TECHNICAL SPECIFICATION FOR AN SCR SYSTEM FOR THE FPC HINES ENERGY PROJECT

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REVISION SHEET

REVISION	REISSUE DATE	SECTION	DESCRIPTION OF CHANGE
001	12/3/97	All	Original Issue
002	7/20/98	3.1	Removed second paragraph, as it is the Buyer's option to validate emission guarantees.
		7.1.3	Removed statement as nitrogen purge is not required.
		7.2.2	Revised second sentence to incorporate as built design.
		8.2.1	Changed reference section number.
		10.2.13	Changed reference section number.
		Scope of Supply Datasheet, p. 2	Revised flue gas analyzer scope of supply to incorporate as built design.
		Performance Information Datasheets, pages 1 - 8	Revised combustion turbine emissions. Filled in Seller supplied information for upstream temperature entering catalyst and downstream emissions.
		Design Specification Datasheet	Revised dilution medium to incorporate as built design.
003		Performance Information Datasheets, pages 1, 3, 4	Revised ambient conditions, CT exhaust and emissions conditions. Revised downstream emissions.
		Performance Information Datasheets, pages 6, 8	Revised downstream emissions.

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1.0 DOCUMENT SCOPE

1.1 This specification, together with the contract document and all documents referenced herein, covers the scope of supply and technical design requirements for a Selective Catalytic Reduction (SCR) system to reduce Nitrogen Oxide (NOx) emissions for the 2x1 501F FPC-Hines Energy Combined Cycle Project.

1.2 All conflicts between the requirements of this specification, design specification data sheets, related specifications, and standard codes shall be brought to the attention of the Buyer for clarification before proceeding with the design or manufacture of the affected parts.

1.3 Reference Documents

The design, fabrication, testing, and inspection of the SCR system shall be in accordance with this document and the documents referenced herein.

1.3.1 Westinghouse Specifications and Documents (latest revisions)

21T5673 Supplier Data Requirements for Software Deliverables

21T5802 Supplier Quality Requirements

21T7360 Paint Specification for FPC-Polk County, Florida

21T7397 Specification for a Heat Recovery Steam Generator for FPC-Hines Energy Project

21T7525 Acoustical Requirements for FPC-Polk County Project

1.3.2 Codes and Standards (latest editions apply)

1.3.2.1 American Institute of Steel Construction (AISC)

a. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."

1.3.2.2 American National Standard Institute (ANSI)

a. ANSI B16.5, "Steel Pipe Flanges and Flanged Fittings."

b. ANSI B16.11 for Threaded and Socket Welding Fittings.

c. ANSI B16.9 for Butt Welding Fittings.

d. ANSI B31.1, "Power Piping."

1.3.2.3 American Society of Mechanical Engineers (ASME)

a. ASME Section II, "Material Specifications."

b. ASME Section VIII, Division 1, "Rules for the Construction of Pressure Vessels," plus addenda (if applicable to ammonia injection system).

c. ASME Section IX, "Welding and Brazing Qualifications."

1.3.2.4 American Society for Testing and Materials (ASTM)

In general, all materials of construction not required to be covered by the ASME code shall conform to the latest edition of the applicable ASTM Standard. Other materials may be used provided that they are of a "recognizable quality" as determined by Buyer. Materials conforming to foreign standards (BS, DIM, JIS, etc.) may be used provided that "material equivalency" is proven by the manufacturer to the satisfaction of the Buyer.

1.3.2.5 American Welding Society (AWS)

a. AWS D1.1, "Structural Welding Code."

b. Structural welds shall be done in accordance with AWS welding procedures. ASME Code Certified Welders may be used instead of AWS certified welders.

1.3.2.6 Federal Occupational Safety and Health Act (OSHA)

a. OSHA 2206, "OSHA Safety and Health Standards (29 CFR 1910)."

1.3.2.7 Building Codes

The catalyst and housing shall be designed and constructed in accordance with the building codes indicated in Westinghouse Specification 21T7397, "Heat Recovery Steam Generator (HRSG) for the FPC-Hines Energy Project."

1.3.2.8 Electrical Codes

Electrical equipment supplied shall comply with the latest applicable codes and standards of the NFPA National Electrical Code, the Institute of Electrical and Electronic Engineers (IEEE), the National Electrical Manufacturers Association (NEMA), and the National Electrical Code (NEC). Requirements

for electrical equipment certification shall be in accordance with local building codes.

1.3.2.10 American Standards Association (ASA).

1.3.2.11 American Iron and Steel Institute (AISI).

1.3.2.12 Underwriters Laboratories

All applicable instruments shall be supplied with a UL label.

1.3.2.13 U.S. Environmental Protection Agency (EPA) as applicable to emissions testing.

1.3.3 Other Codes or Standards

The Seller shall list in his proposal any additional codes or standards that he intends to use in the design and manufacture of his equipment. Additional codes or standards are subject to approval by the Buyer.

2.0 SYSTEM APPLICATION AND SCOPE OF SUPPLY

2.1 The SCR catalyst shall reduce NOx from the exhaust of a combustion turbine. The system application and design requirements are indicated in Sections 4.0 through 7.0 and the DESIGN SPECIFICATION data sheets. The performance guarantees that shall be met are indicated in Section 3.0 and on the SELLER GUARANTEE data sheet.

2.2 The Seller shall supply two (2) complete SCR systems, one for each Heat Recovery Steam Generator (HRSG). The SCR systems shall be opposite hand (skid and piping on outboard side of HRSG), but otherwise identical in design. See Figure 1 at the end of this specification.

2.3 The Seller's scope of supply shall be as indicated on the Seller SCOPE OF SUPPLY data sheets.

2.4 The following items are specifically excluded from the Seller's scope of supply unless indicated otherwise on the Seller SCOPE OF SUPPLY data sheets:

2.4.1 Foundations, anchor bolts, and other embedments required for support of the reactor housing, ammonia injection header, and ammonia injection skid.

2.4.2 Heat tracing and/or insulation of hot air piping, miscellaneous drain lines, instrumentation lines, etc. required for freeze or personnel protection which are not on the ammonia injection skid.

2.4.3 Nitrogen supply for nitrogen purge of ammonia injection system.

2.4.4 All motor starting equipment and control centers (MCC's) for fan drives, pump drives, or motor operated valves.

2.4.5 All control and electrical wiring and conduit external to the ammonia injection skid.

2.4.6 Final painting of the reactor housing.

2.4.7 Erection and installation of the catalyst reactor, catalyst modules, and ammonia injection skid.

2.4.8 Materials for field welding (electrodes, etc.).

3.0 PERFORMANCE AND EQUIPMENT GUARANTEES

The Seller shall meet the following guarantees for each SCR System.. These guarantees shall also be contained in the special Terms and Conditions of the SCR System Contract between Buyer and Seller.

3.1 Emission Guarantees

Emission guarantees shall be made for all operating conditions indicated on the PERFORMANCE INFORMATION and SELLER GUARANTEE data sheets.

3.2 Pressure Drop Guarantee

The maximum pressure drop measured from immediately downstream of the inlet interface with the HRSG to immediately upstream of the outlet interface with the HRSG, shall be guaranteed based on the value indicated in the SELLER GUARANTEE data sheet.

3.3 Catalyst Life Guarantee

3.3.1 The catalyst life guarantee shall be indicated on the SELLER GUARANTEE data sheet.

3.3.2 The "life" is defined as the period of time in which each catalyst can meet all the guarantees stated in paragraphs 3.1 through 3.2, including the operational requirements indicated on the DESIGN SPECIFICATION data sheet.

3.4 Used Catalyst Disposal Guarantee

3.4.1 The Seller shall provide and guarantee disposal of the used catalyst at no additional cost except shipping charges provided that:

3.4.1.1 The used catalyst is not damaged or contaminated in any way with elements/compounds that would substantially alter the disposability of the catalyst.

3.4.1.2. The laws and regulations regarding the handling, transportation, storage, disposal, and/or treatment of the used catalyst are substantially unchanged from those in effect on the date of the sales contract.

3.4.2 It is the responsibility of the Seller to indicate to the Buyer before the sales contract any elements/compounds which could alter the disposability of the catalyst. Also, the Seller shall inform the Buyer of any pending legislation regarding the handling, transportation, storage, disposal, and/or treatment of the used catalyst.

3.5 Acoustical Guarantee

The Seller shall comply with and guarantee the sound level requirements as specified in Westinghouse Specification 21T7525 - "Acoustical Requirements for the FPC-Polk County Project."

4.0 DESIGN REQUIREMENTS - GENERAL

4.1 Codes

4.1.1 In addition to those specifications, codes, and standards referenced in Section 1.0 of this document, each SCR system shall comply with all state and local codes applicable for the location at which the equipment is to be installed. The responsibility for compliance with these codes rests solely with the Seller.

4.1.2 All equipment furnished under this specification shall allow each SCR system to be operated and maintained in accordance with the Federal Occupational Safety and Health Act.

4.2 Catalyst Bed Location

Each catalyst shall be located in the project specific Heat Recovery Steam Generator (HRSG) at the location described on the DESIGN SPECIFICATION data sheets, with the expected temperature range at this location.

4.3 Flow and Temperature Maldistribution

Each catalyst shall be designed for gas flow and temperature maldistribution entering the catalyst as specified on the DESIGN SPECIFICATION data sheets.

4.4 Catalyst Operating Requirements

4.4.1 Each catalyst shall be capable of operating in the cyclic duty mode. Start up and shutdown can be on a daily basis.

4.4.2 Each catalyst shall be designed to withstand the number of starts indicated on the DESIGN SPECIFICATION data sheets.

4.4.3 Each catalyst shall be capable of being operated within specification limits within one hour from a cold HRSG start, provided inlet concentrations are within design values.

4.4.4 Start up of each catalyst shall be automatic and initiated from the plant's central control room.

4.5 Catalyst Sampling

4.5.1 Two samples of each catalyst shall be retained before shipping the catalyst to the job site. One shall be forwarded to Buyer for storage. The other sample shall be tested by the Seller to ensure the catalyst meets specifications. The results of this test shall be presented to Buyer before shipment of the catalyst.

4.5.2 Each catalyst bed shall be equipped with provisions for periodic catalyst sampling. If removable catalyst sections are used to meet sampling requirements, one complete set of spare catalyst sample blocks shall be provided.

4.6 Manufacturing Requirements

4.6.1 All equipment supplied by the Seller shall be manufactured in one complete assembly or in sub-assemblies. All assemblies shall be designed and manufactured to enable the largest pieces possible to be shipped to the plant site.

4.6.2 All equipment shall be designed and constructed to minimize field welding. Where field welding is required, all joints shall be prepared for welding before shipment.

4.7 Welding

4.7.1 All structural welds shall be in accordance with Section 1W of Appendix B of 21T7397.

4.7.2 All external welds shall be continuous, full seam welds to prevent rust streaking.

4.8 Surface Preparation

4.8.1 Seller's standard practice for surface preparations of interior surfaces shall be used. For exterior surfaces, the Seller shall conduct surface preparation in accordance with Westinghouse Specification 21T7360, "Paint Specification for FPC Polk County, Florida."

4.8.2 The pipes for the ammonia injection system shall be internally cleaned to remove metal shavings and rust before installation.

4.8.3 All materials shall be cleaned of foreign matter, scale, flux, and weld splatter prior to painting.

5.0 DESIGN REQUIREMENTS - CATALYST

5.1 The design point to be used by the Seller for the design of each catalyst shall be selected from the operating conditions presented in the PERFORMANCE INFORMATION data sheets. The Seller shall design each catalyst to meet all guarantees under the worst case conditions from the data sheets. The design conditions used shall be clearly stated by Seller.

5.2 Each catalyst shall maintain the design removal efficiencies as stated on the PERFORMANCE INFORMATION data sheets as long as the inlet NOx concentrations (ppmvd basis) remain at or below the design values, and that the catalyst operating temperature is maintained within the range given in the SELLER GUARANTEE data sheet.

6.0 DESIGN REQUIREMENTS - CATALYST BED AND HOUSING; MECHANICAL

6.1 Housing Mechanical Design

Each catalyst housing shall be complete with catalyst support structure, inner liner, insulation, and outer casing. Materials of construction for the catalyst housing shall be compatible with the materials used for the HRSG. Seller shall clearly communicate and coordinate with HRSG Seller at interface points.

6.1.1 Outer Casing

6.1.1.1 The outer casing shall be gas tight and shall be a "cold wall" design.

6.1.1.2 The casing shall be manufactured from carbon steel plate, ¼ inch minimum thickness, and reinforced with stiffeners.

6.1.1.3 The internal design pressure of the catalyst housing shall be a minimum of 20 inches of water.

6.1.2 Inner Casing

6.1.2.1 The inner liner shall be constructed of type 409 or 304 stainless steel. Any Type 304 stainless steel exposed to the exhaust gases and which is welded upon, shall be of the low carbon type.

6.1.2.2 Due to the large thermal transients to which the ductwork shall be subjected, the Seller's design shall include adequate provisions for thermal expansion on the inner casing.

6.1.3 Insulation

6.1.3.1 Sufficient insulation shall be installed between the outer and inner casings so that at design conditions the outer casing cold face temperature at any point does not exceed 140 °F with an 80 °F ambient in still air.

6.1.3.2 10 gauge insulation studs and retaining clips shall be installed between liner anchors as required to prevent sagging of the insulation on the ceiling walls.

6.1.3.3 Insulation shall be fire proof and asbestos free.

6.1.4 Catalyst Housing Doors

6.1.4.1 One access opening shall be provided on the HRSG roof with handrail and ladder access.

6.1.4.2 Access doors shall also be provided upstream and downstream of each catalyst bed.

6.1.4.3 All doors shall be hinged and insulated, and shall be a minimum of 18 in. by 24 in.

6.1.5 Interface with HRSG

6.1.5.1 The HRSG interface dimensions for each catalyst are to be worked out between the catalyst Seller and the HRSG Seller. Transitions from the catalyst housing to the HRSG duct may be used to interface the two systems and allow a larger section for each catalyst.

6.1.5.2 The catalyst housing interface, supports, and piping shall be designed so that expansion joints are not required.

6.1.5.3 The scope of supply for the interfacing between the catalyst Seller and HRSG Seller shall be as indicated on the SCOPE OF SUPPLY data sheets.

6.1.6 Housing Drains

Each catalyst housing shall be equipped with drains located at the lowest point of the housing. The drains shall be sized based on the washing requirements of the catalyst if washing is part of the potential maintenance. If washing is not necessary or is performed outside the housing, drains shall be sized based on HRSG draining requirements.

6.2 Catalyst Support Structure

6.2.1 Each catalyst module shall be supported with minimum clearance, and seals should be made to prevent gas by-pass.

6.2.2 In some housing designs it may be required to provide space for additional catalyst or provide additional support structure for addition of catalyst after plant has been in operation. These requirements shall be indicated on the Seller SCOPE OF SUPPLY data sheets.

6.3 Catalyst Housing Structural Loads

6.3.1 Live loads shall be taken as 100 lbs/ft^2.

6.3.2 Wind loading and seismic loading shall be as defined by the applicable building code referenced in Specification 21T7397.

6.3.3 Thermal loadings shall be calculated by the Seller for submission to the HRSG Seller.

6.3.4 Each catalyst housing shall accept all loads imposed on it by the HRSG.

6.4 Catalyst Housing Sampling Ports

6.4.1 All sampling ports and monitoring equipment shall be in compliance with EPA requirements.

6.4.2 Seller shall supply a minimum of 7 equally spaced ports along the vertical dimension of the housing for the measurement of temperature and flow distributions, inlet NOx, and ammonia injection distributions. Sampling ports shall be provided upstream and downstream of each catalyst bed. The ports upstream of the catalyst shall be downstream of the ammonia injection grid.

6.4.3 A permanent gas side thermocouple shall be installed upstream of each catalyst bed to monitor inlet temperature.

7.0 DESIGN REQUIREMENTS - AMMONIA INJECTION SYSTEM

An aqueous ammonia injection system shall be supplied by the Seller that will take aqueous ammonia forwarded from a storage vessel (by others), vaporize the ammonia, mix it with a dilution medium, and inject it into the exhaust gas stream at the proper location and in the proper proportions. Scope of supply requirements for the injection system are given in the Seller SCOPE OF SUPPLY data sheets. Detailed design requirements are given in this section.

7.1 Ammonia Injection System - General

7.1.1 All ammonia injection system components supplied by the Seller shall be free of ammonia leaks. The detectable limit shall be determined by odor such that no ammonia shall be detectable by sense of smell in any area.

7.1.2 A solenoid operated emergency shut-off valve shall be provided for any ammonia supply line or steam supply line to the injection system.

7.1.3 Steel pipe and malleable iron pipe fittings shall be used. Galvanized pipe or fittings and unions with brass seats are not acceptable. Trim containing tungsten carbide shall also not be used. All ammonia injection piping shall also be in accordance with the specifications given in Section 1.3.

7.1.4 The ammonia injection skid shall be pre-piped and pre-wired. All equipment supplied by the Seller shall be mounted on the skid except for the ammonia injection header which should be designed to be accessible from grade and mounted adjacent to the HRSG to minimize the length of the ammonia injection lines. Wiring on the skid shall terminate at a junction box mounted at the edge of the skid.

7.1.5 The ammonia injection skid shall be supplied finish painted.

7.2 Ammonia Injection Skid

7.2.1 Vaporization Method

The aqueous ammonia shall be vaporized before being mixed with a dilution medium and injected into the gas stream in an ammonia vaporizer. The vaporizer shall use high pressure hot air or steam to vaporize all of the water/ammonia mixture before mixing with the dilution medium. The properties of the steam or air used and the piping design requirements shall be indicated on the DESIGN SPECIFICATION data sheets. The vaporizer shall be supplied with steam or air atomizing nozzles and any instrumentation necessary for proper control of the vaporizer.

7.2.2 Dilution Medium

To preclude condensation of the ammonia mixture the temperature of the dilution medium shall be above the vapor point of the mixture used. The dilution medium shall be as indicated on the DESIGN SPECIFICATION data sheets.

7.2.3 Dilution Air Blowers

Two x 100% dilution air fans or blowers shall be provided, one for normal use and one for stand-by. Blowers shall be equipped with an inlet air filter to prevent clogging of injection nozzles.

7.2.4 Ammonia/Dilution Medium Mixer

Ammonia/dilution medium mixer shall be provided to obtain proper dilute concentrations of ammonia. The Seller shall measure both dilution medium and ammonia flow rates such that dilute concentrations can be continuously monitored. The ammonia concentration after mixing with the dilution medium shall be a maximum of 5% by volume.

7.3 Ammonia Injection Grid (AIG)

7.3.1 Because temperature and flow maldistribution are more likely to occur vertically in the HRSG, the AIG shall be designed with horizontal injection pipes to allow for adjusting ammonia flow along the entire height of the catalyst bed. Also, provisions shall be provided for vertical injection pipes at areas where flow maldistribution is expected side to side (i.e., against wall where bypassing is possible between tubes and inner liner).

7.3.2 The ammonia injection header, adjustable trim valves, and flow indicators shall be shop assembled and shall be accessible from grade.

7.3.3 The AIG shall be located upstream of the catalyst in a location which shall prevent the possibility of conversion of NH3 to NO.

7.4 Ammonia Injection System Control

7.4.1 The start-up and control of the ammonia injection system shall be accomplished in the plant distributed control system. The injection system shall also have the capability to be controlled manually.

7.4.2 The control system shall ensure that if the ammonia injection is shut down for any reason while the combustion turbine is in operation, the dilution air is continuously injected into the injection nozzles to prevent back flow of the flue gas into the ammonia injection line.

7.4.3 The control system shall also monitor inlet temperature to the catalyst so that ammonia is not injected into the gas stream at any time when the temperature is below the formation temperatures for ammonia salts.

7.5 Instrumentation and Valve Requirements

7.5.1 Design requirements for all instrumentation and valves shall be in accordance with Section 5.2 of Specification 21T7397 (including referenced subsections).

7.5.2 The scope of supply for specific SCR instrumentation is indicated in the Seller SCOPE OF SUPPLY data sheets.

7.5.3 The pressure drop across each catalyst shall be measured. Local differential pressure measurement devices shall be provided by the catalyst Seller.

7.5.4 All valve limit switches and position transmitters shall be rigidly mounted on the valve, and they shall have water tight enclosures. The position switch shall be an integral part of the valve and actuator design (not an "add-on").

7.5.5 To the extent that it is economically feasible, remotely operated ON-OFF valves shall be pneumatically actuated.

7.5.6 All Seller supplied equipment shall be supplied with provisions for freeze protection.

8.0 QUALITY, SHOP TEST AND SHIPPING REQUIREMENTS

8.1 Quality Assurance Requirements

8.1.1 Suppliers of Materials, Equipment and Services in support of this specification shall meet the requirements of the Westinghouse Supplier Quality Program as described in Westinghouse Document 21T5802, "Supplier Quality Requirements". This document shall be reviewed concurrently with this specification.

8.1.2 It is the Seller's responsibility to obtain copies of all documents referenced in this specification. Unless specific exception is requested formally by the Seller, and formally granted by the Buyer, these referenced documents shall be binding.

8.2 Shop Test Requirements

8.2.1 Catalyst testing shall be as indicated in paragraph 4.5.1.

8.2.2 The Seller shall leak test all ammonia injection piping assemblies before shipment to the site.

8.2.3 The Seller shall perform a functional test of the ammonia injection system including sequencing of all valves.

8.3 Preparation for Shipment

8.3.1 During in-transit time and while pending assembly, the catalyst components will be subject to outdoor exposure in a wide range of ambient conditions. All items shall be preserved, sealed, and packed adequately to keep moisture, dirt and other contaminants out for a minimum of 6 months of field storage and with a preservation durability of one year preferred.

8.3.2 For shipment and storage any flanged connections shall be suitably protected with steel plate, gaskets, and bolts.

8.3.3 A permanently attached corrosion resistant nameplate shall be affixed at a prominent location on the catalyst housing and shall include the following information as a minimum:

8.3.3.1 Name of Manufacturer.

8.3.3.2 Equipment Type (Name).

8.3.3.3 Manufacturer's Model No.

8.3.3.4 Buyer Purchase order No.

8.3.3.5 Design Removal Efficiency.

8.3.4 The Seller shall be responsible for any damage to equipment resulting from improper shipment or storage instructions.

9.0 FIELD ERECTION AND START UP ASSISTANCE

9.1 Field Erection

The Seller's proposal shall include sufficient information to allow evaluation of the erection requirements (see Section 10.1).

9.2 Field Supervision

9.2.1 The Seller shall make available a competent engineer to supervise erection and start up of all equipment in his scope.

9.2.2 The requirements shall be indicated on the SELLER SCOPE OF SUPPLY data sheets. The Seller should recommend the number of hours required for erection and start-up separately.

9.2.3 The Seller shall supply, at no cost to the Buyer, personnel to witness the performance testing of the catalyst, if desired by the Buyer.

9.3 Erection Equipment

9.3.1 The Seller shall supply special tools, fixtures, wrenches, or other equipment required for erection and list additional equipment which may be required but is not furnished.

9.3.2 The Seller shall supply all lifting beams, spreader bars, and other devices required for unloading and installation purposes. Any special slings or cables required shall be provided.

9.4 Erection Instructions

9.4.1 The Seller shall furnish a complete written description of the erection and start up procedure to supplement his erection drawings.

9.4.2 The Seller shall furnish instructions for the preservation and storage of equipment in his scope at the job site during construction.

10.0 DOCUMENTATION AND INFORMATION REQUIREMENTS

The following drawings and information shall be furnished by the Seller in accordance with Westinghouse Document 21T5673, "Supplier Data Requirements for Software Deliverables." More specific information required is given in this section to be used in conjunction with 21T5673. All documents shall contain the following information as a minimum:

Customer:	Westinghouse Electric Corporation
Project Name:	Hines Energy Complex PB1
P.A. No.:	
Service:	Selective Catalytic Reduction
Tag No.:	
Specification :	21T8900
Sequence No.:	
WBS No.:	255

10.1 Proposal Information Requirements

The Seller shall submit three (3) copies of a technical proposal containing the following requirements, at a minimum. Drawings and details of the proposed system shall give enough detail for evaluation of the system with regard to performance, structural integrity, installation labor and conformance with all major requirements of this specification.

10.1.1 General arrangement drawings showing outline dimensions, foundation requirements and accessories.

10.1.2 Preliminary foundation footprint, including estimated plot space and flooded weights and foundation loadings.

10.1.3 Ammonia injection system piping and instrumentation diagram.

10.1.4 Expected performance curves for NOx conversion versus temperature, and ammonia slip versus temperature.

10.1.5 All filled-in data sheets in this specification

10.1.6 Clearly identified design conditions used for the design point.

10.1.7 List of any specific contaminants which could alter the catalyst performance (e.g. air, fuel, water, steam, lubricating oil contaminants).

10.1.8 Expected gas side pressure drop.

10.1.9 Buyer and HRSG Seller Interface List:

The Seller shall furnish a list of all major interface points where the Seller terminates their supply with the Buyer and with the HRSG Seller. Seller shall provide information as necessary to properly interface the catalyst housing with the HRSG and the housing foundation.

10.1.10 Catalyst disposal/replacement information.

10.1.11 List of shipping components including dimensions and weights.

10.1.12 Any special storage requirements for equipment supplied.

10.1.13 Field Erection Information

A typical erection procedure shall be submitted for equipment substantially similar to the equipment being proposed by the Seller, including typical erection drawings of how the unit is to be erected. The Seller shall also provide lifting requirements for the specific catalyst components being proposed including required lifting capacity and length of time that each crane is required. A detailed erection schedule shall also be supplied specific to the proposed equipment, which includes craft man-hour estimates for each major step in the erection procedure.

10.1.14 Proposed engineering, purchasing and fabrication schedule.

10.1.15 List of exceptions (with reasoning) to all requirements of referenced specifications.

10.2 Buyer Approval Drawings and Information

The following certified drawings and information shall be furnished by the Seller in accordance with Westinghouse Document 21T5673.

10.2.1 General Arrangement Drawing

This shall show the arrangement and location of all major components within the Seller's scope, and shall feature side elevations, plan, and frontal views.

10.2.2 Ammonia Injection P&I Diagram

This shall show all components of ammonia injection system including control valves and flow meters.

10.2.3 Catalyst Housing Layout Drawings

This shall show all layout and interface details with the HRSG duct. The layout shall show the location of all Buyer interface points including piping connections, structural supports to grade, and other structural supports which interface with the HRSG duct. This shall also show layout of loading and access doors.

10.2.4 Catalyst Housing Foundation Loading Diagram

This shall show locations of baseplates, plate and anchor bolt details, and list the dead, wind, thermal, and seismic forces transmitted to the foundations for the catalyst support duct.

10.2.5 Ammonia Injection Control System Drawings

The following control system drawings shall be supplied by the Seller:

10.2.5.1 Control Logic drawings.

10.2.5.2 Instrumentation Input and Output List.

10.2.5.3 Instrument Specification Data Sheets.

10.2.5.4 Instrument Installation Details.

10.2.5.5 Instrument Control Setting List.

10.2.5.6 All Control Valve Data Sheets.

10.2.6 Maintenance Layout Drawing

This shall show the location of all stairs, ladders, and platforms as well as the location of all instruments, valves, and other equipment that requires access for maintenance.

10.2.7 Detail Drawings

Details of the following components shall be provided for Buyer approval:

(a) Module sealing details
(b) Ammonia injection skid details

(c) Ammonia injection grid/piping details
(d) All equipment on ammonia injection skid

10.2.8 Performance Curves

(a) NOx conversion versus temperature.
(b) Ammonia slip versus temperature.
(c) Ammonia slip as a function of inlet NOx and NH3 injection rate.
(d) SO2 to SO3 conversion versus temperature.
(e) Formation of ammonia sulfur compounds versus SO3 concentration upstream of AIG and temperature assuming constant NH3 slip.
(f) Estimated removal efficiencies for Non-Methane and Non-Ethane Hydrocarbons versus temperature.
(g) NOx conversion versus hours of operation.

10.2.9 Catalyst Replacement Details

10.2.9.1 A detailed cost analysis should be submitted regarding the replacement of each used catalyst, including cost of new catalyst, installation cost, and reclaim value of used catalyst.

10.2.9.2 A detailed description of removal and disposal procedures should be submitted.

10.2.10 Piping Layout Drawings

This shall show the layout and routing of all piping within the Seller's scope.

10.2.11 Erection Drawings

Drawings and instructions shall be furnished sufficient to allow erection of the equipment in the field by others (See Section 9.0).

10.2.12 Design, Engineering, and Manufacturing Schedule

The Seller shall submit a schedule showing specific milestones for all design, engineering, drafting, purchasing, and manufacturing functions. This schedule shall include specific shipping dates.

10.2.13 Catalyst Testing Results

A sample of each catalyst shall be tested as explained in paragraph 4.5.1. The results of this test shall be presented to the Buyer before shipment of each catalyst.

10.2.14 Recommended long term storage procedure for items prior to construction.

10.2.15 Shipping Details

The Seller shall submit drawings and other documentation as required to give complete shipping details for major equipment. The drawings/documents shall show the proposed method of shipment, the weight, center of gravity, shipping dimensions for each piece, the tie down and bracing methods used for each package (lifting instructions), and instructions for proper storage at the plant site.

10.2.16 Spare Parts List

The Seller shall furnish a priced list of the recommended spare parts for one, three, and five years of inventory.

10.3 Instruction Books

The Seller shall submit 10 copies of bound instruction manuals for the unloading, storage, installation, operation and maintenance of all equipment in the Seller's scope of supply.

LIST OF ATTACHMENTS DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

THE SCR CATALYST SYSTEM SHALL BE DESIGNED IN COMPLIANCE WITH THE ATTACHMENTS LISTED BELOW ACCORDING TO THE FOLLOWING KEY **(THIS KEY SHALL APPLY TO ALL DATA SHEETS)**:

X= SCR SELLER, H = HRSG SELLER, W = OTHERS, NR = NOT REQUIRED, OPT = OPTION

SPECIFICATIONS (LATEST REVISIONS):

X	SPECIFICATION 21T7397, SPECIFICATION FOR A HEAT RECOVERY STEAM GENERATOR (HRSG) FOR THE FPC-HINES ENERGY PROJECT
X	SPECIFICATION 21T8900, SPECIFICATION FOR AN SCR CATALYST FOR THE FPC-HINES ENERGY PROJECT
X	SPECIFICATION 21T7525, ACOUSTICAL REQUIREMENTS FOR THE FPC-POLK COUNTY PROJECT
X	SPECIFICATION 21T7360, PAINT SPECIFICATION FOR FPC POLK COUNTY, FLORIDA
X	SPECIFICATION 21T5802, SUPPLIER QUALITY REQUIREMENTS
X	SPECIFICATION 21T5673, SUPPLIER DATA REQUIREMENTS FOR SOFTWARE DELIVERABLES

DATASHEETS:

X	SELLER SCOPE OF SUPPLY DATASHEET - GENERAL (1 PAGE)
X	SELLER SCOPE OF SUPPLY DATASHEET - SCR AQUEOUS AMMONIA (2 PAGES)
NR	SELLER SCOPE OF SUPPLY DATASHEET - SCR/ANHYDROUS AMMONIA (2 PAGES)
NR	SELLER SCOPE OF SUPPLY DATASHEET - CO INSTRUMENTATION (1 PAGE)
X	PERFORMANCE INFORMATION DATASHEET (8 PAGES)
X	DESIGN SPECIFICATION DATASHEET - GENERAL(1 PAGE)
X	DESIGN SPECIFICATION DATASHEET - AMMONIA INJECTION SYSTEM (1 PAGE)
X	SELLER GUARANTEE DATASHEET (1 PAGE)

THE SELLER SHALL REVIEW THE ABOVE LIST TO ENSURE THAT ALL ATTACHMENTS INDICATED HAVE BEEN INCLUDED WITH THE TRANSMITTAL. SELLER SHALL NOTIFY BUYER IF ANY DOCUMENTS ARE MISSING.

SELLER SCOPE OF SUPPLY DATASHEET - GENERAL

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

THE ITEMS LISTED BELOW SHALL INDICATE THE SELLER'S SCOPE OF SUPPLY:

X	SCR CATALYST IN MODULES
NR	CO CATALYST IN MODULES
X	AQUEOUS AMMONIA INJECTION SYSTEM
NR	ANHYDROUS AMMONIA INJECTION SYSTEM

CATALYST REACTOR HOUSING:

X	CATALYST HOUSING WITH INTERNAL INSULATION AND LINER
X	CATALYST MODULE SUPPORT STRUCTURE
NR	SPACE IN REACTOR FOR ADDITION OF CATALYST AT LATER DATE (TO ACHIEVE 90% REDUCTION IN NOx)
NR	CATALYST SUPPORT STRUCTURE FOR ADDITION OF CATALYST AT LATER DATE (TO ACHIEVE 90% REDUCTION IN NOx)

CATALYST HANDLING/MAINTENANCE FACILITIES:

X	CATALYST LOADING DOORS
X	ACCESS DOORS (UPSTREAM AND DOWNSTREAM OF CATALYST BED)
NR	MONORAIL AND HOIST WITH SUPPORT STEEL FOR CATALYST LOADING
H	PLATFORMS, LADDERS, AND STAIRWAYS

ACCESSORIES AND FIELD WORK:

X	HOUSING SAMPLING PORTS (7 UPSTREAM AND DOWNSTREAM OF EACH CATALYST BED)
NR	CATALYST FOR SAMPLING CELLS
X	SAMPLE EXTRACTION TOOLS
W	FOUNDATIONS
W	SLIDE PLATES FOR FOUNDATIONS (EMBEDDED)
W	FOUNDATION BOLTS
X	STRUCTURAL STEEL FOR SUPPORT OF ALL ITEMS WITHIN SELLERS SCOPE OF SUPPLY
X	SURFACE PREPARATION PER THE SPECIFICATION
X	SHIPMENT OF ALL EQUIPMENT TO SITE
W	ERECTION OF CATALYST HOUSING
W	INSTALLATION OF CATALYST MODULES
W	INSTALLATION OF AMMONIA INJECTION SKID
X	ALL CONSTRUCTION, START-UP, AND COMMISSIONING SPARES

TECHNICAL FIELD ASSISTANCE:

X	TFA FOR ERECTION AND INSTALLATION
NR	TFA FOR START-UP OF CATALYST
NR	TFA FOR PERFORMANCE TESTS

SELLER SCOPE OF SUPPLY DATASHEET - AQUEOUS AMMONIA INJECTION SYSTEM

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

THE ITEMS LISTED BELOW SHALL INDICATE THE SELLER'S SCOPE OF SUPPLY:

AMMONIA INJECTION HEADER ASSEMBLY (MOUNTED AT GRADE):

X	AMMONIA INJECTION HEADER WITH CONNECTING PIPES
X	MANUAL TRIM VALVES
X	FLOW INDICATORS
X	MANUAL SHUT-OFF VALVES
W	SUPPORT OF INJECTION HEADER, IF REQUIRED (FOUNDATIONS)

AQUEOUS AMMONIA EVAPORATION AND FLOW CONTROL SKID:

X	DILUTION AIR FANS WITH MOTOR (QTY. 2)
X	PROVISIONS FOR RECIRCULATING HOT GAS FROM HRSG
NR	ELECTRIC AIR HEATERS
X	AMMONIA VAPORIZER WITH AIR OR STEAM ATOMIZING NOZZLE
X	AMMONIA/AIR MIXER
X	ALL AMMONIA/STEAM AIR PIPING AND VALVES ON SKID
X	ALL CONTROL INSTRUMENTATION (SEE CONTROL AND INSTRUMENTATION DATASHEET)
X	TUBING AND WIRING ON SKID
X	INSULATION ON SKID
X	PROVISIONS FOR NITROGEN PURGE OF AMMONIA INJECTION SYSTEM

AQUEOUS AMMONIA STORAGE AND FORWARDING EQUIPMENT:

W	AQUEOUS AMMONIA STORAGE TANK
W	AQUEOUS AMMONIA FORWARDING PUMPS
W	AQUEOUS AMMONIA STRAINER

EXTERNAL PIPING:

W	PIPING FROM FORWARDING SYSTEM TO AMMONIA INJECTION SKID
X/H*	PIPING FROM AMMONIA INJECTION SKID TO AMMONIA INJECTION HEADER
X/H*	PIPING FROM HRSG DUCT TO INLET OF DILUTION AIR FANS
X/H*	PIPING FROM AMMONIA INJECTION HEADER TO HRSG DUCT (INJECTION GRID)
X	AMMONIA FLOW CONTROL VALVE
X	AMMONIA SHUT-OFF VALVE (SOLENOID OPERATED)
X	AMMONIA FLOW TRANSMITTER
X	DILUTION AIR FLOW TRANSMITTER
X	ATOMIZING STEAM/AIR FLOW CONTROL VALVE
X	ATOMIZING STEAM/AIR PRESSURE REGULATING VALVE
X	ATOMIZING STEAM/AIR SHUT-OFF VALVE (SOLENOID OPERATED)

* TO BE WORKED OUT BETWEEN HRSG SELLER AND CATALYST SELLER

SELLER SCOPE OF SUPPLY DATASHEET - AQUEOUS AMMONIA INJECTION SYSTEM

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

EXTERNAL PIPING:

X	PRESSURE/TEMPERATURE TRANSMITTERS FOR CONTROL
X	LOCAL PRESSURE/TEMPERATURE INDICATORS
X	ALL INSTRUMENTATION AND VALVES FOR CONTROL OF EQUIPMENT ON INJECTION SKID
X	FLUE GAS INLET TEMPERATURE TRANSMITTER - CONNECTION ONLY
NR	CATALYST PRESSURE DROP TRANSMITTER
X	LOCAL CATALYST PRESSURE DROP INDICATOR
X	CONTROL LOGIC
W	CONTROL SYSTEM HARDWARE

FLUE GAS ANALYZERS:

N/A	SCR INLET $NOx/0_2$ ANALYZER WITH PROBE AND SAMPLING LINE
W	SCR OUTLET $NOx/0_2$ ANALYZER WITH PROBE AND SAMPLING LINE
N/A	SCR OUTLET NH3 ANALYZER WITH PROBE AND SAMPLING LINE

GAS SAMPLING PORTS:

H	INLET $NOx/0_2$ PORT
H	STACK SAMPLING PORTS

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____

JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #1, 32°F AMB, N.G., BASE LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
FUEL	NONE	N.G.		
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	3,612,690		
EXHAUST TEMPERATURE	DEG. F	1112		
TEMP. ENTERING SCR CATALYST	DEG. F	655*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL. %	12.43		
CARBON DIOXIDE	VOL.%	3.90		
WATER	VOL.%	7.89		
NITROGEN	VOL. %	74.82		
ARGON	VOL.%	0.94		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.45		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	45	N/A	45		12
NOx	(lbs/hour)	316				78
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	25				25
CO	(lbs/hour)	85				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	1				1
S02	(lbs/hour)	2				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	3				3
VOC	(lbs/hour)	6				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	16.2				16.2
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)

***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #2, 59°F AMB, N.G., BASE LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
FUEL	NONE	N.G.		
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	3,519,210		
EXHAUST TEMPERATURE	DEG. F	1140		
TEMP. ENTERING SCR CATALYST	DEG. F	653*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL. %	12.60		
CARBON DIOXIDE	VOL.%	3.76		
WATER	VOL.%	8.31		
NITROGEN	VOL.%	74.38		
ARGON	VOL.%	0.93		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.39		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	45	N/A	45		12
NOx	(lbs/hour)	298				73
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	25				25
CO	(lbs/hour)	77				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	1				1
S02	(lbs/hour)	2				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	3				3
VOC	(lbs/hour)	6				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	15.6				15.6
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #3, 95°F AMB, N.G., BASE LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
FUEL	NONE	N.G.		
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	3,228,150		
EXHAUST TEMPERATURE	DEG. F	1160		
TEMP. ENTERING SCR CATALYST	DEG. F	642*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL. %	12.13		
CARBON DIOXIDE	VOL.%	3.65		
WATER	VOL.%	11.49		
NITROGEN	VOL.%	71.82		
ARGON	VOL.%	0.90		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.04		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	45	N/A	45		12
NOx	(lbs/hour)	268				67
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	25				25
CO	(lbs/hour)	71				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	1				1
S02	(lbs/hour)	1				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	3				3
VOC	(lbs/hour)	5				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	13.6				13.6
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #4, 95°F AMB, N.G., 57% LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
FUEL	NONE	N.G.		
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	2,410,190		
EXHAUST TEMPERATURE	DEG. F	1160		
TEMP. ENTERING SCR CATALYST	DEG. F	605*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL. %	12.66		
CARBON DIOXIDE	VOL. %	3.40		
WATER	VOL.%	11.02		
NITROGEN	VOL.%	72.00		
ARGON	VOL.%	0.90		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.07		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	45	N/A	45		12
NOx	(lbs/hour)	179				67
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	78				78
CO	(lbs/hour)	165				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	1				1
S02	(lbs/hour)	1				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	8				8
VOC	(lbs/hour)	10				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	10.3				10.3
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #5, 59°F AMB, N.G., 50% LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
FUEL	NONE	N.G.		
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	2,552,500		
EXHAUST TEMPERATURE	DEG. F	1043		
TEMP. ENTERING SCR CATALYST	DEG. F	605*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL.%	14.09		
CARBON DIOXIDE	VOL.%	3.08		
WATER	VOL.%	6.99		
NITROGEN	VOL.%	74.90		
ARGON	VOL.%	0.94		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.48		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	45	N/A	45		12
NOx	(lbs/hour)	179				73
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	200				200
CO	(lbs/hour)	474				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	1				1
S02	(lbs/hour)	1				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	20				20
VOC	(lbs/hour)	27				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	11.4				11.4
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #6, AMMONIA SIZING CASE 1, 40°F AMB, BASE LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	3,813,140		
EXHAUST TEMPERATURE	DEG. F	1087		
TEMP. ENTERING SCR CATALYST	DEG. F	655*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL.%	11.60		
CARBON DIOXIDE	VOL.%	5.47		
WATER	VOL.%	9.83		
NITROGEN	VOL.%	72.18		
ARGON	VOL.%	0.91		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.48		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	75	N/A	75		42
NOx	(lbs/hour)	568				317
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	30				30
CO	(lbs/hour)	93				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	14				14
S02	(lbs/hour)	101				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	10				10
VOC	(lbs/hour)	20				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	95.3				95.3
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #7, AMMONIA SIZING CASE 2, 59°F AMB, BASE LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	3,642,480		
EXHAUST TEMPERATURE	DEG. F	1102		
TEMP. ENTERING SCR CATALYST	DEG. F	651*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL.%	11.69		
CARBON DIOXIDE	VOL.%	5.36		
WATER	VOL.%	10.06		
NITROGEN	VOL.%	71.97		
ARGON	VOL.%	0.90		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.44		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	75	N/A	75		42
NOx	(lbs/hour)	547				305
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	30				30
CO	(lbs/hour)	93				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	14				14
S02	(lbs/hour)	97				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	10				10
VOC	(lbs/hour)	19				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	92.1				92.1
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

PERFORMANCE INFORMATION DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

PERFORMANCE CASE DESCRIPTION: CASE #8, AMMONIA SIZING CASE 3, 59°F AMB, 50% LOAD

	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL
DUCT BURNER HEAT INPUT (HHV)	MMBTU/HR	N/A		
EXHAUST FLOW	LB/HR	2,560,680		
EXHAUST TEMPERATURE	DEG. F	1076		
TEMP. ENTERING SCR CATALYST	DEG. F	605*		
TEMP. ENTERING CO CATALYST	DEG. F	NR		
EXHAUST COMPOSITION:				
OXYGEN	VOL.%	14.18		
CARBON DIOXIDE	VOL.%	4.34		
WATER	VOL.%	4.72		
NITROGEN	VOL.%	75.79		
ARGON	VOL.%	0.95		
EXHAUST MOLECULAR WEIGHT	LBS/LBMOLE	28.91		

EXHAUST EMISSIONS	UNITS	COMBUSTION TURBINE	DUCT BURNER	TOTAL	DOWNSTREAM CO	DOWNSTREAM SCR
NOx	(ppmvd @ 15% 02)	75	N/A	75		42
NOx	(lbs/hour)	325				305
NOx	(lbs/MMBtu), HHV					
CO	(ppmvd)	300				300
CO	(lbs/hour)	720				
CO	(lbs/MMBtu), HHV					
S02	(ppmvd)	11				11
S02	(lbs/hour)	58				
S02	(lbs/MMBtu), HHV					
VOC***	(ppmvd)	100				100
VOC	(lbs/hour)	137				
VOC	(lbs/MMBtu), HHV					
Particulates	(lbs/hour)	109				109
Particulates	(lbs/MMBtu), HHV					

*HRSG SELLER TO USE ± 20°F MARGIN FOR SCR DESIGN (AVERAGE TEMP.)
***VOC DEFINED AS NON-METHANE AND NON-ETHANE HC'S

DESIGN SPECIFICATION DATASHEET - GENERAL

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

SCR/CO CATALYST OPERATION

____	CONTINUOUS DUTY	X	CYCLIC DUTY	30 YRS	DESIGN LIFE
7500	EST. HOURS PER YEAR	120	HOT STARTS PER YEAR	30	COLD STARTS PER YEAR

COMBUSTION TURBINE OPERATION

X	NATURAL GAS	X	NO. 2 FUEL OIL	OTHER:	
7350	HOURS OPER. PER YEAR	150	HOURS OPER. PER YEAR	____	HOURS OPER./YR
X	UNFIRED DESIGN	____	FIRED DESIGN		

SCR CATALYST BED LOCATION

____	SPLIT HP EVAP	____	DESIGN FLOW MALDSTRIB	____	DESIGN TEMP MALDSTRIB
X	DOWNSTREAM OF HP EVAP	H	DESIGN FLOW MALDSTRIB	H	DESIGN TEMP MALDSTRIB
____	DOWNSTREAM OF HP ECON	____	DESIGN FLOW MALDSTRIB	____	DESIGN TEMP MALDSTRIB

CO CATALYST BED LOCATION

N/A	UPSTREAM OF HP SUPHTR	N/A	DESIGN FLOW MALDSTRIB	N/A	DESIGN TEMP MALDSTRIB
N/A	DWNSTRM OF HP SUPHTR	N/A	DESIGN FLOW MALDSTRIB	N/A	DESIGN TEMP MALDSTRIB
N/A	SPLIT HP EVAP	N/A	DESIGN FLOW MALDSTRIB	N/A	DESIGN TEMP MALDSTRIB
N/A	DWNSTRM OF HP SUPHTR	N/A	DESIGN FLOW MALDSTRIB	N/A	DESIGN TEMP MALDSTRIB
N/A	DWNSTRM OF HP SUPHTR	N/A	DESIGN FLOW MALDSTRIB	N/A	DESIGN TEMP MALDSTRIB

CATALYST DESIGN

H	APPROX. HRSG DIM.	H	MAX INNER LINER DIMENSIONS

SPECIAL DESIGN CONSIDERATIONS:

HRSG SELLER TO COORDINATE WITH CATALYST SELLER CATALYST DESIGN LOCATION AND DIMENSIONS, AND MALDISTRIBUTIONS.

DESIGN SPECIFICATION DATASHEET - AMMONIA INJECTION SYSTEM

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

AMMONIA INJECTION SYSTEM

DILUTION MEDIUM (ANHYDROUS AMMONIA INJECTION SYSTEM): N/A

_____ STEAM _____ AMBIENT AIR _____ HEATED AIR

DILUTION MEDIUM (AQUEOUS AMMONIA INJECTION SYSTEM):

_____ STEAM _____ RECIRCULATED HRSG GAS X HEATED AIR

VAPORIZATION MEDIUM (AQUEOUS AMMONIA INJECTION SYSTEM):

H STEAM H HOT AIR (HIGH PRESSURE)

AVAILABLE STEAM PROPS:	H	PRESSURE (PSIG)	H	TEMPERATURE (DEG. F)
STEAM PIPING DESIGN:	H	PRESSURE (PSIG)	H	TEMPERATURE (DEG. F)
AVAILABLE AIR PROPS:	H	PRESSURE (PSIG)	H	TEMPERATURE (DEG. F)
AIR PIPING DESIGN:	H	PRESSURE (PSIG)	H	TEMPERATURE (DEG. F)

SELLER TO FILL IN FOLLOWING DATA:

_____	AQUEOUS AMMONIA WT %	_____	DISTANCE BETWEEN NOZZLES/ORIFICES ON INJECTION GRID
_____	AQUEOUS NH3 CONSP. RATE	_____	DESIGN PRESSURE DROP ACROSS NOZZLES/ORIFICES
N/A	ANHYDROUS NH3 CONSP. RATE	_____	DIRECTION OF NH3 INJECTION (UPSTREAM OR DOWNSTREAM)
_____	# AIG HORIZONTAL RUNNERS	_____	DIRECTION BETWEEN AIG AND SCR CATALYST
_____	# AIG VERTICAL RUNNERS		

SPECIAL DESIGN CONSIDERATIONS:

SELLER TO SPECIFY ANY SPECIAL DESIGN CONSIDERATIONS IN THE PROPOSAL.
HRSG SELLER TO DETERMINE VAPORIZATION MEDIUM.

SELLER GUARANTEE DATASHEET

JOB NO./SHOP NO. _____ RFQ NO. _____
JOB TITLE FPC-HINES ENERGY PROJECT SPECIFICATION NO. 21T8900

THE SCR CATALYST SHALL MEET THE GUARANTEES LISTED BELOW AND AS EXPLAINED IN SECTION 3.0 OF SPEC 21T8900

REFERENCE CATALYST INLET CONDITIONS*

	UNITS:	
EXHAUST GAS FLOW	LB/HR	SEE PERFORMANCE DATA SHEETS
TEMPERATURE RANGE ENTERING SCR CATALYST**	DEG. F	H
TEMPERATURE RANGE ENTERING CO CATALYST**	DEG. F	N/A
TOTAL EMISSIONS: (WORST CASE FROM PERFORMANCE DATASHEETS)		SEE PERFORMANCE DATA SHEETS

SCR CONVERSION GUARANTEES:

	UNITS:	
NOx REDUCTION	(%)	WORST CASE FROM PERF. DATA SHTS
AMMONIA SLIP	(ppmvd @ 15% 02)	10 MAX
S02-S03 CONVERSION	(%)	3 MAX

OTHER GUARANTEES

	UNITS	
CATALYST LIFE GUARANTEE		
FROM DELIVERY	MONTHS	N/A
FROM FIRST EXHAUST GAS IN	MONTHS	36
EQUIPMENT GUARANTEE		
FROM DELIVERY	MONTHS	NA
FROM PLANT ACCEPTANCE	MONTHS	24
GAS SIDE PRESSURE DROP		
SCR CATALYST	INCHES H20	3.0 MAX
CO CATALYST	INCHES H20	N/A
TOTAL	INCHES H20	N/A
DISPOSAL GUARANTEE	NONE	YES
ACOUSTICAL GUARANTEE		
3 FEET FROM SOURCE, ALL EQUIPMENT	dB(A)	SEE 21T7525

*ALL GUARANTEES SHOULD BE MADE AT THESE CONDITIONS UNLESS NOTED OTHERWISE
** TEMPERATURE RANGE DENOTES AVERAGE TEMPERATURES
H-HRSG SELLER TO DETERMINE FROM PERFORMANCE INFORMATION DATA SHEETS

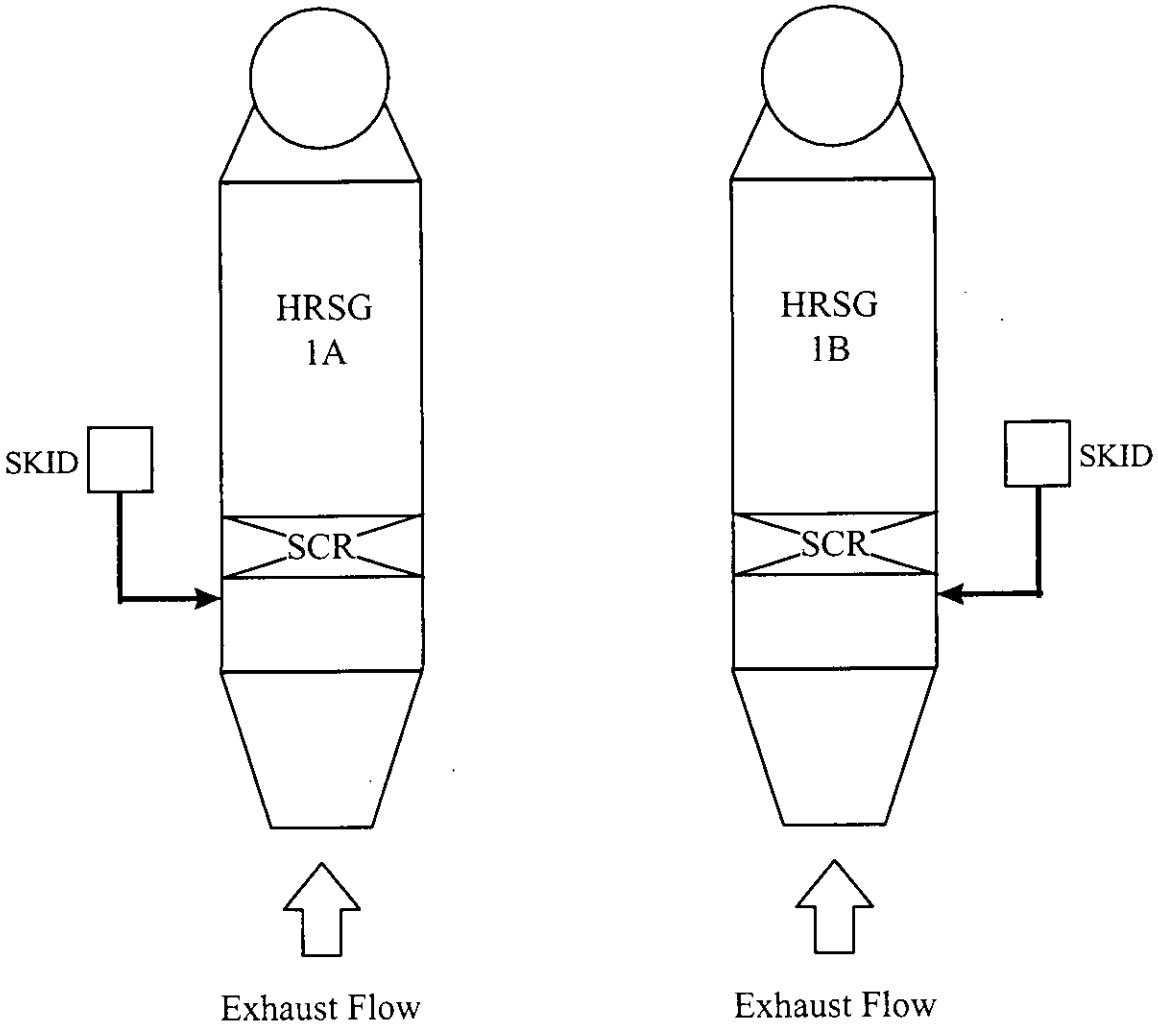

FIGURE 1 - SCR SYSTEM LAYOUT : PLAN VIEW

4. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.

If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Jennifer L. Tillman 7/27/98

Signature No. 52125 Date

(seal)

* Attach any exception to certification statement.

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AUG 03 1998

BUREAU OF
AIR REGULATION

Exceptions to PE Certification Statement

This certification is for the content of the attached supplemental design document. The certification is to provide the Department "reasonable assurance based on plans, test results, installation of control equipment, or other information, that the construction, expansion, modification, operation, or activity of the installation will not discharge, emit, or cause pollution in contravention of Department standards or rules" to the best of my knowledge in conformity with sound engineering principles.

This certification statement is not intended to certify the specific design criteria of the attached selective catalytic reduction (SCR) system design document. Mr. Daniel Barpal, Project Engineer of Westinghouse, who was primarily responsible for the design specification, is certifying this criterion. Mr. Barpal is a registered Florida Professional Engineer, license number 52578.

AL

Florida Power
CORPORATION

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AUG 06 1998
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AIR REGULATION

August 2, 1998

Mr. Hamilton S. Oven, Jr.
Florida Department of Environmental Protection
Douglas Bldg, Room 953AA
3900 Commonwealth Blvd., MS48
Tallahassee, Florida 32399-3000

Dear Mr. Oven:

Re: Florida Power Corporation
Hines Energy Complex
Site Certification No. PA-92-33; Condition No. XIII.E.2.c.
PSD Permit No. FL-195; Specific Condition E.2.c.

In fulfillment of the above-referenced condition of Florida Power Corporation's Site Certification and Prevention of Significant Deterioration (PSD) permit, this letter serves to notify the Department that one of the two combustion turbines (CT1B) conducted first fire on July 17, 1998. It is anticipated that the other combustion turbine will be fired during the week of August 3, 1998.

If you should have any questions concerning this submittal, please do not hesitate to contact me at (727) 826-4258.

Sincerely,

for

Scott H. Osbourn
Senior Environmental Engineer

cc: Clair Fancy, DEP

ONE POWER PLAZA, 263 - 13th Avenue South, BB1A, St. Petersburg, FL 33701-5511
P.O. Box 14042, BB1A • St. Petersburg • Florida 33733-4042 • (727) 866-5151
A Florida Progress Company

FAX COVER SHEET

ENGELHARD

ENGELHARD CORPORATION
2205 CHEQUERS COURT
BEL AIR, MD 21015
PHONE 410-569-0297
FAX 410-569-1841
E-Mail Fred_Booth@ENGELHARD.COM

DATE:	July 8, 1998	NO. PAGES	5	(INCLUDING COVER)
TO:	Florida DEP ATTN: Syed Arif	FAX 850-922-6979		
FROM:	Fred Booth	Ph 410-569-0297 // FAX 410-569-1841		

RE: **SCR System Components**
Engelhard Budgetary Proposal EPB98205

ENGELHARD

ENGELHARD CORPORATION
2205 CHEQUERS COURT
BEL AIR, MD 21015
PHONE 410-569-0297
FAX 410-569-1841
E-Mail Fred_Booth@ENGELHARD.COM

July 8, 1998

Florida DEP

ATTN: **Syed Arif**

RE: **SCR System Components**
Engelhard Budgetary Proposal EPB98205

Dear Mr. Arif,

We enclose Engelhard Budgetary Proposal EPB98205 for Engelhard **NOxCAT™ VNX™** Vanadia-Titania SCR Catalyst System Components.

This Proposal Includes:

- Engelhard **NOxCAT™ VNX™** SCR Catalyst modules with internal support frame to fit inside HRSG casing;
- Catalysts are sized for NOx reductions as noted with ammonia slip of 10 ppmvd @ 15%O_2;
- Aqueous Ammonia (28% Solution to skid) Delivery System components;
- Dimensions illustrated are assumed HRSG duct - inside liner dimensions.

Sincerely yours,

ENGELHARD CORPORATION

Frederick A. Booth
Sales Engineer

cc: Lorraine Pierson - Proposal Administrator

ENGELHARD CORPORATION
NOxCAT™ VNX™ SCR NOx ABATEMENT CATALYST SYSTEM

Engelhard Corporation ("Engelhard") offers to supply the **NOxCAT™ VNX™** Vanadia-Titania Ceramic Substrate SCR systems herein.

Scope of Supply
1. Engelhard **NOxCAT™ VNX™** SCR catalyst modules;
2. Internal support structures for catalyst modules; includes all hardware and gaskets for catalyst module installation;
3. Ammonia Injection Grid (AIG);
4. External AIG manifold with flow control valves;
5. NH_3 Vaporization / Air dilution skid; 28% Aqueous Ammonia to skid

BUDGET PRICE: FOB, shipping point

Per Unit	NOx Out-12 ppmvd@ 15% O_2	NOx Out-9 ppmvd@ 15% O_2
SCR Catalyst System Components	**$1,150,000**	**$1,250,000**
Replacement SCR Catalyst	**$ 750,000**	**$ 850,000**

WARRANTY AND GUARANTEE:

Mechanical Warranty: One year of operation* or 18 months after delivery, whichever occurs first.

Performance Guarantee: Three (3) years of operation* or thirty-six (36)) months after catalyst delivery, whichever occurs first. Catalyst warranty is prorated over the guaranteed life.

**Operation is considered to start when exhaust gas is first passed through the catalyst.*

Typical, useful catalyst life is 5 - 7 years.

DOCUMENT / MATERIAL DELIVERY SCHEDULE

Drawings / Documentation - 10 weeks after notice to proceed and receipt of engineering specifications and details

Material Delivery 24 - 30 weeks after approval and release for fabrication

QUALITY ASSURANCE and SAFETY

Engelhard's manufacturing is carried out under strict adherence to published quality control and statistical process control programs, and strict adherence to Corporate safety practices and procedures.

SCR SYSTEM DESIGN BASIS:

Gas Flow from:	Combustion Turbine
Gas Flow:	Assumed Horizontal through HRSG
Fuel:	Natural Gas
Gas Flow Rate (At catalyst face):	See Performance Data
Temperature (At catalyst face):	See Performance Data
NOx Concentration (At catalyst face):	45 ppmvd @ 15% O_2
NH_3 Slip	10 ppmvd @ 15% O_2
HRSG Cross section	57 ft. H x 32 ft. W - inside liner sheets

ENGELHARD

Florida DEP
NOxCAT™ VNX™ SCR Catalyst Systems
Engelhard Budgetary Proposal EPB98205
July 8, 1998

Performance Data

GIVEN // CALC. DATA		
CASE	NOx Out-12 ppmvd@ 15% O_2	NOx Out-12 ppmvd@ 15% O_2
FUEL	NG	NG
TURBINE EXHAUST FLOW, lb/hr	3,554,960	3,554,960
TURBINE EXHAUST GAS ANALYSIS, % VOL.		
N_2	74.84	74.84
O_2	12.43	12.43
CO_2	3.90	3.90
H_2O	7.89	7.89
Ar	0.94	0.94
CALCULATED GAS MOL. WT.	28.46	28.46
GIVEN: TURBINE NOx, ppmvd @ 15%O_2	45	45
CALC.: TURBINE NOx, lb/hr	298.9	298.9
ASSUMED GAS TEMP. @ SCR CATALYST, F	650	650
DESIGN REQUIREMENTS		
NOx OUT, ppmvd@15%O_2	12	9
NH_3 SLIP, ppmvd@15%O_2	10	10
SCR PRESSURE DROP, "WG - Max.		
GUARANTEED PERFORMANCE DATA		
NOx CONVERSION, % - Min.	73.3%	80.0%
NOx OUT, ppmvd@15%O_2 - Max.	12	9
NOx OUT, lb/hr - Max.	79.7	59.8
EXPECTED 28% AQUEOUS NH_3 FLOW, lb/hr	377	403
NH_3 SLIP, ppmvd@15%O_2 - Max.	10	10
SCR PRESSURE DROP, "WG - Max.	2.0	2.3

ENGELHARD

Florida DEP
NOxCAT™ VNX™ SCR Catalyst Systems
Engelhard Budgetary Proposal EPB98205
July 8, 1998

Scope of Supply: The equipment supplied is installed by others in accordance with the Engelhard design and installation instructions.

- **Engelhard NOxCAT™ VNX™ SCR catalyst modules;**
- **Internal support structures for catalyst modules; includes all hardware and gaskets for catalyst module installation;**
- **Ammonia injection Grid (AIG);**
- **External AIG manifold with flow control valves;**
- **NH_3/Air dilution skid: Pre-piped & wired (including all valves and fittings)**
  - **Two (2) dilution air fans, one for back-up purposes**
  - **Panel mounted system controls for:**
    - **Fans (on/off/flow indicators)**
    - **Air/ammonia flow indicator and controller**
    - **System pressure indicators**
    - **Main power disconnect switch**

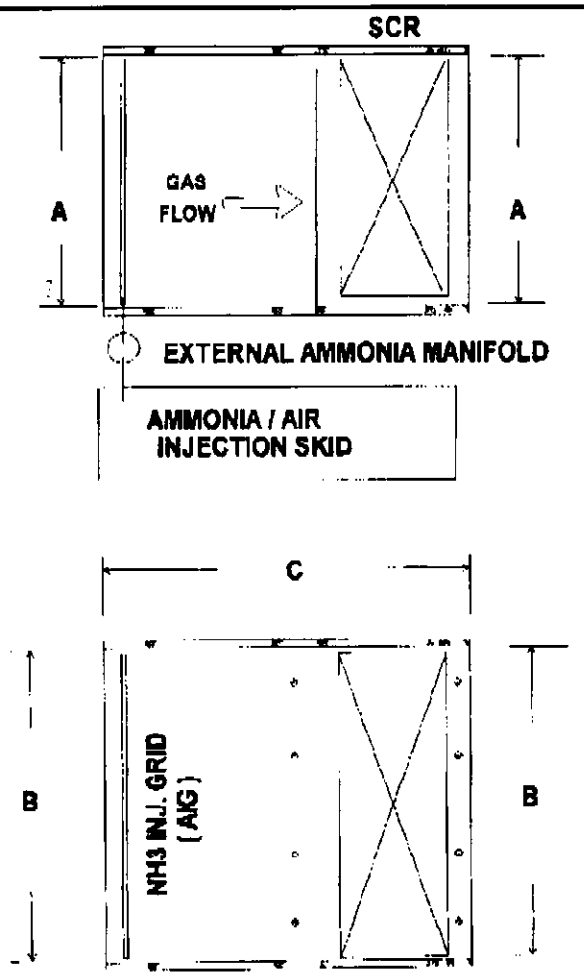
Excluded from Scope of Supply:

- Ammonia storage and pumping
- HRSG Casing - internally insulated
- Electrical grounding equipment
- Foundations
- All other items not specifically listed in Scope of Supply
- Interconnecting field piping or wiring
- Utilities
- All Monitors

Dimensions: Estimated

HRSG Inside Liner Width	(A) 32'-0"
HRSG Inside Liner Height	(B) 57'-0"
Reactor Depth - Total	(C) 12'-0" **

**Assumes no heat transfer surface between AIG and SCR Catalyst



Department of Environmental Protection

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

July 10, 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. W. Jeffrey Pardue, C.E.P.
Director, Environmental Service Department
Florida Power Corporation
3201 34th Street South
St. Petersburg, Florida 33711

Re: Hines Energy Complex
Permit PSD-FL-195 and Site Certification PA-92-33

Dear Mr. Pardue:

The Department has received the letter with an attachment on July 1, 1998 advising of FPC and Westinghouse's decision to install a Selective Catalytic Reduction (SCR) system to achieve the NO_x levels required in the original above-referenced PSD permit. The Bureau of Air Regulation requests responses to the following items to expedite the issuance of the amended permit:

1. The present permit requires that the "Permittee install a Dry Low NO_X combustion turbine (and) make *every practicable effort* to achieve with that CT the *lowest* possible NO_X emission rate but must not exceed 73 lbs/hr (based on 12 ppm) .... on a continuous basis when firing natural gas. According to the Technical Specification submitted by Westinghouse for the SCR system, it is being designed to achieve 12 ppm. Dry Low NO_X systems are typically designed to achieve BACT requirements of 9-15 ppm, whereas SCR systems are typically designed to meet BACT requirements of 4.5 to 9 ppm. If Westinghouse designs the SCR system accordingly, then it will be possible to make "every practicable effort to achieve the lowest possible NO_X emission rate." **Specific Condition 3, PSD-FL-195.**

2. The Westinghouse specifications require achievement of 73 lb/hr (about 25 ppm NO_X) at 50 percent capacity. In contrast with Westinghouse's DLN technology, lower NO_X emissions rates and concentrations are typically realized with SCR at lower operating rates. A properly designed and operated SCR system should achieve proportionately lower emissions at lower operating rates. Consistent with the requirements of Specific Condition 3, practicable efforts to achieve the lowest possible NO_X rate should yield emissions *substantially* less than 73 lb/hr or 25 ppm at 50 percent of capacity.

3. Based on FPC's original application, the Department's determination of Best Available Control Technology (BACT), SCR was rejected for technical, economic, and *environmental reasons*. Now that SCR is being reconsidered by FPC, the Technical Specification (or a supplementary document) prepared by Westinghouse should be certified by a Professional Engineer (P.E.) registered in the State of Florida and knowledgeable in the field of combustion and/or air pollution control. This is a typical requirement of engineering plans prepared in the State of Florida. The P.E. seal is also required for permit applications and will "affirmatively provide the Department with reasonable assurance based on plans, test results, installation of control equipment, or other information, that the construction, expansion, modification, operation, or activity of the installation will not discharge, emit, or cause pollution in contravention of Department standards or rules." **Rules 62-4.050(2) and 62-4.070(1), F.A.C.**

4. Please compare the original permit with the latest proposed draft permit and indicate the changes needed to accommodate the SCR system.

We will be contacting SCR manufacturers to get estimated cost data for an SCR system that will achieve the requirements of the original PSD permit. The original BACT negated the use of SCR system due to excessive cost of $10,000/ton of NO_x removed. We would appreciate receiving any cost information already developed by FPC and Westinghouse for the planned SCR system.

In the meantime, we will be working on the technical write-up to amend your original permit. If you have any questions regarding this matter, please call Syed Arif, P.E., at (850)921-9528.

Sincerely,

A A Linero 7/10

A. A. Linero, P.E. Administrator
New Source Review Section

AAL/sa

cc: Brian Beals, EPA
John Bunyak, NPS
Buck Oven, DEP
Bill Thomas, SWD
M.S. Briesch, Westinghouse

Is your RETURN ADDRESS completed on the reverse side?

SENDER:
- Complete items 1 and/or 2 for additional services.
- Complete items 3, 4a, and 4b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "*Return Receipt Requested*" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):
1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Mr. W. Jeffrey Pardue
Director, Env. Service Dept.
Fla. Power Corp
3201 34th St. South
St. Petersburg, FL
33711

4a. Article Number
P 265 659 387

4b. Service Type
☐ Registered ☑ Certified
☐ Express Mail ☐ Insured
☐ Return Receipt for Merchandise ☐ COD

7. Date of Delivery
7/20/98

5. Received By: *(Print Name)*

8. Addressee's Address *(Only if requested and fee is paid)*

6. Signature: *(Addressee or Agent)*
X Kathy DeLong for W Pardue

PS Form **3811**, December 1994 Domestic Return Receipt

Thank you for using Return Receipt Service.

P 265 659 387

US Postal Service
Receipt for Certified Mail
No Insurance Coverage Provided.
Do not use for International Mail *(See reverse)*

Sent to W. Pardue	
Street & Number FPC	
Post Office, State, & ZIP Code Public Env. Affairs St. Pete, FL	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date 7-14-98	

PS Form **3800**, April 1995
PSD-FI-195
PA 92-33

Department of Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

P.E. Certification Statement

Permittee:
Florida Power Corporation
Hines Energy Complex

DRAFT Permit No. PSD-FL-195A / PA92-33
Facility ID No.: 1050234

Project type: Construction of New Combustion Turbines and
Heat Recovery Steam Generators
Hines Energy Complex
Permit Modification to Authorize SCR and Other Changes

I HEREBY CERTIFY *that the engineering features described in the above referenced application and subject to the proposed permit conditions provide reasonable assurance of compliance with applicable provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 62-4 and 62-204 through 62-297. However, I have not evaluated and I do not certify aspects of the proposal outside of my area of expertise (including but not limited to the electrical, mechanical, structural, hydrological, and geological features).*

Martin Costello, 8/6/98

Martin Costello, P.E. Date
Registration Number: 47587
Professional Engineer II

Department of Environmental Protection
Bureau of Air Regulation
New Source Review Section
111 South Magnolia Drive, Suite 4
Tallahassee, Florida 32301
Phone (904) 488-1344
Fax (904) 922-6979