BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

Vero Beach, Florida
Municipal Power Plant - Unit 5

B&V Project 16834
B&V File 32.0401
March 9, 1991

Florida Department of Environmental Regulation
Bureau of Air Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Mr. Clair Fancy

Gentlemen:

Enclosed is a copy of our conference memorandum from our visit with you on February 12, 1991.

If you have any questions or comments, please let us know.

Yours very truly,

BLACK & VEATCH

L. W. Sherrill

LWS
Enclosure

cc: Peter Cunningham
Shuler Massey

Black & Veatch

CONFERENCE MEMORANDUM

City of Vero Beach
Combustion Turbine Project
Meeting with Florida Department
of Environmental Regulation

B&V Project 16834
B&V File
March 8, 1991

Meeting held on Tuesday, February 12, 1991, at the offices of the Florida Department of Environmental Regulation (DER), Division of Air Resources Management, in Tallahassee, Florida.

Attending:

DER	Hopping, Green, Boyd, & Sams (HGB&S)	B&V
Claire Fancy	Peter Cunningham	Earl Windisch
Barry Andrews	Rick Melson	Wade Sherrill
	Gary Perkow	Morgan Fagan
City		Anne Harris
Shuler Massey		Mike Pelan

BACKGROUND INFORMATION

On December 21, 1990, the City of Vero Beach received a Notice of Intent (NOI) from the DER to issue an air construction permit (No. AC-31-184928:PAS -FL-152). The NOI was accompanied by a Technical Evaluation and Preliminary Determination for air emissions and pollutant control technology from the proposed Vero Beach combustion turbine facility. The proposed permit contains 24 specific conditions, including prescribed emission limits for a number of air pollutants based on the DER's preliminary determination of Best Available Control Technology (BACT). The DER's BACT for NOx during combined cycle operation would require the use of Selective Catalytic Reduction (SCR) to achieve an emission rate of 9 ppmvd or 25 ppmvd (at 15 percent oxygen) when firing natural gas or No. 2 fuel oil, respectively. In the BACT analysis portion of its permit application, the City determined that BACT for NOx emissions from the proposed combined cycle unit is the use of water injection necessary to limit emissions to 42 ppmvd or 65 ppmvd (at 15 percent oxygen) when burning natural gas or No. 2 fuel oil, respectively. The city rejected SCR as BACT for NOx because of site-specific energy, environmental, and economic concerns.

The purpose of this meeting was to acquaint the DER staff with the proposed project, to explain the proposed mode of operation of the new combustion turbine in conjunction with the existing Unit 2 steam turbine, and to demonstrate that the proposed mode of operation will result in a significant reductions in NOx emissions without the use of SCR technology.

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Description of the Proposed Facility

B&V initiated the meeting by explaining the location of the proposed facility within the City's existing municipal electric system. B&V noted that load growth projections for the City had demonstrated a need for additional peaking capacity, and that this project was undertaken to provide the additional capacity.

There are currently 4 units in operation within the City's system. The operation of the new unit, referred to as unit 5, will present the City with considerable flexibility in meeting the system load requirements. The new Unit 5 combustion turbine can be operated independently, in simple cycle, or as a combined cycle with the existing Unit 2 steam turbine. When operated in combined cycle with Unit 2, Unit 5 will become the most efficient unit and will therefore become the base load unit at the Vero Beach plant. The existing Unit 4 or Unit 3 will become the regulating unit, and loading to these units will be variable depending on the system demand.

The existing Unit 2 steam generator is in excellent condition, and there are no plans to retire it. The Unit 2 gas/oil fired boiler will remain in standby operation and will be capable of supplying steam to the Unit 2 steam turbine at any time the new Heat Recovery Steam Generator (HRSG) is unavailable for service. The Unit 2 steam generator and the Unit 5 HRSG cannot operate at the same time. An operating diagram was presented during the meeting to indicate the two independent operating modes.

The City emphasized that the new unit includes numerous design features to ensure minimum environmental impacts resulting from construction and operation of the proposed facility. In addition to the reductions in air emissions from the facility that will be achieved by the operation of Unit 5, the facility will contain state-of-the-art noise attenuation features and will minimize City water use by utilizing sewage effluent from the City's municipal water treatment plant for cooling, water injection for NOx control, and steam cycle makeup

Environmental Considerations Associated with Operation of Unit 5

B&V discussed the environmental considerations associated with the operation of the proposed facility and the potential air quality impacts resulting from a number of operating scenarios. B&V first noted that the ambient air quality impacts as defined by the Environmental Protection Agency (EPA) resulting from the addition of the new combustion turbine are modeled to be less than significant.

B&V then presented Tables 1-8 (Attachment A) summarizing NOx emissions in various operating scenarios. B&V stressed that hourly emissions of NOx for a peak load and a base load condition will be higher if Unit 5 is not added, or if it is added and operated in simple cycle mode. The information presented in Tables 1-8 is summarized below.

Table 1: Current Permitted NOx Emission Rates at Full Plant Capacity All Existing Units In Operation

This table shows the currently permitted NOx emission rates in pounds per hour with all existing units operating at full capacity. Because Units 1, 2, and 3 do not have permit conditions limiting NOx emissions, the data are based on average AP-42 emission factors for natural gas and residual oil fuel for units of this size. The potential NOx emissions for the four units are 591.0 lbs/h when operating on gas and 559.7 lbs/h when operating on oil.

Table 2: Proposed NOx Emission Rates at Full Plant Capacity Unit 5 Operating in Simple Cycle

Table 2 shows the proposed NOx emission rates with the proposed Unit 5 combustion turbine operating in simple cycle and all other units operating at full capacity. Under this scenario, there would be an increase in overall emissions of NOx (75 lb/h) due to the addition of Unit 5. The emission rate of the new combustion turbine, however, is less than that of any of the existing units.

Table 3: Proposed NOx Emission Rates at Full Plant Capacity Unit 5 in Combined Cycle Without SCR

Table 3 shows the operating condition with the new Unit 5 combustion turbine operating in combined cycle (without SCR) with existing Unit 2 steam turbine and all other units operating at maximum capacity. This operating scenario shows a net decrease of 54.9 lb/h of NOx emissions from the facility when compared with the current condition when operating on gas and a 2.2 percent increase when operating on No. 2 fuel oil.

Table 4: Proposed NOx Emission Rates With Unit 5 Operating in Combined Cycle With SCR

This table shows the emission rates at full capacity when Unit 5 is operated in combined cycle with Unit 2 and SCR technology is employed. As expected, the NOx emission rates are further reduced by 60 lb/h on gas and 78.5 lb/h on No. 2 fuel oil.

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Table 5: Current Permitted NOx Emission Rates at Base Load Capacity Unit 4 Operating At Base Load

Table 5 summarizes plant emissions with Unit 4 operating at base load condition without Unit 5. This is an operating scenario which currently exists at the plant a majority of the time. Since the existing Unit 4 is the most efficient unit in the plant, it would normally be in operation whenever system load is sufficient. Potential NOx emissions on gas are 137.0 lb/h, and on No. 2 fuel oil, 205.5 lb/h.

Table 6: Operating Unit 5 in Simple Cycle Mode

Table 6 shows a similar base load condition using the new Unit 5 combustion turbine in simple cycle and the existing Unit 2 operating as a conventionally fired boiler. This operating condition would meet approximately the same base load requirements. In this operating scenario, there would be a potential increase in NOx emissions of 67.9 lb/h on gas and 24.0 lb/h on No. 2 fuel oil.

Table 7: Operating Unit 5 in Combined Cycle Mode Without SCR

Table 7 shows Unit 5 operating in combined cycle operation (using the Unit 2 steam turbine) only. This operating scenario would result in a decrease in NOx emissions of 62 lb/h on gas and 84.5 lb/h on No. 2 fuel oil.

Table 8: Operating Unit 5 in Combined Cycle Mode With SCR

When Unit 5 is operating in combined cycle, and SCR technology is installed on the HRSG, there is the additional reduction in NOx emissions of 60 lb/h on gas and 78.5 lb/h on oil.

B&V noted that the information in the dispersion modeling and the emission scenario tables indicates that no major environmental benefits in the form of NOx emission reductions would be gained from installing SCR technology on Unit 5. Further, if SCR technology is required, other adverse environmental consequences may result. SCR technology requires onsite storage and handling of ammonia and could result in emissions of particulate ammonia sulfate compounds and potentially hazardous unreacted ammonia. In addition, SCR technology would require periodic replacement of catalytic elements, which could require implementation of hazardous waste disposal procedures. The minimal environmental benefit to be gained in decreases of NOx emissions and the potential risks associated with ammonia storage and use associated with the installation of SCR technology indicate that this control technology is not an appropriate requirement for this project.

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Cost of Installation of SCR

B&V noted that installation and use of an SCR technology would have a significant economic impact on the project. In the BACT presented to the DER with the air permit application, the City noted that installation and operation of SCR would increase total cost for the project by $790,000 per year, resulting in an incremental cost of $3,050 per ton of NOx removed while burning natural gas and $2,290 per ton of NOx removed while burning No. 2 fuel oil. Since submitting its permit application for the proposed combined cycle unit, the City has performed a refined economic analysis which establishes the incremental cost of SCR to be between $4,500 and $4,700 per ton of NOx removed, depending on whether the unit is firing natural gas or No. 2 fuel oil. This refined analysis will be presented to the DER in the near future.

DER Comments

DER noted that EPA's main interest is whether other, similarly sized facilities of a particular type have successfully implemented a particular control technology. EPA is less interested in the cost per ton of pollutant removed. If the technology has been operated successfully, a strong case must be made to EPA to justify why it should not be employed in the case being considered. Further, EPA only considers environmental impacts AFTER evaluating the economic impact of employing the technology.

B&V emphasized that the City has demonstrated a decrease in NOx without the use of SCR when Unit 5 is operated in combined cycle mode with the HRSG. In this scenario, Unit 2 cannot operate. The City is retaining Unit 2 only to maintain its operating flexibility.

DER noted that EPA will also question actual versus potential emissions. The tables presented show only potential emissions. B&V noted, however, that the City was not attempting to use offsets, but that the City was arguing that these potential NOx reductions should be included as environmental considerations in the BACT analysis.

DER stated that they did not fully understand the potential impacts of operating the facility in the various modes described during this meeting. DER suggested that the City submit a letter to the DER describing the information presented in the tables and include both historical and projected emissions. Emission evaluations on other pollutants (e.g. SO2) should also be included. The new economic analysis should accompany this submittal. The City should justify the source of its calculations. The DER will send a copy of the City's letter to EPA.

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DER noted that other proposed Florida combustion turbine projects are basically new generation. DER anticipates that all of these projects would be required to employ SCR for NOx reduction.

It is not clear what restrictions EPA has recommended during operation in simple cycle mode. The DER stated that the Northeast States Commission on Air Use Management (NESCAUM) provided a guidance document in the fall of 1990 which stated that 2,500 hours on simple cycle operation should be the threshold. DER will consult the EPA on this matter.

Summary

HBG&S summarized the presentations and noted that the City would submit additional information for the DER's consideration in the near future. He emphasized that the proposed project would result in lower hourly emissions than if no new unit were added or the new unit were operated in simple cycle mode. If the combined cycle option is not available, the City could operate Unit 5 in simple cycle, but NOx controls such as quiet combustors are not yet available for this size unit. Vendors have confirmed that quiet combustors will not be available until at least 1993. The City must ensure that it can meet its capacity requirements in the near future.

HBG&S also noted that the City wishes to continue its dialogue with the DER to explore the options of modification of the permit conditions to eliminate the requirement for including SCR on the proposed facility. However, to avoid waiver of the City's right to challenge the DER's proposed actions as set forth in the NOI, the City does plan to file a petition for formal administrative proceedings to challenge certain construction permit conditions. He emphasized that the City hopes to achieve a mutually acceptable resolution without the initiation of formal administrative proceedings.

afh

cc: E. C. Windisch
L. W. Sherrill
M. E. Fagan
A. F. Harris
M. L. Pelan

Hand Delivered 3-28-91

File Copy

HOPPING BOYD GREEN & SAMS

ATTORNEYS AND COUNSELORS

123 SOUTH CALHOUN STREET

POST OFFICE BOX 6526

TALLAHASSEE, FLORIDA 32314

(904) 222-7500

FAX (904) 224-8551

CARLOS ALVAREZ
JAMES S. ALVES
BRIAN H. BIBEAU
ELIZABETH C. BOWMAN
WILLIAM L. BOYD, IV
RICHARD S. BRIGHTMAN
PETER C. CUNNINGHAM
THOMAS M. DeROSE
WILLIAM H. GREEN
WADE L. HOPPING
FRANK E. MATTHEWS
RICHARD D. MELSON
WILLIAM D. PRESTON
CAROLYN S. RAEPPLE
GARY P. SAMS
ROBERT P. SMITH, JR.
CHERYL G. STUART

KATHLEEN BLIZZARD
RICHARD W. MOORE
ANGELA R. MORRISON
MARIBEL N. NICHOLSON
DIANA M. PARKER
LAURA BOYD PEARCE
GARY V. PERKO
MICHAEL P. PETROVICH
DAVID L. POWELL
DOUGLAS S. ROBERTS
CECELIA C. SMITH

OF COUNSEL
W. ROBERT FOKES

March 27, 1991

RECEIVED

MAR 28 1991

DER - BAQM

Clair Fancy, P.E.
Bureau Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road, Room 338
Tallahassee, Florida 32399-2400

Re: City of Vero Beach
Municipal Power Plant - Unit 5
Permit File Nos. AC 31-184982
and PSD-FL-152
OGC File No. 91-0376
DOAH Case No. 91-1400EPP

Dear Clair:

Enclosed for the Department's consideration in connection with the referenced matter please find the following documents submitted on behalf of the City of Vero Beach as a follow up to our meeting last month:

Attachment "A" -- Summary of Information Supporting City of Vero Beach Position Regarding NO_x Control for Unit 5.

Attachment "B" -- Information on Selective Catalytic Reduction Costs for City of Vero Beach "Unit 5" Project.

Attachment "C" -- Comparison of Permitted and Projected NO_x Emission Levels from City of Vero Beach Municipal Power Plant.

The City hopes that the information provided in these attachments will be of assistance to the Department in

reconsidering the proposed emission limits and preliminary BACT determination for nitrogen oxides applicable to Unit 5 when operated in the combined cycle mode.

Your continued consideration in this matter is much appreciated.

Sincerely,

Peter C. Cunningham

VeroBeach:gbb

cc: Douglas MacLaughlin, Esquire
Barry Andrews ✓ 3-27-91
Teresa Heron
Clem Holladay
Jewell A. Harper, EPA
Chuck Collins, CD
CHF w/6 Attachments
3-29-91 RAM

ATTACHMENT "A"

SUMMARY OF INFORMATION SUPPORTING CITY OF VERO BEACH POSITION REGARDING NO_x CONTROL FOR UNIT 5

(SCR COST INFORMATION IS DETAILED IN ATTACHMENT "B")

(NO_x EMISSION COMPARISONS ARE DETAILED IN ATTACHMENT "C")

Existing Generation

The City of Vero Beach Municipal Electric Plant currently consists of four gas and oil fired steam boilers and their related steam turbine electric generators, as follows:

Unit 1	12.5 MW
Unit 2	16.5 MW
Unit 3	33.0 MW
Unit 4	55.0 MW
Total	117.0 MW

Proposed Unit 5

The proposed Unit 5 combustion turbine will provide 40 MW of new gas or oil fired electric generating capacity. The proposed heat recovery steam generator (HRSG) to be built in conjunction with Unit 5 will enable the City to use waste heat from Unit 5 to provide an alternative source of steam for the existing Unit 2 steam turbine electric generator.

The existing Unit 2 steam boiler is in excellent condition and there are no plans to retire it. This boiler will remain in standby, and will be capable of supplying steam to the Unit 2 steam turbine electric generator at any time the new HRSG is unavailable for service. Of course, both the Unit 2 steam boiler and the Unit 5 HRSG will not operate at the same time.

Typical Operation Today

Unit 4 is currently the most efficient unit at the Vero Beach plant. It therefore dispatches first and operates essentially as a base load unit. The next most efficient unit at the Vero Beach plant, Unit 3, typically operates in the intermediate load range in response to system demand.

Typical Operation With Unit 5

The new Unit 5 combustion turbine, when operated in the combined cycle mode with the HRSG and the existing Unit 2 steam turbine electric generator, will be the most efficient unit at the Vero Beach plant. It will therefore be the first unit to be dispatched and will effectively substitute

for Unit 4 as a base load unit. Unit 3 or Unit 4 will then become the "regulating" unit for the Vero Beach system, and the loading on these units will vary depending on the system demand.

NOx Emission Characteristics of Unit 5

The new Unit 5 has the lowest NOx emission rate of any of the units at the Vero Beach plant in pounds per megawatt hour, as shown in the following table. This remains true whether the unit is operated in the simple cycle mode (producing 40 MW) or in the combined cycle mode (producing 60 MW).

	Potential NOx Emissions (Pounds/MWH)	
	Natural Gas	Oil
Unit 1	8.456	5.000
Unit 2	7.873	6.576
Unit 3	6.618	5.548
Unit 4	2.491	3.736
Unit 5 (Simple Cycle)	1.875	3.025
Unit 5 (Combined Cycle)	1.250	2.017

This low emission rate means that hourly NOx emissions from the Vero Beach plant will be reduced in the typical situation in which electricity generated by Unit 5 displaces generation by one of the other units at plant. 1/

1/ The only situation in which hourly NOx emissions would be increased is if the electricity generated by Unit 5 was in addition to generation by the other units. This situation could occur if the HRSG were not in operation and the City needed to call on the maximum capacity of all of its generating units. In that case, Unit 5 could operate in the simple cycle mode while Unit 2 was being fired by its existing steam generator. Even in this situation, the average NOx emissions per MWH of electricity generated would be lower than today, because of the relatively low emissions rate enjoyed by Unit 5.

Maximum Permitted NOx Emissions of Vero Beach Plant

The Vero Beach plant currently has permitted maximum annual NOx emissions of 2,589 tons/year (gas) and 2,451 tons/year (oil), assuming that existing Units 1 to 4 operate continuously at their maximum rated capacities. (See Base Case on Tables A and B)

The Notice of Intent to Issue Permit would allow Unit 5 to operate in a simple cycle mode with a NOx emissions limit of 42 ppmvd (gas) and 65 ppmvd (oil). These limits are based on using water injection as BACT in the simple cycle mode. The permitted maximum annual NOx emissions of the plant would thus increase to 2,917 tons/year (gas) and 2,981 tons/year (oil), assuming that all five units operate continuously at their maximum rated capacities, with Unit 5 operating in the simple cycle mode. (See Option 1 on Tables A and B)

Under the City's proposal for NOx emissions limits of 42 ppmvd (gas) and 65 ppmvd (oil) using water injection as BACT in the combined cycle mode, the permitted maximum annual NOx emissions would be 2,348 tons/year (gas) and 2,506 tons/year (oil). This assumes that all five units operate continuously at their maximum rated capacities, with Unit 5 operating in the combined cycle mode. (See Option 2 on Tables A and B).

For the natural gas firing scenario, the City's proposal represents a decrease in annual permitted NOx emissions of 241 tons/year compared to current permit levels, and a decrease of 569 tons/year compared to the level that would be allowed assuming simple cycle operation of Unit 5 under the Notice of Intent to Issue Permit.

For the oil firing scenario, the City's proposal represents a slight increase of 55 tons/year in annual permitted NOx emissions compared to current permit levels, but a decrease of 475 tons/year compared to DER's proposed permit levels for Unit 5 in simple cycle operation.

Potential NOx Emissions Under Projected Load Conditions

As an alternative to analyzing maximum annual permitted NOx emissions, the City has also examined potential NOx emissions under projected load conditions. The results of this analysis are shown in graphic form on Figure 3. As that figure demonstrates, the projected annual NOx emissions with Unit 5 available to run only in the simple cycle mode

are significantly lower than expected NOx emissions without Unit 5. This reduction occurs because the electricity generated by Unit 5, with its relatively low emissions rate, displaces electricity that would otherwise have been generated by units with higher emissions rates.

This projected reduction in annual NOx emissions is even greater when Unit 5 operates in the combined cycle mode, which is expected to be its normal method of operation.

Tables C and D present these comparative NOx emissions projections in tabular form for the years 1992 and 1999. As these tables show, total annual NOx emissions are reduced approximately 197 tons/year (1992) and 239 tons/year (1999) if Unit 5 is added and operated only in the simple cycle mode. These reductions are even greater, approximately 417 tons/year (1992) and 507 tons/year (1999), if Unit 5 is added and operated in the combined cycle mode. This represents a 38% decrease in the combined cycle mode and an 18% decrease in the simple cycle mode in annual NOx emissions compared to the base case scenario in which the same amount of electricity is generated by the existing Units 1 to 4.

Conclusion

The City's proposal for NOx emissions limits of 42 ppmvd (gas) and 65 ppmvd (oil) based on water injection provides significant emission reductions whether compared to the maximum permitted emissions for the Vero Beach plant or to the expected emissions from that plant under projected load conditions.

While additional emission reductions could be obtained by the use of selective catalytic reduction (SCR) when Unit 5 is operated in the combined cycle mode, the City submits that these additional reductions are not justified when consideration is given to (1) the significant reductions which already result from the addition of Unit 5 with water injection to the Vero Beach plant, (2) the significant additional cost (approximately $4,500 to 4,700 per ton) associated with the incremental NOx reductions that could be achieved by the use of SCR.

Table A

PERMITTED MAXIMUM -- 100% GAS FIRING

	NOx Emissions on Natural Gas (Tons/Yr)	Emissions Difference from Base Case (Tons/Yr)	Emissions Difference from Option 1 (Tons/Yr)
BASE CASE			
Existing Plant (Permitted)	2,589	---	-328
OPTION 1			
Existing Plant & Unit 5 (Simple Cycle) without SCR (Proposed by Appliant and Permittable per Notice of Intent)	2,917	+328	---
OPTION 2			
Existing Plant & Unit 5 (Combined Cycle) without SCR (Proposed by Applicant)	2,348	-241	-569
OPTION 3			
Existing Plant & Unit 5 (Combined Cycle) with SCR (Proposed by DER)	2,085	-504	-832

Table B

PERMITTED MAXIMUM -- 100% OIL FIRING

	NOx Emissions On Oil (Tons/Yr)	Emissions Difference from Base Case (Tons/Yr)	Emissions Difference from Option 1 (Tons/Yr)
BASE CASE			
Existing Plant (Permitted)	2,451	---	-530
OPTION 1			
Existing Plant & Unit 5 (Simple Cycle) without SCR (Proposed by Appliant and Permittable per Notice of Intent)	2,981	+530	---
OPTION 2			
Existing Plant & Unit 5 (Combined Cycle) without SCR (Proposed by Applicant)	2,506	+55	-475
OPTION 3			
Existing Plant & Unit 5 (Combined Cycle) with SCR (Proposed by DER)	2,162	-289	-319

Table C

PROJECTED EMISSIONS -- 1992

	NOx Emissions On Gas & Oil (Tons/Yr)	Emissions Difference from Base Case (Tons/Yr)	Emissions Difference from Option 1 (Tons/Yr)
BASE CASE			
Existing Plant (Permitted)	1,091	---	+197
OPTION 1			
Existing Plant & Unit 5 (Simple Cycle) without SCR (Proposed by Appliant and Permittable per Notice of Intent)	894	-197	---
OPTION 2			
Existing Plant & Unit 5 (Combined Cycle) without SCR (Proposed by Applicant)	674	-417	-220
OPTION 3			
Existing Plant & Unit 5 (Combined Cycle) with SCR (Proposed by DER)	523	-568	-371

Table D

PROJECTED EMISSIONS -- 1999

	NOx Emissions On Gas & Oil (Tons/Yr)	Emissions Difference from Base Case (Tons/Yr)	Emissions Difference from Option 1 (Tons/Yr)
BASE CASE			
Existing Plant (Permitted)	1,328	---	+239
OPTION 1			
Existing Plant & Unit 5 (Simple Cycle) without SCR (Proposed by Appliant and Permittable per Notice of Intent)	1,089	-239	---
OPTION 2			
Existing Plant & Unit 5 (Combined Cycle) without SCR (Proposed by Applicant)	821	-507	-268
OPTION 3			
Existing Plant & Unit 5 (Combined Cycle) with SCR (Proposed by DER)	637	-691	-452

ATTACHMENT "B"

INFORMATION ON SELECTIVE CATALYTIC REDUCTION COSTS FOR CITY OF VERO BEACH "UNIT 5" PROJECT

Prepared by Black & Veatch

Capital Cost	Scope	Price $ 1,000
1)SCR Reactor	Evaporator System HRSG Modifications Catalyst & Housing CEM Analyzer Inj. Grid Piping & Valves (AIG to Header) Dilution Fan	$1,154
2) SCR Auxiliaries and NH_3 Storage	Tank Piping & Valves Burm Pumps	$125
3) Erection & Engineering	Installation	$218
4) Balance of Equipment	Foundations Ammonia System Erection Misc. Piping & Valves	$37
Total Capital Cost		$1,534
5) Contingency (15%)	Accounts for unforseen price increases.	$230
6) Escalation (6%)	Accounts for price increase between the time of the evaluation and when the equipment is purchased (mid-point of construction)	$70
7) Indirects (16%)	Accounts for the cost of goods and services that are not directly related to the cost of the equipment.	$293
8) Interest During Construction (8%)	Assumes that all payments are made on a lump sum basis at the midpoint of construction. It represent the interest accrued on the capital from the time it is spent until commercial operation.	$83
Total Installed Cost		$2,210

Annual Operating Costs:		
9) Operation and Maintenance Cost	Catalyst replacement Maintenance Labor Operating Labor ECM parts and service Catalyst freight	$614
10) Ammonia Usage	Cost of the ammonia used in the process.	$68
11) Heat Rate Penalty	Includes the additional fuel cost as a result of the additional back pressure created by the SCR.	$Neg.
12) Power Consumption	Auxiliary power requirements to run the SCR system.	$41
13) Lost Generating Capacity	The additional back pressure created by SCR reduces the output of the CT. This lost power will then have to be replaced by other system capacity. There are two components; 1) the cost of building additional capacity and 2) the operating cost of the additional capacity.	$149
Total Operating Cost		$873
14) Fixed Charges on Capital	This represents the annualized portion of total capital cost. The fixed charge rate includes the cost of money, taxes, insurance, and administrative costs.	$248
Total Annual Cost		$1,121

CAPITAL COSTS:	Standard Combustor Design Plus SCR	Standard Combustor Design
	$1,000	$1,000
Differential Combustion(1) turbine costs	Base	Base
HRSG Modification	NA	Base
SCR reactor	1154	Base
SCR Auxilliaries and ammonia storage	125	Base
Water treatment, storage, and injection equipment	NA	Base
SCR Erection	218	Base
Foundations, Ammonia System Erection & BOP Equipment	37	Base
Total Capital Cost	1534	Base
Contingency, (15%)	230	Base
Subtotal	1764	Base
Escalation, (6%)	70	Base
Total Escalated Cost	1834	Base
Sales Tax, (0%)	0	Base
Subtotal	1834	Base
Indirects, (16.0%)	293	Base
IDC, (8.00%)	83	Base
Total Installed Costs	2210	Base

LEVELIZED ANNUAL COST:

Differential O&M Cost	614	Base
Ammonia	68	NA
Energy		
Heat Rate Penalty	0	Base
Power Consumption	41	Base
Lost Generating Capacity & Energy	149	Base
	873	Base
Fixed Charges on Capital,(11.20%)	248	Base
Total Annual Cost	1121	Base
Incremental Total Annual Cost	1121	Base
Annual NOx Emission, tpy		
Gas, tpy	67	312
Oil, tpy	0	0
	67	312
Tpy removed	245	
$/ton Removed	4573	

Oil

Capital Cost	Scope	Price $ 1,000
1)SCR Reactor	Evaporator System HRSG Modifications Catalyst & Housing CEM Analyzer Inj. Grid Piping & Valves (AIG to Header) Dilution Fan	$1,154
2) SCR Auxiliaries and NH_3 Storage	Tank Piping & Valves Burm Pumps	$125
3) Erection & Engineering	Installation	$219
4) Balance of Equipment	Foundations Ammonia System Erection Misc. Piping & Valves	$37
Total Capital Cost		$1,535
5) Contingency (15%)	Accounts for unforseen price increases.	$230
6) Escalation (6%)	Accounts for price increase between the time of the evaluation and when the equipment is purchased (mid-point of construction)	$70
7) Indirects (16%)	Accounts for the cost of goods and services that are not directly related to the cost of the equipment.	$294
8) Interest During Construction (8%)	Assumes that all payments are made on a lump sum basis at the midpoint of construction. It represent the interest accrued on the capital from the time it is spent until commercial operation.	$84
Total Installed Cost		$2,213

Oil

Annual Operating Costs:		
9) Operation and Maintenance Cost	Catalyst replacement Maintenance Labor Operating Labor ECM parts and service Catalyst freight	$836
10) Ammonia Usage	Cost of the ammonia used in the process.	$86
11) Heat Rate Penalty	Includes the additional fuel cost as a result of the additional back pressure created by the SCR.	$Neg.
12) Power Consumption	Auxiliary power requirements to run the SCR system.	$61
13) Lost Generating Capacity	The additional back pressure created by SCR reduces the output of the CT. This lost power will then have to be replaced by other system capacity. There are two components; 1) the cost of building additional capacity and 2) the operating cost of the additional capacity.	$212
Total Operating Cost		$1194
14) Fixed Charges on Capital	This represents the annualized portion of total capital cost. The fixed charge rate includes the cost of money, taxes, insurance, and administrative costs.	$248
Total Annual Cost		$1,442

CAPITAL COSTS:	Standard Combustor Design Plus SCR	Standard Combustor Design
	$1,000	$1,000
Differential Combustion(1) turbine costs	Base	Base
HRSG Modification	NA	Base
SCR reactor	1154	Base
SCR Auxilliaries and ammonia storage	125	Base
Water treatment, storage, and injection equipment	NA	Base
SCR Erection	219	Base
Foundations, Ammonia System Erection & BOP Equipment	37	Base
Total Capital Cost	1535	Base
Contingency, (15%)	230	Base
Subtotal	1765	Base
Escalation, (6%)	70	Base
Total Escalated Cost	1835	Base
Sales Tax, (0%)	0	Base
Subtotal	1835	Base
Indirects, (16.0%)	294	Base
IDC, (8.00%)	84	Base
Total Installed Costs	2213	Base

Oil

LEVELIZED ANNUAL COST:

Differential O&M Cost	836	Base
Ammonia	86	NA
Energy		
Heat Rate Penalty	0	Base
Power Consumption	61	Base
Lost Generating Capacity & Energy	212	Base
	1194	Base
Fixed Charges on Capital,(11.20%)	248	Base
Total Annual Cost	1442	Base
Incremental Total Annual Cost	1442	Base
Annual NOx Emission, tpy		
Gas, tpy	0	0
Oil, tpy	193	503
	193	503
Tpy removed	310	
$/ton Removed	4658	

ATTACHMENT "C"

COMPARISON OF PERMITTED AND PROJECTED NO_x EMISSION LEVELS FROM CITY OF VERO BEACH MUNICIPAL POWER PLANT

Prepared by Black & Veatch

BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913)339-2000

Vero Beach, Florida
Municipal Power Plant - Unit 5

B&V Project 16834
B&V File 32.0402
March 11, 1991

Florida Department of Environmental Regulation
Bureau of Air Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Mr. Clair Fancy

Gentlemen:

Thank you for the opportunity to meet with you in your offices on February 12, 1991. We are anxious to work with you to allow construction to begin on the new generating unit in a timely manner in order to meet load demands which are forecasted for the City of Vero Beach Municipal Electric System.

As we discussed, the new combustion turbine project which is being planned for the City of Vero Beach is unique in the manner in which it will be operating. Some of the project's features include the following:

The Combustion turbine unit will be capable of black start to loaded condition within ten minutes. This feature will allow the unit to meet the Florida Coordinating Group's criteria for spinning reserve and could thus avoid the requirement of having a spare steam-turbine generator in operation to handle unexpected outages on the interconnected system.

The existing unit 2 steam generator is in excellent condition and there are no plans to retire it. The unit will remain in standby and will be capable of supplying steam to the unit 2 steam turbine at any time the new Heat Recovery Steam Generator (HRSG) is unavailable for service. Of course, both the Unit 2 steam generator and the Unit 5 HRSG will not operate at the same time. The attached operating diagram (figure 1) we presented during the meeting indicate the two distinct operating modes.

The City of Vero Beach owns 10.8 MW of generation at the St. Lucie Nuclear station and 18.8 MW of the coal fueled Stanton Energy Center in Orlando. These units will normally be dispatched first since they are the most efficient generation owned by the City, however the operation of the Vero Beach plant with Unit 5 in service will provide the City with another very efficient generation source and will also provide considerable flexibility in meeting the system load. The new Unit 5 Combustion Turbine, when

operated in combined cycle with Unit 2 steam turbine, will become the most efficient unit at the Vero Beach plant and will therefore become the first units to be dispatched from the Vero Beach plant site. The existing Unit 3 or Unit 4 will then become the regulating unit for the Vero Beach system. The instantaneous loading of these units will be variable, depending on the system demand.

The attached tables were presented at our meeting to show that the potential hourly NO_x emissions from the plant will decrease with the operation of Unit 5 combustion turbine when it is operated with existing unit 2 in the combined cycle mode. Tables 1 through 8 show various system operating conditions and the resulting NO_x emissions rates in pounds per hour as follows. A brief explanation of the information which was presented in each table is repeated here for your convenience.

Table 1 shows the currently permitted NO_x emission rates in pounds per hour with all existing units operating at full capacity. Unit 1, 2, and 3 do not have a permit restriction on NO_x, therefore the data is based on average AP-42 emission factors for natural gas and residual oil fuel for units of this size.

Table 2 shows the NO_x emission rates with the proposed Unit 5 combustion turbine operating in simple cycle mode and all other units operating at full capacity. There would of course be an increase in NO_x emissions under this scenario by the amount of new emissions attributed to Unit 5. Note, however, that the NO_x emission rate of the new combustion turbine is less than that of any other existing units.

Table 3 shows the operating condition with the new combustion turbine Unit 5 operating in combined cycle with existing Unit 2 steam turbine and all other units operating at maximum capacity. This operating scenario shows a net decrease of 9.3 % in NO_x emission rates from the current condition when operating on natural gas and only a 2.2 % increase when burning number 2 fuel oil.

Table 4 shows the emission rates of the plant at full capacity if the new Unit 5 were operated in combined cycle with Unit 2 and a Selective Catalytic Reduction device were also installed. The emission rates in this instance are further reduced by another 11 % when firing gas and 13.2 % when burning oil.

Table 5 shows Unit 4 only operating at full load condition while all other units are off. This is an operating scenario which currently is not unusual at the Vero Beach plant during light system load conditions. Since the existing Unit 4 is the most efficient unit at the Vero Beach plant, it would normally be the first unit at the plant to be dispatched.

Table 6 shows a similar load condition using the new Unit 5 combustion turbine operating in simple cycle and the existing unit 2 operating as a conventionally fired boiler. This operating condition would meet approximately the same load as that shown in Table 5.

Table 7 shows Unit 5 in combined cycle operation with Unit 2 only. This condition will result in a decrease in emissions of 62 lb/hr or 45.3 % on gas and 84.5 lb/h or 42.2% on oil over existing unit 4 operation.

Table 8 is the comparable case when Unit 5 is operating in combined cycle with Unit 2 and an SCR is installed on the HRSG. This shows an additional reduction of 60 lb/hr on gas and 78.5 lb/hr on oil from table 7.

As you requested, we are also enclosing additional data which reasonably address the total annual NO_x emissions under projected load conditions. In order to establish a baseline for comparison of NO_x emissions from the Vero Beach plant, both with and without an SCR on the new HRSG, the future net annual KWHR energy requirements for the Vero Beach system was used to establish the maximum potential generating hours for the plant. This projection was made by R. W. Beck and Associates. The generation available at both St. Lucie nuclear and Stanton Energy Center were not included in the analysis.

The annual Kilowatt-hour (KWHR) energy load growth projection is shown in Figure 3. The projected peak load kilowatt (KW) demand growth is shown in Figure 2.

The allocation of generation from each of the four existing units was made using the same percent contribution of total annual KWHR energy generation that each unit actually contributed in 1990. For example, in 1990 Unit 1 was responsible for 3.2 % of the total generation. Units 2, 3, and 4 were responsible for 4.8, 18.4, and 73.6 percent of the total annual KWHR of generation, respectively. The City could meet the annual Kilowatt-hour energy projection through 1999 (see figure 3) utilizing the existing capacity at the plant. However, it could not meet the projected Kilowatt peak demand after 1993 without the additional generating capacity from the new Unit 5 (see figure 2).

The annual NO_x emissions for this baseline reference case is shown in the top curve of Figure 4. This projection was made using the same ratio of natural gas to fuel oil usage as the past three years' average fuel use. Annual NO_x emissions for each unit were based on the unit's rated capacity and its potential NO_x emission rate. The potential NO_x emission rates were derived from AP-42 emission factors (Units 1, 2, and 3) and NSPSs criteria for Unit 4. The emission rates are consistent with the rates used in the earlier analysis (submitted during our meeting of 2/12/91) and FDER emission inventory methods.

A second case for projected annual NO_x emissions shown in the center curve of Figure 4 was made for the scenario where Unit 5 is installed as a simple cycle unit only, beginning in 1992 with 5000 hours of operation. Hours of operation for subsequent years were then incremented upward at the same percentage rate as the KWHR energy load projection. Annual NO_x emissions for Unit 5 were based on the proposed (and approved) BACT limits of 42/65 ppmvd for natural gas and fuel oil firing in the simple cycle mode,

respectively. The load distribution percentages for Units 1 through 4 is in the same ratio as in the first case.

The third case shown on the bottom curve of figure 4 is for annual NO_x emissions with Unit 5 and Unit 2 operating in combined cycle. Otherwise the distribution of total generation is the same as in case 2. In this case however, the Unit 2 steam generator is not operating and therefore does not contribute any NO_x emission.

The results shown in Figure 4 demonstrate that, with this model, the potential annual NO_x emissions from the Vero Beach plant with Unit 5 installed are less than the potential emissions using the current plant configuration (i.e. without Unit 5).

The current permitted maximum potential annual NO_x emission from the Vero Beach plant is 2,589 tons per year for natural gas and 2,451 tons per year for fuel oil. These values will increase to a maximum of 2,917 and 2,981 tons per year for natural gas and fuel oil respectively with the addition of Unit 5 in the simple cycle mode at the permit conditions of 25/65 ppmvd. With Unit 5 operating in the combined cycle mode, even <u>without</u> Selective Catalytic Reduction, the maximum potential annual NO_x emission would be lower (2,348 tons per year for natural gas, and 2,506 tons per year for fuel oil combustion).

Although the above annual operating models are straight line examples, we believe that the relative NO_x emissions would be comparable to any actual operating scenarios.

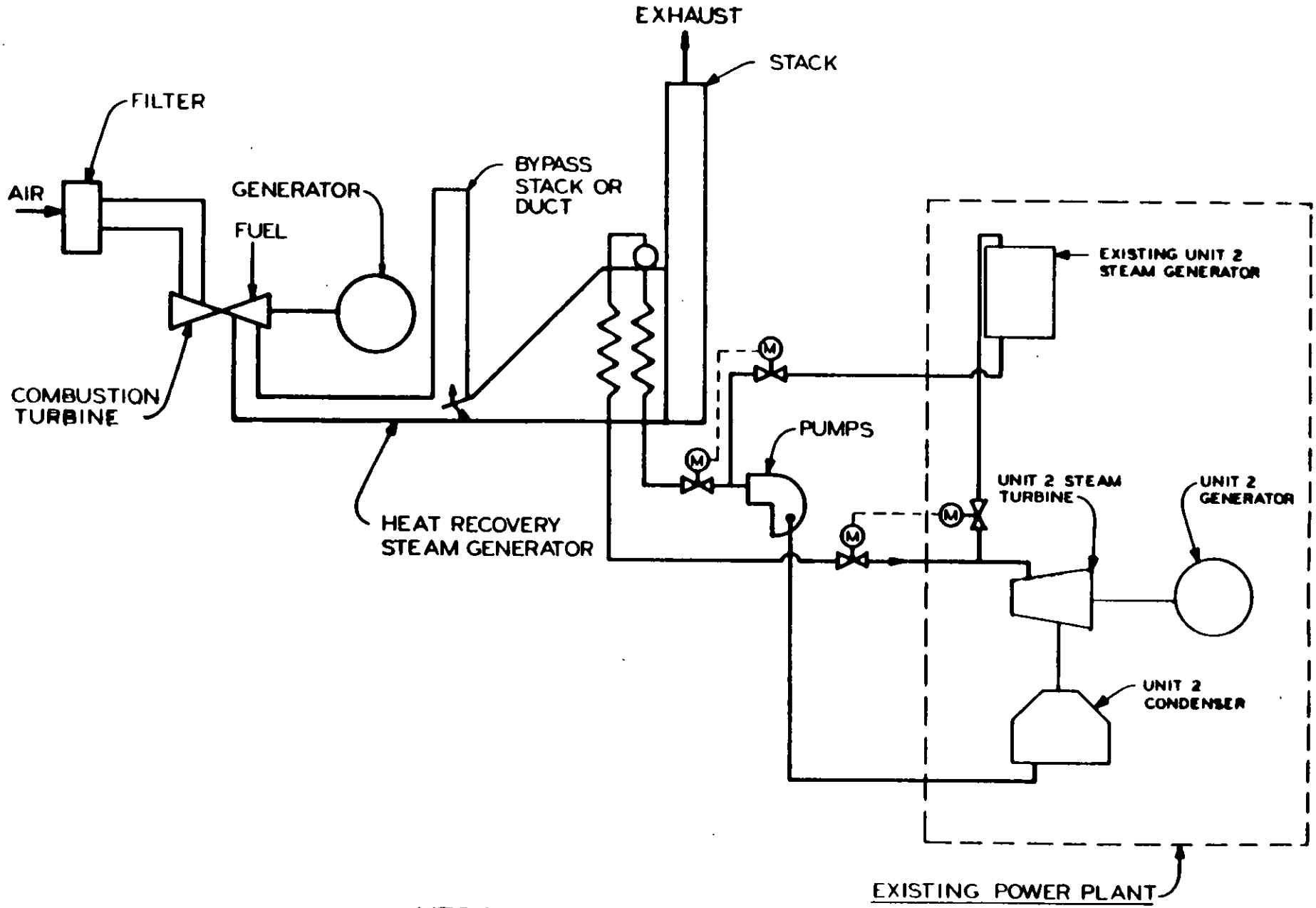
We appreciate this opportunity to respond to your concerns. If you have any questions, please let us know.

Yours very truly,

BLACK & VEATCH

L. W. Sherrill

cc: Mr. Shuler Massey
Mr. Peter Cunningham



VERO BEACH
COMBUSTION TURBINE COMBINED
CYCLE PROJECT

FIGURE 1

FIGURE 2

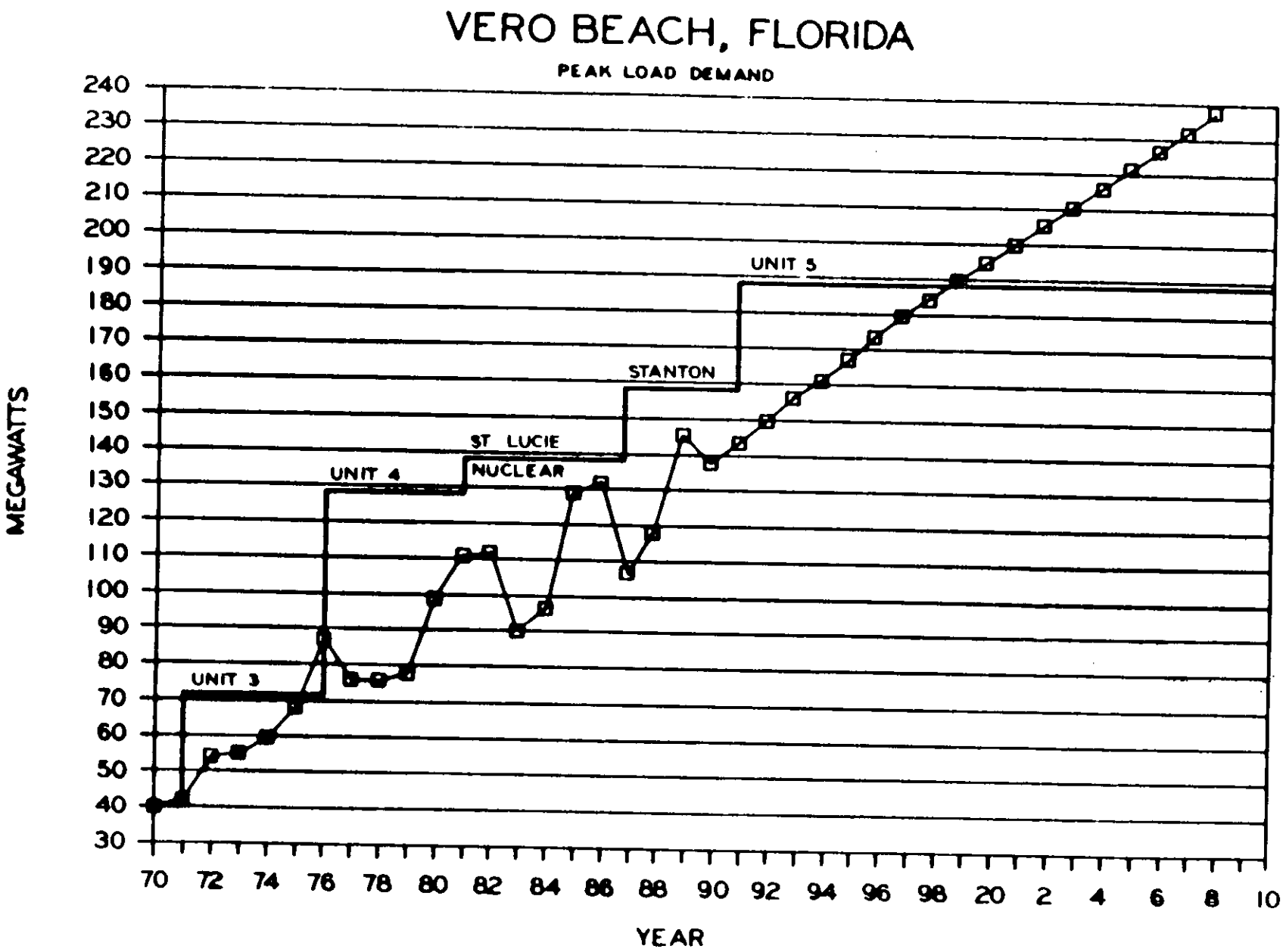


FIGURE 2

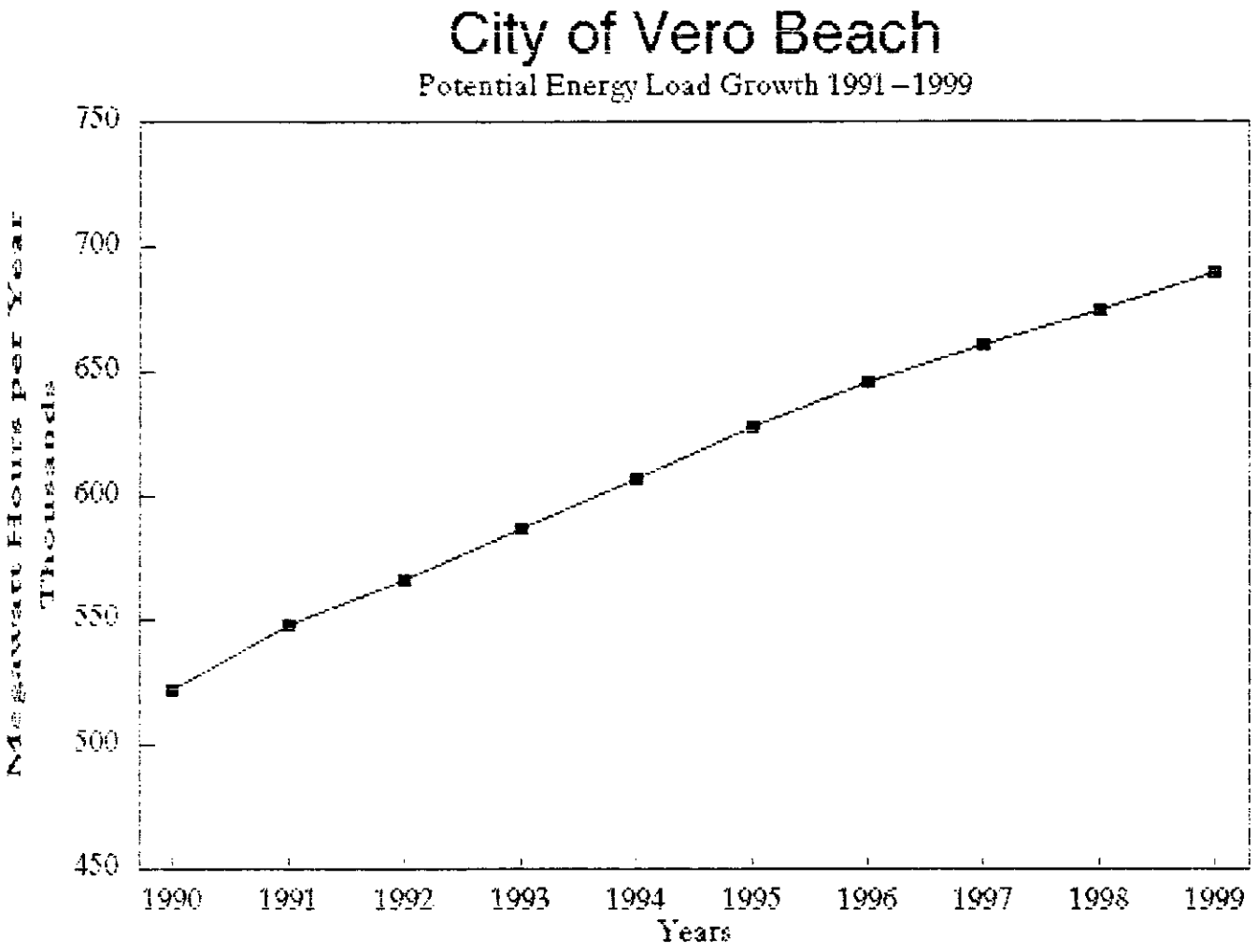
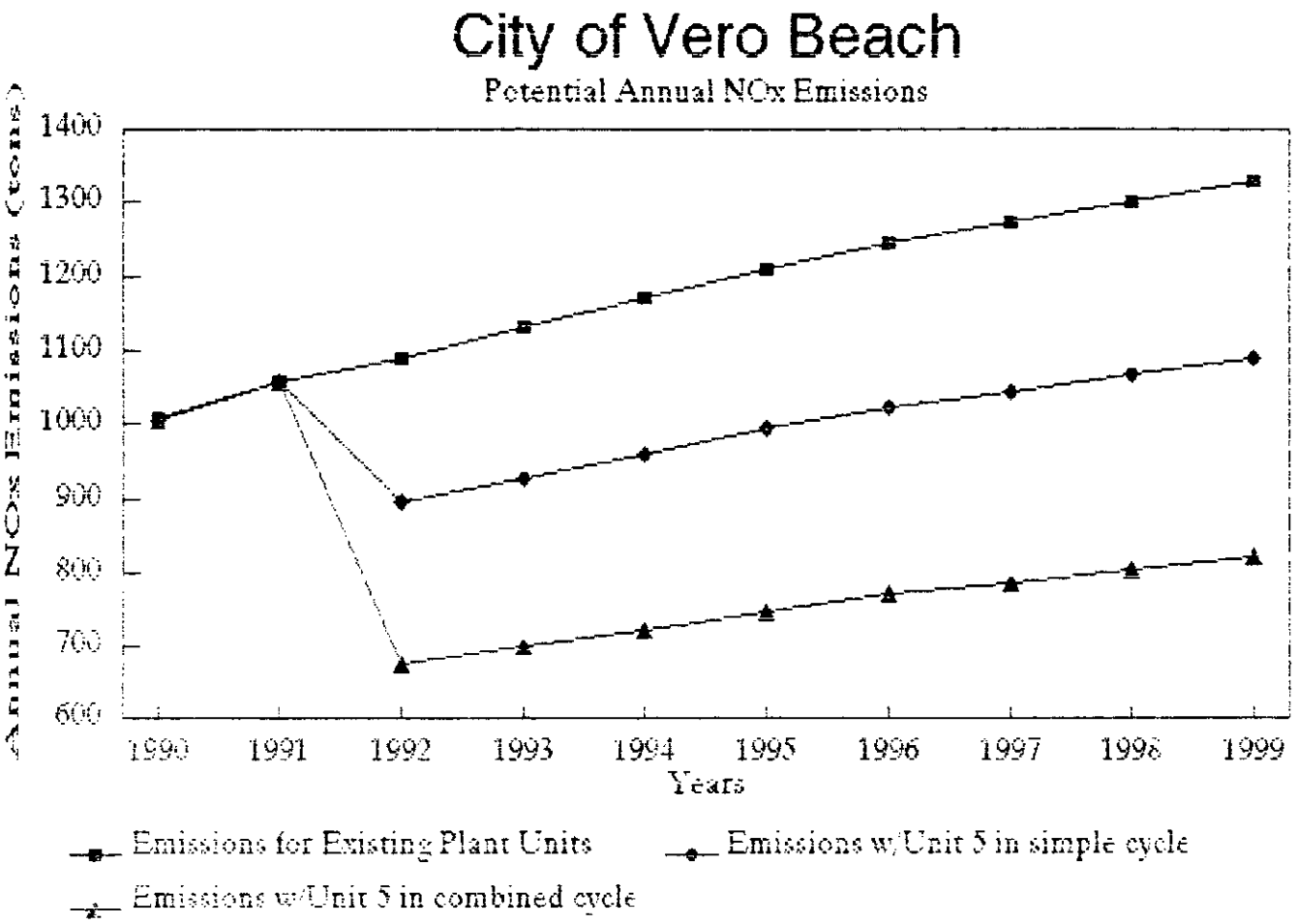

City of Vero Beach
Potential Energy Load Growth 1991 – 1999
Megawatt Hours per Year
Thousands
750
700
650
600
550
500
450
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Years

FIGURE 3



Based on Operations at the Vero Beach Plant Necessary to Meet Projected Load Growth

FIGURE 4

TABLE 1

CURRENT PERMITTED NOX EMISSION RATES
FULL PLANT CAPACITY

	NATURAL GAS					FUEL OIL			
Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions	Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h		MW	MBtu/h	kgal/h	lb/h
1	12.5	201.8	0.192	105.7	1	12.5	140.0	0.933	62.5
2	16.5	248.0	0.236	129.9	2	16.5	243.0	1.620	108.5
3	33.0	417.0	0.397	218.4	3	33.0	410.0	2.733	183.1
4	55.0	685.0	0.652	137.0	4	55.0	685.0	4.567	205.5
	117.0	1551.8	1.478	591.0		117.0	1478.0	9.853	559.7

Note: Potential NOx emission rates for Units 1-3 are based on AP-42 emission factors for natural gas and residual oil combustion.

Natural Gas - 550 lb/mcf (Table 1.4-1 Uncontrolled Emission Factors for Natural Gas Combustion)
No. 6 Fuel Oil - 67 lb/kgal (Table 1.3-1 Uncontrolled Emission Factors for Fuel Oil Combustion)

Potential NOx emission rate for Unit 4 are based on NSPS and permit conditions.

TABLE 2

PROPOSED NOX EMISSION RATES - FULL PLANT CAPACITY

Option 1 - Operating Unit 5 in simple cycle mode:

NATURAL GAS

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h
1	12.5	201.8	0.192	105.7
2	16.5	248.0	0.236	129.9
3	33.0	417.0	0.397	218.4
4	55.0	685.0	0.652	137.0
5	40.0	446.0	0.425	75.0
	157.0	1997.8	1.903	666.0

Increase from current NOx emission (lb/h): 75.0

FUEL OIL

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	kgal/h	lb/h
1	12.5	140.0	0.933	62.5
2	16.5	243.0	1.620	108.5
3	33.0	410.0	2.733	183.1
4	55.0	685.0	4.567	205.5
5	40.0	443.2	2.955	121.0
	157.0	1921.2	12.808	680.7

Increase from current NOx emission (lb/h): 121.0

TABLE 3

PROPOSED NOX EMISSION RATES - FULL PLANT CAPACITY

Option 2 - Operating Unit 5 in combined cycle mode (without SCR)

NATURAL GAS

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h
1	12.5	201.8	0.192	105.7
2	0.0	0.0	0.000	0.0
3	33.0	417.0	0.397	218.4
4	55.0	685.0	0.652	137.0
5	60.0	446.0	0.425	75.0
	160.5	1749.8	1.666	536.1

Increase from current NOx emission (lb/h): -54.9
Increase from simple cycle operation (lb/h): -129.9

FUEL OIL

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	kgal/h	lb/h
1	12.5	140.0	0.933	62.5
2	0.0	0.0	0.000	0.0
3	33.0	410.0	2.733	183.1
4	55.0	685.0	4.567	205.5
5	60.0	443.2	2.955	121.0
	160.5	1678.2	11.188	572.2

Increase from current NOx emission (lb/h): 12.5
Increase from simple cycle operation (lb/h): -108.5

TABLE 4

PROPOSED NOX EMISSION RATES - FULL PLANT CAPACITY

Option 3 Operating Unit 5 in combined cycle mode (with SCR)

NATURAL GAS

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h
1	12.5	201.8	0.192	105.7
2	0.0	0.0	0.000	0.0
3	33.0	417.0	0.397	218.4
4	55.0	685.0	0.652	137.0
5	60.0	446.0	0.425	15.0
	160.5	1749.8	1.666	476.1

Increase from current NOx emission (lb/h): -114.9
Increase from simple cycle operation (lb/h): -189.9
Increase from combined cycle operation without SCR (lb/h): -60.0

FUEL OIL

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	kgal/h	lb/h
1	12.5	140.0	0.933	62.5
2	0.0	0.0	0.000	0.0
3	33.0	410.0	2.733	183.1
4	55.0	685.0	4.567	205.5
5	60.0	443.2	2.955	42.5
	160.5	1678.2	11.188	493.7

Increase from current NOx emission (lb/h): -66.0
Increase from simple cycle operation (lb/h): -187.0
Increase from combined cycle operation without SCR (lb/h): -78.5

Note: Potential NOx emission rates for Unit 5 are based on BACT analysis provided in the PSD application.

TABLE 5

CURRENT PERMITTED NOX EMISSION RATES
BASE LOAD CAPACITY

	NATURAL GAS					FUEL OIL			
Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions	Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h		MW	MBtu/h	kgal/h	lb/h
1	0.0	0.0	0.000	0.0	1	0.0	0.0	0.000	0.0
2	0.0	0.0	0.000	0.0	2	0.0	0.0	0.000	0.0
3	0.0	0.0	0.000	0.0	3	0.0	0.0	0.000	0.0
4	55.0	685.0	0.652	137.0	4	55.0	685.0	4.567	205.5
	55.0	685.0	0.652	137.0		55.0	685.0	4.567	205.5

Note: Potential NOx emission rates for Units 1-3 are based on AP-42 emission factors for natural gas and residual oil combustion.

Natural Gas - 550 lb/mcf (Table 1.4-1 Uncontrolled Emission Factors for Natural Gas Combustion)
No. 6 Fuel Oil - 67 lb/kgal (Table 1.3-1 Uncontrolled Emission Factors for Fuel Oil Combustion)

Potential NOx emission rate for Unit 4 are based on NSPS and permit conditions.

TABLE 6

PROPOSED NOX EMISSION RATES - BASE LOAD CAPACITY

Option 1 - Operating Unit 5 in simple cycle mode:

	NATURAL GAS				FUEL OIL				
Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions	Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h		MW	MBtu/h	kgal/h	lb/h
1	0.0	0.0	0.000	0.0	1	0.0	0.0	0.000	0.0
2	16.5	248.0	0.236	129.9	2	16.5	243.0	1.620	108.5
3	0.0	0.0	0.000	0.0	3	0.0	0.0	0.000	0.0
4	0.0	0.0	0.000	0.0	4	0.0	0.0	0.000	0.0
5	40.0	446.0	0.425	75.0	5	40.0	443.2	2.955	121.0
	56.5	694.0	0.661	204.9		56.5	686.2	4.575	229.5
Increase from current NOx emission (lb/h):				67.9	Increase from current NOx emission (lb/h):				24.0

TABLE 7

PROPOSED NOX EMISSION RATES - BASE LOAD CAPACITY

Option 2 - Operating Unit 5 in combined cycle mode (without SCR)

NATURAL GAS

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h
1	0.0	0.0	0.000	0.0
2	0.0	0.0	0.000	0.0
3	0.0	0.0	0.000	0.0
4	0.0	0.0	0.000	0.0
5	60.0	446.0	0.425	75.0
	60.0	446.0	0.425	75.0

Increase from current NOx emission (lb/h): -62.0
Increase from simple cycle operation (lb/h): -129.9

FUEL OIL

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	kgal/h	lb/h
1	0.0	0.0	0.000	0.0
2	0.0	0.0	0.000	0.0
3	0.0	0.0	0.000	0.0
4	0.0	0.0	0.000	0.0
5	60.0	443.2	2.955	121.0
	60.0	443.2	2.955	121.0

Increase from current NOx emission (lb/h): -84.5
Increase from simple cycle operation (lb/h): -108.5

TABLE 8

PROPOSED NOX EMISSION RATES - BASE LOAD CAPACITY

Option 3 Operating Unit 5 in combined cycle mode (with SCR)

NATURAL GAS

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	mcf/h	lb/h
1	0.0	0.0	0.000	0.0
2	0.0	0.0	0.000	0.0
3	0.0	0.0	0.000	0.0
4	0.0	0.0	0.000	0.0
5	60.0	446.0	0.425	15.0
	60.0	446.0	0.425	15.0

Increase from current NOx emission (lb/h): -122.0
Increase from simple cycle operation (lb/h): -189.9
Increase from combined cycle operation without SCR (lb/h): -60.0

FUEL OIL

Unit	Rated Capacity	Fuel Burn Rate	Fuel Usage Rate	Potential NOx Emissions
	MW	MBtu/h	kgal/h	lb/h
1	0.0	0.0	0.000	0.0
2	0.0	0.0	0.000	0.0
3	0.0	0.0	0.000	0.0
4	0.0	0.0	0.000	0.0
5	60.0	443.2	2.955	42.5
	60.0	443.2	2.955	42.5

Increase from current NOx emission (lb/h): -163.0
Increase from simple cycle operation (lb/h): -187.0
Increase from combined cycle operation without SCR (lb/h): -78.5

Note: Potential NOx emission rates for Unit 5 are based on BACT analysis provided in the PSD application.

LOAD DISTRIBUTION AND NOx EMISSIONS - EXISTING PLANT CONFIGURATION

1990

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,057	13,207	105.7	55.8	14	181	62.5	0.5	56.3
2	16.5	1,559	25,718	129.9	101.2	21	352	108.5	1.2	102.4
3	33.0	3,533	116,579	218.4	385.8	48	1,594	183.1	4.4	390.2
4	55.0	6,550	360,276	137.0	448.7	90	4,925	205.5	9.2	457.9
		12,698	515,780		991.6	174	7,052		15.2	1,006.8

1991

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,108	13,846	105.7	58.5	15	189	62.5	0.5	59.0
2	16.5	1,634	26,963	129.9	106.1	22	369	108.5	1.2	107.3
3	33.0	3,704	122,221	218.4	404.4	51	1,671	183.1	4.6	409.1
4	55.0	6,868	377,713	137.0	470.4	94	5,164	205.5	9.6	480.1
		13,313	540,743		1,039.5	182	7,393		16.0	1,055.5

1992

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,144	14,305	105.7	60.5	16	196	62.5	0.5	61.0
2	16.5	1,699	27,857	129.9	109.7	23	391	108.5	1.3	110.9
3	33.0	3,826	126,274	218.4	417.9	52	1,727	183.1	4.8	422.6
4	55.0	7,095	390,238	137.0	486.0	97	5,336	205.5	10.0	496.0
		13,754	558,674		1,074.0	188	7,640		16.5	1,090.5

LOAD DISTRIBUTION AND NOx EMISSIONS - EXISTING PLANT CONFIGURATION

1993

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,186	14,829	105.7	62.7	16	203	62.5	0.5	63.2
2	16.5	1,750	29,877	129.9	113.7	24	395	108.5	1.3	115.0
3	33.0	3,967	130,897	218.4	433.2	54	1,790	183.1	5.0	438.1
4	55.0	7,355	404,525	137.0	503.9	101	5,531	205.5	10.3	514.2
		14,259	579,129		1,113.3	195	7,919		17.1	1,130.4

1994

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,228	15,350	105.7	64.9	17	210	62.5	0.5	65.4
2	16.5	1,812	29,892	129.9	117.7	25	409	108.5	1.3	119.0
3	33.0	4,104	135,497	218.4	448.4	56	1,853	183.1	5.1	453.5
4	55.0	7,617	418,740	137.0	521.5	104	5,725	205.5	10.7	532.2
		14,759	599,479		1,152.5	202	8,197		17.7	1,170.2

1995

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,269	15,868	105.7	67.1	17	217	62.5	0.5	67.6
2	16.5	1,873	30,901	129.9	121.6	26	423	108.5	1.4	123.0
3	33.0	4,245	140,071	218.4	463.5	58	1,916	183.1	5.3	468.8
4	55.0	7,870	432,876	137.0	539.1	108	5,919	205.5	11.1	550.2
		15,257	619,718		1,191.4	209	8,474		18.3	1,209.7

LOAD DISTRIBUTION AND NOx EMISSIONS - EXISTING PLANT CONFIGURATION

1996

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,307	16,333	105.7	69.1	18	223	62.5	0.6	69.6
2	16.5	1,928	31,808	129.9	125.2	26	435	108.5	1.4	126.6
3	33.0	4,369	144,175	218.4	477.1	60	1,972	183.1	5.5	482.6
4	55.0	8,101	445,559	137.0	554.9	111	6,092	205.5	11.4	566.3
		15,704	637,873		1,226.3	215	8,722		18.8	1,245.1

1997

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,336	16,694	105.7	70.6	18	228	62.5	0.6	71.2
2	16.5	1,970	32,510	129.9	128.0	27	445	108.5	1.5	129.4
3	33.0	4,465	147,363	218.4	487.6	61	2,015	183.1	5.6	493.2
4	55.0	8,280	455,410	137.0	567.2	113	6,227	205.5	11.6	578.9
		16,052	651,977		1,253.4	219	8,915		19.3	1,272.6

1998

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,364	17,053	105.7	72.1	19	233	62.5	0.6	72.7
2	16.5	2,013	33,207	129.9	130.7	28	454	108.5	1.5	132.2
3	33.0	4,561	150,526	218.4	498.1	62	2,058	133.1	5.7	503.8
4	55.0	8,458	465,185	137.0	579.4	116	6,360	205.5	11.9	591.2
		16,396	665,971		1,280.3	224	9,106		19.7	1,300.0

LOAD DISTRIBUTION AND NOx EMISSIONS - EXISTING PLANT CONFIGURATION

1999

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,394	17,421	105.7	73.7	19	238	62.5	0.6	74.3
2	16.5	2,056	33,925	129.9	133.5	28	464	108.5	1.5	135.1
3	33.0	4,660	153,781	218.4	508.9	64	2,103	183.1	5.8	514.7
4	55.0	8,641	475,244	137.0	591.9	118	6,498	205.5	12.1	604.0
		16,751	680,371		1,308.0	229	9,303		20.1	1,328.1

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (simple cycle mode)

1990

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,057	13,207	105.7	55.8	14	181	62.5	0.5	56.3
2	16.5	1,559	25,718	129.9	101.2	21	352	108.5	1.2	102.4
3	33.0	3,533	116,579	218.4	385.8	48	1,594	183.1	4.4	390.2
4	55.0	6,550	360,276	137.0	448.7	90	4,925	205.5	9.2	457.9
5	0.0	0	0	75.0	0.0	0	0	121.0	0.0	0.0
		12,698	515,780		991.6	174	7,052		15.2	1,006.8

1991

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,108	13,846	105.7	58.5	15	189	62.5	0.5	59.0
2	16.5	1,634	26,963	129.9	106.1	22	369	108.5	1.2	107.3
3	33.0	3,704	122,221	218.4	404.4	51	1,671	183.1	4.6	409.1
4	55.0	6,868	377,713	137.0	470.4	94	5,164	205.5	9.6	480.1
5	0.0	0	0	75.0	0.0	0	0	121.0	0.0	0.0
		13,313	540,743		1,039.5	182	7,393		16.0	1,055.5

1992

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	740	9,254	105.7	39.1	10	127	62.5	0.3	39.4
2	16.5	1,092	18,017	129.9	70.9	15	247	108.5	0.8	71.7
3	33.0	2,475	81,674	218.4	270.3	34	1,121	183.1	3.1	273.4
4	55.0	4,589	252,409	137.0	314.4	63	3,465	205.5	6.5	320.9
5	40.0	4,933	197,320	75.0	185.0	67	2,680	121.0	4.1	189.0
		13,829	558,674		879.7	189	7,640		14.8	894.4

LOAD DISTRIBUTION AND NOx EMISEIONS - PROJECTED PLANT CONFIGURATION (simple cycle mode)

1993

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	767	9,593	105.7	40.6	11	132	62.5	0.3	40.9
2	16.5	1,132	18,677	129.9	73.5	16	256	108.5	0.8	74.4
3	33.0	2,566	84,664	218.4	280.2	35	1,162	183.1	3.2	283.4
4	55.0	4,757	261,659	137.0	325.9	65	3,592	205.5	6.7	332.6
5	40.0	5,114	204,544	75.0	191.8	69	2,778	121.0	4.2	196.0
		14,336	579,128		911.9	196	7,919		15.3	927.2

1994

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	794	9,930	105.7	42.0	11	136	62.5	0.3	42.3
2	16.5	1,172	19,333	129.9	76.1	16	265	108.5	0.9	77.0
3	33.0	2,656	87,639	218.4	290.0	36	1,203	183.1	3.3	293.3
4	55.0	4,924	270,845	137.0	337.3	68	3,718	205.5	6.9	344.3
5	40.0	5,293	211,732	75.0	198.5	72	2,875	121.0	4.3	202.9
		14,840	599,479		943.9	203	8,197		15.3	959.8

1995

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	821	10,265	105.7	43.4	11	141	62.5	0.4	43.8
2	16.5	1,211	19,986	129.9	78.7	17	274	108.5	0.9	79.6
3	33.0	2,745	90,598	218.4	299.8	38	1,243	183.1	3.4	303.2
4	55.0	5,091	279,988	137.0	348.7	70	3,843	205.5	7.2	355.9
5	40.0	5,472	218,880	75.0	205.2	74	2,973	121.0	4.5	209.7
		15,341	619,716		975.8	210	8,474		16.4	992.2

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (simple cycle mode)

1996

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	845	10,566	105.7	44.7	12	145	62.5	0.4	45.0
2	16.5	1,247	20,571	129.9	81.0	17	282	108.5	0.9	81.9
3	33.0	2,826	93,252	218.4	308.6	39	1,280	183.1	3.6	312.1
4	55.0	5,240	289,191	137.0	358.9	72	3,956	205.5	7.4	366.3
5	40.0	5,632	225,293	75.0	211.2	76	3,060	121.0	4.6	215.8
		15,790	637,873		1,004.4	216	8,722		16.9	1,021.2

1997

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	864	10,799	105.7	45.7	12	148	62.5	0.4	46.0
2	16.5	1,274	21,028	129.9	82.8	17	288	108.5	0.9	83.7
3	33.0	2,889	95,314	218.4	315.4	40	1,308	183.1	3.6	319.0
4	55.0	5,356	294,563	137.0	366.9	74	4,043	205.5	7.6	374.4
5	40.0	5,757	230,274	75.0	215.9	78	3,127	121.0	4.7	220.6
		16,139	651,977		1,026.6	221	8,915		17.2	1,043.8

1998

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	883	11,031	105.7	46.6	12	151	62.5	0.4	47.0
2	16.5	1,302	21,477	129.9	84.5	18	294	108.5	1.0	85.5
3	33.0	2,950	97,360	218.4	322.2	40	1,336	183.1	3.7	325.9
4	55.0	5,471	300,686	137.0	374.7	75	4,130	205.5	7.7	382.5
5	40.0	5,880	235,217	75.0	220.5	80	3,194	121.0	4.8	225.3
		16,486	665,971		1,048.6	225	9,106		17.6	1,066.2

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (simple cycle mode)

1999

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	902	11,270	105.7	47.6	12	155	62.5	0.4	48.0
2	16.5	1,330	21,942	129.9	86.4	18	301	108.5	1.0	87.4
3	33.0	3,014	99,465	218.4	329.1	41	1,365	183.1	3.8	332.9
4	55.0	5,589	307,392	137.0	382.8	77	4,219	205.5	7.9	390.7
5	40.0	6,008	240,303	75.0	225.3	82	3,263	121.0	4.9	230.2
		16,842	689,371		1,071.3	230	9,303		18.0	1,089.3

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (combined cycle mode)

1990

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,057	13,207	105.7	55.8	14	181	62.5	0.5	56.3
2	16.5	1,559	25,718	129.9	101.2	21	352	108.5	1.2	102.4
3	33.0	3,533	116,579	218.4	385.8	48	1,594	183.1	4.4	390.2
4	55.0	6,550	360,276	137.0	448.7	90	4,925	205.5	9.2	457.9
5	0.0	0	0	75.0	0.0	0	0	121.0	0.0	0.0
		12,698	515,780		991.6	174	7,052		15.2	1,006.8

1991

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	1,108	13,846	105.7	58.5	15	189	62.5	0.5	59.0
2	16.5	1,634	26,963	129.9	106.1	22	369	108.5	1.2	107.3
3	33.0	3,704	122,221	218.4	404.4	51	1,671	183.1	4.6	409.1
4	55.0	6,868	377,713	137.0	470.4	94	5,164	205.5	9.6	480.1
5	0.0	0	0	75.0	0.0	0	0	121.0	0.0	0.0
		13,313	540,743		1,039.5	182	7,393		16.0	1,055.5

1992

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	566	7,080	105.7	29.9	8	98	62.5	0.2	30.2
2	20.0	4,933	98,660	0.0	0.0	67	1,340	0.0	0.0	0.0
3	33.0	1,894	62,492	218.4	206.8	26	861	183.1	2.4	209.2
4	55.0	3,511	193,122	137.0	240.5	48	2,661	205.5	5.0	245.5
5	40.0	4,933	197,320	75.0	185.0	67	2,680	121.0	4.1	189.0
		15,837	558,674		662.2	216	7,640		11.7	673.9

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (combined cycle mode)

1993

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	587	7,339	105.7	31.0	8	102	62.5	0.3	31.3
2	20.0	5,114	102,272	0.0	0.0	69	1,389	0.0	0.0	0.0
3	33.0	1,963	64,780	218.4	214.4	27	892	183.1	2.5	216.8
4	55.0	3,640	200,193	137.0	249.3	50	2,758	205.5	5.2	254.5
5	40.0	5,114	204,544	75.0	191.8	69	2,778	121.0	4.2	196.0
		16,417	579,128		686.5	224	7,919		12.1	698.6

1994

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	608	7,597	105.7	32.1	8	105	62.5	0.3	32.4
2	20.0	5,293	105,866	0.0	0.0	72	1,438	0.0	0.0	0.0
3	33.0	2,032	67,056	218.4	221.9	28	924	183.1	2.6	224.5
4	55.0	3,768	207,227	137.0	258.1	52	2,855	205.5	5.3	263.4
5	40.0	5,293	211,732	75.0	198.5	72	2,875	121.0	4.3	202.8
		16,994	599,479		710.6	232	8,197		12.5	723.1

1995

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	628	7,854	105.7	33.2	9	109	62.5	0.3	33.5
2	20.0	5,472	109,440	0.0	0.0	74	1,486	0.0	0.0	0.0
3	33.0	2,101	69,320	218.4	229.4	29	955	183.1	2.6	232.0
4	55.0	3,895	214,223	137.0	266.8	54	2,951	205.5	5.5	272.3
5	40.0	5,472	218,880	75.0	205.2	74	2,973	121.0	4.5	209.7
		17,568	619,716		734.6	240	8,474		12.9	747.5

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (combined cycle mode)

1996

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	647	8,084	105.7	34.2	9	112	62.5	0.3	34.5
2	20.0	5,632	112,646	0.0	0.0	76	1,530	0.0	0.0	0.0
3	33.0	2,162	71,351	218.4	236.1	30	983	183.1	2.7	238.8
4	55.0	4,009	220,499	137.0	274.6	55	3,038	205.5	5.7	280.3
5	40.0	5,632	225,293	75.0	211.2	76	3,060	121.0	4.6	215.8
		18,083	637,873		756.1	247	8,722		13.3	769.4

1997

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	661	8,262	105.7	34.9	9	114	62.5	0.3	35.2
2	20.0	5,757	115,137	0.0	0.0	78	1,564	0.0	0.0	0.0
3	33.0	2,210	72,929	218.4	241.3	30	1,005	183.1	2.8	244.1
4	55.0	4,098	225,375	137.0	280.7	56	3,105	205.5	5.8	286.5
5	40.0	5,757	230,274	75.0	215.9	78	3,127	121.0	4.7	220.6
		18,482	651,977		772.8	252	8,915		13.6	786.4

1998

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	675	8,440	105.7	35.7	9	117	62.5	0.3	36.0
2	20.0	5,880	117,608	0.0	0.0	80	1,597	0.0	0.0	0.0
3	33.0	2,257	74,494	218.4	246.5	31	1,026	183.1	2.8	249.4
4	55.0	4,186	230,212	137.0	286.7	58	3,172	205.5	5.9	292.6
5	40.0	5,860	235,217	75.0	220.5	80	3,194	121.0	4.8	225.3
		18,879	665,971		789.4	258	9,106		13.9	803.3

LOAD DISTRIBUTION AND NOx EMISSIONS - PROJECTED PLANT CONFIGURATION (combined cycle mode)

1999

		Natural Gas				Fuel Oil				
Unit	Unit Rating	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Operating Period	Energy Generation	Potential NOx Emission	Estimated NOx Emissions	Total NOx Emissions Gas+Oil
	(MW)	(h)	(MWh/y)	(lb/h)	(t/yr)	(h)	(MWh/y)	(lb/h)	(t/yr)	(t/yr)
1	12.5	690	8,622	105.7	36.5	10	119	62.5	0.3	36.8
2	20.0	6,008	120,151	0.0	0.0	82	1,632	0.0	0.0	0.0
3	33.0	2,306	76,105	218.4	251.8	32	1,048	183.1	2.9	254.7
4	55.0	4,276	235,190	137.0	292.9	59	3,240	205.5	6.1	299.0
5	40.0	6,008	240,303	75.0	225.3	82	3,263	121.0	4.9	230.2
		19,287	680,371		806.5	263	9,303		14.2	820.7