Environmental Radiation Studies
Environmental Impact Studies
Radiation Dose Modeling
Risk Assessment

Perigee
Technical Services, Inc.

Atmospheric Dispersion Modeling
Air Pollution Permitting
Landscape Design
Graphic Arts

June 14, 2000

Mr. Jeffery F. Koerner, P. E.
Department of Environmental Protection
Division of Air Resources Management
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Addition of Inlet Fogging System to Unit No. 2
Kissimmee Utility Authority
Cane Island Power Park - Unit 2 - Project Number: 0970043-008-AC

Dear Mr. Koerner:

This is in response to your request for additional information dated June 8, 2000 regarding the above referenced project.

1. Please identify the proposed manufacturer, model, and description of the inlet fogging system. Is the proposed model a high-pressure direct spray system? What is the approximate water flow rate (gpm) injected to produce evaporative cooling from 95° F to 70° F under base load conditions? Please provide manufacturer specification sheets on the proposed product.

I have attached technical information provided by Caldwell Energy & Environmental, Inc. which describes the operation of their PowerFog inlet fogging system. The system is a high-pressure system operating at about 26 gallons per minute water flow.

2. The original PSD permit limits heat input for gas firing to 869 mmBTU per hour and 928 mmBTU per hour for oil firing at ISO conditions and base load according to the manufacturer's design. The emission summary tables provided with the application indicate that the maximum heat input would increase to 934 mmBTU per hour for gas firing and 993 mmBTU per hour for oil firing. However, the General Electric performance curve for the Model PG7211(EA) gas turbine shows that only 90% of the design fuel consumption rate can be achieved at a compressor inlet air temperature of 95° F for both gas and oil firing. This suggests that the maximum heat input rates for gas and oil firing at 95° F would be 782 and 835, respectively. In addition, cooling the inlet air to 70° F would result in increases of the maximum fuel consumption rates to 97% of the maximum design rate or 845 and 900 mmBTU per hour for gas and oil firing, respectively. Therefore, the heat inputs would increase to:

\foggerrfi.ltr/197.0

3214 Deer Chase Run, Longwood, Florida 32779-3173
Telephone (407) 333-7374 FAX (407) 333-9396

Fuel	Design mmBTU/hour	Maximum @ 95° F mmBTU/hour	Maximum @ 70° F mmBTU/hour	Net Increase mmBTU/hour
Gas Firing	869	782 (90%)	845 (97%)	63
Oil Firing	928	835 (90%)	900 (97%)	65

The addition of the inlet foggers would not result in an increase in the design heat input rates or permit limits, which were based on ISO conditions and based load operation. Please respond.

The information provided in the application was patterned after a previous inlet fogger application. This application does not propose to increase the maximum heat input rates above those which are currently permitted or above the design rates for Unit 2. The information was provided to demonstrate the quantity of emissions increase which could result from the operation of the fogger continuously. We concur with your alternative analysis.

3. Does the heat recovery steam generator for the 120 MW combined cycle gas turbine include duct firing? If so, what fuel is fired and what is the maximum heat input rate (mmBTU per hour)?

The heat recovery steam generator for the 120 MW combined cycle gas turbine does not include duct firing.

4. Attached are emissions calculations performed by the Department for the requested modification. Please review and comment.

We concur with the emissions calculations and note that restrictions on the hours of operation of the fogger are not necessary to assure that the PSD significance thresholds are not exceeded.

5. Unit No. 2 was originally permitted under PSD-FL-182 issued on March 31, 1995. The addition of inlet fogging will be a modification of the PSD permit and will require a 30-day comment period with the Public Notice. Is this facility also subject to power plant site certification?

We acknowledge the public notice requirement. This facility is subject to power plant site certification.

Please call me at (407) 333-7374 if you have any questions regarding this submittal.

Very truly yours,

PERIGEE TECHNICAL SERVICES, INC.

Jerome J. Guidry, P.E., Q.E.P.
President

JJG:emc

cc: A. K. Sharma
Jeff Ling
Larry Mattern

cc: CD
EPA
NPS

Enclosures

via Federal Express - Airbill number 8132 1390 6743

\foggerrfi.ltr/197.0

SUPPLY AND INSTALLATION OF AN INLET MISTING SYSTEM

ITN#204-00

At the

Cane Island Power Park Project

POWERFOG

FIRM PROPOSAL for 25 Degrees F(Inclusive Overspray)

SUBMITTED TO:

Kissimmee Utility Authority (KUA)
1701 West Carroll Street
Kissimee, Florida 34741

BY:

Caldwell Energy &
Environmental, Inc.
4020 Tower Road
Louisville, KY 40219, USA
(502) 964-6450
Contracts P.O.C. - Drew Wozniak

January 3, 2000

CALDWELL ENERGY & ENVIRONMENTAL, INC.

POWERFog System Proposal
January 3, 2000
Project Number: P991208-1

Kissimee Utility Authority (KUA)
Cane Island Power Park
GE Frame 7EA

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CALDWELL ENERGY & ENVIRONMENTAL,INC.

1.0 Introduction

Thank you for giving us the opportunity to propose our PowerFog Combustion Turbine Inlet Air Cooling (CTIAC) system for use at your plant. CE&E personnel have many years of experience in engineering and installing cooling systems in power plants. CE&E was formed in 1995 to pursue the CTIAC market. Our owners and managers come from such respected company names as GE Power Systems, Henry Vogt Machine Company, Vogt/Turbo Refrigeration Equipment, American Air Filter, Stewart & Stevenson, Allison Gas Turbines, the Army Corp of Engineers, and the Department of the Navy. We have successfully installed fogging systems at many plants in the US and have been developing international projects as well. All of our systems are designed to industrial grade standards. We are intimately familiar with the power plant environment.

The goal of this proposal is to give you a general understanding of what a PowerFog system is, how it works, and to offer you the most economical pricing possible. For your convenience, if you have any questions or require further information. Please do not hesitate to contact:

Drew Wozniak or Joe Nitzken, P.E.
Director Business Development or Director of Project Engineering
Caldwell Energy & Environmental, Inc.
4020 Tower Road
Louisville, KY 40219
Phone: 502.964.6450
Fax: 502.964.7444
Email: dwoz@caldwellenergy.com or jnitzken@caldwellenergy.com
Pagers: 888.962.3534 or 888.259.1435

2.0 General System Description

PowerFog systems spray controlled amounts of microfine droplets into the inlet air flow of gas turbines. The fog particles evaporate, cooling the air adiabatically. This has the effect of both increasing the gas turbines output and, increasing the efficiency of the power generated (less fuel per KWh output). It also has the effect of decreasing NOx. The system effectively reduces the temperature of the inlet air from the ambient dry bulb temperature to the ambient wet bulb temperature.

The "fog" is created by special nozzles proprietary to CE&E, which direct a high pressure stream of water at an impaction pin which shatters the stream into micron sized droplets. These droplets evaporate quickly and efficiently cooling the air to the turbine. Since the systems typically use demineralized water, all components that come in contact with the water are made of stainless steel. The water is supplied to the nozzles by industrial grade high pressure triplex plunger pumps. In order to control the amount of water sprayed into the inlet air, a microprocessor based PLC control system is used. It is connected to a state of the art temperature and humidity sensor (weather station) which provides the information necessary to spray appropriate amounts of water into the air to achieve complete cooling.

3.0 Plant Description

The Cane Island Power Park project consists of 1 GE Frame 7EA Combined Cycle Combustion Turbines operating in baseload mode.

4.0 Design Conditions

The PowerFog system cools from the ambient dry bulb temperature to within one degree F of the ambient wet bulb temperature. The system is able to produce more fog than that which can be evaporated from the design conditions (SEE 4.2) which is essentially overspray to be evaporated within the compressor. The following are the design conditions for the PowerFog system:

4.1	Ambient Dry Bulb Temperature	95	°F
4.2	Ambient Wet Bulb Conditions	70	°F, **(coincident design is 80° F T_{WB})**
4.3	Elevation	30	feet above sea level
4.4	Cool to within	0	°F of the Ambient Wet Bulb Temp.
4.5	Cool to	70	°F
4.6	Inlet Air Mass Flow at 70 degrees F	2,077,077	lbs. per hour per turbine

5.0 POWERFog System Specification

5.1 System Design Parameters

Using the design conditions, and our knowledge of your plant, we have arrived at the following parameters (specified per turbine):

5.1.1	Operating Pressure	3000	PSIG
5.1.2	Number of Nozzles	275	
5.1.3	Nozzle Flow Rate	0.094	GPM
5.1.4	Max. Water Consumption	26	GPM
5.1.5	Pump Skid Power Requirement	104	Amps (480V)
		NOTE:	**60 Amps (480V) at 95/80 Design Point**
5.1.6	Cooling Capacity	25	°F

5.1.7 Number of Pumps 3
5.1.8 Number of Zones 6
5.1.9 Cooling Control (+/-) 1 °F

5.2 Scope of Supply (specified per turbine)

5.2.1 High Pressure Pump Skid Assembly.
Each Turbine(s) will have a separate, independantly controlled pump skid assembly. The skids are provided with lifting provisions and hook-up termination points. Motor wiring is taken under the decking to provide protection and additional work space. Valves, regulators, pumps and motors are all made easily accessible for in-place maintenance or removal. The individual pumps or stages can be isolated electrically and mechanically at each pumps suction valve. This allows the system to continue to operate using the remaining pumps. Each Turbine will have the following pump(s):

5.2.1.1 High Pressure Pumps. The pump(s) are belt driven, high pressure triplex plunger design capable of continuous operation. A total enclosure belt guard covers both rotating pulleys and the belt at each pump. Each skid will have the following pumps:

Pump	GPM	HP Required	Motor HP Rating
1	9.31	19.13	20
2	8.27	16.99	20
3	8.27	16.99	20

NOTE: All pumps are identical. This minimizes maintenance efforts and provides interchangeability between zones and pump.

5.2.1.2 Zones.
There are 6 zones of cooling that provide complete coverage within 1 degree(s) F over the 25 degrees F cooling range between the design dry and wet bulb temperatures.
The pump to zone configuration is as follows:

Controlling Pump Number	Zone Number	Degrees of Cooling per Zone
1	1	1
1	2	2
1	3	2
1	4	4
2	5	8
3	6	8
	TOTAL Degrees	25

By configuring the zones like this, instead of having a separate pump for each zone, frequent starting and stopping of a pump is avoided, thus preventing premature wear of multiple smaller pumps. The following table illustrates a possible combination of pumps and valves which control within one degree over the entire cooling range:

Zone Control °F	Zones On
1	1

2	2
3	1,2
4	4
5	1,4
6	2,4
7	1,2,4
8	5
9	1,5
10	2,5
11	1,2,5
12	4,5
13	1,4,5
14	2,4,5
15	1,2,4,5
16	5,6
17	1,5,6
18	2,5,6
19	1,2,5,6
20	4,5,6
21	1,4,5,6
22	2,4,5,6
23	1,2,4,5,6
24	2,3,4,5,6
25	1,2,3,4,5,6

5.2.1.3 Bypassing and Recirculation System. Since the pump(s) are positive displacement type, unneeded high pressure water from inactive zones is bypassed either directly to the common pump suction header or to a corrosion resistant tank where it mixes with incoming flow on the suction side of the high pressure pumps. This mixing prevents the supply water from rising in temperature beyond safe levels. This system is custom fabricated to our exact requirements. The recirculation tank system allows the pumps to operate on a continuous basis when the system is on.

Recirculation replaces the starting and stopping of multiple smaller GPM, high RPM "feathering" pumps, which would be turning on and off during transient ambient temperatures. Only the pump, P1 (above) that is divided into three zones uses this tank. Other pumps are run as full flow and only discharge minimal relief to the tank.

5.2.1.4 Zone Control. Each zone has a motorized stainless steel ball valve which opens to establish flow to the zone. Only pump one (P1) requires this valve for discreet zone control, any additional pumps have the valves for isolation purposes. The valve selection is controlled by the PLC.

5.2.1.5 Weather Station. Each pump skid has a Vaisala HMP230 series temperature and humidity sensor mounted on it. It is considered "state of the art" in humidity measurement and utilizes a HumicapTM dewpoint sensitive capacitive probe. Humidity and ambient dry bulb temperature are measured while the wet bulb temperature is internally calculated. This information is transmitted to the PLC as the necessary weather data to perform the required psychometric calculations. The sensors are mounted in an HM 2212 solar shield to maintain their accuracy. The unit is completely Y2K compliant.

5.2.1.6 PLC. While the skid can be manually operated, each skid has a Cutler-Hammer (base bid) or Allen Bradley SLC 500TM modular hardware style programmable logic controller mounted on it. Final selection to be finalized with customer. Other manufacturers available. The PLC is programmed by CE&E engineers with ladder logic that takes the weather data from the HMP230 transmitter and calculates which zones to be turned on or off for the particular ambient conditions at that particular moment in time. The difference between dry bulb and wet bulb temperatures is recorded every 30 seconds and then time averaged over a ten (10) minute interval. The PLC requires an enable "start" signal from the CT control which allows the fogger to run only when the CT is running for automatic operation. This enable can be jumpered to permit local operation for maintenance and troubleshooting. Dry contacts are provided for both system running and system fault indication. Any DCS interface programming to be done by others. The unit is completely Y2K compliant.

5.2.1.6.1 Additional PLC parameters. As required in ITN#204-00 the PLC is capable of exchanging data with the Westinghouse WDPF plant DCS via a 4-20ma interconnection. For each parameter delivered to the DCS a separate 4-20ma signal (wire set) is required. The output signals from the PLC are brought to a terminal block in the panel, where the DCS wire can be landed. Parameters stated in the bid document are ambient RH, dry & wet bulb temperatures, stage of operation with cumulative water output and the cooling potential in degrees F, current setpoint for under or overcooling, current total water flow through the pump skid (note this is similar to toalized flow for stages).

5.2.1.7 Motors. All motors are GE, Baldor or equal in manufacture and are Totally Enclosed Fan Cooled (TEFC) with Type F insulation (rated for outdoor use). Motors are protected against overheating. They are also automatically shutdown via pressure sensors upon high or low pressure. The motors are connected to the high pressure pumps via a belt drive which is enclosed in a safety belt guard. All motors include heaters.

5.2.1.8 Piping. All piping on the pump skid is stainless steel with TIG welded fittings wherever practical (certain features require other fittings).

5.2.1.8.1 Flex Hoses. Flex hoses are used in the final connection to the pump suction and discharge ports (off H.P. regulator). The inlet hoses are reinforced and suitable for negative (suction) inlet systems. The hoses aid in dampening pressure pulsations resulting from the inherent flow variations produced in reciprocating pumps. Pulsation dampeners are also provided on the pump discharge side.

5.2.1.9 Sub-micron Water Filter. Prior to being forwarded to the high pressure pumps, the water is filtered through a Harmsco 0.35 micron multi-element filter rated at the design flow rate. The filter housing is 304 stainless steel, pressure rate to 150 PSIG and hydrostatically tested at the factory. Polyester-Plus filter elements are easily replaced by unfastening SS wing nuts on the pump housing cover.

5.2.1.10 Flowmeter. Each skid has a flowmeter which transmits water flow information to the PLC. Low flow below 90% of rated flow will alarm per the ITN#204-00 requirement and flow below 80% of rated flow will shut down the skid. Typically we key shutdown to high and low discharge pressures off the pumps. This is a faster acting signal where time delay can eliminate spikes. We do not believe control based on flow is as precise since the flow swings up and down as stages are opened and closed. CE&E would like to discuss such control with KUA.

5.2.1.11 Isolation Valves. An isolation valve is mounted on the suction side of each pump to allow for water flow isolation during maintenance.

5.2.1.12 Gauges. The suction side of the pump(s) has a single Ashcroft (or equal) liquid filled pressure gauge. Similarly, the discharge of each pump has a liquid filled gauge but at the higher pressure range rating.

5.2.2 Nozzle Arrays

5.2.2.1 Power Fog Nozzle
The turbine inlet will have 275 proprietary impaction pin type nozzles fastened to the nozzle tubing arrays. The arrays are protected by high pressure in-line filters with 140 micron elements to guard against nozzle contamination.

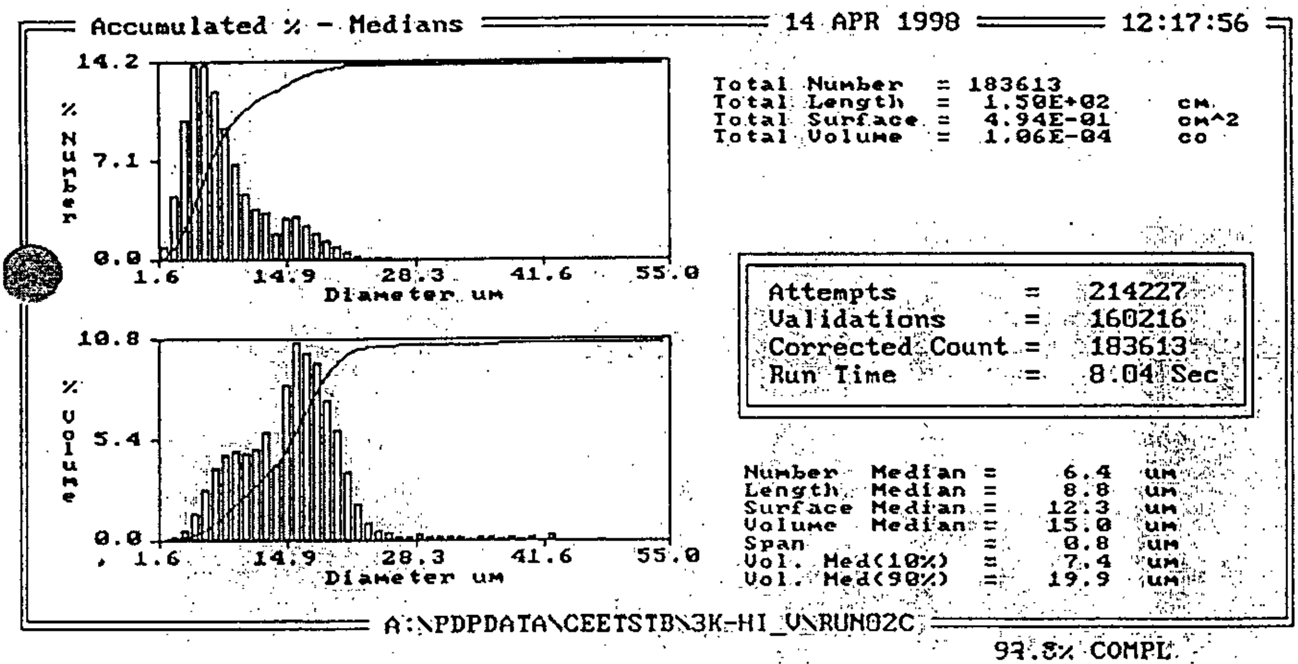
5.2.2.1.1 All stainless steel construction.

5.2.2.1.2 A lock wire hole to secure the nozzle to the manifold tubing with aircraft grade stainless steel lockwire for downstream of filter installations.

5.2.2.1.3 A 200 mesh (0.005 spacing) stainless steel screen nozzle filter provides a final barrier of protection. This screen has a longer life when compared to poly or sintered element filters.

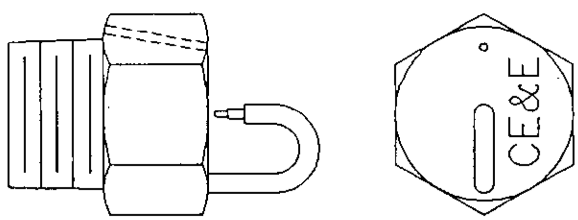
5.2.2.1.4 No whirl vanes or internal parts.

5.2.2.1.5 Optimized sizing - CE&E has chosen an orifice which provides a mass median of 15 microns (expressed here as volume). See following graphical output data.



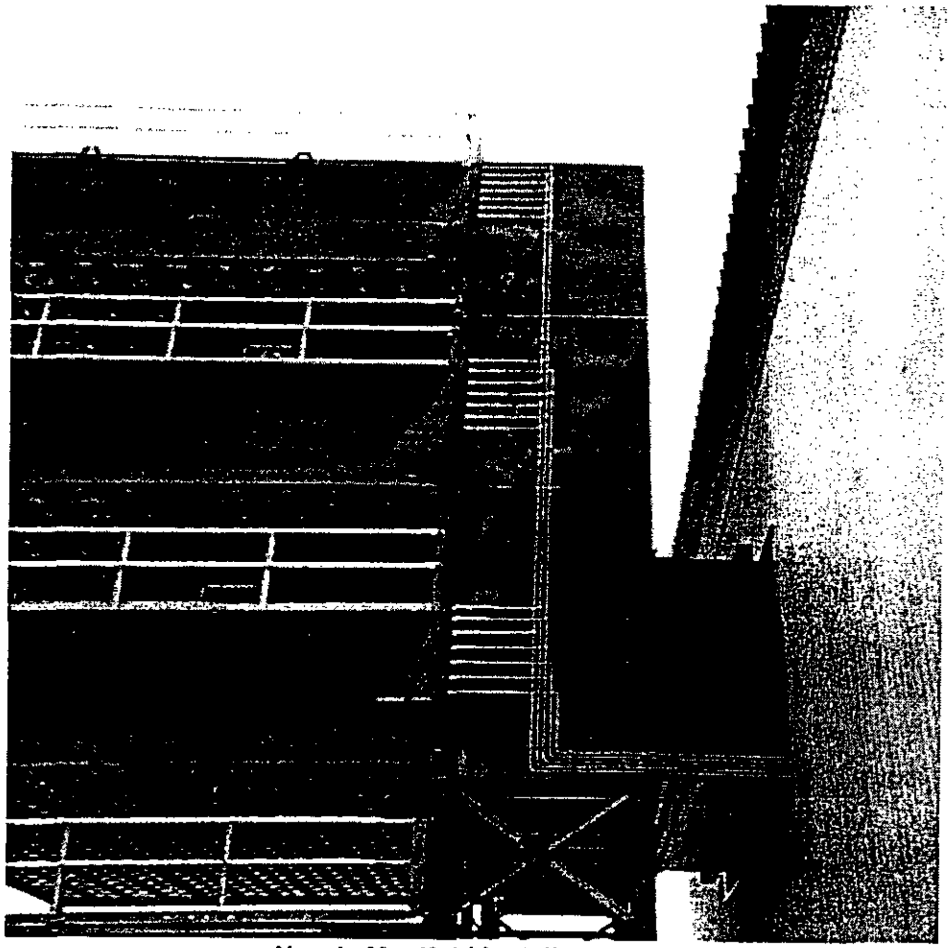
This test was performed by an independent testing lab on our nozzle using state of the art laser doppler interfermometry.

5.2.2.1.6 High strength impaction pin.



5.2.2.2 Piping Manifolds. Upstream of filter installations require mist elimination prior to the filters. When demisters are not used the nozzle manifolds are secured downstream of final filters for each turbine. This prevents filter wetting from the nozzle spray which can cause increased differential pressure drop, decreasing filter efficiency and leading to premature turbine compressor fouling. The PowerFog nozzles are fastened to a 300 series stainless steel coupling using a 1/8" NPT screw connection. The nozzles are lockwired to the manifolds for extra protection from turbine F.O.D. Each coupling is TIG welded to ½" seamless 300 series stainless steel tubing. The standard manifold length is 20 feet. The nozzle manifolds are secured, as required, to epoxy coated strut with HydrazorbTM clamps which utilize a rubber grommet to dampen any manifold vibration. All brackets, supports, and pipe hangers are included and will be securely locked in place with lockwire, lockplates, or other positive locking methods (e.g. welding). We assume the inlet filter house and duct are structurally capable of supporting the piping manifolds. Each 20' nozzle manifold is design pressure shop tested.

5.2.2.3 Manifold to Zone Interconnect. Stainless steel SwagelokTM fittings join the proper number of manifolds to meet the required flow value of each zone. All tubing sections have low point drains and/or blow out connections to facilitate winterization of the system.



Nozzle Manifold Installation Example

5.2.3 System Protection and Data Points

5.2.3.1 System Protection. Each system has a main disconnect switch which must be engaged to turn on the system. This switch is used for locklout/tagout procedures and no other control can override it. In addition to the main disconnect several parameters are measured by the control system, any one of which can shut down the system or individual pumps. These are:

System Protection Points	
Control	**Alarm(s)**
Pressure Transmitter	1 – Low suction pressure on the water supply (on/off)
Pressure Transmitter	1 – High discharge pressure on pumps (on/off)
Thermal Overload Relays	1 - Pump Motor Overload (on/off)

Flow Meter	1 – Below normal flow conditions for all zone combinations, Above Normal Flow indicating a system leak, (alarm indication & shut down)

"Fail Safe" to the closed position motorized ball valves - Low pressure conditions on the suction and discharge sides of the pumps cause the system to fault, shutting down the pumps and electrically closing the zone valves. High pressure on the discharge end of the pumps does the same. Pump motor overload protection causes the pump to shutdown. The system inherently "fails safe".

5.2.3.2 System Datapoints. The following is a list of system datapoints gathered by the PLC(s) and available to the plants DCS.

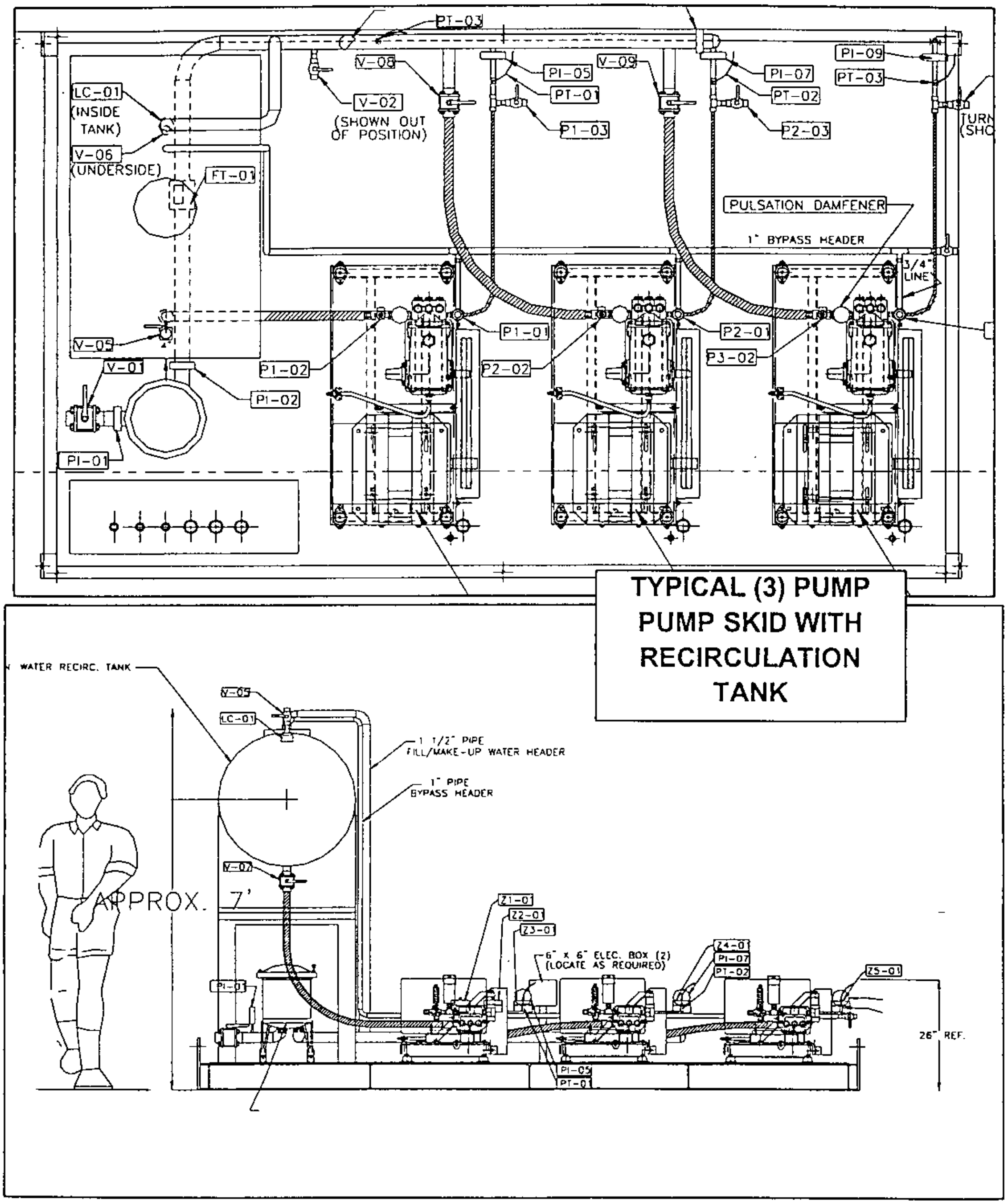
System Data Points
Ambient Dry Bulb Temperature
Ambient Wet Bulb Temperature
Rate of Flow of Water
Zone Operation
All alarm and trip functions on the skid

5.2.4 Field Installation

This proposal is for a complete PowerFog system. This includes all installation hardware and installation labor required to place the systems into operation. Supply power wiring, skid supply water piping, and control cable will be brought to the skid by the customer as stated in ITN#204-00. The boundary limits and assumptions for the installation scope are restated as:

5.2.4.1 Pump Skid Foundation. Each skid, (1) for this project, will be mounted on a permanent concrete pad provided by the customer.

A typical high pressure pump/control skid is shown below for a three pump unit. While the design and fabrication of the foundation pad are not in CE&E scope at this time, they can be negotiated at a later date if desired.



5.2.4.2 Pump Skid zones to Nozzle Manifold Interconnection. Flow from the pumps will be connected to the nozzle manifolds with up to ¾" diameter seamless stainless steel tubing.

Each interconnection shall not exceed 50 feet on the average as determined from review of KeySpan Sketch No. 1.

5.2.4.3 Water Supply Piping

The length of this supply run is not in CE&E scope of supply. The supply line to the fogging skid should be 1 1/2 to 2 inch piping, depending on available water pressure.

5.2.4.4 Power Supply Wiring

The length of this power run is not in CE&E scope of supply at this time. The line to each skid must supply 66 amps at 480 volts for the maximum flow operation condition (33 amps at 92/77 design point). Instalallation can be negotiated with CE&E at a later date if desired.

5.2.4.5 Control System Interconnect

Each fogging skid and control panel furnished shal contain terminal blocks for control wiring and shall be the point of connection for Purchaser's field wiring. Interface of the fog systems controls with plant control system (Physical tie-in to plant control system) shall involve KeySpan Energy personnel. Since specific length to the plant control system was not provided, the length of this cabling is not in scope of supply for CE&E at this time. It can be negotiated with CE&E at a later date if desired.

5.2.5 System Documentation

The following will be included with your PowerFog installation:

5.2.5.1 Installation and Erection Manual

5.2.5.2 Operations and Maintenance manual which will include documentation on all system components, system integration, a complete set of drawings and P&ID's, and instructions on proper system operation. Also included will be a complete listing of the PLCs programming.

5.2.5.3 Performance Testing Procedure

5.2.6 Spare Parts List.

The following is a list of the recommended spare parts to be kept in inventory.

System Component	Spare Part
CE&E Nozzle	Qty 5 – Included with Installation
H.P. Plunger Pump Seal Kit	Qty 1/pump – Option ($201.50 each)
H.P. Regulator Rebuild Kit	Qty 1/skid - Option ($29.80 each)

5.2.7 Performance Testing and Guarantee.

5.2.7.1 The following parameters are guaranteed by CE&E:

5.2.7.1.1 Spray capacity - no more than 25.85 GPM Max (+ .25 GPM)

5.2.7.2.2 Control functioning of the fogging system to select appropriate zones.

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

June 8, 2000

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. A. K. Sharma, Director of Power Supply
Kissimmee Utility Authority
P.O. Box 423219
Kissimmee, FL 34742-3219

Re: Request for Additional Information No. 1
Project No. 0970043-008-AC (PSD-FL-182I)
KUA - Cane Island Power Park
Addition of Inlet Fogging System to Unit No. 2

Dear Mr. Sharma:

On June 6, 2000, the Department received your application and sufficient fee for an air construction permit to add inlet air fogging to Unit No. 2, a 120 MW combined cycle combustion turbine at the Cane Island Power Park. The application is incomplete. In order to continue processing your application, the Department will need the additional information requested below. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. Please identify the proposed manufacturer, model, and description of the inlet fogging system. Is the proposed model a high-pressure direct spray system? What is the approximate water flow rate (gpm) injected to produce evaporative cooling from 95° F to 70° F under base load conditions? Please provide manufacturer specification sheets on the proposed product.

2. The original PSD permit limits heat input for gas firing to 869 mmBTU per hour and 928 mmBTU per hour for oil firing at ISO conditions and base load according to the manufacturer's design. The emission summary tables provided with the application indicate that the maximum heat input would increase to 934 mmBTU per hour for gas firing and 993 mmBTU per hour for oil firing. However, the General Electric performance curve for the Model PG7211(EA) gas turbine shows that only 90% of the design fuel consumption rate can be achieved at a compressor inlet air temperature of 95° F for both gas and oil firing. This suggests that the maximum heat input rates for gas and oil firing at 95° F would be 782 and 835, respectively. In addition, cooling the inlet air to 70° F would result in increases of the maximum fuel consumption rates to 97% of the maximum design rate or 845 and 900 mmBTU per hour for gas and oil firing, respectively. Therefore, the heat inputs would increase to:

Fuel	Design mmBTU/hour	Maximum @ 95° F mmBTU/hour	Maximum @ 70° F mmBTU/hour	Net Increase mmBTU/hour
Gas Firing	869	782 (90%)	845 (97%)	63
Oil Firing	928	835 (90%)	900 (97%)	65

The addition of the inlet foggers would not result in an increase in the design heat input rates or permit limits, which were based on ISO conditions and based load operation. Please respond.

3. Does the heat recovery steam generator for the 120 MW combined cycle gas turbine include duct firing? If so, what fuel is fired and what is the maximum heat input rate (mmBTU per hour)?

4. Attached are emissions calculations performed by the Department for the requested modification. Please review and comment.

5. Unit No. 2 was originally permitted under PSD-FL-182 issued on March 31, 1995. The addition of inlet fogging will be a modification of the PSD permit and will require a 30-day comment period with the Public Notice. Is this facility also subject to power plant site certification?

The Department will resume processing your application after receipt of the requested information. Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. Material changes to the application should also be accompanied by a new certification statement by the authorized representative or responsible official. Permit applicants are advised that Rule 62-4.055(1), F.A.C. now requires applicants to respond to requests for information within 90 days. If there are any questions, please call me at 850/414-7268.

Sincerely,

Jeffery F. Koerner, P.E.
New Source Review Section

jfk

Enclosure

cc: Mr. Jerome Guidry, Perigree Technical Services, Inc.
Mr. Len Koslov, CD
Mr. Gregg Worley, EPA
Mr. John Bunyak, NPS

KUA Cane Island Power Park
Unit No. 2 Fogging
Project No. 0970043-003-AC

NET EMISSIONS INCREASE FROM GAS FIRING W/FOGGING

			Increase ONLY[a]	Past Actuals[b]	Future Potentials[b]	Net Increase
	mmBTU/hr	------------->	63	782	845	NA
	hr/yr	------------->	8760	7799	8760	NA
Pollutant	lb/hr	lb/mmBTU	TPY	TPY	TPY	TPY
CO	54.0	0.0621	17.14	189.37	229.84	40.47
NOx	53.0	0.0610	16.83	186.01	225.77	39.75
PM10	8.7	0.0100	2.76	30.49	37.01	6.52
SO2	1.2	0.0014	0.39	4.27	5.18	0.91
VOC	2.0	0.0023	0.63	7.01	8.51	1.50

a - The isolated net increase is estimated based on the ability to fire additional fuel during hot weather than would normally be possible. The design heat input (and permit limit) for gas firing is 869 mmBTU at ISO conditions (59° F and 60% RH, LHV) as specified by the permit. According to the manufacturer's performance curve provided by the applicant, the unit would only be capable of firing 90% of the design heat input at an ambient inlet temperature of 95° F. If inlet fogging was added, the inlet temperature would be reduced to approximately 70° F and up to 97% of the design heat input could be fired resulting in a power boost for the given ambient conditions. The heat input increase is approximately 63 mmBTU per hour. Clearly, the isolated net emissions increase is less than the Significant Emissions Rates of Table 62-212.400-2.

b - The future potential emissions were based on the permit limits and continuous operation (8760 hr/yr). The past actual emissions were based on the average operation for the last two years, assuming that natural gas was the sole fuel. Although this analysis indicates that the net emissions increase approaches the Significant Emissions Rates, this unit is clearly a base load unit and the addition of the inlet fogging system could hardly be expected to increase capacity utilization. Hours of operation were reported on the Title V fee form.

NOx is the limiting pollutant.

KUA Cane Island Power Park
Unit No. 2 Fogging
Project No. 0970043-003-AC

ISOLATED EMISSIONS INCREASE FROM OIL FIRING W/FOGGING ONLY

			Fogging Increase ONLY
	mmBTU/hr[a]	------------->	65
	hr/yr	------------->	1000
Pollutant	lb/hr	lb/mmBTU	TPY
CO	65	0.0700	2.28
NOx	170	0.1832	5.95
PM10	15	0.0162	0.53
SO2	52	0.0560	1.82
VOC	5	0.0054	0.18

For this project, it was assumed that adding the inlet fogging system would not increase the likelihood of firing oil. This assumption is based on the permit condition specifying natural gas as the primary fuel with low sulfur distillate oil only to be fired if natural gas is unavailable. As further support for this assumption, Unit No. 2 operated 90% of the allowable hours (8760) over the last two years, but fired oil for only 30 hours. This worksheet is a check to ensure that the isolated increase would not result in a significant increase. As shown, the isolated increase is much less than the Significant Emissions Rates in Table 62-212.400-2.

a - The isolated net increase is estimated based on the ability to fire additional fuel during hot weather than would normally be possible. The design heat input (and permit limit) for oil firing is 928 mmBTU at ISO conditions (59° F and 60% RH, LHV) as specified by the permit. According to the manufacturer's performance curve provided by the applicant, the unit would only be capable of firing 90% of the design heat input at an ambient inlet temperature of 95° F. If inlet fogging was added, the inlet temperature would be reduced to approximately 70° F and up to 97% of the design heat input could be fired resulting in a power boost for the give ambient conditions. The heat input increase is approximately 65 mmBTU per hour. Clearly, the isolated net emissions increase is less than the Significant Emissions Rates of Table 62-212.400-2. Hours of operation were reported on the Title V fee form.

NET EMISSIONS INCREASE FROM FOGGER PROJECT

	Net Increase Gas Firing	Net Increase Oil Firing	Net Increase Total
Pollutant	TPY	TPY	TPY
CO	17.14	2.28	19.41
NOx	16.83	5.95	22.79
PM10	2.76	0.53	3.29
SO2	0.39	1.82	2.21
VOC	0.63	0.18	0.81

OPERATING HISTORY - Unit No. 2

Year	Total Hours	Gas Firing hour/year	Oil Firing hour/year
1999	8230	8229	1
1998	7368	7339	29
Average	7799	7784	15

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KUA
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Kissimmee, Fl
34742-3219

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