STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NOTICE OF REVISED PERMITS

In the matter of an
Application for Revised Permits by:

DEP File Nos. AC 53-233852A
AC 53-233851B
PSD-FL-206A&B
Polk County

Mr. William R. Malenius
Director of Project Development
Orange Cogeneration Limited Partnership
23046 Avendia De La Carlota
Laguna Hills, CA 92653

Enclosed are revised permits, Nos. AC 53-233852A & AC 53-233851B and PSD-FL-206B, and the revised Best Available Control Technology (BACT) determination for two gas combustion turbines and one auxiliary boiler to be located in Bartow, Polk County, Florida. These revised permits and BACT determination change the nitrogen oxides emission standard concentration from 15 parts per million by volume dry corrected to 15 percent oxygen and ISO ambient standard conditions (15 ppmvd @ 15% O_2 @ ISO) to the observed concentration of 15 ppmvd @ 15% O_2. These revised permits and BACT determination are issued pursuant to Section 403, Florida Statutes.

Any party to this Order (revised permits) has the right to seek judicial review of the revised permits pursuant to Section 120.68, Florida Statutes, by filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 14 days from the date this Notice is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

C. H. Fancy, P.E., Chief
Bureau of Air Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
904-488-1344

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF REVISED PERMITS and all copies were mailed by certified mail before the close of business on 3-7-95 to the listed persons.

Clerk Stamp

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to §120.52(11), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk 3-7-95
Date

Copies furnished to:

B. Thomas, SWD
J. Harper, EPA
J. Bunyak, NPS
L. Novak, PCESD
K. Kosky, P.E., KBN
T. Donovan, OCLP

FINAL DETERMINATION

Orange Cogeneration L.P.

AC 53-233852A & AC 53-233851B
PSD-FL-206B

An Intent to Issue Revised Permits for Orange Cogeneration Limited Partnership proposed combustion turbines and auxiliary boiler to be located in Bartow, Polk County, Florida, was distributed on December 29, 1994. The Notice of Intent to Issue Revised Permits was published in the Polk County Democrat on January 5, 1995.

Orange Cogeneration Limited Partnership submitted a comment in a letter dated January 26, 1995. It was noted that the nitrogen oxides emission standard in Specific Condition No. 19 had the ISO condition listed and not been revised, which was the purpose of the request. The Department agrees with this comment and has corrected the condition.

The final action of the Department will be to issue the revised permits and BACT as proposed in the Intent to Issue Revised Permits, except for the change noted above.

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

PERMITTEE:
Orange Cogeneration Limited Partnership
23046 Avenida De La Carlota
Suite 400
Laguna Hills, CA 92653

Permit Number: AC53-233851B
PSD-FL-206B
Expiration Date: April 1, 1998
County: Polk
Latitude/Longitude: 27°52'15"N
81°49'31"W
Project: Two Combustion Turbines

This revised permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Chapters 62-212 and 62-4, Florida Administrative Code (F.A.C.). The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto and specifically described as follows:

Installation of two natural gas/biogas fired GE LM 6000 (or equivalent) combustion turbines (CT), two heat recovery steam generators and one steam turbine. An auxiliary boiler (AC53-233852) is being permitted separately. The CTs will be equipped with **a staged combustion technology** dry low-NO_X system to control nitrogen oxides (NO_X) emissions. Each CT will be equipped with a 100 ft. high, 11 ft. diameter stack that will handle approximately 300,000 actual cubic feet per minute of flue gas at 230°F. The cogeneration facility will be located on Clear Springs Road, Bartow, Polk County, Florida.

The UTM coordinates of this facility are Zone 17, 418.75 km East and 3083.0 km North.

The emissions unit(s)/sources shall be constructed in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application received July 1, 1993.
2. Department's July 22, 1993 letter.
3. KBN's August 5, 1993 letter.
4. KBN's August 29, 1993 letter.
5. Tables 1 and 2, Allowable Emission Rates.
6. KBN's October 28, 1993 letter.
7. KBN's October 29, 1993 letter.
8. Department's February 18, 1994 letter.
9. KBN's March 11, 1994 letter.
10. Department's March 29, 1994 letter.
11. KBN's June 22, 1994 letter.
12. KBN's October 10, 1994 letter.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of F.S. and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

a. Have access to and copy any records that must be kept under the conditions of the permit;

b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and,

c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

a. a description of and cause of non-compliance; and,

b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the F.S. or Department rules, except where such use is prescribed by Sections 403.73 and 403.111, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and F.S. after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by F.S. or Department rules.

GENERAL CONDITIONS:

11. This permit is transferable only upon Department approval in accordance with Rules 62-4.120 and 62-730.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

(x) Determination of Best Available Control Technology (BACT)
(x) Determination of Prevention of Significant Deterioration (PSD)
(x) Compliance with New Source Performance Standards (NSPS)

14. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and,
- the results of such analyses.

GENERAL CONDITIONS:

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

This permit replaces permit No. AC53-233851/PSD-FL-206 and amended construction permit No. AC53-233851A/PSD-FL-206A.

Construction Requirements

1. Dry low-NO_X **combustion technology** systems shall be installed and operated on each combustion turbine (CT).

2. A system to continuously monitor the fuel consumption, nitrogen oxides emissions, and oxygen content of the flue gas shall be installed on each CT.

3. The heat recovery steam generator (HRSG) installed on each CT shall not be equipped with an auxiliary/duct burner.

4. Each CT stack shall be equipped with stack sampling facilities (sample ports, work platforms, access, and electrical power) that meet the specifications given in Rule 62-297.345, F.A.C.

Operation Limitations

5. The CTs shall comply with all requirements of 40 CFR 60, Subpart GG (July, 1993), Standard of Performance for Stationary Gas Turbines, which is adopted by reference in Rule 62-296.800(2)(a), F.A.C.

6. The facility is allowed to operate continuously, 8760 hours per year.

7. Only natural gas/biogas fuel shall be used for fuel at this facility.

8. Each CT shall have a maximum heat input of 368.3 MMBtu/hr, when using dry low NO_X technology to control NO_X emissions.

9. The operation of this facility shall not create a nuisance or discharge air pollutants that cause or contribute to objectionable odors **pursuant to Rule 62-296.320(2), F.A.C.**

ORANGE COGENERATION LIMITED PARTNERSHIP
AC53-233851B (PSD-FL-206B)
42 MW COMBINED CYCLE GAS TURBINES

Table 1 - Allowable Emission Rates[b] for each Combustion Turbine

Pollutant[a]	Control[e]	Allowable Emissions Standards/Limitations Concentration	Compl. Date	Maximum Corrected[c] lbs/hr	TPY	Basis for Limit
NO_x	DLN	25 ppmvd at 15% O_2[d]	initial	37.0	161.9	BACT
	DLN	15 ppmvd at 15% O_2[d]	1/1/98	22.1	97.0	BACT
CO	GC[f]	30 ppmvd		27.8	127.0	BACT
PM/PM_{10}	GC[f]			5	21.9	BACT
VOC	GC[f]	10 ppmvd		3.98	17.4	BACT

[a] Pollutant emissions are based on 8,760 hours per year operation firing natural gas or biogas.

[b] Allowable emissions, lbs/hr, at different inlet temperatures shall not exceed the rates given in the manufacturer's data required by specific condition No. 15.

[c] Maximum emission rates not to be exceeded.

[d] The NO_x maximum concentration will be lowered to 15 ppmvd at 15% O_2 by 1/1/98 using appropriate combustion technology improvements. Should this level of control not be achieved when the initial compliance demonstration stack tests are performed, the permittee must provide the Department with a plan and schedule to meet this standard. NO_x emission concentrations are to be corrected to 15 percent oxygen to demonstrate compliance with the NO_x emissions standard.

[e] Dry Low-NO_x (DLN) combustors.

[f] Good Combustion.

SPECIFIC CONDITIONS:

Emission Limitation

10. Prior to January 1, 1998, the maximum NO_x concentration, 1-hour average, from each CT/HRSG unit, shall not exceed 25 parts per million by volume dry corrected to 15 percent oxygen (25 ppmvd @ 15% O_2), as determined by the procedures in Specific Conditions Nos. 16, 17 and 18.

11. After December 31, 1997, the maximum NO_x concentration, 1-hour average, from each CT/HRSG unit, shall not exceed 15 ppmvd @ 15% O_2, as determined by the procedures in Specific Conditions Nos. 16, 17 and 18. Should the NO_x standard of 15 ppmvd @ 15% O_2 not be achieved during the initial compliance tests, the permittee will provide the Department with a plan and schedule to meet this standard. The permittee shall obtain prior approval from the Department for any air pollution control equipment not addressed in this permit that is needed to meet the NO_x emission standard.

12. The maximum emission rates for particulate matter (PM/PM_{10}), volatile organic compounds (VOC), NO_x, and carbon monoxide (CO) shall not exceed any of the rates listed in Table 1, Allowable Emission Rates.

13. Visible emissions shall not exceed 10 percent opacity, 6 minute average.

14. The emission rates for sulfur dioxide (SO_2) and sulfuric acid (H_2SO_4) mist, listed in the following table, shall be used for inventory purposes only.

Maximum Emission Rates for Each Combustion Turbine
For Inventory and PSD Tracking Purposes Only

Pollutant	Combustion Turbine Dry Low NO_x Combustion	
	lb/hr	TPY
SO_2	1.11	4.87
H_2SO_4 mist	0.085	0.37

15. Manufacturer's curves for the emission rate correction to other temperatures at different loads shall be provided to DEP for review **by January 1, 1998.** Until new curves are approved by the Department or the combustion turbines meet the NO_x emission standard of 15 ppmvd @ 15% (whichever occurs first), the stack, operator, and emission data for the proposed combustion turbines in

SPECIFIC CONDITIONS:

Table 2-4 **(October 28, 1993)** will be used. The data will be used to determine compliance with the maximum allowable emission rates of the regulated air pollutants at different air inlet temperatures for these turbines.

Compliance Determination

16. Testing of emissions shall be conducted at **95-100%** of the manufacturer's rated heat input based on the **average air inlet temperature** for the CT during the test. **Compliance for NO_x emission limits shall be determined by calculating the concentration of NO_x (ppmvd at 15% O_2) and using the turbine manufacturer's thermal throughput rating for the average air inlet temperature by multiplying the permitted emission limit by the ratio of the tested heat input to the maximum heat input (MMBtu/hr) at this temperature.** Compliance with the visible emissions, NO_x, SO_2, CO, PM/PM_{10}, and VOC emission standards shall be determined within 60 days of achieving maximum production but not later than 180 days after initial firing of each CT (40 CFR 60.8). Compliance with the visible emissions **limitation and the** NO_x and SO_2 **emission** standards shall be determined annually thereafter. **Tests shall be conducted on both natural gas and biogas fuels. If the initial tests or fuel analyses show the emissions of air pollutants from the combustion turbines are independent of the fuel (natural gas or biogas fuel), then annual compliance tests can be conducted while the combustion turbines are burning either fuel.**

17. Compliance shall be determined by the following test methods listed in 40 CFR 60, Appendix A (July, 1993).

Pollutant	EPA Method
PM/PM_{10}*	5 or 17**
NO_x	20
CO	10
VOC	18 or 25A
Visible Emissions	9

NOTE: No other test methods may be used for compliance testing **unless** prior Department **written** approval **has been received.**
* **Assumption is that all PM is PM_{10}.**
** Stack flue gas temperature must be less than 320°F to use Method 17.

SPECIFIC CONDITIONS:

Monitoring

18. **NO_x and oxygen monitoring to meet the requirements of 40 CFR 60, Subpart GG, shall be accomplished using a continuous emission monitoring (CEM) system. The CEM system shall meet the requirements of 40 CFR 60, Appendix B. The requirements of 40 CFR 75, Appendices A and B, can be substituted for those of 40 CFR 60 provided the minimum criteria of 40 CFR 60 are met. NO_x monitoring to indicate compliance with the BACT limit shall be based on one hour average emissions determined on ppmvd @ 15% O_2.**

Administrative Requirement

19. Prior to January 1, 1998, the permittee shall provide a report showing how the allowable NO_x emissions of 15 ppmvd @ 15% O_2 is achieved by the CTs.

20. The permittee shall provide the Southwest District office with the following notifications required by 40 CFR 60.7:

- When construction commenced within 30 days of commencement of construction
- Anticipated date of initial starting 30 to 60 days prior to startup
- Actual date of startup up within 15 days after the starting
- Notification of the date of the compliance tests not less than 30 days prior to the test

21. Pursuant to Rule 62-210.370(2), F.A.C., Air Operating **Reports**, the permittee is required to submit annual reports on the actual operating rates and emissions from this facility. These reports shall include, but are not limited to the following: sulfur content and the lower heating value of the fuel being fired, fuel usage, hours of operation, and air emissions. Annual reports shall be sent to the Department's Southwest District office by March 1 of each calendar year.

22. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the **Department's** Bureau of Air Regulation prior to 60 days before the expiration of the permit (Rule 62-4.090, F.A.C.).

23. An application for an operation permit must be submitted to the **Department's** Southwest District office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the

SPECIFIC CONDITIONS:

construction permit, and compliance test reports as required by this permit (Rules 62-4.055 and 62-4.220, F.A.C.).

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Virginia B. Wetherell, Secretary

(2) LM-6000

365.3 mmBtu/hour 8760 hr/yr

	TPY	lb/hour
NO_x	97.0	22.1
CO	127.0	27.8
PM	21.9	5
VOC	17.4	3.98
SO_2	4.87	1.11
SAM	0.37	0.085

134 088 - Foundation/supports
50 283 - Contingencies
16 761 - Performance testing
201,132

GE's costs 2,643,238 - 201,132 = 2,442,106

GPM

Aqueous Ammonia

Foundation/Supports	114,552
Contingencies	42,957
Performance Testing	14,319
	171,828

Current TCI 2,257,402
-171,828

Revised TCI 2,085,574

Capital Recovery (0.1175)(171,828 ~~2,085,574~~) = ~~245,055~~ 20,190

958,553 - 310,929 = 647,624

96,448
56,435 } 173073
20,190
1,125,676
1,131,626
- 5950 @ $25 ton

NOx Reductions Cons Facility 238

$3423/ton

$4755/ton

4730

G PPM

82 584
30 969
~~10 323~~
123,876

1626 034
-123 876
1,502,158

589,796
96448
40651 } 181,654
14555

741,450
÷125 TPY
$5932/ton

Look up short term permit for NOx limit

LM6000 CT

- Cannot achieve 15 ppmvd on DLN tech. alone
- Reject XONON and SCONOx as not yet "commercially available" and not proven reliable for CTs the size of the LM6000
- Performed cost analysis for SCR

- Replacement with a derated LM6000PD is very costly and unsure whether or not can meet 15ppmvd on "long term" basis due to degradation
- Focused on only economic impacts
- So, really only 3 options

#2	15 ppmvd	w/ SCR	$7200/ton
#3	6 ppmvd		$5643/ton
#4	3.5 ppmvd		$5562/ton

- Total Capital Investment should be paid by GE and costs to 15ppmvd
- Incremental costs (Calpine) should not vary by more than $3% even after GE secures bids w/ contractual guarantees
- Vendors will evaluate HRSG for available space to install ammonia injection and base quotes on NO_x emissions of 15, 6, 3.5 w/o structural changes; Otherwise vendors will quote the max. lbs possible reduction w/o structural changes
- What about a 24-hour 20 ppmvd limit? What about a 30-day rolling avg. limit? What about a tons/day limit?

1994 wasn't even close to 25 ppm → 1995 closer to 25 ppmvd

Lots of oil units at 42 ppmvd

Dennis Derivy?

941-534-1141

NY-0075 Pilgrim Energy Center · 9-14-94

2 WH W501D5 Turbines

4.5 ppmvd @ 15% Oxygen

Steam injection w/ SCR

PA-0148 Blue Mtn. Power LP

153 MW CCCT

4 ppm w/SCR (LATER)

10 ppm Ammonia slip

FL-0102 Panda-Kathleen, LP

CCCT (115 MW)

15 ppm @ 15% O_2 06-01-95

Ever built?

DLN

FL-0104 Seminole Hardee Unit 3

CCCT 1-1-96

15 ppm @ 15% O_2

DLN

FL-0109 Keywest City Electric System (73 MW)

75 ppm @ 15% O_2 9-28-95

DLN

GA-0063 Mid GA Cogen.

2 nat. gas CT

9 ppm @ 15% O_2

DLN w/SCR

NM-0028 SW Public Service Co/Cunningham Station

SC-0036 Cooling Power & Light

25 ppmvd @ 15% O_2 Plant

Post-it® Fax Note 7671	Date 7-7-99	# of pages ▶ 2
To Darryl Graziani	From Jeff Koerner	
Co./Dept. Air Pollution	Co. NEP	
Phone # SC 273-3136	Phone # SC 894-7268	
Fax # 561-355-2442	Fax # 850/922-6979	

FOSTER WHEELER ENVIRONMENTAL CORPORATION
EXCEL 5.0 CALCULATION SHEET

By: RB Hook
Date: 3/31/99
Ckd. By:
Date:
Rev. By:
Date:

OFS No.:
File: COTBACT.XLS
Sheet:: SCR-BACT

Description: Incremental and total cost analysis for the SCR System Cost factors and references listed. Capital costs estimate for theSCR was supplied by a vendor. SCR-BACT to 3 5 ppm, Quote F

BACT ANALYSIS

CAPITAL COST FACTORS FOR SELECT CATALYTIC REDUCTION

COST ITEM	COST FACTOR	REFERENCE	COST ($1999)	
DIRECT COSTS (DC)				
PURCHASED EQUIPMENT COSTS (PEC)				
SCR & AUXILIARY EQUIPMENT	**AS ESTIMATED, A**	**VENDOR QUOTE**	**$1,510,000.00**	
INSTRUMENTATION	0.05 X A	(EPA, 1990d)	$75,500.00	
STATE SALES TAXES	0.06 X A	State Sales Tax	$90,600.00	
FREIGHT	0.05 X A	(EPA, 1990d)	$0.00	included
PEC SUBTOTAL	1.16 X A = B		**$1,676,100.00**	
DIRECT INSTALLATION COSTS (DIC)				
FOUNDATIONS & SUPPORTS	0.08 X B	(ULRICH, 1984)	$134,088.00	
LABOR	.0 14 X B	(EPA, 1990d)	$234,654 00	
ELECTRICAL	0 04 X B	(EPA, 1990d)	$67,044.00	
PIPING	N/A	VENDOR QUOTE	-	
INSULATION	N/A	VENDOR QUOTE	-	
PAINTING	0.01 X B	(EPA, 1990d)	$16,761 00	
DIC SUBTOTAL	0 27 X B	(EPA, 1990d)	**$452,547.00**	
SITE PREPARATION	N/A	-	-	
BUILDINGS	N/A	-	-	
TOTAL DC	1 27 X B	-	**$2,128,647.00**	
INDIRECT COSTS (IDC)				
ENGINEERING	0.10 X B	(EPA,1990d)	$167,610.00	
CONSTRUCTION OVERHEAD	0 05 X B	(EPA,1990d)	$83,805.00	
CONTRACTOR FEES	0 10 X B	(EPA,1990d)	$167,610.00	
CONTINGENCIES	0 03 X B	(EPA,1990d)	$50,283.00	
START-UP	0.02 X B	(EPA,1990d)	$28,522.00	5 days of support included in quote
PERFORMANCE TESTING	0 01 X B	(EPA,1990d)	$16,761 00	
TOTAL IDC	0.53 X B	-	**$514,591.00**	
TOTAL CAPITAL INVESTMENT (TCI)	1.84 X B		**$2,643,238.00**	

FOSTER WHEELER ENVIRONMENTAL CORPORATION
EXCEL 5.0 CALCULATION SHEET

By: RB Hook
Date: 3/31/99
Ckd. By:
Date:
Rev. By:
Date:

OFS No :
File: COTBACT XLS
Sheet:: SCR-BACT

OPERATING COST FACTORS FOR SELECT CATALYTIC REDUCTION

COST DATA

CHEMICAL ENGINEERING PLANT COST INDEX

1990	357.6	
1993	359.2	
Jun-99	392.3	estimate

CAPITAL RECOVERY FACTOR (CRF) @i=10%,n=20: 0.1175 cost of money 10%

0.1
20

DIRECT ANNUAL COSTS, $/YR	**FACTOR**	**REFERENCE**	**1999 COSTS, $/YR**	
OPERATING LABOR	$27.82/HR @ 1HR/12HR	(COT & EPA 1993b)	$20,309	
SUPERVISORY LABOR	15 % OF OPERATING L	(EPA,1993b)	$3,046	
MAINTENANCE LABOR AND MATERIALS	1,250 (MW) + 25,800	(EPA,1993b)	$137,392	
CATALYST REPLACEMENT (CR)	N/A	Vendor Estimate	$189,200	Scaled
CATALYST DISPOSAL	$15/CF	(EPA,1993b)	$23,220	Scaled
AQUEOUS AMMONIA	$378/ton	(EPA,1993b)	$668,498	Scaled
DILUTION SYSTEM	N/A	(EPA,1993b)	-	
ELECTRICITY	N/A	(EPA,1993b)	-	
PERFORMANCE LOSS	0.50%	(EPA,1993b)	$19,320	
BLOWER	N/A	(EPA,1993b)	-	
PRODUCTION LOSS	N/A	(EPA,1993b)	-	
			$1,060,985	
INDIRECT ANNUAL COSTS, $/YR				
OVERHEAD	60% OF ALL LABOR M	(EPA,1990d)	$96,448	
INSURANCE & ADMINISTRATION	2.5%OF TCI	(EPA,1990d)	$66,081	
CAPITAL RECOVERY	CRF X (TCI - CR)	N/A	$272,634	
			$435,163	
TOTAL ANNUAL COSTS, $/YR			**$1,496,148**	
TOTAL NET NOx REDUCTIONS (TPY)				
Oil Firing			0	
Gas Firing			269	
Total			**269**	
INCREMENTAL COST EFFECTIVENESS, $/TON			**$5,562**	

Post-it® Fax Note 7671	Date 7-7-99	# of pages ▶ 2
To Daryl Graziani	From Jeff Koerner	
Co./Dept. Air Pollution	Co. DEP	
Phone # C 273-3136	Phone # SC 894-7268	
Fax # C 1-355-2442	Fax # 850/922-6979	

FOSTER WHEELER ENVIRONMENTAL CORPORATION
EXCEL 5 CALCULATION SHEET

By: RB Hook
Date: 3/31/99
Chk. By:
Date:
Rev. By:
Date:

OFS No.:
File: COTBACT.XLS
Sheet:: SCR-BACT

Description: Incremental and total cost analysis for the SCR System ... factors and references listed. Capital costs estimate for theSCR was supplied by a vendor. SCR-BACT ... ppm, Orange ...

BACT ANALYSIS

CAPITAL COST FACTORS FOR SELECT CATALYTIC REDUCTION

COST ITEM	COST FACTOR	REFERENCE	COST ($1999)	
DIRECT COSTS (DC)				
PURCHASED EQUIPMENT COSTS (PEC)				
SCR & AUXILIARY EQUIPMENT	AS ESTIMATED, A	VENDOR QUOTE	$1,510,000.00	
INSTRUMENTATION	0.05 X A	(EPA 1990d)	$75,500.00	
STATE SALES TAXES	0.06 X A	State Sales Tax	$90,600.00	
FREIGHT	0.05 X A	(EPA 1990d)	$0.00	included
PEC SUBTOTAL	1.16 X A		$1,676,100.00	
DIRECT INSTALLATION COSTS (DIC)				
FOUNDATIONS & SUPPORTS	0.08 X B	(OAQPS 1984)	$134,088.00	← CSW
LABOR	0.14 X B	(EPA 1990d)	$234,654.00	
ELECTRICAL	0.04 X B	(EPA 1990d)	$67,044.00	
PIPING	N/A	VENDOR QUOTE	-	
INSULATION	N/A	VENDOR QUOTE	-	
PAINTING	0.01 X B	(EPA 1990d)	$16,761.00	
DIC SUBTOTAL	0.27 X B	(EPA 1990d)	$452,547.00	
SITE PREPARATION	N/A	-	-	
BUILDINGS	N/A	-	-	
TOTAL DC	1.27 X B	-	$2,128,647.00	
INDIRECT COSTS (IDC)				
ENGINEERING	0.10 X B	(EPA 1990d)	$167,610.00	
CONSTRUCTION OVERHEAD	0.05 X B	(EPA 1990d)	$83,805.00	
CONTRACTOR FEES	0.10 X B	(EPA 1990d)	$167,610.00	
CONTINGENCIES	0.03 X B	(EPA 1990d)	$50,283.00	→ CSW
START-UP	0.02 X B	(EPA 1990d)	$28,522.00	5 days of support included in quote
PERFORMANCE TESTING	0.01 X B	(EPA 1990d)	$16,761.00	→ CSW
TOTAL IDC	0.53 X B	-	$514,591.00	
TOTAL CAPITAL INVESTMENT (TCI)	1.84 X B		$2,643,238.00	

TCI CSW → 201,132
TCI GE → 2,643,238 - 201,132
→ 2,442,106

FOSTER WHEELER EN[illegible]RONMENT[illegible]L CORPORATION
EXCEL 5.0 CALCULATIO[illegible] SHEET

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OPERATING COST FACTORS FOR SELECT CATALYTIC REDUCTION

COST DATA

CHEMICAL ENGINEERING PLANT COST INDEX

1990	357.6	
1993	359.2	
Jan-99	392.3	estimate

CAPITAL RECOVERY FACTOR (CRF) @i=10%,n=20r 0.1175 [illegible] 0%

0.1

20

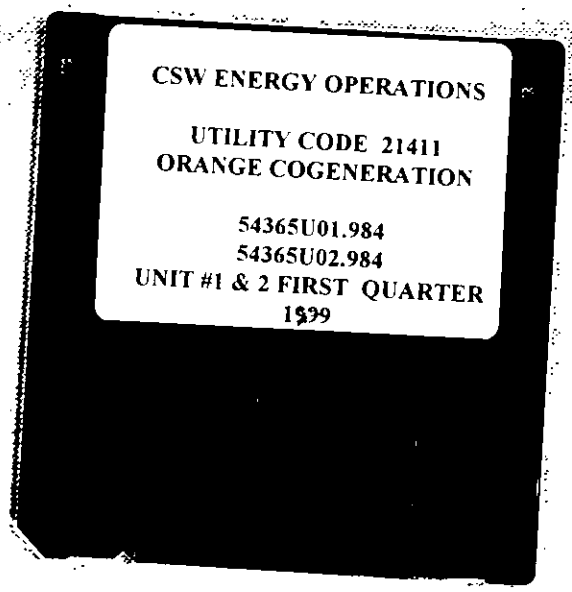
DIRECT ANNUAL COSTS, $/YR	FACTOR	REFERENCE	1999 COSTS, $/YR	
OPERATING LABOR	$27.82/HR @ 1HR/[illegible]	[illegible] EPA [illegible])	$20,309	
SUPERVISORY LABOR	15 % OF OPERATI[illegible]	(EPA 19[illegible])	$3,046	
MAINTENANCE LABOR AND MATERIALS	1,280 (MW) + 25,[illegible]	(EPA 19[illegible])	$137,392	
CATALYST REPLACEMENT (CR)	N/A	Vendor Es[illegible]iate	$189,200	Scaled
CATALYST DISPOSAL	$15/CF	(EPA 19[illegible])	$23,220	Scaled
AQUEOUS AMMONIA	$378/ton	(EPA 19[illegible])	$868,495	Scaled
DILUTION SYSTEM	N/A	(EPA 19[illegible])	-	
ELECTRICITY	N/A	(EPA 19[illegible])	-	
PERFORMANCE LOSS	0.50%	(EPA 19[illegible])	$19,320	
BLOWER	N/A	(EPA 19[illegible])	-	
PRODUCTION LOSS	N/A	(EPA 19[illegible])		
			$1,060,985	
INDIRECT ANNUAL COSTS, $/YR				
OVERHEAD	60% OF ALL LABO[illegible]	(EPA 19[illegible])	$96,448	
INSURANCE & ADMINISTRATION	2.6%OF TCI	(EPA 19[illegible])	$88,081	
CAPITAL RECOVERY	CRF X (TCI - CR)	N/A	~~[illegible]~~	→ 0.175 x 201,132 = 23,633
			~~[illegible]~~	→ 186,160
TOTAL ANNUAL COSTS, $/YR			~~[illegible]~~	→ 1,247,145
TOTAL NET NOx REDUCTIONS (TPY)				
Oil Firing			0	
Gas Firing			269	
Total			269	
INCREMENTAL COST EFFECTIVENESS, $/TON			$5,582	→ 4636 $/Ton

Jeff,

The 15 + 6 ppm cases may have lower $/ton. Big costs are CR, NH_3, + disposal costs

Darrel

P.S.
If al wants to smack GE why not a 2.4 million dollar


CSW ENERGY OPERATIONS
UTILITY CODE 21411
ORANGE COGENERATION
54365U01.984
54365U02.984
UNIT #1 & 2 FIRST QUARTER
1999