Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

December 23, 1991

Ms. Jewell A. Harper, Chief
Air Enforcement Branch
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Dear Mrs. Harper:

RE: Ridge Generating Station
Polk County, PSD-FL-183

Enclosed for you review and comment is the above referenced PSD permit application. If you have any comments or questions, please contact John Reynolds or Cleve Holladay at (904)488-1344.

Sincerely,

Patricia G. Adams

Patricia G. Adams
Planner
Bureau of Air Regulation

/pa

Enclosures

December 23, 1991

Mrs. Chris Shaver, Chief
Permit Review and Technical Support Branch
National Park Service-Air Quality Division
P. O. Box 25287
Denver, Colorado 80225

Dear Mrs. Shaver:

RE: Ridge Generating Station
Polk County, PSD-FL-183

Enclosed for you review and comment is the above referenced PSD permit application. If you have any comments or questions, please contact John Reynolds or Cleve Holladay at (904)488-1344.

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Planner
Bureau of Air Regulation

/pa

Enclosures

WHEELABRATOR ENVIRONMENTAL SYSTEMS INC.

Liberty Lane
Hampton, NH 03842
603-929-3000

December 19, 1991

Florida Department of Environmental Regulation
Division of Air Resources Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Attention: Mr. Barry Andrews, Administrator
Permitting and Standards Section
Bureau of Air Regulation

Re: Ridge Generating Station
Air Emission Source Construction Permit Application

Dear Mr. Andrews:

Ridge Generating Station Limited Partnership (RGSLP) is proposing to develop an independent power production facility in Polk County, Florida. The General Partners of RGSLP are Decker Energy-Ridge, Inc., and Wheelabrator Polk Inc.

The proposed facility will be designated as the Ridge Generating Station (RGS). The facility will consist of a 45-MW multi-fuel, steam driven electric power plant, with one boiler providing the total steam production. It will generate up to 40 megawatts (net) of electric power by burning a mixture of wood, tires and landfill gas. The electric power will be sold under an existing contract to Florida Power Corporation.

Enclosed are an original and six copies of an air emission source construction permit application for the project. Also enclosed is one package of computer printouts in support of the application's ambient air quality impact analysis, and a check for the permit application fee in the amount of $7,500.00.

Please direct all written correspondence regarding this project to me with a copy also sent to Mr. Macauley Whiting, Jr. Both addresses are provided on Page 2-1 of the application. We will be pleased to assist as needed in helping you complete your review of the application. If you have questions or comments on the application materials, please contact Matt Killeen, of Wheelabrator Environmental Systems Inc., at 1-800-682-0026.

Sincerely,

Richard C. Stone
Project Manager
Wheelabrator Polk Inc.

MPK101/cjb

Enclosures

- o Original and 6 copies of Construction Permit Application
- o Package of modeling printouts
- o Application fee ($7,500.00)

cc: Macauley Whiting, Jr. - Decker Energy - Ridge, Inc.
Matthew Killeen - Wheelabrator Environmental Systems Inc.

APPLICATION FOR PERMIT TO CONSTRUCT AIR EMISSION SOURCES

(INCLUDING PREVENTION OF SIGNIFICANT DETERIORATION EVALUATION)

RIDGE GENERATING STATION
POLK COUNTY, FLORIDA

OWNER:
RIDGE GENERATING STATION LIMITED PARTNERSHIP

GENERAL PARTNERS:
DECKER ENERGY - RIDGE, INC.
AND
WHEELABRATOR POLK INC.

SUBMITTED TO:
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

PREPARED WITH ASSISTANCE OF
DAMES & MOORE
AND
SFT, INC.

December 1991

TABLE OF CONTENTS

TABLES

FIGURES

ABBREVIATIONS AND ACRONYMS

SUBSTANCES

Be	-	beryllium
CO	-	carbon monoxide
HCl	-	hydrogen chloride (hydrochloric acid)
HF	-	hydrogen fluoride
Hg	-	mercury
H_2SO_4	-	sulfuric acid
NH_3	-	ammonia
NO_X	-	nitrogen oxides
NO_2	-	nitrogen dioxide
O_2	-	oxygen (molecular)
PM	-	particulate matter (total)
PM_{10}	-	particulate matter (equivalent aerodynamic diameter of 10μm or less)
SO_2	-	sulfur dioxide

DIMENSIONAL AND QUANTITY UNITS

acfm	-	actual cubic foot per minute
Btu	-	British thermal unit
°F	-	degree fahrenheit
ft	-	foot
g	-	gram
gr	-	grain
hr	-	hour
K	-	kelvin
km	-	kilometer
lb	-	pound
m	-	meter
mg	-	milligram
min	-	minute
MMBtu	-	million British thermal units
MW	-	megawatt
ppm	-	parts per million
ppmv	-	parts per million by volume
s	-	second
ton	-	short ton (2,000 lb)
yr	-	year
μg	-	microgram

ABBREVIATIONS AND ACRONYMS (Continued)

PROJECT RELATED AND OTHER TERMS

BACT	-	best available control technology
C&D	-	construction and demolition
DER	-	Florida Department of Environmental Regulation
DSI	-	dry sorbent injection
EPA	-	U.S. Environmental Protection Agency
ESP	-	electrostatic precipitator
FAAQS	-	Florida ambient air quality standards
FF	-	fabric filter
GEP	-	good engineering practice
LAER	-	lowest achievable emission rate
MCR	-	maximum continuous rating
MSW	-	municipal-type solid waste
MWC	-	municipal waste combustor
NAAQS	-	national ambient air quality standards
NSPS	-	new source performance standards
NTL	-	no-threat level
PSD	-	prevention of significant deterioration
RDF	-	refuse-derived fuel
RGS	-	Ridge Generating Station
RGSLP	-	Ridge Generating Station Limited Partnership
SCR	-	selective catalytic reduction
SDA	-	spray dryer absorber
SNCR	-	selective noncatalytic reduction
UTM	-	Universal Transverse Mercator

1.0 INTRODUCTION

Ridge Generation Station Limited Partnership (RGSLP) proposes to construct and operate a 45-MW electric power generating station in central Polk County, Florida. The proposed facility will be designated as the Ridge Generating Station (RGS) and will sell power under an existing contract with Florida Power Corporation. Facility construction is planned to begin during July 1992, and the start of operation is planned for July of 1994.

The power block portion of the RGS will include one boiler. This boiler will be capable of burning wood, tires, and landfill gas. The various fuel mixes that can be accommodated consist of wood alone, a mixture of wood and tires with tires representing up to 20 percent of the heat input to the boiler, and a mixture of wood, tires, and landfill gas. Landfill gas will be extracted from the Polk County North Central Landfill located adjacent to the RGS site.

Estimated RGS emissions are of sufficient quantity that the project is subject to prevention of significant deterioration (PSD) air quality regulations. This permit application therefore addresses all PSD requirements including compliance with best available control technology (BACT) requirements. In addition, the impacts of toxic air pollutant emissions have been assessed to determine compliance with the Florida air toxics permitting strategy.

The project is being designed to meet stringent air pollution control objectives. The principal air pollution control features consist of (1) a spray dryer absorber and fabric filter for control of acid gases, particulate matter (including metals), and organic compounds, and (2) a selective noncatalytic reduction system for control of oxides of nitrogen. Through use of efficient air pollution control equipment and appropriate operating procedures, the RGS project will comply with all applicable air quality protection requirements.

2.0 APPLICANT AND SITE INFORMATION

2.1 APPLICANT INFORMATION

The proposed project will be developed by Ridge Generating Station Limited Partnership.

The Ridge Generating Station Limited Partnership is comprised solely of subsidiaries of Decker Energy International, Inc. and Wheelabrator Environmental Systems Inc. The two General Partners are Decker Energy-Ridge, Inc. and Wheelabrator Polk Inc. The contact persons, their addresses and telephone numbers are as follows:

Contact: Macauley Whiting, Jr. President
Decker Energy-Ridge, Inc.
400 N. New York Avenue, Suite 101
P.O. Box 2397
Winter Park, Florida 32790
(407) 628-8900

Contact: Richard C. Stone, Project Manager
Wheelabrator Polk Inc.
Liberty Lane
Hampton, New Hampshire 03842
(803) 929-3456

2.2 SITE INFORMATION

The location of the RGS site is in Polk County as shown in Figure 2-1 and Figure 2-2. The site is approximately five miles east of Lakeland in the southeast part of Section 19, Township 28 South, Range 25 East. The site is approximately 30 acres in size. It is located about three-quarters of a mile from the nearest residence and is bounded on the north by mined-out phosphate lands and on the south by the Polk County North Central Landfill.

2.3 APPLICATION FORM

Appendix A contains a signed copy of DER Form 17-1.202(1).

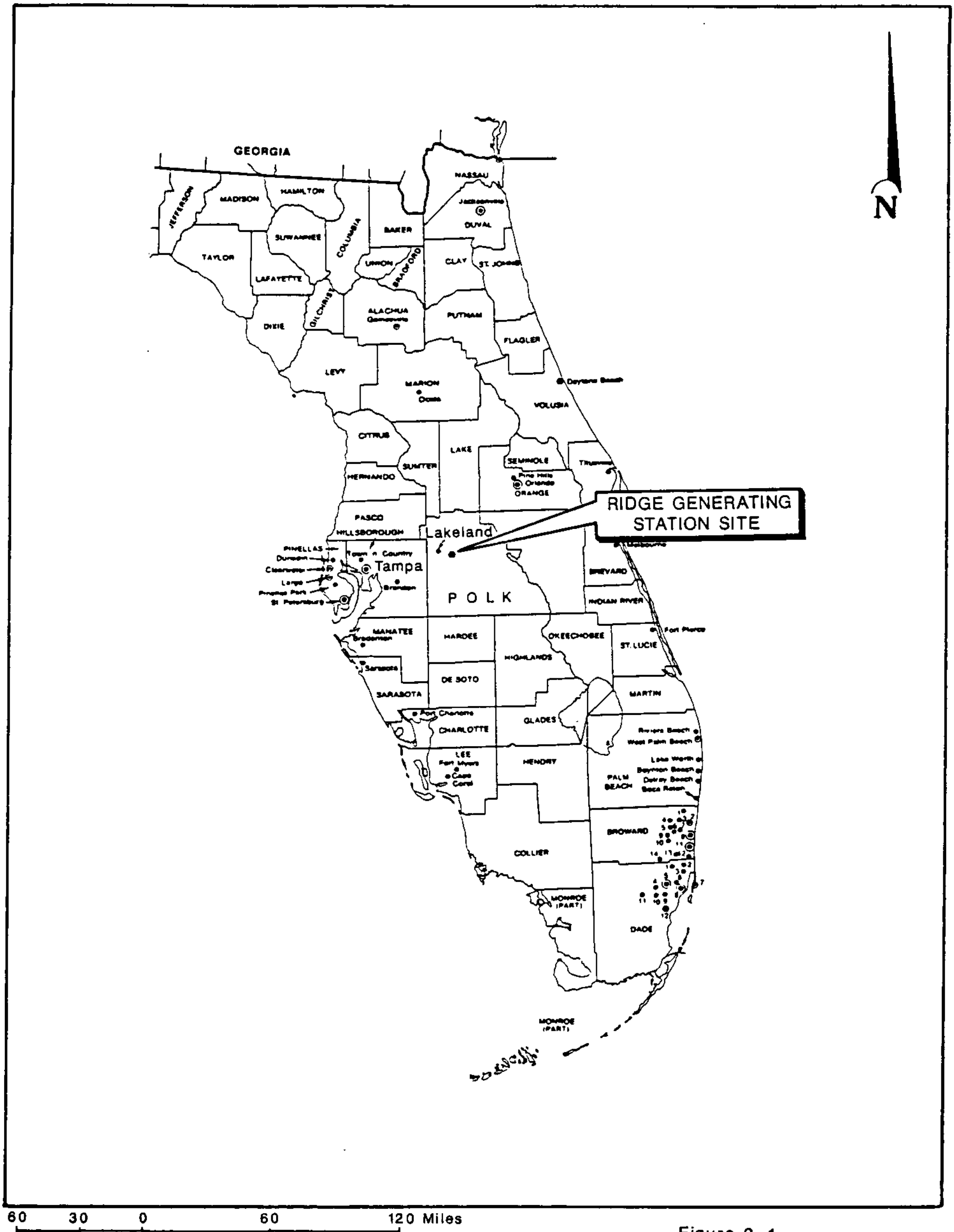
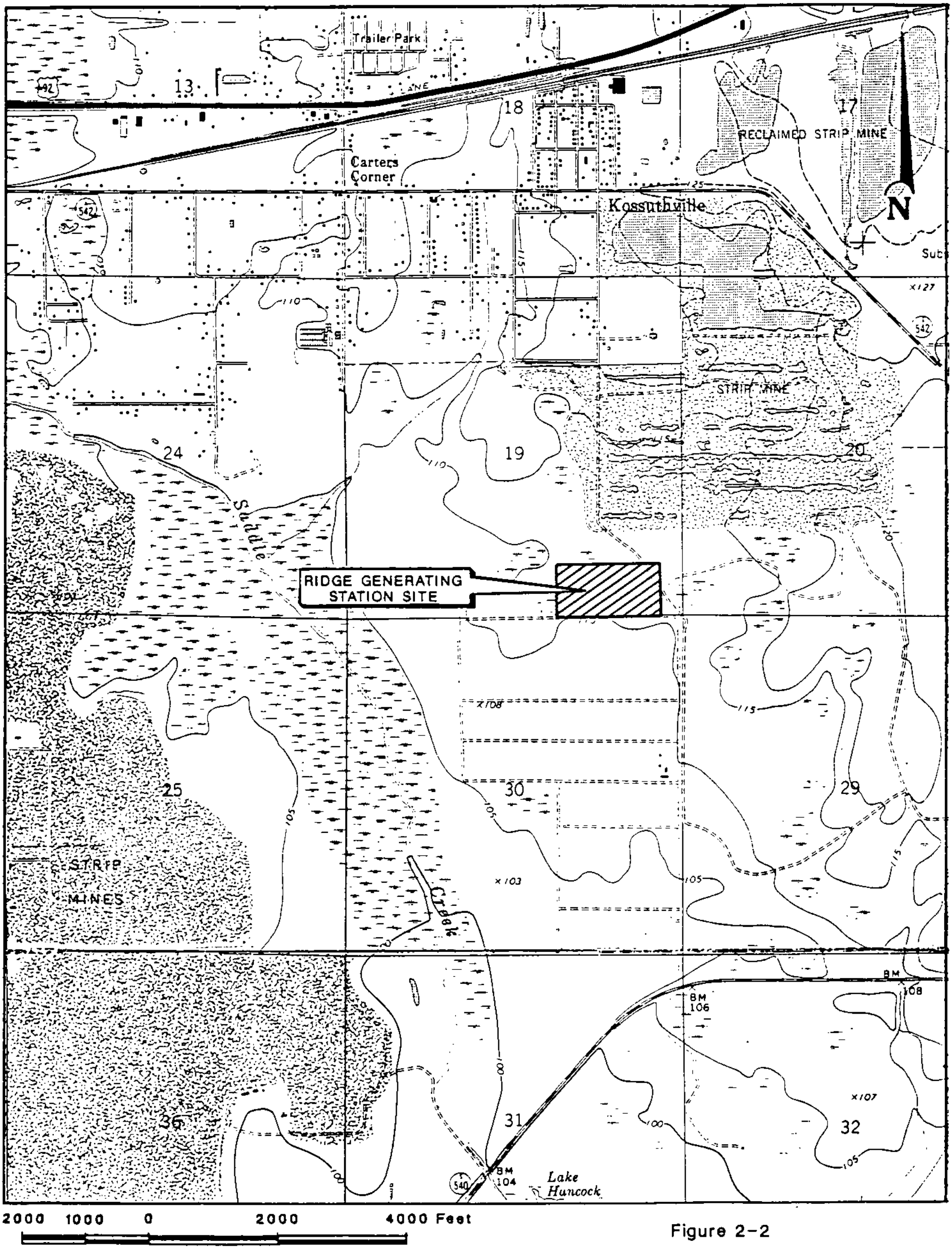


Figure 2-1

RIDGE GENERATING STATION SITE LOCATION



SOURCE: USGS 7.5' Auburndale, Fla. Quadrangle, Photorevised 1988

Figure 2-2

RIDGE GENERATING STATION SITE BOUNDARIES

3.0 PROJECT DESCRIPTION

3.1 TYPE OF PROJECT

The Ridge Generating Station consists of a 45-MW multi-fuel, steam-driven electric power plant, with one boiler providing the total steam production. The boiler will typically burn a mixture of wood, tires, and landfill gas. Figure 3-1 contains a flow diagram for station operations. A site plan is shown in Figure 3-2.

3.2 DESCRIPTION OF FUELS AND EXPECTED FUEL USE

Four different fuels will be used to fire the boiler: wood, tires, landfill gas, and propane. Wood, tires, and landfill gas will be the primary fuels used on a regular basis, whereas propane will be used for start-up, shutdown, and emergency purposes only. The wood and tires will be obtained from a variety of sources, while the landfill gas will be delivered by pipeline from the Polk County North Central Landfill located adjacent to the RGS site. Combustion of propane will not exceed a heat input of 180 MMBtu/hr.

The boiler will be designed to burn wood alone as well as a combination of wood, tires, and landfill gas. Table 3-1 provides the projected range of fuels by weight for each category. Tire usage will be limited to 20 percent of the total heat input (equivalent to approximately 10 percent on a weight basis). The average fuel combination will be a mix of approximately 75 percent wood, 15 percent tires, and 10 percent landfill gas on a heat input basis. Table 3-2 shows the typical expected fuel analysis for the individual fuel components. Each of the three fuels will exhibit a certain degree of variability in their makeup. Due to both the number of suppliers and local weather conditions, the wood components are expected to exhibit the greatest degree of variability. Therefore, although the Btu/lb value of wood is shown in Table 3-2 to be 5,450, the actual heating value may vary from 5,000 to 5,900 Btu/lb. The expected fuel analysis for the average condition fuel mix and the maximum tire use fuel mix is given in Table 3-3.

3.2.1 Wood Fuels

Wood accepted at RGS is anticipated to have a moisture content of less than 50 percent. The wood will be essentially free of dirt, concrete, steel, aluminum, and other metals. Wood fuel will be obtained from independent contractors, and will include the following materials: construction and demolition (C&D) material, forest residuals/land clearing material, industrial wood wastes, and wood chips derived from processing residential yard waste. C&D wood includes scrap wood from new construction, lumber from demolished buildings, and processed/separated wood from C&D processing facilities and transfer stations. Forest residuals/land clearing material includes commercial tree trimmings, electric/telephone transmission line clearing and maintenance material, and brush and land clearing residuals including trees, limbs, logging waste, orchard trimmings, etc. Industrial waste wood includes materials from pallet companies, sawmills, manufacturers of wood products, and may also include a small percentage of railroad ties and utility poles. Finally, wood derived from processing residential yard waste includes wood material, sized one inch and greater, separated from grass clippings, leaves, and other yard waste material that would otherwise be suitable for composting. While the plant will have wood processing equipment, it is planned that the bulk of the wood fuel will be delivered in a minus 2-inch processed form suitable as boiler-ready fuel.

Wood fuel will be obtained from sources as close to the RGS site as possible to minimize transportation costs. While most of the wood will be obtained from within a 50-mile radius of the site, it is expected that wood fuels will be delivered to the facility from an area approximately 75 miles in radius. The primary procurement area includes the following counties: Polk, Hardee, Hillsborough, Pasco, Lake, Orange, and Osceola. The secondary procurement area includes the following counties: Highlands, De Soto, Sarasota, Manatee, Pinellas, Hernando, Citrus, Sumter, Seminole, Brevard, and Volusia.

3.2.2 Scrap Tires

Scrap tires will be received at the plant from various sources. Tires accepted at the site will be essentially free of dirt, metal rims, and other foreign matter. Both whole tires and chipped tires will be accepted. The plant will have a whole tire shredder to process tires into minus 2-inch material prior to its being mixed with the processed wood fuel. RGS will co-fire tires at an expected rate of 15-20 percent of the heat input to the boiler.

3.2.3 Landfill Gas

Polk County's North Central Landfill will be required to install a landfill gas collection system by 1994 in order to comply with Florida landfill regulations. The gas is planned to be collected, dehydrated, and compressed at the County site for delivery to RGS. Based on current estimates, the landfill gas will represent 5-10 percent of the heat input to the boiler.

3.3 FUEL PROCESSING, HANDLING, AND STORAGE

Received tires will be stored in a designated tire storage area. This area will be constructed in accordance with Florida DER Chapter 17-711 Waste Tire Rule. The approximate size of the tire storage area is 2.4 acres. Tires will be processed as required using a single shredder with sizing screens. The size of the shredded tire pieces will be minus 2-inch. Tires will be conveyed to the processed wood receiving hopper and onto one of the two covered conveyors feeding the powerhouse. Given the composition of tires and the fact that tires will not be shredded to extremely small size, the generation of fugitive dust will be minimal from this process.

Two types of wood will be delivered to the site: processed (ground) and unprocessed (unground). Processed wood is expected to account for 75 percent of deliveries. Unprocessed wood is expected to be delivered in self unloading trucks. These trucks will back into individual bays and unload. The bays will have access from both ends. A front end loader will either stack the unprocessed wood in a pile or deliver it to the processing area. Processed wood will be delivered in trucks using a truck dump unloader feeding a receiving hopper. The hopper will feed either into a screw and thence to a radial unloader, or onto conveyors directly feeding the powerhouse. The unloader will drop the fuel directly into the ground wood pile.

Wood will be stored outside in two piles: processed and unprocessed. The total size of the wood storage area will be approximately 8 to 10 acres. The wood pile areas will be surfaced with crushed stone. Unprocessed wood will be transported to a wood processing area by using front end loaders.

Large size wood materials will be reduced in size in two stages. Tree trunks, utility poles, railroad ties, construction debris, etc. will be initially sized with a course hogger having a capacity of 25 ton/hr. The output from this unit will feed a trommel or other screening device. A magnetic separator will extract ferrous metal from the oversize material before it is sent to the final stage of size reduction in a hammermill-type hogger. Processed wood passing through the trommel (or screen) and discharging from the secondary hogger will be conveyed to the boiler fuel storage bin or stacked-out in the processed wood storage area. Fines from the on-site processing of wood will be collected and disposed of off site.

Mixing of solid fuels will be accomplished by direct feed of tires onto the active fuel feed conveyor. The mixed fuel will be fed into a storage bin located in front of the boiler. The storage bin will provide a minimum storage of fuel in the powerhouse, as required for fuel flow/surge control.

Landfill gas and propane will be piped directly into burners located in the boiler.

3.4 POWER PLANT EQUIPMENT

3.4.1 Boiler and Generator

The power plant will have a gross generation capability of 45 MW and a net capability of approximately 39.6 MW. It will utilize a traditional rankine cycle boiler and steam turbine-generator combination.

There will be one boiler and one steam turbine-generator. The boiler will have a steam generating capacity of 375,000 lb/hr. Steam will be generated at 1,250 psig and 950°F. The steam turbine-generator will have a nameplate rating of 45 MW. Steam for feedwater heating will be provided by three turbine extraction points. Based on the steam capacity of the steam turbine-generator and the minimal amount of auxiliary steam use, the boiler should never have to operate beyond its stated capacity.

As discussed above, propane will be used for startup, shutdown, and emergency purposes. The propane burner will have a heat input capacity of 180 MMBtu/hr.

Boiler steam will be used for sootblowing. However, only a nominal amount of steam will be used for this purpose. Sootblowing will occur on an intermittent basis, typically three times a day.

The boiler will be a conventional wood-fired boiler with membrane waterwall construction. The fuel feed will be via a spreader stoker design using either a traveling grate, a vibrating grate, or a reciprocating rate, depending upon boiler vendor selection. A spreader stoker design uses either pneumatic or mechanical fuel distributors located in the stoker front wall to distribute the fuel uniformly throughout the furnace. Fine particles of fuel entering the furnace are burned in suspension. Strategically located high pressure overfire air jets provide turbulence and thorough mixing of the fine fuel and air to assure complete combustion. The coarser, heavier particles of fuel are spread evenly on the grate forming a thin, fast-burning fuel bed.

The plant systems will be designed and operated so that optimum furnace combustion conditions will be maintained. As a result, a high combustion efficiency and low carbon monoxide emissions will be achieved. Some of the measures that will be taken to assure this are: consistent fuel sizing (low fines), proper feeder control, fuel blending, varying grate speed, proper air distribution, and air preheating.

The grate provides a platform on which the fuel can burn and the ash is conveyed away. The grate also serves as a means of introducing part of the combustion air requirements. The remainder of the combustion air is injected through overfire air ports located above the grates. In a traveling grate, the grate moves from the rear to the front where ash is discharged. Both the reciprocating and vibrating grate use intermittent grate movement or vibration to carry the fuel bed forward through the furnace and automatically discharge the ash off the forward end of the grates.

Gases from the furnace section of the boiler will pass through the superheater and steam generating section. Gases will leave the boiler and then pass through an economizer and air heater before entering the air pollution control system.

The 45-MW steam turbine-generator will be a three extraction condensing type unit equipped with a water cooled steam surface condenser. Water will be supplied to the condenser from a cooling tower. The cooling tower will be a multi-cell unit using a mechanical draft counterflow design. High efficiency drift eliminators will force three distinct changes in air direction to obtain exceptionally low drift rates. The RGS is being designed for zero discharge of waste water. Three wells on-site will provide both service and potable water.

3.4.2 Air Pollution Control System

Spray Dryer Absorber and Fabric Filter System

The air pollution control system for sulfur dioxide and particulate matter will use a spray dryer absorber (SDA) and fabric filter (FF) technology to control acid gases and particulate matter. In this system, lime is fed from a silo into a slaker to form a high solids slurry. The RGS system will incorporate redundant slakers. After being screened for grit removal, the solids slurry is stored in an agitated tank. The slurry is then pumped to the SDA where it is diluted before being introduced into an atomizer located at the inlet of the spray dryer absorber. The SDA will be equipped with multiple atomizers.

Flue gas enters the spray dryer absorber where it is brought in contact with the finely atomized lime - water slurry. Both acid gas absorption and gas cooling occur within the spray dryer absorber. Calcium hydroxide in the lime slurry reacts with sulfur dioxide and hydrogen chloride to form primarily calcium sulfite and calcium chloride. Proper residence time in the absorber allows drying of the reaction products into dry particles. Residence time is estimated to be 10 seconds. The flow of lime slurry is controlled to maintain a pre-set absorber outlet temperature. A portion of the dried particulate matter falls out in the SDA; however, the majority is carried onto the fabric filter. The expected calcium:sulfur molar ratio range is 2.5 - 3.75.

The fabric filter will be a pulse jet type using acid resistant fiberglass bags. The flue gas leaving the SDA is ducted into a parallel arrangement of fabric filter modules. Flue gas is pulled through the modules by an induced draft fan. Particulate matter is collected on the outside of the bags. The bags are periodically cleaned with a pulse of compressed air. Dust falls off the bags and into hoppers where it is evacuated by the ash handling system. The clean flue gas is drawn through the induced draft fan and discharged into the stack.

The fabric filter will be designed for adequate collection of fly ash at all boiler loads. Protection will be furnished to maintain temperatures above the dew point temperature. The maximum net air-to-cloth ratio, defined as one module out of service and all other modules operating, will not exceed 3.75 to 1. A minimum of six modules will be used. The pulse jet type bag cleaning system will be capable of cleaning a module either in service or out of service without affecting the outlet dust loading or opacity. Bag support cages will be galvanized steel wire mesh or welded wire with a minimum thickness of 16 gauge. Each module gas inlet will be above the ash hopper and will include all necessary turning vanes and distribution devices to assure even distribution of gas throughout the module and minimize reentrainment of ash into the gas stream. Inlet, outlet, and bypass dampers will be automated and will be the poppet type. The baghouse will be designed for a maximum inlet gas temperature of 500 °F.

The ash removal system will vary depending on the type of ash. Bottom ash will be removed using wet drag conveyors. The wetting of the bottom ash will minimize any fugitive dust emissions from that source. Solid waste from the sifting hoppers, economizers hoppers, SDA hoppers, and fabric filter hoppers will be removed by a combination of screw conveyors and/or drag conveyors. All ash conveyors will feed an ash silo equipped with an ash handling vent filter to minimize emissions during loading. The silo will also include an ash conditioner. The ash conditioner will moisten the waste to insure minimization of fugitive emissions. Ash will be removed from the site using trucks.

Due to the potential for the mixture of wet bottom ash, flyash, and SDA residue (with excess lime) to solidify, an alternative method of handling/storing of combined ash is also being considered. The alternative would entail the wetting (conditioning) of the dry flyash/SDA residue mixture to suppress fugitive dust before it is combined with the bottom ash from the wet drag conveyor. The combined ash would then be sent to an enclosed ash load-out area where it would be deposited in roll-on/roll-off ash containers. The enclosure would incorporate an ash handling vent filter to prevent dust migration outside of the structure. Provisions for a minimum of 90 hours of on-site storage of ash will be made with either alternative.

Nitrogen Oxides Control System

A combination of combustion controls and selective noncatalytic reduction (SNCR) will be used to control NO_X emissions from the facility. SNCR refers to add-on NO_X control techniques which reduce NO_X to N_2 without the use of catalysts. There are two commercially available systems: Exxon's "Thermal $DeNo_X$" which uses ammonia injection and the Electric Power Research Institute's "NO_XOut" (FuelTech) process which uses urea as the reagent. Since urea quickly decomposes to ammonia when heated to the appropriate temperatures, the process chemistry described below is applicable to both the ammonia and the urea SNCR systems.

Selective noncatalytic reduction uses ammonia to react with oxides of nitrogen in the combustion gas, forming nitrogen and water. Ammonia (NH_3) or urea is injected into the upper furnace area, where it reacts with NO_X. The desired reaction created by the use of SNCR occurs in the temperature range from 1,600 °F to 1,800 °F, with an optimum temperature of about 1,750 °F. The reaction is a homogeneous, gas-phase reaction; therefore, no catalyst is required. The reactions proceed in the presence of excess oxygen within a critical temperature range. The overall NO_X reduction reaction is summarized in the equation below:

$$NO + NH_3 + 0.25\ O_2 = N_2 + 1.5\ H_2O$$

The reduction of NO_X using SNCR requires a specific temperature window, residence time, and good mixing of the ammonia in the flue gas. If these conditions are achieved, the amount of ammonia injected into the flue gas will be based on the theoretical NH_3/NO_X mole ratio of 1. However, the temperature within the furnace will vary due to changes in various parameters, including the moisture and heat content of the fuel and the fuel feed rate. Irregular flow patterns in the furnace will prevent perfect mixing/distribution of the ammonia in the flue gas. At present, there are no monitoring and controlling systems with the capability for instantaneous control of a NO_X/NH_3 process. Since no method exists to continuously monitor uncontrolled NO_X within the furnace before the ammonia injection, the ammonia feed rate is established by a feedback control from a post-control NO_X monitor. Therefore, some lag time always exists between reading any higher or lower NO_X emissions and adjusting the NH_3 appropriately. Thus excess ammonia must be injected into the flue gas to ensure the desired reduction efficiency. The ammonia which does not react with NO_X will pass through the furnace. Unreacted NH_3 exiting the boiler is referred to as "ammonia slip."

The SNCR vendor helps locate the optimum furnace injection points to achieve efficient reagent mixing within the temperature window, and the facility operator makes adjustment to assure consistency of the furnace operation and/or minimize shifts in the temperature profile. This combination of careful attention to the design and operation of the system is used to maximize NO_X removal and minimize NH_3 slip.

3.5 VEHICLE TRAFFIC DURING STATION OPERATION

Wood and tires will be brought in by truck. The expected number of deliveries is approximately 70 to 130 trucks per day depending on the mix of 5-ton trucks, 8-ton trucks, and 25-ton vans. Lime for the scrubber system will be delivered by truck on an expected schedule of two trucks per week. Trucks will also be used to transport ash from the site to a landfill. Approximately four truck loads per day are expected for ash disposal, operating on a Monday through Saturday schedule. Additional vehicle traffic will include employee commuter traffic (from a total operational work force of approximately 36 employees) and miscellaneous traffic associated with supply deliveries, visitors, etc.

TABLE 3-1

RIDGE GENERATING STATION
PROJECTED FUEL SUPPLY MIX

Fuel Source	Weight Percent Range
Construction and Demolition Material	40-60
Forest Residuals/Land Clearing	25-40
Wood Derived from Residential Yard Waste	15-29
Polk County North Central Landfill Gas	5-10
Industrial Waste Wood	5-10
Scrap Tires (15-20% heat input)	7-10

TABLE 3-2

RIDGE GENERATING STATION
ESTIMATED ANALYSIS FOR BOILER FUEL COMPONENTS

	Wood[a]	Tires	Landfill Gas
Percent by Weight			
Ash	7.93	6.55	
Sulfur	0.15	1.50	
Hydrogen (H_2)	3.86	6.78	6.67
Carbon	32.57	78.18	20.00
Water	29.23	1.02	
Nitrogen (N_2)	0.22	0.12	
Oxygen (O_2)	25.96	5.86	
Carbon Dioxide			73.33
Heating Value, Btu/lb	5,450	14,000	6,000

[a] These values are for the expected typical wood mix. The heating value of the wood component will vary depending on the mixtures of wood in use.

TABLE 3-3

RIDGE GENERATING STATION
ESTIMATED ANALYSIS FOR BOILER FUEL MIXES

	100% Wood[a]	80% Wood 20% Tires[a]	75% Wood 15% Tires 10% Landfill Gas[a]
Percent by Weight			
Ash	7.93	7.81	7.04
Sulfur	0.15	0.27	0.22
Hydrogen (H_2)	3.86	4.12	4.33
Carbon	32.57	36.62	34.26
Water	29.23	26.73	24.45
Nitrogen (N_2)	0.22	0.21	0.19
Oxygen (O_2)	25.96	24.18	22.03
Carbon Dioxide			7.41
Heating Value, Btu/lb	5,450	6,208	6,061

[a] Percentages on a heat input basis.

Note: The heating values will vary depending on the mixtures of wood in use.

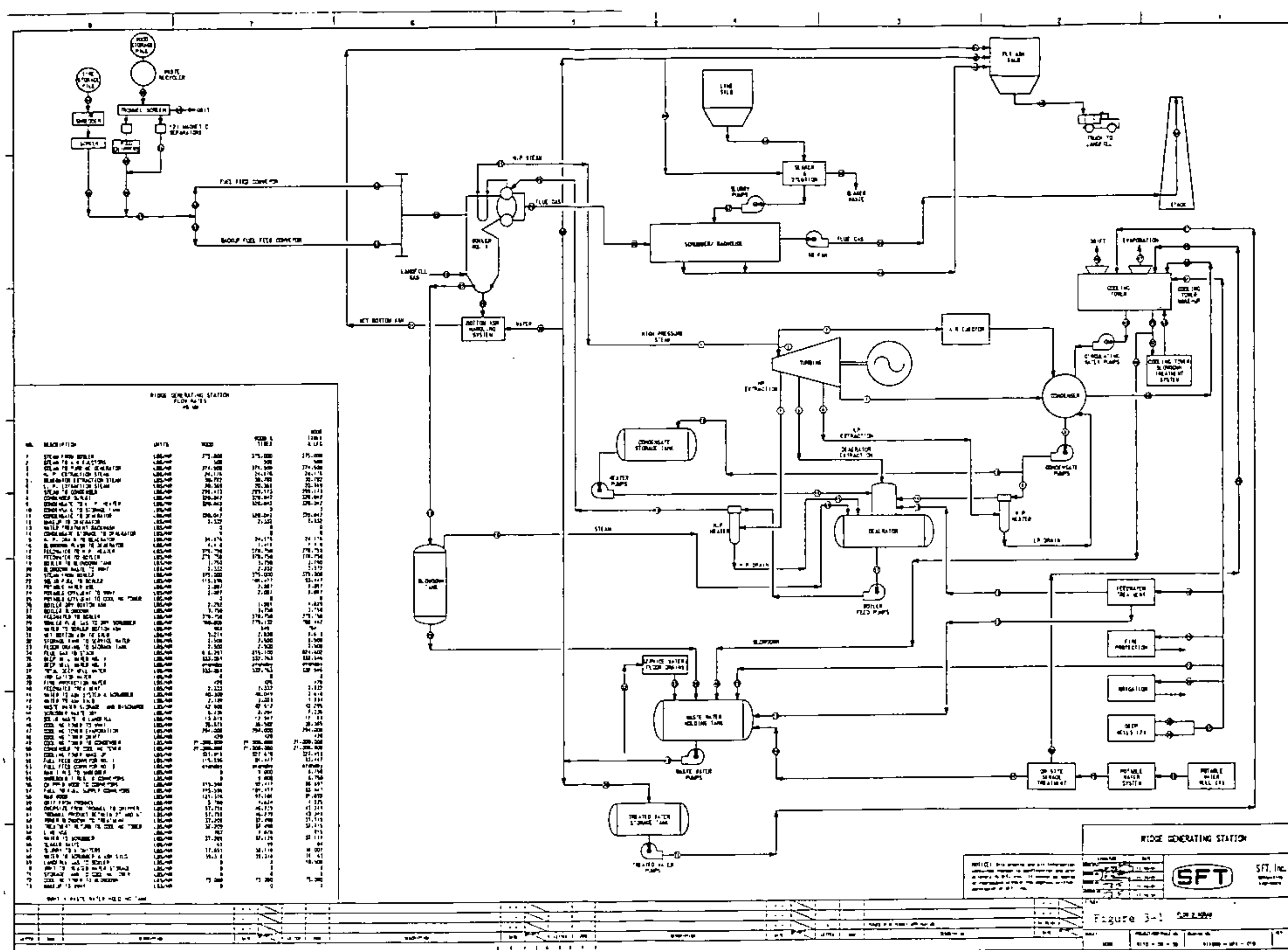

RIDGE GENERATING STATION
FLOW RATES
TURBINE
CONDENSER
DEAERATOR
BOILER FEED PUMPS
CONDENSATE PUMPS
HIGH PRESSURE STEAM
BLOWDOWN TANK
WASTE WATER HOLDING TANK
WASTE WATER PUMPS
TREATED WATER STORAGE TANK
SCRUBBER/ BAGHOUSE
FLUE GAS
STACK
LIME SILO
FLY ASH SILO
TRUCK TO LANDFILL
COOLING TOWER
EVAPORATION
DRIFT
CIRCULATING WATER PUMPS
COOLING TOWER BLOWDOWN TREATMENT SYSTEM
FIRE PROTECTION
IRRIGATION
DEEP WELLS
POTABLE WATER SYSTEM
POTABLE WATER WELL
BOTTOM ASH HANDLING SYSTEM
WET BOTTOM ASH
WATER
LANDFILL GAS
FUEL FEED CONVEYOR
BACKUP FUEL FEED CONVEYOR
TROMMEL SCREEN
WASTE RECYCLER
SLURRY PUMPS
SLAKER WASTE
STEAM
BLOWDOWN
L.P. DRAIN
H.P. DRAIN
H.P. EXTRACTION
L.P. EXTRACTION
GENERATOR EXTRACTION
CONDENSATE STORAGE TANK
HEATER PUMPS
SFT, Inc.

Figure 3-1

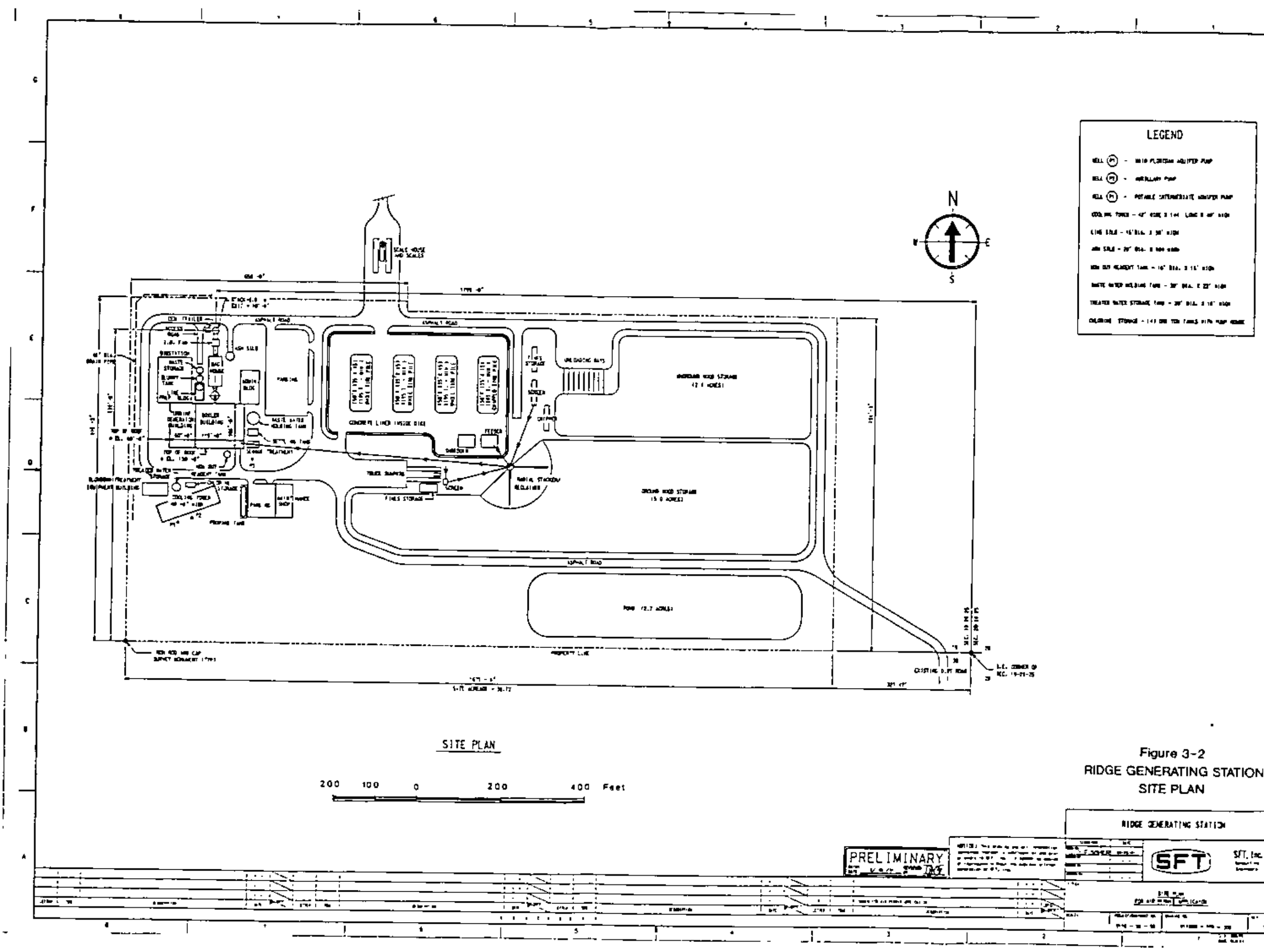


Figure 3-2
RIDGE GENERATING STATION
SITE PLAN

that burn either wood only or tires only. The information available for combination wood- and tire-fired boilers pertains primarily to facilities not equipped with spray dryer absorbers and fabric filters as proposed for RGS.

Before presenting an estimate of emissions, the following points should be noted:

- The use of a spray dryer absorber/fabric filter will result in control of toxic air pollutants as well as sulfur dioxide and particulate matter. Hydrogen chloride, for example, will be controlled effectively by this method. The SDA/FF will result in very high removal efficiencies for non-volatile metals and has been demonstrated to be effective at controlling certain organic emissions. Published toxic air pollutant emission factors (for wood burning emissions especially) do not typically reflect use of SDA/FF controls.

- Some of the toxic air pollutant emission factors cited for wood combustion are based on tests for woodstoves and residential fireplaces. These factors are not appropriate for large wood-fired boilers. Not only would emission rates for boilers be much lower (per pound of fuel burned), some of the substances emitted by woodstoves and fireplaces would not be emitted from boilers due to the much more efficient oxidizing environment of a boiler (greater temperature, combustion time, and turbulence).

- One of the EPA publications cited to identify the toxic air pollutants that might be emitted from various emission sources is "Control Technologies for Hazardous Air Pollutants" (U.S. Environmental Protection Agency, 1986). This publication contains an entry for wood combustion. However, the types of emission sources for the wood combustion category consist of furnaces, boilers, and woodstoves/fireplaces, with no comment as to whether the identified pollutants pertain to all three sources or just to one or two. As indicated above, this distinction is important because emissions from woodstoves and fireplaces may not be applicable to boilers. Therefore, although the EPA "Control Technologies" publication was consulted, other references are considered more relevant to RGS boiler emissions.

Estimated toxic air pollutant emissions from the RGS boiler are listed in Table 4-5. These emission rates have been conservatively estimated from available data and apply to emissions at maximum continuous rating. Emissions at 75 percent and 50 percent load levels would be approximately 0.75 and 0.50 times those shown for MCR. For completeness sake, Table 4-5 contains an emission rate for lead (a criteria pollutant) and for the non-criteria regulated pollutants that have a defined significant emission rate and that are also listed in Table 4-1. Emission rate calculations provided in Appendix B.

As will be shown in Section 6.0, the estimated toxic air pollutant emission rates in Table 4-5 result in compliance with the Florida no-threat levels by a wide margin.

The toxic air pollutants listed in Table 4-5 are divided into three categories: metals, non-metal inorganic compounds, and organic compounds. The specific substances selected for listing are those that are expected to be emitted in greatest quantities, or those that are often considered to be of most potential concern from a human exposure standpoint even though emitted in small quantities. The substances expected to be emitted in greatest amount are zinc in the metals category (resulting from the combustion of tires), and ammonia and hydrogen chloride in the non-metal inorganics category. Representing those substances often considered of most potential concern from an exposure standpoint (and that generally have the lowest acceptable ambient concentration levels) are the remaining metals in Table 4-5 (arsenic, beryllium, etc.), formaldehyde, and benzene. The polycyclic organic matter sometimes associated with wood combustion are expected to be effectively controlled through efficient furnace operation.

Substances that might theoretically be emitted from the combustion of any treated wood that may be included in the construction and demolition fraction of the wood fuel are expected to be negligible. The construction and demolition materials will be processed to remove non-woody contaminants prior to combustion. The wood fuel is expected to contain only a small percentage of treated wood. In addition, the boiler operating features designed to promote complete combustion will help minimize emissions of any organic treatment chemicals that may evolve from the burning of treated wood. Likewise, the highly efficient scrubber and baghouse will help minimize emissions of organic or metallic compounds present in treated wood.

4.2 ADDITIONAL PARTICULATE MATTER POINT SOURCES

Two point sources of particulate matter emissions will exist in addition to the boiler. Both sources will be minor. One source is the lime silo vent filter and the other is the ash handling vent filter. Expected lime and ash quantities are listed in Figure 3-1.

The lime silo will be operated about twice a week for approximately an hour at a time. PM emissions will be controlled through use of a bin vent filter limiting emissions to 0.02 gr/ft^3. At an expected flow rate of 1,400 ft^3/min through the filter, estimated PM emissions are 0.24 lb/hr. For an operating schedule of two hours a week, annual PM emissions would be only about 0.013 ton/yr.

Ash will be conveyed to the ash silo (or the ash load-out area in the alternate design) by mechanical or belt conveyors. The ash silo or ash load-out area will be equipped with an ash handling vent filter limiting PM emissions to 0.02 gr/ft^3. At a flow rate of 1400 ft^3/min estimated PM emissions are 0.24 lb/hr. Therefore, the annual PM emissions are expected to be approximately 1.05 ton/yr.

The total annual PM emissions from both vent filters combined are expected to be slightly more than 1 ton/yr.

4.3 OTHER EMISSION SOURCES

4.3.1 Fugitive Dust Emissions

Potential fugitive dust sources include unprocessed wood unloading, storage, chipping, and handling; processed wood unloading, storage and handling; tire unloading, storage, shredding, and handling; and vehicle movements. Factors that will act to reduce fugitive dust emissions are summarized in Section 5.0.

4.3.2 Cooling Tower

A single, multi-cell mechanical draft cooling tower will be used to supply cooling water to the condenser. Drift emissions will be minimized through use of high efficiency drift eliminators. Particulate emissions resulting from evaporation of drift droplets are expected to be minimal.

TABLE 4-1

RIDGE GENERATING STATION
BOILER OPERATING AND EMISSION CHARACTERISTICS
AT MAXIMUM CONTINUOUS RATING

Characteristic	Fuel[a]		
	100% Wood	80% Wood 20% Tires	75% Wood 15% Tires 10% Landfill Gas
• Operating Data			
Heat Input, MMBtu/hr	630	630	630
Steam Generated, lb/hr	375,000	375,000	375,000
Wood Burned, lb/hr	115,596	92,477	86,697
Tires Burned, lb/hr	0	9,000	6,750
Landfill Gas Burned, lb/hr	0	0	10,500
Total Fuel Burned, lb/hr	115,596	101,477	103,947
• Stack Data			
Stack Height, ft	325	325	325
Stack Diameter, ft	10	10	10
Flue Gas Temperature, °F	170	170	170
Flue Gas Volume, ft^3/min (actual)	226,556	224,693	227,553
Flue Gas Velocity, ft/s (actual)	48.1	47.7	48.3
• Pollutant[b] Emission Rate, lb/hr			
Particulate Matter (PM and PM_{10})	12.6	12.6	12.6
Sulfur Dioxide	69.4	109.4	92.5
Nitrogen Oxides (as NO_2)	94.5	94.5	94.5
Carbon Monoxide	315.0	315.0	315.0
Volatile Organic Compounds	22.1	22.1	22.1
Lead[c]	0.25	0.25	0.25
Beryllium[c]	0.0063	0.0063	0.0063
Mercury[c]	0.022	0.022	0.022
Fluorides	Negligible	Negligible	Negligible
Asbestos	Negligible	Negligible	Negligible
Vinyl Chloride	Negligible	Negligible	Negligible
Sulfuric Acid Mist	Negligible	Negligible	Negligible
Hydrogen Sulfide	Negligible	Negligible	Negligible
Total Reduced Sulfur	Negligible	Negligible	Negligible
Reduced Sulfur Compounds	Negligible	Negligible	Negligible

[a] Fuel percentages on a heat input basis.

[b] Pollutants with a defined significant emission rate in PSD regulations.

[c] The highest estimated emission rate for any fuel mix is shown in each column.

TABLE 4-2

RIDGE GENERATING STATION
BOILER OPERATING AND EMISSION CHARACTERISTICS
AT 75 PERCENT LOAD

Characteristic	Fuel[a] 100% Wood	Fuel[a] 80% Wood 20% Tires	Fuel[a] 75% Wood 15% Tires 10% Landfill Gas
• Operating Data			
Heat Input, MMBtu/hr	473	473	473
Steam Generated, lb/hr	281,250	281,250	281,250
Wood Burned, lb/hr	86,697	69,358	65,023
Tires Burned, lb/hr	0	6,750	5,063
Landfill Gas Burned, lb/hr	0	0	7,875
Total Fuel Burned, lb/hr	86,697	76,108	77,960
• Stack Data			
Stack Height, ft	325	325	325
Stack Diameter, ft	10	10	10
Flue Gas Temperature, °F	170	170	170
Flue Gas Volume, ft^3/min (actual)	169,917	168,520	170,665
Flue Gas Velocity, ft/s (actual)	36.1	35.8	36.2
• Pollutant[b] Emission Rate, lb/hr			
Particulate Matter (PM and PM_{10})	9.5	9.5	9.5
Sulfur Dioxide	52.0	82.0	69.3
Nitrogen Oxides (as NO_2)	70.9	70.9	70.9
Carbon Monoxide	236.5	236.5	236.5
Volatile Organic Compounds	16.5	16.5	16.5
Lead[c]	0.19	0.19	0.19
Beryllium[c]	0.0047	0.0047	0.0047
Mercury[c]	0.017	0.017	0.017
Fluorides	Negligible	Negligible	Negligible
Asbestos	Negligible	Negligible	Negligible
Vinyl Chloride	Negligible	Negligible	Negligible
Sulfuric Acid Mist	Negligible	Negligible	Negligible
Hydrogen Sulfide	Negligible	Negligible	Negligible
Total Reduced Sulfur	Negligible	Negligible	Negligible
Reduced Sulfur Compounds	Negligible		Negligible

[a] Fuel percentages on a heat input basis.

[b] Pollutants with a defined significant emission rate in PSD regulations.

[c] The highest estimated emission rate for any fuel mix is shown in each column.

TABLE 4-3

RIDGE GENERATING STATION
BOILER OPERATING AND EMISSION CHARACTERISTICS
AT 50 PERCENT LOAD

Characteristic	Fuel[a]		
	100% Wood	80% Wood 20% Tires	75% Wood 15% Tires 10% Landfill Gas
• Operating Data			
Heat Input, MMBtu/hr	315	315	315
Steam Generated, lb/hr	187,500	187,500	187,500
Wood Burned, lb/hr	57,798	46,239	43,349
Tires Burned, lb/hr	0	4,500	3,375
Landfill Gas Burned, lb/hr	0	0	5,250
Total Fuel Burned, lb/hr	57,798	50,739	51,974
• Stack Data			
Stack Height, ft	325	325	325
Stack Diameter, ft	10	10	10
Flue Gas Temperature, °F	170	170	170
Flue Gas Volume, $ft/^3$ (actual)	120,471	119,715	121,142
Flue Gas Velocity, $ft/^3$ (actual)	25.6	25.4	25.7
• Pollutant[b] Emission Rate, lb/hr			
Particulate Matter (PM and PM_{10})	6.3	6.3	6.3
Sulfur Dioxide	34.7	54.7	46.2
Nitrogen Oxides (as NO_2)	47.3	47.3	47.3
Carbon Monoxide	157.5	157.5	157.5
Volatile Organic Compounds	11.0	11.0	11.0
Lead[c]	0.13	0.13	0.13
Beryllium[c]	0.0032	0.0032	0.0032
Mercury[c]	0.011	0.011	0.011
Fluorides	Negligible	Negligible	Negligible
Asbestos	Negligible	Negligible	Negligible
Vinyl Chloride	Negligible	Negligible	Negligible
Sulfuric Acid Mist	Negligible	Negligible	Negligible
Hydrogen Sulfide	Negligible	Negligible	Negligible
Total Reduced Sulfur	Negligible	Negligible	Negligible
Reduced Sulfur Compounds	Negligible	Negligible	Negligible

[a] Fuel percentages on a heat input basis.

[b] Pollutants with a defined significant emission rate in PSD regulations.

[c] The highest estimated emission rate for any fuel mix is shown in each column.

TABLE 4-4

RIDGE GENERATING STATION
ESTIMATED BOILER EMISSION RATES COMPARED TO
PSD SIGNIFICANT EMISSION LEVELS

Pollutant	Estimated Emissions Assuming Continuous Operation at Maximum Continuous Rating (ton/yr)			PSD Significant Emission Level (ton/yr)
	100% Wood[a]	80% Wood 20% Tires[a]	75 % Wood 15% Tires 10% Landfill Gas[a]	
Particulate Matter (PM/PM_{10})	55.2	55.2	55.2	25 (PM) 15 (PM_{10})
Sulfur Dioxide	304.0	479.2	405.2	40
Nitrogen Oxides	413.9	413.9	413.9	40
Carbon Monoxide	1,379.7	1,379.7	1,379.7	100
Volatile Organic Compounds	96.8	96.8	96.8	40
Lead[b]	1.1	1.1	1.1	0.6
Beryllium[b]	0.03	0.03	0.03	0.0004
Mercury[b]	0.096	0.096	0.096	0.1
Fluorides	Negligible	Negligible	Negligible	3
Asbestos	Negligible	Negligible	Negligible	0.007
Vinyl Chloride	Negligible	Negligible	Negligible	1
Sulfuric Acid Mist	Negligible	Negligible	Negligible	7
Hydrogen Sulfide	Negligible	Negligible	Negligible	10
Total Reduced Sulfur	Negligible	Negligible	Negligible	10
Reduced Sulfur Compounds	Negligible	Negligible	Negligible	10

[a] Percentages on a heat input basis.

[b] The highest estimated emission rate for any fuel mix is shown in each column.

TABLE 4-5

RIDGE GENERATING STATION
ESTIMATED TOXIC AIR POLLUTANT EMISSIONS
AT MAXIMUM CONTINUOUS RATING

Pollutant	Highest Emissions (lb/hr) for Any Fuel Mix
• Metals	
arsenic	0.019
beryllium	0.0063
cadmium	0.033
chromium VI	0.016
lead	0.25
mercury	0.022
nickel	0.063
zinc	0.63
• Non-Metal Inorganics	
ammonia	17.8
hydrogen chloride	3.2
• Organics	
benzene	5.0
formaldehyde	1.7

5.0 EMISSION CONTROLS AND COMPLIANCE WITH EMISSION STANDARDS

5.1 BEST AVAILABLE CONTROL TECHNOLOGY FOR BOILER

5.1.1 Introduction

The regulated pollutants subject to PSD review as a result of boiler emissions are particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds, lead, and beryllium. These pollutants are assessed in the following best available control technology (BACT) evaluation.

BACT evaluations must be performed following EPA's "top-down" BACT approach. The top-down approach first entails identifying the technically feasible alternatives applicable to a given type of emission source. The most stringent of the technically feasible alternatives is then evaluated in terms of economic, energy, and environmental factors. If the "top" alternative is justifiable on the basis of these factors, it is selected as the BACT alternative and less stringent alternatives need not be considered. If the top alternative is shown to be not justified, the next most stringent alternative is evaluated. This process continues until a justifiable alternative remains. This then becomes the proposed BACT alternative. It should also be noted that the term "alternatives" can refer not only to different types of control methods, but also to different emission rates potentially achievable by the same method.

Another aspect of BACT evaluations is consideration of "unregulated" pollutants. EPA's North County remand decision requires that the environmental impact of pollutants not subject to PSD review be taken into account when evaluating the BACT emission control alternatives for PSD-regulated pollutants. Examples of non-PSD pollutants applicable to the RGS boiler BACT evaluation include metals (other than Pb and Be), hydrogen chloride, and specific organic compounds.

Information sources considered for the BACT evaluation consist of the following:

- The EPA BACT/LAER Information System, BACT/LAER Clearinghouse.
- Federal, state, and local air quality permits.
- Federal, state, and local agency representatives identified as contacts for similar sources.
- Control equipment vendors.
- Other sources such as trade journals and publications.

Table 5-1 was developed from these sources and contains a summary of wood-fired boilers similar in size to the RGS boiler. Three other facilities have been identified as permitted to burn tires as the sole fuel. Information on these facilities is presented in Table 5-2. A number of additional facilities have been identified as burning wood and tires. These facilities are generally hog fuel boilers located at pulp and paper mills. Included among these facilities are the following:

- Fort Howard Paper, Green Bay, Wisconsin
- Great Southern Paper, Cedar Springs, Georgia
- Inland-Rome Paper, Rome, Georgia
- Nekoosa Paper, Tomahawk, Wisconsin
- Willamette Industries, Albany, Oregon
- Jefferson Smurfit Paper, Newberg, Oregon
- Champion International, Bucksport, Maine
- Port Townsend Paper, Port Townsend, Washington

In each of these cases tire-firing was added to an existing boiler with little or no change made to air pollution control equipment.

The search for emission source information did not disclose any facilities that were originally permitted, designed, and built to burn a mixture of wood and tires. A wood/tire facility in Michigan was identified which is currently in the permitting process.

The pollutants assessed in the BACT evaluation can be grouped into three categories: combustion products not including acid gases, acid gases, and products of incomplete combustion. The RGS boiler emissions subject to BACT evaluation within these three categories are as follows:

- Combustion products not including acid gases: PM/PM_{10}, Pb, Be
- Acid gases: SO_2, NO_x
- Products of incomplete combustion: CO, VOC's

PM and metals (the non-acid combustion products) are most often controlled by flue gas particulate collection devices. NO_x is most often controlled in newer wood- or tire-fired boilers by using a selective noncatalytic reduction system. Due to the low sulfur content of wood, SO_2 emissions are generally uncontrolled from wood-fired boilers. SO_2 emissions from tire-fired boilers are typically controlled using a scrubber. CO and VOC's (the products of incomplete combustion) are most often controlled by operating practices that promote complete combustion.

The facilities listed in Table 5-1 include fluid bed combustors as well as conventional boilers. Because of the considerable design and operating differences between fluid bed combustors and non-fluid bed boilers, the information for fluid bed combustors is not considered applicable to the RGS project. The reason for not selecting a fluid bed combustor for the RGS project is that this technology has not been demonstrated for tire combustion, and it is anticipated that operational problems would occur if one were used.

5.1.2 Particulate Matter

Technically Feasible Control Technologies -- PM

The generally recognized techniques for particulate matter control are fabric filters, electrostatic precipitators (ESP's), venturi scrubbers, and cyclone-type mechanical collectors.

Ranking of Control Technology Alternatives -- PM

A review of the various information sources previously listed indicated that wood-fired boilers are equipped almost exclusively with ESP's, mechanical collectors, and venturi scrubbers. Baghouses have historically been avoided on wood-fired units due to the potential fire hazard they present. However, at RGS the proposed emissions control system includes installation of a spray dryer absorber prior to the particulate control device. This design arrangement mitigates the potential for carryover of "sparklers," thereby greatly decreasing the chance of a fire occurring in the particulate control device. When particulate control equipment is located downstream of a spray dryer absorber, a fabric filter is recognized as the "top" control technology. Fabric filtration is proposed for the RGS facility. Therefore, no other control alternatives need be considered. In addition, collection efficiency is enhanced when a fabric filter is used in conjunction with an SDA due to agglomeration of finer particles into larger ones. A fabric filter is not as sensitive as other particulate control devices, such as an ESP, to changes in gas volume, composition, inlet concentration, and temperature. Fabric filters will accept surges in gas flow and particulate concentration with no significant increase in particulate emissions. Fluctuations in fly ash resistivity, which affects particulate removal with an ESP, is not a problem with a fabric filter.

A fabric filter also serves as BACT for PM_{10}. Fabric filters are capable of achieving the highest PM_{10} removal efficiency of the applicable control devices.

Ranking of Emission Rate Alternatives -- PM

The minimum level of control that must be achieved by a given emission source is the level that complies with applicable emission standards. As discussed in Section 5.3, the emission standard considered applicable to the RGS project requires a PM emission rate not to exceed 0.10 lb/MMBtu heat input. However, newer wood and tire burning facilities have been permitted at lower levels. The three tire burners listed in Table 5-2 all use scrubber/baghouse combinations and have maximum allowable particulate limits in the range of 0.02 - 0.03 lb/MMBtu. The one wood-fired boiler permitted with a baghouse is limited to 0.03 lb/MMBtu. The most recently permitted wood-fired unit identified is a unit at the Beaver-Livermore facility. This facility was permitted September 5, 1991, with a particulate limit of 0.02 lb/MMBtu. It is the fourth unit listed in Table 5-1.

Non-PSD Pollutant Considerations -- PM

Use of fabric filtration for control of PM emissions will achieve control of any pollutants appearing in particulate form. This would include various heavy metals such as zinc emissions from tire combustion. The major advantage of fabric filter systems over ESP systems is their improved control efficiency for particulate in the submicron particle size range. Since small particles have a greater relative surface area than larger ones, it is believed that trace metals and noncondensible organics tend to accumulate on the smaller particulate matter. Hence, the fabric filter's greater capability for removing particulate matter also enhances its ability to remove trace metals and noncondensible organics.

As noted above, the FF's ability to remove submicron particles enhances its capability to remove trace metals and condensible organics. The actual formation mechanisms of particles containing trace metal constituents are not completely understood. It is theorized that the removal mechanisms are condensation and/or absorption coupled with collection in the particulate control device. The temperature of the flue gas and efficiency of particle collection (especially in the submicron size range) are, therefore, the two most important factors affecting trace metal emissions removal in the flue control system. Most of the metal compounds potentially emitted by the facility have condensation points well above 300°C and are typically removed by the particulate removal device with a high efficiency.

Non-volatile trace metal emissions represent a concentration of the metal in the PM exiting the facility. The removal of trace metal PM emissions, which would include arsenic, beryllium, cadmium, chromium (total and hexavalent), lead, nickel, zinc, and to a lesser degree mercury, is accomplished by the fabric filter, but it is assisted by the action of the SDA. Reducing the flue gas temperature in the SDA aids in condensation and the agglomeration of particles for easier collection in the FF. The high uniform collection efficiency of the FF across all particle size ranges also contributes to trace metal PM emission control. Therefore, RGS will be applying the most efficient control system to control trace metals.

Selected BACT -- PM

An emission rate of 0.02 lb/MMBtu using fabric filtration is proposed as BACT. This selection represents the "top" control alternative. Furthermore, based on modeling results, an emission rate of 0.02 lb/MMBtu will result in an insignificant particulate matter ambient impact.

5.1.3 Sulfur Dioxide

The SO_2 control method generally acceptable for wood-fired units is fuel selection because of the inherently low sulfur content of most wood fuels. SO_2 control for facilities using tires as the primary fuel is generally achieved using a scrubber/fabric filter combination. Post-combustion methods for SO_2 control include spray dryer absorbers, wet scrubbers, and dry sorbent injection (DSI) with either a fabric filter or ESP.

Ranking of Control Technology Alternatives -- SO_2

The SO_2 BACT control hierarchy would Rank SDA and wet scrubbers as the "top" level of control. Either an SDA or a wet scrubber is capable of achieving 80 percent SO_2 removal and 95 percent HCL removal reliably on a long-term basis. DSI Systems cannot achieve equally stringent control requirements on a continuous, long-term basis. Therefore, DSI would not be considered BACT.

The energy and economic impacts of an SDA and a wet scrubber are not equal. A wet scrubber has a larger pressure drop requiring more energy, and the capital costs for wastewater treatment add significantly to the economics. In addition, from an environmental perspective, wet scrubbers have significant disadvantages compared to the proposed SDA system. Wet scrubber systems use large quantities of water, produce wet sludge which must be stabilized before disposal (requiring large predisposal storage capacity), require high maintenance due to scaling and corrosion of equipment in the system, and require costly reheat for equipment protection and adequate plume dispersion. For these reasons, when fuel sulfur content requires the use of a flue gas desulfurization system, the SDA/FF SO_2 removal method is most often selected for non-fluid bed boilers burning fuels other than fossil fuels. This method represents the "top" SO_2 control technology. No other control technology has been demonstrated to achieve greater control of acid gas emissions in the United States. Since an SDA/FF system is proposed for the RGS facility, no other control technology alternatives need be considered in the BACT evaluation.

Ranking of Emission Rate Alternatives -- SO_2

The specific SO_2 emission rates resulting from application of a given control technology will depend of fuel sulfur content as well as on the removal efficiency of the control device. Fuel sulfur content variability is compounded in the case of the RGS facility since the facility will be designed to burn wood, tires, and landfill gas at different percentages. Because of fuel and sulfur content variability, it is not appropriate to compare SO_2 emissions from the RGS facility to units that burn only wood or only tires. For example, the SO_2 emission limits shown in Table 5-1 for wood-fired boilers tend to be low due in large part to the low sulfur content of most wood fuels. A mix of wood fuels will be combusted at RGS. Some of these fuels, such as the wood fuel derived from C&D materials, are expected to have higher sulfur contents. The SDA/FF design being developed for RGS will achieve a removal efficiency of approximately 80 percent. Based on the expected range of fuel sulfur content, this control efficiency will result in SO_2 emissions of 0.17 lb/MMBtu or less on a 24-hour block average basis.

Non-PSD Pollutant Considerations -- SO_2

Use of an SDA/FF system for SO_2 will also result in control of acid gases such as HCl. As previously discussed, the SDA/FF system provides the combination of factors that are most favorable for trace metal emissions removal. As the spray droplets in the lime slurry evaporate and the flue gas is cooled, the metals condense and impact or absorb onto the smaller particles in the gas stream. The greater submicron removal efficiency of the FF results in higher overall metal removal efficiencies for the SDA-based system. Removal efficiencies for heavy metals in the SDA/fabric filter system will exceed 99 percent. The SDA in conjunction with the fabric filter will also remove a smaller percentage of volatile trace metals, such as mercury which may occur in very low concentrations in the RGS fuel mix. Removal efficiency for mercury is expected to be approximately 50 percent. This removal is accomplished through a variety of mechanisms, which include vapor condensation in the SDA and adsorption/absorption in the fabric filter. In addition, control of some organic compounds is accomplished in SDA/FF systems. For example, while dioxin emissions attributable to this type of facility are negligible, SDA/FF systems have been demonstrated to reduce dioxin emissions by approximately 90 percent.

Selected BACT Alternative -- SO_2

The control approach selected as BACT for SO_2 is use of a dry scrubber/fabric filtration system limiting SO_2 emissions to 0.17 lb/MMBtu on a 24-hour block average basis. Based on modeling results, an emission rate of 0.17 lb/MMBtu will result in an insignificant ambient impact.

5.1.4. Nitrogen Oxides

Technically Feasible Alternatives -- NO_X

The technically feasible control alternatives consist of combustor design, add-on controls, or a combination of the two. The candidate add-on control methods for large combustion sources in general are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). While SCR has been demonstrated to be effective on a developmental basis on oil-, gas- and coal-fired boilers and has been commercially applied to several gas-fired combustion processes in the United States, SCR has not been commercially proven at wood-fired or tire-fired boiler facilities. Based on the information sources previously cited, SCR technology has not been used at existing or proposed wood- and/or tire-fired boilers. SCR technology for wood- and/or tire-fired combustion is therefore not considered a sufficiently proven method to be considered as a technically feasible alternative for the RGS project.

Ranking of Control Technology Alternatives -- NO_X

Use of SNCR can achieve a greater NO_X control efficiency than combustor design alone. A combination of SNCR and combustor design should theoretically be able to achieve greater control than either method individually. This combination approach, which represents the "top" control method, is proposed for the RGS facility. Therefore, no other control method need be considered in the BACT evaluation. Features of the furnace designed for installation at the RGS facility that will help minimize NO_X emissions include an enlarged furnace volume and installation of an overfire air system.

Ranking of Emission Rate Alternatives -- NO_X

NO_X formation is influenced by both the amount of nitrogen in the fuel and the combustion technology applied. The expected average fuel mix on a heat input basis is 75 percent wood, 15 percent tires, and 10 percent landfill gas. On a weight basis, this equates to 83 percent wood, 7 percent tires, and 10 percent landfill gas. Given these percentages, the combustion process and, hence, NO_X formation will be dominated by wood firing. Therefore, NO_X emissions from the RGS facility should be evaluated based on units burning 100 percent wood.

The list in Table 5-1 contains three fluid bed units. As pointed out previously, however, fluid bed combustors are not appropriate for comparison to conventional boilers. The non-fluid bed boilers in Table 5-1 show a NO_X range of 0.11 - 1.19 lb/MMBtu. The RGS facility is designed based on stoker firing. Therefore, the most appropriate BACT reference is to stoker-fired units using SNCR.

Nine units are listed in Table 5-1 that use SNCR and are not fluid bed units. Two of these units have a NO_X limit of 0.11 lb/MMBtu. Five have a limit of 0.15 lb/MMBtu. One has a limit of 0.21 lb/MMBtu, and one has a limit of 246.6 ton/yr. A mix of wood fuels will be combusted at RGS. Some of these fuels, such as the wood fuel derived from yard waste, are expected to have a higher nitrogen content than others. Using this higher nitrogen fuel will increase NO_X emissions. Therefore, based on the fuel mix, it is anticipated that an SNCR system at RGS will result in NO_X emissions in the upper range of the nine units identified in Table 5-1 as using SNCR on a non-fluid bed boiler.

Non-PSD Pollutant Considerations -- NO_X

As discussed in Section 3.4.2, the two types of SNCR systems, ammonia injection and urea injection, will result in ammonia emissions. These emissions, referred to as ammonia slip, occur when the injected reagent does not react completely with NO_X. Ammonia emissions are minimized by careful design and operation, but they are an unavoidable byproduct of achieving better control of NOX emissions. As will be discussed in Section 6.0, modeling of the ammonia emissions estimated for the RGS boiler indicates that the ambient concentrations resulting from ammonia slip will be less than the no threat levels defined by DER.

Selected BACT Alternative -- NO_X

The alternative selected as BACT for RGS NO_X emissions is use of SNCR and combustion design to achieve a NO_X emission rate of 0.15 lb/MMBtu on a 24-hour block average basis. This alternative is consistent with the most recent BACT determination made for a wood-fired unit (Beaver-Livermore) and is commensurate with fuel nitrogen content levels expected over the anticipated fuel mix. Based on modeling results, an emission rate of 0.15 lb/MMBtu will result in an insignificant ambient impact.

5.1.5 Carbon Monoxide

Technically Feasible Alternatives -- CO

In fuel burning equipment, CO emissions result from incomplete combustion. Procedures accepted as BACT for CO control consist of techniques to enhance combustion efficiency. As far as is known, no boiler owners have installed or proposed installation of add-on control systems for CO.

Ranking of Control Technology Alternatives -- CO

The approach proposed as BACT for CO emissions from the RGS facility is use of good combustion practices. This approach is consistent with the control methods accepted as BACT for other wood- and/or tire-fired boilers as indicated by a review of the BACT/LAER Clearinghouse entries, and is the "top" control method. Therefore, no other control technology need be considered.

Ranking of Emission Rate Alternatives -- CO

Combustion practices that minimize CO will generally increase NO_X production. Therefore, selection of a CO emission rate has to be made in conjunction with the NO_X emission limit selection. The five units in Table 5-1 which have a NO_X limit of 0.15 lb/MMBtu have CO limits of 0.3 to 0.4 lb/MMBtu. Another consideration in selecting a CO emission rate is the effect of tire burning on CO emissions. Boiler vendors have indicated that CO emissions will increase when tires are co-fired with wood. In addition, a recent study on emissions from tire burning facilities was published by Malcolm Pirnie, Inc., entitled "Air Emissions Associated With the Combustion of Scrap Tires for Energy Recovery." This report includes CO emissions data on five boilers. The results, summarized in Table 5-3, show that adding tires to the base fuel increased CO emissions in four of five facilities. These increases ranged from 35 to 88 percent. Based on these data, burning tires with wood at RGS is expected to increase CO emissions as compared to burning wood alone.

An emission limit of 0.5 lb/MMBtu (24-hour block average) has been selected as BACT. This limit is based upon a review of actual CO emissions data at several operating wood-fired boilers, and giving consideration to the mix of wood fuels anticipated to be fired, as well as the information which indicates that CO emissions will increase when tires are co-fired with wood in the boiler.

Non-PSD Pollutant Considerations -- CO

The good combustion practices employed to reduce CO emissions will also help reduce emissions of organic compounds.

Selected BACT Alternative -- CO

The alternative selected as BACT for CO emissions is good combustion practices. The furnace will be designed to provide conditions conducive to good combustion. The methods that will be used to ensure high combustion efficiency and minimize CO and VOC emissions from the combustion process include:

- High combustion temperatures
- Sufficiently long residence times
- Good fuel mixing and fuel bed management
- Controlled distribution of combustion air
- High combustion gas turbulence.

These methods will achieve an emission limit of 0.5 lb/MMBtu on a 24-hour block average basis, excluding periods of start-up and shut down. The proposed CO limit is slightly higher than the limits established for recently permitted wood-fired facilities with a NO_X limit of 0.15 lb/MMBtu. This high end value is warranted due to the proposed fuel mix at this facility.. Based on modeling results, an emission rate of 0.5 lb/MMBtu will result in an insignificant ambient impact.

5.1.6 Volatile Organic Compounds (VOC's) -- VOC's

Technically Feasible Alternatives -- VOC's

Control technologies for VOC emissions from industrial processes include incineration, carbon adsorption, absorption, and condensation. However, due to their low concentrations in a high volume of flue gas, wood-fired boiler VOC emissions are such that carbon adsorption, absorption, and condensation would be ineffective add-on control technologies. These control methods are therefore considered not technically feasible for the project. Thermal incineration of VOC's is the most appropriate technology, and is accomplished in a boiler furnace by a combination of residence time, temperature, and mixing velocities. Maintaining good combustion practices to assure proper residence time, temperature, and turbulence is the only feasible control technology applicable to the RGS project.

Ranking of Control Technology Alternatives -- VOC's

Proper combustion practices is the top VOC control technology for boilers. The same methods used to ensure high combustion efficiency and reduce CO emissions are also used to minimize VOC emissions. Since good combustion practices are being proposed for RGS facility, no other control technology alternatives need to be considered in the BACT analysis.

Ranking of Emission Rate Alternatives -- VOC's

For non-fluid bed boilers, Table 5-1 shows a range of permitted VOC emission limits from 0.016 - 0.126 lb/MMBtu. A VOC emission limit is available for only one of the tire-fired units in Table 5-2. This limit is listed as 0.032 lb/MMBtu.

Non-PSD Pollutant Considerations -- VOC's

Control of VOC emissions as a general class of organics will of course also control the specific organic compounds that make up this class.

Selected BACT Alternatives -- VOC's

The alternative selected as BACT for VOC emissions from the RGS project is good combustion practices with an emission limit of 0.035 lb/MMBtu. This emission limit is in the lower end of the range shown for other wood-fired units and is similar to the one tire-fired plant having a VOC limit.

5.1.7 Lead

As discussed above, the BACT selected for particulate matter (fabric filtration) is also applicable to metals such as lead which remain primarily in particulate form following combustion. The proposed maximum Pb emission rate is .0004 lb/MMBtu.

5.1.8 Beryllium

As discussed above, the BACT selected for particulate matter (fabric filtration) is also applicable to metals such as beryllium which remain primarily in particulate form following combustion. The proposed maximum Be emission rate is 0.00001 lb/MMBtu.

5.1.9 BACT Summary

Table 5-4 presents a summary of the control technologies and emission rates proposed as BACT for PM, SO_2, NO_X, CO, VOC's, Pb, and Be.

5.2 OTHER EMISSION CONTROL CONSIDERATIONS

5.2.1. Toxic Air Pollutants from Fuel Combustion

As previously indicated, the control methods proposed for the regulated pollutants emitted in significant amounts will also serve to reduce emissions of many toxic air pollutants. On the other hand, emissions of one toxic air pollutant (ammonia) are an unavoidable byproduct of the proposed control method for NO_X. The following summary addresses toxic air pollutant emissions from the RGS boiler.

Hydrogen Chloride - HCl will be controlled by the SO_2 acid gas control system (SDA/FF). The expected removal efficiency of uncontrolled HCl emissions is approximately 95 percent.

Metals - Metals that remain in particulate form during combustion will be effectively controlled by the fabric filtration system. As discussed above, the SDA/FF provides the combination of factors that are most favorable for trace metal emissions removal. The removal efficiencies for the majority of the heavy metals (i.e., non-volatile metals) will exceed 99 percent, with a lower removal efficiency expected for the more volatile metals.

Specific Organic Compounds - Good operating practices for VOC control in general will also act to control emissions of specific organic compounds. In addition, a spray dryer/fabric filter control system for acid gases and particulate matter has been found effective in removing a significant portion of the organic compounds from the flue gases of some combustors.

Ammonia - Ammonia emissions will occur only as a result of "ammonia slip" from the SNCR system that will be used to control NO_X emissions. The presence of ammonia is therefore a tradeoff involved in controlling NO_X emissions. Keeping ammonia emissions to a minimum will be achieved by proper design and operation of the SNCR system.

5.2.2 Other Particulate Matter Emission Sources

Ash Silo and Lime Silo

Particulate emissions from the ash silo and lime silo will be controlled by bin vent filters. The expected outlet dust loadings from these filters is 0.02 gr/ft^3. In addition, loading and unloading operations involving the ash and lime silos will occur on an intermittent basis. The lime silo is expected to be loaded about twice a week for about an hour per loading. The ash silo will be in use about six times per day for about an hour each time.

The alternative ash handling system that is being considered eliminates the ash silo and its vent filter. With the alternate design an enclosed ash loadout structure is included which will have its own ash handling vent filter. Because both bottom ash and the combined fly ash/SDA residue will be wetted before being loaded into containers, fugitive dust emissions are expected to be less than with the ash silo option. If the ash loadout area is incorporated into the plant design, it will be located within 50 ft of the proposed ash silo, adjacent to the baghouse, SDA, and boiler. The ash handling vent filter will be on the roof of that structure, and will have an expected outlet dust loading of 0.02 gr/ft^3.

Cooling Tower

Particulate emissions from the cooling tower will be controlled by an effective drift elimination design. The cooling tower will be equipped with high efficiency drift eliminators forcing three distinct changes in air direction and obtaining extremely low drift rates.

Fugitive Dust Sources

Factors that will serve to minimize fugitive dust emissions are as follows:

- Unprocessed wood unloading, storage, chipping and handling - The unprocessed wood portion of the RGS fuel supply is expected to make up less than 19 percent of the average boiler heat input. By virtue of the relatively small quantity and the size of the unprocessed material, unloading and storage are not expected to create a significant fugitive dust source. The chipping or hogging of these materials may produce fines or dust. Therefore, measures will be taken in fuel procurement to minimize deliveries of loads which could result in dust generation. For the atypical loads which could cause dusting, wood yard operators will have available service water hose stations which will be used for wash-down and dust suppression. Fines which are generated in the hogging operations will be collected by mechanical or pneumatic means, stored temporarily, then sent to an approved landfill.

- Processed wood unloading, storage and handling - Processed or ground wood will be received in covered trucks and will be unloaded into the receiving hopper using a hydraulic truck unloader. From the receiving hopper, sized fuel will be added to the fuel pile via the radial stacker. To minimize windborn dust as the wood chips fall off the stacker onto the pile, the height of the stacker will be adjusted by woodyard operators. The use of the stacker reclaimer will not generate dust emissions, and the use of a covered fuel conveyor to the boiler house will keep windswept emissions from that source to a minimum.

- Tire unloading, storage, shredding, and handling - Tires will be received as whole tires and fragments, but not powdered. Tire materials as received will not be inherently dusty when unloaded and stored. The tire fragments resulting from shredding will be relatively large (minus 2-inch) and should not result in excessive dust emissions during the shredding process or when conveyed to the boiler.

- Vehicle movements - On-site roads will be paved, and the surface of the wood storage area will be compacted crushed stone which will minimize dust from vehicle movement in that area. In addition, a water truck will be maintained on-site, and the driving surfaces will be wetted as needed to control dust.

5.3 COMPLIANCE WITH EMISSION STANDARDS

5.3.1 Applicable Standards

40 CFR 60, Subpart Db

Portions of the federal new source performance standards (NSPS) in 40 CFR 60, Subpart Db, pertaining to industrial - commercial - institutional steam generating units with a heat input capacity greater than 100 MMBtu/hr are considered applicable to the RGS project. However, not all of the standards in Subpart Db are applicable. The applicable standards are (1) the emission rate standard for particulate matter when combusting wood or a mixture of wood and other fuels, and (2) the opacity standard. The standard for sulfur dioxide is not applicable because it pertains to coal and oil combustion. The standard for nitrogen oxides is 0.30 lb/MMBtu for facilities that simultaneously combust natural gas with wood, municipal-type solid waste, or other solid fuel, except coal. However, this standard does not apply if the facility has a federally enforceable requirement that limits operation of the facility to an annual capacity factor of 10 percent or less for natural gas. RGS is willing to accept such a permit condition.

The Subpart Db particulate standard applicable to wood combustion (40 CFR 60.43b(c)(1)) is 0.10 lb/MMBtu heat input. The proposed RGS boiler emission rate of 0.02 lb/MMBtu will easily meet this standard.

The applicable opacity standard (40 CFR 60.43b(f)) requires that discharges will be limited to an opacity of 20 percent (6-minute average), except for one 6-minute period per hour when opacity can increase to 27 percent. The RGS boiler will be operated to comply with this standard.

Florida Rule 17-2.610(2) and 17-2.610(3)

Florida Rule 17-2.610 contains general particulate emission limiting standards. Rule 17-2.610(2), the general visible emissions standard, is considered applicable to the RGS ash handling system and lime silo. This standard requires limiting discharges to less than 20 percent opacity. The vent filters installed for control of ash and lime emissions will achieve this requirement. Rule 17-2.610(3) pertains to unconfined emissions of particulate matter from sources such as vehicular movement, transportation of materials, loading, unloading, storing, and handling. RGSLP will take reasonable precautions to reduce fugitive dust emissions, including paving of on-site roads.

5.3.2 Standards Not Considered Applicable

The following standards are not considered applicable to the RGS project for the reasons stated:

- 40 CFR 60, Subpart Da, the federal NSPS for electric utility steam generating units with a heat input greater than 250 MMBtu/hr using fossil fuel. -- Subpart Da applies to units burning fossil fuels alone or in combination with other fuels. At least 250 MMBtu/hr of fossil fuels must be burned for a unit to be an affected facility. The only fossil fuel that will be burned in the RGS boiler is propane. The propane burner design will limit heat input from propane to 180 MMBtu/hr. Since the total fossil fuel heat input will be less than 250 MMBtu/hr, the facility is not subject to Subpart Da.

- 40 CFR 60, Subpart Ea, the federal NSPS for municipal waste combustors (MWC's) with a capacity greater than 250 tons per day of municipal-type solid waste (MSW) or refuse-derived fuel (RDF). --- RGS will not be subject to the standards in Subpart Ea because 30 percent or less (by weight) of the fuel feed stream will be comprised of municipal solid waste (MSW) as defined in 40 CFR 60, Subpart Ea. To satisfy the criteria for exclusion of co-fired combustors from the standards, RGS will accept a federally enforceable permit condition which limits the percent of MSW in the fuel stream to no more than 30 percent, by weight, measured on a daily basis. RGS will also comply with all applicable reporting requirements contained in Subpart Ea.

- 40 CFR 61, Subpart C, the national emission standard for hazardous air pollutants pertaining to beryllium. --- The provisions of this subpart apply to extraction plants, ceramic plans, foundries, incinerators, and propellant plants which process beryllium ore, beryllium, beryllium oxide, beryllium alloys, or beryllium-containing waste. The RGS facility is not in one of these affected source categories. It is not an incinerator within the bounds of this standard because incinerator is defined as "any furnace used in the process of burning waste for the primary purpose of reducing the volume of the waste by removing combustible matter." The primary purpose of the RGS facility is to produce electric power.

- 40 CFR 60, Subpart E, the federal NSPS for incinerators with a charging rate greater than 50 tons per day of solid waste. --- These standards are not considered applicable for two reasons. First, the Subpart E definition of "incinerator" is a "furnace used in the process of burning solid waste for the purpose of reducing the volume of the waste by removing combustible matter." The purpose of the RGS project is to produce power, not to reduce the volume of waste. Second, "solid waste" means refuse, more than 50 percent of which is municipal type waste on a weight basis. As discussed above, the fuel burned in the RGS boiler will contain less than 50 percent MSW by weight.

- Florida Rule 17-2.610(1), the process weight table of the general particulate emission limiting standards. --- The process weight table emission rates are not applicable to ash and lime handling because ash and lime materials are not used to produce a finished product.

Note that federal NSPS are also referenced in Florida Rule 17-2.660. Conclusions above regarding the applicability or inapplicability of federal NSPS also pertain to 17-2.660.

BACT/LAER Clearinghouse Data

WOOD FIRED BOILERS

TABLE 5-1

BACT/LAER CLEARINGHOUSE DATA FOR WOOD-FIRED BOILERS

	CODE	PERMIT ISSUE	SIZE MMBtu/Hr	NOx Lb/MMBtu	PM Lb/MMBtu	CO Lb/MMBtu	VOC Lb/MMBtu	SO2 Lb/MMBtu	NOTES
1)	#VT-0004	Jul-90	300	0.150	.001 gr/dsc	0.300	0.030		Mech Coll & ESP, NH3 Inj, Limit VE, BAP & NH3
2)	CA-0294	Jul-88	230	0.094	0.018	0.150	0.027	0.027	FBC, NH3 Inj., Multicl & ESP, Limestone Inj.
3)	#VT-0002	May-84	670	0.200	.007 gr/dsc	*1500 ppmv		*0.3 % fuel	Mech Dust Collector & ESP ,gas NOx 0.13, low NOx burners
4)	ME-*****	Sep-91	534	0.150	0.020	0.300	0.016	0.014	Comb Control, multiclone, dry ESP, urea injection, CEMS
5)	CA-0261	Nov-87	127	0.180	0.022	0.173	0.126		Limit 8000 H/yr, Multicl & ESP, Ccomb Controls
6)	CA-0295	Not Built	216	0.063	0.029	0.038	0.027	0.027	FBC, NH3 Inj., Limestone Inj., Multicl & Baghouse
7)	#CA-0172	Apr-85	*18.4 T/H Lu	0.140	.010 gr/dscf				FBC, Htd Stgd Air Addition, Multicyc. & ESP
8)	MI-0139	Dec-89	300	0.150	0.030	0.350	0.070	0.018	Mech Coll & ESP, Boiler Des, Comb Contr, SNCR, Lim BAP
9)	MI-0147	Jan-90	293	0.210	0.030	0.350	0.069	0.017	Mech Coll, Baghouse, Good Comb Contr, Limit BAP & NH3, SNCR
10)	MI-0151	Mar-90	450	0.150	0.030	0.400	0.050		Multiclone, ESP, Stack Monitor, SNCR, Design & Oper Practices, Limit
11)	MI-0180	none	523	0.150	0.030	0.400	0.043		ESP, SNCR, Comb Controls
12)	CA-0235	Mar-87	198	0.110	0.032	0.217			Thermal DeNOx, Low Exc Air, ESP & Multicl Precleaner
13)	CA-0188	Jan-85	309	0.200	0.040	0.400			HP overfire air sys., Multiclones & ESP
14)	NC-0046	Jan-89	666	0.350	0.041	0.660	0.077		Auto Comb Controls, Cyclone Sep & ESP
15)	#CA-0071	Sep-83	162	*130 ppmv	.020 gr/dscf				Stgd Comb, CEM-NOx, O2, CO, Baghouse
16)	#CA-0194	Jan-87	357	0.157	.020 gr/dscf				ACFB, Boiler design, ESP
17)	KY-0001	Jun-80	400		0.075				
18)	GA-0020	Nov-86	290		0.100				Multicyclone & Venturi Scrubber
19)	MS-0009	Mar-87	151	0.300	0.100	0.476		0.038	Multiclone & Scrubber, Low Exc Air, Comb Design

BACT/LAER Clearinghouse Data

TABLE 5-1 (continued)

WOOD FIRED BOILERS

	CODE	PERMIT ISSUE	SIZE MMBtu/Hr	NOx Lb/MMBtu	PM Lb/MMBtu	CO Lb/MMBtu	VOC Lb/MMBtu	SO2 Lb/MMBtu	NOTES
20)	NC-0002	Mar-81	*120 kLb/H s	*35.23 Lb/	0.100	*44.04 Lb/H		*33.03 Lb/H	Venturi Scrubber & Multiclone, Low S Fuel, Equip Oper
21)	#CA-0039	Oct-82	145	*139 T/Yr	.035 gr/dsc	*126 T/Yr	*55 T/Yr	*21 T/Yr	Multiclone & Venturi Scrubber, Comb Parm. Control
22)	ME-0003	Aug-82	84		0.120			0.136	Multiclones [Common stack w/Dryer]
23)	ME-0004	Jan-82	25		0.150				ESP
24)	VA-0132	May-88	4		0.200	0.480			Gas Gen & Boiler, Limit Formaldehyde (.12 Lb/H)
25)	ID-0005	Dec-82	88	0.200	0.241	0.200			2 Stgd Multiclones [See Note]
26)	SC-0005	Jun-81	172	1.190	0.250				Bark/Woodwste, Mech Coll &ESP, Equip Oper & Design
27)	TX-0057	Jan-80	*70 kLb/H		*10.7 Lb/H				Scrubber in series w/Scrubber
28)	NC-0007	Jan-80	*165 kLb/H		*246 T/Yr				Bagfilters, Cyc & Venturi Scrubber
29)	CA-0265	Mar-88	*38.5 MW	*246.7 T/Y	*65.7 T/Yr	*674.5 T/Y	*92.97 T/Y	*20.49 T/Yr	Multiclone & ESP, Stgd Comb, NH3 Inj, complete Comb
30)	CA-0268	May-88	335	0.110		0.500			Secondary Air Inj., NH3 Injection
31)	CA-0272	Nov-88	287			2.056	0.122		[mod. source] Good Oper & Comb Practices, Stgd Comb
32)	MI-0165	Aug-90							[small] Limit BAP, Cyclone
33)	MI-0166	Aug-90	5						Limit BAP
34)	MS-0009*	Mar-87	137	0.200		0.036			Gas Firing, Low Exc Air, Comb Design
35)	NC-0022	Jan-82	22				*917 T/Y		Limit wood use to limit VOC

\# PM level as listed in gr/dscf. Conversion to Lb/mmBtu is approximate.

***** as listed in permit, not from BACT/LAER Clearinghouse.

TABLE 5-2

100 PERCENT TIRE-FIRED BOILERS
MAXIMUM PERMIT LIMITS

Facility	Heat Input (MMBtu/hr)	Permitted Emission Rates				
		PM (lb/MMBtu)	SO_2 (lb/MMBtu)	NO_x (lb/MMBtu)	CO (lb/MMBtu)	VOC's (lb/MMBtu)
Modesto, California	188	0.02	0.06	0.11	0.08	0.033
Sterling, Connecticut	362	0.03	0.11	0.12	0.17	--
Moapa, Nevada	605	0.03	0.19	0.18	0.19	--

TABLE 5-3

EFFECT OF BURNING TIRES
ON
CO EMISSIONS

			CO EMISSIONS		
Location	Fuels	Units	Without Tires	With Tires	Percent Change in CO Emissions Due to Burning Tires
Nekoosa Packaging Tomahawk, Wisconsin	Coal, Bark & Tires	lb/hr	223	301	+ 35.0
Uniroyal Goodrich Tire Eau Claire, Wisconsin	Coal and Tires	lb/hr	3.1	1.1	- 64.5
Virginia Polytechnic Institute	Coal and Tires	lb/MMBtu	0.17	0.32	+ 88.2
Monsanto Company Sauget, Illinois	Coal and Tires	lb/hr	0.38	0.53	+ 39.4
Energy Product of Idaho	RDF and Tires	ppm	20.0	30.0	+ 50.0

TABLE 5-4

RIDGE GENERATING STATION
SUMMARY OF PROPOSED BACT APPROACH

Pollutant	Proposed Best Available Control Technology	Proposed Emission Limit (lb/MMBtu)
PM	Fabric Filtration	0.02
SO_2	Spray Dryer with Fabric Filtration	0.17[a]
NO_X	Combustor Design and Selective Noncatalytic Reduction System	0.15[a]
CO	Good Combustion Practices	0.5[a, b]
VOCs	Good Combustion Practices	0.035
Pb	Fabric Filtration	0.0004
Be	Fabric Filtration	0.00001

[a] On a 24-hour block average basis

[b] Excluding periods of start-up and shut down.

6.0 PRIMARY AMBIENT AIR QUALITY IMPACT ANALYSIS

6.1 MODELING APPROACH

The dispersion modeling analysis for the project was designed to assess the potential impact on ambient air quality of emissions from the proposed RGS project. As indicated previously, the operation of this facility is expected to result in "significant" emissions (as defined by DER and EPA) of carbon monoxide, nitrogen oxides, particulate matter (PM and PM_{10}), sulfur dioxide, volatile organic compounds, lead, and beryllium. In addition to the pollutants with "significant" emission rates, a modeling analysis was also performed for several toxic air pollutants that are subject to the Florida air toxics permitting strategy.

Prior to initiating the air quality impact analysis described in this section, Dames & Moore prepared and submitted to Mr. Cleve Holladay of DER a dispersion modeling protocol dated November 1, 1991. The dispersion models, meteorological data, and modeling approach used to develop impact analysis results are in accordance with this protocol.

6.1.1 Dispersion Model

Dispersion modeling results were obtained using the most recent version of EPA's short-term Industrial Source Complex (ISCST) model and SCREEN model. The ISCST model was used to determine annual average concentrations as well as short-term concentrations (24-hours or less).

6.1.2 Ridge Generating Station Emission Source Data

The boiler will be the dominant emission source at RGS and was the only RGS source considered for the modeling evaluation. Tables 4-1, 4-2, and 4-3 show boiler emission rates and stack conditions for the 100 percent wood case, the 80 percent wood/20 percent tire case, and the wood/tire/landfill gas case. The wood/tire combination fuel has either higher emission rates or essentially the same emission rates compared to other fuel cases. Also, wood/tire combustion results in the lowest exhaust gas velocities for all load levels. Since the expected exhaust gas exit temperature is the same for all three fuel cases, lowest plume rise will occur with the wood/tire fuel case. Taking into account both emission rates and plume dispersion characteristics, the wood/tire fuel case is the worst-case fuel from an air quality standpoint and was the only case evaluated in the modeling analysis.

Three boiler load levels were considered for modeling: maximum continuous rating, 75 percent load, and 50 percent load. To help determine which of these load levels to include in the detailed ISCST modeling assessment, they were first evaluated with the SCREEN model. The 50 percent load level clearly resulted in the lowest concentrations, but the results for the MCR and 75 percent load levels were similar. Therefore, detailed ISCST evaluations were performed for both the MCR and 75 percent load levels.

RGS boiler emission characteristics in metric units as used for modeling purposes are listed in Table 6-1. A normalized emission rate of 1.0 g/s was used in each ISCST modeling run so that concentrations for different pollutants could be obtained easily by scaling. Actual emission rates in g/s are listed in Table 6-2.

As will be shown later, RGS emissions result in maximum concentrations that are less than the PSD significant impact levels. Assessing the interaction of the RGS boiler with other emission sources is therefore not required. Consequently, this application does not contain an inventory for other emission sources or a modeling analysis involving other sources.

6.1.3 Meteorological Input Data

The meteorological data base used with the ISCST model consisted of five years (1982-1986) of national weather service surface and upper air observations from Tampa, Florida. Data were obtained in processed format from DER.

6.1.4 Receptor Specification

As is typical for PSD evaluations, the initial modeling calculations were made for RGS emissions to determine if these emissions will produce a significant impact (with reference to defined significant impact levels). In this analysis, no attempt was made to exclude areas within the site boundary under the concept that on-site locations are not "ambient air" locations. Preliminary modeling results from both SCREEN and ISCST indicated that predicted maximum concentrations occur at distances beyond the RGS site boundary. Specifically, initial modeling demonstrated that maximum predicted concentrations occur at distances beyond 250 m.

The significant impact analysis was conducted using a polar coordinate grid centered on the boiler stack. The first set of calculations specified receptors along radial lines spaced 10 degrees apart. For these first calculations, receptors were specified at intervals of 250 m beginning at a distance of 250 m and going out to a distance of 3,000 m from the boiler stack. Calculations were made with all five years of meteorological data for MCR conditions and 75 percent load level conditions.

The predicted normalized concentrations from these initial calculations were then tabulated in a list showing the maximum predicted concentration for each averaging period, for each meteorological data year, and for both load levels. The ten maximum contrations thus obtained for each averaging period were listed in descending order. The highest of the yearly maximum concentrations, plus any other yearly maximum concentrations within 10 percent of the highest, were then evaluated in a second set of calculations using a polar receptor grid consisting of radials spaced 2 degrees apart and a distance spacing of 100 m. This approach provides an estimate of maximum concentrations to a receptor spacing resolution of 100 m.

An example will illustrate the details of this process. From the first set of calculations, the predicted maximum (normalized) 24-hour concentrations for each year and load level are shown below in ranked order, together with the direction and distance of the receptor where the maximum was predicted. (In this listing, the concentrations for the 75 percent load level represent an emission rate of 0.75 g/s for comparison with an emission rate of 1.0 g/s at MCR.)

Concentration	Year	Load	Direction	Distance
0.31082	1983	MCR	250°	1,500 m
0.30128	1982	MCR	360°	1,750 m
0.28378	1983	75%	250°	1,500 m
0.27785	1986	MCR	90°	1,250 m
0.27312	1984	MCR	250°	1,250 m
0.27284	1982	75%	360°	1,500 m
0.26790	1985	MCR	80°	1,500 m
0.25211	1986	75%	90°	1,250 m
0.24588	1985	75%	80°	1,250 m
0.24489	1984	75%	90°	1,250 m

From this ranking, only the second and third yearly maximum values are within 10 percent of the highest value. Therefore, the top three values were evaluated further. The receptor grid specified for further evaluation of the highest value consisted of directions 246°, 248°, 250°, 252°, and 254°, and distances of 1,300, 1,400, 1,500, 1,600, and 1,700 m. A similar method was used to specify receptors for further evaluation of the second and third yearly maximum concentrations in the rank order.

Modeling results obtained from the significant impact analysis were also used to assess compliance with the DER toxic air pollutant no-threat levels (NTL's). Therefore, toxic air pollutant concentrations attributable to RGS boiler emissions were determined to a receptor spacing resolution of 100 m.

Modeling was also conducted to determine the impact of RGS boiler emissions within the nearest PSD Class I area, the Chassahowitzka National Wilderness Area (a part of the Chassahowitzka National Wildlife Refuge). This area is located on the Gulf Coast about 100 km to the northwest of the RGS site at its closest point. The receptor coordinates used to represent the Chassahowitzka PSD Class I area were obtained from DER. DER supplied UTM coordinates for receptors used in a previous evaluation. These receptors represent the landward side of the area. The receptor coordinates obtained from DER are as follows (in meters):

340300 E, 3165700 N	340300 E, 3167700 N
340300 E, 3169800 N	340700 E, 3171990 N
342000 E, 3174000 N	343000 E, 3176200 N
343700 E, 3178300 N	342400 E, 3180600 N
341100 E, 3183400 N	

These points were modeled as discrete receptors with respect to the RGS boiler stack UTM coordinates of 416690 E, 3100380 N.

6.1.5 Model Option Selection

The ISCST model contains options that determine the way in which calculations are made. The choice of options was made consistent with EPA's current recommended approach by specifying the regulatory default option. Due to the RGS site location in an undeveloped part of Polk County, the selected terrain option was rural terrain.

6.1.6 Good Engineering Practice Stack Height

GEP stack height is determined on the basis of the dimensions of "nearby" structures. "Nearby" means a structure that is within a distance of 5L from a stack, where L is the lesser of the structure height or maximum projected width.

Table 6-3 lists the dimensions of taller structures that are within 5L of the RGS boiler stack. The location of these structures is shown in Figure 3-2. Also shown in Table 6-3 is the GEP stack height calculated for each structure. The greatest GEP height is produced by the upper tier of the boiler building. The GEP height associated with this structure is 325 ft.

The proposed height of the RGS boiler stack is the GEP height of 325 ft. Because this height does not exceed the GEP level, the entire height can be credited in the modeling analysis. Furthermore, because the proposed height equals GEP height, building downwash effects need not be considered.

6.2 SIGNIFICANT IMPACT DETERMINATION

Predicted maximum normalized concentrations (emission rate = 1.0 g/s) are shown in Tables 6-4 and 6-5 for MCR and 75 percent load levels. These concentrations can be multiplied by the emission rates in Table 6-2 to obtain total concentrations. The annual concentrations are based on an assumed continuous operation at either MCR or 75 percent load.

Maximum concentrations considering both MCR and 75 percent load are listed in Table 6-6 for SO_2, NO_2, PM, CO, and Pb. Maximum SO_2, NO_2, PM, and CO concentrations are well below the significant impact levels. The maximum Pb concentration is well below the national and Florida ambient air quality standard. (A significant impact level does not exist for Pb.)

The conclusion from these results is that emissions from the proposed boiler will not produce a significant impact within the area surrounding the RGS site. In accordance with PSD assessment policies, no further modeling is needed to demonstrate that the proposed project is acceptable from the standpoint of PSD Class II increment consumption and compliance with NAAQS and FAAQS.

6.3 IMPACT ON NEAREST PSD CLASS I AREA

The significant impact concept is not as well defined for PSD Class I areas as it is for PSD Class II areas. However, EPA has suggested significance levels for use in assessing SO_2, NO_2, and PM concentrations within PSD Class I areas (U.S. Environmental Protection Agency, 1991).

Predicted maximum concentrations within the Chassahowitzka PSD Class I area attributable to RGS boiler emissions are listed in Table 6-7. These maximum concentrations are less than the EPA-suggested PSD Class I significance levels. The conclusion is, therefore, that the RGS project will have an insignificant impact on the nearest PSD Class I area. This is a reasonable conclusion given the large distance separating the RGS site from the Chassahowitzka National Wilderness area. Of further note is that the modeling technique employed to evaluate PSD Class I impacts made no allowance for chemical transformation or other depletion of pollutants during the time required for plume transport over a distance of 100 km. Nor was any attempt made to compensate for the fact that the steady-state meteorological conditions assumed by the ISCST model are unlikely to persist from the point of emissions release to the point of impact. The predicted PSD Class I area concentrations reported in Table 6-7 are therefore likely to be very conservative.

6.4 COMPLIANCE WITH FLORIDA AIR TOXICS PERMITTING STRATEGY

The Florida air toxics permitting strategy was developed for the purpose of controlling toxic emissions from stationary sources to levels that would not endanger public health. The strategy is based on comparing the predicted ambient impacts of individual toxic air pollutants with ambient exposure levels considered protective of public health. Acceptable ambient exposure levels, referred to as no-threat levels (NTL's), have been developed by the Florida Air Toxics Working Group composed of DER and local county air toxics staff representatives. NTL's are tabulated in a document entitled the "Florida Air Toxics Working List," and are revised as needed to match changes in accepted concentration values.

To evaluate the effect of toxic air pollutant emissions from the RGS boiler, predicted maximum concentration (based on all five years of meteorological data) have been compared with appropriate NTL's. The NTL's used for this comparison were verified with DER to confirm that currently accepted values were used.

Table 6-8 contains a comparison of predicted maximum concentrations with the Florida NTL's. As can be seen, predicted maximum concentrations are less than the NTL's. Therefore, predicted concentrations attributable to toxic air pollutant emissions from the RGS boiler comply with the Florida air toxics permitting strategy.

TABLE 6-1

RIDGE GENERATING STATION
BOILER EMISSION CHARACTERISTICS AS
USED FOR MODELING ANALYSIS[a]

	Load Level	
Emission Characteristic	MCR	75% Load
Emission rate, g/s	1.0[b]	1.0[b]
Stack Height, m	99.06	99.06
Stack Diameter, m	3.05	3.05
Exit Temperature, K	349.82	349.82
Exit Velocity, m/s	14.54	10.91

[a] Data for the 80% wood/20% tires fuel mix.

[b] Normalized emission rate used for model input. Modeling results can be scaled using the actual emission rates in Table 6-2.

TABLE 6-2

RIDGE GENERATING STATION
EMISSION RATES FOR CONVERSION OF NORMALIZED CONCENTRATIONS

To convert the predicted normalized concentrations in Tables 6-4 and 6-5 to total concentrations, use the following emission rates. These rates apply to the RGS boiler firing an 80% wood/20% tires fuel mix.

Pollutant	MCR Emission Rate (g/s)	75% Load Level Emission Rate (g/s)
Sulfur Oxides (as SO_2)	13.78	10.33
Nitrogen Oxides (as NO_2)	11.91	8.93
Particulate Matter (PM/PM_{10})	1.59	1.20
Carbon Monoxide	39.69	29.80
Lead	0.032	0.024
Beryllium	0.0008	20.0006

TABLE 6-3

RIDGE GENERATING STATION
GOOD ENGINEERING PRACTICE STACK HEIGHT CALCULATIONS

Structure	Structure Dimensions		GEP Stack Height[a] (ft)
	Height (ft)	Maximum Projected Width (ft)	
Upper Part of Boiler Building	130	156	325
Lower Part of Boiler Building + Turbine Generator Building	60	205	150
Baghouse	56	76	140
Ash Silo	104	20	134
Lime Silo	30	16	54

[a] GEP height = H + 1.5L, where H is the structure height and L is the lesser of the structure height or maximum projected width.

TABLE 6-4
RIDGE GENERATING STATION
SUMMARY OF PREDICTED MAXIMUM NORMALIZED CONCENTRATIONS
FOR BOILER EMISSIONS
OPERATING AT MAXIMUM CONTINUOUS RATING
(EMISSION RATE = 1.0 g/s)

		Predicted Maximum Normalized Concentrations ($\mu g/m^3$)				
Year of Meterological Data	Receptor Resolution	1-Hour	3-Hour	8-Hour	24-hour	Annual
1982	250 m 100 m	2.119 ---	1.072 ---	0.678 ---	0.301 0.319 (1700 m/2°)	0.019 ---
1983	250 m 100 m	2.048 ---	1.247 ---	0.686 ---	0.311 ---	0.016 ---
1984	250 m 100 m	2.055 ---	1.273 ---	0.765 ---	0.273 ---	0.019 ---
1985	250 m 100 m	2.494 ---	1.182 ---	0.627 ---	0.268 ---	0.024 ---
1986	250 m 100 m	2.082 ---	1.303 1.355 (700 m/92°)	0.834 0.884 (1300 m/86°)	0.278 ---	0.030 0.030 (1500 m/86°)

Notes:

1. Predicted concentrations based on stack parameters for 80% wood/20% tires fuel mix.
2. [m/°] designation refers to distance in meters and azimuth direction in degrees relative to RGS boiler stack for the 100-m receptor resolution concentrations.
3. To obtain total concentrations, multiply the normalized concentrations in this table by the appropriate emission rates in Table 6-2.
4. The concentrations shown for the 100-m receptor resolution are the highest values obtained for each averaging period considering both MCR and 75 percent load conditions. These values are used to compute the concentrations in Table 6-6. The highest 1-hour value was obtained for the 75% load level and is listed in Table 6-5.

TABLE 6-5
RIDGE GENERATING STATION
SUMMARY OF PREDICTED MAXIMUM NORMALIZED CONCENTRATIONS FOR BOILER EMISSIONS OPERATING AT 75 PERCENT LOAD LEVEL
(EMISSION RATE = 1.0 g/s)

		Predicted Maximum Normalized Concentrations ($\mu g/m^3$)				
Year of Meterological Data	Receptor Resolution	1-Hour	3-Hour	8-Hour	24-hour	Annual
1982	250 m 100 m	3.868 4.212 (600 m/92°)	1.289 ---	0.818 ---	0.364 ---	0.023 ---
1983	250 m 100 m	2.461 ---	1.459 ---	0.833 ---	0.378 ---	0.020 ---
1984	250 m 100 m	2.434 ---	1.474 ---	0.894 ---	0.326 ---	0.023 ---
1985	250 m 100 m	2.714 ---	1.373 ---	0.751 ---	0.328 ---	0.029 ---
1986	250 m 100 m	2.491 ---	1.514 ---	1.008 ---	0.336 ---	0.036 ---

Notes:

1. Predicted concentrations based on stack parameters for 80% wood/20% tires fuel mix.
2. [m/°] designation refers to distance in meters and azimuth direction in degrees relative to RGS boiler stack for the 100-m receptor resolution concentrations.
3. To obtain total concentrations, multiply the normalized concentrations in this table by the appropriate emission rates in Table 6-2.
4. The concentratoins shown for the 100-m recptor resolution are the highest values obtained for each averaging period considering both MCR and 75 percent load conditions. These values are used to compute the concentrations in Table 6-6. The highest 3-hour, 8-hour, 24-hour, and annual concentrations were obtained for MCR (100% load) conditions and are listed in Table 6-4.

TABLE 6-6

RIDGE GENERATING STATION
SUMMARY OF PREDICTED MAXIMUM CONCENTRATIONS
FOR POLLUTANTS WITH SIGNIFICANT IMPACT LEVELS

Pollutant and Averaging Period	Maximum Predicted Concentration[a] ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
Sulfur Dioxide		
3-Hour	18.7	25
24-Hour	4.4	5
Annual	0.4	1
Nitrogen Dioxide		
Annual	0.4	1
Particulate Matter		
24-Hour	0.5	5
Annual	0.05	1
Carbon Monoxide		
1-Hour	125.5	2,000
8-Hour	35.1	500
Lead Quarterly	0.001[b]	1.5[c]

[a] Based on operating year-round at maximum continuous rating or at 75 percent load firing an 80% wood/20% tires fuel mix. Concentrations shown are maximum concentrations for all five years of meteorological data.

[b] This is the predicted maximum annual average concentration used to represent the maximum quarterly concentration.

[c] This is a national and Florida ambient air quality standard and not a significant impact level.

TABLE 6-7

RIDGE GENERATING STATION
SUMMARY OF PREDICTED MAXIMUM CONCENTRATIONS
WITHIN THE CHASSAHOWITZKA PSD CLASS I AREA
ATTRIBUTABLE TO BOILER EMISSIONS

Pollutant and Averaging Period	Predicted Maximum Concentration[a] ($\mu g/m^3$)	PSD Class I Increments ($\mu g/m^3$)	EPA Suggested[b] Significance Levels ($\mu g/m^3$)
Sulfur Dioxide			
3-Hour	0.71	25	1.23
24-Hour	0.16	5	0.275
Annual	0.01	2	0.1
Nitrogen Dioxide			
Annual	0.01	2.5	0.1
Particulate Matter			
24-Hour	0.02	10	1.35
Annual	0.001	5	0.27

[a] Based on modeling with all 5 years of meteorological data at both MCR and 75 percent load conditions.

[b] Reference: U.S. Environmental Protection Agency, 1991.

TABLE 6-8

RIDGE GENERATING STATION
SUMMARY OF PREDICTED MAXIMUM CONCENTRATIONS
OF TOXIC AIR POLLUTANTS ATTRIBUTABLE
TO BOILER EMISSIONS

	Maximum Predicted Concentrations ($\mu g/m^3$)			Florida DER No-Threat Levels[b] ($\mu g/m^3$)		
Pollutant	8-Hour	24-Hour	Annual	8-Hour	24-Hour	Annual
Arsenic	0.002	0.0008	7.2×10^{-5}	2	0.48	2.3×10^{-4}
Beryllium	0.0007	0.0003	2.4×10^{-5}	0.02	0.005	4.2×10^{-4}
Cadmium	0.004	0.001	1.2×10^{-4}	0.5	0.12	5.6×10^{-4}
Chromium VI	0.002	0.0006	6.0×10^{-5}	0.5	0.12	8.3×10^{-5}
Lead	0.03	0.01	9.5×10^{-4}	1.5	0.36	9.0×10^{-2}
Mercury	0.002	0.0009	8.4×10^{-5}	0.5	0.12	0.3
Nickel	0.007	0.003	2.4×10^{-4}	0.5	0.12	4.2×10^{-3}
Zinc	0.07	0.03	-	50	12	-
Ammonia	2.0	0.7	0.07	180	43.2	1.0
Hydrogenchloride	0.4	0.1	0.01	70	16.8	7.0
Formaldehyde	0.2	0.07	6.4×10^{-3}	4.5	1.08	7.7×10^{-2}
Benzene	0.6	0.2	0.02	30	7.2	0.12

[a] Based on operating year-round at maximum continuous rating or 75 percent load firing an 80% wood/20% tires fuel mix.

[b] Including any relevant federal reference air concentrations, reference specific doses (divided by 10), or inhalation reference concentrations.

7.0 OTHER IMPACT CONSIDERATIONS

7.1 VISIBILITY

For PSD sources, the principal visibility impacts of concern are impacts on visibility conditions within the nearest PSD Class I area. The nearest such area, as previously discussed, is the Chassahowitzka National Wilderness Area located (at its closest point) about 100 km from the site of the proposed RGS project.

The effect of RGS emissions on visibility conditions within the Chassahowitzka PSD Class I Area has been evaluated by a Level-1 plume visual impact screening analysis using the latest version of the EPA VISCREEN model. The input data used for visibility impact analysis are as follows:

primary particulate matter emissions -	12.6 lb/hr
nitrogen oxides emissions (as NO_2) -	94.5 lb/hr
minimum distance from source to Class I area -	100 km
maximum distance from source to Class I area -	120 km
background visual range -	25 km

The emission rates are for operation of the RGS boiler at maximum continuous rating.

VISCREEN modeling results are shown in Table 7-1. Based on the Level-1 screening criteria, VISCREEN results indicate that RGS emissions will not have an adverse impact on visibility conditions within the Chassahowitzka PSD Class I Area.

7.2 VEGETATION AND SOILS

Effects on vegetation and soils associated with power generating facilities are primarily related to SO_2 and NO_X emissions. Since RGS SO_2 and NO_X emissions are predicted to have an insignificant impact, adverse effects on vegetation and soils are highly unlikely.

7.3 ASSOCIATED GROWTH

When RGS begins operation, approximately 40 employees will be needed for the facility. Adding this small number of employees to the area work force will not result in significant residential or commercial growth. Furthermore, the project on its own is not expected to produce significant industrial growth in central Florida. Also, the project will be a net generator of electricity and will not require additional power generation (and associated additional emissions) from existing power generating utilities. Therefore, the secondary air quality impacts related to residential, commercial, or industrial growth associated with the project are expected to be minor.

7.4 NONATTAINMENT AREAS

Polk County is currently considered in attainment with all ambient air quality standards. The nearest designated nonattainment area is the Hillsborough/Pinellas County ozone nonattainment area. Ozone precursor emissions from RGS are not expected to interfere with strategies to achieve compliance with the ozone standard in the Tampa/St. Petersburg area.

TABLE 7-1

Visual Effects Screening Analysis for
Source: RIDGE GENERATING STATION
Class I Area: CHASSAHOWITZKA NWA

*** Level-1 Screening ***

Input Emissions for

Particulates	12.60	LB /HR
NOx (as NO2)	94.50	LB /HR
Primary NO2	.00	LB /HR
Soot	.00	LB /HR
Primary SO4	.00	LB /HR

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	100.00 km
Min. Source-Class I Distance:	100.00 km
Max. Source-Class I Distance:	120.00 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6
Wind Speed:	1.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	100.0	84.	2.00	.019	.05	.000
SKY	140.	84.	100.0	84.	2.00	.005	.05	-.000
TERRAIN	10.	84.	100.0	84.	2.00	.001	.05	.000
TERRAIN	140.	84.	100.0	84.	2.00	.000	.05	.000

Maximum Visual Impacts OUTSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	75.	96.8	94.	2.00	.020	.05	.000
SKY	140.	75.	96.8	94.	2.00	.005	.05	-.000
TERRAIN	10.	60.	91.5	109.	2.00	.002	.05	.000
TERRAIN	140.	60.	91.5	109.	2.00	.000	.05	.000

8.0 PSD PRECONSTRUCTION MONITORING EXEMPTION REQUEST

As previously discussed, the RGS project is subject to PSD review for the following regulated pollutants: SO_2, NO_X, CO, PM/PM_{10}, VOC's (and O_3), Pb, and Be. An exemption from PSD preconstruction ambient air quality monitoring requirements is requested on the basis of the reasons discussed below. Included in these exemption requests is a reference to the *de minimis* ambient impact levels that can serve as a basis for a monitoring exemption at the discretion of the reviewing agency. The *de minimis* levels for the regulated pollutants subject to PSD review for RGS are as follows:

sulfur dioxide -	13 $\mu g/m^3$ (24-hour average)
nitrogen dioxide -	14 $\mu g/m^3$ (annual average)
carbon monoxide -	575 $\mu g/m^3$ (8-hour average)
particulate matter (PM_{10}) -	10 $\mu g/m^3$ (24-hour average)
ozone -	100 ton/yr of VOC emissions
lead -	0.1 $\mu g/m^3$ (3-month average)
beryllium -	0.001 $\mu g/m^3$ (24-hour average)

Sulfur Dioxide

The maximum predicted 24-hour SO_2 concentration attributable to RGS emissions is 4.4 $\mu g/m^3$. This concentration is less than the *de minimis* level. A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

Nitrogen Dioxide

The maximum predicted annual average NO_2 concentration attributable to RGS NO_X emissions is 0.4 $\mu g/m^3$ which is less than the *de minimis* level. A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

Carbon Monoxide

The maximum predicted 8-hour average CO concentration attributable to RGS emissions is 35.1 $\mu g/m^3$ which is less than the *de minimis* level. A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

Particulate Matter

The maximum predicted 24-hour average PM concentration attributable to RGS emissions is 0.5 $\mu g/m^3$ which is less than the *de minimis* level. A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

Ozone

Estimated VOC emissions from RGS are 96.6 ton/yr. A monitoring exemption for ozone is requested on the basis of project-related VOC emissions being less than the *de minimis* level of 100 ton/yr.

Lead

The maximum predicted annual average Pb concentration attributable to RGS emissions is 0.01 $\mu g/m^3$ which is less than the *de minimis* level (assuming the maximum annual concentration represents a 3-month average.) A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

Beryllium

The maximum predicted 24-hour average Be concentration attributable to RGS emissions is 0.0003 $\mu g/m^3$ which is less than the *de minimis* level. A monitoring exemption is requested on the basis of the maximum predicted concentration being less than the *de minimis* level.

9.0 REFERENCES

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APPENDIX A

PERMIT APPLICATION FORM

$7500 pd.
12-20-91
Recpt. #180724

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

AC 53-206244
PSD-FL-183

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: New [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Ridge Generating Station Limited Partnership COUNTY: Polk
By: Decker Energy - Ridge, Inc., General Partner

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) Boiler and Related Equipment

SOURCE LOCATION: Street State Road 542 and Taylor Rd. City Auburndale

UTM: East 416690 m North 3100380 m

Latitude ___° ___' ___"N Longitude ___° ___' ___"W

APPLICANT NAME AND TITLE: Macauley Whiting, Jr., President - Decker Energy - Ridge, Inc.*

APPLICANT ADDRESS: P.O. Box 2397, Winter Park, FL 32790

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Ridge Generating Station Limited Partnership

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: Macauley Whiting Jr.

Macauley Whiting, Jr., President - Decker Energy - Ridge, Inc.*
Name and Title (Please Type)

Date: 12-10-91 Telephone No. 407/628-8900

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)

*Decker Energy - Ridge, Inc. is a General Partner of Ridge Generating Station, L.P.

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

Signed Thomas J. Fitzpatrick, 12/10/91

Thomas J. Fitzpatrick
Name (Please Type)

SFT, Inc.
Company Name (Please Type)

6629 W. Central Ave., Toledo, OH 43617
Mailing Address (Please Type)

Florida Registration No. 0044846 Date: 1991 Telephone No. 419/843-8200

SECTION II: GENERAL PROJECT INFORMATION

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

The project consists of a power generating facility with a boiler that will burn wood, tires, and landfill gas. Pollution control equipment will meet BACT requirements and will result in compliance with all applicable standards (see attached report)

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

Start of Construction July 1992 Completion of Construction July 1994

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.)

To be determined

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

None

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;
if power plant, hrs/yr 8760; if seasonal, describe: ____

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

1. Is this source in a non-attainment area for a particular pollutant? No

   a. If yes, has "offset" been applied? ____

   b. If yes, has "Lowest Achievable Emission Rate" been applied? ____

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

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

3. Does the State "Prevention of Significant Deterioriation" (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? ____

   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.

[BOILER]

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

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

Description	Contaminants Type	Contaminants % Wt	Utilization Rate - lbs/hr	Relate to Flow Diagram
(see attached report)				

B. Process Rate, if applicable: (See Section V, Item 1) Not applicable

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

2. Product Weight (lbs/hr): ______

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

Boiler emissions

Name of Contaminant	Emission[1] Maximum lbs/hr	Emission[1] Actual T/yr	Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission lbs/yr	Potential[4] Emission T/yr	Relate to Flow Diagram
SO_2							See
PM/PM_{10}	(See attached report)						attached
NO_x							report
CO							
VOC's							

[1]See Section V, Item 2. (See attached report for other contaminants)

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

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

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)
(See attached report)				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
(See attached report)			

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

Fuel Analysis: (See attached report)

Percent Sulfur: ____________ Percent Ash: ____________

Density: ____________ lbs/gal Typical Percent Nitrogen: ____________

Heat Capacity: ____________ BTU/lb ____________ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ____________

F. If applicable, indicate the percent of fuel used for space heating. Not applicable.

Annual Average ____________ Maximum ____________

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

Fly ash and bottom ash will be disposed of in a landfill permitted to accept such materials.

[BOILER]

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

Stack Height: (See attached report) ft. Stack Diameter: ______ ft.

Gas Flow Rate: ______ ACFM ______ DSCFM Gas Exit Temperature: ______ °F.

Water Vapor Content: ______ % Velocity: ______ FPS

SECTION IV: INCINERATOR INFORMATION (NOT APPLICABLE)

Type of Waste	Type O (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) ______

[ASH HANDLING VENT FILTER]

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

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

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Boiler Ash	PM	100	(See attached	report)

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

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

2. Product Weight (lbs/hr): ______

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]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
PM/PM_{10}	(See attached		report)				

[1]See Section V, Item 2.

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

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

. 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)
Bin Vent Filter	PM	0.02 gr/ft^3	Unknown	Vendor Data

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
NOT APPLICABLE			

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

Fuel Analysis:

Percent Sulfur: ______________________ Percent Ash: ______________________

Density: ______________________ lbs/gal Typical Percent Nitrogen: ______________________

Heat Capacity: ______________________ BTU/lb ______________________ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ______________________

____

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

Annual Average ______________________ Maximum ______________________

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

____

____

____

____

[ASH HANDLING VENT FILTER]

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

Stack Height: ______ ft. Stack Diameter: ______ ft.

Gas Flow Rate: 1,400 ACFM ______ DSCFM Gas Exit Temperature: Ambient °F.

Water Vapor Content: ______ % Velocity: ______ FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (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) ______

[LIME SILO]

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

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

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		
Lime	PM	100	(See attached report)	

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

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

2. Product Weight (lbs/hr): ________________

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]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
PM/PM_{10}	(See attached report)						

[1] See Section V, Item 2.

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

[3] Calculated from operating rate and applicable standard.

[4] Emission, if source operated without control (See Section V, Item 3).

[LIME SILO]

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)
Bin Vent Filter	PM	0.02 gr/ft^3	Unknown	Vendor Data

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
NOT APPLICABLE			

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

Fuel Analysis:

Percent Sulfur: ______________ Percent Ash: ______________

Density: ______________ lbs/gal Typical Percent Nitrogen: ______________

Heat Capacity: ______________ BTU/lb ______________ BTU/gal

Other Fuel Contaminants (which may cause air pollution): ______________

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

Annual Average ______________ Maximum ______________

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

[LIME SILO]

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

Stack Height: ____________ ft. Stack Diameter: ____________ ft.

Gas Flow Rate: 1,400 ACFM ____________ DSCFM Gas Exit Temperature: ambient °F.

Water Vapor Content: ____________ % Velocity: ____________ FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (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)]
   Not applicable
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made. (see attached report)
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   (see attached report)
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.)
   (see attached report)
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).
   (see attached report)
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.
   (see attached report)
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).
   (see attached report)
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.
   (see attached report)

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
(See attached report)	

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

[ ] Yes [ ] No

Contaminant	Rate or Concentration
(See attached report)	

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

Contaminant	Rate or Concentration
(See attached report)	

D. Describe the existing control and treatment technology (if any). Not applicable

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

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

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

1. (See attached report)

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: (see attached report)

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

3. Capital Cost: 4. Useful Life:

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

7. Maintenance Cost: 8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

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

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

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

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data None

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 / 82 (month day year) to 12 / 31 / 86 (month day year)

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

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

4. Stability wind rose (STAR) data obtained from (location) Not applicable

C. Computer Models Used

1. ISCST (not modified) Modified? If yes, attach description.

2. ______ Modified? If yes, attach description.

3. ______ Modified? If yes, attach description.

4. ______ Modified? If yes, attach description.

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

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	(See attached report)	grams/sec
SO^2	(See attached report)	grams/sec

E. Emission Data Used in Modeling

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

F. Attach all other information supportive to the PSD review. (See attached report)

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.
(See attached report)

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.

(See attached report)

APPENDIX B

CALCULATION OF EMISSION RATES

FOR RIDGE GENERATING STATION BOILER

APPENDIX B

CALCULATION OF EMISSION RATES FOR RIDGE GENERATING STATION BOILER

The following calculations apply to generation at maximum continuous rating (MCR or 100 percent load). Heat input, fuel consumption, and emission rates at lower load levels are expected to be approximately in proportion to conditions at MCR. Therefore, emissions at 75 percent and 50 percent loads can be calculated by multiplying MCR emission rates by 0.75 and 0.50.

The emission rates shown in this application are expressed in pounds per hour. Maximum annual emission rates can be calculated conservatively by assuming continuous year-round operation at MCR. Hence, annual emissions in tons per year equal:

$$(\text{lb/hr}) \times (8{,}760\ \text{hr/yr})/(2{,}000\ \text{lb/ton}) = 4.38 \times (\text{lb/hr})$$

Table B-1 contains a summary of emission rate calculations by fuel mix for each pollutant. The calculation equations in this table use letter designations for the calculation variables. These letter designations are defined in Table B-2. Derivations of calculation variables are given in Table B-3.

TABLE B-1

RIDGE GENERATING STATION BOILER
EMISSION RATE CALCULATIONS FOR
MAXIMUM CONTINUOUS RATING

POLLUTANT	EMISSION RATES (LB/HR) BY FUEL TYPE (FUEL PERCENTAGES ON A HEAT INPUT BASIS)		
	100% WOOD	80% WOOD 20% TIRES	75% WOOD 15% TIRES 10% LANDFILL GAS
sulfur oxides (as SO_2)	B x C x E x H = 69.4	B x C x E x H = 109.4	B x C x E x H = 92.5
particulate matter/PM_{10}	A x I = 12.6	A x I = 12.6	A x I = 12.6
nitrogen oxides (as NO_2)	A x J = 94.5	A x J = 94.5	A x J = 94.5
carbon monoxide	A x K = 315.0	A x K = 315.0	A x K = 315.0
volatile organic compounds	A x L = 22.1	A x L = 22.1	A x L = 22.1
lead[a]	A x M = 0.25	A x M = 0.25	A x M = 0.25
hydrogen chloride[a]	A x F = 3.2	A x F = 3.2	A x F = 3.2
beryllium[a]	A x N = 0.0063	A x N = 0.0063	A x N = 0.0063
mercury[a]	A x O = 0.022	A x O = 0.022	A x O = 0.022
ammonia[a]	P x Q x R = 17.8	P x Q x R = 17.8	P x Q x R = 17.8
arsenic[a]	A x S = 0.019	A x S = 0.019	A x S = 0.019
cadmium[a]	A x T = 0.033	A x T = 0.033	A x T = 0.033
chromium VI[a]	A x U = 0.016	A x U = 0.016	A x U = 0.016
nickel[a]	A x V = 0.063	A x V = 0.063	A x V = 0.063
zinc[a]	A x W = 0.63	A x W = 0.63	A x W = 0.63
benzene[a]	A x X = 5.0	A x X = 5.0	A x X = 5.0
formaldehyde[a]	A x Y = 1.7	A x Y = 1.7	A x Y =1.7

Note: Calculation variables are defined in Table B-2.

[a] Highest estimated emissions for any fuel mix shown in each column.

TABLE B-2

RIDGE GENERATING STATION BOILER
EMISSION RATE CALCULATION VARIABLES FOR
MAXIMUM CONTINUOUS RATING

VARIABLE	CALCULATION VALUES BY FUEL TYPE (FUEL PERCENTAGES ON A HEAT INPUT BASIS)		
	100% WOOD	80% WOOD 20% TIRES	75% WOOD 15% TIRES 10% LANDFILL GAS
A = heat input, MMBTU/hr	630	630	630
B = fuel consumption, lb/hr	115,596	101,477	103,947
C = SO_2 dry scrubber/ fabric filter efficiency factor (1 - 80%/100%)	0.2	0.2	0.2
E = fuel sulfur content fraction	0.0015	0.00269	0.00222
F = HCl emission factor[a], lb/MMBTU	0.005	0.005	0.005
H = ratio of SO_2 to S	2	2	2
I = PM emission factor, lb/MMBTU	0.02	0.02	0.02
J = NO_X emission factor, lb/MMBTU	0.15	0.15	0.15
K = CO emission factor, lb/MMBTU	0.50	0.50	0.50
L = VOC emission factor, lb/MMBTU	0.035	0.035	0.035
M = Pb emission factor[a], lb/MMBTU	0.0004	0.0004	0.0004
N = Be emission factor[a], lb/MMBTU	0.00001	0.00001	0.00001
O = Hg emission factor[a], lb/MMBTU	0.000035	0.000035	0.000035
P = NH_3 volume (ppmv) divided by 10^6	$35.36/10^6$	$35.18/10^6$	$35.26/10^6$
Q = flue gas volume, ft^3/hr (@ 170°F)	13,593,360	13,481,580	13,653,180
R = factor to convert ft^3 of NH_3 @ 170°F flue gas exit temperature	0.037	0.037	0.037
S = arsenic emission factor[a], lb/MMBtu	0.0003	0.0003	0.0003

TABLE B-2

RIDGE GENERATING STATION BOILER
EMISSION RATE CALCULATION VARIABLES FOR
MAXIMUM CONTINUOUS RATING
(continued)

	CALCULATION VALUES BY FUEL TYPE (FUEL PERCENTAGES ON A HEAT INPUT BASIS)		
VARIABLE	100% WOOD	80% WOOD 20% TIRES	75% WOOD 15% TIRES 10% LANDFILL GAS
T = cadmium emission factor[a], lb/MMBtu	0.000052	0.000052	0.000052
U = chromium emission factor[a], lb/MMBtu	0.000026	0.000026	0.000026
V = nickel emission factor[a], lb/MMBtu	0.0001	0.0001	0.0001
W = zinc emission factor[a], lb/MMBtu	0.001	0.001	0.001
X = benzene emission factor[a], lb/MMBtu	0.008	0.008	0.008
Y = formaldehyde emission factor[a], lb/MMBtu	0.0027	0.0027	0.0027

[a] Represents highest emission factor for any fuel combination.

TABLE B-3

RIDGE GENERATING STATION BOILER
DERIVATION OF EMISSION RATE CALCULATION VARIABLES

VARIABLE[a]	DERIVATION
A	design data
B	design data and expected fuel heating value
C	design data
E	test data
F	estimated based on review of test data and other literature
H	basic chemistry
I	design data
J	design data
K	design data
L	design data
M	estimated based on review of test data and other literature
N	estimated based on review of test data and other literature
O	estimated based on review of test data and other literature
P	design data
Q	design data
R	17 lb/lb mole x lb mole/358.8 ft^3 (@ 32 °F) x (460 + 32 °R)/(460 + 170 °R) = 0.037
S	estimated based on review of test data and other literature
T	estimated based on review of test data and other literature
U	estimated based on review of test data and other literature
V	estimated based on review of test data and other literature
W	estimated based on review of test data and other literature
X	estimated based on review of test data and other literature
Y	estimated based on review of test data and other literature
Z	estimated based on review of test data and other literature

[a] Variable defined in Table B-2.

APPENDIX C

MODELING PRINTOUTS LIST

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MODELING PRINTOUTS LIST

Printouts of modeling results are being submitted in a separate package. This package also contains diskettes with the output files from which printouts were produced. The following files/printouts are provided:

File Number	Met. Year	Load Level	PSD Area	Averaging Period	Grid
RGS82P15	1982	100%	Class II	All	10°, 250-m spacing
RGS83P15	1983	100%	Class II	All	10°, 250-m spacing
RGS84P15	1984	100%	Class II	All	10°, 250-m spacing
RGS85P15	1985	100%	Class II	All	10°, 250-m spacing
RGS86P15	1986	100%	Class II	All	10°, 250-m spacing
RGS82P16	1982	75%	Class II	All	10°, 250-m spacing
RGS83P16	1983	75%	Class II	All	10°, 250-m spacing
RGS84P16	1984	75%	Class II	All	10°, 250-m spacing
RGS85P16	1985	75%	Class II	All	10°, 250-m spacing
RGS86P16	1986	75%	Class II	All	10°, 250-m spacing
RGCI82P4	1982	100%	Class I	All	[Discrete Receptors]
RGCI83P4	1983	100%	Class I	All	[Discrete Receptors]
RGCI84P4	1984	100%	Class I	All	[Discrete Receptors]
RGCI85P4	1985	100%	Class I	All	[Discrete Receptors]
RGCI86P4	1986	100%	Class I	All	[Discrete Receptors]
RGCI82P5	1982	75%	Class I	All	[Discrete Receptors]
RGCI83P5	1983	75%	Class I	All	[Discrete Receptors]
RGCI84P5	1984	75%	Class I	All	[Discrete Receptors]
RGCI85P5	1985	75%	Class I	All	[Discrete Receptors]
RGCI86P5	1986	75%	Class I	All	[Discrete Receptors]

File Number	Met. Year	Load Level	PSD Area	Averaging Period	Grid
RGS82P21	1982	75%	Class II	1-hour	2°, 100-m spacing
RGS83P17	1983	100%	Class II	3-hour	2°, 100-m spacing
RGS84P17	1984	100%	Class II	3-hour	2°, 100-m spacing
RGS85P17	1985	100%	Class II	3-hour	2°, 100-m spacing
RGS86P17	1986	100%	Class II	3-hour	2°, 100-m spacing
RGS84P18	1984	100%	Class II	8-hour	2°, 100-m spacing
RGS86P18	1986	100%	Class II	8-hour	2°, 100-m spacing
RGS86P18A	1986	75%	Class II	8-hour	2°, 100-m spacing
RGS82P19	1982	100%	Class II	24-hour	2°, 100-m spacing
RGS83P19	1983	100%	Class II	24-hour	2°, 100-m spacing
RGS83P19A	1983	75%	Class II	24-hour	2°, 100-m spacing
RGS86P20	1986	100%	Class II	Annual	2°, 100-m spacing

RGS100SC	Screen Results for 100% Load
RGS75SC	Screen Results for 75% Load
RGS50SC	Screen Results for 50% Load