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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

IN RE:

FLORIDA POWER & LIGHT COMPANY PUTNAM POWER PLANT; modification of terms and conditions of Certification No. PPS-74-01, Putnam County, Florida,

Petitioner.

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**REQUEST FOR MODIFICATION OF CONDITIONS OF CERTIFICATION**

1. FLORIDA POWER & LIGHT COMPANY (FPL) hereby requests modification of the Conditions of Certification for the Putnam Power Plant pursuant to Section 403.516(1)(b), Florida Statutes, and Site Certification Condition No. 32, as more particularly described herein.

**Background**

2. On October 16, 1974, FPL was issued Site Certification by the Board of the Department of Pollution Control authorizing the construction and operation of its "Putnam Plant," subject to certain Conditions of Certification.

3. The Putnam Plant Conditions of Certification were previously modified pursuant to Section 403.516, Florida Statutes, on May 18, 1976; September 26, 1978; May 20, 1980; February 21, 1984; and May 15, 1986.

Modification Request

4. Modifications to the conditions are needed to incorporate new source performance standards applicable to the heat recovery steam generators as a result of proposed refurbishments and to allow the construction activities which are necessary for those refurbishments to occur. The proposed refurbishments will increase the steam system's reliability and efficiency by allowing more electrical energy to be generated from the same amount of fuel. The modification of conditions would allow FPL to reconstruct and operate the heat recovery steam generators in a manner consistent with the conditions set forth below. Certain clarifying modifications and modifications reflecting current Department of Environmental Regulation programs also need to be made.

5. Accordingly, FPL hereby requests modifications to Site Certification Conditions 1, 2, 4, 5, 9, 12, 31, and 32 and the addition of a new Condition No. 30 as follows (proposed new language is shown underlined):

6. Condition No. 1: FPL requests expansion of Condition No. 1 to cover the proposed heat recovery steam generator (HRSG) system improvements and to clarify which requirements apply to the auxiliary boilers, combustion turbines, and HRSGs.

~~1.~~ ~~A.~~ Auxiliary Boilers:

~~Fuel consumed should not contain more than 0.7% sulfur nor should stack emissions exceed those specified in chapter 17-2.600(6).~~

B. Combustion Turbines:

(i) Only fuel oil with not more than 0.7 percent sulfur content or natural gas may be fired.

(ii) Opacity shall not exceed 20 percent opacity except for one 6-minute period per hour during which opacity shall not exceed 27 percent.

C. Heat Recovery Steam Generators:

(i) Only the following fuels may be fired: (a) natural gas or (b) fuel oil with not more than 0.5 percent sulfur content by weight.

(ii) Emissions shall not exceed the following limitations:

(a) Opacity emissions shall not exceed 20 percent (6-minute average), except for one 6-minute period per hour of not more than 27 percent.

(b) Excess opacity resulting from malfunctions is permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess opacity shall be minimized, but in no case exceed two hours in any 24-hour period unless specifically authorized by the Department for longer duration.

(c) Excess opacity resulting from startup or shutdown is permitted, provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized.

(d) Nitrogen oxides emissions shall not exceed 0.2 lb/mmBtu heat input when natural gas or distillate oil is combusted or 0.4 lb/mmBtu heat input when residual oil is combusted. Compliance is determined on a 30-day rolling average basis. The nitrogen oxides standard applies at all times, including periods of startup, shutdown, or malfunction.

(iii) To determine compliance with the emissions limit for sulfur dioxide, receipts from the fuel supplier shall be maintained for each shipment which certify that the oil complies with the specifications for fuel oil numbers 1 and 2, as defined by the American Society of Testing and

Materials in ASTM D396-78, Standard Specifications for Fuel Oils. Quarterly reports based on such receipts shall be submitted to the Northeast District Office certifying that only oil containing no more than 0.5 weight percent sulfur or oil that has a sulfur dioxide emission rate equal to or less than 0.5 lb/mmBtu heat input and which meets the ASTM specifications was combusted in the duct burners during the preceding quarter. All quarterly reports shall be postmarked by the 30th day following the end of each calendar quarter.

(iv) To determine compliance with the opacity limit, Method 9 shall be used as required under 40 CFR § 60.8 (July 1, 1990) Edition). The initial performance test shall be performed within 60 days after achieving the maximum production rate for the HRSGs, but not later than 180 days after initial startup. Annual compliance tests shall be performed at least once during each federal fiscal year (October 1 - September 30). Thirty (30) days prior to the initial compliance test and fifteen (15) days prior to each annual compliance test, notice shall be provided to the Northeast District Office. The results of each test shall be submitted to the Northeast District Office within 45 days of test completion. Other Department-approved methods may be used for compliance testing after prior Department approval.

(v) To determine compliance with the nitrogen oxides emissions limit, FPL shall conduct the performance test described in 40 CFR § 60.46b(f) (July 1, 1990 Edition) and required under 40 CFR § 60.8 (July 1, 1990 Edition) using the nitrogen oxides and oxygen measurement procedures in 40 CFR Part 60 Appendix A, Method 20 (July 1, 1990 Edition). The initial compliance test shall be performed within 60 days after achieving the maximum production rate for the HRSGs, but not later than 180 days after initial startup. Annual compliance tests shall be performed at least once during each federal fiscal year (October 1 - September 30). Thirty (30) days prior to the initial compliance test and fifteen (15) days prior to each annual compliance test, notice shall be provided to the Northeast District Office. The results of each test shall be submitted to the Northeast District Office within 45 days of test completion.

(vi) FPL shall maintain records of opacity and must submit excess emissions reports for any calendar quarter during which there are excess emissions from the HRSGs. If there are no excess emissions during the calendar quarter, FPL shall submit a report stating that no excess emissions occurred during the quarterly reporting period. The quarterly reports shall be submitted to the Department's Northeast District Office.

(vii) FPL shall satisfy any applicable nitrogen oxides emissions records maintenance requirements set forth in 40 CFR § 60.49b(g) (July 1, 1990 Edition).

(viii) All records required under this condition shall be maintained by FPL for a period of two years following the date of such record.

**Rationale**

FPL proposes to make changes to the heat recovery steam generators (HRSGs) as outlined in the attached letters dated March 26, 1990, to the Department of Environmental Regulation[1] (Exhibit 1), and dated October 26, 1990, to the Environmental Protection Agency (EPA) (Exhibit 2). The proposed changes to the existing HRSGs will make them subject to the regulatory requirements, including emission limitations, that apply to new HRSGs. (See letter from EPA dated May 9, 1990, attached as Exhibit 3.) EPA has also determined that because the potential emissions from the plant will not be increased by the proposed changes, the

[1] FPL is not proposing to make any changes to the combustion turbines at this time. Accordingly, the Environmental Protection Agency has determined that the HRSG changes above will not trigger the need for a Prevention of Significant Deterioration (PSD) construction permit (see Exhibit 3).

final refurbishment plan will not require Prevention of Significant Deterioration (PSD) preconstruction review. (See letter from EPA dated December 3, 1990, letter to EPA dated December 7, 1990, and letter from EPA dated December 13, 1990, attached as Exhibits 4, 5, and 6, respectively.) A description of the proposed changes is included in a construction application form that is attached as Exhibit 7 in order to update the Department's files.

The changes to Condition No. 1 reflect standards of performance for new steam generating units (HRSGs) reconstructed after June, 1984, and which have a heat input capacity of greater than 100 mmBtu/hr, but not more than 250 mmBtu/hr, Subpart Db of 40 CFR Part 60, specifically, 40 CFR § 60.43b(f), 60.46b(d), 60.48b(a) (opacity); 40 CFR § 60.43b(g) (excess emissions); 40 CFR § 60.42b(d), (j) (sulfur dioxide); 40 CFR § 60.44b(4), 60.46b(f), 60.48b(h) (nitrogen oxides); 40 CFR § 60.49b (reporting and record keeping); 40 CFR § 60.8 (performance tests); emissions standards contained in Rules 17-2.250 and 17-2.600(6), Florida Administrative Code (excess emissions); and performance testing requirements of Rule 17-2.700, Florida Administrative Code.

The proposed language regarding auxiliary boilers is intended to clarify the Conditions of Certification and does not reflect any physical or operational change to the Putnam Plant. The existing Putnam Plant includes two auxiliary

boilers that produce auxiliary steam needed to operate several plant auxiliary systems, including, but not limited to, fuel treatment, steam turbine seals and steam jet air ejectors. These auxiliary boilers were part of the design of the plant at the time of its original Site Certification in October, 1974. Construction commenced on the foundations for the auxiliary boilers, as well as other portions of the plant, prior to January 6, 1975. The auxiliary boilers have operated as an integral part of the plant since it was put into service in 1978. Because the Conditions of Certification do not explicitly address the auxiliary boilers, FPL proposes that several of the conditions be clarified to indicate which requirements apply to the auxiliary boilers and which apply to the combined cycle units. (See revised language proposed for Conditions 1, 2 and 4.)

7. Condition No. 2: FPL proposes to revise the stack height and wind monitoring provisions as follows:

> 2. Stack Height: Minimum stack heights for ~~the paired combined cycle unit exhaust stacks shall be 71 feet above grade. Stacks with a height of at~~ least 150 feet shall be constructed if monitoring data per Condition 5 indicates ambient air standards ~~have been~~ would be violated.
>
> Wind Restriction: The permittee will burn fuel oil containing no more than 0.50% sulfur when sustained winds exceed 20 miles per hour for any continuous period of three hours or longer.

Wind Monitoring: The permittee shall measure wind velocity and wind direction at hourly intervals in the plant vicinity, only for those hours during which combustion turbines at either of the combined cycle units of the plant operates on oil with greater than 0.5 percent sulfur content. Wind data for the hours during which oil with greater than 0.5 percent sulfur content was burned each month, or, if applicable, a statement that no oil with greater than 0.5 percent sulfur content was burned during that month, shall be reported to the Northeast District Assistant Deputy Secretary Manager of the Department by the last day of the each month following each the reporting period. Wind velocity and direction measurements required by this paragraph shall be made in accordance with recognized methods and procedures.

Do we want to leave this in

**Rationale**

These changes would: (a) clarify that the stack height condition applies only to the combined cycle units and not to the auxiliary boilers; and (b) make the wind "monitoring" provision more consistent with the wind "restriction" provision of Condition No. 2, which is intended to ensure that the combustion turbine fuel sulfur content is restricted to a maximum of 0.5 percent when sustained wind speeds exceed 20 miles per hour.

8. Condition No. 4: FPL proposes to change the continuous monitoring requirements as follows:

4. The permittee shall install and operate continuous monitoring devices on one of the paired combined cycle unit exhaust stacks for each unit for the following: Opacity, Nitrogen Oxides. Records of such monitoring shall be available for inspection.

Rationale

This change would clarify that the continuous emissions monitor requirements apply to one stack at each combined cycle unit and not to the auxiliary boilers.

9. Condition No. 5: FPL proposes to change the date for submission of monitoring reports, as follows:

> 5. The permittee shall install and operate continuously for a 24-hour period every six days, two ambient air, West-Gaeke, monitoring devices for sulfur dioxide and two suspended particulate sampling devices. The location of these ambient air samples shall be determined by consultation with the Northeast District Assistant Deputy Secretary Manager of the Department. The data collected will be reported to the Northeast District Assistant Deputy Secretary Manager quarterly by the 45th day following the end of ~~last day of each month following~~ the reporting period, utilizing the SAROAD or other mutually acceptable format.

Rationale

With this change, the air quality monitoring reports will be due within 45 days after the end of the quarterly reporting period, consistent with Rule 17-2.700(7)(b), Florida Administrative Code, the reporting requirement for compliance tests.

10. Condition Nos. 7, 9 and 12: FPL proposes changes to clarify the District's title, as follows:

> 7. Monitoring shall be conducted at the frequencies listed below on the following waste streams, where applicable: Cooling Tower Blowdown, West EP Pond, North Fuel Oil Tank Farm, and the Physical Chemical Treatment System. Each of these

waste streams discharge to the St. Johns River. Cooling Tower Blowdown and the Physical Chemical Treatment System discharge may discharge simultaneously or separately through the same pipe. Monitoring reports shall be submitted quarterly to the Department's Northeast District Assistant Deputy Secretary ~~Manager~~:

* * *

9. Noncompliance Notification: If, for any reason, the permittee does not comply with or will be unable to comply with any limitation specified in this certification, the permittee shall provide prompt notification to the Assistant Deputy Secretary of the Northeast District ~~Lower St. Johns Subdistrict Manager~~ of the Department by telecommunication sent by 3:00 p.m. of the next normal work day following the occurrence of such noncompliance, and shall submit the following information in writing, within ninety-six (96) hours of becoming aware of such conditions:

(a) [No change]

(b) [No change]

* * *

12. Bypassing: Any diversion or bypass of facilities necessary to maintain compliance with the terms and conditions of this certification is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the conditions of this certification. The permittee shall promptly notify the Assistant Deputy Secretary of the Northeast District ~~Lower St. Johns Subdistrict Manager~~ of the Department of each such diversion or bypass in accordance with the procedure contained in Condition 9 of this certification.

**Rationale**

These changes would update the correct titles of the appropriate Department staff and District to whom FPL must provide any notices of noncompliance, reports, or correspondence.

11. **FPL proposes to incorporate the plant's Groundwater Monitoring Plan as a new Condition No. 30, as follows:**

> 30. The Groundwater Monitoring Plan for the Putnam Power Plant, approved on February 25, 1985, and on file with the Department, is incorporated by reference.
>
> Copies of any subsequent revisions to the Groundwater Monitoring Plan which are approved by the Department's Northeast District Office shall be filed with the Department's Siting Coordination Office and provided to the parties hereto by certified mail, and, in the absence of a request for a hearing thereon within 15 days of receipt of such revision, the revisions shall become part of this certification without the need for further filing or the submission of filing fees.

**Rationale**

The Groundwater Monitoring Plan for the Putnam Power Plant was proposed pursuant to Rule 17-28.700, Florida Administrative Code, and approved by the Department of Environmental Regulation in 1985. Section 403.511, Florida Statutes, provides that a power plant certified under the Act must comply with rules adopted by the Department subsequent to the certification which prescribe new or stricter criteria. The statute further provides that such rules operate as automatic modifications to

certifications. The Department issued rules requiring a groundwater monitoring plan subsequent to the certification of the Putnam Power Plant. FPL submitted its Groundwater Monitoring Plan for the Putnam Plant in May of 1984, and the Plan was approved by the Department in February of 1985. A copy of the Groundwater Monitoring Plan for the Putnam Plant is attached as Exhibit 8. The Conditions of Certification should therefore be modified to incorporate the plan.

FPL may seek additional revisions to its Groundwater Monitoring Plan at some future date. The Department and FPL should be able to make such revisions without going through a formal modification procedure, in the absence of the objection of a party. The Northeast District would be authorized to approve such minor revisions without a formal modification of conditions unless a party were to request a hearing within fifteen (15) days of receipt of the revisions. This would simplify the process for minor changes to the Groundwater Monitoring Plan.

12. Condition Nos. 30, 31, and 32: **FPL proposes to renumber these conditions as follows:**

31. ~~30~~. [No change]
32. ~~31~~. [No change]
33. ~~32~~. [No change]

**Rationale**

These changes are to reflect the renumbering of Condition Nos. 30, 31, and 32 to Nos. 31, 32, and 33 because of the addition of a new Condition No. 30.

13. The Conditions of Certification, as modified, are attached as Exhibit 9.

## Request for Relief

WHEREFORE, Petitioner respectfully requests that:

A. The Department give notice and opportunity for hearing in accordance with Chapter 403 and Chapter 120, Florida Statutes; Petitioner will provide notice to all parties to the original site certification proceeding in the above-styled case of this request to modify certain terms and conditions of Site Certification No. PPS-74-01, in accordance with Florida Administrative Code Rule 17-17.211(4);

B. The Secretary of the Department approve the modifications described herein; and

C. The Secretary of the Department grant such other relief as may be appropriate.

Respectfully submitted,

HOPPING BOYD GREEN & SAMS

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Attorneys for Petitioner,
Florida Power & Light Company

## CERTIFICATE OF SERVICE

I HEREBY CERTIFY that copies of the foregoing Request for Modification of Conditions of Certification were furnished to the following by United States Mail, postage prepaid, this 12th day of March, 1991:

Steven Pfeiffer, General Counsel
Department of Community Affairs
The Rhyne Building, Room 138
2740 Centerview Drive
Tallahassee, FL 32399-2100

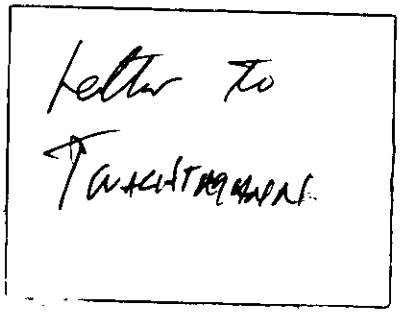
Susan F. Clark, General Counsel
Florida Public Service Commission
Fletcher Building
101 E. Gaines Street
Tallahassee, FL 32399-0850

John Thompson, Chairman
Putnam County Board of
County Commissioners
Post Office Box 758
Palatka, FL 32178

Attorney

bjh/PutnamReqC

3/26/90 Letter to Duke Investments



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OF COUNSEL
W. ROBERT FOKES

March 26, 1990

Dale S. Twachtmann, Secretary
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: PSD and NSPS Determination Request

Dear Secretary Twachtmann:

Florida Power & Light (FPL) is proposing to improve its Putnam Combined-Cycle Power Plant to achieve greater reliability, capability and efficiency. These improvements require review by the Department under its New Source Performance Standards (NSPS) and potentially under its Prevention of Significant Deterioration (PSD) responsibilities. FPL has had two preliminary meetings with Clair Fancy and Buck Oven of your staff, and now wishes to formally request a determination from the Florida Department of Environmental Regulation (DER) for the project, pursuant to 40 CFR §60.5. In particular, we seek the Department's concurrence, in view of the proposed work at the Putnam Plant, that the Heat Recovery Steam Generator (HRSG) components of the plant will be "reconstructed" and thus subject to the 40 CFR, Part 60, Subpart Db NSPS, and that the combustion turbine components will not be subject to the 40 CFR, Part 60, Subpart GG NSPS for nitrogen oxides ($NO_x$). FPL further requests concurrence that the facility will not be subject to PSD review.

## BACKGROUND

FPL's Putnam Power Plant consists of two combined-cycle units each comprised of two combustion turbines, two afterburners, and two HRSGs. (See Attachment 1.) The Putnam Plant was the first power plant licensed under Chapter 403, Sections 403.501-403.517, Florida Statutes, the Florida Electrical Power Plant Siting Act (PPSA). Certification under the PPSA was issued in October, 1974. In December, 1975 the plant was issued a NPDES permit from EPA. Commercial operation of the Putnam Plant units began in August, 1977 (Unit 2) and April, 1978 (Unit 1).

EXHIBIT 1

The [redacted] designed to burn distillate oil, residual oil and natural gas. The Plant operated exclusively on oil until 1981 when natural gas was added to the fuel mix and when rotor improvements allowed combustion of more distillate oil and natural gas fuel at an improved heat rate and marginally increased power output on the turbine side. The maximum design and maximum potential emission rate, reflecting use of residual oil, remained unchanged as a result of the work done in 1981-82, and actual emissions in terms of both the kg/hr rate and annual emissions decreased, since the plant has primarily operated on gas and distillate oil following the turbine efficiency improvements. DER was nevertheless apprised of the program to burn natural gas as a primary operational fuel, and DER subsequently modified the Site Certification to relax wind speed monitoring requirements when gas was being burned.

PROPOSED WORK

FPL is now proposing a modernization program at the Putnam Plant which would increase the plant's power output at a reduced heat rate. Steam cycle performance will be enhanced by complete tube bundle replacement in the existing HRSGs. A series of components will also be upgraded in the combustion turbines. [redacted] The base load unit heat rate is expected to improve by an average of 542 BTU/kwh, thereby potentially ranking Putnam Plant as number one in the United States for heat rate (efficiency) performance.

The greatest potential regulatory impact on the proposed project is related to nitrogen oxides ($NO_x$) emissions. [redacted] thereby making the project

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1/ It should be noted that these improvements will not require an increase in the maximum operating capacity of the existing electric generators at the plant. See §403.506(2).

economically infeasible. FPL proposes to avoid increased $NO_x$ emissions by the installation of a water injection system and the acceptance of a federally enforceable $NO_x$ emissions limitation for the combustion turbines.

## REGULATORY ANALYSIS

Your review of this request will involve a determination of the applicability or non-applicability of various NSPS and PSD regulatory requirements. Our analysis of these requirements for the project follows.[2/]

## NSPS

### Heat Recovery Steam Generators (HRSGs)

40 CFR, Part 60, Subpart Db is presumed to be applicable for the proposed changes to the Putnam Plant HRSGs because the fixed capital cost of the components being replaced in the HRSGs exceeds 50 percent of the fixed capital cost that would be required to construct comparable entirely new HRSGs. See 40 CFR §60.15.

This letter constitutes notice under 40 CFR §60.15(d), that under the proposed plan the HRSGs will be reconstructed and thus subject to NSPS. It is our understanding that the following standards will apply under Subpart Db:

| Pollutant | Emission Standard |
|---|---|
| Particulate Matter<br>40 CFR §60.43b | No standard when burning very low sulfur oil. (≤0.5% by weight) See 54 Fed. Reg. 51818 |
| Visible Emissions<br>40 CFR §60.43b(f) | 20% opacity, except for one 6-minute period per hour of up to 27% opacity |

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2/ This analysis does not cover the current conditions of site certification, which will be discussed in a subsequent letter.

| | |
|---|---|
| Sulfur Dioxides<br>40 CFR §60.42b(j) | 0.5 lbs/$10^6$ BTU heat input or<br>0.5% sulfur by weight |
| Nitrogen Oxides<br>40 CFR §60.44b(a)(4) | 0.2 lbs/$10^6$ BTU heat input (gas or distillate oil); 0.4 lbs/$10^6$ BTU residual oil |

The Company will burn only very low sulfur oil (maximum 0.5% sulfur content) or natural gas in the HRSGs. Therefore, the HRSGs will not be subject to performance and compliance testing for sulfur dioxide under 40 CFR §60.45b(j), or emission monitoring requirements for sulfur dioxide under 40 CFR §60.47b(f), provided that fuel receipts are obtained from the fuel supplier which certify that the oil meets the definition of distillate oil as defined in 40 CFR §60.41b. Compliance with the emission limit for nitrogen oxides will be determined by performance tests using procedures in 40 CFR Part 60, Appendix A, Method 20. See 40 CFR §60.46b(f). No continuous monitoring system is required to measure nitrogen oxides. 40 CFR §60.48b(h). The plant will operate a continuous monitoring system for measuring the opacity of emissions discharged to the atmosphere and record the output of the system. 40 CFR §60.48b(a).

Combustion Turbines

For the combustion turbines, the potentially applicable standards are found in 40 CFR Part 60, Subpart GG, which contains NSPS for $NO_x$ and $SO_2$. Subpart GG, does not currently apply to the Putnam Plant because construction of the combustion turbines commenced before October 3, 1977. Subpart GG could apply to the turbines if the proposed changes caused them to be "reconstructed" sources (see above discussion for HRSGs). However, on the basis of manufacturer's price estimates, fixed capital cost of those components that would be replaced for each combustion turbine as part of the modernization program is approximately $2.8 million, whereas the cost of a comparable entirely new combustion turbine is estimated to range between $15 and $20 million dollars. See Attachment 2 (depicting the components included in the cost analysis). The capital cost for the combustion turbines work is less than 20 percent of the replacement value, well below the 50 percent range needed to constitute reconstruction.

Under EPA regulation 40 CFR §60.14, adopted by reference in Florida Administrative Code Rule 17-2.660(2)(f), a source will be "modified" if physical or operational changes to it would increase, or initiate for the first time, emissions (in kg/hr) to the atmosphere of any pollutant to which a standard applies; NSPS would be triggered for each such pollutant.

Anticipated differences in the combustion turbine emissions at the Putnam Plant are depicted in Table 1. (Table 2, Attachment 3, provides estimated short-term emissions for the proposed changes for all pollutants.) Water injection, designed to achieve a 100 ppm $NO_x$ emissions limit, will preclude any increase in nitrogen oxides emissions after the proposed changes. The installation of water injection capability to reduce air pollutants is exempt from the definition of modification under 40 CFR §60.15(e)(5).

**Table 1. Emissions Rates (kg/hr) Per Combustion Turbine Before and After the Proposed Changes**

| FUEL | POLLUTANT | BEFORE | AFTER |
|---|---|---|---|
| Residual Oil | $NO_x$ | 433 | 433 |
| | $SO_2$ | 279 | 279 |
| Distillate Oil | $NO_x$ | 388 | 191 |
| | $SO_2$ | 204 | 225 |
| Natural Gas | $NO_x$ | 233 | 177 |
| | $SO_2$ | 0.26 | 0.28 |

The proposed changes would theoretically increase the short-term (kg/hr) emission rate for $SO_2$. Therefore, the combustion turbines will be subject to the 40 CFR Part 60, Subpart GG NSPS standard for $SO_2$ which limits the sulfur content of fuel to 0.8% sulfur by weight. The combustion turbines share a common fuel storage with the HRSG's afterburners. The 40 CFR Part 60, Subpart Db, $SO_2$ NSPS standard applicable to the reconstructed HRSGs will require FPL to reduce its currently allowed fuel sulfur content from 0.7% to 0.5% (see HRSG discussion above). Thus, the combustion turbines will meet the Subpart GG $SO_2$ standard.

FPL will monitor the sulfur fuel content of its Putnam Plant fuel by maintaining fuel receipts from the fuel supplier as required under Subpart Db.

PSD

Although no PSD permit was required for the construction of the Putnam Plant because construction commenced prior to the June 1, 1975 applicability date of the PSD regulations, current DER regulations require a PSD permit when a major facility is modified such that it experiences a significant net increase in emissions of any pollutant regulated under the Clean Air Act. Fla. Admin. Code R. 17-2.500(2)(d)(4)(ii)(1989).[3/]

In order to determine whether a source will experience a significant net increase in actual emissions of a regulated pollutant, emissions from the entire plant site before and after the proposed work must be examined on a tons-per-year basis. PSD review will only be triggered for those pollutants for which the source will experience a significant net emission increase, after taking into account contemporaneous creditable increases and decreases in actual emissions. Fla. Admin. Code R. 17-2.500(2)(e). The pre-alteration emission rate for the Putnam Plant is listed in Table 3, Attachment 4. The pre-alteration actual emission rate was calculated by computing the average rate, in tons per year, at which the Putnam Plant actually emitted the pollutant during the two-year period preceding the proposed change (1988-89). Actual operating conditions and fuel usage were used in the computation. Also displayed in Table 3. for comparison are the emissions that would have resulted if 100% residual oil had been burned in 1988-89;[4/] the proposed changes will not alter these emissions. Also

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3/ See the definition of "modification" at Fla. Admin. Code R. 17-2.100(126) (1989) and "significant net emissions increase" at Fla. Admin. Code R. 17-2.500(2)(e)(2) (1989) and Table 500-2, Regulated Air Pollutants - Significant Emission Rates.

4/ At this time, the Company has no plans to burn residual oil in the future, though it wishes to retain this option.

displayed in Table 3. are the potential actual emissions of the plant for distillate oil and natural gas usage after the proposed work, assuming that reductions in $NO_x$ emissions are made federally enforceable. Fla. Admin. Code R. 17-2.500(2)(e)4.c.(ii)(1989). The emissions were calculated assuming the same capacity factor and fuel use conditions before and after the proposed work. This approach is consistent with the recent holding of Wisconsin Electric Power Co. v. Reilly, 893 F.2d 901, 918 n.14 (7th Cir. 1990).

As Table 3. shows, $NO_x$ emissions will decrease somewhat after the change because of water injection control. The emissions of other regulated pollutants will not significantly increase.

To further conservatively depict the effects of the proposed work to the Putnam Plant, the plant's theoretical maximum potential to emit regulated pollutants from the three fuels, before and after the proposed work, is displayed in Table 4, Attachment 5. Also, note that the plant will actually observe a decrease in emissions per megawatt as a result of being operated at a higher efficiency rate. Table 5, Attachment 6, displays the emissions rates in tons/MW of electricity produced. Table 5. shows that the proposed project will allow FPL to produce more electricity while decreasing pollutant emissions per MW.

## CONCLUSION

FPL remains committed to providing its customers with improved reliability, capability and efficiency and to maintaining its concern for the environment. The changes that FPL is proposing for the Putnam Plant provide an increase in generating capability and efficiency, a decrease in the emission rate of $NO_x$, and minimal increases in the emission rates of other pollutants. Indeed, with water injection, the maximum $NO_x$ emissions are projected to decrease by approximately 20% and 50% respectively for natural gas and distillate oil. FPL therefore respectfully requests that DER issue a written determination concurring with our conclusions that the changes proposed at the Putnam Plant:

(a) would constitute reconstruction of the HRSGs, thereby triggering the applicability of 40 CFR, Part 60, Subpart Db to the HRSGs;

(b) would not trigger the applicability of 40 CFR, Part 60, Subpart GG to the combustion turbines, provided that:

(i) $NO_x$ controls (water injection) are installed so as to avoid any increase in the maximum short term emission rate (kg/hr); and

(ii) the sulfur content in distillate oil burned is limited to 0.5% by weight; and

(c) Would not trigger PSD/BACT review for the plant, provided that a federally enforceable $NO_x$ emissions limit based upon water injection is imposed.

In view of the increased generating capacity needs projected for the State of Florida by 1992, FPL will need all generating units operational to meet demand. FPL would greatly appreciate your response to this request within the next 45 days, in order to allow construction to begin as soon as possible and thus allow the units to return to service in time to meet the projected demand. In the interim, if you have any questions or would like more information about the project, please contact us.

Thanks for your assistance in this matter.

Respectfully submitted,

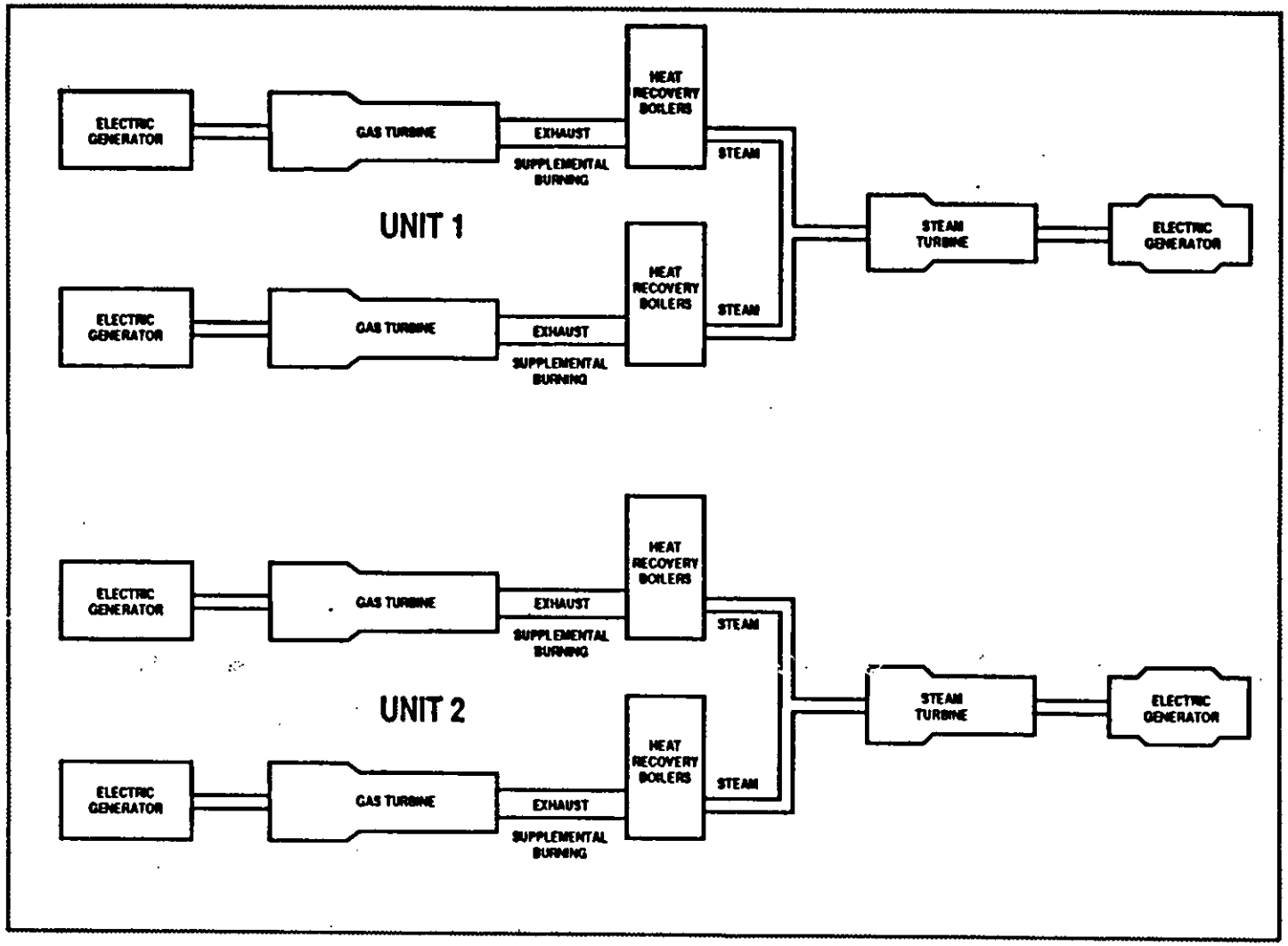
William H. Green
Sam J. Smith

Attorneys for Florida Power and Light Company

WHG/SJS/kkm/wrn:Twachtmann

cc: Mr. Hamilton S. Oven, Jr., P.E., DER
Mr. Clair Fancy, DER
Mr. Steve Smallwood, DER

Attachment -

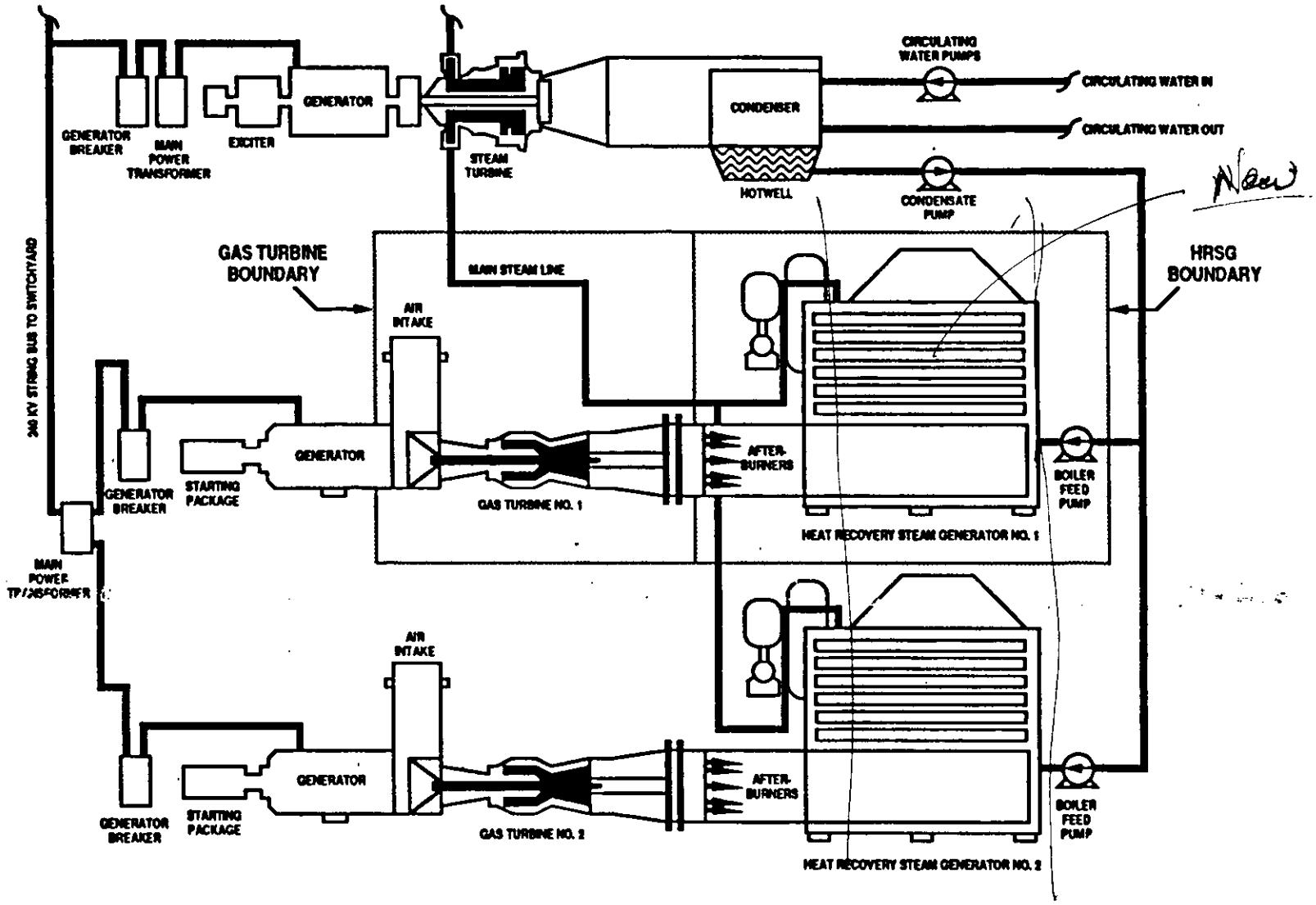



**FPL PUTNAM COMBINED CYCLE POWER PLANT**
(Block Diagram)

KBN

Attachment 2

KBN 10/PUTNAM.1




FPL PUTNAM PLANT COMBINED CYCLE UNIT

KBN

Attachment 3

# Table 2. Estimated Emissions for Putnam Plant Changes

| | CT/Natural Gas | | CT/Fuel Oil | | HRSG/Natural Gas | | HRSG/Fuel Oil | | Total - Before | | Total - After | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Before | After | Before | After | Before | After | Natural Gas | Oil | Natural Gas | Oil |
| Fuel Flow (lb/hr) | 44,100 | 47,160 | 47,200 | 52,020 | 8,140 | 6,522 | 8,516 | 6,823 | 52,240.0 | 55,716.0 | 53,682.0 | 58,943.0 |
| Heat Input (mmBtu/hr) | 968.3 | 1035.4 | 910.6 | 1003.6 | 178.7 | 143.2 | 164.3 | 133.6 | 1,147.0 | 1,074.9 | 1,178.6 | 1,137.2 |
| NOx - lb/hr | 490 | 390 | 853.3 | 420.6 | 17.9 | 14.3 | 23.9 | 19.4 | 507.9 | 877.2 | 404.3 | 440 |
| - kg/hr | 223 | 177 | 388 | 191 | 8 | 7 | 11 | 9 | | | | |
| SO2 - lb/hr | 0.57 | 0.61 | 448.4 | 494.2 | 0.105 | 0.084 | 80.9 | 65.8 | 0.67 | 529.30 | 0.69 | 560.00 |
| | 0.26 | 0.28 | 204 | 225 | | | | | | | | |
| CO - lb/hr | 6 | 7 | 5 | 14 | 7.36 | 5.90 | 5.91 | 4.81 | 13.36 | 10.91 | 12.90 | 18.81 |
| PM10 - lb/hr | 1 | 1 | 8 | 9 | 0.92 | 0.74 | 2.37 | 1.92 | 1.92 | 10.37 | 1.74 | 10.92 |
| VOC - lb/hr | 1 | 1 | 1 | 1 | 0.26 | 0.21 | 0.24 | 0.19 | 1.26 | 1.24 | 1.21 | 1.19 |
| H2SO4 -lb/hr | 0.046 | 0.049 | 36.1 | 39.8 | 0.008 | 0.007 | 6.5 | 5.3 | 0.05 | 42.62 | 0.06 | 45.09 |
| Pb - lb/hr | 0 | 0 | 0.0081 | 0.0089 | 0 | 0 | 0.0015 | 0.0012 | 0.000 | 0.010 | 0.000 | 0.010 |
| Be - lb/hr | 0 | 0 | 0.0023 | 0.0025 | 0 | 0 | 0.0004 | 0.0003 | 0.000 | 0.003 | 0.000 | 0.003 |
| Hg - lb/hr | 0.0110 | 0.0118 | 0.0027 | 0.0030 | 0.0020 | 0.0016 | 0.0005 | 0.0004 | 0.013 | 0.003 | 0.013 | 0.003 |
| Fl - lb/hr | 0 | 0 | 0.028 | 0.031 | 0 | 0 | 0.005 | 0.004 | 0.000 | 0.034 | 0.000 | 0.036 |
| As - lb/hr | 0 | 0 | 0.0038 | 0.0042 | 0 | 0 | 0.0007 | 0.0006 | 0.000 | 0.005 | 0.000 | 0.005 |

Note: Based on manufacturer design data, AP-42, or other EPA referenced documents.

Attachment 4

## Table 3. Actual Emissions in tons/year

| Pollutant | BEFORE | | AFTER * | | INCREASE/(DECREASE) | |
|---|---|---|---|---|---|---|
| | RESIDUAL OIL** | NATURAL GAS | DISTILLATE OIL | NATURAL GAS | DISTILLATE OIL | NATURAL GAS | DISTILLATE OIL |
| Nitrogen Oxides | 9,322 | 4,733 | 69.1 | 3,800 | 35.2 | (933) | (33.9) |
| Sulfur Dioxide | 7,728 | 6.3 | 42.7 | 6.5 | 44.8 | 0.2 | 3.1 |
| Carbon Monoxide | 98.6 | 125 | 0.86 | 121 | 1.5 | (4) | 0.65 |
| $PM_{10}$ | 702 | 17.9 | 0.82 | 16.3 | 0.87 | (1.5) | 0.06 |
| VOC | 16.7 | 11.7 | 0.097 | 11.3 | 0.095 | (0.4) | (0.002) |
| Sulfuric Acid Mist | 622 | 0.51 | 3.36 | 0.53 | 3.61 | 0.02 | 0.25 |
| Lead | 0.26 | 0 | 0.00075 | 0 | 0.00081 | 0 | 0.00006 |
| Beryllium | 0.039 | 0 | 0.00021 | 0 | 0.00023 | 0 | 0.00002 |
| Mercury | 0.030 | 0.122 | 0.00025 | 0.126 | 0.00027 | 0.004 | 0.00002 |
| Flouride | 1.063 | 0 | 0.00265 | 0 | 0.00285 | 0 | 0.00020 |
| Arsenic | 0.78 | 0 | 0.00036 | 0 | 0.00038 | 0 | 0.00003 |

* Water injection to 100 ppm gas/oil + allowance for FBN of 0.015% in oil
Water injected gas - 7,075 lb/hr, 0.15 lb $H_2O$/lb Fuel
oil - 23,410 lb/hr, 0.45 lb $H_2O$/lb Fuel

** Not changed by proposed work.

Attachment 5

## Table 4. Potential Emissions in tons/year (8760 hrs/yr)

| | | BEFORE | | AFTER * | | INCREASE/(DECREASE) | |
|---|---|---|---|---|---|---|---|
| Pollutant | RESIDUAL OIL** | NATURAL GAS | DISTILLATE OIL | NATURAL GAS | DISTILLATE OIL | NATURAL GAS | DISTILLATE OIL |
| Nitrogen Oxides | 17,227 | 8,898 | 15,368 | 7,683 | 7,709 | (1,815) | (7,659) |
| Sulfur Dioxide | 14,282 | 11.8 | 9,273 | 12.2 | 9,811 | 0.4 | 538 |
| Carbon Monoxide | 182 | 234 | 191 | 226 | 330 | (8) | 139 |
| $PM_{10}$ | 1,297 | 34 | 182 | 30 | 191 | (4) | 9 |
| VOC | 30.9 | 22.0 | 21.7 | 21.1 | 20.9 | (0.9) | (0.8) |
| Sulfuric Acid Mist | 1,150 | 0.95 | 747 | 0.98 | 790 | 0.03 | 43 |
| Lead | 0.48 | 0 | 0.168 | 0 | 0.177 | 0 | 0.009 |
| Beryllium | 0.073 | 0 | 0.047 | 0 | 0.050 | 0 | 0.003 |
| Mercury | 0.055 | 0.228 | 0.057 | 0.235 | 0.060 | 0.007 | 0.003 |
| Flouride | 1.965 | 0 | 0.589 | 0 | 0.623 | 0 | 0.034 |
| Arsenic | 0.328 | 0 | 0.079 | 0 | 0.084 | 0 | 0.004 |

* Water injection to 100 ppm gas/oil + allowance for FBN of 0.015% in oil
Water injected gas - 7,075 lb/hr, 0.15 lb $H_2O$/lb Fuel
oil - 23,410 lb/hr, 0.45 lb $H_2O$/lb Fuel

** Not changed by proposed work.

Table 5. Emission Rate (Tons/Mw)

| | BEFORE | | AFTER | |
|---|---|---|---|---|
| Pollutant | RESIDUAL OIL* | NATURAL GAS | DISTILLATE OIL | NATURAL GAS | DISTILLATE OIL |
| Nitrogen Oxides | 9.64 | 4.97 | 8.59 | 3.46 | 3.77 |
| Sulfur Dioxide | 7.99 | 0.0066 | 5.19 | 0.0059 | 4.79 |
| Carbon Monoxide | 0.102 | 0.131 | 0.107 | 0.110 | 0.161 |
| $PM_{10}$ | 0.726 | 0.0188 | 0.1016 | 0.0149 | 0.0935 |
| VOC | 0.017 | 0.0123 | 0.0121 | 0.0103 | 0.0102 |
| Sulfuric Acid Mist | 0.644 | 0.0005 | 0.4179 | 0.0005 | 0.3861 |
| Lead | 0.00027 | 0 | 0.00009 | 0 | 0.00009 |
| Beryllium | 0.00004 | 0 | 0.00003 | 0 | 0.00002 |
| Mercury | 0.00003 | 0.00013 | 0.00003 | 0.00011 | 0.00003 |
| Flouride | 0.00110 | 0 | 0.00033 | 0 | 0.00030 |
| Arsenic | 0.00018 | 0 | 0.00004 | 0 | 0.00004 |

* Not changed by proposed work.

Letter to
EPA
10/26/90

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OF COUNSEL
W. ROBERT FOKES

October 26, 1990

Ms. Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides and Toxics
Management Division
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

RE: FPL Putnam Plant
PSD/NSPS Applicability Determination

Dear Ms. Harper:

As you will recall, by letter dated March 26, 1990, our client, Florida Power & Light Company (FPL) requested an applicability determination from the Florida Department of Environmental Regulation (DER) regarding whether New Source Performance Standards (NSPS) or Prevention of Significant Deterioration (PSD) permitting requirements would apply to certain proposed changes to FPL's Putnam combined cycle power plant. We appreciate the timely response to that request contained in your letter of May 11, 1990 wherein you concluded that the proposed changes to the combustion turbines (CTs) would trigger PSD review, and that the proposed changes to the Heat Recovery Steam Generators (HRSGs) would constitute reconstruction that would trigger NSPS applicability to those components.

In light of EPA's determination, FPL has further evaluated its options for the Putnam Power Plant and has elected to forego the changes to the CTs and the related emissions increases that you found would trigger PSD review. Only the heat transfer related replacements at the HRSGs will be pursued at present. Of course, in view of the cost of those component changes, FPL acknowledges the correctness of your earlier determination that the HRSGs will be required to meet the applicable NSPS.

EXHIBIT 2

We have evaluated the proposed HRSG changes under applicable regulations at the request of FPL and, because they will not involve any changes in emissions from the source, we concluded that PSD review will not be triggered. As you are probably aware, the HRSGs recover heat from the CT exhaust gases and use that heat to generate steam electric energy. The HRSGs themselves do not generate emissions, with the exception of their supplemental duct burners, which can be used to raise the temperature of CT exhaust gases. (Attachments 1 and 2 depict the combined cycle unit block diagram and component relationships.) The changes proposed for the Putnam HRSGs will not involve the existing duct burners which, incidentally, will comply with NSPS; rather, the changes relate solely to the steam system and are intended to increase its reliability and efficiency. The changes include the following items:

- Replacement of steam tube modules
- Addition of tubing and replacement of steam drum internals to achieve lower steam and water velocities and reduced erosion
- Replacement of low pressure separation vessels
- Steam performance improvements to existing de-aerators
- Replacement of evaporator forced circulation pumps
- Replacement of boiler feed pump impellers and mechanical seals
- Replacement of miscellaneous steam and water piping.

It should be noted that the above changes will not affect the normal operations of the Putnam Plant units, nor will they influence the extent or priority of their utilization; thus, Plant emissions will be unaffected by the changes.

In view of the continued importance of this project and its scheduling constraints, we respectfully request confirmation by EPA of our interpretation of the

nonapplicability of PSD permitting to the facts outlined above.

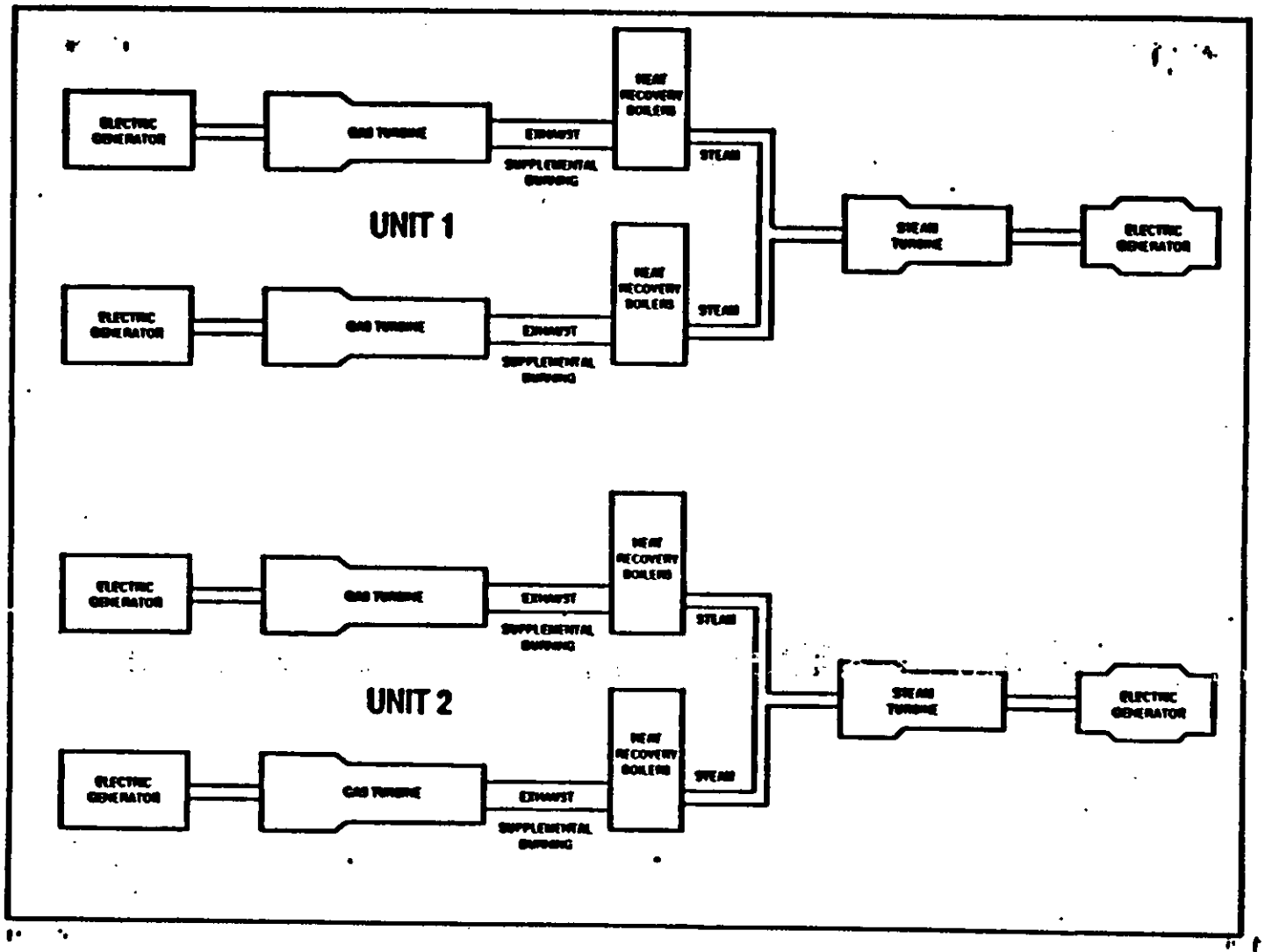
Once again, we thank you for your earlier timely response in this matter and look forward to your continued guidance. Of course, please do not hesitate to call if you have any questions in this matter.

Sincerely,

William H. Green
Angela R. Morrison

WHG/wrn:ltrharper
cc: Greg Worley, EPA Air Enforcement Branch
Clair Fancy, Chief, Bureau of Air Regulation, DER
Dr. Martin A. Smith, FPL

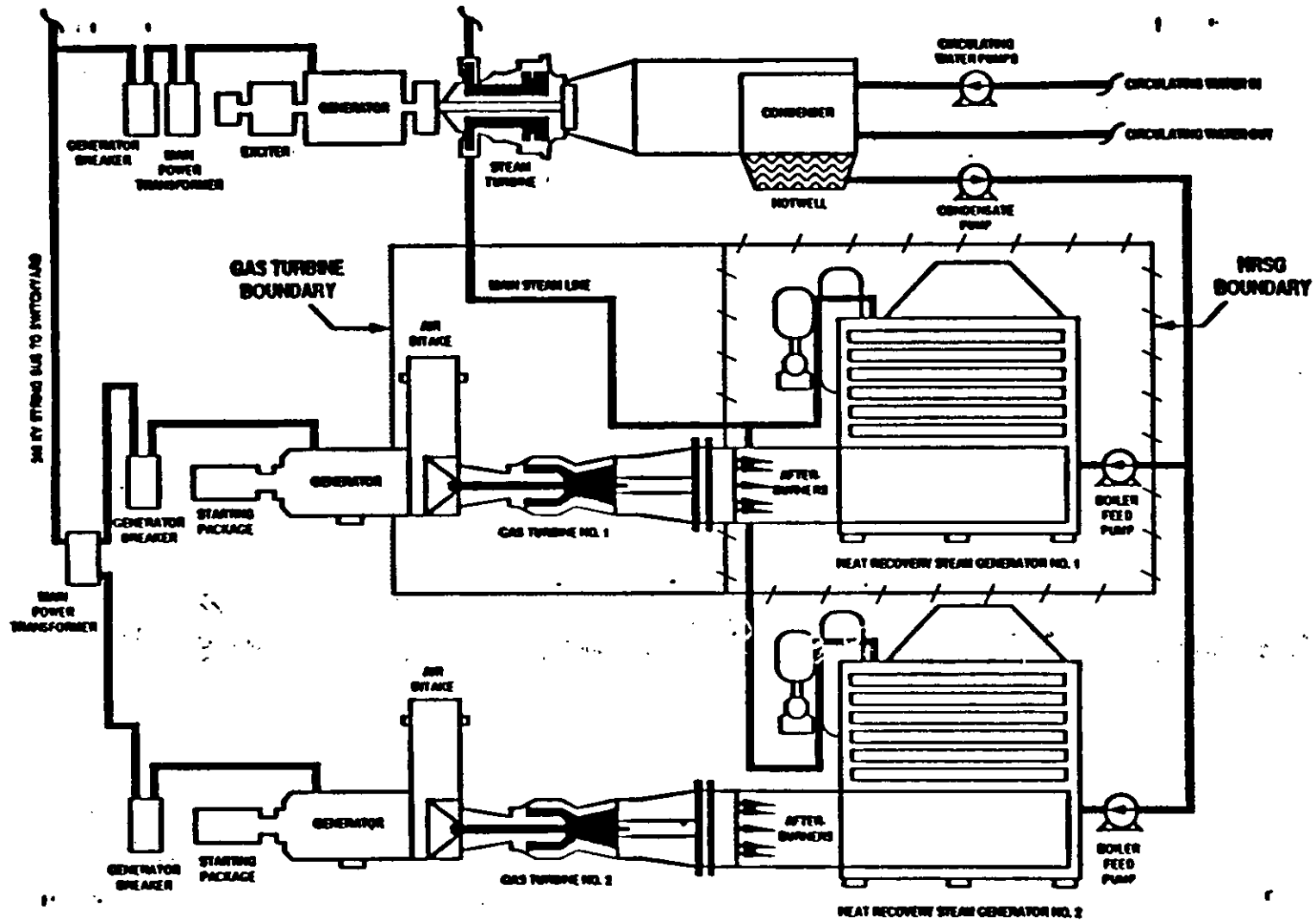
Attachment 1




**FPL PUTNAM COMBINED CYCLE POWER PLANT**
(Block Diagram)

KBN

Attachment 2




**FPL PUTNAM PLANT COMBINED CYCLE UNIT**

KBM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

RECEIVED

MAY 11 1990

DER - BAQM

4APTMD-AEB

MAY 9 1990

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: FPL Plant Putnam Request for Applicability Determination

Dear Mr. Fancy:

This is to acknowledge receipt of your letter dated April 12, 1990, concerning a request by the above referenced source for a determination of New Source Performance Standards (NSPS) and Prevention of Significant Deterioration (PSD) applicability to their proposed modification. Our comments regarding such determinations are as follows.

APPLICABILITY OF NSPS TO THE HEAT RECOVERY STEAM GENERATORS

FPL has declared pursuant to 40 C.F.R. §60.15(d) that each of the four Heat Recovery Steam Generators (HRSGs) will be reconstructed as defined in 40 C.F.R. §60.15. Each HRSG will be subject to 40 C.F.R. Part 60, Subpart Db because the heat input to each HRSG according to Table 2 of Attachment 3 will be greater than 100 million BTU per hour.

Since FPL intends to fire very low sulfur oil (both residual and distillate) and natural gas in the duct burners prior to the HRSGs, the following Subpart Db standards will apply:

Opacity standard of 20 percent when firing oil, either alone or in combination, as specified in 40 C.F.R. §60.43b(f).

Sulfur dioxide standard of 0.5 lb/MMBTU based solely on the heat input of the oil or 0.5% sulfur by weight as specified in 40 C.F.R. §60.42b(j).

Nitrogen Oxides standard of 0.2 lb/MMBTU when firing distillate or natural gas; and 0.4 lb/MMBTU when firing residual oil as specified 40 C.F.R. §60.44b(a)(4).

EXHIBIT 3

FPL will be required by 40 C.F.R. §60.48b(a) to install, calibrate, operate and maintain an opacity monitor on each HRSG. FPL has indicated that they will obtain fuel receipts as described in 40 C.F.R. §60.49b(r) to demonstrate compliance with the applicable $SO_2$ emission standard. For nitrogen oxides, compliance will be determined by Method 20 as specified in 40 C.F.R. §60.46b(f).

APPLICABILITY OF NSPS TO THE COMBUSTION TURBINES

According to FPL, each of the four combustion turbines will have an increase in the sulfur dioxide emission rate in kg/hr and will be subject to the sulfur dioxide standard of 40 C.F.R. Part 60, Subpart GG as a result of the modification provisions at 40 C.F.R. §60.14. FPL has indicated that the addition of water injection will result in no increase in the kg/hr emission rate of nitrogen oxides, therefore, not triggering the modification provisions of NSPS. In order to verify this, we recommend that emission tests be conducted before and after the changes to the turbines.

Compliance with the sulfur dioxide emission standard of Subpart GG shall be determined by the procedures specified in 40 C.F.R. §60.335(d).

APPLICABILITY OF PSD

In making the determination of PSD applicability, FPL based their calculations on comparing actual emissions prior to the proposed modification to estimated "actual emissions" after the modification. This method of comparing before and after emissions is in direct conflict with the EPA method of comparing actual emissions (based on the previous two years of operation) before the modification to potential emissions after the modification. EPA's method of determining PSD applicability was upheld in the recent ruling in Puerto Rican Cement Co., Inc. v. EPA, 889 F.2d 292 (First Cir. 1989).

Although FPL cites the recent WEPCO court decision as a basis for their method of calculation, the modifications proposed by FPL are not "like-kind replacements" designed to restore lost capacity. Rather, the modifications proposed by FPL are designed to increase the facility's capacity, and it can be anticipated that the utilization rate of the facility will increase.

FPL provided their current actual emissions in Table 3. According to FPL, the facility has been operated primarily on

natural gas and distillate oil in recent years. The maximum potential emissions for the source after modification were provided in Table 4. In the attached table, we have reconstructed the calculation for applicability comparing previous actual emissions to potential emissions after modification. The source will be subject to PSD for each pollutant which has an emissions increase exceeding the applicable significance level unless potential emissions are limited in a federally enforceable permit.

Thank you for the opportunity to review and comment on this package. If you have further questions regarding NSPS applicability, please contact Mr. Paul Reinermann of my staff at (404) 347-2904. For questions on PSD applicability, please contact Mr. Gregg Worley of my staff at (404) 347-2864.

Sincerely yours,

Sally S. Dumas, for

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

Enclosure

Table 1. Change in Emissions in tons/year

| | ACTUAL | | | POTENTIAL | | | CHANGE |
|---|---|---|---|---|---|---|---|
| Pollutant | Natural Gas | Distillate Oil | Total | Natural Gas | Distillate Oil | Residual Oil | |
| Nitrogen Oxides | 4,733 | 69.1 | 4,802 | 7,683 | 7,709 | 17,227 | 12,425 |
| Sulfur Dioxide | 6.3 | 42.7 | 49 | 12.2 | 9,811 | 14,282 | 14,233 |
| Carbon Monoxide | 125 | 0.86 | 126 | 226 | 330 | 182 | 204 |
| $PM_{10}$ | 17.9 | 0.82 | 18.7 | 30 | 191 | 1,297 | 1,278 |
| VOC | 11.7 | 0.097 | 11.8 | 21.1 | 20.9 | 30.9 | 19.1 |
| Sulfuric Acid Mist | 0.51 | 3.36 | 3.87 | 0.98 | 790 | 1,150 | 1,146 |
| Lead | 0 | 0.00075 | 0.00075 | 0 | 0.177 | 0.48 | 0.48 |
| Beryllium | 0 | 0.00021 | 0.00021 | 0 | 0.050 | 0.073 | 0.073 |
| Mercury | 0.122 | 0.00025 | 0.122 | 0.235 | 0.060 | 0.055 | 0.11 |
| Fluoride | 0 | 0.00265 | 0.00265 | 0 | 0.623 | 1.965 | 1.962 |
| Arsenic | 0 | 0.00036 | 0.00036 | 0 | 0.084 | 0.328 | 0.328 |

**NOTE** The change in emissions is calculated by comparing the worst case potential emissions for each pollutant after the modification (from Table 4) to the combined actual emissions for natural gas and distillate oil (from Table 3).

12/3/90 Letter FDA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

DEC 03 1990

4APT-AEB

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: FPL Putnam Revised Applicability Determination Request

Dear Mr. Fancy:

By letter of April 12, 1990, your office requested EPA assistance in a Prevention of Significant Deterioration (PSD) applicability determination for proposed modifications at the FPL Putnam Plant. We responded to your request in a letter dated May 9, 1990. Since that time, Mr. William Green, attorney for FPL, has requested from EPA an applicability determination for a revised scenario at the plant in which physical changes will be made only to the HRSG steam system internals. This request, dated October 26, 1990, asks that EPA make a finding of non-applicability of PSD to the proposed project.

As you know, Florida has a SIP approved permitting program and full authority for implementing PSD regulations. Thus, we feel that it is appropriate that FDER make the final determination on applicability while EPA's role is to provide assistance and support. We are happy to offer you assistance in this determination.

From the information submitted by Mr. Green, the determination does not appear to be very clear-cut. The changes to the HRSG internals raise several questions which may be similar to the issues raised in the WEPCO court case; however, no physical changes will be made to fuel firing units. Some of the questions which would need to be answered are:

1. Are the changes to the HRSG internals considered routine replacements according to industry standards?

   a. Are the parts being replaced with the same or equivalent parts?

   b. Is the current condition of the unit such that it cannot be operated at capacity?

2. Can the source document, within reason, that the usage of the source will not increase?

> Comment: The increased efficiency of the unit due to the proposed changes would lead one to believe that the unit would be utilized more frequently than in the past. The source should provide data as to the actual operating history of this unit and provide reasonable assurances that the "extent or priority of their utilization" will not change.

It is our understanding, from a discussion between Mr. Green and Mr. Gregg Worley of my staff that the proposed changes will only allow the unit to more efficiently transfer heat and will have no effect on the amount of fuel fired. Apparently, the current steam system does not physically limit the firing or operation of the turbine. Additionally, the increased efficiency will not change the plant's position on the priority list. We have requested that Mr. Green provide answers to the questions stated above in order to aid in the applicability determination.

If the situation is as stated above, it would be our interpretation that the changes would not be subject to PSD review. As stated previously, we are currently reviewing this information and awaiting additional information to confirm FPL's position. We will continue to provide information and assistance to you as it becomes available. If you have any questions or comments on this issue, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

Enclosure

cc: Mr. William Green, Esquire
123 South Calhoun Street
P.O. Box 6526
Tallahassee, Florida 32314

1/7/90 Letter
to EPA

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OF COUNSEL
W. ROBERT FOKES

December 7, 1990

Ms. Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides and Toxics
Management Division
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

RE: FPL Putnam Plant
PSD/NSPS Applicability Determination Request

Dear Ms. Harper:

We are in receipt of a copy of your letter to Mr. Clair Fancy dated December 3, 1990 relating to the above. At the outset, I would like to thank you on behalf of Florida Power & Light Company (FPL) and myself for the prompt response to our earlier requests and your continued guidance in this matter. The purpose of this letter is to respond to the questions set forth in your letter to Mr. Fancy and to confirm the understanding of you and your staff concerning the other aspects of the improvements discussed in your letter. Your questions and FPL's responses are as follows:

**EPA Question No. 1.:**

**Are the changes to the HRSG internals considered routine replacements according to industry standards?**

**a. Are the parts being replaced with the same or equivalent parts?**

**b. Is the current condition of the unit such that it cannot be operated at capacity?**

**FPL Response:**

The electric utility industry has not developed "industry standards" for the replacement of component parts of heat recovery steam generators (HRSGs). These replacements are made on a case-by-case basis and deal primarily with the need to replace steam tubes as they experience wear and resulting failure. The system is designed to remove otherwise wasted exhaust gas energy from the exhaust gasses and to convert it into usable energy. In effect, leaking steam tubes waste otherwise usable energy.

The parts that would be replaced by the proposed work are functionally equivalent to those parts which came with the original units. The parts have been improved somewhat to decrease the likelihood and hopefully the frequency of leaks. For example, the configuration of the original steam tubes involved certain angles and stresses which tend to produce points where erosion and wear and resulting leaks become intensified. The replacement tubes will have greater tolerances between tubes and a somewhat improved configuration to make the tube stresses more uniform and, hopefully, make leaks less frequent. None of these changes would cause the components to have a non-equivalent function.

The current condition of the Putnam units is such that both the combustion turbines and the HRSGs can be run at maximum capacity. When the units are running, the more efficient steam tube system will generate more electrical energy from a given amount of fuel combusted. However, the changes will not allow the units to combust more fuel.

**EPA Question No. 2:**

**Can the source document, within reason, that the usage of the source will not increase?**

**Comment: The increased efficiency of the unit due to the proposed changes would lead one to believe that the unit would be utilized more frequently than in the past. The source should provide data as to the actual operating history of this unit and provide reasonable assurances that the "extent or priority of their utilization" will not change.**

**FPL Response:**

Changes to the HRSG steam system internals will not increase the usage of the HRSGs or the extent or priority of their utilization. The Putnam units currently have top priority for usage among all of FPL's fossil-fired units. The proposed changes will not cause them to move ahead of the nuclear units. The Putnam Plant will, nevertheless, realize a significant increase in efficiency; i.e., the amount of megawatts generated from a given quantity of fuel.

Your letter reflected a discussion which occurred between Mr. Greg Worley of your staff and myself concerning the changes. I believe that your letter correctly reflects our discussion and I would like to confirm, once again, that the changes proposed to the HRSGs deal only with heat transfer efficiency as FPL attempts to capture more electrical output from otherwise wasted exhaust gasses. These efficiency changes are independent of the amount of fuel fired in the units. In addition, the current steam system does not physically limit the firing or operation of the combustion turbines; rather, they limit the amount of heat that can be recovered from the combustion turbine exhaust gasses. Moreover, the proposed steam system changes do not include any changes to the duct burners (the actual emissions source of the HRSGs) nor will they affect the amount of their use.

In light of the above and in light of our understanding of your letter, we conclude that the proposed changes will not be subject to PSD review. As you suggested, we have now requested confirmation of that interpretation by the Florida Department of Environmental Regulation (DER), as you will see from the enclosed correspondence.

We wish to thank you for your continued assistance and guidance in these important matters.

Sincerely,

William H. Green
Angela R. Morrison

WHG/wrn:ltrharper
cc: Clair Fancy, Chief
Bureau of Air Regulation, DER

WHITE FILE COPY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

DEC 13 1990

4APT-AEB

Mr. Clair H. Fancy, P.E., Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: FPL Putnam Revised Applicability Determination Request

Dear Mr. Fancy:

By letter of April 12, 1990, your office requested EPA assistance in a Prevention of Significant Deterioration (PSD) applicability determination for proposed modifications at the FPL Putnam Plant. We responded to your request in a letter dated May 9, 1990. Since that time, Mr. William Green, attorney for FPL, has requested from EPA an applicability determination for a revised scenario at the plant in which physical changes will be made only to the HRSG steam system internals. This request, dated October 26, 1990, asks that EPA make a finding of non-applicability of PSD to the proposed project.

EPA responded to this latest request by letter to you dated December 3, 1990. As stated in that letter, we feel that it is appropriate that FDER make the final determination on applicability while EPA's role is to provide assistance and support. To that end, we provided several questions which we thought needed to be answered in order to make an applicability determination. Mr. Green responded to these questions by letter dated December 7, 1990.

Based on Mr. Green's response (i.e., the source is not physically limited by the current steam system, the amount of fuel combusted will not change, the utilization priority of the source will not change), it would be our interpretation that the changes would not be subject to PSD review. If you have any questions or comments on this issue, please contact Mr. Gregg Worley of my staff at (404) 347-2904.

Sincerely yours,

Jewell A. Harper, Chief
Air Enforcement Branch
Air, Pesticides, and Toxics
Management Division

cc: Mr. William Green, Esquire
123 South Calhoun Street
P.O. Box 6526
Tallahassee, Florida 32314

EXHIBIT 6

CERTIFICATION
MODIFICATION
REQUEST

FLORIDA POWER & LIGHT COMPANY
PUTNAM POWER PLANT

REQUEST FOR MODIFICATION OF
CONDITIONS OF CERTIFICATION

Kennard Kosky, P.E.
KBN Engineering & Applied Sciences
1034 N.W. 57th Street
Gainesville, FL 32605
904-331-9000
Florida Registration No. 14996

EXHIBIT 7

STATE OF FLORIDA

# DEPARTMENT OF ENVIRONMENTAL REGULATION

## APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Electric Generating Station [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Florida Power & Light Company COUNTY: Putnam

Identify the specific emission point source(s) addressed in this application (i.e., Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) 2 combined cycle units

SOURCE LOCATION: Street U.S. Highway 17 City East Palatka

UTM: East 443.3 km North 3277.6 km

Latitude 29 ° 37 ' 42 "N Longitude 81 ° 35 ' 08 "W

APPLICANT NAME AND TITLE: Martin A. Smith, Ph.D. Manager Environmental Permitting & Programs

APPLICANT ADDRESS: P.O. Box 078768, West Palm Beach, FL 33407-0768

### SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Florida Power & Light Company

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: _____

Martin A. Smith, Ph.D. Manager Environmental
Name and Title (Please Type)
Permitting and Programs

Date: _____ Telephone No. (407) 697-6930

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgement, that

[1]See Florida Administration Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed _____

Kennard F. Kosky
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

1034 N.W. 57th Street, Gainesville, FL
Mailing Address (Please Type)

Florida Registration No. 14996 Date: _____ Telephone No. (904) 331-9000

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

The heat recovery steam generators (HRSGs) will be reconstructed and will achieve the NSPS contained in 40 CFR 60 Subpart Db applicable to the duct burners. This application is notification of this change. See Attachment A.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction August 1991 Completion of Construction December 1992

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Not applicable

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

Putnam plant was certified under the Electric Power Plant Siting Act on October 16, 1974 (Certification No. PPS74-01)

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;
If power plant, hrs/yr 8,760; if seasonal, describe: _____

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? No
   a. If yes, has "offset" been applied? _____
   b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
   c. If yes, list non-attainment pollutants. _____
2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. No
3. Does the State "Prevention of Significant Deterioration" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Reconstructed under Subpart Db. Yes
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No
   a. If yes, for what pollutants? _____
   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

## SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable: Not Applicable (NA)

| Description | Contaminants | | Utilization Rate - lbs/hr | Relate to Flow Diagram |
|---|---|---|---|---|
| | Type | % Wt | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): N/A

2. Product Weight (lbs/hr): N/A

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Based on Oil Firing Except CO Emissions - One CT/HRSG

| Name of Contaminant | Emission[1] | | Allowed[2] Emission Rate per Rule 17-2 | Allowable[3] Emission lbs/hr | Potential[4] Emission | | Relate to Flow Diagram |
|---|---|---|---|---|---|---|---|
| | Maximum lbs/hr | Actual T/yr[5] | | | lbs/hr | T/yr | |
| PM | 11.60 | 50.8 | NA | NA | 11.60 | 50.8 | See |
| $SO_2$ | 571.5 | 2,503 | NA | NA | 571.5 | 2,503 | Figures |
| $NO_x$[6] | 889.7 | 3,897 | NA | NA | 889.7 | 3,897 | 2-1 and |
| CO | 16.3 | 71.4 | NA | NA | 16.3 | 71.4 | 2-2 in |
| VOC | 1.36 | 6.0 | NA | NA | 1.36 | 6.0 | Att. A. |

See also Tables 2-1, 2-2, and 2-3; data shown based on one CT/HRSG.
[1]See Section V, Item 2.
[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input).
[3]Calculated from operating rate and applicable standard.
[4]Emission, if source operated with control (See Section V, Item 3).
[5]Potential emissions using 0.5% sulfur maximum presented; actual sulfur content of No. 2 fuel oil over last 5 years was 0.3%.
[6]Does not include allowance for fuel-bound nitrogen (FBN) if FBN exceeds 0.015%.

D. Control Devices: (See Section V, Item 4) Not Applicable

| Name and Type (Model & Serial No.) | Contaminant | Efficiency | Range of Particles Size Collected (in microns) (If applicable) | Basis for Efficiency (Section V Item 5) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

E. Fuels

| Type (Be Specific) | Consumption* | | Maximum Heat Input (MMBTU/hr) |
|---|---|---|---|
| | avg/hr+ | max./hr | |
| No. 2 Fuel Oil-CT | 3,547 | 6,556 gal/hr. | 910.6 |
| No. 2 Fuel Oil-HRSG | 974 | 1,800 gal/hr. | 250 |
| Natural Gas-Ct | 526 | 973 MCF | 968.3 |
| Natural Gas-HRSG | 136 | 252 MCF | 250 |

*Based on CT operation at base load and 85°F.
Note: See Tables A-1 through A-8 for fuel consumption at other temperatures.

+Based on last 2 years of operation; 4,740 hours/year equivalent full load (100% load). Actual operating hours were 6,155, 6,698 and 5,476 for 1988, 1989 and 1990, respectively.

Fuel Analysis:

Percent Sulfur: 0.5 WT % max oil; 1 gr/100 cf gas Percent Ash: 0.01 WT % max

Density: 7.2 lbs/gal Typical Percent Nitrogen: 0.015 WT%

Heat Capacity: oil 19,292(HHV)/gas 21,956(HHV) BTU/lb 138,902 (HHV) Gas=995 Btu/cf(HHV) BTU/gal

Other Fuel Contaminants (which may cause air pollution): None

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average N/A Maximum N/A

G. Indicate liquid or solid wastes generated and method of disposal.

Not applicable; existing source.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: 73* ft. Stack Diameter: 7' x 12'(10.3 effective)* ft.

Gas Flow Rate: 856,750 ACFM 537,100 DSCFM Gas Exit Temperature: 328 °F.

Water Vapor Content: 5 % Velocity: 85 FPS

See Tables 2-1 through 2-3 in Attachment A.

*Two stacks per HRSG

SECTION IV: INCINERATOR INFORMATION--NOT APPLICABLE

| Type of Waste | Type 0 (Plastics) | Type II (Rubbish) | Type III (Refuse) | Type IV (Garbage) | Type IV (Patholog-ical) | Type V (Liq.& Gas By-prod.) | Type VI (Solid By-prod.) |
|---|---|---|---|---|---|---|---|
| Actual lb/hr Inciner-ated | | | | | | | |
| Uncon-trolled (lbs/hr) | | | | | | | |

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr)_____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr._____

Manufacturer _____

Date Constructed _____ Model No. _____

| | Volume $(ft)^3$ | Heat Release (BTU/hr) | Fuel | | Temperature (°F) |
|---|---|---|---|---|---|
| | | | Type | BTU/hr | |
| Primary Chamber | | | | | |
| Secondary Chamber | | | | | |

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control devices: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other

(specify)_____

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

## SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
   Not Applicable
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods, 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
   See Tables 2-1 through 2-4 in Attachment A.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   Manufacturer data sheets and emission factors; See Tables 2-1 through 2-4.
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
   Not applicable
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
   Manufacturers' guarantees form the basis of emission estimates; see Tables 2-1 through 2-4 in Attachment A.
6. An 8 ½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
   See Figures 2-1 and 2-2 in Attachment A.
7. An 8 ½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Examples: Copy of relevant portion of USGS topographic map).
   See Figure 1-1 in Attachment A.
8. An 8 ½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.
   See Figure 1-2 in Attachment A.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

## SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[X] Yes [ ] No; duct burner in combined cycle system 40 CFR Part 60 Subpart Db.

| Contaminant | Rate or Concentration |
|---|---|
| See Table 2-5 in Attachment A | |
| | |
| | |

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No Not Applicable

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |
| | |

C. What emission levels do you propose as best available control technology?

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |
| | |

D. Describe the existing control and treatment technology (if any). (See Attachment A)

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |

10. Stack Parameters

a. Height: ft.

b. Diameter ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Devices:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |
| | |

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

| Contaminant | Rate or Concentration |
|---|---|
| | |
| | |
| | |

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

## SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

Not Applicable

A. Company Monitored Data

1. _____ no. sites _____ TSP _____( ) $SO^{2*}$ _____ Wind spd/dir

Period of Monitoring _____/_____/_____ to _____/_____/_____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from _____/_____/_____ to _____/_____/_____
month day year month day year

2. Surface data obtained from (location)_____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

| Pollutant | Emission Rate |
|---|---|
| TSP | _____ grams/sec |
| $SO^2$ | _____ grams/sec |

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e, jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

ATTACHMENT A

## 1.0 INTRODUCTION

Florida Power & Light Company (FPL) is proposing to improve the heat recovery steam generators (HRSGs) at its Putnam combined cycle plant. The HRSG improvements require review under the Florida Department of Environmental Regulation (FDER) New Source Performance Standards (NSPS). The HRSG components of the plant will be "reconstructed" and thus subject to 40 Code of Federal Regulations (CFR), Part 60, Subpart Db NSPS. There will be no change in the plant's potential emissions.

The Putnam plant site is located in Putnam County about 1 mile southeast of Palatka (Figure 1-1). The Putnam plant was the first power plant licensed under Chapter 403, Sections 403.501-403.517, Florida Statutes (FS), the Florida Electrical Power Plant Siting Act (PPSA). Certification under PPSA was issued in October 1974. Commercial operation of the Putnam plant units began in August 1977 (Unit 2) and April 1978 (Unit 1). The plant has net summer and winter generating capabilities of 448 and 468 megawatts (MW), respectively. A plot plan of the facility is presented in Figure 1-2.

## 2.0 EXISTING OPERATION AND PROJECT DESCRIPTION

### 2.1 EXISTING OPERATION

The existing facility consists of two combined cycle units, each comprised of two combustion turbines (CTs), two duct burners, and two HRSGs (Figure 2-1). Each of the four gas turbines has a maximum heat input rate of 968 million British thermal units per hour ($10^6$ Btu/hr) at an ambient temperature of 85°F, which generates 70 megawatt per hour (MW/hr) output when fired with natural gas. Heat input and electrical generation when firing No. 2 fuel oil or No. 6 fuel oil is slightly lower than that for natural gas. The four duct burners operate at a maximum heat input rate of 250 x $10^6$ Btu/hr while burning either natural gas, No. 2 fuel oil, or No. 6 fuel oil. The maximum permitted sulfur content of the fuel oil fired in the turbines and duct burners is 0.7 percent. Technical descriptions and nitrogen oxide ($NO_x$) and $SO_2$

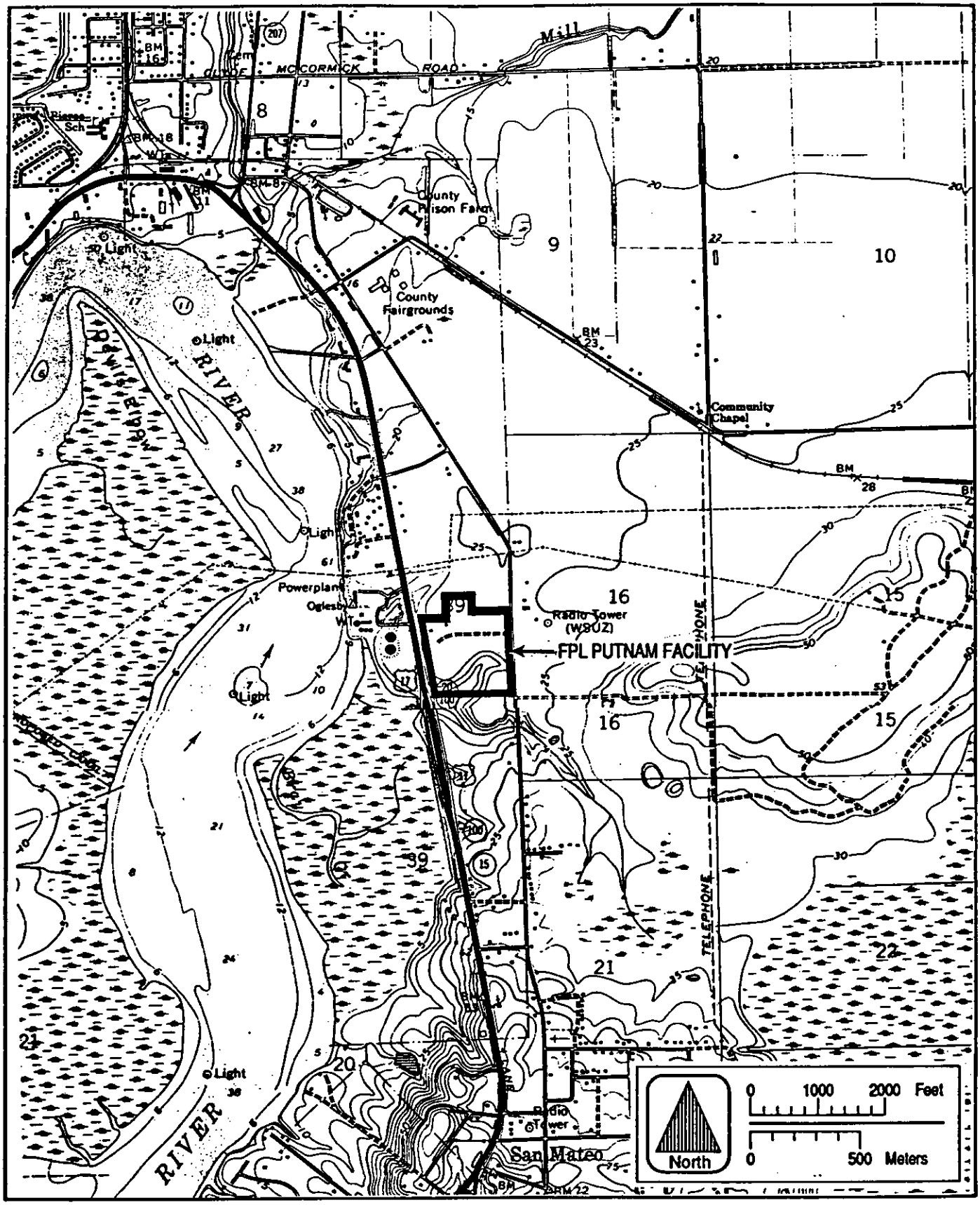


Figure 1-1 SITE LOCATION MAP

KBN

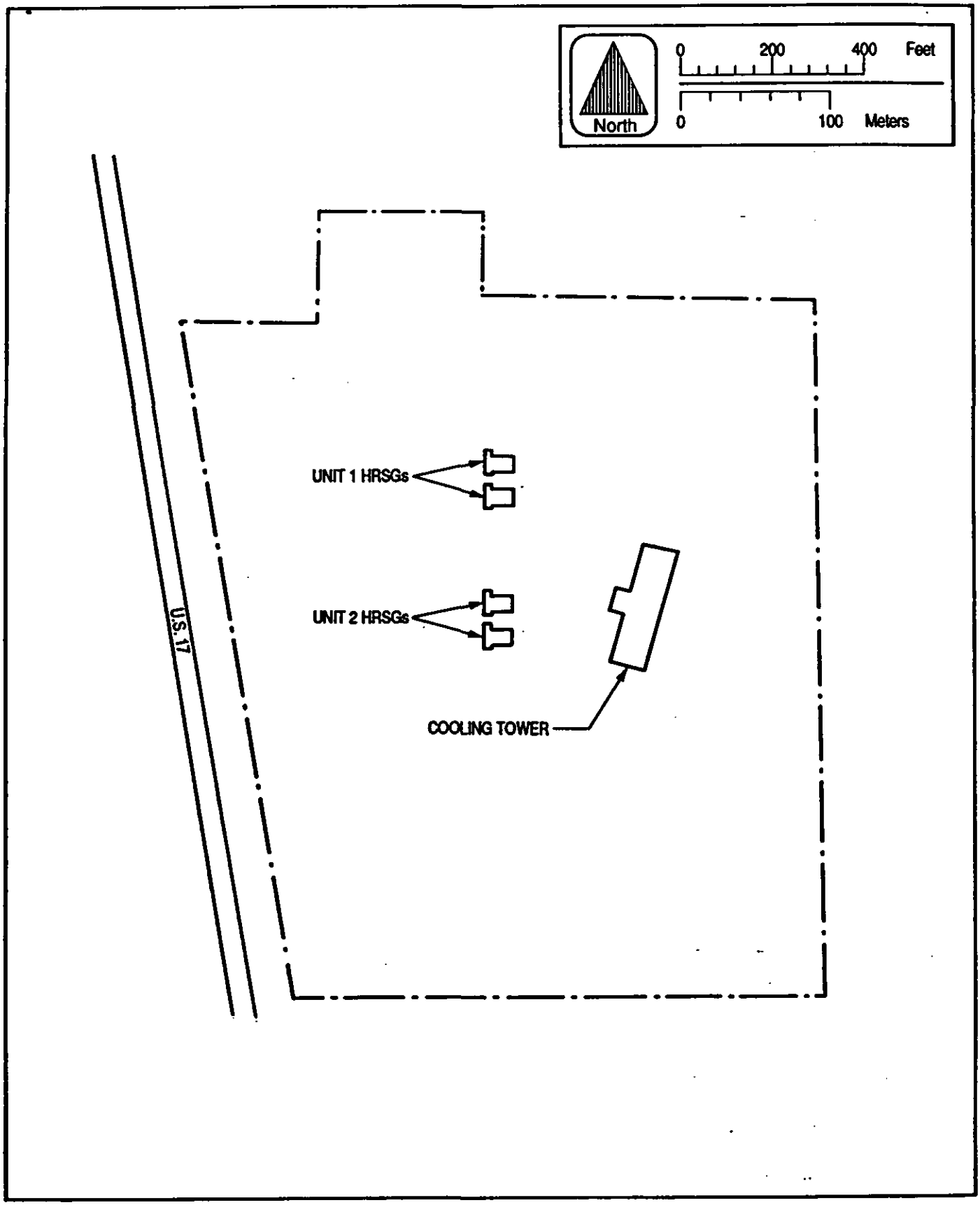


Figure 1-2 FACILITY PLOT PLAN

KBN

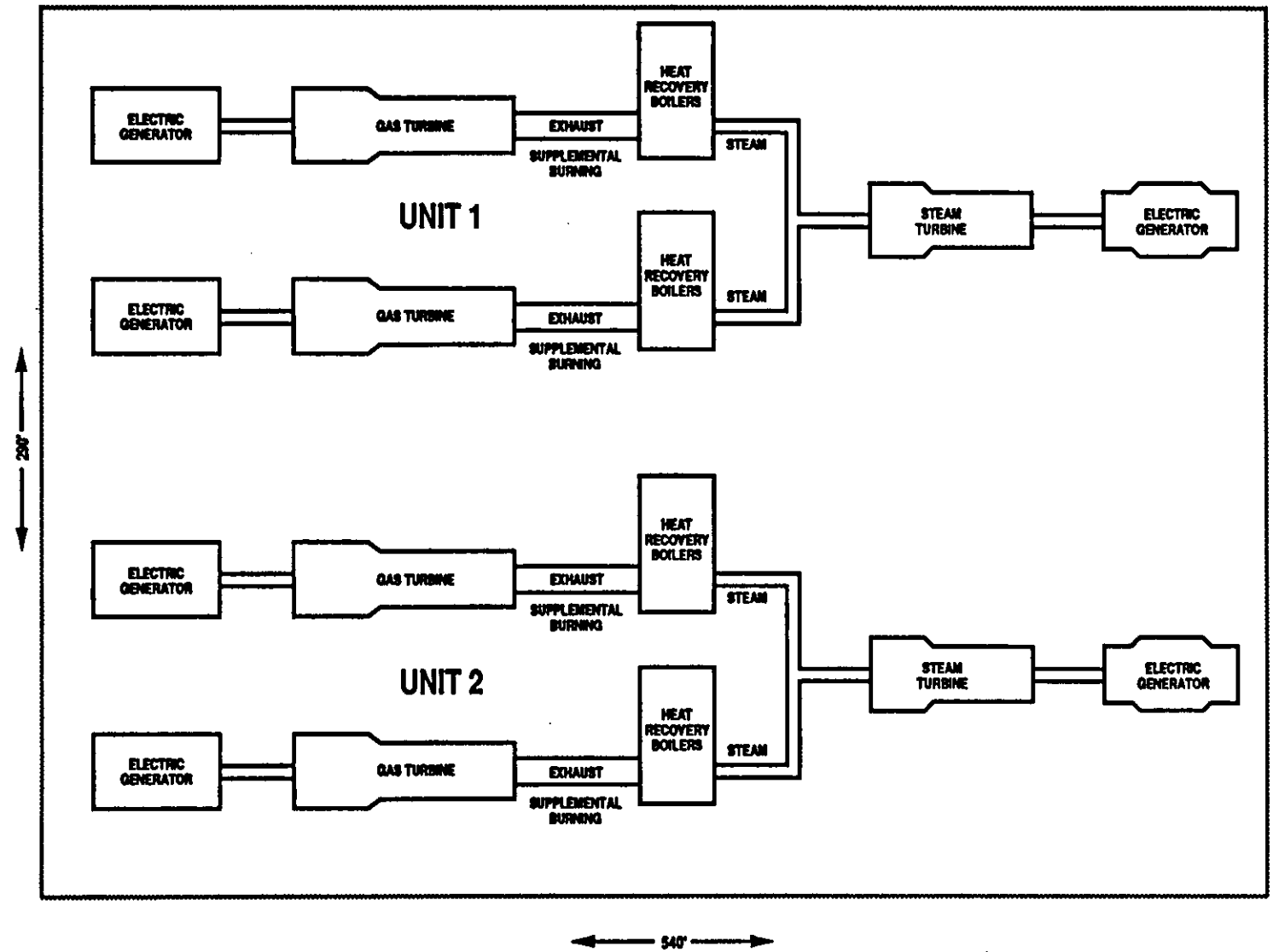


Figure 2-1 FPL PUTNAM COMBINED CYCLE POWER PLANT

emission rates for the CTs are presented in Table 2-1. Table 2-2 presents technical descriptions of the duct burners. Emissions of all criteria pollutants are presented in Table 2-3. The basis for emission estimates is presented in Table 2-4.

## 2.2 PROJECT DESCRIPTION

The proposed improvements to the HRSGs will not result in an increase in potential emissions from the facility. The HRSGs recover heat from the CT exhaust gases and use that heat to generate steam electric energy. The HRSGs themselves do not generate emissions, with the exception of their supplemental duct burners, which can be used to raise the temperature of CT exhaust gases (see Figure 2-2). The changes proposed for the Putnam HRSGs will not involve the existing burners which will comply with NSPS; rather, the changes relate solely to the steam system and are intended to increase its reliability and efficiency. The changes include the following items:

1. Replacement of steam tube modules,
2. Addition of tubing and replacement of steam drum internals to achieve lower steam and water velocities and reduced erosion,
3. Addition of low-pressure separation vessels,
4. Steam performance improvements to existing de-aerators,
5. Replacement of evaporator forced-circulation pumps,
6. Replacement of boiler feed pump impellers and mechanical seals, and
7. Replacement of miscellaneous steam and water piping.

The above changes will not affect the normal operations of the Putnam plant units, nor will they influence the extent or priority of their utilization. Thus, plant emissions will be unaffected by the changes.

## 2.3 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS (40 CFR part 60 Subpart Db) is applicable to the HRSG duct burners because the facility will be reconstructed under the definition in 40 CFR 60. FDER has adopted these NSPS by reference in Rule 17-2.660, Florida Administrative Code (F.A.C.). The NSPS contained in Subpart Db for natural

Table 2-1. Design Parameters and Emission Factors for Combustion Turbines at FPL Putnam Plant

| Parameter | Fuel: Natural Gas | Fuel: No. 2 Fuel Oil | Fuel: No. 6 Fuel Oil |
|---|---|---|---|
| **CT Parameters** | | | |
| Nominal Capacity (MW) | 70 | 68 | 64 |
| Heat Rate (Btu/kw) | 13,832.2 | 13,390.9 | 13,323.4 |
| Fuel Flow (lb/hr) | 44,100.0 | 47,200.0 | 46,091.9 |
| Heat Input ($10^6$ Btu) | 968.3 | 910.6 | 852.7 |
| Air Flow (lb/hr) | 2,458,490.0 | 2,458,490.0 | 2,458,490.0 |
| Exhaust Gas Flow (lb/hr) | 2,502,590.0 | 2,505,690.0 | 2,502,690.0 |
| Exhaust Temperature (°F) | 980.0 | 985.0 | 935.0 |
| Exhaust Flow (acfm) | 1,565,638.8 | 1,573,021.2 | 1,516,773.2 |
| **Stack Parameters** | | | |
| Temperature (°F) | 328 | 328 | 328 |
| Exhaust Flow (acfm) | 856,752.3 | 857,813.6 | 856,786.6 |
| Diameter (ft) | 10.3 | 10.3 | 10.3 |
| Velocity (ft/s) | 85.0 | 85.0 | 85.0 |
| **Emissions** | | | |
| $NO_x$ Concentration (ppmvd) | 145.0 | 230.0 | 220.0 |
| Fuel-Bound Nitrogen (%) | 0 | 0.015 | 0.35 |
| $NO_x$ Emissions--Thermal (lb/hr) | 490.0 | 830.0 | 740.0 |
| $NO_x$ Emissions--Fuel Bound (lb/hr) | 0.0 | 23.3 | 212.0 |
| $NO_x$ Emissions--Total (lb/hr) | 490.0 | 853.3 | 952.0 |
| $NO_x$ Emissions (TPY) | 2,146.2 | 3,737.3 | 4,169.9 |
| $NO_x$ Emissions (lb/$10^6$ Btu) | 0.51 | 0.94 | 1.12 |
| $SO_2$ Emissions (lb/hr) | 2.90 | 448.4 | 613.0 |
| $SO_2$ Emissions (TPY) | 11.5 | 1,964.0 | 2,685.0 |

Note: Sulfur Content: Natural Gas = 1 gr/100 scf; Oil = 0.5%
Combustion turbine performance based on 85°F compressor inlet temperature.

See Tables A-1 through A-8 for operating conditions at other temperatures.

Calculations based on manufacturer design data.

Parameters can vary 1 to 4 percent from design due to operating and equipment conditions.

Sources: Westinghouse, 1989
FPL, 1973
KBN, 1990

Table 2-2. Duct Burner Emissions Estimates

| Parameter | Fuel | | |
|---|---|---|---|
| | Natural Gas | No. 2 Fuel Oil | No. 6 Fuel Oil |
| Fuel Flow (lb/hr) | 11,386.5 | 12,958.7 | 13,513.5 |
| Heat Input ($10^6$Btu/hr) | 250 | 250 | 250 |
| Fuel-Bound Nitrogen (%) | 0 | 0.015 | 0.35 |
| $NO_x$ Emissions--Thermal (lb/hr) | 25.0 | 30.0 | 30.0 |
| $NO_x$ Emissions--Fuel Bound (lb/hr) | 0.0 | 6.4 | 62.2 |
| $NO_x$ Emissions--Total (lb/hr) | 25.0 | 36.4 | 92.2 |
| $NO_x$ Emissions (TPY) | 109.5 | 159.4 | 403.7 |
| $SO_2$ Emissions (lb/hr) | 0.735 | 123.1 | 179.7 |
| $SO_2$ Emissions (TPY) | 3.2 | 539.2 | 787.2 |

Source: Westinghouse, 1989.

Table 2-3. Estimated Emissions Before and After Implementation of Putnam HRSG Improvements

| Parameter | CT/Natural Gas | | CT/Fuel Oil | | HRSG/Natural Gas | | HRSG/Fuel Oil | | Total--Before | | Total--After | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Before | After | Before | After | Before | After | Before | After | Natural Gas | Oil | Natural Gas | Oil |
| Fuel Flow (lb/hr) | 44,100 | 44,100 | 47,200 | 47,200 | 11,387 | 11,387 | 12,959 | 12,959 | 55,487 | 60,159 | 55,487 | 60,159 |
| Heat Input ($10^6$Btu/hr) | 966.3 | 966.3 | 910.6 | 910.6 | 250 | 250 | 250 | 250 | 1,216.3 | 1,160.6 | 1,216.3 | 1,160.6 |
| $NO_x$ (lb/hr) | 490 | 490 | 853.3 | 853.3 | 25 | 25 | 36.4 | 36.4 | 515 | 889.7 | 515 | 889.7 |
| (kg/hr) | 223 | 223 | 388 | 388 | 11 | 11 | 17 | 17 | | | | |
| $SO_2$ (lb/hr) | 2.9 | 2.9 | 448.4 | 448.4 | 0.735 | 0.735 | 123.1 | 123.1 | 3.6 | 571.5 | 3.6 | 571.5 |
| (kg/hr) | 1.32 | 1.32 | 204 | 204 | | | | | | | | |
| CO (lb/hr) | 6 | 6 | 5 | 5 | 10.3 | 10.3 | 9 | 9 | 16.29 | 14.0 | 16.29 | 14.0 |
| PM10 (lb/hr) | 1 | 1 | 8 | 8 | 1.3 | 1.3 | 3.6 | 3.6 | 2.29 | 11.60 | 2.29 | 11.60 |
| VOC (lb/hr) | 1 | 1 | 1 | 1 | 0.36 | 0.36 | 0.36 | 0.36 | 1.36 | 1.36 | 1.36 | 1.36 |
| $H_2SO_4$ (lb/hr) | 0.234 | 0.234 | 36.1 | 36.1 | 0.059 | 0.059 | 9.9 | 9.9 | 0.293 | 46.02 | 0.293 | 46.02 |
| Pb (lb/hr) | 0 | 0 | 0.0081 | 0.0081 | 0 | 0 | 0.0022 | 0.0022 | 0.000 | 0.010 | 0.000 | 0.010 |
| Be (lb/hr) | 0 | 0 | 0.0023 | 0.0023 | 0 | 0 | 0.0006 | 0.0006 | 0.000 | 0.003 | 0.000 | 0.003 |
| Hg (lb/hr) | 0.0110 | 0.0110 | 0.0027 | 0.0027 | 0.0028 | 0.0028 | 0.0008 | 0.0008 | 0.014 | 0.003 | 0.014 | 0.003 |
| Fl (lb/hr) | 0 | 0 | 0.03 | 0.03 | 0 | 0 | 0.008 | 0.008 | 0.000 | 0.038 | 0.000 | 0.038 |
| As (lb/hr) | 0 | 0 | 0.0038 | 0.0038 | 0 | 0 | 0.0011 | 0.0011 | 0.000 | 0.005 | 0.000 | 0.005 |

Table 2-4. Basis for Emission Calculations for Putnam Plant Changes

| Pollutant | Combustion Turbine[a] Natural Gas | Combustion Turbine[a] Fuel Oil | Combustion Turbine[a] Residual Oil | HRSG[b] Natural Gas | HRSG[b] Fuel Oil | HRSG[b] Residual Oil |
|---|---|---|---|---|---|---|
| $NO_x$ | c | d | e | f | g | h |
| $SO_2$ | i | j | j | i | j | j |
| CO | k | k | k | l | m | m |
| PM10 | k | k | k | n | o | p |
| VOC | k | k | k | q | r | s |
| $H_2SO_4$ | t | t | t | t | t | t |
| Pb | u | v | w | u | b | w |
| Be | u | x | y | u | x | y |
| Hg | z | aa | bb | z | aa | bb |
| Fl | u | cc | dd | u | cc | dd |
| As | u | ee | ff | u | ee | ff |

Note: All data based on 95°F.

[a] 85°F Conditions.
[b] Maximum firing rate.
[c] Manufacturer's estimate.
[d] Manufacturer's estimate includes fuel-bound nitrogen (FBN) of 0.015 percent; 100-percent conversion of FBN to $NO_x$.
[e] From manufacturer with addition of 0.35-percent FBN; assumes 40-percent conversion of FBN to $NO_x$.
[f] Emissions of 0.1 lb/$10^6$ Btu; manufacturer's estimate.
[g] Emissions of 0.12 lb/$10^6$ Btu plus FBN addition of 0.015 percent; 100-percent conversion of FBN.
[h] Emissions of 0.12 lb/$10^6$ Btu plus FBN addition of 0.35 percent; assumes 10-percent conversion of FBN.
[i] 1 grains/100 scf of natural gas; 95-percent conversion to $SO_2$.
[j] 0.5-percent sulfur for distillate oil and 0.7-percent sulfur for residual oil; 95-percent conversion to $SO_2$.
[k] manufacturer's estimate.
[l] AP-42--40 lb/$10^6$ scf of natural gas.
[m] AP-42--5 lb/1,000 gallons of oil.
[n] AP-42--5 lb/$10^6$ $ft^3$ of natural gas.
[o] AP-42--2 lb/$10^3$ gallons of oil.
[p] AP-42--49 lb/$10^3$ gallons of oil.
[q] AP-42--1.4 lb/$10^6$ $ft^3$ of natural gas.
[r] AP-42--0.2 lb/$10^3$ gallons of oil.
[s] AP-42--0.76 lb/$10^3$ gallons of oil.
[t] Assumes 5-percent conversion of sulfur to $H_2SO_4$.
[u] No reported emissions of these pollutants.
[v] EPA, 1988--8.9 lb/$10^{12}$ Btu heat input.
[w] EPA, 1988--28 lb/$10^{12}$ Btu heat input.
[x] EPA, 1988--2.5 lb/$10^{12}$ Btu heat input.
[y] EPA, 1988--4.2 lb/$10^{12}$ Btu heat input.
[z] EPA, 1980--4.9 pg/J = 11.4 lb/$10^{12}$ Btu heat input.
[aa] EPA, 1988--3 lb/$10^{12}$ Btu heat input.
[bb] EPA, 1988--3.2 lb/$10^{12}$ Btu heat input.
[cc] EPA, 1981--14 pg/J = 32.5 lb/$10^{12}$ Btu heat input.
[dd] EPA, 1981--50.9 pg/J = 11.8 lb/$10^{12}$ Btu heat input.
[ee] EPA, 1988--4.2 lb/$10^{12}$ Btu heat input.
[ff] EPA, 1988--19 lb/$10^{12}$ Btu heat input.

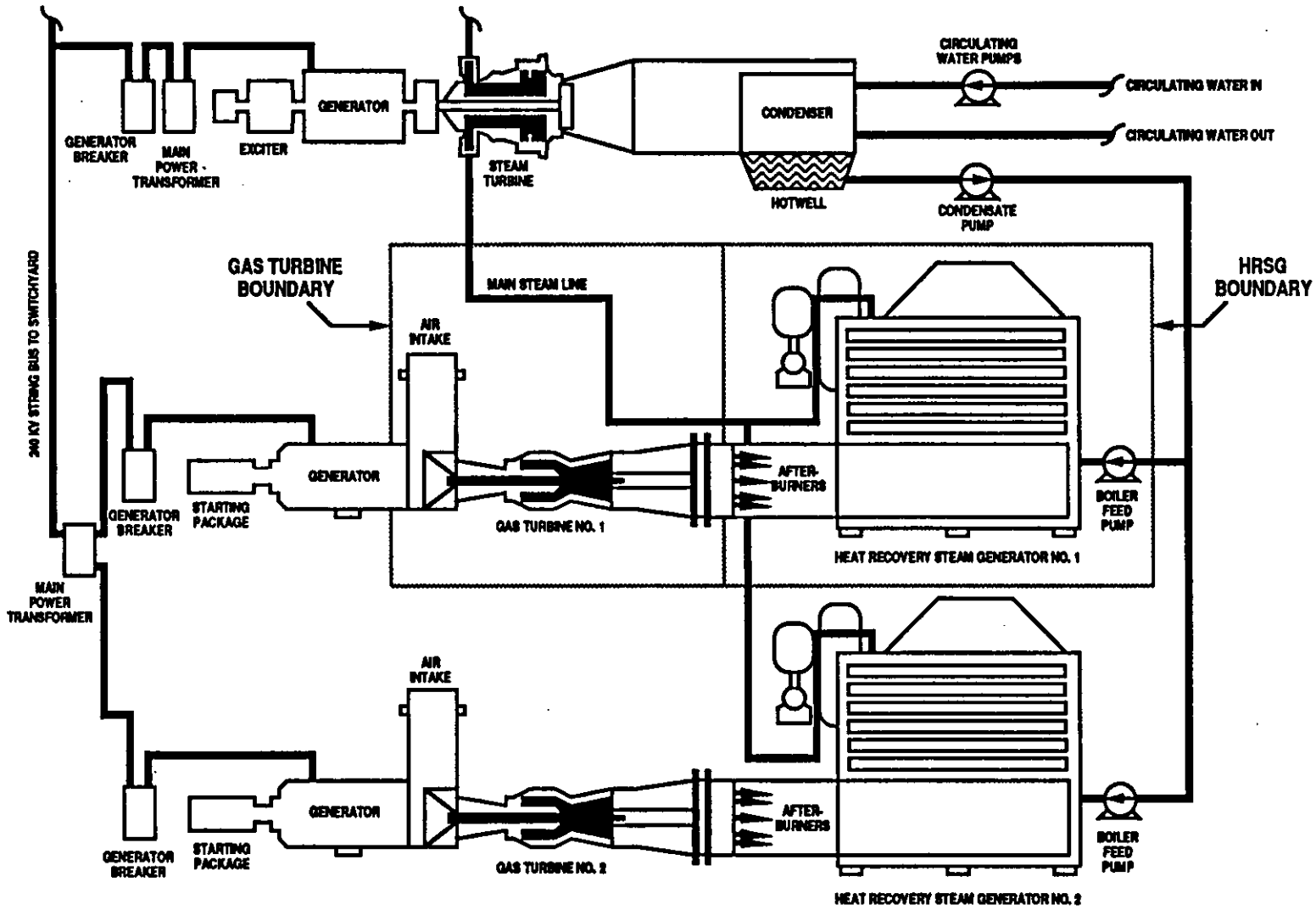


Figure 2-2 FPL PUTNAM PLANT COMBINED CYCLE UNIT

gas and distillate oil firing are presented in Table 2-5. The applicable NSPS for the duct burners are as follows:

| | Emission Limits ($lb/10^6$ Btu) | |
|---|---|---|
| Pollutant | Natural Gas | Distillate Oil |
| $SO_2$ | No limit | 0.5% Sulfur[a] |
| PM | No limit | No limit[b] |
| $NO_x$ | 0.2 | 0.2 |

[a] Requires very low sulfur oil as defined in 40 CFR 60.41b.

[b] An opacity limit of 20 percent, except for 27 percent for one 6-minute period per hour.

The NSPS maximum emission rates, based on the maximum heat input of the duct burners, are as follows:

| | Emission Rates (lb/hr) | |
|---|---|---|
| Pollutant | Natural Gas[a] | Distillate Oil[a] |
| $SO_2$ | No limit | 125.0 |
| PM | No limit | No limit |
| $NO_x$ | 50.0 | 50.0 |

[a] $250.0 \times 10^6$ Btu/hr

Estimated emissions (see Tables 2-2 and 2-3) of the existing duct burners meet the NSPS limit. NSPS Subpart Db monitoring requirements are summarized in Table 2-6. FPL will provide FDER with applicable performance tests after the HRSGs are reconstructed and record sulfur information on distillate fuel oil received.

Table 2-5. NSPS for Natural Gas and Oil-Fired Steam-Generating Units With Heat Input Between 100 and 250 x $10^6$ Btu/hr (40 CFR 60, Subpart Db)

| Pollutant | Annual Capacity Factor (%) | Standard |
|---|---|---|
| Sulfur Dioxide | 31 to 100 on oil | 0.80 lb/$10^6$ Btu; 90% reduction[a] |
| | 0 to 30 | 0.50 lb/$10^6$ Btu[b] |
| | | No limit for natural gas |
| Particulate Matter | 0 to 100 | Conventional or emerging $SO_2$ control technology used: 0.10 lb/$10^6$ Btu; $SO_2$ control technology not used: No PM limit |
| | 0 to 100 | 20% opacity, except 27% for one 6-minute period per hour |
| | | No limit for natural gas |
| Nitrogen Oxides | 11 to 100 | Distillate oil only:<br>Low heat release rate --0.10 lb/$10^6$ Btu<br>High heat release rate--0.20 lb/$10^6$ Btu<br>Duct burner in combined cycle[c] --0.20 lb/$10^6$ Btu<br><br>Residual oil only:<br>Low heat release rate --0.30 lb/$10^6$ Btu<br>High heat release rate--0.40 lb/$10^6$ Btu<br>Duct burner in combined cycle --0.40 lb/$10^6$ Btu |
| | 0 to 10 | Residual oil with %N ≤0.3, distillate oil, or natural gas:<br>- No $NO_x$ standard |

[a]Percentage reduction requirement does not apply if burning very low sulfur oil (less than or equal to 0.50 lb/$10^6$ Btu or 0.5% sulfur).
[b]Also applies if oil is fired in a duct burner of a combined cycle unit and 30% or less of the heat input to the steam-generating unit is from oil combustion in the duct burner.
[c]Includes natural gas and distillate oil firing.

Table 2-6. Monitoring Requirements for Natural Gas and Oil-Fired Steam-Generating Units With Heat Input Between 100 and 250 x $10^6$ Btu/hr (40 CFR 60, Subpart Db)

| Pollutant | Monitoring Requirement |
|---|---|
| Sulfur Dioxide | Fuel oil with S content >0.50 lb/$10^6$ Btu:<br>- CFMS for $SO_2$ and $O_2$ or CO, or measure S content of oil and outlet of $SO_2$ control system for 30 consecutive days<br><br>Fuel oil with S content ≤0.50 lb/$10^6$ Btu:<br>- Fuel receipts and supplier certification required |
| Particulate Matter | Fuel oil with S content >0.50 lb/$10^6$ Btu:<br>- Continuous opacity monitoring<br><br>Fuel oil with S content ≤0.50 lb/$10^6$ Btu:<br>- No monitoring required |
| Nitrogen Oxides | Residual oil with %N ≤0.3, distillate oil, or natural gas, with annual capacity factor >10%:<br>- Install continuous $NO_x$ monitoring system; or<br>- Monitor steam-generating unit operating conditions<br><br>Duct burner in combined cycle unit:<br>- Continuous $NO_x$ monitor not required[a]<br><br>Residual oil with %N ≤0.3, distillate oil, or natural gas, with annual capacity factor ≤10%:<br>- No monitoring required |

[a] Includes natural gas and distillate oil firing.

REFERENCES:

U.S. Environmental Protection Agency (EPA). 1980. Health Impacts, Emissions, and Emission Factors for Noncriteria Pollutants Subject to De Minimis Guidelines and Emitted from Stationary Conventional Combustion Processes. EPA 450/2-80-074.

U.S. Environmental Protection Agency (EPA). 1981. Emission Assessment of Conventional Stationary Combustion Systems. Volume V: Industrial Combustion Sources. PB81-225559.

U.S. Environmental Protection Agency (EPA). 1988a. Compilation of Air Pollutant Emission Factors, Supplement B. AP-42.

U.S. Environmental Protection Agency (EPA). 1988b. Toxic Air Pollutant Emission Factors--A Compilation for Selected Air Toxic Compounds and Sources. EPA-450/2-88-006.

# APPENDIX A

# EMISSIONS

Table A-1. Design Information and Stack Parameters for Putnam Combustion Turbines-Fuel Oil

| Data | Gas Turbine No.2 Oil @ 30°F | Gas Turbine No.2 Oil @ ISO | Gas Turbine No.2 Oil @ 85°F | Gas Turbine No.2 Oil @ 100°F |
|---|---|---|---|---|
| General: | | | | |
| Power (MW) | 90 | 79 | 68 | 62 |
| Heat Rate (Btu/kwh) | 12,614.2 | 12,962.4 | 13,390.9 | 13,698.9 |
| Heat Input (mmBtu/hr) | 1,138.1 | 1,019.1 | 910.6 | 852.3 |
| Fuel Oil (lb/hr) | 59,490.4 | 53,272.3 | 47,199.0 | 44,555.2 |
| Fuel: | | | | |
| Heat Content - Oil(HHV) | 19,292 Btu/lb | 19,292 Btu/lb | 19,292 Btu/lb | 19,292 Btu/lb |
| % Sulfur | 0.5 | 0.5 | 0.5 | 0.5 |
| CT Exhaust: | | | | |
| Volume Flow (acfm) | 1,649,695 | 1,607,242 | 1,573,021 | 1,554,724 |
| Volume Flow (scfm) | 639,295 | 603,573 | 574,779 | 559,383 |
| Mass Flow (lb/hr) | 2,786,941 | 2,631,216 | 2,505,690 | 2,438,573 |
| Temperature (°F) | 903 | 946 | 985 | 1,008 |
| Molecular Weight | 28 | 28 | 28 | 28 |
| HRSG Stack: | | | | |
| Volume Flow (acfm) | 954,099 | 900,787 | 857,814 | 834,836 |
| Temperature (°F) | 328 | 328 | 328 | 328 |
| Diameter (ft)* | 10.3 | 10.3 | 10.3 | 10.3 |
| Velocity (ft/sec) | 95.4 | 90.1 | 85.8 | 83.5 |
| Height (ft) | 73.0 | 73.0 | 73.0 | 73.0 |

* two stacks per HRSG

Table A-2. Maximum Criteria Pollutant Emissions for Putnam Combustion Turbines-Fuel Oil

| Pollutant | Gas Turbine No.2 Oil @ 30°F | Gas Turbine No.2 Oil @ ISO | Gas Turbine No.2 Oil @ 85°F | Gas Turbine No.2 Oil @ 100°F |
|---|---|---|---|---|
| **Particulate:** | | | | |
| **Basis** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 8.0 | 8.0 | 8.0 | 8.0 |
| **TPY** | 35.0 | 35.0 | 35.0 | 35.0 |
| **Sulfur Dioxide:** | | | | |
| **Basis** | 0.5 % Sulfur | 0.5 % Sulfur | 0.5 % Sulfur | 0.5 % Sulfur |
| **lb/hr** | 565.16 | 506.09 | 448.39 | 423.27 |
| **TPY** | 2,475.4 | 2,216.7 | 1,964.0 | 1,853.9 |
| **Nitrogen Oxides:** | | | | |
| **Basis** | 202 ppm* | 202 ppm* | 202 ppm* | 202 ppm* |
| **lb/hr** | 923.1 | 871.5 | 830.0 | 807.7 |
| **TPY** | 4,043.3 | 3,817.4 | 3,635.3 | 3,537.9 |
| **ppm** | 202 | 202 | 202 | 202 |
| **Carbon Monoxide:** | | | | |
| **Basis** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 5.0 | 5.0 | 5.0 | 5.0 |
| **TPY** | 21.9 | 21.9 | 21.9 | 21.9 |
| **VOC's:** | | | | |
| **Basis** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 1.00 | 1.00 | 1.00 | 1.00 |
| **TPY** | 4.4 | 4.4 | 4.4 | 4.4 |
| **Lead:** | | | | |
| **Basis** | EPA(1988) | EPA(1988) | EPA(1988) | EPA(1988) |
| **lb/hr** | 1.01E-02 | 9.07E-03 | 8.10E-03 | 7.59E-03 |
| **TPY** | 4.44E-02 | 3.97E-02 | 3.55E-02 | 3.32E-02 |

* actual ppm, does not include fuel bound nitrogen.

Table A-3. Maximum Other Regulated Pollutant Emissions for Putnam Combustion Turbines - Fuel Oil

| Pollutant | Gas Turbine No.2 Oil @ 30°F | Gas Turbine No.2 Oil @ ISO | Gas Turbine No.2 Oil @ 85°F | Gas Turbine No.2 Oil @ 100°F |
|---|---|---|---|---|
| As (lb/hr) | 0.0047798178 | 0.0042802171 | 0.0038243679 | 0.0035798317 |
| (TPY) | 2.09E-02 | 1.87E-02 | 1.68E-02 | 1.57E-02 |
| Be (lb/hr) | 0.0028451296 | 0.0025477483 | 0.0022764095 | 0.0021308522 |
| (TPY) | 1.25E-02 | 1.12E-02 | 9.97E-03 | 9.33E-03 |
| Hg (lb/hr) | 3.41E-03 | 3.06E-03 | 2.73E-03 | 2.56E-03 |
| (TPY) | 1.50E-02 | 1.34E-02 | 1.20E-02 | 1.12E-02 |
| F (lb/hr) | 0.0369866851 | 0.0331207275 | 0.0295933232 | 0.0277010783 |
| (TPY) | 1.62E-01 | 1.45E-01 | 1.30E-01 | 1.21E-01 |
| H2SO4 (lb/hr) | 45.5 | 40.8 | 36.1 | 34.1 |
| (TPY) | 1.99E+02 | 1.78E+02 | 1.58E+02 | 1.49E+02 |

Sources of Emission Factors: EPA, 1988; EPA, 1980

Table A-4. Maximum Non-Regulated Pollutant Emissions for Putnam Combustion Turbines-Fuel Oil

| Pollutant | Gas Turbine No.2 Oil @ 30°F | Gas Turbine No.2 Oil @ ISO | Gas Turbine No.2 Oil @ 85°F | Gas Turbine No.2 Oil @ 100°F |
|---|---|---|---|---|
| Manganese (lb/hr) | 7.33E-03 | 6.56E-03 | 5.86E-03 | 5.49E-03 |
| (TPY) | 3.21E-02 | 2.87E-02 | 2.57E-02 | 2.40E-02 |
| Nickel (lb/hr) | 1.93E-01 | 1.73E-01 | 1.55E-01 | 1.45E-01 |
| (TPY) | 8.47E-01 | 7.59E-01 | 6.78E-01 | 6.35E-01 |
| Cadmium (lb/hr) | 1.19E-02 | 1.07E-02 | 9.56E-03 | 8.95E-03 |
| (TPY) | 5.23E-02 | 4.69E-02 | 4.19E-02 | 3.92E-02 |
| Chromium (lb/hr) | 5.41E-02 | 4.84E-02 | 4.33E-02 | 4.05E-02 |
| (TPY) | 2.37E-01 | 2.12E-01 | 1.89E-01 | 1.77E-01 |
| Copper (lb/hr) | 3.19E-01 | 2.85E-01 | 2.55E-01 | 2.39E-01 |
| (TPY) | 1.40E+00 | 1.25E+00 | 1.12E+00 | 1.05E+00 |
| Vanadium (lb/hr) | 7.93E-02 | 7.11E-02 | 6.35E-02 | 5.94E-02 |
| (TPY) | 3.48E-01 | 3.11E-01 | 2.78E-01 | 2.60E-01 |
| Selenium (lb/hr) | 2.67E-02 | 2.39E-02 | 2.14E-02 | 2.00E-02 |
| (TPY) | 1.17E-01 | 1.05E-01 | 9.36E-02 | 8.76E-02 |
| POM (lb/hr) | 3.17E-04 | 2.84E-04 | 2.54E-04 | 2.38E-04 |
| (TPY) | 1.39E-03 | 1.24E-03 | 1.11E-03 | 1.04E-03 |
| Formaldehyde (lb/hr) | 4.61E-01 | 4.13E-01 | 3.69E-01 | 3.45E-01 |
| (TPY) | 2.02E+00 | 1.81E+00 | 1.62E+00 | 1.51E+00 |

Source of Emission Factors: EPA(1988)

Table A-5. Design Information and Stack Parameters Putnam Combined Cycle Plant-Natural Gas Firing

| Data | Gas Turbine Natural Gas @ 30°F | Gas Turbine Natural Gas @ ISO | Gas Turbine Natural Gas @ 85°F | Gas Turbine Natural Gas @ 100°F |
|---|---|---|---|---|
| General: | | | | |
| Power - Net (MW) | 91 | 80 | 70 | 65 |
| Heat Rate -Net (Btu/kwh) | 13,029.9 | 13,389.6 | 13,832.2 | 14,150.3 |
| Heat Input (MMBtu/hr) | 1,184.7 | 1,071.2 | 968.3 | 913.7 |
| Natural Gas (Mcf/hr) | 1,240.6 | 1,121.7 | 1,013.9 | 956.7 |
| (lb/hr) | 51,510.6 | 46,576.0 | 44,100.0 | 39,725.4 |
| Fuel: | | | | |
| Heat Content - Gas (HHV) | 955 Btu/cf | 955 Btu/cf | 955 Btu/cf | 955 Btu/cf |
| CT Exhaust: | | | | |
| Volume Flow (acfm) | 1,641,608 | 1,599,545 | 1,565,639 | 1,547,510 |
| Volume Flow (scfm) | 638,504 | 602,826 | 574,068 | 558,691 |
| Mass Flow (lb/hr) | 2,783,493 | 2,627,961 | 2,502,590 | 2,435,556 |
| Temperature (°F) | 898 | 941 | 980 | 1003 |
| Molecular Weight | 28 | 28 | 28 | 28 |
| HRSG Stack: | | | | |
| Volume Flow (acfm) | 952,918 | 899,672 | 856,752 | 833,804 |
| Temperature (°F) | 328 | 328 | 328 | 328 |
| Diameter (ft)* | 10.3 | 10.3 | 10.3 | 10.3 |
| Velocity (ft/sec) | 95.3 | 90.0 | 85.7 | 83.4 |
| Height (ft) | 73.0 | 73.0 | 73.0 | 73.0 |

* two stacks per HRSG

Table A-6. Maximum Criteria Pollutant Emissions for Putnam Combustion Turbines-Natural Gas Firing

| Pollutant | Gas Turbine Natural Gas @ 30°F | Gas Turbine Natural Gas @ ISO | Gas Turbine Natural Gas @ 85°F | Gas Turbine Natural Gas @ 100°F |
|---|---|---|---|---|
| **Particulate:** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 1.0 | 1.0 | 1.0 | 1.0 |
| **TPY** | 4.4 | 4.4 | 4.4 | 4.4 |
| **Sulfur Dioxide:** | | | | |
| **Basis** | 1 gr/100scf | 1 gr/100scf | 1 gr/100scf | 1 gr/100scf |
| **lb/hr** | 3.54 | 3.20 | 2.90 | 2.73 |
| **TPY** | 15.5 | 14.0 | 12.7 | 12.0 |
| **Nitrogen Oxides:** | | | | |
| **Basis** | 119.2 ppm* | 119.2 ppm* | 119.2 ppm* | 119.2 ppm* |
| **lb/hr** | 545.1 | 514.6 | 490.1 | 477.0 |
| **TPY** | 2,387.5 | 2,254.1 | 2,146.5 | 2,089.0 |
| **ppm** | 119.2 | 119.2 | 119.2 | 119.2 |
| **Carbon Monoxide:** | | | | |
| **Basis** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 6.0 | 6.0 | 6.0 | 6.0 |
| **TPY** | 26.3 | 26.3 | 26.3 | 26.3 |
| **ppm** | 30.0 | 30.0 | 30.0 | 30.0 |
| **VOC's:** | | | | |
| **Basis** | Vendor | Vendor | Vendor | Vendor |
| **lb/hr** | 1.00 | 1.00 | 1.00 | 1.00 |
| **TPY** | 4.38 | 4.38 | 4.38 | 4.38 |
| **ppm** | 1.0 | 1.0 | 1.0 | 1.0 |
| **Lead:** | | | | |
| **Basis** | | | | |
| **lb/hr** | neg. | neg. | neg. | neg. |
| **TPY** | neg. | neg. | neg. | neg. |

* actual ppm.

Table A-7. Maximum Other Regulated Pollutant Emissions for Putnam Combustion Turbines - Natural Gas Firing

| Pollutant | Gas Turbine Natural Gas @ 30°F | Gas Turbine Natural Gas @ ISO | Gas Turbine Natural Gas @ 85°F | Gas Turbine Natural Gas @ 100°F |
|---|---|---|---|---|
| As (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Be (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Hg (lb/hr) | 1.35E-02 | 1.22E-02 | 1.10E-02 | 1.04E-02 |
| (TPY) | 5.91E-02 | 5.34E-02 | 4.83E-02 | 4.56E-02 |
| F (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| H2SO4 (lb/hr) | 0.271 | 0.245 | 0.222 | 0.209 |
| (TPY) | 1.188 | 1.074 | 0.971 | 0.916 |

Sources: EPA, 1988; EPA, 1980

Table A-8. Maximum Non-Regulated Pollutant Emissions for Putnam Combustion Turbines-Natural Gas Firing

| Pollutant | Gas Turbine Natural Gas @ 30°F | Gas Turbine Natural Gas @ ISO | Gas Turbine Natural Gas @ 85°F | Gas Turbine Natural Gas @ 100°F |
|---|---|---|---|---|
| Manganese (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Nickel (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Cadmium (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Chromium (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Copper (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Vanadium (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| Selenium (lb/hr) | neg. | neg. | neg. | neg. |
| (TPY) | neg. | neg. | neg. | neg. |
| POM (lb/hr) | 7.71E-04 | 6.97E-04 | 6.30E-04 | 5.95E-04 |
| (TPY) | 3.38E-03 | 3.05E-03 | 2.76E-03 | 2.60E-03 |
| Formaldehyde (lb/hr) | 1.05E-01 | 9.46E-02 | 8.55E-02 | 8.07E-02 |
| (TPY) | 4.58E-01 | 4.14E-01 | 3.75E-01 | 3.53E-01 |

Source: EPA, 1988

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# Toxic Air Pollutant Emission Factors—A Compilation For Selected Air Toxic Compounds And Sources

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October 1988

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| Nonylphenol production | 2869 | General | 301 | Phenol | 108952 | 8.0 x 10E-4 lb/lb used | From engineering estimates | 13 |
| Nonylphenol production | 2869 | Fugitive | 301 | Phenol | 108952 | 1.9 x 10E-4 lb/lb used | From engineering estimates | 13 |
| Nonylphenol production | 2869 | Storage | 407084 | Phenol | 108952 | 1.0 x 10E-5 lb/lb used | From engineering estimates | 13 |
| Normal superphosphate production | 2574 | Curing building | 30102806 | Fluoride | 16984488 | 3.8 lb/ton P2O5 | Uncontrolled | 97 |
| Normal superphosphate production | 2874 | Mixer and den | 30102805 | Fluoride | 16984488 | 0.2 lb/ton P2O5 | Wet scrubber (97%) | 97 |
| Oil and coal combustion | 49 | Stack - particulate | 102 | Polychlorinated dibenzo-p-dioxins | | 68 ng/g | No penta homologue included, one location, TCDD detection = 20 ng/g | 119 |
| Oil and coal combustion | 49 | Stack - particulate | 102 | Tetrachlorodibenzo-p-dioxin, 2,3,7,8- | 1746016 | Not detectable | One location, detection limit = 10 ng/g | 119 |
| Oil combustion | | Oil-fired boiler or furnace, util/commerc/industr/residential | 1 | Formaldehyde | 50000 | 405 lb/10E12 Btu | Uncontrolled, based on emissions testing | 36 |
| Oil combustion | | Industrial, commercial, and residential boilers | 1 | Lead | 7439921 | 8.9 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement, assumed use distillate oil | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 26 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 11.96 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 5.72 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 2.86 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 14 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti | 1 | Manganese | 7439965 | 6.44 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering | 36 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| | | al | | | | | Judgement | |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 3.08 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Manganese | 7439965 | 1.54 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 3.2 lb/10E12 Btu | Uncontrolled, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 3.2 lb/10E12 Btu | Controlled by multiclone, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 2.4 lb/10E12 Btu | Controlled by ESP, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 0.83 lb/10E12 Btu | Controlled by scrubber, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 3.0 lb/10E12 Btu | Uncontrolled, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 3.0 lb/10E12 Btu | Controlled by multiclone, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 2.25 lb/10E12 Btu | Controlled by ESP, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boiler, util/commerc/industr/residential | 1 | Mercury | 7439976 | 0.78 lb/10E12 Btu | Controlled by scrubber, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Nickel | 7440020 | 1260 lb/10E12 Btu | Uncontrolled, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti | 1 | Nickel | 7440020 | 642.6 lb/10E12 Btu | Controlled by multiclone, based on engineering judgement | 36 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| | | al | | | | | | |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 352.8 lb/10E12 Btu | Controlled by ESP, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 50.4 lb/10E12 Btu | Controlled by scrubber, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 170 lb/10E12 Btu | Uncontrolled, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 86.7 lb/10E12 Btu | Controlled by multiclone, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 47.6 lb/10E12 Btu | Controlled by ESP, based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Nickel | 7440020 | 6.8 lb/10E12 Btu | Controlled by scrubber, based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Arsenic | 7440382 | 19 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Arsenic | 7440382 | 4.2 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Arsenic | 7440382 | 2.06 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Arsenic | 7440382 | 0.50 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Arsenic | 7440382 | 0.42 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti | 1 | Arsenic | 7440382 | 9.31 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering | 36 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| | | al | | | | | judgement | |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Arsenic | 7440382 | 2.28 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Arsenic | 7440382 | 1.90 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 4.2 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 2.5 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 1.58 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 0.35 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 0.15 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 2.65 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 0.59 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Beryllium | 7440417 | 0.25 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Cadmium | 7440439 | 15.7 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti | 1 | Cadmium | 7440439 | 10.5 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| | | al | | | | | | |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 7.45 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 1.58 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 0.63 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 46.86 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 9.90 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Cadmium | 7440439 | 3.96 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti al | 1 | Chromium | 7440473 | 21 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Chromium | 7440473 | 47.5 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Chromium | 7440473 | 27.8 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Chromium | 7440473 | 13.92 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residenti al | 1 | Chromium | 7440473 | 3.84 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residenti | 1 | Chromium | 7440473 | 12.18 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering | 36 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| | | al | | | | | judgement | |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Chromium | 7440473 | 6.09 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Chromium | 7440473 | 1.68 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 278 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 280 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 165.2 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 42 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Distillate oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 25.2 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 165.2 lb/10E12 Btu | Controlled with multiclone, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 42.0 lb/10E12 Btu | Controlled with ESP, calculated based on engineering judgement | 36 |
| Oil combustion | | Residual oil-fired boilers, util/commerc/industr/residential | 1 | Copper | 7440508 | 25.2 lb/10E12 Btu | Controlled with scrubber, calculated based on engineering judgement | 36 |
| Oil combustion | | Utility boilers | 101004 | Lead | 7439921 | 28 lb/10E12 Btu | Uncontrolled, calculated based on engineering judgement, assumed use residual oil | 36 |
| Oil combustion | | Distillate watertube boilers | 10300501 | PCN | | <0.12 pg/J heat input | Uncontrolled | 114 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| Oil combustion | | Scotch marine boilers, distillate oil | 10300501 | PCN | | 17.7 pg/J | Uncontrolled | 114 |
| Oil combustion | | Cast iron sectional boilers, distillate oil | 10300501 | PCN | | <14.9 pg/J | Uncontrolled, home heating application | 114 |
| Oil combustion | | Hot air furnace, distillate oil | 10300501 | PCN | | <0.14 pg/J | Uncontrolled, same reference also lists <15.4 for same boiler/fuel type | 114 |
| Oil combustion | 49 | Boiler flue gas | 1 | Tetrachlorodibenzo-p-dioxin, 2,3,7,8- | 1746016 | Not detectable | Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<4.2-<7.9 ng/m3 | 119 |
| Oil combustion | 49 | Flue gas | 1 | Tetrachlorodibenzofuran, 2,3,7,8- | 51207319 | Not detectable | Low ash, 2% sulfur oil, sampled after heat exch., before ESP, 2378-TCDD detec. limit=<0.67-<1.3ng/m3 | 119 |
| Oil combustion, commercial | | Residual oil-fired tangential furnaces | 103004 | Vanadium | 7440622 | 3660 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, commercial | | Residual oil-fired wall furnaces | 103004 | Vanadium | 7440622 | 3660 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, commercial | | Tangential furnace, residual oil | 103004 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, commercial | | Wall furnace, residual oil | 103004 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, commercial | | Scotch marine boilers, residual oil | 10300401 | PCN | | 0.95 pg/J heat input | Uncontrolled, represents benzo(a)pyrene only | 114 |
| Oil combustion, commercial | | Distillate oil-fired tangential furnaces | 103005 | Vanadium | 7440622 | 30.0 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, commercial | | Distillate oil-fired wall furnaces | 103005 | Vanadium | 7440622 | 30.0 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, commercial | | Tangential furnace, distillate oil | 103005 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| Oil combustion, commercial | | Wall furnace, distillate oil | 103005 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, industrial | | Tangential furnaces | 102 | Vanadium | 7440622 | 260 pg/J | Controlled by scrubber, based on reported emissions and engineering judgement | 54 |
| Oil combustion, industrial | | Tangential furnaces | 102 | Vanadium | 7440622 | 1300 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, industrial | | Wall furnaces | 102 | Vanadium | 7440622 | 260 pg/J | Controlled by scrubber, based on reported emissions and engineering judgement | 54 |
| Oil combustion, industrial | | Wall furnaces | 102 | Vanadium | 7440622 | 1300 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, industrial | | Tangential furnace | 102 | Selenium | 7782492 | 2.0 pg/J | Controlled by scrubber, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, industrial | | Tangential furnace | 102 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, industrial | | Wall furnace | 102 | Selenium | 7782492 | 2.0 pg/J | Controlled by scrubber, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, industrial | | Wall furnace | 102 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, industrial | | Steam atomized watertube, residual oil | 10200401 | PON | | 2.3 pg/J heat input | Uncontrolled, represents mostly particulate PON | 114 |
| Oil combustion, industrial | | Watertube, residual oil | 10200401 | PON | | 0.63 pg/J heat input | Uncontrolled, represents both gaseous and particulate PON | 114 |
| Oil combustion, residential | | Distillate oil-fired boilers | | Vanadium | 7440622 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, residential | | Distillate oil-fired furnaces | | Selenium | 7782492 | 2.9 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |

| INDUSTRIAL PROCESS | SIC CODE | EMISSION SOURCE | SCC | POLLUTANT | CAS NUMBER | EMISSION FACTOR | NOTES | REFERENCE |
|---|---|---|---|---|---|---|---|---|
| Oil combustion, utility | | Wall-fired, residual oil | 10100401 | PCM | | 3.9 pg/J heat input | Uncontrolled, ave. of 4 values ranging from 0.45-12.3 pg/J, represents gaseous & particulate PCM | 114 |
| Oil combustion, utility | | Face-fired, residual oil | 10100401 | PCM | | 0.37 pg/J heat input | Uncontrolled, represents both gaseous and particulate PCM | 114 |
| Oil combustion, utility | | Tangential-fired, residual oil | 10100404 | PCM | | 2.5 pg/J heat input | Cyclone controls, represents both gaseous and particulate PCM | 114 |
| Oil combustion, utility | 4911 | Residual oil-fired tangential furnaces | 101004 | Vanadium | 7440622 | 303 pg/J | Controlled by ESP, based on reported emissions and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Residual oil-fired tangential furnaces | 101004 | Vanadium | 7440622 | 1516 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Residual oil-fired wall furnaces | 101004 | Vanadium | 7440622 | 303 pg/J | Controlled by ESP, based on reported emissions and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Residual oil-fired wall furnaces | 101004 | Vanadium | 7440622 | 1516 pg/J | Uncontrolled, based on reported emissions and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Tangential, residual oil | 101004 | Selenium | 7782492 | 2.0 pg/J | Controlled by ESP, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Tangential, residual oil | 101004 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Wall furnace, residual oil | 101004 | Selenium | 7782492 | 2.0 pg/J | Controlled by ESP, based on reported emissions data and engineering judgement | 54 |
| Oil combustion, utility | 4911 | Wall furnace, residual oil | 101004 | Selenium | 7782492 | 10.1 pg/J | Uncontrolled, based on reported emissions data and engineering judgement | 54 |
| Oil shale retorting | 1311 | Modified in situ retort | | PCM | | 3.3 g/hr | Based on offgas concentration and flow rate | 114 |
| Oil shale retorting | 2911 | Entire process | | Mercury | 7439976 | 2.2 x 10E-4 lbs/barrel oil produced | Includes Hg compound form, assumes fac. using 13,000 tons/day raw shale to prod. 12,000 bbl/day oil | 40 |

PB81-225559

# Emissions Assessment of Conventional Stationary Combustion Systems: Volume V: Industrial Combustion Sources

TRW, Inc.
Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

1981

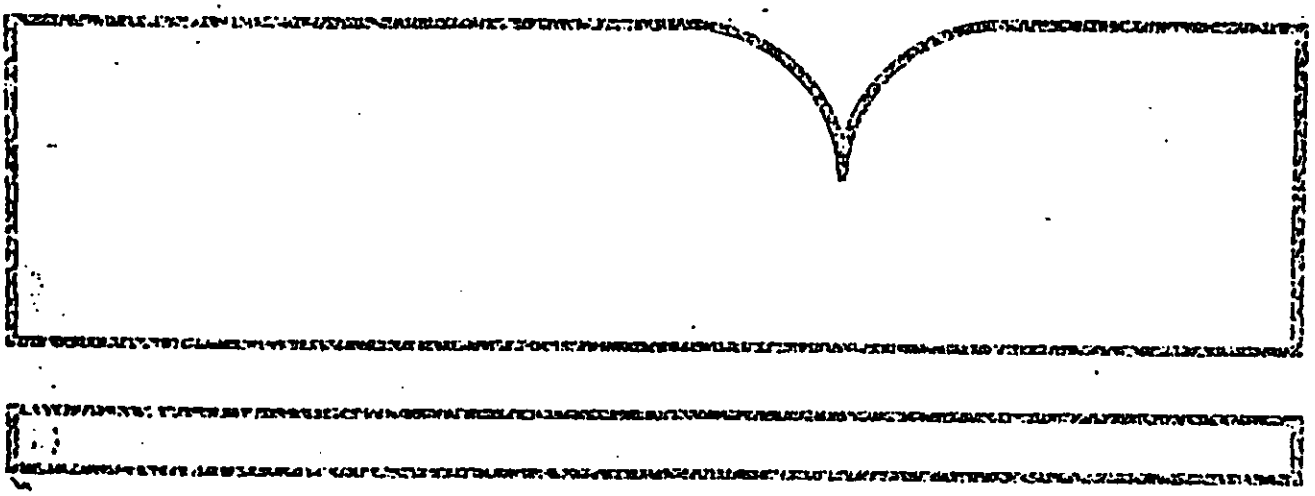

TABLE 61. COMPARISON OF EXISTING TRACE ELEMENT EMISSION FACTOR DATA WITH RESULTS OF CURRENT STUDY OF OIL-FIRED INDUSTRIAL COMBUSTION SOURCES, pg/J

| | Distillate oil-fired boilers | | | Residual oil-fired boilers | | | |
|---|---|---|---|---|---|---|---|
| | | Existing data | | | Existing data | | |
| Element | Current study | Ref. 42 | Ref. 43 | Current study | Ref. 42 | Ref. 21 | Ref. 28 |
| Aluminum (Al) | 178 | 15 | 250 | 177 | 156 | 87 | 132 |
| Arsenic (As) | 3.5 | 1.3 | 1.5 | 1.2 | 9.1 | 18 | 12 |
| Barium (Ba) | 1.2 | 8.4 | 16 | 3.3 | 9.5 | 29 | 31 |
| Calcium (Ca) | 75 | 845 | 450 | 229 | 780 | 320 | 1428 |
| Cadmium (Cd) | 1.3 | 2.5 | 11 | 0.66 | 0.2 | 52 | 6.9 |
| Cobalt (Co) | 3.8 | 2.3 | 1.0 | 11 | 23 | 50 | 10 |
| Chromium (Cr) | 24 | 36 | 29 | 29 | 50 | 30 | 21 |
| Copper (Cu) | 37 | 205 | 160 | 10 | 93 | 64 | 350 |
| Fluorine (F) | – | 14 | – | – | 1.0 | 2.7 | 149 |
| Iron (Fe) | 363 | 545 | 140 | 83 | 379 | 411 | 453 |
| Mercury (Hg) | – | 1.7 | 1.2 | – | 1.9 | 0.9 | 1.5 |
| Potassium (K) | 85 | 60 | 230 | 261 | 213 | 777 | 392 |
| Lithium (Li) | 0.5 | 1.5 | 1.2 | 1.1 | 1.0 | 1.4 | 1.7 |
| Magnesium (Mg) | 42 | 40 | 210 | 24 | 111 | 297 | 2384 |
| Nickel (Ni) | 255 | 112 | 290 | 728 | 804 | 964 | 433 |
| Lead (Pb) | 24 | 48 | 42 | 2 | 7 | 80 | 34 |
| Antimony (Sb) | – | 1.7 | 5.7 | – | 21 | 10 | 25 |
| Silicon (Si) | 735 | 173 | – | 8655 | 1610 | 400 | 595 |
| Vanadium (V) | 195 | 30 | 2.9 | 366 | 250 | 3656 | 714 |
| Zinc (Zn) | 42 | 40 | 110 | 33 | 46 | 29 | 66 |

Ave. 50.9

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-296 390

# Emission Assessment of Conventional Stationary Combustion Systems; Volume II Internal Combustion Sources

TRW, Inc, Redondo Beach, CA

Prepared for

Industrial Environmental Research Lab, Research Triangle Park, NC

Feb 1979

TABLE 52. COMPARISON OF TRACE ELEMENT EMISSION FACTORS FOR DISTILLATE OIL-FUELED GAS TURBINES AND DISTILLATE OIL ENGINES

| Trace Element | Mean Emission Factor, pg/J | |
|---|---|---|
| | Distillate Oil Fueled Gas Turbine | Distillate Oil Reciprocating Engine |
| Aluminum | 64 | 66 |
| Antimony | 9.4 | 12 |
| Arsenic | 2.1 | 2.2 |
| Barium | 8.4 | 14 |
| Beryllium | 0.14 | 0.03 |
| Boron | 28 | 11 |
| Bromine | 1.8 | 4.0 |
| Cadmium | 1.8 | 3.1 |
| Calcium | 330 | 237 |
| Chromium | 20 | 26 |
| Cobalt | 3.9 | 5.7 |
| Copper | 578 | 453 |
| Iron | 256 | 325 |
| Lead | 25 | 26 |
| Magnesium | 100 | 44 |
| Manganese | 145 | 16 |
| Mercury | 0.39 | 0.13 |
| Molybdenum | 3.6 | 12.5 |
| Nickel | 526 | 564 |
| Phosphorus | 127 | 97 |
| Potassium | 185 | 179 |
| Selenium | 2.3 | 2.1 |
| Silicon | 575 | 301 |
| Sodium | 590 | 1625 |
| Tin | 35 | 9.1 |
| Vanadium | 1.9 | 0.95 |
| Zinc | 294 | 178 |

# EXHIBIT 8

FLORIDA POWER & LIGHT COMPANY
GROUNDWATER MONITORING PLAN
PUTNAM POWER PLANT

NOTE: Due to its length, the Groundwater Monitoring Plan is attached separately and is attached only to the original Request for Modification of Conditions of Certification. Copies are available upon request.

ORIGINAL
CERTIFICATE AND
CONDITIONS

# FLORIDA POWER & LIGHT COMPANY
# PUTNAM PLANT
# CONDITIONS OF CERTIFICATION

(Incorporating modifications from 1976, 1978, 1980, 1984, 1986, and 1991)

The permittee shall comply with the following conditions of certification:

1. A. Auxiliary Boilers:

Fuel consumed should not contain more than 0.7% sulfur nor should stack emissions exceed those specified in chapter 17-2.600(6).

B. Combustion Turbines:

(i) Only fuel oil with not more than 0.7 percent sulfur content or natural gas may be fired.

(ii) Opacity shall not exceed 20 percent opacity except for one 6-minute period per hour during which opacity shall not exceed 27 percent.

C. Heat Recovery Steam Generators:

(i) Only the following fuels may be fired: (a) natural gas or (b) fuel oil with not more than 0.5 percent sulfur content by weight.

(ii) Emissions shall not exceed the following limitations:

(a) Opacity emissions shall not exceed 20 percent (6-minute average), except for one 6-minute period per hour of not more than 27 percent.

(b) Excess opacity resulting from malfunctions is permitted provided that best operational practices to minimize emissions are adhered to and the duration of excess opacity shall be minimized, but in no case exceed two hours in any 24-hour period unless specifically authorized by the Department for longer duration.

(c) Excess opacity resulting from startup or shutdown is permitted, provided that best operational practices to minimize emissions are adhered to and the duration of excess emissions shall be minimized.

(d) Nitrogen oxides emissions shall not exceed 0.2 lb/mmBtu heat input when natural gas or distillate oil is combusted or 0.4 lb/mmBtu heat input when residual oil is combusted. Compliance is determined on a 30-day rolling average basis. The nitrogen oxides standard applies at all times, including periods of startup, shutdown, or malfunction.

(iii) To determine compliance with the emissions limit for sulfur dioxide, receipts from the fuel supplier shall be maintained for each shipment which certify that the oil complies with the specifications for fuel oil numbers 1 and 2, as defined by the American Society of Testing and Materials in ASTM D396-78, Standard Specifications for Fuel Oils. Quarterly reports based on such receipts shall be submitted to the Northeast District Office certifying that only oil containing no more than 0.5 weight percent sulfur or oil that has a sulfur dioxide emission rate equal to or less than 0.5 lb/mmBtu heat input and which meets the ASTM specifications was combusted in the duct burners during the preceding quarter. All quarterly reports shall be postmarked by the 30th day following the end of each calendar quarter.

(iv) To determine compliance with the opacity limit, Method 9 shall be used as required under 40 CFR § 60.8 (July 1, 1990) Edition). The initial performance test shall be performed within 60 days after achieving the maximum production rate for the HRSGs, but not later than 180 days after initial startup. Annual compliance tests shall be performed at least once during each federal fiscal year (October 1 - September 30). Thirty (30) days prior to the initial compliance test and fifteen (15) days prior to each annual compliance test, notice shall be provided to the Northeast District Office. The results of each test shall be submitted to the Northeast District Office within 45 days of test completion. Other Department-approved methods may be used for compliance testing after prior Department approval.

(v) To determine compliance with the nitrogen oxides emissions limit, FPL shall conduct the performance test described in 40 CFR § 60.46b(f) (July 1, 1990 Edition) and required under 40 CFR § 60.8 (July 1, 1990 Edition) using the nitrogen oxides and oxygen measurement procedures in 40 CFR Part 60 Appendix A, Method 20 (July 1, 1990 Edition). The initial compliance test shall be performed within 60 days after achieving the maximum production rate for the HRSGs, but not later than 180 days after initial startup. Annual compliance tests shall be performed at least once during each federal fiscal year (October 1 - September 30). Thirty (30) days prior to the initial

compliance test and fifteen (15) days prior to each annual compliance test, notice shall be provided to the Northeast District Office. The results of each test shall be submitted to the Northeast District Office within 45 days of test completion.

(vi) FPL shall maintain records of opacity and must submit excess emissions reports for any calendar quarter during which there are excess emissions from the HRSGs. If there are no excess emissions during the calendar quarter, FPL shall submit a report stating that no excess emissions occurred during the quarterly reporting period. The quarterly reports shall be submitted to the Department's Northeast District Office.

(vii) FPL shall satisfy any applicable nitrogen oxides emissions records maintenance requirements set forth in 40 CFR § 60.49b(g) (July 1, 1990 Edition).

(viii) All records required under this condition shall be maintained by FPL for a period of two years following the date of such record.

2. Stack Height: Minimum stack heights for the paired combined cycle unit exhaust stacks shall be 71 feet above grade. Stacks with a height of at least 150 feet shall be constructed if monitoring data per Condition 5 indicates ambient air standards have been violated.

Wind Restriction: The permittee will burn fuel oil containing no more than 0.50% sulfur when sustained winds exceed 20 miles per hour for any continuous period of three hours or longer.

Wind Monitoring: The permittee shall measure wind velocity and wind direction at hourly intervals in the plant vicinity, only for those hours during which combustion turbines at either of the combined cycle units of the plant operates on oil with greater than 0.5 percent sulfur content. Wind data for the hours during which oil with greater than 0.5 percent sulfur content was burned each month, or, if applicable, a statement that no oil with greater than 0.5 percent sulfur content was burned during that month, shall be reported to the Northeast District Assistant Deputy Secretary of the Department by the last day of the month following each reporting period. Wind velocity and direction measurements required by this paragraph shall be made in accordance with recognized methods and procedures.

3. The permittee shall install a sampling platform on one stack or shall provide sampling ports and such temporary access facilities as may be prescribed by the Department in performing stack sampling.

4. The permittee shall install and operate continuous monitoring devices on one of the paired combined cycle unit exhaust stacks for each unit for the following: Opacity, Nitrogen Oxides. Records of such monitoring shall be available for inspection.

5. The permittee shall install and operate continuously for a 24-hour period every six days, two ambient air, West-Gaeke, monitoring devices for sulfur dioxide and two suspended particulate sampling devices. The location of these ambient air samplers shall be determined by consultation with the Northeast District Assistant Deputy Secretary of the Department. The data collected will be reported to the Northeast District Assistant Deputy Secretary quarterly by the 45th day following the end of the reporting period, utilizing the SAROAD or other mutually acceptable format.

6. With the exception of cooling tower blowdown, water effluents shall conform to the limitations of Chapter 17-3, F.A.C., including, but not limited to, those contained in Condition 7 below. For cooling tower blowdown, in addition to those limitations contained in Chapter 17-3, F.A.C., and Condition 7 below, a mixing zone is hereby established for the parameters of iron, chlorine, copper, nickel and zinc with the dimensions of 800 meters in length and 90 meters in width, except that the southernmost section of the mixing zone shall be 150 meters in width as shown on Figure 5 of Attachment "A" hereto so as to take into account a particular shoreline configuration.

7. Monitoring shall be conducted at the frequencies listed below on the following waste streams, where applicable: Cooling Tower Blowdown, West EP Pond, North Fuel Oil Tank Farm, and the Physical Chemical Treatment System. Each of these waste streams discharge to the St. Johns River. Cooling Tower Blowdown and the Physical Chemical Treatment System discharge may discharge simultaneously or separately through the same pipe. Monitoring reports shall be submitted quarterly to the Department's Northeast District Assistant Deputy Secretary:

| Parameter | Monitoring Limitations | Frequency | Waste Streams |
|---|---|---|---|
| Flow | Cooling tower blowdown shall be minimized to the degree allowed by best engineering Practices | Continuous recorders, pump logs or calculation | Cooling Tower Blowdown, West EP Pond, North Fuel Oil Tank Farm Area, Physical Chemical Treatment System |
| Temperature | Not to exceed 98°F. at the P.O.D. and not to exceed 92°F. 5°F. above ambient at the boundary of a three-dimensional zone of mixing described by a cylinder of 50 meters radius running horizontally from the P.O.D. and which extends vertically to the river surface and river bottom | Continuous (recorder or logs) at any point between the blowdown discharge at the cooling tower and the P.O.D. or cooling water water into the river | Cooling Tower Blowdown |
| Phosphate | 50 ppm | Weekly | Physical Chemical Treatment System during periods of discharge from the neutralization basin |
| Dissolved Solids | 6000 ppm | Daily | Cooling Tower Blowdown, Physical Chemical Treatment System |
| pH | 6.0 - 8.5 | Daily | Cooling Tower Blowdown, West EP Pond, North Fuel Oil Tank Farm Area, Physical Chemical Treatment System |
| Floating Solids and and Visible Foam | None visible | None | Cooling Tower Blowdown, West EP Pond, North Fuel Oil Tank Farm Area, Physical Chemical Treatment System |

8. Change in Discharge: All discharges or emissions authorized herein shall be consistent with the terms and conditions of this certification. The discharge of any pollutant identified in this certification more frequently than or at a level in excess of that authorized shall constitute a violation of the certification. Any

anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants or expansion in steam generating capacity must be reported by submission of a new application.

9. Noncompliance Notification: If, for any reason, the permittee does not comply with or will be unable to comply with any limitation specified in this certification, the permittee shall provide prompt notification to the Assistant Deputy Secretary of the Northeast District of the Department by telecommunication sent by 3:00 p.m. of the next normal work day following the occurrence of such noncompliance, and shall submit the following information in writing, within ninety-six (96) hours of becoming aware of such conditions:

(a) A description of the discharge and cause of noncompliance; and

(b) The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

10. Facilities Operation: The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this certification.

11. Adverse Impact: The permittee shall take all reasonable steps to minimize any adverse impact resulting from noncompliance with any limitation specified in this certification, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

12. Bypassing: Any diversion or bypass of facilities necessary to maintain compliance with the terms and conditions of this certification is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the conditions of this certification. The permittee shall promptly notify the Assistant Deputy Secretary of the Northeast District of the Department of each such diversion or bypass in accordance with the procedure contained in Condition 9 of this certification.

13. Removed Substances: Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the state.

14. Right of Entry: The permittee shall allow the Secretary of the Florida Department of Environmental Regulation and/or authorized representatives, upon the presentation of credentials:

(a) To enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under terms and conditions of this permit; and

(b) To have access to and copy any records required to be kept under the conditions of this certification; and

(c) To inspect any monitoring equipment or monitoring method required in this certification and to sample any discharge of pollutants.

15. Revocation or Suspension: After notice and opportunity for a hearing, this certification may be suspended, or revoked in whole or in part during its terms for cause, including, but not limited to, the provisions of § 403.512, Chapter 403, Florida Statutes, or for failure to comply with the terms and conditions of the certification.

16. New Pollutant Standards: If an effluent or emission standard or prohibition (including any schedule of compliance specified in such effluent or emission standard or prohibition) is established for a pollutant which is present in this certification and such standard or prohibition is more stringent than any limitation for such pollutant in this certification, this certification shall be revised in accordance with the new effluent or emission standard or prohibition and the permittee so notified.

17. Civil and Criminal Liability: Nothing in this certification shall be construed to relieve the permittee from civil or criminal penalties for noncompliance with any condition of this certification, applicable rules or regulations of the Department, or Chapter 403, Florida Statutes.

18. Nothing in this certification shall be construed to preclude the institution of any legal action or relieve the permittee from the responsibilities, requirements, liabilities, or penalties established pursuant to any

applicable state statutes or regulations, including Departmental rules and regulations promulgated by the Department pursuant to Chapter 403, Florida Statutes.

19. Property Rights: The issuance of this certification does not convey any property rights in either real or personal property, or any exclusive privileges, nor 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.

20. Severability: The provisions of this certification are severable, and if any provision of this certification or the application or any provision of this certification to any circumstances is held invalid, the application of such provision to other circumstances and the remainder of this certification shall not be affected thereby.

21. No debris shall be discharged to waters of the state from the intake screens with the exception of viable nekton.

22. Discharge of cooling tower blowdown shall not begin until total residual chlorine concentrations are below 0.14 mg/l. Free available chlorine shall not exceed a daily average concentration of 0.2 mg/l and a maximum concentration of 0.5 mg/l during a maximum of one 2-hour period a day at the point of discharge. Chlorine concentration monitoring shall be conducted two times per week using multiple grab sampling. The results of such a monitoring shall be reported to the District Manager on the same frequency as reported to the U. S. Environmental Protection Agency.

23. Any biocide discharge from any point source shall comply with the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended (7 U.S.C. 136 et seq.) and the use of such pesticide shall be in a manner consistent with the labeling.

24. There shall be no release from containment devices or structures of polychlorinated biphenyl compounds to the environment.

25. There shall be no surface discharge of turbid waters to waters of the state from the spoil disposal/borrow pit system. Any spoil excavated during construction of maintenance dredging shall be deposited on an upland area. A berm or other control device shall be constructed around the spoil disposal area to ensure against spillage or discharge of excavated material which may cause turbidity in

excess of 50 Jackson Turbidity Units above background in waters of the state.

26. The barge slip shall be of a sheet-pile type construction with a poured concrete cap. Riprap shall be placed on the river bank adjacent to the barge slip to prevent erosion due to removal of natural vegetation. Spilled oil shall be removed from the barge slip prior to the departure of any barge. Such oil shall be disposed of by the plant's oil treatment system.

27. Construction of the utilities tunnel under U.S. 17 shall be expedited to occur in a minimal amount of time. Such construction shall be performed in accordance with the standards of the Florida Department of Transportation and in close coordination with:

Mr. C. A. Benedict
District Engineer, Fifth Division
Florida Department of Transportation
Post Office Box 47
Deland, Florida 32720

and with

Mr. J. A. Crookshank, Jr.
Maintenance Engineer, Putnam County
Post Office Drawer X
St. Augustine, Florida 32084

28. During construction and plant operation, necessary measures shall be employed to settle, filter or absorb silt-containing or pollutant-loaded stormwater runoff to prevent contamination of waters of the state. Such measures may include sediment traps, barriers, and use of berms or vegetation. Exposed or disturbed soil shall be sodded as soon as possible to minimize silt and sediment runoff into waters of the state.

29. Turbidity control shall be installed prior to any construction or maintenance dredging to ensure that turbidity of state waters is not increased more than 50 Jackson Turbidity Units.

30. The Groundwater Monitoring Plan for the Putnam Power Plant, approved on February 25, 1985, and on file with the Department, is incorporated by reference.

Copies of any subsequent revisions to the Groundwater Monitoring Plan which are approved by the Department's Northeast District Office shall be filed with the Department's Siting Coordination Office and provided to

the parties hereto by certified mail, and, in the absence of a request for a hearing thereon within 15 days of receipt of such revision, the revisions shall become part of this certification without the need for further filing or the submission of filing fees.

31. Review of Site Certification: This certification shall be final unless revoked or suspended pursuant to law. Five years from the date of issuance of any National Pollutant Discharge Elimination System Permit issued pursuant to the Federal Water Pollution Control Act Amendments of 1972, for the Combined Cycle Units, the Department shall review all monitoring data that have been submitted to it during the preceding five-year period for the purpose of determining the extent of the permittee's compliance with the conditions of this certification and the environmental impact of this facility. The Department shall submit the results of its review and recommendations to the permittee and all parties of record in this certification proceeding.

32. Monitoring Program Review: The results of the air, water, and groundwater monitoring programs will be reviewed by the Department and Florida Power & Light Company at the end of each year of operation to determine the necessity and/or extent of continuation. The methods and procedures utilized in the monitoring program shall be approved by the Department and shall also be reviewed annually by the Department and Florida Power & Light Company, and may be modified by agreement of all parties of record in this certification proceeding.

33. Modification of Conditions: The conditions of this certification may be modified in the following manner:

(a) The Board, pursuant to § 403.516(1), Florida Statutes, hereby delegates to the Secretary the authority to modify, after notice and opportunity for hearing, any conditions pertaining to air and water monitoring and sampling, variances, or exceptions to water quality standards.

(b) All other modifications shall be made in accordance with § 403.516, Florida Statutes.

bjh/PutnamCond