AC 48-137740
PSD-FL-123

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Gas-Fired Turbine with Heat Recovery Boiler [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Reedy Creek Improvement District COUNTY: Orange

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

SOURCE LOCATION: Street Central Energy Plant ------ Bay Lake City Lake Buena Vista

UTM: East 442.0 North 3139.0

Latitude 28 ° 25 ' 34 "N Longitude 81 ° 34 ' 48 "W

APPLICANT NAME AND TITLE: REEDY CREEK IMPROVEMENT DISTRICT Thomas M. Moses, Director/General Manager

APPLICANT ADDRESS: P.O. Box 40 Lake Buena Vista, Florida 32830

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of RCID

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

*Attach letter of authorization

Signed: Thomas M Moses

Thomas M. Moses, Director/General Manager
Name and Title (Please Type)

Date: 8/4/87 Telephone No. (305)828-2241

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

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

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

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

HAROLD L. CULP
CERTIFICATE
NO
PE 0029275
STATE OF FLORIDA
REGISTERED ENGINEER

Signed Harold L Culp

Harold L. Culp, PE
Name (Please Type)

Ford Bacon & Davis, Inc
Company Name (Please Type)

P.O.Box 1894 Monroe, LA 71210
Mailing Address (Please Type)

Florida Registration No. 29275 Date: 8/3/87 Telephone No. (318) 323-9000

SECTION II: GENERAL PROJECT INFORMATION

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

Installation of a gas-fired, aircraft derivative, turbine generator using water injection for NO_x control, standby fuel oil, duct burner, steam generator and steam turbine to produce up to 38 MW of power for Reedy Creek Improvement District usage. See attached reports.

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

Start of Construction September 15, 1987 Completion of Construction November 1, 1987

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

Integral design of equipment and not individually available

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

Will replace existing smaller turbines and boilers A048-106735 and A048-106733

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr 8760 ; if seasonal, describe: However expect units to experience some maintenance downtime that should maximize operating time to about 8500 hours/year on an average basis.

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

1. Is this source in a non-attainment area for a particular pollutant? Yes

   a. If yes, has "offset" been applied? No

   b. If yes, has "Lowest Achievable Emission Rate" been applied? No

   c. If yes, list non-attainment pollutants. Ozone

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. Yes

3. Does the State "Prevention of Significant Deteriorioation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. Yes

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? Yes

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants? N/A

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

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

See Attachments

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

A. Raw Materials and Chemicals Used in your Process, if applicable: N/A

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

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

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

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

Name of Contaminant		Emission[1] Requested max. Maximum lbs/hr	Actual T/yr	Allowed[2] Emission Rate per Rule 17-2 NSPS	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/hr	T/yr	Relate to Flow Diagram
CO	gas *oil	15 20	63.7 6.96	N/A	N/A gas oil	11.8 17.6	50.1 6.1	Main
NOx	gas *oil	145 150	616.2 52.2	gas 152.1ppm oil 103.5ppm	gas 215 gas oil 153 oil	142.6 149	606 51.8	Stack
PM	gas *oil	0.5 9	2.1 3.1	N/A	N/A gas oil	0.4 8	1.7 2.8	(See
SO_2	gas *oil	0.18 112	0.78 39	0.8% S (oil) 150 ppmvd-15% O_2	112 gas (29 days) oil 112	0.17	0.75 39	Diagram)
°VOC	gas *oil	7.5 8	31.8 2.8	N/A	N/A gas oil	6.1 6.6	25.9 2.3	

[1] See Section V, Item 2. * Standby No.2 fuel oil to be used not more than 29 days/year
NOx-ReferenceMethod 20 44 FR 52792 emergency only-oil contains 0.32% S.

[2] Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input) NOx-ppmvd-15% O_2 (NSPS)

[3] Calculated from operating rate and applicable standard.

[4] Emission, if source operated without control (See Section V, Item 3).
(Projected but using water injection - based on mfg. data for 8500 $\frac{hrs}{yr}$)
o Methane plus non-methane

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
Water injection	NOx	55-70%	N/A	Mfg. data

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
Natural gas	0.419	0.432	445.2
No.2 fuel oil (for only 29 days /yr)	2473	3248	400.0

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: 0.001 ± (gas) 0.32 (oil) Percent Ash: 0 (gas) 0.005 (oil)

Density: 7.1 ± (oil) lbs/gal Typical Percent Nitrogen: 0.756 (gas) 0 (oil)

Heat Capacity: 20797 LHV (gas) BTU/lb 131,350 LHV (oil) BTU/gal

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

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

Annual Average ______ Maximum ______

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

Any miscellaneous oils will be collected and reclaimed by outside contract. Miscellaneous boiler/cooling tower blowdowns and water treatment regenerant/reject streams will be discharged to the sanitary sewer and treated.

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

Stack Height: 65 (M) 65 (B) ft. Stack Diameter: 11.16 (M) 12.41 (B) ft. (equivalents-rectangular)

Gas Flow Rate: 306,396 (M) 513,790 (B) ACFM 206,385 (M) 206,183 (B) DSCFM Gas Exit Temperature: 285 (M) 800 (B) °F.

Water Vapor Content: 7.3 (M) 7 (B) % Velocity: 52.2 (M) 70.8 (B) FPS

M= Main stack B= By-pass stack

SECTION IV: INCINERATOR INFORMATION

N/A

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

Description of Waste ______

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

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

Manufacturer ______

Date Constructed ______ Model No. ______

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

Stack Height: ______ ft. Stack Diamter: ______ Stack Temp. ______

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

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

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

[ ] Other (specify) ______

Brief description of operating characteristics of control devices: ____________

____

____

____

____

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

____

____

____

____

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

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

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

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

[X] Yes [ ] No

Contaminant	Rate or Concentration
NOx	*152.1 ppmvd 15% O_2 $(0.0075 \frac{14.4}{Y} + F)$ (F=.005)
SO_2	0.015% by vol., 15% O_2, dry and fuel under 0.8%
	S by weight
	* Converts to 215 lbs/hr NOx - gas fuel

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

[X] Yes [ ] No

Contaminant	Rate or Concentration
See 40 CFR Subpart GG	60.330 et al

C. What emission levels do you propose as best available control technology? 40 CFR GG

Contaminant	Rate or Concentration
NOx	145 lbs/hr (gas) 150 lbs/hr (oil-29 days/yr)
SO_2	0.32% sulfur fuel oil (#2) $<$ 0.8%

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

1. Control Device/System: Water Injection into combustor
2. Operating Principles: Reduce flame temperatures
3. Efficiency:* 60-65% Generally (by vendor)
4. Capital Costs:

*Explain method of determining

5. Useful Life: Same As Machine

6. Operating Costs:

7. Energy: 8 gpm gas, 21 gpm oil (water usage)

8. Maintenance Cost:

9. Emissions:

Contaminant (See IIIc)	Rate or Concentration
NOx	145 lbs/hr (gas), 150 lbs/hr (oil)
SO2	0.18 lbs/hr (gas), 112 lbs/hr (oil - for only 29 days/yr)

10. Stack Parameters M = Main Stack B = Bypass Stack

a. Height: 65 (M) 65 (B) ft.

b. Diameter: 11.16 (M) 12.41 (B) ft.

c. Flow Rate: 306,396 (M) 513,790 (B) ACFM

d. Temperature: 285 (M) 800 (B) °F.

e. Velocity: 52.2 (M) 70.8 (B) FPS

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

(See VI, D)

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

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

j. Applicability to manufacturing processes:

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

3.

a. Control Device: b. Operating Principles:

c. Efficiency:[1] d. Capital Cost:

e. Useful Life: f. Operating Cost:

g. Energy:[2] h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

4.

a. Control Device: b. Operating Principles:

c. Efficiency:[1] d. Capital Costs:

e. Useful Life: f. Operating Cost:

g. Energy:[2] h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

F. Describe the control technology selected:

1. Control Device: 2. Efficiency:[1]

3. Capital Cost: 4. Useful Life:

5. Operating Cost: 6. Energy:[2]

7. Maintenance Cost: 8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration
(See VI D)	

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

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

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data N/A (See attached PSD Report for detailed information.)

1. ________no. sites ________ TSP ________ ( ) SO^2* ________ Wind spd/dir

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

Other data recorded ________________

Attach all data or statistical summaries to this application.

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

2. Instrumentation, Field and Laboratory

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

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. 5 Year(s) of data from 01 / 01 / 81 (month day year) to 12 / 31 / 85 (month day year)

2. Surface data obtained from (location) Orlando, Florida

3. Upper air (mixing height) data obtained from (location) Tampa, Florida

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

C. Computer Models Used

1. ISCST UNAMAP Version 6 Modified? If yes, attach description. Default, Rural

2. PT PLU Screening Modified? If yes, attach description. Default, Rural

3. ______ Modified? If yes, attach description.

4. ______ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	N/A	grams/sec
SO^2	N/A	grams/sec

E. Emission Data Used in Modeling (See Attached Report)

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

F. Attach all other information supportive to the PSD review. (Attached)

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

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

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

BOB MARTINEZ
GOVERNOR

DALE TWACHTMANN
SECRETARY

APPLICATION FOR PERMIT TO CONSTRUCT/OPERATE AIR POLLUTANT EMISSION SOURCE

This form is not intended to be self-explanatory. An instruction booklet for air permit application forms is available from any office of the department. The booklet provides general instructions for both the applicant and the department as well as specific instructions for each numbered field.

All applicable fields must be filled in, all applicable supplemental requirements addressed, and the appropriate application fee submitted for the application to be considered complete and for the department to take action upon it. Shaded fields are reserved for DER use and must be left blank by the applicant.

APPLICATION TYPE & FACILITY IDENTIFICATION

1. Type of Permit Application (Check One)					2. Facility Identification Code			
Construction Initial	Construction Modif.	Initial Operation	Site Cert.	Amend-ment	Dist.	Office	County	Facility
☒	☐	☐	☐	☐				

CERTIFICATIONS

1. Statement By Owner Or Authorized Representative

I, the undersigned, am the owner or authorized representative* of the facility described in this application. I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge. Futher, I agree to operate and maintain the source of air pollutants and pollution control equipment described in this application so as to comply with all provisions of Chapter 403, Florida Statutes, and all applicable rules and regulations of the Department of Environmental Regulation and revisions thereof. I also understand that a permit, if granted by the department, will be nontransferable, and I will promptly notify the department upon sale or legal transfer of the permitted source.

*Attach letter of authorization if not currently on file.

[illegible]	8/4/87
Signature	Date

2. Professional Engineer Information	Name	Florida Registration Number
	Harold L. Culp, PE	29275

Organization/Firm	Street or Post Office Box
Ford, Bacon & Davis, Incorporated	P.O. Box 1894

City	State	Zip	Telephone Number
Monroe	LA	71210	(318) 323-9000

3. Statement By Professional Engineer Registered In Florida (where required by Chapter 471, F.S.)

I, the undersigned, certify that the engineering features of this project have been designed or examined by me or individuals under my direct supervision and found to be in conformity with modern engineering principles applicable to the control of emissions of the air pollutants characterized in this permit application. There is reasonable assurance, in my professional judgment, that the source of air pollutants and the pollution control equipment, when properly operated and maintained, will comply with all applicable statutes of the State of Florida and all applicable rules and regulations of the Department of Environmental Regulation.

Harold L Culp	8/3/1987
Signature	Date

HAROLD L. CULP
CERTIFICATE NO PE 0029275
STATE OF FLORIDA
REGISTERED ENGINEER

(Affix Seal)

AIR020					APIS	

FACILITY INFORMATION

1. Facility Owner (40 Characters) Reedy Creek Improvement District			2. Facility Ownership Code U
3. Facility Name/Location (40 Characters) Central Energy Plant - Bay Lake			4. Facility Loc. Zip Code 32830
5. Facility City Lake Buena Vista			6. City Code
7. Facility Type Code/Description 99 Gas Turbine Cogeneration			8. On Table 500-1? Y
9. Facility UTM Coordinates (km)	Zone 17	East 442.0	North 3139.0
10. Facility Lat./Long. (o, ', ")	Latitude 28-25-34		Longitude 81-34-48
11. Facility Compliance Tracking Codes	CDS		VOC
12. Facility Comment (60 Characters)			

AIR021 APIS

OWNER/CONTACT INFORMATION

1. Owner or Authorized Representative	Name: Thomas M. Moses	(40 Characters)
Organization/Firm: REEDY CREEK IMPROVEMENT DISTRICT		(40 Characters)
Street Address or P. O. Box: P O Box 40	City: Lake Buena Vista	
State: Florida	Zip: 32830	Telephone: (305) 828-2034
2. Facility Contact	Name: Frank Jones	(40 Characters)
Organization/Firm: Reedy Creek Utilities Co., Inc.		(40 Characters)
Street Address or P. O. Box: 5300 N. Center Dr.	City: Lake Buena Vista	
State: Florida	Zip: 32830	Telephone: (305) 827-7700

SOURCE/PROCESS DESCRIPTION & PROJECT INFORMATION (DO NOT ENTER INTO APIS)

1. Source Identifer	2. Current DER Permit Number To replace AO 48-106735 (Turbines) and AO 48-106733 (Boilers)

3. Description of Source

GE LM5000 Gas-fired turbine generator supplemented by a gas-fired duct burner-assisted three drum heat recovery steam boiler (combined-cycle power plant).

4. Description of Process

Provide a gas-fired (aircraft) turbine generator, with standby No. 2 fuel oil, duct burner, steam generator and all auxiliaries to produce up to 38 MW of power for various District usages. See attached flow diagram.

5. Nature and Extent of Proposed Project

To shutdown two existing Orenda Gas Turbines and Waste Heat Boilers (11MW), install new, larger GE gas turbine (32 MW) and downstream waste heat recovery boiler, produce three levels of steam pressure for turbine, chiller and hot water needs. High pressure (600 psig) steam will drive a conventional turbine-coupled generator adding an additional 6 MW capacity. Project also includes an 1800 BHP, 1200 net KW, No. 2 oil "Black Start" skid-mounted generator that will not operate until a total outside utility power outage occurs. For reliability unit will be run an estimated 10 minutes/week. See supplementary information attached.

6. Projected Dates of Commencement and Completion of Construction

Commence September 15, 1987. Complete by October, 1988 to November 1, 1988.

AIR030					APIS

SOURCE PROCESSING/TRACKING INFORMATION

1. Construction Permit/PPS Information

Permit Number Assigned This App.	PPS Number Assigned This App.	Fee Paid
AC -		

Date Permit Issued/Site Cert. Approved MM/DD/YY	Date This Permit Expires MM/DD/YY

Probable Completion Date MM/DD/YY	

2. Operation Permit Information

Permit Number Assigned This App.	Fee Paid	AOR Required?
AO -		

Date This Permit Issued MM/DD/YY	Date This Permit Expires MM/DD/YY

3. Description of Source Addressed in This Application (60 Characters)

4. Source Initial Construction Date MM/DD/YY	5. Source Type Code
09/00/87 Planned	C-3

6. Source SIC Code

4911

7. NSPS	8. NESHAP	9. 111(d)	10. PSD	11. NAA NSR	12. RACT

13. Source Comment (120 Characters)

AIR032 APIS

SOURCE OPERATING SCHEDULE/RATE INFORMATION

1. Typical Operating Schedule	hr/dy 24	dy/wk 7	wk/yr 50.6-52	
2. Typical % Hours of Operation By Season	DJF 25	MAM 25	JJA 25	SON 25
3. Requested Operating Schedule Limit(s)	hr/dy 24	dy/wk 7	wk/yr 52	hr/yr 8760
	DO NOT ENTER INTO APIS			
4. Permitted Operating Schedule Limit(s)	hr/dy	dy/wk	wk/yr	hr/yr
5. Maximum Process Rate N/A	Units			
6. Maximum Production Rate 38.4 + 8.4 = 46.8	Units Megawatts			

AIR033						APIS	

SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Diagram TB-1	3. Sources with Common Stack N/A

4. Stack Height (ft)	5. Exit Diameter (ft)	6. Exit Temperature (°F)
65	11.16	285

7. Actual Volumetric Flow Rate (acfm)	8. Dry Standard Flow Rate (dscfm)
306,396	N/A

9. Nonstack Emission Height (ft)	10. Building Dimensions (ft)	Height	Width
0		N/A	N/A

11. Point UTM Coordinates (Optional) (km)	East	North	12. Good Engineering Practice Stack Height (ft)
			N/A

13. Emission Point Comment (52 Characters)

14a. Description of Control Equipment 'a'
Direct injection of water into combustor to reduce NOx formation (by GE).

14b. Description of Control Equipment 'b'

N/A

15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal

N/A

AIR034						APIS	

SOURCE PROCESS INFORMATION (PAGE 1 OF 1)

1. Component Process or Type of Fuel Employed Natural gas used to fire turbine and downstream duct burner (MM CF burned) - primary fuel.			
2. Source Classification Code for Above Process/Fuel		3. Requested Annual Rate Limit 3246 DO NOT ENTER INTO APIS	
4. Rate Unit Code MCFB	5. Maximum Hourly Rate 0.432	6. Permitted Annual Rate Limit	
7. Estimated Annual Rate 3091	8. % Sulfur in Fuel 0.001±	9. % Ash in Fuel 0	10. 10^6 Btu/Unit (as Fired) in Fuel 1030.2 HHV
11. SCC Comment for Above Process/Fuel (52 Characters)			

1. Component Process or Type of Fuel Employed No. 2 fuel oil used as standby fuel to fire turbine and downstream duct burner (M GAL burned) up to 29 days/yr.			
2. Source Classification Code for Above Process/Fuel		3. Requested Annual Rate Limit 1800 DO NOT ENTER INTO APIS	
4. Rate Unit Code K GAL B	5. Maximum Hourly Rate 3.248	6. Permitted Annual Rate Limit	
7. Estimated Annual Rate 1700	8. % Sulfur in Fuel 0.32 Max.	9. % Ash in Fuel 0.005	10. 10^6 Btu/Unit (as Fired) in Fuel 141.3 HHV
11. SCC Comment for Above Process/Fuel (52 Characters)			

AIR037 APIS

RFP INFORMATION

1. RFP Tracked?

2. Base Year Actual Emissions

Base Year	VOC (lb/day)	NOX (lb/day)

3. Projected Year Allowable Emissions

Proj. Year	VOC (lb/day)	NOX (lb/day)

4. Comments

AIR038						APIS	

PSD INFORMATION

1. PSD Increment Consuming/Expanding?

2. Baseline Emissions

SO2 Short Term (lb/hr)	SO2 Annual (ton/yr)
PM Short Term (lb/hr)	PM Annual (ton/yr)

3. Comments

AIR040							APIS	

POLLUTANT INFORMATION (PAGE 1 OF 5)

1. Pollutant Emitted ID CO	2. Total % Efficiency of Control 0
3. Primary Control Device Code 000	4. Secondary Control Device Code 000
5. Emission Factor Source Test and Design Data	6. Emission Factor Reference Vendor Data
7. Potential Emission (lb/hr): 11.8 Nat. Gas; 17.6 Standby Fuel Oil	(ton/yr): 50.1 (8500 hrs/yr); 6.1 (29 days/yr)
8. Estimated Emission (ton/yr) Gas - 50.1 (8500 hrs/yr) Oil - 6.1 (29 days/yr)	9. Emission Estimate Method Code 1 and 2
10. Requested Emission Limit(s) lb/hr: 15 gas; 20 oil ton/yr: 63.7; 6.96 DO NOT ENTER INTO APIS	11. Requested Emission Limit in Units Other Than lb/hr N/A DO NOT ENTER INTO APIS
12. Allowable Emissions lb/hr ton/yr	13. Allowable Emission in Units Other Than lb/hr
14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date
18. Pollutant Comment (60 Characters)	

AIR040 APIS

POLLUTANT INFORMATION (PAGE 2 OF 5)

1. Pollutant Emitted ID NOx	2. Total % Efficiency of Control 50-70
3. Primary Control Device Code 028	4. Secondary Control Device Code 000
5. Emission Factor Source Test and Design Data	6. Emission Factor Reference Vendor Data
7. Potential Emission (lb/hr): 142.6 Nat. Gas; 149 Standby Fuel Oil	(ton/yr): 606 (8500 hrs/yr); 51.8 (29 days/yr)
8. Estimated Emission (ton/yr) Gas - 606 (8500 hrs/yr) Oil - 51.8 (29 days/yr)	9. Emission Estimate Method Code 1 and 2
10. Requested Emission Limit(s) lb/hr: 145 Gas; 150 Oil — ton/yr: 616.2; 52.2 DO NOT ENTER INTO APIS	11. Requested Emission Limit in Units Other Than lb/hr N/A DO NOT ENTER INTO APIS
12. Allowable Emissions lb/hr ton/yr	13. Allowable Emission in Units Other Than lb/hr
14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date
18. Pollutant Comment (60 Characters)	

AIR040						APIS	

POLLUTANT INFORMATION (PAGE 3 OF 5)

1. Pollutant Emitted ID PM	2. Total % Efficiency of Control 0
3. Primary Control Device Code 000	4. Secondary Control Device Code 000
5. Emission Factor Source Test and Design Data	6. Emission Factor Reference Vendor Data

7. Potential Emission	(lb/hr)	(ton/yr)
	0.4 Nat. Gas	1.7 (8500 hrs/yr)
	8.0 Standby Fuel Oil	2.8 (29 days/yr)

8. Estimated Emission (ton/yr) Gas - 1.7 (8500 hrs/yr) Oil - 2.8 (29 days/yr)	9. Emission Estimate Method Code 1 and 2

10. Requested Emission Limit(s)	lb/hr	ton/yr	11. Requested Emission Limit in Units Other Than lb/hr
	0.5 Gas	2.1	N/A
	9.0 Oil	3.1	
	DO NOT ENTER INTO APIS		DO NOT ENTER INTO APIS

12. Allowable Emissions	lb/hr	ton/yr	13. Allowable Emission in Units Other Than lb/hr

14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date
18. Pollutant Comment (60 Characters)	

DER Form 17-2.1000(1) - Page 12
Effective:

AIR040							APIS	

POLLUTANT INFORMATION (PAGE 4 OF 5)

1. Pollutant Emitted ID SO2	2. Total % Efficiency of Control 0
3. Primary Control Device Code 000	4. Secondary Control Device Code 000
5. Emission Factor Source Test and Design Data	6. Emission Factor Reference Vendor Data

7. Potential Emission	(lb/hr)	(ton/yr)
	0.17 Nat. Gas 112 Standby Fuel Oil	0.75 (8500 hrs/yr) 39.0 (29 days/yr)

8. Estimated Emission (ton/yr) Gas - 0.75 (8500 hrs/yr) Oil - 39.0 (29 days/yr)	9. Emission Estimate Method Code 1 and 2

10. Requested Emission Limit(s)	lb/hr	ton/yr
	0.18 Gas 112 Oil	0.78 39
	DO NOT ENTER INTO APIS	

11. Requested Emission Limit in Units Other Than lb/hr

N/A

DO NOT ENTER INTO APIS

12. Allowable Emissions	lb/hr	ton/yr

13. Allowable Emission in Units Other Than lb/hr

14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date
18. Pollutant Comment (60 Characters)	

AIR040							APIS	

POLLUTANT INFORMATION (PAGE 5 OF 5)

1. Pollutant Emitted ID VOC	2. Total % Efficiency of Control 0
3. Primary Control Device Code 000	4. Secondary Control Device Code 000
5. Emission Factor Source Test and Design Data	6. Emission Factor Reference Vendor Data (includes methane)

7. Potential Emission	(lb/hr)	(ton/yr)
	6.1 Nat. Gas 6.6 Standby Fuel Oil	25.9 (8500 hrs/yr) 2.3 (29 days/yr)

8. Estimated Emission (ton/yr) Gas - 25.9 (8500 hrs/yr) Oil - 2.3 (29 days/yr)	9. Emission Estimate Method Code 1 and 2 (methane and non-methane)

10. Requested Emission Limit(s)	lb/hr	ton/yr
	7.5 Gas	31.8
	8 Oil	2.8
	DO NOT ENTER INTO APIS	

11. Requested Emission Limit in Units Other Than lb/hr

N/A

DO NOT ENTER INTO APIS

12. Allowable Emissions	lb/hr	ton/yr

13. Allowable Emission in Units Other Than lb/hr	
14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date

18. Pollutant Comment (60 Characters)

AIR042							APIS	

VISIBLE EMISSIONS INFORMATION (PAGE 1 OF 1)

1. Visible Emissions Subtype ID VE		
2. Requested Opacity Limit(s)	Normal Conditions 4-5 %	Exceptional Conditions N/A % min/hr
	DO NOT ENTER INTO APIS	
3. Allowable Opacity	Normal Conditions %	Exceptional Conditions % min/hr
4. Regulation Code	5. CEM Required?	
6. Test Frequency	7. Frequency Base Date	

AIR043 APIS

FUGITIVE EMISSIONS INFORMATION (PAGE 1 OF 1)

1. Fugitive Pollutant Emitted

ID None

2. Fugitive Emission Source and Control Information

N/A

3. Quantifiable Fugitive Emission (ton/yr)

N/A

AIR046 APIS

TOXIC POLLUTANT INFORMATION PART I (PAGE PAIR __ OF __)

'RESERVED'

AIR047 APIS

TOXIC POLLUTANT INFORMATION PART II (PAGE PAIR __ OF __)

'RESERVED'

AIR060 APIS

BOILER INFORMATION

1.	Boiler Manufacturer Henry Vogt Machine Company
2.	Boiler Model Number Class MSG
3.	Boiler Type Natural Circ. Finned Tube Heat Rec. Unit
4.	Maximum Heat Input Rate (10^6 Btu/hr) 198.948
5.	Maximum Steam Production Rate (lb/hr) and/or Horsepower 150,750
6.	Generator Nameplate Rating (gross MW) 8.40
7.	Boiler Comment (104 Characters)

AIR061						APIS	

INCINERATOR/RESOURCE RECOVERY INFORMATION

1. Incinerator Manufacturer N/A		
2. Incinerator Type		
3. Incinerator Maximum Capacity	lb/hr	ton/day
4. Dwell Time/Temperature sec. @ °F	5. Afterburner Temperature °F	

6. Type(s) of Waste Incinerated

_ (Trash 0) _ (Rubbish 1) _ (Refuse 2)
_ (Garbage 3) _ (Organic 4) _ (Nonsolid By-Prod 5)
_ (Solid By-Prod 6) _ (MSW 7) _ (Hazardous Waste 8)

_ (Other) Description

7. Generator Nameplate Rating (gross MW)

8. Incinerator Comment (104 Characters)

AIR062 ☐☐ ☐☐☐ ☐☐ ☐☐☐☐ ☐☐ APIS ☐☐

STORAGE TANK INFORMATION (PAGE 1 OF 1)

1. Liquid Storage Tank ID N/A	2. Storage Tank Type of Control
3. Storage Tank Product	4. Storage Tank Size Category (bbl) ☐ 10,500 ☐ 67,000 ☐ 250,000
5. Storage Tank Capacity (10^3 gal)	6. Storage Tank Est. Annual Throughput (10^3 gal)
7. Storage Tank Comment (60 Characters)	

1. Liquid Storage Tank ID N/A	2. Storage Tank Type of Control
3. Storage Tank Product	4. Storage Tank Size Category (bbl) ☐ 10,500 ☐ 67,000 ☐ 250,000
5. Storage Tank Capacity (10^3 gal)	6. Storage Tank Est. Annual Throughput (10^3 gal)
7. Storage Tank Comment (60 Characters)	

1. Liquid Storage Tank ID N/A	2. Storage Tank Type of Control
3. Storage Tank Product	4. Storage Tank Size Category (bbl) ☐ 10,5000 ☐ 67,000 ☐ 250,000
5. Storage Tank Capacity (10^3 gal)	6. Storage Tank Est. Annual Throughput (10^3 gal)
7. Storage Tank Comment (60 Characters)	

SUPPLEMENTAL REQUIREMENTS

1. If not submitted previously, provide an up-to-date 8-1/2" x 11" map (e.g., the relevant portion of a USGS topographic map) showing the location of the facility and points of air pollutant emissions in relation to residences, roads, and other features of the surrounding area. [X] Attached [ ] Submitted Previously

2. If not submitted previously, provide an up-to-date 8-1/2" x 11" plot plan of the facility showing the location of manufacturing processes, control equipment, stacks, vents, and sources of fugitive emissions. [X] Attached [ ] Submitted Previously

3. If not submitted previously, provide an up-to-date 8-1/2" x 11" flow diagram identifying the individual operations and processes. Indicate where raw materials enter, where solid and liquid wastes exit, where gaseous and/or particulate emissions are evolved, and where finished products are obtained. [X] Attached [ ] Submitted Previously

4. For a construction permit application, provide an estimate of the maximum uncontrolled emission rate (in lb/hr) of each pollutant emitted and show the derivation of each such estimate (e.g., AP-42 emission factor). For a construction permit application involving the combustion of any fuel other than distillate oil, liquefied petroleum gas, or natural gas, provide an ultimate analysis of the fuel to be used. The ultimate analysis should give the density, the heat content, and the percent content by weight of carbon, hydrogen, oxygen, sulfur, nitrogen, ash, and moisture.

5. For a construction permit application, show the bases of the potential (after control) emission estimates (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and describe the proposed methods for showing proof of compliance with any applicable emission limiting standards.

6. For a construction permit application, provide design details for all air pollution control systems (e.g., for baghouse, include cloth to air ratio; for scrubber, include cross-section sketch, design pressure drop, etc.). For each such system, provide either a copy of the manufacture's guarantee of control efficiency or an engineering estimate of control efficiency as certified by a registered professional engineer. Items 4, 5, and 6 should be consistent; i.e., Uncontrolled Emission = (Potential Hourly Emission)/(1-Control Efficiency).

7. For a construction permit application subject to review under Rule 17-2.500, "Prevention of Significant Deterioration," or Rule 17-2.510, "New Source Review for Nonattainment Areas," provide all additional information required by the department under such rule (e.g., summary of contemporaneous emission changes, BACT or LAER evaluation, monitoring data, summary of modeling results, one copy of all pertinent model output, etc.).

8. For a permit application subject to the "Reasonably Available Control Technology" provisions of Rule 17-2.650, provide all additional information required by the department under that rule.

9. For a permit application involving the incineration of hazardous wastes, provide all additional information required by the department under Rule 17-30 and Chapter 403, Florida Statutes.

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

PERMIT APPLICATION REPORT FOR THE INSTALLATION OF A COMBINED CYCLE POWER PLANT AT THE REEDY CREEK IMPROVEMENT DISTRICT (WALT DISNEY WORLD) CENTRAL ENERGY PLANT AT LAKE BUENA VISTA, FLORIDA

Prepared by:
Ford, Bacon & Davis, Inc.
Engineers - Constructors
Monroe, Louisiana

July 29, 1987

I6356L

TABLE OF CONTENTS

I. Introduction and Background

II. Project Premises

A. General
B. Existing Turbines
C. "Black Start" Emergency Diesel Generator
D. Illustrations

III. Compliance Basis for Gas Turbine and Steam Generator Emissions

IV. Closure

Appendix

Figure 1 and 2 - Area Map and Site Location
Figure 3 - Area Plot Plan
Figure 4 - Process Flow Diagram

Exhibit 1 - Gas Turbine Performance
Exhibit 2 - Combustion Data
Exhibit 3 - "Black Start" Generator

SUPPLEMENTAL REPORT

I. Introduction and Background

In order to better meet power needs the Reedy Creek Improvement District (Walt Disney World) is planning to shutdown two older, smaller gas turbines and their associated heat recovery steam generators, and replace them with one new GE LM5000 dual-fuel combustion turbine followed by an integrated heat recovery steam boiler and steam turbine.

The Reedy Creek Utilities Company, Inc. will be operating these facilities, but only in behalf of the Owner, which for the purposes of this application is the Reedy Creek Improvement District (RCID).

This 38 MW combined cycle plant is considered a new source of air emissions and falls under the Prevention of Significant Deterioration (PSD) regulations category for NO_X.

A meeting was held with Bureau of Air Quality Management personnel on April 10, 1987 in Tallahassee to introduce the Project and to verify details of the PSD-based Permit-to-Construct requirements. The culmination of this effort is incorporated within this application package and consists of:

a) DER Form 17-2.1000(1)
b) DER Form 17.1.202(1) - both completed forms requested by Engineering Section
c) PSD Permit Analysis Report by ERT
d) Supplemental Report containing -

    1) Area Map
    2) Plot Plan of Emission Source
    3) Process Flow Diagram
    4) Manufacturer's Performance Data - Gas Turbine
    5) Manufacturer's Combustion Products Breakdown - Turbine plus Duct Burner (Gas and Oil)
    6) Manufacturer's Data-Black Start Diesel Generator
    7) Other Relevant Information, Premises and Details

II. Project Premises

A. General

To allow for reasonable maintenance downtime the turbine/heat recovery boiler installation should be operated at about 8500 hours per year although this can vary with needs and machine availability. It is possible that for some twelve month period the equipment may perform for 8760 hours. Thus the requested emission limits are based on a maximum of 8760 hours operation and the potential, more likely, limits on 8500 hours.

These intervals are based on burning natural gas consistently. The turbine and downstream supplementary duct burner can burn No. 2 distillate oil if the natural gas supply is curtailed. This should rarely occur thus this application is based on burning oil only up to 29 days in any one year (maximum oil sulfur level of 0.32%). This interval was predicated on internal reliabilities plus acknowledging that the PSD De Minimis Permitting threshold of 40 tons/year of SO_2 need not be exceeded.

As described in the application itself, there are two emission points involved, the main or primary stack (98.14 SF square unit or an equivalent of 11'-2" diameter) and the emergency bypass stack (121.9 SF square or equivalent of 12'-5" diameter). The main stack exit temperature is 285°F, the bypass 800°F.

The main stack is in continuous service, the bypass unit is used only when the turbine is started up or the steam boiler (and steam turbine) must be shutdown. This shutdown instance should only occur 5-6 times per year for an hour or two for a total of around 12-15 hours per year. Because of this the PSD modeling and emission impact work was based on using only the cooler, lower velocity main stack which is the more conservative approach. Both stacks are to be 65 feet high,which when considering only the adjacent 52½ feet high turbine filter house (64 feet long, 39 feet wide), is substantially below the theoretical (by definition) GEP stack height of 111 feet.

The best available control technology to be used for NO_X abatement is water injection into the turbine combustor and controlled combustion for minimizing CO, particulate matter, volatile organic compound and opacity emissions. The use of selective catalytic reduction (SCR) or other flue gas denitrification steps was not considered cost effective nor environmentally appropriate for this installation.

For example, SCR systems use ammonia as the primary reducing agent for NO_X conversion and must be injected uniformly at near stoichiometric NH_3-NO_X levels with minimum ammonia slippages. The low reaction rates require large reactor configurations and added turbine backpressures. For the GE LM5000 turbine a converter system to reduce NO_X would cost about $850,000 additional over that of water/steam injection for roughly the same removal efficiencies. While water/steam injection performs well with gas or distillate oil firing, residual oils create NO_X (due to its fuel bound nitrogen) thus impairing removals. The sophisticated control system needed for precise ammonia injection (including analyzers for O_2, NO_X and CO) involves an additional $200,000.

Other operating concerns with this emerging catalytic technology are:

a) Reactor must be operated in the 625°-825°F exhaust temperature range consistently,

b) Catalyst life (noble metals) is about four years,

c) Ammonia expense, handling, slip and side reactions forming ammonium nitrates which pose explosive conditions, must be considered.

Overall, based on emission standards, removals, operating regimes, reliability and costs, the use of water injection was deemed superior for this project.

B. Existing Turbines

During the changeover created by shutting down the existing smaller Orenda turbines and starting up the new GE unit, the District and Utilities Company are desirous of maintaining the existing No. 1 and 2 turbine installations (Permit No. A048-106735 and 33) on a standby basis, in event of startup reliability problems associated with the GE unit. This permit overlap period would last approximately six months. The new, plus the two old turbines, would not be operated concurrently, only either the new or one of the old ones at a given time due to a performance failure. Thus it is requested that the existing Permit (A048-106735 and 33) not be withdrawn when the new Permit (GE plus Vogt) is issued, but kept applicable for six (6) months, with the stipulation that both power trains (GE plus Orenda) not be operated simultaneously, but independently, if required for power needs. Whereas the existing No. 1 waste heat boiler will be kept on standby for six months, the existing No. 2 boiler will be dismantled to make room for the new GE/Vogt unit (see Figure 3).

C. "Black Start" Emergency Diesel Generator

If the Reedy Creek facility ever loses their own power generation capability and outside power from the Florida Power Corporation is also not available, a "black start" emergency No. 2 diesel oil-fired generator will provide the necessary electricity to restart the gas turbine or steam boiler. While this set of circumstances will probably never occur, the unit is being provided for this purpose.

Section 17-4.04 of the Department's Regulations on Permit Exemptions (paragraph 11) indicates that any machine that does not cause the issuance of contaminants in sufficient quantity to contribute significantly to the State's pollution problems, etc. are exempted from Permit requirements. Contact with the Bureau on May 20, 1987 indicated while this may be the case, this specific activity should be described as a part of the overall application document but not detailed on a separate application form.

Data on the 1200 KW, 1800 HP Cummins generator package are contained in the Appendix (Exhibit 3). In order to maintain the generator's state of maintenance readiness, it is planned to manually operate it about 10 minutes per week or about 9 hours per year.

Cummins Engine furnished the following information:

Exhaust flow - 12,650 acfm at 810°F - 1779 HP
NO_X emission = 6.83 gm/hp/hr = 12,151 gms/hr = 26.76 lbs/hr
CO emission = 1.07 gm/hp/hr = 1904 gms/hr = 4.19 lbs/hr
Hydroc. emission = 0.27 gm/hp/hr = 480 gms/hr = 1.06 lbs/hr
Particulate emission = 0.25 gm/hp/hr = 445 gms/hr = 0.98 lbs/hr
SO_2 emission = 0.90 gm/hp/hr = 1601 gms/hr = 3.52 lbs/hr (0.32% S oil)

Thus for a 10 minute per week check-out operation the following low-level emissions result:

	lbs/week	lbs/year
NO_X	4.46	232
CO	0.70	36
Hydrocarbons	0.17	9
Particulates	0.16	8
SO_2	0.59	30

Based on these expected results stemming from a nine hour per year operation, it is requested that this unit be exempted from formal Permit requirements per Section 17-4.04 of the DER Regulations. Alternatively it may be incorporated by reference within the application sought for the gas turbine and heat recovery steam generator itself if this appears preferable by the Bureau. In any event, the applicant seeks to validate through the permit process, that this unit will be installed as part of the overall project.

D. Illustrations

Included in this report are two area maps (Figure 1 and 2) depicting the project location at the Central Energy Plant on North Central Drive near Bay Lake, and a more detailed plot plan of the facility (Figure 3) showing the new power facility on the existing developed site. Figure 4 illustrates the process flow configuration of the facility showing the heat/power cycle plus the bypass and main stack (TB-1).

III. Compliance Basis for Gas Turbine and Steam Generator Emissions

Subpart GG - Standards of Performance for Stationary Gas Turbines (40CFR 60) apply to the turbine to be installed as follows:

NO_X Standard = $0.0075 \frac{14.4}{Y} + F$ (for over 100 MM BTU/hr) (% volume dry, 15% O_2)

Y = Manufacturer's rated heat rate at rated load (kj/w-hr)

F = Allowance for fuel bound nitrogen
(if N over 0.25 % = 0.005)
(if N under 0.015% = 0)

$$311.29 \times 10^6 \text{ BTU/hr } (1055 \text{ J/BTU}) \frac{1 \text{ KJ}}{1000 \text{ J}} =$$

$$328.4 \times 10^6 \text{ KJ/hr}$$

$$42{,}573.7 \text{ HP } \left(\frac{746 \text{ w}}{\text{HP}}\right) \underset{\text{(effic.)}}{0.9779} = 31{,}058{,}085 \text{ watts}$$

$$Y = \frac{328.4 \times 10^6}{31.05 \times 10^6} \frac{\text{KJ/hr}}{\text{w}} = 10.576 \frac{\text{KJ}}{\text{w-hr}}$$

Fuel gas has N of 0.756% thus F = 0.005

NO_X Standard = $0.0075 \left(\frac{14.4}{10.576}\right) + 0.005 = 0.01521$ or
(%, dry, 15% O_2)
152.1 ppm by volume dry for natural gas.

Similarly for No. 2 fuel oil:

$$y = \frac{340.44 \times 10^6}{32.63 \times 10^6} \frac{\text{KJ/hr}}{\text{w}}$$

$$y = 10.433 \frac{\text{KJ}}{\text{w-hr}}$$

Fuel oil has N under 0.015% thus F = 0

NO_X Standard = $.0075 \left(\frac{14.4}{10.433}\right) + 0 = 0.01035$ or 103.5 ppm by volume dry for fuel oil

(See manufacturer's data contained in Appendix, Exhibits 1 and 2).

These manufacturer's data indicate that at the bypass stack location the gas-fired turbine can exhaust a gas flow of 513,790 acfm (481,220 acfmd at 15% O_2) at 800°F. The above gas Standard of 152.1 ppm then translates to:

0.0001521 (481,220 acfmd) = 73.19 acfmd NO_X 800°F.
NO_X at 800°F is 0.049 lbs/cf or, 215.1 lbs/hr NO_X allowed for gas firing on a dry basis and corrected for 15% oxygen.

Similarly the manufacturer's data shows that at the bypass stack the oil-fired turbine can exhaust a gas flow of 529,048 acfm (500,744 acfmd at 15% O_2) at 794°F. The above oil standard of 103.5 ppm translates to:

0.0001035 (500,744 acfmd) = 51.83 acfmd NO_X 794°F.
NO_X at 794°F is 0.049 lbs/cf or, 152.4 lbs/hr NO_X allowed for oil firing on a dry basis and corrected for 15% oxygen.

Thus design allowances are defined as follows:

NO_X Limit (gas firing) = 215 lbs/hr
NO_X Limit (oil firing) = 152.4 lbs/hr.

The manufacturer's data also indicates that when gas-firing, the total installation will emit 140.1 lbs/hr of NO_X from the turbine and an additional 2.3 lbs/hr from the downstream duct burner while at full load, for a total emission level of 142.4 lbs/hr NO_X or under the 215 lbs/hr limit.

When firing fuel oil (29 days/year) the installation will emit 146 lbs/hr of NO_X from the turbine and 2.3 lbs/hr from the duct burner, for a total emission of 148.3 lbs/hr NO_X or slightly under the 152 lbs/hr standard.

The duct burner is ordinarily firing at about 23 MM BTU/hr heat release when the upstream gas turbine is operating and at 193 to 198 (gas) MM BTU/hr when the turbine is out of service. Under the EPA Standard published 11/25/86 (40 CFR 60, 51, 227, 42769) gas or distillate oil-fired duct burners used in combined cycle turbine systems are limited to NO_X emissions of 0.20 lbs/MM BTU heat input.

These duct burners comply as indicated:

Low fire - 23 MM BTU/hr x 0.2 = 4.6 lbs NO_X per hour allowed vs. 2.3 lbs/hr expected with gas and oil.

High fire - 198 MM BTU/hr x 0.2 = 39.6 lbs NO_X per hour allowed vs. 39.6 lbs/hr expected with gas and 38.5 lbs/hr expected with oil (compared to 192.7 x 0.2 = 38.5 lbs/hr NO_X allowed for oil).

The oil to be used as emergency fuel has a sulfur content of up to 0.32 percent sulfur or within the 0.8 percent sulfur limit stipulated by the Subpart GG Standard. The fuel gas has a sulfur content of essentially 0.001 percent or within the required 0.015 percent limitation.

Data from the manufacturer shows that without water injection the turbine would discharge at least 250 lbs/hr NO_X while firing gas and 328 lbs/hr NO_X while firing distillate oil at 68°F and 59°F ambient temperatures. These two data points result in 44 to 56 percent removals using a 0.6/1.0 water to fuel ratio. On an overall performance basis, over varying seasonal temperatures, NO_X removal efficiencies of 50 to near 70 percent are anticipated.

Other emissions such as CO, particulates and volatile organic compounds are of relatively low quantity as indicated on the application and will not degrade local air qualities.

Gas turbines produce low amounts of unburned hydrocarbons because of the large amount of excess air involved in the combustion process. Carbon monoxide is also at a very low level because of the high amounts of excess air used and particulates are not a factor in this type operation.

Based on 1986 estimated data furnished to the BAQM by Reedy Creek, shutdown of the two existing Orenda turbines (and their boilers) should result in the following approximate reductions:

CO	70 tons/year *
Particulates	9 tons/year *
Volatiles	26 tons/year *

* Data largely based on AP-42 Tables.

Standards of performance as required will be based on those promulgated by 40 CFR Part 60 and administered by the BAQM through provisions of Section 17-2.660 in the Florida DER Regulations. Proof of operating compliance will be based on those test procedures outlined in Section 17-2.700 of the DER Regulations, specifically EPA Methods 1, 2, 5, 9, 10, 20 and other relevant procedures. Also the compliance testing procedures stipulated by paragraph 60.46b(f) of 40 CFR Part 60 as amended by Subpart Db published 11/25/86 (FR 51, 227, 42792) will be followed.

A continuous emission monitoring system (CEMS) may be installed if required, however indications are that under EPA Standards published November 25, 1986 (FR 51, 227, 42793 - paragraph 60.48b(h)), no NO_x monitor will be necessary. With oil used less than 29 days per year the need for any analyzer (beyond fuel consumption and water injected-to-fuel ratios) is uncertain and official guidance from the BAQM on this matter is requested.

IV. Closure

This project is utilizing the best available control technology in order to reduce and minimize adverse emissions. All critical discharge criteria will be satisfied. The accompanying Modeling (PSD) Report shows that NO_x levels will be well below the PSD significance, de minimis monitoring exemption, and required national air quality concentrations. No discernible impact on visibilities or other environmental parameters are foreseen.

Based on these findings, the Company and District requests favorable consideration of the accompanying Permit application.

RDS:tv/D164/F

APPENDIX

Figure 1 and 2	- Area Map and Site Location
Figure 3	- Area Plot Plan
Figure 4	- Process Flow Diagram
Exhibit 1	- Gas Turbine Performance
Exhibit 2	- Combustion Data
Exhibit 3	- "Black Start" Generator

RDS:tv:D164/F

Ford, Bacon & Davis
Incorporated

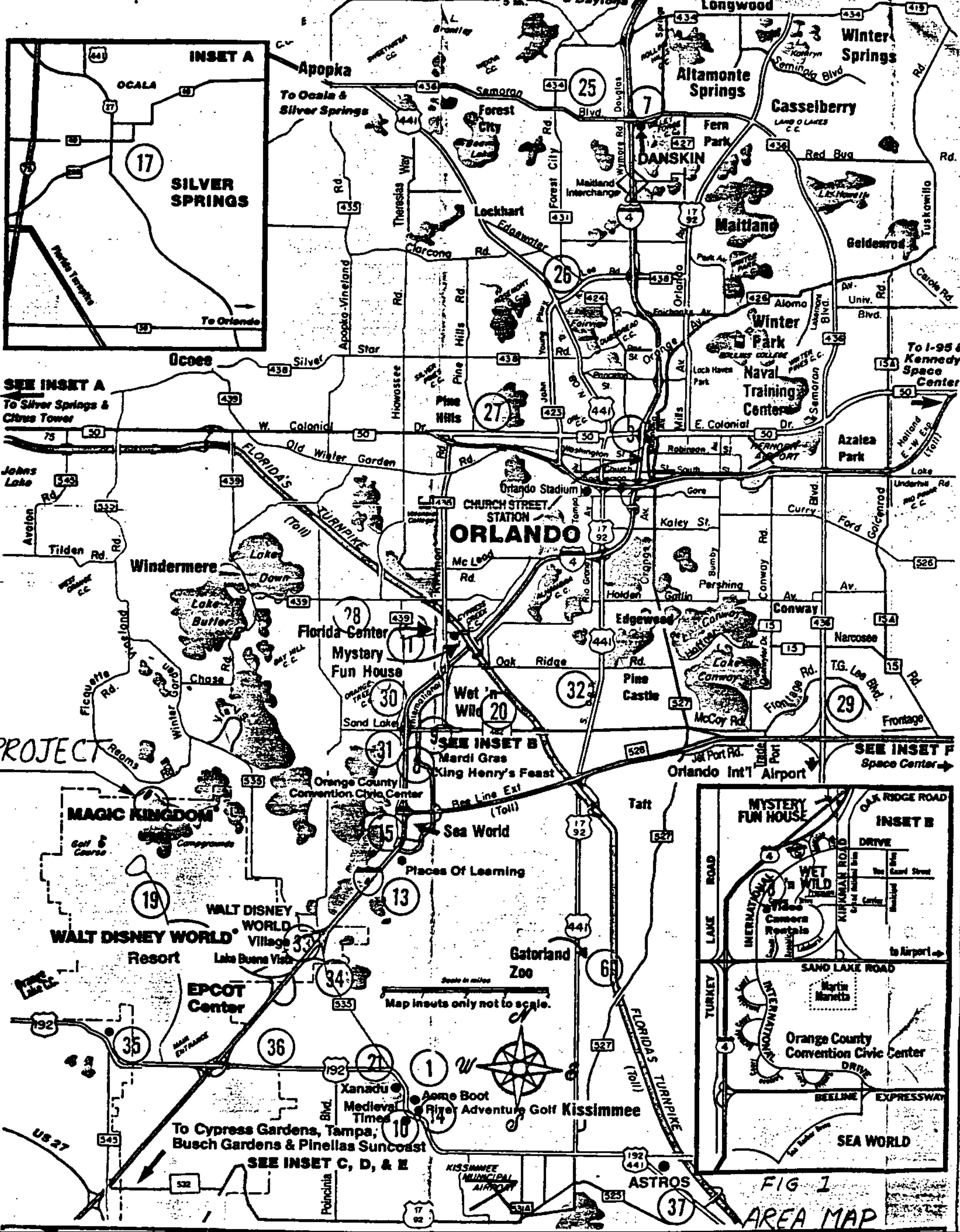


FIG 1
AREA MAP

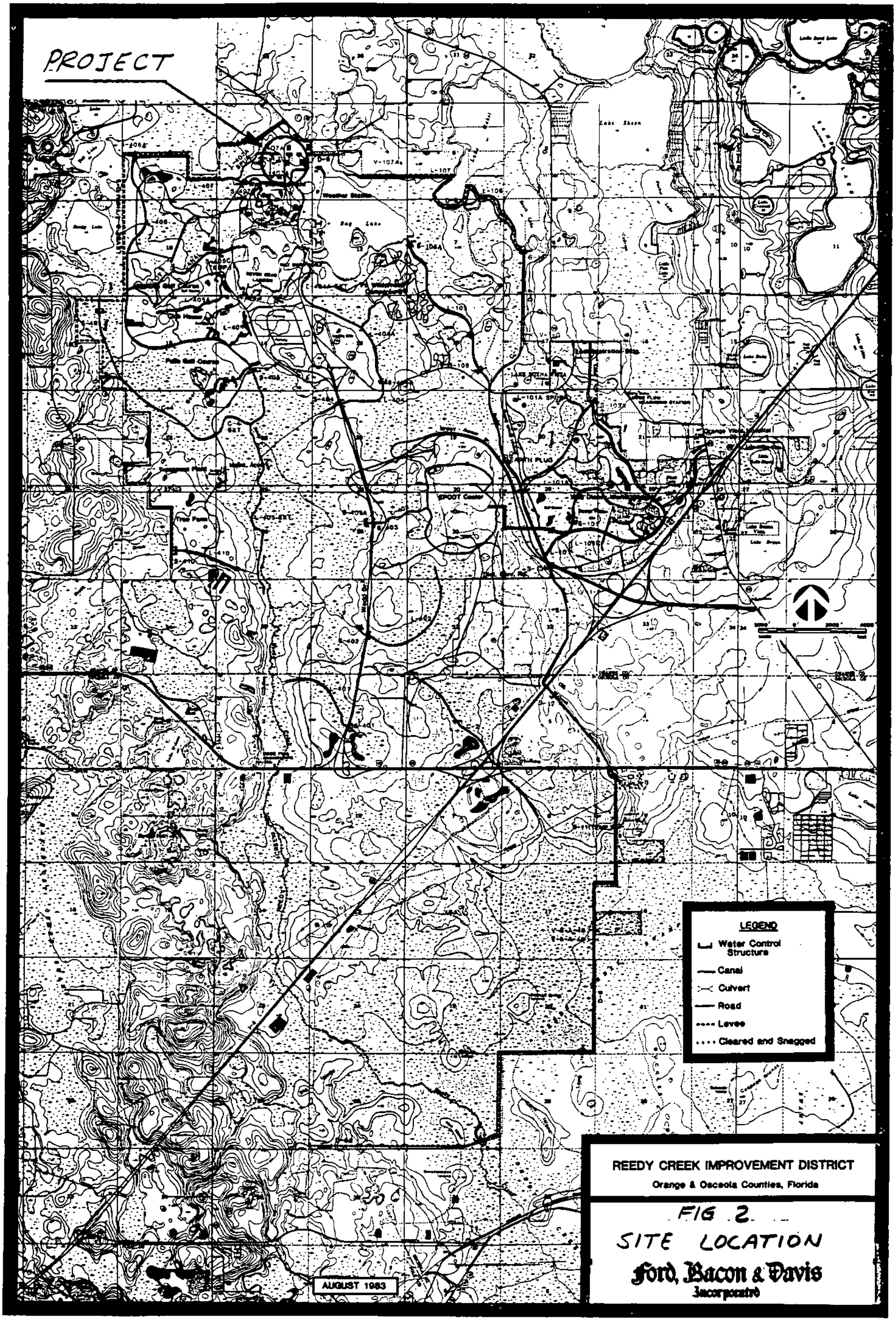


FIG 2
SITE LOCATION

FIG 3

AREA PLOT PLAN

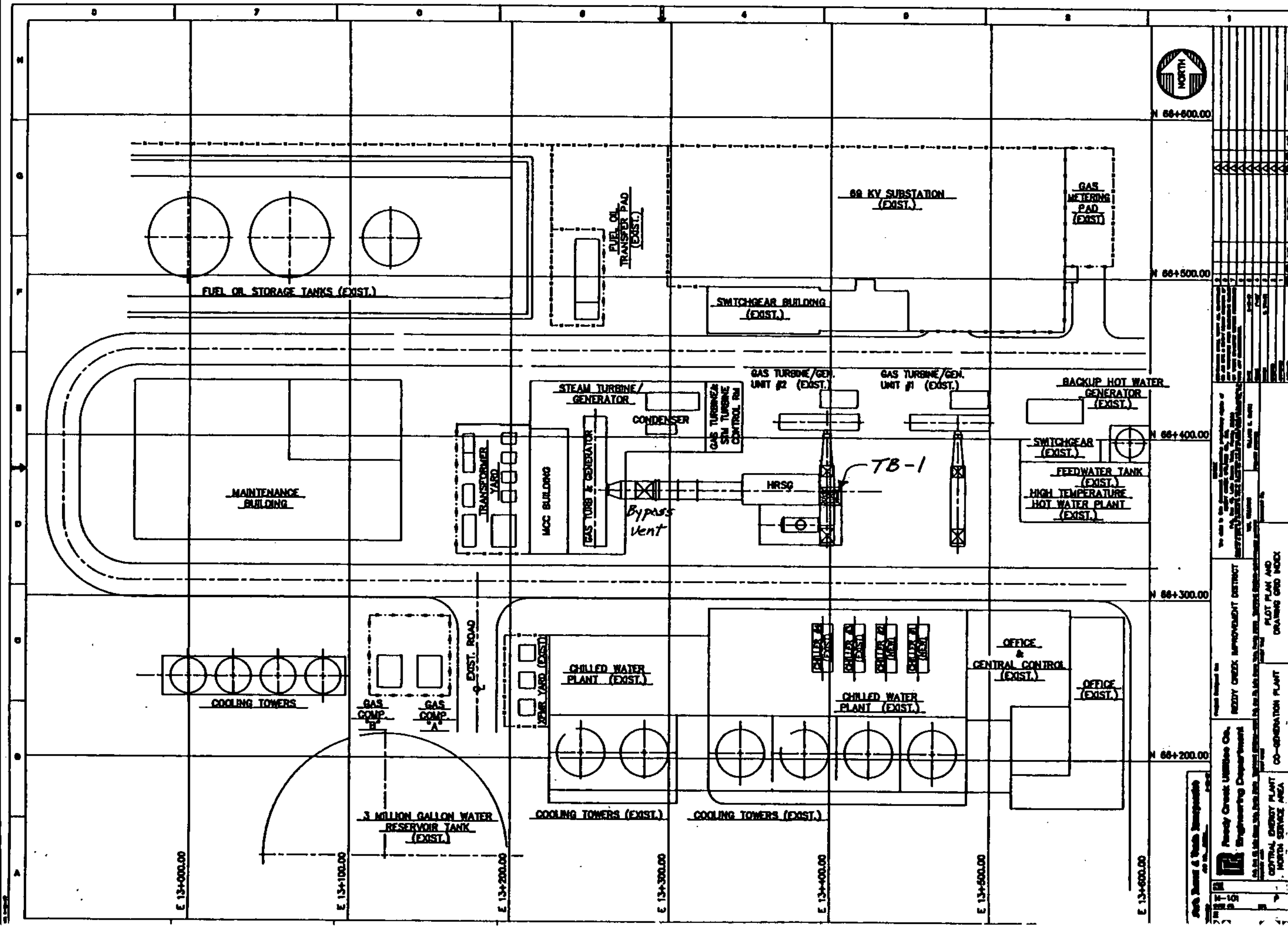
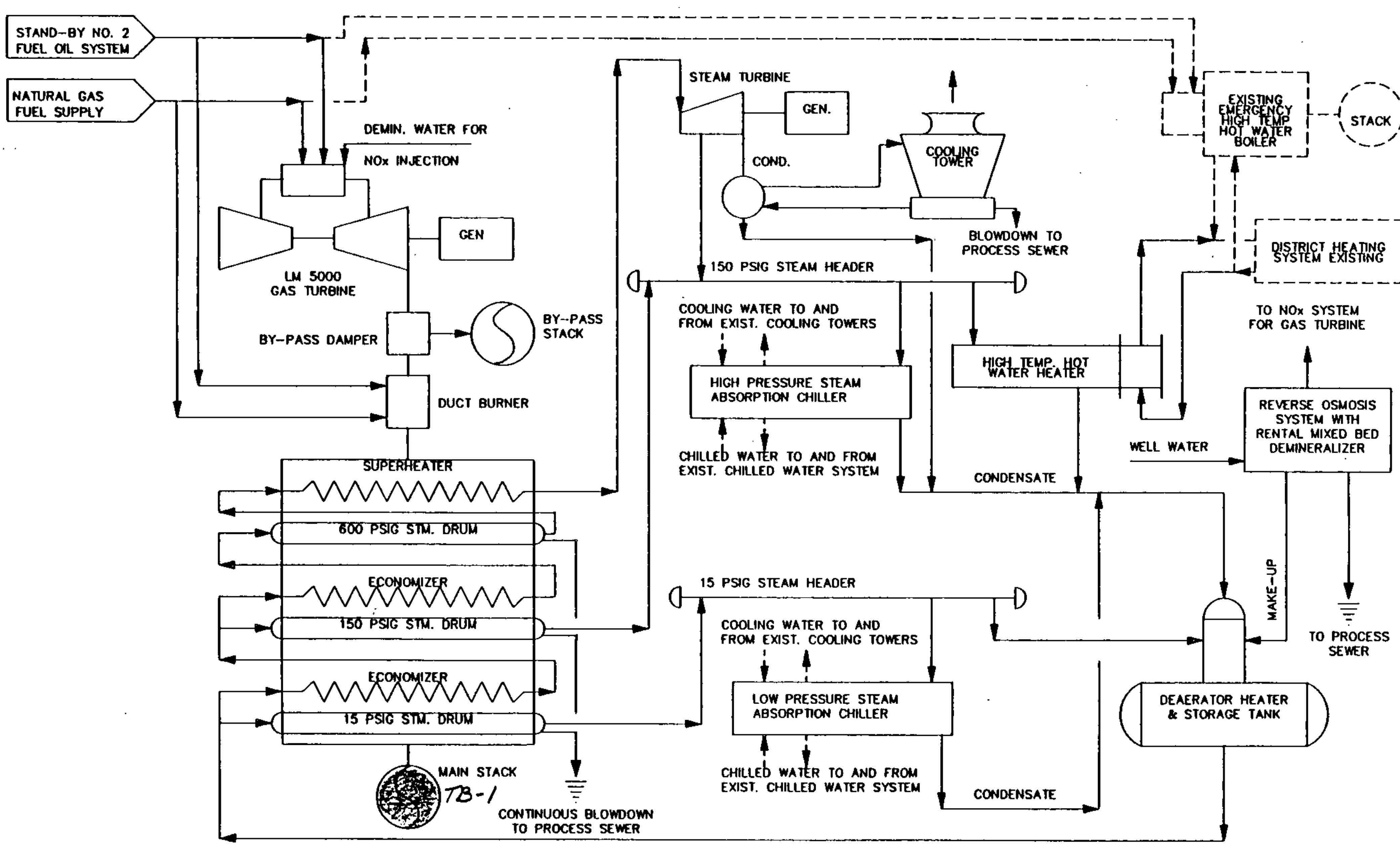


FIG 4
PROCESS FLOW DIAGRAM



REEDY CREEK UTILITIES
COGENERATION PROJECT

Ford, Bacon & Davis Incorporated

EXHIBIT 1
(1 of 5)

6-11-87

5.1 TECHNICAL INFORMATION

5.1.1 Engineering and Performance Data

A. G.T. Mfgr. and Model No. General Electric LM5000 PA

B. Conditions: TURBINE ALONE Gas

1. Elevation 100 Ft.
2. Relative Humidity 60%
3. Inlet Losses 4" H20
4. Exhaust Losses 10" H20
5. New & Clean, Electric Generator Efficiency 97.79%

C. CASE 1: Guarantee Point (Data for this case to be submitted with proposal).

1. Gas Fuel (19,000 BTU/LB-LHV)
2. Water Injection at 0.6/1.0:Water/Fuel ratio (75 PPMV) *WITH EPA HEAT RATE CORRECTION

Performance Data:

	Ambient Temp., F.	20	40	59 2)	58* 2)	80 2)	100 2)	120
1)	Shaft Power, KW	38272	36418	33479	31760 *	29748	26465	N A
	Heat Rate, BTU/KWH-LHV)	9118	9258	9436	9801.6 *	9714	10001	
	Gas Temperature at 1st Stage Vanes, F.				42,573.7 HP 311.29 × 10^6 BTU/h			
4)	Water Injection, LB/HR	5560	5159	4393	3874	2968	1170	
	Metal Temperature at 1st Stage Vanes, F.							
	Turbine Exhaust Gas Temperature, F.	750	779	792	800	814.4	836.4	
	Turbine Exhaust Gas Flow, LB/SEC	307.58	292.73	277.08	269.74	256.0	236.86	
	Turbine Rotor Speed							
	-High Pressure	10176	10144	10093	10132	10142	10183	
	-Low Pressure	3656	3656	3606	3597	3559	3511	
	Emissions, PPMV -WGT.%WET							
	-AR	1.2601	1.2575	1.2515	1.2500	1.2416	1.2279	
	-N2	73.8884	73.7441	73.5441	73.2970	72.9640	72.1598	
	-O2	16.7589	16.6663	16.6061	16.6015	16.4902	16.3806	
	-CO2	4.1162	4.1497	4.2319	4.0994	4.1879	4.1473	
	-H2O	3.9664	4.1723	4.3561	4.7422	5.1063	6.1543	
	-SO2	0	0	0	0	0	0	
	-CO	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	
	-HC	0.0002	0.0002	0.0002	0.0001	0.0002	0.0002	
	-NO & NO2	0.0096	0.0097	0.0098	0.0096	0.0096	0.0095	
	-Particulates LB/HR	<2	<2	<2	<2	<2	<2	

1) At the generator terminals.
* Guaranteed data.
2) Evaporative Cooler operating at all points except 20 deg. and 40 deg.
3) All performance estimates based on a Gas Turbine in new and clean condition
4) The actual water injection schedule will be determined by field emissions test results

6-11-87

D. Case 2: (Dry, Gas Fuel)

1. Gas Fuel (19,000 BTU/LB-LHV)
2. No Water Injection
3. No Bleed Air Extraction

Performance Data: (Same form as CASE 1).

Performance Data:

Ambient Temp., F.	20	40	59	80	100	120
Shaft Power, KW	38923	34967	32373	28526	25690	NA
Heat Rate, BTU/KWH-LHV)	8987	9204	9404	9756	10094	
Gas Temperature at 1st Stage Vanes, F.	NOT CALCULATED	FOR THIS	CASE			
Water Injection, LB/HR	0	0	0	0	0	
Metal Temperature at 1st Stage Vanes, F.	NOT CALCULATED	FOR THIS	CASE			
Turbine Exhaust Gas Temperature, F.	765	782	796	819	839	
Turbine Exhaust Gas Flow, LB/SEC	307.35	286.47	272.13	250.48	233.51	
Turbine Rotor Speed						
-High Pressure	10168	10055	10051	10084	10141	
-Low Pressure	3667	3615	3577	3522	3487	
Emissions, PPMV						
-A	1.2648	1.2629	1.2571	1.2466	1.2300	
-N2	74.3217	74.2075	73.8664	73.2496	72.2814	
-O2	16.8510	16.8919	16.8131	16.6652	16.3730	
-CO2	4.2244	4.1711	4.1532	4.1248	4.1221	
-H2O	3.3166	3.4463	3.8917	4.6986	5.9821	
-SO2	0	0	0	0	0	
-CO	0.0002	0.0002	0.0002	0.0002	0.0002	
-HC	0.0002	0.0002	0.0002	0.0002	0.0002	
-NO & NO2	0.0209	0.0200	0.0180	0.0149	0.0109	
-Particulates	<2	<2	<2	<2	<2	

1) At the generator terminals.

2) Performance is expected, not guaranteed for this case.

6-11-87

E. Case 3: (Liquid Fuel, Wet)

1. Liquid Fuel (18,400 BTU/LB-LHV)
2. Water Injection to EPA Standards
3. No Bleed Air Extraction

Performance Data: (Same form as CASE 1).

TURBINE ALONE

Oil

Performance Data: 44,722.5 HP

Ambient Temp., F.	20	40	59	80	100	120
Shaft Power, KW	39555	36083	33363	29173	25863	NA
Heat Rate, BTU/KWH-LHV)	9295	9490	9672	10019	10354	
			322.69×10^6 BTU/hr			
Gas Temperature at 1st Stage Vanes, F.	NOT CALCULATED FOR THIS CASE					
Water Injection, LB/HR	12608	11743	10435	8496	6203	
Metal Temperature at 1st Stage Vanes, F.	NOT CALCULATED FOR THIS CASE					
Turbine Exhaust Gas Temperature, F.	761	780	794	818	840	
Turbine Exhaust Gas Flow, LB/SEC	311.87	292.62	277.75	254.51	235.24	
Turbine Rotor Speed -High Pressure	10159	10084	10073	10093	10134	
-Low Pressure	3674	3638	3599	3537	3489	
Emissions, PPMV -A	1:2489	1.2470	1.2422	1.2334	1.2197	
-N2	73.2246	73.1140	72.8346	72.3183	71.5122	
-O2	16.4620	16.4721	16.4288	16.3383	16.1425	
-CO2	5.7096	5.6681	5.6280	5.5638	5.5149	
-H2O	3.3435	3.4879	3.8558	4.5362	5.6012	
-SO2	0	0	0	0	0	
-CO	0.0008	0.0006	0.0005	0.0003	0.0003	
-HC	0.0002	0.0002	0.0002	0.0002	0.0002	
-NO & NO2	0.0104	0.0101	0.0099	0.0095	0.0091	
-Particulates Lbs/Hr	<10	<10	<10	<10	<10	

1) At the generator terminals.

2) Performance is expected, not guaranteed for this case.

3) Assumes zero sulfur in fuel

F. Case 4: (Liquid Fuel, Dry)

1. Liquid fuel (18,400 BTU/LB-LHV)
2. Water Injection to EPA Standard (NONE)
3. No Bleed Air Extraction

6-11-87

Performance Data: (Same form as CASE 1).

Performance Data:

Ambient Temp., F.	20	40	59	80	100	120
Shaft Power, KW	37530	33443	30918	27236	24383	NA
Heat Rate, BTU/KWH-LHV)	9101	9357	9569	9939	10318	
Gas Temperature at 1st Stage Vanes, F.	NOT CALCULATED FOR THIS CASE					
Water Injection, LB/HR	0	0	0	0	0	
Metal Temperature at 1st Stage Vanes, F.	NOT CALCULATED FOR THIS CASE					
Turbine Exhaust Gas Temperature, F.	770	790	804	827	848	
Turbine Exhaust Gas Flow, LB/SEC	302.48	280.62	266.44	245.36	228.10	
Turbine Rotor Speed						
-High Pressure	9992	9974	9981	10024	10080	
-Low Pressure	3624	3569	3532	3473	3441	
Emissions, PPMV						
-A	1.2643	1.2624	1.2566	1.2460	1.2295	
-N2	74.1155	74.0036	73.6641	73.0494	72.0827	
-O2	16.9741	17.0119	16.9331	16.7831	16.4916	
-CO2	5.4725	5.4046	5.3818	5.3472	5.3448	
-H2O	2.1342	2.2794	2.7298	3.5431	4.8289	
-SO2	0	0	0	0	0	
-CO	0.0003	0.0003	0.0003	0.0002	0.0002	
-HC	0.0002	0.0002	0.0002	0.0002	0.0002	
-NO & NO2	0.0389	0.0376	0.0342	0.0288	0.0220	
-Particulates	10	10	10	10	10	

1) At the generator terminals.

2) Performance is expected, not guaranteed for this case.

5.1.13 Part Load Exhaust Emissions

(SEE COEN)

6-11-87

A. Exhaust Emissions (Gas Fuel)

	NOx LB/HR	CO PPMV	SOx PPMV	Particulates LB/HR	Air Flow 10^{-5} LB/HR	Temp. F.
Synch.Sp./No Load	14	272	0	<2	3.996	682
25% Cont. Rating	45	26			5.658	694
50% Cont. Rating	81	7			7.257	730
75% Cont. Rating	108	2			8.556	765
100% Cont. Rating	136 *	2			9.696	800

B. Exhaust Emissions (Liquid Fuel)

	NOx LB/HR	CO PPMV	SOx PPMV	Particulates LB/HR	Air Flow 10^{-5} LB/HR	Temp. F.	Opacity Von Brand No. O.P.	V.B.
Synch.Sp./No Load	33	388	28	1.9	3.994	690	<2	>90
25% Cont. Rating	56	67	34	3.2	5.705	698		
50% Cont. Rating	85	27	40	4.8	7.334	733		
75% Cont. Rating	113	10	46	6.4	8.665	767		
100% Cont. Rating	143 *	5	51	8.0	9.828	804		

NOTE: Performance on commercially available No. 2 home heating oil, without smoke-reducing additives.

Notes apply to all tabulated data:

1. CO is expected.
2. Only NOx is guaranteed at 110 PPMVD @ 15% O_2 (Gas)/108 PPMVD @ 15% O_2 (Dist.)
3. SO_x assumes 0.3% sulfur in liquid fuel
4. Particulates are shown in LB/HR, not PPMVD. Values include engine generated particulates only, not including particulate material which might enter the engine via water injection, fuel or inlet air.
5. *Guaranteed per conditions given in Section 5.0.1, Base Load Rating, 68°F with the evaporative cooler operating.
6. Exhaust air flow is expressed in ~~10^{-6}~~ 10^{-5}.

EXHIBIT 2
(1 of 8)

COMBUSTION DATA

PROJECT: Reedy Creek Utilities June 26, 1987 Page 3

TURBINE ALONE

General Electric LM-5000 - Firing Natural Gas - 68 Deg. F

ON GAS WITH WATER INJECTION

TURBINE EXHAUST GAS FLOW (LBS/HR): 971064 GUAR.

TURBINE EXHAUST GAS TEMPERATURE: 800 Degrees F.

0.0315 lbs/cf

TURBINE EXHAUST GAS COMPOSITION:

	% WT.	LBS/HR	Vol. %	Vol.% Dry
Oxygen O_2	16.3779	159039.6	14.563	15.665
Carbon Dioxide CO_2	4.3879	42609.12	2.837	3.052
Water Vapor H_2O	4.4528	43239.88	7.033	0
Nitrogen N_2	73.5155	713882.7	74.666	80.315
Argon Ar	1.2510	12147.73	0.891	0.958
Carbon Monoxide CO	0.0003	2.6704	0.0003	0.0003
Nitrogen Oxides NO_x	0.0144	140.1440 ✓	0.0089	0.0096
Hydrocarbons CH_4	0.0002	1.5314	0.0003	0.0003
Hydrocarbons C_2H_6	0	0	0	0
Sulfur Dioxide SO_2	0	0	0	0
Particulate	0.000039	0.3836	0.0001	0.0001
TOTAL	100.000	971063.9	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen:	3.38
NO_x - PPMV Dry, Reference 15% Oxygen:	107.98
CH_4 - PPMV Dry, Reference 15% Oxygen:	3.38
C_2H_6 - PPMV Dry, Reference 15% Oxygen:	0.00
SO_2 - PPMV Dry, Reference 15% Oxygen:	0.00

BYPASS STACK
d = 12.41'
V = 70.8 fps
513,790 acfm

Exhaust Gas Molecular Weight: 28.455

Burner Fuel: Natural Gas

Heating Value: 21065 BTU/LB (HHV)
19000 BTU/LB (LHV)

Duct Burner Heat Input: 23.136 Million BTU/HR (Gross HHV)
20.868 Million BTU/HR (Net LHV)

Fuel Gas Elemental Composition:

	WEIGHT %	LBS/HR
CARBON	73.480%	807.040
HYDROGEN	24.080%	264.477
OXYGEN	1.684%	18.492
SULFUR	0.000%	0.000
NITROGEN	0.756%	8.306
ASH	0.000%	0.000
TOTAL	100.000%	1098.315

Emissions Added by the Duct Burner (LB/Million BTU HHV):

NO_x as NO_2:	0.100
Carbon Monoxide:	0.380
UBHC as CH_4:	0.190
UBHC as C_2H_6:	0
Particulate:	0.001

ADDITIONAL AIR SOURCES:

Flame Scanner Cooling Air:	2160 LBS/HR
Augmenting Combustion Air:	0 LBS/HR
Atomizing Air:	0 LBS/HR
Total	2160 LBS/HR

TURBINE PLUS DUCT BURNER

ON GAS WITH WATER INJECTION

68°F COMBUSTION PRODUCTS DOWNSTREAM OF THE DUCT BURNER

Downstream Firing Temperature: 874 Degrees F.

COMBUSTION PRODUCTS (LBS/HR) 0.0297 lbs/cf

BOILER STACK = 285°F (0.053 lbs/cf)

	Upstream	Fuel	Air	Total	
Oxygen O2	159039.6	-4228.17	500.040	155311.5	
Carbon Dioxide CO2	42609.12	2953.766	0	45562.89	
Water Vapor H2O	43239.88	2364.422	0	45604.30	
Nitrogen N2	713882.7	8.306	1659.960	715551.0	
Argon Ar	12147.73	0	0	12147.73	
Carbon Monoxide CO	2.670	8.792	0	11.462	
Nitrogen Oxides NOx	140.144	2.314	0	142.458	✓ 8500 hrs/yr
Hydrocarbons CH4	1.531	4.396	0	5.927	
Hydrocarbons C2H6	0.000	0.000	0	0.000	= 605.4 t/yr.
Sulfur Dioxide SO2	0.000	0.000	0	0.000	
Particulate	0.384	0.023	0	0.407	
TOTAL	971063.9	1113.839	2160.000	974337.7	

COMBUSTION PRODUCTS - VOLUME BASIS

MAIN STACK
d = 11.16'
V = 52.2 fps
306,396 acfm

	Moles/HR	Vol. %	Vol. % Dry
Oxygen O2	4853.486	14.161	15.290
Carbon Dioxide CO2	1035.285	3.021	3.261
Water Vapor H2O	2530.761	7.384	0
Nitrogen N2	25546.26	74.536	80.478
Argon Ar	304.089	0.887	0.958
Carbon Monoxide CO	0.409	0.001	0.001
Nitrogen Oxides NOx	3.096	0.009	0.010
Hydrocarbons CH4	0.370	0.001	0.001
Hydrocarbons C2H6	0	0	0
Sulfur Dioxide SO2	0	0	0
Particulate	0.034	0.000	0.000
TOTAL	34273.79	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen: 13.55
NOx - PPMV Dry, Reference 15% Oxygen: 102.50
CH4 - PPMV Dry, Reference 15% Oxygen: 12.23
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 0.00

Exhaust Gas Molecular Weight: 28.432

COEN Company, Incorporated
1510 Rollins Road; Burlingame, CA 94010
(415) 697-0440
Automatic Telefax Number (415) 579-3255

ROJECT: Reedy Creek Utilities June 26, 1987 Page 5 DUCT BURNER
Fresh Air Operation at 68 Deg. F - Natural Gas Firing
FRESH AIR FLOW (LBS/HR): 544000

FRESH AIR ONLY FOR GAS

FRESH AIR INLET TEMPERATURE: 68 Degrees F.

URBINE EXHAUST GAS COMPOSITION:	% WT.	LBS/HR	Vol. %	Vol.% Dry
Oxygen O2	20.9500	113968	18.889	18.889
Carbon Dioxide CO2	0.0300	163.2	0.020	0.020
Water Vapor H2O	0	0	0	0
Nitrogen N2	78.0900	424809.6	80.420	80.420
Argon Ar	0.9300	5059.2	0.672	0.672
Carbon Monoxide CO	0	0	0	0
Nitrogen Oxides NOx	0	0	0	0
Hydrocarbons CH4	0	0	0	0
Hydrocarbons C2H6	0	0	0	0
Sulfur Dioxide SO2	0	0	0	0
Particulate	0	0	0	0
TOTAL	100.000	544000	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen: 0.00
NOx - PPMV Dry, Reference 15% Oxygen: 0.00
CH4 - PPMV Dry, Reference 15% Oxygen: 0.00
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 0.00

Exhaust Gas Molecular Weight: 28.852

Burner Fuel: Natural Gas

Heating Value: 21065 BTU/LB (HHV)
19000 BTU/LB (LHV)

Duct Burner Heat Input: 198.060 Million BTU/HR (Gross HHV) ✓
178.644 Million BTU/HR (Net LHV)

Fuel Gas Elemental Composition:

	WEIGHT %	LBS/HR
CARBON	73.480%	6908.814
HYDROGEN	24.080%	2264.102
OXYGEN	1.684%	158.306
SULFUR	0.000%	0.000
NITROGEN	0.756%	71.103
ASH	0.000%	0.000
TOTAL	100.000%	9402.326

Emissions Added by the Duct Burner (LB/Million BTU HHV):

NOx as NO2:	0.200
Carbon Monoxide:	0.160
UBHC as CH4:	0.080
UBHC as C2H6:	0
Particulate:	0.001

ADDITIONAL AIR SOURCES:

Flame Scanner Cooling Air:	2160 LBS/HR
Augmenting Combustion Air:	0 LBS/HR
Atomizing Air:	0 LBS/HR
Total	2160 LBS/HR

DUCT BURNER
ALONE

Page 6 GAS FIRING

COMBUSTION PRODUCTS DOWNSTREAM OF THE DUCT BURNER

68°F

Downstream Firing Temperature: 1282 Degrees F.

COMBUSTION PRODUCTS (LBS/HR)

	Upstream	Fuel	Air	Total
Oxygen O2	113968	-36196.1	500.040	78271.92
Carbon Dioxide CO2	163.2	25286.26	0	25449.46
Water Vapor H2O	0	20241.07	0	20241.07
Nitrogen N2	424809.6	71.103	1659.960	426540.6
Argon Ar	5059.2	0	0	5059.2
Carbon Monoxide CO	0	31.690	0	31.690
Nitrogen Oxides NOx	0	39.612	0	39.612
Hydrocarbons CH4	0	15.845	0	15.845
Hydrocarbons C2H6	0	0	0	0
Sulfur Dioxide SO2	0	0	0	0
Particulate	0	0.198	0	0.198
TOTAL	544000	9489.671	2160.000	555649.6

COMBUSTION PRODUCTS - VOLUME BASIS

	Moles/HR	Vol. %	Vol. % Dry
Oxygen O2	2445.998	12.540	13.306
Carbon Dioxide CO2	578.265	2.965	3.146
Water Vapor H2O	1123.256	5.759	0
Nitrogen N2	15228.15	78.072	82.842
Argon Ar	126.645	0.649	0.689
Carbon Monoxide CO	1.131	0.0058	0.0062
Nitrogen Oxides NOx	0.861	0.0044	0.0047
Hydrocarbons CH4	0.988	0.0051	0.0054
Hydrocarbons C2H6	0	0	0
Sulfur Dioxide SO2	0	0	0
Particulate	0.016	0.000	0.000
TOTAL	19505.31	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen: 48.00
NOx - PPMV Dry, Reference 15% Oxygen: 36.53
CH4 - PPMV Dry, Reference 15% Oxygen: 41.91
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 0.00

Exhaust Gas Molecular Weight: 28.492

COEN Company, Incorporated
1510 Rollins Road; Burlingame, CA 94010
(415) 697-0440
Automatic Telefax Number (415) 579-3255

PROJECT: Reedy Creek Utilities June 26, 1987 Page 11
Fresh air Operation at 59 Deg. F - #2 Fuel Oil Firing
FRESH AIR FLOW (LBS/HR): 544000

DUCT BURNER
FRESH AIR ONLY FOR OIL

FRESH AIR INLET TEMPERATURE: 59 Degrees F.

TURBINE EXHAUST GAS COMPOSITION:	% WT.	LBS/HR	Vol. %	Vol.% Dry
Oxygen O2	20.9500	113968	18.889	18.889
Carbon Dioxide CO2	0.0300	163.2	0.020	0.020
Water Vapor H2O	0	0	0	0
Nitrogen N2	78.0900	424809.6	80.420	80.420
Argon Ar	0.9300	5059.2	0.672	0.672
Carbon Monoxide CO	0	0	0	0
Nitrogen Oxides NOx	0	0	0	0
Hydrocarbons CH4	0	0	0	0
Hydrocarbons C2H6	0	0	0	0
Sulfur Dioxide SO2	0	0	0	0
Particulate	0	0	0	0
TOTAL	100.000	544000	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen: 0.00
NOx - PPMV Dry, Reference 15% Oxygen: 0.00
CH4 - PPMV Dry, Reference 15% Oxygen: 0.00
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 0.00

Exhaust Gas Molecular Weight: 28.852

Burner Fuel: #2 Fuel Oil

Heating Value: 19504 BTU/LB (HHV)
18400 BTU/LB (LHV)

Duct Burner Heat Input: 192.790 Million BTU/HR (Gross HHV)
181.877 Million BTU/HR (Net LHV)

Fuel ~~Gas~~ Oil Elemental Composition:

	WEIGHT %	LBS/HR
CARBON	87.300%	8629.290
HYDROGEN	12.400%	1225.695
OXYGEN	0.000%	0.000
SULFUR	0.300%	29.654
NITROGEN	0.000%	0.000
ASH	0.000%	0.000
TOTAL	100.000%	9884.639

Emissions Added by the Duct Burner (LB/Million BTU HHV):

NOx as NO2:	0.200
Carbon Monoxide:	0.160
UBHC as CH4:	0.080
UBHC as C2H6:	0
Particulate:	0.004

ADDITIONAL AIR SOURCES:

Flame Scanner Cooling Air:	2160 LBS/HR
Augmenting Combustion Air:	28977 LBS/HR
Atomizing Air:	7920 LBS/HR
Total	39057 LBS/HR

DUCT BURNER
ALONE
OIL FIRING

COMBUSTION PRODUCTS DOWNSTREAM OF THE DUCT BURNER

59°F

Downstream Firing Temperature: 1236 Degrees F.

COMBUSTION PRODUCTS (LBS/HR)

	Upstream	Fuel	Air	Total
Oxygen O2	113968	-32715.5	9041.696	90294.11
Carbon Dioxide CO2	163.2	31583.20	0	31746.40
Water Vapor H2O	0	10957.71	0	10957.71
Nitrogen N2	424809.6	0.000	30015.30	454824.9
Argon Ar	5059.2	0	0	5059.2
Carbon Monoxide CO	0	30.846	0	30.846
Nitrogen Oxides NOx	0	38.558	0	38.558
Hydrocarbons CH4	0	15.423	0	15.423
Hydrocarbons C2H6	0	0	0	0
Sulfur Dioxide SO2	0	59.30783	0	59.30783
Particulate	0	0.771	0	0.771
TOTAL	544000	9970.238	39057	593027.2

COMBUSTION PRODUCTS - VOLUME BASIS

	Moles/HR	Vol. %	Vol. % Dry
Oxygen O2	2821.691	13.751	14.171
Carbon Dioxide CO2	721.345	3.515	3.623
Water Vapor H2O	608.086	2.963	0
Nitrogen N2	16237.94	79.134	81.551
Argon Ar	126.645	0.617	0.636
Carbon Monoxide CO	1.101	0.0054	0.0055
Nitrogen Oxides NOx	0.838	0.0041	0.0042
Hydrocarbons CH4	0.962	0.0047	0.0048
Hydrocarbons C2H6	0	0	0
Sulfur Dioxide SO2	0.926	0.0045	0.0046
Particulate	0.064	0.0003	0.0003
TOTAL	20519.60	100.000	100.000

CO -- PPMV Dry, Reference 15% Oxygen: 48.59
NOx - PPMV Dry, Reference 15% Oxygen: 36.98
CH4 - PPMV Dry, Reference 15% Oxygen: 42.43
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 40.85 ✓

Exhaust Gas Molecular Weight: 28.904

COEN Company, Incorporated
1510 Rollins Road; Burlingame, CA 94010
(415) 697-0440
Automatic Telefax Number (415) 579-3255

TURBINE ALONE ON OIL WITH WATER INJECTION

ROJECT: Reedy Creek Utilities June 26, 1987 Page 13
General Electric LM-5000 - Firing Liquid Fuel - 59 Deg. F
URBINE EXHAUST GAS FLOW (LBS/HR): 999900.0

URBINE EXHAUST GAS TEMPERATURE: 794 Degrees F.

URBINE EXHAUST GAS COMPOSITION:	% WT.	LBS/HR	Vol. %	Vol.% Dry
Oxygen O2	16.2216	162199.4	14.554	15.489
Carbon Dioxide CO2	5.8397	58390.75	3.809	4.054
Water Vapor H2O	3.7903	37899.42	6.040	0
Nitrogen N2	72.8791	728717.6	74.683	79.484
Argon Ar	1.2432	12430.82	0.893	0.951
Carbon Monoxide CO	0.0008	8.2592	0.0008	0.0009
Nitrogen Oxides NOx	0.0146	146.0954 ✓	0.0091	0.0097
Hydrocarbons CH4	0.0002	2.1098	0.0004	0.0004
Hydrocarbons C2H6	0	0	0	0
Sulfur Dioxide SO2	0.010501	105 ✓	0.0094	0.0100
Particulate	0.000041	0.4100	0.0001	0.0001
TOTAL	100.000	999900.0	100.000	100.000

CO - PPMV Dry, Reference 15% Oxygen: 9.81
NOx - PPMV Dry, Reference 15% Oxygen: 105.65
CH4 - PPMV Dry, Reference 15% Oxygen: 4.38
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 108.97

Exhaust Gas Molecular Weight: 28.710

Burner Fuel: #2 Fuel Oil

Heating Value: 19504 BTU/LB (HHV)
18400 BTU/LB (LHV)

Duct Burner Heat Input: 22.531 Million BTU/HR (Gross HHV)
21.256 Million BTU/HR (Net LHV)

Fuel ~~Gas~~ oil Elemental Composition:

	WEIGHT %	LBS/HR
CARBON	87.300%	1008.489
HYDROGEN	12.400%	143.245
OXYGEN	0.000%	0.000
SULFUR	0.300% ✓	3.466
NITROGEN	0.000%	0.000
ASH	0.000%	0.000
TOTAL	100.000%	1155.199

Emissions Added by the Duct Burner (LB/Million BTU HHV):

NOx as NO2: 0.100
Carbon Monoxide: 0.400
UBHC as CH4: 0.200
UBHC as C2H6: 0
Particulate: 0.004

ADDITIONAL AIR SOURCES:
Flame Scanner Cooling Air: 2160 LBS/HR
Augmenting Combustion Air: 0 LBS/HR
Atomizing Air: 7920 LBS/HR
Total 10080 LBS/HR

TURBINE PLUS
DUCT BURNER

Page 14 ON OIL
WITH WATER
INJECTION

COMBUSTION PRODUCTS DOWNSTREAM OF THE DUCT BURNER

59°F

Downstream Firing Temperature: 863 Degrees F.

COMBUSTION PRODUCTS (LBS/HR)

STACK = 285°F

	Upstream	Fuel	Air	Total
Oxygen O2	162199.4	-3823.40	2333.520	160709.6
Carbon Dioxide CO2	58390.75	3691.068	0	62081.82
Water Vapor H2O	37899.42	1280.607	0	39180.03
Nitrogen N2	728717.6	0.000	7746.480	736464.1
Argon Ar	12430.82	0	0	12430.82
Carbon Monoxide CO	8.259	9.012	0	17.272
Nitrogen Oxides NOx	146.095	2.253	0	148.348 ✓
Hydrocarbons CH4	2.110	4.506	0	6.616
Hydrocarbons C2H6	0.000	0.000	0	0.000
Sulfur Dioxide SO2	105.000	6.931	0	111.931 ✓
Particulate	0.410	0.090	0	0.500
TOTAL	999900.0	1171.061	10080	1011151.

($0.053 \frac{lbs}{cf}$)

COMBUSTION PRODUCTS - VOLUME BASIS

317,972 acfm

dia. = 11.16'

vel. = 54.2 fps

	Moles/HR	Vol. %	Vol. % Dry
Oxygen O2	5022.175	14.261	15.199
Carbon Dioxide CO2	1410.630	4.006	4.269
Water Vapor H2O	2174.253	6.174	0
Nitrogen N2	26292.89	74.659	79.572
Argon Ar	311.175	0.884	0.942
Carbon Monoxide CO	0.617	0.002	0.002
Nitrogen Oxides NOx	3.224	0.009	0.010
Hydrocarbons CH4	0.412	0.001	0.001
Hydrocarbons C2H6	0	0	0
Sulfur Dioxide SO2	1.747	0.005	0.005
Particulate	0.042	0.000	0.000
TOTAL	35217.17	100.000	100.000

SO_2

40 ton/yr limit

112 lbs/hr for 714 hrs

= 29.7 days / year MAX.

CO - PPMV Dry, Reference 15% Oxygen: 19.30
NOx - PPMV Dry, Reference 15% Oxygen: 100.93
CH4 - PPMV Dry, Reference 15% Oxygen: 12.91
C2H6 - PPMV Dry, Reference 15% Oxygen: 0.00
SO2 - PPMV Dry, Reference 15% Oxygen: 54.69 ✓

Exhaust Gas Molecular Weight: 28.715

COEN Company, Incorporated
1510 Rollins Road; Burlingame, CA 94010
(415) 697-0440
Automatic Telefax Number (415) 579-3255

Cummins Mid-South
666 Riverside Drive
P.O. Box 3080
Memphis, Tennessee
38103

325 New Highway 49 South • Phone 601/939-1800 • Jackson, MS 39218
1784 East Brooks Road • 901/345-7424 • Memphis, TN 38116
6600 Interstate 30 • Phone 501/568-2200 • Little Rock, AR 72209
1906 North 6th Street • Phone 501/474-7953 • Van Buren, AR 72956

Louisiana Division
4628 1-10 Service Road
P.O. Box 277
Metairie, LA 70004-0277
504-885-5675

December 15, 1986

EXHIBIT 3

(1 of 4)

Ford, Bacon and Davis
4001 Jackson Street
Monroe, LA 71210

F. ... INC. P. D.
Rec. DEC 18 1986
Ref'd to
Noted

GENERATOR

Attn: Gene Hodges

Re: T6356D/023 Alt.

Gentlemen:

Please find below and attached our proposal for the above referenced bid.

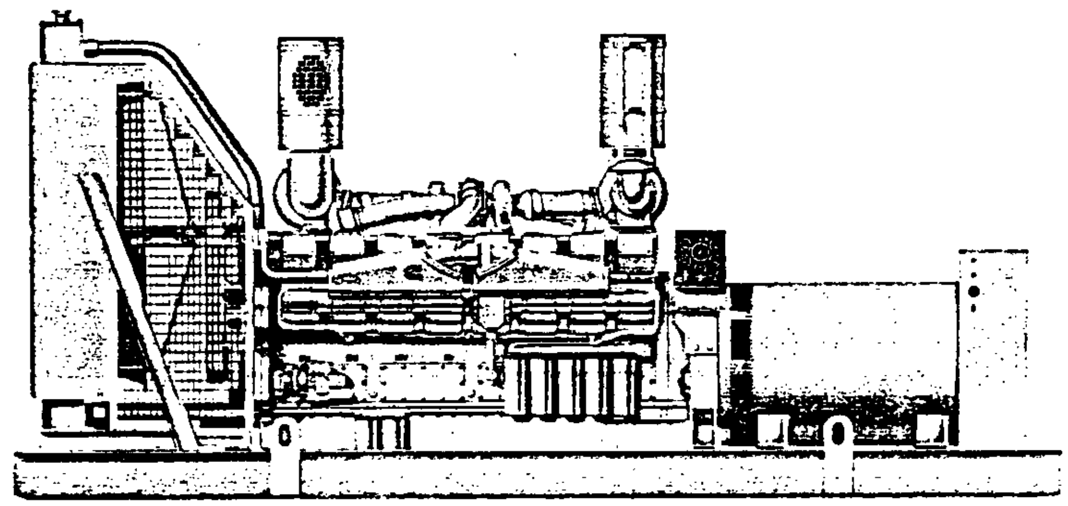
We propose to furnish one (1) New Cummins Generator Drive Package, Model KTTA50G1 unit factory mounted with a New Newage Stamford Generator, Model SC734C rated 1750KW, 480V continuous standby with PMG pilot exciter. This unit will be equipped with a Woodward 2301 electro hydraulic governor, as well as all monitoring and shutdown devices as specified and requested.

This generator unit will be mounted on a large skid (approx 29'x7') with fabcell vibration isolation devices and a 150 gallon simplex fuel oil day tank and electric transfer pump. This unit will be covered by one (1) sound attenuated generator and swithgear weatherproof enclosure (approx 29'Lx7'Wx10'H) with double access doors, sound baffler, and separate switchgear room. The switchgear room will contain one (1) enclosure (90"x42"x42") for the switchgear requested. All relays, switches, monitors, and wiring will be installed as requested throughout the enclosure. (Please see attached switchgear sheet).

The engine generator package will be manufactured, assembled, and tested at Cummins Engine Company, Inc. in Columbus, Indiana. The system shutdown devices, instrumentation, enclosure assembly, and controls will be manufactured and upfitted at Point 8 Power, Inc. in Belle Chasse, LA. Here the unit will complete the testing procedure, and be ready for shipment to the jobsite for installation.

Your cost FOB jobsite

KTTA50-GS/GC
GENERATOR SET



SPECIFICATIONS

Four Stroke Cycle, Turbocharged-Aftercooled, V-16 Cylinder Diesel Engine.

Rated Output	**60 Hz 1800 RPM Standby[1]** ☒	**Prime[2]** ☐	**50 Hz 1500 RPM Standby[1]** ☐	**Prime[2]** ☐
kW @ 0.8 PF with fan	**1200**	**1090**	**1100**	**1000**
KVA	1500	1363	1375	1250
kW @ 0.8 PF without fan	**1235**	**1125**	**1120**	**1020**
KVA	1544	1406	1400	1275
Approx. fuel consumption at ¾ rated output (with fan)				
Litres/hr.	242	223	216	197
U.S. gals/hr.	64	59	57	52

Bore and Stroke	159x159 mm	(6¼x6¼ in.)
Displacement	50 L	(3067 cu. in.)
Approx. Dry Weight	9 627 kg	(21,205 lbs.)

[1]**Standby Rating (GS)** is applicable for supplying electric power in the event of normal utility power failure and it may be used for continuous service for as long as the emergency may last. This rating conforms to ISO-3046 overload power and fuel stop power. The engine may be operated at the standby rating up to 1 500 m (5000 ft.) altitude and 38°C (100°F) ambient temperature without deration.

[2]**Prime Power Rating (GC)** is applicable for supplying electric power with intermittent overload (of 10%) up to the standby rating. This rating conforms to ISO-3046 continuous power. The engine may be operated at the prime power rating up to 2 250 m (7500 ft.) altitude and 38°C (100°F) ambient temperature without deration.

BS 5514 and DIN 6271 are based on ISO-3046.

AVAILABLE EQUIPMENT

Air Cleaners:
Dry type: ☐ Normal duty.

Controls:
Engine Instrument Panel: ☐ Starting switches, hourmeter, battery charging meter, electrical instruments for: coolant temperature, lube oil temperature and lube oil pressure, and three alarm lights for overspeed, coolant and low lube oil pressure. ☐ Tachometer.
Monitoring Switches: ☐ Low oil pressure. ☐ High coolant temperature. ☐ Low coolant level. ☐ Engine overspeed.

Generator Control Panel: ☐ Generator mounted. ☐ Manual start. ☐ Auto start. ☐ Prealarm controls.

Circuit Breaker: ☐ Main line. ☐ Exciter field.

Cooling System:
☐ Radiator with fan guards. ☐ 38°C (100°F). ☐ 52°C (125°F) ambient temperature. ☐ Heat exchanger, copper nickel element. ☐ Raw water pump. ☐ Remote cooling.

Exhaust System:
Manifold: ☐ Dry. ☐ Flexible conn.

Silencer: ☐ Industrial. ☐ Critical. ☐ Expansion adapter.

Filters:
Fleetguard. Lubricating oil: spin-on paper element full flow ☐ by-pass type. Fuel: dual spin-on paper element type.

Governors:
☐ Cummins EFC. ☐ Electric (other). ☐ Hydraulic
Operation: ☐ Droop. ☐ Isochronous.

Starting System:
Starters: ☐ 24V starter. ☐ Air starter.

Starting Aids: ☐ Starting fluid, pressurized cylinder type. ☐ Coolant heater. ☐ Oil pan immersion heater.

Battery Chargers: ☐ 24V alternator. ☐ 24V static charger.

KTTA50-GS/GC
GENERATOR SET

ENGINE DESIGN FEATURES

Aftercooler: Large capacity aftercooler results in cooler, denser intake air for more efficient combustion and reduced internal stresses for longer life. Aftercooler is located in engine coolant system, eliminating need for special plumbing.
Bearings: Precision type, steel backed inserts. 9 main bearings, 165 mm (6.5 in.) diameter. Connecting Rod—108 mm (4.25 in.) diameter.
Camshaft: Dual camshafts control all valve and injector movement. Induction hardened alloy steel with gear drive.
Crankshaft: High tensile strength steel forging. Bearing journals are induction hardened. Fully counterweighted.
Cylinder Block: Alloy cast iron with removable wet liners.
Cylinder Heads: Individual cylinder heads. Corrosion resistant inserts on intake and exhaust valve seats.
Fuel System: Cummins PT™ self-adjusting system. Integral flyweight type governor provides overspeed protection independent of main engine governor. Camshaft actuated injectors.
Lurbicating Oil Cooler: Plate type located in engine coolant system.
Lubrication: Force feed to all bearings, gear type pump. All lubrication lines are drilled passages, except pan to pump suction line.
Pistons: Aluminum, cam ground, with two compression and one oil ring. Oil cooled.
Thermostat: Modulating by-pass type.
Turbocharger: Two Brown-Bovari and two AiResearch exhaust gas driven turbochargers mounted on top of engine. Turbochargers are arranged as two pairs in series flow to provide two stage turbocharging to each cylinder bank. Two stage turbocharging allows increased power with improved fuel economy and acceleration characteristics plus excellent altitude compensation.
Valves: Dual intake and exhaust each cylinder. Each valve 56 mm (2.22 in.) diameter. Heat and corrosion resistant face on intake and exhaust valves.
Vibration Damper: Viscous type.

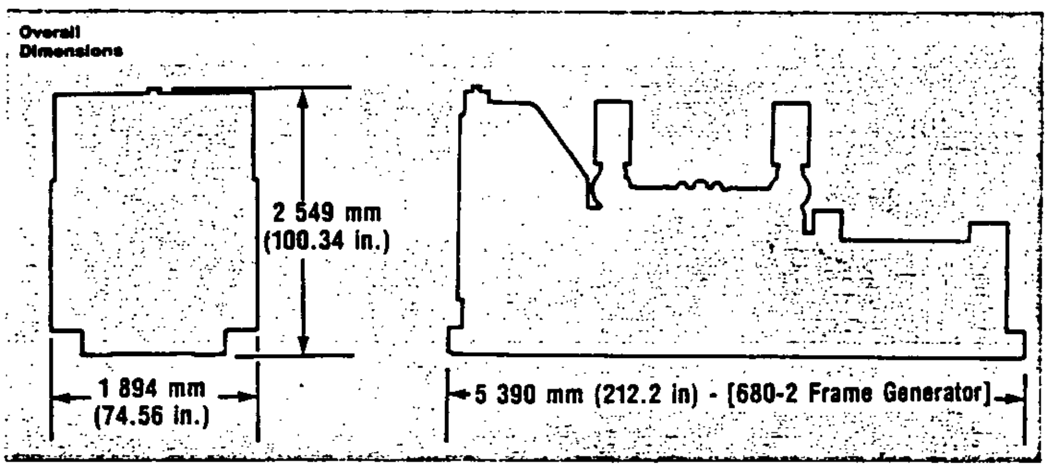
GENERATOR DESIGN FEATURES

Bearing: Pre-lubricated, shielded, cartridge ball bearing with lubrication provisions.
Construction: Conforms with National Electrical Manufacturers Association NEMA MG1-22.
Cooling: Cast aluminum alloy ventilating fan.
Drive Coupling: Flexible steel disks with 400% safety factor.
Exciter: Brushless rotating with solid state full wave rectifier. Mounted outboard of rotor bearing.
Insulation: Class F, meets NEMA standards for temperature rise limitations.
Main Frame: Rolled steel construction with rear mounted louvered conduit box.
Rotor: Single-piece 4 pole rotor with integrally diecast amortisseur winding and coil supports. Field winding is layer wound with thermo setting epoxy. Protective epoxy coating for abrasion and moisture protection. Rotor shrunk fit and keyed to shaft, dynamically balanced to withstand 25% overspeed.
Stator: Epoxy coated for abrasion and humidity protection. 4 output leads, suitable for 3 or 4 wire Y connection.
Voltage Regulator: Solid state with SCR control. Integral RFI filter for suppression of conducted electromagnetic interference to levels meeting most commercial requirements. Integral automatic underfrequency protection. Protected against high humidity conditions. A circuit breaker provides protection for the generator rotor and excitation system.

***Voltages Available:**

Hz	Conn.	3 Wire Y	4 Wire Y
60	High Y	380 to 480	220/380 to 277/480
50	High Y	380 to 416	220/380 to 240/416

*For other voltages consult Cummins.



Cummins Engine Company, Inc.
Columbus, IN 47202
U.S.A.

Cummins has always been a pioneer in product improvement. Thus specifications may change without notice. Illustrations may include optional equipment. See specific proposal bill of material for actual equipment being furnished.

Bulletin 3380652 Printed in U.S.A. Rev. 11/85

12.0 **DATA TO BE SUPPLIED WITH BID**

(Ratings at 70° F, 100 ft. site elevation, including all inlet and exhaust silencer losses.)

12.1	Guaranteed net output shaft power at continous standby	1800	BHP 1779 actual
12.2	Guaranteed net generator output at 480V, 0.80 power factor at continous standby	1200	KW Net
12.3	Engine type and model: CUMMINS KTTA50 GS FOUR STROKE, #2 DIESEL, V16		
12.4	BMEP at	230	PSI
12.5	Piston speed at 1800 RPM	1875	FT/MIN
12.6	Number of cylinders, bore, stroke	16	
		6.25	IN
		6.25	IN
12.7	Compression ratio	14.5/1	
12.8	Capacity of day tank	150	GALS
12.9	#2 diesel fuel consumption at: cont. standby	66	GAL/HR
	50% load	50	GAL/HR
	25% load	25	GAL/HR
	1800 RPM idle		GAL/HR
12.10	Quantity of cooling water in radiator system	100	GALS
12.11	Type of governor: WOODWARD 2301 ELECTRIC HYDRAULIC		