other existing sources.

A facility subject to the provisions of the NO_x Budget Program must identify a Designated Representative and establish a NO_x Allowance Trading Account. The Designated Representative is responsible for maintaining the facility account, including ensuring that enough allowances are in place in time to meet the regulatory deadline. Shortfalls in the account can be made up by either transferring allowances from another facility account or outright purchase of the needed allowances.

In order to ensure that NO_x emissions do not exceed allowances, budget sources are required to monitor and report NO_x emissions during the control period of each year. The preferred method of emissions monitoring includes utilization of sophisticated CEMS, as approved under 40 CFR 75 (the Acid Rain Program). Although Part 75 need not be followed for the NO_x Budget program (the program allows for monitoring at a "near Part 75" level of effort), the issue becomes moot given that Ravenswood Cogeneration Facility will need to comply with Part 75 under the Acid Rain program. Any budget source currently subject to Part 75 monitoring must maintain and use that monitoring for emissions tracking under the NO_x Budget Program.

3.7 Federal Acid Rain Regulations

Title IV of the CAAA required U.S. EPA to establish a program to reduce emissions of acid rain forming pollutants, called the Acid Rain Program. The overall goal of the Acid Rain Program is to achieve significant environmental benefits through reductions in SO_2 and NO_x emissions. To achieve this goal, the program employs both traditional and market-based approaches for controlling air pollution. Under the market-based part of the program, existing units are allocated SO_2 allowances by the U.S. EPA. Once allowances are allocated, affected facilities may use their allowances to cover emissions, or may trade their allowances to other units under a market allowance program. In addition, applicable facilities are required to implement continuous emissions monitoring (CEM) for affected units. The proposed Ravenswood Cogeneration Facility does not meet the eligibility requirements for "Cogeneration Units" (under 40 CFR 72.6(b)(4)) that would allow for exemption from the Acid Rain Program. Therefore, the requirements detailed in the following paragraphs will need to be met.

The CEM requirements of the Acid Rain Program include: an SO_2 concentration monitor, a NO_x concentration monitor, a CO_2 concentration monitor, a volumetric flow monitor, an opacity monitor, a diluent gas (O_2) monitor, and a computer-based data acquisition and handling system for recording and performing calculations. Note, Title IV Acid Rain NO_x emission limits have only been established for coal-fired utility boilers at this time. Therefore, the proposed Ravenswood Cogeneration Facility is not subject to the NO_x emission limitations, although NO_x (and CO_2) needs to be continuously monitored to satisfy agency "data gathering" requirements. CO_2 emissions, as measured by an O_2 diluent monitor, are an acceptable source of data for the Acid Rain program. The Acid Rain program allows for alternate methods of SO_2 monitoring for facilities that fire only low-sulfur gaseous fuels or primarily fire low-sulfur gaseous fuels (i.e., at least 90% of the unit's average annual heat input during the previous three calendar years and for at least 85% of the annual heat input in each of those calendar years). An allowable alternate method would include fuel flow monitoring and mass balance reconciliation of SO_2 emissions from fuel sulfur content. The proposed facility qualifies on the basis that it would primarily fire low-sulfur gaseous fuel (natural gas), and NSPS Subpart Da requirements for an SO_2 monitor do not apply since the duct burner only fires natural gas.

Implementation of the Acid Rain Program by the U.S. EPA has been broken into two phases. Phase I of the program required 110 sources identified in the CAAA to operate in compliance by January 1, 1995. Facilities identified in Phase II of the program were required to operate in compliance by January 1, 2000. Additionally, existing Phase II facilities were required to install and operate a certified CEM system by January 1, 1995. The Ravenswood Cogeneration Facility is subject to the Acid Rain Program based upon the provisions of 40 CFR 72.6(a)(3) since the turbine and duct burner (HRSG) are considered utility units under the program definition and do not meet the exemptions listed under paragraph (b) of this Section. The proposed Ravenswood Cogeneration Facility will be subject to Phase II Acid Rain requirements and will be required to submit an acid rain permit application by the 24 months prior to the date on which the unit expects to begin service as a generator. Based upon these provisions and the proposed schedule, the facility would be required to submit a complete Acid Rain Permit Application prior to October 1, 2000. A complete Acid Rain Permit Application is included in Appendix E to fulfill these requirements.

3.8 MACT Applicability

On April 20, 2000, a notice was published in the Federal Register (Federal Register: April 20, 2000, Volume 65, Number 78, page 21363 - 21365) detailing an interpretative rule which states that new combustion turbines are subject to case-by-case MACT if they are a major source of hazardous air pollutants (pursuant to 40 CFR Part 63). Current U.S. EPA AP-42 emission factors, and correspondence from the Frame 7FA vendor, General Electric, were reviewed in determining if the project was subject to MACT. Emission factors indicate that formaldehyde is the contaminant that has the potential to be emitted in the greatest quantity. On a potential to emit basis, the AP-42 emission factors and vendor data suggest that maximum single hazardous air pollutant emissions (in this case formaldehyde) will be no more than 50% of the 10 ton per year MACT applicability threshold (for a single pollutant). Combined hazardous pollutant emissions will likewise be well below the applicability threshold of 25 tons per year (approximately one-third of the threshold). Therefore, applicability to MACT is precluded.

TABLE 3-1
RAVENSWOOD COGENERATION FACILITY
NATIONAL AND NEW YORK STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary/Secondary	Averaging Period	National Standard ($\mu g/m^3$)
Carbon Monoxide	Primary Primary	1-Hour 8-Hour	40,000 10,000
Nitrogen Dioxide	Primary & Secondary	Annual	100
Ozone	Primary & Secondary	1-Hour	235
Inhaleable Particulates (PM-10)	Primary & Secondary	24-Hour Annual	150 50
Sulfur Dioxide	Primary Primary Secondary	24-Hour Annual 3-Hour	365 80 1,300
Lead	Primary	3-Month	1.5
Beryllium	Primary	1-Month	0.01[(1)]

(1) New York Standard. New York also has ambient air standards for hydrogen sulfide (0.01 ppm, 1-hour basis) and fluorides (1.0 ppb, 1-month basis; 2.0 ppb, 1-week basis; 3.5 ppb. 24-hour basis; and 4.5 ppb, 1-hour basis)

TABLE 3-2
RAVENSWOOD COGENERATION FACILITY
PSD SIGNIFICANT EMISSIONS INCREASE LEVEL AND PROJECT POTENTIAL EMISSION RATES
(Pursuant to 40 CFR 52.21 (b) (23) (i))

Pollutant	Significant Emissions Increase Level (tons per year)	Annual Facility Emissions [a] (tons per year)
Carbon Monoxide	100/50 [b]	95.3
Sulfur Dioxide	40	104
PM–10	15	203
Nitrogen Oxides[c]	25	142
Ozone (VOC)[c]	25	99.2
Lead	0.6	0.042
Fluorides	3	0
Sulfuric Acid Mist	7	33.5
Total Reduced Sulfur Compounds	10	0

(a) PTE calculated based on worst-case load hourly emissions assuming up to 30-days of kerosene firing, remainder of the year on gas firing and up to 25% of the year operating at part load. Preliminary emission estimates do not include start-up emissions. VOC emissions include kerosene tank breathing loses associated with increased throughput.

(b) The project site is currently designated moderate non-attainment for carbon monoxide. Values presented represent New Source Review thresholds: 100 tons per year threshold if no modeled significant impacts for CO, otherwise threshold is 50 tons per year.

(c) The project site is currently designated severe non-attainment for ozone. NO_x and VOC are precursors to ozone formation. Values presented represent New Source Review thresholds.

TABLE 3-3
RAVENSWOOD COGENERATION FACILITY
PSD CLASS II INCREMENTS ($\mu g/m^3$)

SO_2	
Annual [(a)]	20
24-Hour [(a)]	91
3-Hour [(b)]	512

PM-10	
Annual [(a)]	17
24-Hour [(b)]	30

NO_2	
Annual [(a)]	25

Notes:

(a) Never to be exceeded

(b) Not to be exceeded more than once per year

TABLE 3-4
RAVENSWOOD COGENERATION FACILITY
PSD SIGNIFICANT MONITORING CONCENTRATIONS

Pollutant	Averaging Period	Significant Monitoring Concentration ($\mu g/m^3$)
Carbon Monoxide	8-hour	575
Nitrogen Dioxide	Annual	14
Sulfur Dioxide	24-Hour	13
Particulates (PM & PM-10)	24-hour	10
Beryllium	24-Hour	0.001
Sulfuric Acid Mist	-	(a)

(a) Acceptable monitoring techniques not available

TABLE 3-5
RAVENSWOOD COGENERATION FACILITY
PSD SIGNIFICANT IMPACT CONCENTRATIONS

Pollutant	Averaging Period	Significant Impact Concentration ($\mu g/m^3$)
Sulfur Dioxide	3-hour 24-hour Annual	25 5 1
Nitrogen Dioxide	Annual	1
Carbon Monoxide	1-hour 8-hour	2,000 500
Particulates (PM & PM-10)	24-hour Annual	5 1

4.0 CONTROL TECHNOLOGY ANALYSIS FOR THE PROPOSED FACILITY

A control technology analysis has been performed for the proposed facility based upon guidance presented in the draft U.S. EPA Guidance Document "New Source Review Workshop Manual", (October 1990) and guidance provided by NYSDEC at the October 13, 1999 pre-application meeting. Control technology requirements for each pollutant depend upon the area's attainment status for the pollutant and the potential emissions of the pollutant. PSD and non-attainment NSR requirements for each pollutant are defined in Section 3 of this document. LAER is required for pollutants subject to non-attainment NSR; BACT is applied for pollutants subject to PSD review.

Section 4.1 outlines the degree of control required (LAER or BACT) for each pollutant, as determined in Section 3. Section 4.2 presents an overview of the BACT assessment procedure used in this analysis. The procedure used in the economic analysis for technically feasible control options is detailed in Section 4.2.1. Sections 4.3, 4.4, 4.5, 4.6, 4.7, 4.8 and 4.9 present control technology determinations for CO, PM/PM-10, SO_2, sulfuric acid mist, NO_x, VOC, and NH_3 respectively, for the proposed combined cycle units and supporting equipment.

Note that throughout this section, "ppm" concentration levels for gaseous pollutants are parts per million by volume, dry basis, corrected to 15% O_2 content (ppmdv @ 15% O_2), unless otherwise noted. Likewise, all emission factors expressed as pounds of pollutant per million Btu of fuel (lb/mmBtu) are based upon the higher heating value (HHV) of the fuel.

4.1 Applicability of Control Technology Requirements

An applicability determination, as discussed in this section, is the process of determining the level of emissions control required for each applicable air pollutant. Control technology requirements are generally based upon the potential emissions from the new or modified source and the attainment status of the area in which the source is to be located. A detailed determination of applicable regulations, including control technology requirements under the PSD and non-attainment rules, is provided in Section 3. The following sections discuss the applicability of BACT, LAER and NYSDEC requirements for emissions from equipment included in this permit application.

4.1.1 PSD Pollutants Subject To BACT

Pollutants subject to PSD review are subject to a BACT analysis. BACT is defined as an emission limitation based on the maximum degree of reduction, on a case-by-case basis, taking into account energy, environmental and economic impacts. Based upon the regulatory applicability analysis in

Section 3.4, the proposed facility is considered a "major" source for PSD purposes since potential emissions exceed major source thresholds for all regulated pollutants. Therefore, individual regulated pollutants are subject to BACT requirements unless potential emissions are below the significant emission rates presented in 40 CFR 52.21(b)(23) in a PSD (attainment) area, as presented in Table 3-2. Based upon these criteria, PM/PM-10, SO_2 and sulfuric acid mist are subject to BACT requirements. The area is also designated attainment for NO_2; therefore NO_x emissions are subject to BACT, as well as the more stringent LAER requirements under the ozone non-attainment provisions. Since the LAER requirements are at least as stringent as BACT, the LAER analysis will satisfy the technology requirements for NO_x. The area is also designated moderate non-attainment for CO, thus the project CO emissions are currently subject to LAER requirements, as well. Therefore, NO_x, VOC and CO emissions are subject to LAER requirements.

4.1.2 Non-Attainment Pollutants Subject To LAER

Pollutants subject to non-attainment NSR must be limited to LAER levels. LAER is defined as either the most stringent emission limitation contained in a SIP (unless it is demonstrated to not be achievable) or the most stringent emission limitation which is achieved in practice by the class or category of source, whichever is the most stringent. Furthermore, NYSDEC LAER policy is that issuance of two permits for a source category at a given emission limit level is sufficient basis for establishing LAER, regardless of whether the permitted units have been constructed. Pollutants are subject to LAER if potential emissions of individual pollutants exceed area-specific emission thresholds. Emissions of VOC and NO_x are subject to LAER requirements since they exceed the severe non-attainment threshold of 25 tons per year. Based upon the uncontrolled potential-to-emit (PTE), CO emissions would be subject to LAER requirements since the PTE would exceed the moderate non-attainment threshold of 100 tons per year. However, the only feasible approach to meeting LAER requirements would be to install an oxidation catalyst to control CO emissions. Use of such a catalyst to control CO emissions to below 100 tons per year, while not necessarily satisfying LAER requirements, would lower potential facility emissions to less than the CO NSR threshold (for projects having insignificant CO impacts), thereby eliminating the need to apply LAER technology. Consequently, a LAER analysis for CO has not been prepared for this project.

4.1.3 Emission Units Subject to BACT or LAER Analysis

For a facility subject to BACT or LAER analysis, each regulated pollutant emitted in a significant amount is subject to the prescribed level of control technology review for each emission unit from which the pollutant is emitted. Thus, the BACT analysis for PM/PM-10 addresses emissions from the turbine/duct burner unit. The BACT analyses for SO_2 and sulfuric acid mist address emissions from the combined cycle units, which are the only sources of these pollutants. For the same reason, the LAER analysis for NO_x and VOC applies only to the turbine/duct burner unit, and the analysis for NH_3 applies only to the turbine/duct burner unit. The only sources of CO emissions from this facility are the turbine/duct burner units. Note that for both the BACT and LAER analyses, the turbine and duct burner are treated as the same source of emissions since the applicable control technologies would reduce emissions from both the turbine and duct burner. Otherwise, the costs of controls would have to be divided between emissions controlled from the two contributors.

4.2 Approach Used in BACT Analysis

As explained in Section 4.1, the Ravenswood Cogeneration Facility must utilize BACT controls for emissions of SO_2, sulfuric acid mist and PM/PM-10. As previously stated, BACT is defined as the optimum level of control applied to pollutant emissions based upon consideration of energy, economic and environmental factors. In a BACT analysis, the energy, environmental, and economic factors associated with each alternate control technology are evaluated, as necessary, in addition to the benefit of reduced emissions that the technology would provide. The BACT analysis presented here consist of up to five steps for each pollutant, as outlined below.

4.2.1 Identification of Technically Feasible Control Options

The first step is identification of available technically feasible control technology options, including consideration of transferrable and innovative control measures that may not have previously been applied to the source type under analysis. The minimum requirement for a BACT proposal is an option that meets federal NSPS limits or other minimum state or local requirements that would prevail in the absence of BACT decision-making, such as RACT or NYSDEC emission standards. After elimination of technically infeasible control technologies, the remaining options are to be ranked by control effectiveness.

If there is only a single feasible option, or if the applicant is proposing the most stringent alternative, then no further analysis is required. If two or more technically feasible options are identified, the next three steps are applied to identify and compare the economic, energy, and environmental impacts of the options. Technical considerations and site-specific sensitive issues will often play a role in BACT determinations. Generally, if the most stringent technology is rejected as BACT, the next most stringent technology is evaluated and so on.

In order to identify options for each class of equipment, a search of the U.S. EPA BACT/LAER Clearinghouse has been performed. Individual searches have been performed for each pollutant (subject to BACT/LAER) emitted from each emissions unit. Results of the BACT/LAER Clearinghouse search are summarized in Appendix F.

4.2.2 Economic (Cost-Effectiveness) Analysis

This analysis consists of estimation of costs and calculation of the cost-effectiveness of each control technology, on a dollar per ton of pollution removed basis. Annual emissions of an option are subtracted from base case emissions to calculate tons of pollutant controlled per year. The base case may be uncontrolled emissions or the maximum emission rate allowable without BACT considerations which would generally correspond to an NSPS or RACT level. Annual costs, dollars per year, are calculated by adding annual operation and maintenance costs to the annualized capital cost of an option. Cost-effectiveness ($/ton) of an option is simply the equivalent annual cost ($/yr) divided by the annual reduction in emissions (ton/yr).

Note that no economic analysis is required if either the most effective option is proposed or if there are no technically feasible control options. As such, no economic evaluation needs to be considered for this project.

4.2.3 Energy Impact Analysis

Two forms of energy impacts that may be associated with a control option can normally be quantified. Increases in energy consumption resulting from increased heat rate may be shown as incremental Btu's or fuel consumed per year. Also, the installation of a control option may reduce the output and/or reliability of the proposed equipment. This reduction would result in loss of revenue from power sales.

4.2.4 Environmental Impact Analysis

The primary focus of the environmental impact analysis is the reduction in ambient concentrations of the pollutant being emitted. Increases or decreases in emissions of other criteria or non-criteria pollutants may occur with some technologies, and should also be identified. Non-air impacts, such as solid waste disposal and increased water consumption/treatment, may be an issue for some projects and control options.

4.2.5 BACT Proposal

The determination of BACT for each pollutant and emissions unit is based on a review of the three impact categories and the technical factors that affect feasibility of the control alternatives under consideration. The methodology described above is applied to the proposed facility for SO_2, sulfuric acid mist and PM/PM-10.

4.3 LAER Analysis for Carbon Monoxide

Currently, the area where this facility is located is designated moderate non-attainment for CO emissions. However, the area is in the process of being re-designated as attainment for CO emissions. Therefore, if the facility is still designated moderate non-attainment when the final permit is issued, this LAER analysis will be required.

The GE 7FA turbine is an inherently low emitter of CO emissions, with the duct burner the uncontrolled potential to emit is 423 tons per year. This is well above the moderate non-attainment major source threshold of 100 tons per year.

4.3.1 LAER Proposal for Turbine/Duct Burner Carbon Monoxide Control

KeySpan Energy will install an oxidation catalyst to reduce CO emissions below the 100 ton per year moderate non-attainment threshold. As a result, a LAER analysis is not required since the resulting potential to emit for this facility would be 95.3 tons per year of CO.

Proposed emission limits for the combined cycle units under that scenario are 2.0 ppm while firing natural gas in the turbine and 5.0 ppm while firing kerosene in the turbine. Separate emission rates are proposed while the duct burner is firing natural gas, the proposed limit while firing natural gas in the turbine is 3.9 ppm and 5.4 ppm while firing kerosene in the turbine.

4.4 BACT Analysis for Particulate Matter

Sources of PM/PM-10 at the proposed facility are the combustion turbine and the duct burner of the combined cycle unit. Since potential emissions from the facility exceed the PSD "significant net emission increase" threshold, particulate emissions must meet BACT controls.

PM/PM-10 emissions from combustion turbines are inherently very low, arising from impurities in combustion air and fuel, primarily from elements present in trace quantities in fuels. Other sources of PM/PM-10 include PM/PM-10 present in the combustion air and ammonia/sulfur salt formation due to the presence of the oxidation catalyst and SCR. The presence of an oxidation catalyst would encourage conversion of SO_2 to SO_3, which is then available to react with NH_3 and form ammonium sulfate or ammonia bisulfate. These compounds, known as ammonia salts, may condense and be detected as PM/PM-10 during compliance stack testing. However, by installing the oxidation catalyst in a cooler region of the HRSG, SO_3 formation will be limited and is integral to the proposed BACT limits for PM/PM-10.

The use of clean burning fuels, such as natural gas and low-sulfur kerosene, is considered to be the most effective means for controlling PM/PM-10 emissions from combustion turbines. Post-combustion controls, such as baghouses, scrubbers and electrostatic precipitators are impractical due to the high pressure drops associated with these units and the low concentrations of PM/PM-10 present in the exhaust gas. A review of PM/PM-10 emission limits for dual-fuel (natural gas and distillate oil) combustion turbines presented in the U.S. EPA BACT/LAER Clearinghouse shows that only good combustion techniques and low-sulfur fuel have been used as controls for PM/PM-10 emissions.

The facility plans to fire natural gas with up to 30-days of kerosene in the turbine and only natural gas in the duct burner; this is considered BACT for control of PM/PM-10 emissions. The proposed BACT emission limit for PM/PM-10 is 0.021 lb/mmBtu while firing natural gas in the turbine and 0.057 lb/mmBtu while firing kerosene in the turbine. The same limits will apply with and without duct burner operation. These levels are within the range of recent BACT determinations for combustion turbines. The proposed limit for PM-10 includes both filterable and condensable PM-10; it is likely that limits lower than this for certain existing combustion turbines do not include condensable matter.

4.5 BACT Analysis for Sulfur Dioxide

The turbine/duct burner are the only sources of SO_2 emissions at the facility. Strategies for the control of SO_2 emissions can be divided into pre- and post-combustion categories. Pre-combustion controls entail the use of low sulfur fuels. Post-combustion controls comprise various wet and dry flue gas desulfurization (FGD) processes. However, FGD alternatives are undesirable for use on combustion turbine power facilities due to high pressure drops across the device, and would be particularly impractical for the large flue gas volumes and low SO_2 concentrations in this situation.

The use of natural gas (which contains only trace amounts of mercaptans for the detection of gas leaks) and 0.04% sulfur kerosene will result in very low emission levels of SO_2.

The Ravenswood Cogeneration Facility plans to fire natural gas and low-sulfur kerosene for up to 30-days per year; this is considered BACT for control of SO_2 emissions. The proposed facility BACT emission limit for SO_2 is 0.0071 lb/mmBtu for natural gas fired in the turbine with or without the duct burner. The proposed emission limit is 0.044 lb/mmBtu for kerosene fired in the turbine with or without the duct burner firing natural gas.

4.6 BACT Analysis For Sulfuric Acid Mist

Sulfuric acid mist emissions from the proposed combined cycle units occur due to oxidation of fuel sulfur. As presented in Section 4.3, fuel sulfur can oxidize into SO_2, SO_3 and sulfate particulate. The presence of an oxidation catalyst would increase the conversion rate of SO_2 to SO_3. SO_3 readily reacts with water vapor (both in the atmosphere and in flue gases) to form a sulfuric acid mist. Since an oxidation catalyst can substantially increase the formation of sulfuric acid mist, the specification of installing the oxidation catalyst in a cooler region of the HRSG for this project is integral to the proposed BACT limits.

Since the amount of sulfuric acid mist formation is directly proportional to the amount of fuel sulfur present, KeySpan Energy is proposing to utilize natural gas fuel and low sulfur kerosene to control sulfuric acid mist emissions. The proposed BACT emission limit for sulfuric acid mist is 0.0022 lb/mmBtu while firing natural gas in the turbine with or without the duct burner firing. The proposed emission limit is 0.014 lb/mmBtu while firing kerosene in the turbine with and without firing natural gas in the duct burner.

4.7 LAER Analysis for Nitrogen Oxides

The formation of NO_x is determined by the interaction of chemical and physical processes occurring within the combustion zones of the turbine and duct burner. There are two principal forms of NO_x designated as "thermal" NO_x and "fuel" NO_x. Thermal NO_x formation is the result of oxidation of atmospheric nitrogen contained in the inlet gas in the high-temperature, post-flame region of the combustion zone. The major factors influencing thermal NO_x formation are temperature, concentrations of nitrogen and oxygen in the inlet air and residence time within the combustion zone. Fuel NO_x is formed by the oxidation of fuel-bound nitrogen. NO_x formation can be controlled by adjusting the combustion process and/or installing post-combustion controls. KeySpan Energy Ravenswood is proposing to utilize lean combustion techniques and SCR to control NO_x emissions to achieve LAER (discussed in Section 4.8.1). The following paragraphs provide a technical description of both lean combustion techniques and SCR controls.

Typical gas turbines are designed to operate at a nearly stoichiometric ratio of fuel and in the combustion zone, with additional air introduced downstream. This is the point where the highest combustion temperature and quickest combustion reactions (including NO_x formation) occur. Fuel-to-air ratios below stoichiometric are referred to as fuel-lean mixtures (i.e. excess air in the combustion chamber); fuel-to-air ratios above stoichiometric are referred to as fuel-rich (i.e. excess fuel in the combustion chamber). The rate of NO_x production falls off dramatically as the flame temperature decreases. Very lean, dry combustors can be used to control emissions.

Based upon this concept, lean combustors are designed to operate below the stoichiometric ratio thereby reducing thermal NO_x formation within the combustion chamber. The lean combustors typically are two staged premixed combustors designed for use with natural gas fuel. The first stage serves to thoroughly mix the fuel and air and to deliver a uniform, lean, unburned fuel-air mixture to the second stage. The General Electric Model 7FA turbine produces uncontrolled NO_x emissions of 9 ppm in the dry low-NO_x mode, the lowest NO_x level commercially available from a combustion turbine.

SCR is an add-on NO_x control technique that is placed in the exhaust stream following the gas turbine. SCR involves the injection of aqueous NH_3 into the exhaust gas stream upstream of a catalyst bed. On the catalyst surface, NH_3 reacts with NO_x contained within the air to form nitrogen gas (N_2) and water (H_2O) in accordance with the following chemical equations:

$$4NH_3 + 4NO + O_2 \Rightarrow 4N_2 + 6H_2O$$
$$8NH_3 + 6NO_2 \Rightarrow 7N_2 + 12H_2O$$

The catalyst's active surface is usually either a noble metal (platinum), base metal (titanium or vanadium) or a zeolite-based material. Metal based catalysts are usually applied as a coating over a metal or ceramic substrate. Zeolite catalysts are typically a homogenous material that forms both the active surface and the substrate. The geometric configuration of the catalyst body is designed for maximum surface area and minimum obstruction of the flue gas flow path in order to achieve maximum conversion efficiency and minimum back pressure on the gas turbine. The most common configuration is a "honeycomb" design. In an aqueous NH_3 injection system, NH_3 is drawn from a storage tank, vaporized and injected upstream of the catalyst bed. Excess NH_3 which is not reacted in the catalyst bed and which is emitted from the stack is referred to as NH_3 slip.

An important factor that affects the performance of an SCR is operating temperature. The temperature range for standard base metal catalyst is between 400 and 800°F. Since SCR's effective temperatures are below turbine exit temperature and above stack temperature, the catalyst must be located within the HRSG.

An undesirable side-effect of SCR is the potential formation of ammonium bisulfate (NH_4HSO_4), which is corrosive and can stick to the heat recovery surfaces, duct work, or stack at low temperatures and results in additional PM/PM-10 formation if emitted. NH_4HSO_4 is a reaction product of SO_3 and NH_3. Because of higher sulfur content and the presence of an SCR, kerosene firing increases SO_2 emissions, which increase SO_3 formation, which in turn can substantially increase the amount of ammonium bisulfate formation.

4.7.1 Most Stringent Emission Limitation Achieved in Practice for Source Class or Category

As discussed in Section 4.1.2, a LAER determination for a source category is based upon the more stringent of either 1) the most stringent emission limitation contained in the SIP for such class or category of source or 2) the most stringent emission limitation achieved in practice by such class or category of source unless demonstrated to not be achievable. Permit limits for many recent combined cycle units are lower than any limits in Federal Regulations (NSPS Subpart GG) or state laws or regulations (SIPs); thus, LAER is established by the lowest limit achieved in practice by a comparable source. To determine the most stringent permit limit, a search of the BACT/LAER Clearinghouse was performed. For a limit to be considered "LAER", it requires more than just the issuance of a permit. If a facility was never built or operated, or has not demonstrated compliance through stack testing and/or CEM, its limits have not been demonstrated to be achievable and are not considered LAER. The results of the BACT/LAER Clearinghouse search are presented in Appendix F. In the pre-application meeting, NYSDEC staff indicated that it is NYSDEC policy that two permits issued in the USA for a certain level are sufficient basis to establish LAER, regardless of whether the permitted facilities are constructed or operating in compliance.

Further research was performed to identify more recent facilities that have been issued permits, but have not been entered in the BACT/LAER Clearinghouse; the results are presented in Table 4-1. These recent permits show the lowest NO_x emission rate with two or more permits issued is 2.0 ppm, achieved with an SCR. Recent technology which controls both NO_x and CO, but is not included in Table 4-1, was also researched as an alternative to SCR control.

The Sunlaw Cogeneration Partners 32 MW Federal Cogeneration Plant in Southern California has been determined by EPA Region IX to have achieved an emissions rate of 3.5 ppm. This facility has controlled its emission rate through the use of the Goal Line Environmental Technologies $SCONO_X$

technology. This technology utilizes a coated, precious metal catalyst to reduce NO_X and CO emissions without NH_3 injection. The catalyst coating is periodically regenerated by injection of natural gas in an oxygen free environment. The catalyst is divided into sections which can be isolated by dampers so that portions of the catalyst can be regenerated while others are in service, maintaining operation of the plant

This technology has been used on two 32 MW gas-only plants using GE LM 2500 turbines and operated by one of the parent companies of Goal Line Technologies. Although this technology has achieved a NO_X emission rate comparable to those considered LAER at other facilities, it is not considered suitable for the Ravenswood Cogeneration Facility project for the following reasons:

- The two plants for which this technology has thus far been used have been fired by natural gas only; the manufacturer has stated that the system is only available for natural gas fired turbines. The KeySpan Energy Ravenswood Cogeneration Facility will utilize low-sulfur kerosene as a back-up fuel and thus would not be a candidate for the use of this technology. Apparently, in order for the $SCONO_x$ system to function properly, sulfur must be removed from the fuel before it is combusted in the turbine. This is necessary to prevent the absorption of sulfur onto the surface of the $SCONO_x$ catalyst. Such absorption, over time, would reduce the number of sites that are available for NO_x adsorption and would result in an increase in NO_x emissions. Without this absorption, even the small amounts of sulfur found in the fuel can damage the $SCONO_x$ system. At this time, $SCONO_x$ has only been tried on natural gas fired facilities. Without proven demonstration of $SCONO_x$ on a kerosene or an oil-fired facility, it cannot be shown that the sulfur absorption system can handle the increased sulfur loads associated with kerosene, relative to natural gas.

- The limited demonstration of $SCONO_x$ technology is based on the LM-2500 turbine, an aeroderivative engine rated at about 25 MW. The KeySpan Energy Ravenswood project proposes to use a single GE 7FA frame type turbine rated at approximately 180 MW each, which would represent a significant scale-up (approximately seven times the flue gas flow volume for which $SCONO_X$ is demonstrated).

- The operating history of this technology on the two plants is not long enough to document the effects of degradation after several years of operation and numerous regeneration cycles.

- Every six months to a year the $SCONO_x$ system is required to be washed. The washing frequency is dependent upon the amount of sulfur in the gas passing through the $SCONO_x$

system. Washing is accomplished by removing sections of the catalyst from the process and immersing them in potassium carbonate which coats the catalyst metal and is the active surface ingredient for the catalyst. This procedure presents several problems, including: unknown frequency of washing required, additional labor costs to remove the catalyst and safety issues with regard to removing and reinstalling the catalyst.

- Sulfur is removed upstream of the combustion turbine by a sulfur catalyst called $SCOSO_x$, this catalyst also requires online regeneration just like the $SCONO_x$ system. Byproducts of this regeneration process are either H_2S or SO_2. This catalyst also requires washing, however due to limited operating experience the frequence of required washing is not known. Washing the $SCOSO_x$ catalyst also presents several problems, including: unknown frequency of washing required, additional labor costs to remove the catalyst and safety issues with regards to handling a contaminated catalyst containing reduced sulfur compounds and sulfur acids.

In addition to the RBLC and the $SCONO_x$ units identified above, TRC has summarized recently-issued permits for gas, kerosene and oil-fired combined cycle units in Table 4-1. NYSDEC has indicated that a level proposed as an emission limit in two or more permits may be considered to represent LAER for a category of sources. While the lowest NO_x limit in permits for gas-fired combined cycle emits is 2 ppm, higher values are specified for operating scenarios utilizing duct burners and kerosene/oil firing.

4.7.2 LAER Proposals for Combustion Turbine/Duct Burner

Ravenswood Cogeneration Facility is proposing to comply with this emission limit by utilizing a General Electric Model 7FA dry low-NO_x lean combustion turbine and selective catalytic reduction to control emissions of NO_x while firing natural gas to 2.0 ppm for the turbine and 3.1 ppm with the duct burner. A higher limit of 9.0 ppm for the turbine firing kerosene with and without the duct burner firing natural gas.

4.8 LAER Analysis for Volatile Organic Compounds

Since potential emissions from the facility exceed the NSR "significance" threshold, VOC emissions must meet LAER controls. Section 4.7.1 presents the LAER proposal for VOC emissions from the combustion turbine.

4.8.1 LAER Proposal for Turbine/Duct Burner Volatile Organic Compound Control

Combustion turbines have inherently low VOC emissions. The emissions of VOC in a combustion process are a result of the incomplete combustion of organic compounds within the fuel. In an ideal combustion process, all carbon and hydrogen contained within the fuel are oxidized to form CO_2 and H_2O. Ideal combustion occurs under high temperatures and sufficient excess air, both of which favor NO_x production. Advanced dry low-NO_x turbine combustion technology with an oxidation catalyst is proposed as LAER for VOC emissions from the turbine/duct burner unit. Dual emission limits are proposed to account for the greater VOC emissions associated with supplementary fired operation. Proposed limits are 1.2 ppm for the turbine firing natural gas and 10.7 ppm for the turbine and duct burner firing natural gas, while firing kerosene the proposed limit for the turbine is 3.0 ppm and 9.7 ppm for the turbine firing kerosene and the duct burner firing natural gas @ 15% O_2.

4.9 Ammonia Slip Emissions

Ammonia (NH_3) emissions from the proposed combustion turbine/duct burner result from the use of SCR for NO_x control. SCR involves the injection of NH_3 into the exhaust gas stream upstream of a catalyst bed. On the catalyst surface, NH_3 reacts with NO_x contained within the air to form N_2 gas and H_2O as previously described.

In a typical NH_3 injection system, NH_3 is drawn from a storage tank, vaporized and injected upstream of the catalyst bed. Excess NH_3 which is not reacted in the catalyst bed, and which is emitted, is referred to as NH_3 slip.

Ravenswood Cogeneration Facility has assumed a maximum NH_3 slip from the SCR of 10 ppm. This proposed emission limit is equivalent to the limit in the recently-issued Athens Generating permit for a combined cycle electric generating facility. Therefore, the proposal for NH_3 emissions is a 10 ppm emission limit, which is feasible based upon the NO_x emission limit specified in Section 4.7.

4.10 Summary of Control Technology Proposals

Table 4–2 provides a summary of the control technology proposals presented for regulated pollutants.

TABLE 4-1
KEYSPAN ENERGY
ELECTRIC UTILITY POWER PLANTS
RECENT PERMITTED/PROPOSED EMISSION LIMITS - UPDATED 12/14/99

Facility	Location	Output MW	Natural Gas Emission Limits (ppmvd) NOx	Equipment Description	Controls Description	Permit Status
ANP Energy Co	Bellingham, MA	180	2.0	(2) ABB GT24's, 2 unfired HRSGs	SCR, Ox Cat	Air Permit Approval issued 7/30/99
ANP Energy Co	Blackstone, MA	580	2.0	(2) ABB GT24's, 2 unfired HRSGs	SCR, Ox Cat	Air Permit Approval issued 4/16/99
Lake Road	Lake Road, CT		2.0	ABB GT-24 178 MW per unit	SCR	Final Permit Issued 6/22/99
PDC El Paso/Milford	Milford, CT		2.0	(?) turbines, combined cycle	SCR	Final Permit Issued 4/16/99
Sithe Fore River	Fore River, MA		2.0	MHI 501G turbines	SCR	
Sithe Mystic	Everett, MA	1,550	2.0	(4) MHI 501G turbines, fired HRSGs	SCR, LNB, Ox Cat	Air permit issued 11/23/99; NH3 slip = 2.0 ppm; VOC = 1.7 ppm when duct firing
Southern Energy	MA	170	2.0	GE 7FA turbine	SCR	Proposed NOx levels in permit application; 2 ppm NH3 slip
Southern Energy	Sandwich, MA	525	2.0	(2) GE 7FA's	SCR	Proposed NOx levels in permit application; 2 ppm NH3 slip
US Generating Co	Athens, NY	1,080	2.0	(3) 501G's	SCR	Draft permit issued
US Generating Co	Killingly, CT	792	2.0	(3) ABB GT24's w/ duct burners	SCR, Ox Cat	Air Permit Approval issued 6/22/99
AES Londonderry	Londonderry, CT	720	2.5	(2) 501G turbines, 2 unfired HRSGs	SCR	Final Approval issued 4/26/99
Cogen Tech	Linden, NJ	181	2.5	(1) GE 7FA, unfired HRSG	SCR, DLN, Ox Cat	Final NJDEP permit issued 12/7/99; NH3 slip <10 ppm
Gorham Energy	Gorham, ME	900	2.5	(?) turbines, combined cycle	SCR	Permit application submitted in 12/98
LaPaloma Generating	McKittrick, CA	1,048	2.5	(4) ABB KA-24 w/ HRSGs	SCR, DLN, Ox Cat*	Application approved August 1998; NH3 slip of 10 ppm
Southern Energy	Newington, NH	525	2.5	(2) GE 7FA's w/ 2 fired HRSGs	SCR	Temporary Air Permit issued 4/26/99
US Generating Co	Mantau Creek, NJ		2.5	(3) ABB GT24's, 3 unfired HRSGs	SCR	Final NJDEP permit issued 12/8/99; NH3 slip <10 ppm
Westbrook Power	Westbrook, ME	528	2.5	(2) turbines, combined cycle	SCR, DLN	Permit application submitted in 12/98
AES Red Oak	Sayreville, NJ	816	3.0	(3) 501F turbines, 3 unfired HRSGs	SCR, DLN, Ox Cat	Public draft permit issued - comment period ends 1/10/00
Sacramento Power	Sacramento, CA	157	3.0	(?) Siemens V84.2 turbines	SCR, DLN	Permitted emission limits
Berkshire Power	Agawam, MA	224	3.1	(?) ABB GT24 turbines	SCR, DLN	Permitted emission limits
Alabama Power Co	Theodore, AL	170	3.5	Turbine w/ duct burner, HR boiler	SCR, DLN	Permit application submitted in 3/99
Brooklyn Navy Yard	New York, NY	240	3.5	Turbine - cogeneration facility	SCR, Ox Cat	Permit issued by NYSDEC
Casco Bay Energy	Veazie, ME	170	3.5	(2) turbines, combined cycle	SCR	Permit aplication submitted 7/98
Dighton Power	Dighton, MA	166	3.5	(?) ABB GT11N2 turbines	SCR, DLN	Permitted emission limits
FPL Energy	Marcus Hook, PA	750	3.5	(3) GE 7FA's, 3 fired HRSGs	SCR, DLN	Plan Approval application submitted to PaDEP on 12/14/99
Granite Road Limited	CA	58	3.5	Turbine - electric generation	SCR	Permit issued by San Joaquin APCD (facility not constructed)
Liberty Electric	Eddystone, PA	500	3.5	(2) GE 7FA's, 2 fired HRSGs	SCR, DLN	Draft permit issued 8/25/99
Blue Mountain Power	Richland, PA	153	4.0	Turbine with heat recovery boiler	SCR, DLN	Application submitted in 1996; facility never constructed
AES Ironwood	S. Lebanon Twp, PA	700	4.5	(2) West. 501G's, 2 unfired HRSGs	SCR, DLN	Plan Approval issued 3/29/99; NH3 slip <10 ppm

Notes:

All proposed/permitted emission limits represent turbine operation without duct burner firing.

Data obtained from RACT/BACT/LAER Clearinghouse (RBLC) search is limited in certain cases.

SCR - Selective Catalytic Reduction

DLN - Dry Low-NOx Burners

HRSG - Heat Recovery Steam Generator

Ox Cat - Oxidation Catalyst

* - Permit requires SCONOx or SCR and Oxidation Catalyst

TABLE 4-2
RAVENSWOOD COGENERATION FACILITY
CONTROL TECHNOLOGY PROPOSAL SUMMARY FOR REGULATED POLLUTANTS

Pollutant	Section	Combined Cycle Units without Duct Burner	Combined Cycle Units with Duct Burner Firing Natural Gas	Basis
Carbon Monoxide	4.3	Dry Low-NO_x Combustor and Oxidation Catalyst 2.0 ppm while Firing Natural Gas 5.0 ppm while Firing Kerosene	Dry Low-NO_x Combustor and Oxidation Catalyst 3.9 ppm while Firing Natural Gas 5.4 ppm while Firing Kerosene in Turbine	LAER
Particulate Matter	4.4	Clean Fuel: Natural Gas or Kerosene 0.021 lb/mmBtu while Firing Natural Gas 0.057 lb/mmBtu while Firing Kerosene	Clean Fuel: Natural Gas or Kerosene 0.021 lb/mmBtu while Firing Natural Gas 0.057 lb/mmBtu while Firing Kerosene in Turbine	BACT
Sulfur Dioxide	4.5	Low-Sulfur Fuel: Natural Gas or Kerosene 0.0071 lb/mmBtu while Firing Natural Gas 0.044 lb/mmBtu while Firing Kerosene	Low-Sulfur Fuel: Natural Gas or Kerosene 0.0071 lb/mmBtu while Firing Natural Gas 0.044 lb/mmBtu while Firing Kerosene in Turbine	BACT
Sulfuric Acid Mist	4.6	Low Sulfur Fuel: Natural Gas or Kerosene 0.0022 lb/mmBtu while Firing Natural Gas 0.014 lb/mmBtu while Firing Kerosene	Low Sulfur Fuel: Natural Gas or Kerosene 0.0022 lb/mmBtu while Firing Natural Gas 0.014 lb/mmBtu while Firing Kerosene in Turbine	BACT
Nitrogen Oxides	4.7	Dry Low-NO_x Combustion and SCR Clean Fuel: Natural Gas or Kerosene 2.0 ppm while Firing Natural Gas 9.0 ppm while Firing Kerosene	Dry Low-NO_x Combustion and SCR Clean Fuel: Natural Gas or Kerosene 3.1 ppm while Firing Natural Gas 9.0 ppm while Firing Kerosene in Turbine	LAER
Volatile Organic Compounds	4.8	Dry Low-NO_x Combustor and Oxidation Catalyst Clean Fuel: Natural Gas pr Kerosene 1.2 ppm while Firing Natural Gas 3.0 ppm while Firing Kerosene	Dry Low-NO_x Combustor and Oxidation Catalyst Clean Fuel: Natural Gas pr Kerosene 10.7 ppm while Firing Natural Gas 9.7 ppm while Firing Kerosene in Turbine	LAER
Ammonia	4.9	10 ppm Ammonia Slip	10 ppm Ammonia Slip	Recent NYSDEC Permit

Notes: All ppm values are parts per million by volume, dry basis, corrected to 15% oxygen.
All lb/mmBtu values are based upon the higher heating value (HHV) of the fuel.

5.0 NON-ATTAINMENT AREA REQUIREMENTS

Based upon the provisions of 6 NYCRR Subdivision 231-2.4: "Permit Requirements", facilities subject to the provisions of 6 NYCRR Subpart 231-2 (i.e., major sources or major modifications located in non-attainment or transport areas) must demonstrate, as part of the permit application, that several special conditions are met. These include the need to apply LAER to control facility NOx, VOC and CO emissions and the need to offset all allowable (i.e., potential) emissions of NO_x and VOC at a 1.3 offset to 1.0 emitted ratio. The use of a oxidation catalyst will result in potential facility emissions of CO well below the 100 tons-per-year major source threshold, thereby precluding the need to obtain offsets and perform net benefit modeling. As such, the remainder of this section only discusses the requirements for NO_x and VOC. (The LAER proposals for NO_X and VOC are presented in Sections 4.6 and 4.7 of this permit application, respectively.) Offset requirements are discussed in Section 5.2 Additional requirements specific to offsetting are provided in 6 NYCRR Subdivision 231-2.4, as are other requirements related to NSR. These include:

1) The identification of each emission source from which an emission offset will be obtained. Information required must include the name and location of the facility, emission point identification number, and the mechanism(s) proposed to effect the emission reduction credit (i.e., shutdown, curtailment, installation of emission control equipment) (from 6 NYCRR Subdivision 231-2.4(a)(1)(ii)(a)). (NYSDEC indicated at the October 21, 1999 PSD permit pre-application meeting that emission offsets need to be identified at least 60 days prior to the issuance of the PSD permit and Article X certificate.)

2) The certification that all emission sources which are part of any major facility 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 ownership or control of any entity which controls, is controlled by, or has common control with the applicant) are in compliance, or are on a schedule for compliance, with all applicable emission limitations and standards under Chapter III of Title 6 (Environmental Conservation) (from 6 NYCRR Subdivision 231-2.4(a)(1)(ii)(b)).

3) The submission of an analysis of alternative sites, sizes and production processes, and environmental control techniques which demonstrate that benefits of the proposed source project or proposed major facility significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification within New York State (from 6 NYCRR Subdivision 231-2.4(a)(1)(ii)(c)).

5.1 Compliance Status of KeySpan Energy New York Facilities

KeySpan Energy directly owns, operates or is affiliated with several other facilities within New York State. These entities represent facilities that were once owned and operated by other parties prior to purchase by KeySpan Energy. KeySpan Energy has endeavored to operate these facilities in compliance with applicable Environmental Conservation laws under Title III. KeySpan Energy, and all predecessor companies, have a demonstrated history of compliance with State and Federal environmental regulations. The Ravenswood Cogeneration Facility represents KeySpan Energy's first development of an entirely new project in New York State. KeySpan Energy will commit the effort necessary to ensure that the Ravenswood Cogeneration Facility achieves the same level of compliance.

KeySpan Energy performs environmental audits and prepares annual compliance reports for the U.S. EPA and NYSDEC. The latest such report was filed on March 22, 2000 (Mr. Robert Teetz, KeySpan Energy to Mr. Karl Mangels, U.S. EPA Region II with copies to NYSDEC Bureau of compliance Monitoring and Enforcement in Albany and Mr. Ajay Shah, NYSDEC Region 1). At the present time, facilities owned, operated by or affiliated with KeySpan Energy in New York State are operating in compliance with Title III (Environmental Conservation).

5.2 Emissions Offset Requirements

A major source or major modification planned in a non-attainment area must obtain emissions reductions as a condition for approval. The emissions reductions, generally obtained from existing sources located in the vicinity of a proposed source, must (1) offset the emissions increase from the new source or modification, (2) provide a net air quality benefit on balance (for CO and PM-10 offsets only), and (3) satisfy a "contribution test" for VOC and NO_x offsets. The "contribution test" involves a demonstration that an emission offset obtained from a source in an ozone non-attainment area that is of a different classification than the area in which a proposed source is located, does contribute to the violation of the ozone standard in the non-attainment area where the proposed source is to be located. If such a demonstration can be made, then the shut-down or reduction in the source generating the credit is considered beneficial in the area where the proposed source is located. These offsets, obtained from existing sources which have implemented a permanent, enforceable, quantifiable and surplus emissions reduction, must equal the emissions increase from the new source or modification multiplied by an offset ratio.

KeySpan Energy will be required to purchase ERCs from a source (or sources) that is in a severe ozone non-attainment area. The U.S. EPA allows ERCs to be traded across state lines and the State of New York has reciprocal trading agreements with Pennsylvania and Connecticut. Various efforts have been made by NYSDEC to streamline the procedures for satisfying the "contribution test" for NO_x and VOC offsets. NYSDEC formulated one such technique which considered regional wind patterns, pollutant transport times and ozone formation mechanisms. This effort led to the development of a graphic which delineates the upwind, downwind and crosswind zones where sources of VOC and NO_x offsets can be located relative to the source needing the offsets. This graphic is presented as "Figure 2" in NYSDEC's Air Guide 26. Appendix C. A review of this graphic indicates that KeySpan Energy can obtain offsets from any source within the Rockland, Westchester, Lower Orange County Metropolitan Area (LOCMA), New York City, Nassau and Suffolk Counties, the Philadelphia metropolitan area, or Litchfield and Fairfield counties within Connecticut.

The calculation of required offsets for the KeySpan Energy Ravenswood project is presented in Table 5-1.

5.2.1 Availability and Certification of Emission Reduction Credits

As was previously noted, each emission source providing offsets will need to be identified along with the proposed mechanism to effect the emission reduction credit. As was also previously discussed, NYSDEC indicated at the October 21, 1999 air permit pre-application meeting that emission offsets need to be identified at least 60 days prior to the issuance of the NYSDEC air permit and Article X certificate. After the sources of the emission offsets are identified, the offsets will need to be certified pursuant to the requirements of 6 NYCRR Subpart 231-2.4 "Permit Requirements" and as follows:

1) The applicant will ensure that the permit for each emission source used to provide an emission reduction credit is modified pursuant to Part 621.12 of Part 621 of Title 6 (Environmental Conservation) or in accordance with the procedures of the state (outside of New York) where the providing source is located. The modification must occur prior to the date the proposed facility commences operation and the copy of the modified permit must be submitted NYSDEC (from 6 NYCRR Subdivision 231-2.4(a)(2)(i)(b) & -2.4(a)(2)(ii)).

2) The owner of the emission source shall comply with Subdivision 231-2.12(a). This subdivision details the information required by NYSDEC for certification, including,

(i) name and address of the emission source;
(ii) description of the emission source, its location and operation;
(iii) name of non-attainment contaminant(s);
(iv) documentation establishing the amount of the emission reduction;
(v) documentation establishing that the emission reduction will be surplus, permanent, quantifiable, and enforceable, with supporting calculations;
(vi) specification of the equipment or source operation related to the emission reduction;
(vii) the procedure as to how the applicant will ensure that the emission source will remain in compliance with the reduced emission level; and
(viii) any additional information necessary to enable the NYSDEC to publish a notice of complete permit application.

3) The applicant shall demonstrate to the satisfaction of the NYSDEC that each emission source used to provide an emission reduction credit will be in compliance with special permit conditions effecting the credit within 30 working days, but no less than 10 working days, prior to the date the proposed project commences operation (from 6 NYCRR Subdivision 231-2.4 (b)(2)).

The NYSDEC maintains a registry of emission reduction credits for sources that have fulfilled the requirements for certifying emission reduction credits through enforceable permit modifications. This registry may be utilized by KeySpan Energy in obtaining the required offsets.

5.3 Analysis of Alternatives

Based upon the NYSDEC requirements, Ravenswood Cogeneration Facility is required to conduct an analysis of "alternative sites, sizes production processes and environmental control techniques for the proposed facility, which demonstrates that the benefits of the proposed facility significantly outweigh the environmental and social costs" imposed as a result of the proposed construction. The following section details how the considerable benefits of the proposed project outweigh the minimal environmental impacts.

5.3.1 Project Background

The proposed Ravenswood Cogeneration Facility power generation facility will be a merchant plant that will maximize efficiency and minimize environmental impacts. The facility will consist of one General Electric Frame 7FA combustion turbine with a supplementary fired (duct burner) heat recovery steam generator. The turbine will employ selective catalytic reduction to control nitrogen oxide emissions and an oxidation catalyst to control CO and VOC emissions; turbine exhausts will be directed to one 400-foot stack (above grade level) with an 18.5 foot diameter flue. The turbine will fire natural gas with up to 30-days of kerosene per year. The duct burner will fire only natural gas. Evaporative coolers will be used to lower the temperature of the turbine inlet air, thereby maximizing combustion efficiency. The proposed facility will be constructed on a previously disturbed site adjacent to two existing generation facilities located on the same site. The power from the project will be sold in the competitive electricity market that is developing as a result of deregulation of the electric industry in New York State and elsewhere. The plant will be privately financed and will receive its revenues from the sale of electricity to the market. No regulated cost recovery will be sought for the Facility.

Several vendors were contacted and turbine performance specifications were obtained specific to the size of the project in terms of electrical output. The Ravenswood Cogeneration Facility team evaluated the project's life-cycle costs, preliminary engineering design, and licensing schedule along with vendor emissions data for NO_x, CO, VOC and PM/PM-10 for each machine from -5 °F, 54.6 °F (cooled to 45 °F) and 100 °F (cooled to 73 °F), initial equipment delivery schedules, costs, operations and maintenance programs and warranties for each machine.

The review of vendor specifications also considered the proposed project site location and recognized the project would be affected by the following:

- The project site area within New York is a severe non-attainment area for ozone and moderate non-attainment for CO;
- The project would result in an emissions increase of greater than 25 tons of NO_x and VOC per year and would be subject to ozone non-attainment requirements;
- The facility would be considered a new major PSD source;
- The facility would need to comply with LAER provisions; and
- Emissions offsets for NO_x and VOC would need to be acquired; however, CO offsets would not be required as LAER level of control would reduce emissions to below major source thresholds.

Based upon this assessment and the time allotted for equipment procurement and construction, a decision was made to proceed with the licensing of a GE Frame 7FA combustion turbine combined cycle unit.

5.3.2 Alternative Analysis Results

This section details the results of the alternative analysis studies that were performed during the development of the project. Alternative studies considered a different option for generating the power (i.e., repowering existing boilers Units 10, 20 and 30 and/or upgrading the 17 existing natural gas turbine peaking units), alternative sites and proposed methods of environmental control.

5.3.2.1 Repowering of Ravenswood Units 10, 20 and 30 and/or the 17 Existing Turbines

Repowering of Ravenswood Units 10, 20 and 30 and/or the 17 existing natural gas turbine peaking units would require substantial periods when such units would not be available to service load in the southeastern portion of New York State. Because of this fact and the considerable financial penalty associated with such a determination, this alternative was not pursued.

5.3.2.2 Alternative Sites

Ravenswood Unit 10 was installed in 1961, Unit 20 was installed in 1962, and Unit 30 ("Big Allis") was added in 1965. Units 10 and 20 are essentially identical (twin) units consisting of 390 MW GE turbine-generators and Combustion Engineering (CE) boilers. Unit 30 consists of a 972 MW Allis Chalmers (a.k.a. "Big Allis") steam turbine generator and two half-sized CE gas and oil fired boilers. Originally constructed as a coal-fired facility, coal operations at Ravenswood ceased by 1969 and the facility was modified to burn oil and natural gas. The Ravenswood site also includes the gas turbine complex that provides an additional 415 MW of power. As an existing power site, the Ravenswood Cogeneration Facility site represents an ideal site from the perspective of existing infrastructure, including the ability to utilize the existing steam supply line that runs beneath the East River to steam users in Manhattan. As such, no alternative site is considered as desirable for the proposed Project.

Although KeySpan Energy owns other generation facilities in New York State, the proposed site is considered superior by virtue of its current use, the available acreage, and the ability to utilize the infrastructure attendant to Ravenswood Units 10, 20 and 30 and the 17 existing turbine peaking units. The proposed Project has been sited and designed to minimize visual impacts to the surrounding area and region. The proposed siting places the proposed facility immediately adjacent to existing power station development on previously disturbed land, thereby minimizing potential visual intrusion and eliminating visual impacts to greenfield areas.

5.3.2.3 Environmental Considerations

The use of modern combined cycle technology, as represented by the selected turbine, inherently promotes the efficient utilization of fuel for electric generation. The Ravenswood Cogeneration Facility has been designed to meet the objective of providing environmentally safe electricity. KeySpan Energy believes that the project meets and exceeds environmental commitments for the following reasons;

- The use of an SCR system as LAER for control of NO_x;
- The use of an oxidation catalyst to control CO and VOC;
- Utilization of aqueous ammonia as opposed to anhydrous ammonia for the SCR system;
- The use of clean burning natural gas and low-sulfur kerosene to minimize impacts of SO_2 and PM-10 (emissions of PM-10 are minimized since less sulfur is available to react and form ammonia bisulfate particulate); and
- The use of of an inherently clean firing turbine that, by design, has very low emissions of VOC and CO across proposed operating load ranges.

5.4 Public Need for the Project

Public agencies and private corporations, in their consideration of specific proposals to address growing demands for electrical energy, must evaluate a number of associated needs. Foremost among these are the need to ensure system efficiency and reliability, the need to generate or supply power at a reasonable cost, and the need to provide the required power in an environmentally responsible manner.

A number of features, each of which will be promoted through development of the Ravenswood Cogeneration Facility, affect the efficient and reliable supply of power to the electrical system. One important factor, particularly during periods of high demand, is the availability of backup capacity to mitigate potential power disruptions or emergency situations. The development of new capacity with peaking capability will provide for this flexibility of response and promote system reliability.

Another factor contributing to system reliability is the siting of sources of supply and associated transmission facilities in proximity to demand centers. Siting of generating capacity near the users minimizes the inherent losses during transmission.

Use of modern combined cycle technology promotes the efficient utilization of fuel for electric generation. Increasing fuel efficiency favorably affects the cost of generating electricity and reduces environmental impacts associated with other generation methods such as coal-fired or residual oil-fired plants. The proposed Ravenswood Cogeneration Facility has been designed to meet the objective of providing reliable, efficient, economical and environmentally safe electricity. Use of combined cycle technology to convert natural gas to electrical energy represents an important contribution to the region's current and future energy needs.

5.5 Benefits of the Proposed Facility

The purpose of the proposed 250 MW Ravenswood Cogeneration Facility is to provide economical, reliable, efficient and environmentally safe electricity to residents of southeastern New York and the surrounding region. According to documents published by the New York State Department of Public Service (NYSDPS), New Yorkers have been paying electric prices well above the national average. In addition, according to the New York State Energy Research Development Authority's Patterns and Trends, New York State Energy Profiles: 1982-1996, the average cost per kilowatt hour for residential customers in 1996 was 14.1 cents compared to the average of 8.4 cents for the entire country. In addition to higher residential rates, it has been suggested that high electric rates have been a factor hindering economic development, causing businesses to leave the state, or not to locate or expand in New York, potentially resulting in the loss of jobs.

The New York Public Service Commission (NYPSC or Commission) regulates privately-owned electric, cable, gas, steam, telecommunications, and water utilities in New York State. The commission's mandate is to ensure that consumers receive safe and reliable utility service at reasonable rates with the least adverse effect on the environment.

On May 20, 1996, the Commission issued Opinion No. 96-12 which established the framework for a competitive electric industry in the State of New York. The goal of the Order was reduced prices through an "open and fair" retail marketplace with increased consumer choice of electric providers. The Commission stated:

> ...there should be effective competition in both the generation and energy services sectors. We expect enough players to participate so that no single provider of service dominates the market as a whole or any part of it, controls the price of electricity, or limits customer options. An effective market

requires many buyers and sellers.

The proposed Ravenswood Cogeneration Facility will provide competitive electric generation and improve reliability of power generation and supply within the region. Power demand within the region is rising faster than the ability of the region's power systems to generate and deliver it. During July, 1999, the three major power pools in the Northeastern United States (the New York Power Pool, the New England Power Pool, and the Pennsylvania-Jersey-Maryland Interconnection) set records for demand. The pools are reported to have much less generating capacity in reserve than optimally desired. Such reserves are required to allow the power systems to absorb unexpected problems such as the loss of generating power or downed transmission lines without resorting to voltage reduction or rolling blackouts. The proposed Ravenswood Cogeneration Facility will assist in addressing the situation and result in improved system reliability.

The Ravenswood Cogeneration Facility will bring a number of economic benefits to the residents of New York City. Besides improving the efficiency with which citizens of New York meet their energy needs, the beneficial economic impacts include:

- The proposed Ravenswood Cogeneration Facility will pay substantial taxes associated with improvements to the property, sales taxes on locally purchased items supporting the operation of the facility, and income taxes. These taxes will benefit the local school district, New York City, and the State of New York.

- Construction of the Ravenswood Cogeneration Facility will employ an average workforce of 250 to 300 employees, during an 18-month construction period. The estimated construction-related cost of the facility is in excess of $100 million including labor benefits, overhead and taxes, and the purchase of local supplies, services and consumables. The Ravenswood Cogeneration Facility will have a minimal impact on the municipal services supported by the tax dollars it pays.
- The proposed Ravenswood Cogeneration Facility will employ approximately 25 permanent, highly skilled jobs with a substantial payroll.

- The proposed Ravenswood Cogeneration Facility will have a yearly operating and maintenance budget of approximately $8 million.

- The proposed Ravenswood Cogeneration Facility results in a net environmental impact far less than the impacts associated with the equivalent power that would need to be generated from existing power stations that are less efficient or do not fire clean fuels.

- Emissions of all criteria pollutants meet federal and state air pollution requirements, as presented in Section 3 of this document.

5.6 Conclusions of Analysis

Based upon arguments presented above, the net public gain resulting from the proposed project far exceeds anticipated impacts associated with the construction and operation of the Ravenswood Cogeneration Facility.

TABLE 5-1
RAVENSWOOD COGENERATION FACILITY
CALCULATION OF REQUIRED OFFSETS

Non-Attainment Pollutant	Potential Emissions (TPY)	Proposed Offset Ratio	Required Offsets (Rounded Up)
Nitrogen Oxides	142	1.3:1	185
Volatile Organic Compounds	99.2	1.3:1	129

6.0 TITLE IV SULFUR DIOXIDE ALLOWANCE REQUIREMENTS

Based upon the regulatory impact analysis presented in Section 3 of the PSD Application, the facility is required to obtain SO_2 allowances in order to comply with the requirements of the Acid Rain regulations as presented in 40 CFR 72 and 40 CFR 73.

6.1 Calculation of SO_2 Allowances Required

At the end of each operating year, affected emission units must hold in their compliance subaccounts a quantity of allowances equal to or greater than the amount of SO_2 emitted during that year. To cover their emissions for the previous year, such units must finalize allowance transactions and submit them to U.S. EPA by January 30 to be recorded in their unit accounts. The amount of emissions is determined in accordance with the monitoring and reporting requirements described in the 40 CFR 75 CEM rules.

After the January 30 deadline and the recording of the final submitted transfers, U.S. EPA deducts allowances from each unit's compliance subaccount in an amount equal to its SO_2 emissions for that year. If the unit's emissions do not exceed its allowances, the remaining allowances are carried forward, or banked, into the next year's subaccount, which then becomes the current compliance subaccount. If a unit's emissions exceed its allowances, the unit must pay a penalty and surrender allowances for the following year to U.S. EPA as excess emission offsets. Unless otherwise provided in an offset plan, U.S. EPA deducts allowances from the compliance subaccount in an amount equal to the excess emissions.

Ravenswood Cogeneration Facility will be required to obtain SO_2 allowances based upon the annual SO_2 emissions from the facility. Therefore, based upon potential emission calculations presented in Section 2 of the application, the facility will be required to purchase no more than 104 allowances per year.

6.2 Sources of Allowances

Allowances may be bought, sold, and traded by any individual, corporation, or governing body, including brokers, municipalities, environmental groups, and private citizens. The primary participants in allowance trading are officials designated and authorized to represent the owners and operators of electric utility plants that emit SO_2. Other potential participants are utility power pools, or groups of units choosing to aggregate some or all of the allowances held by the individual units within the pool. The parties involved in the pool determine the details of these allowance-pooling arrangements.

Units that began operating in 1996 or later (such as the proposed Ravenswood Cogeneration Facility) will not be allocated allowances (a source that was operational during the program baseline period was provided allowances as a Phase I unit). Instead, they will have several options for obtaining allowances. Acid Rain program affected sources may purchase allowances from the open market or from the U.S. EPA auctions and direct sales to cover their annual SO_2 emissions; sources with multiple facilities may also opt to transfer allowances from one facility to another. KeySpan Energy plans to do the latter and will utilize allowances provided to, or generated from, existing KeySpan Energy facilities to offset actual SO_2 emissions from the proposed Ravenswood Cogeneration Facility.

6.3 Phase II Acid Rain Permit Application

A completed application for a Phase II Acid Rain permit is included as Appendix E.

7.0 ASSESSMENT OF AIR QUALITY IMPACTS

7.1 Introduction and Summary

The proposed Ravenswood Cogeneration Facility represents a new major source that will have potential annual emissions greater than the significant emission rates under 40 CFR 52.21(b)(23) for CO, SO_2, NO_x, and PM-10; therefore, an air quality dispersion modeling analysis is required (see Table 3-2). The purpose of the air quality analysis is to demonstrate that the National Ambient Air Quality Standards (NAAQS) would not be exceeded due to the proposed facility emissions. However, the New York City area is designated non-attainment for CO; thus, the proposed facility must comply with the NSR non-attainment regulations for CO. The NSR non-attainment regulations require that the proposed facility demonstrate that the CO significant impact concentrations (SICs) will not be exceeded. Because New York County, which borders the existing Ravenswood Generating Station, is non-attainment for PM-10, the proposed facility must also comply with the NSR non-attainment requirements for impacts within that county. Namely, the maximum modeled PM-10 concentrations from the proposed facility must be less than the PM-10 SICs.

The facility is also required to demonstrate compliance with the PSD Class II increment levels. Because the proposed facility triggers PSD review, additional analyses for impacts on soils, vegetation, and visibility for the surrounding area are also required. Another PSD requirement, for urban areas, is a "point-in-space" or "flagpole" receptor analysis to determine the maximum impacts on the numerous high rise buildings throughout the surrounding area for comparison to the SICs and NAAQS.

The PSD and NSR non-attainment modeling analyses also evaluated impacts at "special receptors". These receptors represent sensitive area such as schools, hospitals, and other community facilities in the area surrounding the proposed facility.

Results of the PSD and NSR non-attainment air quality analyses indicate that the proposed facility will have an insignificant impact on the surrounding air quality (i.e., the maximum modeled impacts were less than the SICs). Hence, no further analyses were required as the NAAQS and PSD Class II increment levels will not be threatened by the proposed facility. Additional analyses are also included to demonstrate that the impacts on the surrounding soil, vegetation, and visibility from the proposed facility will also be insignificant.

The flagpole receptor analysis demonstrated that the proposed facility will have maximum modeled concentrations on the high rise buildings that are less than the SICs for all pollutants. Thus, the maximum modeled concentrations are well below the NAAQS.

7.2 Modeling Methodology

Modeling was performed consistent with the procedures found in the U.S. EPA documents; Guideline on Air Quality Models (Revised) (U.S. EPA, 1999), New Source Review Workshop Manual (Draft) (U.S. EPA, 1990), and Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (U.S. EPA, 1992). A detailed discussion on the modeling methodology which was used for the air quality analysis contained in the Dispersion Modeling Protocol submitted to NYSDEC on June 9, 2000 and approved on July 27, 2000.

As described in the dispersion modeling protocol and pursuant to U.S. EPA guidance, the following methodology was incorporated into the assessment:

- Screening of plant operation scenarios with sequential modeling to identify the worst-case to be used for subsequent modeling, if necessary;

- Determination of the project area of impact (if any) in simple terrain areas with sequential modeling; and

- Determination of the project area impact (if any) in intermediate and complex terrain areas using a screening level analysis.

Specifically, results of the screening of plant operation scenarios with sequential modeling to identify the worst-case operating conditions were compared to the SICs established in the NSR regulations. The results were less than the SICs, thus there were no areas of impact and no subsequent modeling (i.e., PSD Class II increment and NAAQS analyses) was required.

Similarly, results of the screening of plant operation scenarios with sequential modeling for the flagpole receptors to identify the worst-case operating conditions were compared to the SICs established in the NSR regulations. The results were less than the SICs; and therefore, well below the NAAQS as required.

7.3 Surrounding Area and Land Use

The proposed project site, shown in Figure 2-2 , is a 2.5-acre, paved parking area located next to KeySpan's existing Ravenswood Generating Station. The proposed site is located within KeySpan's 27.6 acres of property, including an area leased by Con Edison in which their steam generating plant, Boiler "A" House, is located. Con Edison has used the Ravenswood site since the early 1960's for the generation of electricity and steam. KeySpan completed acquisition of Con Edison's electric generating facilities at Ravenswood, including the 1,753 MW Ravenswood Units 10, 20 and 30, and the 415 MW gas turbine complex, in mid-1999. The proposed project will take advantage of the unique opportunities provided by the existing facilities and interconnections at the Ravenswood Generating Station including natural gas supply, electric transmission, steam transmission, fuel storage, and water intake and discharge facilities.

The proposed facility is located at approximately 40° 45' 53" North Latitude, 73° 56' 44" West Longitude. The approximate Universal Transverse Mercator (UTM) coordinates of the facility are: 589,000 meters east, 4,512,381 meters north, in Zone 18.

The project site is located along the East River in the Long Island City section of Queens Borough. The site is immediately adjacent to the river and only a few feet above sea level. To the west, across the East Channel, is Roosevelt Island and further west across the West Channel is Manhattan (at the approximate location of 69th Street). To the north are the Astoria Section of Queens and the south reaches of Bronx Borough across the Hell Gate Channel. To the east is the Ravenswood section of Queens; La Guardia Airport is located approximately 5.2 km (3.2 miles) to the east-northeast (distances are from the site to the Marine Air Terminal located on the western portion of La Guardia Airport). The northern boundary of Kings County and Brooklyn Borough is 2.5 km (1.5 miles) to the south. Terrain within 6.0 km (3.8 miles) of the site is relatively flat with elevations limited to 80 feet or less, with the exception of several higher hills to 140 feet in northern Manhattan.

Beyond 6 km (3.8 miles), terrain remains below stack top (approximately 415 feet above sea level) throughout Brooklyn and Queens Counties. It is not until the Hudson River is crossed that elevated terrain (above stack top) is first encountered in the Palisades region of New Jersey. Terrain above stack top is first reached in the Palisades approximately 15 km (9.3 miles) to the north-northwest of the project site. Thereafter, only in a 1-kilometer-wide band of terrain that is the Palisades does the terrain consistently exceed stack top. This band stretches north-northeast parallel to the Hudson River from a distance of 15 km (9.3 miles) from the site and beyond. Another area of elevated terrain is noted 16 km (10 miles) and beyond to the north and northeast of the site in the areas of Mount Vernon, Yonkers and the northern Bronx. However, elevations within this terrain area remain below stack top. Further out (beyond 16 km) the range of the modeling, terrain exceeds stack top in northern Westchester County (terrain to 800 feet) and in Staten Island (at just over 400 feet).

The land uses nearby and adjacent to the Ravenswood site include residential (Queensbridge Houses and Ravenswood Houses in Queens and residential development on Roosevelt Island), industrial and warehousing (on the opposite side of Vernon Boulevard, between 40th and 36th avenues), and public recreation (Queensbridge Park and Roosevelt Island). The area within one mile of the proposed project site also includes most of the Long Island City area of Queens including a portion of the

Hunters Point area, Roosevelt Island, and a portion of the Upper East Side in Manhattan. Roosevelt Island and the area of Manhattan within one-mile of the proposed project site is predominantly residential.

A land use classification analysis was performed to determine whether urban or rural dispersion parameters should be used in quantifying ground-level concentrations. The analysis conformed to the procedures contained in the A.H. Auer paper "Correlation of Land Use and Cover with Meteorological Anomalies" (Auer, 1978). This procedure was followed by visually determining the uses of various industrial, commercial, residential, and agricultural/natural areas within a three kilometer radius circle centered on the proposed site in order to assess the land use around the Ravenswood Cogeneration facility. Essentially, if more than 50 percent of the area within this circle is designated I1, I2, C1, R2, and R3 (industrial, light industrial, commercial, and compact residential), urban dispersion parameters should be used; otherwise, the modeling should use rural dispersion parameters.

Approximately 32 percent of the area surrounding the facility is commercial (C1 according to the Auer classification technique), another 31 percent is compact residential (R2/R3), and 13 percent is considered industrial/light industrial. All three of these land uses are considered urban. Water surfaces cover approximately 14% of the area with metropolitan natural making up the remaining 10%. Water surfaces and metropolitan natural land uses are considered rural. Thus a total of 76% of the land use surrounding the proposed facility is classified as urban. Therefore, the urban dispersion coefficients were used for the air quality modeling analysis. The land use analysis is presented in more detail in Appendix G.

7.4 Model Selection and Inputs

The Industrial Source Complex Short-Term (ISCST3, Version 00101) and SCREEN3 (Version 96043) models were ~~was~~ used to assess the air quality impact from the proposed Ravenswood Cogeneration Facility. ISCST3 Version 00101 was made available for general use by the U.S. EPA Office of Air Quality Planning and Standards (OAQPS) on April 27, 2000. Throughout this application, "ISCST3" refers to version 00101 unless otherwise specified. The ISCST3 model was applied in accordance with the recommendations made in U.S. EPA's Guideline on Air Quality Models (Revised) (U.S. EPA, 1999).

The ISCST3 model is a Gaussian plume model capable of calculating impacts in simple (below stack top), intermediate (above stack top and below final plume rise), and complex (above final plume rise) terrain. However, according to the U.S. EPA's Guideline on Air Quality Models (Revised) (U.S. EPA, 1999), the ISCST3 model can only be used to calculate impacts in intermediate and complex terrain if on-site meteorological data for one continuous year or more is available. Because KeySpan Energy does not have one year of on-site meteorological data for the existing site, the ISCST3 model was only used to determine impacts in simple terrain (Impacts in intermediate terrain were also calculated using the simple terrain algorithms).

Because terrain rises above the proposed stack height for the turbine (i.e., intermediate terrain) and potentially above the height of the turbine final plume rise (i.e., complex terrain), the Valley mode of the SCREEN3 model was used to assess pollutant impacts in the intermediate and complex terrain areas.

If the impacts in areas of intermediate and complex terrain were greater than the simple terrain impacts or greater than the SICs, then a more refined complex terrain model, such as CTSCREEN would have been used. However, the impacts in intermediate and complex terrain were less than the simple terrain impacts and less than the SICs for all pollutants; therefore, no further complex terrain modeling was necessary.

The ISCST3 model includes various input and output options. The model was applied using regulatory default options. These included the following:

- Stack Tip Downwash. U.S. EPA recommends this option for use in regulatory applications. When this option is implemented, a height increment is deducted from the physical stack height before computing plume rise, as recommended by Briggs (1974). The height increment to be deducted depends upon the ratio of stack exit velocity to wind speed and is equal to 2d $[1.5 - v_s/u]$, where v_s is the stack exit velocity, u is the wind speed, and d is the inside stack diameter. If v_s/u is greater than 1.5, the height increment is zero.

- Final Plume Rise. With this option, final plume rise is used for calculating the plume height to be used in estimating ground-level concentrations at all receptors. Gradual plume rise is used for stacks below GEP height and for assessment of impacts at flagpole receptors. U.S. EPA also recommends use of this option for regulatory applications.

- Buoyancy-Induced Dispersion. This option causes modifications to the dispersion coefficient (σ_y and σ_z) calculations that account for enhanced dispersion due to turbulence caused by plume buoyancy (Pasquill, 1976). This results in a simulated plume with greater horizontal and vertical extent than would be simulated considering dispersion from ambient turbulence only. This option is applied only near the source, before the plume reaches its final height. It is a recommended option for regulatory applications.

- Vertical Potential Temperature Gradient. The vertical potential temperature gradient is used to calculate the stability parameters used in plume rise equations for stable conditions. Default values appropriate for rural applications were used in the ISCST3 modeling.

- Wind Profile Exponents. ISCST3 uses a power-law extrapolation of wind speeds from measurement height to plume height. Default values appropriate for rural applications were used in the ISCST3 modeling.

- Decay. An exponential decay term may be included in ISCST3 modeling to simulate removal processes. The decay coefficient may be universally applied to all calculations or entered with meteorological data on an hourly basis. No decay was applied in this analysis.

- Wake Effects. Building wake effects may be simulated using procedures suggested by Huber and Snyder (1976) and Huber (1977). When the stack height is less than the building height plus one half the lesser of the building height or width, wake effects are simulated using procedures suggested by Schulman and Hanna (1986) and based on the work of Scire and Schulman (1980). Direction-specific wake effects were used in ISCST3.

- Calm Processing. The calm processing option was implemented and calm conditions were handled according to methods developed by the U.S. EPA. When a calm is detected in the meteorological data, or the data are missing, the concentrations at all receptors are set to zero, and the number of hours being averaged is never less than 75 percent of the averaging time.

Urban dispersion coefficients and terrain heights for each receptor were also input to the ISCST3 and SCREEN3 model.

7.4.1 Source Parameters and Emission Rates

The Ravenswood Cogeneration Facility will consist of one GE Frame 7FA combustion turbine with a nominal net power output of 171 MW, a supplementary fired (duct burner), HRSG, and a steam turbine generator with a net power output of approximately 90 MW. The majority of the steam created in the HRSG will be used to drive the steam turbine generator, with a portion being sold to Con Edison. SCR will be used to control NO_x emissions and an oxidation catalyst will be used to control CO emissions. Steam leaving the steam turbine will be returned to a condenser, which will be cooled via the existing once-through cooling system. The total nominal electrical power from the cogeneration facility will be approximately 250 MW.

The Ravenswood Cogeneration Facility is proposing to utilize natural gas as the primary fuel and up to 30-days of kerosene as the back-up fuel for the combustion turbine. Each fuel will be fired separately (i.e., there will be no co-firing or fuel mixing) and the duct burner will only fire natural gas. The natural gas is assumed to have a Higher Heating Value (HHV) of approximately 1,000 Btu/standard cubic foot (SCF) and is assumed to contain 2.5 grains of sulfur per 100 SCF on an annual average basis. The kerosene is assumed to have a HHV of 135,000 Btu/gallon and is assumed to contain 0.04% sulfur by weight.

The maximum heat input for the GE Frame 7FA turbine at -5 degrees Fahrenheit (°F) ambient temperature is 2,028 mmBtu/hr, HHV, while firing kerosene. Because turbine performance and emissions are affected by ambient temperature and since performance increases during lower temperatures, an evaporative cooler will be used to cool the inlet air during the warmer seasons. Exhaust gas from the turbine will be exhausted through the supplementary fired (duct burner) HRSG and to the atmosphere through a 400-foot stack. The duct burner will have a maximum rated capacity of 580 mmBtu/hr, Lower Heating Value (LHV) or 644 mmBtu/hr HHV and will only fire natural gas.

The facility will operate on an economic dispatch mode wherein electricity will be provided to the New York Independent System Operator (NY ISO) on an on-demand basis, but will be designed to operate on a continuous basis. Due to the dispatchable nature of the facility operation, periods of part load operation and multiple startups/shutdowns per week could occur. KeySpan Energy anticipates that the proposed Ravenswood Cogeneration Facility will operate at a "base load" exceeding 80% capacity. However, the turbine may operate at maximum capacity (100% load) and part load, as low as 50% capacity. Therefore, the load screening analysis for the turbine will determined impacts for the turbine operating at 50%, 75%, and 100% load conditions. These conditions represent the minimum, midpoint, and maximum operating loads. Because the performance of combustion turbines varies with ambient temperature, the three turbine operating loads were modeled for three ambient temperatures (-5°F, 54.6°F, and 100°F). These ambient temperatures were agreed upon with NYSDEC and represent minimum, average, and maximum design point temperatures for the site area. Thus, nine operating scenarios were modeled for each fuel type to reflect the turbine operating at three different loads and three different ambient temperatures.

When the turbine is firing at 100% load, a duct burner may be fired at maximum load. The duct burner is natural gas fired only; however, it may be fired when the turbine is firing natural gas or kerosene. Therefore, three additional operating scenarios were modeled for each turbine fuel type to account for duct firing when the turbine is operating at 100% at the three ambient temperatures.

In addition to the duct burner, the turbine will be equipped with an evaporative cooler to reduce the temperature of the inlet air to the turbine. The evaporative cooler will only be used when the turbine is operating at 100% load (with and without the duct burner operating) and the ambient temperature is greater than 45°F. Thus, four more operating scenarios were modeled for each turbine fuel type to include the exhaust characteristics and emissions from the turbine (with and without the duct burner operating).

A total of 16 operating scenarios were modeled for each of the turbine fuel types (natural gas and kerosene). Exhaust characteristics of the turbine stack for all 32 operating scenarios are provided in Table 7-1. Table 7-2 presents the potential emission rates for each of the operating scenarios.

7.4.2 Good Engineering Practice Stack Height Analysis

The U.S. EPA provides specific guidance for determining GEP stack height and for determining whether building downwash will occur in the Guidance for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations), (EPA-450/4-80-023R, June, 1985). GEP is defined as "the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes that may be created by the source itself, or nearby structures, or nearby terrain "obstacles".

The GEP definition is based on the observed phenomenon of atmospheric flow in the immediate vicinity of a structure. It identifies the minimum stack height at which significant adverse aerodynamics (downwash) are avoided.

The U.S. EPA GEP stack height regulations specify that the formula GEP stack height is calculated in the following manner:

$$H_{GEP} = H_B + 1.5L$$

where:

H_B = the height of adjacent or nearby structures, and

L = the lesser dimension (height or projected width of the adjacent or nearby structures)

The Ravenswood Cogeneration facility will be designed with a single exhaust stack. The preliminary site layout indicates that the stack will be located within the downwash zone caused by the proposed and existing power plant structures at the Ravenswood site. The controlling structure for the proposed stack will be the proposed air-cooled condenser, which will be located on top of the proposed turbine building. The air-cooled condenser and turbine building have a combined height of 215 feet above grade level and would result in a GEP stack height of 537.5 feet above grade level. However, KeySpan plans to construct a 400-foot stack for the turbine. This stack height has been reviewed to ensure that the stack is at a height sufficient to allow the plume to escape the downwind, turbulent "cavity" zone (extending to roughly 1.5 times the height of the controlling structure) caused by the proposed air-cooled condenser on top of the turbine building. In this case the cavity height is 322.5 feet (1.5 times the air-cooled condenser and turbine building height). As such, the (preliminary) stack height of 400 feet above grade is sufficient to keep the plume out of the cavity.

Because a non-GEP stack will be constructed for the proposed turbine, direction-specific building downwash parameters were included in the modeling analyses for the proposed turbine. The U.S. EPA approved Building Profile Input Program (BPIP - version 95086) was used to determine the directionally dependent building dimensions for input to the ISCST3 model. Table 7-3 presents the GEP stack height analysis and Table 7-4 presents the directional building dimensions used in the ISCST3 modeling analysis. A detailed plot plan of the proposed facility has been provided in Figure 2-2; an elevation view of the facility is provided in Figure 2-3.

7.4.3 Meteorological Data

La Guardia airport is the closest National Weather Service station (NWS Station 14732) that provides publicly available meteorological data for modeling purposes. La Guardia Airport is located in Queens County, New York City, south of the East River on the Long Island Sound and is situated 5.2 km (3.2 miles) east-northeast of the project site. La Guardia Airport data are considered representative of site conditions as terrain features and proximity to major water bodies (which influence local climate) are nearly identical. A five year database, representing the years 1991 to 1995, was used in the modeling. Note that manual data collection ended in 1995 at La Guardia Airport; data are currently collected using automated means which do not allow for the proper calculation of atmospheric stability.

Twice-daily mixing height data collected at the U.S. Department of Energy's Brookhaven National Laboratory site (NWS station 94703) and Atlantic City Airport (NWS station 93755) were also used in the modeling assessment. Two stations were required to complete the five year record because data collection at Atlantic City, located 103 miles south-southwest of the project site, was terminated in August 1994 with the Brookhaven Laboratory site assuming responsibility at that time. The Brookhaven Laboratory site is located approximately 56 miles to the east, in Suffolk County approximately midway between the north and south shores of Long Island. Brookhaven is the nearest location where upper air data is currently collected relative to the project site and is very much representative of upper air conditions at the project site as both are influenced by the same continental/coastal features. Based upon review of summarized mixing height data for 62 upper air stations in the United States, which was prepared by Holzworth (Holzworth, 1972), it was concluded that Brookhaven and Atlantic City mixing height data are both representative of site conditions.

7.4.4 Receptor Grid

7.4.4.1 Basic Grid

A polar receptor grid was developed that extended from the proposed turbine stack out to a distance of 15 km. Receptors were placed on radials every 10 degrees from 10 degrees to 360 degrees (north). The receptors were spaced every 100 meters out to 2 km, every 250 meters from 2 km to 5 km, and every 1 km from 5 km to 15 km along the radials. Any receptors located along these radials that were located within the Ravenswood Generating Station fenceline were removed from the analysis, as this area is precluded from public access. In addition to the polar grid, receptors were placed along the KeySpan fenceline every 25 meters and at identified special receptors.

Because of the surrounding terrain features, terrain heights were input to the ISCST3 model for each receptor. Receptors were assigned the maximum terrain height within the area centered on the receptor location and extending one-half the distance to the adjacent receptors in all directions. Elevation data for the basic grid were obtained from U.S. Geological Survey topographic maps of the study area and CD-ROM 3-arc second digital elevation data. Figures 7-1 and 7-2 depict the receptor grid used to locate the maximum ground-level concentrations for each pollutant.

7.4.4.2 Maximum Impact Area Grid

Modeling results, discussed in Section 7.5, indicated that the maximum concentrations for all pollutants were located within the 100 meter spaced receptor area. As such, no further refinement of the receptor grid was required.

7.4.4.3 Flagpole Receptors

Pursuant to the requirements of the NYCDEP, a list of flagpole receptors was developed for inclusion into the modeling. The list included those flagpole receptors already established by the NYCDEP (i.e., landmark buildings such as the World Trace Center, United Nations Building, and Empire State Building) as well as those included as a result of a field survey conducted by the applicant. The field survey included the following areas:

- Randalls Island;
- East Side of Manhattan - east of 1st Avenue, south of 125th Street, north of 42nd Street;

- North Brother Island;
- Roosevelt Island;
- Southern Bronx - southeast of I-278 from East 132nd to East 141st Streets, Barry Road, Oak Point Avenue, and the area bounded by Tiffany, East Bay and Halleck; and
- Western Queens - north of I-495, west of Jackson and 31st, north of I-278, west of Steinway.

The area extends an approximate minimum distance of 4 km from the project area to an approximate maximum distance of 8 km from the project area. However, inclusion of the landmark receptors extends the maximum distance much farther. As was previously noted, modeling was performed using the gradual plume rise option consistent with regulatory guidance. Appendix H contains the list of building locations and heights used in the analysis.

To account for any possible open windows or balconies on the buildings, half the building height was modeled with a flagpole receptor along with the top of the building. If the maximum modeled concentration had been determined to be at half the height of the building, then a more refined set of flagpole receptors would have been used over the entire height of the building. However, all the pollutant-specific maximum modeled concentrations were located at the top of the buildings; therefore, no refinement of the flagpole receptors was conducted.

7.4.4.4 Special Receptors

A list of special receptors was developed for inclusion into the modeling analysis. USGS topographic maps were reviewed for the area immediately surrounding the project site and noted special receptors (hospitals, schools and other community facilities) were identified. Information for these receptors included the name of the facility, elevation of the terrain above sea level, distance and direction from the Ravenswood Cogeneration Facility and UTM location. Table 7-5 identifies the special receptors included in the modeling as well as the receptor information obtained from the topographic maps (i.e., elevation, UTM location, etc.).

7.5 Modeling Results

Modeling was conducted to assess impacts of the proposed facility and demonstrate that it would not cause an exceedance of the NAAQS or PSD increments in the attainment areas. For the CO and PM-10 non-attainment areas, the proposed facility had to demonstrate that it would result in insignificant PM-10 impacts in New York County and insignificant CO impacts in Queens County. As previously discussed, the modeling was performed for both ground-level and flagpole receptors.

Results of these analyses are presented in following sections. All modeling input and output files used to conduct these analyses have been included electronically on CD-ROM. Copies of this CD-ROM are contained in Appendix J in copies of the PSD Air Permit Application sent to Mr. Leon Sedefian (NYSDEC) and to Mr. Steven Riva (U.S. EPA).

7.5.1 Ground-Level Results

7.5.1.1 Simple Terrain

To determine the worst-case operating scenario for the proposed turbine/HRSG, a load analysis was conducted for four operating loads (50%, 75%, 100%, and 100% with duct burner), three ambient temperatures (-5°F, 54.6°F, and 100°F), and two fuel types. An additional eight operating scenarios were included in the load analysis to account for the operation of the evaporative coolers when the ambient temperature exceeds 45°F and the turbine is operating at 100% load (with and without the duct burner). Thus, a total of 32 scenarios were modeled in the load analyses for the proposed project.

The worst-case turbine/HRSG operating scenarios (i.e., operating scenarios which yielded the maximum modeled concentrations) for the ground-level receptors were: scenario 23 (turbine firing kerosene at 100% load with duct burner firing natural gas and evaporative cooler at 54.6°F) for 1-hour CO impacts and scenario 17 (turbine firing kerosene at 100% load with duct burner firing natural gas at -5°F) for 8-hour CO, 3-hour, 24-hour and annual SO_2, 24-hour and annual PM-10, and annual NO_2 impacts.

The maximum ground-level concentrations were located within the area of 100 meter spaced receptors; therefore, no refined receptor grids surrounding each of the maximum locations were necessary. Results of the turbine/HRSG load analysis for ground-level receptors are shown in Table 7-6. The table shows that maximum concentrations of all pollutants for all averaging periods are less than their respective SICs. Complete results of the turbine/HRSG load analysis for ground-level receptors are presented in Appendix I.

7.5.1.2 Complex Terrain

The complex terrain analysis consisted of modeling the same 32 operating scenarios as in the simple terrain analysis using the Valley mode of the SCREEN3 model. The nearest area of terrain exceeding the elevation of the proposed stack top (415 ft above MSL) is located approximately 25 km from the facility. Receptors were input to the SCREEN3 model at distances of 25, 30, 35, 40, 45, and 50 km from the proposed stack. Elevations for these receptors were obtained from the USGS 3-arc second CD-ROM. Polar rings were created at these distances from the proposed stack and the maximum elevation, regardless of direction, along each polar ring was input to the SCREEN3 model for that distance. The following table presents the distance and maximum elevation input to the SCREEN3 model.

Distance from the KeySpan Ravenswood Cogeneration Facility (km)	Maximum Elevation (ft)
25	499
30	699
35	801
40	801
45	984
50	1158

Results of the complex terrain analysis indicate that the proposed facility will have insignificant air quality impacts in complex terrain areas. Table 7-7 shows the maximum results of the complex terrain analysis. Results for each of the operating scenarios have been included in Appendix I. The worst-case operating scenarios (i.e., operating scenarios which yielded the maximum modeled concentrations) for the complex terrain analysis were scenario 23 (turbine firing kerosene at 100% load with duct burner firing natural gas and evaporative cooler at 54.6°F) for 1-hour and 8-hour CO impacts and scenario 17 (turbine firing kerosene at 100% load with duct burner firing natural gas at -5°F) for 3-hour, 24-hour and annual SO_2, 24-hour and annual PM-10, and annual NO_2 impacts.

Because the turbine/HRSG load analyses resulted in insignificant impacts in both simple and complex terrain, no further modeling is required for the proposed Ravenswood Cogeneration Facility. Additionally, all modeled pollutant concentrations are less than their respective de minimis monitoring levels which confirms the preliminary modeling results submitted with the pre-construction ambient monitoring exemption request, which was submitted to Region II of the U.S. EPA and NYSDEC and approved in a March 27, 2000, letter from U.S. EPA Region II.

7.5.2 Flagpole Receptor Results

A load analysis was also conducted for flagpole receptors for each of the potential turbine/HRSG operating scenarios. Results of the load analysis indicate that scenario 17 (one turbine firing kerosene at 100 % load with duct burner firing natural gas at -5°F) was the worst-case operating scenario for all pollutants and averaging periods.

All of the maximum modeled concentrations were located at the top of the buildings; thus, no refinement of the flagpole receptors was done. Table 7-8 presents the results of the load analysis for the flagpole receptors. As shown in Table 7-8, the maximum modeled concentrations of all pollutants for all averaging periods are less than their respective SICs; and therefore, well below the pollutant-specific NAAQS. Appendix I includes the complete results of the load analysis for the flagpole receptors.

7.6 PSD Additional Impacts Analysis

The following sections present the results of the additional analyses required under the PSD regulations. The additional analyses included the determination of facility impacts to soils and vegetation, impacts to visibility, and impacts to industrial, commercial and residential growth. The results presented below satisfy the requirements of the PSD program. Additional requirements that were raised as part of the Article X process can be found in the Article X Application.

7.6.1 Impacts to Soils and Vegetation

A component of the PSD review includes an analysis to determine the potential air quality impacts on sensitive vegetation types that may be present in the vicinity of the proposed project. The evaluation of potential impacts on vegetation was conducted in accordance with A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals, (U.S. EPA, 1980). Predicted emission concentrations of various constituents from the proposed plant are added to ambient background concentrations and compared to screening concentrations (levels at which change has been reported) to provide an assessment regarding the potential for adversely impacting vegetation with significant commercial and/or recreational value.

Screening concentrations used in this assessment represent the minimum ambient concentrations reported in the scientific literature for which adverse effects (e.g., visible damage or growth retardation) to plants have been reported. Of the potential pollutants generated by the proposed project, vegetative screening concentrations are available for SO_2, NO_2, and CO. Screening concentrations for other potential constituents generated by the facility (e.g., particulate matter) are not currently available. Table 7-9 presents a comparison of the maximum modeled concentrations plus background to the screening concentrations. Inspection of the table reveals that the proposed

Ravenswood Cogeneration Facility will not adversely impact vegetation in the site area.

7.6.2 Impact on Visibility

A Level-1 screening analysis was performed based upon procedures described in U.S. EPA's Workbook for Plume Visual Impact Screening and Analysis (U.S. EPA, 1988). The screening procedure involves calculation of three plume contrast coefficients using emissions of NO_2, PM/PM-10, and sulfates (i.e., H_2SO_4). The Level-1 screening procedure determines the light scattering impacts of particulates, including sulfates and nitrates, with a mean diameter of two micrometers with a standard deviation of two micrometers. The analysis was run assuming that all emitted particulate would be as PM-10, which results in a conservative assessment of visibility impact. These coefficients consider plume/sky contrast, plume/terrain contrast, and sky/terrain contrast.

The Level-1 screening analysis using the U.S. EPA VISCREEN (Version 1.01) model was performed for the worst possible operating scenario. Because the proposed project is projected to have no area of impact, the visibility assessment was performed for an observer at a distance of 30 kilometers from the project site with a conservative background visual range of 30 kilometers. The results of this analysis are presented in Table 7-10 and indicate that the plant will not impact visibility in the area surrounding the plant.

As requested by NYSDEC, a Level-1 screening analysis was also conducted for the nearest Class I area (Edwin B. Forsythe National Wildlife Refuge (NWR)) located in Brigantine, New Jersey. The Edwin B. Forsythe NWR is located approximately 115 kilometers from the proposed site. Therefore an observer distance of 115 kilometers was used with the background visual range of 30 kilometers. Table 7-11 shows the results of the visibility analysis for the Class I area. As shown, the proposed facility will not impact the visibility at the Edwin B. Forsythe NWR.

Electronic output files from the VISCREEN model have been provided on the CD-ROM contained in Appendix J of the copies of the PSD Air Permit Application sent to Mr. Leon Sedefian (NYSDEC) and to Mr. Steven Riva (U.S. EPA).

7.6.3 Impact on Industrial, Commercial and Residential Growth

The proposed project's location at an existing brownfield site within a long-established industrial area will result in minimal impact to services, traffic, and infrastructure. The project will utilize natural gas, which will be brought in by an existing pipeline and will be used for the efficient production of electricity, which will be exported by existing power lines and steam which will be exported to the existing Con Edison steam distribution system. Kerosene, which will be used as a backup fuel will be delivered by barge to the existing barge unloading facility. This kerosene will be stored in an existing kerosene tank at site. The existing roads and services will easily be able to handle the approximately 25 person workforce, who will be spread over 3 shifts. A transient workforce, drawn from a large surrounding area, will be used during the construction phase of the project, however, it is anticipated that few, if any, construction workers will permanently relocate to the surrounding communities. Field construction activities are expected to have an approximate 18-month duration.

The project is designed to result in very low emission levels of air contaminants. In addition, the production of steam by this facility is expected to reduce or eliminate the use of the existing Con Edison "A House" steam plant which currently burns fuel oil with 0.3% sulfur content. The electricity and steam generated by the project will directed to the power and steam distribution system in New York. Thus, this increased power supply will not attract new industry to any specific area. Finally, since the air emissions from the project are so low as to result in less than significant impacts, new industry desiring to locate in the area will not be prohibited due to high air pollution levels caused by the proposed plant. Therefore, the proposed project should have no effect on either existing or future industrial, commercial, or residential growth in the region. Please refer to the Article X Application for greater detail on the results of the evaluation of project impacts to the industrial, commercial and residential growth.

7.7 Modeling Data Files

A listing of the modeling data files for the load analyses used to determine the worst-case operating scenario is included on a CD-ROM. Also included on the CD-ROM are all of the modeling files for the visibility analyses. The CD-ROM is included as Appendix J in the NYSDEC copy of this document that is addressed to Mr. Leon Sedefian and the copy addressed to Mr. Steven Riva (U.S. EPA).

7.8 References

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TABLE 7-1
RAVENSWOOD COGENERATION FACILITY
MODELED SOURCE PARAMETERS[a]

Turbine/ HRSG Scenario No.	Fuel Type	Ambient Temperature (°F)	Turbine Load (%)	Duct Burner Load[b] (%)	Evaporative Cooler Operating?	Exhaust Temperature (°F)	Stack Velocity[c] (ft/s)
1	Natural Gas	-5	100	100	No	181	65.1
2	Natural Gas	-5	100	0	No	181	64.2
3	Natural Gas	-5	75	0	No	175	51.8
4	Natural Gas	-5	50	0	No	172	42.5
5	Natural Gas	54.6	100	100	No	182	61.6
6	Natural Gas	54.6	100	0	Yes	183	62.0
7	Natural Gas	54.6	100	100	Yes	183	62.8
8	Natural Gas	54.6	100	0	No	182	60.8
9	Natural Gas	54.6	75	0	No	175	49.1
10	Natural Gas	54.6	50	0	No	171	40.3
11	Natural Gas	100	100	100	No	186	55.9
12	Natural Gas	100	100	0	Yes	189	59.2
13	Natural Gas	100	100	100	Yes	189	60.0
14	Natural Gas	100	100	0	No	186	55.1
15	Natural Gas	100	75	0	No	179	45.7
16	Natural Gas	100	50	0	No	175	38.7
17	Kerosene	-5	100	100	No	263	69.2
18	Kerosene	-5	100	0	No	263	68.2
19	Kerosene	-5	75	0	No	257	57.9
20	Kerosene	-5	50	0	No	254	47.7
21	Kerosene	54.6	100	100	No	275	73.7
22	Kerosene	54.6	100	0	Yes	278	74.2
23	Kerosene	54.6	100	100	Yes	278	75.3
24	Kerosene	54.6	100	0	No	275	72.6
25	Kerosene	54.6	75	0	No	257	56.3
26	Kerosene	54.6	50	0	No	254	46.4
27	Kerosene	100	100	100	No	278	66.0
28	Kerosene	100	100	0	Yes	283	70.4
29	Kerosene	100	100	100	Yes	283	71.5
30	Kerosene	100	100	0	No	278	65.0
31	Kerosene	100	75	0	No	265	53.1
32	Kerosene	100	50	0	No	255	44.4

[a]Modeling based on a stack height of 400 ft (121.9 m) and base elevation of 15 ft (4.6 m).

[b]Duct burner firing natural gas only.

[c]Exhaust velocity per flue are based on a 18.5 ft (5.6 m) diameter stack.

TABLE 7-2
RAVENSWOOD COGENERATION FACILITY
POTENTIAL EMISSION RATES
(g/s)

Turbine/ HRSG Scenario No.	CO	PM-10[a]	SO_2	NO_x
1	2.66	5.24	2.32	3.61
2	0.87	3.24	1.74	1.82
3	0.70	3.11	1.44	1.46
4	0.59	2.87	1.15	1.15
5	2.60	5.18	2.18	3.44
6	0.84	3.19	1.63	1.68
7	2.63	5.20	2.21	3.47
8	0.81	3.18	1.60	1.65
9	0.67	3.07	1.33	1.34
10	0.56	2.83	1.06	1.06
11	2.49	5.11	1.99	3.25
12	0.76	3.15	1.53	1.60
13	2.55	5.16	2.11	3.39
14	0.70	3.10	1.41	1.46
15	0.59	3.01	1.19	1.20
16	0.50	2.79	0.95	0.95
17	3.97	13.04	11.75	10.91
18	1.95	11.03	11.17	9.18
19	1.70	9.87	9.11	7.37
20	1.42	8.66	7.24	5.81
21	4.06	12.69	11.22	10.45
22	2.08	10.88	10.80	8.86
23	4.10	12.88	11.38	10.58
24	2.05	10.69	10.64	8.72
25	1.64	9.49	8.66	6.99
26	1.35	8.51	6.90	5.51
27	3.81	11.90	9.92	9.40
28	1.95	10.51	10.21	8.40
29	3.97	12.52	10.79	10.13
30	1.80	9.90	9.34	7.67
31	1.51	8.98	7.71	6.24
32	1.29	7.94	6.11	4.89

[a]Potential PM-10 emissions include condensable particulates.

TABLE 7-3
RAVENSWOOD COGENERATION FACILITY
GEP STACK HEIGHT ANALYSIS

Building Description	Height[a] (ft)	Maximum Projected Width (ft)	Distance from Stack (ft)	"5L" Distance (ft)	Formula GEP Stack Height (ft)
Boiler Building Units 10 & 20	155.5	425.0	416.3	777.5	388.8
Boiler Building Unit 30 Tier 1	189.0	470.0	176.1	945.0	472.5
Boiler Building Unit 30 Tier 2	210.0	200.0	176.1	1,000.0	510.0
Boilerhouse "A"	75.0	175.0	240.2	375.0	187.5
Proposed Turbine Building	120.0	320.0	16.0	600.0	300.0
Proposed Air -Cooled Condenser and Turbine Building	215.0	265.0	112.0	1,075.0	537.5
Combustion Turbines CT004-CT007	20.0	130.0	376.2	100.0	50.0
Combustion Turbines CT008-CT011	20.0	130.0	520.3	100.0	50.0
Worthington Gas Turbine Building Unit #1	20.0	130.0	464.3	100.0	50.0
Worthington Gas Turbine Building Unit #2	20.0	130.0	328.2	100.0	50.0
Administration Building	20.0	130.0	408.3	100.0	50.0

[a]Building height is relative to the stack base elevation (15 ft).

TABLE 7-4
RAVENSWOOD COGENERATION FACILITY
BPIP CALCULATED DIRECTION DEPENDENT BUILDING DIMENSIONS FOR PROPOSED TURBINE/HRSG STACK

Direction (Degrees)	Building Height (m)	Building Width (m)
10	64.0	146.2
20	64.0	123.0
30	57.8	122.5
40	64.0	90.6
50	64.0	78.8
60	65.5	70.1
70	65.5	76.1
80	65.5	79.8
90	65.5	81.1
100	65.5	79.9
110	65.5	76.3
120	65.5	72.9
130	65.5	78.3
140	65.5	81.2
150	65.5	81.7
160	65.5	79.7
170	65.5	75.3
180	65.5	68.6
190	64.0	146.2
200	64.0	123.0
210	57.8	122.5
220	64.0	90.6
230	64.0	78.8
240	65.5	70.1
250	65.5	76.1
260	65.5	79.8
270	65.5	81.1
280	65.5	79.9
290	65.5	76.3
300	65.5	72.9
310	65.5	78.3
320	65.5	81.2
330	65.5	81.7
340	65.5	79.7
350	65.5	75.3
360	65.5	68.6

TABLE 7-5
KEYSPAN ENERGY - RAVENSWOOD COGENERATION FACILITY
SPECIAL RECEPTORS INCLUDED IN MODELING ANALYSIS

Receptor	Latitude			Longitude			Elevation (feet above sea level)	UTM East (km)	UTM North (km)	Distance from Facility (m)	Direction from Facility (deg)
	degree	min	sec	degree	min	sec					
PS #76	40	45	38.09	73	56	31.08	20	589.312	4,512.535	348	64
St. Rita's School	40	45	37.06	73	56	24.05	20	589.477	4,512.506	493	75
PS #111	40	45	30.15	73	56	23.12	20	589.503	4,512.291	511	100
PS #112	40	45	8.64	73	56	4.06	20	589.956	4,511.648	1,205	127
PS #204	40	45	23.16	73	56	1.10	30	590.022	4,512.081	1,065	106
PS #4	40	45	14.10	73	56	16.08	30	589.674	4,511.799	891	131
St. Patrick's School	40	45	10.10	73	56	11.08	40	589.792	4,511.677	1,060	132
PS #166	40	45	26.10	73	55	36.02	40	590.607	4,512.181	1,619	97
PS #6	40	45	38.21	73	55	7.27	70	591.282	4,512.559	2,289	86
PS #83	40	45	53.07	73	56	26.31	20	589.425	4,512.999	750	35
Junior High School # 126	40	45	57.05	73	55	50.08	20	590.267	4,513.133	1,473	59
Astoria General Hospital	40	46	5.80	73	55	30.86	30	590.709	4,513.416	1,998	59
PS #5	40	46	5.06	73	55	23.01	40	590.897	4,513.387	2,147	62
PS #17	40	46	0.99	73	55	24.02	40	590.875	4,513.263	2,072	65
St. Georges Church	40	46	22.97	73	55	45.00	30	590.374	4,513.936	2,075	41
PS #7	40	46	21.00	73	55	32.00	30	590.68	4,513.877	2,250	48
School and Church	40	46	15.61	73	55	27.45	40	590.799	4,513.725	2,246	53
Playground	40	46	21.27	73	55	27.84	40	590.773	4,513.878	2,320	50
School	40	46	14.96	73	55	25.97	20	590.823	4,513.694	2,247	54
Astoria Park	40	47	36.22	73	55	34.45	50	590.605	4,516.190	4,133	23
Astoria Park	40	46	41.37	73	55	34.83	40	590.602	4,514.494	2,652	37
Park	40	46	21.25	73	56	7.19	10-20	589.859	4,513.868	1,717	30
Athletic Field	40	46	39.35	73	56	5.10	20	589.899	4,514.423	2,231	24
PS #70	40	45	42.02	73	54	51.94	70	591.633	4,512.687	2,651	83
Junior High School #10	40	45	34.01	73	54	45.91	60-70	591.776	4,512.441	2,777	89
Church	40	45	32.26	73	55	16.15	50-60	591.073	4,512.371	2,073	90
Army Pictorial Center	40	45	25.12	73	55	28.58	40	590.771	4,512.152	1,786	97
Church	40	45	55.51	73	55	24.08	40	590.877	4,513.109	2,013	69
Church	40	46	3.96	73	55	33.30	40	590.663	4,513.353	1,926	60
Church	40	46	2.10	73	55	34.18	40	590.64	4,513.292	1,876	61
School	40	46	15.26	73	55	46.35	40	590.354	4,513.688	1,882	46
Playground	40	46	5.83	73	55	47.66	20	590.31	4,513.411	1,666	52
Health Center	40	46	4.12	73	55	58.04	20	590.077	4,513.346	1,446	48
Rainey Park	40	45	58.31	73	54	17.18	20	592.447	4,513.189	3,540	77

TABLE 7-5
KEYSPAN ENERGY - RAVENSWOOD COGENERATION FACILITY
SPECIAL RECEPTORS INCLUDED IN MODELING ANALYSIS

Receptor	Latitude			Longitude			Elevation	UTM East	UTM North	Distance from	Direction from
	degree	min	sec	degree	min	sec	(feet above sea level)	(km)	(km)	Facility (m)	Facility (deg)
Playground	40	45	44.71	73	56	6.15	20	589.896	4,512.758	972	67
Park	40	45	19.70	73	56	57.72	20	588.686	4,511.972	516	218
High School	40	45	4.06	73	56	14.22	30	589.724	4,511.491	1,147	141
Playground	40	44	49.58	73	56	58.10	20	588.697	4,511.047	1,368	193
St. Johns Hospital	40	44	48.26	73	56	38.87	20	589.143	4,510.991	1,397	174
Court House	40	44	44.20	73	56	36.15	20	589.215	4,510.869	1,527	172
Queens City Prison	40	44	40.80	73	56	49.10	30	588.912	4,510.772	1,611	183
St. Mary's School	40	44	35.21	73	57	13.68	20	588.328	4,510.581	1,921	200
Rail yard	40	44	41.19	73	56	25.46	40	589.475	4,510.779	1,671	163
Rail yard	40	44	51.83	73	55	53.42	60	590.221	4,511.127	1,750	136
Dutch Kills	40	44	28.57	73	56	25.79	0	589.456	4,510.409	2,024	167
Aviation High School	40	44	34.11	73	55	50.19	60	590.298	4,510.573	2,226	144
Queens Vocational High School	40	44	30.06	73	55	44.04	60	590.44	4,510.451	2,408	143
PS #150	40	44	45.15	73	55	28.19	80	590.81	4,510.918	2,327	129
Greenland Park	40	44	51.10	73	55	4.14	50	591.37	4,511.110	2,689	118
Sunnyside Garden Park	40	44	57.52	73	54	54.00	60	591.602	4,511.329	2,807	112
Torsney Playground	40	44	49.34	73	55	16.70	90	591.067	4,511.045	2,461	123
City Hospital	40	45	13.78	73	57	30.50	20	587.915	4,511.778	1,241	241
Correction Hospital	40	45	34.40	73	57	8.23	20	588.446	4,512.401	554	272
Coler Memorial Hospital and Home	40	46	15.21	73	56	35.44	20	589.205	4,513.674	1,309	9
Schurz Park	40	46	36.31	73	56	36.81	40	589.15	4,514.322	1,947	4
Schurz Park	40	46	24.96	73	56	42.95	30	589.014	4,513.981	1,600	1
Goldwater Memorial Hospital	40	45	16.68	73	57	21.13	20	588.148	4,511.874	991	239
Playground	40	46	59.84	73	56	41.91	10	589.024	4,515.060	2,679	1
Playground	40	46	58.53	73	56	42.35	10	589.025	4,515.029	2,648	1
Metropolitan Hospital	40	47	4.29	73	56	40.43	10-20	589.07	4,515.184	2,804	1
School	40	47	1.21	73	56	42.63	10-20	589.001	4,515.091	2,710	0
Vocational High School	40	46	59.24	73	56	45.31	10-20	588.955	4,515.029	2,648	359
Hospital	40	46	55.70	73	57	11.50	80	588.323	4,514.929	2,636	345
Vocational High School	40	46	40.35	73	56	52.20	30	588.797	4,514.441	2,070	354
Beth Israel Hospital North	40	46	32.23	73	56	39.91	30	589.082	4,514.198	1,819	3
PS #190	40	46	30.06	73	57	11.04	60	588.356	4,514.127	1,861	340
PS #37	40	46	45.03	73	57	24.01	90	588.045	4,514.586	2,403	337
Church/School	40	46	36.86	73	56	56.12	40	588.704	4,514.347	1,988	351
Church	40	46	41.36	73	56	58.75	50	588.633	4,514.470	2,121	350

TABLE 7-5
KEYSPAN ENERGY - RAVENSWOOD COGENERATION FACILITY
SPECIAL RECEPTORS INCLUDED IN MODELING ANALYSIS

Receptor	Latitude			Longitude			Elevation (feet above sea level)	UTM East (km)	UTM North (km)	Distance from Facility (m)	Direction from Facility (deg)
	degree	min	sec	degree	min	sec					
PS #6	40	46	39.01	73	57	37.95	90	587.719	4,514.397	2,389	328
School/Church	40	46	44.05	73	57	34.73	90	587.788	4,514.552	2,486	331
School/Church	40	46	46.13	73	57	33.20	90	587.834	4,514.614	2,519	332
Central Park	40	47	1.72	73	57	35.86	50-100	587.758	4,515.107	2,996	336
Central Park	40	45	51.62	73	58	26.11	50-100	586.611	4,512.935	2,452	283
Lenox Hill Hospital	40	46	25.63	73	57	42.56	60-70	587.607	4,513.995	2,132	319
Turtle Pond	40	46	47.02	73	58	5.60	80	587.06	4,514.637	2,975	319
Conservatory Pond	40	46	27.38	73	58	2.75	80	587.138	4,514.020	2,481	311
The Pond	40	45	55.35	73	58	27.65	50	586.563	4,513.026	2,521	285
Hospital	40	46	25.79	73	57	49.42	70	587.466	4,513.993	2,225	316
Junior High School #167	40	46	18.06	73	57	29.95	50	587.914	4,513.752	1,749	322
City University of NY - Hunter College	40	46	6.05	73	57	54.03	80	587.357	4,513.375	1,920	301
School for the Deaf	40	46	5.31	73	57	59.10	70	587.239	4,513.343	2,007	299
Church/School	40	45	56.42	73	57	55.59	60	587.313	4,513.066	1,821	292
Manhattan Eye, Ear, Throat Hospital	40	45	51.10	73	57	51.53	60	587.408	4,512.913	1,679	288
Aviation Trades High School	40	45	48.11	73	57	51.01	60	587.433	4,512.821	1,628	286
PS #59	40	45	33.16	73	57	59.04	50	587.251	4,512.356	1,749	269
Hospital	40	45	33.60	73	58	12.71	40	586.923	4,512.383	2,077	270
St. Patricks Cathedral	40	45	30.20	73	58	36.02	60	586.384	4,512.254	2,619	267
St. Bartholomews Church	40	45	26.30	73	58	24.06	50	586.667	4,512.133	2,346	264
PS #18	40	45	24.22	73	58	22.09	50	586.715	4,512.072	2,306	262
Rockafeller Center	40	45	31.35	73	58	45.52	60-70	586.15	4,512.282	2,852	268
PS #167	40	45	18.13	73	57	59.04	50	587.256	4,511.894	1,811	254
PS #73	40	45	11.11	73	58	20.00	60	586.767	4,511.672	2,343	252
United Nations Building	40	44	54.42	73	58	11.55	50	586.96	4,511.150	2,383	239
Rockafeller University Hospital	40	45	40.82	73	57	28.38	30	587.975	4,512.612	1,051	283
Memorial Hospital for Cancer	40	45	51.41	73	57	20.98	40	588.135	4,512.922	1,020	302
NY Hospital	40	45	49.49	73	57	19.28	30	588.183	4,512.860	947	300
Richman High School	40	45	56.24	73	57	36.06	70	587.782	4,513.072	1,400	300
Cornell University Medical College	40	45	55.17	73	57	15.03	30	588.274	4,513.046	985	312
PS #82	40	46	0.32	73	57	27.04	50	587.992	4,513.198	1,298	309
Hospital for Special Surgery	40	45	53.91	73	57	15.03	30	588.275	4,513.016	964	311
PS #158	40	46	12.25	73	57	4.42	30	588.526	4,513.574	1,284	338
Park	40	46	9.26	73	56	58.98	20	588.645	4,513.483	1,158	342

TABLE 7-6
RAVENSWOOD COGENERATION FACILITY
MAXIMUM MODELED GROUND-LEVEL SIMPLE TERRAIN CONCENTRATIONS

Pollutant	Averaging Period	Significant Impact Concentration ($\mu g/m^3$)	Maximum Modeled Concentration[a] ($\mu g/m^3$)	Maximum Modeled Concentration Location			Distance from Proposed Stack (m)	Direction from Proposed Stack (deg)
				UTM East (m)	UTM North (m)	Elevation (m)		
CO	1-Hour	2,000	3.6	588,614	4,511,922	0.0	600	220
	8-Hour	500	1.9	588,614	4,511,922	0.0	600	220
SO_2	3-Hour	25	6.7	588,614	4,511,922	0.0	600	220
	24-Hour	5	3.2	588,311	4,511,802	0.0	900	230
	Annual	1	0.4[b]	589,674	4,511,799	9.1	891	131
PM-10	24-Hour	5	3.6	588,311	4,511,802	0.0	900	230
	Annual	1	0.5[b]	589,674	4,511,799	9.1	891	131
NO_2	Annual	1	0.4[b]	589,674	4,511,799	9.1	891	131

[a] Results calculated using the ISCST3 model. Scenario 23 (turbine firing kerosene at 100% load with duct burner firing natural gas and evaporative cooler at 54.6°F) yielded the maximum 1-hour CO impacts and scenario 17 (turbine firing kerosene at 100% load with duct burner firing natural gas at -5°F) for 8-hour CO, 3-hour, 24-hour and annual SO_2, 24-hour and annual PM-10, and annual NO_2 impacts.

[b]Annual impacts represent the impacts due to the worst-case fuel burning for 8,760 hours per year. Kerosene was determined to yield the maximum annual impacts for SO_2, PM-10, and NO_2.

TABLE 7-7
RAVENSWOOD COGENERATION FACILITY
MAXIMUM MODELED GROUND-LEVEL COMPLEX TERRAIN CONCENTRATIONS

Pollutant	Averaging Period	Significant Impact Concentration ($\mu g/m^3$)	Maximum Modeled Concentration[a] ($\mu g/m^3$)	Distance from Proposed Stack (km)
CO	1-Hour	2,000	0.6	25
	8-Hour	500	0.3	25
SO_2	3-Hour	25	1.3	25
	24-Hour	5	0.3	25
	Annual	1	0.1[b]	25
PM-10	24-Hour	5	0.3	25
	Annual	1	0.1[b]	25
NO_2	Annual	1	0.1[b]	25

[a]Results calculated using the SCREEN3 model in Valley mode. SCREEN3 24-hour Valley mode concentrations converted to the appropriate averaging periods using the methodology presented in the CTSCREEN manual. Namely, the 24-hour concentration was divided by 0.15 to get the 1-hour concentration and then multiplied by 0.7, 0.55, and 0.03 for 3-hour, 8-hour, and annual concentrations, respectively. Scenario 23 (turbine firing kerosene at 100% load with duct burner firing natural gas and evaporative cooler at 54.6°F) yielded the maximum 1-hour and 8-hour CO impacts and scenario 17 (turbine firing kerosene at 100% load with duct burner firing natural gas at -5°F) yielded the maximum 3-hour, 24-hour and annual SO_2, 24-hour and annual PM-10, and annual NO_2 impacts.

[b]Annual impacts represent the impacts due to the worst-case fuel burning for 8,760 hours per year. Kerosene was determined to yield the maximum annual impacts for SO_2, PM-10, and NO_2.

TABLE 7-8
RAVENSWOOD COGENERATION FACILITY
MAXIMUM MODELED FLAGPOLE RECEPTOR CONCENTRATIONS

Pollutant	Averaging Period	Significant Impact Concentration (μg/m³)	Maximum Modeled Concentration[a] (μg/m³)	Maximum Modeled Concentration Location				Distance from Proposed Stack (m)	Direction from Proposed Stack (deg)
				UTM East (m)	UTM North (m)	Elevation (m)	Flagpole Height (m)		
CO	1-Hour	2,000	10.7	587,100	4,512,395	12.0	189.0	1,900	270
	8-Hour	500	2.5	588,064	4,513,013	15.0	146.3	1,129	304
SO_2	3-Hour	25	19.7	588,064	4,513,013	15.0	146.3	1,129	304
	24-Hour	5	4.2	588,800	4,513,797	12.0	121.0	1,430	352
	Annual	1	0.4[b]	589,740	4,511,690	5.0	14.6	1,012	133
PM-10	24-Hour	5	4.6	588,800	4,513,797	12.0	121.0	1,430	352
	Annual	1	0.4[b]	589,740	4,511,690	5.0	14.6	1,012	133
NO_2	Annual	1	0.4[b]	589,740	4,511,690	5.0	14.6	1,012	133

[a]Scenario 17 (~~one~~ turbine firing kerosene at 100 % load with duct burner firing natural gas at -5°F) was the worst-case operating scenario for all pollutants and averaging periods (i.e., 1-hour and 8-hour CO, 3-hour, 24-hour, and annual SO_2, 24-hour and annual PM-10, and annual NO_2).

[b]Annual impacts represent the impacts due to the worst-case fuel burning for 8,760 hours per year. Kerosene was determined to yield the maximum annual impacts for SO_2, PM-10, and NO_2.

TABLE 7-9
RAVENSWOOD COGENERATION FACILITY
COMPARISON OF MAXIMUM PREDICTED CONCENTRATIONS OF POLLUTANTS TO VEGETATION SCREENING CONCENTRATIONS

Pollutant	Averaging Period	Maximum Modeled Ground-Level Concentration (µg/m³)	Background[a] Concentration (µg/m³)	Total Concentration (µg/m³)	Vegetation Screening Concentrations (µg/m³)		
					Sensitive	Intermediate	Resistant
CO	1-Week	1.1[b]	4,465[c]	4,466.1	1,800,000	--	18,000,000
SO_2	1-Hour	10.9	450[d]	460.9	917	--	–
	3-Hour	6.7	225	231.7	786	2,096	13,100
NO_2	4-Hour	6.2[e]	229[f]	235.2	3,760	9,400	16,920
	8-Hour	5.2	229[f]	234.2	3,760	7,520	15,040
	Annual	0.4	79	79.4	--	94	--

[a]Background concentrations represent the highest second-highest short term (1-, 3-, 8-, and 24-hour) and maximum annual concentrations recorded during the latest three years of available monitoring data (1996-1998) for the PS59 monitor located in New York County.

[b]Maximum modeled concentration conservatively based on 24-hour averaging period.

[c]Maximum background concentration conservatively based on 8-hour averaging period.

[d]Background concentration for SO_2 1-hour unavailable, conservatively assumed to be twice the 3-hour concentration.

[e]Maximum modeled concentration conservatively based on 3-hour averaging period.

[f]Maximum background concentration conservatively based on 1-hour averaging period.

TABLE 7-10
RAVENSWOOD COGENERATION FACILITY
VISCREEN MAXIMUM SURROUNDING AREA VISUAL IMPACTS[a]

Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E[b]		Contrast[c]	
					Criteria	Plume	Criteria	Plume
Inside Surrounding Area								
Sky	10	84	30	84	2.0	1.0	0.05	0.02
Sky	140	84	30	84	2.0	0.3	0.05	-0.01
Terrain	10	84	30	84	2.0	1.3	0.05	0.02
Terrain	140	84	30	84	2.0	0.3	0.05	0.01
Outside Surrounding Area								
Sky	10	25	21.4	144	2.0	1.1	0.05	0.02
Sky	140	25	21.4	144	2.0	0.3	0.05	-0.01
Terrain	10	0	1.0	168	2.0	1.7	0.05	0.02
Terrain	140	0	1.0	168	2.0	0.5	0.05	0.02

[a]Based on the total project emissions.

[b]Color difference parameter (dimensionless).

[c]Visual contrast against background parameter (dimensionless).

TABLE 7-11
RAVENSWOOD COGENERATION FACILITY
VISCREEN MAXIMUM CLASS I AREA VISUAL IMPACTS[a]

Background	Theta (degrees)	Azimuth (degrees)	Distance (km)	Alpha (degrees)	Delta E[b]		Contrast[c]	
					Criteria	Plume	Criteria	Plume
Inside Surrounding Area								
Sky	10	84	115	84	2.0	0.042	0.05	0.00
Sky	140	84	115	84	2.0	0.007	0.05	0.00
Terrain	10	84	115	84	2.0	0.005	0.05	0.00
Terrain	140	84	115	84	2.0	0.001	0.05	0.00
Outside Surrounding Area								
Sky	10	70	109.3	99	2.0	0.044	0.05	0.00
Sky	140	70	109.3	99	2.0	0.008	0.05	0.00
Terrain	10	60	105.2	109	2.0	0.008	0.05	0.00
Terrain	140	60	105.2	109	2.0	0.002	0.05	0.00

[a]Based on the total project emissions.

[b]Color difference parameter (dimensionless).

[c]Visual contrast against background parameter (dimensionless).

FIGURE 7-1
RAVENSWOOD COGENERATION FACILITY
MODELED RECEPTOR GRID INCLUDING SPECIAL RECEPTORS

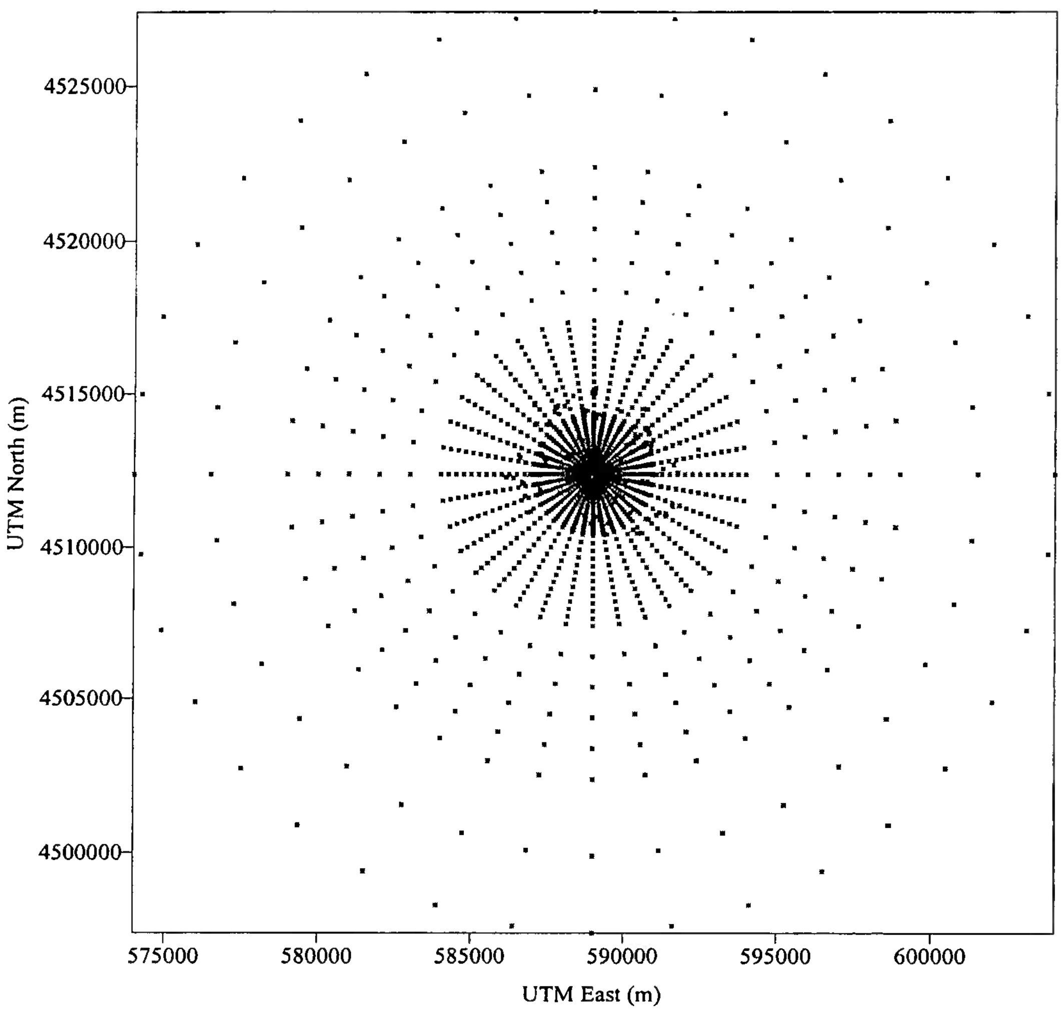
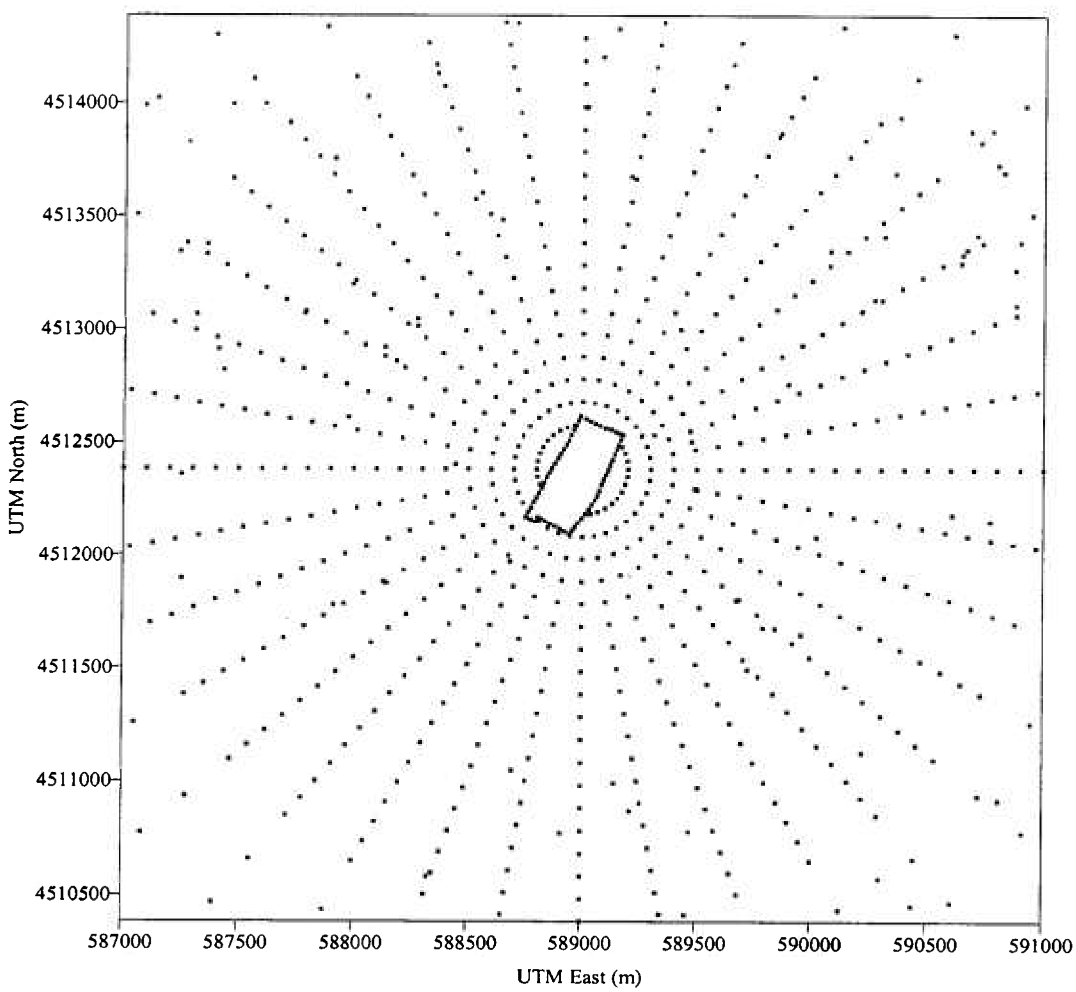


FIGURE 7-2
RAVENSWOOD COGENERATION FACILITY
NEAR RECEPTOR GRID INCLUDING SPECIAL RECEPTORS



Appendix A

Part 201 Major New Source Permit Application

New York State Department of Environmental Conservation
Air Permit Application

DEC ID	APPLICATION ID	OFFICE USE ONLY
2-6304-00024	2-6304-00024/	/ /

Section I - Certification

Title V Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons directly responsible for gathering information (required pursuant to 6 NYCRR 201-6.3(d)) I believe the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Responsible Official	Howard A. Kosel, Jr.	Title	KeySpan V.P. Fossil Production
Signature		Date	

State Facility Certification

I certify that this facility will be operated in conformance with all provisions of existing regulations.

Responsible Official		Title	
Signature		Date	

Section II - Identification Information

Title V Facility Permit
☒ New ☐ Significant Modification ☐ Administrative Amendment
☐ Renewal ☐ Minor Modification General Permit Title:
☒ Application involves construction of new facility ☐ Application involves construction of new emission unit(s)

State Facility Permit
☐ New ☐ Modification
General Permit Title:

Owner/Firm

Name	KeySpan-Ravenswood, Inc.						
Street Address	175 East Old Country Road						
City	Hicksville	State	NY	Country	USA	Zip	11801

Owner Classification: ☐ - Federal ☒ - Corporation/Partnership ☐ - State ☐ - Individual ☐ - Municipal
Taxpayer ID: 113435692

Facility

☐ - Confidential

Name	Ravenswood Cogeneration Facility		
Street Address	38-54 Vernon Boulevard		
☒ City / ☐ Town / ☐ Village	Queens	Zip	11101

Project Description

☐ - Continuation Sheet(s)

This is an initial Title V Air Permit for the construction of a major source. The project consists of one GE 7FA combustion turbine, one heat recover steam generator (HRSG)equipped with a duct burner for supplemental firing and one steam turbine. The turbine will fire natural gas with up to 30 days of kerosene, the duct burner will only fire natural gas. The gas turbine will not operate below 50% load, except during start-up and shutdown. Evaporative foggers will be used to cool the turbine inlet air to increase turbine performance. The plant will have a nominal generating capacity of approximately 250 megawatts.

Owner/Firm Contact Mailing Address

Name (Last, First, Middle Initial)	Teetz, Robert D.					Phone No.	(631) 391-6133
Affiliation	Environmental Engineering Department	Title	Manager			Fax No.	(631) 391-6079
Street Address	445 Broadhollow Road						
City	Melville	State	NY	Country	USA	Zip	11747

Facility Contact Mailing Address

Name (Last, First, Middle Initial)	Teetz, Robert D.					Phone No.	(631) 391-6133
Affiliation	Environmental Engineering Department	Title	Manager			Fax No.	(631) 391-6079
Street Address	445 Broadhollow Road						
City	Melville	State	NY	Country	USA	Zip	11747

New York State Department of Environmental Conservation
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Section III - Facility Information

Classification

☐ Hospital ☐ Residential ☐ Educational/Institutional ☐ Commercial ☐ Industrial ☒ Utility

Affected States (Title V)

☐ Vermont	☐ Massachusetts	☐ Rhode Island	☐ Pennsylvania	Tribal Land:
☐ New Hampshire	☒ Connecticut	☒ New Jersey	☐ Ohio	Tribal Land:

SIC Codes ☐ Continuation Sheet(s)

4911											

Facility Description ☐ Continuation Sheet(s)

The facility will consist of one GE 7FA combustion turbine, one heat recovery steam generator (HRSG) equipped with a duct burner for supplemental firing and one steam turbine. The turbine will fire natural gas with up to 30 days of kerosene, the duct burner will only fire natural gas. The plant will have a nominal generating capacity of approximately 250 megawatts.

Compliance Statements (Title V Only)

For all emission sources at this facility that are operating in compliance with all applicable requirements including any compliance certification requirements under section 114 (a) (3) of the Clean Air Act Amendments of 1990, complete the following:

- ☒ This facility will continue to be operated and maintained in such a manner as to assure compliance for the duration of the permit.
- ☒ For all emission units, subject to any applicable requirements that will become effective during the term of the permit, this facility will meet all such requirements on a timely basis.
- ☒ Compliance certification reports will be submitted at least once per year. Each report will certify compliance status with respect to each requirement, and the method used to determine the status.

Facility Applicable Federal Requirements ☒ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	200		6					
6	NYCRR	200		7					
6	NYCRR	201	1	4	b				
6	NYCRR	201	1	4	d				

Facility State Only Requirements ☐ Continuation Sheet(s)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	215							
6	NYCRR	257	1	4					
6	NYCRR	205							
6	NYCRR	207							
6	NYCRR	226							

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Section III - Facility Information

Facility Applicable Federal Requirements (continuation)

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	201	1	5					
6	NYCRR	201	1	6					
6	NYCRR	201	1	7					
6	NYCRR	201	1	8					
6	NYCRR	201	6	1	a	1			
6	NYCRR	201	b	1	b	3			
6	NYCRR	201	6	3					
6	NYCRR	201	6	5					
6	NYCRR	201	6	6	b				
6	NYCRR	201	6	6	c				
6	NYCRR	202	1	5					
6	NYCRR	202	2						
6	NYCRR	204							
6	NYCRR	211	2						
6	NYCRR	211	3						
6	NYCRR	225	1	8	d				
6	NYCRR	225	1	2	d				
6	NYCRR	227	1	3					
6	NYCRR	227	2						
6	NYCRR	227	3	1					
6	NYCRR	231	2	2	b	1			
6	NYCRR	231	2	3					
6	NYCRR	231	2	4	a				
6	NYCRR	231	2	7	a	1			
6	NYCRR	231	2	7	b				
6	NYCRR	231	2	8					
40	CFR	52	A	21					
40	CFR	60	A						
40	CFR	68							
40	CFR	72	A	6	a	3			
40	CFR	72	A	9					
40	CFR	82	F						

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Section III - Facility Information (continued)

Facility Compliance Certification

☒ Continuation Sheet(s)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	225	I	2	d				

		CAS No.	Contaminant Name
☒ Applicable Federal Requirement	☐ Capping	CAS No.	Contaminant Name
☐ State Only Requirement		7446-09-5	**Sulfur Dioxide**

Monitoring Information

☐ Ambient Air Monitoring ☒ Work Practice Involving Specific Operations ☐ RecordKeeping/Maintenance Procedures

Description

KeySpan Energy will utilize distillate fuel oil containing a maximum 0.2% sulfur by weight at the facility, unless permit restrictions impose additional sulfur limits on a unit-specific basis. KeySpan Energy is proposing compliance by taking a sample of distillate oil from the bulk storage tank after each oil delivery, and testing the sample for sulfur content.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
4	20		ASTM Method D4292 or equiv.

Parameter Code	Parameter Description	Manufacturer Name/Model No.
32	**Sulfur Content**	

Limit Upper	Limit Lower	Limits Units Code	Limits Units Description
0.20		57	**Percent Sulfur by Weight**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
01	**Discrete Sample**	11	**Per Delivery**	10	**Upon Request**

Facility Emissions Summary

☒ Continuation Sheet(s)

CAS No.	Contaminant Name	PTE (lbs/yr)	PTE Range Code	Actual (lbs/yr)
NY075 - 00 - 5	PM-10		G	
NY075 - 00 - 0	Particulates		G	
7446 - 09 - 5	SO2		G	
NY210 - 00 - 0	NOx		G	
630 - 08 - 0	CO		F	
7439 - 92 - 1	Lead		Y	
NY998 - 00 - 0	VOC		G	
NY100 - 00 - 0	HAP		B	
07664 - 93 - 9	Sulfuric Acid		D	
07664 - 41 - 7	Ammonia		G	
7440 - 36 - 0	Antimony		Y	
7440 - 28 - 2	Arsenic		Y	
7740 - 39 - 3	Barium		Y	
07440 - 41 - 7	Beryllium		Y	
07726 - 95 - 6	Bromine		Y	

Facility Emissions Summary (Continued)

CAS No.	Contaminant Name	PTE (lbs/yr)	PTE Range Code	Actual (lbs/yr)
07440 - 43 - 9	Cadmium		Y	
07440 - 47 - 3	Chromium		Y	
07440 - 48 - 4	Cobalt		Y	
07740 - 50 - 8	Copper		Y	
00050 - 00 - 0	Formaldehyde		Y	
07439 - 96 - 5	Manganese		Y	
07439 - 97 - 6	Mercury		Y	
07440 - 02 - 0	Nickel		Y	
07723 - 14 - 0	Phosphorous		Y	
7782 - 49 - 2	Selenium		Y	
07740 - 62 -2	Vanadium		Y	
07740 - 66 - 6	Zinc		Y	
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Section III - Facility Information

Facility Compliance Certification (Continuation)

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	211		3					

☒ Applicable Federal Requirement	☐ Capping	CAS No.	Contaminant Name
☐ State Only Requirement			

Monitoring Information

☐ Ambient Air Monitoring ☒ Work Practice Involving Specific Operations ☐ RecordKeeping/Maintenance Procedures

Description

Compliance will be shown in accordance with 40 CFR 60, Method 9.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR 60, Method 9

Parameter Code	Parameter Description	Manufacturer Name/Model No.
01	**Opacity**	

Limit Upper	Limit Lower	Limits Units Code	Limits Units Description
27		**136**	**Percent**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
18	**6 Minute Average (Method 9)**	**13**	**Single Occurrence**	**10**	**Upon Request**

Rule Citation

Title	Type	Part	Subpart	Section	Subdivision	Paragraph	Sub Paragraph	Clause	Subclause
6	NYCRR	211		3					

☒ Applicable Federal Requirement	☐ Capping	CAS No.	Contaminant Name
☐ State Only Requirement			

Monitoring Information

☐ Ambient Air Monitoring ☒ Work Practice Involving Specific Operations ☐ RecordKeeping/Maintenance Procedures

Description

Compliance will be shown in accordance with 40 CFR 60 Method 9.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR 60, Method 9

Parameter Code	Parameter Description	Manufacturer Name/Model No.
01	**Opacity**	

Limit Upper	Limit Lower	Limits Units Code	Limits Units Description
57		**136**	**Percent**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
18	**6 Minute Average (Method 9)**	**13**	**Single Occurrence**	**10**	**Upon Request**

New York State Department of Environmental Conservation
Air Permit Application

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Section IV - Emission Unit Information

Emission Unit Description

☐ Continuation Sheet(s)

EMISSION UNIT	UCC001

Emission Unit UCC001 represents one GE S107FA combustion turbine rated at 1,779 mmBtu/hr when firing natural gas (the primary fuel) at 54.6°F and 2,028 mmBtu/hr when firing kerosene (back-up fuel) at -5°F. The combustion turbine is equipped with a duct burner rated at 644 mmBtu/hr HHV while firing natural gas. The combined cycle facility generates approximately 250 MW of power.

Building

☐ Continuation Sheet(s)

Building	Building Name	Length (ft)	Width (ft)	Orientation
CCRAV01	Combined Cycle			

Emission Point

☐ Continuation Sheet(s)

EMISSION PT.	CC001					
Ground Elev. (ft.)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section Length (in)	Cross Section Width (in)
15	400	211	222	283		
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal
75	1,213,877			CCRAV01		

Emission Source/Control

☒ Continuation Sheet(s)

Emission Source ID	Emission Source Type	Date Of Construction	Date Of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
ESCC1	C	Sep-00	Sep-02		104	Combustion Chamber	GE S107FA Turbine

Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description
2,028	25	mmBtu/hr				

New York State Department of Environmental Conservation
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Section IV - Emission Unit Information

EMISSION UNIT: U C C 0 0 1

Emission Source/Control (continuation)

Emission Source ID	Type	Date of Construction	Date of Operation	Date of Removal	Control Type Code	Control Type Description	Manufacturer's Name/Model No.
DB01	C	9/2000	9/2002		104	Combustion Chamber	Duct Burner
DLN1	K	9/2000	9/2002		103	Dry Low NO_x Combustor	GE Combustion Turbine
SCR1	K	9/2000	9/2002		033	SCR	
OX1	K	9/2000	9/2002		065	Oxidation Catalyst	

Emission Source ID	Design Capacity	Design Capacity Units Code	Design Capacity Units Description	Waste Feed Code	Waste Feed Description	Waste Type Code	Waste Type Description
DB01	644	25	mmBtu/hr				
DLN1	2028	25	mmBtu/hr				
SCR1							
OX1							

DEC ID
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Section IV - Emission Unit Information (continued)

Process Information

☒ Continuation Sheet(s)

EMISSION UNIT	UCC001	PROCESS	PC1

Description

Emission Unit UCC001 represents a GE S107FA combustion turbine rated at 1,779 mmBtu/hr when firing natural gas (the primary fuel) at 54.6°F and 2,028 mmBtu/hr when firing kerosene (back-up fuel) at -5°F operating at 50-100% load.
Process PC1 for Emission Unit UCC001 represents natural gas firing in the turbine and no duct burner firing. For this process Dry Low NO_x burners and Selective Catalytic Reduction are used to control NO_x emissions. Emissions of VOC and CO are controlled through the use of an oxidation catalyst. Total throughput values listed below represent maximum natural gas use for the short-term (hourly) basis while the annual quantity per year of natural gas represents turbine operations at the average annual temperature (54.6°F).

Source Classification Code (SCC)	Total Thruput Quantity/Hr	Total Thruput Quantity/Yr	Thruput Quantity Units Code	Thruput Quantity Units Description
2-01-002-01	1.81	15,869	0115	million cubic feet gas

	Operating Schedule Hrs/Day	Operating Schedule Days/Yr	Building	Floor/Location
☐ Confidential ☒ Operating at Maximum Capacity ☐ Activity with Insignificant Emissions	24	365	CCRAV01	Ground

Emission Source/Control Identifier(s) (continued)

ESCC1	DLN1	SCR1	OX1				

EMISSION UNIT	UCC001	PROCESS	PC2

Description

Emission Unit UCC001 represents a GE S107FA combustion turbine rated at 1,779 mmBtu/hr when firing natural gas (the primary fuel) at 54.6°F and 2,028 mmBtu/hr when firing kerosene (back-up fuel) at -5°F operating at 50-100% load.
Process PC2 for Emission Unit UCC001 represents kerosene firing in the turbine and no duct burner firing. For this process, Dry Low NO_x burners Selective Catalytic Reduction are used to control NO_x emissions. Emissions of VOC and CO are are controlled through the use of an oxidation catalyst. Kerosene use will be limited to 11.32 million gallons per year, which is equivalent to 720 hours per year of operation. Maximum total throughput of kerosene on an hourly basis, represents turbine operations at -5°F at full load.

Source Classification Code (SCC)	Total Thruput Quantity/Hr	Total Thruput Quantity/Yr	Thruput Quantity Units Code	Thruput Quantity Units Description
2-01-009-01	15,717	11,320,000	0045	Gallons

	Operating Schedule Hrs/Day	Operating Schedule Days/Yr	Building	Floor/Location
☐ Confidential ☒ Operating at Maximum Capacity ☐ Activity with Insignificant Emissions	24	30	CCRAV01	Ground

Emission Source/Control Identifier(s) (continued)

ESCC1	DLN1	SCR1	OX1				

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Section IV - Emission Unit Information (continued)

Process Information

☐ Continuation Sheet(s)

EMISSION UNIT	UCC001		PROCESS	PC3

Description

Emission Unit UCC001 represents a GE S107FA combustion turbine rated at 1,779 mmBtu/hr when firing natural gas (the primary fuel) at 54.6°F and 2,028 mmBtu/hr when firing kerosene (back-up fuel) at -5°F operating at 85-100% load. The combustion turbine is equipped with a duct burner rated at 644 mmBtu/hr while firing natural gas. Process PC3 for Emission Unit UCC001 represents natural gas firing in the gas turbine and duct burner. For this process Dry Low NO_x burners and Selective Catalytic Reduction are used to control NO_x emissions. Emissions of VOC and CO are controlled through the use of an oxidation catalyst. Total throughput values located below represent natural gas use for the short-term (hourly) basis while the annual quantity per year of natural gas represents turbine operations at the average annual temperature (54.6°F).

Source Classification Code (SCC)	Total Thruput Quantity/Hr	Total Thruput Quantity/Yr	Thruput Quantity Units Code	Thruput Quantity Units Description
2-01-002-01	2.45	21,509	0115	million cubic feet gas

☐ Confidential
☒ Operating at Maximum Capacity
☐ Activity with Insignificant Emissions

Operating Schedule Hrs/Day	Operating Schedule Days/Yr	Building	Floor/Location
24	365	CCRAV01	Ground

Emission Source/Control Identifier(s) (continued)

ESCC1	DB01	DLN1	SCR1	OX1			

EMISSION UNIT	UCC001		PROCESS	PC4

Description

Emission Unit UCC001 represents a GE S107FA combustion turbine rated at 1,779 mmBtu/hr when firing natural gas (the primary fuel) at 54.6°F and 2,028 mmBtu/hr when firing kerosene (back-up fuel) at -5°F operating at 85-100% load. The combustion turbine is equipped with a duct burner rated at 644 mmBtu/hr while firing natural gas. Process PC4 for Emission Unit UCC001 represents kerosene firing in the gas turbine, while natural gas is fired in the duct burner. For this process Dry Low NO_x burners and Selective Catalytic Reduction are used to control NO_x emissions. Emissions of VOC and CO are controlled through the use of an oxidation catalyst. Kerosene use will be limited to 11.32 million gallons per year, which is equivalent to 720 hours per year of operation. Maximum total throughput of kerosene, on an hourly basis, represents turbine operations at -5°F at full load.

Source Classification Code (SCC)	Total Thruput Quantity/Hr	Total Thruput Quantity/Yr	Thruput Quantity Units Code	Thruput Quantity Units Description
2-01-009-01	15,717	11,320,000	0045	Gallons

☐ Confidential
☒ Operating at Maximum Capacity
☐ Activity with Insignificant Emissions

Operating Schedule Hrs/Day	Operating Schedule Days/Yr	Building	Floor/Location
24	30	CCRAV01	Ground

Emission Source/Control Identifier(s) (continued)

ESCC1	DB01	DLN1	SCR1	OX1			

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Section IV - Emission Unit Information (continued)

Emission Unit	Emission Point	Process	Emission Source	Emission Unit Applicable Federal Requirements ☒ Continuation Sheet(s)									
				Title	Type	Part	SubPart	Section	SubDivision	Parag.	Sub Parag.	Clause	SubClause
UCC001				40	CFR	60	A	7					
UCC001				40	CFR	60	A	8					
UCC001				40	CFR	60	11						
UCC001				40	CFR	60	12						
UCC001				40	CFR	60	13						

Emission Unit	Emission Point	Process	Emission Source	Emission Unit State Only Requirements ☐ Continuation Sheet(s)									
				Title	Type	Part	SubPart	Section	SubDivision	Parag.	Sub Parag.	Clause	SubClause
UCC001				5	NYCRR	227	1	3					

Emission Unit Compliance Certification

☒ Continuation Sheet(s)

Rule Citation

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	60	GG	333	b				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				7446-09-5	Sulfur Content

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy is proposing a custom schedule for fuel sulfur monitoring in accordance with 40 CFR 60 Part 60.13(i).

Work Practice Type	Parameter Code	Parameter Description	Reference Test Method
			Part 60, Appendix A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
32	Sulfur Content	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.8		57	Percent by Weight

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
01	Grab Sample	36	Custom Schedule	10	Upon Request

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Section IV - Emission Unit Information (continued)

Emission Unit	Emission Point	Process	Emission Source	Emission Unit Applicable Federal Requirements									☐ Continuation Sheet(s)
				Title	Type	Part	SubPart	Section	SubDivision	Parag.	Sub Parag.	Clause	SubClause
UCC001				40	CFR	52	A	21					
UCC001				40	CFR	60	A	19					
UCC001				40	CFR	60	Da						
UCC001				40	CFR	60	GG	322	a	1			
UCC001				40	CFR	60	GG	333	b				
UCC001				40	CFR	60	GG	334	b				
UCC001				40	CFR	60	GG	335	c				
UCC001				40	CFR	60	GG	335	d				
UCC001				40	CFR	60	GG	335	e				
UCC001				40	CFR	72	A	9					
UCC001				40	CFR	75	A	5					
UCC001				40	CFR	75	B	10					
UCC001				40	CFR	75	B	11	d				
UCC001				40	CFR	75	B	11	d	2			
UCC001				40	CFR	75	B	12	a				
UCC001				40	CFR	75	B	12	b				
UCC001				40	CFR	75	B	13	b				
UCC001				40	CFR	75	C						
UCC001				40	CFR	75	D						
UCC001				40	CFR	75	F	50					
UCC001				40	CFR	75	F	52					
UCC001				40	CFR	75	F	53					
UCC001				40	CFR	75	F	54					
UCC001				40	CFR	75	F	55	b	2			
UCC001				40	CFR	75	F	55	b	3			
UCC001				40	CFR	75	F	55	c				
UCC001				40	CFR	75	F	56					
UCC001				40	CFR	G							
UCC001				6	NYCRR	201	7	1					
UCC001				6	NYCRR	227	1	3	a	1			
UCC001				6	NYCRR	227	1	3	a	2			
UCC001				6	NYCRR	231	2	7	a	1			
UCC001				6	NYCRR	231	2	7	b				

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				07440-41-7	Beryllium

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Alternate fuel usage (kerosene) in the combustion turbine is limited to 11.32 million gallons per year.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
04	006	Number 1 Oil (kerosene)	40 CFR Part 60 Appendix A Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
11.32		121	Million Gallons Burned

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
16	Calender Max Recorded Daily	12	During Oil Use	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☐ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				07664-93-9	Sulfuric Acid

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Aletrnate fuel usage (kerosene) in the combustion turbine is limited to 11.32 million gallons per year.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
01	006	Number 1 Oil (Kerosene)	

Parameter Code	Parameter Description	Manufacturer Name/Model No.

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
11.32		121	Million Gallons Burned

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
16	Calender Max Recorded Daily	12	During Oil Use	10	Upon Request

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	60	GG	334	(a)				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				NY210 - 00 - 0	Oxides Of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy is proposing to use a CEM for NO_x to satisfy Subpart GG requirements.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.038		7	Pounds per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
08	1-Hour Average	01	Continuously	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001					Sulfuric Acid

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy will burn natural gas as a primary fuel in the combustion turbine and as the only fuel in the duct burner.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
04	012	Natural Gas Burned	

Parameter Code	Parameter Description	Manufacturer Name/Model No.
22	Volume	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
		01	Continuous	10	Upon Request

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				07440 - 41 - 7	Beryllium

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy will burn natural gas as a primary fuel in the combustion turbine and as the only fuel in the duct burner.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
04	012	Natural Gas Burned	

Parameter Code	Parameter Description	Manufacturer Name/Model No.
22	Volume	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
		01	Continuous	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	201	7	1					

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				7446-09-5	Sulfur Dioxide

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy is proposing a fuel sulfur limit of 0.04 percent by weight to be tested each time the tank is filled.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
4	036	Kerosene	ASTM Method D4292 or Equivalent

Parameter Code	Parameter Description	Manufacturer Name/Model No.
32	Sulfur Control	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.04		57	Percent by Weight

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
01	Grab Sample	12	Per Batch	10	Upon Request

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				7446-09-5	Sulfur Dioxide

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Alternate Fuel Usage (kerosene) in the combustion turbine is limited to 11.32 million gallons per year.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
04	006	Number 1 Oil (Kerosene)	

Parameter Code	Parameter Description	Manufacturer Name/Model No.

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
11.32		121	Million Gallons Burned

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
16	Calendar Max Recorded Daily	12	During Oil Use	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	227	1	3	a	1			

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001					

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Limit opacity to 20% for any six-minute period. Compliance will be demonstrated with an opacity meter as required in 40 CFR 60.47a(a).

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR 60 Appendix A Method 9

Parameter Code	Parameter Description	Manufacturer Name/Model No.
01	Opacity	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
20.0		136	Percent Opacity

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
19	6-Minute Average	01	Continuous	07	Quarterly

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	227	1	3	a	1			

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001					

Monitoring Information

- ☒ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as Surrogate
- ☐ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

Limit opacity to 27% for one six-minute time period. Compliance will be demonstrated with an opacity meter as required in 40 CFR 60.47a(a).

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR 60 Appendix A Method 9

Parameter Code	Parameter Description	Manufacturer Name/Model No.
1	Opacity	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
27		136	Percent opacity

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
19	6-minute average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	227	2	4	e	2	i		

☐ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				NY210-00-0	Oxides of Nitrogen

Monitoring Information

- ☒ Continuous Emission Monitoring
- ☐ Intermittent Emission Testing
- ☐ Ambient Air Monitoring
- ☐ Monitoring of Process or Control Device Parameters as Surrogate
- ☐ Work Practice Involving Specific Operations
- ☐ Record Keeping/Maintenance Procedures

Description

Compliance with the NO_x RACT emission limit will be demonstrated pursuant to 40 CFR 60 Appendix A, Method 19 and 6 NYCRR 227-2.6 (b). Compliance will be based on the combination of the turbine and the duct burner when both fire, and the turbine alone when not duct firing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR 60 Appendix A Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
42		275	Parts per million by volume (dry, corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	01	Continuous	07	Quarterly

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☐ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				7446-09-5	Sulfur Dioxide

Monitoring Information

☐ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☒ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

KeySpan Energy will burn natural gas as a primary fuel in the combustion turbine and as the only fuel in the duct burner.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
04	012	Natural Gas Burned	

Parameter Code	Parameter Description	Manufacturer Name/Model No.
22	Volume	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
		01	Continuous	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	227	2	4	e	2	ii		

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001				NY210-00-0	Oxides of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Compliance with the NO_x RACT emission limit will be demonstrated pursuant to 40 CFR 60 Appenidx A, Method 19 and 6 NYCRR 227-2-6(b). Compliance will be based on the combination of the turbine and the duct burner when both fire, and the turbine alone when not duct firing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR Part 60 Appendix A Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
65		275	Parts per million by volume (dry, corrected 10 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	01	Continuous	07	Quarterly

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC01	CC001	PC1		NY075 - 00 - 0	Particulates

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.021 lb/mmBtu Particulate Matter emission limit during natural gas firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with particulate emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 5

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.021		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC2		NY075 - 00 - 0	Particulates

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.057 lb/mmBtu Particulate Matter emission limit during kerosene firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup three and shutdown (not to exceed hours per occurrence). KeySpan Energy will show compliance with particulate emission by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 5

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.057		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

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Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		NY075 - 00 - 0	Particulates

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.021 lb/mmBtu Particulate Matter emission limit during natural gas firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine and the duct burner operating simultaneously on natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with particulate matter limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 5

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	**Concentration**	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.021		**7**	**Pounds Per Million Btus**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	**Reference Test Method**	**14**	**As Required**	**10**	**Upon Request**

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		NY075 - 00 - 0	Particulates

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.057 lb/mmBtu particulate matter emission limit during kerosene firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine firing kerosene while the duct burner fires natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). Keyspan Energy will show compliance with particulate emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 5

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	**Concentration**	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.057		**7**	**Pounds Per Million Btus**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	**Ref. Test Method**	**14**	**As Required**	**10**	**Upon Request**

DEC ID
2-6304-00024

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC1		NY075 - 00 - 5	PM - 10

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.021 lb/mmBtu Particulate Matter emission limit during natural gas firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with PM emissions limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 201/201A and 202

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.021		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC2		NY075 - 00 - 5	PM - 10

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.057 lb/mmBtu Particulate Matter emission limit during kerosene firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This limit applies at all loads except during startup three and shutdown (not to exceed hours per occurrence). KeySpan Energy will show compliance with PM-10 emissions by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 201/201A and 202

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.057		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		NY075 - 00 - 5	PM - 10

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.021 lb/mmBtu Particulate Matter emission limit during natural gas firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine and the duct burner operating simultaneously on natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with particulate matter limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 201/201A and 202

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.021		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		NY075 - 00 - 5	PM - 10

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.057 lb/mmBtu particulate matter emission limit during kerosene firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine firing kerosene while the duct burner fires natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with PM emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Method 201/201A and 202

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.057		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Ref. Test Method	14	As Required	10	Upon Request

New York State Department of Environmental Conservation
Air Permit Application

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC1		NY210 - 00 -0	Oxides Of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

2 ppm (by volume, dry, corrected to 15% O_2) NO_x emission limit during natural gas firing in the gas turbine based upon High Heating Value (HHV) of fuel with no firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Parameter Code	Parameter Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
2.0		275	Parts per million by volume (dry, corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
# 6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC2		NY210 - 00 -0	Oxides Of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

9 ppm (by volume, dry, corrected to 15% O_2) NO_x emission limit during kerosene firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
9		275	Parts per million by volume (dry, corrected to 15% O_2

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

New York State Department of Environmental Conservation
Air Permit Application

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		NY210 - 00 -0	Oxides Of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

3.1 ppm (by volume, dry corrected to 15% O_2) NO_x emission limit during natural gas firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine and the duct burner operating simultaneously on natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Parameter Code	Parameter Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
3.1		275	Parts per million by volume (corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	60	Da	45					

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		NY210 - 00 - 0	Oxides of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Subpart Da limits NO_x emissions from electric utility, industrial and steam generating units. For units constructed after July 9, 1997, NO_x emissions are limited to 0.15 lb/mmBtu. The duct burner, firing natural gas, will be subject to this limit. KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.15		275	Parts per million by volume (corrected to 15% O2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

New York State Department of Environmental Conservation
Air Permit Application

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	60	Da	45					

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		NY210-00-0	Oxides of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

Subpart Da limit NO_x emissions from electric utility, industrial and steam generating units. For units constructed after July 9, 1997, NO_x emissions are limited to 0.15 lb/mmBtu. The duct burner, firing natural gas, will be subject to this limit. KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.15		275	Parts per million by volume (corrected to 15% O2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 hour average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		NY210 - 00 -0	Oxides Of Nitrogen

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

9 ppm (by volume, dry @15% O_2) NO_x emission limit during kerosene firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine firing kerosene while the duct burner fires natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor NO_x emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			40 CFR Part 60, Appendix A, Method 19

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
9		275	Parts per million by volume (corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC1		NY998 - 00 - 0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.0015 lb/mmBtu VOC emission limit during natural gas firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with VOC emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix A, Method 25A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.0015		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Ref. Test Method	14	As Required	10	Upon Request

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC2		NY998 - 00 - 0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.0036 lb/mmBtu VOC emission limit during kerosene firing in the gas turbine based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup hours and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with VOC emission limits by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix A, Method 25A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.0036		7	Pounds Per Million Btus

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	Reference Test Method	14	As Required	10	Upon Request

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2	7	1				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		NY998 - 00 - 0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.0099 lb/mmBtu VOC emission limit during natural gas firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine and the duct burner operating simultaneously on natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with VOC emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix A, Method 25A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	**Concentration**	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.0099		7	**Pounds Per Million Btus**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	**Ref. Test Method**	14	**As Required**	10	**Upon Request**

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		NY998 - 00 - 0	VOC

Monitoring Information

☐ Continuous Emission Monitoring
☒ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

0.0108 lb/mmBtu VOC emission limit during kerosene firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine firing kerosene while the duct burner fires natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will show compliance with VOC emission limit by stack testing.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix A, Method 25A

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	**Concentration**	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
0.0108		7	**Pounds per Million Btus**

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
20	**Reference Test Method**	14	**As Required**	10	**Upon Request**

DEC ID
2-6304-00024

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC1		630 - 08 - 0	Carbon Monoxide

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☒ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

2 ppm (by volume, dry, corrected to 15% O_2) CO emission limit during natural gas firing in the gas turbine based upon High Heating Value (HHV) of fuel with no firing in the duct burner. This emission limit applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor CO emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendices B and F

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
2.0		275	Parts per million by volume (dry, corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J	2			

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC2		630 - 08 - 0	Carbon Monoxide

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

5 ppm (by volume, dry, corrected to 15% O_2) CO emission limit during kerosene firing based upon High Heating Value (HHV) of fuel with no fuel firing in the duct burner. This emission limit applies at all loads except during startup three and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor CO emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix B and F

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
5.0		275	Parts per million by volume (dry, corrected to 15% O_2

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

Emission Unit Compliance Certification (Continued)

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC3		630 - 08 - 0	Carbon Monoxide

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

3.9 ppm (by volume, dry corrected to 15% O_2) CO emission limit during natural gas firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine and the duct burner operating simultaneously on natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor CO emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix B and F

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
3.9		275	Parts per million by volume (corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

Applicable Rule

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	52	A	21	J				

☒ Applicable Federal Requirement ☐ State Only Requirement ☐ Capping

Emission Unit	Emission Point	Process	Emission Source	CAS. No.	Contaminant Name
UCC001	CC001	PC4		630 - 08 - 0	Carbon Monoxide

Monitoring Information

☒ Continuous Emission Monitoring
☐ Intermittent Emission Testing
☐ Ambient Air Monitoring
☐ Monitoring of Process or Control Device Parameters as Surrogate
☐ Work Practice Involving Specific Operations
☐ Record Keeping/Maintenance Procedures

Description

5.4 ppm (by volume, dry @15% O2) CO emission limit during kerosene firing based upon High Heating Value (HHV) of fuel. This emission limit applies to the turbine firing kerosene while the duct burner fires Natural gas. This applies at all loads except during startup and shutdown (not to exceed three hours per occurrence). KeySpan Energy will use a CEM to monitor CO emissions at the stack.

Work Practice Type	Process Material Code	Process Material Description	Reference Test Method
			Part 60, Appendix B and F

Parameter Code	Parameter Description	Manufacturer Name/Model No.
23	Concentration	

Limit Upper	Limit Lower	Limit Units Code	Limit Units Description
5.4		275	Parts per million by volume (corrected to 15% O_2)

Averaging Method Code	Averaging Method Description	Monitoring Frequency Code	Monitoring Frequency Description	Reporting Requirements Code	Reporting Requirements Description
8	1 Hour Average	01	Continuous	07	Quarterly

DEC ID
2 - 6 3 0 4 - 0 0 0 2 4

Section IV - Emission Unit Information (continued)

Determination of Non-Applicability (Title V Only)

☐Continuation Sheet(s)

Rule Citation

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	60	47a	b					

Emission Unit	Emission Point	Process	Emission Source		
UCC001	CC001				☒Applicable Federal Requirement ☐State Only Requirement

Description

Continuous emission monitoring of duct burner exhaust for SO_2 is not required since natural gas is the only fuel to be combusted in the duct burner.

Rule Citation

Title	Type	Part	SubPart	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause

Emission Unit	Emission Point	Process	Emission Source		
					☐Applicable Federal Requirements ☐State Only Requirement

Description

Process Emissions Summary

☐ Continuation Sheet(s)

Emission Unit					PROCESS	
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined

PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)

Emission Unit					PROCESS	
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined

PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)

Emission Unit					PROCESS	
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined

PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)

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Section IV - Emission Unit Information (continued)

Determination of Non-Applicability (Title V Only)

☒Continuation Sheet(s)

Rule Citation

Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
6	NYCRR	231	2						

Emission Unit	Emission Point	Process	Emission Source	
UCC001	CC001			☒Applicable Federal Requirement ☐State Only Requirement

Description

Rule Citation

Title	Type	Part	SubPart	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause
40	CFR	75	11	e					

Emission Unit	Emission Point	Process	Emission Source	
UCC001	CC001			☒Applicable Federal Requirements ☐State Only Requirement

Description

Facility kerosene use will be limited to an equivalent of 720 full power hours per year or 8.2% of annual potential. Since the facility qualifies as a "primarily natural gas fired" (under 40 CFR 72.2), continuous emission monitoring of SO_2 is not required. An alternative monitoring method including fuel flow and fuel sulfur content will be developed for agency approval.

Process Emissions Summary

☒ Continuation Sheet(s)

Emission Unit	UCC001					PROCESS	PC1
CAS No.	Contaminant Name		% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY210 - 00 -0	Oxides Of Nitrogen					65.0	09
PTE				Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)				(lb/hr)	(lb/yr)
65	569,400				09		

Emission Unit	UCC001					PROCESS	PC1
CAS No.	Contaminant Name		% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
630 - 08 - 0	Carbon Monoxide					6.9	09
PTE				Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)				(lb/hr)	(lb/yr)
6.9	60,444				09		

Emission Unit	UCC001					PROCESS	PC1
CAS No.	Contaminant Name		% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY075 - 00 - 0	Particulates					20	09
PTE				Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)				(lb/hr)	(lb/yr)
20	175,200				09		

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Section IV - Emission Unit Information (continued)

Process Emissions Summary (Continuation Sheet)

Emission Unit	UCC001				PROCESS	PC1
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY998 - 00 - 0	VOC				2.6	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
2.6	22,776			09		
Emission Unit	UCC001				PROCESS	PC2
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY210 - 00 -0	Oxides Of Nitrogen				340	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
340	244,800			09		
Emission Unit	UCC001				PROCESS	PC2
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
630 - 08 - 0	Carbon Monoxide				16.5	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
16.5	47,520			09		
Emission Unit	UCC001				PROCESS	PC2
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY075 - 00 - 0	Particulates				51	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
51	36,720			09		
Emission Unit	UCC001				PROCESS	PC2
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY998 - 00 - 0	VOC				6.4	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
6.4	5,400			09		
Emission Unit	UCC001				PROCESS	PC3
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY210 - 00 -0	Oxides Of Nitrogen				129	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
129	1,130,040			09		
Emission Unit	UCC001				PROCESS	PC3
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
630 - 08 - 0	Carbon Monoxide				21.1	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
21.1	184,836			09		

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Section IV - Emission Unit Information (continued)

Process Emissions Summary (Continuation Sheet)

Emission Unit	UCC001				PROCESS	PC3
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY075 - 00 - 0	Particulates				34	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
34	297,840			09		

Emission Unit	UCC001				PROCESS	PC3
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY998 - 00 - 0	VOC				22.3	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
22.3	195,348			09		

Emission Unit	UCC001				PROCESS	PC4
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY210 - 00 -0	Oxides Of Nitrogen				404	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
404	290,880			09		

Emission Unit	UCC001				PROCESS	PC4
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
630 - 08 - 0	Carbon Monoxide				32.5	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
32.5	93,600			09		

Emission Unit	UCC001				PROCESS	PC4
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY075 - 00 - 0	Particulates				65	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
65	46,800			09		

Emission Unit	UCC001				PROCESS	PC4
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
NY998 - 00 - 0	VOC				26.1	09
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)
26.1	21,960			09		

Emission Unit					PROCESS	
CAS No.	Contaminant Name	% Thruput	% Capture	% Control	ERP (LB/HR)	ERP How Determined
PTE			Standard Units	PTE How Determined	Actual	
(lb/hr)	(lb/yr)	(standard units)			(lb/hr)	(lb/yr)

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Section IV - Emission Unit Information (continued)

Emission Unit Emission Summary

☐ Continuation Sheet(s)

Emission Unit				
CAS No.	Contaminant Name			
ERP (lb/yr)	PTE Emissions		Actual	
	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)
CAS No.	Contaminant Name			
ERP (lb/yr)	PTE Emissions		Actual	
	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)
CAS No.	Contaminant Name			
ERP (lb/yr)	PTE Emissions		Actual	
	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)
CAS No.	Contaminant Name			
ERP (lb/yr)	PTE Emissions		Actual	
	(lb/hr)	(lb/yr)	(lb/hr)	(lb/yr)

Compliance Plan

☐ Continuation Sheet(s)

For any emission unit which will not be in compliance at the time of permit issuance, complete the following:

Consent Order

Certified progress reports are to be submitted every 6 months beginning ___/___/____

Emission Unit	Process	Emission Source	Applicable Federal Requirements									
			Title	Type	Part	Sub Part	Section	Sub Division	Parag.	SubParag.	Clause	SubClause

Remedial Measure/Intermediate Milestones	R/I	Date Schedules

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Supporting Documentation

- ☒ P.E. Certification (form attached)
- ☐ List of Exempt Activities (form attached)
- ☒ Plot Plan
- ☒ Calculations*
- ☒ Air Quality Model (___ / ___ / ___)*
- ☐ Confidentiality Justification
- ☐ Ambient Air Monitoring Plan (___ / ___ / ___)
- ☐ Stack Test Protocols/Reports (___ / ___ / ___)
- ☐ Continuous Emissions Monitoring Plans/QA/QC (___ / ___ / ___)
- ☐ MACT Demonstration (___ / ___ / ___)
- ☐ Operational Flexibility: Description of Alternative Operating Scenarios and Protocols
- ☒ Title IV: Application/Registration*
- ☐ ERC Quantification (form attached)
- ☐ Use of ERC(s) (form attached)*
- ☐ Baseline Period Demonstration
- ☐ Analysis of Contemporaneous Emission Increase/Decrease
- ☒ LAER Demonstration* (___ / ___ / ___)
- ☒ BACT Demonstration* (___ / ___ / ___)
- ☒ Other Document(s): *Contained in: PSD Air Permit Application

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Appendix B
Emission Calculations

Keyspan Ravenswood NY Combined Cycle Project

General Electric PG7241(FA) Combustion Turbine (all data are per turbine)

Stack Diameter (ft) = 18.5 Meters= 5.639

Case No.	Fuel	Duct Burner Fuel	Ambient Temp (°F)	Turbine Load (%)	Chiller Operation	Duct Burner Load (%)	Turbine Fuel Rate (lb/hr)	Fuel LHV (Btu/lb)	CTG HHV Heat Input (mmBtu/hr)	HHV Duct Burner (mmBtu/hr)	LHV Heat Input (mmBtu/hr)	Turbine Exhaust (lb/hr)	Flue Gas Mol Wt (lb/lb mol)	Exhaust Temp (°F)	Exhaust Temp (°K)	Stack Exhaust (ACFM)	Stack Velocity (ft/s)	Stack Velocity (m/s)
1	Gas	Gas	-5	100		100	114,966	20,787	1,938	644	1,746	3,784,000	28.48	181	356.1	1,049,354	65.1	19.8
2	Gas		-5	100		0	83,995	20,787	1,938		1,746	3,784,000	28.48	181	356.1	1,036,168	64.2	19.6
3	Gas		-5	75		0	69,274	20,787	1,598		1,440	3,079,000	28.49	175	352.8	835,020	51.8	15.8
4	Gas		-5	50		0	55,467	20,787	1,280		1,153	2,544,000	28.50	172	351.1	686,210	42.5	13.0
5	Gas	Gas	54.6	100		100	108,087	20,787	1,779	644	1,603	3,567,000	28.41	182	356.7	993,882	61.6	18.8
6	Gas		54.6	100	On to 45F	0	78,511	20,787	1,812		1,632	3,631,000	28.40	183	357.2	1,000,131	62.0	18.9
7	Gas	Gas	54.6	100	On to 45F	100	109,482	20,787	1,812	644	1,632	3,631,000	28.40	183	357.2	1,013,337	62.8	19.1
8	Gas		54.6	100		0	77,116	20,787	1,779		1,603	3,567,000	28.41	182	356.7	980,676	60.8	18.5
9	Gas		54.6	75		0	63,838	20,787	1,473		1,327	2,914,000	28.41	175	352.8	792,290	49.1	15.0
10	Gas		54.6	50		0	51,186	20,787	1,181		1,064	2,409,000	28.43	171	350.6	650,423	40.3	12.3
11	Gas	Gas	100	100		100	99,091	20,787	1,572	644	1,416	3,177,000	28.10	186	358.9	901,805	55.9	17.0
12	Gas		100	100	On to 73F	0	73,892	20,787	1,705		1,536	3,411,000	28.23	189	360.6	954,014	59.2	18.0
13	Gas	Gas	100	100	On to 73F	100	104,864	20,787	1,705	644	1,536	3,411,000	28.23	189	360.6	967,303	60.0	18.3
14	Gas		100	100		0	68,119	20,787	1,572		1,416	3,177,000	28.10	186	358.9	888,516	55.1	16.8
15	Gas		100	75		0	57,392	20,787	1,324		1,193	2,668,000	28.11	179	355.0	737,844	45.7	13.9
16	Gas		100	50		0	45,894	20,787	1,059		954	2,273,000	28.14	175	352.8	624,004	38.7	11.8
17	Kerosene	Gas	-5	100		100	139,716	18,300	2,028	644	1,913	3,545,000	28.36	263	401.7	1,116,467	69.2	21.1
18	Kerosene		-5	100		0	104,536	18,300	2,028		1,913	3,545,000	28.36	263	401.7	1,099,572	68.2	20.8
19	Kerosene		-5	75		0	85,246	18,300	1,654		1,560	3,048,000	28.45	257	398.3	934,419	57.9	17.7
20	Kerosene		-5	50		0	67,760	18,300	1,314		1,240	2,527,000	28.53	254	396.7	769,451	47.7	14.5
21	Kerosene	Gas	54.6	100		100	134,798	18,300	1,932	644	1,823	3,714,000	28.35	275	408.3	1,188,731	73.7	22.5
22	Kerosene		54.6	100	On to 45F	0	101,093	18,300	1,961		1,850	3,778,000	28.34	278	410.0	1,196,701	74.2	22.6
23	Kerosene	Gas	54.6	100	On to 45F	100	136,273	18,300	1,961	644	1,850	3,778,000	28.34	278	410.0	1,213,877	75.3	22.9
24	Kerosene		54.6	100		0	99,617	18,300	1,932		1,823	3,714,000	28.35	275	408.3	1,171,555	72.6	22.1
25	Kerosene		54.6	75		0	81,038	18,300	1,572		1,483	2,953,000	28.39	257	398.3	907,304	56.3	17.1
26	Kerosene		54.6	50		0	64,536	18,300	1,252		1,181	2,451,000	28.46	254	396.7	748,055	46.4	14.1
27	Kerosene	Gas	100	100		100	122,557	18,300	1,695	644	1,599	3,284,000	28.14	278	410.0	1,064,994	66.0	20.1
28	Kerosene		100	100	On to 73F	0	95,574	18,300	1,854		1,749	3,545,000	28.22	283	412.8	1,135,410	70.4	21.5
29	Kerosene	Gas	100	100	On to 73F	100	130,754	18,300	1,854	644	1,749	3,545,000	28.22	283	412.8	1,152,656	71.5	21.8
30	Kerosene		100	100		0	87,377	18,300	1,695		1,599	3,284,000	28.14	278	410.0	1,047,748	65.0	19.8
31	Kerosene		100	75		0	72,186	18,300	1,400		1,321	2,737,000	28.20	265	402.8	855,950	53.1	16.2
32	Kerosene		100	50		0	57,213	18,300	1,110		1,047	2,329,000	28.28	255	397.2	716,377	44.4	13.5

Notes

1 Design data are based on GE spreadsheets for the Keyspan Ravenswood Project (received 1/11/2000)

2 The exhaust rate is calculated based upon the following formula:

Exhaust Rate (ACFM) = $Q_{FG} / MW_{FG} * (460 + T_{FG}) * 0.73 / 60$

Where Q_{FG} = Turbine Exhaust Flow Rate from vendor, in lb/hr

MW_{FG} = Molecular Weight of flue gas provided by vendor or calculated based on vendor flue gas composition, in lb/lb mole

T_{FG} = Flue Gas Exhaust Temperature, in °F

3 Stack cross-sectional area has been calculated based upon the following formula, $A = \Pi * (diam/2)^2$

4 Duct burner is based off of 588 mmBtu/hr (LHV) used for the GE 7FA duct burner for the Keyspan Ravenswood Project

Keyspan Ravenswood NY Combined Cycle Project

General Electric PG7241(FA) Combustion Turbine (all data are per turbine)

With an Oxidation Catalyst

Case No.	Fuel	Duct Burner Fuel	Ambient Temp. (°F)	Turbine Load (%)	Duct Burner Load (%)	Chiller Operation	CTG HHV Heat Input (mmBtu/hr)	HHV Duct Burner (mmBtu/hr)
1	Gas	Gas	-5	100	100		1,938	644
2	Gas		-5	100	0		1,938	0
3	Gas		-5	75	0		1,598	0
4	Gas		-5	50	0		1,280	0
5	Gas	Gas	54.6	100	100		1,779	644
6	Gas		54.6	100	0	On to 45F	1,812	0
7	Gas	Gas	54.6	100	100	On to 45F	1,812	644
8	Gas		54.6	100	0		1,779	0
9	Gas		54.6	75	0		1,473	0
10	Gas		54.6	50	0		1,181	0
11	Gas	Gas	100	100	100		1,572	644
12	Gas		100	100	0	On to 73F	1,705	0
13	Gas	Gas	100	100	100	On to 73F	1,705	644
14	Gas		100	100	0		1,572	0
15	Gas		100	75	0		1,324	0
16	Gas		100	50	0		1,059	0
17	Kerosene	Gas	-5	100	100		2,028	644
18	Kerosene		-5	100	0		2,028	0
19	Kerosene		-5	75	0		1,654	0
20	Kerosene		-5	50	0		1,314	0
21	Kerosene	Gas	54.6	100	100		1,932	644
22	Kerosene		54.6	100	0	On to 45F	1,961	0
23	Kerosene	Gas	54.6	100	100	On to 45F	1,961	644
24	Kerosene		54.6	100	0		1,932	0
25	Kerosene		54.6	75	0		1,572	0
26	Kerosene		54.6	50	0		1,252	0
27	Kerosene	Gas	100	100	100		1,695	644
28	Kerosene		100	100	0	On to 73F	1,854	0
29	Kerosene	Gas	100	100	100	On to 73F	1,854	644
30	Kerosene		100	100	0		1,695	0
31	Kerosene		100	75	0		1,400	0
32	Kerosene		100	50	0		1,110	0

Uncontrolled Emissions (Turbine and Duct Burner)

Case No.	NOx ppm	NOx lb/hr	CO ppm	CO lb/hr	VOC ppm	VOC lb/hr	PM-10 lb/hr
1	13	129	16	95	11.4	26.0	34
2	9	65	9	31	1.4	3.0	20
3	9	52	9	25	1.4	2.4	20
4	9	41	9	21	1.4	2.0	19
5	14	123	17	93	11.8	25.8	34
6	9	60	9	30	1.4	2.9	20
7	14	124	17	94	11.6	25.9	34
8	9	59	9	29	1.4	2.8	20
9	9	48	9	24	1.4	2.3	20
10	9	38	9	20	1.4	1.9	19
11	14	116	18	89	12.5	25.5	34
12	9	57	9	27	1.4	2.7	20
13	14	121	17	91	12.2	25.7	34
14	9	52	9	25	1.4	2.5	20
15	9	43	9	21	1.4	2.1	20
16	9	34	9	18	1.4	1.8	19
17	38	404	20	126	10.1	30.0	65
18	42	340	20	62	3.5	7.0	51
19	42	273	20	54	3.5	6.0	48
20	42	215	20	45	3.5	5.0	45
21	38	387	21	129	10.8	30.4	64
22	42	328	20	66	3.5	7.5	51
23	38	392	21	130	10.7	30.5	65
24	42	323	20	65	3.5	7.4	50
25	42	259	20	52	3.5	5.8	47
26	42	204	20	43	3.5	4.8	45
27	38	348	22	121	11.3	29.6	62
28	42	311	20	62	3.5	7.1	50
29	38	375	21	126	10.8	30.1	64
30	42	284	20	57	3.5	6.6	48
31	42	231	20	48	3.5	5.4	46
32	42	181	20	41	3.5	4.6	43

Emissions After Control

Case No.	NOx ppm	NOx lb/hr	CO ppm	CO lb/hr	VOC ppm	VOC lb/hr	PM-10 lb/hr	SO2 lb/hr
1	3.0	28.7	3.6	21.1	9.7	22.3	41.6	18.4
2	2.0	14.4	2.0	6.9	1.2	2.6	25.7	13.8
3	2.0	11.6	2.0	5.6	1.2	2.1	24.7	11.4
4	2.0	9.1	2.0	4.7	1.2	1.7	22.8	9.1
5	3.0	27.3	3.8	20.7	10.1	22.1	41.1	17.3
6	2.0	13.3	2.0	6.7	1.2	2.5	25.3	12.9
7	3.0	27.6	3.8	20.9	10.0	22.2	41.2	17.5
8	2.0	13.1	2.0	6.4	1.2	2.4	25.2	12.7
9	2.0	10.7	2.0	5.3	1.2	2.0	24.3	10.5
10	2.0	8.4	2.0	4.4	1.2	1.6	22.5	8.4
11	3.1	25.8	3.9	19.8	10.7	21.9	40.5	15.8
12	2.0	12.7	2.0	6.0	1.2	2.3	25.0	12.2
13	3.1	26.9	3.9	20.2	10.4	22.0	40.9	16.8
14	2.0	11.6	2.0	5.6	1.2	2.1	24.6	11.2
15	2.0	9.6	2.0	4.7	1.2	1.8	23.9	9.5
16	2.0	7.6	2.0	4.0	1.2	1.5	22.1	7.6
17	8.2	86.6	4.9	31.5	8.7	25.7	103.5	93.2
18	9.0	72.9	5.0	15.5	3.0	6.0	87.6	88.6
19	9.0	58.5	5.0	13.5	3.0	5.1	77.8	72.3
20	9.0	46.1	5.0	11.3	3.0	4.3	68.7	57.5
21	8.2	82.9	5.2	32.3	9.2	26.1	100.7	89.1
22	9.0	70.3	5.0	16.5	3.0	6.4	86.4	85.7
23	8.2	84.0	5.2	32.5	9.1	26.1	102.3	90.3
24	9.0	69.2	5.0	16.3	3.0	6.3	84.8	84.5
25	9.0	55.5	5.0	13.0	3.0	5.0	75.3	68.7
26	9.0	43.7	5.0	10.8	3.0	4.1	67.6	54.7
27	8.1	74.6	5.4	30.3	9.7	25.4	94.5	78.7
28	9.0	66.6	5.0	15.5	3.0	6.1	83.4	81.0
29	8.1	80.4	5.4	31.5	9.3	25.8	99.3	85.6
30	9.0	60.9	5.0	14.3	3.0	5.7	78.6	74.1
31	9.0	49.5	5.0	12.0	3.0	4.6	71.3	61.2
32	9.0	38.8	5.0	10.3	3.0	3.9	63.0	48.5

Modeling Emission Rates

Case No.	NO_x (g/s)	CO (g/s)	PM-10 (g/s)	SO_2 (g/s)
1	3.61	2.66	5.24	2.32
2	1.82	0.87	3.24	1.74
3	1.46	0.70	3.11	1.44
4	1.15	0.59	2.87	1.15
5	3.44	2.60	5.18	2.18
6	1.68	0.84	3.19	1.63
7	3.47	2.63	5.20	2.21
8	1.65	0.81	3.18	1.60
9	1.34	0.67	3.07	1.33
10	1.06	0.56	2.83	1.06
11	3.25	2.49	5.11	1.99
12	1.60	0.76	3.15	1.53
13	3.39	2.55	5.16	2.11
14	1.46	0.70	3.10	1.41
15	1.20	0.59	3.01	1.19
16	0.95	0.50	2.79	0.95
17	10.91	3.97	13.04	11.75
18	9.18	1.95	11.03	11.17
19	7.37	1.70	9.81	9.11
20	5.81	1.42	8.66	7.24
21	10.45	4.06	12.69	11.22
22	8.86	2.08	10.88	10.80
23	10.58	4.10	12.88	11.38
24	8.72	2.05	10.69	10.64
25	6.99	1.64	9.49	8.66
26	5.51	1.35	8.51	6.90
27	9.40	3.81	11.90	9.92
28	8.40	1.95	10.51	10.21
29	10.13	3.97	12.52	10.79
30	7.67	1.80	9.90	9.34
31	6.24	1.51	8.93	7.71
32	4.89	1.29	7.94	6.11

Emission Per Unit Fuel Burned

Case No.	VOC lb/mmBtu	PM-10 lb/mmBtu	SO2 lb/mmBtu	NO_x lb/mmBtu	CO lb/mmBtu
1	0.0086	0.0161	0.0071	0.0111	0.0082
2	0.0013	0.0133	0.0071	0.0075	0.0036
3	0.0013	0.0155	0.0071	0.0072	0.0035
4	0.0013	0.0178	0.0071	0.0071	0.0036
5	0.0091	0.0170	0.0071	0.0113	0.0085
6	0.0014	0.0140	0.0071	0.0074	0.0037
7	0.0090	0.0168	0.0071	0.0112	0.0085
8	0.0013	0.0142	0.0071	0.0074	0.0036
9	0.0013	0.0165	0.0071	0.0072	0.0036
10	0.0014	0.0190	0.0071	0.0072	0.0038
11	0.0099	0.0183	0.0071	0.0116	0.0089
12	0.0014	0.0147	0.0071	0.0074	0.0035
13	0.0094	0.0174	0.0071	0.0114	0.0086
14	0.0014	0.0157	0.0071	0.0074	0.0035
15	0.0014	0.0180	0.0071	0.0072	0.0035
16	0.0015	0.0209	0.0071	0.0071	0.0034
17	0.0096	0.0387	0.0349	0.0324	0.0118
18	0.0030	0.0432	0.0437	0.0359	0.0076
19	0.0031	0.0471	0.0437	0.0354	0.0082
20	0.0033	0.0523	0.0437	0.0351	0.0086
21	0.0101	0.0391	0.0346	0.0322	0.0125
22	0.0033	0.0440	0.0437	0.0358	0.0084
23	0.0100	0.0393	0.0347	0.0322	0.0125
24	0.0033	0.0439	0.0437	0.0358	0.0084
25	0.0032	0.0479	0.0437	0.0353	0.0083
26	0.0033	0.0540	0.0437	0.0349	0.0086
27	0.0104	0.0404	0.0336	0.0319	0.0129
28	0.0033	0.0450	0.0437	0.0359	0.0084
29	0.0103	0.0398	0.0343	0.0322	0.0126
30	0.0033	0.0464	0.0437	0.0359	0.0084
31	0.0033	0.0509	0.0432	0.0354	0.0086
32	0.0036	0.0568	0.0437	0.0349	0.0092

	VOC lb/mmBtu	PM-10 lb/mmBtu	SO2 lb/mmBtu	NO_x lb/mmBtu	CO lb/mmBtu
Max natural gas w. duct burner	0.0099	0.0183	0.0071	0.0116	0.0089
Max natural gas w/o duct burner	0.0015	0.0209	0.0071	0.0075	0.0038
Max kerosene w. duct burner	0.0104	0.0404	0.0349	0.0324	0.0129
Max kerosene w/o duct burner	0.0036	0.0568	0.0437	0.0359	0.0092

Notes

1 CTG Emissions of all pollutants, except SO_2, are based upon vendor emission estimates for given ambient conditions
Design data are based on Burns and Roe spreadsheets for the Keyspan Ravenswood Project (Received 1/11/2000)

2 Duct burner heat input capacity (HHV) [643.8] mmBtu/hr (Natural Gas Only)

	Duct Burner Emissions Based on Performance Data			
	NO_X	CO	VOC	PM-10
lb/hr	64	64	23	14
lb/mmBtu	0.099	0.099	0.036	0.022

3 Control technology assumptions:

	Natural gas		Kerosene	
SCR reduces NOx emissions to	2	ppmvd @ 15% O2 (natural gas)	9	ppmvd @ 15% O2 (kerosene)
Oxidation catalyst Reduces CO emissions to	2	ppmvd @ 15% O2 (natural gas)	5	ppmvd @ 15% O2 (kerosene)
Oxidation catalyst reduces VOC emissions	1.2	ppmvd @ 15% O2 (natural gas)	3	ppmvd @ 15% O2 (kerosene)
Oxidation catalyst conversion of SO2 to SO3	20%			

4 PM after control includes ammonia salt from reaction of SO_3 and NH_3, calculated assuming SO_3 formation = of all SO3 to ammonium sulfate, (NH4)2 SO4, MW=132. HRSG PM lb/hr = CTG PM lb/hr + [(SO_2 lb/hr /64)*(%S-->SO3)*(132)]

5 Emissions of SO_2 from the combustion turbine and the duct burner are based upon a mass balance assuming all available elemental sulfur is converted to SO_2 during combustion
Maximum natural gas sulfur content (grains/100 SCF) = [2.5]
Maximum kerosene sulfur content (% by weight) = [0.04%]

6 Values for cases 7, 13, 23 and 29 where the duct burner and chiller are operating simultaneously were created from Burns and Roe data as follows.
DB + Chiller Data (Case 7) = Chiller Data (Case 6) + DB Data (Case 5) - Turbine Only (Case 8)

7 PPM values for all duct burner cases were created using the TRC Duct Burner Predictor Spreadsheet. Values are based on a dry volume and were corrected to 15% Oxygen.

8 [11.32] million gallons per year of Kerosene

Keyspan Ravenswood NY Combined Cycle Project

General Electric PG7241(FA) Combustion Turbine (all data are per turbine)

With an Oxidation Catalyst

				Potential Emissions, Tons/Year				
Fuel	Temp	Load	Hours/Year	NO_x	CO	VOC	PM-10	SO_2
Gas	50	85-100	6030	83	63	67	124	53
Gas	50	70-84	2010	28	21	22	41	18
Kerosene	0	85-100	540	23	9	7	28	25
Kerosene	0	70-84	180	8	3	2	9	8
Total			8760	141.9	95.3	98.5	203.0	104.1
PSD Significant Emission Rate				25	100	25	100	40

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Natural Gas
Ambient Temp, F	-5 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	-5
Exhaust Flow -lb/hr	3,784,000
Exhaust Temp -deg F	1081
Heat Input -MMBtu/hr (LHV)	1,746.0
Heat Input -MMBtu/hr (HHV)	1,938.1

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.88	1,169	46,718	0.95
Nitrogen	75.03	99,710	2,793,206	81.33
Oxygen	12.35	16,412	525,173	13.39
Carbon Dioxide	3.99	5,302	233,360	4.33
Water	7.75	10,299	185,544	0.00
Total	100.00	132,893.0	3,784,000	100.00
Total (Dry)		122,594	3,598,456	
Molecular Weight	28.47			29.35

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	65.00	NO_x	0.099	64.00
CO	31.00	CO	0.099	64.00
UHC	15.00	VOC	0.036	23.00
SO_x	13.86	SO_x		4.60
TSP	9.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	181
Stack Diam -ft	18.5
Exit Velocity -ft/sec	65.07
ACFM	1,049,534
DSCFM	747,920

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	46,718	1,169	0.87	0.97
Nitrogen	2,793,206	99,710	74.06	82.51
Oxygen	413,844	12,933	9.61	10.70
Carbon Dioxide	309,811	7,040	5.23	5.82
Water	248,323	13,784	10.24	0.00
Total	3,811,902	134,636	100.00	100.00
Total (Dry)	3,563,579	120,852		
Molecular Weight			28.31	29.49

STACK EMISSIONS

NO_x -lb/hr	129.0	VOC -lb/hr	38.0
NO_x -ppmwv	20.8	VOC- ppmwv	17.6
NO_x -ppmdv	23.2	VOC -ppmdv	19.7
NO_x -ppmdv @ 15% O_2	13.4	VOC- ppmdv @15% O_2	11.4
NO_x -lb/MMBtu- HHV	0.050	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	95.0	SO_x -lb/hr	18.5
CO -ppmwv	25.2	SO_x -ppmdv	2.4
CO -ppmdv	28.1	SO_x -lb/MMBtu- HHV	0.007
CO -ppmdv @ 15% O_2	16.2		
CO -lb/MMBtu- HHV	0.037	TSP -lb/hr	15.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.002

NOTES:
NO_x emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO_2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM_{10} Emissions provided by turbine and duct burner vendor
SO_x emissions based on mass balance equations using sulfur content of 2.5 gr/100 SCF in natural gas.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Natural Gas
Ambient Temp, F	54.6 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	54.6
Exhaust Flow -lb/hr	3,567,000
Exhaust Temp -deg F	1121
Heat Input -MMBtu/hr (LHV)	1,603.0
Heat Input -MMBtu/hr (HHV)	1,779.3

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.89	1,119	44,698	0.97
Nitrogen	74.51	93,568	2,621,165	81.25
Oxygen	12.43	15,609	499,481	13.55
Carbon Dioxide	3.87	4,860	213,883	4.22
Water	8.3	10,423	187,774	0.00
Total	100.00	125,579.4	3,567,000	100.00
Total (Dry)		115,156	3,379,226	
Molecular Weight	28.40			29.34

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	59.00	NO_x	0.099	64.00
CO	29.00	CO	0.099	64.00
UHC	14.00	VOC	0.036	23.00
SO_x	12.72	SO_x		4.60
TSP	9.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	182
Stack Diam -ft	18.5
Exit Velocity -ft/sec	61.64
ACFM	994,070
DSCFM	699,941

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	44,698	1,119	0.88	0.99
Nitrogen	2,621,165	93,568	73.49	82.50
Oxygen	388,152	12,130	9.53	10.70
Carbon Dioxide	290,334	6,597	5.18	5.82
Water	250,553	13,908	10.92	0.00
Total	3,594,902	127,322	100.00	100.00
Total (Dry)	3,344,349	113,414		
Molecular Weight			28.23	29.49

STACK EMISSIONS

NO_x -lb/hr	123.0	VOC -lb/hr	37.0
NO_x -ppmwv	21.0	VOC- ppmwv	18.2
NO_x -ppmdv	23.6	VOC -ppmdv	20.4
NO_x -ppmdv @ 15% O_2	13.6	VOC- ppmdv @15% O_2	11.8
NO_x -lb/MMBtu- HHV	0.051	VOC -lb/MMBtu- HHV	0.02
CO -lb/hr	93.0	SO_x -lb/hr	17.3
CO -ppmwv	26.1	SO_x -ppmdv	2.4
CO -ppmdv	29.3	SO_x -lb/MMBtu- HHV	0.007
CO -ppmdv @ 15% O_2	16.9		
CO -lb/MMBtu- HHV	0.038	TSP -lb/hr	15.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.003

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 2.5 gr/100 SCF in natural gas.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Natural Gas
Ambient Temp, F	100 deg F

INPUTS (Input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	100
Exhaust Flow -lb/hr	3,177,000
Exhaust Temp -deg F	1168
Heat Input -MMBtu/hr (LHV)	1,416.0
Heat Input -MMBtu/hr (HHV)	1,571.8

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.87	984	39,295	0.98
Nitrogen	72.3	81,744	2,289,927	81.28
Oxygen	11.98	13,545	433,419	13.47
Carbon Dioxide	3.8	4,296	189,083	4.27
Water	11.06	12,505	225,276	0.00
Total	100.01	113,073.5	3,177,000	100.00
Total (Dry)		100,569	2,951,724	
Molecular Weight	28.10			29.35

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	52.00	NO_x	0.099	64.00
CO	25.00	CO	0.099	64.00
UHC	13.00	VOC	0.036	23.00
SO_x	11.24	SO_x		4.60
TSP	9.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	186
Stack Diam -ft	18.5
Exit Velocity -ft/sec	55.93
ACFM	902,016
DSCFM	602,423

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	39,295	984	0.86	1.00
Nitrogen	2,289,927	81,744	71.20	82.71
Oxygen	322,090	10,066	8.77	10.19
Carbon Dioxide	265,534	6,034	5.25	6.11
Water	288,056	15,989	13.93	0.00
Total	3,204,902	114,816	100.00	100.00
Total (Dry)	2,916,846	98,827		
Molecular Weight			27.91	29.51

STACK EMISSIONS

NO_x -lb/hr	116.0	VOC -lb/hr	36.0
NO_x -ppmwv	22.0	VOC- ppmwv	19.6
NO_x -ppmdv	25.5	VOC -ppmdv	22.8
NO_x -ppmdv @ 15% O_2	14.1	VOC- ppmdv @15% O_2	12.5
NO_x -lb/MMBtu- HHV	0.052	VOC -lb/MMBtu- HHV	0.02
CO -lb/hr	89.0	SO_x -lb/hr	15.8
CO -ppmwv	27.7	SO_x -ppmdv	2.5
CO -ppmdv	32.2	SO_x -lb/MMBtu- HHV	0.007
CO -ppmdv @ 15% O_2	17.7		
CO -lb/MMBtu- HHV	0.040	TSP -lb/hr	15.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.003

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 2.5 gr/100 SCF in natural gas.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Kerosene
Ambient Temp	-5 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	-5
Exhaust Flow -lb/hr	3,545,000
Exhaust Temp -deg F	1130
Heat Input -MMBtu/hr (LHV)	1,913.0
Heat Input -MMBtu/hr (HHV)	2,123.4

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11
Fuel Sulfur Content (% by wt)	0.04

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.85	1,063	42,453	0.96
Nitrogen	71.23	89,054	2,494,703	80.53
Oxygen	10.19	12,740	407,660	11.52
Carbon Dioxide	6.18	7,726	340,040	6.99
Water	11.55	14,440	260,144	0.00
Total	100.00	125,023.1	3,545,000	100.00
Total (Dry)		110,583	3,284,856	
Molecular Weight	28.35			29.70

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	340.0	NO_x	0.099	64.00
CO	62.0	CO	0.099	64.00
UHC	14.0	VOC	0.036	23.00
SO_x	83.63	SO_x		4.60
TSP	17.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	263
Stack Diam -ft	18.5
Exit Velocity -ft/sec	61.27
ACFM	988,185
DSCFM	662,181

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	42,453	1,063	0.84	0.98
Nitrogen	2,494,703	89,054	70.25	81.82
Oxygen	296,331	9,261	7.31	8.51
Carbon Dioxide	416,491	9,464	7.47	8.69
Water	322,924	17,925	14.14	0.00
Total	3,572,902	126,766	100.00	100.00
Total (Dry)	3,249,978	108,841		
Molecular Weight			28.19	29.86

STACK EMISSIONS

NO_x -lb/hr	404.0	VOC -lb/hr	37.0
NO_x -ppmwv	69.3	VOC- ppmwv	18.2
NO_x -ppmdv	80.7	VOC -ppmdv	21.2
NO_x -ppmdv @ 15% O_2	38.4	VOC- ppmdv @15% O_2	10.1
NO_x -lb/MMBtu- HHV	0.146	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	126.0	SO_x -lb/hr	88.2
CO -ppmwv	35.5	SO_x -ppmdv	12.7
CO -ppmdv	41.3	SO_x -lb/MMBtu- HHV	0.032
CO -ppmdv @ 15% O_2	19.7		
CO -lb/MMBtu- HHV	0.046	TSP -lb/hr	23.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.004

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2

CO emissions in lb/hr provided by turbine and duct burner vendor.

TSP and PM10 Emissions provided by turbine and duct burner vendor

SO_x emissions based on mass balance equations using sulfur content of 0.04% by weight for Kerosene.

VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Kerosene
Ambient Temp	54.6 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	54.6
Exhaust Flow -lb/hr	3,714,000
Exhaust Temp -deg F	1096
Heat Input -MMBtu/hr (LHV)	1,823.0
Heat Input -MMBtu/hr (HHV)	2,023.5

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11
Fuel Sulfur Content (% by wt)	0.04

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.86	1,127	45,012	0.97
Nitrogen	71.38	93,521	2,619,850	80.29
Oxygen	11.04	14,464	462,846	12.42
Carbon Dioxide	5.62	7,363	324,057	6.32
Water	11.11	14,556	262,235	0.00
Total	100.01	131,032.0	3,714,000	100.00
Total (Dry)		116,476	3,451,765	
Molecular Weight	28.35			29.64

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	323.0	NO_x	0.099	64.00
CO	65.0	CO	0.099	64.00
UHC	15.0	VOC	0.036	23.00
SO_x	79.69	SO_x		4.60
TSP	17.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	275
Stack Diam -ft	18.5
Exit Velocity -ft/sec	64.28
ACFM	1,036,642
DSCFM	699,814

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	45,012	1,127	0.85	0.98
Nitrogen	2,619,850	93,521	70.44	81.51
Oxygen	351,517	10,985	8.27	9.57
Carbon Dioxide	400,509	9,100	6.85	7.93
Water	325,015	18,041	13.59	0.00
Total	3,741,902	132,775	100.00	100.00
Total (Dry)	3,416,887	114,734		
Molecular Weight			28.18	29.78

STACK EMISSIONS

NO_x -lb/hr	387.0	VOC -lb/hr	38.0
NO_x -ppmwv	63.4	VOC- ppmwv	17.9
NO_x -ppmdv	73.3	VOC -ppmdv	20.7
NO_x -ppmdv @ 15% O_2	38.2	VOC- ppmdv @15% O_2	10.8
NO_x -lb/MMBtu- HHV	0.145	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	129.0	SO_x -lb/hr	84.3
CO -ppmwv	34.7	SO_x -ppmdv	11.5
CO -ppmdv	40.2	SO_x -lb/MMBtu- HHV	0.032
CO -ppmdv @ 15% O_2	20.9		
CO -lb/MMBtu- HHV	0.048	TSP -lb/hr	23.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.004

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 0.04% by weight for Kerosene.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Kerosene
Ambient Temp	100 deg F

INPUTS (Input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	100
Exhaust Flow -lb/hr	3,284,000
Exhaust Temp -deg F	1157
Heat Input -MMBtu/hr (LHV)	1,599.0
Heat Input -MMBtu/hr (HHV)	1,774.9

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11
Fuel Sulfur Content (% by wt)	0.04

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.83	969	38,697	0.95
Nitrogen	69.95	81,637	2,286,942	80.31
Oxygen	10.78	12,581	402,582	12.38
Carbon Dioxide	5.54	6,466	284,552	6.36
Water	12.9	15,055	271,228	0.00
Total	100.00	116,708.2	3,284,000	100.00
Total (Dry)		101,653	3,012,772	
Molecular Weight	28.14			29.64

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	284.0	NO_x	0.099	64.00
CO	57.0	CO	0.099	64.00
UHC	13.0	VOC	0.036	23.00
SO_x	69.90	SO_x		4.60
TSP	17.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	278
Stack Diam -ft	18.5
Exit Velocity -ft/sec	57.70
ACFM	930,571
DSCFM	604,100

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	38,697	969	0.82	0.97
Nitrogen	2,286,942	81,637	68.92	81.71
Oxygen	291,252	9,102	7.68	9.11
Carbon Dioxide	361,004	8,203	6.93	8.21
Water	334,007	18,540	15.65	0.00
Total	3,311,902	118,451	100.00	100.00
Total (Dry)	2,977,895	99,911		
Molecular Weight			27.96	29.81

STACK EMISSIONS

NO_x -lb/hr	348.0	VOC -lb/hr	36.0
NO_x -ppmwv	63.9	VOC- ppmwv	19.0
NO_x -ppmdv	75.7	VOC -ppmdv	22.5
NO_x -ppmdv @ 15% O_2	37.9	VOC- ppmdv @15% O_2	11.3
NO_x -lb/MMBtu- HHV	0.144	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	121.0	SO_x -lb/hr	74.5
CO -ppmwv	36.5	SO_x -ppmdv	11.7
CO -ppmdv	43.3	SO_x -lb/MMBtu- HHV	0.031
CO -ppmdv @ 15% O_2	21.6		
CO -lb/MMBtu- HHV	0.050	TSP -lb/hr	23.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.004

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 0.04% by weight for Kerosene.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Natural Gas
Ambient Temp, F	54.6 deg F with Chiller on to 45 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS / DUCT BURNER PARAMETERS

Ambient Temp -deg F	45	Heat Input -MMBtu/hr (LHV)	580.0
Exhaust Flow -lb/hr	3,631,000	Heating Value -Btu/lb (LHV)	20,787
Exhaust Temp -deg F	1109	Heat Input -MMBtu/hr (HHV)	643.8
Heat Input -MMBtu/hr (LHV)	1,632.0	Fuel HHV/LHV Ratio	1.11
Heat Input -MMBtu/hr (HHV)	1,811.5		

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.90	1,151	45,969	0.98
Nitrogen	74.44	95,178	2,666,270	81.25
Oxygen	12.41	15,867	507,735	13.55
Carbon Dioxide	3.87	4,948	217,768	4.22
Water	8.39	10,727	193,257	0.00
Total	100.01	127,872.0	3,631,000	100.00
Total (Dry)		117,145	3,437,743	
Molecular Weight	28.40			29.35

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	60.00	NO_x	0.099	64.00
CO	30.00	CO	0.099	64.00
UHC	14.00	VOC	0.036	23.00
SO_x	12.95	SO_x		4.60
TSP	9.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	183
Stack Diam -ft	18.5
Exit Velocity -ft/sec	62.84
ACFM	1,013,546
DSCFM	712,093

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	45,969	1,151	0.89	1.00
Nitrogen	2,666,270	95,178	73.43	82.48
Oxygen	396,406	12,388	9.56	10.73
Carbon Dioxide	294,219	6,685	5.16	5.79
Water	256,037	14,212	10.96	0.00
Total	3,658,902	129,615	100.00	100.00
Total (Dry)	3,402,865	115,403		
Molecular Weight			28.23	29.49

STACK EMISSIONS

NO_x -lb/hr	124.0	VOC -lb/hr	37.0
NO_x -ppmwv	20.8	VOC- ppmwv	17.8
NO_x -ppmdv	23.4	VOC -ppmdv	20.0
NO_x -ppmdv @ 15% O_2	13.6	VOC- ppmdv @15% O_2	11.6
NO_x -lb/MMBtu- HHV	0.051	VOC -lb/MMBtu- HHV	0.02
CO -lb/hr	94.0	SO_x -lb/hr	17.6
CO -ppmwv	25.9	SO_x -ppmdv	2.4
CO -ppmdv	29.1	SO_x -lb/MMBtu- HHV	0.007
CO -ppmdv @ 15% O_2	16.9		
CO -lb/MMBtu- HHV	0.038	TSP -lb/hr	15.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.002

NOTES:

NO_x emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO_2

CO emissions in lb/hr provided by turbine and duct burner vendor.

TSP and PM_{10} Emissions provided by turbine and duct burner vendor

SO_x emissions based on mass balance equations using sulfur content of 2.5 gr/100 SCF in natural gas.

VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Natural Gas
Ambient Temp, F	100 deg F with Chiller on to 73 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	73
Exhaust Flow -lb/hr	3,411,000
Exhaust Temp -deg F	1141
Heat Input -MMBtu/hr (LHV)	1,536.0
Heat Input -MMBtu/hr (HHV)	1,705.0

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.89	1,077	43,009	0.99
Nitrogen	73.22	88,474	2,478,467	81.28
Oxygen	12.12	14,645	468,623	13.45
Carbon Dioxide	3.85	4,652	204,738	4.27
Water	9.93	11,999	216,162	0.00
Total	100.01	120,846.9	3,411,000	100.00
Total (Dry)		108,848	3,194,838	
Molecular Weight	28.23			29.35

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	57.00	NO_x	0.099	64.00
CO	27.00	CO	0.099	64.00
UHC	14.00	VOC	0.036	23.00
SO_x	12.19	SO_x		4.60
TSP	9.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	189
Stack Diam -ft	18.5
Exit Velocity -ft/sec	59.99
ACFM	967,557
DSCFM	656,397

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	43,009	1,077	0.88	1.01
Nitrogen	2,478,467	88,474	72.17	82.60
Oxygen	357,294	11,166	9.11	10.43
Carbon Dioxide	281,190	6,389	5.21	5.97
Water	278,942	15,484	12.63	0.00
Total	3,438,902	122,590	100.00	100.00
Total (Dry)	3,159,960	107,106		
Molecular Weight			28.05	29.50

STACK EMISSIONS

NO_x -lb/hr	121.0	VOC -lb/hr	37.0
NO_x -ppmwv	21.5	VOC- ppmwv	18.9
NO_x -ppmdv	24.6	VOC -ppmdv	21.6
NO_x -ppmdv @ 15% O_2	13.8	VOC- ppmdv @15% O_2	12.2
NO_x -lb/MMBtu- HHV	0.052	VOC -lb/MMBtu- HHV	0.02
CO -lb/hr	91.0	SO_x -lb/hr	16.8
CO -ppmwv	26.5	SO_x -ppmdv	2.4
CO -ppmdv	30.3	SO_x -lb/MMBtu- HHV	0.007
CO -ppmdv @ 15% O_2	17.1		
CO -lb/MMBtu- HHV	0.039	TSP -lb/hr	15.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.003

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 2.5 gr/100 SCF in natural gas.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Kerosene
Ambient Temp	54.6 deg F with Chiller on to 45 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	45
Exhaust Flow -lb/hr	3,778,000
Exhaust Temp -deg F	1083
Heat Input -MMBtu/hr (LHV)	1,850.0
Heat Input -MMBtu/hr (HHV)	2,053.5

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11
Fuel Sulfur Content (% by wt)	0.04

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.84	1,120	44,731	0.94
Nitrogen	71.39	95,163	2,665,838	80.30
Oxygen	11.06	14,743	471,758	12.44
Carbon Dioxide	5.61	7,478	329,112	6.31
Water	11.1	14,796	266,561	0.00
Total	100.00	133,300.1	3,778,000	100.00
Total (Dry)		118,504	3,511,439	
Molecular Weight	28.34			29.63

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	328.0	NO_x	0.099	64.00
CO	66.0	CO	0.099	64.00
UHC	15.0	VOC	0.036	23.00
SO_x	89.77	SO_x		4.60
TSP	17.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	278
Stack Diam -ft	18.5
Exit Velocity -ft/sec	65.48
ACFM	1,055,992
DSCFM	712,347

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	44,731	1,120	0.83	0.96
Nitrogen	2,665,838	95,163	70.47	81.50
Oxygen	360,429	11,264	8.34	9.65
Carbon Dioxide	405,564	9,215	6.82	7.89
Water	329,340	18,281	13.54	0.00
Total	3,805,902	135,043	100.00	100.00
Total (Dry)	3,476,562	116,762		
Molecular Weight			28.18	29.77

STACK EMISSIONS

NO_x -lb/hr	392.0	VOC -lb/hr	38.0
NO_x -ppmwv	63.1	VOC- ppmwv	17.6
NO_x -ppmdv	73.0	VOC -ppmdv	20.3
NO_x -ppmdv @ 15% O_2	38.3	VOC- ppmdv @15% O_2	10.7
NO_x -lb/MMBtu- HHV	0.145	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	130.0	SO_x -lb/hr	94.4
CO -ppmwv	34.4	SO_x -ppmdv	12.6
CO -ppmdv	39.8	SO_x -lb/MMBtu- HHV	0.035
CO -ppmdv @ 15% O_2	20.8		
CO -lb/MMBtu- HHV	0.048	TSP -lb/hr	23.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.004

NOTES:
NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2
CO emissions in lb/hr provided by turbine and duct burner vendor.
TSP and PM10 Emissions provided by turbine and duct burner vendor
SOx emissions based on mass balance equations using sulfur content of 0.04% by weight for Kerosene.
VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

Project	Keyspan Ravenswood NY Combined Cycle Project
Gas Turbine	GE Frame 7FA
GT Load	Base
Duct Burner	Max
Fuel	Kerosene
Ambient Temp	100 deg F with Chiller on to 73 deg F

INPUTS (input values underlined)

GAS TURBINE PARAMETERS

Ambient Temp -deg F	73
Exhaust Flow -lb/hr	3,545,000
Exhaust Temp -deg F	1128
Heat Input -MMBtu/hr (LHV)	1,749.0
Heat Input -MMBtu/hr (HHV)	1,941.4

DUCT BURNER PARAMETERS

Heat Input -MMBtu/hr (LHV)	580.0
Heating Value -Btu/lb (LHV)	20,787
Heat Input -MMBtu/hr (HHV)	643.8
Fuel HHV/LHV Ratio	1.11
Fuel Sulfur Content (% by wt)	0.04

GT EXHAUST ANALYSIS

	% Vol (wet)	lb-mol/hr	lb/hr	% Vol (dry)
Argon	0.84	1,055	42,150	0.96
Nitrogen	70.49	88,542	2,480,355	80.33
Oxygen	10.78	13,541	433,284	12.28
Carbon Dioxide	5.64	7,084	311,782	6.43
Water	12.26	15,400	277,430	0.00
Total	100.01	125,621.5	3,545,000	100.00
Total (Dry)		110,222	3,267,570	
Molecular Weight	28.22			29.65

MASS EMISSIONS - lb/hr

Gas Turbine		Duct Burner	Vendor Factor	
NO_x	311.0	NO_x	0.099	64.00
CO	62.0	CO	0.099	64.00
UHC	14.0	VOC	0.036	23.00
SO_x	84.87	SO_x		4.60
TSP	17.00	TSP	0.009	6.00

STACK PARAMETERS

Stack Temp -deg F	283
Stack Diam -ft	18.5
Exit Velocity -ft/sec	62.33
ACFM	1,005,241
DSCFM	658,205

CALCULATIONS

COMBUSTION CALCULATIONS

Duct Burner Fuel Flow -lb/hr	27,902
O_2 Required -lb/hr	111,329
H_2O Produced -lb/hr	62,780
CO_2 Produced -lb/hr	76,452

FINAL EXHAUST ANALYSIS

	lb/hr	lb-mol/hr	% Vol (wet)	% Vol (dry)
Argon	42,150	1,055	0.83	0.97
Nitrogen	2,480,355	88,542	69.52	81.62
Oxygen	321,955	10,061	7.90	9.27
Carbon Dioxide	388,233	8,821	6.93	8.13
Water	340,210	18,884	14.83	0.00
Total	3,572,902	127,364	100.00	100.00
Total (Dry)	3,232,692	108,480		
Molecular Weight			28.05	29.80

STACK EMISSIONS

NO_x -lb/hr	375.0	VOC -lb/hr	37.0
NO_x -ppmwv	64.0	VOC- ppmwv	18.2
NO_x -ppmdv	75.1	VOC -ppmdv	21.3
NO_x -ppmdv @ 15% O_2	38.1	VOC- ppmdv @15% O_2	10.8
NO_x -lb/MMBtu- HHV	0.145	VOC -lb/MMBtu- HHV	0.01
CO -lb/hr	126.0	SO_x -lb/hr	89.5
CO -ppmwv	35.3	SO_x -ppmdv	12.9
CO -ppmdv	41.5	SO_x -lb/MMBtu- HHV	0.035
CO -ppmdv @ 15% O_2	21.1		
CO -lb/MMBtu- HHV	0.049	TSP -lb/hr	23.00
		TSP -lb/MMBtu- HHV	0.01
		TSP -gr/dscf	0.004

NOTES:

NOx emissions in lb/hr provided by turbine and duct burner vendor. NOx is referenced to NO2

CO emissions in lb/hr provided by turbine and duct burner vendor.

TSP and PM10 Emissions provided by turbine and duct burner vendor

SOx emissions based on mass balance equations using sulfur content of 0.04% by weight for Kerosene.

VOC emissions in lb/hr provided by turbine and duct burner vendor. VOC is referenced as methane.

TANKS 4.0
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Ravenswood Kerosene Storage
City:	Long Island City
State:	New York
Company:	KeySpan Energy
Type of Tank:	Vertical Fixed Roof Tank
Description:	Ravenswood Cogeneration Unit Bulk Storage of Kerosene

Tank Dimensions

Shell Height (ft):	48.00
Diameter (ft):	84.00
Liquid Height (ft):	48.00
Avg. Liquid Height (ft):	24.00
Volume (gallons):	1,989,861.67
Turnovers:	5.69
Net Throughput (gal/yr):	11,320,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition:	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft):	48.00
Radius (ft) (Dome Roof):	42.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Laguardia AP, New York (Avg Atmospheric Pressure = 14.73 psia)

TANKS 4.0
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Jet kerosene	All	60.51	53.64	67.37	56.49	0.0084	0.0067	0.0105	130.0000			162.00	Option 5: A=12.39, B=8933

TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
Standing Losses (lb):	1,099.8219
Vapor Space Volume (cu ft):	323,910.7686
Vapor Density (lb/cu ft):	0.0002
Vapor Space Expansion Factor:	0.0490
Vented Vapor Saturation Factor:	0.9747
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	323,910.7686
Tank Diameter (ft):	84.0000
Vapor Space Outage (ft):	58.4490
Tank Shell Height (ft):	48.0000
Average Liquid Height (ft):	24.0000
Roof Outage (ft):	34.4490
Roof Outage (Dome Roof)	
Roof Outage (ft):	34.4490
Dome Radius (ft):	42.0000
Shell Radius (ft):	42.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0002
Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0084
Daily Avg. Liquid Surface Temp. (deg. R):	520.1762
Daily Average Ambient Temp. (deg. F):	54.2542
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.1642
Tank Paint Solar Absorptance (Shell):	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,171.5000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0490
Daily Vapor Temperature Range (deg. R):	27.4511
Daily Vapor Pressure Range (psia):	0.0038
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0084
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0067
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0105
Daily Avg. Liquid Surface Temp. (deg R):	520.1762
Daily Min. Liquid Surface Temp. (deg R):	513.3134
Daily Max. Liquid Surface Temp. (deg R):	527.0390
Daily Ambient Temp. Range (deg. R):	13.5250
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9747
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0084
Vapor Space Outage (ft):	58.4490
Working Losses (lb):	293.2905

TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)- (Continued)

Vapor Molecular Weight (lb/lb-mole):	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0084
Annual Net Throughput (gal/yr.):	11,320,000.0000
Number of Turnovers:	5.6888
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	1,989,861.6733
Maximum Liquid Height (ft):	48.0000
Tank Diameter (ft):	84.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,393.1124

TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	293.29	1,099.82	1,393.11

Appendix C

Project Correspondence to/from Regulatory Agencies

TRC

February 24, 2000
AL049-00

Mr. Leon Sedefian
Air Pollution Meteorologist V
New York State Department of Environmental Conservation
Division of Air Resources, Bureau of Technical Services
80 Wolf Road, Room 400
Albany, NY 12233-3253

Subject: KeySpan Energy – Ravenswood Cogeneration Facility
Air Quality Modeling Protocol

Dear Mr. Sedefian:

The enclosed modeling protocol has been prepared for the proposed KeySpan Energy Ravenswood Cogeneration Facility to address the methods for assessing the air quality impacts based on atmospheric dispersion modeling. The methods for assessing the visible plume formation from the turbine stack are also included. (Note that the project is not proposing to use an evaporative cooling tower, thus no discussion of SACTII modeling has been included.)

Additional detail has been provided in the subject protocol, beyond which is normally contained in a standard modeling protocol (i.e., for a facility subject only to PSD permitting). This detail has been included to support the public involvement requirement of the Article X process. Please note, that TRC is in the process of setting up a meeting with the New York City Department of Environmental Protection (NYCDEP) regarding their requirements specific to the Article X process. TRC understands that formal resolution was not reached between your group and the NYCDEP on all issues discussed at your January 20th meeting in Queens. In addition, in attempting to set up a meeting with NYCDEP, TRC has been advised by the NYCDEP that internal issues need to be resolved within their agency prior to our meeting with them. As such, several sections of the protocol that discuss NYCDEP requirements, specifically the cumulative impact analysis section, may need to be revised. TRC will advise your group of the resolution of these outstanding issues as they occur via formal correspondence (which will serve as attachments to the protocol).

Please also note that the stack height of the proposed facility has not yet been finalized. The protocol references a proposed stack height of 400 feet above grade level. Although this height is non-GEP, it is well above the cavity height associated with both the proposed cogeneration facility turbine building and the existing Ravenswood Generating Station boiler house. Current air quality evaluation of this height stack suggests that it represents a stack which provides acceptable (i.e., insignificant) air quality impacts and minimal viewshed disruption. TRC will also confirm the final stack height in formal correspondence and will provide a copy of the GEP analysis and BPIP files.

1200 Wall Street West, 2nd Floor • Lyndhurst, New Jersey 07071
Telephone 201-933-5541 • Fax 201-933-5601

Customer-Focused Solutions

The protocol has been written such that the general public is provided a readable description of the proposed modeling process without adding excessive technical jargon that may confuse the non-technical reader.

TRC, on behalf of KeySpan Energy, respectfully requests that you review the subject air quality modeling protocol. We appreciate this opportunity to continue to work with you and your staff and look forward to receiving your comments. Please feel free to contact me at (201) 933-5541 ext. 115 should you have any questions.

Yours truly,

TRC Environmental Corporation

Anthony P. Letizia
Vice President

Enclosure

cc: Steve Riva, U.S. EPA Region I
Peter Seidman, NYSDPS
Alan Domaracki, NYSDPS
Tarick Di Domenico, NYCDEP
Chris Corrado, KeySpan Energy
Brian McCabe, KeySpan Energy
Richard Paccione, KeySpan Energy
Howard Hurwitz, Burns and Roe
Ted Main, TRC Environmental
Jay Snyder, TRC Environmental
Craig Wolfgang, TRC Environmental
Gary Baranowski, TRC Environmental

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TRC

February 28, 2000
AL053-00

Mr. Steven Riva
Chief, Permitting Section
U.S. EPA Region II
290 Broadway
New York, NY 10007-1866

Subject: Request for Waiver from Pre-Construction Ambient Air Quality Monitoring for the Proposed Ravenswood Cogeneration Facility

Dear Mr. Riva:

This letter details a request for exemption from pre-construction monitoring for the proposed KeySpan Energy Ravenswood Cogeneration Facility. The proposed project will be a 250 MW cogeneration facility located at the KeySpan Energy Ravenswood site. As you are aware, KeySpan has purchased Con Ed's Ravenswood electric generating assets and has assumed operating responsibility for the steam generating facility (the "A" House). However, Con Ed has retained ownership of the steam generating facility at Ravenswood. This project involves installation of a new, state-of-the-art combined cycle facility that will be located adjacent to the existing electric generating facility that is now under the control of KeySpan Energy. New generating equipment to be installed will be comprised of a single General Electric Model 7FA combustion turbine, a single supplementary fired heat recovery steam generator, and a steam turbine. Clean burning fuels will be used in the new combustion equipment; the combustion turbine will be fueled by natural gas with low sulfur (0.04%) distillate oil as a back up fuel; the heat recovery steam generator/duct burner will only fire natural gas. No cooling tower is planned for the site. Steam generated by the proposed combined cycle facility that is not used in the steam turbine will be sold to Con Ed, thus offsetting operations of older, higher emitting steam generating boilers.

Based on preliminary potential to emit estimations, the project will trigger Prevention of Significant Deterioration (PSD) review under the Federal New Source Review (NSR) program for sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and inhalable particulates (PM-10). Although the project is located in an area that is currently designated moderate non-attainment for CO, the NYSDEC has begun the regulatory process to re-designate the CO non-attainment classification in the New York Metropolitan Area (including Queens County). Recent conversation with the New York State Department of Environmental Conservation (NYSDEC) indicates that formal redesignation may occur by September, 2000. It is expected that all permit applications will be filed prior to the formal re-designation, but facility operations will commence under the attainment re-designation. Because of this, KeySpan Energy has decided to assess impacts and regulatory requirements for both CO classification scenarios, i.e., attainment and non-attainment. This approach will allow for an easier transition in permitting when re-designation actually occurs as all possible impacts and requirements specific to CO will have been addressed.

Pursuant to PSD regulations, 40 CFR 52.21, pre-construction ambient air quality monitoring may be required unless one of the following can be demonstrated.

- The project ambient air quality impacts are less than the deminimis monitoring concentrations specified in 40 CFR 52.21, and/or

- Existing and approved ambient air quality data are available from alternate locations that are representative of, or conservative as compared to, conditions at the proposed site location.

The purpose of this letter is to request a waiver from a requirement to perform one year of pre-construction ambient air quality monitoring at the proposed site. KeySpan Energy has discussed with the NYSDEC the possibility of requesting such a waiver, and they concur with this request. Supporting documentation for this waiver request is presented herein.

PRELIMINARY AIR QUALITY IMPACT ANALYSIS

A preliminary air quality impact analysis was conducted using the Industrial Source Complex Short-Term (ISCST3) model and 1991 to 1995 surface meteorological data from La Guardia Airport and 1991 to 1995 upper air data from Atlantic City, New Jersey and Brookhaven National Laboratory (Long Island, New York). Two stations were required to complete the five-year record since data collection at Atlantic City, located 103 miles south-southwest of the project site, was terminated in August, 1994 with the Brookhaven Laboratory site assuming responsibility at that time. Impacts were evaluated for ground-level and "point-in-space" elevated receptors (i.e., intake vents, balconies, operable windows associated with tall structures). Pursuant to U.S. EPA Guidance, modeling was performed with the final plume rise option for the ground-level receptors and gradual plume rise for the elevated receptors. Emission rates and stack parameters used in the preliminary modeling analysis are presented in Table 1. ISCST3 modeling, with 5-years of meteorological data, was performed for each of the 32 cases for the ground level and elevated receptors. Note that the PM-10 emission rate includes condensable particulates and annual emission rates are based on the use of No. 2 fuel oil for a maximum 30-days per year. Furthermore, the CO emissions presented are worst-case in that they reflect uncontrolled (i.e., no catalyst emissions), whereas PM-10 emissions assume the use of an oxidation catalyst and the associated increase in PM-10 emissions due to the conversion of SO_2 to SO_3, and ultimately to PM-10. The modeling results are presented in Table 2a (for the ground-level receptors) and Table 2b (for the point-in-space receptors) and indicate that maximum predicted impacts for all pollutants will be well below the thresholds that would require consideration of pre-construction ambient air monitoring. This conclusion is valid for either CO scenario (catalyst/no catalyst).

WAIVER REQUEST

Based on the preliminary impact analysis results from the proposed project, KeySpan Energy formally requests that a waiver be granted from the requirement to perform pre-construction ambient air quality monitoring for the proposed project. The project modeling protocol will present a section describing the NYSDEC monitors selected for establishing background ambient air quality data.

We appreciate your prompt attention to this request. If you have any questions or need additional information, please call me at (201) 933-5541, ext. 115.

Sincerely,

TRC Environmental Corporation

Anthony P. Letizia
Vice-President

cc: Leon Sedefian, NYSDEC
Peter Seidman, NYSDPS
Alan Domaracki, NYSDPS
Tarik Di Domenico, NYCDEP
Chris Corrado, KeySpan Energy
Brian McCabe, KeySpan Energy
Richard Paccione, KeySpan Energy
Howard Hurwitz, Burns & Roe
Craig Wolfgang, TRC Environmental Corporation

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bcc: Robert Golden, TRC Environmental
David Shotts, TRC Environmental
Ted Main, TRC Environmental
Jay Snyder, TRC Environmental
Gary Baranowski, TRC Environmental

Table 1
KeySpan Energy Proposed Ravenswood Cogeneration Facility
Model Input Emission and Stack Exhaust Parameters (1)

Case	Turbine Fuel Type	Ambient Temp. (deg F)	Turbine Load (percent) (2)	Exhaust Temp. (K)	Exhaust Velocity (m/sec)	Emissions (grams/second)			
						NO_x	CO	PM-10	SO_2
1	Gas	-5	100 + DB	356.1	19.8	3.61	11.97	5.24	2.32
2	Gas	-5	100	356.1	19.5	1.82	3.91	3.24	1.74
3	Gas	-5	75	352.8	15.8	1.46	3.15	3.11	1.44
4	Gas	-5	50	351.1	13.1	1.15	2.65	2.87	1.15
5	Gas	54.6	100+DB	356.7	18.9	3.44	11.72	5.18	2.18
6	Gas	45 (3)	100	357.2	18.9	1.68	3.78	3.19	1.63
7	Gas	45 (3)	100+DB	357.2	19.2	3.47	11.84	5.20	2.21
8	Gas	54.6	100	356.7	18.6	1.65	3.65	3.18	1.60
9	Gas	54.6	75	352.8	14.9	1.34	3.02	3.07	1.33
10	Gas	54.6	50	350.6	12.2	1.06	2.52	2.83	1.06
11	Gas	100	100+DB	358.9	17.1	3.25	11.21	5.11	1.99
12	Gas	73 (3)	100	360.6	18.0	1.60	3.40	3.15	1.53
13	Gas	73 (3)	100+DB	360.6	18.3	3.39	11.47	5.16	2.11
14	Gas	100	100	358.9	16.8	1.46	3.15	3.10	1.41
15	Gas	100	75	355.0	14.0	1.20	2.65	3.01	1.19
16	Gas	100	50	352.8	11.9	0.95	2.27	2.79	0.95
17	Oil	-5	100+DB	401.7	21.0	10.9	15.88	13.0	11.8
18	Oil	-5	100	401.7	20.7	9.18	7.81	11.0	11.2
19	Oil	-5	75	398.3	17.7	7.37	6.80	9.81	9.11
20	Oil	-5	50	396.7	14.6	5.81	5.67	8.66	7.24
21	Oil	54.6	100+DB	408.3	22.6	10.5	16.25	12.7	11.2
22	Oil	45 (3)	100	410.0	22.6	8.86	8.32	10.9	10.8
23	Oil	45 (3)	100+DB	410.0	22.9	10.6	16.38	12.9	11.4
24	Oil	54.6	100	408.3	22.2	8.72	8.19	10.7	10.6
25	Oil	54.6	75	398.3	17.1	6.99	6.55	9.49	8.66
26	Oil	54.6	50	396.7	14.0	5.51	5.42	8.51	6.90
27	Oil	100	100+DB	410.0	20.1	9.40	15.25	11.9	9.92
28	Oil	73 (3)	100	412.8	21.3	8.40	7.81	10.5	10.2
29	Oil	73 (3)	100+DB	412.8	21.6	10.1	15.88	12.5	10.8
30	Oil	100	100	410.0	19.8	7.67	7.18	9.90	9.34
31	Oil	100	75	402.8	16.2	6.24	6.05	8.98	7.71
32	Oil	100	50	397.2	13.4	4.89	5.17	7.94	6.11

Notes:

(1) Fixed parameters include a stack height of 400 feet (121.9 meters) at a ground elevation of 15 feet 6 inches above sea level and a stack inner diameter of 18.5 feet (5.64 meters).

(2) DB = Duct burner at full load; the DB will only fire natural gas.

(3) Temperature represents inlet air cooled by evaporative cooler operation.

(4) Potential emissions for a single GE Frame 7FA turbine and 580 mmBtu/hr duct burner. Worst-case CO emissions (no catalyst) presented, worst-case PM-10 (use of catalyst) presented. This is highly conservative in that the worst-case emissions are taken from two independent operating scenarios.

Table 2a
KeySpan Energy Proposed Ravenswood Cogeneration Facility
Maximum Ground Level Impacts Compared Against
Significant Impact Concentration and Significant Monitoring Concentration Levels

Pollutant	Averaging Period	Significant Impact Concentration ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	
				Gas Firing	Oil Firing
CO	1-Hour	2,000	--	16.7	16.4
	8-Hour	500	575	8.1	8.0
SO_2	3-Hour	25	--	1.6	6.0
	24-Hour	5.0	13	0.6	2.9
	Annual	1.0	--	0.1	
PM-10	24-Hour	5.0	10	1.5	3.2
	Annual	1.0	--	0.2	
NO_2	Annual	1.0	14	0.1	

Notes:
(1) Values presented are the maximum of all 32 Cases defined in Table 1.
(2) Non-GEP stack height of 400 feet.
(3) CO impacts represent no CO catalyst use; PM-10 impacts represent use of CO catalyst. This is highly conservative in that the worst-case emissions are taken from two independent operating scenarios.
(4) Annual impacts assume operation for 8,040 hrs/yr on natural gas and 720 hrs/yr on 0.04% sulfur distillate oil.

Table 2b
KeySpan Energy Proposed Ravenswood Cogeneration Facility
Maximum Point-In-Space Impacts Compared Against
Significant Impact Concentration and Significant Monitoring Concentration Levels

Pollutant	Averaging Period	Significant Impact Concentration ($\mu g/m^3$)	Significant Monitoring Concentration ($\mu g/m^3$)	Maximum Modeled Concentration ($\mu g/m^3$)	
				Gas Firing	Oil Firing
CO	1-Hour	2,000	--	54.5	59.6
	8-Hour	500	575	14.9	14.4
SO_2	3-Hour	25	--	5.1	19.7
	24-Hour	5.0	13	1.0	4.0
	Annual	1.0	--	0.1	
PM-10	24-Hour	5.0	10	2.2	4.4
	Annual	1.0	--	0.2	
NO_2	Annual	1.0	14	0.2	

Notes:
(1) Values presented are the maximum of all 32 Cases defined in Table 1.
(2) Building locations and heights collected by TRC staff via visual surveys (also includes NYCDEP building list).
(3) Non-default gradual plume rise option used for elevated point-in-space receptors, following regulatory guidance for a conservative analysis.
(4) Non-GEP stack height of 400 feet.
(5) CO impacts represent no CO catalyst use; PM-10 impacts represent use of CO catalyst. This is highly conservative in that the worst-case emissions are taken from two independent operating scenarios.
(6) Annual impacts assume operation for 8,040 hrs/yr on natural gas and 720 hrs/yr on 0.04% sulfur distillate oil.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-1010
Website: www.dec.state.ny.us

Environmental Conservation 30 YEARS
John P. Cahill
Commissioner

March 16, 2000

Mr. Anthony P. Letizia
TRC Environmental Corp.
1099 Wall Street West
Lyndhurst, New Jersey 07071

Dear Mr. Letizia,

We have reviewed the February 2000 modeling protocol for the Ravenswood Cogeneration Facility and have listed our comments below.

1. Permit conditions will need to be established for the lower limit 50% load.

2. It is stated that the formula GEP stack height of 472.5 feet is based on a turbine building height of 189 feet. Yet, this height is not evident when examining Figure 3-2. The turbine building and its respective height should be clearly identified in this figure. Given the stack's close proximity to Laguardia Airport, you should be sure that the proposed stack height receives FAA approval.

3. It is proposed that the Complex I option of the ISC3 model be used for evaluating impacts in complex and intermediate terrain. Despite the fact that Laguardia Airport is only about 5 km from the site, it is not considered an on-site data set. Therefore, Complex I cannot be used in this application and an alternative model such as the Valley mode of SCREEN3 (and, if need be, CTSCREEN) must be employed for terrain above stack height.

4. While the proposed facility is an area that is attainment for PM-10, Manhattan (New York County), just west of the facility, is classified as non-attainment. This area should be addressed in your analysis, with modeled impacts required to be less than significant at both ground level and elevated receptors.

5. Though the Brigantine class I area is 115 km away from the site, if the Federal Land Manager should comment on this project, it would be in the applicant's best interest to have a visibility analysis already prepared. Therefore, we recommend that your visibility analysis be extended to this area.

6. Should a cumulative analysis be required for this project, other recent Article X projects may have to be included in the source inventory. Attached is language which has been incorporated in stipulations of other Article X projects. Also, we recommend that the significant impact area (SIA) be the same for all pollutants which exceed EPA levels of significance. This final SIA should be defined as the SIA furthest out from the source. If a pollutant is significant for a given averaging time, then all averaging times for that pollutant must be addressed in the subsequent NAAQS and PSD increment analyses.

Responses to these comments should be incorporated in a revised protocol and submitted through the project manager, John Ferguson with copies to us and the Department of Health If you have any questions, you can reach me directly at 518-457-0807.

Sincerely,

Robert S. Gaza, Ph.D.
Impact Assessment and
Meteorology Section
Bureau of Technical Support

cc: L. Sedefian
A. Domaracki, NYSDPS
A. Becker, Region 2
T. Christoffel
W. Little, Legal Affairs
J. Ferguson, DEP
S. Riva, EPA Region 2

The application will include 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 inventory of existing and proposed nearby sources located within a circular area defined by the significant impact area (SIA) of the proposed project plus 50 km, shall also include all other proposed major electric generating facilities that have applications for a certificate filed with the Siting Board, provided such applications have been accepted by the Siting Board for review, pursuant to Section 165.1, to determine compliance with section 164 of the Public Service Law at the time NYSDEC approves the Project's final, verified nearby source inventory pursuant to NYSDEC Air Guide 36 requirements.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

MAR 27 2000

Mr. Anthony P. Letizia
TRC Environmental Corporation
1200 Wall Street West, 2nd Floor
Lyndhurst, New Jersey 07071

Re: Preconstruction Ambient Air Quality Monitoring Waiver Request for the Ravenswood Cogeneration Facility

Dear Mr. Letizia:

The U.S. Environmental Protection Agency, Region 2 Office has reviewed your February 28, 2000 submittal which requests a waiver from performing preconstruction ambient air quality monitoring for the Ravenswood Cogeneration project located in Long Island City, New York. You support this request by stating that the preliminary dispersion modeling results show that the air impacts from the new emission unit will be below the monitoring de minimis thresholds specified in 40 CFR Part 52.21.

Although not specified in the request, it should be noted that the NYSDEC operates ambient air monitors in the area which could be used for background concentrations for estimating existing background conditions. Since we are in receipt of letters from the NYSDEC stating that these monitors meet the appropriate quality assurance criteria, we recommend that you obtain the latest 3 years of data available and include it in the PSD permit application.

Therefore, given that the preliminary modeling results indicate that the air impacts will be below the monitoring de minimis thresholds and that monitoring data exists in the area, a waiver from initiating a preconstruction ambient air monitoring program may be granted to the Ravenswood project. If you have any questions regarding this letter please call Annamaria Colecchia of my staff at (212) 637-4016.

Sincerely,

Steven C. Riva, Chief
Permitting Section, Air Programs Branch

cc: L. Sedefian, NYSDEC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

MAR 2 9 2000

Mr. Leon Sedefian
Air Pollution Meteorologist V
New York State Department of Environmental Conservation
Impact and Assessment & Meteorology Section
80 Wolf Road, Room 400
Albany, New York 12233-3253

Re: Keyspan Energy - Ravenswood Cogeneration Facility Modeling Protocol

Dear Mr. Sedefian:

The U.S. Environmental Protection Agency, Region 2 Office has reviewed the February 24, 2000 modeling protocol for the Keyspan Energy - Ravenswood Cogeneration Facility . The protocol proposed methods that would be used to assess the air quality impacts from a new 250 MW natural gas fired (0.04% sulfur oil back-up) generating unit at the existing site in Long Island City, Queens. The protocol was reviewed pursuant to the Prevention of Significant Deterioration (PSD) of Air Quality regulations. We have noted the following points which need to be addressed in order to deem the protocol complete and approvable. These are outlined below:

- The model will be set up to calculate concentrations on a polar receptor grid. However, the angular degree spacing is not specified. In addition, the grid spacing beyond 5 kilometers may not present adequate resolution at only 1 receptor every kilometer. Given that a polar grid is proposed which provides for many receptors close in but less with increasing distance, the resolution should be improved at the distances beyond 5 kilometers.

- Do the PM10 emissions include condensible particulates? This should be specified in the application.

- We would like to note some clarification in terminology. Appendix A of the protocol refers to above ground receptors, (i.e., receptors placed at building heights) as "elevated receptors". The EPA guideline refers to these type of receptors as "flagpole receptors". When the EPA guideline refers to "elevated receptors", it refers to receptors that are on the ground but the ground level is elevated.

- We would also like to ensure that the applicant is clear on the definition of the significant impact area. That is, it is defined at the <u>circular area</u> with a radius extending from the source to the point where the modeled concentration falls below the significant impact level. The PSD increment and NAAQS would be analyzed throughout this circular area.

- Pursuant to Executive Order 12898, the applicant should perform an environmental justice analysis as part of the PSD application in order to assess whether there is a disproportionately high and adverse impact on a minority or low income community. We recommend that the applicant perform such an analysis by modeling its impact (even if the maximum impacts are below significant impact levels) with the combined impact of any other existing or proposed significant source in the area so that a judgement could be made as to whether there is a disproportionately high and adverse burden on the nearby community. At a minimum, the analysis should include isopleths of the concentrations which identifies the combined maximum impact overlaid on top of a demographic map which depicts the percent minority and income level. It is also useful to include a windrose of the meteorological data. As guidance, you should already be in receipt of 2 sample EJ analyses performed by EPA Region 2 in Puerto Rico on PSD permit applications. If you need another copy of these please let us know. Meanwhile, if you would like to discuss this letter further, please contact Annamaria Colecchia of my staff at (212) 637-4016.

Sincerely,

Steven C. Riva, Chief
Permitting Section, Air Programs Branch

✓ cc: A. Letizia, TRC Consultants

TRC

June 9, 2000
AL116-00

Mr. Steven Riva, Chief
Permitting Section, Air Program Branch
United States Environmental Protection Agency, Region 2
290 Broadway
New York, New York 10007-1866

Re: KeySpan Energy Ravenswood Cogeneration Facility
Air Quality Modeling Protocol

Dear Mr. Riva:

We have received your letter of March 29, 2000 to Mr. Leon Sedefian of the New York State Department of Environmental Conservation (NYSDEC) and are providing the following information to address the concerns expressed in the letter. Action items are identified with *underlined italic text*.

Comment 1 - Receptor Grid

An angular spacing of 10 degrees is proposed for the polar receptor grid. Although a 1 kilometer spacing is proposed for receptors beyond 5 kilometers from the stack, Section 5.4 of the protocol further explains that for any maximum modeled impacts that occur outside of the area of 100 meter grid point spacing, additional refined modeling will be performed using additional receptors, placed at 100 meter intervals on the radial and arc containing the original receptor to half the distance to the four adjacent receptor points. *The PSD application will include a figure showing the fine grid receptors used for the modeling of any maximum impacts that occurred beyond 5 kilometers*.

Comment 2 - Condensable Particulates

Facility PM-10 emission rates for gas and oil fired operation include condensable particulates. *Reference will be clearly specified in the revised modeling protocol and PSD Application that PM-10 emissions include the condensable component*.

Comment 3- Above Ground Receptor Nomenclature

In order to be consistent with United States Environmental Protection Agency (U.S. EPA) guidelines and avoid confusion *the revised modeling protocol and PSD application will refer to above ground receptors (i.e. on buildings) as "flagpole receptors" and those at the ground in elevated terrain as elevated receptors*.

1200 Wall Street West, 2nd Floor • Lyndhurst, New Jersey 07071
Telephone 201-933-5541 • Fax 201-933-5601

Comment 4 - Definition of Significant Impact Area

The definition of significant impact area stated in the comment is consistent with the applicant's understanding of this concept.

Comment 5 - Environmental Justice Analysis

The applicant is currently reviewing the example Environmental Justice analyses previously forwarded by USEPA. After completion of the review, the applicant will consult with USEPA Region 2 staff to discuss this issue and finalize an analysis approach.

Pursuant to the instructions of Leon Sedefian, each agency that provided comments specific to the KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol is receiving an individual letter responding to their comments. Mr. Sedefian also requested that a revised protocol, reflecting agency comments, be issued. The revised protocol will be issued through the NYSDEC project manager, John Ferguson, with copies to those who received the initial protocol. To this point, the NYSDEC and New York State Public Service Commission (NYSPSC) in addition to the USEPA, have provided comments. The New York City Department of Environmental Protection (NYCDEP) has been provided a copy of the protocol on February 24 and has been contacted to solicit comments. The NYCDEP has not provided any comments on the protocol.

I hope that the above information adequately responds to the concerns expressed in your letter. Please feel free to contact either Ted Main at 201- 933-5541, ext. 114 or me at ext. 115 should you wish to discuss your comments or this letter further.

Yours truly,

TRC Environmental Corporation

Anthony P. Letizia
Vice President

APL/xp

Enclosure: Amended KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol

cc: J. Ferguson, NYSDEC
L. Sedefian, NYSDEC
R. Gaza, NYSDEC
A. Domaracki, NYSDPS
D. Cabbagestalk, NYCDEP
B. McCabe, KeySpan
C. Corrado, KeySpan
C. Wolfgang, TRC
T. Main, TRC
G. Baranowski, TRC

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TRC

June 9, 2000
AL115-00

Mr. Robert S. Gaza, Ph.D.
Impact Assessment and Meteorology Section
Bureau of Technical Services
New York State Department of Environmental Conservation
80 Wolf Road
Albany, New York 12233-1010

Re: KeySpan Energy Ravenswood Cogeneration Facility
Air Quality Modeling Protocol

Dear Mr. Gaza:

We have received your letter of March 16, 2000 and are providing the following information to address the concerns expressed in the letter. Action items are identified with *underlined italic text*.

Comment 1 - Permit Conditions for 50% Load

KeySpan Energy understands that permit conditions will need to be established in regard to the lower limit 50% load.

Comment 2 - Basis for GEP Height/FAA Approval

The controlling structure in the GEP stack height evaluation is the Unit #3 boiler building. The revised modeling protocol and PSD application will contain an elevation view that clearly shows the height of the structure. The FAA has been contacted with regard to potential stack height restrictions due to the proximity of the facility to La Guardia Airport. An FAA "Notice of Proposed Construction or Alteration" form will also be completed and submitted to the FAA. Note that Units #1, #2 and #3 boilers have exhaust stacks that are 500 feet above grade level. The proposed height of the cogeneration facility stack is 400 feet above grade (below the GEP height of 472.5 feet). Since the new stack is located adjacent to the existing, and taller, stacks, no FAA restrictions are expected other than following illuminating/painting requirements. *Section 3.4 of the modeling protocol will be revised to reflect the selected stack height of the new stack* (at the time of protocol issuance, the 400-foot stack height was indicated as "preliminary"; KeySpan Energy has indicated that a 400-foot stack has been selected as part of the current facility design).

Comment 3 - Modeling in Complex and Intermediate Terrain

The nearest complex and intermediate terrain is located approximately 15 kilometers to the north-northwest of the project site in the Palisades of New Jersey. This distance is significant enough to minimize concerns over modeling in intermediate and complex terrain. None-the-less, if such modeling is required, the Valley mode of SCREEN3 (and, if need be, CTSCREEN) will be employed for terrain above stack top. *The revised modeling protocol will contain a discussion of this approach for evaluating impacts in intermediate and complex terrain.*

Comment 4 - Manhattan (New York County) PM-10 Non-attainment Area

The border of Manhattan (New York County) with Queens County is defined as the east shore of the East River, which abuts the western property line of the KeySpan Energy Ravenswood site. Given this proximity, the non-attainment area is well represented in the modeling receptor grid. Section 5.5 (Page 5-8) of the February 24, 2000 (original) modeling protocol makes reference to the fact that modeled PM-10 impacts cannot exceed significant impact levels within the non-attainment area of New York County.

Comment 5 - Brigantine Class I Area

The Level-1 screening analysis using the U.S. EPA VISCREEN (Version 1.01) model will be conducted for the nearest Class I area (Edwin B. Forsythe National Wildlife Refuge (NWR)) located in Brigantine, New Jersey. The visibility analysis will be performed for the worst possible operating scenario. *The revised modeling protocol, specifically Section 5.9.1, will include a discussion of the evaluation of visibility impacts at the Edwin B. Forsythe NWR.* The PSD application will contain the results of the Level-1 screening analysis.

Comment 6 - Cumulative Analysis

In the event that a cumulative impact analysis is required for the project, the requirements specified in the language (that was attached to your letter) will be followed. The use of the maximum significant impact area distance will be applied to all pollutants for which modeled impacts are significant. In addition, if a pollutant is significant for a given averaging time, then all averaging times for that pollutant will be addressed in the NAAQS and PSD increment analyses. Other proposed power projects that are subject to Article X review will be included in the cumulative impact analysis if their application has been deemed, by the chairman of the board, to comply with Section 164 of the Article X regulations. *Section 5.7 of the modeling protocol will be revised to incorporate that elements discussed in response to Comment 6.*

Pursuant to the instructions of Leon Sedefian, each agency that provided comments specific to the KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol is receiving an individual letter responding to their comments. Mr. Sedefian also requested that a revised protocol, reflecting agency comments, be issued. The revised protocol will be issued through the NYSDEC project manager, John Ferguson, with copies to those who received the initial protocol. To this point, the NYSDEC and New York State Public Service Commission (NYSPSC) in addition to the USEPA, have provided comments. The New York City

Department of Environmental Protection (NYCDEP) has been provided a copy of the protocol on February 24 and has been contacted to solicit comments. The NYCDEP has not provided any comments on the protocol.

I hope that the above information adequately responds to the concerns expressed in your letter. Please feel free to contact either Ted Main at 201- 933-5541, ext. 114 or me at ext. 115 should you wish to discuss your comments or this letter further.

Yours truly,

TRC Environmental Corporation

Anthony P. Letizia
Vice President

APL/xp

Enclosure: Amended KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol

cc: J. Ferguson, NYSDEC
L. Sedefian, NYSDEC
A. Domaracki, NYSDPS
S. Riva, U.S. EPA
D. Cabbagestalk, NYCDEP
B. McCabe, KeySpan
C. Corrado, KeySpan
C. Wolfgang, TRC
T. Main, TRC
G. Baranowski, TRC

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TRC

June 9, 2000
AL114-00

Mr. Alan J. Domaracki, Ph.D.
Air Quality Policy Analyst
New York State Department of Public Service
Three Empire Plaza
Albany, New York 12233-1350

Re: KeySpan Energy Ravenswood Cogeneration Facility
Air Quality Modeling Protocol

Dear Mr. Domaracki:

We have received your letter of March 7, 2000 and are providing the following information to address the concerns expressed in the letter. Action items are identified with *underlined italic text*.

Comment 1 – Turbine Oil firing and Water Injection Specific to Visible Plume Analysis

The visible plume analysis for the combustion turbine plume will be assessed for several operational conditions. These conditions will consider operation with natural gas firing without additional water injection for NO_x suppressions, and during oil firing where water will be injected. The total water content of the plume is modeled, which includes the water vapor formed by the combustion process, and the additional water added during oil firing. Additional cases will examine the formation of visible plumes under part load operation, for both natural gas and oil firing. *Section 5.13.2 of the modeling protocol will be revised to incorporate this discussion.*

Comment 2 – Visible Plume Analysis Screening for Inclement Weather

The visible plume analysis will be performed to determine the total number of hours the water vapor in the combustion turbine plume condenses and forms a visible plume. Of these total hours, the number of hours during the daylight periods only (where daylight is defined as the period between ½ before sunrise until ½ hour after sunset) will be identified. Additionally, the hours that have inclement weather or low visibility will also be identified. Weather obscuration is defined as an hour of inclement weather (indicated in the meteorological data record as moderate rain or snow, or conditions where the horizontal visibility is reduced to less than ½ mile. As such, the base case visible plume conditions will be all possible hours. A subsequent refinement of the base case (i.e. screening of the total number of hours) will be performed to determine those hours of visible plume that occur during daylight only. An additional refinement will determine the total number of visible plumes that occur during the daylight period, without weather obscuration. In this fashion, the DPS staff will be provided a "layered" analysis to determine the level of potential visual impact of the combustion turbine visible plumes.

Sections 5.13 and 5.13.1 of the modeling protocol will be revised to incorporate the inclement weather screening.

Pursuant to the instructions of Leon Sedefian, each agency that provided comments specific to the KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol is receiving an individual letter responding to their comments. Mr. Sedefian also requested that a revised protocol, reflecting agency comments, be issued. The revised protocol will be issued through the NYSDEC project manager, John Ferguson, with copies to those who received the initial protocol. To this point, the NYSDEC and New York State Public Service Commission (NYSPSC) in addition to the USEPA, have provided comments. The New York City Department of Environmental Protection (NYCDEP) has been provided a copy of the protocol on February 24 and has been contacted to solicit comments. The NYCDEP has not provided any comments on the protocol.

I hope that the above information adequately responds to the concerns expressed in your letter. Please feel free to contact either Ted Main at 201- 933-5541, ext. 114 or me at ext. 115 should you wish to discuss your comments or this letter further.

Yours truly,

TRC Environmental Corporation

Anthony P. Letizia
Vice President

APL/xp
Enclosure: Amended KeySpan Energy Ravenswood Cogeneration Facility Modeling Protocol

cc: J. Ferguson, NYSDEC
L. Sedefian, NYSDEC
R. Gaza, NYSDEC
S. Riva, U.S. EPA
D. Cabbagestalk, NYCDEP
B. McCabe, KeySpan
C. Corrado, KeySpan
C. Wolfgang, TRC
T. Main, TRC
G. Baranowski, TRC

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New York State Department of Environmental Conservation
Division of Environmental Permits, Room 538
Wolf Road, Albany, New York 12233-1750
Phone: (518) 457-7718 • **FAX:** (518) 457-7759
Website: www.dec.state.ny.us

John P. Cahill
Commissioner

Mr. Brian McCabe
Project Manager
KeySpan Energy
200 Shore Road
Glenwood Landing, NY 11547

July 27, 2000

RE: Ravenswood Power Plant
Article X No. 99-F-1625
Air Modeling Protocol Approval

Dear Mr. McCabe:

The Department has completed its review of the June 9, 2000 responses to our March 16, 2000 comments on the KeySpan Energy Ravenswood Air Quality Modeling Protocol and find the responses and the revised protocol acceptable. Since U.S. EPA has yet to review the final version of this protocol, KeySpan should be prepared to respond to any comments that EPA might have on this document.

Please be advised that it is in the best interest of KeySpan to file its Application only after all pre-application documents (including the pending stipulations) have been approved and signed, and all required pre-application studies are completed. The results of those studies can then be documented in the Application, greatly facilitating review.

If there are any question, you may call me at (518)457-7718.

Sincerely,

/s/

Orest Lewinter
Environmental Analyst 2

Ravenswood1
P. Seidman - DPS
D. Drexler/R. King - DPS
T. Grey - DOH
A. Licata/T. DiDomenico - NYC DEP
R. Miller - NYC EDC
Ravenswood Team
J. Hairie, Esq.
S. Taluto

Appendix D
Use of ERCs Form

USE OF EMISSION REDUCTION CREDITS FORM

NOTE: This form must be completed and submitted by the offset user.

FACILITY USING THE EMISSION REDUCTION CREDIT

Facility name: ____________________

Address: ____________________ DEC ID#: __________

DEC Region: ______ Emission point ID#: __________ Facility location ID#: __________

Proposed project description: ____________________

Signature of Authorized Representative: ____________________ Date: __________

FACILITY CREATING/OWNING THE EMISSION REDUCTION CREDIT

Facility name: ____________________

Address: ____________________ DEC ID#: __________

DEC Region: ______ Emission point ID#: __________ Facility location ID#: __________

Reduction mechanism: ____________________

Signature of Authorized Representative: ____________________ Date: __________

AMOUNT OF ERC BEING USED

(complete all that apply)

NO_x: offsets _______tpy netting_______tpy

PM-10: offsets_______tpy netting_______tpy

VOC: offsets _______tpy netting_______tpy

CO: offsets_______tpy netting_______tpy

FOR DEC USE ONLY

Date of Permit Issuance for Facility Using ERC: ___/___/___

Name: ____________________ Region: __________

Signature: ____________________ Date: __________

Appendix E
Acid Rain Permit Application

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258

EPA

Certificate of Representation

For more information, see instructions and refer to 40 CFR 72.24

This submission is: ☒ New ☐ Revised (revised submissions must be completed in full; see instructions)

This submission includes combustion or process sources under 40 CFR part 74 ☐

STEP 1
Identify the source by plant name, State, and ORIS code.

Plant Name Ravenswood Cogeneration Facility	State NY	ORIS Code

STEP 2
Enter requested information for the designated representative.

Name Mr. Howard A. Kosel, Jr.	
Address KeySpan Energy 175 East Old Country Road Hicksville, NY 11801	
Phone Number (516) 545-4474	Fax Number (516) 545-4746
E-mail address (if available) hkosel@keyspanenergy.com	

STEP 3
Enter requested information for the alternate designated representative, if applicable.

Name Mr. Robert D. Teetz	
Phone Number (631) 391-6133	Fax Number (631) 391-6079
E-mail address (if available) rteetz@keyspanenergy.com	

STEP 4
Complete Step 5, read the certifications, and sign and date. For a designated representative of a combustion or process source under 40 CFR part 74, the references in the certifications to "affected unit" or "affected units" also apply to the combustion or process source under 40 CFR part 74 and the references to "affected source" also apply to the source at which the combustion or process source is located.

I certify that I was selected as the designated representative or alternate designated representative, as applicable, by an agreement binding on the owners and operators of the affected source and each affected unit at the source.

I certify that I have given notice of the agreement, selecting me as the 'designated representative' for the affected source and each affected unit at the source identified in this certificate of representation, in a newspaper of general circulation in the area where the source is located or in a State publication designed to give general public notice.

I certify that I have all necessary authority to carry out my duties and responsibilities under the Acid Rain Program on behalf of the owners and operators of the affected source and of each affected unit at the source and that each such owner and operator shall be fully bound by my actions, inactions, or submissions.

I certify that I shall abide by any fiduciary responsibilities imposed by the agreement by which I was selected as designated representative or alternate designated representative, as applicable.

I certify that the owners and operators of the affected source and of each affected unit at the source shall be bound by any order issued to me by the Administrator, the permitting authority, or a court regarding the source or unit.

Where there are multiple holders of a legal or equitable title to, or a leasehold interest in, an affected unit, or where a utility or industrial customer purchases power from an affected unit under life-of-the-unit, firm power contractual arrangements, I certify that:

> I have given a written notice of my selection as the designated representative or alternate designated representative, as applicable, and of the agreement by which I was selected to each owner and operator of the affected source and of each affected unit at the source; and
>
> Allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in proportion to each holder's legal, equitable, leasehold, or contractual reservation or entitlement or, if such multiple holders have expressly provided for a different distribution of allowances by contract, that allowances and the proceeds of transactions involving allowances will be deemed to be held or distributed in accordance with the contract.

Plant Name (from Step 1) Ravenswood Cogeneration Facility

The agreement by which I was selected as the alternate designated representative, if applicable, includes a procedure for the owners and operators of the source and affected units at the source to authorize the alternate designated representative to act in lieu of the designated representative.

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Signature (designated representative)	Date
Signature (alternate designated representative)	Date

STEP 5
Provide the name of every owner and operator of the source and each affected unit (or combustion or process source) at the source. Identify the units they own and/or operate by boiler ID# from NADB, if applicable.

Name Ravenswood Cogeneration Facility					☒ Owner	☒ Operator
ID# UCC001	ID	ID#	ID#	ID#	ID#	ID#
ID	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

Name					☐ Owner	☐ Operator
ID#	ID#	ID#	ID#	ID#	ID#	ID#
ID#	ID#	ID#	ID#	ID#	ID#	ID#

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258
Expires 1-31-96

EPA

Phase II Permit Application

For more information, see instructions and refer to 40 CFR 72.30 and 72.31

This submission is: ☒ New ☐ Revised

STEP 1
Identify the source by plant name, State, and ORIS code from NADB

Plant Name Ravenswood Cogeneration Facility	State NY	ORIS Code

STEP 2
Enter the boiler ID# from NADB for each affected unit, and indicate whether a repowering plan is being submitted for the unit by entering "yes" or "no" at column c. For new units, enter the requested information in columns d and e

a	b (Compliance Plan)	c (Compliance Plan)	d	e
Boiler ID#	Unit Will Hold Allowances in Accordance with 40 CFR 72.9(c)(1)	Repowering Plan	New Units Commence Operation Date	New Units Monitor Certification Deadline
UCC001	Yes	No	Approximately October 1, 2002	90 Days After d), (Approximately January 1, 2003)
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			
	Yes			

STEP 3
Check the box if the response in column c of Step 2 is "Yes" for any unit

☐ For each unit that will be repowered, the Repowering Extension Plan form is included and the Repowering Technology Petition form has been submitted or will be submitted by June 1, 1997.

Plant Name (from Step 1) **Ravenswood Cogeneration Facility**

STEP 4
Read the standard requirements and certification, enter the name of the designated representative, and sign and date

Standard Requirements

Permit Requirements.

(1) The designated representative of each affected source and each affected unit at the source shall:
(i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and
(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;
(2) The owners and operators of each affected source and each affected unit at the source shall:
(i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and
(ii) Have an Acid Rain Permit.

Monitoring Requirements.

(1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR parts 74, 75, and 76.
(2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the unit with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.
(3) The requirements of 40 CFR parts 74 and 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements.

(1) The owners and operators of each source and each affected unit at the source shall:
(i) Hold allowances, as of the allowance transfer deadline, in the unit's compliance subaccount (after deductions under 40 CFR 73.34(c)) not less than the total annual emissions of sulfur dioxide for the previous calendar year from the unit; and
(ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.
(2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.
(3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:
(i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or
(ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).
(4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
(5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1)(i) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
(6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or the written exemption under 40 CFR 72.7 and 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
(7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements. The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

Excess Emissions Requirements.

(1) The designated representative of an affected unit that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
(2) The owners and operators of an affected unit that has excess emissions in any calendar year shall:
(i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
(ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements.

(1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
(i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation changing the designated representative;
(ii) All emissions monitoring information, in accordance with 40 CFR part 75;
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,

Plant Name (from Step 1) **Ravenswood Cogeneration Facility**

Recordkeeping and Reporting Requirements (cont.)

(iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.

(2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Liability.

(1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or a written exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
(2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001.
(3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
(4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
(5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
(6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit. Except as provided under 40 CFR 72.44 (Phase II repowering extension plans) and 40 CFR 76.11 (NO_x averaging plans), and except with regard to the requirements applicable to units with a common stack under 40 CFR part 75 (including 40 CFR 75.16, 75.17, and 75.18), the owners and operators and the designated representative of one affected unit shall not be liable for any violation by any other affected unit of which they are not owners or operators or the designated representative and that is located at a source of which they are not owners or operators or the designated representative.
(7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

Effect on Other Authorities. No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or a written exemption under 40 CFR 72.7 or 72.8 shall be construed as:

(1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating to applicable National Ambient Air Quality Standards or State Implementation Plans;
(2) Limiting the number of allowances a unit can hold; *provided,* that the number of allowances held by the unit shall not affect the source's obligation to comply with any other provisions of the Act;
(3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements under such State law;
(4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
(5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

Certification

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name **Howard A. Kosel, Jr.**	
Signature	Date

STEP 5 (optional)
Enter the source AIRS and FINDS identification numbers, if known

Appendix F

BACT/LAER Clearinghouse Search Results

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - NOx

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
CITY OF ANAHEIM GAS TURBINE PROJECT		CA	9/15/89	TURBINE, GAS, GE PGLM 5000	55	2.3	SCR, STEAM INJECTION, CO REACTOR	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	164	2.5	COMBUSTION CONTROL	BACT-PSD
GORHAM ENERGY LIMITED PARTNERSHIP	GORHAM	ME	12/4/98	TURBINE, COMBINED CYCLE	900	2.5	SELECTIVE CATALYTIC REDUCTION. EMISSION IS FROM	LAER
UNION OIL CO.	RODEO	CA	3/3/86	TURBINE, GAS & DUCT BURNER	54	2.5	SCR, STEAM INJECTION	BACT-PSD
WESTBROOK POWER LLC	WESTBROOK	ME	12/4/98	TURBINE, COMBINED CYCLE, TWO	528	2.5	SELECTIVE CATALYTIC REDUCTION AND DRY LOW NOX BUR- NER	LAER
SEPCO	RIO LINDA	CA	10/5/94	TURBINE, GAS COMBINED CYCLE GE MODEL 7	115	2.6	SELECTIVE CATALYTIC REDUCTION AND DRY LOW NOX COMBU	BACT
SACRAMENTO COGENERATION AUTHORITY P&G	SACRAMENTO	CA	8/19/94	TURBINE, GAS, COMBINED CYCLE LM6000	53	3.0	SELECTIVE CATALYTIC REDUCTION AND WATER INJECTION	BACT
SACRAMENTO POWER AUTHORITY CAMPBELL SOUP	SACRAMENTO	CA	8/19/94	TURBINE GAS, COMBINE CYCLE SIEMENS V84.2	157	3.0	SELECTIVE CATALYTIC REDUCTION AND DRY LOW NOX COMBU	BACT
SACRAMENTO POWER AUTHORITY CAMPBELL SOUP	SACRAMENTO	CA	8/19/94	TURBINE, GAS , COMBINED CYCLE, SIEMENS V84.2	157	3.0	SELECTIVE CATALYTIC REDUCTION AND DRY LOW NOX CO MBUS	BACT
BERKSHIRE POWER DEVELOPMENT, INC.	AGAWAM	MA	9/22/97	TURBINE, COMBUSTION, ABB GT24	224	3.1	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NO	BACT-PSD
DIGHTON POWER ASSOCIATE, LP	DIGHTON	MA	10/6/97	TURBINE, COMBUSTION, ABB GT11N2	166	3.5	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NO	BACT-PSD
BROOKLYN NAVY YARD COGENERATION PARTNERS L.P.	NEW YORK CITY	NY	6/6/95	TURBINE, NATURAL GAS FIRED	240	3.5	SCR	LAER
CASCO RAY ENERGY CO	VEAZIE	ME	7/13/98	TURBINE, COMBINED CYCLE, NATURAL GAS, TWO	170	3.5	SELECTIVE CATALYTIC REDUCTION	BACT-PSD
GRANITE ROAD LIMITED		CA	5/6/91	TURBINE, GAS, ELECTRIC GENERATION	58	3.5	SCR, STEAM INJECTION	BACT-PSD
MILLENNIUM POWER PARTNER, LP	CHARLTON	MA	2/2/98	TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501	317	3.5	DRY LOW NOX COMBUSTION TECHNOLOGY IN CONJUNCTION WIT	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, NATURAL GAS-FIRED (2)	77	3.5	SCR	BACT-PSD
RUMFORD POWER ASSOCIATES	RUMFORD	ME	5/1/98	TURBINE GENERATOR, COMBUSTION, NATURAL GAS	238	3.5	SCR AMMONIA INJECTION SYSTEM AND CATALYTIC REACTORTO R	BACT-PSD
TIVERTON POWER ASSOCIATES	TIVERTON	RI	2/13/98	COMBUSTION TURBINE, NATURAL GAS	265	3.5	SCR	LAER
ALABAMA POWER COMPANY - THEODORE COGENERATION	THEODORE	AL	3/16/99	170 MW TURBINE W/ DUCT BURNER, HR BOILER, SCR	170	3.5	DLN COMBUSTOR IN CT, LNB IN DUCT BURNER, SCR	BACT-PSD
ALABAMA POWER PLANT BARRY	BUCKS	AL	8/7/98	TURBINES, COMBUSTION, NATURAL GAS	510	3.5	NATURAL GAS, CT-DLN COMBUSTORS, DUCTBURNER, LOW NOX	BACT-PSD
LSP-COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	3/1/95	COMBUSTION TURBINE/GENERATOR	246	3.6	FUEL SELECTION, GOOD COMBUSTION	BACT-PSD
BADGER CREEK LIMITED		CA	10/30/89	TURBINE, GAS COGENERATION	57	3.7	SCR, STEAM INJECTION	BACT-PSD
BLUE MOUNTAIN POWER, LP	RICHLAND	PA	7/31/96	COMBUSTION TURBINE WITH HEAT RECOVERY BOILE	153	4.0	DRY LNB WITH SCR WATER INJECTION IN PLACE WHEN FIRING OIL	LAER
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	168	4.3	NONE	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	4.4	STEAM/WATER INJECTION AND SELECTIVE CATALYTIC REDUCTIO	BACT-PSD
HERMISTON GENERATING CO.	HERMISTON	OR	7/7/94	TURBINES, NATURAL GAS (2)	212	4.5	SCR	BACT-PSD
LSP - COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	11/10/98	GENERATOR, COMBUSTION TURBINE & DUCT BURNE	1988	4.5	SELECTIVE CATALYTIC REDUCTION (SCR) WITH A NOX CEM AND A	BACT-PSD
PILGRIM ENERGY CENTER	ISLIP	NY		(2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001	175	4.5	STEAM INJECTION FOLLOWED BY SCR	BACT
PORTLAND GENERAL ELECTRIC CO.	BOARDMAN	OR	5/31/94	TURBINES, NATURAL GAS (2)	215	4.5	SCR	BACT-PSD
SITHE/INDEPENDENCE POWER PARTNERS	OSWEGO	NY	11/24/92	TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 M	267	4.5	SCR AND DRY LOW NOX	BACT-OTHER
SOUTHWESTERN PUBLIC SERVICE COMPANY/CUNNINGHAM S	HOBBS	NM	2/15/97	COMBUSTION TURBINE, NATURAL GAS	100	4.5	DRY LOW NOX COMBUSTION	BACT-PSD
WYANDOTTE ENERGY	WYANDOTTE	MI	2/8/99	TURBINE, COMBINED CYCLE, POWER PLANT	500	4.5	SCR	BACT
PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA)	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	4.8	FUEL SPEC: FIRING #2 FUEL OIL	BACT-PSD
BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT	PERRYMMAN	MD		TURBINE, 140 MW NATURAL GAS FIRED ELECTRIC	140	5.0	DRY BURN LOW NOX BURNERS	BACT-PSD
CARSON ENERGY GROUP & CENTRAL VALLEY FINANCING AUT	ELK GROVE	CA	7/23/93	TURBINE, GAS, COMBINED CYCLE, GE LM6000	56	5.0	SELECTIVE CATALYTIC REDUCTION AND WATER INJECTION ALSO	BACT
CROCKETT COGENERATION - C&H SUGAR	CROCKETT	CA	10/5/93	TURBINE, GAS, GENERAL ELECTRIC MODEL PG7221(F	240	5.0	DRY LOW-NOX COMBUSTERS AND A MITSUBISHI HEAVY INDUSTRI	BACT-OTHER
KALAMAZOO POWER LIMITED	COMSTOCK	MI	12/3/91	TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS	226	5.0	DRY LOW NOX TURBINES	BACT-PSD
MOBILE ENERGY LLC	MOBILE	AL	1/5/99	TURBINE, GAS, COMBINED CYCLE	168	5.1	SCR & DLN COMBUSTORS DURING GAS FIRING. STEAM/WAT	BACT-PSD
KERN FRONT LIMITED	BAKERSFIELD	CA	11/4/86	TURBINE, GAS, GENERAL ELECTRIC LM-2500	25	5.5	WATER INJECTION AND SELECTIVE CATALYTIC REDUCTION	BACT-OTHER
BRIDGEPORT ENERGY, LLC	BRIDGEPORT	CT	6/29/98	TURBINES, COMBUSTION MODEL V84.3A, 2 SIEMES	260	6.0	DRY LOW NOX BURNER WITH SCR	BACT-PSD
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC.	MOSELL	MS	4/9/96	COMBUSTION TURBINE, COMBINED CYCLE	162	6.0	GOOD COMBUSTION CONTROLS	BACT-PSD
SUMAS ENERGY INC.	SUMAS	WA	6/25/91	TURBINE, NATURAL GAS	88	6.0	SCR	BACT-PSD
AES PLACERITA, INC.		CA	7/2/87	TURBINE, GAS	66	6.2	SCR, STEAM INJECTION	BACT-PSD
SIMPSON PAPER CO.		CA	6/22/87	TURBINE, GAS	50	6.6	SCR, STEAM INJECTION	OTHER
MIDWAY - SUNSET PROJECT		CA	1/6/87	TURBINE, GAS, 3	122	7.2	H2O INJECTION	BACT-PSD
SALINAS RIVER COGENERATION COMPANY		CA	11/19/90	TURBINE,GAS, W/ HEAT RECOVERY STEAM GENERAT	43	7.8	TURBINE DRY LOW NOX COMBUST SYS W/ SCR CNTRL SYS	BACT-PSD
SARGENT CANYON COGENERATION COMPANY		CA	11/19/90	TURBINE, GAS W/ HEAT RECOVERY STEAM GENERAT	43	8.0	TURBINE DRY LOW NOX COMBUST SYS W/ SCR CNTRL SYS	BACT-PSD
BASF CORPORATION	GEISMAR	LA	12/30/97	TURBINE, COGEN UNIT 2, GE FRAME 6	42	8.0	STEAM INJECTION AND SCR TO LIMIT NOX TO 8 PPM FOR NATURA	BACT-PSD
CHAMPION INTERNATL CORP. & CHAMP CLEAN ENERGY	BUCKSPORT	ME	9/14/98	TURBINE, COMBINED CYCLE, NATURAL GAS	175	8.0		BACT-OTHER
RICHMOND POWER ENTERPRISE PARTNERSHIP	RICHMOND	VA	12/12/89	TURBINE, GAS FIRED, 2	145	8.2	SCR, STEAM INJECTION	LAER
MOJAVE COGENERATION CO.		CA	1/12/89	TURBINE, GAS	61	8.4	FUEL SPEC: OIL FIRING LIMITED TO 11 H/D	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	8.9	COMBUSTION CONTROL	BACT-PSD
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (NATURAL GAS) (2)	149	8.9	SCR, DRY LOW NOX BURNER	BACT-OTHER
NEWARK BAY COGENERATION PARTNERSHIP	NEWARK	NJ	11/1/90	TURBINE, NATURAL GAS FIRED	73	8.9	STEAM INJECTION AND SCR	BACT-PSD
AIR LIQUIDE AMERICA CORPORATION	GEISMAR	LA	2/13/98	TURBINE GAS, GE, 7ME 7	121	9.0	DRY LOW NOX TO LIMIT NOX EMISSION TO 9PPMV	BACT-PSD
BAF ENERGY		CA	7/8/87	TURBINE, GENERATOR	111	9.0	SCR, STEAM INJECTION	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	9.0	SELECTIVE CATALYTIC REDUCTION (SCR)	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	147	9.0	SCR, STEAM INJECTION	BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	9.0	DRY COMBUSTOR TO 25 PPM SCR TO 9 PPM USING NAT GAS	OTHER
DUKE ENERGY NEW SOMYRNA BEACH POWER CO. LP	CHARLOTTE NC (HEADQUARTERS)	FL	10/15/99	TURBINE-GAS, COMBINED CYCLE	500	9.0	DLN , GE DLN2.6 BURNERS	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	2/28/95	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	89	9.0	GOOD COMBUSTION CONTROL	BACT-PSD
FORMOSA PLASTICS CORPORATION, BATON ROUGE PLANT	BATON ROUGE	LA	3/7/97	TURBINE/HSRG, GAS COGENERATION	56	9.0	DRY LOW NOX BURNER/COMBUSTION DESIGN AND CONSTRUCTIC	BACT-PSD

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - NOx

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
FORMOSA PLASTICS CORPORATION, LOUISIANA	BATON ROUGE	LA	3/2/95	TURBINE/HRSG, GAS COGENERATION	56	9.0	DRY LOW NOX BURNER/COMBUSTION DESIGN AND CONTROL	LAER
KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW	81	9.0	DRY LOW NOX OR SCR	BACT-OTHER
KAMINE/BESICORP CORNING L.P.	SOUTH CORNING	NY	11/5/92	TURBINE, COMBUSTION (79 MW)	82	9.0	DRY LOW NOX OR SCR	BACT-OTHER
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), NATURAL GAS	116	9.0	DRY LOW NOX BURNER WITH SCR	BACT-PSD
NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO.	PROVIDENCE	RI	4/13/92	TURBINE, GAS AND DUCT BURNER	170	9.0	SCR	BACT-PSD
NEVADA COGENERATION ASSOCIATES #2	LAS VEGAS	NV	1/17/91	COMBINED-CYCLE POWER GENERATION	85	9.0	SELECTIVE CATALYTIC SYSTEM ON ONE UNIT	BACT-PSD
NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT	LAS VEGAS	NV	9/18/92	COMBUSTION TURBINE ELECTRIC POWER GENERATI	600	9.0	PRECISION CONTROL FOR THE LOW NOX COMBUSTOR	BACT-PSD
OCEAN STATE POWER	BURRILLVILLE	RI	12/13/88	TURBINE, GAS, GE FRAME 7, 4 EA	132	9.0	SCR, H2O INJECTION	BACT-PSD
OLEANDER POWER PROJECT	BALTIMORE (HEADQUARTERS)	FL	10/1/99	TURBINE-GAS, COMBINED CYCLE	190	9.0	DLN 2.6 GE ADVANCED DRY LOW NOX BU	BACT-PSD
PASNY/HOLTSVILLE COMBINED CYCLE PLANT	HOLTSVILLE	NY	9/1/92	TURBINE, COMBUSTION GAS (150 MW)	143	9.0	DRY LOW NOX	BACT-OTHER
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	TURBINES, COMBUSTION (2) (NATURAL GAS)	140	9.0	SCR	BACT-OTHER
SUMAS ENERGY INC	SUMAS	WA	12/1/90	TURBINE, GAS-FIRED	67	9.0	SELECTIVE CATALYTIC REDUCTION (SCR)	BACT-PSD
SUNLAW/INDUSTRIAL PARK 2		CA	6/28/85	TURBINE, GAS W/#2 FUEL OIL BACKUP, 2 EA, GE FRAM	52	9.0	SCR, STEAM INJECTION	OTHER
SANTA ROSA ENERGY LLC	NORTHBROOK	FL	12/4/98	TURBINE, COMBUSTION, NATURAL GAS	241	9.8	DRY LOW NOX BURNER	BACT-PSD
LAS VEGAS COGENERATION LTD. PARTNERSHIP	NORTH LAS VEGAS	NV	10/18/90	TURBINE, COMBUSTION COGENERATION	50	10.0	H2O INJECTION/SCR	BACT-PSD
TAMPA ELECTRIC COMPANY (TEC)	APOLLO BEACH	FL	10/15/99	TURBINE, COMBUSTION, SIMPLE CYCLE	165	10.5	DLN GE DLN2 6	BACT-PSD
PEDRICKTOWN COGENERATION LIMITED PARTNERSHIP	OLDMANS TOWNSHIP	NJ	2/23/90	TURBINE, NATURAL GAS FIRED	125	11.8	STEAM INJECTION AND SCR	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, NATURAL GAS (2)	189	12.0	DRY LOW NOX COMBUSTOR	BACT-PSD
ALABAMA POWER COMPANY	MCINTOSH	AL	12/17/97	COMBUSTION TURBINE W/ DUCT BURNER (COMBINED	100	15.0	DRY LOW NOX BURNERS	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE,GAS	152	15.0	DRY LOW NOX COMBUSTOR	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL	74	15.0	DRY LOW NOX BURNERS GE FRAME UNIT, CAN ANNULAR COMBUS	BACT-PSD
KALAMAZOO POWER LIMITED	COMSTOCK	MI	12/3/91	TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS	226	15.0	DRY LOW NOX TURBINES	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, NATURAL GAS	109	15.0	DRY LOW NOX COMBUSTOR	BACT-PSD
PANDA-KATHLEEN, L.P.	LAKELAND	FL	8/1/95	COMBINED CYCLE COMBUSTION TURBINE (TOTAL 115	75	15.0	DRY LOW NOX BURNER	BACT-PSD
PEPCO - CHALK POINT PLANT	EAGLE HARBOR	MD	6/25/90	TURBINE, 84 MW NATURAL GAS FIRED ELECTRIC	84	15.0	QUIET COMBUSTION AND WATER INJECTION	BACT-PSD
PUBLIC SERVICE OF COLO.-FORT ST VRAIN	PLATTEVILLE	CO	5/1/96	COMBINED CYCLE TURBINES (2), NATURAL	471	15.0	DRY LOW NOX COMBUSTION SYSTEMS FOR TURBINES AND DUC	BACT-PSD
SEMINOLE HARDEE UNIT 3	FORT GREEN	FL	1/1/96	COMBINED CYCLE COMBUSTION TURBINE	140	15.0	DRY LNB STAGED COMBUSTION	BACT-PSD
SOUTHWESTERN PUBLIC SERVICE CO/CUNNINGHAM STATION	HOBBS	NM	11/4/96	COMBUSTION TURBINE, NATURAL GAS	100	15.0	DRY LOW NOX COMBUSTION	BACT-PSD
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	15.0	USING 15% EXCESS AIR. NOX EMISSION IS BECAUSE OF NATURAL	BACT-PSD
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, GAS	202	15.0	DRY LOW NOX COMBUSTOR	BACT-PSD
WESTPLAINS ENERGY	PUEBLO	CO	6/14/96	SIMPLE CYCLE TURBINE, NATURAL GAS	219	15.0	DRY LOW NOX COMBUSTION SYSTEM (DLN). COMMITMENT TOUPG	BACT-PSD
STAR ENTERPRISE	DELAWARE CITY	DE	3/30/98	TURBINES, COMBINED CYCLE, 2	103	16.0	NITROGEN INJECTION WHILE FIRING SYNGAS AND STEAM INJECT	LAER
WEST CAMPUS COGENERATION COMPANY	COLLEGE STATION	TX	5/2/94	GAS TURBINES	75	20.5	INTERNAL COMBUSTION CONTROLS	BACT-PSD
SC ELECTRIC AND GAS COMPANY - HAGOOD STATION	CHARLESTON	SC	12/11/89	INTERNAL COMBUSTION TURBINE	110	21.7	WATER INJECTION	BACT-PSD
SOUTHERN MARYLAND ELECTRIC COOPERATIVE (SMECO)	EAGLE HARBOR	MD	10/1/89	TURBINE, NATURAL GAS FIRED ELECTRIC	90	22.0	WATER INJECTION	BACT-PSD
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	GE LM5000 COMBINED CYCLE GAS TURBINE EP #0000	56	25.0	NO CONTROLS	BACT-OTHER
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, GAS, 1 EACH	80	25.0	WET INJECTION	BACT-PSD
CITY OF LAKELAND ELECTRIC AND WATER UTILITIES	LAKELAND	FL	7/10/98	TURBINE, COMBUSTION, GAS FIRED W/ FUEL OIL ALS	272	25.0	DRY LOW NOX BURNERS FOR SIMPLE CYCLE, SCR WHEN C	BACT-PSD
COLORADO SPRINGS UTILITIES-NIXON POWER PLANT	FOUNTAIN	CO	6/30/98	SIMPLE CYCLE TURBINE, NATURAL GAS	1122	25.0	DRY LOW NOX COMBUSTION	BACT-PSD
COMMONWEALTH ATLANTIC LTD PARTNERSHIP	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	192	25.0	H2O INJECTION & LOW NOX COMBUSTION, ANNUAL STACK TESTIN	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, GAS, 4 EACH	400	25.0	LOW NOX COMBUSTORS	BACT-PSD
GEORGIA GULF CORPORATION	PLAQUEMINE	LA	3/26/96	GENERATOR, NATURAL GAS FIRED TURBINE	140	25.0	CONTROL NOX USING STEAM INJECTION	BACT-PSD
GEORGIA POWER COMPANY, ROBINS TURBINE PROJECT	ROBINS AIR FORCE BASE	GA	5/13/94	TURBINE, COMBUSTION, NATURAL GAS	80	25.0	WATER INJECTION, FUEL SPEC: NATURAL GAS	BACT-PSD
GEORGIA POWER COMPANY, ROBINS TURBINE PROJECT	ROBINS AIR FORCE BASE	GA	5/13/94	TURBINE, COMBUSTION, NATURAL GAS	80	25.0	WATER INJECTION, FUEL SPEC: NATURAL GAS	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, GAS FIRED (2 EACH)	227	25.0	MAXIMUM WATER INJECTION	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	TURBINE, GE FRAME 7, GAS FIRED	80	25.0	STEAM INJECTION	BACT-PSD
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	SIEMENS V64.3 GAS TURBINE (EP #00001)	81	25.0	WATER INJECTION	BACT
LORDSBURG L.P.	LORDSBURG	NM	6/18/97	TURBINE, NATURAL GAS-FIRED, ELEC. GEN.	100	25.0	DRY LOW-NOX TECHNOLOGY WHICH ADOPTS STAGED OR SCHE	BACT-PSD
MARCH POINT COGENERATION CO		WA	10/26/90	TURBINE, GAS-FIRED	80	25.0	MASSIVE STEAM INJECTION	BACT-PSD
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	COMBINED CYCLE TURBINE (25 MW)	71	25.0	FUEL OIL SULFUR CONTENT <=0.05% BY WEIGHT DRY LOW NOX C	BACT-PSD
PACIFIC THERMONETICS, INC.	CROCKETT	CA	12/10/85	TURBINE, GAS, FRAME 7, 2 EA	127	25.0	QUIET COMBUSTOR. FUEL SPEC: NATURAL GAS FIRING LIMITED	BACT-PSD
PEABODY MUNICIPAL LIGHT PLANT	PEABODY	MA	11/30/89	TURBINE, 38 MW NATURAL FAS FIRED	52	25.0	WATER INJECTION	BACT-OTHER
PEPCO - STATION A	DICKERSON	MD	5/31/90	TURBINE, 124 MW NATURAL GAS FIRED	125	25.0	WATER INJECTION	BACT-PSD
PG & E, STATION T	SAN FRANCISCO	CA	8/25/86	TURBINE, GAS, GE LM5000	50	25.0	STEAM INJECTION AT STEAM/FUEL RATIO = 1.7/1	BACT-PSD
PROJECT ORANGE ASSOCIATES	SYRACUSE	NY	12/1/93	GE LM-5000 GAS TURBINE	69	25.0	STEAM INJECTION, FUEL SPEC. NATURAL GAS ONLY	BACT
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	TURBINE, GAS FIRED	79	25.0	STEAM INJECTION	OTHER
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	GENERATOR, GAS TURBINE	164	25.0	DRY LOW NOX COMBUSTOR	BACT-PSD
WI ELECTRIC POWER CO.	CONCORD STATION	WI	10/18/90	TURBINES, COMBUSTION, SIMPLE CYCLE, 4	75	25.0	H2O INJECTION	BACT-PSD
DELMARVA POWER	WILMINGTON	DE	9/27/90	TURBINE, COMBUSTION	100	27.1	LOW NOX BURNER	BACT-PSD
ONEIDA COGENERATION FACILITY	ONEIDA	NY	2/26/90	TURBINE, GE FRAME 6	52	32.0	COMBUSTION CONTROL	OTHER
CHAMPION INTERNATIONAL CORP.	SHELDON	TX	3/5/85	TURBINE, GAS, 2	168	33.2		BACT-PSD
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	TURBINE, GE LM5000, GAS FIRED	63	36.0	H2O INJECTION	BACT-PSD

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - NOx

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	TURBINE, GAS FIRED	79	36.0	WATER INJECTION	OTHER
MIDWAY-SUNSET COGENERATION CO.		CA	1/27/88	TURBINE, GE FRAME 7, 3 EA	75	38 4	H2O INJECTION, QUIET COMBUSTOR™	BACT-PSD
O'BRIEN COGENERATION	HARTFORD	CT	8/8/88	TURBINE, GAS FIRED	62	39.0	WATER INJECTION	BACT-PSD
CAPITOL DISTRICT ENERGY CENTER	HARTFORD	CT	10/23/89	ENGINE, GAS TURBINE	92	42.0	STEAM INJECTION	BACT-PSD
CITY UTILITIES OF SPRINGFIELD	SPRINGFIELD	MO	3/4/91	GENERATION OF ELECTRICAL POWER	73	42.0	WATER INJECTION	BACT-PSD
CITY UTILITIES OF SPRINGFIELD	SPRINGFIELD	MO	3/6/91	GENERATION OF ELECTRICAL POWER	94	42.0	WATER INJECTION	BACT-PSD
DELMARVA POWER	WILMINGTON	DE	8/23/88	TURBINE, COMBUSTION, 2 EA	100	42 0	LOW NOX BURNER, WATER INJECTION	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION CO.	LOCKPORT	NY	5/2/89	TURBINE, GR FRAME 6, 3 EA	52	42.0	STEAM INJECTION	BACT-PSD
FLORIDA POWER AND LIGHT	LAVOGROME	FL	3/14/91	TURBINE, GAS, 4 EACH	240	42.0	COMBUSTION CONTROL	BACT-PSD
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, NAT GAS FIRED, 3 EA	129	42.0		BACT-PSD
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	GE FRAME 6 GAS TURBINE (EP #00001)	54	42.0	STEAM INJECTION	BACT
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	GE FRAME 6 GAS TURBINE	62	42.0	WATER INJECTION	BACT
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	GE FRAME 6 GAS TURBINE	63	42.0	STEAM INJECTION	BACT
LEDERLE LABORATORIES	PEARL RIVER	NY		(2) GAS TURBINES (EP #S 00101&102)	14	42.0	STEAM INJECTION	BACT-PSD
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(6) GE FRAME 6 TURBINES (EP #S 00001-00006)	53	42.0	STEAM INJECTION	BACT
MEGAN-RACINE ASSOCIATES, INC	CANTON	NY	8/5/89	GE LM5000-N COMBINED CYCLE GAS TURBINE	401	42.0	WATER INJECTION	BACT
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	TURBINE, LM5000	54	42.0	H2O INJECTION	BACT-PSD
MIDLAND COGENERATION VENTURE	MIDLAND	MI	2/16/88	TURBINE, 12 TOTAL	123	42.0	STEAM INJECTION	BACT-PSD
THE DEXTER CORP.	WINDSOR LOCKS	CT	9/29/89	TURBINE, NAT GAS & #2 FUEL OIL FIRED	69	42.0	STEAM INJECTION	BACT-PSD
VIRGINIA POWER	CHESTERFIELD	VA	4/15/88	TURBINE, GE,2 EA	234	42 0	STEAM INJECTION W/MAXIMIZATION (NSPS SUBPART GG)	LAER
VIRGINIA POWER		VA	9/7/89	TURBINE, GAS	164	42.0	H2O INJECTION, RECORD KEEPING OF FUEL N2 CONTENT	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	131	44.8	H2O INJECTION	BACT-PSD
LONG ISLAND LIGHTING CO.		NY	11/1/88	TURBINE, GE FRAME 7, 3 EA	75	55.0	WATER INJECTION	BACT-PSD
PROCTOR AND GAMBLE PAPER PRODUCTS CO (CHARMIN)	MEHOOPANY	PA	5/31/95	TURBINE, NATURAL GAS	73	55.0	STEAM INJECTION	RACT
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	GE FRAME 6 GAS TURBINE	53	60 0	STEAM INJECTION	BACT
ALASKA ELECTRICAL GENERATION & TRANSMISSION	BIG LAKE	AK	3/18/87	TURBINE, NAT GAS FIRED	80	75.0	H2O INJECTION	BACT-PSD
CONTINENTAL ENERGY ASSOC.	HAZELTON	PA	7/26/88	TURBINE, NAT GAS	98	75.0	STEAM INJECTION	BACT-PSD
SOUTHEAST PAPER CORP.	DUBLIN	GA	10/13/87	TURBINE, COMBUSTION	68	100.0	STEAM INJECTION	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr

2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of NO_2: 1 (PPM) = (lb/mmBtu) * 271
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values

All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - CO

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA)	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	1.0	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, GAS FIRED (2 EACH)	227	1.8	MAXIMUM WATER INJECTION	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, NATURAL GAS-FIRED (2)	77	1.8	OXIDATION CATALYST	OTHER
VIRGINIA POWER		VA	9/7/89	TURBINE, GAS	164	2.1		BACT-PSD
SC ELECTRIC AND GAS COMPANY - HAGOOD STATION	CHARLESTON	SC	12/11/89	INTERNAL COMBUSTION TURBINE	110	2.7	GOOD COMBUSTION PRACTICES	BACT-PSD
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, GAS, 1 EACH	80	3.0	FUEL SPEC: NATURAL GAS	BACT-PSD
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	TURBINES, COMBUSTION (2) (NATURAL GAS)	140	3.0	OXIDATION CATALYST	BACT-OTHER
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, GAS	202	3.0	GOOD COMBUSTION PRACTICES	BACT-PSD
WYANDOTTE ENERGY	WYANDOTTE	MI	2/8/99	TURBINE, COMBINED CYCLE, POWER PLANT	500	3.0	CATALYTIC OXIDIZER	LAER
BLUE MOUNTAIN POWER, LP	RICHLAND	PA	7/31/96	COMBUSTION TURBINE WITH HEAT RECOVERY BOILE	153	3.1	OXIDATION CATALYST 16 PPM @ 15% O2 WHEN FIRING NO	OTHER
BERKSHIRE POWER DEVELOPMENT, INC.	AGAWAM	MA	9/22/97	TURBINE, COMBUSTION, ABB GT24	224	3.6	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADI	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, CG, 4 EACH	400	3.6	LOW NOX COMBUSTORS	BACT-PSD
AES PLACERITA, INC.		CA	3/10/86	TURBINE & RECOVERY BOILER	65	3.7	OXIDATION CATALYST	BACT-PSD
BROOKLYN NAVY YARD COGENERATION PARTNERS L.P	NEW YORK CITY	NY	6/6/95	TURBINE, NATURAL GAS FIRED	240	4.0	OXIDATION CATALYST	LAER
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	4.3	COMBUSTION CONTROL	BACT-PSD
CHAMPION INTERNATIONAL CORP.	SHELDON	TX	3/5/85	TURBINE, GAS, 2	168	5.3		BACT-PSD
PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA)	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	5.3	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND	BACT-PSD
CROCKETT COGENERATION - C&H SUGAR	CROCKETT	CA	10/5/93	TURBINE, GAS, GENERAL ELECTRIC MODEL PG7221(F	240	5.9	ENGELHARD OXIDATION CATALYST	BACT-OTHER
PUBLIC SERVICE OF COLO.-FORT ST VRAIN	PLATTEVILLE	CO	5/1/96	COMBINED CYCLE TURBINES (2), NATURAL	471	5.9	GOOD COMBUSTION CONTROL PRACTICES. COMMITMENT	BACT-PSD
SUMAS ENERGY INC.	SUMAS	WA	6/25/91	TURBINE, NATURAL GAS	88	6.0	CO CATALYST	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, NATURAL GAS	109	6.1	DRY LOW NOX COMBUSTOR	BACT-PSD
PASNY/HOLTSVILLE COMBINED CYCLE PLANT	HOLTSVILLE	NY	9/1/92	TURBINE, COMBUSTION GAS (150 MW)	143	8.5	COMBUSTION CONTROL	BACT-OTHER
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	8.8	COMBUSTOR DESIGN & OPERATION	OTHER
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	TURBINE, GE LM5000, GAS FIRED	63	8.9	COMBUSTION CONTROL	BACT-PSD
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	GE FRAME 6 GAS TURBINE	63	8.9	NO CONTROLS	BACT-OTHER
CHAMPION INTERNATL CORP. & CHAMP. CLEAN ENERG	BUCKSPORT	ME	9/14/98	TURBINE, COMBINED CYCLE, NATURAL GAS	175	9.0	NONE	BACT-OTHER
FLORIDA POWER AND LIGHT	LAVOGROME REPOWER	FL	3/14/91	TURBINE, GAS, 4 EACH	240	9.0	FUEL SPEC: NATURAL GAS AS FUEL	BACT-PSD
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	GE FRAME 6 GAS TURBINE	62	9.0	NO CONTROLS	BACT-OTHER
KAMINE/BESICORP BEAVER FALLS COGENERATION FA	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW	81	9.5	COMBUSTION CONTROLS	BACT-OTHER
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	SIEMENS V64.3 GAS TURBINE (EP #00001)	81	9.5	NO CONTROLS	BACT-OTHER
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	62	9.6	COMBUSTION CONTROL	BACT-PSD
BRIDGEPORT ENERGY, LLC	BRIDGEPORT	CT	6/29/98	TURBINES, COMBUSTION MODEL V84.3A, 2 SIEMES	260	10.0	PRE-MIX FUEL FAIR TO OPTIMIZE EFFICIENCY ACTUAL EMI	BACT-PSD
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	GE FRAME 6 GAS TURBINE (EP #00001)	54	10.0	NO CONTROLS	BACT-OTHER
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(6) GE FRAME 6 TURBINES (EP #S 00001-00006)	53	10.0	NO CONTROLS	BACT-OTHER
LONG ISLAND LIGHTING CO.		NY	11/1/88	TURBINE, GE FRAME 7, 3 EA	75	10.0	COMBUSTION CONTROL	OTHER
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), NATURAL GAS	116	10.0	COMPLETE COMBUSTION	BACT-PSD
PILGRIM ENERGY CENTER	ISLIP	NY		(2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&	175	10.0		BACT-OTHER
SUNLAW/INDUSTRIAL PARK 2		CA	6/28/85	TURBINE, GAS W/#2 FUEL OIL BACKUP, 2 EA, GE FRAM	52	10.0	MFG GUARANTEE ON CO EMISSIONS	OTHER
SYCAMORE COGENERATION CO.	BAKERSFIELD	CA	3/6/87	TURBINE, GAS FIRED, 4 EA	75	10.0	CO OXIDIZING CATALYST, COMBUSTION CONTROL	BACT-PSD
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	GE FRAME 6 GAS TURBINE	53	10.0	NO CONTROLS	BACT-OTHER
WESTPLAINS ENERGY	PUEBLO	CO	6/14/96	SIMPLE CYCLE TURBINE, NATURAL GAS	219	10.0	DRY LOW NOX COMBUSTION SYSTEM (DLN) COMMITMENT	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	10.3	GOOD COMBUSTION	BACT-PSD
PORTSIDE ENERGY CORP.	PORTAGE	IN	5/13/96	TURBINE, NATURAL GAS-FIRED	63	10.6	GOOD COMBUSTION AND EMISSIONS NOT TO EXCEED 10 P	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION CO.	LOCKPORT	NY	5/2/89	TURBINE, GR FRAME 6, 3 EA	52	10.7	COMBUSTION CONTROL	BACT-PSD
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, NAT GAS FIRED, 3 EA	129	10.9	STEAM INJECTION	BACT-PSD
NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO	PROVIDENCE	RI	4/13/92	TURBINE, GAS AND DUCT BURNER	170	11.0	NONE	BACT-PSD
SEPCO	RIO LINDA	CA	10/5/94	TURBINE, GAS COMBINED CYCLE GE MODEL 7	115	11.6	OXIDATION CATALYST	BACT
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (NATURAL GAS) (2)	149	11.6	TURBINE DESIGN	BACT-OTHER
MEGAN-RACINE ASSOCIATES, INC	CANTON	NY	8/5/89	GE LM5000-N COMBINED CYCLE GAS TURBINE	401	11.6	NO CONTROLS	BACT-OTHER
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	TURBINE, LM5000	54	11.6	COMBUSTION CONTROL	OTHER
MIDLAND COGENERATION VENTURE	MIDLAND	MI	2/16/88	TURBINE, 12 TOTAL	123	11.8	TURBINE DESIGN	BACT-PSD
DUKE ENERGY NEW SOMYRNA BEACH POWER CO. LP	CHARLOTTE NC (HEADQ	FL	10/15/99	TURBINE-GAS, COMBINED CYCLE	500	12.0	GOOD COMBUSTION	BACT-PSD
GRANITE ROAD LIMITED		CA	5/6/91	TURBINE, GAS, ELECTRIC GENERATION	58	12.0	SCR, STEAM INJECTION	BACT-PSD
OLEANDER POWER PROJECT	BALTIMORE (HEADQUAR	FL	10/1/99	TURBINE-GAS, COMBINED CYCLE	190	12.0	GOOD COMBUSTION	BACT-PSD
TIVERTON POWER ASSOCIATES	TIVERTON	RI	2/13/98	COMBUSTION TURBINE, NATURAL GAS	265	12.0	GOOD COMBUSTION	BACT-PSD

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - CO

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	TURBINE, GAS FIRED	79	12.5	COMBUSTION CONTROL	OTHER
SITHE/INDEPENDENCE POWER PARTNERS	OSWEGO	NY	11/24/92	TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW	267	13.0	COMBUSTION CONTROLS	BACT-OTHER
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, GAS	202	13.5	GOOD COMBUSTION PRACTICES	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE,GAS	152	15.0	GOOD COMBUSTION PRACTICES	BACT-PSD
DELMARVA POWER	WILMINGTON	DE	8/23/88	TURBINE, COMBUSTION, 2 EA	100	15.0	GOOD COMBUSTION PRACTICES	BACT-PSD
GEORGIA POWER COMPANY, ROBINS TURBINE PROJE	ROBINS AIR FORCE BAS	GA	5/13/94	TURBINE, COMBUSTION, NATURAL GAS	80	15.0	FUEL SPEC: LOW SULFUR FUEL (3% AVG) FUEL 0.1	BACT-PSD
HERMISTON GENERATING CO.	HERMISTON	OR	7/7/94	TURBINES, NATURAL GAS (2)	212	15.0	GOOD COMBUSTION PRACTICES	BACT-PSD
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	COMBINED CYCLE TURBINE (25 MW)	71	15.0	PRIMARY FUEL IS NATURAL GAS WITH BACKUP FUEL AS	BACT-PSD
PORTLAND GENERAL ELECTRIC CO.	BOARDMAN	OR	5/31/94	TURBINES, NATURAL GAS (2)	215	15.0	GOOD COMBUSTION PRACTICES	BACT-PSD
PSI ENERGY, INC. WABASH RIVER STATION	WEST TERRE HAUTE	IN	5/27/93	COMBINED CYCLE SYNGAS TURBINE	222	15.0	OPERATION PRACTICES AND GOOD COMBUSTION, COMBI	BACT-PSD
PUBLIC SERVICE OF COLO.-FORT ST VRAIN	PLATTEVILLE	CO	5/1/96	COMBINED CYCLE TURBINES (2), NATURAL	471	15.0	GOOD COMBUSTION CONTROL PRACTICES. COMMITMENT	BACT-PSD
RUMFORD POWER ASSOCIATES	RUMFORD	ME	5/1/98	TURBINE GENERATOR, COMBUSTION, NATURAL GAS	238	15.0	GE DRY LOW-NOX COMBUSTOR DESIGN GOOD COMBUST	BACT-PSD
SUMAS ENERGY INC	SUMAS	WA	12/1/90	TURBINE, GAS-FIRED	67	15.0	CO CATALYST	BACT-PSD
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	15.0	USING 15% EXCESS AIR. CO EMISSION IS BECAUSE OF N	BACT-PSD
WESTBROOK POWER LLC	WESTBROOK	ME	12/4/98	TURBINE, COMBINED CYCLE, TWO	528	15.0	USING 15 % EXCESS AIR	BACT-PSD
LORDSBURG L.P.	LORDSBURG	NM	6/18/97	TURBINE, NATURAL GAS-FIRED, ELEC. GEN.	100	15.0	DRY LOW-NOX TECHNOLOGY BY MAINTAINING PROPER AI	BACT-PSD
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	GENERATOR, GAS TURBINE	164	15.4	NO ADD-ON CONTROL GOOD COMBUSTI	BACT-PSD
FORMOSA PLASTICS CORPORATION, BATON ROUGE P	BATON ROUGE	LA	3/7/97	TURBINE/HSRG, GAS COGENERATION	56	15.8	COMBUSTION DESIGN AND CONSTRUCTION.	BACT-PSD
PROJECT ORANGE ASSOCIATES	SYRACUSE	NY	12/1/93	GE LM-5000 GAS TURBINE	69	17.0	NO CONTROLS	BACT-OTHER
MOBILE ENERGY LLC	MOBILE	AL	1/5/99	TURBINE, GAS, COMBINED CYCLE	168	17.8	GOOD COMBUSTION PRACTICES	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TURBINE ST	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	164	20.0	COMBUSTION CONTROL	BACT-PSD
BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT	PERRYMMAN	MD		TURBINE, 140 MW NATURAL GAS FIRED ELECTRIC	140	20.0	GOOD COMBUSTION PRACTICES	BACT-PSD
CASCO RAY ENERGY CO	VEAZIE	ME	7/13/98	TURBINE, COMBINED CYCLE, NATURAL GAS, TWO	170	20.0	15% EXCESS AIR	BACT-PSD
KALAMAZOO POWER LIMITED	COMSTOCK	MI	12/3/91	TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS	226	20.0	DRY LOW NOX TURBINES	BACT-PSD
SEMINOLE HARDEE UNIT 3	FORT GREEN	FL	1/1/96	COMBINED CYCLE COMBUSTION TURBINE	140	20.0	DRY LNB GOOD COMBUSTION PRA	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	147	23.5	FURNACE DESIGN	BACT-PSD
AIR LIQUIDE AMERICA CORPORATION	GEISMAR	LA	2/13/98	TURBINE GAS, GE, 7ME 7	121	25.0	GOOD EQUIPMENT DESIGN, PROPER COMBUSTION TECHN	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, NATURAL GAS (2)	189	25.0	GOOD COMBUSTION PRACTICES	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	TURBINE, GE FRAME 7, GAS FIRED	80	25.0	COMBUSTION CONTROL	BACT-PSD
OCEAN STATE POWER	BURRILLVILLE	RI	12/13/88	TURBINE, GAS, GE FRAME 7, 4 EA	132	25.0		BACT-PSD
PANDA-KATHLEEN, L.P.	LAKELAND	FL	6/1/95	COMBINED CYCLE COMBUSTION TURBINE (TOTAL 11	75	25.0	COMBUSTION CONTROLS STANDARD ONLY APPLIES IF GE	BACT-PSD
ALABAMA POWER PLANT BARRY	BUCKS	AL	8/7/98	TURBINES, COMBUSTION, NATURAL GAS	510	25.4	EFFICIENT COMBUSTION	BACT-PSD
NEVADA POWER COMPANY, HARRY ALLEN PEAKING P	LAS VEGAS	NV	9/18/92	COMBUSTION TURBINE ELECTRIC POWER GENERATI	75	25.8	PRECISION CONTROL FOR THE LOW NOX COMBUSTOR	BACT-PSD
NEVADA COGENERATION ASSOCIATES #1	LAS VEGAS	NV	1/17/91	COMBINED-CYCLE POWER GENERATION	85	26.2	CATALYTIC CONVERTER	BACT-PSD
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC.	MOSELL	MS	4/9/96	COMBUSTION TURBINE, COMBINED CYCLE	162	26.3	GOOD COMBUSTION CONTROLS	BACT-PSD
COLORADO SPRINGS UTILITIES-NIXON POWER PLANT	FOUNTAIN	CO	6/30/98	SIMPLE CYCLE TURBINE, NATURAL GAS	1122	30.0	DRY LOW NOX COMBUSTION	BACT-PSD
COMMONWEALTH ATLANTIC LTD PARTNERSHIP	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	192	30.0	COMBUSTION CONTROLS, ANNUAL STACK TESTING	BACT-PSD
CITY OF LAKELAND ELECTRIC AND WATER UTILITIES	LAKELAND	FL	7/10/98	TURBINE, COMBUSTION, GAS FIRED W/ FUEL OIL ALS	272	31.2	DRY LOW NOX BURNERS FOR SIMPLE CYCLE, SCR	BACT-PSD
MILLENNIUM POWER PARTNER, LP	CHARLTON	MA	2/2/98	TURBINE, COMBUSTION, WESTINGHOUSE MODEL 50	317	31.2	DRY LOW NOX COMBUSTION TECHNOLOGY IN CONJUNCT	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	33.0	COMBUSTION CONTROLS.	BACT-PSD
VIRGINIA POWER	CHESTERFIELD	VA	4/15/88	TURBINE, GE,2 EA	234	33.2	EQUIPMENT DESIGN	LAER
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	GE LM5000 COMBINED CYCLE GAS TURBINE EP #000	56	36.0	BAFFLE CHAMBER	SEE NOTE #4
MARCH POINT COGENERATION CO		WA	10/26/90	TURBINE, GAS-FIRED	80	37.0	GOOD COMBUSTION	BACT-PSD
CAROLINA COGENERATION CO., INC.	NEW BERN	NC	7/11/86	TURBINE, GAS, PEAT FIRED	52	37.0	PROPER OPERATION	BACT-PSD
CARSON ENERGY GROUP & CENTERAL VALLEY FINAN	ELK GROVE	CA	7/23/93	TURBINE, GAS SIMPLE CYCLE LM6000	56	39.5	OXIDATION CATALYST	BACT
INDECK ENERGY COMPANY	SILVER SPRINGS	NY	5/12/93	GE FRAME 6 GAS TURBINE EP #00001	61	40.0	NO CONTROLS	BACT-OTHER
ONEIDA COGENERATION FACILITY	ONEIDA	NY	2/26/90	TURBINE, GE FRAME 6	52	40.0	COMBUSTION CONTROL	OTHER
PEABODY MUNICIPAL LIGHT PLANT	PEABODY	MA	11/30/89	TURBINE, 38 MW NATURAL GAS FIRED	52	40.0	GOOD COMBUSTION PRACTICES	BACT-OTHER
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	OIL FIRED COMBUSTION TURBINE	74	42.0	FUEL SPEC: LOW S OIL 0.05% S	BACT-PSD
CAPITOL DISTRICT ENERGY CENTER	HARTFORD	CT	10/23/89	ENGINE, GAS TURBINE	92	49.8		BACT-PSD
THE DEXTER CORP.	WINDSOR LOCKS	CT	9/29/89	TURBINE, NAT GAS & #2 FUEL OIL FIRED	69	49.8		BACT-PSD
SACRAMENTO COGENERATION AUTHORITY P&G	SACRAMENTO	CA	8/19/94	TURBINE, GAS, COMBINED CYCLE LM6000	53	50.0	OXIDATION CATALYST	BACT
WEST CAMPUS COGENERATION COMPANY	COLLEGE STATION	TX	5/2/94	GAS TURBINES	75	50.6	INTERNAL COMBUSTION CONTROLS	BACT
CARSON ENERGY GROUP & CENTRAL VALLEY FINANC	ELK GROVE	CA	7/23/93	TURBINE, GAS, COMBINED CYCLE, GE LM6000	450	50.7	SELECTIVE CATALYTIC REDUCTION AND WATER INJECTIO	BACT
FORMOSA PLASTICS CORPORATION	BATON ROUGE	LA	9/20/90	TURBINE, GAS-FIRED, 2	73	53.1	COMBUSTION CONTROL	BACT-PSD

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - CO

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
SIMPSON PAPER CO.		CA	6/22/87	TURBINE, GAS	50	61.0	COMBUSTION CONTROLS	OTHER
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	2/28/95	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	89	61.2	GOOD COMBUSTION CONTROL	BACT-PSD
MIDWAY-SUNSET COGENERATION CO.		CA	1/27/88	TURBINE, GE FRAME 7, 3 EA	75	69.7	GOOD COMBUSTION PRACTICES	BACT-PSD
PROJECT ORANGE ASSOCIATES	SYRACUSE	NY	12/1/93	GE LM-5000 GAS TURBINE	69	74.4	NO CONTROLS	BACT-OTHER
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	TURBINE, GAS FIRED	79	75.7	CATALYTIC OXIDATION	OTHER
GEORGIA GULF CORPORATION	PLAQUEMINE	LA	3/26/96	GENERATOR, NATURAL GAS FIRED TURBINE	140	88.0	GOOD COMBUSTION PRACTICE AND PROPER OPERATION	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of CO: 1 (PPM) = (lb/mmBtu) * 445
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - PM/PM10

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	lb/mmBtu[2]	CTRLDESC	BASIS
MIDLAND COGENERATION VENTURE	MIDLAND	MI	2/16/88	TURBINE, 12 TOTAL	123	0.00051	FUEL SPEC: NAT GAS FUEL	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	1345	0.00052	NONE	BACT-PSD
BROOKLYN NAVY YARD COGENERATION PARTNERS L.P.	NEW YORK CITY	NY	6/6/95	TURBINE, NATURAL GAS FIRED	240	0.0013		LAER
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (NATURAL GAS) (2)	149	0.0023	TURBINE DESIGN	BACT-OTHER
PUBLIC SERVICE OF COLO.-FORT ST VRAIN	PLATTEVILLE	CO	5/1/96	COMBINED CYCLE TURBINES (2), NATURAL	471	0.0024	FUEL SPEC: COMBUSTION OF PIPE LINE QUALITY GAS. CLOSE	BACT-PSD
CHAMPION INTERNATIONAL CORP.	SHELDON	TX	3/5/85	TURBINE, GAS, 2	168	0.0030	LOW NOX BURNERS	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	0.0033	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMPL	BACT-PSD
LILCO SHOREHAM	HICKSVILLE	NY	5/10/93	(3) GE FRAME 7 TURBINES (EP #S 00007-9)	106	0.0035	NO CONTROLS	BACT-OTHER
DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	164	0.0038	COMBUSTION CONTROL	BACT-PSD
PILGRIM ENERGY CENTER	ISLIP	NY		(2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&	175	0.0039		BACT-OTHER
COMMONWEALTH ATLANTIC LTD PARTNERSHIP	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	192	0.0039	FUEL SPEC: LOW ASH FUEL	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	2/28/95	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	89	0.0039	GOOD COMBUSTION CONTROL	BACT-PSD
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	COMBINED CYCLE TURBINE (25 MW)	71	0.0044	PRIMARY FUEL IS NATURAL GAS WITH BACKUP FUEL AS DISTIL	BACT-PSD
NEVADA COGENERATION ASSOCIATES #1	LAS VEGAS	NV	1/17/91	COMBINED-CYCLE POWER GENERATION	85	0.0044	FUEL SPEC: BURN NATURAL GAS	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	0.0047	COMBUSTION CONTROL	BACT-PSD
PACIFIC THERMONETICS, INC.	CROCKETT	CA	4/6/89	BURNER, HRSG, 2	53	0.0048	FUEL SPEC: NAT GAS USE ONLY	OTHER
VIRGINIA POWER		VA	9/7/89	TURBINE, GAS	164	0.0048		BACT-PSD
INDECK ENERGY COMPANY	SILVER SPRINGS	NY	5/12/93	GE FRAME 6 GAS TURBINE EP #00001	61	0.0050	NO CONTROLS	BACT-OTHER
KAMINE/BESICORP CARTHAGE L.P.	CARTHAGE	NY	1/18/94	GE FRAME 6 GAS TURBINE	61	0.0050	FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.20% BY WEI	BACT-OTHER
MILLENNIUM POWER PARTNER, LP	CHARLTON	MA	2/2/98	TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501	317	0.0050	DRY LOW NOX COMBUSTION TECHNOLOGY IN CONJUNCTION W	BACT-PSD
NARRAGANSETT ELECTRIC/NEW ENGLAND POWER CO.	PROVIDENCE	RI	4/13/92	TURBINE, GAS AND DUCT BURNER	170	0.0050	NONE	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	62	0.0050	COMBUSTION CONTROL	BACT-PSD
HERMISTON GENERATING CO.	HERMISTON	OR	7/7/94	TURBINES, NATURAL GAS (2)	212	0.0053	GOOD COMBUSTION PRACTICES	BACT-PSD
LSP-COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	3/1/95	COMBUSTION TURBINE/GENERATOR	246	0.0054	FUEL SELECTION; GOOD COMBUSTION	BACT-PSD
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	GE LM5000 COMBINED CYCLE GAS TURBINE EP #0000	56	0.0055	NO CONTROLS	BACT-OTHER
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, GAS	202	0.0056	GOOD COMBUSTION PRACTICES	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, GAS, 4 EACH	400	0.0056	COMBUSTION CONTROL	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, NATURAL GAS (2)	189	0.0060	GOOD COMBUSTION PRACTICES	BACT-PSD
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, GAS, 1 EACH	80	0.0060	COMBUSTION CONTROL	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION CO.	LOCKPORT	NY	5/2/89	TURBINE, GR FRAME 6, 3 EA	52	0.0060	COMBUSTION CONTROL	BACT-PSD
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	GE FRAME 6 GAS TURBINE	63	0.0060	STEAM INJECTION	BACT
LONG ISLAND LIGHTING CO.		NY	11/1/88	TURBINE, GE FRAME 7, 3 EA	75	0.0060	COMBUSTION CONTROL	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, NATURAL GAS-FIRED (2)	77	0.0060	TURBINE DESIGN	BACT-PSD
ONEIDA COGENERATION FACILITY	ONEIDA	NY	2/26/90	TURBINE, GE FRAME 6	52	0.0060	COMBUSTION CONTROL	OTHER
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC.	MOSELL	MS	4/9/96	COMBUSTION TURBINE, COMBINED CYCLE	162	0.0062	GOOD COMBUSTION CONTROLS	BACT-PSD
SEMINOLE HARDEE UNIT 3	FORT GREEN	FL	1/1/96	COMBINED CYCLE COMBUSTION TURBINE	140	0.0063	DRY LNB FUEL SPEC: LOW S OIL, LIMITE	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, GAS FIRED (2 EACH)	227	0.0064	FUEL SPEC: CLEAN BURNING FUELS	BACT-PSD
CHAMPION INTERNATL CORP. & CHAMP. CLEAN ENERGY	BUCKSPORT	ME	9/14/98	TURBINE, COMBINED CYCLE, NATURAL GAS	175	0.0064	NONE	BACT-OTHER
LORDSBURG L.P.	LORDSBURG	NM	6/18/97	TURBINE, NATURAL GAS-FIRED, ELEC. GEN.	100	0.0066	WATER INJECTION	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	TURBINE, GE FRAME 7, GAS FIRED	80	0.0070	COMBUSTION CONTROL	BACT-PSD
KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW	81	0.0077	COMBUSTION CONTROLS	BACT-OTHER
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	TURBINES, COMBUSTION (2) (NATURAL GAS)	140	0.0080	SCR	BACT-OTHER
FLORIDA POWER AND LIGHT	LAVOGROME	FL	3/14/91	TURBINE, GAS, 4 EACH	240	0.0080	COMBUSTION CONTROL	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, NATURAL GAS	109	0.0081	GOOD COMBUSTION PRACTICES	BACT-PSD
SITHE/INDEPENDENCE POWER PARTNERS	OSWEGO	NY	11/24/92	TURBINES, COMBUSTION (4) (NATURAL GAS) (1012 MW	267	0.0082	FUEL SPEC. USE OF NATURAL GAS	BACT-OTHER
LSP - COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	11/10/98	GENERATOR, COMBUSTION TURBINE & DUCT BURNER	249	0.0089	COMBUSTING NATURAL GAS	BACT-PSD
MOBILE ENERGY LLC	MOBILE	AL	1/5/99	TURBINE, GAS, COMBINED CYCLE	168	0.0089	COMBUSTION OF CLEAN FUELS	BACT-PSD
TIVERTON POWER ASSOCIATES	TIVERTON	RI	2/13/98	COMBUSTION TURBINE, NATURAL GAS	265	0.0089	GOOD COMBUSTION	BACT-PSD
O'BRIEN COGENERATION	HARTFORD	CT	8/8/88	TURBINE, GAS FIRED	62	0.0090	GOOD COMBUSTION PRACTICES	BACT-PSD
DIGHTON POWER ASSOCIATE, LP	DIGHTON	MA	10/6/97	TURBINE, COMBUSTION, ABB GT11N2	166	0.0094	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON	BACT-PSD
BERKSHIRE POWER DEVELOPMENT, INC.	AGAWAM	MA	9/22/97	TURBINE, COMBUSTION, ABB GT24	224	0.0097	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON	BACT-PSD
PORTSIDE ENERGY CORP.	PORTAGE	IN	5/13/96	TURBINE, NATURAL GAS-FIRED	63	0.0099	NONE	BACT-PSD
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	0.010	PM EMISSION IS BECAUSE OF NATURAL GAS.	BACT-PSD
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	0.010	PM EMISSION IS BECAUSE OF NATURAL GAS.	BACT-PSD
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	GE FRAME 6 GAS TURBINE	62	0.010	NO CONTROLS	BACT-OTHER
GRAYS FERRY CO. GENERATION PARTNERSHIP	PHILADELPHIA	PA	11/4/92	TURBINE (NATURAL GAS & OIL)	144	0.010	DRY LOW NOX BURNER, COMBUSTION CONTROL	BACT-OTHER
VIRGINIA POWER	CHESTERFIELD	VA	4/15/88	TURBINE, GE,2 EA	234	0.011	EQUIPMENT DESIGN	LAER

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - PM/PM10

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	lb/mmBtu[2]	CTRLDESC	BASIS
ALABAMA POWER PLANT BARRY	BUCKS	AL	8/7/98	TURBINES, COMBUSTION, NATURAL GAS	510	0.011	NATURAL GAS ONLY, EFFICIENT COMBUSTION	BACT-PSD
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	GE FRAME 6 GAS TURBINE (EP #00001)	54	0.012	NO CONTROLS	BACT-OTHER
NEVADA POWER COMPANY, HARRY ALLEN PEAKING PLANT	LAS VEGAS	NV	9/18/92	COMBUSTION TURBINE ELECTRIC POWER GENERATIO	75	0.012	PRECISION CONTROL FOR THE COMBUSTOR	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL	74	0.012	FUEL SPEC: LOW SULFUR FUELS	BACT-PSD
ALABAMA POWER COMPANY - THEODORE COGENERATION	THEODORE	AL	3/16/99	170 MW TURBINE W/ DUCT BURNER, HR BOILER, SCR	170	0.012	COMBUSTION OF NATURAL GAS ONLY	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE,GAS	152	0.014	GOOD COMBUSTION PRACTICES	BACT-PSD
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	SIEMENS V64.3 GAS TURBINE (EP #00001)	81	0.014	NO CONTROLS	BACT-OTHER
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	GENERATOR, GAS TURBINE	164	0.014	NO CONTROL CLEAN FUEL	BACT-PSD
THE DEXTER CORP.	WINDSOR LOCKS	CT	9/29/89	TURBINE, NAT GAS & #2 FUEL OIL FIRED	69	0.014		BACT-PSD
PROJECT ORANGE ASSOCIATES	SYRACUSE	NY	12/1/93	GE LM-5000 GAS TURBINE	69	0.014	NO CONTROLS	BACT-OTHER
PASNY/HOLTSVILLE COMBINED CYCLE PLANT	HOLTSVILLE	NY	9/1/92	TURBINE, COMBUSTION GAS (150 MW)	143	0.016	COMBUSTION CONTROL	BACT-OTHER
MOJAVE COGENERATION CO.		CA	1/12/89	TURBINE, GAS	61	0.017	FUEL SPEC: OIL FIRING LIMITED TO 11 H/D	BACT-PSD
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	0.017	PM IS BECAUSE OF FUEL OIL. WHEN GROSS OUTPUT IS BELOW	BACT-PSD
GEORGIA GULF CORPORATION	PLAQUEMINE	LA	3/26/96	GENERATOR, NATURAL GAS FIRED TURBINE	140	0.019	GOOD COMBUSTION PRACTICE AND PROPER OPERATION	BACT-PSD
AIR LIQUIDE AMERICA CORPORATION	GEISMAR	LA	2/13/98	TURBINE GAS, GE, 7ME 7	121	0.019	GOOD COMBUSTION PRACTICES AND USE CLEAN NATURAL G	BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), NATURAL GAS	116	0.019	CLEAN FUEL	BACT-PSD
WEST CAMPUS COGENERATION COMPANY	COLLEGE STATION	TX	5/2/94	GAS TURBINES	75	0.020	INTERNAL COMBUSTION CONTROLS	BACT
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	TURBINE, GAS FIRED	79	0.020	COMBUSTION CONTROL	OTHER
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	GE FRAME 6 GAS TURBINE	53	0.021	NO CONTROLS	BACT-OTHER
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(6) GE FRAME 6 TURBINES (EP #S 00001-00006)	53	0.021	STEAM INJECTION	BACT
KAMINE/BESICORP CORNING L.P.	SOUTH CORNING	NY	11/5/92	TURBINE, COMBUSTION (79 MW)	82	0.024	DRY LOW NOX OR SCR	BACT-OTHER
FULTON COGEN PLANT	FULTON	NY	9/15/94	GE LM5000 GAS TURBINE	63	0.024	FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.3% BY WEIG	BACT-OTHER
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	TURBINE, GE LM5000, GAS FIRED	63	0.024		BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	0.026	FUEL SPEC: CLEAN BURNING FUEL, NAT GAS & DIST. #2 OIL	OTHER
MEGAN-RACINE ASSOCIATES, INC	CANTON	NY	8/5/89	GE LM5000-N COMBINED CYCLE GAS TURBINE	401	0.028	NO CONTROLS	BACT-OTHER
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	TURBINE, LM5000	54	0.028		BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	0.036	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
PUERTO RICO ELECTRIC POWER AUTHORITY (PREPA)	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	0.036	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMP	BACT-PSD
PEABODY MUNICIPAL LIGHT PLANT	PEABODY	MA	11/30/89	TURBINE, 38 MW OIL FIRED	52	0.050	FUEL SPECIFICATION: NO. 2 LIGHT OIL	BACT-OTHER
SC ELECTRIC AND GAS COMPANY - HAGOOD STATION	CHARLESTON	SC	12/11/89	INTERNAL COMBUSTION TURBINE	110	0.051	FUEL SPEC: LOW ASH CONTENT FUELS	BACT-PSD
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	TURBINE, GAS FIRED	79	0.053	COMBUSTION CONTROL	OTHER
CASCO RAY ENERGY CO	VEAZIE	ME	7/13/98	TURBINE, COMBINED CYCLE, NATURAL GAS, TWO	170	0.060	NONE	BACT-PSD
WESTBROOK POWER LLC	WESTBROOK	ME	12/4/98	TURBINE, COMBINED CYCLE, TWO	528	0.060	NONE	BACT-PSD
WI ELECTRIC POWER CO.	CONCORD STATION	WI	10/18/90	TURBINES, COMBUSTION, SIMPLE CYCLE, 4	75	0.065	GOOD COMBUSTION	BACT-PSD
SOUTHEAST PAPER CORP.	DUBLIN	GA	10/13/87	TURBINE, COMBUSTION	68	0.10		OTHER

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some lb/mmBtu values were calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - VOC

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
WESTBROOK POWER LLC	WESTBROOK	ME	12/4/98	TURBINE, COMBINED CYCLE, TWO	528	0.40	NONE	BACT-PSD
PATOWMACK POWER PARTNERS, LIMITED PA	LEESBURG	VA	9/15/93	TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3	146	0.60	FUEL SPEC: CLEAN FUELS	BACT-PSD
FLORIDA POWER AND LIGHT	LAVOGROME	FL	3/14/91	TURBINE, GAS, 4 EACH	240	1.0	COMBUSTION CONTROL	BACT-PSD
CASCO RAY ENERGY CO	VEAZIE	ME	7/13/98	TURBINE, COMBINED CYCLE, NATURAL GAS, TWO	170	1.0	LOW NOX BURNER	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TUR	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	164	1.2	COMBUSTION CONTROL	BACT-PSD
VIRGINIA POWER		VA	9/7/89	TURBINE, GAS	164	1.2		BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	147	1.4	FUEL SPEC: LOW SULFUR FUEL	BACT-PSD
PUBLIC SERVICE OF COLO.-FORT ST VRAIN	PLATTEVILLE	CO	5/1/96	COMBINED CYCLE TURBINES (2), NATURAL	471	1.4	GOOD COMBUSTION CONTROL PRACTICES.	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	147	1.5	FURNACE DESIGN	BACT-PSD
PILGRIM ENERGY CENTER	ISLIP	NY		(2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001	175	1.6		BACT-OTHER
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, GAS, 4 EACH	400	1.6	COMBUSTION CONTROL	BACT-PSD
CHAMPION INTERNATL CORP. & CHAMP. CLEA	BUCKSPORT	ME	9/14/98	TURBINE, COMBINED CYCLE, NATURAL GAS	175	1.7	NONE	BACT-OTHER
TIVERTON POWER ASSOCIATES	TIVERTON	RI	2/13/98	COMBUSTION TURBINE, NATURAL GAS	265	2.0	GOOD COMBUSTION	BACT-PSD
SACRAMENTO COGENERATION AUTHORITY P	SACRAMENTO	CA	8/19/94	TURBINE, SIMPLE CYCLE LM6000 GAS	53	2.0	OXIDATION CATALYST	BACT
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	2.7	COMBUSTOR DESIGN & OPERATION, GAS	OTHER
BERKSHIRE POWER DEVELOPMENT, INC.	AGAWAM	MA	9/22/97	TURBINE, COMBUSTION, ABB GT24	224	2.7	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL	BACT-PSD
UNION OIL CO. OF CALIFORNIA	KENAI	AK	8/4/89	TURBINE, SOLAR CENTAUR WEST	550	2.9		BACT-PSD
DIGHTON POWER ASSOCIATE, LP	DIGHTON	MA	10/6/97	TURBINE, COMBUSTION, ABB GT11N2	166	3.0	DRY LOW NOX COMBUSTION TECHNOLOGY WITH SCR ADD-ON NOX CONTROL	BACT-PSD
TAMPA ELECTRIC COMPANY (TEC)	APOLLO BEACH	FL	10/15/99	TURBINE, COMBUSTION, SIMPLE CYCLE	165	3.0	GOOD COMBUSTION	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TUR	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	156	3.1	COMBUSTION CONTROL	BACT-PSD
SEPCO	RIO LINDA	CA	10/5/94	TURBINE, GAS COMBINED CYCLE GE MODEL 7	115	3.1	OXIDATION CATALYST	BACT
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	TURBINES, COMBUSTION (2) (NATURAL GAS)	140	3.5	OXIDATION CATALYST	BACT-OTHER
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (NATURAL GAS) (2)	149	3.6	TURBINE DESIGN	OTHER
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE,GAS	152	3.9	GOOD COMBUSTION PRACTICES	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, NATURAL GAS-FIRED (2)	77	4.0	TURBINE DESIGN	BACT-PSD
BLUE MOUNTAIN POWER, LP	RICHLAND	PA	7/31/96	COMBUSTION TURBINE WITH HEAT RECOVERY BOILER	153	4.0	OXIDATION CATALYST WHEN FIRING NO. 2 OIL EMISSION LIMIT = 4 4 PPMVD @	LAER
COMMONWEALTH ATLANTIC LTD PARTNERSH	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	192	4.0	COMBUSTION CONTROLS, ANNUAL STACK TESTING	BACT-PSD
OCEAN STATE POWER	BURRILLVILLE	RI	12/13/88	TURBINE, GAS, GE FRAME 7, 4 EA	132	4.1		BACT-PSD
PUERTO RICO ELECTRIC POWER AUTHORITY	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	4.3	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMPLEMENT GOOD	BACT-PSD
MOBILE ENERGY LLC	MOBILE	AL	1/5/99	TURBINE, GAS, COMBINED CYCLE	168	4.7	GOOD COMBUSTION PRACTICE	BACT-PSD
LONG ISLAND LIGHTING CO.		NY	11/1/88	TURBINE, GE FRAME 7, 3 EA	75	4.7	COMBUSTION CONTROL	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	5.0	COMBUSTION CONTROLS	BACT-PSD
NARRAGANSETT ELECTRIC/NEW ENGLAND P	PROVIDENCE	RI	4/13/92	TURBINE, GAS AND DUCT BURNER	170	5.0	NONE	BACT-PSD
PATOWMACK POWER PARTNERS, LIMITED PA	LEESBURG	VA	9/15/93	TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3	146	5.0	GOOD COMBUSTION OPERATING PRACTICES	BACT-PSD
PUERTO RICO ELECTRIC POWER AUTHORITY	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	5.1	MAINTAIN EACH TURBINE IN GOOD WORKING ORDER AND IMPLEMENT GOOD	BACT-PSD
SOUTH MISSISSIPPI ELECTRIC POWER ASSOC	MOSELL	MS	4/9/96	COMBUSTION TURBINE, COMBINED CYCLE	162	5.2	GOOD COMBUSTION CONTROLS	BACT-PSD
KAMINE/BESICORP BEAVER FALLS COGENER	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW	81	5.5	COMBUSTION CONTROLS	BACT-OTHER
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	SIEMENS V64.3 GAS TURBINE (EP #00001)	81	5.5	NO CONTROLS	BACT-OTHER
CROCKETT COGENERATION - C&H SUGAR	CROCKETT	CA	10/5/93	TURBINE, GAS, GENERAL ELECTRIC MODEL PG7221(F	240	6.0	ENGELHARD OXIDATION CATALYST	BACT-OTHER
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), NATURAL GAS	116	6.0	COMPLETE COMBUSTION	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	147	6.0	SCR, STEAM INJECTION	BACT-PSD
LSP - COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	11/10/98	GENERATOR, COMBUSTION TURBINE & DUCT BURNER	249	6.2	NATURAL GAS COMBUSTION	BACT-PSD
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	GE LM5000 COMBINED CYCLE GAS TURBINE EP #0000	56	6.2	NO CONTROLS	BACT-OTHER
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	GE FRAME 6 GAS TURBINE	63	6.2	NO CONTROLS	BACT-OTHER
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	2/28/95	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	89	6.3	GOOD COMBUSTION CONTROL	BACT-PSD
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	GE FRAME 6 GAS TURBINE	62	6.9	NO CONTROLS	BACT-OTHER
FLORIDA POWER CORPORATION POLK COUN	BARTOW	FL	2/25/94	TURBINE, NATURAL GAS (2)	189	7.0	GOOD COMBUSTION PRACTICES	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	TURBINE, GE FRAME 7, GAS FIRED	80	7.0	COMBUSTION CONTROL	BACT-PSD
VIRGINIA POWER	CHESTERFIELD	VA	4/15/88	TURBINE, GE,2 EA	234	7.1		LAER
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	62	7.5	COMBUSTION CONTROL	BACT-PSD
LSP-COTTAGE GROVE, L.P.	COTTAGE GROVE	MN	3/1/95	COMBUSTION TURBINE/GENERATOR	246	7.5	FUEL SELECTION, GOOD COMBUSTION	BACT-PSD
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	TURBINE, GE LM5000, GAS FIRED	63	7.8	COMBUSTION CONTROL	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	8.2	GOOD COMBUSTION	BACT-PSD
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	GE FRAME 6 GAS TURBINE	53	8.6	NO CONTROLS	BACT-OTHER
SC ELECTRIC AND GAS COMPANY - HAGOOD S	CHARLESTON	SC	12/11/89	INTERNAL COMBUSTION TURBINE	110	8.9	GOOD COMBUSTION PRACTICES	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, CG, 4 EACH	400	9.0	COMBUSTION CONTROL	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION C	LOCKPORT	NY	5/2/89	TURBINE, GR FRAME 6, 3 EA	52	9.4	COMBUSTION CONTROL	BACT-PSD

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - VOC

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(6) GE FRAME 6 TURBINES (EP #S 00001-00006)	53	9.4	NO CONTROLS	BACT-OTHER
UNION OIL CO. OF CALIFORNIA	KENAI	AK	8/4/89	TURBINE, GTM SOLAR SATURN, 4 EA	163	9.9		BACT-PSD
ONEIDA COGENERATION FACILITY	ONEIDA	NY	2/26/90	TURBINE, GE FRAME 6	52	10.1	COMBUSTION CONTROL	OTHER
WEST CAMPUS COGENERATION COMPANY	COLLEGE STATION	TX	5/2/94	GAS TURBINES	75	11.2	INTERNAL COMBUSTION CONTROLS	BACT
UNION OIL CO. OF CALIFORNIA	KENAI	AK	8/4/89	TURBINE, ELECT. GENERATOR, 4 EA	138	11.7		BACT-PSD
ALABAMA POWER PLANT BARRY	BUCKS	AL	8/7/98	TURBINES, COMBUSTION, NATURAL GAS	510	11.7	EFFICIENT COMBUSTION	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BOILER, CIRCULATING FLUIDIZED COMBUSTION	86	11.8	GOOD COMBUSTION	BACT-PSD
ALABAMA POWER COMPANY - THEODORE CO	THEODORE	AL	3/16/99	170 MW TURBINE W/ DUCT BURNER, HR BOILER, SCR	170	12.5	EFFICIENT COMBUSTION	BACT-PSD
MEGAN-RACINE ASSOCIATES, INC	CANTON	NY	8/5/89	GE LM5000-N COMBINED CYCLE GAS TURBINE	401	15.6	NO CONTROLS	BACT-OTHER
COMMONWEALTH ATLANTIC LTD PARTNERSH	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	175	16.0	COMBUSTION CONTROL, ANNUAL STACK TESTING	BACT-PSD
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	TURBINE, GAS FIRED	79	21.8	COMBUSTION CONTROL	OTHER
TENUSKA GEORGIA PARTNERS, L.P.	FRANKLIN	GA	12/18/98	TURBINE, COMBUSTION, SIMPLE CYCLE, 6	160	23.4	VOC EMISSION IS BECAUSE OF NATURAL GAS	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	25.0	GOOD COMBUSTION	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of CH_4: 1 (PPM) = (lb/mmBtu) * 780
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - SO_2

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	lb/mmBtu[2]	CTRLDESC	BASIS
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	0.000014	MAINTAIN EACH TURBINE IN GOOD WORKING C	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	1345	0.00011	LOW SULFUR CONTENT & COMBUSTION CONTR	BACT-PSD
PROCTOR AND GAMBLE PAPER PRODUCTS CO	MEHOOPANY	PA	5/31/95	TURBINE, NATURAL GAS	73	0.00014	STEAM INJECTION	RACT
PUERTO RICO ELECTRIC POWER AUTHORITY	ARECIBO	PR	7/31/95	COMBUSTION TURBINES (3), 83 MW SIMPLE-CYCLE EA	248	0.00035	MAINTAIN EACH TURBINE IN GOOD WORKING C	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/86	COMBUSTION TURBINE, 4 EACH	238	0.00052	COMBUSTION CONTROL	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TUR	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	164	0.00053	COMBUSTION CONTROL	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	62	0.00058	FUEL SPEC: LOW S FUEL	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	131	0.00059	FUEL SPEC: LOW S FUEL	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNT	BARTOW	FL	2/25/94	TURBINE, NATURAL GAS (2)	189	0.00066	FUEL SPEC: LOW SULFUR IN NATURAL GAS	BACT-PSD
CAROLINA POWER AND LIGHT CO.	DARLINGTON	SC	9/23/91	TURBINE, I.C.	80	0.00078	FUEL SPEC: LOW SULFUR FUEL	BACT-PSD
CHAMPION INTERNATIONAL CORP.	SHELDON	TX	3/5/85	TURBINE, GAS, 2	168	0.00085		BACT-PSD
WEST CAMPUS COGENERATION COMPANY	COLLEGE STATION	TX	5/2/94	GAS TURBINES	75	0.0011	INTERNAL COMBUSTION CONTROLS	BACT
SC ELECTRIC AND GAS COMPANY - HAGOOD S	CHARLESTON	SC	12/11/89	INTERNAL COMBUSTION TURBINE	110	0.0011	GOOD COMBUSTION PRACTICES	BACT-PSD
BERKSHIRE POWER DEVELOPMENT, INC.	AGAWAM	MA	9/22/97	TURBINE, COMBUSTION, ABB GT24	224	0.0022	DRY LOW NOX COMBUSTION TECHNOLOGY WI	BACT-PSD
DIGHTON POWER ASSOCIATE, LP	DIGHTON	MA	10/6/97	TURBINE, COMBUSTION, ABB GT11N2	166	0.0023	DRY LOW NOX COMBUSTION TECHNOLOGY WI	BACT-PSD
MILLENNIUM POWER PARTNER, LP	CHARLTON	MA	2/2/98	TURBINE, COMBUSTION, WESTINGHOUSE MODEL 501G	317	0.0023	DRY LOW NOX COMBUSTION TECHNOLOGY IN	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	0.0032	FUEL SPEC: LOW SULFUR FUEL	BACT-PSD
CASCO RAY ENERGY CO	VEAZIE	ME	7/13/98	TURBINE, COMBINED CYCLE, NATURAL GAS, TWO	170	0.0060		BACT-PSD
TIVERTON POWER ASSOCIATES	TIVERTON	RI	2/13/98	COMBUSTION TURBINE, NATURAL GAS	265	0.0060	FUEL SPEC: NATURAL GAS FIRED	BACT-PSD
WESTBROOK POWER LLC	WESTBROOK	ME	12/4/98	TURBINE, COMBINED CYCLE, TWO	528	0.0060		BACT-PSD
CHAMPION INTERNATL CORP. & CHAMP. CLEA	BUCKSPORT	ME	9/14/98	TURBINE, COMBINED CYCLE, NATURAL GAS	175	0.0086		BACT-OTHER
MIDLAND COGENERATION VENTURE	MIDLAND	MI	2/16/88	TURBINE, 12 TOTAL	123	0.016	FUEL SPEC: NAT GAS FUEL	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, GAS, 4 EACH	400	0.029	FUEL SPEC: NATURAL GAS AS FUEL	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE,GAS	152	0.033	FUEL SPEC: LOW SULFUR IN NATURAL GAS	BACT-PSD
COMMONWEALTH ATLANTIC LTD PARTNERSHI	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	192	0.057	FUEL SPEC: LOW SULFUR FUEL & NAT GAS	BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	0.059	FUEL SPEC: LOW SULFUR FUELS, NAT GAS	OTHER
DELMARVA POWER	WILMINGTON	DE	9/27/90	TURBINE, COMBUSTION	100	0.070	FUEL SPEC: SULFUR IN FUEL	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr

2) Some lb/mmBtu values were calculated from lb/hr, lb/yr or ton/yr values

All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Duct Burners (Gas Fired) - NOx

FACILITY	CITY	STATE	PERMIT	PROCESS	mmBtu/hr	lb/mmBtu[1]	CTRLDESC	BASIS
PILGRIM ENERGY CENTER	ISLIP	NY		(2) DUCT BURNER (EP #S 00001&2)	214	0.01	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	DUCT BURNERS (2)	206	0.02	LOW NOX BURNER AND SCR	BACT-OTHER
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	553	0.08	SCR	BACT-OTHER
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	DUCT BURNER	123	0.09	LOW NOX BURNER	BACT-OTHER
CHAMPION INTERNATIONAL	COURTLAND	AL	11/30/88	BURNER, DUCT, HEAT RECOVERY	128	0.10		BACT-PSD
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	DUCT BURNERS	170	0.10	THE PRIMARY FUEL FOR BURNER OPERATION	BACT-PSD
GREENLEAF POWER CO.	YUBA CITY	CA	4/18/85	BURNER, DUCT	64	0.10	LOW NOX DESIGN	OTHER
PACIFIC THERMONETICS, INC.	CROCKETT	CA	12/10/85	BURNER, DUCT, HRSG, 2 EA	353	0.10	LOW NOX BURNER	BACT-PSD
TROPICANA PRODUCTS, INC.	BRADENTON	FL	5/30/89	BURNER, DUCT	104	0.10		BACT-PSD
LAKE COGEN LIMITED	UMATILLA	FL	11/20/91	DUCT BURNER, GAS	150	0.10	COMBUSTION CONTROL	BACT-OTHER
TIGER BAY LP	FT. MEADE	FL	5/17/93	DUCT BURNER, GAS	100	0.10	GOOD COMBUSTION PRACTICES	BACT-PSD
AMOCO RESEARCH CENTER	NAPERVILLE	IL	1/12/90	BURNER, DUCT	34	0.10		BACT-PSD
EXXON CHEMICAL AMERICAS	BATON ROUGE	LA	2/4/91	DUCT BURNER	458	0.10	LOW NOX BURNER FOR DUCT BURNER	BACT-PSD
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	DUCT BURNER	710	0.10	LOW NOX BURNERS	BACT-PSD
AIR LIQUIDE AMERICA CORPORATION	GEISMAR	LA	2/13/98	DUCT BURNER	426	0.10	LOW NOX BURNER	BACT-OTHER
MIDLAND COGENERATION VENTURE	MIDLAND	MI	2/16/88	BURNER, DUCT, 6 TOTAL	249	0.10	BURNER DESIGN	BACT-PSD
ADA COGENERATION	ADA	MI	6/21/88	BURNER, DUCT	75	0.10		BACT-PSD
KAMINE SOUTH GLENS FALLS	SOUTH GLENS FALLS	NY	9/1/88	BURNER, DUCT	113	0.10	COMBUSTION CONTROL	BACT-PSD
KAMINE CARTHAGE	CARTHAGE	NY	7/1/88	BURNER, DUCT	113	0.10	COMBUSTION CONTROL	BACT-PSD
L & J ENERGY SYSTEM COGENERATION	LOWVILLE	NY	1/15/89	BURNER, DUCT	50	0.10	COMBUSTION CONTROL	BACT-PSD
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	BURNER, DUCT	180	0.10	COMBUSTION CONTROL	OTHER
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	DUCT BURNER, NAT GAS FIRED .	40	0.10	COMBUSTION CONTROL	BACT-PSD
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	DUCT BURNER, NAT GAS FIRED	40	0.10	COMBUSTION CONTROL	BACT-PSD
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	DUCT BURNER	140	0.10	COMBUSTION CONTROL	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	DUCT BURNER, SUPPLEMENTARILY FIRED	123	0.10	COMBUSTION CONTROL	BACT-PSD
KAMINE/BESICORP CORNING L.P.	SOUTH CORNING	NY	11/5/92	BURNER, DUCT	90	0.10	LOW NOX BURNER	BACT-OTHER
KAMINE/BESICORP BEAVER FALLS COGENER	BEAVER FALLS	NY	11/9/92	BURNER, DUCT	90	0.10	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
MEGAN-RACINE ASSOCIATES, INC	CANTON	NY	8/5/89	COEN DUCT BURNER	40	0.10	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	DUCT BURNER EP #00001	70	0.10	ZINK LOW NOX DUCT BURNER	BACT-OTHER
INDECK ENERGY COMPANY	SILVER SPRINGS	NY	5/12/93	DUCT BURNER EP #00001	100	0.10	FUEL SPEC: NATURAL GAS ONLY	NSPS
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	DUCT BURNER	90	0.10	NO CONTROLS	BACT-OTHER
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	DUCT BURNER (EP #00001)	90	0.10	NO CONTROLS	BACT-OTHER
BUCKNELL UNIVERSITY	LEWISBURG	PA	11/26/97	HEAT RECOVERY BOILER	24	0.10	NONE	BACT-OTHER
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	BURNERS, DUCT, 4	208	0.10	SCR LOCATED DOWNSTREAM OF DUCT BURN	OTHER
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	DUCT BURNER (EP #00001)	20	0.11	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	DUCT BURNER	30	0.12	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
WITCO CHEMICAL CORP.	OILDALE	CA	12/19/84	BURNER, DUCT	112	0.12	FUEL SPEC: GAS FIRING ONLY	BACT-PSD
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	DUCT BURNER (SEE NOTE #3)	44	0.15	NO CONTROLS	BACT-OTHER
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	BURNER, DUCT	300	0.18	COMBUSTION CONTROL	OTHER
SOUTHEAST PAPER CORP.	DUBLIN	GA	10/13/87	BURNER, DUCT	155	0.20		NSPS
TRIGEN		NY	7/1/88	BURNER, DUCT	193	0.20	COMBUSTION CONTROL	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION	LOCKPORT	NY	5/2/89	DUCT BURNER, 3 EA	94	0.20	COMBUSTION CONTROL	BACT-PSD
TBG COGEN COGENERATION PLANT	BETHPAGE	NY	8/5/90	COEN DUCT BURNER	162	0.20	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(3) DUCT BURNER (EP #S 00001-00003)	94	0.20	FUEL SPEC; NATURAL GAS ONLY	BACT-OTHER
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	DUCT BURNER	195	0.20	NO CONTROLS	BACT-OTHER
LEDERLE LABORATORIES	PEARL RIVER	NY		(2) DUCT BURNERS (EP #S 00101&102)	99	0.40		BACT-OTHER

1) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of NO_2: (lb/mmBtu) = (PPM) / 271

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Duct Burners (Gas Fired) - CO

FACILITY	CITY	STATE	PERMIT	PROCESS	mmBtu/hr	lb/mmBtu[1]	CTRLDESC	BASIS
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	DUCT BURNERS	170	0.0080	GOOD BURNER DESIGN AND OPERATION	BACT-PSD
NORTHWEST PIPELINE CORPORATION	LA PLATA B" STATION"	CO	5/29/92	BURNERS, DUCT, COEN	29	0.0090	NONE	OTHER
TIGER BAY LP	FT. MEADE	FL	5/17/93	DUCT BURNER, GAS	100	0.022	GOOD COMBUSTION PRACTICES	BACT-PSD
CHAMPION INTERNATIONAL	COURTLAND	AL	11/30/88	BURNER, DUCT, HEAT RECOVERY	128	0.023		BACT-PSD
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	DUCT BURNER EP #00001	70	0.035	NO CONTROLS	BACT-OTHER
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	BURNER, DUCT	197	0.036	FURNACE DESIGN	BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	BURNERS, DUCT, 4	208	0.038	COMBUSTOR DESIGN & OPERATION, NAT GAS	OTHER
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	DUCT BURNER (EP #00001)	20	0.040	LOW NOX BURNERS AND SCR TO LIMIT NOX TO 8 PPM FOR NATURAL GA	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	136	0.040	COMBUSTION CONTROLS AND FUEL SPEC: LOW SULFUR OIL	BACT-OTHER
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	BURNER, DUCT	189	0.042	GOOD DESIGN, PROPER OPERATING PRACTICES, 2% EXCESS O2	BACT-PSD
BEAR ISLAND PAPER COMPANY, L P.	ASHLAND	VA	10/30/92	BURNER, DUCT (TOTAL)	129	0.043	LOW NOX BURNER	BACT-OTHER
FULTON COGENERATION ASSOCIATES	FULTON	NY	1/29/90	DUCT BURNER	140	0.050	COMBUSTION CONTROL	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	DUCT BURNER, SUPPLEMENTARILY FIRED	123	0.060	COMBUSTION CONTROL	BACT-PSD
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	553	0.060	OXIDATION CATALYST	BACT-OTHER
LEDERLE LABORATORIES	PEARL RIVER	NY		(2) DUCT BURNERS (EP #S 00101&102)	99	0.060		BACT-OTHER
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	BURNERS, DUCT, 4	208	0.061	COMBUSTOR DESIGN & OPERATION, OIL	OTHER
TRIGEN		NY	7/1/88	BURNER, DUCT	193	0.070	COMBUSTION CONTROL	BACT-PSD
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	DUCT BURNER	195	0.070	GOOD COMBUSTION PRACTICES AND USE CLEAN NATURAL GAS AS FU	BACT-PSD
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	DUCT BURNER	123	0.072	GOOD COMBUSTION PRACTICE AND PROPER OPERATION	BACT-PSD
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	DUCT BURNERS (2)	206	0.073	LOW NOX BURNERS	BACT-PSD
ADA COGENERATION	ADA	MI	6/21/88	BURNER, DUCT	75	0.10		BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION C	LOCKPORT	NY	5/2/89	DUCT BURNER, 3 EA	94	0.10	COMBUSTION CONTROL	BACT-PSD
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(3) DUCT BURNER (EP #S 00001-00003)	94	0.10	NO CONTROLS	BACT-OTHER
BUCKNELL UNIVERSITY	LEWISBURG	PA	11/26/97	HEAT RECOVERY BOILER	24	0.10	NONE	BACT-OTHER
PILGRIM ENERGY CENTER	ISLIP,	NY		(2) DUCT BURNER (EP #S 00001&2)	214	0.11	GOOD DESIGN, PROPER COMBUSTION PRACTICES, 2% EXCESS O2	BACT-PSD
GREENLEAF POWER CO.	YUBA CITY	CA	4/18/85	BURNER, DUCT	64	0.12	CONTROLLED BY NOX & PM CONTROL SYS, GEP	OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	DUCT BURNER	30	0.13	LOW NOX BURNERS	BACT-PSD
TROPICANA PRODUCTS, INC.	BRADENTON	FL	5/30/89	BURNER, DUCT	104	0.14		BACT-PSD
INDECK ENERGY COMPANY	SILVER SPRINGS	NY	5/12/93	DUCT BURNER EP #00001	100	0.14	NO CONTROLS	BACT-OTHER
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	BURNER, DUCT	300	0.14	COMBUSTION CONTROL	OTHER
KAMINE/BESICORP BEAVER FALLS COGENERA	BEAVER FALLS	NY	11/9/92	BURNER, DUCT	90	0.15	GOOD COMBUSTION PRACTICE AND PROPER OPERATION	BACT-PSD
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	DUCT BURNER (EP #00001)	90	0.15	NO CONTROLS	BACT-OTHER
KAMINE SOUTH GLENS FALLS	SOUTH GLENS FALLS	NY	9/1/88	BURNER, DUCT	113	0.16	COMBUSTION CONTROL	BACT-PSD
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	BURNER, DUCT	180	0.16	CATALYTIC OXIDATION	OTHER
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	DUCT BURNER	90	0.16	NO CONTROLS	BACT-OTHER
LAKE COGEN LIMITED	UMATILLA	FL	11/20/91	DUCT BURNER, GAS	150	0.20	NOT REQUIRED	BACT-PSD
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	DUCT BURNER	710	0.45	GOOD COMBUSTION PRACTICES	BACT-PSD

1) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of CO: (lb/mmBtu) = (PPM) / 445

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Duct Burners (Gas Fired) - PM/PM10

FACILITY	CITY	STATE	PERMIT	PROCESS	mmBtu/hr	lb/mmBtu[1]	CTRLDESC	BASIS
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	553	0.0030	COMBUSTION CONTROLS	BACT-OTHER
KAMINE SOUTH GLENS FALLS	SOUTH GLENS FALLS	NY	9/1/88	BURNER, DUCT	113	0.0050	COMBUSTION CONTROL	BACT-PSD
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	DUCT BURNER (SEE NOTE #3)	44	0.0050	FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.	BACT-OTHER
INDECK-YERKES ENERGY SERVICES	TONAWANDA	NY	6/24/92	DUCT BURNER (EP #00001)	20	0.0050	NO CONTROLS	BACT-OTHER
GREENLEAF POWER CO.	YUBA CITY	CA	4/18/85	BURNER, DUCT	64	0.0053	FUEL SPEC: USE OF NAT GAS AS FUEL	OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	129	0.0054		BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	DUCT BURNER, SUPPLEMENTARILY FIRED	123	0.0057	COMBUSTION CONTROL	BACT-PSD
LAKE COGEN LIMITED	UMATILLA	FL	11/20/91	DUCT BURNER, GAS	150	0.0060	FUEL SPEC: LIMITED TO NATURAL GAS	BACT-PSD
LAKE COGEN LIMITED	UMATILLA	FL	11/20/91	DUCT BURNER, GAS	150	0.0060	FUEL SPEC: LIMITED TO NATURAL GAS	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION	LOCKPORT	NY	5/2/89	DUCT BURNER, 3 EA	94	0.0060	COMBUSTION CONTROL	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION	LOCKPORT	NY	5/2/89	DUCT BURNER, 3 EA	94	0.0060	COMBUSTION CONTROL	BACT-PSD
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(3) DUCT BURNER (EP #S 00001-00003)	94	0.0060	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(3) DUCT BURNER (EP #S 00001-00003)	94	0.0060	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	DUCT BURNER EP #00001	70	0.0070	FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.	BACT-OTHER
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	DUCT BURNERS	170	0.010	USE OF CLEAN BURNING FUELS (NATURAL GAS AN	BACT-PSD
TIGER BAY LP	FT. MEADE	FL	5/17/93	DUCT BURNER, GAS	100	0.010	FUEL SPEC; NATURAL GAS ONLY	BACT-OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	DUCT BURNER	30	0.010	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
INDECK ENERGY COMPANY	SILVER SPRINGS	NY	5/12/93	DUCT BURNER EP #00001	100	0.010	FABRIC COLLECTOR	BACT
PILGRIM ENERGY CENTER	ISLIP	NY		(2) DUCT BURNER (EP #S 00001&2)	214	0.011	FUEL SPEC: NATURAL GAS ONLY	BACT-OTHER
NORTHWEST PIPELINE CORPORATION	LA PLATA B" STATION"	CO	5/29/92	BURNERS, DUCT, COEN	29	0.014	NONE	OTHER
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	DUCT BURNER	123	0.014	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
TRIGEN		NY	7/1/88	BURNER, DUCT	193	0.015	COMBUSTION CONTROL	BACT-PSD
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	DUCT BURNER	195	0.015	NO CONTROLS	BACT-OTHER
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	DUCT BURNER	195	0.015	NO CONTROLS	BACT-OTHER
SYRACUSE UNIVERSITY	SYRACUSE	NY	9/1/89	BURNER, DUCT	180	0.020	COMBUSTION CONTROL	OTHER
TBG COGEN COGENERATION PLANT	BETHPAGE	NY	8/5/90	COEN DUCT BURNER	162	0.020	FUEL SPEC: NATURAL GAS ONLY	SEE NOTE #4
UNION CARBIDE CORPORATION	HAHNVILLE	LA	9/22/95	DUCT BURNER	710	0.026	NO ADD-ON CONTROL CLEAN FUEL	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	136	0.037		BACT-PSD
AIR LIQUIDE AMERICA CORPORATION	GEISMAR	LA	2/13/98	DUCT BURNER	426	0.044	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
KAMINE/BESICORP CORNING L.P.	SOUTH CORNING	NY	11/5/92	BURNER, DUCT	90	0.050	COMBUSTION CONTROL	BACT-OTHER
KAMINE/BESICORP BEAVER FALLS COGENER	BEAVER FALLS	NY	11/9/92	BURNER, DUCT	90	0.050	SCR, STEAM INJ.	BACT-PSD
KAMINE/BESICORP SYRACUSE LP	SOLVAY	NY	12/10/94	DUCT BURNER (EP #00001)	90	0.050	FUEL SPEC: SULFUR CONTENT NOT TO EXCEED 0.	BACT-OTHER
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	BURNER, DUCT	197	0.050	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	BURNER, DUCT	300	0.067	COMBUSTION CONTROL	OTHER
SOUTHEAST PAPER CORP.	DUBLIN	GA	10/13/87	BURNER, DUCT	155	0.10		NSPS

1) Some lb/mmBtu values were calculated from lb/hr values.

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Duct Burners (Gas Fired) - VOC

FACILITY	CITY	STATE	PERMIT	PROCESS	mmBtu/hr	lb/mmBtu[1]	CTRLDESC	BASIS
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	553	0.0011	OXIDATION CATALYST	BACT-OTHER
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	BURNERS, DUCT, 4	208	0.010	COMBUSTOR DESIGN & OPERATION, NAT GAS	OTHER
PILGRIM ENERGY CENTER	ISLIP	NY		(2) DUCT BURNER (EP #S 00001&2)	214	0.016	NONE	BACT-OTHER
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	DUCT BURNER, NAT GAS FIRED	40	0.020	COMBUSTION CONTROL	OTHER
ANITEC COGEN PLANT	BINGHAMTON	NY	7/7/93	DUCT BURNER EP #00001	70	0.020	NO CONTROLS	BACT-OTHER
KAMINE SOUTH GLENS FALLS COGEN CO	SOUTH GLENS FALLS	NY	9/10/92	DUCT BURNER (SEE NOTE #3)	44	0.029	NO CONTROLS	BACT-OTHER
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	BURNER, DUCT	197	0.030	FURNACE DESIGN	BACT-PSD
JMC SELKIRK, INC.	SELKIRK	NY	11/21/89	DUCT BURNER, SUPPLEMENTARILY FIRED	123	0.030	COMBUSTION CONTROL	BACT-PSD
TRIGEN		NY	7/1/88	BURNER, DUCT	193	0.035	COMBUSTION CONTROL	BACT-PSD
TRIGEN MITCHEL FIELD	HEMPSTEAD	NY	4/16/93	DUCT BURNER	195	0.035	GOOD COMBUSTION	BACT-PSD
CHAMPION INTERNATIONAL	COURTLAND	AL	11/30/88	BURNER, DUCT, HEAT RECOVERY	128	0.040		BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTN	CHESTERFIELD	VA	3/3/92	BURNER, DUCT	189	0.042	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
NORTHWEST PIPELINE CORPORATION	LA PLATA B" STATION"	CO	5/29/92	BURNERS, DUCT, COEN	29	0.055	NONE	OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	DUCT BURNER	30	0.060	NO CONTROLS	BACT-OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	136	0.066	GOOD COMBUSTION	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	129	0.078	SCR	BACT-PSD
KAMINE SYRACUSE COGENERATION CO.	SOLVAY	NY	9/1/89	BURNER, DUCT	300	0.086	COMBUSTION CONTROL	OTHER
KAMINE/BESICORP BEAVER FALLS COGENERA	BEAVER FALLS	NY	11/9/92	BURNER, DUCT	90	0.090	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
KAMINE SOUTH GLENS FALLS	SOUTH GLENS FALLS	NY	9/1/88	BURNER, DUCT	113	0.10	COMBUSTION CONTROL	BACT-PSD
EMPIRE ENERGY - NIAGARA COGENERATION C	LOCKPORT	NY	5/2/89	DUCT BURNER, 3 EA	94	0.10	COMBUSTION CONTROL	BACT-PSD
KAMINE/BESICORP NATURAL DAM LP	NATURAL DAM	NY	12/31/91	DUCT BURNER	90	0.10	NO CONTROLS	BACT-OTHER
LOCKPORT COGEN FACILITY	LOCKPORT	NY	7/14/93	(3) DUCT BURNER (EP #S 00001-00003)	94	0.10	NO CONTROLS	BACT-OTHER
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	BURNERS, DUCT, 4	208	0.12	COMBUSTOR DESIGN & OPERATION, OIL	OTHER

1) Some lb/mmBtu values were calculated from lb/hr values.

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Duct Burners (Natural Gas) - SO_2

FACILITY	CITY	STATE	PERMIT	PROCESS	mmBtu/hr	lb/mmBtu[1]	CONTROLCOD	CTRLDESC	BASIS
NORTHWEST PIPELINE CORPORATION	LA PLATA B" STATION"	CO	5/29/92	BURNERS, DUCT, COEN	29	0.0010	N		OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	129	0.0031	P	FUEL SPEC: LOW SULFUR FUEL	BACT-OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	BURNER, DUCT	136	0.2100	P	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD

1) Some lb/mmBtu values were calculated from lb/hr values.

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Fuel Oil) - NOx

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
BROOKLYN NAVY YARD COGENERATION PARTNERS L.P.	NEW YORK CITY	NY	6/6/95	TURBINE, OIL FIRED	240	10.0	FUEL SPEC: DISTILLATE #2 FUEL OIL	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL B-UP	74	15.0	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	15.0		91
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	15.0		80.8
KALAMAZOO POWER LIMITED	COMSTOCK	MI	12/3/91	TURBINE, GAS-FIRED, 2, W/ WASTE HEAT BOILERS	226	15.0	DRY LOW NOX TURBINES	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, KEROSENE-FIRED (2)	80	16.0	COMBUSTION CONTROL	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP	NEWARK	NJ	11/1/90	TURBINE, KEROSENE FIRED	73	16.2	STEAM INJECTION AND SCR	BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), FUEL OIL	116	20.0	WATER INJECTION WITH SCR	BACT-PSD
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	69	20.6	COMBUSTION CONTROL	BACT-PSD
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (#2 FUEL OIL) (2)	149	21.1	FUEL SPEC: NO. 2 FUEL OIL AS FUEL	BACT-PSD
MEAD COATED BOARD, INC.	PHENIX CITY	AL	3/12/97	COMBINED CYCLE TURBINE (25 MW)	71	25.0	FUEL OIL SULFUR CONTENT <=0.05% BY WEIGHT O	BACT-PSD
SAVANNAH ELECTRIC AND POWER CO.		GA	2/12/92	TURBINES, 8	129	25.0	MAX WATER INJECTION	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, OIL FIRED (2 EACH)	230	25.0	MAXIMUM WATER INJECTION	BACT-PSD
PEPCO - CHALK POINT PLANT	EAGLE HARBOR	MD	6/25/90	TURBINE, 105 MW OIL FIRED ELECTRIC	105	25.0	DRY PREMIX BURNER	BACT-PSD
OKLAHOMA MUNICIPAL POWER AUTHORITY	PONCA CITY	OK	12/17/92	TURBINE, COMBUSTION	58	25.0	COMBUSTION CONTROLS	BACT-OTHER
PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP	LEESBURG	VA	9/15/93	TURBINE, COMBUSTION, SIEMENS MODEL V84.2, 3	146	28.9	WET INJECTION	BACT-PSD
FULTON COGEN PLANT	FULTON	NY	9/15/94	GE LM5000 GAS TURBINE	63	36.0	WATER INJECTION	BACT
PEABODY MUNICIPAL LIGHT PLANT	PEABODY	MA	11/30/89	TURBINE, 38 MW OIL FIRED	52	40.0	WATER INJECTION	BACT-OTHER
STAR ENTERPRISE	DELAWARE CITY	DE	3/30/98	TURBINES, COMBINED CYCLE, 2	103	42.0	COMBUSTION CONTROL	BACT-PSD
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, OIL, 1 EACH	80	42.0	WET INJECTION	BACT-PSD
FLORIDA POWER GENERATION	DEBARY	FL	10/18/91	TURBINE, OIL, 6 EACH	93	42.0	WET INJECTION	BACT-PSD
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, OIL	231	42.0	WATER INJECTION	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, FUEL OIL	116	42.0	WATER INJECTION	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE, OIL	146	42.0	STEAM INJECTION	BACT-PSD
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	42.0	WET INJECTION	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, FUEL OIL (2)	216	42.0	WATER INJECTION	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	129	42.0	WET INJECTION	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	OIL FIRED COMBUSTION TURBINE	74	42.0	WATER INJECTION	BACT-PSD
KENTUCKY UTILITIES COMPANY	MERCER	KY	3/10/92	TURBINE, #2 FUEL OIL/NATURAL GAS (8)	188	42.0	WATER INJECTION	BACT-PSD
EAST KENTUCKY POWER COOPERATIVE		KY	3/24/93	TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED	187	42.0	WATER INJECTION	SEE NOTES
PASNY/HOLTSVILLE COMBINED CYCLE PLANT	HOLTSVILLE	NY	9/1/92	TURBINE, COMBUSTION GAS (150 MW)	143	42.0	WATER INJECTOR	BACT-OTHER
KAMINE/BESICORP CARTHAGE L.P.	CARTHAGE	NY	1/18/94	GE FRAME 6 GAS TURBINE	61	42.0	STEAM INJECTION	BACT
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	168	49.5	LOW NOX BURNERS, AND WATER INJECTION	BACT-PSD
KAMINE/BESICORP BEAVER FALLS COGENERATION FACILITY	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW)	81	55.0	DRY LOW NOX OR SCR	BACT-OTHER
PEPCO - CHALK POINT PLANT	EAGLE HARBOR	MD	6/25/90	TURBINE, 84 MW OIL FIRED ELECTRIC	84	58.0	QUIET COMBUSTION AND WATER INJECTION	BACT-PSD
CAROLINA POWER AND LIGHT	HARTSVILLE	SC	8/31/94	STATIONARY GAS TURBINE	190	62.0	FUEL SPEC: FUEL QUALITY	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, OIL, 2 EACH	400	65.0	LOW NOX COMBUSTORS	BACT-PSD
BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT	PERRYMMAN	MD		TURBINE, 140 MW OIL FIRED ELECTRIC	140	65.0	WATER INJECTION	BACT-PSD
OKLAHOMA MUNICIPAL POWER AUTHORITY	PONCA CITY	OK	12/17/92	TURBINE, COMBUSTION	58	65.0	COMBUSTION CONTROLS	BACT-OTHER
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, OIL FIRED, 3 EA	129	65.0		BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	65.0	STEAM INJECTION & FUEL SPEC: USE OF #2 OIL	OTHER
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	133	67.2		
KALAELOE PARTNERS, L.P.		HI	3/9/90	TURBINE, LSFO, 2	225	69.0	STEAM INJECTION AT 1.3 TO 1 STEAM TO FUEL RATIO	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	69.0	WATER INJECTION; FUEL SPEC: 0.04% N FUEL OIL	BACT-PSD
PEPCO - STATION A	DICKERSON	MD	5/31/90	TURBINE, 124 MW OIL FIRED	125	77.0	WATER INJECTION	BACT-PSD
SOUTHERN MARYLAND ELECTRIC COOPERATIVE (SMECO)	EAGLE HARBOR	MD	10/1/89	TURBINE, OIL FIRED ELECTRIC	90	142.8	WATER INJECTION	BACT-PSD
UNION ELECTRIC CO	WEST ALTON	MO	5/6/79	CONSTRUCTION OF A NEW OIL FIRED COMBUSTION TURBINE	78	494.5	WATER INJECTION FOR NOX EMISSIONS	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of NO_2: 1 (PPM) = (lb/mmBtu) * 257
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Fuel Oil) - CO

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
GORHAM ENERGY LIMITED PARTNERSHIP	GORHAM	ME	12/4/98	TURBINE, COMBINED CYCLE	900	5.0	0.05% SULFUR DISTILLATE OIL #2 IS USED. EMISSION IS FROM	BACT-PSD
BROOKLYN NAVY YARD COGENERATION PAR	NEW YORK CITY	NY	6/6/95	TURBINE, OIL FIRED	240	5.0	COMBUSTION DESIGN	BACT-PSD
UNION ELECTRIC CO	WEST ALTON	MO	5/6/79	CONSTRUCTION OF A NEW OIL FIRED COMBUSTION	622	9.0		BACT-PSD
SAVANNAH ELECTRIC AND POWER CO.		GA	2/12/92	TURBINES, 8	129	9.0	WATER INJECTION	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	133	9.2		
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	COMBUSTION TURBINES (2) (252 MW)	147	10.0	COMBUSTION CONTROLS	BACT-OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	GE FRAME 6 GAS TURBINE	533	10.0	NO CONTROLS	BACT-OTHER
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, OIL FIRED, 3 EA	129	10.5		BACT-PSD
MEGAN-RACINE ASSOCIATES, INC.	CANTON	NY	3/6/89	TURBINE, LM5000	54	11.0		
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	233	17.9	GOOD COMBUSTION PRACTICES	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	18.0	COMBUSTION DESIGN	BACT-PSD
KENTUCKY UTILITIES COMPANY	MERCER	KY	3/10/92	TURBINE, #2 FUEL OIL/NATURAL GAS (8)	188	21.2	COMBUSTION CONTROL	BACT-PSD
EAST KENTUCKY POWER COOPERATIVE		KY	3/24/93	TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED	187	21.3	PROPER COMBUSTION TECHNIQUES	BACT-OTHER
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	129	22.2	GOOD COMBUSTION PRACTICES	BACT-PSD
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, OIL	231	22.5	WATER INJECTION	BACT-PSD
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, OIL, 1 EACH	80	25.0	COMBUSTION CONTROL	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE, OIL	146	25.0	GOOD COMBUSTION PRACTICES	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, OIL FIRED (2 EACH)	230	25.0	FUEL SPEC: CLEAN BURNING FUELS	BACT-PSD
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	COMBUSTION TURBINE (79 MW)	147	25.0	COMBUSTION CONTROL	BACT-OTHER
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (#2 FUEL OIL) (2)	149	25.4	COMBUSTOR WATER INJECTOR, WATER INJECTION	BACT-PSD
SARANAC ENERGY COMPANY	PLATTSBURGH	NY	7/31/92	BURNERS, DUCT (2)	69	25.4	COMBUSTION DESIGN	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP	NEWARK	NJ	11/1/90	TURBINE, KEROSENE FIRED	73	26.6	CATALYTIC OXIDATION	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, FUEL OIL	116	29.6	GOOD COMBUSTION PRACTICES	BACT-PSD
FLORIDA POWER CORPORATION POLK COUN	BARTOW	FL	2/25/94	TURBINE, FUEL OIL (2)	216	30.0	GOOD COMBUSTION PRACTICES	BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), FUEL OIL	116	30.0	WATER INJECTION	BACT-OTHER
FLORIDA POWER GENERATION	DEBARY	FL	10/18/91	TURBINE, OIL, 6 EACH	93	30.7	GOOD COMBUSTION	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, OIL, 2 EACH	400	33.0	WET INJECTION	BACT-PSD
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	40.0	GOOD COMBUSTION	BACT-PSD
UNION ELECTRIC CO	WEST ALTON	MO	5/6/79	CONSTRUCTION OF A NEW OIL FIRED COMBUSTION	78	71.9	GOOD COMBUSTION PRACTICES	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	168	92.6	COMBUSTION DESIGN	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	100.0	COMBUSTION DESIGN	BACT-PSD
FULTON COGEN PLANT	FULTON	NY	9/15/94	GE LM5000 GAS TURBINE	63	107.0	NO CONTROLS	BACT-OTHER
CAROLINA POWER AND LIGHT	HARTSVILLE	SC	8/31/94	STATIONARY GAS TURBINE	190	115.2	COMBUSTION DESIGN	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr

2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of CO: 1 (PPM) = (lb/mmBtu) * 423
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values

All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Fuel Oil) - PM/PM10

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	lb/mmBtu[2]	CTRLDESC	BASIS
SELKIRK COGENERATION PARTNERS, L.P.	SELKIRK	NY	6/18/92	COMBUSTION TURBINES (2) (252 MW)	147	0.004	0 5 % SULFUR DISTILLATE OIL #2 IS USED.	BACT-PSD
KAMINE/BESICORP CARTHAGE L.P.	CARTHAGE	NY	1/18/94	GE FRAME 6 GAS TURBINE	61	0.005	FUEL SPEC: SULFUR CONTENT NOT TO EXCEE	BACT-OTHER
SAVANNAH ELECTRIC AND POWER CO.		GA	2/12/92	TURBINES, 8	129	0.006	FUEL SPEC: FUEL LIMITED AND 0 3 % S	BACT-PSD
PILGRIM ENERGY CENTER	ISLIP	NY		(2) WESTINGHOUSE W501D5 TURBINES (EP #S 00001&2)	175	0.007	FUEL SPEC. SULFUR CONTENT NOT TO EXCEE	BACT-OTHER
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	GE FRAME 6 GAS TURBINE	67	0.008	FUEL SPEC. SULFUR CONTENT NOT TO EXCEE	BACT-OTHER
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	0.009	GOOD COMBUSTION	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	0.009	WATER INJECTION FOR NOX EMISSIONS	BACT-PSD
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	0.009	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	233	0 009	GOOD COMBUSTION PRACTICES	BACT-PSD
TIGER BAY LP	FT. MEADE	FL	5/17/93	TURBINE, OIL	231	0.009	FUEL SPEC. LOW SULFUR FUEL OIL	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	133	0.009		
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, FUEL OIL (2)	216	0.010	GOOD COMBUSTION PRACTICES	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	SIMPLE CYCLE COMBUSTION TURBINE, GAS/NO 2 OIL B-UP	74	0.012	FUEL SPEC. LOW SULFUR FUEL	BACT-OTHER
SAVANNAH ELECTRIC AND POWER CO.		GA	2/12/92	TURBINES, 8	122	0.012	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
OKLAHOMA MUNICIPAL POWER AUTHORITY	PONCA CITY	OK	12/17/92	TURBINE, COMBUSTION	58	0.013	FUEL SPEC: USE OF DISTILLATE FUEL	BACT-OTHER
CAROLINA POWER AND LIGHT	HARTSVILLE	SC	8/31/94	STATIONARY GAS TURBINE	190	0.014	0.05% SULFUR DISTILLATE OIL #2 USED.	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	129	0.015	GOOD COMBUSTION PRACTICES	BACT-PSD
HARTWELL ENERGY LIMITED PARTNERSHIP	HARTWELL	GA	7/28/92	TURBINE, OIL FIRED (2 EACH)	230	0.016	FUEL SPEC: CLEAN BURNING FUELS	BACT-PSD
COMMONWEALTH ATLANTIC LTD PARTNERSHIP	CHESAPEAKE	VA	3/5/91	TURBINE, NAT GAS & #2 OIL	175	0.016	FUEL SPEC: LOW ASH FUEL, GRADE 76 #2 OIL	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	0.016	FUEL SPEC: 0.2% SULFUR FUEL OIL	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, FUEL OIL	116	0.016	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, OIL, 2 EACH	400	0.019	MAX WATER INJECTION	BACT-PSD
FLORIDA POWER GENERATION	DEBARY	FL	10/18/91	TURBINE, OIL, 6 EACH	93	0.020	WATER INJECTION	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, KEROSENE-FIRED (2)	80	0.023		BACT-PSD
FULTON COGEN PLANT	FULTON	NY	9/15/94	GE LM5000 GAS TURBINE	63	0 024	FUEL SPEC: SULFUR CONTENT NOT TO EXCEE	BACT-OTHER
CHARLES LARSEN POWER PLANT	CITY OF OF LAKELAND	FL	7/25/91	TURBINE, OIL, 1 EACH	80	0.025	COMBUSTION CONTROL	BACT-PSD
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIP	NJ	4/1/91	TURBINES (#2 FUEL OIL) (2)	149	0.026	FUEL SPEC. LOW SULFUR OIL (0 05%)	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	168	0.028	FUEL SPEC: 0.2% SULFUR FUEL OIL	BACT-PSD
KAMINE/BESICORP BEAVER FALLS COGENERATION F	BEAVER FALLS	NY	11/9/92	TURBINE, COMBUSTION (NAT. GAS & OIL FUEL) (79MW)	81	0.030	COMBUSTION CONTROLS	BACT-OTHER
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	64	0.033		
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, OIL FIRED, 3 EA	129	0 034		BACT-PSD
CAPITOL DISTRICT ENERGY CENTER	HARTFORD	CT	10/23/89	ENGINE, GAS TURBINE	92	0 035		
EAST KENTUCKY POWER COOPERATIVE		KY	3/24/93	TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED	187	0 036	PROPER COMBUSTION TECHNIQUES	BACT-OTHER
KALAELOE PARTNERS, L.P.		HI	3/9/90	TURBINE, LSFO, 2	225	0.044		BACT-PSD
KENTUCKY UTILITIES COMPANY	MERCER	KY	3/10/92	TURBINE, #2 FUEL OIL/NATURAL GAS (8)	188	0.045	COMBUSTION CONTROL	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE, OIL	146	0.047	GOOD COMBUSTION PRACTICES	BACT-PSD
PEABODY MUNICIPAL LIGHT PLANT	PEABODY	MA	11/30/89	TURBINE, 38 MW OIL FIRED	52	0 050	QUIET COMBUSTION AND WATER INJECTION	BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), FUEL OIL	116	0.059	PROPER COMBUSTION TECHNIQUE	BACT-OTHER
UNION ELECTRIC CO	WEST ALTON	MO	5/6/79	CONSTRUCTION OF A NEW OIL FIRED COMBUSTION TURBINE	78	0.064		BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), FUEL OIL	116	55.000	CLEAN FUEL	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some lb/mmBtu values were calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - VOC

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	PPM[2]	CTRLDESC	BASIS
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	1.0	FURNACE DESIGN	BACT-PSD
KALAELOE PARTNERS, L.P.		HI	3/9/90	TURBINE, LSFO, 2	225	1.0		BACT-PSD
GORHAM ENERGY LIMITED PARTNERSHIP	GORHAM	ME	12/4/98	TURBINE, COMBINED CYCLE	900	1.3	0.5 % SULFUR DISTILLATE OIL #2 IS USED. EM	BACT-PSD
GORDONSVILLE ENERGY L.P.	FAIRFAX	VA	9/25/92	TURBINES (2) [EACH WITH A SF]	170	1.5	FUEL SPEC: LOW LEAD FUEL	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	1.6	FURNACE DESIGN	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	2.0	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	2.5	FUEL SPEC: LOW SULFUR OIL	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	2.7	COMBUSTION CONTROL	BACT-PSD
FULTON COGEN PLANT	FULTON	NY	9/15/94	GE LM5000 GAS TURBINE	63	3.0	NO CONTROLS	SEE NOTE #6
SAVANNAH ELECTRIC AND POWER CO.		GA	2/12/92	TURBINES, 8	122	3.1	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	233	3.6	GOOD COMBUSTION PRACTICES	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	129	3.6	GOOD COMBUSTION PRACTICES	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	3.8	FURNACE DESIGN	BACT-PSD
BLUE MOUNTAIN POWER, LP	RICHLAND	PA	7/31/96	COMBUSTION TURBINE WITH HEAT RECOVERY BOILE	153	4.0	NONE	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	4.0	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, OIL FIRED, 3 EA	129	4.7		BACT-PSD
FLORIDA POWER GENERATION	DEBARY	FL	10/18/91	TURBINE, OIL, 6 EACH	93	5.0	COMBUSTION CONTROL	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	5.1	GOOD COMBUSTION	BACT-PSD
GORDONSVILLE ENERGY L.P.	FAIRFAX	VA	9/25/92	TURBINES (2) [EACH WITH A SF]	170	5.2	GOOD COMBUSTION PRACTICES	BACT-PSD
LAKEWOOD COGENERATION, L.P.	LAKEWOOD TOWNSHIF	NJ	4/1/91	TURBINES (#2 FUEL OIL) (2)	149	5.4	LOW SULFUR CONTENT FUEL, & COMBUSTION CO	BACT-PSD
GORDONSVILLE ENERGY L.P.	FAIRFAX	VA	9/25/92	TURBINES (2) [EACH WITH A SF]	170	5.9	FUEL SPEC: 0.2 WT LOW SULFUR FUEL	BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, OIL, 2 EACH	400	6.0	COMBUSTION CONTROL	BACT-PSD
NEWARK BAY COGENERATION PARTNERSHIP, L.P.	NEWARK	NJ	6/9/93	TURBINES, COMBUSTION, KEROSENE-FIRED (2)	80	6.1	NONE	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE, OIL	146	6.3	WATER INJECTION	BACT-PSD
KAMINE/BESICORP CARTHAGE L.P.	CARTHAGE	NY	1/18/94	GE FRAME 6 GAS TURBINE	61	6.6	NO CONTROLS	BACT-OTHER
GORDONSVILLE ENERGY L.P.	FAIRFAX	VA	9/25/92	TURBINES (2) [EACH WITH A SF]	170	6.7	WATER INJECTION AND SCR	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #6 FRAME	64	6.8	COMBUSTION CONTROL	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	7.0		BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, FUEL OIL (2)	216	7.0	COMBUSTION CONTROLS.	BACT-PSD
INDECK-OSWEGO ENERGY CENTER	OSWEGO	NY	10/6/94	GE FRAME 6 GAS TURBINE	67	7.4	NO CONTROLS	BACT-OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	7.9	GOOD COMBUSTION	BACT-PSD
ECOELECTRICA, L.P.	PENUELAS	PR	10/1/96	TURBINES, COMBINED-CYCLE COGENERATION	461	8.0	DRY LOW NOX COMBUSTOR; DESIGN, WATER INJE	BACT-PSD
GORDONSVILLE ENERGY L.P.	FAIRFAX	VA	9/25/92	TURBINES (2) [EACH WITH A SF]	170	8.9	GOOD COMBUSTION PRACTICES	BACT-PSD
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	9.0	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
EMPIRE DISTRICT ELECTRIC CO.	JOPLIN	MO	5/17/94	INSTALL TWO NEW SIMPLE-CYCLE TURBINES	168	10.0	NONE	BACT-PSD
KENTUCKY UTILITIES COMPANY	MERCER	KY	3/10/92	TURBINE, #2 FUEL OIL/NATURAL GAS (8)	188	10.1	SCR WITH AMMONIA CEM MONITORING	OTHER
BERMUDA HUNDRED ENERGY LIMITED PARTNERSHIP	CHESTERFIELD	VA	3/3/92	TURBINE, COMBUSTION	140	11.1	SCR, STEAM INJ.	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	11.8	FUEL SPEC: CLEAN BURN FUEL	BACT-PSD
EAST KENTUCKY POWER COOPERATIVE		KY	3/24/93	TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED	187	12.9	PROPER COMBUSTION TECHNIQUES	BACT-OTHER
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	15.8	SCR	BACT-PSD
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	20.7	GOOD COMBUSTION	BACT-PSD
MID-GEORGIA COGEN.	KATHLEEN	GA	4/3/96	COMBUSTION TURBINE (2), FUEL OIL	116	30.0	OXIDATION CATALYST 16 PPM @	OTHER

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr

2) Some PPM values were calculated using a conversion factor based on the F-Factor and molecular weight of CH_4: 1 (PPM) = (lb/mmBtu) * 740
lb/mmBtu values were also calculated from lb/hr, lb/yr or ton/yr values

All turbines less than 50 MW and above 100 PPM were removed from this list

RACT/BACT/LAER Clearinghouse Search Results - 3/1/2000
Combustion Turbines (Natural Gas) - SO_2

FACILITY	CITY	STATE	PERMIT	PROCESS	MW[1]	lb/mmBtu[2]	CTRLDESC	BASIS
GORHAM ENERGY LIMITED PARTNERSHIP	GORHAM	ME	12/4/98	TURBINE, COMBINED CYCLE	900	0.00068	0.05% SULFUR DISTILLATE OIL #2 USED.	BACT-PSD
MOJAVE COGENERATION CO.		CA	1/12/89	TURBINE, GAS	61	0.0012	FUEL SPEC. OIL FIRING LIMITED TO 11 H/D	BACT-PSD
TECO POLK POWER STATION	BARTOW	FL	2/24/94	TURBINE, FUEL OIL	221	0.048	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
VIRGINIA POWER		VA	9/7/89	TURBINE, GAS	164	0.051	FUEL SPEC: 0.06% BY WT ANN AVG S FUEL, GA	BACT-PSD
WI ELECTRIC POWER CO.	CONCORD STATION	WI	10/18/90	TURBINES, COMBUSTION, SIMPLE CYCLE, 4	75	0.052	FUEL SPEC. 0.05% S OIL ALLOWED ONLY IF NA	BACT-PSD
FLORIDA POWER CORPORATION POLK COUNTY SITE	BARTOW	FL	2/25/94	TURBINE, FUEL OIL (2)	216	0.054	FUEL SPEC: LOW SULFUR FUEL OIL (MAX 0.05 %	BACT-PSD
KISSIMMEE UTILITY AUTHORITY	INTERCESSION CITY	FL	4/7/93	TURBINE, FUEL OIL	116	0.056	FUEL SPEC: LOW SULFUR FUEL	BACT-PSD
AUBURNDALE POWER PARTNERS, LP	AUBURNDALE	FL	12/14/92	TURBINE, OIL	146	0.060	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
BALTIMORE GAS & ELECTRIC - PERRYMAN PLANT	PERRYMMAN	MD		TURBINE, 140 MW OIL FIRED ELECTRIC	140	0.078	FUEL SPEC: LOW SULFUR OIL (0.05%)	BACT-PSD
GAINESVILLE REGIONAL UTILITIES	GAINESVILLE	FL	4/11/95	OIL FIRED COMBUSTION TURBINE	74	0.090	FUEL SPEC: LOW S OIL 0.05% S	BACT-PSD
THE DEXTER CORP.	WINDSOR LOCKS	CT	9/29/89	TURBINE, NAT GAS & #2 FUEL OIL FIRED	69	0.12	FUEL SPEC: LOW SULFUR FUEL - 0.28%	BACT-PSD
CAROLINA POWER & LIGHT	GOLDSBORO	NC	4/11/96	COMBUSTION TURBINE, 4 EACH	238	0.16	FUEL SPEC: 0.15% S FUEL OIL	BACT-PSD
O'BRIEN COGENERATION	HARTFORD	CT	8/8/88	TURBINE, GAS FIRED	62	0.19	FUEL SPEC: LOW S OIL, ANNUAL FUEL LIMIT	BACT-PSD
DUKE POWER CO. LINCOLN COMBUSTION TURBINE STATION	LOWESVILLE	NC	12/20/91	TURBINE, COMBUSTION	156	0.19	FUEL SPEC: 0.2% SULFUR FUEL OIL	BACT-PSD
PANDA-ROSEMARY CORP.	ROANOKE RAPIDS	NC	9/6/89	TURBINE, COMBUSTION, #7 FRAME	133	0.21	FUEL SPEC: LOW S FUEL	BACT-PSD
HOPEWELL COGENERATION LIMITED PARTNERSHIP		VA	7/1/88	TURBINE, OIL FIRED, 3 EA	129	0.21	FUEL SPEC: SULFUR CONTENT OF FUEL	BACT-PSD
BEAR ISLAND PAPER COMPANY, L.P.	ASHLAND	VA	10/30/92	TURBINE, COMBUSTION GAS	59	0.21	FUEL SPEC: LOW SULFUR FUEL	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	129	0.22	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
FLORIDA POWER CORPORATION	INTERCESSION CITY	FL	8/17/92	TURBINE, OIL	233	0.22	FUEL SPEC: LOW SULFUR FUEL OIL	BACT-PSD
DOSWELL LIMITED PARTNERSHIP		VA	5/4/90	TURBINE, COMBUSTION	158	0.22	USING #2 OIL	OTHER
KALAELOE PARTNERS, L.P.		HI	3/9/90	TURBINE, LSFO, 2	225	0.27		BACT-PSD
FLORIDA POWER AND LIGHT	NORTH PALM BEACH	FL	6/5/91	TURBINE, OIL, 2 EACH	400	0.29	FUEL SPEC: NO. 2 FUEL OIL	BACT-PSD
KENTUCKY UTILITIES COMPANY	MERCER	KY	3/10/92	TURBINE, #2 FUEL OIL/NATURAL GAS (8)	188	0.30	FUEL SPEC LOW SULFUR FUEL (0.3% SULFUR	BACT-PSD
CAPITOL DISTRICT ENERGY CENTER	HARTFORD	CT	10/23/89	ENGINE, GAS TURBINE	92	0.31	FUEL SPEC: LOW S OIL	BACT-PSD
VIRGINIA POWER	CHESTERFIELD	VA	4/15/88	TURBINE, GE,2 EA	234	0.33	FUEL SPEC: 0.3% BY WT SULFUR LIMIT ON FUE	LAER
EAST KENTUCKY POWER COOPERATIVE		KY	3/24/93	TURBINES (5), #2 FUEL OIL AND NAT. GAS FIRED	187	0.34	FUEL SPEC: LOW SULFUR FUEL (0.3% SULFUR	SEE NOTES
FLORIDA POWER GENERATION	DEBARY	FL	10/18/91	TURBINE, OIL, 6 EACH	93	0.75	FUEL SPEC: #2 FUEL OIL	BACT-PSD

1) Some MW were converted from mmBtu/hr, KW, HP and BHP, assuming a heat rate of 8,000 Btu/KW-hr
2) Some lb/mmBtu values were calculated from lb/hr, lb/yr or ton/yr values
All turbines less than 50 MW and above 100 PPM were removed from this list

Appendix G
Land Use Analysis

APPENDIX G
LAND USE ANALYSIS

A land use classification analysis was performed to determine whether urban or rural dispersion parameters should be used in quantifying ground-level concentrations. The analysis conformed to the procedures contained in the A.H. Auer paper "Correlation of Land Use and Cover with Meteorological Anomalies" (Auer, 1978). The Auer method identifies the amount of land covered by structures and pavement versus the amount of land covered by grass or vegetation within a 3 km radius around the proposed site. The Auer land use types are provided below in Table H-1 below.

Table G-1
Auer Land Use Types

Urban Land Use Types	Rural Land Use Types
Industrial (I1)	Common Residential (R1)
Light Industrial (I2)	Metropolitan Natural (A1)
Commercial (C1)	Undeveloped (A3)
Compact Residential (R2)	Water Surfaces (A5)
Compact Residential (R3)	

The Auer method, in agreement with the U.S. EPA, defines an urban area as an area whose land usage within the 3 km radial study area is more than 50% urban; otherwise, Auer defines the area as rural.

Figure H depicts the 3 km radial study area surrounding the site. For this study area, the land use types were identified according to the land use types defined in Table G-1 above. After the land use types were identified, their respective percent areas were estimated. The land use types identified within the 3 km radial study area along with their respective percent areas are provided in Table G-2.

Table G-2
Percent Area Land Use

Urban	Percent	Rural	Percent
Industrial (I1),	13%	Common Residential (R1)	0%
Commercial (C1)	32%	Undeveloped (A3)	0%
Compact Residential (R2/R3)	31%	Metropolitan Natural (A1)	10%
		Water Surfaces (A5)	14%
Total Urban	76%	Total Rural	24%

The majority of land use in the 3 km circle surrounding the site is comprised of commercial use (32%) followed by compact residential use (31%). An additional 13% of the land is used for industrial and light industrial usage. These three uses are classified as urban and account for 76% of the surrounding land use. Rural uses include water surfaces at 14% and metropolitan natural at 10%. Therefore, total rural usage is limited to 24%. The following generalizations can be made for the primary land uses:

- Manhattan Island (located west of the site) and the southern sections of Queens Borough make up the majority of the R2/R3 areas;
- Central Park, located in Manhattan, comprises nearly all of the A1 area, additional A1 usages in noted in some "pocket" parks that are located in Queens;
- the "Sunnyside" rail yard (located southeast of the site), Welfare Island and scattered commercial areas along the east side of Manhattan (north of the site along the East River) comprise the C areas; and
- the majority of the I1/I2 areas (north and south of the site) are in thin strips on either side of the East River and in larger zones south of the site, south of the Queensboro Bridge and the Sunnyside rail yard including portions in northern Brooklyn.

There are also commercial zones present throughout the study area along the major roadways and railroads.

Based on this analysis, approximately 76% of the land usage is urban and, as such, modeling will be performed using urban dispersion coefficients.

Appendix H
List of Flagpole Receptors

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B1	588,190	4,510,860	3	95.1
B2	588,304	4,510,580	3	14.6
B3	588,594	4,511,848	3	15.2
B4	589,060	4,512,580	3	18.3
B5	589,500	4,511,220	2	14.6
B6	589,740	4,511,690	5	14.6
B7	590,450	4,512,220	15	21.9
B8	589,830	4,512,620	4	18.3
B9	591,070	4,513,220	15	18.3
B10	590,840	4.513,210	13	21.9
B11	590,820	4,513,270	12	18.3
B12	589,839	4,511,616	5	14.6
B13	589,817	4,511,554	5	18.3
B14	589,583	4,511,521	2	36.6
B15	589,901	4,512,357	6	18.3
B16	589,450	4,512,783	3	14.6
B17	589,473	4,512,814	3	14.6
B18	589,901	4,512,357	6	18.3
B19	589,563	4,513,186	3	15.2
B20	589,563	4,513,186	3	15.2
B21	590,512	4,512,210	15	21.9
B22	590,790	4,513,170	12	18.3
B23	590,810	4,513,220	12	25.6
B24	589,970	4,513,720	3	18.3
B25	589,970	4,513,720	3	18.3
B26	590,310	4,513,890	2	29.3
B27	590,140	4,514,270	3	54.9
B28	590,258	4,513,811	2	21.9
B29	589,901	4,514,331	3	21.9
B30	588,790	4,515,088	15	21.9
B31	588,766	4,515,088	16	18.3
B32	588,789	4,515,150	15	131.7
B33	588,744	4,514,995	17	18.3
B34	588,744	4,514,995	17	91.4
B35	588,955	4,514,967	11	18.3
B36	588,931	4,514,967	11	120.7
B37	588,978	4,514,967	11	80.5
B38	588,841	4,514,750	13	18.3
B39	589,172	4,514,415	4	62.2
B40	589,030	4,514,598	7	109.7

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New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B41	589,007	4,514,567	7	109.7
B42	588,560	4,514,654	23	84.1
B43	592,335	4,514,700	9	21.9
B44	587,344	4,514,423	30	21.9
B45	588,680	4,514,471	16	18.3
B46	588,822	4,514,287	15	21.9
B47	587,204	4,514,329	30	76.8
B48	588,823	4,514,225	15	73.2
B49	588,566	4,514,222	18	21.9
B50	588,354	4,514,282	22	18.3
B51	588,686	4,513,977	15	18.3
B52	588,356	4,514,127	20	18.3
B53	588,498	4,514,005	16	18.3
B54	588,829	4,513,701	15	47.5
B55	588,829	4,513,732	15	18.3
B56	588,217	4,514,002	18	21.9
B57	588,263	4,513,972	18	76.8
B58	588,572	4,513,698	15	18.3
B59	588,738	4,513,577	12	80.5
B60	588,337	4,513,695	14	21.9
B61	588,503	4,513,574	13	18.3
B62	588,502	4,513,697	15	18.3
B63	588,079	4,513,723	17	113.4
B64	587,964	4,513,567	16	14.6
B65	587,987	4,513,568	16	14.6
B66	588,152	4,513,447	15	80.5
B67	588,129	4,513,477	15	29.3
B68	587,919	4,513,382	16	76.8
B69	588,274	4,513,046	14	91.4
B70	588,251	4,513,046	14	91.4
B71	588,203	4,513,108	15	73.2
B72	587,803	4,513,226	16	18.3
B73	588,064	4,513,013	15	153.6
B74	588,182	4,512,984	15	102.4
B75	588,135	4,512,983	15	14.6
B76	588,113	4,512,891	15	48.8
B77	588,159	4,512,892	15	42.7
B78	587,924	4,512,919	15	21.9
B79	587,878	4,512,950	15	21.9
B80	587,666	4,512,947	16	65.8

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B81	587,689	4,512,978	16	43.9
B82	587,929	4,512,549	15	102.4
B83	587,905	4,512,549	15	43.9
B84	587,746	4,512,177	15	54.9
B85	592,130	4,512,261	15	43.9
B86	587,345	4,512,327	15	54.9
B87	587,276	4,512,233	15	62.2
B88	587,299	4,512,265	15	146.3
B89	587,512	4,512,144	15	102.4
B90	587,465	4,512,143	15	76.8
B91	587,488	4,512,174	15	73.2
B92	587,631	4,511,990	15	73.2
B93	587,631	4,511,959	15	54.9
B94	587,442	4,512,081	15	18.3
B95	587,207	4,512,109	15	73.2
B96	587,442	4,512,081	15	113.4
B97	587,538	4,511,835	15	65.8
B98	587,115	4,511,984	15	146.3
B99	587,138	4,512,016	14	142.6
B100	587,516	4,511,773	9	36.6
B101	587,070	4,511,799	13	14.6
B102	587,235	4,511,708	9	146.3
B103	587,258	4,511,739	9	21.9
B104	586,984	4,511,182	7	146.3
B105	587,189	4,511,677	9	58.5
B106	587,143	4,511,522	7	91.4
B107	586,758	4,512,381	15	109.7
B108	586,799	4,510,871	6	109.7
B109	586,869	4,510,964	6	0.0
B110	586,869	4,510,964	6	0.0
B111	586,151	4,510,154	5	69.5
B112	586,151	4,510,123	5	73.2
B113	586,127	4,510,154	5	87.8
B114	586,012	4,509,967	4	91.4
B115	586,060	4,509,937	4	76.8
B116	586,508	4,509,696	3	62.2
B117	586,531	4,509,726	3	91.4
B118	586,133	4,509,691	2	21.9
B119	585,921	4,509,781	4	62.2
B120	586,133	4,509,629	2	54.9

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B121	588,883	4,509,261	3	51.2
B122	586,539	4,509,017	3	30.5
B123	586,752	4,508,896	3	54.9
B124	586,447	4,508,893	3	18.3
B125	586,471	4,508,863	3	91.4
B126	586,116	4,509,136	3	25.6
B127	585,857	4,509,225	1	43.9
B128	585,880	4,509,256	1	21.9
B129	585,669	4,509,254	2	21.9
B130	585,622	4,509,253	2	18.3
B131	585,977	4,508,980	6	18.3
B132	586,236	4,508,860	3	58.5
B133	586,333	4,508,676	3	73.2
B134	586,380	4,508,676	3	25.6
B135	585,931	4,508,887	3	25.6
B136	585,789	4,508,978	1	54.9
B137	585,507	4,509,036	3	25.6
B138	585,554	4,509,006	2	21.9
B139	586,287	4,508,521	3	21.9
B140	586,263	4,508,551	3	54.9
B141	586,240	4,508,521	3	21.9
B142	586,288	4,508,490	3	54.9
B143	586,454	4,508,338	3	54.9
B144	586,057	4,508,179	3	21.9
B145	585,891	4,508,332	3	18.3
B146	585,684	4,513,973	15	21.9
B147	586,127	4,508,180	3	21.9
B148	586,177	4,507,903	3	73.2
B149	584,840	4,507,888	9	54.9
B150	585,798	4,508,207	1	21.9
B151	585,657	4,508,236	2	54.9
B152	585,634	4,508,205	2	51.2
B153	585,587	4,508,235	3	80.5
B154	585,729	4,508,114	1	14.6
B155	586,224	4,507,934	3	18.3
B156	586,154	4,507,810	6	73.2
B157	585,756	4,507,805	6	21.9
B158	585,638	4,507,865	1	18.3
B159	585,638	4,507,865	1	18.3
B160	585,168	4,507,860	5	21.9

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New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B161	585,098	4,507,921	5	21.9
B162	584,956	4,508,042	6	29.3
B163	584,956	4,508,042	6	18.3
B164	584,959	4,507,765	8	21.9
B165	584,959	4,507,734	8	18.3
B166	585,338	4,509,466	5	51.2
B167	585,360	4,507,585	2	73.2
B168	585,855	4,507,375	6	25.6
B169	585,834	4,507,189	6	65.8
B170	584,888	4,507,765	9	91.4
B171	584,773	4,507,517	11	30.5
B172	584,797	4,507,548	10	18.3
B173	584,797	4,507,517	10	25.6
B174	590,337	4,515,714	6	67.4
B175	590,386	4,515,667	6	67.4
B176	590,386	4,515,833	6	67.4
B177	590,410	4,515,405	9	30.5
B178	592,952	4,514,679	6	24.4
B179	591,750	4,515,595	2	31.7
B180	590,560	4,514,714	0	36.6
B181	590,548	4,514,262	5	63.4
B182	590,547	4,514,380	9	24.4
B183	591,976	4,516,893	3	19.8
B184	592,036	4,516,976	4	24.4
B185	592,964	4,517,060	0	47.5
B186	592,333	4,517,381	3	24.4
B187	593,405	4,517,893	3	21.3
B188	594,548	4,517,405	3	28.3
B189	594,274	4,517,976	5	19.8
B190	589,476	4,517,476	7	43.6
B191	589,964	4,517,238	4	19.8
B192	589,869	4,517,095	4	142.6
B193	589,976	4,517,286	4	19.8
B194	589,929	4,517,143	4	63.4
B195	589,869	4,517,071	4	150.6
B196	589,786	4,516,929	6	19.8
B197	590,000	4,517,000	3	63.4
B198	590,095	4,516,833	3	63.4
B199	589,952	4,516,726	3	24.4
B200	589,929	4,516,702	3	24.4

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B201	590,286	4,516,798	2	63.4
B202	590,310	4,516,714	3	27.7
B203	590,167	4,516,571	3	19.8
B204	590,202	4,516,357	3	19.8
B205	589,619	4,515,667	2	79.2
B206	589,615	4,515,631	2	79.2
B207	589,536	4,515,667	2	79.2
B208	589,452	4,515,833	3	79.2
B209	588,952	4,515,464	6	55.5
B210	588,833	4,515,238	6	138.7
B211	588,952	4,515,071	2	99.1
B212	589,025	4,515,143	1	55.5
B213	588,738	4,515,036	6	150.6
B214	588,690	4,514,952	6	178.3
B215	588,714	4,515,025	6	126.8
B216	588,952	4,514,929	4	99.1
B217	588,595	4,514,774	11	19.8
B218	588,631	4,514,714	11	158.5
B219	588,429	4,514,405	20	142.6
B220	588,476	4,514,500	18	99.1
B221	588,809	4,514,286	24	158.5
B222	588,857	4,514,214	13	79.2
B223	588,798	4,514,238	6	138.7
B224	588,200	4,513,195	12	115
B225	588,200	4,513,297	12	97
B226	588,300	4,513,395	12	98
B227	588,300	4,513,395	12	98
B228	588,500	4,513,598	12	97
B229	588,700	4,513,895	12	95
B230	587,800	4,512,797	12	103
B231	588,100	4,513,297	12	92
B232	587,400	4,514,000	12	96
B233	587,100	4,512,098	12	94
B234	587,400	4,512,395	12	124
B235	587,700	4,512,895	12	130
B236	587,900	4,513,195	12	98
B237	588,000	4,513,500	12	105
B238	588,000	4,513,589	12	93
B239	588,000	4,513,797	12	110
B240	587,900	4,513,195	12	98

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B241	586,800	4,511,895	12	152
B242	587,300	4,512,695	12	97
B243	587,600	4,513,500	12	94
B244	587,600	4,511,797	12	101
B245	587,600	4,512,000	12	105
B246	587,500	4,513,297	12	96
B247	588,800	4,514,098	12	104
B248	587,700	4,512,297	12	128
B249	587,700	4,512,750	12	43
B250	589,000	4,514,797	12	43
B251	587,000	4,513,500	12	30
B252	587,500	4,513,000	12	46
B253	587,500	4,512,750	12	49
B254	587,200	4,513,297	12	46
B255	587,300	4,513,395	12	55
B256	587,600	4,513,195	12	55
B257	587,100	4,511,797	12	18
B258	589,300	4,513,695	12	24
B259 (Empire State Building)	585,600	4,511,098	12	381
B260	583,800	4,506,395	8	259
B261	584,200	4,507,297	8	185
B262	585,600	4,510,297	12	206
B263	585,200	4,511,395	12	229
B264	584,500	4,508,297	8	123
B265	584,800	4,507,797	8	121
B266 (Lincoln)	586,200	4,511,598	12	205
B267 (Pan Am)	586,500	4,511,797	12	246
B268	586,400	4,512,195	12	177
B269 (Chrysler)	586,400	4,511,395	12	277
B270 (Waldorf)	586,600	4,512,000	12	191
B271	586,900	4,511,695	12	202
B272	585,400	4,511,695	12	177
B273	585,800	4,512,695	12	202
B274	586,200	4,512,797	12	197
B275	585,700	4,512,598	12	204
B276	586,100	4,513,098	12	185
B277	586,500	4,512,797	12	221
B278 (RCA)	586,000	4,512,395	12	259
B279	587,700	4,513,098	12	130
B280 (GE)	586,700	4,512,098	12	197

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B281 (Citicorp)	586,900	4,512,297	12	279
B282	587,100	4,512,395	12	189
B283 (The Excelsior)	587,300	4,512,395	12	124
B284	587,400	4,512,098	12	110
B285	587,600	4,512,195	12	128
B286	585,900	4,513,395	12	207
B287	585,800	4,513,695	12	115
B288	588,400	4,514,895	12	115
B289	588,700	4,514,797	12	130
B290	588,800	4,513,797	12	121
B291	585,500	4,512,195	12	218
B292	584,800	4,512,500	12	126
B293	586,000	4,511,797	12	212
B294 (World Trade Center)	583,300	4,507,000	6	404
B295 (Galleria)	586,900	4,512,695	12	176
B296	588,700	4,519,300	12	30
B297	592,400	4,520,450	12	21
B298	586,800	4,513,300	12	15
B299	585,700	4,509,400	12	8
B300	588,800	4,509,400	12	3
B301	591,800	4,513,310	12	6
B302	599,800	4,510,000	12	30
B303	589,900	4,493,900	12	2
B304	574,000	4,516,800	12	90
B305	570,600	4,495,500	12	9
B306	590,000	4,516,800	12	3
B307	583,600	4,506,350	6	226
B308	583,600	4,506,750	8	226
B309	586,100	4,512,400	12	204
B310	586,200	4,512,100	12	144
B311	586,300	4,511,500	12	207
B312	586,800	4,513,000	12	156
B313 (Trump Towers)	586,500	4,512,500	12	200
B314	586,300	4,512,500	12	166
B315 (Wall St. Tower)	583,600	4,506,450	8	283
B316 (Exxon)	586,200	4,512,550	12	229
B317 (GM)	586,700	4,512,800	12	155
B318	587,100	4,503,600	20	105
B319 (Williamsburg Savings)	588,800	4,508,000	15	155
B320 (NY Telephone)	585,500	4,505,000	15	101

Appendix H
Ravenswood Cogeneration Facility
New York City Flagpole Receptors (i.e., Buildings)

Building No.	UTM East (m)	UTM North (m)	Elevation (m)	Approximate Height of Building (m)
B321	584,700	4,505,880	20	140
B322 (Met Life)	590,300	4,506,860	8	173
B323 (Met Life)	590,200	4,507,400	8	128
B324	590,300	4,507,900	8	125
B325	590,200	4,506,840	8	113
B326 (Chase)	590,300	4,506,860	8	228
B327 (Federal Building)	590,400	4,506,890	8	273
B328	583,700	4,506,300	8	152
B329	584,000	4,506,830	8	113
B330	583,700	4,506,910	8	183
B331	583,700	4,506,910	8	144
B332	583,700	4,506,300	8	150
B333	583,600	4,506,300	8	191
B334	583,700	4,506,910	8	119
B335	583,500	4,506,300	8	113
B336	583,600	4,506,930	8	145
B337	583,700	4,506,910	8	160
B338	583,400	4,507,280	8	143
B339	583,400	4,506,960	6	405
B340	583,800	4,507,500	8	210
B341 (Woolworth)	583,700	4,507,500	8	237
B342	584,300	4,506,900	8	174
B343	583,900	4,506,300	8	202
B344	587,290	4,506,485	11	65
B345	587,275	4,506,425	11	65
B346	587,100	4,506,570	6	48
B347	587,510	4,506,410	15	55
B348	587,550	4,506,340	15	55
B349	587,440	4,506,390	15	55
B350	587,475	4,506,310	15	55
B351	587,390	4,506,310	15	55
B352	587,440	4,506,250	15	55
B353	587,275	4,506,360	12	17
B354	587,310	4,506,290	12	35
B355	587,325	4,506,240	12	23
B356	587,400	4,506,220	12	30
B357	587,420	4,506,160	11	23
B358	587,450	4,506,150	11	35

Appendix I

Summary of Worst-Case Operating Scenario Modeling Analysis

Appendix I
KeySpan Ravenswood Cogeneration Facility
Maximum Ground-Level Concentrations (μg/m^3)

400 ft Stack - Maximum Ground-Level Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

1-hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	1.16658	95061909	589700	4512381	3.1	2.7	4.2	6.1	3.1	700	90
CASE02	1.16653	95061909	589700	4512381	3.1	2.0	2.1	3.8	1.0	700	90
CASE03	1.32627	93060416	589386	4511922	0.0	1.9	1.9	4.1	0.9	600	140
CASE04	1.73526	92071913	589137	4512757	0.0	2.0	2.0	5.0	1.0	400	20
CASE05	1.32272	93060416	589386	4511922	0.0	2.9	4.6	6.9	3.4	600	140
CASE06	1.32262	93060416	589386	4511922	0.0	2.2	2.2	4.2	1.1	600	140
CASE07	1.1665	95061909	589700	4512381	3.1	2.6	4.1	6.1	3.1	700	90
CASE08	1.32287	93060416	589386	4511922	0.0	2.1	2.2	4.2	1.1	600	140
CASE09	1.33697	91060906	589104	4511790	0.0	1.8	1.8	4.1	0.9	600	170
CASE10	1.73411	92071913	589137	4512757	0.0	1.8	1.8	4.9	1.0	400	20
CASE11	1.32352	93060416	589386	4511922	0.0	2.6	4.3	6.8	3.3	600	140
CASE12	1.32266	93060416	589386	4511922	0.0	2.0	2.1	4.2	1.0	600	140
CASE13	1.32252	93060416	589386	4511922	0.0	2.8	4.5	6.8	3.4	600	140
CASE14	1.32368	93060416	589386	4511922	0.0	1.9	1.9	4.1	0.9	600	140
CASE15	1.33581	91060906	589104	4511790	0.0	1.6	1.6	4.0	0.8	600	170
CASE16	1.73409	92071913	589137	4512757	0.0	1.7	1.7	4.8	0.9	400	20
CASE17	0.90442	95060610	588878	4513070	0.0	10.6	9.9	11.8	3.59	700	350
CASE18	0.92579	91020909	589606	4512031	3.1	10.3	8.5	10.2	1.81	700	120
CASE19	1.16551	93060416	589321	4511998	0.0	10.6	8.6	11.4	1.98	500	140
CASE20	1.32208	93060416	589386	4511922	0.0	9.6	7.7	11.4	1.87	600	140
CASE21	0.88754	91052611	588614	4511922	0.0	10.0	9.3	11.3	3.61	600	220
CASE22	0.88754	91052611	588614	4511922	0.0	9.6	7.9	9.7	1.85	600	220
CASE23	0.88755	91052611	588614	4511922	0.0	10.1	9.4	11.4	3.63	600	220
CASE24	0.90604	95060610	588878	4513070	0.0	9.6	7.9	9.7	1.86	700	350
CASE25	1.16561	93060416	589321	4511998	0.0	10.1	8.2	11.1	1.91	500	140
CASE26	1.32211	93060416	589386	4511922	0.0	9.1	7.3	11.3	1.79	600	140
CASE27	0.92597	91020909	589606	4512031	3.1	9.2	8.7	11.0	3.53	700	120
CASE28	0.90609	95060610	588878	4513070	0.0	9.3	7.6	9.5	1.77	700	350
CASE29	0.90642	95060610	588878	4513070	0.0	9.8	9.2	11.3	3.60	700	350
CASE30	1.16897	93060416	589321	4511998	0.0	10.9	9.0	11.6	2.1	500	140
CASE31	1.16578	93060416	589321	4511998	0.0	9.0	7.3	10.5	1.8	500	140
CASE32	1.32225	93060416	589386	4511922	0.0	8.1	6.5	10.5	1.7	600	140

Appendix I

KeySpan Ravenswood Cogeneration Facility

Maximum Ground-Level Concentrations ($\mu g/m^3$)

400 ft Stack - Maximum Ground-Level Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

3-Hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.69414	91052612	588550	4511844	0.0	1.6	2.5	3.6	1.8	701	220
CASE02	0.75754	91052612	588486	4511768	0.0	1.3	1.4	2.5	0.7	800	220
CASE03	0.79807	94120412	589450	4511845	0.9	1.1	1.2	2.5	0.6	700	140
CASE04	1.17933	93060415	589383	4512060	0.0	1.4	1.4	3.4	0.7	500	130
CASE05	0.75761	91052612	588486	4511768	0.0	1.7	2.6	3.9	2.0	800	220
CASE06	0.75759	91052612	588486	4511768	0.0	1.2	1.3	2.4	0.6	800	220
CASE07	0.75757	91052612	588486	4511768	0.0	1.7	2.6	3.9	2.0	800	220
CASE08	0.75767	91052612	588486	4511768	0.0	1.2	1.3	2.4	0.6	800	220
CASE09	0.86438	91121212	588486	4511768	0.0	1.1	1.2	2.7	0.6	800	220
CASE10	1.18453	93060415	589383	4512060	0.0	1.3	1.3	3.4	0.7	500	130
CASE11	0.78301	91121212	588550	4511844	0.0	1.6	2.5	4.0	2.0	701	220
CASE12	0.75775	91052612	588486	4511768	0.0	1.2	1.2	2.4	0.6	800	220
CASE13	0.75769	91052612	588486	4511768	0.0	1.6	2.6	3.9	1.9	800	220
CASE14	0.78299	91121212	588550	4511844	0.0	1.1	1.1	2.4	0.5	701	220
CASE15	0.86431	91121212	588486	4511768	0.0	1.0	1.0	2.6	0.5	800	220
CASE16	1.1853	93060415	589383	4512060	0.0	1.1	1.1	3.3	0.6	500	130
CASE17	0.57164	91052612	588614	4511922	0.0	6.7	6.2	7.5	2.3	600	220
CASE18	0.5976	95062315	588311	4511802	0.0	6.7	5.5	6.6	1.2	900	230
CASE19	0.69433	91052612	588550	4511844	0.0	6.3	5.1	6.8	1.2	701	220
CASE20	0.75832	91052612	588486	4511768	0.0	5.5	4.4	6.6	1.1	800	220
CASE21	0.56323	95061912	589752	4512654	3.1	6.3	5.9	7.1	2.3	800	70
CASE22	0.56248	95061912	589752	4512654	3.1	6.1	5.0	6.1	1.2	800	70
CASE23	0.56189	95061912	589752	4512654	3.1	6.4	5.9	7.2	2.3	800	70
CASE24	0.56403	95061912	589752	4512654	3.1	6.0	4.9	6.0	1.2	800	70
CASE25	0.69437	91052612	588550	4511844	0.0	6.0	4.9	6.6	1.1	701	220
CASE26	0.75844	91052612	588486	4511768	0.0	5.2	4.2	6.5	1.0	800	220
CASE27	0.5719	91052612	588614	4511922	0.0	5.7	5.4	6.8	2.2	600	220
CASE28	0.56382	95061912	589752	4512654	3.1	5.8	4.7	5.9	1.1	800	70
CASE29	0.5632	95061912	589752	4512654	3.1	6.1	5.7	7.0	2.2	800	70
CASE30	0.59548	93060415	589383	4512060	0.0	5.6	4.6	5.9	1.1	500	130
CASE31	0.69468	91052612	588550	4511844	0.0	5.4	4.3	6.2	1.1	701	220
CASE32	0.78245	91121212	588550	4511844	0.0	4.8	3.8	6.2	1.0	701	220

Appendix I
KeySpan Ravenswood Cogeneration Facility
Maximum Ground-Level Concentrations (μg/m³)

400 ft Stack - Maximum Ground-Level Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

8-hour	XOQ	yymmddhh	UTMX	UTMY	ELEV (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.60697	91052616	588550	4511844	0.0	1.4	2.2	3.2	1.6	701	220
CASE02	0.68047	91052616	588486	4511768	0.0	1.2	1.2	2.2	0.6	800	220
CASE03	0.7162	91052616	588422	4511692	0.0	1.0	1.0	2.2	0.5	899	220
CASE04	0.7432	93060416	589321	4511998	0.0	0.9	0.9	2.1	0.4	500	140
CASE05	0.68085	91052616	588486	4511768	0.0	1.5	2.3	3.5	1.8	800	220
CASE06	0.68078	91052616	588486	4511768	0.0	1.1	1.1	2.2	0.6	800	220
CASE07	0.68067	91052616	588486	4511768	0.0	1.5	2.4	3.5	1.8	800	220
CASE08	0.68104	91052616	588486	4511768	0.0	1.1	1.1	2.2	0.6	800	220
CASE09	0.72221	91052616	588357	4511615	0.0	1.0	1.0	2.2	0.5	1000	220
CASE10	0.75765	93060416	589321	4511998	0.0	0.8	0.8	2.1	0.4	500	140
CASE11	0.6821	91052616	588486	4511768	0.0	1.4	2.2	3.5	1.7	800	220
CASE12	0.68117	91052616	588486	4511768	0.0	1.0	1.1	2.1	0.5	800	220
CASE13	0.68099	91052616	588486	4511768	0.0	1.4	2.3	3.5	1.7	800	220
CASE14	0.68232	91052616	588486	4511768	0.0	1.0	1.0	2.1	0.5	800	220
CASE15	0.72274	91052616	588357	4511615	0.0	0.9	0.9	2.2	0.4	1000	220
CASE16	0.75894	93060416	589321	4511998	0.0	0.7	0.7	2.1	0.4	500	140
CASE17	0.47848	91052616	588614	4511922	0.0	5.6	5.2	6.2	1.9	600	220
CASE18	0.47868	91052616	588614	4511922	0.0	5.3	4.4	5.3	0.9	600	220
CASE19	0.53809	91052616	588550	4511844	0.0	4.9	4.0	5.3	0.9	701	220
CASE20	0.682	91052616	588486	4511768	0.0	4.9	4.0	5.9	1.0	800	220
CASE21	0.36714	95062316	588387	4511866	0.0	4.1	3.8	4.7	1.5	801	230
CASE22	0.36663	95062316	588387	4511866	0.0	4.0	3.2	4.0	0.8	801	230
CASE23	0.36607	95062316	588387	4511866	0.0	4.2	3.9	4.7	1.5	801	230
CASE24	0.37363	91052616	588614	4511922	0.0	4.0	3.3	4.0	0.8	600	220
CASE25	0.60661	91052616	588550	4511844	0.0	5.3	4.2	5.8	1.0	701	220
CASE26	0.68228	91052616	588486	4511768	0.0	4.7	3.8	5.8	0.9	800	220
CASE27	0.47913	91052616	588614	4511922	0.0	4.8	4.5	5.7	1.8	600	220
CASE28	0.37388	91052616	588614	4511922	0.0	3.8	3.1	3.9	0.7	600	220
CASE29	0.37366	91052616	588614	4511922	0.0	4.0	3.8	4.7	1.5	600	220
CASE30	0.47937	91052616	588614	4511922	0.0	4.5	3.7	4.7	0.9	600	220
CASE31	0.60723	91052616	588550	4511844	0.0	4.7	3.8	5.5	0.9	701	220
CASE32	0.68283	91052616	588486	4511768	0.0	4.2	3.3	5.4	0.9	800	220

Appendix I
KeySpan Ravenswood Cogeneration Facility
Maximum Ground-Level Concentrations ($\mu g/m^3$)

400 ft Stack - Maximum Ground-Level Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

24-hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.30854	92050824	588311	4511802	0.0	0.7	1.1	1.6	0.8	900	230
CASE02	0.30972	92050824	588311	4511802	0.0	0.5	0.6	1.0	0.3	900	230
CASE03	0.33935	92050824	588387	4511866	0.0	0.5	0.5	1.1	0.2	801	230
CASE04	0.36879	91072924	588081	4511610	0.0	0.4	0.4	1.1	0.2	1200	230
CASE05	0.31404	92050824	588311	4511802	0.0	0.7	1.1	1.6	0.8	900	230
CASE06	0.31302	92050824	588311	4511802	0.0	0.5	0.5	1.0	0.3	900	230
CASE07	0.31181	92050824	588311	4511802	0.0	0.7	1.1	1.6	0.8	900	230
CASE08	0.31588	92050824	588311	4511802	0.0	0.5	0.5	1.0	0.3	900	230
CASE09	0.34617	92050824	588387	4511866	0.0	0.5	0.5	1.1	0.2	801	230
CASE10	0.37928	91072924	588157	4511674	0.0	0.4	0.4	1.1	0.2	1100	230
CASE11	0.32405	92050824	588311	4511802	0.0	0.6	1.1	1.7	0.8	900	230
CASE12	0.3159	92050824	588311	4511802	0.0	0.5	0.5	1.0	0.2	900	230
CASE13	0.31402	92050824	588311	4511802	0.0	0.7	1.1	1.6	0.8	900	230
CASE14	0.32564	92050824	588387	4511866	0.0	0.5	0.5	1.0	0.2	801	230
CASE15	0.35394	92050824	588387	4511866	0.0	0.4	0.4	1.1	0.2	801	230
CASE16	0.3821	91072924	588157	4511674	0.0	0.4	0.4	1.1	0.2	1100	230
CASE17	0.27269	92050824	588311	4511802	0.0	3.2	3.0	3.6	1.1	900	230
CASE18	0.2744	92050824	588311	4511802	0.0	3.1	2.5	3.0	0.5	900	230
CASE19	0.29496	92050824	588311	4511802	0.0	2.7	2.2	2.9	0.5	900	230
CASE20	0.31942	92050824	588387	4511866	0.0	2.3	1.9	2.8	0.5	801	230
CASE21	0.26195	92050824	588311	4511802	0.0	2.9	2.7	3.3	1.1	900	230
CASE22	0.26068	92050824	588311	4511802	0.0	2.8	2.3	2.8	0.5	900	230
CASE23	0.25907	92050824	588311	4511802	0.0	2.9	2.7	3.3	1.1	900	230
CASE24	0.26413	92050824	588311	4511802	0.0	2.8	2.3	2.8	0.5	900	230
CASE25	0.29911	92050824	588311	4511802	0.0	2.6	2.1	2.8	0.5	900	230
CASE26	0.32303	92050824	588387	4511866	0.0	2.2	1.8	2.8	0.4	801	230
CASE27	0.27473	92050824	588311	4511802	0.0	2.7	2.6	3.3	1.0	900	230
CASE28	0.26552	92050824	588311	4511802	0.0	2.7	2.2	2.8	0.5	900	230
CASE29	0.26385	92050824	588311	4511802	0.0	2.8	2.7	3.3	1.0	900	230
CASE30	0.2765	92050824	588311	4511802	0.0	2.6	2.1	2.7	0.5	900	230
CASE31	0.30342	92050824	588311	4511802	0.0	2.3	1.9	2.7	0.5	900	230
CASE32	0.32833	92050824	588387	4511866	0.0	2.0	1.6	2.6	0.4	801	230

Appendix I
KeySpan Ravenswood Cogeneration Facility
Maximum Ground-Level Concentrations (µg/m^3)

400 ft Stack - Maximum Ground-Level Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

Annual	XOQ	Year	UTMY	UTMY	ELEV (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.04137	1994	589674	4511799	9.1	0.1	0.1	0.2	0.1	891	131
CASE02	0.04157	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE03	0.04739	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE04	0.05273	1994	589674	4511799	9.1	0.1	0.1	0.2	0.0	891	131
CASE05	0.04243	1994	589674	4511799	9.1	0.1	0.1	0.2	0.1	891	131
CASE06	0.04223	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE07	0.04198	1994	589674	4511799	9.1	0.1	0.1	0.2	0.1	891	131
CASE08	0.04281	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE09	0.04865	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE10	0.05418	1994	589674	4511799	9.1	0.1	0.1	0.2	0.0	891	131
CASE11	0.04456	1994	589674	4511799	9.1	0.1	0.1	0.2	0.1	891	131
CASE12	0.04294	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE13	0.04249	1994	589674	4511799	9.1	0.1	0.1	0.2	0.1	891	131
CASE14	0.04479	1994	589674	4511799	9.1	0.1	0.1	0.1	0.0	891	131
CASE15	0.05009	1994	589674	4511799	9.1	0.1	0.1	0.2	0.0	891	131
CASE16	0.05462	1994	589674	4511799	9.1	0.1	0.1	0.2	0.0	891	131
CASE17	0.03469	1994	589674	4511799	9.1	0.408	0.378	0.452	0.1	891	131
CASE18	0.03494	1994	589674	4511799	9.1	0.390	0.321	0.386	0.1	891	131
CASE19	0.03896	1994	589674	4511799	9.1	0.355	0.287	0.382	0.1	891	131
CASE20	0.04324	1994	589674	4511799	9.1	0.313	0.251	0.374	0.1	891	131
CASE21	0.03304	1994	589674	4511799	9.1	0.371	0.345	0.419	0.1	891	131
CASE22	0.03285	1994	589674	4511799	9.1	0.355	0.291	0.357	0.1	891	131
CASE23	0.0326	1994	589674	4511799	9.1	0.371	0.345	0.420	0.1	891	131
CASE24	0.03335	1994	589674	4511799	9.1	0.355	0.291	0.357	0.1	891	131
CASE25	0.03961	1994	589674	4511799	9.1	0.343	0.277	0.376	0.1	891	131
CASE26	0.04399	1994	589674	4511799	9.1	0.303	0.242	0.375	0.1	891	131
CASE27	0.03501	1994	589674	4511799	9.1	0.347	0.329	0.417	0.1	891	131
CASE28	0.03346	1994	589674	4511799	9.1	0.342	0.281	0.352	0.1	891	131
CASE29	0.03323	1994	589674	4511799	9.1	0.359	0.336	0.416	0.1	891	131
CASE30	0.03553	1994	589674	4511799	9.1	0.332	0.272	0.352	0.1	891	131
CASE31	0.04042	1994	589674	4511799	9.1	0.312	0.252	0.363	0.1	891	131
CASE32	0.04518	1994	589674	4511799	9.1	0.276	0.221	0.359	0.1	891	131

Appendix I
KeySpan Energy Ravenswood Cogeneration Facility
Maximum Flagpole (i.e., Building) Concentrations (µg/m^3)

400 ft Stack - Maximum Flagpole Receptor (i.e., Buildings) Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

1-hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	Flag (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	3.14154	95041101	588064	4513013	15	146.3	7.3	11.3	16.5	8.4	1129	304
CASE02	3.16235	95041101	588064	4513013	15	146.3	5.5	5.8	10.2	2.7	1129	304
CASE03	3.68042	95041101	588064	4513013	15	146.3	5.3	5.4	11.5	2.6	1129	304
CASE04	3.44026	95041101	588064	4513013	15	146.3	4.0	3.9	9.9	2.0	1129	304
CASE05	3.2352	95041101	588064	4513013	15	146.3	7.1	11.1	16.8	8.4	1129	304
CASE06	3.21373	95041101	588064	4513013	15	146.3	5.2	5.4	10.3	2.7	1129	304
CASE07	3.1921	95041101	588064	4513013	15	146.3	7.1	11.1	16.6	8.4	1129	304
CASE08	3.26832	95041101	588064	4513013	15	146.3	5.2	5.4	10.4	2.7	1129	304
CASE09	3.78782	95041101	588064	4513013	15	146.3	5.0	5.1	11.6	2.5	1129	304
CASE10	3.48839	95041101	588064	4513013	15	146.3	3.7	3.7	9.9	2.0	1129	304
CASE11	3.39689	95041101	588064	4513013	15	146.3	6.8	11.0	17.3	8.5	1129	304
CASE12	3.24447	95041101	588064	4513013	15	146.3	5.0	5.2	10.2	2.5	1129	304
CASE13	3.21047	95041101	588064	4513013	15	146.3	6.8	10.9	16.6	8.2	1129	304
CASE14	3.42137	95041101	588064	4513013	15	146.3	4.8	5.0	10.6	2.4	1129	304
CASE15	3.35002	95041101	588064	4513013	15	146.3	4.0	4.0	10.1	2.0	1129	304
CASE16	3.50144	95041101	588064	4513013	15	146.3	3.3	3.3	9.8	1.8	1129	304
CASE17	2.70477	91052221	587100	4512395	12	189.0	31.8	29.5	35.3	10.7	1900	270
CASE18	2.71629	91052221	587100	4512395	12	189.0	30.3	24.9	30.0	5.3	1900	270
CASE19	2.85663	91052221	587100	4512395	12	189.0	26.0	21.1	28.0	4.9	1900	270
CASE20	3.00532	95041101	588064	4513013	15	146.3	21.8	17.4	26.0	4.3	1129	304
CASE21	2.61211	91052221	587100	4512395	12	189.0	29.3	27.3	33.2	10.6	1900	270
CASE22	2.59836	91052221	587100	4512395	12	189.0	28.1	23.0	28.3	5.4	1900	270
CASE23	2.58682	91052221	587100	4512395	12	189.0	29.4	27.4	33.3	10.6	1900	270
CASE24	2.62754	91052221	587100	4512395	12	189.0	28.0	22.9	28.1	5.4	1900	270
CASE25	2.88044	91052221	587100	4512395	12	189.0	24.9	20.1	27.3	4.7	1900	270
CASE26	3.03283	95041101	588064	4513013	15	146.3	20.9	16.7	25.8	4.1	1129	304
CASE27	2.69722	91052221	587100	4512395	12	189.0	26.7	25.3	32.1	10.3	1900	270
CASE28	2.6257	91052221	587100	4512395	12	189.0	26.8	22.0	27.6	5.1	1900	270
CASE29	2.61378	91052221	587100	4512395	12	189.0	28.2	26.5	32.7	10.4	1900	270
CASE30	2.7094	91052221	587100	4512395	12	189.0	25.3	20.8	26.8	4.9	1900	270
CASE31	2.89437	91052221	587100	4512395	12	189.0	22.3	18.1	26.0	4.4	1900	270
CASE32	3.07211	95041101	588064	4513013	15	146.3	18.8	15.0	24.4	4.0	1129	304

Appendix I
KeySpan Energy Ravenswood Cogeneration Facility
Maximum Flagpole (i.e., Building) Concentrations ($\mu g/m^3$)

400 ft Stack - Maximum Flagpole Receptor (i.e., Buildings) Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

3-Hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	Flag (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	2.137	95041103	588064	4513013	15	146.3	5.0	7.7	11.2	5.7	1129	304
CASE02	2.14842	95041103	588064	4513013	15	146.3	3.7	3.9	7.0	1.9	1129	304
CASE03	2.29862	95041103	588064	4513013	15	146.3	3.3	3.3	7.2	1.6	1129	304
CASE04	2.25986	95041103	588064	4513013	15	146.3	2.6	2.6	6.5	1.3	1129	304
CASE05	2.18835	95041103	588064	4513013	15	146.3	4.8	7.5	11.3	5.7	1129	304
CASE06	2.17665	95041103	588064	4513013	15	146.3	3.5	3.7	6.9	1.8	1129	304
CASE07	2.16481	95041103	588064	4513013	15	146.3	4.8	7.5	11.2	5.7	1129	304
CASE08	2.20643	95041103	588064	4513013	15	146.3	3.5	3.6	7.0	1.8	1129	304
CASE09	2.34496	95041103	588064	4513013	15	146.3	3.1	3.2	7.2	1.6	1129	304
CASE10	2.28669	95041103	588064	4513013	15	146.3	2.4	2.4	6.5	1.3	1129	304
CASE11	2.17498	95041103	588064	4513013	15	146.3	4.3	7.1	11.1	5.4	1129	304
CASE12	2.10748	95041103	588064	4513013	15	146.3	3.2	3.4	6.6	1.6	1129	304
CASE13	2.09231	95041103	588064	4513013	15	146.3	4.4	7.1	10.8	5.3	1129	304
CASE14	2.18576	95041103	588064	4513013	15	146.3	3.1	3.2	6.8	1.5	1129	304
CASE15	2.20941	95041103	588064	4513013	15	146.3	2.6	2.7	6.7	1.3	1129	304
CASE16	2.29402	95041103	588064	4513013	15	146.3	2.2	2.2	6.4	1.2	1129	304
CASE17	1.67976	95041103	588064	4513013	15	146.3	19.7	18.3	21.9	6.7	1129	304
CASE18	1.6952	95041103	588064	4513013	15	146.3	18.9	15.6	18.7	3.3	1129	304
CASE19	1.86053	95041103	588064	4513013	15	146.3	16.9	13.7	18.2	3.2	1129	304
CASE20	2.01449	95041103	588064	4513013	15	146.3	14.6	11.7	17.4	2.9	1129	304
CASE21	1.57253	95041103	588064	4513013	15	146.3	17.6	16.4	20.0	6.4	1129	304
CASE22	1.55842	95041103	588064	4513013	15	146.3	16.8	13.8	17.0	3.2	1129	304
CASE23	1.54462	95041103	588064	4513013	15	146.3	17.6	16.3	19.9	6.3	1129	304
CASE24	1.59143	95041103	588064	4513013	15	146.3	16.9	13.9	17.0	3.3	1129	304
CASE25	1.89228	95041103	588064	4513013	15	146.3	16.4	13.2	18.0	3.1	1129	304
CASE26	2.03027	95041103	588064	4513013	15	146.3	14.0	11.2	17.3	2.8	1129	304
CASE27	1.68303	95041103	588064	4513013	15	146.3	16.7	15.8	20.0	6.4	1129	304
CASE28	1.59567	95041103	588064	4513013	15	146.3	16.3	13.4	16.8	3.1	1129	304
CASE29	1.58105	95041103	588064	4513013	15	146.3	17.1	16.0	19.8	6.3	1129	304
CASE30	1.69925	95041103	588064	4513013	15	146.3	15.9	13.0	16.8	3.1	1129	304
CASE31	1.91801	95041103	588064	4513013	15	146.3	14.8	12.0	17.2	2.9	1129	304
CASE32	2.05277	95041103	588064	4513013	15	146.3	12.5	10.0	16.3	2.7	1129	304

Appendix I
KeySpan Energy Ravenswood Cogeneration Facility
Maximum Flagpole (i.e., Building) Concentrations ($\mu g/m^3$)

400 ft Stack - Maximum Flagpole Receptor (i.e., Buildings) Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

8-hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	Flag (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.80138	95041108	588064	4513013	15	146.3	1.9	2.9	4.2	2.1	1129	304
CASE02	0.80566	95041108	588064	4513013	15	146.3	1.4	1.5	2.6	0.7	1129	304
CASE03	0.86198	95041108	588064	4513013	15	146.3	1.2	1.3	2.7	0.6	1129	304
CASE04	0.84745	95041108	588064	4513013	15	146.3	1.0	1.0	2.4	0.5	1129	304
CASE05	0.82063	95041108	588064	4513013	15	146.3	1.8	2.8	4.3	2.1	1129	304
CASE06	0.81624	95041108	588064	4513013	15	146.3	1.3	1.4	2.6	0.7	1129	304
CASE07	0.8118	95041108	588064	4513013	15	146.3	1.8	2.8	4.2	2.1	1129	304
CASE08	0.82741	95041108	588064	4513013	15	146.3	1.3	1.4	2.6	0.7	1129	304
CASE09	0.87936	95041108	588064	4513013	15	146.3	1.2	1.2	2.7	0.6	1129	304
CASE10	0.85751	95041108	588064	4513013	15	146.3	0.9	0.9	2.4	0.5	1129	304
CASE11	0.81562	95041108	588064	4513013	15	146.3	1.6	2.6	4.2	2.0	1129	304
CASE12	0.7903	95041108	588064	4513013	15	146.3	1.2	1.3	2.5	0.6	1129	304
CASE13	0.78461	95041108	588064	4513013	15	146.3	1.7	2.7	4.0	2.0	1129	304
CASE14	0.81966	95041108	588064	4513013	15	146.3	1.2	1.2	2.5	0.6	1129	304
CASE15	0.82853	95041108	588064	4513013	15	146.3	1.0	1.0	2.5	0.5	1129	304
CASE16	0.86026	95041108	588064	4513013	15	146.3	0.8	0.8	2.4	0.4	1129	304
CASE17	0.62991	95041108	588064	4513013	15	146.3	7.4	6.9	8.2	2.5	1129	304
CASE18	0.6357	95041108	588064	4513013	15	146.3	7.1	5.8	7.0	1.2	1129	304
CASE19	0.6977	95041108	588064	4513013	15	146.3	6.4	5.1	6.8	1.2	1129	304
CASE20	0.75543	95041108	588064	4513013	15	146.3	5.5	4.4	6.5	1.1	1129	304
CASE21	0.5897	95041108	588064	4513013	15	146.3	6.6	6.2	7.5	2.4	1129	304
CASE22	0.58441	95041108	588064	4513013	15	146.3	6.3	5.2	6.4	1.2	1129	304
CASE23	0.5813	93111824	588064	4513013	15	146.3	6.6	6.2	7.5	2.4	1129	304
CASE24	0.59679	95041108	588064	4513013	15	146.3	6.4	5.2	6.4	1.2	1129	304
CASE25	0.70961	95041108	588064	4513013	15	146.3	6.1	5.0	6.7	1.2	1129	304
CASE26	0.76135	95041108	588064	4513013	15	146.3	5.2	4.2	6.5	1.0	1129	304
CASE27	0.63114	95041108	588064	4513013	15	146.3	6.3	5.9	7.5	2.4	1129	304
CASE28	0.59838	95041108	588064	4513013	15	146.3	6.1	5.0	6.3	1.2	1129	304
CASE29	0.59289	95041108	588064	4513013	15	146.3	6.4	6.0	7.4	2.4	1129	304
CASE30	0.63722	95041108	588064	4513013	15	146.3	5.9	4.9	6.3	1.1	1129	304
CASE31	0.71925	95041108	588064	4513013	15	146.3	5.5	4.5	6.5	1.1	1129	304
CASE32	0.76979	95041108	588064	4513013	15	146.3	4.7	3.8	6.1	1.0	1129	304

Appendix I
KeySpan Energy Ravenswood Cogeneration Facility
Maximum Flagpole (i.e., Building) Concentrations ($\mu g/m^3$)

400 ft Stack - Maximum Flagpole Receptor (i.e., Buildings) Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

24-hour	XOQ	yymmddhh	UTMY	UTMY	ELEV (m)	Flag (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.40669	94061324	588800	4513797	12	121.0	0.9	1.5	2.1	1.1	1430	352
CASE02	0.40767	94061324	588800	4513797	12	121.0	0.7	0.7	1.3	0.4	1430	352
CASE03	0.43198	94061324	588800	4513797	12	121.0	0.6	0.6	1.3	0.3	1430	352
CASE04	0.45089	94061324	588800	4513797	12	121.0	0.5	0.5	1.3	0.3	1430	352
CASE05	0.41099	94061324	588800	4513797	12	121.0	0.9	1.4	2.1	1.1	1430	352
CASE06	0.40986	94061324	588800	4513797	12	121.0	0.7	0.7	1.3	0.3	1430	352
CASE07	0.40883	94061324	588800	4513797	12	121.0	0.9	1.4	2.1	1.1	1430	352
CASE08	0.41257	94061324	588800	4513797	12	121.0	0.7	0.7	1.3	0.3	1430	352
CASE09	0.43661	94061324	588800	4513797	12	121.0	0.6	0.6	1.3	0.3	1430	352
CASE10	0.45651	94061324	588800	4513797	12	121.0	0.5	0.5	1.3	0.3	1430	352
CASE11	0.41819	94061324	588800	4513797	12	121.0	0.8	1.4	2.1	1.0	1430	352
CASE12	0.4107	94061324	588800	4513797	12	121.0	0.6	0.7	1.3	0.3	1430	352
CASE13	0.40906	94061324	588800	4513797	12	121.0	0.9	1.4	2.1	1.0	1430	352
CASE14	0.41932	94061324	588800	4513797	12	121.0	0.6	0.6	1.3	0.3	1430	352
CASE15	0.44088	94061324	588800	4513797	12	121.0	0.5	0.5	1.3	0.3	1430	352
CASE16	0.45799	94061324	588800	4513797	12	121.0	0.4	0.4	1.3	0.2	1430	352
CASE17	0.35419	94061324	588800	4513797	12	121.0	4.2	3.9	4.6	1.4	1430	352
CASE18	0.3559	94061324	588800	4513797	12	121.0	4.0	3.3	3.9	0.7	1430	352
CASE19	0.37744	94061324	588800	4513797	12	121.0	3.4	2.8	3.7	0.6	1430	352
CASE20	0.40081	94061324	588800	4513797	12	121.0	2.9	2.3	3.5	0.6	1430	352
CASE21	0.34123	94061324	588800	4513797	12	121.0	3.8	3.6	4.3	1.4	1430	352
CASE22	0.33938	94061324	588800	4513797	12	121.0	3.7	3.0	3.7	0.7	1430	352
CASE23	0.33774	94061324	588800	4513797	12	121.0	3.8	3.6	4.4	1.4	1430	352
CASE24	0.34344	94061324	588800	4513797	12	121.0	3.7	3.0	3.7	0.7	1430	352
CASE25	0.38139	94061324	588800	4513797	12	121.0	3.3	2.7	3.6	0.6	1430	352
CASE26	0.40381	94061324	588800	4513797	12	121.0	2.8	2.2	3.4	0.5	1430	352
CASE27	0.35368	94061324	588800	4513797	12	121.0	3.5	3.3	4.2	1.3	1430	352
CASE28	0.34346	94061324	588800	4513797	12	121.0	3.5	2.9	3.6	0.7	1430	352
CASE29	0.34175	94061324	588800	4513797	12	121.0	3.7	3.5	4.3	1.4	1430	352
CASE30	0.35547	94061324	588800	4513797	12	121.0	3.3	2.7	3.5	0.6	1430	352
CASE31	0.38422	94061324	588800	4513797	12	121.0	3.0	2.4	3.4	0.6	1430	352
CASE32	0.40803	94061324	588800	4513797	12	121.0	2.5	2.0	3.2	0.5	1430	352

Appendix I
KeySpan Energy Ravenswood Cogeneration Facility
Maximum Flagpole (i.e., Building) Concentrations (μg/m^3)

400 ft Stack - Maximum Flagpole Receptor (i.e., Buildings) Concentrations - Assumes 20% Sulfate Conversion - ACC located on top of turbine bldg

Annual	XOQ	Year	UTMY	UTMY	ELEV (m)	Flag (m)	SO2	NOx	PM/PM-10	CO	Distance	Direction
CASE01	0.03896	1994	589740	4511690	5	14.6	0.1	0.1	0.2	0.1	1012	133
CASE02	0.0391	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE03	0.04357	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE04	0.04856	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE05	0.03963	1994	589740	4511690	5	14.6	0.1	0.1	0.2	0.1	1012	133
CASE06	0.03949	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE07	0.03933	1994	589740	4511690	5	14.6	0.1	0.1	0.2	0.1	1012	133
CASE08	0.03992	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE09	0.04461	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE10	0.05017	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE11	0.04137	1994	589740	4511690	5	14.6	0.1	0.1	0.2	0.1	1012	133
CASE12	0.04	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE13	0.0396	1994	589740	4511690	5	14.6	0.1	0.1	0.2	0.1	1012	133
CASE14	0.04155	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE15	0.0459	1994	589740	4511690	5	14.6	0.1	0.1	0.1	0.0	1012	133
CASE16	0.05071	1994	589740	4511690	5	14.6	0.0	0.0	0.1	0.0	1012	133
CASE17	0.03328	1994	589740	4511690	5	14.6	0.391	0.363	0.434	0.1	1012	133
CASE18	0.03352	1994	589740	4511690	5	14.6	0.374	0.308	0.370	0.1	1012	133
CASE19	0.03672	1994	589740	4511690	5	14.6	0.334	0.271	0.360	0.1	1012	133
CASE20	0.04007	1994	589740	4511690	5	14.6	0.290	0.233	0.347	0.1	1012	133
CASE21	0.03193	1994	589740	4511690	5	14.6	0.358	0.334	0.405	0.1	1012	133
CASE22	0.03176	1994	589740	4511690	5	14.6	0.343	0.281	0.346	0.1	1012	133
CASE23	0.03158	1994	589740	4511690	5	14.6	0.359	0.334	0.407	0.1	1012	133
CASE24	0.03217	1994	589740	4511690	5	14.6	0.342	0.281	0.344	0.1	1012	133
CASE25	0.03724	1994	589740	4511690	5	14.6	0.322	0.260	0.354	0.1	1012.	133
CASE26	0.04064	1994	589740	4511690	5	14.6	0.280	0.224	0.346	0.1	1012	133
CASE27	0.03341	1994	589740	4511690	5	14.6	0.331	0.314	0.398	0.1	1012	133
CASE28	0.03226	1994	589740	4511690	5	14.6	0.329	0.271	0.339	0.1	1012	133
CASE29	0.03207	1994	589740	4511690	5	14.6	0.346	0.325	0.401	0.1	1012	133
CASE30	0.03374	1994	589740	4511690	5	14.6	0.315	0.259	0.334	0.1	1012	133
CASE31	0.03775	1994	589740	4511690	5	14.6	0.291	0.235	0.339	0.1	1012	133
CASE32	0.04148	1994	589740	4511690	5	14.6	0.254	0.203	0.329	0.1	1012	133

APPENDIX 5E

Risk Assessment Scenarios:
KeySpan Ravenswood Cogeneration Facility
Long Island City, Queens, New York

Revised November 2000

RESIDENTIAL SCENARIO

Revised 11/10/00

CONTAMINANT CONCENTRATION IN SOIL
RESIDENTIAL SCENARIO

Parameters

Carcinogens

Sc=[Ds/(ks*(tD-T1))]*[(tD+(exp(-ks*tD)/ks))-(T1+(exp(-ks*T1))/ks)]

where:
Ds = [UC1*(Dydp+Dywp)/Zs*BD]

and:

Values Specific to Contaminant:	CS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
T1 = Time Period At Beginning Of Combustion (yr):	0
ks = COC Soil Loss Constant (yr-1):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	30
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	see below
Tilled Soil:	2.0E+01
Untilled Soil:	1.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil):	1.5E+00
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04

CONTAMINANT CONCENTRATION IN SOIL
RESIDENTIAL SCENARIO

Contaminant	Sc Tilled (20 cm)	Sc Untilled (1 cm)	Ds Tilled (20 cm)	Ds Untilled (1 cm)	ks Tilled (yr-1)	ks Untilled (yr-1)
Inorganics						
Arsenic	1.8E-02	3.3E-02	1.9E-03	3.9E-02	5.65E-02	1.13E+00

CALCULATION OF SOIL LOSS CONSTANT

Parameters

ks = ksl + ksg + ksr + kse + ksv

where:

ksl = IR/ Z * (theta sw + Kds * BD)

ksr = (RO/*theta sw*Zs)*(1/(1.0+(Kds*BD/theta sw)))

ksv = Ke*Kt

where:

Ke = (UC1 * H) /(Zs * Koc * foc * R * T * BD)

Kt = (Da * theta v)/ Zs

theta v = 1 - (BD/ps) - theta sw

and:

Values Specific to Contaminant:	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
P = Average Annual Precipitation (cm/yr):	8.1E+01
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff (cm/yr):	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	5.5E+01
Z = Soil Depth From Which Leaching Removal Occurs (see below):	
Tilled Soil (cm):	2.0E+01
Untilled Soil (cm):	1.0E+00
theta sw= Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC1 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Infiltration Rate (cm/yr):	2.2E+01

**Note: Koc * foc = Kds (cm3/g)

CALCULATION OF SOIL LOSS CONSTANT

Contaminant	ks Tilled (yr-1)	ks Untilled (yr-1)	ksg (yr-1)	ksl Tilled (yr-1)	ksl Untilled (yr-1)	ksr Tilled (yr-1)	ksr Untilled (yr-1)	ksv Tilled (yr-1)	ksv Untilled (yr-1)	Kds
Inorganics										
Arsenic	5.7E-02	1.1E+00	NA	2.5E-02	5.0E-01	3.1E-02	6.3E-01	NA	NA	2.9E+01

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
RESIDENTIAL SCENARIO

Parameters

Pd =(UC1 * [Dydp + (FW * Dywp)] * Rp * [1 - exp(-kp*Tp)]) / Yp * kp
Pv = ((Cyv * Bvag * VGag) / pa)
Pr abvgrd = Sc * Br ag

Where:

Values Specific to Contaminant:	CS*
Pd = Aboveground Produce Concentration Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration Due to Air-to-Plant Transfer(ug/g) :	CS*
Pr abvgrd = Exposed and Protected Aboveground Produce Concentration Due to Root Uptake (mg/kg) :	CS*
UC1 = Units Conversion Factor (mg/g):	1000
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04
FW = Fraction of COC Wet Deposition That Adheres to Plant Surfaces (--):	CS*
Bvag = Air-to-Plant Biotransfer Factor (--):	CS*
VGag = Above Ground Vegetable Correction Factor (--):	CS*
Rp = Interception Factor For Above Ground Vegetation (--):	3.90E-01
kp = Plant Surface Loss Coefficient (yr-1):	1.80E+01
Tp = Length of Growing Season For Above Ground Vegetation (yr):	1.64E-01
Yp = Vegetation Yield For Above Ground Vegetation (kg DW/m2):	2.24E+00
pa = Air Density (g/m3):	1.19E+03
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br ag= Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
RESIDENTIAL SCENARIO

Contaminant	Pd	Pv	Pr abvgrd exposed	Pr abvgrd protected	Sc Tilled (20 cm)	Fv	Fw	Bvag	VG ag	Br ag
Inorganics										
Arsenic	3.3E-03	NA	1.1E-04	1.1E-04	1.8E-02	0.0E+00	6.0E-01	NA	NA	6.3E-03

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
RESIDENTIAL SCENARIO

Parameters	
Pr bg = Sc * Br rv * VG rv Where:	
Values Specific to Contaminant:	CS*
Pr bg = Total Contaminant Level In Below Ground Vegetation (mg/kg):	CS*
Sc = Soil Concentration (tilled) (mg/kg):	CS*
Br rv = Plant-Soil Bioconcentration Factor For Below Ground Vegetables:	CS*
VGrv = Below Ground Vegetable Correction Factor:	CS*

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
RESIDENTIAL SCENARIO

Contaminant	Pr bg	Sc Tilled (20 cm)	Br rv	VGrv
Inorganics				
Arsenic	1.4E-04	1.8E-02	8.0E-03	1.0E+00

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

Carcinogens

Sc=Ds/ks*(tD-T1)*[(tD+exp*(-ks*tD)/ks)-(T1+exp(-ks*T1)/ks)]

where:

Ds = [UC1*(Dytp)/Zs*BD]

ks = ksl + ksg + ksr + kse + ksv
ksl = IR/ Z * (theta sw + Kds * BD)
ksr = RO/theta sw*Zs*(1/(1.0+(Kds*BD/theta sw)))
ksv = Ke*Kt
kse = (Xe * SD * ER * 0.1)/(BD * Z) * (Kds * BD)/(theta + (Kds * BD))

where:

Ke = (UC3 + H) /(Zs * Koc * foc * R * T * BD)
Kt = (Da * theta v)/ Zs
theta v = 1 - (BD/ps) - theta sw

and:

Values Specific to Contaminant:	CS*
Values Specific to Receptor:	RS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0.0E+00
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	3.0E+01
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	1.0E+00
T1 = Time Peroid At Beginning Of Combustion (yr):	0.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
UC2 = Units Conversion Factor (m-g-s/cm-ug-yr):	3.2E-01
Dytwp = Yearly Average Total Deposition From Particle Phase (Watershed) (g/m2-yr):	1.56E-04
P = Average Annual Precipitation (cm/yr):	1.1E+02
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	7.0E+01
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC3 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Soil Infiltration Rate (cm/yr):	2.2E+01
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00

**Note: Koc * foc = Kds (cm3/g)

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	Sc Surface (1 cm)	Ds (1cm)	ks (yr-1)	ksl (yr-1)	ksr (yr-1)	kse (yr-1)	ksv (yr-1)	ksg (yr-1)	Kds
Inorganics									
Arsenic	9.2E-03	1.0E-02	1.1E+00	5.0E-01	6.3E-01	3.4E-03	NA	NA	2.9E+01

CALCULATION OF TOTAL WATERBODY LOAD
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

LT = LDif + LDep + LRI + LR + LE
Where:
LDep = Dytwp * WAw
LRI = Dytwp * WAi
LR = UC1 * RO * (WAL) * ((Sc * BD)/(theta sw + Kds * BD))
LE = Xe * (WAL) * SD * ER * (Sc * Kds * BD)/(theta sw + Kds * BD) * UC2
LDif = (Kv * Cywv * WAw * UC5)/(H/R*Twk)
Xe = RF * K * LS * C * PF * (UC3/UC4)
SD = a * (WAl)^-b
Kv = ([Kl^-1+(Kg*(H/R*T)^-1)]^-1)*theta^Twk-293)
Kl = SQRT((1 * 1E-04 * Dw * u)/dz) * UC6 (Flowing Streams or Rivers)

and:

Values Specific to Contaminant:	CS*
LT = Total Contaminant Load to the Water Body (g/yr):	CS*
LDep = Deposition of Particle Phase and Wet Vapor Phase Contaminant Load to the Water Body (g/yr):	CS*
LRI = Runoff Load From Impervious Surfaces (g/yr):	CS*
LR = Runoff Load From Pervious Surface (g/yr):	CS*
LE = Soil Erosion Load (g/yr):	CS*
Dytwp = Yearly Waterbody Average Total (Wet and Dry) Deposition From Particle Phase (g/m2*yr):	1.690E-04
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
WAw = Water Body Area (m2):	1.35E+08
WAi = Impervious Watershed Area Receiving Pollutant Deposition (m2):	4.50E+08
UC1 = Units Conversion Factor (kg-cm2/mg-m2):	1.0E-02
WAL = Total Watershed Area Receiving Pollutant Deposition (m2):	9.00E+08
RO = Average Annual Surface Runoff (cm/yr):	2.7E+01
Sc = Contaminant Level in Watershed Soil (mg/kg):	CS*
BD = Soil Bulk Density (g/cm3):	1.5E+00
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-water partition coefficient (cm3/g or ml/g):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.56E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00
UC2 = Units Conversion Factor (g/mg):	1.0E-03
RF = "Erosivity" Factor (yr-1):	1.5E+02
K = "Erodibility" Factor (tons/acre):	2.2E-01
LS = "Topographic or Slope Length" Factor (--):	1.5E+00
C = "Cover Management" Factor (--):	1.0E-01
PF = "Supporting Practice" Factor (--):	1.0E+00
a = Empirical Intercept Coefficient:	6.0E-01
b = Empirical Slope Coefficient:	1.25E-01
UC3 = Units Conversion Factor (kg/ton):	9.1E+02
UC4 = Units Conversion Factor (m2/acre):	4.0E+03
Kv = Overall Transfer Rate Coefficient (m/yr):	CS*
H = Henry's Law Constant (atm-m3/mol):	CS*
R = Universal Gas Constant (atm-m3/mol-K):	8.2E-05
Twk = Water Body Temperature (K):	3.0E+02
theta = Temperature Correction Factor (--):	1.03E+00
Kl = Liquid Phase Transfer Coefficient (m/yr):	CS*
Dw = Diffusivity of COC in Water (cm3/s):	CS*
UC5 = Units Conversion Factor (g/ug):	1.00E-06
UC6 = Units Conversion Factor (s/yr):	3.2E+07
Kg = Gas Phase Transfer Coefficient For Flowing Rivers or Streams (m/yr):	3.7E+04
u = Current Velocity (m/s):	5.0E-02
dz = Total Waterbody Depth (m):	1.4E+01

CALCULATION OF TOTAL WATERBODY LOAD
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	LT	LDiff	LDep	LRI	LR	LE	Kv	Kl
Inorganics								
Arsenic	1.7E+05	NA	2.1E+04	7.0E+04	7.7E+04	4.2E+02	NA	6.7E+01

CALCULATION OF WATER CONCENTRATION
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

Cwtot = LT/Vfx * fwc + kwt * WAw * (dwc + dbs)
Cwt = fwc * Cwtot * (dwc + dbs/dwc)
Cdw = Cwt/1 + Kdsw * TSS * 10-6
Csb = fbs * Cwtot * (Kdbs / thetabs + Kdbs * Cbs) * (dwc + dbs/dbs)

Where:
fwc = (1 + Kdsw * TSS * 10-6) * (dwc/dz)/(1 + Kdsw * TSS * 10-6) * (dwc/dz) + (thetabs + Kdbs * Cbs) * (dbs/dz)
kwt = fwc * kv + fbs * kb
fbs = 1 - fwc
kv = Kv/(dz * (1 + Kdsw * TSS * 10-6)
kb = [(Xe * WAl * SD * 10+3 - Vfx * TSS)/(WAw *TSS)] * [(TSS * 10-6)/(Cbs * dbs)]

and:

Values Specific to Contaminant:	CS*
Cwtot = Total Water Body Concentration (mg/L):	CS*
Cwt = Total Concentration in Water Column (mg/L):	CS*
Cdw = Dissolved Phase Water Concentration (mg/L):	CS*
Csb = Concentration Sorbed to Bed Sediments (mg/L):	CS*
fwc = Fraction of Total Water Body Concentration That Occurs in the Water Column (--):	CS*
kwt = Total First Order Dissipation Rate Constant (yr-1):	CS*
fbs = Fraction of Total Water Body Concentration That Occurs in the Bed Sediment (--):	CS*
LT = Total Contaminant Load to the Water Body (mg/yr):	CS*
Vfx = Average Volumetric Flow Rate Through Water Body (m3/yr):	1.88E+10
dwc = Depth of Water Column (m):	7.6E+00
dbs = Depth of Upper Benthic Sediment Layer (m):	3.0E-02
dz = Total Waterbody Depth (m):	7.6E+00
WAw = Water Body Area (m2):	1.35E+08
UC1 = Units Conversion Factor (g//mg):	1.0E+03
Kdsw = Suspended Sediment/Surface Water Partition Coefficient (L/kg):	CS*
TSS = Total Suspended Solids (mg/L):	1.4E+02
thetabs = Bed Sediment Porosity (Lwater/L):	6.0E-01
Kdbs = Bed Sediment/Sediment Pore Water Partition Coefficient (L/kg):	CS*
Cbs = Bed Sediment Concentration (g/cm3):	1.0E+00
kb = Benthic Burial Rate Constant (yr-1):	0.0E+00
kv = Water Column Volatilization Rate Constant (yr-1):	CS*
Kv = Overall COC Transfer Rate Coefficient (m/yr):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
WAl = Total Watershed Area Recieving Pollutant Deposition (m2):	9.0E+08

CALCULATION OF WATER CONCENTRATION
RESIDENTIAL DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	Cwtot	Cwt	Cdw	Csb	fwc	fbs	kwt	kv	Kdsw	Kdbs
Inorganics										
Arsenic	1.0E-05	9.0E-06	8.9E-06	2.6E-04	9.0E-01	1.04E-01	NA	NA	2.9E+01	2.9E+01

CALCULATION OF CHEMICAL INTAKES
RESIDENTIAL SCENARIO: ADULT

Parameter		Contaminant	Itot	Isoil	Iag	Idw
Itot = Isoil + Iag + Idw		**Inorganics**				
Where: Isoil = Sc * CRsoil * Fsoil/BW Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag Idw = (Cdw * CRdw * Fdw)/BW		Arsenic	5.0E-07	4.7E-08	2.7E-07	1.8E-07
Where:						
CS* = Values Specific to Contaminant:						
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*					
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*					
Sc = Soil Concentration (untilled) (mg/kg):	CS*					
CRsoil = Adult Soil Consumption Rate (kg/d):	0.0001					
Fsoil = Fraction of Consumed Soil that is Contaminated:	1					
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*					
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*					
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*					
Pr=Exposed and Protected Aboveground Produce Concentration Due to Root Uptake (mg/kg) :	CS*					
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*					
CRag = Adult Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.0003					
CRpp=Adult Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00057					
CRbg=Adult Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00014					
Fag = Fraction of Produce that is Contaminated:	0.25					
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*					
Cdw = Dissolved phase water concentration (mg/L):	CS*					
CRdw = Adult Consumption Rate of Drinking Water (L/day):	1.4					
Fdw = Fraction of Drinking Water that is Contaminated (--):	1					
BW = Body weight (adult) (kg):	70					

CALCULATION OF CHEMICAL INTAKES
RESIDENTIAL SCENARIO: CHILD

Parameter		Contaminant	Itot	Isoil	Iag	Idw
Itot = Isoil + Iag + dw		**Inorganics**				
Where: Isoil = Sc * CRsoil * Fsoil/BW Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag Idw = (Cdw * CRdw * Fdw)/BW		Arsenic	#VALUE!	4.4E-07	#VALUE!	4.0E-07
Where:						
CS* = Values Specific to Contaminant:						
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*					
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*					
Sc = Soil Concentration (untilled) (mg/kg):	CS*					
CRsoil = Child Soil Consumption Rate (kg/d):	0.0002					
Fsoil = Fraction of Consumed Soil that is Contaminated:	1					
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*					
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*					
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*					
Pr=Above Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*					
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*					
CRag = Child Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.00042					
CRpp=Child Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00077					
CRbg=Child Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00022					
Fag = Fraction of Produce that is Contaminated:	0.25					
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*					
Cdw = Dissolved phase water concentration (mg/L):	CS*					
CRdw = Child Consumption Rate of Drinking Water (L/day):	0.67					
Fdw = Fraction of Drinking Water that is Contaminated (--):	1					
BW = Body weight (child) (kg):	15					

RESIDENTIAL SCENARIO
SUMMARY OF CANCER RISKS AND HAZARD INDICES (a)

Parameter	Contaminant	RfDo	SFo	HQo Adult	CRo Adult	HQo Child	CRo Child	Noncarcinogenic Target Organ/Critical Effects
CRo = Itot * ED * EF * SFo/AT * UC HQo = Itot * ED * EF/ RfDo * AT * UC	**Inorganics**							
	Arsenic	3.0E-04	1.5E+00	1.6E-03	3E-07	3.9E-03	2E-07	Hyperpigmentation, keratosis, possible vascular effects
Where: CS* = Values Specific to Contaminant: CRo = Cancer Risk oral (--): CS* HQo = Ingestion Hazard Index (--): CS* Itot = Total Daily Intake of Contaminant (mg/d): CS* SFo = Ingestion Slope Factor ((mg/kg-d)-1): CS* RfDo = Ingestion Reference Dose (mg/kg-d): CS* ED = Exposure Duration (see below) (yr): adult: 30 child: 6 EF = Exposure Frequency (day/yr): 350 AT = Averaging Time (yr): See Below Cancer: 70 Noncancer: See Below adult: 30 child: 6 UC = Units Conversion (day/yr): 365								

(a) Exposures routes include soil ingestion, produce consumption and drinking water consumption

	Adult	Child
Total Cancer Risk:	3.1E-07	1.5E-07
Critical Effect HIs:	1.6E-03	3.9E-03

CHRONIC INHALATION OF AMBIENT CONSTITUENTS
RESIDENTIAL SCENARIO

Parameter		Contaminant	Ca	RfDi	SFi	HQi Adult	CRi Adult	HQi Child	CRi Child	Noncarcinogenic Critical Effects
CRi = Ca * IR * ED * EF * ET * SFi * UC1/ BW * AT * UC2 HQi = Ca * IR * ED * EF * ET * UC1/ RfDi * AT * BW * UC2		**Inorganics**								
Where:		Arsenic	4.737E-05	3.1E-04	1.5E+01	3E-05	6E-08	7E-05	3E-08	
CS* = Values specific to Contaminant:										
Values specific to Site:	RS*									
CRi = Cancer Risk inhalation (--):	CS*									
HQi = Inhalation Hazard Index (--):	CS*									
Ca = Air Concentration (ug/m3)	1.78E-05									
SFi = Ingestion Slope Factor ((mg/kg-d)-1):	CS*									
RfDi = Ingestion Reference Dose (mg/kg-d):	CS*									
IR = Inhalation Rate (see below) (m3/hr):										
adult:	0.63									
child:	0.3									
ED = Exposure Duration (see below) (yr):										
adult:	30									
child:	6									
EF = Exposure Frequency (day/yr):	350									
ET = Exposure Time (hrs/day):	24									
UC1 = Units Conversion (mg/ug):	0.001									
BW = Body Weight (see below) (kg):										
adult:	70									
child:	15									
AT = Averaging Time (yr):	See Below									
Cancer:	70									
Noncancer:	See Below									
adult:	30									
child:	6									
UC2 = Units Conversion (day/yr):	365									

	Adult	Child
Total Cancer Risk:	6.3E-08	2.8E-08
Critical Effect HIs:	3.1E-05	6.9E-05

SUBSISTENCE FISHER SCENARIO

Revised 11/10/00

CONTAMINANT CONCENTRATION IN SOIL
SUBSISTENCE FISHER SCENARIO

Parameters

Carcinogens

Sc=[Ds/(ks*(tD-T1))]*[(tD+(exp(-ks*tD)/ks))-(T1+(exp(-ks*T1))/ks)]

where:
Ds = [UC1*(Dydp+Dywp)/Zs*BD]

and:

Values Specific to Contaminant:	CS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
T1 = Time Period At Beginning Of Combustion (yr):	0
ks = COC Soil Loss Constant (yr-1):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	30
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	see below
Tilled Soil:	2.0E+01
Untilled Soil:	1.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil):	1.5E+00
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04

CONTAMINANT CONCENTRATION IN SOIL
SUBSISTENCE FISHER SCENARIO

Contaminant	Sc Tilled (20 cm)	Sc Untilled (1 cm)	Ds Tilled (20 cm)	Ds Untilled (1 cm)	ks Tilled (yr-1)	ks Untilled (yr-1)
Inorganics						
Arsenic	1.8E-02	3.3E-02	1.9E-03	3.9E-02	5.65E-02	1.13E+00

CALCULATION OF SOIL LOSS CONSTANT

Parameters

ks = ksl + ksg + ksr + kse + ksv

where:

ksl = IR/ Z * (theta sw + Kds * BD)

ksr = (RO/*theta sw*Zs)*(1/(1.0+(Kds*BD/theta sw)))

ksv = Ke*Kt

where:

Ke = (UC1 * H) /(Zs * Koc * foc * R * T * BD)

Kt = (Da * theta v)/ Zs

theta v = 1 - (BD/ps) - theta sw

and:

Values Specific to Contaminant:	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
P = Average Annual Precipitation (cm/yr):	8.1E+01
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff (cm/yr):	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	5.5E+01
Z = Soil Depth From Which Leaching Removal Occurs (see below):	
Tilled Soil (cm):	2.0E+01
Untilled Soil (cm):	1.0E+00
theta sw= Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC1 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Infiltration Rate (cm/yr):	2.2E+01

**Note: Koc * foc = Kds (cm3/g)

CALCULATION OF SOIL LOSS CONSTANT

Contaminant	ks Tilled (yr-1)	ks Untilled (yr-1)	ksg (yr-1)	ksl Tilled (yr-1)	ksl Untilled (yr-1)	ksr Tilled (yr-1)	ksr Untilled (yr-1)	ksv Tilled (yr-1)	ksv Untilled (yr-1)	Kds
Inorganics										
Arsenic	5.7E-02	1.1E+00	NA	2.5E-02	5.0E-01	3.1E-02	6.3E-01	NA	NA	2.9E+01

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
SUBSISTENCE FISHER SCENARIO

Parameters

Pd =(UC1 * [Dydp + (FW * Dywp)] * Rp * [1 - exp(-kp*Tp)]) / Yp * kp
Pv = ((Cyv * Bvag * VGag) / pa)
Pr abvgrd = Sc * Br ag

Where:

Values Specific to Contaminant:	CS*
Pd = Aboveground Produce Concentration Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration Due to Air-to-Plant Transfer(ug/g) :	CS*
Pr abvgrd = Exposed and Protected Aboveground Produce Concentration Due to Root Uptake (mg/kg) :	CS*
UC1 = Units Conversion Factor (mg/g):	1000
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04
FW = Fraction of COC Wet Deposition That Adheres to Plant Surfaces (--):	CS*
Bvag = Air-to-Plant Biotransfer Factor (--):	CS*
VGag = Above Ground Vegetable Correction Factor (--):	CS*
Rp = Interception Factor For Above Ground Vegetation (--):	3.90E-01
kp = Plant Surface Loss Coefficient (yr-1):	1.80E+01
Tp = Length of Growing Season For Above Ground Vegetation (yr):	1.64E-01
Yp = Vegetation Yield For Above Ground Vegetation (kg DW/m2):	2.24E+00
pa = Air Density (g/m3):	1.19E+03
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br ag= Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
SUBSISTENCE FISHER SCENARIO

Contaminant	Pd	Pv	Pr abvgrd exposed	Pr abvgrd protected	Sc Tilled (20 cm)	Fv	Fw	Bvag	VG ag	Br ag
Inorganics										
Arsenic	3.3E-03	NA	1.1E-04	1.1E-04	1.8E-02	0.0E+00	6.0E-01	NA	NA	6.3E-03

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
SUBSISTENCE FISHER SCENARIO

Parameters	
Pr bg = Sc * Br rv * VG rv	
Where:	
Values Specific to Contaminant:	CS*
Pr bg = Total Contaminant Level In Below Ground Vegetation (mg/kg):	CS*
Sc = Soil Concentration (tilled) (mg/kg):	CS*
Br rv = Plant-Soil Bioconcentration Factor For Below Ground Vegetables:	CS*
VGrv = Below Ground Vegetable Correction Factor:	CS*

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
SUBSISTENCE FISHER SCENARIO

Contaminant	Pr bg	Sc Tilled (20 cm)	Br rv	VGrv
Inorganics				
Arsenic	1.4E-04	1.8E-02	8.0E-03	1.0E+00

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Parameters

Carcinogens

Sc=Ds/ks*(tD-T1)*[(tD+exp*(-ks*tD)/ks)-(T1+exp(-ks*T1)/ks)]

where:

Ds = [UC1*(Dytp)/Zs*BD]

ks = ksl + ksg + ksr + kse + ksv
ksl = IR/ Z * (theta sw + Kds * BD)
ksr = RO/theta sw*Zs*(1/(1.0+(Kds*BD/theta sw)))
ksv = Ke*Kt
kse = (Xe * SD * ER * 0.1)/(BD * Z) * (Kds * BD)/(theta + (Kds * BD))

where:

Ke = (UC3 + H) /(Zs * Koc * foc * R * T * BD)
Kt = (Da * theta v)/ Zs
theta v = 1 - (BD/ps) - theta sw

and:

Values Specific to Contaminant:	CS*
Values Specific to Receptor:	RS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0.0E+00
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	3.0E+01
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	1.0E+00
T1 = Time Peroid At Beginning Of Combustion (yr):	0.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
UC2 = Units Conversion Factor (m-g-s/cm-ug-yr):	3.2E-01
Dytwp = Yearly Average Total Deposition From Particle Phase (Watershed) (g/m2-yr):	1.56E-04
P = Average Annual Precipitation (cm/yr):	1.1E+02
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	7.0E+01
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC3 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Soil Infiltration Rate (cm/yr):	2.2E+01
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00

**Note: Koc * foc = Kds (cm3/g)

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Contaminant	Sc Surface (1 cm)	Ds (1cm)	ks (yr-1)	ksl (yr-1)	ksr (yr-1)	kse (yr-1)	ksv (yr-1)	ksg (yr-1)	Kds
Inorganics									
Arsenic	9.2E-03	1.0E-02	1.1E+00	5.0E-01	6.3E-01	3.4E-03	NA	NA	2.9E+01

CALCULATION OF TOTAL WATERBODY LOAD
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Parameters

LT = LDif + LDep + LRI + LR + LE
Where:
LDep = Dytwp * WAw
LRI = Dytwp * WAi
LR = UC1 * RO * (WAL) * ((Sc * BD)/(theta sw + Kds * BD))
LE = Xe * (WAL) * SD * ER * (Sc * Kds * BD)/(theta sw + Kds * BD) * UC2
LDif = (Kv * Cywv * WAw * UC5)/(H/R*Twk)
Xe = RF * K * LS * C * PF * (UC3/UC4)
SD = a * (WAl)^-b
Kv = ([Kl^-1+(Kg*(H/R*T)^-1)]^-1)*theta^Twk-293)
Kl = SQRT((1 * 1E-04 * Dw * u)/dz) * UC6 (Flowing Streams or Rivers)

and:

Values Specific to Contaminant:	CS*
LT = Total Contaminant Load to the Water Body (g/yr):	CS*
LDep = Deposition of Particle Phase and Wet Vapor Phase Contaminant Load to the Water Body (g/yr):	CS*
LRI = Runoff Load From Impervious Surfaces (g/yr):	CS*
LR = Runoff Load From Pervious Surface (g/yr):	CS*
LE = Soil Erosion Load (g/yr):	CS*
Dytwp = Yearly Waterbody Average Total (Wet and Dry) Deposition From Particle Phase (g/m2*yr):	1.690E-04
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
WAw = Water Body Area (m2):	1.35E+08
WAi = Impervious Watershed Area Receiving Pollutant Deposition (m2):	4.50E+08
UC1 = Units Conversion Factor (kg-cm2/mg-m2):	1.0E-02
WAL = Total Watershed Area Receiving Pollutant Deposition (m2):	9.00E+08
RO = Average Annual Surface Runoff (cm/yr):	2.7E+01
Sc = Contaminant Level in Watershed Soil (mg/kg):	CS*
BD = Soil Bulk Density (g/cm3):	1.5E+00
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-water partition coefficient (cm3/g or ml/g):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.56E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00
UC2 = Units Conversion Factor (g/mg):	1.0E-03
RF = "Erosivity" Factor (yr-1):	1.5E+02
K = "Erodibility" Factor (tons/acre):	2.2E-01
LS = "Topographic or Slope Length" Factor (--):	1.5E+00
C = "Cover Management" Factor (--):	1.0E-01
PF = "Supporting Practice" Factor (--):	1.0E+00
a = Empirical Intercept Coefficient:	6.0E-01
b = Empirical Slope Coefficient:	1.25E-01
UC3 = Units Conversion Factor (kg/ton):	9.1E+02
UC4 = Units Conversion Factor (m2/acre):	4.0E+03
Kv = Overall Transfer Rate Coefficient (m/yr):	CS*
H = Henry's Law Constant (atm-m3/mol):	CS*
R = Universal Gas Constant (atm-m3/mol-K):	8.2E-05
Twk = Water Body Temperature (K):	3.0E+02
theta = Temperature Correction Factor (--):	1.03E+00
Kl = Liquid Phase Transfer Coefficient (m/yr):	CS*
Dw = Diffusivity of COC in Water (cm3/s):	CS*
UC5 = Units Conversion Factor (g/ug):	1.00E-06
UC6 = Units Conversion Factor (s/yr):	3.2E+07
Kg = Gas Phase Transfer Coefficient For Flowing Rivers or Streams (m/yr):	3.7E+04
u = Current Velocity (m/s):	5.0E-02
dz = Total Waterbody Depth (m):	1.4E+01

CALCULATION OF TOTAL WATERBODY LOAD
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Contaminant	LT	LDiff	LDep	LRI	LR	LE	Kv	Kl
Inorganics								
Arsenic	1.7E+05	NA	2.1E+04	7.0E+04	7.7E+04	4.2E+02	NA	6.7E+01

CALCULATION OF WATER CONCENTRATION
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Parameters

Cwtot = LT/Vfx * fwc + kwt * WAw * (dwc + dbs)
Cwt = fwc * Cwtot * (dwc + dbs/dwc)
Cdw = Cwt/1 + Kdsw * TSS * 10-6
Csb = fbs * Cwtot * (Kdbs / thetabs + Kdbs * Cbs) * (dwc + dbs/dbs)

Where:
fwc = (1 + Kdsw * TSS * 10-6) * (dwc/dz)/(1 + Kdsw * TSS * 10-6) * (dwc/dz) + (thetabs + Kdbs * Cbs) * (dbs/dz)
kwt = fwc * kv + fbs * kb
fbs = 1 - fwc
kv = Kv/(dz * (1 + Kdsw * TSS * 10-6)
kb = [(Xe * WAl * SD * 10+3 - Vfx * TSS)/(WAw *TSS)] * [(TSS * 10-6)/(Cbs * dbs)]

and:

Values Specific to Contaminant:	CS*
Cwtot = Total Water Body Concentration (mg/L):	CS*
Cwt = Total Concentration in Water Column (mg/L):	CS*
Cdw = Dissolved Phase Water Concentration (mg/L):	CS*
Csb = Concentration Sorbed to Bed Sediments (mg/L):	CS*
fwc = Fraction of Total Water Body Concentration That Occurs in the Water Column (--):	CS*
kwt = Total First Order Dissipation Rate Constant (yr-1):	CS*
fbs = Fraction of Total Water Body Concentration That Occurs in the Bed Sediment (--):	CS*
LT = Total Contaminant Load to the Water Body (mg/yr):	CS*
Vfx = Average Volumetric Flow Rate Through Water Body (m3/yr):	1.88E+10
dwc = Depth of Water Column (m):	7.6E+00
dbs = Depth of Upper Benthic Sediment Layer (m):	3.0E-02
dz = Total Waterbody Depth (m):	7.6E+00
WAw = Water Body Area (m2):	1.35E+08
UC1 = Units Conversion Factor (g//mg):	1.0E+03
Kdsw = Suspended Sediment/Surface Water Partition Coefficient (L/kg):	CS*
TSS = Total Suspended Solids (mg/L):	1.4E+02
thetabs = Bed Sediment Porosity (Lwater/L):	6.0E-01
Kdbs = Bed Sediment/Sediment Pore Water Partition Coefficient (L/kg):	CS*
Cbs = Bed Sediment Concentration (g/cm3):	1.0E+00
kb = Benthic Burial Rate Constant (yr-1):	0.0E+00
kv = Water Column Volatilization Rate Constant (yr-1):	CS*
Kv = Overall COC Transfer Rate Coefficient (m/yr):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
WAl = Total Watershed Area Recieving Pollutant Deposition (m2):	9.0E+08

CALCULATION OF WATER CONCENTRATION
DRINKING WATER AND SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Contaminant	Cwtot	Cwt	Cdw	Csb	fwc	fbs	kwt	kv	Kdsw	Kdbs
Inorganics										
Arsenic	1.0E-05	9.0E-06	8.9E-06	2.6E-04	9.0E-01	1.04E-01	NA	NA	2.9E+01	2.9E+01

CALCULATION OF FISH CONTAMINANT CONCENTRATION
SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Parameters	
Cfishdw = Cdw * BCFfish or	
Cfishdw = Cdw * BAFfish or	
Cfishsb = Csb * flipid * BSAF/ OCsed	
Where:	
Values Specific to Contaminant:	CS*
Cfish = Contaminant Concentration In Fish (mg/kg):	CS*
Cfishdw = Fish Concentration from Dissolved Water Concentration (mg/kg):	CS*
Cfishsb = Fish Concentration from Bed Sediments (mg/kg):	CS*
Cdw = Dissolved Water Concentration (mg/L):	CS*
Cwt = Total Water Column Concentration (mg/L):	CS*
Csb = Concentration of Contaminant Sorbed to Bed Sediment (mg/kg):	CS*
BCFfish = Fish Bioconcentration Factor (L/kg):	CS*
BAFfish = Fish Bioaccumulation Factor (L/kg):	CS*
BSAF = Biota to Sediment Accumulation Factor (--):	CS*
flipid = Fish Lipid Content:	7.0E-02
OCsed = Fraction Organic Carbon in Bottom Sediment:	4.0E-02

CALCULATION OF FISH CONTAMINANT CONCENTRATION
SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER

Contaminant	Cfish	Cfishdw_BCF	BCF	Cfishdw_BAF	BAF	Cfishsb	BSAF
Inorganics							
Arsenic	1.8E-04	1.8E-04	2.0E+01	NA	NA	NA	NA

CALCULATION OF CHEMICAL INTAKES
SUSISTENCE FISHER: ADULT

Parameter		Contaminant	Itot	Isoil	Iag	Ifish	Idw
Itot = Isoil + Iag + Ifish + Idw		**Inorganics**					
Where: Isoil = Sc * CRsoil * Fsoil/BW Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag Ifish = Cfish * CRfish * Ffish Idw = Cdw * CRdw * Fdw/BW		Arsenic	7.1E-07	4.7E-08	2.7E-07	2.1E-07	1.8E-07
Where:							
CS* = Values Specific to Contaminant:							
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*						
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*						
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*						
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*						
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*						
Pr=Above Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*						
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*						
Ifish = Daily Intake of Contaminant from Fish (mg/kg-d):	CS*						
Sc = Soil Concentration (untilled) (mg/kg):	CS*						
CRsoil = Adult Soil Consumption Rate (kg/d):	0.00005						
Fsoil = Fraction of Consumed Soil that is Contaminated:	1						
CRag = Adult Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.0003						
CRpp=Adult Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00057						
CRbg=Adult Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00014						
Fag = Fraction of Above Ground Vegetables that are Contaminated:	0.25						
Cfish = Total Contaminant Concentration in Fish (mg/kg):	CS*						
CRfish = Consumption Rate of Fish (kg/kg-d FW):	0.00117						
Ffish = Fraction of Fish that is Contaminated:	1						
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*						
Cdw = Dissolved phase water concentration (mg/L):	CS*						
CRdw = Adult Consumption Rate of Drinking Water (L/day):	1.4						
Fdw = Fraction of Drinking Water that is Contaminated (--):	1						
BW = Body weight (adult) (kg):	70						

CALCULATION OF CHEMICAL INTAKES
SUBSISTENCE FISHER: CHILD

Parameter		Contaminant	Itot	Isoil	Iag	Ifish	Idw
Itot = Isoil + Iag + Ifish + Idw		**Inorganics**					
Where:		Arsenic	#VALUE!	4.4E-07	#VALUE!	1.4E-07	4.0E-07
Isoil = Sc * CRsoil * Fsoil/BW							
Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag							
Ifish = Cfish * CRfish * Ffish							
Idw = Cdw * CRdw * Fdw/BW							
Where:							
CS* = Values Specific to Contaminant:							
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*						
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*						
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*						
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*						
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*						
Pr=Above Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*						
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*						
Ifish = Daily Intake of Contaminant from Fish (mg/kg-d):	CS*						
Sc = Soil Concentration (untilled) (mg/kg):	CS*						
CRsoil = Child Soil Consumption Rate (kg/d):	0.0002						
Fsoil = Fraction of Consumed Soil that is Contaminated:	1						
CRag = Child Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.00042						
CRpp=Child Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00077						
CRbg=Child Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00022						
Fag = Fraction of Produce that is Contaminated:	0.25						
Cfish = Total Contaminant Concentration in Fish (mg/kg):	CS*						
CRfish = Child Consumption Rate of Fish (kg/kg-d FW):	0.000759						
Ffish = Fraction of Fish that is Contaminated:	1						
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*						
Cdw = Dissolved phase water concentration (mg/L):	CS*						
CRdw = Child Consumption Rate of Drinking Water (L/day):	0.67						
Fdw = Fraction of Drinking Water that is Contaminated (--):	1						
BW = Body weight (child) (kg):	15						

SUBSISTENCE FISHER SCENARIO - EAST/HUDSON RIVER
SUMMARY OF CANCER RISKS AND HAZARD INDICES (a)

Parameter	Contaminant	RfDo	SFo	HQo Adult	CRo Adult	HQo Child	CRo Child	Noncarcinogenic Critical Effects
CRo = Itot * ED * EF * SFo/AT * UC HQo = Itot * ED * EF/ RfDo * AT * UC	**Inorganics**							
	Arsenic	3.0E-04	1.5E+00	2.3E-03	4E-07	4.3E-03	2E-07	Hyperpigmentation, keratosis, possible vascular effects
Where: CS* = Values specific to Contaminant: CRo = Cancer Risk oral (--): CS* HQo = Ingestion Hazard Index (--): CS* Itot = Total Daily Intake of Contaminant (mg/d): CS* SFo = Ingestion Slope Factor ((mg/kg-d)-1): CS* RfDo = Ingestion Reference Dose (mg/kg-d): CS* ED = Exposure Duration (see below) (yr): adult: 30 child: 6 EF = Exposure Frequency (day/yr): 350 AT = Averaging Time (yr): See Below Cancer: 70 Noncancer: See Below adult: 30 child: 6 UC = Units Conversion (day/yr): 365								

(a) Exposures routes include soil ingestion, fish, produce and drinking water consumption

	Adult	Child
Total Cancer Risk:	4E-07	2E-07
Critical Effect HIs:	2.3E-03	4.3E-03

CHRONIC INHALATION OF AMBIENT CONSTITUENTS
SUBSISTENCE FISHER SCENARIO

Parameter		Contaminant	Ca	RfDi	SFi	HQi Adult	CRi Adult	HQi Child	CRi Child	Noncarcinogenic Critical Effects
CRi = Ca * IR * ED * EF * ET * SFi * UC1/ BW * AT * UC2 HQi = Ca * IR * ED * EF * ET * UC1/ RfDi * AT * BW * UC2		**Inorganics**								
		Arsenic	4.737E-05	3.1E-04	1.5E+01	3E-05	6E-08	7E-05	3E-08	
Where:										
CS* = Values specific to Contaminant:										
Values specific to Site:	RS*									
CRi = Cancer Risk inhalation (--):	CS*									
HQi = Inhalation Hazard Index (--):	CS*									
Ca = Air Concentration (ug/m3)	1.78E-05									
SFi = Ingestion Slope Factor ((mg/kg-d)-1):	CS*									
RfDi = Ingestion Reference Dose (mg/kg-d):	CS*									
IR = Inhalation Rate (see below) (m3/hr):										
adult:	0.63									
child:	0.3									
ED = Exposure Duration (see below) (yr):										
adult:	30									
child:	6									
EF = Exposure Frequency (day/yr):	350									
ET = Exposure Time (hrs/day):	24									
UC1 = Units Conversion (mg/ug):	0.001									
BW = Body Weight (see below) (kg):										
adult:	70									
child:	15									
AT = Averaging Time (yr):	See Below									
Cancer:	70									
Noncancer:	See Below									
adult:	30									
child:	6									
UC2 = Units Conversion (day/yr):	365									

	Adult	Child
Total Cancer Risk:	6.3E-08	2.8E-08
Critical Effect HIs:	3.1E-05	6.9E-05

SUBSISTENCE FARMER SCENARIO

Revised 11/10/00

CONTAMINANT CONCENTRATION IN SOIL
SUBSISTENCE FARMER SCENARIO

Parameters

Carcinogens

Sc=[Ds/(ks*(tD-T1))]*[(tD+(exp(-ks*tD)/ks))-(T1+(exp(-ks*T1))/ks)]

where:

Ds = [UC1*(Dydp+Dywp)/Zs*BD]

and:

Values Specific to Contaminant:	CS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
T1 = Time Period At Beginning Of Combustion (yr):	0
ks = COC Soil Loss Constant (yr-1):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	30
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	see below
Tilled Soil:	2.0E+01
Untilled Soil:	1.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil):	1.5E+00
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04

CONTAMINANT CONCENTRATION IN SOIL
SUBSISTENCE FARMER SCENARIO

Contaminant	Sc Tilled (20 cm)	Sc Untilled (1 cm)	Ds Tilled (20 cm)	Ds Untilled (1 cm)	ks Tilled (yr-1)	ks Untilled (yr-1)
Inorganics						
Arsenic	1.8E-02	3.3E-02	1.9E-03	3.9E-02	5.65E-02	1.13E+00

CALCULATION OF SOIL LOSS CONSTANT

Parameters	
ks = ksl + ksg + ksr + kse + ksv	
where:	
ksl = IR/ Z * (theta sw + Kds * BD)	
ksr = (RO/*theta sw*Zs)*(1/(1.0+(Kds*BD/theta sw)))	
ksv = Ke*Kt	
where:	
Ke = (UC1 * H) /(Zs * Koc * foc * R * T * BD)	
Kt = (Da * theta v)/ Zs	
theta v = 1 - (BD/ps) - theta sw	
and:	
Values Specific to Contaminant:	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
P = Average Annual Precipitation (cm/yr):	8.1E+01
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff (cm/yr):	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	5.5E+01
Z = Soil Depth From Which Leaching Removal Occurs (see below):	
Tilled Soil (cm):	2.0E+01
Untilled Soil (cm):	1.0E+00
theta sw= Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC1 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Infiltration Rate (cm/yr):	2.2E+01
**Note: Koc * foc = Kds (cm3/g)	

CALCULATION OF SOIL LOSS CONSTANT

Contaminant	ks Tilled (yr-1)	ks Untilled (yr-1)	ksg (yr-1)	ksl Tilled (yr-1)	ksl Untilled (yr-1)	ksr Tilled (yr-1)	ksr Untilled (yr-1)	ksv Tilled (yr-1)	ksv Untilled (yr-1)	Kds
Inorganics										
Arsenic	5.7E-02	1.1E+00	NA	2.5E-02	5.0E-01	3.1E-02	6.3E-01	NA	NA	2.9E+01

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
SUBSISTENCE FARMER

Parameters

Pd =(UC1 * [Dydp + (FW * Dywp)] * Rp * [1 - exp(-kp*Tp)]) / Yp * kp
Pv = ((Cyv * Bvag * VGag) / pa)
Pr abvgrd = Sc * Br ag

Where:

Values Specific to Contaminant:	CS*
Pd = Aboveground Produce Concentration Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration Due to Air-to-Plant Transfer(ug/g) :	CS*
Pr abvgrd = Exposed and Protected Aboveground Produce Concentration Due to Root Uptake (mg/kg) :	CS*
UC1 = Units Conversion Factor (mg/g):	1000
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
Dydp = Yearly Average Dry Deposition From Particle Phase (g/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (g/m2-yr):	5.75E-04
FW = Fraction of COC Wet Deposition That Adheres to Plant Surfaces (--):	CS*
Bvag = Air-to-Plant Biotransfer Factor (--):	CS*
VGag = Above Ground Vegetable Correction Factor (--):	CS*
Rp = Interception Factor For Above Ground Vegetation (--):	3.90E-01
kp = Plant Surface Loss Coefficient (yr-1):	1.80E+01
Tp = Length of Growing Season For Above Ground Vegetation (yr):	1.64E-01
Yp = Vegetation Yield For Above Ground Vegetation (kg DW/m2):	2.24E+00
pa = Air Density (g/m3):	1.19E+03
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br ag= Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN ABOVE GROUND VEGETATION
SUBSISTENCE FARMER

Contaminant	Pd	Pv	Pr abvgrd exposed	Pr abvgrd protected	Sc Tilled (20 cm)	Fv	Fw	Bvag	VG ag	Br ag
Inorganics										
Arsenic	3.3E-03	NA	1.1E-04	1.1E-04	1.8E-02	0.0E+00	6.0E-01	NA	NA	6.3E-03

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
SUBSISTENCE FARMER SCENARIO

Parameters	
Pr bg = Sc * Br rv * VG rv	
Where:	
Values Specific to Contaminant:	CS*
Pr bg = Total Contaminant Level In Below Ground Vegetation (mg/kg):	CS*
Sc = Soil Concentration (tilled) (mg/kg):	CS*
Br rv = Plant-Soil Bioconcentration Factor For Below Ground Vegetables:	CS*
VGrv = Below Ground Vegetable Correction Factor:	CS*

CONTAMINANT CONCENTRATION IN BELOW GROUND VEGETATION
SUBSISTENCE FARMER SCENARIO

Contaminant	Pr bg	Sc Tilled (20 cm)	Br rv	VGrv
Inorganics				
Arsenic	1.4E-04	1.8E-02	8.0E-03	1.0E+00

CONTAMINANT CONCENTRATION IN FORAGE
SUBSISTENCE FARMER SCENARIO

Parameters	
Pd =(UC1 * [Dydp + (FW * Dywp)] * Rp * [1 - exp(-kp*Tp)]) / Yp * kp Pv = ((Cyv * Bvforage * VGag) / pa) Pr = Sc * Br forage	
Where:	
Values Specific to Contaminant:	CS*
Pd = Aboveground Produce Concentration Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration Due to Air-to-Plant Transfer (ug/g) :	CS*
Pr = Forage Concentration Due to Root Uptake (mg/kg) :	CS*
Cyv = Yearly Average Air Concentration From Vapor Phase (ug-s/g-m3):	NA
Fv = Fraction of Air Concentration in Vapor Phase (--):	CS*
1-Fv = Fraction of Air Concentration in Particulate Phase (--):	CS*
UC1 = Units Conversion Factor (mg/g):	1000
Dydp = Yearly Average Dry Deposition From Particle Phase (s/m2-yr):	3.94E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (s/m2-yr):	5.750E-04
FW = Fraction of COC Wet Deposition That Adheres to Plant Surfaces (--):	CS*
Bvag = Air-to-Plant Biotransfer Factor (--):	CS*
VGag = Above Ground Vegetable Correction Factor - Forage (--):	1.0E+00
Rp = Interception Factor For Above Ground Vegetation (--):	5.0E-01
kp = Plant Surface Loss Coefficient (yr-1):	1.8E+01
Tp = Length of Growing Season For Above Ground Vegetation (yr):	1.20E-01
Yp = Vegetation Yield For Above Ground Vegetation (kg DW/m2):	2.40E-01
pa = Air Density (g/m3):	1.19E+03
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br = Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN FORAGE
SUBSISTENCE FARMER SCENARIO

Contaminant	Pd	Pv	Pr forage	Sc Tilled (20 cm)	Fv	Fw	Bv forage	Br forage
Inorganics								
Arsenic	6.0E-02	NA	6.4E-04	1.8E-02	0.0E+00	6.0E-01	NA	3.6E-02

CONTAMINANT CONCENTRATION IN SILAGE
SUBSISTENCE FARMER SCENARIO

Parameters

Pd =(UC1 * [Dydp + (FW * Dywp)] * Rp * [1 - exp(-kp*Tp)]) / Yp * kp
Pv = ((Cyv * Bvforage * VGag) / pa)
Pr silage = Sc * Br forage

Where:

Values Specific to Contaminant:	CS*
Pd = Aboveground Produce Concentration Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration Due to Air-to-Plant Transfer(ug/g) :	CS*
Pr silage = Silage Concentration Due to Root Uptake (mg/kg) :	CS*
Cyv = Yearly Average Air Concentration From Vapor Phase (ug-s/g-m3):	NA
Fv = Fraction of Air Concentration in Vapor Phase (--):	CS*
1-Fv = Fraction of Air Concentration in Particulate Phase (--):	CS*
UC1 = Units Conversion Factor (mg/g):	1000
Dydp = Yearly Average Dry Deposition From Particle Phase (s/m2-yr):	3.940E-06
Dywp = Yearly Average Wet Deposition From Particle Phase (s/m2-yr):	5.750E-04
FW = Fraction of COC Wet Deposition That Adheres to Plant Surfaces (--):	CS*
Bv forage = Air-to-Plant Biotransfer Factor (--):	CS*
VGag = Above Ground Vegetable Correction Factor - Forage (--):	5.0E-01
Rp = Interception Factor For Above Ground Vegetation (--):	4.6E-01
kp = Plant Surface Loss Coefficient (yr-1):	1.8E+01
Tp = Length of Growing Season For Above Ground Vegetation (yr):	1.60E-01
Yp = Vegetation Yield For Above Ground Vegetation (kg DW/m2):	8.00E-01
pa = Air Density (g/m3):	1.2E+03
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br = Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN SILAGE
SUBSISTENCE FARMER SCENARIO

Contaminant	Pd	Pv	Pr silage	Sc Tilled (20 cm)	Fv	Fw	Bv forage	Br forage
Inorganics								
Arsenic	1.1E-02	NA	6.4E-04	1.8E-02	0.0E+00	6.0E-01	NA	3.6E-02

CONTAMINANT CONCENTRATION IN GRAIN
SUBSISTENCE FARMER SCENARIO

Parameter	
Pr grain = Sc * Br grain	
Where:	
Values Specific to Contaminant:	CS*
Pr grain = Grain Concentration Due to Root Uptake (mg/kg) :	CS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Br = Plant Soil Bioconcentration Factor For Produce (--):	CS*

CONTAMINANT CONCENTRATION IN GRAIN
SUBSISTENCE FARMER SCENARIO

Contaminant	Pr abvgrd protected	Sc Tilled (20 cm)	Br ag
Inorganics			
Arsenic	7.1E-05	1.8E-02	4.0E-03

CONTAMINANT CONCENTRATION IN BEEF AND MILK
SUBSISTENCE FARMER SCENARIO

Parameters

Abeef = (Sum of (Fi * Qpi * Pi) + Qs * SC * Bs) * Ba beef * MF
Amilk = (Sum of (Fi * Qpi * Pi) + Qs * SC * Bs) * Ba milk * MF
and:

Pi = Pdi + Pvi + Pri

Where:

Abeef = Concentration of COC in Beef (mg/kg):	CS*
Amilk = Concentration of COC in Milk (mg/kg):	CS*
Fi = Fraction of Plant type i Grown on Contaminated Soil (--):	1.0E+00
Qpi = Quantity of Plant Type i Eaten By Beef Cattle per day (kg/d):	See Below
Forage:	8.8E+00
Silage:	2.5E+00
Grain:	4.7E-01
Qpi = Quantity of Plant Type i Eaten By Dairy Cattle per day (kg/d):	See Below
Forage:	1.3E+01
Silage:	4.1E+00
Grain:	3.0E+00
Pi = Concentration of COC in Each Plant Type i (mg/kg):	CS*
Pd = Aboveground Produce Concentration of Plant Type i Due to Direct Exposure (mg/kg) :	CS*
Pv = Aboveground Produce Concentration of Plant Type i Due to Air-to-Plant Transfer (ug/g) :	CS*
Pr abvgrd = Exposed and Protected Aboveground Produce Concentration Due to Root Uptake (mg/kg) :	CS*
Qs = Quantity of Soil Eaten Each Day (kg/d):	See Below:
Beef Cattle:	5.0E-01
Dairy Cattle:	4.0E-01
Sc = Average Soil Concentration Over Exposure Duration (mg/kg) :	CS*
Bs = Soil Bioavailability Factor (--):	1.0E+00
Ba beef = COC Biotransfer Factor for Beef (d/kg):	CS*
Ba milk = COC Biotransfer Factor for Milk (d/kg):	CS*
MF = Metabolism Factor (--):	1.0E+00

CONTAMINANT CONCENTRATION IN BEEF AND MILK
SUBSISTENCE FARMER SCENARIO

Contaminant	A beef	A milk	P for	P sil	P gr	Sc Untilled (1 cm)	Babeef	Bamilk
Inorganics								
Arsenic	1.1E-03	5.1E-05	6.0E-02	1.1E-02	7.1E-05	3.3E-02	2.0E-03	6.0E-05

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

Carcinogens

Sc=Ds/ks*(tD-T1)*[(tD+exp*(-ks*tD)/ks)-(T1+exp(-ks*T1)/ks)]

where:

Ds = [UC1*(Dytp)/Zs*BD]

ks = ksl + ksg + ksr + kse + ksv
ksl = IR/ Z * (theta sw + Kds * BD)
ksr = RO/theta sw*Zs*(1/(1.0+(Kds*BD/theta sw)))
ksv = Ke*Kt
kse = (Xe * SD * ER * 0.1)/(BD * Z) * (Kds * BD)/(theta + (Kds * BD))

where:

Ke = (UC3 + H) /(Zs * Koc * foc * R * T * BD)
Kt = (Da * theta v)/ Zs
theta v = 1 - (BD/ps) - theta sw

and:

Values Specific to Contaminant:	CS*
Values Specific to Receptor:	RS*
Sc = Average Soil Concentration Over Exposure Duration (mg/kg soil):	CS*
Ds = Deposition Term (mg/kg soil/yr):	CS*
ks = COC Soil Loss Constant (yr-1):	CS*
ksl = COC Loss Constant Due to Leaching (yr-1):	CS*
ksr = COC Loss Constant Due to Runoff (yr-1):	CS*
kse = COC Loss Constant Due to Erosion (yr-1) (default):	0.0E+00
ksg = COC Loss Constant Due to Biotic and Abiotic Degradation (yr-1):	CS*
ksv = COC Loss Constant Due to Volitilization (yr-1) (default):	CS*
tD = Time Period Over Which Depositon Occurs (yr):	3.0E+01
Sc(tD) = Soil Concentration At Time tD (mg/kg):	CS*
Zs = Soil Mixing Depth (cm):	1.0E+00
T1 = Time Peroid At Beginning Of Combustion (yr):	0.0E+00
UC1 = Units Conversion Factor (mg-g-cm2/g-kg-m2):	1.0E+02
BD = Soil Bulk Density (g soil/cm3 soil)	1.5E+00
UC2 = Units Conversion Factor (m-g-s/cm-ug-yr):	3.2E-01
Dytwp = Yearly Average Total Deposition From Particle Phase (Watershed) (g/m2-yr):	1.56E-04
P = Average Annual Precipitation (cm/yr):	1.1E+02
I = Average Annual Irrigation (cm/yr):	0.0E+00
RO = Average Annual Surface Water Runoff	2.7E+01
Ev = Average Annual Evapotranspiration (cm/yr):	7.0E+01
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-Water Partition Coefficient (cm3/g or ml/g):	CS*
Ke = Equilibrium Coefficient (s/yr-cm):	CS*
UC3 = Units Conversion (sec/yr):	3.2E+07
H = Henry's Law Constant (atm-m3/mol):	CS*
Koc = Organic Carbon Partition Coefficient (mL/g):	See Note**
foc = Fraction of Organic Carbon in Soil (unitless):	See Note**
R = Ideal Gas Constant (atm-m3/mol-K):	8.2E-05
T = Temperature (K):	298
Kt = Gas Phase Mass Transfer Coefficient (cm/s):	CS*
Da = Diffusion Coefficient of Contaminant in Air (cm2/s):	CS*
theta v = Soil Void Fraction (cm3/cm3):	2.4E-01
ps = Solids Particle Density (g/cm3):	2.7E+00
IR = Soil Infiltration Rate (cm/yr):	2.2E+01
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00

**Note: Koc * foc = Kds (cm3/g)

WATERSHED SOIL CONTAMINANT CONCENTRATION DUE TO DEPOSITION
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	Sc Surface (1 cm)	Ds (1cm)	ks (yr-1)	ksl (yr-1)	ksr (yr-1)	kse (yr-1)	ksv (yr-1)	ksg (yr-1)	Kds
Inorganics									
Arsenic	9.2E-03	1.0E-02	1.1E+00	5.0E-01	6.3E-01	3.4E-03	NA	NA	2.9E+01

CALCULATION OF TOTAL WATERBODY LOAD
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

LT = LDif + LDep + LRI + LR + LE

Where:

LDep = Dytwp * WAw

LRI = Dytwp * WAi

LR = UC1 * RO * (WAL) * ((Sc * BD)/(theta sw + Kds * BD))

LE = Xe * (WAL) * SD * ER * (Sc * Kds * BD)/(theta sw + Kds * BD) * UC2

LDif = (Kv * Cywv * WAw * UC5)/(H/R*Twk)

Xe = RF * K * LS * C * PF * (UC3/UC4)

SD = a * (WAl)^-b

Kv = ([Kl^-1+(Kg*(H/R*T)^-1)]^-1)*theta^Twk-293)

Kl = SQRT((1 * 1E-04 * Dw * u)/dz) * UC6 (Flowing Streams or Rivers)

and:

Values Specific to Contaminant:	CS*
LT = Total Contaminant Load to the Water Body (g/yr):	CS*
LDep = Deposition of Particle Phase and Wet Vapor Phase Contaminant Load to the Water Body (g/yr):	CS*
LRI = Runoff Load From Impervious Surfaces (g/yr):	CS*
LR = Runoff Load From Pervious Surface (g/yr):	CS*
LE = Soil Erosion Load (g/yr):	CS*
Dytwp = Yearly Waterbody Average Total (Wet and Dry) Deposition From Particle Phase (g/m2*yr):	1.690E-04
Cyv = Yearly Average Air Concentration From Vapor Phase (ug/m3):	NA
WAw = Water Body Area (m2):	1.35E+08
WAi = Impervious Watershed Area Receiving Pollutant Deposition (m2):	4.50E+08
UC1 = Units Conversion Factor (kg-cm2/mg-m2):	1.0E-02
WAL = Total Watershed Area Receiving Pollutant Deposition (m2):	9.00E+08
RO = Average Annual Surface Runoff (cm/yr):	2.7E+01
Sc = Contaminant Level in Watershed Soil (mg/kg):	CS*
BD = Soil Bulk Density (g/cm3):	1.5E+00
theta sw = Volumetric Water Content (cm3/cm3):	2.0E-01
Kds = Soil-water partition coefficient (cm3/g or ml/g):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.56E-02
ER = Contaminant Enrichment Ratio (--):	1.0E+00
UC2 = Units Conversion Factor (g/mg):	1.0E-03
RF = "Erosivity" Factor (yr-1):	1.5E+02
K = "Erodibility" Factor (tons/acre):	2.2E-01
LS = "Topographic or Slope Length" Factor (--):	1.5E+00
C = "Cover Management" Factor (--):	1.0E-01
PF = "Supporting Practice" Factor (--):	1.0E+00
a = Empirical Intercept Coefficient:	6.0E-01
b = Empirical Slope Coefficient:	1.25E-01
UC3 = Units Conversion Factor (kg/ton):	9.1E+02
UC4 = Units Conversion Factor (m2/acre):	4.0E+03
Kv = Overall Transfer Rate Coefficient (m/yr):	CS*
H = Henry's Law Constant (atm-m3/mol):	CS*
R = Universal Gas Constant (atm-m3/mol-K):	8.2E-05
Twk = Water Body Temperature (K):	3.0E+02
theta = Temperature Correction Factor (--):	1.03E+00
Kl = Liquid Phase Transfer Coefficient (m/yr):	CS*
Dw = Diffusivity of COC in Water (cm3/s):	CS*
UC5 = Units Conversion Factor (g/ug):	1.00E-06
UC6 = Units Conversion Factor (s/yr):	3.2E+07
Kg = Gas Phase Transfer Coefficient For Flowing Rivers or Streams (m/yr):	3.7E+04
u = Current Velocity (m/s):	5.0E-02
dz = Total Waterbody Depth (m):	1.4E+01

CALCULATION OF TOTAL WATERBODY LOAD
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	LT	LDiff	LDep	LRI	LR	LE	Kv	Kl
Inorganics								
Arsenic	1.7E+05	NA	2.1E+04	7.0E+04	7.7E+04	4.2E+02	NA	6.7E+01

CALCULATION OF WATER CONCENTRATION
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Parameters

Cwtot = LT/Vfx * fwc + kwt * WAw * (dwc + dbs)
Cwt = fwc * Cwtot * (dwc + dbs/dwc)
Cdw = Cwt/1 + Kdsw * TSS * 10-6
Csb = fbs * Cwtot * (Kdbs / thetabs + Kdbs * Cbs) * (dwc + dbs/dbs)

Where:
fwc = (1 + Kdsw * TSS * 10-6) * (dwc/dz)/(1 + Kdsw * TSS * 10-6) * (dwc/dz) + (thetabs + Kdbs * Cbs) * (dbs/dz)
kwt = fwc * kv + fbs * kb
fbs = 1 - fwc
kv = Kv/(dz * (1 + Kdsw * TSS * 10-6)
kb = [(Xe * WAl * SD * 10+3 - Vfx * TSS)/(WAw *TSS)] * [(TSS * 10-6)/(Cbs * dbs)]

and:

Values Specific to Contaminant:	CS*
Cwtot = Total Water Body Concentration (mg/L):	CS*
Cwt = Total Concentration in Water Column (mg/L):	CS*
Cdw = Dissolved Phase Water Concentration (mg/L):	CS*
Csb = Concentration Sorbed to Bed Sediments (mg/L):	CS*
fwc = Fraction of Total Water Body Concentration That Occurs in the Water Column (--):	CS*
kwt = Total First Order Dissipation Rate Constant (yr-1):	CS*
fbs = Fraction of Total Water Body Concentration That Occurs in the Bed Sediment (--):	CS*
LT = Total Contaminant Load to the Water Body (mg/yr):	CS*
Vfx = Average Volumetric Flow Rate Through Water Body (m3/yr):	1.88E+10
dwc = Depth of Water Column (m):	7.6E+00
dbs = Depth of Upper Benthic Sediment Layer (m):	3.0E-02
dz = Total Waterbody Depth (m):	7.6E+00
WAw = Water Body Area (m2):	1.35E+08
UC1 = Units Conversion Factor (g//mg):	1.0E+03
Kdsw = Suspended Sediment/Surface Water Partition Coefficient (L/kg):	CS*
TSS = Total Suspended Solids (mg/L):	1.4E+02
thetabs = Bed Sediment Porosity (Lwater/L):	6.0E-01
Kdbs = Bed Sediment/Sediment Pore Water Partition Coefficient (L/kg):	CS*
Cbs = Bed Sediment Concentration (g/cm3):	1.0E+00
kb = Benthic Burial Rate Constant (yr-1):	0.0E+00
kv = Water Column Volatilization Rate Constant (yr-1):	CS*
Kv = Overall COC Transfer Rate Coefficient (m/yr):	CS*
Xe = Unit Soil Loss (kg/m2/yr):	1.1E+00
SD = Sediment Delivery Ratio (--):	4.6E-02
WAl = Total Watershed Area Recieving Pollutant Deposition (m2):	9.0E+08

CALCULATION OF WATER CONCENTRATION
SUBSISTENCE FARMER DRINKING WATER SCENARIO - EAST/HUDSON RIVER

Contaminant	Cwtot	Cwt	Cdw	Csb	fwc	fbs	kwt	kv	Kdsw	Kdbs
Inorganics										
Arsenic	1.0E-05	9.0E-06	8.9E-06	2.6E-04	9.0E-01	1.04E-01	NA	NA	2.9E+01	2.9E+01

CALCULATION OF CHEMICAL INTAKES
SUBSISTENCE FARMER: ADULT

Parameter		Contaminant	Itot	Isoil	Iag	Ibeef	Imilk	Idw
Itot = Isoil + Iag + Ibeef + Imilk + Idw Where: Isoil = Sc * CRsoil * Fsoil/BW Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag Ibeef = Abeef * CRbeef * Fbeef Imilk = Amilk * CRmilk * Fmilk Idw = Cdw * CRdw * Fdw/BW Where:		**Inorganics**						
		Arsenic	2.5E-06	4.7E-08	2.7E-07	1.6E-06	4.3E-07	1.8E-07
CS* = Values Specific to Contaminant:								
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*							
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*							
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*							
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*							
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*							
Pr=Above Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*							
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*							
Ibeef = Daily Intake of Contaminant from Beef (mg/kg-d):	CS*							
Imilk = Daily Intake of Contaminant from Milk (mg/kg-d):	CS*							
Sc = Soil Concentration (untilled) (mg/kg):	CS*							
CRsoil = Adult Soil Consumption Rate (kg/d):	0.0001							
Fsoil = Fraction of Consumed Soil that is Contaminated:	1							
CRag = Adult Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.0003							
CRpp=Adult Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00057							
CRbg=Adult Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00014							
Fag = Fraction of Produce that is Contaminated:	1							
Abeef = Total Contaminant Concentration in Beef (mg/kg):	CS*							
CRbeef = Consumption Rate of Beef (kg/d FW):	0.0014							
Fbeef = Fraction of Beef that is Contaminated:	1							
Amilk = Total Contaminant Concentration in Milk (mg/kg):	CS*							
CRmilk = Consumption Rate of Milk (kg/d):	0.00842							
Fmilk = Fraction of Milk that is Contaminated:	1							
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*							
Cdw = Dissolved phase water concentration (mg/L):	CS*							
CRdw = Adult Consumption Rate of Drinking Water (L/day):	1.4							
Fdw = Fraction of Drinking Water that is Contaminated (--):	1							
BW = Body weight (adult) (kg):	70							

CALCULATION OF CHEMICAL INTAKES
SUBSISTENCE FARMER: CHILD

Parameter		Contaminant	Itot	Isoil	Iag	Ibeef	Imilk	Idw
Itot = Isoil + Iag + Ibeef + Imilk + Idw		**Inorganics**						
Where: Isoil = Sc * CRsoil * Fsoil/BW Iag = [((Pd+Pv+Pr)*CRag)+(Pr*CRpp)+(Prbg*CRbg)] * Fag Ibeef = Abeef * CRbeef * Fbeef Imilk = Amilk * CRmilk * Fmilk Idw = Cdw * CRdw * Fdw/BW		Arsenic	#VALUE!	4.4E-07	#VALUE!	5.9E-07	9.5E-07	4.0E-07
Where:								
Values Specific to Contaminant:	CS*							
Itot = Total Daily Intake of Contaminant (mg/kg-d):	CS*							
Isoil = Daily Intake of Contaminant from Soil (mg/kg-d):	CS*							
Iag = Daily Intake of Contaminant from Produce (mg/kg-d):	CS*							
Pd=Above Ground Exposed Produce Concentration Due to Direct Deposition (mg/kg):	CS*							
Pv=Above Ground Exposed Produce Concentration Due to Air-to-Plant Transfer (mg/kg):	CS*							
Pr=Above Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*							
PRbg=Below Ground Produce Concentration Due to Root Uptake (mg/kg):	CS*							
Ibeef = Daily Intake of Contaminant from Beef (mg/kg-d):	CS*							
Imilk = Daily Intake of Contaminant from Milk (mg/kg-d):	CS*							
Sc = Soil Concentration (untilled) (mg/kg):	CS*							
CRsoil = Child Soil Consumption Rate (kg/d):	0.0002							
Fsoil = Fraction of Consumed Soil that is Contaminated:	1							
CRag = Child Consumption Rate of Above Ground Produce (kg/kg-d DW):	0.00042							
CRpp=Child Consumption Rate of Protected Aboveground Produce (kg/kg-d DW):	0.00077							
CRbg=Child Consumption Rate of Below Ground Produce (kg/kg-d DW):	0.00022							
Fag = Fraction of Produce that is Contaminated:	1							
Abeef = Total Contaminant Concentration in Beef (mg/kg):	CS*							
CRbeef = Consumption Rate of Beef (kg/d FW):	0.00051							
Fbeef = Fraction of Beef that is Contaminated:	1							
Amilk = Total Contaminant Concentration in Milk (mg/kg):	CS*							
CRmilk = Consumption Rate of Milk (kg/d):	0.01857							
Fmilk = Fraction of Milk that is Contaminated:	1							
Idw = Daily Intake of Contaminant from Drinking Water (mg/kg-day):	CS*							
Cdw = Dissolved phase water concentration (mg/L):	CS*							
CRdw = Child Consumption Rate of Drinking Water (L/day):	0.67							
Fdw = Fraction of Drinking Water that is Contaminated (--):	1							
BW = Body weight (child) (kg):	15							

SUBSISTENCE FARMER SCENARIO
SUMMARY OF CANCER RISKS AND HAZARD INDICES (a)

Parameter	Contaminant	RfDo	SFo	HQo Adult	CRo Adult	HQo Child	CRo Child	Noncarcinogenic Critical Effects
CRo = Itot * ED * EF * SFo/ AT * UC HQo = Itot * ED * EF/ RfDo * AT * UC Where: CS* = Values Specific to Contaminant: CRo = Cancer Risk oral (--): CS* HQo = Ingestion Hazard Index (--): CS* Itot = Total Daily Intake of Contaminant (mg/d): CS* SFo = Ingestion Slope Factor ((mg/kg-d)-1): CS* RfDo = Ingestion Reference Dose (mg/kg-d): CS* ED = Exposure Duration (see below) (yr): adult: 40 child: 6 EF = Exposure Frequency (day/yr): 350 AT = Averaging Time (yr): See Below Cancer: 70 Noncancer: See Below adult: 40 child: 6 UC = Units Conversion (day/yr): 365	**Inorganics** Arsenic	3.0E-04	1.5E+00	8.1E-03	2E-06	8.8E-03	3E-07	Hyperpigmentation, keratosis, possible vascular effects

(a) Exposures routes include soil ingestion, beef, milk, produce and drinking water consumption

	Adult	Child
Total Cancer Risk:	2E-06	3E-07
Critical Effect HIs:	8.1E-03	8.8E-03

CHRONIC INHALATION OF AMBIENT CONSTITUENTS
SUBSISTENCE FARMER

Parameter		Contaminant	Ca	RfDi	SFi	HQi Adult	CRi Adult	HQi Child	CRi Child	Noncarcinogenic Critical Effects
CRi = Ca * IR * ED * EF * ET * SFi * UC1/ BW * AT * UC2 HQi = Ca * IR * ED * EF * ET * UC1/ RfDi * AT * BW * UC2		**Inorganics**								
Where:		Arsenic	4.737E-05	3.1E-04	1.5E+01	3E-05	6E-08	7E-05	3E-08	
CS* = Values specific to Contaminant:										
Values specific to Site:	RS*									
CRi = Cancer Risk inhalation (--):	CS*									
HQi = Inhalation Hazard Index (--):	CS*									
Ca = Air Concentration (ug/m3)	1.78E-05									
SFi = Ingestion Slope Factor ((mg/kg-d)-1):	CS*									
RfDi = Ingestion Reference Dose (mg/kg-d):	CS*									
IR = Inhalation Rate (see below) (m3/hr):										
adult:	0.63									
child:	0.3									
ED = Exposure Duration (see below) (yr):										
adult:	30									
child:	6									
EF = Exposure Frequency (day/yr):	350									
ET = Exposure Time (hrs/day):	24									
UC1 = Units Conversion (mg/ug):	0.001									
BW = Body Weight (see below) (kg):										
adult:	70									
child:	15									
AT = Averaging Time (yr):	See Below									
Cancer:	70									
Noncancer:	See Below									
adult:	30									
child:	6									
UC2 = Units Conversion (day/yr):	365									

	Adult	Child
Total Cancer Risk:	6.3E-08	2.8E-08
Critical Effect HIs:	3.1E-05	6.9E-05

APPENDIX 5F

Environmental Justice Analysis:
KeySpan Ravenswood Cogeneration Facility
Long Island City, Queens, New York

Environmental Justice Analysis

Ravenswood Cogeneration Facility

Long Island City, Queens County, New York

Submitted to:
U.S. Environmental Protection Agency
Permitting Section
Air Programs Branch
Region 2
290 Broadway
New York, New York 10007-1866

Submitted by:
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Submitted:
November 2000

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1.0 INTRODUCTION

KeySpan Energy (KeySpan) is seeking a Prevention of Significant Deterioration (PSD) operating permit for the construction and operation of a nominal 250 megawatt (MW) combined cycle/cogeneration electric generating facility (Ravenswood Cogeneration Facility) or (Facility). The proposed Facility will burn natural gas as its primary fuel with low sulfur (0.04%) kerosene as a backup fuel. The Ravenswood Cogeneration Facility will be located at the existing Ravenswood Generating Station in Long Island City, Queens, New York. The 2.5-acre Facility site is a portion of the 27.6-acre Ravenswood Generating Station Property.

Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" (February 11, 1994), requires federal agencies to consider disproportionate adverse human health and environmental impacts on minority and low income populations as part of National Environmental Policy Act analysis. On April 13, 2000, New York State Department of Environmental Conservation (NYSDEC) notified the applicant that USEPA Region II recommended that an environmental justice (EJ) analysis be incorporated into the Prevention of Significant Deterioration (PSD) application for the project before the NYSDEC may deem it complete.

On September 20, 2000, the applicant submitted the EJ analysis protocol used in this report to USEPA, NYSDEC and NYSDPS. This report addresses the minority population and income characteristics of an identified Community of Concern adjacent to the Ravenswood Cogeneration Facility site.

The focus of an environmental justice analysis is the determination of whether the construction and operation of a proposed facility will have both adverse and disproportionate impacts on an environmental justice community. The "Implementation Guidance to the USEPA Region 2 Draft Interim Policy on Identifying EJ Areas" (USEPA 1999) (Draft Interim Policy) provides guidance in making this determination. The Draft Interim Policy states that it:

> Provides criteria for assessing 'adverse.' If the burden in the COC [Community of Concern] is considered by a recognized authority to be safe, then it would not be considered to be adverse, even if it is greater than the burden in the reference areas. When an acknowledged health/welfare standard exists for the burden of concern (for example, an EPA National Ambient Air Quality Standard), this Draft Interim Policy defines the burden as disproportionate and adverse only if the burden exceeds that standard and exceeds the cutoffs set forth in the Policy.

The glossary that is included in the Draft Interim Policy defines adverse environmental burden as:

> A harmful environmental burden. When there is an acknowledged health or welfare standard for the burden in question, the burden is adverse only when it exceeds that standard. When there is not standard, the decision is more subjective.

Air Quality modeling prepared for and included within the Ravenswood Cogeneration Facility Article X and PSD Applications indicates that the proposed facility does not have a modeled air quality area of impact (i.e., modeled air quality impacts do not exceed USEPA Significant Impact Concentrations). Thus, based on the Draft Interim Policy criteria, the impact of the Facility could not be considered adverse. Notwithstanding the fact that the impact of the Ravenswood Cogeneration Facility will not be "adverse", KeySpan conducted an analysis to determine whether minority or low income populations would be subject to a disproportionate environmental burden.

This EJ report addresses the minority population and income characteristics of an identified Community of Concern adjacent to the Ravenswood Cogeneration Facility and demonstrates that the proposed Facility will not have an adverse or disproportionate effect on a minority or low income population.

2.0 PROJECT LOCATION

The site for the proposed Ravenswood Cogeneration Facility is located at the existing Ravenswood Generating Station in Long Island City, New York along the East River opposite Roosevelt Island (see Figure 1). The proposed Facility will occupy 2.5 acres of the 27.6-acre parcel presently owned by KeySpan. The proposed site is north of and adjacent to the existing Ravenswood Unit 3, just west of Vernon Boulevard and approximately between 37th and 38th Avenues.

The site has been devoted to industrial use since the late nineteenth century and has been used for synthetic gas manufacturing, steam production and the generation of electricity, fuel storage and associated facilities. Historical Sanborn maps show the proposed site developed in 1898 with a gas manufacturing plant owned by the East River Gas Light Co. A single gasholder occupied the area nearest Vernon Boulevard and two smaller gasholders occupied the area closer to the East River and other buildings and ancillary facilities associated with the manufacture of gas from coal. By 1915, the gas plant had expanded to occupy the entire area between Webster Avenue (37th Avenue) and Freeman Avenue (38th Avenue), from Vernon Boulevard to the East River. Two gasholders occupied the area closest to Vernon Boulevard. Ownership in 1915 was shown as the New Amsterdam Gas Co. These gas plant facilities remained intact for several decades with only minor changes, as shown on 1936 and 1947 Sanborn maps. The 1947 map shows the ownership change to the Consolidated Edison Company of New York (Con Edison).

The 1950 Sanborn map shows a boiler house that would eventually become the Con Edison Boiler "A" House steam plant. Over the next two decades, the gas plant facilities were removed and the existing Ravenswood Generating Station was developed to the south of the proposed site. Ravenswood Unit 1 (385 MW) was installed in 1961, Unit 2 (385 MW) was installed in 1962, and Unit 3 (972 MW) was added in 1965. Units 1 and 2 were constructed to fire fuel oil or natural gas, and were designed for a future conversion to coal that never materialized. Unit 3 was constructed for both oil and coal firing. Coal firing on Unit 3 was limited to approximately two years. Unit 3 was later modified in 1987 to fire natural gas and fuel oil. By 1980, the proposed site was cleared of all manufactured gas plant facilities and residuals and the surrounding properties were occupied by the Ravenswood Unit 3, the Boiler "A" House steam plant and the gas turbine complex. In 1998, Con Edison began the divestiture of their electric generation assets, and KeySpan acquired the Ravenswood Generating Station in June 1999.

3.0 METHODOLOGY

The environmental justice analysis contained within this report is based on Executive Order 12898 and guidance documents prepared by the Council on Environmental Quality (1997), USEPA (1999) Region 2, and USEPA (2000a) Office of Civil Rights. Additional information on environmental justice analysis also was obtained from USEPA Region 2.

3.1 Selection of Community of Concern and Reference Areas

Total minority population and poverty rate were the principal indicators used to identify Communities of Concern. Minority population and poverty data were obtained from Bureau of the Census (1990) data, as it is the best data source on minority populations, income levels, and poverty status. The 1990 census provides data for smaller geographic areas, such as census tracts, allowing communities with high minority populations and low incomes to be identified. To obtain the total minority population for a census tract, the population of African-Americans, Native Americans, Asians/Pacific Islanders, White Hispanics, and Other Race Hispanics were totaled. Poverty rate data at the census tract level was readily available from the 1990 Census.

To identify any environmental justice Communities of Concern (COC), KeySpan first reviewed minority population and poverty rate data for an initial screening analysis area within one mile of the Ravenswood Cogeneration Facility site. The area within one mile of the proposed Facility site includes most of the Long Island City area of Queens including a portion of the Hunters Point area, Roosevelt Island, and a portion of the Upper East Side in Manhattan, and contains 42 census tracts within New York and Queens Counties. Further inspection of the data for tracts 0171 and 0087 revealed that approximately 90% of the residents of those tracts live outside the one-mile radius, and as such, the tracts were not included in the screening analysis. Therefore, the initial screening analysis area addressed a total of 40 census tracts within one mile of the Facility site (see Figure 2).

Most of the screening analysis area is characterized by a wide range of income levels and minority representation. Higher incomes tend to occur within the screening analysis area on the east side of Manhattan, and lower incomes are found in Queens. Minority representation is quite variable across the screening analysis area, with large differences between census tracts. African Americans are the principal minority group (see Figure 3). Total minority population and poverty rate data was then compared with air modeling results to identify preliminary Communities of Concern.

Air Quality modeling prepared for and included within the Ravenswood Cogeneration Facility Article X and PSD Applications indicates that the proposed facility does not have a modeled air quality area of impact (i.e., modeled air quality impacts do not exceed USEPA Significant Impact Concentrations). Based on these air quality modeling results, it can be concluded that the Ravenswood Cogeneration Facility will not adversely affect any environmental justice Community of Concern. Nevertheless, the total minority population and poverty rate data revealed a nearby area surrounding the Ravenswood Cogeneration Facility site as a potential environmental justice Community of Concern based on proximity to the Ravenswood Cogeneration Facility site. The community's close proximity merited further consideration and study to evaluate the potential for disproportionate environmental impacts.

Based on the above described preliminary analysis, the six census tracts in the immediate vicinity of the Ravenswood Cogeneration Facility site (census tracts 25, 35, 39, 41, 43, and 238) were selected as the Community of Concern. The location of the selected Community of Concern is shown in Figure 4. All of the census tracts, except tract 238, occur in Long Island City within Queens County. Census tract 238 encompasses Roosevelt Island, in New York County, and occurs within the East River to the west of the Facility site.

New York/New Jersey Metropolitan Statistical Area (MSA), Queens County, and the 40 census tracts within one mile of the Facility site (screening analysis area) were selected as three reference areas for the environmental justice analysis. Queens County and the New York/New Jersey MSA provide a regional context, and the screening analysis area provides a local context for EJ analysis. Census tract data obtained for the selected Community of Concern was compared with the selected reference areas.

3.2 Evaluation of Ravenswood Cogeneration Facility Impacts in the Community of Concern

As described in the PSD application maximum modeled air quality impacts of the proposed cogeneration facility are below USEPA Significant Impact Concentrations (SICs) at all locations (including in the COC). Thus the Ravenswood Cogeneration Facility will have no impact on PSD increments for any pollutants at any locations. Consequently, facility emissions were evaluated only to determine if impacts from the proposed project would cause or exacerbate an exceedance of health based USEPA National Ambient Air Quality Standards (NAAQS). Toxic air pollutant emissions in the COC were also evaluated against those of Queens and New York counties using data from the Toxic Release Inventory (TRI) database (see Section 5.6).

The assessment of the Ravenswood Cogeneration Facility's air quality impacts in the Community of Concern used the results from modeling the proposed cogeneration facility as submitted in the PSD application and performed in accordance with the approved project modeling protocol. These results were used to demonstrate that Community of Concern residents are not exposed to air quality concentrations that exceed National Ambient Air Quality Standards (NAAQS).

3.2.1 Background Air Quality

The NYSDEC currently operates numerous ambient air quality monitors in New York City. These monitors are maintained and operated in accordance with rigorous quality assurance standards. The Article X application filed for the Ravenswood Cogeneration Facility on July 28, 2000 identifies the NYSDEC monitors at PS-59 in Manhattan (1.7 km west of the site) and at the Greenpoint Sewage Treatment plant in Brooklyn (3.1 km south of the site) as the monitors closest to the project site. KeySpan is proposing to use the SO_2, NO_2, PM-10 and CO ambient air quality data from these monitors as representative of background air quality in the site area. Data collected during the last 3 years at these monitors are summarized in Table 1. Note that the data presented in Table 3-1 differs in the following two respects from that presented in the Article X application:

- The data have been updated to include the latest available 3-year period (1997-1999), since 1999 data has recently become available.
- PM-10 background data have been obtained from the Greenpoint monitor rather than the PS-59 monitor in Manhattan. This is considered appropriate since the site and Greenpoint monitors are located in an area designated by USEPA as a PM-10 attainment area while the PS-59 monitor is located in a PM-10 non-attainment area. The Greenpoint monitor was shut down during 1999, so the maximum recorded 24-hr and annual concentrations from 1996-1998 were used.

Table 3-1 Background Concentrations of Criteria Pollutants

Pollutant	Averaging Period	NAAQS[a] (ug/m^3)	Background Concentration[b] (ug/m^3) 1996	1997	1998	1999	Monitor Location
SO_2	3-Hour	1,300	-	173	168	**228**	PS59 New York County (Manhattan) Located 1.7 km W of Project site
	24-Hour	365	-	105	100	**118**	
	Annual	80	-	31	31	**34**	
NO_2	Annual	100	-	75	75	**77**	
CO	1-Hour	40,000	-	5,150	5,040	**5,750**	
	8-Hour	10,000	-	3,665	**4,485**	4,140	
PM-10	24-Hour	150	45	**50**	40	NA	Greenpoint Sewage Treatment Plant Located 3.1 km S of Project Site
	Annual	50	**26**	**26**	23	NA	

[a]National Ambient Air Quality Standards

[b]Highest-second highest short-term (1-,3-,8-, and 24-hour) and maximum annual average concentrations presented.

Bold font identifies the greatest value over the 3-year period. These values were selected to conservatively represent background air quality.

NA – Not Available because Greenpoint Sewage PM-10 monitor was shut down in 1999.

Source: NYSDEC 1998, 1999 and 2000.

The data summarized in Table 1 show that the area around the site is in compliance with National Ambient Air Quality Standards for SO_2, NO_2, PM-10 and CO. (Note: The area is expected to be reclassified as in attainment for CO within the next few months)

3.2.2 Cumulative Impact Assessment

The major air emission source closest to the Ravenswood Cogeneration Facility site is the existing Ravenswood Generation Plant. This Plant consists of three large gas/oil fired boilers and numerous gas/kerosene fired combustion turbines.

Although there are other air pollution sources in the general vicinity of the Facility site and EJ area, the air quality impacts of these other sources are included in the background air quality data recorded by the NYSDEC monitors. Therefore, KeySpan has performed a cumulative impact assessment of the proposed cogeneration facility and the existing Ravenswood units in order to determine whether the area will be in compliance with NAAQS for these pollutants. The modeling was performed for both ground level and point-in-space (i.e., receptors that represent high rise structures near the site) receptors in accordance with the approved atmospheric dispersion modeling protocol. The cumulative analysis assumed that the proposed cogeneration facility and existing Ravenswood Generating Station were operating at full load and firing the highest emitting fuel (i.e., kerosene, oil, or gas) for the short-term averaging periods (i.e., 1-, 3-, 8-, and 24-hour). To calculate annual concentrations, the proposed cogeneration facility and existing boilers were assumed to be operating at full load, while the turbines were restricted to a 40% annual capacity factor (actual historical capacity factors have been considerably lower). All sources were assumed to be firing the highest emitting fuel (i.e., kerosene, oil, or gas). These operating scenarios are highly unlikely due to operational and economic reasons. Thus, the operating scenarios modeled resulted in conservative estimates of the air quality impact due to the proposed cogeneration facility and existing Ravenswood Generating Station..

Results of the cumulative impact assessment for the Ravenswood Cogeneration Facility and existing Ravenswood Generating Station were then added to existing background concentrations (which account for general background and other sources in the general vicinity of the site) and compared to NAAQS to demonstrate that the proposed project will not result in a contravention of NAAQS and does not have the potential to result in a disproportionate or adverse impact on the residents of the EJ area. Note that this is a conservative approach since the air quality impacts of the Ravenswood Generating Station are also reflected in the measured background concentrations. The results of the assessment of potential air quality impacts within the COC are included in Section 5.

4.0 ANALYSIS OF MINORITY AND INCOME STATUS

To compare demographic data concerning minority populations and low-income communities in the Community of Concern and the reference areas, KeySpan collected data from the 1990 Census of Population (Bureau of the Census 1990). At the county and state level, more recent Bureau of the Census data was also reviewed (Bureau of the Census 1996).

The New York/New Jersey MSA and the screening analysis area have lower proportional minority populations than Queens County (see Table 4-1). In contrast, the Community of Concern has a higher minority population (71.1%) than the reference areas. African-Americans (47.5%) are the principal minority group. The Community of Concern also has a higher proportion of individuals of Hispanic origin (21.8%) than the reference areas, although this figure is just slightly higher than the Hispanic representation for Queens County (19.0%).

The screening analysis area has income levels that are much higher than median incomes for the New York/New Jersey MSA, Queens County, and the Community of Concern (see Table 4.2). The median family income for screening analysis area was $70,977 in 1989 versus $42,434 for the New York/New Jersey MSA and $40,426 for Queens County. The high income data for the screening analysis area are influenced by the high incomes of residents living in the East Side of Manhattan. In the Community of Concern, incomes are much lower than the reference areas. In 1989, median family income was $32,431, and per capita income was $11,847 for the Community of Concern (see Table 4-2).

More recent data has shown incomes decreasing. Based on 1995 census model data, Queens County had a median household income of $34,115 (see Table 4-3). Recent data is not available for the other reference areas or the Community of Concern.

Table 4-1 1990 Population, Race, and Hispanic Origin

Location	Total Persons	Racial and Hispanic Origin Representation				
		Total Minority Population	African-American	Native American	Asian/ Pacific Islander	Hispanic Origin, Any Race
New York/New Jersey MSA	11,463,705	42.4%	21.5%	0.3%	5.4%	17.6%
Queens County	1,951,598	51.4%	21.7%	0.3%	12.2%	19.0%
Screening Analysis Area	187,703	25.0%	8.2%	0.1%	6.2%	11.3%
Community of Concern	21,617	71.1%	47.5%	0.4%	3.6%	21.8%

Source: Bureau of the Census. 1990.

Table 4-2 1989 Income and Poverty Status

Location	Median Family Income	Per Capita Income	Percent Population in Poverty
New York/New Jersey MSA	$42,434	$18,131	13.9%
Queens County	$40,426	$15,348	10.8%
Screening Analysis Area	$70,977	$40,147	9.9%
Community of Concern	$32,431	$11,847	29.3%

Source: Bureau of the Census (1990)

Table 4-3 1995 Income and Poverty Status

Location	Median Household Income	Percent Population in Poverty
New York State	$33,805	15.8%
Queens County	$34,115	16.3%

Source: Bureau of the Census (1996)

Additional information regarding environmental justice statistics for the reference areas and Community of Concern is included as Appendix A.

Poverty rates parallel the patterns for income. In 1989, the screening analysis area had a poverty rate of 9.9% versus 13.9% for the New York/New Jersey MSA and 10.8% for Queens County (Table 4.2). The Community of Concern had a poverty rate of 29.3%, which is higher than the poverty rates in the reference areas. As of 1995, poverty rates had increased to 16.3% in Queens County (Table 4.3).

In conclusion, the Community of Concern appears to have:

1. A higher proportion of African-American residents than the reference areas.
2. A higher proportion of individuals of Hispanic origin than the reference area although only slightly more than Queens County.
3. Lower incomes and higher poverty rates than the reference areas.

5.0 ASSESSMENT OF ENVIRONMENTAL BURDEN IN THE COMMUNITY OF CONCERN

Based on the demographic data presented in Section 4.0, which indicated at the local (county) level the selected COC can be considered a minority community characterized by higher poverty rates than that of Queens County and the New York/New Jersey MSA, KeySpan evaluated whether a disproportionate adverse environmental burden was imposed on the COC.

The following sections present a discussion of the results of KeySpan's evaluation of the Project's air quality impacts in the COC. As described above and in the PSD application, maximum modeled air quality impacts of the proposed cogeneration facility are below EPA SICs in the COC (and at all other locations). Thus, the proposed facility will have no impact on PSD increments for any pollutants at any locations.

The results in the following sections are presented in the form of isopleths of modeled concentrations of SO_2, CO, PM-10 and NO_2 from the operation of the proposed cogeneration facility and the existing sources at the existing Ravenswood Generating Station. The values in the isopleths include the highest, second-highest short-term and maximum annual monitored background concentrations from the latest three years available NYSDEC data, summarized in Table 3-1. Table 5-1 presents a summary of the highest, second-highest short-term (highest, fourth-highest for PM-10 24-hour) and maximum annual modeled (ground level and point-in-space) concentrations for each pollutant and averaging period as well as the measured background concentration value that was added to all modeled concentrations and is reflected in the isopleths, (note: isopleths were not prepared for point-in-space modeling results) and compares the total calculated ground level and point-in-space concentrations to NAAQS. The assumption used in preparing this table and the analysis is that periods of high background concentrations would coincide with times of high plant impacts.

The highest, second-highest short-term (highest, fourth-highest for PM-10 24-hour) modeled concentrations were used in the NAAQS analysis following the guidance provided in USEPA's New Source Review Workshop Manual (DRAFT) (USEPA, 1990) and the Addendum (April 2000) to the User's Guide for the Industrial Sources Complex (ISC3) Dispersion Models (USEPA, 2000b). Because five years of off-site meteorological data were used in the analysis, the highest, second-highest short-term modeled concentrations can be used for deterministically based standards (e.g., CO and SO_2) while the highest, fourth-highest 24-hour concentrations can be used for PM-10.

Table 5-1
Ravenswood Cogeneration Facility and Existing Generating Station
Maximum Modeled Concentrations

Pollutant	Averaging Period	NAAQS (μg/m^3)	Background Concentration[a] (μg/m^3)	Maximum Ground-Level Concentration[b] (μg/m^3)	Maximum Point-in-Space Concentration[b] (μg/m^3)	Total Ground-Level Concentration[c] (μg/m^3)	Total Point-in-Space Concentration[c] (μg/m^3)
CO	1-Hour	40,000	5,750	2,341.2	1,722.5	8,091.2	7,472.5
	8-Hour	10,000	4,485	1,101.6	778.9	5,586.6	5,263.9
SO_2	3-Hour	1,300	228	383.2	575.0	611.2	803.0
	24-Hour	365	118	167.2	139.8	285.2	257.8
	Annual	80	34	11.1	13.8	45.1	47.8
PM-10	24-Hour	150	50	74.1	62.3	124.1	112.3
	Annual	50	26	6.2	5.7	32.2	31.7
NO_2	Annual	100	77	19.0	7.4	96.0	84.4

[a]Background concentrations are the highest second highest short term (1-, 3-, 8-, and 24-hour) and maximum annual concentrations recorded at the PS 59 New York County ambient background concentration monitor from 1997 through 1999, except PM-10 concentrations. Background PM-10 concentrations recorded at Greenpoint, Kings County, monitor from 1996 through 1998 (the Greenpoint monitor was shutdown in 1999). All background data were provided by NYSDEC. Data for 1996 through 1998 were acquired from the NYSDEC website, while the 1999 data were provided via electronic mail on September, 13, 2000, by Mr. Russ Twadell of NYSDEC to Mr. Jay Snyder of TRC Environmental Corporation.
[b]Maximum modeled concentrations reflect the highest second highest short term (1-, 3-, 8-, and 24-hour) and maximum annual modeled concentrations, except for 24-hour PM-10. Maximum modeled 24-hour PM-10 concentrations are the highest fourth highest concentration.
[c]Total concentration = background concentration + maximum modeled (i.e., ground-level or point-in-space) concentration.

<u>Assumptions</u>

- Cumulative impact assessment includes existing boilers 1,2, and 3, existing combustion turbines 004-011, 201-204, and 301-304, and proposed turbine.
- Proposed turbine stack at a height of 400 ft.
- Proposed turbine maximum modeled concentrations are insignificant (i.e., less than the significant impact concentrations).
- Ambient ratio method (ARM) applied to modeled NO_2 concentrations. Default ARM ratio of 75% applied to NO_x emissions from the existing boilers (Units 1, 2, and 3). NO_2/NO_x ratios for the turbines based on actual Ravenswood turbine test data as provided by KeySpan.
- Existing boiler potential emissions based on AP-42 emission factors, 8,760 hours per year operation (annual impacts) of highest emitting fuel type, and 0.3% sulfur fuel oil and 0.1 lb/mmBtu particulate permit limits.
- Existing combustion turbines' potential emission rates based on AP-42 emission factors and 40% annual capacity (annual impacts) of highest emitting fuel type.

5.1 SO_2 Concentrations Within the Community of Concern

Figures 5, 6 and 7 present isopleths of 3-hour, 24-hour and annual SO_2 concentrations, respectively, in and around the COC. Figure 5 presents modeled 3-hour average concentrations. The figure shows maximum combined ground level SO_2 concentrations of approximately 611 ug/m^3 occur in the industrial area immediately to the north-northeast of the site. These concentrations are far below the 1,300 ug/m^3 3-hour SO_2 NAAQS.

Figure 6 shows 24-hour average SO_2 concentrations, with the maximum combined value of 285 ug/m^3 occurring immediately southeast of the plant and lower concentrations occurring in residential portions of the COC. The maximum combined value is also well below the 24-hour average NAAQS of 365 ug/m^3.

Figure 7 presents combined annual SO_2 concentrations and shows higher annual SO_2 values close to the plant, but also shows small areas of comparable combined impacts some distance to the north, northeast, southeast and southwest. The maximum combined annual SO_2 concentration is 45 ug/m^3, which is just over half of the annual SO_2 NAAQS of 80 ug/m^3.

The actual modeled values and background values used to calculate the maximum combined concentrations are presented in Table 5-1. It is important to note that a significant portion of the combined concentrations are attributable to existing background.

5.2 CO Concentrations Within the Community of Concern

Figure 8 presents maximum combined 1-hour average CO concentrations. The maximum combined concentrations are found adjacent to the plant with lower concentrations throughout the remainder of the COC. The maximum combined concentration of 8,091 ug/m^3 is approximately 20% of the 1-hour CO NAAQS of 40,000 ug/m^3.

Figure 9 shows maximum combined 8-hour average CO concentrations. The maximum combined concentration of 5,586 ug/m^3, immediately adjacent to the plant, is just over half of the 8-hour NAAQS for CO which is 10,000 ug/m^3. As shown in Table 5-1, the existing background concentrations account for approximately 80% of the maximum combined concentrations.

5.3 PM-10 Concentrations Within the Community of Concern

Maximum combined PM-10 concentrations of 124.1 ug/m^3 are shown in Figure 10 to occur adjacent to the plant property. Maximum combined PM-10 concentrations within the remainder of the COC are far lower. Approximately 40% of this value is attributable to existing background. The highest, fourth-highest concentration was used in the analysis according to the April 2000 Addendum to the User's Guide for the Industrial Source Complex (ISC3) Dispersion Models (USEPA, 2000b).

Figure 11 presents maximum annual combined PM-10 concentrations which are highest close to the project site and lower over the remainder of the COC. The highest annual value of 32 ug/m^3 is mostly due to existing background and is well below the annual PM-10 NAAQS of 50 ug/m^3.

5.4 NO_2 Concentrations Within the Community of Concern

Figure 12 presents highest combined annual NO_2 concentrations which are highest adjacent to the site and much lower in the remainder of the COC. It should be noted that roughly 80% of the 96 ug/m^3 highest annual combined concentration is due to existing background. In areas away from this location, where combined concentrations are lower, background accounts for over 90% of the total. Combined annual NO_2 concentrations in all locations are below the annual NO_2 NAAQS of 100 ug/m^3.

5.5 Point-in-Space Receptor Impacts in COC

As mentioned previously, the cumulative impact assessment also evaluated the combined concentrations due to the planned facility, the Ravenswood Generating Station and measured background on building receptors. The background air quality data also reflects the operation of the existing Ravenswood Plant, and thus, adding the background concentrations to the modeled concentrations from the existing Plant could result in double counting the impacts from the existing Ravenswood Plant. Isopleths were not generated to depict the results, however the maximum combined values are provided in Table 5-1. The data in the table shows that in some cases, these values are higher than the ground level values while in others, they are lower than these values. In all cases, however, the maximum combined concentrations at the building receptors are below the respective NAAQS.

5.6 Evaluation of Toxic Release Inventory Facilities

KeySpan Energy conducted a database review utilizing the USEPA's Office of Prevention, Pesticides, and Toxic Substances internet links to the Toxic Release Inventory (TRI) Community Right to Know – TRI 1998 Data Release. A database search was performed using the TRI Explorer to obtain detailed descriptions of the most recent 1998 TRI data available for facilities located in Queens and New York Counties, New York. The TRI database provides the yearly emissions/release data for the following media: air emissions, releases to surface water, land, underground injection, and off-site disposal. The database provides a list of all facilities in Queens and New York Counties that have at some time in the past submitted TRI reports. The search does not only list those facilities with 1998 data. Facilities can be listed in the database search that may not have reports for 1998. For the purpose of this study, only facilities with 1998 data were utilized.

The TRI data indicates twenty-three (23) facilities in Queens County and three (3) facilities in New York County that submitted TRI reports in 1998. Of the twenty-three facilities listed in Queens, only Con Edison – Ravenswood Facility in Long Island City, is located within the Community of Concern (COC). This facility is currently owned and operated by KeySpan and includes the facility site. No facility in New York County falls within the COC. The AES – Hickling facility is listed as a New York County facility, however, it is actually located in Corning, New York, just south of the Finger Lake Region. Emissions from this facility will not be included in the total emissions for New York County. All relevant TRI data is attached as Appendix B.

The 1998 TRI data for the twenty-five facilities in Queens and New York Counties report 556,034 pounds of listed total air emissions in both counties. The total released within the COC is 43,057 pounds, which equates to 7.7 per cent of the total for both counties or 8.4 per cent of the total for Queens County. Therefore, there does not appear to be a disproportionate burden within the COC.

6.0 PUBLIC INVOLVEMENT

Public participation is also considered a key process for incorporating environmental justice concerns (USEPA 2000). As part of the Article X review process, KeySpan developed a Public Involvement Program (PIP) designed to encourage early and continued participation by all stakeholders, including interested agencies and individuals who may be affected by or are interested in issues associated with the siting, certification, construction and operation of the Ravenswood Cogeneration Facility. Public participation through the PIP has been actively sought throughout the planning phase of the project and will continue to be an important component of the application, certification, compliance and implementation phases of the Article X process. The purpose of the PIP is to create a broad level of awareness about the Project and to ensure that the concerns, comments and ideas of various stakeholders are identified prior to key Project decisions. The PIP ensures that Project decisions incorporate, to the extent that is practical, the concerns, comments, and ideas of all stakeholders.

KeySpan has initiated an extensive program of consumer outreach and education targeting the general public, community groups, business leaders and government officials. KeySpan's efforts in this area are aided by its long-standing history of work with local communities and support for over 50 programs and organizations designed to enhance the quality of life for local residents. To ensure a comprehensive outreach and facilitate a readily understandable method of communicating with the public, KeySpan has developed a program using special consumer friendly resources and well-publicized meetings designed to gain maximum public feedback.

KeySpan organized and held public meetings in Queens, mailing more than 40,000 letters in advance of each public meeting to local residents, community leaders and elected officials. Open tours have been held at the Ravenswood Generating Station to provide the public with the opportunity to tour the facility and understand current and planned KeySpan operations. Briefings have also been held with the Queens Borough President, Claire Shulman, the City Council Speaker, Peter Vallone, and Community Boards in Queens and Manhattan as well as the Natural Resources Defense Council (NRDC). Numerous meetings have also been held with representatives from the New York State Department of Public Service (NYSDPS) and the New York State Department of Environmental Conservation (NYSDEC). To date, more than 35 meetings have been held with community organizations, public advocacy groups, state and local officials and the community at-large to provide information regarding the Ravenswood Cogeneration Facility.

In addition, KeySpan conducted a Community Survey of 500 residents and held focus groups with community residents in Queens and Roosevelt Island to determine their issues and concerns both about the existing facility and the proposed expansion. Feedback obtained through these efforts has been factored into the design of the proposed Facility as well as other improvements at the Ravenswood Generating Station.

To ensure comprehensive outreach and to facilitate communications with the public, KeySpan developed a program utilizing special consumer-friendly resources designed to gain maximum public feedback for factoring into project plans. These resources include:

- a specially designed, independently conducted telephone survey to determine public opinion on issues related to energy and the environment;
- an extensive process undertaken to identify local stakeholders groups. As a result, meetings were and will be held with the public for the purpose of addressing the following topics, issues and concerns that were raised by the public during the pre-application phase:
  - energy costs and availability - steam and electric,
  - improved air quality - reduced emissions,
  - service and reliability,
  - economic impacts- job creation, and
  - community benefits;
- a special 24-hour bilingual Hot Line (718) 403-2777 updating callers on project plans, milestones and events, as well as providing a mechanism for public questions and comment;
- a Ravenswood web site linked to KeySpan detailing project objectives and milestones (http://www.keyspanenergy.com/headlines/raven/raven1.cfm);
- a specially prepared video designed to clearly communicate KeySpan's purpose and plans for the Ravenswood Cogeneration Facility; and
- color graphics for general informational use and distribution that addresses project details, plans and benefits.

A more detailed description of the PIP activities sponsored by KeySpan in support of the proposed project is included in Section 2.0 – Public Involvement Program, of the Project's Article X Application.

Public meetings and briefings also allowed KeySpan to listen to the concerns of the public regarding the operation of the existing Ravenswood Generating Station. As the new owners, KeySpan wanted to establish a reputation as a good neighbor as well as a good corporate citizen. Comments were received on a variety of subjects from past experiences with the Ravenswood Generating Station and owners to the cost of electric power. Regardless of the audience, one point was made time and again – people are concerned about air quality in their neighborhood and want to see old plants closed before new ones, even cleaner more efficient plants, open. KeySpan listened to these concerns and realized we are in a position to do our part to improve air quality while still meeting our responsibilities as an electric generator to provide capacity to meet growing demand. The Ravenswood Air Quality Improvement Plan (AQuIP) was developed to voluntarily upgrade existing units to achieve maximum emission savings and improve the quality of air emissions from the facility independent of the proposed Ravenswood Cogeneration Facility. This will be accomplished by installing advanced NO_x controls on existing Units 1, 2 and 3. These improvements will begin in the fall of 2000 with installations on Unit 1 and continue the following year on Unit 3. Unit 2 already has these controls in place. These upgrades will result in a reduction of station wide NO_x emission rates by approximately 22%. This is a savings of up to 750 tons of NO_x per year, roughly the equivalent of shutting down a 350 megawatt electric generator. The reduction is also about ten times the estimated emissions of the proposed facility thereby resulting in a net reduction while increasing much needed capacity in New York City. This will also give the Ravenswood Generating Station the best NO_x emission rate of the northern Queens power stations.

The AQuIP, however, is not the only change KeySpan is making at Ravenswood Generating Station as a result of the public meetings. At many of these meetings, the Plant Manager listened to the community's concerns about noise, odors and unexpected occurrences. Action was immediately taken at the facility to address these concerns such as limiting barge deliveries to daytime hours, limiting the number of barges at the dock, reviewing the settings on boiler safety valves and studying various ways of eliminating routine noise and odors. The plant even set up a special hotline number that the community can call if there is an unexpected occurrence that results in loud noises or increased activity around the plant. A recorded message informs the public of the nature of the occurrence and plant reaction to it.

During the construction, commissioning and operation of the Ravenswood Cogeneration Facility, KeySpan will continue to maintain relationships established with regulatory agency staff, local officials, stakeholders, and interested citizens. During construction and commissioning, KeySpan will schedule meetings to report on the Project's status, and KeySpan representatives will be available to attend meetings, give presentations, and answer questions as requested. KeySpan will continue to participate and support community activities during the life of the facility.

7.0 CONCLUSIONS

KeySpan Energy has conducted an Environmental Justice Analysis for the proposed Ravenswood Cogeneration Facility. The analysis identified a Community of Concern in the area adjacent to the proposed Facility site. Air quality impacts were conservatively assessed in the area through the use of measured ambient air quality data, cumulative air quality impact modeling and an evaluation of the Toxic Release Inventory database.

The conclusion of the analysis is that the proposed Facility will not cause a disproportionate or adverse impact within this community.

8.0 REFERENCES

Bureau of the Census. 1990. *1990 U.S. Census Data, Database: C90STF3A, Tables P1, P8, P12, P107A, P114A, and P117.* Website: venus.census.gov/cdrom/lookup/. U.S. Bureau of the Census, Suitland, Maryland.

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APPENDIX A

ENVIRONMENTAL JUSTICE STATISTICS

Table 1a KeySpan Region, Population and Race

Location	Total Persons	Total Minority	White	African-American	Native American	Asian/ Pacific I.	Other
NY/NJ MSA	11,463,705	4,865,602	7,414,837	2,470,284	30,447	618,735	929,402
		42.4%	64.7%	21.5%	0.3%	5.4%	8.1%
Queens Co.	1,951,598	1,003,495	1,130,320	423,439	5,564	238,818	153,457
		51.4%	57.9%	21.7%	0.3%	12.2%	7.9%

Source: Bureau of the Census (1990)

Table 1b KeySpan Region, Hispanic Origin

Location	Hispanic White	Hispanic Af.-Amer.	Hispanic Nat. Amer.	Hispanic Asian/Pac	Other	Total Hispanic
NY/NJ MSA	840,058	250,164	8,568	15,973	906,078	2,020,841 17.6%
Queens Co.	188,430	29,269	862	5,521	147,244	371,326 19.0%

Source: Bureau of the Census (1990)

Table 2a KeySpan Community of Concern Census Tracts, Population and Race

Location	Total Persons	Total Minority	White	African-American	Native American	Asian/ Pacific I.	Other
Census Tracts site: 37	0	0	0	0	0	0	0
25	8,265	8,149	784	6,592	70	0	819
		98.6%	9.5%	79.8%	0.8%	0.0%	9.9%
35	215	171	63	56	0	0	96
		79.5%	29.3%	26.0%	0.0%	0.0%	44.7%
39	1,627	1,136	973	435	0	31	188
		69.8%	59.8%	26.7%	0.0%	1.9%	11.6%
41	579	197	429	0	0	117	33
		34.0%	74.1%	0.0%	0.0%	20.2%	5.7%
43	2,586	2,011	1,077	1,038	8	103	360
		77.8%	41.6%	40.1%	0.3%	4.0%	13.9%
238	8,345	3,711	5,374	2,144	4	526	297
		44.5%	64.4%	25.7%	0.0%	6.3%	3.6%
Closest Tracts	21,617	15,375	8,700	10,265	82	777	1,793
		71.1%	40.2%	47.5%	0.4%	3.6%	8.3%

Source: Bureau of the Census (1990)

Table 2B KeySpan Community of Concern Census Tracts, Hispanic Origin

Location	Hispanic White	Hispanic Af.-Amer.	Hispanic Nat. Amer.	Hispanic Asian/Pac	Other	Total Hispanic
Tracts site: 37	0	0	0	0	0	0
25	680	53	0	0	807	1,540 18.6%
35	19	17	0	0	96	132 61.4%
39	482	21	0	0	188	691 42.5%
41	47	0	0	0	33	80 13.8%
43	502	177	0	0	360	1,039 40.2%
238	748	173	0	26	289	1,236 14.8%
Closest Tracts	2,478	441	0	26	1,773	4,718 21.8%

Source: Bureau of the Census (1990)

Table 3a KeySpan Census Tracts, Population and Race (Page 1 of 2)

Tracts within 1.0 mile	Total Persons	Total Minority	White	African-American	Native American	Asian/ Pacific I.	Other
Queens 1,BG2	10	0	10	0	0	0	0
7	3,615	1,549	2,707	249	0	252	407
19	633	326	437	47	0	84	65
25	8,265	8,149	784	6,592	70	0	819
27	220	166	84	0	0	136	0
29	1,252	965	683	104	24	181	260
31	1,307	642	877	31	0	209	190
35	215	171	63	56	0	0	96
37	0	0	0	0	0	0	0
39	1,627	1,136	973	435	0	31	188
41	579	197	429	0	0	117	33
43	2,586	2,011	1,077	1,038	8	103	360
45	2,215	298	2,051	117	0	29	18
47	4,168	2,644	2,273	1,129	53	311	402
49	510	336	209	21	0	192	88
51	1,940	1,165	1,117	66	0	592	165
53	5,070	1,647	3,951	0	0	698	421
55	1,009	723	642	23	30	96	218
57	4,211	2,185	2,830	157	7	652	565
59	4,289	1,602	3,276	101	0	451	461
75	4,260	1,445	3,423	199	8	486	144
77	1,141	386	968	93	0	53	27
79	2,892	1,721	1,634	253	0	667	338
81	586	304	335	21	0	0	230

Source: Bureau of the Census (1990) Note: Tract 1 includes only block group 2.

Table 3b KeySpan Census Tracts, Hispanic Origin (Page 1 of 2)

Tracts within 1.0 mile	Hispanic White	Hispanic Af.-Amer.	Hispanic Nat. Amer.	Hispanic Asian/Pac	Other	Total Hispanic
Queens 1,2	0	0	0	0	0	0
7	641	116	0	0	407	1,164
19	130	27	0	84	65	306
25	680	53	0	0	807	1,540
27	30	0	0	0	0	30
29	396	0	0	0	260	656
31	222	31	0	0	180	433
35	19	17	0	0	96	132
37	0	0	0	0	0	0
39	482	21	0	0	188	691
41	47	0	0	0	33	80
43	502	177	0	0	360	1,039
45	134	17	0	0	18	169
47	749	21	4	0	402	1,176
49	50	0	0	0	73	123
51	365	13	0	0	142	520
53	557	0	0	23	392	972
55	356	0	0	0	218	574
57	840	67	7	24	529	1,467
56	604	89	0	8	446	1,147
75	608	16	0	11	144	779
77	213	0	0	17	27	257
79	463	30	0	86	338	917
81	60	21	0	0	223	304

Source: Bureau of the Census (1990) Note: Tract 1 includes only block group 2.

Table 3a KeySpan Census Tracts, Population and Race (Page 2 of 2)

Tracts within 1.0 mile	Total Persons	Minority Total	White	African-American	Native American	Asian/ Pacific	Other
New York 86	7,521	1,001	6,782	197	0	515	27
106.01	7,697	431	7,522	44	0	131	0
106.02	3,821	665	3,269	58	0	494	0
108	7,686	817	7,024	143	0	407	112
110	6,284	736	5,820	118	14	276	56
116	3,870	853	3,254	281	0	304	31
118	8,379	679	7,947	138	0	241	53
124	9,957	1,596	8,694	323	39	763	138
126	12,897	982	12,306	171	0	387	33
132	9,149	1,024	8,412	183	0	436	118
134	9,878	986	9,171	108	0	468	131
136	15,835	1,383	14,903	198	18	659	57
138	12,237	1,155	11,497	215	0	342	183
144.01	5,001	503	4,657	117	0	194	33
144.02	6,546	588	6,115	162	0	246	23
238	8,345	3,711	5,374	2,144	4	526	297
Totals - 1.0 mi.	187,703	46,878	153,580	15,332	275	11,729	6,787
		25.0%	81.8%	8.2%	0.1%	6.2%	3.6%

Source: Bureau of the Census (1990)

Table 3b KeySpan Census Tract, Hispanic Origin (Page 2 of 2)

Tracts within 1.0 mile	Hispanic White	Hispanic Af.-Amer.	Hispanic Nat. Amer.	Hispanic Asian/Pac	Other	Total Hispanic
New York 8	262	0	0	0	27	289
106.01	256	0	.0	0	0	256
106.02	113	26	0	17	0	156
108	169	19	0	0	98	286
110	272	0	0	15	56	343
116	237	36	0	0	31	304
118	262	0	0	0	38	300
124	333	56	14	8	138	549
126	391	28	0	10	33	462
132	300	68	0	0	105	473
134	290	11	0	0	120	421
136	479	12	0	0	29	520
138	421	16	0	22	177	636
144.01	159	37	0	0	33	229
144.02	157	23	0	0	23	203
238	748	173	0	26	289	1,236
Totals 1.0 mi.	12,997	1,221	25	351	6,545	21,139 11.3%

Source: Bureau of the Census (1990)

Table 4a KeySpan Region, Income and Poverty Level

Location	Total Persons	Proportion of Area	Median Income	Per Capita Income	% Poverty	Total Poverty
NY/NJ MSA	11,463,705	1.000	$42,434	$18,131	13.9%	1,598,787
Queens Co.	1,951,598	1.000	$40,426	$15,348	10.8%	210,057

Source: Bureau of the Census (1990)

Table 4b Keyspan Region, Poverty Level by Age

Location	Under 5	5 yrs	6-11 yrs	12-17 yrs	18-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-59 yrs	60-64 yrs	65-74 yrs	75 yrs+
NY/NJ MSA	170,258	35,534	190,650	169,508	177,889	256,005	197,002	115,359	47,319	54,682	94,256	90,325
Queens Co.	17,249	3,876	20,246	19,580	22,237	36,484	27,568	16,165	6,588	8,770	15,155	16,139

Source: Bureau of the Census (1990)

Table 5a KeySpan Community of Concern Census Tracts, Income and Poverty Level

Location	Total Persons	Proportion of Area	Median Income	Per Capita Income	% Poverty	Total Poverty
Census Tracts site: 37			$0	$0	0.0%	0
Closest Tracts:						
25	8,265	0.382	$13,918	$6,840	45.3%	3,745
35	215	0.010	$37,639	$6,317	47.0%	101
39	1,627	0.075	$28,750	$9,760	30.2%	491
41	579	0.027	$33,977	$12,599	6.4%	37
43	2,586	0.120	$20,532	$8,404	31.0%	801
238	8,345	0.386	$54,930	$18,369	13.8%	1,151
Total Closest Tracts	21,617	1.000	$32,431	$11,847	29.3%	6,326

Source: Bureau of the Census (1990)

Table 5b KeySpan Community of Concern Census Tracts, Poverty Level by Age

Location	Under 5	5 yrs	6-11 yrs	12-17 yrs	18-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-59 yrs	60-64 yrs	65-74 yrs	75 yrs+
Tracts site: 37	0	0	0	0	0	0	0	0	0	0	0	0
Closest Tracts:												
25	558	143	444	571	312	622	271	284	68	192	148	132
35	29	0	9	9	6	16	0	0	19	6	7	0
39	29	0	24	0	124	219	45	14	0	9	27	0
41	0	0	0	0	0	0	0	12	0	0	25	0
43	106	5	80	122	31	57	203	33	24	29	44	67
238	132	34	116	64	138	155	101	101	58	58	60	134
Total Closest Tracts	854	182	673	766	611	1,069	620	444	169	294	311	333

Source: Bureau of the Census (1990)

Table 6a KeySpan Census Tracts, Income and Poverty Level (Page 1 of 2)

Tracts within 1.0 mile	Total Persons	Proportion of Area	Median Income	Per Capita Income	% Poverty	Total Poverty
Queens 1,BG2	10	0.000	$46,250	$18,467	0.0%	0
7	3,615	0.019	$36,031	$14,382	15.3%	553
19	633	0.003	$28,382	$12,430	18.2%	115
25	8,265	0.044	$13,918	$6,840	45.3%	3,745
27	220	0.001	$30,568	$11,076	7.7%	17
29	1,252	0.007	$28,580	$13,110	7.3%	92
31	1,307	0.007	$27,692	$13,318	11.2%	147
35	215	0.001	$37,639	$6,317	47.0%	101
37	0	0.000	$0	$0	0.0%	0
39	1,627	0.009	$28,750	$9,760	30.2%	491
41	579	0.003	$33,977	$12,599	6.4%	37
43	2,586	0.014	$20,532	$8,404	31.0%	801
45	2,215	0.012	$44,614	$23,400	5.1%	114
47	4,168	0.022	$28,258	$12,021	16.0%	668
49	510	0.003	$39,018	$11,091	5.3%	27
51	1,940	0.010	$29,667	$11,203	15.5%	301
53	5,070	0.027	$34,534	$15,469	10.5%	531
55	1,009	0.005	$19,651	$8,902	23.1%	233
57	4,211	0.022	$26,106	$13,472	14.5%	609
59	4,289	0.023	$31,636	$14,186	12.2%	523
75	4,260	0.023	$29,148	$15,041	16.8%	715
77	1,141	0.006	$25,769	$12,115	14.5%	165
79	2,892	0.015	$30,385	$12,043	21.7%	628
81	586	0.003	$25,703	$11,586	28.2%	165

Source: Bureau of the Census (1990) Note: Tract 1 includes only block group 2.

Table 6b KeySpan Census Tracts, Poverty Level by Age (Page 1 of 2)

Tracts within 1.0 mile	Under 5	5 yrs	6-11 yrs	12-17 yrs	18-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-59 yrs	60-64 yrs	65-74 yrs	75 yrs+
Queens 1,2	0	0	0	0	0	0	0	0	0	0	0	0
7	7	39	36	13	49	140	79	34	65	16	21	54
19	16	0	4	5	0	27	0	26	0	19	18	0
25	558	143	444	571	312	622	271	284	68	192	148	132
27	0	0	0	0	0	0	8	0	0	0	0	9
29	0	5	0	14	12	11	11	17	14	0	8	0
31	18	0	0	0	32	66	16	0	8	7	0	0
35	29	0	9	9	6	16	0	0	19	6	7	0
37	0	0	0	0	0	0	0	0	0	0	0	0
39	29	0	24	0	124	219	45	14	0	9	27	0
41	0	0	0	0	0	0	0	12	0	0	25	0
43	106	5	80	122	31	57	203	33	24	29	44	67
45	31	0	0	0	8	8	32	0	0	7	8	20
47	45	0	100	30	57	135	70	24	42	35	53	77
49	0	0	0	0	0	7	0	0	0	11	0	9
51	26	0	32	18	30	86	28	25	13	0	35	8
53	29	0	41	24	76	141	72	53	14	43	11	27
55	11	0	14	45	11	17	61	25	0	18	0	31
57	44	6	98	53	41	105	85	35	32	37	38	35
59	17	10	32	11	65	147	74	25	42	29	27	44
75	61	13	55	34	36	187	68	34	37	41	42	107
77	7	0	22	5	41	25	32	0	16	0	7	10
79	65	32	55	42	88	143	93	31	0	14	41	24
81	8	0	12	11	40	59	6	0	21	8	0	0

Source: Bureau of the Census (1990)

Note: Tract 1 includes only block group 2.

Table 6a KeySpan Census Tracts, Income and Poverty Level (Page 2 of 2)

Tracts within 1.0 mile	Total Persons	Proportion of Area	Median Income	Per Capita Income	% Poverty	Total Poverty
New York 86	7,521	0.040	$115,385	$71,494	3.9%	290
106.01	7,697	0.041	$117,170	$80,064	3.0%	229
106.02	3,821	0.020	$85,153	$40,833	2.2%	83
108	7,686	0.041	$117,362	$58,558	5.1%	392
110	6,284	0.033	$71,376	$47,768	4.3%	268
116	3,870	0.021	$53,898	$30,183	4.4%	170
118	8,379	0.045	$81,808	$57,354	4.5%	374
124	9,957	0.053	$83,432	$43,785	10.4%	1,035
126	12,897	0.069	$101,805	$57,736	3.8%	493
132	9,149	0.049	$77,667	$48,171	7.0%	639
134	9,878	0.053	$78,817	$48,713	5.0%	498
136	15,835	0.084	$89,046	$52,988	5.7%	897
138	12,237	0.065	$71,073	$40,912	7.0%	855
144.01	5,001	0.027	$86,424	$57,566	3.4%	169
144.02	6,546	0.035	$109,767	$52,212	3.8%	252
238	8,345	0.044	$54,930	$18,369	13.8%	1,151
Totals - 1.0 mi.	187,703	1.000	$70,977	$40,147	9.9%	18,573

Source: Bureau of the Census (1990)

Table 6b KeySpan Census Tract, Poverty Level by Age (Page 2 of 2)

Tracts within 1.0 mile	Under 5	5 yrs	6-11 yrs	12-17 yrs	18-24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-59 yrs	60-64 yrs	65-74 yrs	75 yrs+
New York 8	0	0	0	0	33	20	32	75	65	9	43	13
106.01	0	0	19	0	0	60	65	33	0	30	13	9
106.02	0	0	0	0	31	35	0	0	0	9	8	0
108	0	0	0	0	49	64	31	82	45	17	23	81
110	0	0	0	0	35	37	68	22	24	0	38	44
116	0	0	12	0	29	55	58	0	0	0	11	5
118	0	0	0	0	38	37	67	74	69	0	22	67
124	39	13	41	12	318	338	126	35	17	28	23	45
126	0	0	0	33	73	83	46	64	12	18	22	142
132	32	0	24	10	64	48	113	39	48	60	65	136
134	17	0	0	29	34	198	54	22	12	16	48	68
136	19	12	0	0	188	227	114	132	53	47	46	59
138	61	15	22	52	127	191	96	127	26	41	57	40
144.01	14	0	0	0	29	36	28	52	0	0	0	10
144.02	26	0	0	8	17	80	48	40	0	9	0	24
238	132	34	116	64	138	155	101	101	58	58	60	134
Totals 1.0 mi.	1,447	327	1,292	1,215	2,262	3,882	2,301	1,570	844	863	1,039	1,531

Source: Bureau of the Census (1990)

Bureau of the Census. 1990. *1990 U.S. Census Dat, Database: C90STF3A, Tables p1, P8, P12, P107A, P114A and P117.* Website: venus.census.gov/cdron/lookup/. U.S. Bureau of the Census, Suitland, Maryland.

APPENDIX B

TOXIC RELEASE INVENTORY

TRI *Explorer*

EPA Office of Environmental Information

Release: Facility Report

See Note Return to selection

TRI On-site and Off-site Reported Releases (in pounds), All Chemicals, Queens County, State of New York, 1998, All Industries

Row #	Facility and Chemical	TRIF ID	Fugitive Air	Stack Air	Total Air Emissions	Total On- and Off-site Releases
1	ABBOTT IND. INC., 95-25 149TH ST., JAMAICA	11435BBTND95251	2,000	25,400	27,400	27,400
	TETRACHLOROETHYLENE		2,000	25,400	27,400	27,400
2	ANACOTE CORP., 10-01 45TH AVE., LONG ISLAND CITY	11101NCTCR10014	0	0	0	0
	NITRIC ACID		0	0	0	0
	PHOSPHORIC ACID		0	0	0	0
3	ATLANTIC WIRE & CABLE CORP., 119-14 14TH RD., COLLEGE POINT	11356TLNTC11914	3	0	3	3
	COPPER		3	0	3	3
	DI(2-ETHYLHEXYL) PHTHALATE		0	0	0	0
4	BROMANTE SIRMOS DIV., 30-00 47TH. AVE., LONG ISLAND CITY	11101BRMNT30004	0	17,471	17,471	17,471
	TOLUENE		0	17,471	17,471	17,471
5	CASTLE ASTORIA TERMINALS INC., 17-10 STEINWAY ST., ASTORIA	11105CSTLS1710S	NA	NA	NA	NA
	POLYCYCLIC AROMATIC COMPOUNDS		NA	NA	NA	NA
6	CHEMCLEAN CORP., 130-45 180TH ST., JAMAICA	11434CHMCL13045	0	0	0	0
	PHOSPHORIC ACID		0	0	0	0
7	COCA-COLA BOTTLING CO. OF NEW YORK - MASPETH, 59-02 BORDEN AVE., MASPETH	11378CCCLB5902B	0	0	0	77
	PHOSPHORIC ACID		0	0	0	77
8	COMSTAR INTL. INC., 20-45 128TH ST., COLLEGE POINT	11356NDSTR20451	NA	NA	NA	NA
	ETHYLENE GLYCOL		NA	NA	NA	NA
	METHYL ETHYL KETONE		NA	NA	NA	NA
	PHOSPHORIC ACID		NA	NA	NA	NA
	TETRACHLOROETHYLENE		NA	NA	NA	NA
	ZINC (FUME OR DUST)		NA	NA	NA	NA
9	CONSOLIDATED EDISON CO. OF NEW YORK - ASTORIA FACILITY, 20TH AVE. & 21ST ST., ASTORIA	10015CNSLD20THA	0	53,977	53,977	53,977
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)		0	53,977	53,977	53,977
10	CONSOLIDATED EDISON CO. OF NEW YORK -RAVENSWOOD FACILITY, 38-54 VERNON BLVD., LONG ISLAND CITY	11101CNSLD3854V	0	43,057	43,057	43,057
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)		0	43,057	43,057	43,057
11	COSMOPOLITAN CHEMICAL CO., 50-23 23RD ST., LONG ISLAND CITY	11101CSMPL50232	0	0	0	0
	SODIUM NITRITE		0	0	0	0
12	EAGLE ELECTRIC MFG. CO. INC., 45-31 CT. SQUARE, LONG ISLAND CITY	11101GLLCT4531C	250	250	500	1,981
	COPPER COMPOUNDS		0	0	0	15
	DI(2-ETHYLHEXYL) PHTHALATE		250	0	250	1,650
	FORMALDEHYDE		0	250	250	250
	ZINC COMPOUNDS		0	0	0	66
13	GETTY TERMINALS CORP., 30-23 GREENPOINT AVE., LONG ISLAND CITY	11101GTTYT3023G	1,902	2,609	4,511	4,511

	1,2,4-TRIMETHYLBENZENE		14	19	33	33
	BENZENE		109	148	257	257
	CYCLOHEXANE		54	73	127	127
	ETHYLBENZENE		20	28	48	48
	METHYL TERT-BUTYL ETHER		1,360	1,859	3,219	3,219
	N-HEXANE		211	288	499	499
	TOLUENE		80	110	190	190
	XYLENE (MIXED ISOMERS)		54	84	138	138
14	**INDEPENDENT CHEMICAL CORP., 79-51 COOPER AVE., GLENDALE**	**11385NDPND7951C**	**NA**	**NA**	**NA**	**NA**
	CERTAIN GLYCOL ETHERS		NA	NA	NA	NA
	NITRIC ACID		NA	NA	NA	NA
	PHOSPHORIC ACID		NA	NA	NA	NA
15	**NEW YORK POWER AUTHORITY CHARLES POLETTI POWER PLANT, 31-03 20TH AVE., ASTORIA**	**11105NWYRK31032**	**5**	**358,360**	**358,365**	**358,365**
	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)		0	54,440	54,440	54,440
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)		5	303,920	303,925	303,925
16	**OGDEN AVIATION SERVICE CO. OF NEW YORK INC., LAGUARDIA AIRPORT BUILDING 42, FLUSHING**	**11371GDNVTLAGUA**	**1,839**	**1,360**	**3,199**	**3,310**
	1,2,4-TRIMETHYLBENZENE		110	80	190	190
	BENZENE		116	86	202	239
	ETHYLBENZENE		82	60	142	142
	METHYL TERT-BUTYL ETHER		350	252	602	602
	N-HEXANE		84	60	144	144
	NAPHTHALENE		7	37	44	44
	TOLUENE		590	425	1,015	1,052
	XYLENE (MIXED ISOMERS)		500	360	860	897
17	**OGDEN NEW YORK SERVICES INC., J.F.K. INTL. AIRPORT, JAMAICA**	**10001GDNNWJFKIN**	**802**	**1,273**	**2,075**	**2,075**
	BENZENE		48	77	125	125
	CYCLOHEXANE		28	54	82	82
	ETHYLBENZENE		28	54	82	82
	METHYL TERT-BUTYL ETHER		56	108	164	164
	N-HEXANE		28	54	82	82
	NAPHTHALENE		363	438	801	801
	TOLUENE		140	271	411	411
	XYLENE (MIXED ISOMERS)		111	217	328	328
18	**PEPSI COLA BOTTLING CO. OF NEW YORK INC., 112-02 15TH AVE., COLLEGE POINT**	**11356CNDDR11202**	**NA**	**NA**	**NA**	**NA**
	PHOSPHORIC ACID		NA	NA	NA	NA
19	**PILOT PRODS. INC., 24-13 46TH ST., LONG ISLAND CITY**	**11103PLTPR24134**	**NA**	**NA**	**NA**	**NA**
	2-MERCAPTOBENZOTHIAZOLE		NA	NA	NA	NA
	THIRAM		NA	NA	NA	NA
	ZINC COMPOUNDS		NA	NA	NA	NA
20	**PROGRAMATIC PLATERS INC., 49-25 20TH AVE., EAST ELMHURST**	**11370PRGRM49252**	**0**	**0**	**0**	**250**
	NICKEL		0	0	0	250
21	**SCHWARTZ CHEMICAL CO. INC., 50-01 2ND ST., LONG ISLAND CITY**	**11101SCHWR50012**	**114**	**0**	**114**	**114**
	DICHLOROMETHANE		66	0	66	66

	METHANOL		48	0	48	48
22	STANDARD MOTOR PRODS. INC., 37-18 NORTHERN BLVD., LONG ISLAND CITY	11101STNDR3718N	0	40	40	152
	COPPER		0	40	40	152
23	VOLKERT PRECISION TECHS. INC., 222-40 96TH AVE., QUEENS VILLAGE	11429VLKRT22240	250	4,000	4,250	4,250
	TRICHLOROETHYLENE		250	4,000	4,250	4,250
	Total	23	7,165	507,797	514,962	516,993

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Export this report to a text file

Create comma-separated values, compatible with spreadsheet and databases.

Download all records

View other report type:

- Transfers Off-site for Further Waste Management; or
- Quantities of TRI Chemicals in Waste (waste management)

Note: Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a *"frozen"* data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.

On-site releases are from Section 5 of the Form R. Off-site releases are from Section 6 (transfers off-site to disposal) of the Form R. Off-site releases include metals and metal compounds transferred off-site for solidification/stabilization and for waste water treatment, including to POTWs.

A decimal point, or "." denotes that the facility left that particular cell blank in its Form R submission (a zero in a cell denotes either that the facility reported "0" or "NA" in its Form R submission). "NA" in a cell denotes that the facility has submitted only Form A and thus the data for release, waste transfers or quantities of TRI chemicals in waste are not applicable. By submitting a Form A the facility has certified that its total annual reportable amount is less than 500 pounds, and that the facility does not manufacture, process, or otherwise use more than 1 million pounds of the toxic chemical.

The facility may have reported multiple SIC codes to TRI in 1998. See the facility profile report by clicking on the facility name to see a list of all SIC codes submitted to TRI for the 1998 reporting year.

Users of TRI information should be aware that TRI data reflect releases and other waste management of chemicals, not exposure of the public to those chemicals. Release estimates alone are not sufficient to determine exposure or to calculate potential adverse effects on human health and the environment. TRI data, in conjunction with other information, can be used as a starting point in evaluating exposures that may result from release and other waste management activities that involve toxic chemicals.

Release: September 19, 2000
Facility Report

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TRI Explorer

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TRI Facility Profile

TRI Facility Name:	**ABBOTT IND. INC.**
Address:	95-25 149TH ST. JAMAICA, NY 11435
County:	QUEENS
Public Contact:	LEONARD A. GROSSMAN
Phone Number:	718 291-0800

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3496 MISC FABRICATED WIRE PRODUCTS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	27,400
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	2,815
Total Waste Managed:	28,215

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1989 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	TETRACHLOROETHYLENE	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-41-58
Longitude:	073-48-30
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11435BBTND95251
RCRA ID Number (Land):	NYD002031870

Down load all data for ABBOTT IND. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

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TRI Facility Profile

TRI Facility Name:	**ANACOTE CORP.**
Address:	10-01 45TH AVE.
	LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	ERIC SAUL
Phone Number:	718 361-1740

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	2
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3471 PLATING + POLISHING

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	10
Total Waste Managed:	39,000

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ⓘ
1	NITRATE COMPOUNDS	☑	☑	☑	
2	NITRIC ACID	☑	☑	☑	
3	PHOSPHORIC ACID	☑	☑	☑	☑
4	SODIUM HYDROXIDE (SOLUTION)	☑	☑	☑	
5	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-45-10
Longitude:	073-57-01
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101NCTCR10014
RCRA ID Number (Land):	NYD001548502

Down load all data for ANACOTE CORP.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Explorer

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TRI Facility Profile

TRI Facility Name:	**ATLANTIC WIRE & CABLE CORP.**
Address:	119-14 14TH RD. COLLEGE POINT, NY 11356
County:	QUEENS
Public Contact:	JEFFREY ROSENBERG
Phone Number:	718 353-4242

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	2
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3357 NONFERROUS WIRE DRAWING/INSULATION

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	3
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	22,849
Total Waste Managed:	22,859

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1992 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	COPPER	☑	☑	☑	☑
2	DI(2-ETHYLHEXYL) PHTHALATE	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-47-04
Longitude:	073-50-55
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11356TLNTC11914
RCRA ID Number (Land):	

Down load all data for ATLANTIC WIRE & CABLE CORP.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**BROMANTE SIRMOS DIV.**
Address:	30-00 47TH. AVE. LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	CRAIG CORONA
Phone Number:	718 786-5920

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3641 ELECTRIC LAMPS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	17,471
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	8,980
Total Waste Managed:	26,451

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1996 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	TOLUENE	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-45-41
Longitude:	073-54-36
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101BRMNT30004
RCRA ID Number (Land):	

Down load all data for BROMANTE SIRMOS DIV.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name: **CASTLE ASTORIA TERMINALS INC.**
Address: 17-10 STEINWAY ST.
ASTORIA, NY 11105
County: QUEENS
Public Contact:
Phone Number:

Forms Submitted to TRI in 1998 Reporting Year:
Form R (regular form): 0
Form A (short form): 1

Reported Standard Industrial Classification (SIC) Code(s):

5171 PETROLEUM BULK STATIONS + TERMINALS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases: .
Total Off-site Releases: .
Total Transfers Off-site for Further Waste Management: .
Total Waste Managed: .

TRI Chemical Table
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	POLYCYCLIC AROMATIC COMPOUNDS	NA	NA	NA	

Other TRI Facility Information

Latitude:	040-46-52
Longitude:	073-53-56
Parent Company Name:	ROM TERMINALS LTD.
Parent Company Dun and Bradstreet:	144135639
TRI Facility ID Number:	11105CSTLS1710S
RCRA ID Number (Land):	

Down load all data for CASTLE ASTORIA TERMINALS INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**CHEMCLEAN CORP.**
Address:	130-45 180TH ST. JAMAICA, NY 11434
County:	QUEENS
Public Contact:	BERNARD ESQUENET
Phone Number:	718 525-4500

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

2842 POLISHES + SANITATION GOODS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	36

TRI Facility Trend Graphs (click to view trend graph)

Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1993 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ⓘ
1	PHOSPHORIC ACID	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-40-40
Longitude:	073-45-45
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11434CHMCL13045
RCRA ID Number (Land):	

Down load all data for CHEMCLEAN CORP.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

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TRI Facility Profile

TRI Facility Name:	**COCA-COLA BOTTLING CO. OF NEW YORK - MASPETH**
Address:	59-02 BORDEN AVE.
	MASPETH, NY 10532
County:	QUEENS
Public Contact:	JOHN H. DOWNS
Phone Number:	770 989-3775

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

2086 BOTTLED + CANNED SOFT DRINKS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	77
Total Transfers Off-site for Further Waste Management:	77
Total Waste Managed:	1,731

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ⓘ
1	PHOSPHORIC ACID	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-43-38
Longitude:	073-54-37
Parent Company Name:	COCA-COLA ENTERPRISES INC.
Parent Company Dun and Bradstreet:	118267624
TRI Facility ID Number:	11378CCCLB5902B
RCRA ID Number (Land):	

Down load all data for COCA-COLA BOTTLING CO. OF NEW YORK - MASPETH

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**COMSTAR INTL. INC.**
Address:	20-45 128TH ST.
	COLLEGE POINT, NY 11356
County:	QUEENS
Public Contact:	S.P. MELLA
Phone Number:	718 445-7900

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	0
Form A (short form):	5

Reported Standard Industrial Classification (SIC) Code(s):

2842 POLISHES + SANITATION GOODS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases: .
Total Off-site Releases: .
Total Transfers Off-site for Further Waste Management: .
Total Waste Managed: .

TRI Chemical Trend Table
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	ETHYLENE GLYCOL	☑	☑	☑	☑
2	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	☑
3	ISOPROPYL ALCOHOL (MANUFACTURING, STRONG-ACID PROCESS ONLY, NO SUPPLIE	☑	☑	☑	
4	METHYL ETHYL KETONE	☑	☑	☑	☑
5	PHOSPHORIC ACID	☑	☑	☑	☑
6	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	
7	TETRACHLOROETHYLENE	☑	☑	☑	☑
8	ZINC (FUME OR DUST)	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-46-48
Longitude:	073-50-27
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11356NDSTR20451
RCRA ID Number (Land):	

Down load all data for COMSTAR INTL. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

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TRI Facility Profile

TRI Facility Name:	**CONSOLIDATED EDISON CO. OF NEW YORK - ASTORIA FACILITY**
Address:	20TH AVE. & 21ST ST.
	ASTORIA, NY 10015
County:	QUEENS
Public Contact:	JOSEPH PETTA
Phone Number:	212 460-4111

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

4911 ELECTRIC SERVICES
4922 NATURAL GAS TRANSMISSION

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	53,977
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	108,000

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information) ⓘ
1	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-47-13
Longitude:	073-54-44
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	10015CNSLD20THA
RCRA ID Number (Land):	

Down load all data for CONSOLIDATED EDISON CO. OF NEW YORK - ASTORIA FACILITY

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**CONSOLIDATED EDISON CO. OF NEW YORK -RAVENSWOOD FACILITY**
Address:	38-54 VERNON BLVD. LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	ROBERT MAHONY
Phone Number:	718 403-2522

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

4911 ELECTRIC SERVICES
4961 STEAM SUPPLY

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	43,057
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	86,000

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-45-34
Longitude:	073-56-44
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101CNSLD3854V
RCRA ID Number (Land):	

Down load all data for CONSOLIDATED EDISON CO. OF NEW YORK -RAVENSWOOD FACILITY

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

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TRI Facility Profile

TRI Facility Name:	**COSMOPOLITAN CHEMICAL CO.**
Address:	50-23 23RD ST.
	LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	SAMUEL WILDSTEIN
Phone Number:	718 729-7200

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

2899 CHEMICAL PREPARATIONS, NEC

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	250
Total Waste Managed:	35

TRI Facility Trend Graphs (click to view trend graph)

Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1995 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	SODIUM NITRITE	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-44-47
Longitude:	073-56-19
Parent Company Name:	METRO GROUP INC.
Parent Company Dun and Bradstreet:	008921850
TRI Facility ID Number:	11101CSMPL50232
RCRA ID Number (Land):	NYD001311455

Down load all data for COSMOPOLITAN CHEMICAL CO.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**EAGLE ELECTRIC MFG. CO. INC.**
Address:	45-31 CT. SQUARE LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	AL PIZZUTO
Phone Number:	718 361-4803

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	4
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3679 ELECTRONIC COMPONENTS, NEC

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	500
Total Off-site Releases:	1,481
Total Transfers Off-site for Further Waste Management:	3,946,110
Total Waste Managed:	3,946,513

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) i
1	COPPER	☑	☑	☑	☑
2	COPPER COMPOUNDS	☑	☑	☑	
3	DI(2-ETHYLHEXYL) PHTHALATE	☑	☑	☑	☑
4	FORMALDEHYDE	☑	☑	☑	☑
5	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	☑
6	LEAD	☑	☑	☑	☑
7	NITRIC ACID	☑	☑	☑	
8	SODIUM HYDROXIDE (SOLUTION)	☑	☑	☑	
9	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	
10	ZINC (FUME OR DUST)	☑	☑	☑	☑
11	ZINC COMPOUNDS	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-44-49
Longitude:	073-56-32
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101GLLCT4531C
RCRA ID Number (Land):	

Down load all data for EAGLE ELECTRIC MFG. CO. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**GETTY TERMINALS CORP.**
Address:	30-23 GREENPOINT AVE. LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	ROBERT SLADE
Phone Number:	516 338-6000

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	8
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

5171 PETROLEUM BULK STATIONS + TERMINALS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	4,511
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	93
Total Waste Managed:	118,737

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	1,2,4-TRIMETHYLBENZENE	☑	☑	☑	
2	BENZENE	☑	☑	☑	☑
3	CYCLOHEXANE	☑	☑	☑	
4	ETHYLBENZENE	☑	☑	☑	☑
5	METHYL TERT-BUTYL ETHER	☑	☑	☑	☑
6	N-HEXANE	☑	☑	☑	☑
7	TOLUENE	☑	☑	☑	☑
8	XYLENE (MIXED ISOMERS)	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-44-02
Longitude:	073-56-27
Parent Company Name:	GETTY PETROLEUM MARKETING INC.
Parent Company Dun and Bradstreet:	945075844
TRI Facility ID Number:	11101GTTYT3023G
RCRA ID Number (Land):	

Down load all data for GETTY TERMINALS CORP.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name: **INDEPENDENT CHEMICAL CORP.**
Address: 79-51 COOPER AVE.
GLENDALE, NY 11385
County: QUEENS
Public Contact:
Phone Number:

Forms Submitted to TRI in 1998 Reporting Year:
Form R (regular form): 0
Form A (short form): 3

Reported Standard Industrial Classification (SIC) Code(s):

5169 CHEMICALS + ALLIED PRODUCTS, NEC

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases: .
Total Off-site Releases: .
Total Transfers Off-site for Further Waste Management: .
Total Waste Managed: .

TRI Chemical Table
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	CERTAIN GLYCOL ETHERS	NA	NA	NA	
2	NITRIC ACID	NA	NA	NA	
3	PHOSPHORIC ACID	NA	NA	NA	☑

Other TRI Facility Information

Latitude:	040-42-31
Longitude:	073-52-12
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11385NDPND7951C
RCRA ID Number (Land):	

Down load all data for INDEPENDENT CHEMICAL CORP.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**NEW YORK POWER AUTHORITY CHARLES POLETTI POWER PLANT**
Address:	31-03 20TH AVE.
	ASTORIA, NY 11105
County:	QUEENS
Public Contact:	MICHAEL PETRALIA
Phone Number:	212 468-6322

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	2
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

4911 ELECTRIC SERVICES

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	358,365
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	358,370

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	☑
2	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-47-25
Longitude:	073-54-40
Parent Company Name:	NEW YORK POWER AUTHORITY
Parent Company Dun and Bradstreet:	075252098
TRI Facility ID Number:	11105NWYRK31032
RCRA ID Number (Land):	

Down load all data for NEW YORK POWER AUTHORITY CHARLES POLETTI POWER PLANT

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**OGDEN AVIATION SERVICE CO. OF NEW YORK INC.**
Address:	LAGUARDIA AIRPORT BUILDING 42 FLUSHING, NY 11371
County:	QUEENS
Public Contact:	JOHN FRANK
Phone Number:	718 476-5583

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	8
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

5171 PETROLEUM BULK STATIONS + TERMINALS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	3,310
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	2,323
Total Waste Managed:	5,522

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	1,2,4-TRIMETHYLBENZENE	☑	☑	☑	
2	BENZENE	☑	☑	☑	☑
3	ETHYLBENZENE	☑	☑	☑	☑
4	METHYL TERT-BUTYL ETHER	☑	☑	☑	☑
5	N-HEXANE	☑	☑	☑	☑
6	NAPHTHALENE	☑	☑	☑	☑
7	TOLUENE	☑	☑	☑	☑
8	XYLENE (MIXED ISOMERS)	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-46-38
Longitude:	073-52-20
Parent Company Name:	OGDEN CORP.
Parent Company Dun and Bradstreet:	001328053
TRI Facility ID Number:	11371GDNVTLAGUA
RCRA ID Number (Land):	

Down load all data for OGDEN AVIATION SERVICE CO. OF NEW YORK INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**OGDEN NEW YORK SERVICES INC.**
Address:	J.F.K. INTL. AIRPORT JAMAICA, NY 10001
County:	QUEENS
Public Contact:	RICHARD BUCCO
Phone Number:	718 995-9764

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	8
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

5171 PETROLEUM BULK STATIONS + TERMINALS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	2,075
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	8,900
Total Waste Managed:	10,975

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	BENZENE	☑	☑	☑	☑
2	CYCLOHEXANE	☑	☑	☑	
3	ETHYLBENZENE	☑	☑	☑	☑
4	METHYL TERT-BUTYL ETHER	☑	☑	☑	☑
5	N-HEXANE	☑	☑	☑	☑
6	NAPHTHALENE	☑	☑	☑	☑
7	TOLUENE	☑	☑	☑	☑
8	XYLENE (MIXED ISOMERS)	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-38-28
Longitude:	073-46-21
Parent Company Name:	OGDEN CORP.
Parent Company Dun and Bradstreet:	001328053
TRI Facility ID Number:	10001GDNNWJFKIN
RCRA ID Number (Land):	

Down load all data for OGDEN NEW YORK SERVICES INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access* EPA Envirofacts *to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**PEPSI COLA BOTTLING CO. OF NEW YORK INC.**
Address:	112-02 15TH AVE. COLLEGE POINT, NY 11356
County:	QUEENS
Public Contact:	DON THOMAS
Phone Number:	718 392-1000

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	0
Form A (short form):	1

Reported Standard Industrial Classification (SIC) Code(s):

2087 FLAVORING EXTRACTS + SIRUPS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	.
Total Off-site Releases:	.
Total Transfers Off-site for Further Waste Management:	.
Total Waste Managed:	.

TRI Facility Trend Graphs (click to view trend graph)

Total Transfers Off-site for Further Waste Management

TRI Chemical Trend Table
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	PHOSPHORIC ACID	☑	☑	☑	☑
2	SODIUM HYDROXIDE (SOLUTION)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-47-10
Longitude:	073-51-15
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	000942537
TRI Facility ID Number:	11356CNDDR11202
RCRA ID Number (Land):	

Down load all data for PEPSI COLA BOTTLING CO. OF NEW YORK INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

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TRI Facility Profile

TRI Facility Name:	**PILOT PRODS. INC.**
Address:	24-13 46TH ST. LONG ISLAND CITY, NY 11103
County:	QUEENS
Public Contact:	
Phone Number:	

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	0
Form A (short form):	3

Reported Standard Industrial Classification (SIC) Code(s):

3069 MISC RUBBER PRODUCTS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	.
Total Off-site Releases:	.
Total Transfers Off-site for Further Waste Management:	.
Total Waste Managed:	.

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases

TRI Chemical Trend Table
(all chemicals reported to TRI between 1992 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ℹ
1	2-MERCAPTOBENZOTHIAZOLE	☑	☑	☑	
2	BARIUM COMPOUNDS	☑	☑	☑	
3	THIRAM	☑	☑	☑	☑
4	ZINC COMPOUNDS	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-46-03
Longitude:	073-54-22
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11103PLTPR24134
RCRA ID Number (Land):	

Down load all data for PILOT PRODS. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI Facility Profile

TRI Facility Name:	**PROGRAMATIC PLATERS INC.**
Address:	49-25 20TH AVE. EAST ELMHURST, NY 11370
County:	QUEENS
Public Contact:	MARTIN ADAMS
Phone Number:	718 721-4330

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3471 PLATING + POLISHING

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	250
Total Transfers Off-site for Further Waste Management:	250
Total Waste Managed:	.

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1992 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ⓘ
1	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	☑
2	NICKEL	☑	☑	☑	
3	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-46-43
Longitude:	073-55-23
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11370PRGRM49252
RCRA ID Number (Land):	NYD045447398

Down load all data for PROGRAMATIC PLATERS INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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Comments?

This request took 2.53 seconds of real time (v1.0.1 build 1039).

TRI Explorer

EPA Office of Environmental Information

Facility Profile Report

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TRI Facility Profile

TRI Facility Name:	**SCHWARTZ CHEMICAL CO. INC.**
Address:	50-01 2ND ST. LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	JOHN D. GILROY
Phone Number:	718 784-7592

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	2
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

2851 PAINTS + ALLIED PRODUCTS

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	114
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	114

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	ACETONE	☑	☑	☑	☑
2	DICHLOROMETHANE	☑	☑	☑	☑
3	METHANOL	☑	☑	☑	☑
4	METHYL ETHYL KETONE	☑	☑	☑	☑
5	TOLUENE	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-44-35
Longitude:	073-57-28
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101SCHWR50012
RCRA ID Number (Land):	

Down load all data for SCHWARTZ CHEMICAL CO. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access* EPA Envirofacts *to view TRI data with the most recent revisions.*

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TRI *Explorer*

EPA Office of Environmental Information

Facility Profile Report

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TRI Facility Profile

TRI Facility Name:	**STANDARD MOTOR PRODS. INC.**
Address:	37-18 NORTHERN BLVD. LONG ISLAND CITY, NY 11101
County:	QUEENS
Public Contact:	AVIS DYER
Phone Number:	718 392-0200

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3694 ENGINE ELECTRICAL EQUIPMENT

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	40
Total Off-site Releases:	112
Total Transfers Off-site for Further Waste Management:	264,984
Total Waste Managed:	265,136

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	1,1,1-TRICHLOROETHANE	☑	☑	☑	☑
2	CHROMIUM	☑	☑	☑	
3	COBALT	☑	☑	☑	
4	COPPER	☑	☑	☑	☑
5	DICHLOROMETHANE	☑	☑	☑	☑
6	LEAD	☑	☑	☑	☑
7	MANGANESE	☑	☑	☑	☑
8	NICKEL	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-45-06
Longitude:	073-55-30
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11101STNDR3718N
RCRA ID Number (Land):	NYD001315266

Down load all data for STANDARD MOTOR PRODS. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

EPA Office of Environmental Information

Facility Profile Report

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TRI Facility Profile

TRI Facility Name:	**VOLKERT PRECISION TECHS. INC.**
Address:	222-40 96TH AVE. QUEENS VILLAGE, NY 11429
County:	QUEENS
Public Contact:	KEN HEIM
Phone Number:	718 464-9500

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3469 METAL STAMPINGS, NEC

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	4,250
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	6,760
Total Waste Managed:	7,981

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1990 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information)
1	TETRACHLOROETHYLENE	☑	☑	☑	☑
2	TRICHLOROETHYLENE	☑	☑	☑	☑

Other TRI Facility Information

Latitude:	040-42-28
Longitude:	073-43-30
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	11429VLKRT22240
RCRA ID Number (Land):	NYD982277774

Down load all data for VOLKERT PRECISION TECHS. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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This request took 2.32 seconds of real time (v1.0.1 build 1039).

TRI *Explorer*

EPA Office of Environmental Information

Release: Facility Report

See Note Return to selection

TRI On-site and Off-site Reported Releases (in pounds), All Chemicals, New York County, State of New York, 1998, All Industries

Row #	Facility and Chemical	TRIF ID	Fugitive Air	Stack Air	Total Air Emissions	Total On- and Off-site Releases
1	AES-HICKLING L.L.C., 11884 HICKLING RD., CORNING	14830SHCKL11884	0	598,415	598,415	623,215
	AMMONIA		0	6,400	6,400	6,400
	BARIUM COMPOUNDS		0	15	15	24,815
	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)		0	490,000	490,000	490,000
	HYDROGEN FLUORIDE		0	59,000	59,000	59,000
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)		0	43,000	43,000	43,000
2	CONSOLIDATED EDISON CO. OF NEW YORK -EAST RIVER FACILITY, 801 E. 14 ST., MANHATTAN	10009CNSLD801E1	0	41,072	41,072	41,072
	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)		0	41,072	41,072	41,072
3	MAGIC NOVELTY CO. INC., 308 DYCKMAN ST., NEW YORK	10034MGCNV304DY	0	0	0	0
	NITRIC ACID		0	0	0	0
	Total	3	0	639,487	639,487	664,287

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Export this report to a text file

Create comma-separated values, compatible with spreadsheet and databases.

Download all records

View other report type:

○ Transfers Off-site for Further Waste Management; or

○ Quantities of TRI Chemicals in Waste (waste management)

Note: Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a *"frozen"* data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.

On-site releases are from Section 5 of the Form R. Off-site releases are from Section 6 (transfers off-site to disposal) of the Form R. Off-site releases include metals and metal compounds transferred off-site for solidification/stabilization and for waste water treatment, including to POTWs.

A decimal point, or "." denotes that the facility left that particular cell blank in its Form R submission (a zero in a cell denotes either that the facility reported "0" or "NA" in its Form R submission). "NA" in a cell denotes that the facility has submitted only Form A and thus the data for release, waste transfers or quantities of TRI chemicals in waste are not applicable. By submitting a Form A the facility has certified that its total annual reportable amount is less than 500 pounds, and that the facility does not manufacture, process, or otherwise use more than 1 million pounds of the toxic chemical.

The facility may have reported multiple SIC codes to TRI in 1998. See the facility profile report by clicking on the facility name to see a list of all SIC codes submitted to TRI for the 1998 reporting year.

Users of TRI information should be aware that TRI data reflect releases and other waste management of chemicals, not exposure of the public to those chemicals. Release estimates alone are not sufficient to determine exposure or to calculate potential adverse effects on human health and the environment. TRI data, in conjunction with other information, can be used as a starting point in evaluating exposures that may result from release and other waste management activities that involve toxic chemicals.

Release:
Facility Report
September 19, 2000

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Comments?

This request took 2.18 seconds of real time (v1.0.1 build 1039).

TRI *Explorer*

EPA Office of Environmental Information

Facility Profile Report

Return

TRI Facility Profile

TRI Facility Name:	**AES-HICKLING L.L.C.**
Address:	11884 HICKLING RD. CORNING, NY 14830
County:	NEW YORK
Public Contact:	ROBERT J. VANG
Phone Number:	607 936-9553

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	5
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

4911 ELECTRIC SERVICES

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	598,415
Total Off-site Releases:	24,800
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	623,400

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information) ⓘ
1	AMMONIA	☑	☑	☑	☑
2	BARIUM COMPOUNDS	☑	☑	☑	
3	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	☑
4	HYDROGEN FLUORIDE	☑	☑	☑	
5	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	042-07-23
Longitude:	076-58-59
Parent Company Name:	AES CORP.
Parent Company Dun and Bradstreet:	043857812
TRI Facility ID Number:	14830SHCKL11884
RCRA ID Number (Land):	NYD079692117

Down load all data for AES-HICKLING L.L.C.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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TRI *Explorer*

EPA Office of Environmental Information

Facility Profile Report

Return

TRI Facility Profile

TRI Facility Name:	**CONSOLIDATED EDISON CO. OF NEW YORK -EAST RIVER FACILITY**
Address:	801 E. 14 ST. MANHATTAN, NY 10009
County:	NEW YORK
Public Contact:	JOSEPH PETTA
Phone Number:	212 460-4111

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

4911 ELECTRIC SERVICES
4961 STEAM SUPPLY

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	41,072
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	82,000

TRI Facility Graphs (click to view graph)

Total On- and Off-site Releases
Total Waste Managed

TRI Chemical Table (click to view table)
(all chemicals reported to TRI in 1998)

Row #	Chemical	On- and Off-site Releases	Transfers Off-site for Further Waste Management	Quantities of TRI Chemicals in Waste	EPA's IRIS Substance File (Risk Information)
1	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-43-42
Longitude:	073-58-29
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	10009CNSLD801E1
RCRA ID Number (Land):	

Down load all data for CONSOLIDATED EDISON CO. OF NEW YORK -EAST RIVER FACILITY

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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This request took 2.15 seconds of real time (v1.0.1 build 1039).

TRI Explorer

EPA Office of Environmental Information

Facility Profile Report

Return

TRI Facility Profile

TRI Facility Name:	**MAGIC NOVELTY CO. INC.**
Address:	308 DYCKMAN ST. NEW YORK, NY 10034
County:	NEW YORK
Public Contact:	DAVID NEUBURGER
Phone Number:	212 304-2777

Forms Submitted to TRI in 1998 Reporting Year:

Form R (regular form):	1
Form A (short form):	0

Reported Standard Industrial Classification (SIC) Code(s):

3953 MARKING DEVICES

Reported TRI Chemical Data
(in pounds, for all chemicals reported in 1998)

Total On-site Releases:	0
Total Off-site Releases:	0
Total Transfers Off-site for Further Waste Management:	0
Total Waste Managed:	12,274

TRI Facility Trend Graphs (click to view trend graph)

Total On- and Off-site Releases
Total Transfers Off-site for Further Waste Management
Total Waste Managed

TRI Chemical Trend Table (click to view trend table)
(all chemicals reported to TRI between 1988 and 1998)

Row #	Chemical	On- and Off-site Releases Trend	Transfers Off-site for Further Waste Management Trend	Quantities of TRI Chemicals in Waste Trend	EPA's IRIS Substance File (Risk Information) ⓘ
1	NITRIC ACID	☑	☑	☑	
2	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY)	☑	☑	☑	

Other TRI Facility Information

Latitude:	040-52-04
Longitude:	073-55-50
Parent Company Name:	NA
Parent Company Dun and Bradstreet:	NA
TRI Facility ID Number:	10034MGCNV304DY
RCRA ID Number (Land):	NYDOO1313816

Down load all data for MAGIC NOVELTY CO. INC.

Note: *Reporting year (RY) 1998 is the most recent TRI data available. Facilities reporting to TRI were required to submit RY 1998 data to EPA by July 1999. TRI Explorer is using a "frozen" data set that includes revisions submitted to EPA as of March 29, 2000 for the years 1988 to 1998 (i.e., revisions submitted to EPA after this time are not reflected in TRI Explorer reports). Please access EPA Envirofacts to view TRI data with the most recent revisions.*

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APPENDIX 7B

Letter Request for Amendment of the Pending SPDES Permit Modification Request for the Proposed KeySpan Ravenswood Cogeneration Facility:
Long Island City, Queens, New York

Revised November 2000

7B. SPDES PERMIT MODIFICATION APPLICATION

Appendix 7B presents a SPDES Permit Modification Application for the Ravenswood Generating Facility. This permit modification addresses the wastestreams that will result from the operation of the proposed Ravenswood Cogeneration Facility at the existing Ravenswood Generating Station.

As discussed in Section 7.6 of the Article X Application, the Modification Application assumes that the existing outfall (001), its associated low-volume outfalls (001A, 001B and 001C), the existing stormwater outfalls (002 and 003) and the proposed outfalls (001D, 001E, 001F, 001G, 001H, 001I, 001J and 001K) would retain the existing SPDES Permit Number NY0005193. All other existing outfalls (002, 003, 004, 005, 006 and 007) at the Ravenswood site would be assigned new permit numbers, unaffected by the proposed Cogeneration Facility.

The SPDES Modification Application incorporates the following New York State Department of Environmental Conservation forms:

- Application Form NY-2C for Industrial Facilities
- Industrial Application Form NY-2C Supplement A — Cogeneration and Steam Generating Facilities (Industrial Code 4911)

The SPDES Modification Application calls for no changes to the permit limits for the existing Outfalls 001, 001A, 001B and 001C. The only change addressed in the SPDES Modification Application is the addition of the new low-volume wastewater discharge outfalls (001D, 001E, 001F, 001G, 001H, 001I, 001J and 001K) associated with the proposed Cogeneration Facility. All low volume wastestreams from the proposed Cogeneration Facility will be discharged via the existing Outfall 001 and the resulting integrated discharge will meet all existing permit limits.

KeySpan Energy - Ravenswood SPDES Permit Modification Application Index

Location	Title
Section 1	Industrial Application Form NY-2C
Section 2	Form 2C Application Supplement Steam Generating Facility (SIC 4911)
Section 3	Current Ravenwood Generating Station SPDES Permit SPDES Permit # NY-005193
Section 4	Overall Ravenswood Generating Station Site Plan and Location Map
Attachment A	250 MW Cogeneration Facility Water Balance Diagrams
Attachment B	Existing Ravenswood Generating Station and Proposed 250 MW Combined Water Balance Diagram
Attachment C	250 MW Combined Cycle Project Preliminary MSDS Forms
Attachment D	Existing Discharge Structure Details
Attachment E	NYC Water Quality Data
Attachment F	Chemical Storage and Containment Features

Section 1

Industrial Application Form NY-2C

State Pollutant Discharge Elimination System (SPDES)

INDUSTRIAL APPLICATION FORM NY-2C

For New Permits and Permit Modifications to Discharge Industrial Wastewater and Storm Water

Section I - Permittee and Facility Information

Please type or print the requested information.

1. Current Permit Information (leave blank if for new discharge)

SPDES Number:	DEC Number:
NY0005193	2-6304-00024 / 00004-0

2. Permit Action Requested: (Check applicable box)

- [ ] A NEW proposed discharge
- [x] A MODIFICATION of the existing permit
- [ ] An EBPS INFORMATION REQUEST response
- [ ] An EXISTING discharge currently without permit

Does this request include an increase in the quantity of water discharged from your facility to the waters of the State?

- [x] YES - Describe the increase:
- [ ] NO - Go to Item 3. below.

Operation of a 250 MW Cogeneration Facility (Unit 4) - The modification addresses new low volume waste streams generated for the proposed Unit 4.

3. Permittee Name and Address

Name: KeySpan - Ravenswood, Inc.	Attention: H. Kosel VP Generation
Street Address: 175 Old Country Road	
City or Village: Hicksville	State: NY; ZIP Code: 11801

4. Facility Name, Address and Location

Name: Ravenswood Generating Station			
Street Address: 38 - 54 Vernon Boulevard		P.O. Box:	
City or Village: Long Island City	State: NY	ZIP Code: 11101	
Town: New York City	County: Queens		
Telephone: (718) 706-2707	FAX: (718) 361-8875	NYTM - E: 606923.87	NYTM - N: 277391.11
Tax Map Info (New York City, Nassau County and Suffolk County only)			
Section: Queens	Block: 357	Subblock:	Lot: 1

5. Facility Contact Person

Name: Robert D. Teetz	Title: General Manager Environmental Engineering and Compliance	
Street Address: KeySpan Energy, 445 Broadhollow Road		P.O. Box:
City or Village: Melville	State: NY	ZIP Code: 11747
Telephone: (631) 391-6133	FAX: (631) 391-6079	E-Mail or Internet: rteetz@keyspanenergy.com

6. Discharge Monitoring Report (DMR) Mailing Address

Mailing Name: KeySpan Environmental Engineering and Compliance	Responsible Person: M. Tucker	
Street Address: 445 Broadhollow Road		P.O. Box:
City or Village: Melville	State: NY	ZIP Code: 11747
Telephone: (631) 391-6133	FAX: (631) 391-6079	E-Mail or Internet: mtucker@keyspanenergy.com

INDUSTRIAL APPLICATION FORM NY-2C
Section I - Permittee and Facility Information

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

7. Summarize the outfalls present at the facility:

Outfall Number	Receiving Water	Type of discharge
001C *	East River	Combined Storm Drains
001D **	East River	Oil Water Separator Effluent
001E **	East River	Boiler Blowdown
001F **	East River	Granular Filter Backwash
001G **	East River	Neutralized Ion Exchange Regenerant Reject Water
001H **	East River	Evaporative Cooler Blowdown
001I **	East River	Air Condenser Fan Cleaning Effluent
001J **	East River	Ion Exchange Softening Reject Water
001K **	East River	External Heat Exchanger Blowdown

* Combined = Existing Generating Station and Proposed 250 MW Stormwater Outfall

** 250 MW Cogeneration Plant Discharge Only

8. Map of Facility and Discharge Locations:

Provide a detailed map showing the location of the facility, all buildings or structures present, wastewater discharge systems, outfall locations into receiving waters, nearby surface water bodies, water supply wells, and groundwater monitoring wells, and attach it to this application.

9. Water Flow Diagram:

Attachment A: Water Balance Diagram for the proposed 250 MW Cogeneration Plant for the different modes of operation.

Attachment B: Combined Water Balance Diagram for the existing Ravenswood Generating Station (Units 1, 2 and 3) and the Proposed 250 MW Cogeneration Plant (Unit 4).

The Average Daily Discharge from Outfall 001C is not expected to change with the construction of the 250 MW Cogeneration Plant (Unit 004). The majority of the project site is currently paved and used for parking.

INDUSTRIAL APPLICATION FORM NY-2C
Section I - Permittee and Facility Information

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

10. Nature of business: (Describe the activities at the facility and the date(s) that operation(s) at the facility commenced)

Operation of the existing Ravenswood Generation Project Unit 1 (January 1963), Unit 2 (April 1963) and Unit 3 (1965) in addition to the proposed 250 MW electric facility which is anticipated to be operational by 2003.

11. List the 4-digit SIC codes which describe your facility in order of priority:

Priority 1	Description:	Priority 3	Description:
4911	Electric Services		
Priority 2	**Description:**	**Priority 4**	**Description:**

12. Is your facility a primary industry as listed in Table 1 of the instructions?

[X] YES - Complete the following table.

[ ] NO - Go to Item 13. below.

Industrial Category	40 CFR		Industrial Category	40 CFR	
	Part	Subpart		Part	Subpart
Steam Electric Power Plant	423	15			

13. Does this facility manufacture, handle, or discharge recombinant-DNA, pathogens, or other potentially infectious or dangerous organisms?

[ ] YES - Attach a detailed explanation to this application.

[X] NO - Go to Item 14 below.

14. Is storm runoff or leachate from a material storage area discharged by your facility?

[X] YES - Complete the following table, and show the location of the stockpile(s) and discharge point(s) on the diagram in Item 9.

[ ] NO - Go to Item 15 on the following page. Materials stored within containment areas.

Size of area	Type(s) of material stored	Quantity of material stored	Runoff control devices
	Fuel Oil Tanks	750,000 gallons each	Secondary Containment
	Ammonia Tank	TBD	Secondary Containment
	Chemical Additives	See Attachment I for Specifics	Stored within Containment Areas

INDUSTRIAL APPLICATION FORM NY-2C
Section I - Permittee and Facility Information

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

15. Facility Ownership: (Place an "X" in the appropriate box)

Corporate [X] Sole Proprietorship [ ] Partnership [ ] Municipal [ ] State [ ] Federal [ ] Other [ ]

Are any of the discharges applied for in this application on Indian lands? Yes [ ] No [X]

16. List information on any other environmental permits for this facility:

Issuing Agency	Permit Type	Permit Number	Permit Status		
			Active	Applied for	Inactive
DEC	AIR	630000CE02GT001	X		
		630000CE02GT002	X		
		630000CE02GT004	X		
		630000CE02GT006	X		
		630000CE02GT008	X		
DEC	MOSF	2-1980 and 2-1960	X		
DEC	CBS	2-000063	X		
USEPA	Title V			X	

17. Laboratory Certification:

Were any of the analyses reported in Section III of this application performed by a contract laboratory or a consulting firm?

[ ] **YES - Complete the following table.**

[X] **NO - Go to Item 18 below.**

Name of laboratory or consulting firm	Address	Telephone (area code and number)	Pollutants analyzed

18. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment ·r knowing violations.

Name and official title (type or print)		Date signed
James K. Brennan, General Manager		
Signature	Telephone number	FAX number
	(516) 545-5598	(516) 545-5210

INDUSTRIAL APPLICATION FORM NY-2C
Section I - Permittee and Facility Information

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

19. Industrial Chemical Survey (ICS)

Complete all information for those substances your facility has used, produced, stored, distributed, or otherwise disposed of in the past five (5) years at or above the threshold values listed in the instructions. Include substances manufactured at your facility, as well as any substances that you have reason to know or believe present in materials used or manufactured at your facility. Do not include chemicals used only in analytical laboratory work, or small quantities of routine household cleaning chemicals. Enter the name and CAS number for each of the chemicals listed in Tables 6-10 of the instructions; and the table number which lists the chemical. You may use ranges (e.g. 10-100 lbs., 100-1000 lbs., 1000-10000 lbs., etc.) to describe the quantities used on an annual basis as well as for the amount presently on hand. For those chemicals listed in Tables 6, 7, or 8 which are indicated as being potentially present in the discharge from one or more outfalls at the facility, indicate which outfalls may be affected in the appropriate column below, and include sampling results in Section III of this application for each of the potentially affected outfalls. Make additional copies of this sheet if necessary.

Name of Substance	Table	CAS Number	Average Annual Usage	Amount Now On Hand	Units (gallons, lbs, etc)	Purpose of Use (see codes in Table 2 of instructions)	Present in Discharge? (Outfall(s)?)
Kerosene		08008-20-6	19.6	NA	Mil. Gal.	REA	NO
Alum (TBD)		TBD	TBD	NA	NA	Flocculant	001F
Sulfuric Acid	10	07664-93-9	TBD	NA	NA	pH Control	001G
Sodium Hydroxide	10	01310-73-2	TBD	NA	NA	pH Control	001G
Phosphate	10	TBD	TBD	NA	NA	pH Control	001E
Ammonia	7	07664-41-7	TBD	NA	NA	Air Pollution Control	NO
Sodium Sulfite		07757-83-7	TBD	NA	NA	Oxygen Scavenger	001H
Oxygen Scavenger (TBD)		TBD	TBD	NA	NA	Oxygen Scavenger	001E
Amine (TBD)		TBD	TBD	NA	NA	Neutralizing Agent	001E
Sodium Chloride Salt		TBD	TBD	NA	NA	Softener	001J

This completes Section I of the SPDES Industrial Application Form NY-2C. Section II, which requires specific information for each of the outfalls at your facility, and Section III, which requires sampling information for each of the outfalls at your facility, must also be completed and submitted with this application.

State Pollutant Discharge Elimination System (SPDES)

INDUSTRIAL APPLICATION FORM NY-2C

For New Permits and Permit Modifications to Discharge Industrial Wastewater and Storm Water

Section II - Outfall Information

Please type or print the requested information.

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

1. Outfall Number and Location

Outfall No.:		
001C	(Proposed 250 MW Plant and Existing Generating Station Combined Outfall)	
Latitude: 40° 45' 39"	Longitude: 73° 56' 49"	Receiving Water: East River

2. Type of Discharge and Discharge Rate (List all information applicable to this outfall)

	Volume/Flow	Units: MGD	GPM	Other (specify)		Volume/Flow	Units: MGD	GPM	Other (specify)
a. Process Wastewater					f. Noncontact Cooling Water				
b. Process Wastewater					g. Remediation System Discharge				
c. Process Wastewater					h. Boiler Blowdown				
d. Process Wastewater					I. Storm Water	Intermittent	NA	NA	NA
e. Contact Cooling Water					j. Sanitary Wastewater				
k. Other discharge (specify):									
l. Other discharge (specify):									

3. List process information for the Process Wastewater streams identified in 2.a-d above:

		Quantity per day	
a. Name of the process contributing to the discharge: Stormwater			Process SIC code: 4 9 1 1
Describe the contributing process: Stormwater and Roof Drain Runoff.	Category: / Subcategory:	Quantity per day:	Units of measure:
b. Name of the process contributing to the discharge:			Process SIC code:
Describe the contributing process:	Category: / Subcategory:	Quantity per day:	Units of measure:
c. Name of the process contributing to the discharge:			Process SIC code:
Describe the contributing process:	Category: / Subcategory:	Quantity per day:	Units of measure:
d. Name of the process contributing to the discharge:			Process SIC code:
Describe the contributing process:	Category: / Subcategory:	Quantity per day:	Units of measure:

4. Expected or Proposed Discharge Flow Rates for this outfall:

a. Total Annual Discharge	b. Daily Minimum Flow	c. Daily Average Flow	d. Daily Maximum Flow	e. Maximum Design flow rate
NA MG	NA MGD	NA MGD	NA MGD	NA MGD

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Facility Name: Ravenswood Generating Station	Outfall No.: 001C SPDES Number: NY0005193

5. Is this a seasonal discharge?

[ ] YES - Complete the following table.
[X] NO - Go to Item 6 below.

Operations contributing flow (list)	Discharge frequency		Flow					
	Batches per year	Duration per batch	Flow rate per day		Total volume per discharge	Units	Duration (Days)
			LTA	Daily Max			

Water Supply Source (indicate all that apply) Not Applicable

	Name or owner of water supply source	Volume or flow	Units (check one)		
Municipal Supply			MGD	GPD	GPM
Private Surface Water Source			MGD	GPD	GPM
Private Supply Well			MGD	GPD	GPM
Other (specify)			MGD	GPD	GPM

7. Outfall configuration: (Surface water discharges only) Not Applicable, Routed to Existing Discharge Canal (Outfall 001)

A. Where is the discharge point located with respect to the receiving stream?

In the streambank: [ ]

In the stream: [X] Information on the discharge configuration is attached. See Attachment D.

In the stream, with [ ] Attach description, including configuration and plan drawing of diffuser, if used.

B. If located in stream, approximately what percentage of stream width from shore is the discharge point located?

10% [ ] 25% [ ] 50% [ ] Other: [ ]

C. Describe the stream geometry in the general vicinity of the discharge point, in terms of approximate averages:

Average stream width	Average stream depth	Average stream velocity
Feet	Feet	

Are the results of a mixing/diffusion study attached? [ ] YES [ ] NO [X] NA

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Outfall No.:
001C
SPDES Number: NY0005193

Facility Name: Ravenswood Generating Station

8. Thermal Discharge Criteria

Is your facility one of the applicable types of facilities listed in the instructions, and does the temperature of this discharge exceed the receiving water temperature by greater than three (3) degrees Fahrenheit?

☐ YES - Complete the following table.

☒ NO - Go to Item 9. below.

☐ Information on the intake and discharge configuration of this outfall is attached

Discharge Temperature, deg. F			Duration of maximum discharge temperature		Dates of maximum discharge temperature		Maximum flow rate	Discharge configuration (e.g. subsurface, surface, effluent diffuser, diffusion well, etc.)
Average change in temperature (delta T)	Maximum change in temperature (delta T)	Maximum temperature	hours per day	days per year	From	To	MGD	

9. Are any water treament chemicals or additives that are used by your facility subsequently discharged through this outfall?

☐ YES - Complete the following table.

☒ NO - Go to Item 10. below.

☐ MSDS sheets attached

☐ Toxicity data attached

Product Name and Manufacturer	Additive Function	Dosage rate (include units)	Discharge concentration, mg/l		Discharge Frequency		Usage (Continuous/ Intermittent)
			Average	Maximum	hrs/day	days/wk	

10. Has any biological test for acute or chronic toxicity been performed on this outfall or on the receiving water in relation to this outfall in the past three (3) years?

☐ YES - Complete the following table.

☒ NO - Go to Item 11. on the following page.

Water tested	Purpose of test	Type of test	Chronic or Acute?	Subject species	Testing date(s)		Submitted? (Date)
					Start	Finish	

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Facility Name: Ravenswood Generating Station	Outfall No.: 001C
	SPDES Number: NY0005193

11. Is the discharge from this outfall treated to remove process wastes, water treatment additives, or other pollutants?

[X] YES - Complete the following table. Treatment codes are listed in Table 4.

[ ] NO - Go to Item 12 below.

Treatment process	Treatment Code(s)	Treatment used for the removal of:	Design Flow Rate (include units)
Best Management Practices	1-U		Intermittant / Variable

12. Does this facility have either a compliance agreement with a regulating agency, or have planned changes in production, which will materially alter the quantity and/or quality of the discharge from this outfall?

[ ] YES - Complete the following table.

[X] NO - Go to Section III on the following page.

Description of project	Subject to Condition or Agreement in existing permit or consent order? (List)	Change due to production increase?	Completion Date(s)	
			Required	Projected

This completes Section II of the SPDES Industrial Application Form NY-2C. Section I, which requires general information regarding your facility, and Section III, which requires sampling information for each of the outfalls at your facility, must also be completed and submitted with this application.

INDUSTRIAL APPLICATION FORM NY-2C
Section III - Sampling Information

Facility Name: Ravenswood Generating Station

SPDES No.: NY0005193

Outfall No.: 001C

1. Sampling Information - Conventional Parameters

Provide the analytical results of at least one analysis for every pollutant in this table. If this outfall is subject to a waiver as listed in Table 5 of the instructions for one or more of the parameters listed below, provide the results for those parameters which are required for this type of outfall.

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (using the same format) instead of completing this page.

Pollutant	Effluent data							Units		Intake data (optional)		
	a. Maximum daily value		b. Maximum 30 day value		c. Long term average		d. Number of analyses	a. Concentration	b. Mass	a. Long term average value		b. Number of analyses
	1. Concentration	2. Mass	1. Concentration	2. Mass	1. Concentration	2. Mass				1. Concentration	2. Mass	
a. Biochemical Oxygen Demand, 5 day (BOD)	< 100	NA	< 30	NA	< 30	NA	0	mg/l	NA			
b. Chemical Oxygen Demand (COD)	< 100	NA	< 50	NA	< 50	NA	0	mg/l	NA			
c. Total Suspended Solids (TSS)	< 100	NA	< 30	NA	< 30	NA	0	mg/l	NA			
d. Total Dissolved Solids (TDS)	< 300	NA	< 250	NA	< 200	NA	0	mg/l	NA			
e. Oil & Grease	< 20	NA	<15	NA	< 5	NA	0	mg/l	NA			
f. Chlorine, Total Residual (TRC)	ND	< 0	ND	0	ND	ND	0	mg/l	NA			
g. Total Organic Nitrogen (TON)	< 0.5	NA	< 0.4	NA	< 0.3	NA	0	mg/l	NA			
h. Ammonia (as N)	< 0.25	NA	< 0.2	NA	< 0.1	NA	0	mg/l	NA			
i. Flow	Value Intermittent		Value Intermittent		Value Intermittent		0	NA	NA	Value		
j. Temperature, winter	Value NA		Value NA		Value NA		0	NA		Value		
k. Temperature, summer	Value NA		Value NA		Value NA		0	NA		Value		
l. pH	Minimum 5.0	Maximum 8.0	Minimum 5.0	Maximum 8.0	5.0 - 8.0		0	Standard pH unit		Minimum	Maximum	

2. Sampling Information - Priority Pollutants, Toxic Pollutants, and Hazardous Substances

a. Primary Industries:

I. Does the discharge from this outfall contain process wastewater?
- [ ] Yes - Go to Item II. below.
- [X] No - Go to Item b. below.

II. Indicate which GC/MS fractions have been tested for: Volatiles: [ ] Acid: [ ] Base/Neutral: [ ] Pesticide: [ ]

b. All applicants:

I. Are any of the pollutants listed in Tables 6, 7, or 8 of the instructions known or expected to be present in the discharge from this outfall?
- [X] Yes - Concentration and mass data attached.
- [ ] No - Go to Item II. below.

II. Are any of the pollutants listed in Table 9 of the instructions known or expected to be present in the discharge from this outfall?
- [ ] Yes - Source or reason for presence in discharge attached
- [ ] Yes - Quantitative data attached
- [X] No

INDUSTRIAL APPLICATION FORM NY-2C
Section III - Sampling Information

Facility Name: Ravenswood Generating Station	SPDES No.: NY0005193	Outfall No.: 001C

3. Projected Effluent Quality - Priority Pollutants, Toxic Pollutants, and Hazardous Substances

Provide analytical results of at least one analysis for each pollutant known or believed present in this discharge, as well as for any GC/MS fractions and metals required to be sampled from Section III Forms, Item 2.a on the preceding page.

List the name and CAS number for each pollutant you know or have reason to believe is present in the discharge from this outfall. For each pollutant listed from Tables 6, 7, or 8, provide the results of at least one analysis for that pollutant, and determine the mass discharge based on the flow rate reported in Item 1.i. For each pollutant listed from Table 9, or any other toxic pollutant not listed in Tables 6-10, you must provide concentration and mass data (if available) and/or an explanation for their presence in the discharge. Make as many copies of this table as necessary for each outfall.

Page 1 of 1

Pollutant and CAS Number	Effluent data							Units		Intake data (optional)			Believed present, no sampling results available
	a. Maximum daily value		b. Maximum 30 day value (if available)		c. Long term average value (if available)		d. Number of analyses	a. Concentration	b. Mass	a. Long term average value		d. Number of analyses	
	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass	(1) Concentration	(2) Mass				(1) Concentration	(2) Mass		
Nitrogen, Nitrate CAS Number:	< 1.0	NA	< 0.5	NA	< 0.5	NA	0	mg/l	NA				
Phosphorous (as P) CAS Number: 07723-14-0	< 0.2	NA	< 0.15	NA	< 0.1	NA	0	mg/l	NA				
Sulfate (as SO4) CAS Number: 14808-79-8	< 50	NA	< 30	NA	< 20	NA	0	mg/l	NA				
Aluminum, Total CAS Number: 07439-90-5	< 0.5	NA	< 0.3	NA	< 0.2	NA	0	mg/l	NA				
Iron, Total CAS Number: 07439-89-6	< 1.0	NA	< 0.5	NA	< 0.3	NA	0	mg/l	NA				
Sodium, Total CAS Number: 07440-23-5	< 50	NA	< 30	NA	< 20	NA	0	mg/l	NA				
Chloride CAS Number:	< 50	NA	< 30	NA	< 20	NA	0	mg/l	NA				
CAS Number:													
CAS Number:													
CAS Number:													
CAS Number:													
CAS Number:													
CAS Number:													

State Pollutant Discharge Elimination System (SPDES)

INDUSTRIAL APPLICATION FORM NY-2C

For New Permits and Permit Modifications to Discharge Industrial Wastewater and Storm Water

Section II - Outfall Information

Please type or print the requested information.

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

1. Outfall Number and Location

Outfall No.:		
001D	(Proposed 250 MW Plant Outfall)	
Latitude 40° 45' 39"	Longitude 73° 56' 49"	Receiving Water East River

2. Type of Discharge and Discharge Rate (List all information applicable to this outfall)

	Volume/Flow	Units MGD	Units GPM	Units Other (specify)		Volume/Flow	Units MGD	Units GPM	Units Other (specify)
a. Process Wastewater	25		X		f. Noncontact Cooling Water				
b. Process Wastewater					g. Remediation System Discharge				
c. Process Wastewater					h. Boiler Blowdown				
d. Process Wastewater					i. Storm Water				
e. Contact Cooling Water					j. Sanitary Wastewater				
k. Other discharge (specify):									
l. Other discharge (specify):									

3. List process information for the Process Wastewater streams identified in 2.a-d above:

a. Name of the process contributing to the discharge			Process SIC code:
Oil / Water Separator Effluent			4 9 1 1
Describe the contributing process: Floor Drains Stormwater in Oily Areas	Category / Subcategory	Quantity per day: 25	Units of measure: GPM

b. Name of the process contributing to the discharge			Process SIC code:
Describe the contributing process	Category / Subcategory	Quantity per day	Units of measure

c. Name of the process contributing to the discharge			Process SIC code:
Describe the contributing process	Category / Subcategory	Quantity per day	Units of measure

d. Name of the process contributing to the discharge			Process SIC code:
Describe the contributing process	Category / Subcategory	Quantity per day	Units of measure

4. Expected or Proposed Discharge Flow Rates for this outfall:

a. Total Annual Discharge	b. Daily Minimum Flow	c. Daily Average Flow	d. Daily Maximum Flow	e. Maximum Design flow rate
13 MG	0 MGD	0.036 MGD	NA MGD	NA MGD

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Facility Name:	Outfall No.: 001D
Ravenswood Generating Station	SPDES Number: NY0005193-

5. Is this a seasonal discharge?

☐ YES - Complete the following table.

☒ NO - Go to Item 6 below.

Operations contributing flow (list)	Discharge frequency		Flow				
	Batches per year	Duration per batch	Flow rate per day LTA	Flow rate per day Daily Max	Total volume per discharge	Units	Duration (Days)

6. Water Supply Source (indicate all that apply) Not Applicable

	Name or owner of water supply source	Volume or flow	Units (check one)		
Municipal Supply	Maximum New York City Water required to operate the proposed Unit 4	0. 55	☒ MGD	GPD	GPM
Private Surface Water Source			MGD	GPD	GPM
Private Supply Well			MGD	GPD	GPM
Other (specify)			MGD	GPD	GPM

7. Outfall configuration: (Surface water discharges only) Not Applicable, Routed to existing discharge canal (Outfall 001)

A. Where is the discharge point located with respect to the receiving stream?

In the streambank: ☐

In the stream: ☒ Information on the discharge configuration is attached. See Attachment D.

In the stream, with ☐ Attach description, including configuration and plan drawing of diffuser, if used.

B. If located in stream, approximately what percentage of stream width from shore is the discharge point located?

10% ☐ 25% ☐ 50% ☐ Other: ☐

C. Describe the stream geometry in the general vicinity of the discharge point, in terms of approximate averages:

Average stream width	Average stream depth	Average stream velocity
Feet	Feet	

Are the results of a mixing/diffusion study attached? ☐ YES ☐ NO ☒ NA

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Facility Name:	Outfall No.: 001D
Ravenswood Generating Station	SPDES Number: NY0005193

8. Thermal Discharge Criteria

Is your facility one of the applicable types of facilities listed in the instructions, and does the temperature of this discharge exceed the receiving water temperature by greater than three (3) degrees Fahrenheit?

[ ] YES - Complete the following table.

[X] NO - Go to Item 9. below.

[ ] Information on the intake and discharge configuration of this outfall is attached

Discharge Temperature, deg. F			Duration of maximum discharge temperature		Dates of maximum discharge temperature		Maximum flow rate	Discharge configuration (e.g. subsurface, surface, effluent diffuser, diffusion well, etc.)
Average change in temperature (delta T)	Maximum change in temperature (delta T)	Maximum temperature	hours per day	days per year	From	To	MGD	

9. Are any water treament chemicals or additives that are used by your facility subsequently discharged through this outfall?

[ ] YES - Complete the following table.

[X] NO - Go to Item 10. below.

[ ] MSDS sheets attached

[ ] Toxicity data attached

Product Name and Manufacturer	Additive Function	Dosage rate (include units)	Discharge concentration, mg/l		Discharge Frequency		Usage (Continuous/ Intermittent)
			Average	Maximum	hrs/day	days/wk	

10. Has any biological test for acute or chronic toxicity been performed on this outfall or on the receiving water in relation to this outfall in the past three (3) years?

[ ] YES - Complete the following table.

[X] NO - Go to Item 11. on the following page.

Water tested	Purpose of test	Type of test	Chronic or Acute?	Subject species	Testing date(s)		Submitted? (Date)
					Start	Finish	

INDUSTRIAL APPLICATION FORM NY-2C
Section II - Outfall Information

Facility Name:	Outfall No.: 001D
Ravenswood Generating Station	SPDES Number: NY0005193

11. Is the discharge from this outfall treated to remove process wastes, water treatment additives, or other pollutants?

[X] YES - Complete the following table. Treatment codes are listed in Table 4.

[ ] NO - Go to Item 12 below.

Treatment process	Treatment Code(s)	Treatment used for the removal of:	Design Flow Rate (include units)
Oil / Water Separator	6-A		25 gpm (minimum)

12. Does this facility have either a compliance agreement with a regulating agency, or have planned changes in production, which will materially alter the quantity and/or quality of the discharge from this outfall?

[ ] YES - Complete the following table.

[X] NO - Go to Section III on the following page.

Description of project	Subject to Condition or Agreement in existing permit or consent order? (List)	Change due to production increase?	Completion Date(s)	
			Required	Projected

This completes Section II of the SPDES Industrial Application Form NY-2C. Section I, which requires general information regarding your facility, and Section III, which requires sampling information for each of the outfalls at your facility, must also be completed and submitted with this application.

INDUSTRIAL APPLICATION FORM NY-2C
Section III - Sampling Information

Facility Name:	SPDES No.:	Outfall No.:
Ravenswood Generating Station	NY0005193	001D

1. Sampling Information - Conventional Parameters

Provide the analytical results of at least one analysis for every pollutant in this table. If this outfall is subject to a waiver as listed in Table 5 of the instructions for one or more of the parameters listed below, provide the results for those parameters which are required for this type of outfall.

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (using the same format) instead of completing this page.

Pollutant	Effluent data							Units		Intake data (optional)		
	a. Maximum daily value		b. Maximum 30 day value		c. Long term average		d. Number of analyses	a. Concentration	b. Mass	a. Long term average value		b. Number of analyses
	1. Concentration	2. Mass	1. Concentration	2. Mass	1. Concentration	2. Mass				1. Concentration	2. Mass	
a. Biochemical Oxygen Demand, 5 day (BOD)	< 5	< 1.5	< 5	< 1.5	< 5	< 1.5	0	mg/l	lbs/day	*		
b. Chemical Oxygen Demand (COD)	< 10	< 3.0	< 10	< 3.0	< 10	< 3.0	0	mg/l	lbs/day	*		
c. Total Suspended Solids (TSS)	< 30	< 9.0	< 30	< 9.0	< 30	< 9.0	0	mg/l	lbs/day	*		
d. Total Dissolved Solids (TDS)	< 300	< 90.0	< 250	< 75.0	< 250	< 75.0	0	mg/l	lbs/day	*		
e. Oil & Grease	< 20	< 6.0	< 15	< 4.5	< 15	< 4.5	0	mg/l	lbs/day	*		
f. Chlorine, Total Residual (TRC)	< 0.5	< 0.15	< 0.5	< 0.15	< 0.5	< 0.15	0	mg/l	lbs/day	*		
g. Total Organic Nitrogen (TON)	< 5	< 1.5	< 5	< 1.5	< 5	< 1.5	0	mg/l	lbs/day	*		
h. Ammonia (as N)	<1	< 0.3	< 1	< 0.3	< 1	< 0.3	0	mg/l	lbs/day	*		
i. Flow	Value 0.036		Value 0.036		Value 0.036		0	MGD	NA	Value		
j. Temperature, winter	Value NA		Value NA		Value NA		0	NA		Value		
k. Temperature, summer	Value NA		Value NA		Value NA		0	NA		Value		
l. pH	Minimum 6.0	Maximum 9.0	Minimum 6.0	Maximum 9.0	6.0 - 9.0		0	pH standard units		Minimum	Maximum	

* See NYC Water Quality Data for the Catskill-Delaware System, provided in Attachment E.

2. Sampling Information - Priority Pollutants, Toxic Pollutants, and Hazardous Substances

a. Primary Industries: I. Does the discharge from this outfall contain process wastewater?

- [X] Yes - Go to Item II. below.
- [ ] No - Go to Item b. below.

II. Indicate which GC/MS fractions have been tested for: Volatiles: [ ] Acid: [ ] Base/Neutral: [ ] Pesticide: [ ]

b. All applicants: I. Are any of the pollutants listed in Tables 6, 7, or 8 of the Instructions known or expected to be present in the discharge from this outfall?

- [ ] Yes - Concentration and mass data attached.
- [X] No - Go to Item II. below.

II. Are any of the pollutants listed in Table 9 of the instructions known or expected to be present in the discharge from this outfall?

- [ ] Yes - Source or reason for presence in discharge attached
- [ ] Yes - Quantitative data attached
- [X] No

State Pollutant Discharge Elimination System (SPDES)

INDUSTRIAL APPLICATION FORM NY-2C

For New Permits and Permit Modifications to Discharge Industrial Wastewater and Storm Water

Section II - Outfall Information

Please type or print the requested information.

Facility Name:	SPDES Number:
Ravenswood Generating Station	NY0005193

1. Outfall Number and Location

Outfall No.:		
001E	(Proposed 250 MW Plant Outfall)	
Latitude 40° 45' 39"	Longitude 73° 56' 49"	Receiving Water East River

2. Type of Discharge and Discharge Rate (List all information applicable to this outfall)

	Volume/Flow	Units MGD	Units GPM	Units Other (specify)		Volume/Flow	Units MGD	Units GPM	Units Other (specify)
a. Process Wastewater	34		X		f. Noncontact Cooling Water				
b. Process Wastewater					g. Remediation System Discharge				
c. Process Wastewater					h. Boiler Blowdown				
d. Process Wastewater					I. Storm Water				
e. Contact Cooling Water					j. Sanitary Wastewater				
k. Other discharge (specify):									
l. Other discharge (specify):									

3. List process information for the Process Wastewater streams identified in 2.a-d above:

a. Name of the process contributing to the discharge				Process SIC code: 4 9 1 1
Describe the contributing process: Netralized Boiler Blowdown	Category 423	Subcategory 15	Quantity per day 34	Units of measure GPM
b. Name of the process contributing to the discharge				Process SIC code:
Describe the contributing process	Category	Subcategory	Quantity per day	Units of measure
c. Name of the process contributing to the discharge				Process SIC code:
Describe the contributing process	Category	Subcategory	Quantity per day	Units of measure
d. Name of the process contributing to the discharge				Process SIC code:
Describe the contributing process	Category	Subcategory	Quantity per day	Units of measure

4. Expected or Proposed Discharge Flow Rates for this outfall:

a. Total Annual Discharge	b. Daily Minimum Flow	c. Daily Average Flow	d. Daily Maximum Flow	e. Maximum Design flow rate
18 MG	0 MGD	0.05 MGD	0.05 MGD	0.05 MGD