KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
352/377-5822 • FAX/377-7158

February 24, 1999

Mr. Joseph Kahn, PE
New Source Review Section
Department of Environmental
Protection
2600 Blair Stone Road, MS 5505
Tallahassee, Florida 32399-2400

RECEIVED
FEB 25 1999
BUREAU OF
AIR REGULATION

Subject: Suwannee American Cement Company
Response to Requests for Additional Information
DEP File No. 1210465-001-AC (PSD-FL-259)

Dear Mr. Kahn:

This letter shall transmit our report (4 copies) responding to your requests for additional information dated December 29, 1998, January 8, 1999 and February 16, 1999.

The report is titled *Additional Information in Support of an Application for a PSD Construction Permit Review.*

All items from the three letters have been addressed in the report.

As the requests for additional information were of an engineering nature, I am certifying this transmittal letter.

If you require any further information, please do not hesitate to contact me.

Sincerely,

Steven C. Cullen, PE
Koogler & Associates

copies to: Frank Darabi, PE

ADDITIONAL INFORMATION

IN SUPPORT OF
AN APPLICATION FOR A PSD CONSTRUCTION PERMIT REVIEW

DEP File No. 1210465-001-AC
PSD-FL-259

PREPARED FOR:

SUWANNEE AMERICAN CEMENT COMPANY
SUWANNEE COUNTY, FLORIDA

February 1999

PREPARED BY:
KOOGLER & ASSOCIATES
4014 N.W. 13TH STREET
GAINESVILLE, FLORIDA 32609

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ENVIRONMENTAL SERVICES
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1	December 29, 1998: Item 1
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25	January 8, 1999: Item 1
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1. Please finalize the design of the precalciner and submit revised drawings that do not show this process as "on hold". Provide a description of the final process design selected. We understand the applicant is considering utilizing a tire gasification system to fuel the precalciner burner. If this option has been selected, please provide a process description of the gasification system, describe how the solid byproducts of the gasification system will be utilized in the cement process, and discuss the impact of the gasification system on emissions.

Response:

The preheater/precalciner system will be a Polysius 4-stage cyclone preheater with a PREPOL MSC-CC Precalciner. The PREPOL MSC-CC Precalciner is a Multi-Stage Combustion (MSC) system with a Combustion Chamber (CC). This system is an adaptation of the power industry's "staged firing" or "stepped combustion" system to the cement industry.

The cyclone preheater with the MSC Precalciner, the rotary kiln and the grate-type clinker cooler comprises Polysius most efficient pyroprocessing system for both heat and electrical energy consumption as the system maximizes heat transfer and minimizes fuel requirements. This results in a low specific exhaust gas volume. With this system, 50-60 percent of the total system fuel is fired at the precalciner and 40-50 percent is fired at the main kiln burner. The 50-60 percent of the fuel fired at the precalciner is split with approximately 10 percent (of total system fuel) being fired at the kiln inlet burner (at the point where the feed enters the kiln) and the remaining 40-50 percent of the total system fuel fired in the Combustion Chamber (CC).

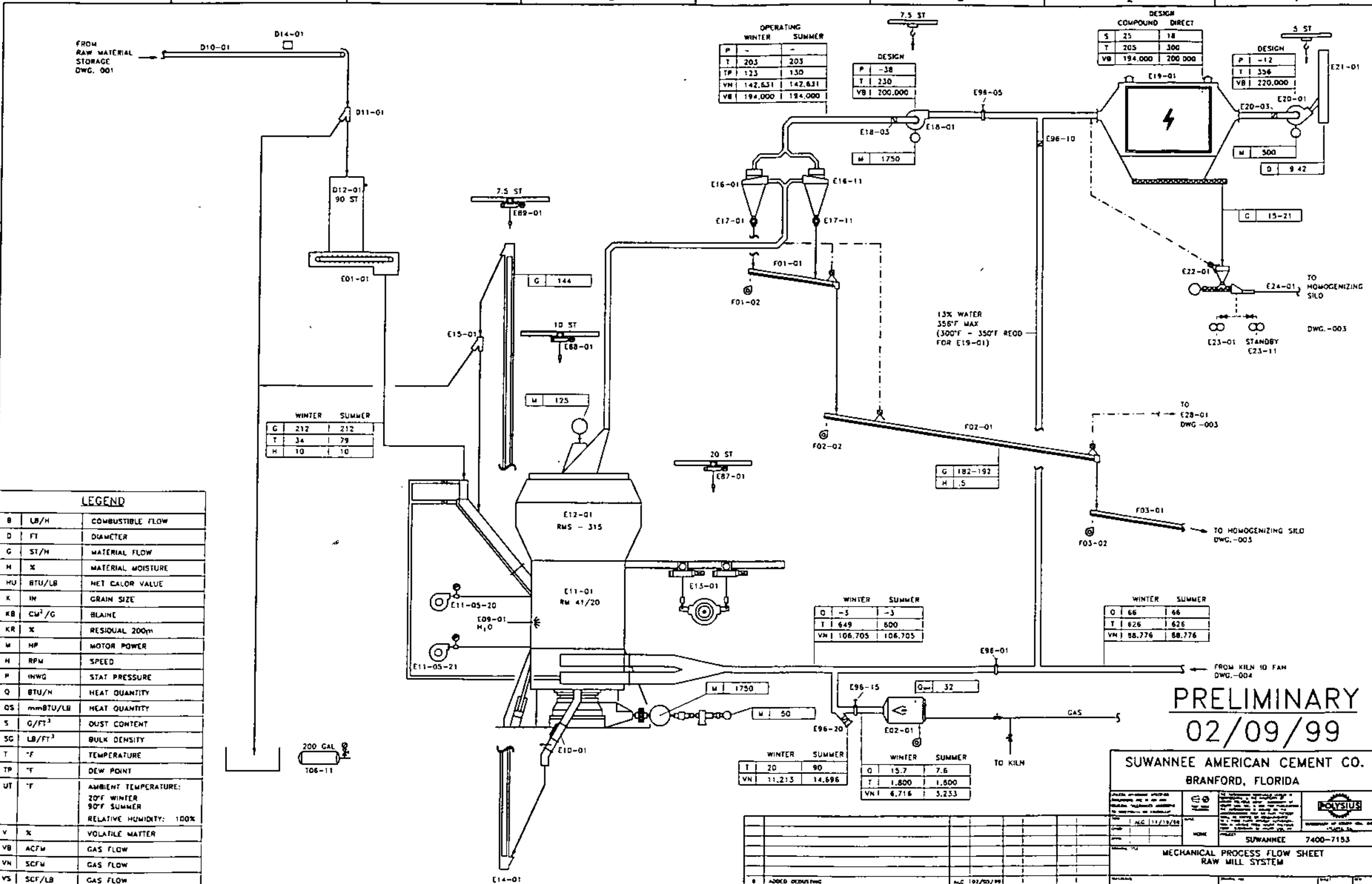
This system was selected for Suwannee American Cement not only because it represents the state-of-the-art in pyroprocessing system technology but also because it provides the most effective means of nitrogen oxides (NOx) reduction available. By minimizing the amount of fuel fired at the main kiln burner (40-50 percent of the total system fuel), the high temperature and high thermal NOx producing combustion necessary for clinkering and maintaining the quality of product is minimized. The fuel fired at the precalciner is burned in a lower temperature reducing zone where very little thermal or fuel NOx is generated. Furthermore, the reducing atmosphere functions to reduce the thermal NOx that was previously produced in the kiln. The combined features make the precalciner kiln with MSC the most efficient pyroprocessing system available from the standpoint of fuel efficiency, low specific exhaust volumes and inherent NOx emission control.

The tire gasification system discussed by Suwannee American will allow the use of tire derived fuel (TDF – as whole tires) to provide up to 40-45 percent of the total system heat input. The gaseous fraction of the fuel is provided to the precalciner burner and the solid fraction of the fuel is introduced at the kiln inlet.

Without the gasifier, approximately 10-15 percent of the total system heat input in the form of TDF (as whole tires) can be fired at the kiln inlet. This TDF will substitute for the fossil fuel that would normally be fired at the kiln inlet burner.

Approximately 10 percent of the total system heat input must be supplied at the kiln inlet in the form of conventional fuels (gas, coal, petcoke) for process control purposes.

The use of TDF will not cause any increase in emissions and will improve the performance of the MSC system for NOx control. The feasibility of the gasifier is dependent on the availability of TDF.



LEGEND

B	LB/H	COMBUSTIBLE FLOW
D	FT	DIAMETER
G	ST/H	MATERIAL FLOW
H	%	MATERIAL MOISTURE
HU	BTU/LB	NET CALOR VALUE
K	IN	GRAIN SIZE
KB	CM^2/G	BLAINE
KR	%	RESIDUAL 200m
M	HP	MOTOR POWER
N	RPM	SPEED
P	INWG	STAT PRESSURE
Q	BTU/H	HEAT QUANTITY
QS	mmBTU/LB	HEAT QUANTITY
S	G/FT^3	DUST CONTENT
SG	LB/FT^3	BULK DENSITY
T	°F	TEMPERATURE
TP	°F	DEW POINT
UT	°F	AMBIENT TEMPERATURE: 20°F WINTER 90°F SUMMER RELATIVE HUMIDITY: 100%
V	%	VOLATILE MATTER
VB	ACFM	GAS FLOW
VN	SCFM	GAS FLOW
VS	SCF/LB	GAS FLOW
VV	FT^3/S	GAS FLOW

B	ADDED DEDUSTING	ALC 02/09/99
A	ADDED AN ESP DUST COLLECTOR	ALC 01/11/99

PRELIMINARY
02/09/99

SUWANNEE AMERICAN CEMENT CO.
BRANFORD, FLORIDA

ALC 11/19/98
NONE
POLYSIUS
SUWANNEE 7400-7153

MECHANICAL PROCESS FLOW SHEET
RAW MILL SYSTEM

110.59.32-002
1 of 1
0
B

2. The application proposes the use of tires to provide up to 40% of the heat input to the pyroprocessing system. Representatives from Krupp Polysius stated that firing no more than 10% tires is practically achievable without the use of a tire gasification system. Further, the proposed volume of tires may result in no fuel being fed to the precalciner which would provide no supplemental heat in the flue gas downstream of the kiln end feed shelf (which we presume will be the introduction point for tires). Operation of this sort seems to violate the principles of NOx control by process design described on page 49 of the supplemental report, in which more fuel is fired in the precalciner than the kiln. Please propose a volume of amount of tires that comports with the recommendation of the pyroprocessing system's manufacturer, or provide more information to support the requested feed rate. Please verify the location of the feed point for tires or TDF.

Response:

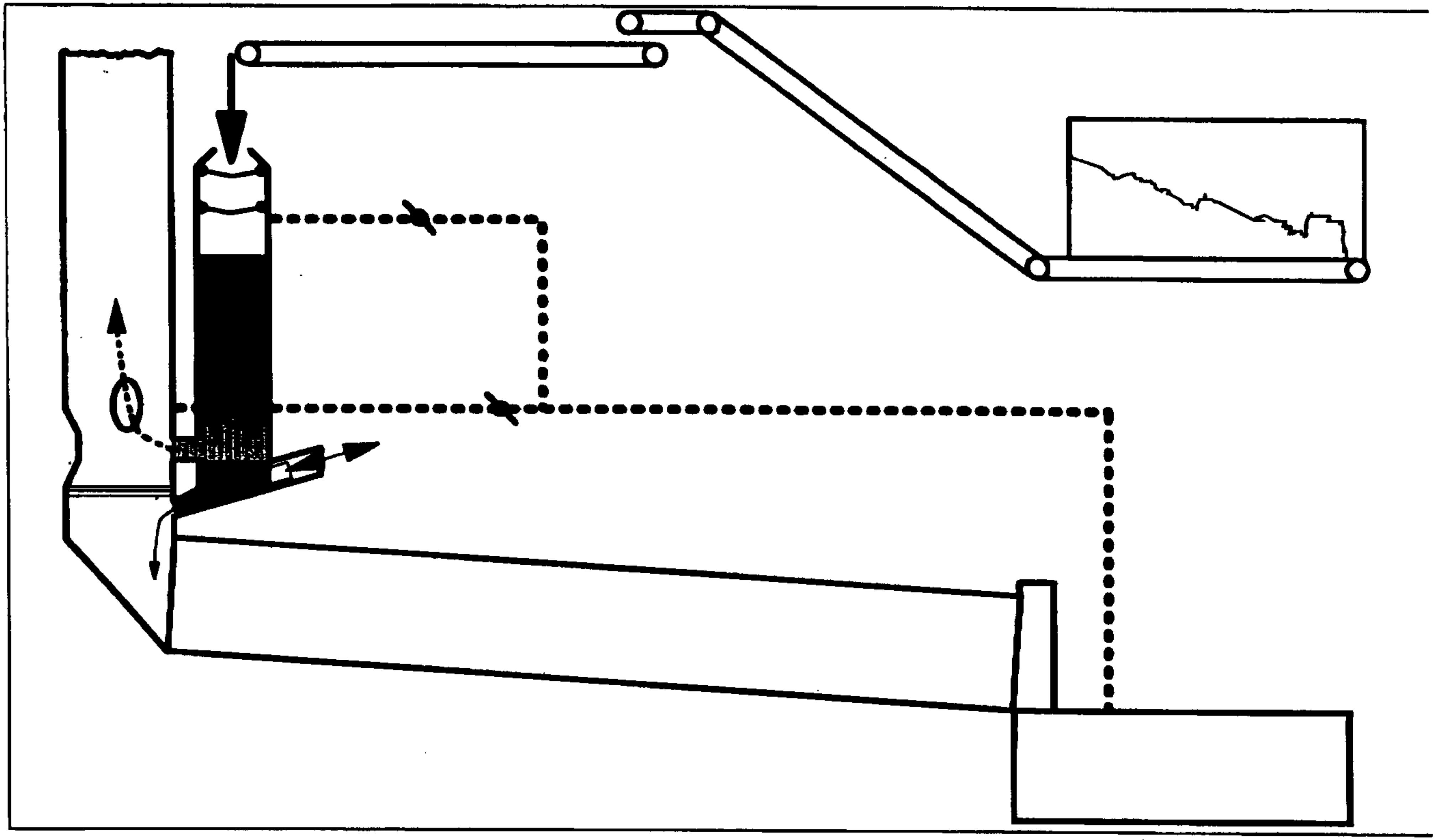
The request in the permit application to use TDF to provide up to 40 percent of the total system heat input was based on the possible use as a tire gasifier.

Without the gasifier, approximately 10-15 percent of the total system fuel can be supplied by TDF. The substituted fuel could be seen as a replacement for fossil fuel that would normally be fired at the kiln inlet burner. For permitting purposes, Suwannee American is requesting that up to 15 percent of the total system heat input be supplied by TDF if the gasifier is not used, and up to 45% of the total system heat input be supplied by TDF if the gasifier is used. The details of the gasifier are described further in the response to Item 1.

The applicant's concern is that the availability of tires may not be adequate to support the full use of the gasifier. Permitting both options however, provides the maximum operational flexibility.

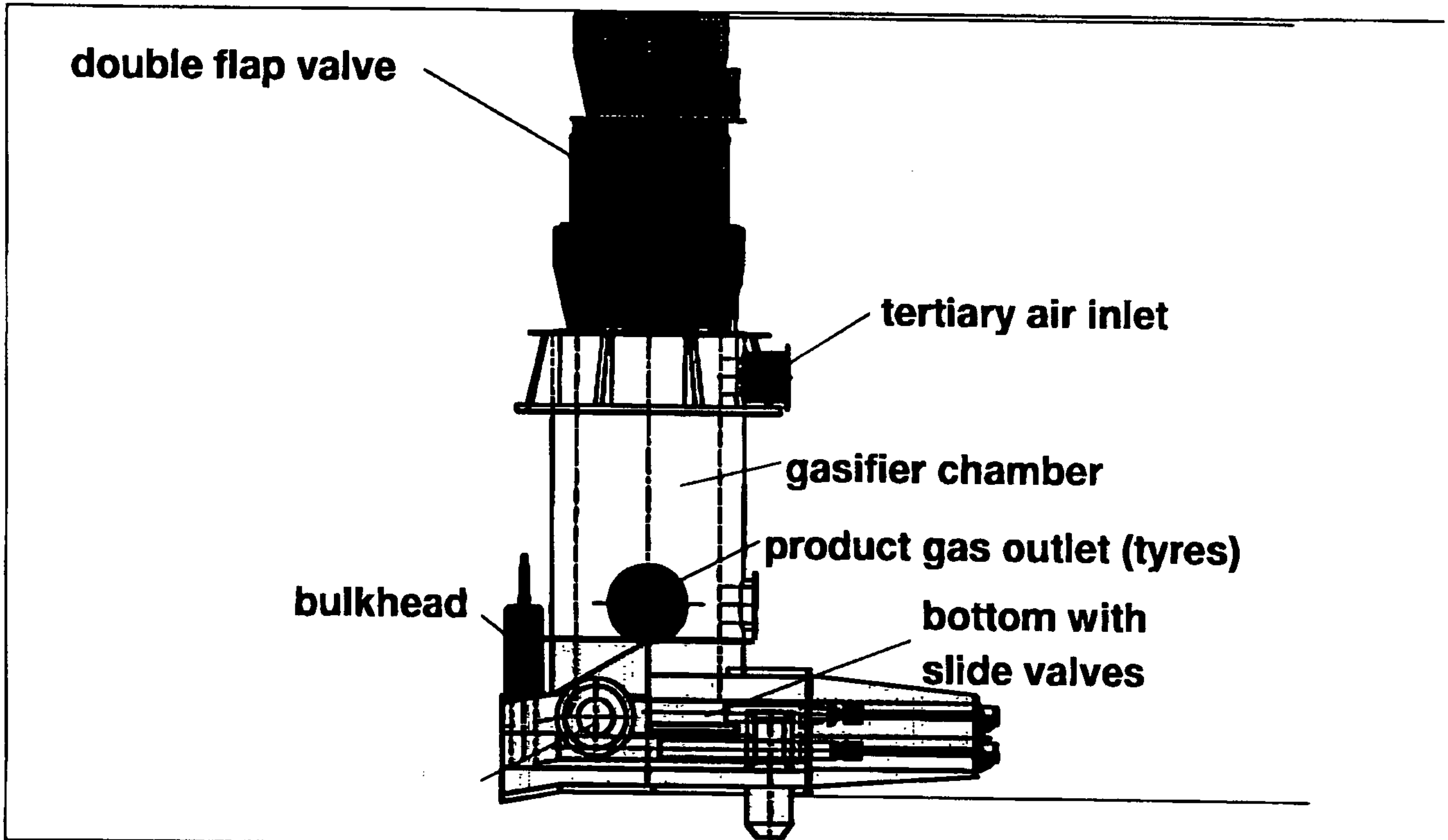
Typically, whole tires (TDF) are fed into the back of the kiln via the kiln inlet housing, roll down the feed shelf and burn out in the inlet of the kiln itself.

When the gasifier is used, the TDF is fed into the gasifier in batches. The gasifier itself is quite simple. Whole tires are fed via an airlock mechanism to a cylindrical reactor. A small portion of the tertiary air (temperature = 750 - 900° C) is injected into the reactor to serve as the gasifying agent. At a excess air factor of 0.2 to 0.4, the tires are decomposed to gas, residual coke and wire. The gas, laden with hydrocarbons and free radicals, is injected into the calciner as fuel to replace the coke or coal. The residual coke and wire is pushed from the bottom of the reactor into the kiln inlet housing at roughly the same place where conventional tire feeding systems introduce the whole tires. The gas is burned in calciner in a staged combustion approach and the residual coke burns out in the entrance to the kiln. The wire melts and is incorporated into the clinker.



Integration of the gasifier into an AS-plant

POLYSIUS



Lateral view of the reactor

POLYSIUS

3. Please finalize the design of the particulate control devices for the in line kiln/raw mill and the clinker cooler and submit revised drawings that do not show the control device for the clinker cooler as "under review". Provide a description of the final control devices selected, and specifications for each device.

Response:

Particulate matter emissions from both the kiln/raw mill system and the clinker cooler will be controlled by electrostatic precipitators. Identical precipitators will be used at the two locations. The description and technical specifications of a precipitator sized for this specific application by Environmental Elements Corporation is with this response. This precipitator or an equivalent precipitator will be selected by Suwannee American.

SECTION 2

DESCRIPTION OF EQUIPMENT

SECTION 2

2. DESCRIPTION OF EQUIPMENT

A. CASING

The precipitator casing is fabricated from 3/16 inch ASTM A-36 steel plate with external columns and stiffeners. The design utilizes rigid frame construction with no internal struts or bracing thus avoiding ledges for dust buildup and disturbance to uniform gas flow. The roof and all internal loads are supported by fabricated plate girders. The design utilizes a "floating bottom" system where the precipitator is anchored at only one point on the support steel. Lubrite sliding plates are provided for the other support points to allow for thermal expansion in all directions.

Seller's shell design allows 4'-5" head room above the top of the dust plates for interior access to perform maintenance or inspection.

Interlocked single wall doors are provided for penthouse roof access. Access to the area above the collecting plates is gained through non-interlocked double wall doors in the precipitator hot roof.

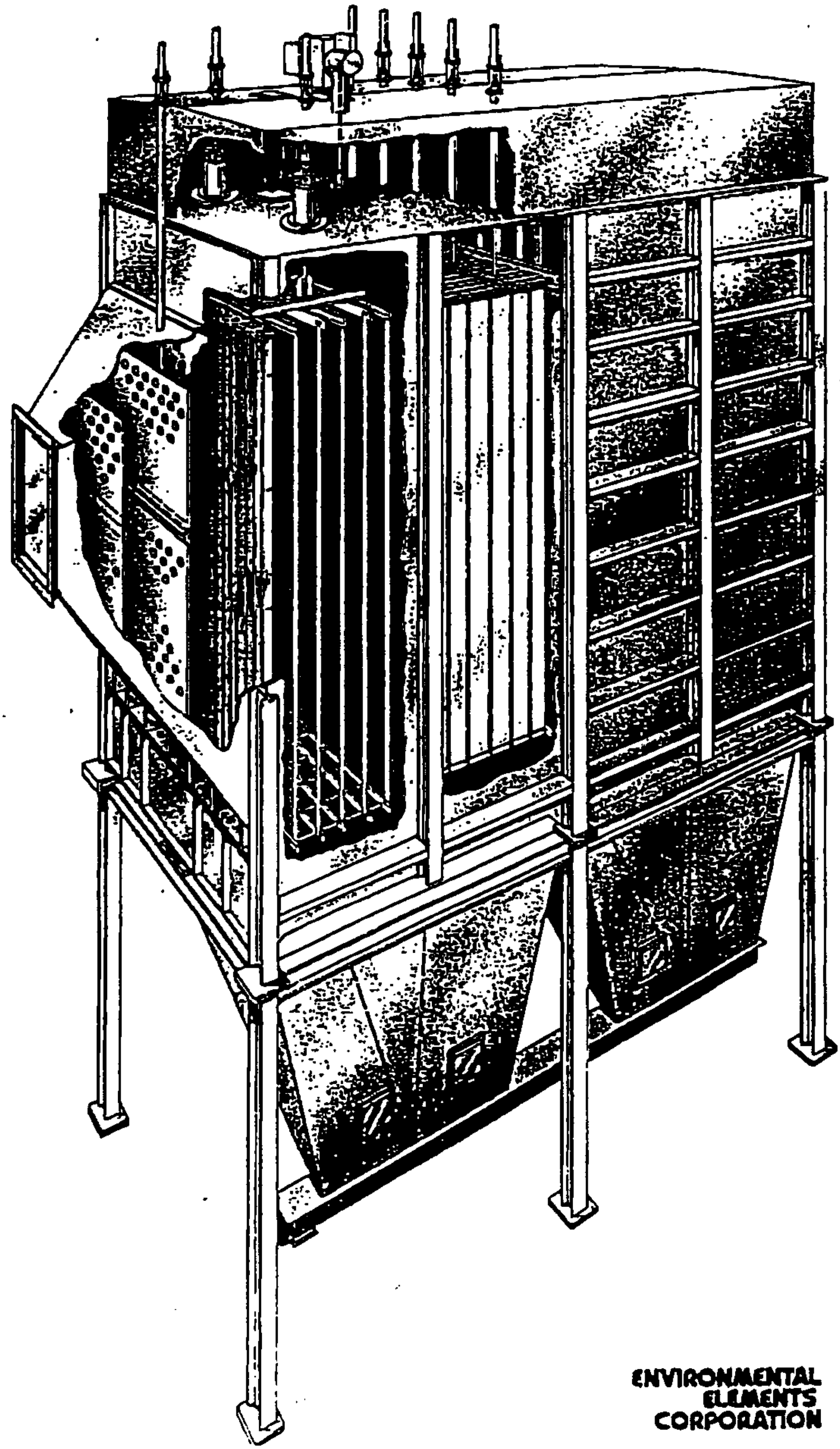
B. NOZZLES

Inlet and outlet nozzles are fabricated from 3/16 inch ASTM A-36 steel with external structural stiffeners of uniform depth to provide full support for insulation and siding. The bottom of the nozzles are sloped 55° with no horizontal ledges to impede free flow of dust fallout inherent with reduction in gas velocity.

The inlet nozzle is complete with three perforated plates to distribute the gas across the face of the treatment zone. The lower 4 inches of the perforated plates are open to allow any dust that falls out in the nozzle to be carried into the inlet field hopper. A double wall, quick-opening, interlocked door is provided in each nozzle for internal inspection and maintenance. Bolted panels are incorporated into the perforated plates for through access.

C. HOPPERS

Trough type hoppers are provided fabricated from 1/4 inch ASTM A-36 steel with external stiffeners of uniform depth to provide support for thermal insulation and siding. The hoppers are designed to support a full dust load. The sides and ends are sloped 60° and 75°, respectively, from the horizontal. The valley angle resulting from this design is 57-1/2°. The between field baffles are extended to the hopper outlet to eliminate gas bypassing in the hoppers. A double wall interlocked door is provided as shown to permit access into each baffled section of each hopper. Each hopper is provided with high level alarms, strike plates for manual hopper rapping, and dust removal system. <u>Hoppers should not be used for storage.</u>



ENVIRONMENTAL
ELEMENTS
CORPORATION

D. HOPPER LEVEL DETECTORS

A Bindicator or equal high level switch is provided for each section of each hopper. This system operates by radio frequency oscillation, which is dampened by a high ash level, producing a proportionate A/C signal. The detector operates a DPDT relay for alarm actuation. The probe is mounted in the side wall of the hopper with the electronics mounted in the hopper area away from high temperatures.

E. DUST REMOVAL SYSTEM

The dust removal system consists of hopper screw conveyor sized to operate at 25 rpm maximum to reduce wear. The hopper conveyor is designed for normal rated conditions and powered for flooded operation in the event of hopper dust buildup.

To insure positive dust removal a Sprout Bauer, or equal, motor operated rotary dust valve with Type 2 rotor with ni-hard adjustable tips is furnished at the outlet of the hopper conveyor.

F. PRECIPITATOR SUPPORTING STEEL

Structural steel is provided to support the precipitator as shown on the proposal drawings. All columns, beams, wind bracing and other structural members supplied by Seller for support of the precipitator will be rolled or fabricated from ASTM A-36 steel. Connections will be bolted and the overall structural design will be in accordance with the latest applicable AISC Standard except as noted under Design Conditions. The support steel and bracing is arranged to provide maximum access for maintenance and cleanup.

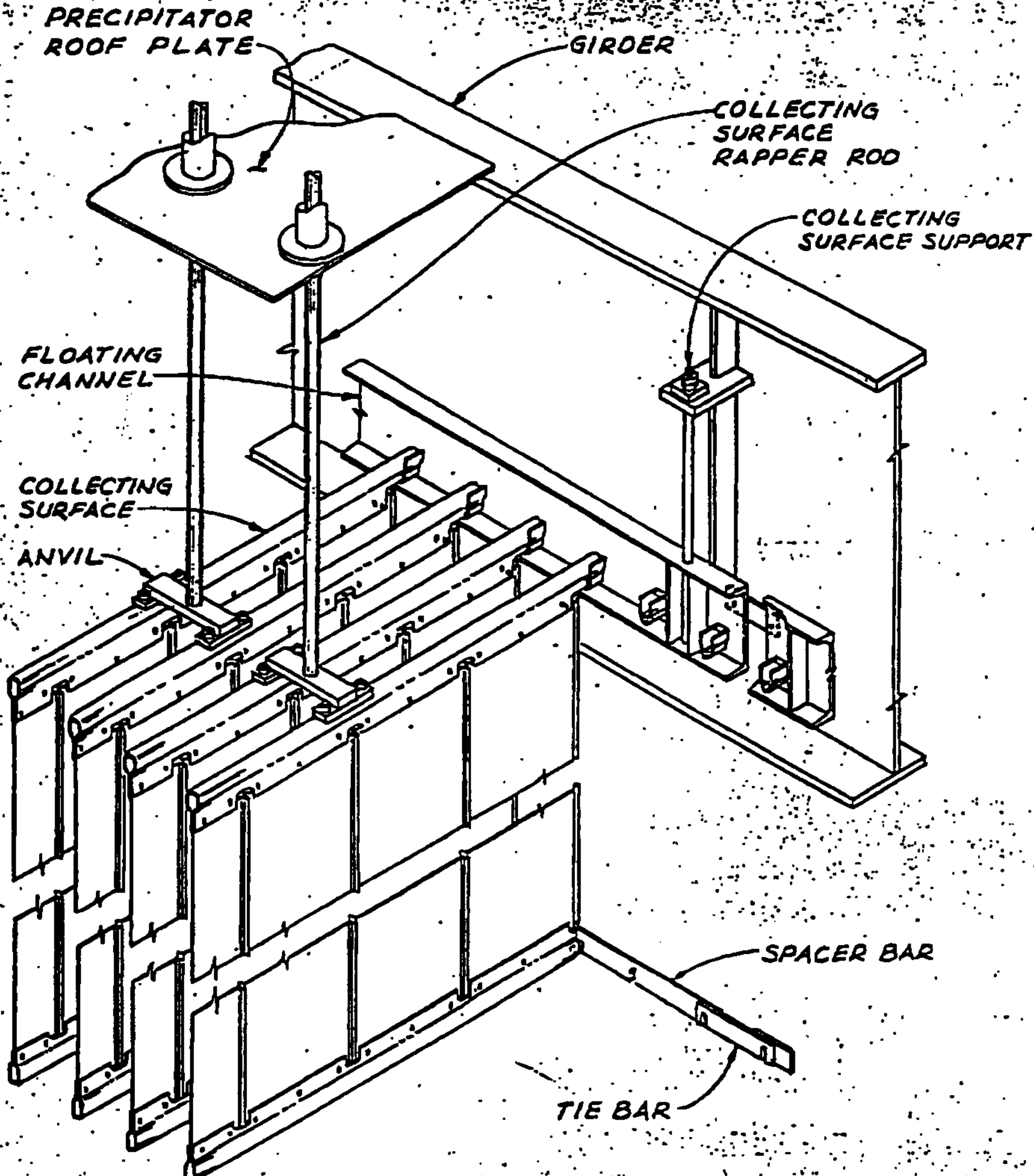
G. ACCESS FACILITIES

Access facilities are provided to the scope as shown on the proposal drawings. Structural steel is ASTM A-36 designed for 100 psf loading. Stairtreads and grating are galvanized. The handrail will be dual rail using 1-1/4 standard pipe rail and post. Platforms will be provided with 4 inch x 1/4 inch toe plates. Walkways are 36 inch minimum width. Stairways are 30" width.

H. COLLECTING ELECTRODE SYSTEM – Drawing No. 1120

Seller's C1010 steel MODULOK collecting surfaces (U.S. Patent # 3,418,792) are roll formed into 18 inch modules having tightly interlocked edges which when factory assembled form a rigid one piece baffled structure, which provides maximum stiffness, optimum gas exposure and minimum field assembly.

The top and bottom edges of each collecting surface are reinforced and stiffened by 7 gauge and 11 gauge respectively tubular structural members which are factory welded to the roll formed collecting surfaces. These members prevent edge effect arc-over where the discharge electrodes enter and leave the collecting field. This horizontal welding at the top and bottom is the only heat applied to the plate during manufacture. This procedure prevents the deformation and "oil-canning" which can easily result when individual modules



ENVIRONMENTAL ELEMENTS CORPORATION

COLLECTING SURFACE RAPPER ARRANGEMENT

are welded together. The collecting surfaces are rapped by electric impact type rappers located on the penthouse roof. Full provision is made in the collecting system suspension for uniform thermal movement up to the maximum design temperature without disturbance to internal alignment.

These collecting surfaces are shipped and lifted into the precipitator shell in nested, upright packages thereby affording maximum protection against handling damage for optimum straightness and uniformity in operation.

I. DISCHARGE ELECTRODE SYSTEM – Drawing No. 1121

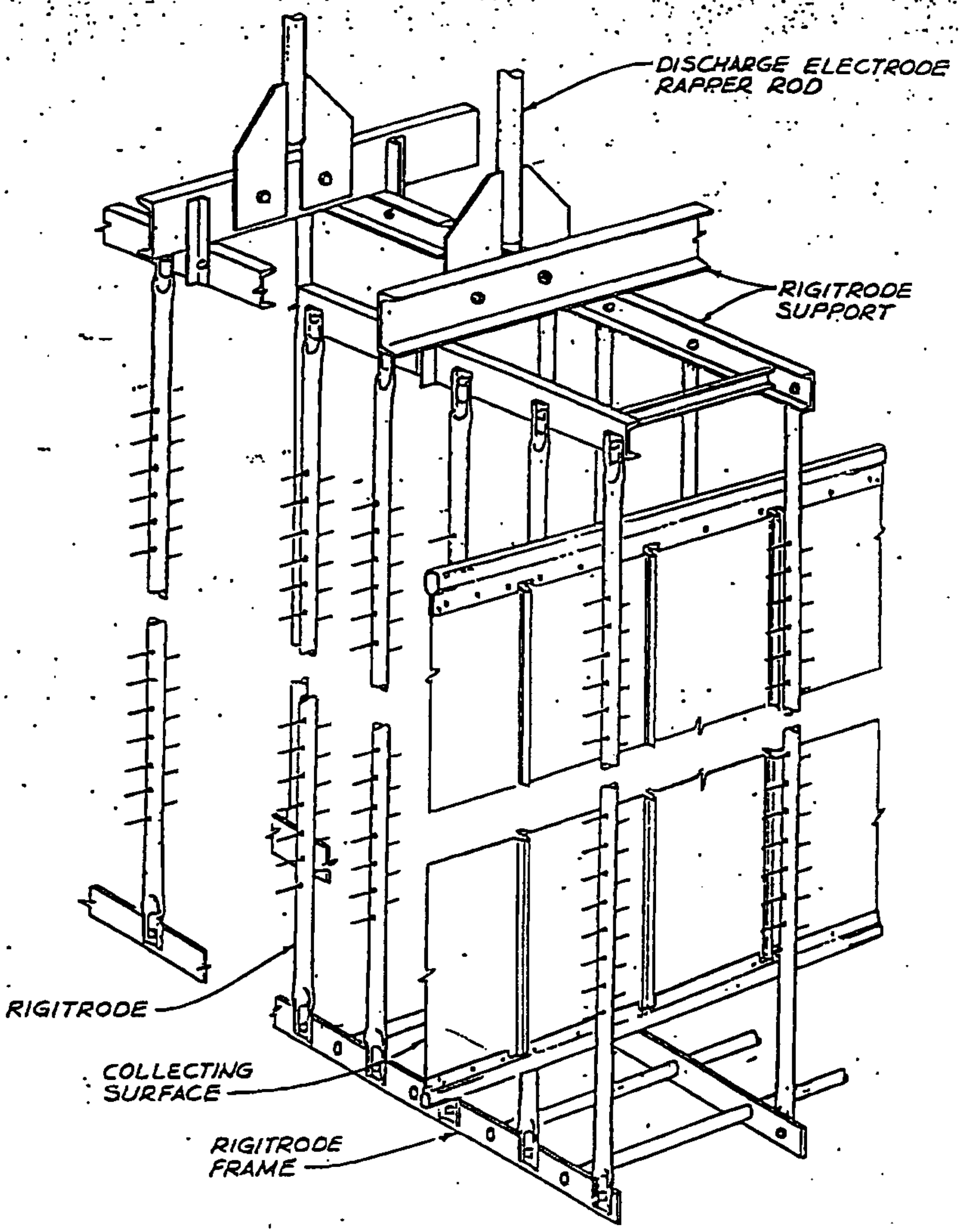
Seller's RIGITRODE electrode is a true unbreakable rigid discharge electrode. The RIGITRODE electrode is a 1-1/2 inch diameter 16 gauge mild steel tube with corona-generating studs welded to it. The studs are 12 gauge and are fully annealed to eliminate fatigue cracking. The RIGITRODE electrode exhibits a low corona onset voltage typical of a pointed discharge electrode. This feature makes it appropriate in inlet fields where dust loadings are high. As voltage is increased, the V-I relationship approaches that of a smooth electrode. This feature allows the same RIGITRODE electrode to be used effectively in outlet fields. Laboratory tests and commercial operation has shown this design to have a unique combination of several characteristics: high sparkover voltage, high field strength and an even current distribution from discrete emission points.

The restoring forces of this system are substantial; therefore, an overfull hopper will not cause permanent misalignment. The system will return to correct alignment when the hopper is emptied, thus avoiding unscheduled outages. Further, the computerized power control (discussed in detail later in this proposal) will protect the power supply and prevent the formation of fused ash in a full hopper.

J. HIGH VOLTAGE SUPPORT – PENTHOUSE DESIGN – Drawing No. 1217

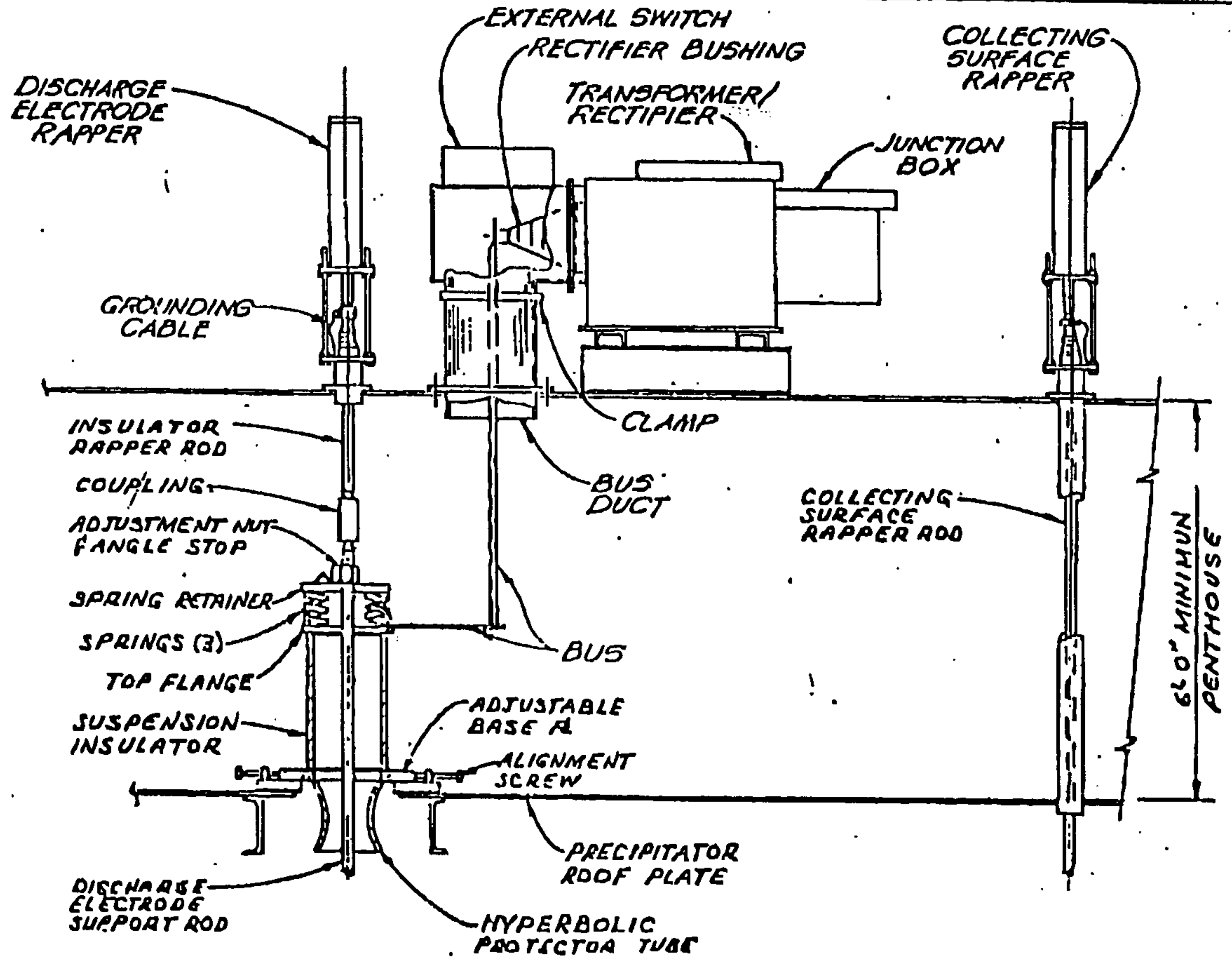
Each bus section is supported by two (2) suspension insulators located on the precipitator roof. An epoxy filled glass filament rod connects an externally located rapper to the high voltage support rod to transmit energy while at the same time providing the necessary electrical insulation.

The insulators are housed in a gas-tight 6 foot high penthouse covering the entire roof area. The sides are fabricated from 10 gauge steel. The roof is fabricated from 1/4 inch checker plate to provide a firm walk surface. All rappers, transformer-rectifiers and rapper panels are located on the penthouse roof allowing inspection and maintenance with the precipitator in operation. The penthouse construction reduces the radiator effect of the many projections through the precipitator and eliminates the roof corrosion inherent with the use of individual insulator compartments. The insulators are totally accessible for cleaning and inspection. The penthouse roof is sloped 1/4 inch in 12 inches for drainage. The penthouse is pressurized by a forced air system, sized to supply 100 cfm per insulator, to prevent the entrance of dust into the penthouse and to keep the inside surface of the support insulators clean.



ENVIRONMENTAL ELEMENTS CORPORATION

RIGITRODE DISCHARGE ELECTRODE ARRANGEMENT



ENVIRONMENTAL ELEMENTS CORPORATION

HIGH VOLTAGE SYSTEM PENTHOUSE ARRGT

K. INSULATOR HEATERS

A 0.4 KW contact heater is provided around each support insulator. Insulator heaters are not essential to operation of the precipitator since the precipitator is normally heated prior to energization. The insulator heaters are included, however, as insurance in the event that the precipitator is energized cold.

L. ELECTRIC IMPULSE RAPPER MODEL ESI-I – Drawing No. 1076

The electric impulse rapper has been specifically designed for rapping the collecting surfaces, discharge electrodes and perforated distribution plates of electrostatic precipitators. The ESI-I is a single impulse gravity impact type rapper consisting of an integral DC coil and steel housing assembly, a 20 pound piston and mounting hardware. Its features include:

Accurate Control. Rapper impact is precisely repeatable. Intensity of impact and frequency of operation are controlled by a microprocessor based controller. With the optional Data Management System, the operating characteristics can be controlled from a remote control room through the CRT.

One Piece Construction. The coil is permanently bonded to the inside of the housing and is totally encapsulated in epoxy to seal out the environment. Long life is assured with this uncomplicated construction.

Lubrication. None is required.

Maintenance Free. The ESI-I requires absolutely no periodic adjustment or maintenance over its entire service life.

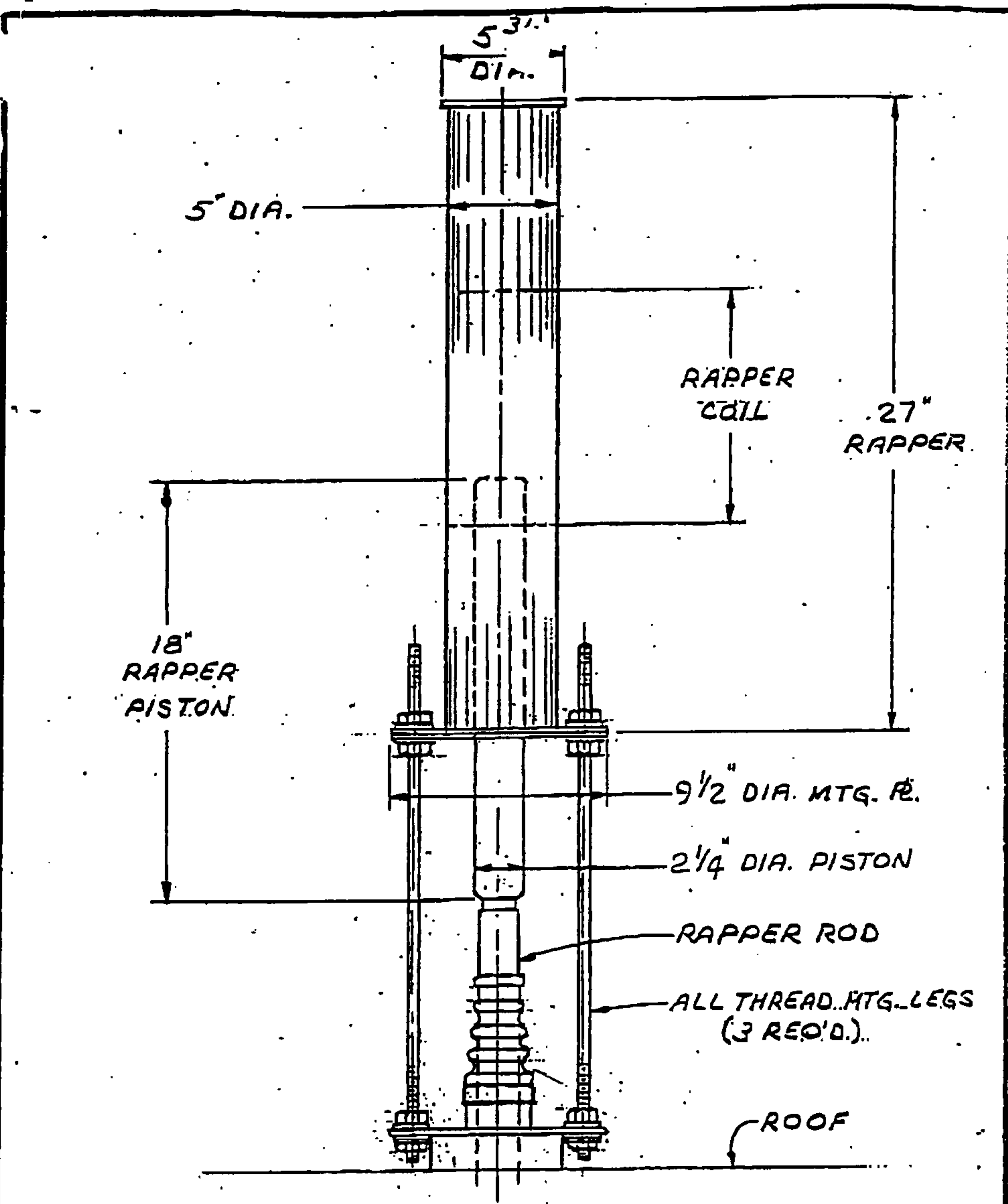
Roof Mounting. The rapper is mounted on the roof by means of three (3) support rods. The piston moves freely in and out of the rapper body when striking the rapper rod.. The impact does not impart a shock to the housing which eliminates any chance of material fatigue. The rapper is weatherproof for outdoor operation.

Power Supply. The rapper operates from a 240 volt supply and draws an instantaneous current of 22 amperes maximum. The three (3) wire conductor cable supplied with the rapper is used to make the electrical connections. An additional grounding strap is provided for connecting the housing to the precipitator roof.

Energy Output. Microprocessor controlled output levels are provided.

M. RAPPER CONTROLS

The microprocessor based rapper controls are housed in a NEMA 4 weathertight enclosure. The rapper control system is designed to operate within ambient temperature limitations of -25°C to 85°C. The rappers for the discharge electrodes and each collecting surface field are individually controlled to permit adjustment of rapper impact intensity and cycle time for each section. Impact is variable up to 10 foot pounds. On time is 1 to 8 half line cycles and



ENVIRONMENTAL ELEMENTS

ESI RAPPER

off time is variable from 1 to 999 seconds. Control, rapper status indication and fault detection can be transferred to a remote location by multiplex signals from the optional Data Management System. For further details, see Attachments.

N. TRANSFORMER-RECTIFIER – Drawing No. C37533

Each field is energized by a high voltage, coolant filled, silicon diode transformer-rectifier. Power is conducted to the precipitator through 3/4 inch A-36 steel bus bar enclosed in a 16 inch round 10 gauge A-36 steel water-tight housing.

The transformer is single phase, liquid cooled with the silicon diode rectifiers immersed in the same tank. Line voltage is regulated by a full range thyristor controller (SCR) which provides automatic power control. The current linear reactor is located in the junction box.

The transformer-rectifiers are furnished with a magnetic liquid level gauge, dial thermometer, drain, low voltage junction box and liquid filled bushings. The units are designed for a 55°C rise, at rated load, based on operation in an average ambient temperature of 40°C providing the maximum daily ambient shall not exceed 50°C. An alarm contact is provided on the temperature gauge.

The high voltage ground switch is integrated into the key interlock system to insure that the transformer-rectifier bushing is grounded before entry can be gained to the precipitator.

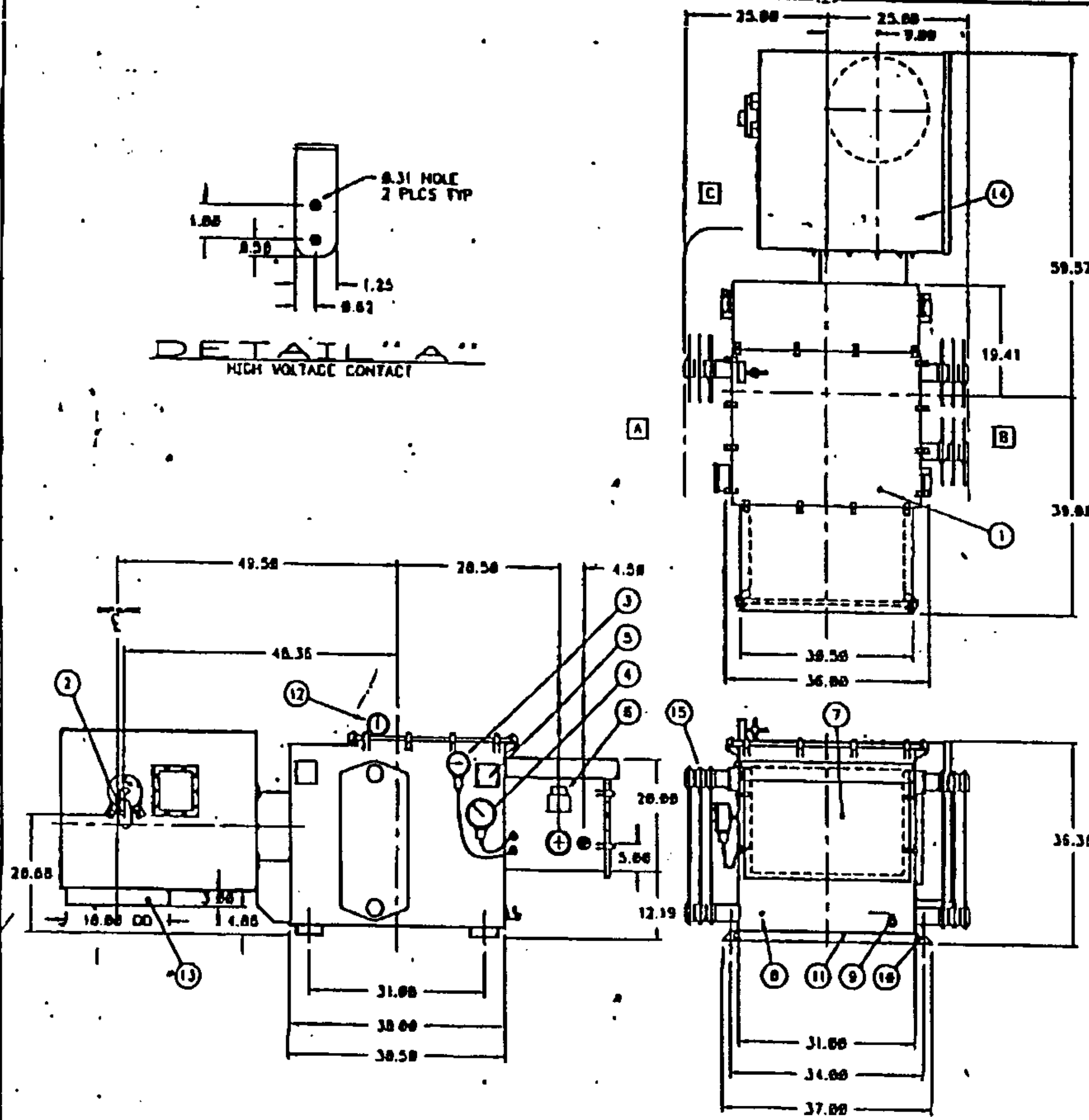
O. AUTOMATIC GROUNDING SYSTEM - Drawing No. C29652

The automatic grounding switch is located in the bus duct between the transformer-rectifier and penthouse insulator compartment. The automatic grounding of the high voltage system is solenoid activated when the transformer-rectifiers are deenergized on CO gas detection signal. The automatic grounding system will be provided for the kiln precipitator only.

P. RECTIFIER CONTROL CABINETS – Drawing No. 1224, 1225

Environmental Elements rectifier control cabinets are fabricated as attractive two section (2-PAC) dead front, NEMA 12 enclosures. The cabinets are independent of one another, each containing separate assemblies to apply voltage to the primary of an associated transformer-rectifier at levels determined by a dedicated automatic power controller. Access to all equipment is through the front door allowing easy access for maintenance. Components include the circuit breaker, contactor, control transformer, monitoring circuits, relays, firing circuit and Silicon Controlled Rectifiers (SCR's). The SCR assembly utilizes two (2) SCR's fitted to electrically isolated heat sinks of an appropriate size. The electronic components of the firing circuit are mounted on a printed circuit board attached to the heat sink. The firing circuitry determines the conduction angle (0° to 180°) of the SCR's as a function of the signal from the automatic power control or manual control.

A separately enclosed high impedance linear reactor (CLR) with an iron core and air chimneys in the windings is connected in series with the SCR's to limit primary current surges during sparking.



SPECIFICATIONS						
MODEL NUMBER	OUTPUT K.V.D.C.	OUTPUT M.A.D.C.	APPROX WEIGHT	FLUID CAPACITY	NO. OF RADIATORS	LOC. OF RADIATORS
39267	65	750	3000#	120 GAL	2	A, B
39268	65	1000	3300#	120 GAL	3	A, (2)B

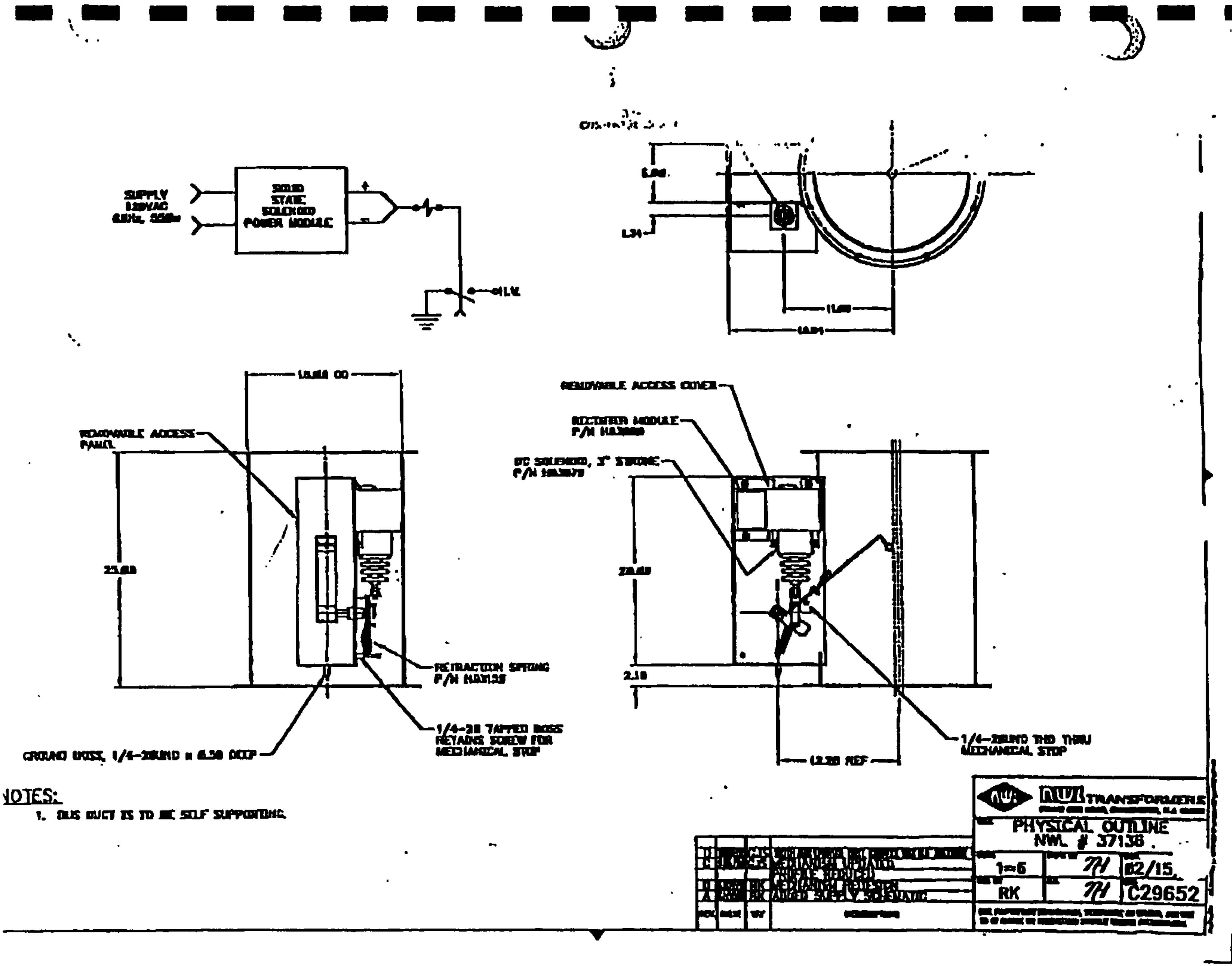
1. HANDHOLE FOR INTERNAL ACCESS WITH REMOVABLE COVER
2. HIGH VOLTAGE CONTACT SEE DETAIL "A"
3. MAGNETIC FLUID LEVEL INDICATOR LOW LEVEL CONTACTS OPTIONAL
4. TEMPERATURE INDICATOR MOUNTED IN WELL TO FACILITATE REPLACEMENT OVERTEMP ALARM CONTACTS SHOWN ARE OPTIONAL
5. LIFTING CHANNEL, C4-7.25# x 4.00 LG. 4 PLC'S
6. NAMEPLATE LOCATION
7. LOW VOLTAGE JUNCTION BOX WITH REMOVABLE COVER AND TOP, 1 - 3" CPLG, 1 - 1" CPLG PROVIDED
8. GROUND BOSS, 1/2-13UNC THREAD WITH THREAD PROTECTIVE PLUG
9. 0.5" VALVE & PLUG FOR DRAIN OR SAMPLING
10. MOUNTING HOLES, 0.75 DIAMETER 4 PLC'S
11. 0.25" PLATE BOTTOM WITH (2) FORMED STEEL CHANNELS
12. 0.5" FILL CPLG. WITH PRESSURE RELIEF VALVE PRESSURE-VACUUM GAUGE OPTIONAL
13. H.V. DUCT FLANGE, 10.00 OD
14. GROUNDING SWITCH, 2 POSITION EXTERNAL WITH PROVISIONS FOR 2 ZERO BOLT EXTENSION INTERLOCKS. APPROVED LOCKS: KIRK TYPE F, SUPERIOR TYPE B4003, OR EQUIVALENT. REF DWG: D37449
15. COOLING RADIATOR

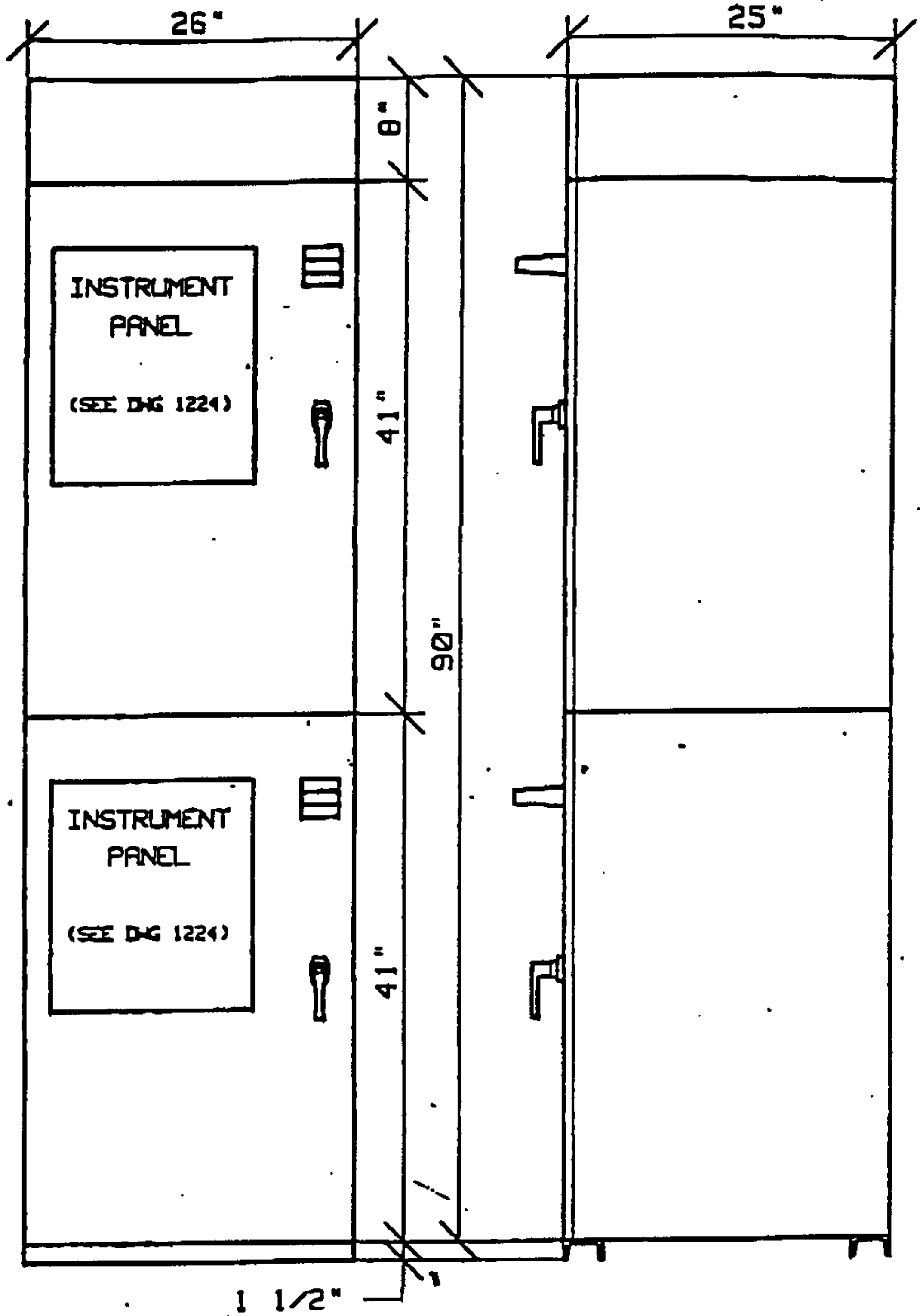
REV	DATE	BY	DESCRIPTION

NWL TRANSFORMERS

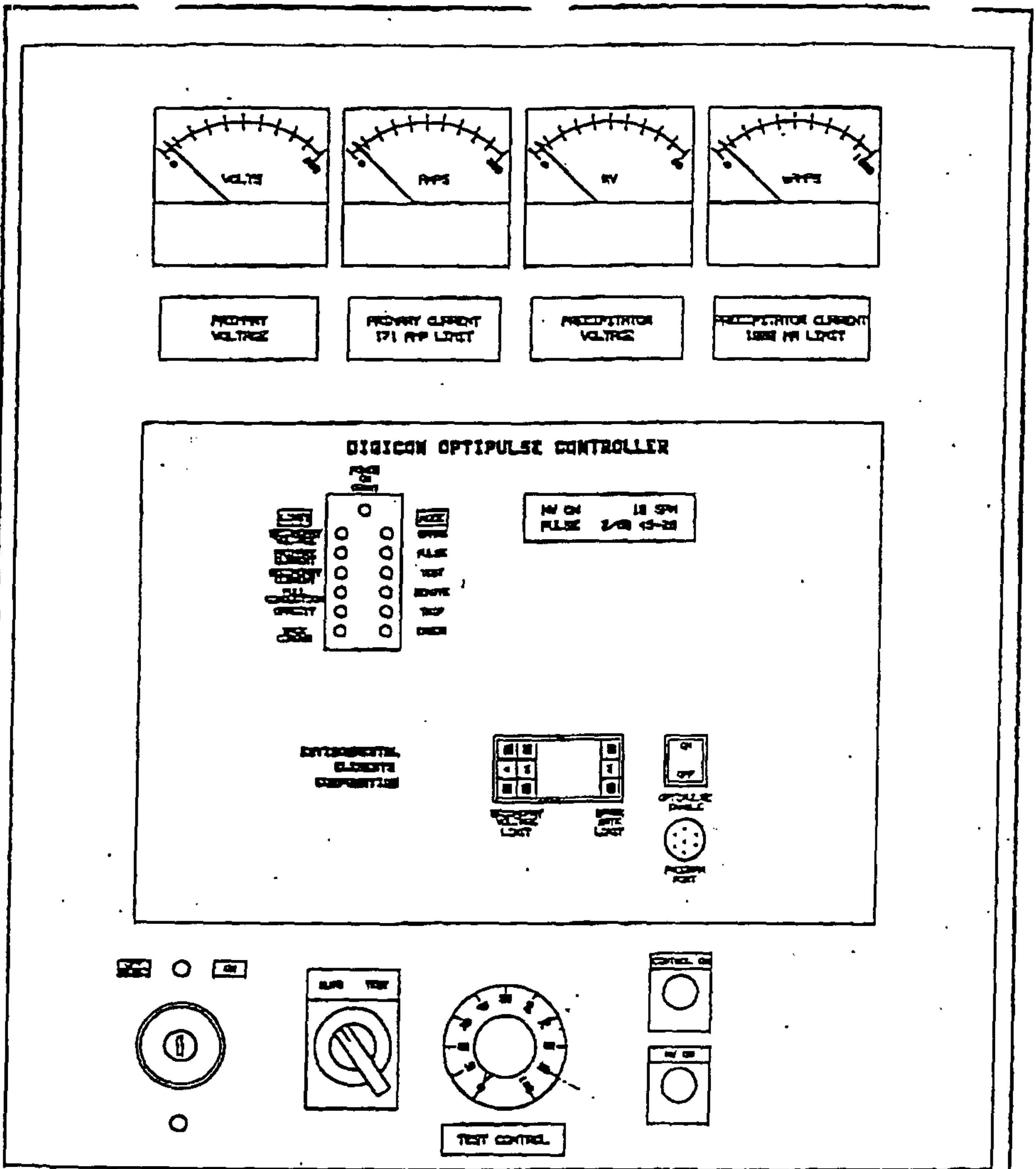
ENVIRONMENTAL ELEMENTS

1=14		3/4/96
PGF	PGF	C37533


SUPPLY
SOLID STATE SOLENOID POWER MODULE
REMOVABLE ACCESS PANEL
REMOVABLE ACCESS COVER
RECTIFIER MODULE
DC SOLENOID, 3" STROKE
RETRACTION SPRING
1/4-20 TAPPED BOSS RETAINS SCREW FOR MECHANICAL STOP
GROUND BOSS, 1/4-20UNC x 0.50 DEEP
1/4-20UNC THD THRU MECHANICAL STOP
12.20 REF
2.10
NOTES:
1. BUS DUCT IS TO BE SELF SUPPORTING.
NWL TRANSFORMERS
PHYSICAL OUTLINE
NWL # 37138
1=6
02/15
RK
C29652



ENVIRONMENTAL ELEMENTS CORPORATION	W.O. NO.	DUAL CONTROL CONSOLE WITH CIRCUIT BREAKER
DRAWN AJD 2-8-87	SIZE A	DRAWING NO. 1225	REV.
DATE	SCALE	SHEET



A1S3

ENVIRONMENTAL ELEMENTS CORPORATION	M.O. NO. INSTRUMENT PANEL			
	SIZE	FSCM NO.	DRAWING NO. 1224	REV. X
DRAWN J. HAMLIN				
DATE 2-16-87	SCALE		SHEET	

The control cabinets also contains a number of features that protect the precipitator and other components. Associated fuses and surge arresters protect the SCR's and metering circuits against external circuit failure and transient current sparks. An electronic overcurrent relay provides additional protection.

To eliminate the manual monitoring of the units, each cabinet contains a DIGICON OPTIPULSE automatic power controller to maintain optimum power input to the precipitator.

Each controller has a two line 32 character alphanumeric Liquid Crystal Display (LCD) located on the front panel which presents a user-friendly interface to the plant operator. Controller faults, operating status and other information are presented in plain English.

Six standard alarms are annunciated through the controller:

Overcurrent
Undervoltage
Overspark
SCR Phase Imbalance
High Ambient Temperature
T-R High Temperature

In the event that power is interrupted due to one of the above mentioned faults, the fault is indicated on the LCD display. An additional three (3) alarm points are available for customized alarming (e.g. SCR high temperature, T-R low liquid level, ...etc.). Process related alarms may also be incorporated into the controller to trip the precipitator field due to such conditions as incomplete combustion in the boiler.

The DIGICON OPTIPULSE controller is described in more detail on the following pages.

Each cabinet is provided with the following meters:

Primary Current
Primary Voltage
Secondary Current
Secondary Voltage
Spark Rate (Digital)

The control cabinets are equipped with face-mounted breakers. The circuit breaker interrupting capacity is greater than or equal to 50,000 amperes symmetrical. As a safety feature, each cabinet is integrated into the key interlock system.

Where space is limited, the 2-PAC arrangement offers an attractive alternative to conventional rectifier control cabinets which house the automatic power controller, power components and current limiting reactor all in one enclosure.

Q. DIGICON OPTIPULSE AUTOMATIC POWER CONTROLLER

The DIGICON OPTIPULSE Automatic Power Controller is a microprocessor based controller using the latest state-of-the-art components. The controller is equipped with dual specialized microprocessors for extremely fast processing of operational functions, and a 16K EEPROM for storage of all program parameters. The controller enclosure is NEMA 12, dust tight, and mounted inside the transformer-rectifier control cabinet. The ambient conditions can range from -10°C to +50°C and 0% to 95% humidity. On the front of the controller are two (2) digital selector switches: secondary voltage and spark rate. The controller uses this information to regulate the power level supplied to the precipitator. An additional selector switch is provided to enable the intermittent energization mode of operation. For further details regarding other features including host computer interfacing, user friendly displays and on line program modification capabilities, see Attachments.

R. UNDERVOLTAGE RELAY PROTECTION

Dust build-up into the electrostatic field is a possibility with failure of the dust removal system. The result is high heat generated due to the resistive ground formed by the dust bridging the space between the discharge and collecting electrodes. This leads to distortion of the discharge and collecting systems. To guard against this, undervoltage protection is built into the controllers to trip the power and sound an alarm in the event of a dead short or ground.

S. ALARM SYSTEM

Alarm contacts are provided in the following circuits for incorporation into Buyer's annunciator system. These contacts may also be integrated into Seller's optional Data Management System.

1. Transformer-rectifier control cabinet trip.
2. Penthouse blower failure.
3. Rapper failure.
4. High dust level in hoppers.
5. Dust conveying system failure.
6. Dust valve failure.
7. Hopper low temperature.

T. GROUNDING DEVICES

Grounding devices, permanently located within the penthouse, are provided for attachment to the high voltage frame whenever work is being performed on the system.

U. ELECTRICAL - GENERAL

All electrical equipment furnished is in accordance with current accepted engineering practices including the National Electrical Code, NEMA standards and the AIEE standards, wherever they apply. Controls for the high voltage are assembled into self-contained units of standard dead-front switchboard construction.

All control circuits will operate on 120V unless otherwise specified. All pushbutton and indicating lights will be combination type. Terminal boards are furnished in each control panel to which customer's signal circuit or safety circuits may be connected.

V. INTERLOCK SYSTEM

Seller's offering is complete with key-interlock system for the portions of the precipitator where high voltage may be a hazard. Access may not be gained to these danger zones without first turning off the power and grounding the appropriate high voltage elements.

Interlocks are provided for the following:

1. Transformer-rectifier control cabinets.
2. Transformer-rectifier grounding switches.
3. Penthouse roof access doors.
4. Hopper access doors.
5. Inlet nozzle door.

W. ACCESS DOORS

Seller's standard quick-opening 22 inch x 28 inch access doors are provided. Each opening through thermal insulation will be of double-door construction consisting of a hinged, dogged outer door of ductile iron and a clamped steel inner doorplate, fabricated of 11 gauge carbon steel. Dogs and lugs on the outer door are made of stainless steel to assure free operation in all environments. This dual construction reduces or eliminates the need for insulation at the door area, and the inner plate provides an additional safety feature not found in competitive designs. The hopper inner door plate is provided with a 1-1/2 inch diameter inspection port which allows the operator to determine if the ash level is above the door level. A Viton coated aramid blend fiber gasket with a stainless steel mesh core is provided on the outer door to maintain a gas-tight seal, and positive interlocking is provided to prevent accidental entry. Each door bears a highly visible "Warning" sign made of enameled aluminum.

X. SHOP PAINT

External uninsulated surfaces will be cleaned per Specification SSPC-SP-6 and given one (1) coat of zinc rich primer.

Y. THERMAL INSULATION

Seller will provide thermal insulation specifications for the electrostatic precipitator system. Three inch thick, 8 pcf, 1000°F mineral wool and 0.032 inch ribbed unpainted aluminum lagging (exterior surfaces) is recommended to insulate the hoppers, inlet nozzle, outlet nozzle precipitator casing and penthouse sides. The penthouse floor should be covered with 3 inches of calcium silicate block insulation. The transformer-rectifier bus duct and the penthouse blower system need not be insulated.

Z. VENDOR'S LIST

The items not manufactured in fabrication shops are furnished by the following suppliers or equal.

Transformer-rectifiers:	NWL
Control Cabinets:	Electronic Power and Control
Rapper Panels:	Forry Incorporated
Hopper Alarms:	Drexelbrook, Bindicator,
Penthouse Blowers:	ACME or Equal
Screw Conveyors:	Jervis B. Webb Co., Summelot or Equal
Dust Valves:	Sprout Bauer or equal

AA. GAS DISTRIBUTION MEDIA AND BAFFLING (WITHOUT MODEL STUDY)

Uniform gas distribution to the precipitator is essential if performance guarantees are to be achieved for the specified service. Included in this proposal are the perforated distribution plates as shown on the proposal drawing. Other vanes, splitters, turning devices and grids as required for uniform gas distribution are to be included in the ductwork contract.

Seller has extensive experience with ductwork configurations and will provide an aerodynamic (not structural) design without additional charge or a model study.

AB. FIRE PROTECTION

The potential for fires exists in all equipment cleaning the exhaust gases from a pyro process where a combustible gas mixture or burning char carryover can occur through improper firing or loss of process control. Risk of fire is minimal where process monitors are installed and maintained to alarm and control a developing hazardous condition. In the rare instance where the process cannot be controlled, the precipitator must be de-energized until conditions are safe for restart.

AC. QUALITY ASSURANCE PLAN

Our Corporate Quality Assurance Section is staffed, trained and equipped to maintain effective quality management of a contract from the time it is awarded until final customer acceptance has been made.

This group routinely provides the following for all contracts:

1. Review of the customer's procurement and technical documents to determine that the requisite requirements have been defined and documented as well as to assure that Seller's resources and capabilities are adequate to meet the requirements.

2. Assist Seller's Purchasing Section in the selection and development of quality fabricators including judgments relative to potential fabricator's abilities to conform to those requisite requirements.

3. Review and assess, for approval, designated fabricator's quality systems including their organizational structure, responsibilities, procedures, processes and resources for implementing quality management to conform to contractual requirements.

4. Schedule source inspection visits by Seller's Quality Assurance Representatives (QAR's) to monitor in-process activities and/or to provide shipping releases.

5. Assure qualifications of all welders to AWS D1.1 for arc welding and AWS C1.1 for spot welding or equivalent as required.

6. Perform system, product and process audits as required to assure conformance and implementation to contractual requirements including the pertinent documentation.

SECTION 3

TECHNICAL TABULATION

SECTION 3

3. TECHNICAL TABULATION

A. KILN MILL PRECIPITATOR

1. Structural Design Parameters

a.	Structural Design	AISC Code throughout
b.	Wind Load	90 mph
c.	Live Load	50 psf on precipitator roof 100 psf on all access
d.	Seismic Zone	1
e.	Dust Bulk Density - Structural Volumetric	 115 pcf 35 pcf
f.	Snow Load	Nil
g.	Temperature	750°F
h.	Pressure	±25 inches H_20

2. Mechanical Design Data

a.	Number of Precipitators	1
b.	Number of Chambers	1
c.	Fields4	
d.	Bus Sections Per Field	1
e.	Total Number Bus Sections	4
f.	Gas Passages	23
g.	Spacing of Gas Passages	16 inches
h.	Precipitator Casing Dimensions	See Drawing 15290-D-3 Rev. 3
i.	Number & Type Hoppers	2 trough

j.	Hopper Material	1/4 inch A-36 steel
k.	Casing Material	3/16 inch A-36 steel
l.	Distribution Plates	12 gauge mild steel

3. Collection Surface Systems

a.	Type of Material	Modular Roll Form 18 gauge Mild Steel
b.	Baffle Stiffeners	Integrally formed on 18 inch centerlines
c.	Number and Size of Surfaces	96@10.625'x38'
d.	Total Active Collecting Surface	74,290 sq. ft.
e.	Floating Channel Support System	Leading and trailing edges of each mechanical field

4. Discharge Electrode System

a.	Type	1.5 inch diameter Rigid Tube with emitting studs
b.	Effective Length Per Electrode	38 feet
c.	Number of Electrodes Per Gas Passage	28
d.	Total Number Electrodes	644
e.	Total Effective Length	24,472 feet
f.	Suspension Insulators	

(1)	Number and Material	8 Alumina
(2)	Manufacturer	Coors
(3)	Dry Arc-Over K.V. RMS	99.1 KV, 60 Cycle
(4)	Wet Arc-Over K.V. RMS	97.0 KV, 60 Cycle
(5)	Leakage Distance	19 3/4 inch

5. Rapping System

a. Quantity and Type of Rappers — Electrical impulse

(1) Collecting Surfaces — 48 Model ESI-I
(2) Discharge Electrodes — 8 Model ESI-I
(3) Perforated Distribution Plates — 1 Model ESI-I

b. Weather-Proof Rapper Panels

(1) Material — Steel - NEMA 4
(2) Quantity — 1
(3) Type — Solid State
(4) Power Transformer — 15 KVA 480/240 volt

6. Electrical

a. Transformer-Rectifiers

(1) Type — Silicon
(2) Voltage Rating — 70kv (DC Avg.)
83kv (AC) RMS
118 kv (DC) Peak
(3) Output Wave Form — Full Wave

	Quantity	KVA	MA
1st Field	1	100.1	1000
2nd Field	1	100.1	1000
3rd Field	1	100.1	1000
4th Field	1	100.1	1000

b. T-R Insulation Fluid — Mineral Oil

c. High Voltage Switch Type — One per T-R unit, interlocked grounding switch with observation window

d. T-R Control Cabinet — One per pair of T-R's
NEMA 12 Construction

e. Type of Control — Thyristor (SCR)

f. Maximum Ambient Temperature for Electrical Supply and Control Equipment — 40°C

g. Electrical Supply — 480 Volt, 60 Hertz, 3 Phase

h. Maximum Expected Power Consumption

(1)	Precipitator (T-R's)	182.7 KW
(2)	Rappers	2.0 KW
(3)	Insulator Heaters	3.2 KW
(4)	Penthouse Blowers	1 1/2 HP
(5)	Conveyor	25 HP
(6)	Dust Valve	3 HP

i. Total Connected Load (Transformer-Rectifier Units) — 400.4 KVA

j. Type of High Voltage Conductor — 3/4 inch pipe in 16 inch round or square duct

7. Access Doors

Penthouse Roof	2, single door, interlocked
Precipitator Roof	4, double door, non-interlocked
Nozzles	1, double door, interlocked
Hoppers	4, double door, interlocked

8. Thermal Insulation - By Erector

Precipitator Roof	3 inch calcium-silicate block AREA = 1558 sq. ft.
Nozzles, Precipitator Sides Penthouse Sides and Hoppers	3 inch 8 PCF mineral wool AREA = 12948 sq. ft.

All lagging will be 0.032 inch ribbed aluminum on exterior surfaces.

9. Dust Removal

a. Hopper Conveyor Kiln ESP

(1)	Quantity and Size		One 18" x 36'
(2)	Type -	Trough	3/16" A-36 U through
		Screw	Full Flight
(3)	Speed		20 rpm
(4)	Capacity	@ 46% load	1200 cfh
		@ 100% load	2,614 cfh
(5)	Dust Density	Volumetric	35 pcf
		Power	85 pcf
(6)	Drive		25 Hp end mounted reducer
(7)	Motion Sensor		By customer

b. Dust Valve Kiln ESP

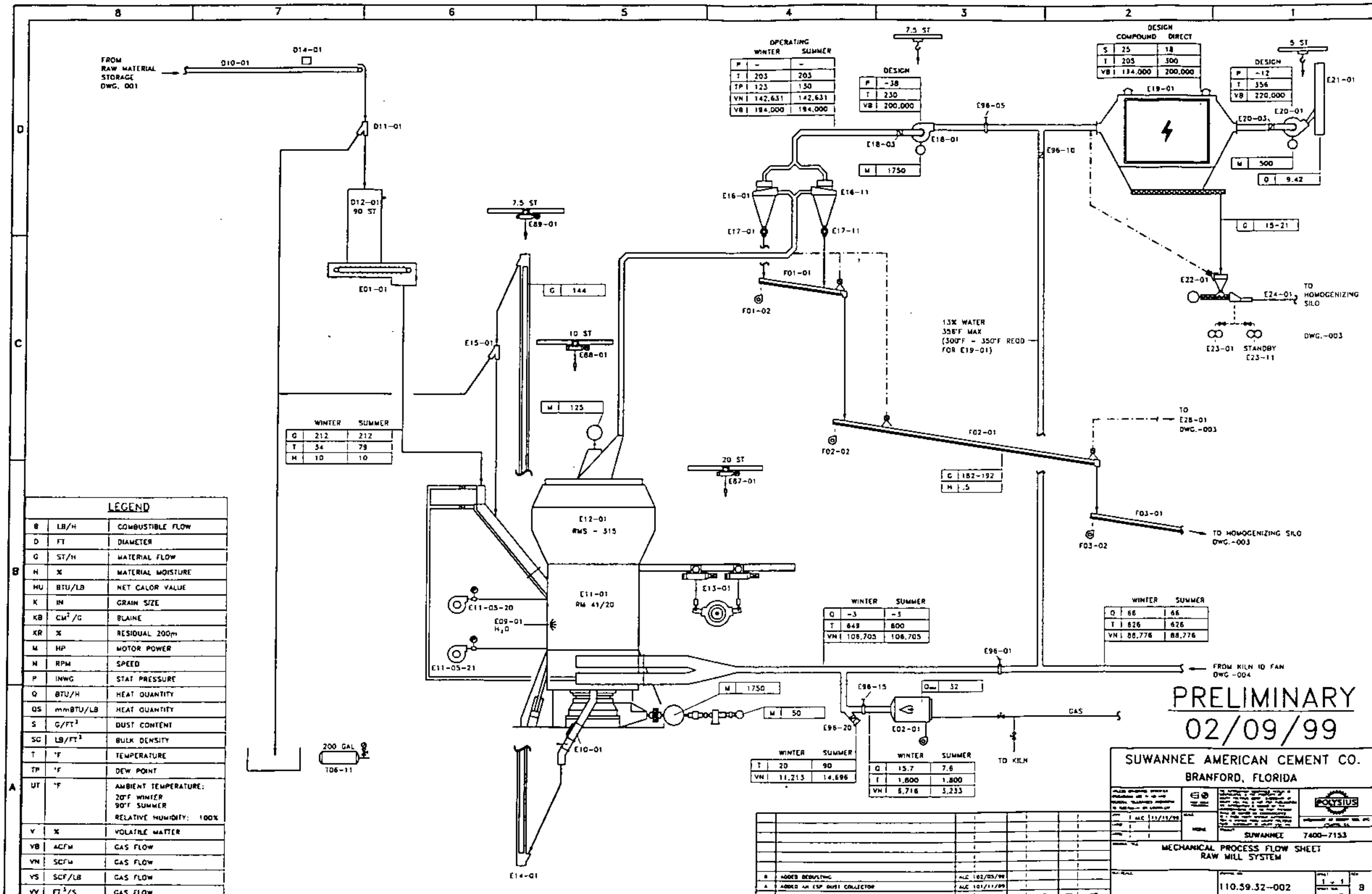
(1)	Type	Sprout Bauer Rotary Valve w/Type 2 Rotar and Ni-Hard
(2)	Adjustable Tips	
(3)	Quantity and Size	One Size 2018
(4)	Capacity @ 80% Load	2,500 cfh
(5)	Speed	18 rpm
(6)	Drive	2 Hp
(7)	Motion Sensor	Shaft Mounted

c. Hopper Conveyor Clinker Cooler ESP

(1)	Quantity and Size	One 14" x 36'
(2)	Type-Trough	3/16" A-36 U Trough
	Screw	Full Flight
(3)	Speed	20 rpm
(4)	Capacity @ 40% Load	510 cfh
	@100% Load	1274 cfh
(5)	Dust Density Volumetric	35 pcf
	Power	85 pcf
(6)	Drive	15 Hp end Mounted Reducer
(7)	Motion Sensor	By Customer

d. Dust Valve Clinker Cooler ESP

(1)	Type	Sprout Bauer Rotary Valve w/type 2 Rotar and Ni-Hard Adjustable Tips
(2)	Quantity and Size	One Size 1614
(3)	Capacity @ 85% Load	1250 cfh
(4)	Speed	20 rpm
(5)	Drive	1 1/2 Hp
(6)	Motion Sensor	By Customer



LEGEND

B	LB/H	COMBUSTIBLE FLOW
D	FT	DIAMETER
G	ST/H	MATERIAL FLOW
H	%	MATERIAL MOISTURE
HU	BTU/LB	NET CALOR VALUE
K	IN	GRAIN SIZE
KB	CM^2/G	BLAINE
KR	%	RESIDUAL 200μ
M	HP	MOTOR POWER
N	RPM	SPEED
P	INWG	STAT PRESSURE
Q	BTU/H	HEAT QUANTITY
QS	mmBTU/LB	HEAT QUANTITY
S	G/FT^3	DUST CONTENT
SC	LB/FT^3	BULK DENSITY
T	°F	TEMPERATURE
TP	°F	DEW POINT
UT	°F	AMBIENT TEMPERATURE: 20°F WINTER 90°F SUMMER RELATIVE HUMIDITY: 100%
V	%	VOLATILE MATTER
VB	ACFM	GAS FLOW
VN	SCFM	GAS FLOW
VS	SCF/LB	GAS FLOW
VV	FT^3/S	GAS FLOW

PRELIMINARY
02/09/99

SUWANNEE AMERICAN CEMENT CO.
BRANFORD, FLORIDA

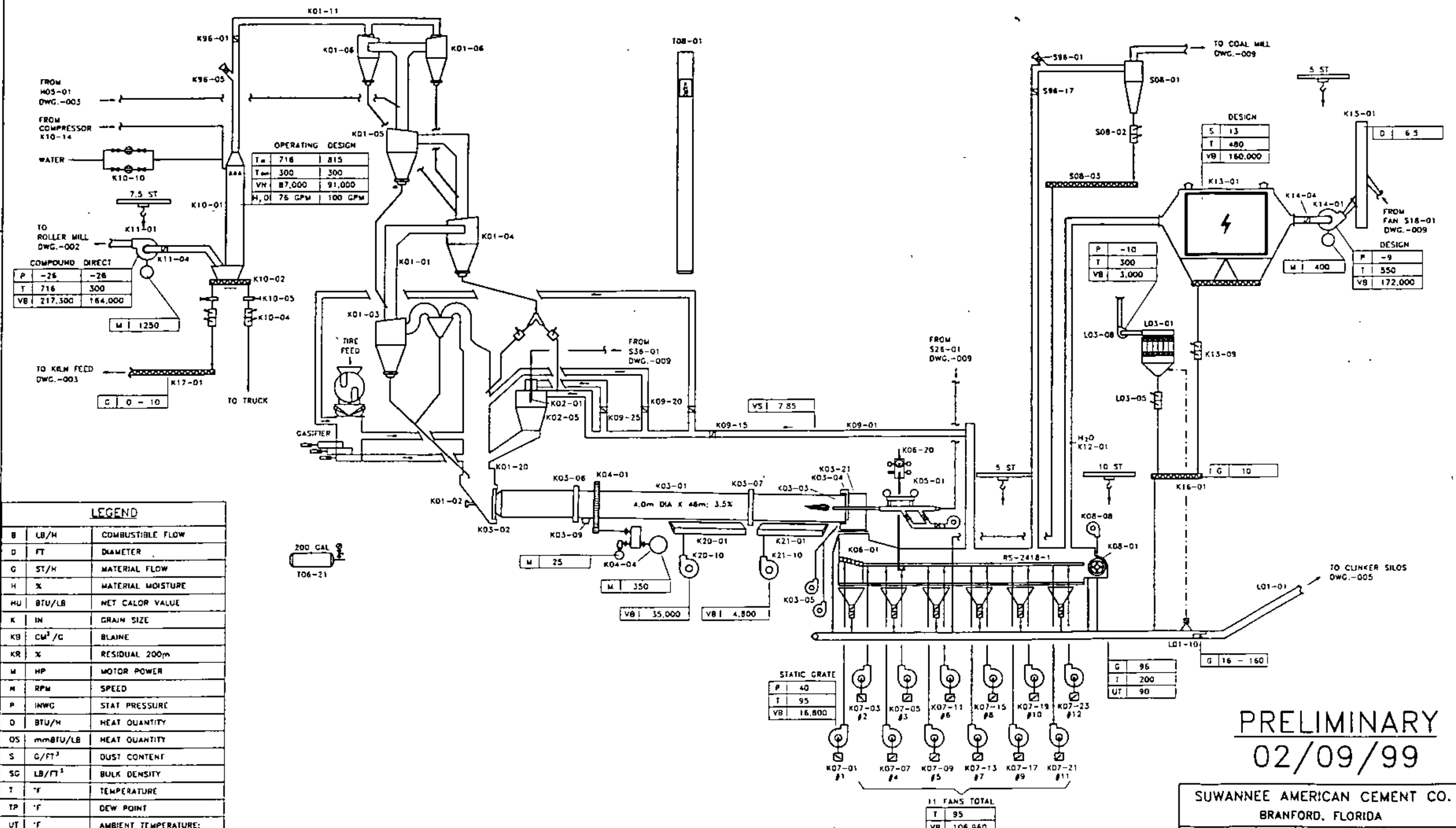
POLYSIUS

SUWANNEE 7400-7153

MECHANICAL PROCESS FLOW SHEET
RAW MILL SYSTEM

110.59.32-002

1 of 1 D B



LEGEND

B	LB/H	COMBUSTIBLE FLOW
D	FT	DIAMETER
G	ST/H	MATERIAL FLOW
H	%	MATERIAL MOISTURE
HU	BTU/LB	NET CALOR VALUE
K	IN	GRAIN SIZE
KB	CM^2/G	BLAINE
KR	%	RESIDUAL 200m
M	HP	MOTOR POWER
N	RPM	SPEED
P	INWG	STAT PRESSURE
Q	BTU/H	HEAT QUANTITY
QS	mmBTU/LB	HEAT QUANTITY
S	G/FT^3	DUST CONTENT
SG	LB/FT^3	BULK DENSITY
T	°F	TEMPERATURE
TP	°F	DEW POINT
UT	°F	AMBIENT TEMPERATURE: 20°F WINTER 90°F SUMMER RELATIVE HUMIDITY: 100%
V	%	VOLATILE MATTER
VB	ACFM	GAS FLOW
VN	SCFM	GAS FLOW
VS	SCF/LB	GAS FLOW
VV	FT^3/S	GAS FLOW

PRELIMINARY
02/09/99

SUWANNEE AMERICAN CEMENT CO.
BRANFORD, FLORIDA

POLYSIUS

B	ADDED DEDUSTING	ALC	02/05/99
A	ADDED CALCINER DROP OUT CHAMBER	ALC	01/11/99

ALC 11/19/98

NONE

SUWANNEE 7400-7155

MECHANICAL PROCESS FLOW SHEET
PREHEATER, KILN AND COOLER

110.59.32-004

1 of 1

D

B

4. The Department believes that BACT at this facility for PM_{10} should at a minimum meet the same emission limits as at Lafarge Corporation's plant included in the BACT determinations shown in Table 14. Please comment.

Response:

We concur. All additional modeling for PM10 was conducted using these lower emission limits.

5. The sample sulfur dioxide reduction calculations were based on coal with a sulfur content of 1.5%. Please evaluate the proposed sulfur limits and reduction required with the proposed coal and petcoke. Also comment on the relative merits of limiting percent sulfur in the fuel versus solely limiting emissions of sulfur dioxide. EPA has commented to the Department that the feasibility of a cement kiln SO_2 emission rate of 0.27 lb/ton clinker (versus the proposed 0.28 lb/ton clinker limit) should be addressed. Please also address EPA's comment.

Response:

No sulfur limits are proposed for petcoke and it is requested that no sulfur limit be placed on coal. The calculations provided for coal (at 1.5 percent sulfur) were for illustrative purposes. Similarly, the estimated removal efficiency of sulfur from the system when burning petcoke is as follows:

The projected SO_2 removal efficiency of the total system is calculated from the total SO_2 available for liberation, as compared to the proposed allowable emission limit.

<u>Petcoke:</u>
4.0% sulfur by weight, 13.0 tons/hour combusted, Sulfur to sulfur dioxide ratio = 1:2
(2 lbs. SO_2 per 1 lb. S) = 2,080 lbs/hr

<u>Raw Meal:</u>
Sulfite (SO_3) from raw meal = 0.1% by weight
Raw meal is processed at the rate of 163 tons/hour = 326,000 lbs/hr
Sulfite to sulfur dioxide ratio = 5:4 (4 lbs. SO_2 per 5 lbs. SO_3)
SO_2 from raw meal =
326,000 lbs/hr X 0.001 lbs. SO_3/lb X 4 lbs. SO_2/5 lbs. SO_3 = 261 lbs/hr

Total SO_2 from petcoke and raw meal = 2,080 + 261 = 2341 lbs/hr

Proposed SO_2 emission limit = 26.83 lb/hr

Estimated SO_2 removal from total system:

100 % - [(26.83 lbs/hr emitted/2341 lbs/hr liberated) X 100%] = **98.9%**

The sulfur in a pyroprocessing system includes the sulfur in the fuel (fuel sulfur) and the sulfur contained in the preheater feed. The sulfur that contributes most significantly to sulfur dioxide (SO_2) emissions is that contained in the preheater feed. Fuel sulfur generally does not contribute significantly to SO_2 emissions.

The sulfur in the preheater feed that results in high SO_2 emissions is primarily pyritic sulfur or other highly volatile forms of sulfur. This sulfur disassociates at about 400°C (750°F) (close to the exit temperature of a four-stage preheater) and exits the system as SO_2. The low SO_2 emission limit proposed by Suwannee American of 0.28 pounds per ton of clinker is based on the fact that there is very little pyritic or high volatility sulfur in the mined feed materials that will be used by Suwannee American.

To reduce SO_2 emissions below 0.28 pounds per ton of clinker is not practical as it would seriously restrict Suwannee American on its selection of non-mined feed materials (flyash, mill scale, iron ore, etc.). These materials will normally contain pyritic or other high volatility sulfur inclusions in some amount. By maintaining the SO_2 limit at 0.28 pounds per ton of clinker, Suwannee American will have the flexibility of obtaining the necessary raw materials at a competitive price while still maintaining a SO_2 emission rate at a level that will create less than a significant impact on ambient air quality.

Regarding fuel sulfur, in a pyroprocessing system the sulfur will generally react with alkaline material in the kiln feed to produce alkaline sulfates which remain part of the clinker. The mined feed material available to Suwannee American are expected to have sufficient alkaline materials to combine with essentially all of the fuel sulfur. This is true regardless of the fuel being used; petroleum, coke, coal, tires, fuel oil, or natural gas. Thus, the SO_2 emission limit established for the plant will be established to control feed sulfur.

A review of recent BACT determinations for SO_2 from cement plants shows limits ranging from 0.42 pounds per ton of clinker (Great Star Cement) to about 8.0 pounds per ton of clinker (Roanoke Cement expressed as 4.99 pounds per ton of feed). The BACT limits for Florida Rock (December 1996) and Florida Crushed Stone (November 1995) were 0.28 and 0.27 pounds of SO_2 per ton of clinker, respectively. The difference in these emission limits is undoubtedly a function of plant design and, most importantly, the amount of volatile sulfur in the feed material. As a result of the inherently low volatile sulfur content of the mined feed material used in Florida plants, the BACT limits for Florida plants are 2-30 times lower than limits for other plants around the county (see Table 15 of Report in Support of an Application for a PSD Construction Permit Review, Suwannee American Cement Company, November 1998).

To impose an even lower SO_2 BACT limit on a Florida plant is without merit. The maximum expected emission rate of 26.8 pounds per hour is already so low that it results in less than a significant impact on ambient air quality; even under worst case meteorological conditions. The fact that there are cement plants with scrubbers for SO_2 control (Holnam in Dundee, Michigan and Midlothian, Texas and TXI at Midlothian, Texas) is, in itself, not relevant. The question that must be asked is what would the uncontrolled SO_2 emissions have been from these plants and what is the permitted SO_2 emission limit following the scrubbers. Krupps Polysius reported that the TXI plant has an allowable SO_2 emission rate of 796 pounds per hour following the scrubbers. The Holnam Dundee, Michigan plant is a wet-process plant and the scrubber and an oxidizer were installed on the 40-year old plant to reduce SO_2, odors, and a visible non-steam plume. No information was available on the Holnam Midlothian, Texas plant. However, given the reported SO_2 emissions from the TXI Midlothian plant, it is expected that high SO_2 emissions from the Holnam Midlothian result from feed materials and a scrubber is necessary to reduce those emissions to a reasonable level.

If scrubbers were considered for the Suwannee American plant for the control of SO_2, the reduction in SO_2 emissions would have to be weighed against plume visibility, less favorable plume dispersion characteristics due to a lower stack gas discharge temperature and the treatment and disposal of the scrubber water blowdown. The cement plant, as designed, is a "zero (wastewater) discharge" facility. If scrubber water blowdown had to be treated and discharged, the facility would no longer be "zero discharge" and a wastewater discharge point would have to be permitted in a sensitive internally drained (discharge directly to the groundwater) karst environment. The downside impacts of a scrubber, considering the already low permitted SO_2 emission rate (and the fact that actual SO_2 emissions are expected to be well below the permitted limit as with Florida Crushed Stone and The Florida Southdown plant), do not support this technology for SO_2 control at Suwannee American.

Suwannee American Cement requests that the SO_2 emissions limit be retained at 0.28 pounds per ton of clinker.

6. Please comment on the feasibility of combining the proposed selected BACT control technologies (process control, secondary combustion, indirect firing) with SNCR. It appears that the proposed selected technologies are integral to the plant design so such a combination appears possible. If the proposed selected technologies are not integral to the plant design, please provide a detailed cost analysis for them in terms of overall and marginal cost effectiveness (annualized dollars/ton of nitrogen oxides removed) for NOx control using these technologies, including all references and assumptions.

Response:

Krupp Polysius has fully evaluated the effectiveness of SNCR for reducing NOx emissions from pyroprocessing kilns. They have reviewed data available worldwide and have conducted testing of their own. SNCR has yet to be proven long-term in a variety of plant types and with the possibility of one or two plants worldwide, the only experience with SNCR has been short-term tests (a week or two) primarily in older plants. SNCR experience on the few precalciner kilns (without MSC) ever tested shows NOx reductions in the range of 10-20 percent.

Krupp Polysius has found that SNCR is an effective measure to reduce NOx emissions from long wet and dry kilns; LEPOL, GEPOL, and preheater kilns; and pyroprocessing systems with precalcining rates below approximately 25 percent (expressed as total system fuel use). They have found through their own experience, and the experience of others, that SNCR has proven to be no more effective than MSC for controlling NOx emissions on precalciner kilns firing more than 50 percent of the total system fuel to the precalciner. The reason for this is that the conditions that make MSC effective reduce the effectiveness of SNCR. These competing reactions can be explained by describing the NOx reduction mechanism of the competing systems.

The precalciner plant with MSC-CC was selected by Suwannee American as it is the most energy efficient state-of-the-art plant design available. With this plant, approximately 50-60 percent of the total system fuel will be fired in the precalciner and the remaining 40-50 percent of the fuel will be fired at the main kiln burner. As previously discussed, minimizing the fuel fired in the main kiln burner will minimize thermal NOx production. Thermal NOx production will also be minimized by keeping the excess oxygen as low as practical in the kiln. This also has the effect of reducing the gas volume and minimizing fuel consumption.

The fuel burned in the precalciner will be split with approximately 10 percent of the total system fuel fired at the kiln inlet burner and the remaining 40-50 percent of the total system fuel fired in the CC. The fuel fired at the kiln inlet burner is introduced with insufficient oxygen to complete combustion. This reduces even further the oxygen that was present in the gas which has passed through the kiln and also releases free radicals (organic radicals which are the product of incomplete combustion). The very low levels of oxygen and the free radicals create a reducing atmosphere which begins to reduce the thermal NOx formed in the kiln.

These gases then pass upward to the precalciner where the remaining 40-50 percent of the total system fuel is fired in the CC. Again, the fuel is fired with insufficient oxygen to complete combustion. This results in a further depletion of available oxygen and the generation of additional free radicals and causes a continuation of the NOx reducing zone. In effect, an NOx reducing zone is maintained from the inlet of the kiln through the precalciner to a point just below the bottom of the fourth cyclone of the preheater system. At this point, the majority of the tertiary air is introduced to complete the combustion process.

In summary, MSC functions on the principal of a NOx reducing zone (very low levels of oxygen in the presence of free radicals) being maintained between the kiln inlet (the point where feed material enters the kiln) and the upper part of the precalciner. In this zone, thermal NOx formed in the kiln is reduced and the formation of thermal and/or fuel NOx resulting from fuel fired in the precalciner is minimized.

SNCR, in contrast, relies on the reduction of NOx in a gas stream by ammonia or urea in a temperature window of 900-1150°C (1650-2100°F) without using any catalyst. The two principal reactions are[1]:

$$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$

$$4NH_3 + 2NO_2 + O_2 \rightarrow 3N_2 + 6H_2O$$

It is apparent that SNCR requires oxygen to be effective; a gas that is intentionally reduced to very low levels in the MSC system. Regarding the temperature window in which SNCR is effective, this temperature regime can be found in a precalciner kiln in the region between the kiln inlet and the fuel injection point of the calciner burner (all within the reducing zone). By the time the gases have reached the upper part of the precalciner to the point where the remaining tertiary combustion air is introduced and sufficient oxygen is available for SNCR, the gas temperature has dropped below 900°C.

To summarize, in the only section of the preheater/precalciner of the kiln system selected by Suwannee American where the temperature is right for SNCR, a reducing atmosphere (oxygen depleted) has intentionally been created to make NOx reduction by MSC effective. Higher up the preheater/precalciner system where additional tertiary combustion air is introduced to complete the combustion reaction and excess oxygen is

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[1] Alternative Control Techniques Document – NOx Emissions from Cement Manufacturing, EPA – 453/R-94-004, Office of Air Quality Planning and Standards, USEPA, Research Triangle Park, NC, March 1994.

present, the gas temperature has dropped below the window for effective SNCR performance.

The favorable SNCR results that have been published have been on long wet or dry kilns; LEPOL, GEPOL, or preheater kilns or on kiln systems with low calcining rates. These are all kiln systems with sufficient excess oxygen in a zone where gas temperatures are in the range of 900-1100°C.

7. Please provide a detailed cost analysis in terms of overall and marginal cost effectiveness (annualized dollars/ton of nitrogen oxides removed for NOx control using SNCR, including all references and assumptions. Krupp Polysius markets an SNCR system for Portland cement plants that should be directly applicable to this project so cost and effectiveness estimates for this project should be detailed. Although the Krupp Polysius system uses ammonia water transported to the site as the reactant, please comment on the feasibility of using anhydrous ammonia to generate the reactant on site.

Response:

In Response No. 6, it was demonstrated that SNCR and MSC are mutually exclusive; that is, one or the other will work on a given kiln system but both will not work together. In a precalciner kiln with MSC-CC (50-60 percent of the total system fuel fired to the calciner), SNCR will not work because there is insufficient oxygen in the zone where the gas temperature is in the range 900-1150°C. Suwannee American has selected the precalciner kiln system with MSC-CC as it is the state-of-the-art design in pyroprocessing systems. The system is the most energy (fuel and electric) efficient plant available as a result of several design features. The incorporation of MSC-CC into the design of the plant will result in NOx emission levels that are as low as can be achieved by SNCR applied to less energy efficient pyroprocessing systems.

Suwannee American has selected a plant design based on technological and energy efficiency features, and SNCR is not compatible with this plant design. As NOx emission levels achieved by the precalciner design with MSC-CC selected by Suwannee American are equivalent or better to NOx emission rates achieved by SNCR, nothing is to be gained by evaluating the cost effectiveness of SNCR on the plant as designed.

Suwannee American Cement has additional concerns related to the discussion of SNCR as a control technique for NOx emissions. These concerns are in two categories:

ecosystem suitability for storage and handling of ammonia/urea, and ecosystem impacts resulting from the use of ammonia/urea.in a SNCR system.

The first concern is related to the suitability of receiving, storing, and handling of ammonia/urea in this karst area with the exposed Floridan Aquifer System. As MSC-CC can achieve similar (or lower) NOX emission levels as SNCR, it is imprudent to specify a control technique that would necessitate the use of potentially hazardous ammonia/urea compounds.

The second concern is related to potential ecosystem impacts resulting from the use of ammonia/urea in a SNCR system. A SNCR system in operation invariably results in some amount of "ammonia slip". This could result in:

- Increased plume visibility
- Ammonia odors
- Elevated deposition or concentration of ammonia
- Increased emissions of N_2O – a "greenhouse gas"

In order to be responsive to the Department's request, cost information for SNCR applied to a precalciner plant with less than 25% heat input to the calciner without MSC was developed by Polysius. The example plant has NOx emissions of 4.29 lb/ton of clinker and 839,500 tons of clinker per year.

It is important to note that Polysius' guarantee for NOx emissions for a precalciner plant with SNCR is 3.18 lb/ton of clinker -- this is substantially greater than the proposed NOx BACT limit attained through the use of MSC-CC. Interestingly, this limit is consistent with the NOx BACT limit for Great Star Cement of 3.1 lb/ton of clinker, with SNCR (plant never built).

Although it may be academic at this point since Polysius is not prepared to guarantee less than 650 mg/Nm^3 at 10% O_2 (approximately 3.18 #/st) NOx in a modern precalciner plant with SNCR, they prepared a cost calculation based on their system using ammonia water. If urea is used at the same NOx level, the N_2O and CO will increase by 15% above the baseline and ammonia slip of up to 50 - 60 ppm can be expected.

Equipment

(one) 12,000 gal. Solution storage tank with accessories.

(one) Pump Station including: pumps, motors, starters, heaters, solution filters, instrumentation for flow and temperature indication, interconnecting pipe valves, and fittings all on a consolidated base frame.

(one) Distribution System including: pumps, motors, motor controls, starters, agitators with drives, pressure and flow control (as well as indication), valves, regulators, filters, interconnecting piping and fittings.

(one set) Injectors with control piping manifolds including: check and control valves, regulators, filters all on a unified base. 6 injectors with tubing, steel flex hoses, clamps, mounting brackets, couplings for solution as well as compressed air and adapters.

(one lot) Electrical and control equipment including: local control panels for Pump Station, PLC for Distribution System, VFD controls and MCC's.

(one lot) Piping, including: mounting brackets, clamps, fittings bands, etc.

(one lot) Complete System Engineering including: Optimization and control interface to Plant Control System, plus layout.

Price (with Engineering)	$757,850
Installation (Estimate)	$201,250
Total Equipment, Engineering & Installation	$959,100
Annualized Cost	$116,735
@ prime (7.75%) for 15 years	
(assumed life of the plant's financing)	
Annual Operating Cost:	
Solution/Reagent	$476,875
Power	$ 19,800
Maintenance	$ 11,000
	$507,675
First Year's Cost	$624,410
(Cheapest of the 15 year period)	

NOx = 4.29 lb/ton of clinker and 839,500 tons of clinker per year = 1800 TPY NOx

Assume 28% control efficiency = 499 TPY of NOx removed

First Year's Cost = $624,410 ÷ 499 TPY of NOx removed

Cost $/ton NOx removed = $1,251

It is apparent from this discussion that cost is not the reason for rejecting SNCR as BACT. The proven MSC technology was selected because it offers the following advantages:

- Krupp Polysius will guarantee a lower NOx emission rate with MSC than with SNCR (3.0 lb NOx/ton of clinker vs. 3.18 lb NOx per ton of clinker).

- The MSC plant is more energy efficient and technologically advanced than a precalciner plant without MSC (as would be required for SNCR to be effective).

- There are no potential environmental risks associated with the MSC technology (such as associated with the ammonia/urea required by SNCR)

- The MSC technology does not introduce a new or different operating technology to the cement plant.

A complete top-down BACT analysis for NOx is included with this response. The top-down analysis clearly shows that environmental, energy, and economic factors support the rejection of SNCR as BACT. Likewise, the analysis concludes that MSC represents BACT for a precalciner cement kiln.

TOP-DOWN BACT ANALYSIS for NOx

STEP 1: *IDENTIFY ALL CONTROL TECHNOLOGIES*

For this review, the control technologies for NOx are categorized in three ways:

- **Inherently Lower-Emitting Processes**

  Staged Combustion (MSC)

  Low-NOx Burners

- **Add-On Controls**

  Selective Non-Catalytic Reduction (SNCR)

- **Combination of Lower-Emitting Processes and Add-on Controls**

  Combination of SNCR with MSC

STEP 2: *ELIMINATE TECHNICALLY INFEASIBLE OPTIONS*

Technical feasibility is assessed based on an evaluation of pollutant bearing gas stream characteristics.[1] This demonstration of technical infeasibility shows, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of:

- Combination of SNCR with MSC

It is apparent that SNCR requires oxygen to be effective; a gas that is intentionally reduced to very low levels in the MSC system. Regarding the temperature window in which SNCR is effective, this temperature regime can be found in a precalciner kiln in the region between the kiln inlet and the fuel injection point of the precalciner burner (all within the reducing zone). By the time the gases have reached the upper part of the

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[1] New Source Review Workshop Manual.

precalciner to the point where the remaining tertiary combustion air is introduced and sufficient oxygen is available for SNCR, the gas temperature has dropped below 900°C. To summarize, in the only section of the preheater/precalciner of the kiln system selected by Suwannee American where the temperature is right for SNCR, a reducing atmosphere (oxygen depleted) has intentionally been created to make NOx reduction by MSC effective. Higher up the preheater/precalciner system where additional tertiary combustion air is introduced to complete the combustion reaction and excess oxygen is present, the gas temperature has dropped below the window for SNCR performance. Therefore it is apparent that SNCR will not work in combination with MSC.

- Low-NOx Burners

Low NOx burner technology, as commonly used in power plants, has not been found effective in the cement industry. Krupp Polysius has installed and operated, at client's request, numerous "Low NOx" burners in cement kilns around the world. These burners are always the main burner and are commonly provided from Pillard (Rotaflam) or from KHD (Pyrojet). The only way these burners have demonstrated significant NOx reduction is through reduced heat output of the burner and the associated decrease in production. The quality of the clinker is dependent upon the quality of the main burner flame, requiring a short, compact, intense flame which generates thermal NOx. The best control method to reduce the thermal NOx in a precalciner kiln is to operate the calciner with reducing zones to reduce the NOx back to N_2. This is best accomplished with Multi-Stage Combustion. Therefore, low-NOx burners are not applicable as BACT for cement kilns.

Remaining control technologies are:

- **Inherently Lower-Emitting Processes**

  Staged Combustion (MSC)

- **Add-On Controls**

  Selective Non-Catalytic Reduction (SNCR)

STEP 3: *RANK REMAINING CONTROL TECHNOLOGIES BY CONTROL EFFECTIVENESS*

A key issue that must be addressed in this step is the determination of common units to compare emissions performance levels among options. This issue arises when comparing inherently lower-emitting processes (MSC) to add-on controls (SNCR). It is generally most effective to express emissions performance as an average steady-state emissions level per unit of product produced (lb/ton clinker). Calculating annual emissions levels (tons/yr) using these units becomes straightforward once the projected annual production rates are known.

Another issue that must be addressed in this step is the evaluation of control techniques with wide (reported) ranges of emissions performance levels. In accordance with EPA guidance, this top-down review uses the most recent regulatory decisions and performance data for identifying the emissions performance level. It is apparent with

SNCR that the reported range of control efficiency (30-70%)[1] is not to be interpreted as being the range of emissions performance levels applicable to a particular source type.

Rather, as with most control devices, the control efficiency falls as the uncontrolled emissions levels fall (i.e., diminishing returns). For this reason, control efficiency for SNCR on a cement kiln with uncontrolled NOx levels in the range of 6-7 pounds per ton of clinker may approach 70%, while control efficiency on a modern precalciner cement kiln with uncontrolled NOx emissions in the range of 4.0-4.5 pounds per ton of clinker is more likely to be on the order of 30%. This discussion confirms that it is generally most effective (and most appropriate) to express emissions performance as an average steady-state emissions level per unit of product produced (lb/ton clinker).

After determining the emissions performance levels (in common units) of each control technology identified in Step 2, a hierarchy is established that places at the top the control technology that achieves the lowest emission level. The following chart displays the control hierarchy for the remaining control technologies.

Control Technology	Expected Emission Rate			Performance Level % NOx Removed	Expected NOx Reduction TPY
	pounds/ton clinker	tons/year	pounds/hour		
MSC	3.0	1260	287	30%	540
SNCR[2]	3.1	1301	297	28%	499

[1] Alternative Control Techniques Document – NOx Emissions from Cement Manufacturing
[2] Great Star Cement Company, BACT/LAER Clearinghouse, 11/98.

STEP 4: ***EVALUATE MOST EFFECTIVE CONTROLS***

The available and technically feasible control technologies have been identified above and the environmental, economic, and energy impacts must be considered.

Environmental Impacts

This environmental impacts portion of the BACT analysis concentrates on impacts other than impacts on air quality standards due to emissions of NOx, such as solid or hazardous waste generation, discharges of polluted water from a control device, visibility impacts, or emissions of unregulated pollutants. Generally, these types of environmental concerns become important when sensitive area-specific conditions exist or when the incremental emissions reduction potential of the top control (MSC) is only marginally greater than the next most effective option (SNCR).

This analysis starts with the identification of the solid, liquid and gaseous discharges from the control device (SNCR), as no environmental impacts within the context of this BACT analysis are associated with the use of MSC.

Any SNCR system will result in some emissions of ammonia, generally referred to as "ammonia slip". Ammonia is a regulated toxic substance under 40 CFR 68. These ammonia emissions can lead to detached (visible) plumes of $(NH_4)_2SO4$,[1] which is the compound most responsible for regional haze in the southeastern U.S.

Likewise, SNCR control of NOx actually results in creation of N_2O, a greenhouse gas and an "oxide of nitrogen". Higher CO emissions have also been associated with SNCR control.

Significant concerns also exist regarding the handling of ammonia/urea in a karst environment with direct exposure potential of the Floridan Aquifer System.

[1] Alternative Control Techniques -- NOx

Economic Impacts

- Total Annualized Cost

MSC = $194,355

> annual cost of capital for $1,600,000 in equipment

SNCR = $624,410

> annual cost of capital for $959,100 in equipment

> $507,675 in annual operating costs

- Average Cost Effectiveness

Average cost effectiveness is a way to present the costs of control. Average cost effectiveness is calculated as shown by the following formula:

Average Cost Effectiveness ($/ton removed) =

$$\frac{\text{Control option annualized cost}}{\text{Baseline emissions rate} - \text{Control option emissions rate}}$$

$$\text{MSC} = \frac{\$194{,}355}{1800\ \text{TPY} - 1260\ \text{TPY}} = \$360/\text{ton of NOx removed}$$

$$\text{SNCR} = \frac{\$624{,}410}{1800\ \text{TPY} - 1301\ \text{TPY}} = \$1251/\text{ton of NOx removed}$$

- Incremental Cost Effectiveness

In addition to the average cost effectiveness of a control option, incremental cost effectiveness between control options are also calculated. The incremental cost effectiveness is examined in combination with the average cost effectiveness in order to justify elimination of a control option (SNCR).

Incremental Cost Effectiveness ($/incremental ton removed) =

$$\frac{\text{Control option annualized cost (MSC)} - \text{Next control option annualized cost (SNCR)}}{\text{Next control option emissions rate (SNCR)} - \text{Control option emissions rate (MSC)}}$$

$$= \frac{\$194{,}355 - \$624{,}410}{1301 \text{ TPY} - 1260 \text{ TPY}} = \$\ {-10{,}489} \text{ per incremental ton of NOx removed}$$

It is apparent from the negative incremental cost effectiveness value that SNCR is not incrementally cost effective when compared to MSC. This is because MSC is, first, a more effective control option (and hence BACT) and second, MSC has significantly lower annual costs than SNCR.

An interesting example is provided to show that even if SNCR is as effective as MSC (same emission rate), recognizing that there is <u>no vendor confirmation of this hypothetical supposition</u>, the incremental cost effectiveness of SNCR versus MSC would be over <u>$400,000 per incremental ton of NOx removed</u>!

$$= \frac{\$194{,}355 - \$624{,}410}{1259 \text{ TPY} - 1260 \text{ TPY}} = \$\ 430{,}055 \text{ per incremental ton of NOx removed}$$

Energy Impacts

This analysis examines the energy requirements of the control technologies and determines that the use of SNCR results in energy penalties while MSC results in energy benefits.

SNCR has direct energy cost for pumps and electrical equipment. These costs are estimated to be $19,800 per year. Also, due to the requirements of the chemical reduction process, SNCR becomes more effective as more fuel is shifted away from the precalciner burner and back to the main burner. Whereas the modern precalciner plant (with or without MSC) will typically combust 60% of fuel in the precalciner and the remaining 40% of fuel in the main burner; SNCR technology becomes effective when less than 40% of the fuel is combusted in the precalciner. The magnitude of this energy penalty is apparent when comparing the energy efficiency of preheater kilns (no precalciner burner) to that of precalciner kilns. The reported heat input requirement for precalciner kilns is 3.3 MMBtu/ton of clinker and for preheater kilns it is 3.8 MMBtu/ton of clinker.

With all other factors held constant, the precalciner kiln is approximately 15% more fuel efficient than the preheater kiln. As fuel is shifted to the main burner to accommodate SNCR, overall fuel efficiency of a precalciner plant drops. This discussion shows why SNCR is more applicable to preheater and other dated types of cement kilns.

Conversely, MSC results in energy benefits in a precalciner plant. First, MSC has "no moving parts" and there is no annual electrical cost associated with its use. Second, as MSC requires the operator to control oxygen levels throughout the process to a higher degree than any other configuration, overall energy efficiency is increased. This is because less excess air is heated, and a lower specific exhaust gas volume results. This translates into energy benefits over a precalciner kiln without MSC.

TOP-DOWN BACT ANALYSIS RESULTS								
CONTROL OPTION	**EMISSIONS (TPY)**	**REDUCTION (TPY)**	**ANNUAL COST ($/YR)**	**AVERAGE COST EFFECTIVENESS ($/TON)**	**INCREMENTAL COST EFFECTIVENESS ($/TON)**	**TOXICS IMPACT (YES/NO)**	**ADVERSE ENVIRONMENTAL IMPACTS (YES/NO)**	**ENERGY IMPACTS (BENEFIT or PENALTY)**
MSC	1260	540	$194,355	$360	$0	**NO**	**NO**	Benefit
SNCR	1301	499	$624,410	$1251	$430,055[1]	**YES**	**YES**	Penalty
Baseline	1800							

[1] See discussion. As MSC is a more effective control (lower emission rate), the incremental cost effectiveness of SNCR is only meaningful if it is assumed to be as effective as MSC.

STEP 5: *SELECT BACT*

The most effective control alternative from Step 4 is selected as BACT (MSC). This top-down BACT analysis has provided information on the various control options. This analysis has adequately demonstrated that energy, environmental, and economic impacts justify the rejection of SNCR.

8. Please compare other NOx limits established by BACT (for Lafarge and Great Star Cement, for example) with the proposed NOx limit and discuss the variables that affect emissions of NOx from Portland cement plants that are applicable to the proposed facility.

Response:

Nitrogen oxides emission rates vary over a considerable range for similar types of plants depending on a variety of factors. For example, EPA reports (see footnote on page 9), the following uncontrolled NOx emission rate ranges for preheater and precalciner plants:

Kiln Type	**Range of NOx Emissions** (lb NOx/ton clinker)
Preheater	2.5 - 11.7
Precalciner	0.9 - 7.0

The NOx emissions vary by a factor of five to eight for "similar type" plants

To compare the NOx emission rates or NOx limits established by BACT for other plants requires specific information on the following;

1. <u>Plant design</u> - whether the plant is a preheater design, a precalciner design or another design; whether or not MSC or MSC-CC is incorporated into the plant design; whether the kiln is direct fired or indirect fired; whether or not a bypass exists; whether or not TDF will be used and if used, how it will be burned and possibly other factors.

2. <u>Fuel type</u> - the specific types of fuel proposed (petroleum, coke, coal, gas, fuel oil, etc.) and the volatile content of the fuel.

3. Raw material - the alkali content of the feed (as it would affect the $SO_2/O_2/NOx$ chemistry); the burnability of the mix (the harder to burn, the more fuel used and hence, the greater the potential for NOx generation); the moisture content of the feed; and the inherent carbon and sulfur content of the feed.

4. Plant operating characteristics - the oxygen levels normally maintained in the kiln system; the desired relationship between NOx, CO and SO_2 emissions (normally dictated by emission limiting standards); and others.

Because of the effects of all of these variables on emission rates of NOx, CO, and SO_2, it is not possible to assume that since one plant operates with a certain emission rate or was permitted with a specific BACT limit for a single pollutant or a combination of pollutants, that a second plant operating under a difference set of conditions can achieve those same limits. Some of the conditions affecting NOx, CO and SO_2 emission rates have been discussed in previous responses. From information presented in the previous responses, the impact of some of the variable listed herein should be apparent. To require an applicant to get all of the information necessary to compare BACT limits would be extremely burdensome and probably impossible in many cases as some of the required information is proprietary.

With this said, a qualitative comparison of BACT limits imposed on other plants with the BACT limits proposed by Suwannee American will be made. The Lafarge Sugar Creek plant has BACT limits for SO_2, NOx and CO of 4.06, 3.68 and 1.64 pounds per ton of clinker, respectively. The SO_2, NOx and CO BACT limits proposed for Suwannee American are 0.28, 3.0, and 3.6 pounds per ton of clinker, respectively. Lafarge has a much higher SO_2 limit (probably as a result of pyritic or other highly volatile sulfur compounds in the feed material) and a significantly higher NOx emission limit (possibly the result of higher oxygen levels required to control sulfur chemistry). On the other hand, the Lafarge CO limit is considerably lower than that proposed for Suwannee American. This would suggest that regulators determined it was more important to reduce CO emissions and to allow a correspondingly higher NOx emission limit. The reasons for these decisions are not known.

With the Great Star Cement plant, SNCR is proposed for NOx control and the BACT limit for NOx is 3.1 pounds per ton of clinker. At the same time, the CO BACT limit is 5.67 pounds per ton of clinker. Both of these BACT limits are higher than limits proposed for Suwannee American. In spite of all of the discussions of permitted limits and BACT limits for Great Star, the plant is not yet under construction (after having been permitted for years) and doubts have been expressed that the plant will ever be built.

A more educated comparison can probably be made between BACT limits for the Florida Crushed Stone and Florida Rock plants and the limits proposed for Suwannee American. The Florida Crushed Stone BACT limits for SO_2 and NOx are very close to limits proposed by Suwannee American and the Florida Crushed Stone CO BACT limit is lower (at 2.0 pounds per ton of clinker) than the limit proposed for Suwannee American. The limit accepted by Florida Crushed Stone is probably based on operating experience with their existing kiln. The Florida Crushed Stone plant is a GEPOL preheater plant whereas the Suwannee American plant is a precalciner plant with MSC-CC.

The Florida Rock plant is very similar in design to the Suwannee American plant (with the exception of the MSC-CC feature) and the BACT limits for SO_2, NOx and CO imposed on the Florida Rock plant are very similar to those proposed by Suwannee American. The differences between the two plants include the design features that have been mentioned, the moisture content of the feed and possibly, operating philosophy.

There is probably enough flexibility offered by these and other factors to allow both plants, even with their differences, to achieve the same set of BACT limits.

As regards the NOx BACT emission limit for Florida Rock, they have been granted two years after startup to reach the limit. If necessary, Florida Rock will likely install Multi-Stage Combustion (MSC) system with a Combustion Chamber (CC) in order to meet their BACT limit. In fact, Polysius' performance guarantee for Florida Rock stipulates that the 1018 ton/year emission rate (actually 2.9 lb of NOx per ton of clinker) will only be guaranteed if Florida Rock installs MSC-CC.

Suwannee American Cement has committed to installing this technology from the outset. This will allow for a foreshortened post-startup tuning period of approximately one year.

9. Although the temporary exemption language of Rule 62-212.400(3)(c), F.A.C. provides for exemption from certain PSD requirements for emissions lasting up to two years, such time period for NOx seems excessive given Krupp Polysius' experience with the startup of similar facilities, and the experience it will gain with the startup of the similar Florida Rock plant (which is scheduled to begin operation prior to completion of this facility). EPA has also commented to the Department that the applicant should address the feasibility of meeting the proposed BACT NOx emission limit at startup of the facility. Please address this issue.

Response:

It is recognized that the Suwannee American plant will be designed and constructed with the latest technology currently available in a MSC-CC plant for NOx control. It is also recognized that Krupp Polysius will have developed operating experience with the Florida Rock plant that is scheduled for startup prior to the completion of the Suwannee American plant. Still, it must be recognized that each cement plant has unique characteristics (as discussed in Response No. 8) and some provisions must be made to account for these characteristics. Suwannee American will make every attempt to achieve the permitted NOx emission limit at startup; however, the company requests a startup NOx emission limit of 3.8 pounds per hour per ton of clinker for a one year period following startup.

Suwannee American will have different sources for fuels and fly ash. The fly ash being considered has a greater loss on ignition (LOI) than that expected for use at the Florida Rock plant. This physical difference can result in higher emissions of CO and SO_2.

The limestone at the Suwannee American plant is all excavated from below the water table whereas at Florida Rock some rock is from above the water table. This results in higher moisture content of the limestone as processed. This excess moisture must be driven off by heat in the raw mill. This heat for material drying is provided at Florida

Rock by an auxiliary air heater. At Suwannee American, the extra heat is to be provided by the pyroprocessing system. This is the most efficient way to provide the necessary heat for material drying.

This need for additional heat input requires higher emission limits (especially for NOx) per ton of clinker. The Florida Rock permit (AC01-267311/PSD-FL-228) allows for 1018 TPY of NOx from 712,500 TPY of clinker. This emission rate includes emissions from the raw mill air heater (40 MMBtu/hr) and equates to an effective NOx BACT limit for Florida Rock of 2.9 lb/ton of clinker. Florida Rock's application was based on a limestone moisture content of 8-12%. Suwannee American expects limestone moisture contents of about 15%. If the Suwannee American preheater feed rate of 163 tons per hour (dry weight) is used as a basis and if the limestone portion of the feed is taken to be 80%, the limestone portion of the feed rate will be 130.4 tons/hour. The comparative wet limestone feed rates at 8-12% (10% average) and 15% moisture are:

Moisture (%)	Limestone		Moisture in Limestone	
	(TPH dry)	(TPH wet)	(TPH)	(lb/hr)
15	130.4	153.4	23.0	46,000
10	130.4	144.9	14.5	29,000
		Difference		= 17,000 lb/hr

Heat requirement for material drying is 1500 Btu/lb of water = 25.5 MMBtu/hr.

As Florida Rock's 40 MMBtu/hr air heater added 0.1 pound of NOx per ton of clinker, it is evident that this additional heat requirement would add an additional 0.06 pounds of

NOx per ton of clinker. Suwannee American Cement is now proposing BACT for NOx from the entire process as 3.0 lb/ton of clinker.

10. EPA has commented to the Department that the applicant should discuss why a reduced kiln CO emission rate limit would not be proposed as BACT, given that the RBLC listings have several kilns with lower CO emission rate limits. EPA has suggested that such a discussion should include a technical and economic analysis regarding the feasibility of a 1.64 lb/ton clinker (Lafarge Corporation, Sugar Creek, Missouri, Permit No. 0897-019, issued August 20, 1997) kiln CO emission rate limit, or a CO emission rate limit of 2.77 lb/ton clinker (June 3, 1998, dry process kiln operations at Signal Mountain Cement Company located at Chattanooga, Tennessee). Please address this issue.

Response:

The interrelationship of the CO, NOx and SO_2 emissions from pyroprocessing systems has been discussed in several of the previous responses and will not be repeated here. The Lafarge Sugar Creek plant referenced does have a CO limit of 1.64 pounds per ton of clinker; however, the NOx emission limit for the plant is 3.68 pounds per ton of clinker. Roanoke Cement is another example of a company with a relatively low CO emission limit (2.53 pounds per ton of feed); however, the NOx emission limit is 6.0 pounds per ton of feed. It is quite apparent that plants with low CO emission limits will have relatively high NOx emission limits while those plants with low NOx emission limits will have relatively high CO emission limits. As stated in previous responses, there is an inverse relationship between CO and NOx, and in the case of Suwannee American, the Department has elected to impose a very restricted NOx emission limit. As a result, the CO emission limit for the plant must be the 3.6 pounds per ton of clinker regardless of what CO limits Lafarge, Signal Mountain Cement and Roanoke Cement have.

11. Provide the worst case startup and shutdown emissions estimates for the inline kiln/raw mill including duration of excess emissions. The Department plans to address excess emissions in its BACT determination.

Response:

During the initial phase of startup, only the main kiln burner is being fired; there is no fuel fired to the kiln inlet burner or to the precalciner; and no raw meal is fed to the preheater. During this phase, NOx emissions (entirely from the main kiln burner) are at their peak and may be as high as 2,000 ppm (equivalent to an emission rate of about 500-600 pounds per hour). This peak emission rate will last only for a few minutes until feed passes down through the precalciner and gets well into the kiln. Once feed is introduced, the system must be quickly stepped up to at least 70 percent of its nominal capacity since the preheater vessels and ducts are of fixed cross-section section and require a minimum gas velocity to function. The time required from "feed ready" (no feed to the preheater) to steady-state operation at 70 percent of nominal capacity and MSC operation is about one hour. During this time interval, the NOx emissions will decrease from the peak emission rate of approximately 500-600 pounds per hour to a rate that will likely be within permit limits. The system will then be brought up to normal capacity as quickly as possible as the system operates most efficiently at this production rate and it is in the producer's best interest to achieve this rate. Generally, the entire startup process is semi-automated through the central plant control system to expedite the process.

During the startup (approximately two hours), there could be an excursion of CO emissions although this is not as likely as higher NOx emissions. There should be no excursion of particulate matter emissions during startup and SO_2 emissions are expected to be no higher than during usual operations as the kiln will be started using natural gas.

During shutdown, no excess emissions are expected. The shutdown process involves assuring that the homogenizing silo is full and then stopping the feed to the preheater. After the preheater feed is stopped, the fuel to the precalciner, the kiln inlet burner, and the main kiln burner are shut off. Material in the kiln at the time of shutdown is classified as "underburned" material. The material is transported to the "fringe" clinker bin and returned to the process later.

12. Please comment on the need to include estimated emissions of PM_{10} from prescribed burning at Ichetucknee Springs State Park in the PM_{10} impact analysis for the proposed facility.

Response:

The estimated emissions of PM_{10} from prescribed burning at Ichetucknee Springs State Park have been properly included in the PM_{10} impact analysis for the proposed facility as part of the background ambient air quality.

This is consistent with Appendix W to 40 CFR 51 – Guideline on Air Quality Models which states:

9.2 Background Concentrations
Background concentrations are an essential part of the total air quality concentration to be considered in determining source impacts. Background air quality includes pollutant concentrations due to:
(1) natural sources,
(2) nearby sources other than the one(s) currently under consideration, and
(3) unidentified sources.

9.2.2 Recommendations (Isolated Single Source)
a. Two options (paragraph b or c of this section) are available to determine the background concentration near isolated sources.
b. Use air quality data collected in the vicinity of the source to determine the background concentration for the averaging times of concern. Determine the mean background concentration at each monitor by excluding values when the source in question is impacting the monitor. The mean annual background is the average of the annual concentrations so determined at each monitor. For shorter averaging periods, the meteorological conditions accompanying the

concentrations of concern should be identified. Concentrations for meteorological conditions of concern, at monitors not impacted by the source in question, should be averaged for each separate averaging time to determine the average background value. Monitoring sites inside a 90° sector downwind of the source may be used to determine the area of impact. One hour concentrations may be added and averaged to determine longer averaging periods.

c. If there are no monitors located in the vicinity of the source, a "regional site" may be used to determine background. A "regional site" is one that is located away from the area of interest but is impacted by similar natural and distant man-made sources.

The recommendations of paragraph c of the above section were utilized for this project. Regional sites in Alachua County and Hamilton County provided monitoring data for PM10 background concentrations. These regional sites are located away from the area of interest but are impacted by similar natural and distant man-made sources; including prescribed burns.

Similarly, the requirements of Subpart W to 40 CFR 51 – Determining Conformity of General Federal Action to State or Federal Implementation Plans, do not apply to:

Actions which implement a decision to conduct or carry out a conforming program such as prescribed burning actions which are consistent with a conforming land management plan. [emphasis added, 40 CFR 51.853(c)(4)]

13. Please discuss the basis for the estimated emissions of mercury and provide illustrative calculations. Please estimate the possible impact or deposition of mercury at the Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility.

Response:

The PSD report used an emission factor for mercury from AP-42, Table 11.6-9, for cement kilns with fabric filters. The other available emission factor in AP-42 is for cement kilns with ESPs. As this kiln will utilize an ESP for the pyroprocessing system, this response uses the ESP emission factor:

0.00022 pounds/ton of clinker X 839,500 tons/year = 185 pounds per year

Mercury emission data from nine cement plants were evaluated as reported in the EPA Document *Locating and Estimating Air Emissions From Sources of Mercury and Mercury Compounds*. These data are shown in the following table:

Company	Location	10^{-3} lb/ton clinker
Lone Star	Cape Girardeau, MO	0.02
Lone Star	Cape Girardeau, MO	0.43
Lafarge Corp	Demopolis, AL	0.16
Ash Grove	Foreman, AK	0.035
Ash Grove	Foreman, AK	0.07
Ash Grove	Chanute, KS	0.97
Ash Grove	Chanute, KS	0.15
Ash Grove	Louisville, NE	0.095
Ash Grove	Louisville, NE	0.03
ESSROC	Fredrick, MD	0.22
ESSROC	Fredrick, MD	0.22
Lafarge Corp	Paulding, OH	0.032
Lone Star	Oglesby, IL	0.0045
Lone Star	Oglesby, IL	0.028
Holnam	Clarksville, MO	0.097
		Average 0.171

The use of the average value from these tests results in a lower and consistent value:

0.000171 pounds/ton of clinker X 839,500 tons/year = 144 pounds per year

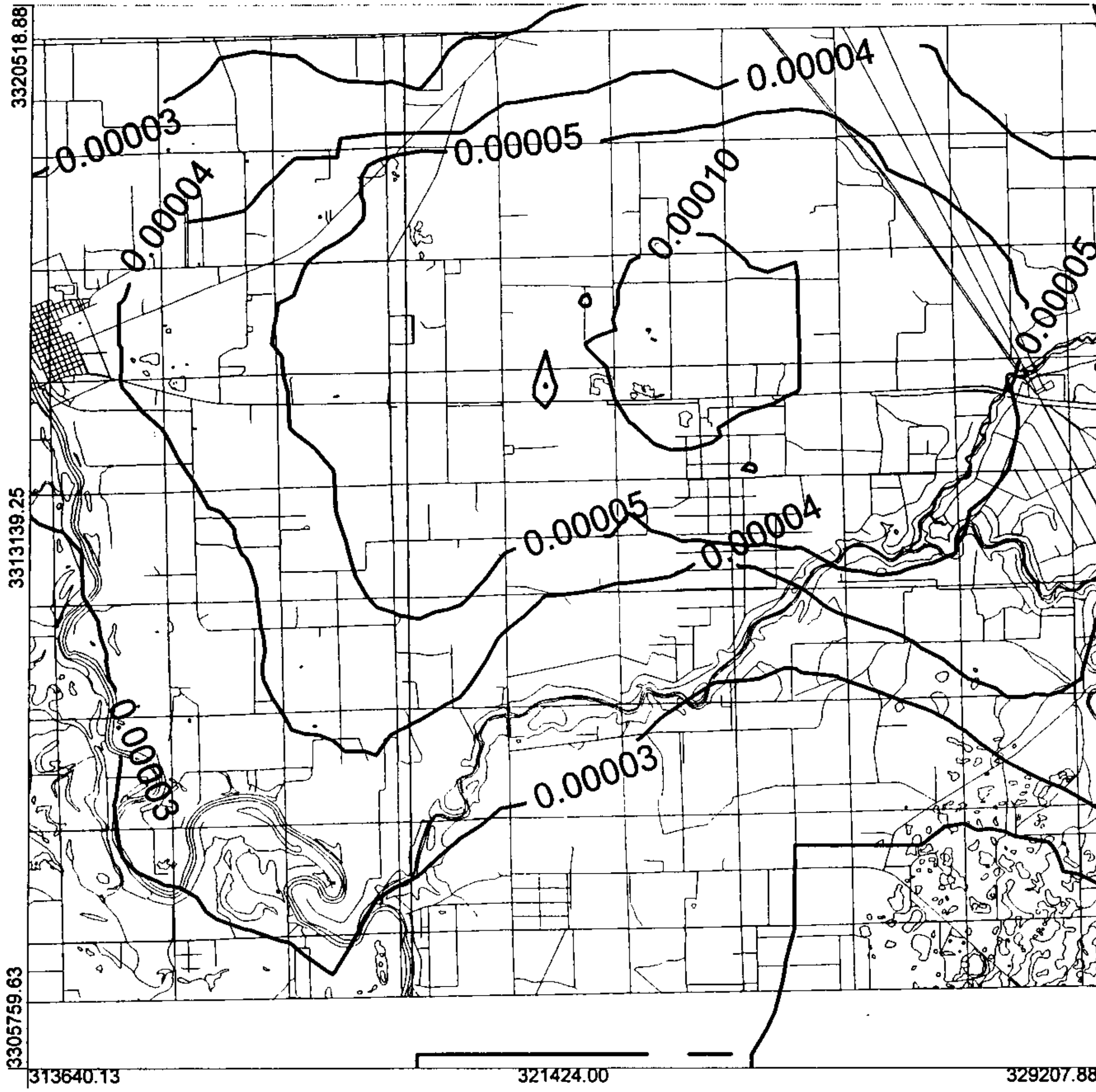
Emission estimates based on expected mercury levels in limestone, clay, sand, fly ash, and coal that will be used by Suwannee American result in an estimated emission rate of 129 pounds per year

The ambient air impact of mercury at the Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility is estimated as 0.00003-0.00005 $\mu g/m^3$ as a maximum annual concentration. The Reference Air Concentration (RAC) for mercury (40 CFR 266, Appendix IV) is 0.3 $\mu g/m^3$, annual average.

The deposition of mercury at the Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility is estimated as 0.00002-0.00005 g/m^2 as a maximum annual deposition. If this level of deposition continued for 50 years and if all deposited mercury was to accumulate in the top six inches of soil, the increase in mercury levels in the soil would be on the order of 0.006 mg/kg. Background mercury levels in clay and sand is on the order of 0.09 mg/kg. Safe mercury levels in soil established by Rule 62-785, FAC are 3.7 mg/kg for direct exposure and 2.1 mg/kg for groundwater protection.

PROJECT NAME :

Mercury
PLOT FILE OF PERIOD VALUES FOR SOURCE GROUP: ALL



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			**Koogler & Associates**	
OUTPUT TYPE : **CONC**	RECEPTORS : **396**	COMMENTS : Maximum annual concentration. 1989 Meteorological data	MODELER : **Steve Cullen**	PROJECT/PLOT NO. :
MAX : **0.00013**	UNITS : **ug/m**3**		DATE : **2/9/99**	

Suwannee American Cement

ISC View by Lakes Environmental Software

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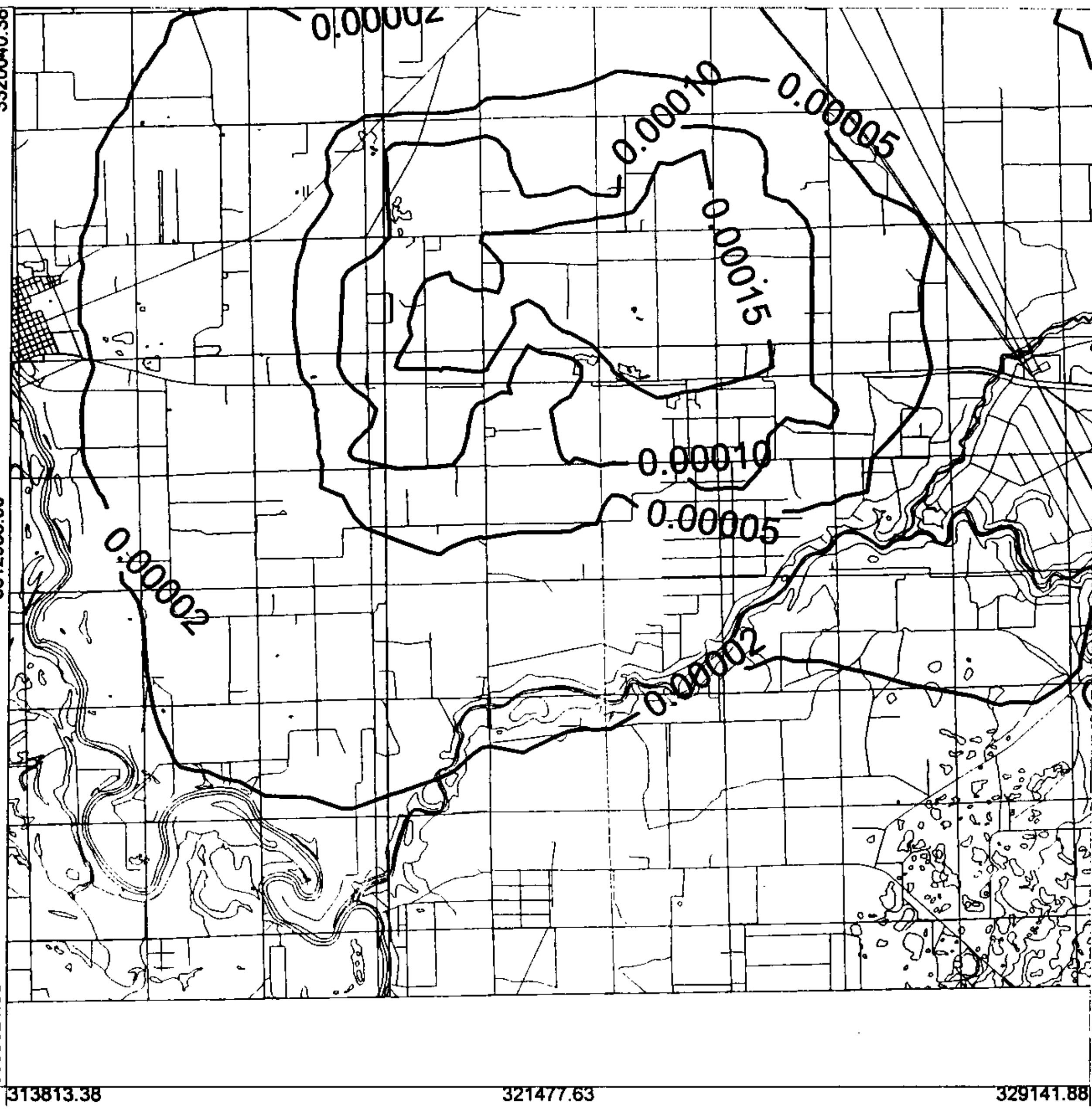
PROJECT NAME :

Mercury
PLOT FILE OF PERIOD VALUES FOR SOURCE GROUP: ALL



MODELING OPTIONS :			COMPANY NAME :	
DEPOS, RURAL, FLAT, DFAULT, DRYDPL, WETDPL, NOCMPL			Koogler & Associates	
OUTPUT TYPE : DEPOS	RECEPTORS : 396	COMMENTS : Maximum annual deposition. 1989 Meteorological data	MODELER : Steve Cullen	PROJECT/PLOT NO. :
MAX : 0.00028	UNITS : g/m**2		DATE : 2/9/99	

Suwannee American Cement

ISC View by Lakes Environmental Software

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14. Please perform an additional impact analysis in the PSD Class II area near the facility including the Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility. This analysis must include impacts on growth, soils and vegetation, and visibility.

Response:

Growth Analysis

This growth analysis includes a projection of the associated industrial, commercial, and residential source growth that will occur in the area due to the source.

No associated industrial growth is expected in the PSD Class II area. The pre-existing mining and trucking activities provide available mechanical and other services.

Minimal commercial growth is expected in the area. Existing retail and wholesale trade establishments can accommodate growth associated with this facility.

Residential growth is expected to be minimal, as the area has a large available work force and good availability of housing.

Soils Analysis

The soils in the PSD Class II area are generally described as a Blanton-Chiefland association of well-drained to excessively drained sands, 30-72 inches deep to fine-textured limestone.

Water drains through the soils. Originally the area was covered hardwoods and pines, but now it has been cleared for cultivation. Corn, tobacco, peanuts, watermelons, and other farm crops are grown. The soils are well suited to pine. Many formerly cultivated fields have been reforested with pine trees. Several pits mine the high-quality limestone.[1]

The major land resource area is described as 138-North-Central Florida Ridge. This land resource area includes 3,400 sq. km (1,310 sq. mi).

Land use: Most of this area is in farms, but some large holdings are used exclusively for forestry. Pasture makes up about one-fourth of the area; the remainder is mainly cropland and forested. Corn, peanuts, tobacco, soybeans, vegetables, and melons are major crops. Some hay and feed grains are grown for livestock. More than one-half of the area is forested. Pulpwood and lumber are the principal forest products.

Soil: The dominant soils are Udults and Psamments. They have a thermic temperature regime and an udic moisture regime. Well drained and somewhat poorly drained Paleudults (Blanton and Albany series) have thick sandy layers over a loamy subsoil.[2]

The main atmospheric pollutants that affect trees and forests are nitrate, sulfate and ozone. Nitrates and sulfates are deposited through rain and dry deposition and serve to lower soil pH. Note that harvesting trees also leads to lower soil pH if the trees do not

[1] Soil Survey of Suwannee County, Florida. USDA Soil Conservation Service. March 1965.
[2] Major Land Resource Areas. USDA Natural Resources Conservation Service. February 1997.

decay and return base cations to the soil. In the southern U.S. pine forests, nitrate and sulfate deposition and tree farming contribute about the same to soil acidification..[1]

Evaluation of impacts to soils and vegetation are considered further relative to terrestrial ecosystems. Sulfur dioxide and nitrogen oxides emitted as a result of fossil fuel combustion undergo chemical transformation in the atmosphere and occur as sulfate, nitrate, and hydrogen ions when dissolved in precipitation. An ecosystem's susceptibility to acidification is determined by the alkalinity, or acid neutralizing capacity (ANC), of its soils and waters. Well- buffered soils can adsorb sulfate and neutralize acidity, resulting in soil water and streamwater composition being maintained in a range acceptable to biota.[2]

Terrestrial Ecosystems – Nitrogen

Annual deposition of all forms of nitrogen averaged 13.5 kilograms/hectare (kg/ha) as measured in the Branford Forest during the period from 1993-1997.[3]

The source contribution to deposition of nitrate at Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility is estimated as 0.1-0.4 kg/ha.

---

[1] *A Brief Overview of the Effects of Air Pollution on Trees and Forests*. William Grant, PhD., June 1996.
[2] The Effects of Air Pollutants on Wildlife and Implications in Class I Areas. Tonnie G. Maniero, National Park Service Air Resources Division.
[3] National Atmospheric Deposition Program. Data obtained February 1999.

The Forest Service's screening value for evaluating impacts to terrestrial ecosystems provides an estimate of the total acceptable nitrogen loading. This value is 15 kg/ha for the southeastern U.S.[1]

There are few data that relate pollutant exposure to growth or other characteristics of mature trees, and almost no data for herbaceous species.[2]

Generally, most nitrogen is retained in the terrestrial ecosystem.

<u>Terrestrial Ecosystems -- Sulfur</u>

There are very few data on the effects of sulfur compounds on mature trees or other native plants, and there is a wide range of sensitivity to ambient sulfur compounds. In order to maximize protection of all plant species, maximum SO_2 concentrations should not exceed 40-50 ppb, and annual average SO_2 concentrations should not exceed 8-12 ppb.

Sulfate serves primarily to lower the soil pH.

Annual deposition of sulfate averaged 13.0 kilograms/hectare (kg/ha) as measured in the Branford Forest during the period from 1993-1997.[3]

---

[1] Forest Service.
[2] Forest Service 2.
[3] NADP

The source contribution to deposition of sulfate at Ichetucknee Springs State Park and the Santa Fe and Suwannee Rivers in the vicinity of the proposed facility is estimated as 0.02-0.04 kg/ha.

The Forest Service's screening value for evaluating impacts to terrestrial ecosystems provides an estimate of acceptable sulfate loadings. This value is 20 kg/ha.[1]

Aquatic Ecosystems

Aquatic impacts are evaluated with respect to the sensitivity of surface waters as measured by the combined concentrations of calcium, magnesium, potassium, and sodium (expressed in microequivalents per liter (μeq/l)). In general, waters with an ANC of 200 microequivalents per liter or less are considered sensitive.

The waters in the three rivers have ANCs that average in the range 2400-2800 μeq/l. This provides substantial buffering for resistance to acidification.

Acidification is the primary concern, with sulfate being considered the primary contributor.

Runoff is considered when evaluating impacts to aquatic AQRVs. Warm temperatures, deep soils, level topography, and vigorous plant growth all favor evapotranspiration and reduce runoff. Effects of nitrogen deposition are not likely to be significant because the

[1] Forest Service.

nitrogen is taken up by the watershed terrestrial and aquatic ecosystems and does not contribute to acidification.[1]

Only waters low in concentrations of both base cations and organic acids are highly susceptible to acidification. Waters high in base cations (and therefore alkalinity) receive substantial neutralization potential from their watersheds, and therefore typically have the capacity to completely neutralize acidic deposition inputs, largely through increased weathering and exchange of base cations.[2]

There are two watersheds present in the vicinity of the project: the Lower Suwannee and the Santa Fe. The EPA has described the health of the aquatic resources in both watersheds as having a low vulnerability to stressors such as pollutant loadings.[3]

---

[1] Forest Service.
[2] Forest Service 2.
[3] Watershed Health Information. Environmental Protection Agency. October 1998.

NATIONAL ATMOSPHERIC DEPOSITION PROGRAM
Site ID: FL03 Date Range: 1993 to 1998 Report Date: 02/07/1999 01:36:43 PM
Deposition in kg/ha.

Year	Ca	Mg	K	Na	NH4	NO3	N	Cl	SO4
1993	1.36	0.450	0.316	3.550	1.39	10.83	3.52	5.92	15.95
1994	1.16	0.445	0.256	3.519	1.11	9.88	3.09	5.99	12.85
1995	1.04	0.455	0.284	3.883	1.92	9.57	3.66	6.42	12.96
1996	0.96	0.405	0.258	3.531	1.05	8.08	2.64	6.13	12.16
1997	0.82	0.355	0.274	2.774	0.96	7.37	2.41	4.89	10.95
				Average:	1.29	9.15	3.06		12.97

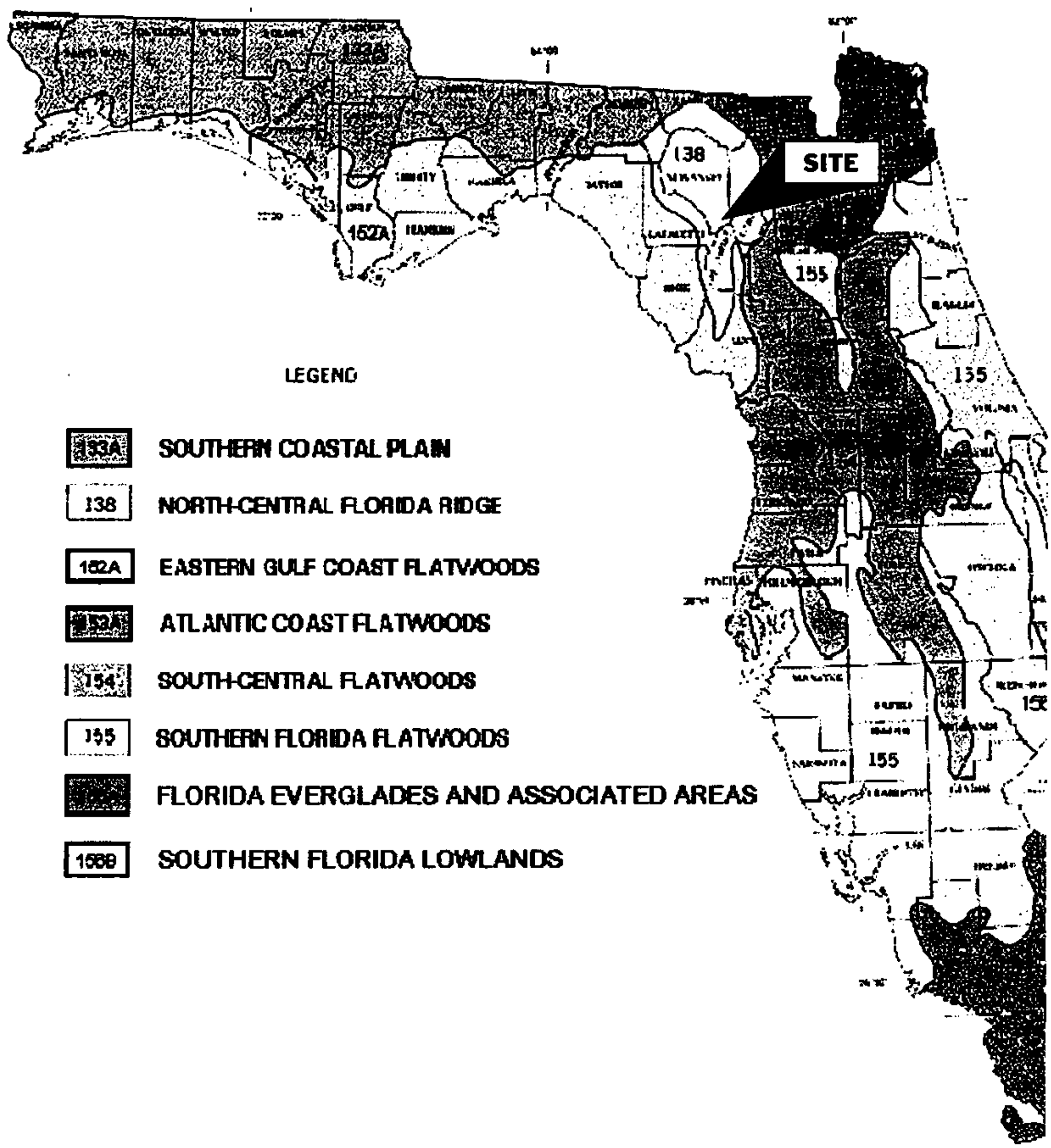
All Nitrogen = 13.5

Visibility Analysis

Visual effects screening analysis was conducted for the PSD Class II Area including the Ichetucknee Springs State Park. The analysis was a Level II analysis using the VISCREEN model. The results (attached) show that maximum visual impacts inside the park do not exceed the screening criteria.

The results also show that maximum visual impacts outside the park (i.e., between the park and the project site do not exceed the screening criteria. This analysis shows that impacts to visibility in the PSD Class II area are within the acceptable range.

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSER\



MAJOR LAND RESOURCE AREAS

FLORIDA

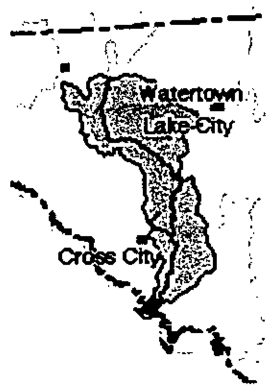
FEBRUARY 1997

Surf Your Watershed

News Flashes:

Lower Suwannee

USGS Cataloging Unit: 03110205

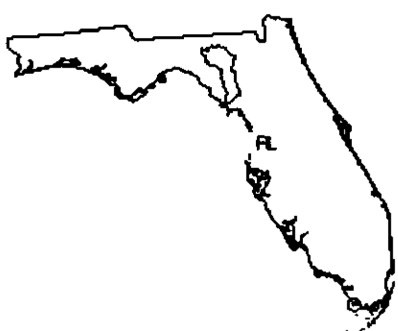


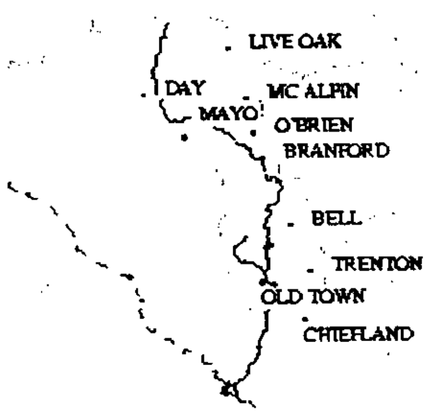
Lower Suwannee

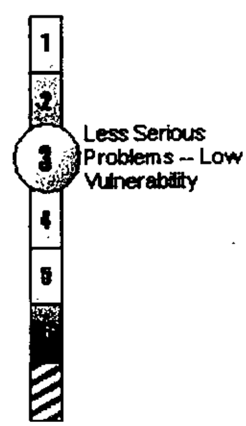
SURF YOUR WATERSHED

The overall IWI score below describes the health of the aquatic resources for this watershed. A score of 3 indicates Less Serious Water Quality Problems - Low Vulnerability to stressors such as pollutant loadings. Get a description of the latest overall score (October 1998, Version 1.2) and find out how your watershed scores are calculated. See the Condition and Vulnerability Indicator Graphs link below for the individual scores used in the overall score calculation.

WATERSHED INDICATORS







EPA United States Environmental Protection Agency

Surf Your Watershed

Locate Your Watershed

JOIN DISCUSSIONS

ADD INFORMATION

SEARCH INFORMATION

MAP LIBRARY

News Flashes:

Santa Fe

USGS Cataloging Unit: 03110206

EPA

Watershed Health (IWI) | Watershed Information: 03110206
located in the state(s) of FL

Santa Fe

Locate Your Watershed

JOIN DISCUSSIONS

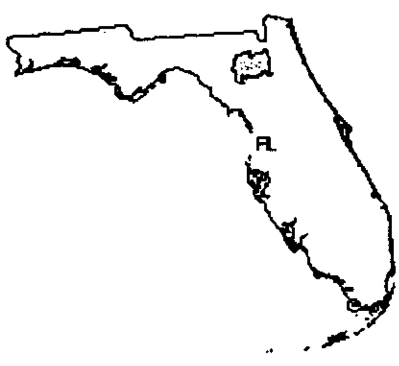
ADD INFORMATION

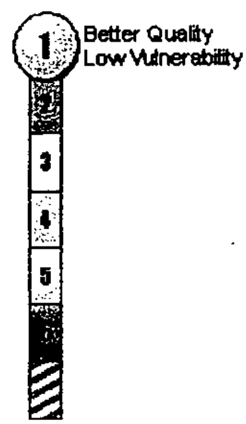
SEARCH INFORMATION

MAP LIBRARY

IWI Homepage | Updates | Surf Your Watershed | Comments

The overall IWI score below describes the health of the aquatic resources for this watershed. A score of 1 indicates Low Vulnerability to stressors such as pollutant loadings. Get a description of the latest overall score (October 1998, Version 1.2) and find out how your watershed scores are calculated. See the Condition and Vulnerability Indicator Graphs link below for the individual scores used in the overall score calculation.



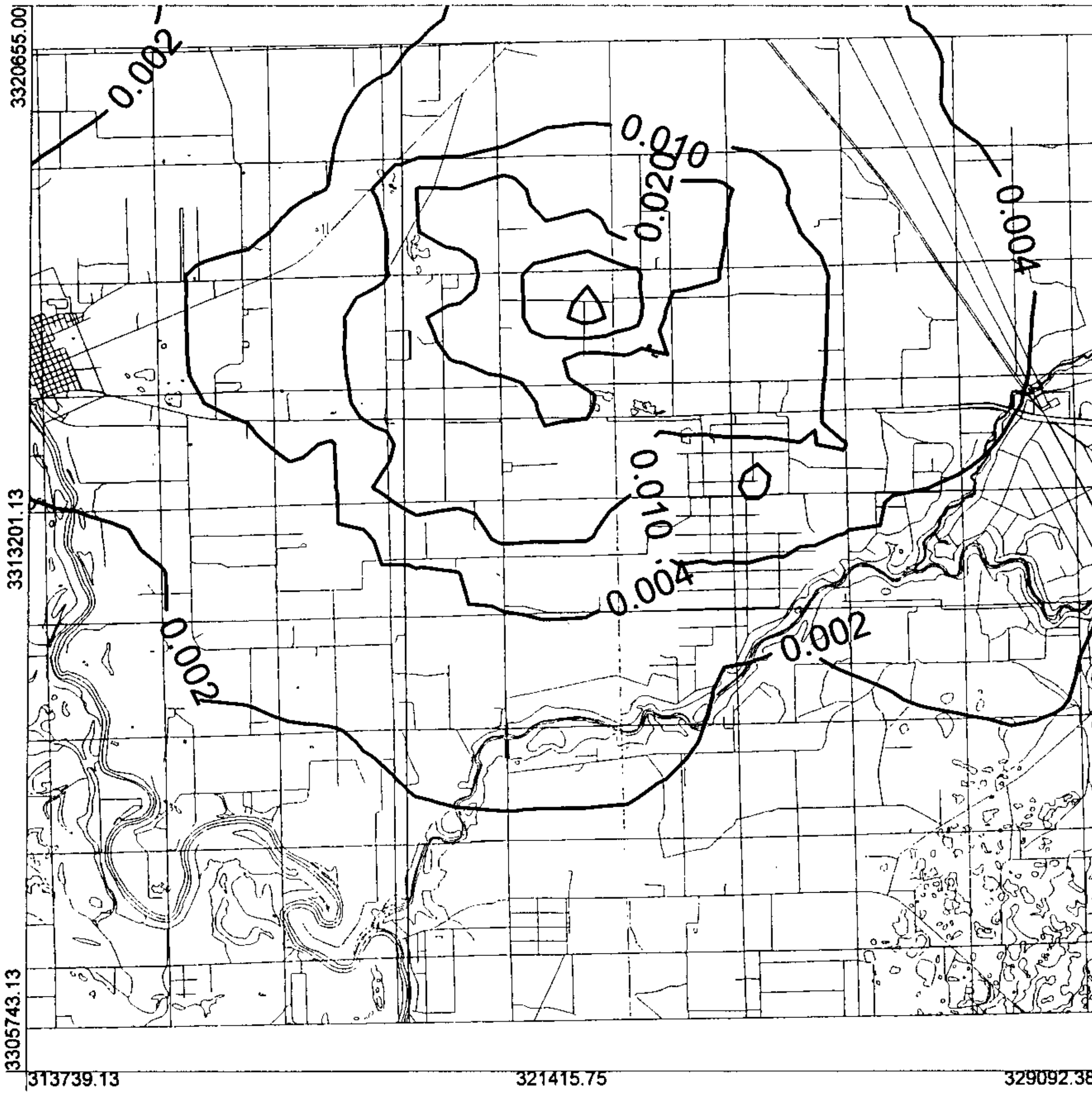


SURF YOUR WATERSHED

WATERSHED INDICATORS

PROJECT NAME :

Estimated Deposition of Sulfate
1990 Meteorological Data



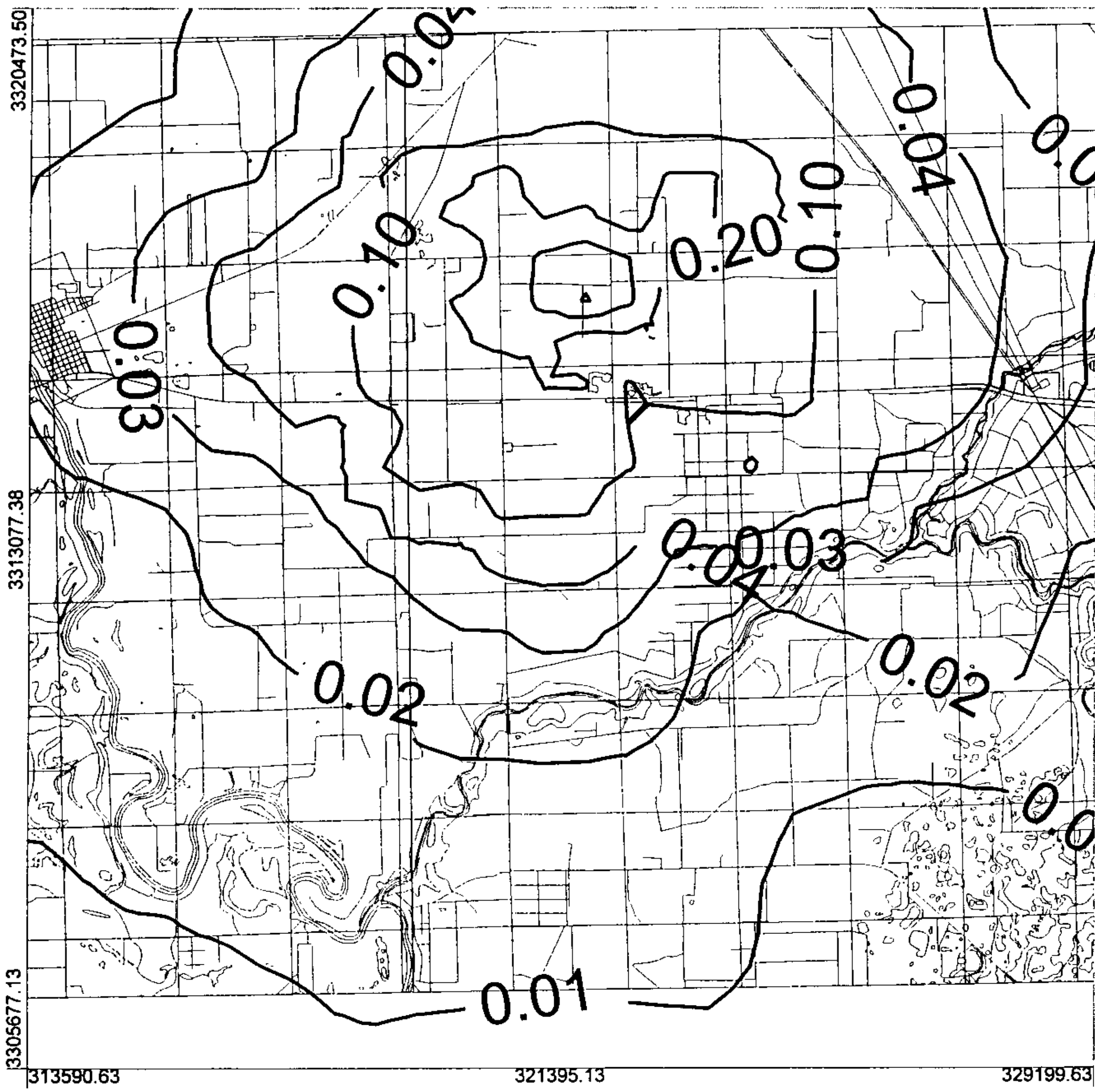
MODELING OPTIONS :	COMPANY NAME :
DEPOS, RURAL, FLAT, DFAULT, DRYDPL, WETDPL, NOCMPL	**Koogler & Associates**

OUTPUT TYPE :	RECEPTORS :	COMMENTS :	MODELER :	PROJECT/PLOT NO. :
DEPOS	**396**	Source-alone g/m^2 x 10 = kg/ha	**Steve Cullen**	**Suwannee American Cement**
MAX :	UNITS :		DATE :	
0.08455	**g/m**2**		**2/9/99**	

ISC View by Lakes Environmental Software C:\ISCVIEW2\DEPOSI~1\SO2DEP90.FIL

PROJECT NAME :

Estimated Deposition of Nitrate
1990 Meteorological Data



MODELING OPTIONS :	COMPANY NAME :
DEPOS, RURAL, FLAT, DFAULT, DRYDPL, WETDPL, NOCMPL	Koogler & Associates

OUTPUT TYPE :	RECEPTORS :	COMMENTS :	MODELER :	PROJECT/PLOT NO. :
DEPOS	396	Source-alone g/m^2 x 10 = kg/ha	Steve Cullen	
MAX :	UNITS :		DATE :	Suwannee American Cement
0.78748	g/m**2		2/9/99	

ISC View by Lakes Environmental Software

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Visual Effects Screening Analysis for
Source: Suwannee American Cement
Class I Area: Ichetucknee Springs S.P.

*** Screening Scenario Results ***

Input Emissions for

Particulates	5.50	G	/S
NOx (as NO2)	33.80	G	/S
Primary NO2	.00	G	/S
Soot	.00	G	/S
Primary SO4	.00	G	/S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	2.5	7
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.01 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	5.60 km
Min. Source-Class I Distance:	5.60 km
Max. Source-Class I Distance:	9.80 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	3
Wind Speed:	2.86 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.	155.	9.8	14.	9.22	.798	.15	-.002
SKY	140.	155.	9.8	14.	2.79	.255	.15	-.003
TERRAIN	10.	84.	5.6	84.	11.45	.223	.30	.001
TERRAIN	140.	84.	5.6	84.	3.52	.067	.30	.001

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.	2.	1.0	166.	2.00	1.467	.05	.001
SKY	140.	2.	1.0	166.	2.00	.434	.05	-.010
TERRAIN	10.	2.	1.0	166.	2.00	1.268	.05	.013
TERRAIN	140.	2.	1.0	166.	2.00	.332	.05	.008

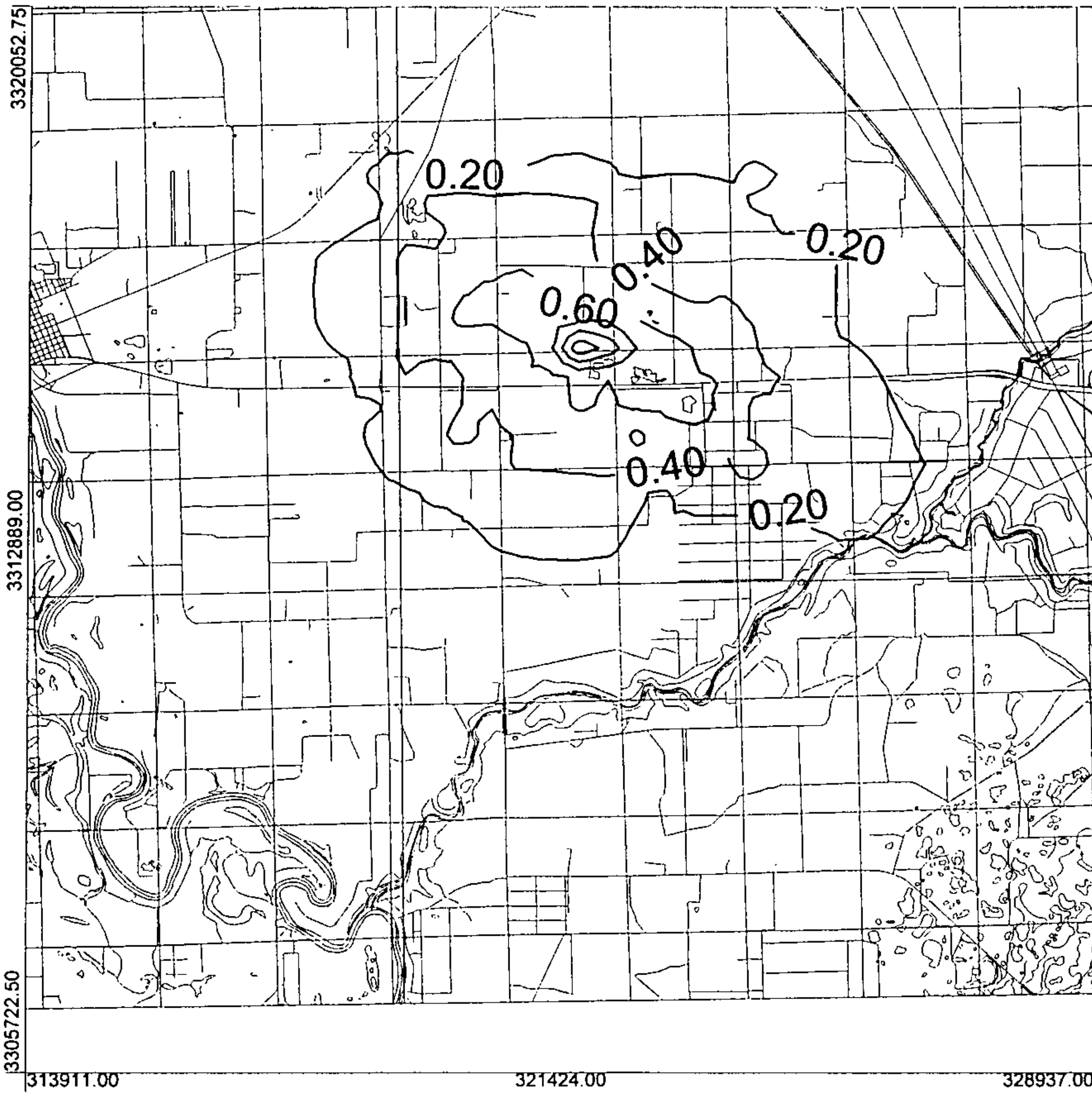
15. Please submit overlays (isopleths) of the maximum ground-level concentrations of NOx, PM/PM_{10}, CO, and SO_2 with respect to residential communities up to 2 miles (3.2 kilometers) from the proposed site.

Response:

The requested isopleths are included with this response.

PROJECT NAME :

Isopleths of the Maximum Annual Average Ground Level Concentrations of PM10
1989 Meterological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE : CONC	RECEPTORS : 336	COMMENTS : Annual high PM10 concentration isopleths for source-alone. 1989 meteorology.	MODELER : Steve Cullen	PROJECT/PLOT NO. :
MAX : 1.86602	UNITS : ug/m**3		DATE : 2/9/99	

Suwannee American Cement

ISC View by Lakes Environmental Software

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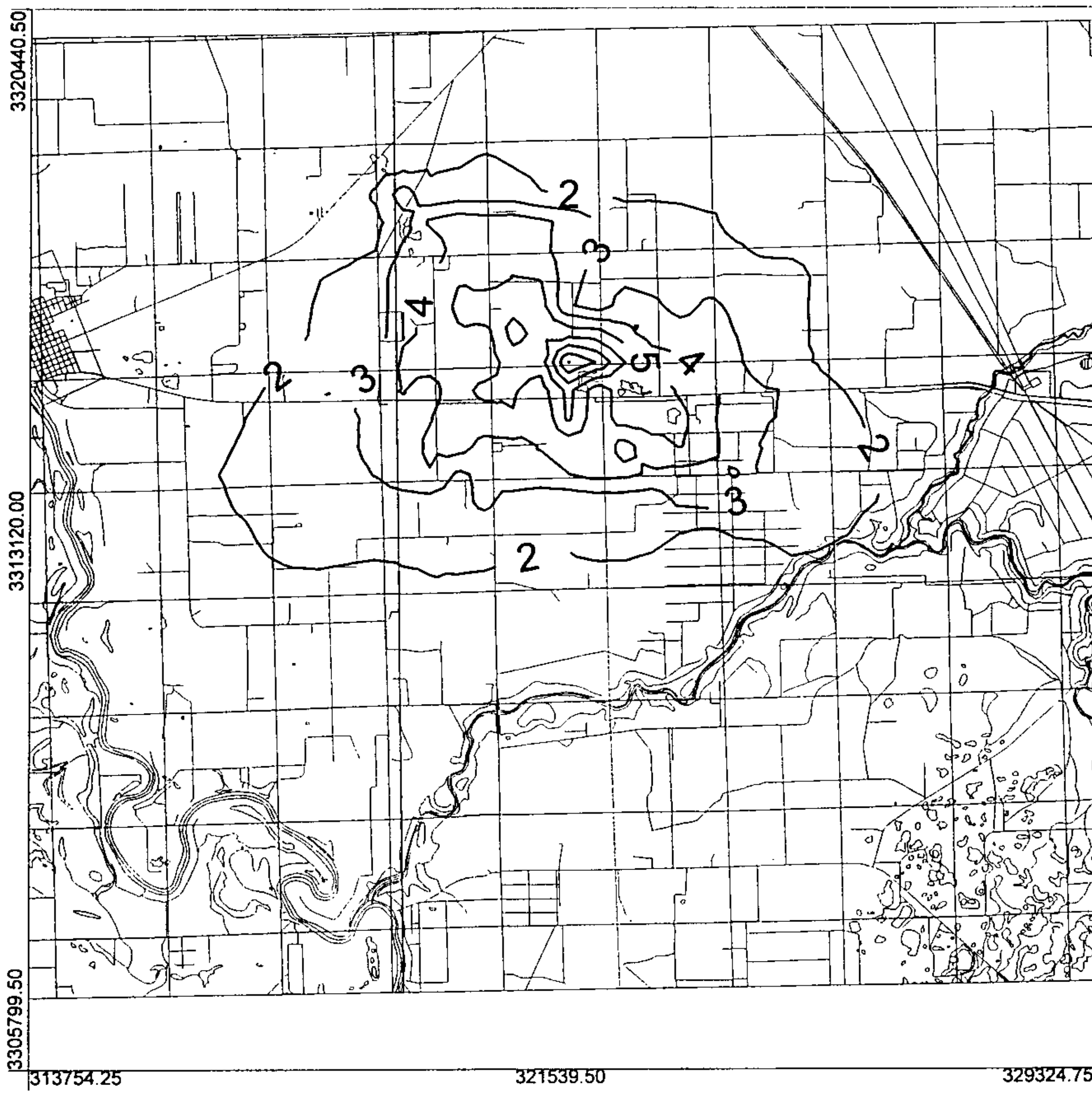
PROJECT NAME :

Isopleths of the Maximum 24-hr Average Ground Level Concentrations of PM10
1991 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE : CONC	RECEPTORS : 336	COMMENTS : Source-alone	MODELER : Steve Cullen	PROJECT/PLOT NO. : Suwannee American Cement
MAX : 12.00522	UNITS : ug/m**3		DATE : 1/18/99	

ISC View by Lakes Environmental Software

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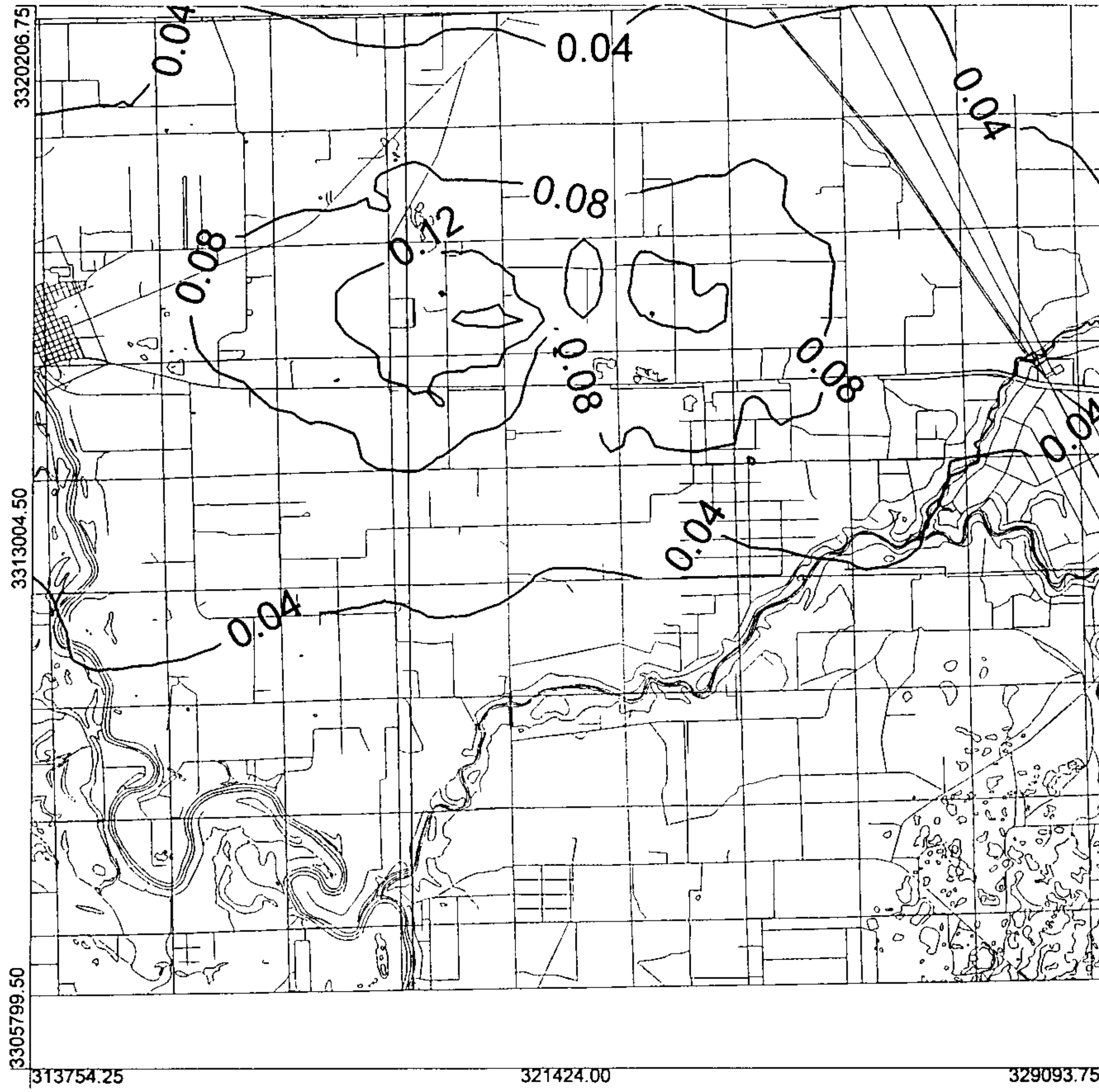
PROJECT NAME :

Isopleths of the Maximum Annual Average Ground Level Concentrations of SO2
1990 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE : CONC	RECEPTORS : 336	COMMENTS : Source-alone	MODELER : Steve Cullen	PROJECT/PLOT NO. :
MAX : 0.18573	UNITS : ug/m**3		DATE : 2/9/99	Suwannee American Cement

ISC View by Lakes Environmental Software

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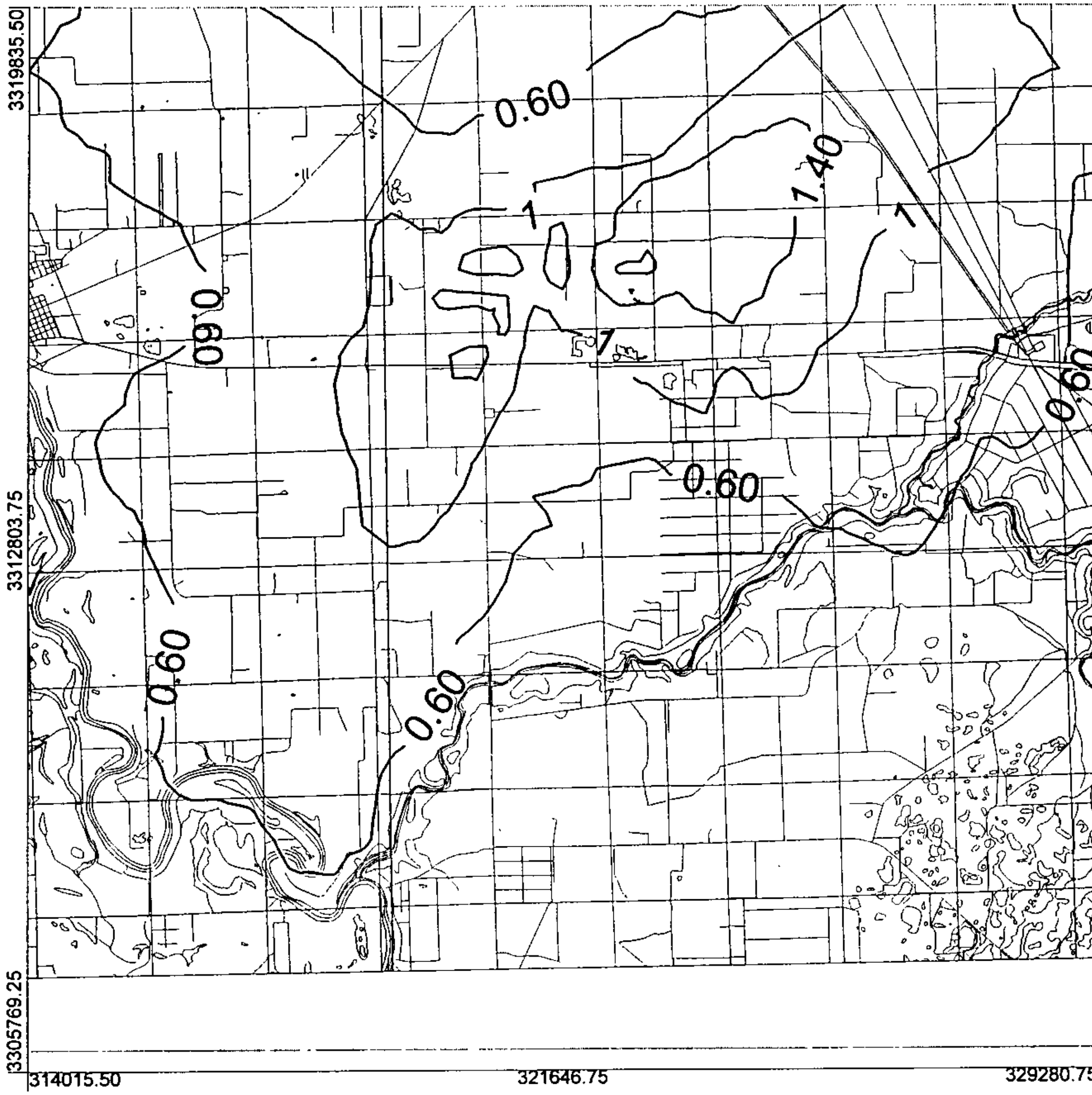
PROJECT NAME :

Isopleths of the Maximum 24-hour Average Ground Level Concentrations of SO2
1992 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE :	RECEPTORS :	COMMENTS :	MODELER :	PROJECT/PLOT NO. :
CONC	336	Source-alone	Steve Cullen	Suwannee American Cement
MAX :	UNITS :		DATE :	
2.62102	ug/m**3		2/9/99	

ISC View by Lakes Environmental Software

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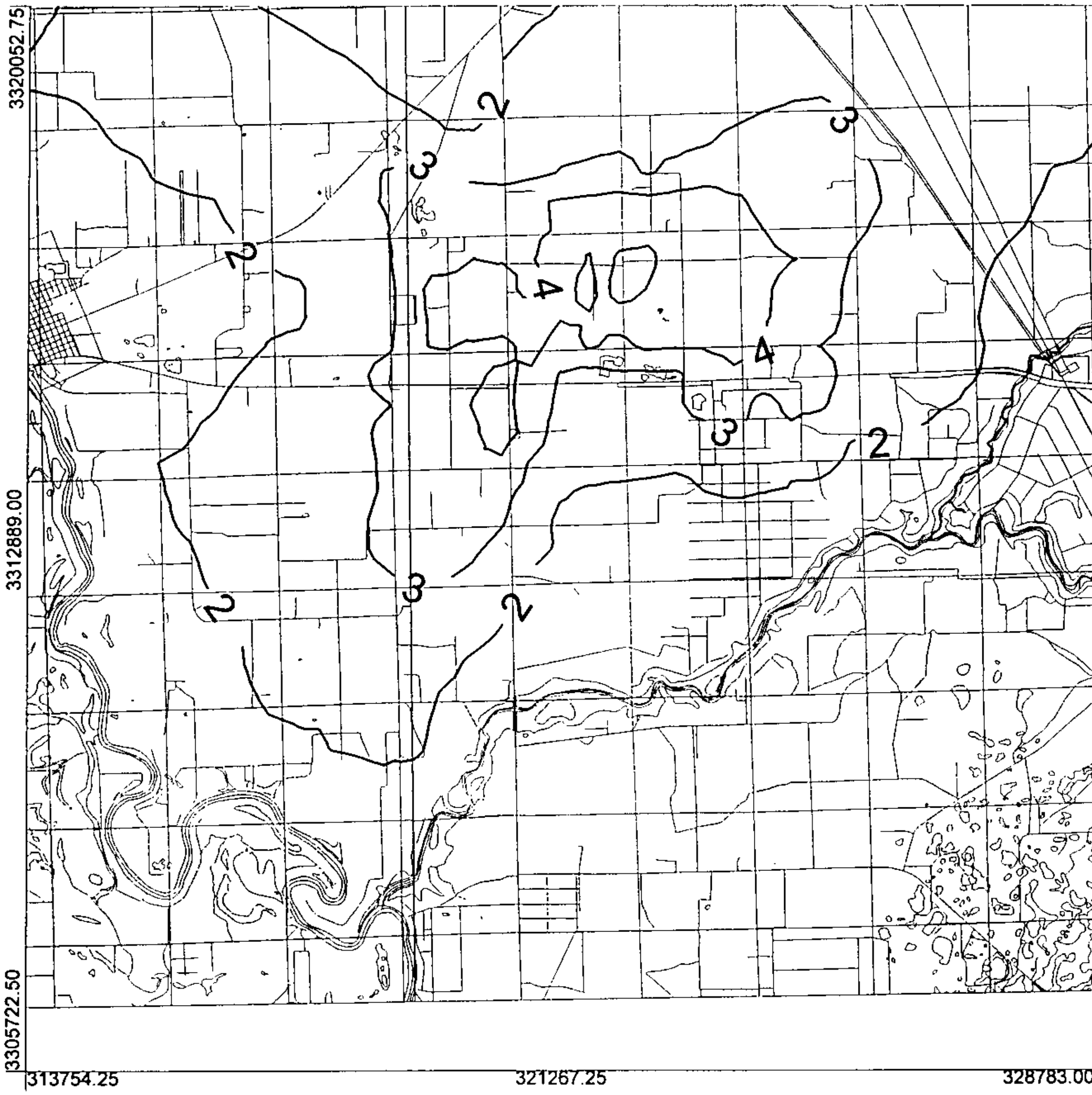
PROJECT NAME :

Isopleths of the Maximum 3-hour Average Ground Level Concentrations of SO2
1992 Meteorological Data



MODELING OPTIONS :	COMPANY NAME :
CONC, RURAL, FLAT, DFAULT, NOCMPL	**Koogler & Associates**

OUTPUT TYPE :	RECEPTORS :	COMMENTS :	MODELER :	PROJECT/PLOT NO. :
CONC	**336**	Source-alone	**Steve Cullen**	
MAX :	UNITS :		DATE :	
7.28792	**ug/m**3**		**1/18/99**	

Suwannee American Cement

ISC View by Lakes Environmental Software

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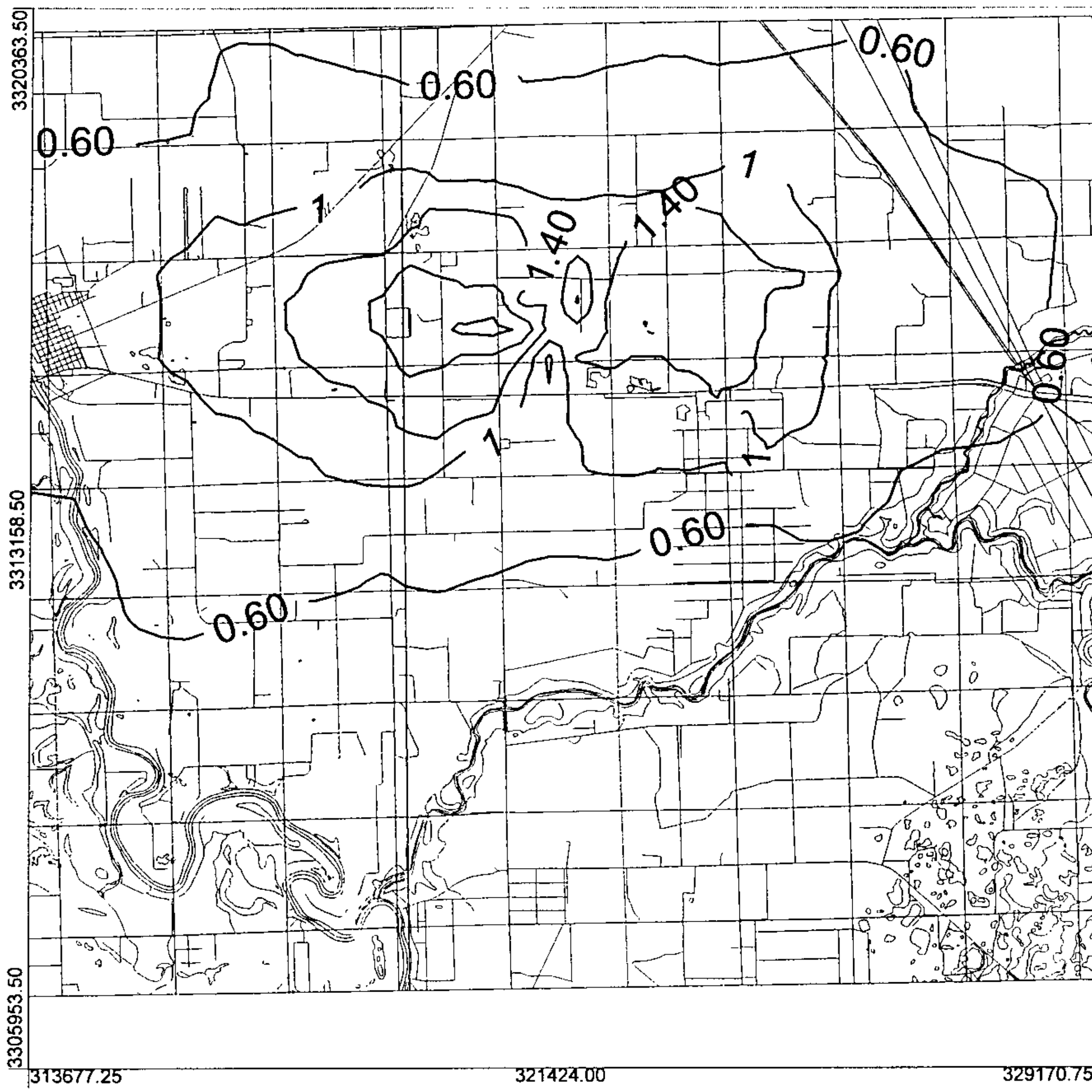
PROJECT NAME :

Isopleths of the Maximum Annual Average Ground Level Concentrations of NOx
1990 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE : CONC	RECEPTORS : 336	COMMENTS : Source-alone	MODELER : Steve Cullen	PROJECT/PLOT NO. :
MAX : 2.52166	UNITS : ug/m**3		DATE : 1/18/99	

Suwannee American Cement

ISC View by Lakes Environmental Software

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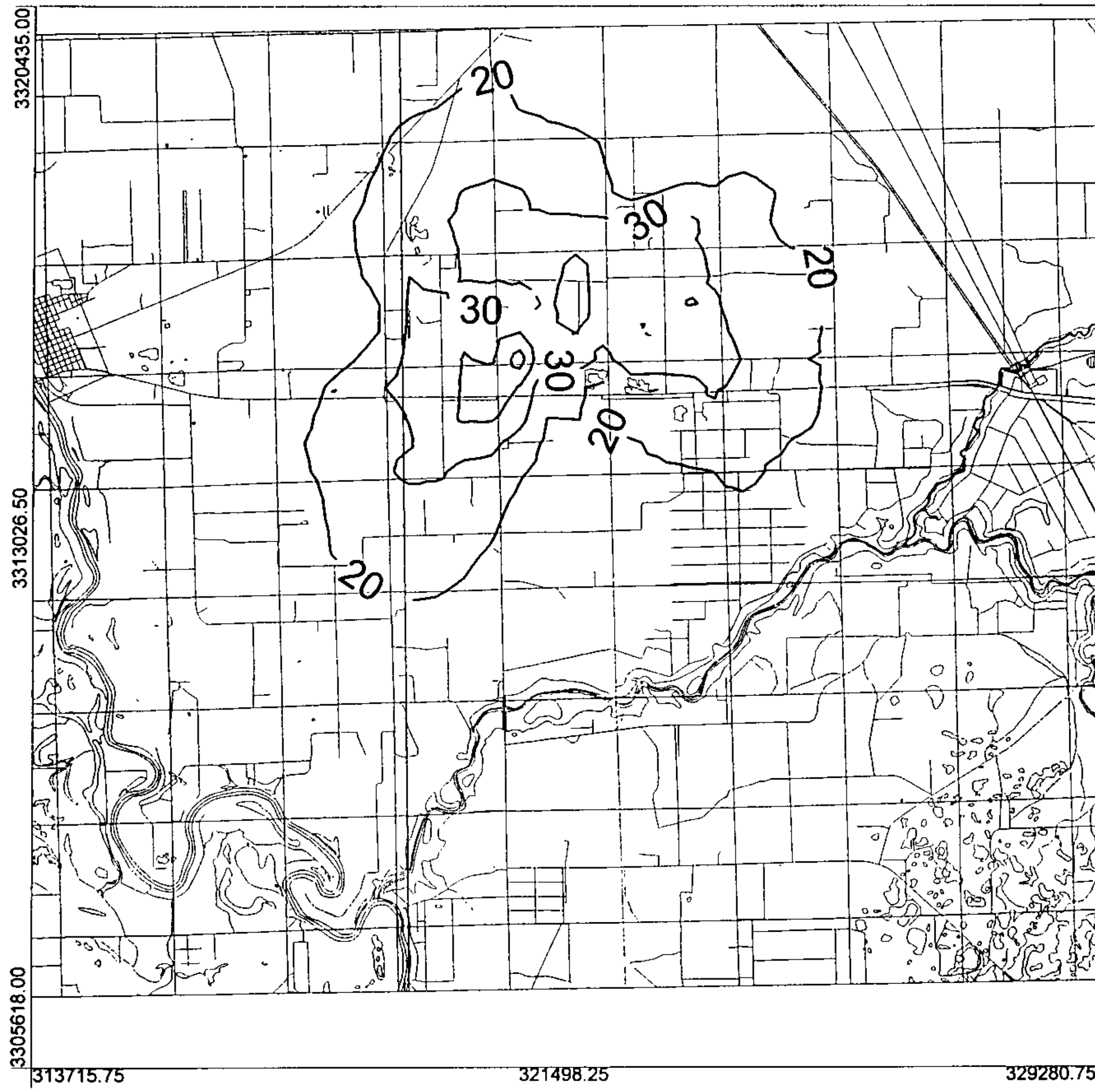
PROJECT NAME :

Isopleths of the Maximum 8-hour Ground Level Concentrations of CO
1993 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			Koogler & Associates	
OUTPUT TYPE : CONC	RECEPTORS : 336	COMMENTS : Source-alone	MODELER : Steve Cullen	PROJECT/PLOT NO. :
MAX : 76.93284	UNITS : ug/m**3		DATE : 2/9/99	

Suwannee American Cement

ISC View by Lakes Environmental Software

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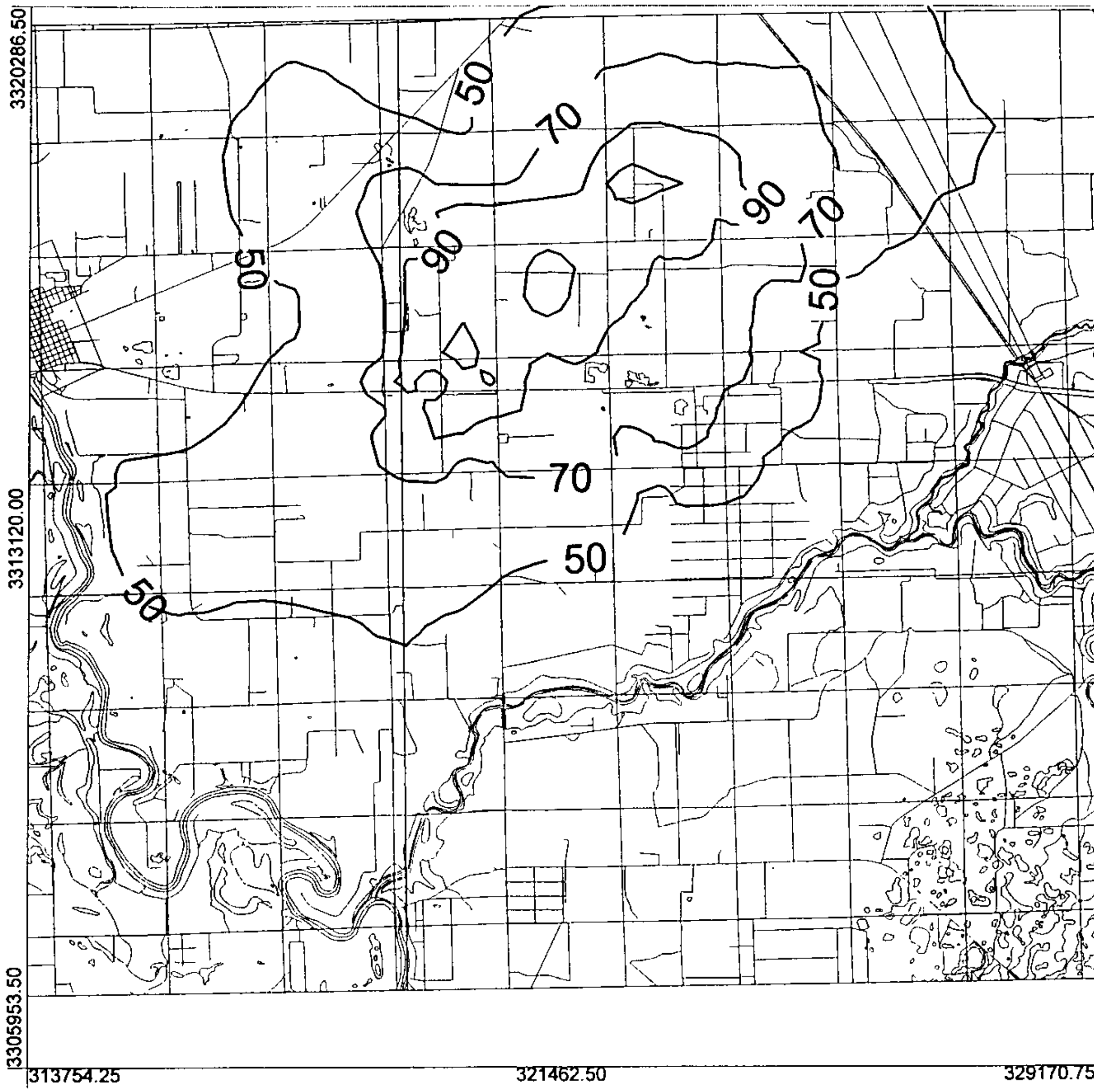
PROJECT NAME :

Isopleths of the Maximum 1-hour Average Ground Level Concentrations of CO
1990 Meteorological Data



MODELING OPTIONS :			COMPANY NAME :	
CONC, RURAL, FLAT, DFAULT, NOCMPL			**Koogler & Associates**	
OUTPUT TYPE : **CONC**	RECEPTORS : **336**	COMMENTS : Source-alone	MODELER : **Steve Cullen**	PROJECT/PLOT NO. :
MAX : **165.75049**	UNITS : **ug/m**3**		DATE : **1/18/99**	

Suwannee American Cement

ISC View by Lakes Environmental Software

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16. The PSD application does not contain discussions of the modeling procedures, selected model options, source emission information, and receptor information associated with the area of significance, PSD increment, and NAAQS modeling. This information is needed to adequately understand the modeling results presented in the application. In addition, please provide a detailed map showing the location of all of the fence-line receptors used in the air quality impact analysis. These receptor locations should be shown in the coordinate system used in the modeling. This detailed map should also display the location and dimensions of the various plant components.

Response:

Procedures

The modeling included the fenceline receptor network (216 receptors) and a polar receptor network at 1000 meter intervals between 1000-10,000 meters from the main stack. The fenceline receptors were spaced 50 meters apart. Modeling included a building downwash (BPIP) analysis of 12 buildings:

1. Storage Hall
2. Raw Mill
3. Homogenization (Blend) Silo
4. Preheater Tower
5. Kiln
6. Coal Storage
7. Coal Mill
8. Clinker Cooler
9. Clinker Silos
10. Limestone and Gypsum Storage Building
11. Finish Mill
12. Cement Silos

Selected Model Options

The regulatory default dispersion option was selected, which means that none of the following non-default options were utilized:

- Gradual plume rise
- No stack-tip downwash
- Bypass the calms processing routine
- No buoyancy-induced dispersion
- Missing data processing routine

The rural dispersion coefficient was selected, and no plume depletion due to wet or dry removal was selected.

Source Emission Information

Eighteeen (18) Emission points (17 point sources and one area source) were used for PM10 modeling. One point source (E21) was used for SO_2, NOx, and CO modeling. The following table shows the point source emission information for the PM10 modeling:

ID	Name	X	Y	Q	H	T	V	D
E21	Kiln/raw mill	321424.48	3315869.89	2.26	76.2	369.26	14.15	2.87
E28	Recycle	321419.39	3315900.42	0.02	21.9	373.15	19.41	0.3
G07	Recycle	321413.91	3315908.25	0.11	73.4	366.48	20.05	0.67
H08	Recycle	321408.83	3315886.33	0.02	15.85	366.48	19.41	0.3
K15	Clinker cooler	321430.74	3315779.1	1.44	60.04	498.21	14.7	2.74
L03	Cooler disch.	321416.65	3315811.58	0.02	11.28	422.04	19.41	0.3
L06	Clinker silos	321411.17	3315745.84	0.03	57.91	422.04	21.39	0.34
M08	Clinker disch.	321414.3	3315694.96	0.03	0.91	373.15	21.39	0.34
N91	Finish mill	321424.09	3315641.74	0.04	13.41	366.48	19.81	0.43
N93	Mill separator	321412.74	3315646.82	0.99	38.71	343.15	14.79	2.29
N94	Finish mill	321422.52	3315667.57	0.24	38.71	383.15	14.16	1.22
Q14	Cement load	321487.88	3315630	0.02	9.14	338.71	19.41	0.3
Q17	Cement load	321487.1	3315644.87	0.02	9.14	338.71	19.41	0.3
Q25	Cement silos	321481.62	3315640.95	0.09	57.91	338.71	19.41	0.61
Q26	Cement silos	321482.01	3315633.52	0.09	57.91	338.71	19.41	0.61
R12	Bagging	321519.58	3315612.39	0.09	11.28	338.71	19.41	0.61
S21	Coal bin	321437	3315810.8	0.02	19.2	338.71	20.22	0.24

Where:

X and **Y** are in meters, Zone 17 UTM coordinates
Q is particulate matter (PM10) emission rate in grams/second
H is stack height in meters
T is stack gas exit temperature in degrees Kelvin
V is stack gas exit velocity in meters/second
D is stack inside diameter in meters

The emission rate of PM10 for the kiln/raw mill is equal to 0.11 lb/ton of dry feed. The emission rate of PM10 for the clinker cooler is equal to 0.07 lb/ton of dry feed. The emission rate used for NOx (45.89 g/s) is equal to 3.8 lb/ton of clinker, which is the proposed temporary NOx emission rate. The emission rate used for SO_2 (3.38 g/s) is equal to 0.28 lb/ton of clinker. . The emission rate used for CO (43.47 g/s) is equal to 3.6 lb/ton of clinker.

Attached please find replacement application pages, reflecting updated point source information. The facility will be equipped with two ESPs (kiln and cooler) and 16 baghouses. There are 17 point sources as the baghouse for the coal mill shares a common stack with the clinker cooler ESP.

9. Actual Volumetric Flow Rate: **See Table**	acfm
10. Percent Water Vapor : **See Table**	%
11. Maximum Dry Standard Flow Rate: **See Table**	dscfm
12. Nonstack Emission Point Height: **NA**	feet
13. Emission Point UTM Coordinates: Zone: East (km): North (km):	
14. Emission Point Comment (limit to 200 characters):	

	HEIGHT FT.	DIAM. FT.	TEMP. °F	ACFM	H20	DSCFM
E-28	72	1.0	212	3,000	2%	2310
G-07	241	2.2	200	15,000	2%	11760
H-08	52	1.0	200	3,000	2%	2352
					Total =	**16422**

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Pollutant Detail Information: Pollutant 1 of 2

1. Pollutant Emitted: **PM**		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	**1.41** lb/hour	**6.2** tons/year
4. Synthetically Limited? [ ] Yes [**X**] No		
5. Range of Estimated Fugitive/Other Emissions: [ ] 1 [ ] 2 [ ] 3		_______ to _______ tons/year
6. Emission Factor: **0.01 gr/dscf** Reference: **Vendor guarantee**		
7. Emissions Method Code: [X] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5		
8. Calculation of Emissions (limit to 600 characters): **16,422 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 1.41 lb/hr** **1.41 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 6.2 tons/year**		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):		

Pollutant Detail Information: Pollutant 2 of 2

1. Pollutant Emitted: **PM10**		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	**1.20** lb/hour	**5.3** tons/year
4. Synthetically Limited? [ ] Yes [X] No		
5. Range of Estimated Fugitive/Other Emissions: [ ] 1 [ ] 2 [ ] 3		_______ to _______ tons/year
6. Emission Factor: **85% of PM** Reference: **AP-42, 5th Edition, Table 11.6-5**		
7. Emissions Method Code: [X] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5		
8. Calculation of Emissions (limit to 600 characters): **0.85 x 16,422 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 1.20 lb/hr** **1.20 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 5.3 tons/year**		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):		

9. Actual Volumetric Flow Rate: **See Table**	acfm
10. Percent Water Vapor : **See Table**	%
11. Maximum Dry Standard Flow Rate: **See Table**	dscfm
12. Nonstack Emission Point Height: **NA**	feet
13. Emission Point UTM Coordinates: Zone: East (km): North (km):	
14. Emission Point Comment (limit to 200 characters):	

	HEIGHT FT.	DIAM. FT.	TEMP. °F	ACFM	H20	DSCFM
L-03	37	1.0	300	3,000	2%	2043
L-06	190	1.1	300	4,000	2%	2723
M-08	3	1.1	212	4,000	2%	3080
N-93	127	7.5	158	128,600	2%	107674
N-94	127	4.0	230	35,000	2%	26247
N-91	44	1.4	200	6,000	2%	4704
Q-14	30	1.0	150	3,000	2%	2545
Q-17	30	1.0	150	3,000	2%	2545
Q-25	190	2.0	150	12,000	2%	10179
Q-26	190	2.0	150	12,000	2%	10179
R-12	37	2.0	150	12,000	2%	10179
					Total =	**182098**

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Pollutant Detail Information: Pollutant 1 of 2

1. Pollutant Emitted: **PM**

2. Total Percent Efficiency of Control: %

3. Potential Emissions: **15.61** lb/hour **68.4** tons/year

4. Synthetically Limited?
[ ] Yes [**X**] No

5. Range of Estimated Fugitive/Other Emissions:
[ ] 1 [ ] 2 [ ] 3 _______ to _______ tons/year

6. Emission Factor: **0.01 gr/dscf**
Reference: **Vendor guarantee**

7. Emissions Method Code:
[**X**] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5

8. Calculation of Emissions (limit to 600 characters):

182,098 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 15.61 lb/hr

15.61 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 68.4 tons/year

9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):

Pollutant Detail Information: Pollutant 2 of 2

1. Pollutant Emitted: **PM10**	
2. Total Percent Efficiency of Control:	%
3. Potential Emissions: **13.27** lb/hour	**58.1** tons/year
4. Synthetically Limited? [ ] Yes [**X**] No	
5. Range of Estimated Fugitive/Other Emissions: [ ] 1 [ ] 2 [ ] 3	_______ to _______ tons/year
6. Emission Factor: **85% of PM** Reference: **AP-42, 5th Edition, Table 11.6-5**	
7. Emissions Method Code: [**X**] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5	
8. Calculation of Emissions (limit to 600 characters): **85% x 182,098 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 13.27 lb/hr** **13.27 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 58.1 tons/year**	
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):	

9. Actual Volumetric Flow Rate: **See Table**	acfm
10. Percent Water Vapor : **See Table**	%
11. Maximum Dry Standard Flow Rate: **See Table**	dscfm
12. Nonstack Emission Point Height: **NA**	feet
13. Emission Point UTM Coordinates: Zone: East (km): North (km):	
14. Emission Point Comment (limit to 200 characters): **Note: Emissions from the coal mill (S-17) are ducted to a common stack with the clinker cooler ESP (K-15).**	

	HEIGHT FT.	DIAM. FT.	TEMP. °F	ACFM	H20	DSCFM
S-17	197	9.0	150	24,000	6.5%	19423
S-21	63	0.8	150	2,000	2%	1697
					Total =	**21,120**

H. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units Only - Emissions Limited Pollutants Only)

Pollutant Detail Information: Pollutant 1 of 2

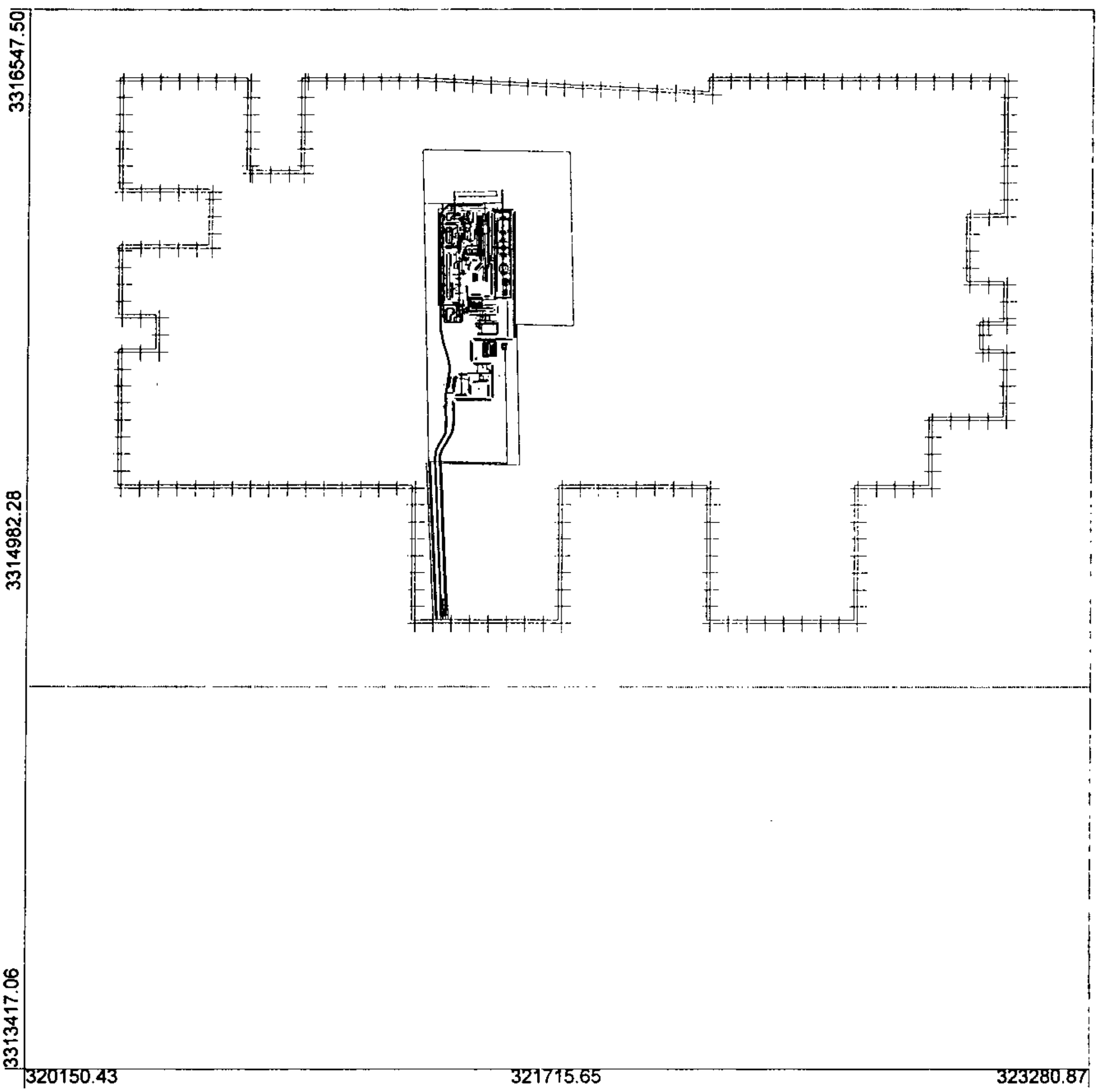
1. Pollutant Emitted: **PM**		
2. Total Percent Efficiency of Control:		%
3. Potential Emissions:	**1.81** lb/hour	**7.9** tons/year
4. Synthetically Limited? [ ] Yes [X] No		
5. Range of Estimated Fugitive/Other Emissions: [ ] 1 [ ] 2 [ ] 3		_______ to _______ tons/year
6. Emission Factor: **0.01 gr/dscf** Reference: **Vendor guarantee**		
7. Emissions Method Code: [X] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5		
8. Calculation of Emissions (limit to 600 characters): **21,120 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 1.81 lb/hr** **1.81 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 7.9 tons/year**		
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):		

Pollutant Detail Information: Pollutant 2 of 2

1. Pollutant Emitted: **PM10**	
2. Total Percent Efficiency of Control: %	
3. Potential Emissions: **1.81** lb/hour **7.9** tons/year	
4. Synthetically Limited? [ ] Yes [X] No	
5. Range of Estimated Fugitive/Other Emissions: [ ] 1 [ ] 2 [ ] 3 _______ to _______ tons/year	
6. Emission Factor: **0.01 gr/dscf: PM10 assumed equal to PM** Reference: **Vendor guarantee**	
7. Emissions Method Code: [X] 0 [ ] 1 [ ] 2 [ ] 3 [ ] 4 [ ] 5	
8. Calculation of Emissions (limit to 600 characters): **21,120 dscfm x 0.01 gr/dscf x 60 min/hr x 1.0 lb/7000 grains = 1.81 lb/hr** **1.81 lb/hr x 8760 hr/yr x 1.0 ton/2000 lb. = 7.9 tons/year**	
9. Pollutant Potential/Estimated Emissions Comment (limit to 200 characters):	

PROJECT NAME :

FENCELINE RECEPTORS
Plant Components



COMMENTS :	SOURCES :	COMPANY NAME :	
Coordinate System is meters, UTM Zone 17	0	Koogler & Associates	
	RECEPTORS :	MODELER :	PROJECT NO. :
	216	Steve Cullen	
		DATE :	
		2/19/99	

Suwannee American Cement

ISC View by Lakes Environmental Software

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TABLE OF APPROXIMATE DIMENSIONS FOR MAJOR COMPONENTS

UNIT NAME	DIMENSIONS IN FT.
RAW MATERIAL STORAGE	150 X 808
ROLLER MILL	73 X 91
KILN / MILL BAGHOUSE	40 X 74
MAIN STACK	DIA = 9
HOMOGENIZING SILO	DIA = 49
PREHEATER & KILN FEED	68 X 53
CLINKER COOLER	61 X 91
CLINKER COOLER BAGHOUSE	32 X 59
CLINKER STORAGE SILOS	DIA = 76
ADDITIVE STORAGE	102 X 82
CEMENT STORAGE SILOS	DIA = 48
PACKING PLANT	DIA = 76
COAL / COKE UNLOADING	14 X 50
COAL / COKE STORAGE	114 X 83
COAL / COKE STORAGE BINS	DIA = 15
COAL MILL	DIA = 11
COAL MILL DUST COLLECTOR	37 X 21
CLINKER COOLER EXHAUST STACK	DIA = 7
OFFICE	40 X 40
WAREHOUSE / MAINTENANCE BLDG	112 X 80
LEACH FIELD	139 X 124

	EMISSION POINTS	EXHAUST ELEVATION
A	KILN / MILL STACK	315' - 0"
B	AEROPOL to BLENDING SILO	120' - 0"
C	TOP of BLENDING SILO	310' - 0"
D	AEROPOL to PREHEATER	115' - 0"
E	SEPERATOR VENT FINISH MILL	182 - 0"
F	FINISH MILL VENT	182 - 0"
G	EQUIPMENT VENT	110' - 0"
H	CLINKER COOLER VENT STACK	253' - 0"
J	CLINKER COOLER DISCHARGE & BREAKER	100' - 0"
K	TOP of CLINKER SILOS	250' - 0"
L	CLINKER / GYPSUM FEEDER	80' - 0"
M	CEMENT SILO VENT	270' - 0"
N	CEMENT SILO VENT	270' - 0"
P	CEMENT LOAD OUT	110' - 0"
Q	CEMENT LOAD OUT	110 - 0"
R	PACKING PLANT	210' - 0"
S	COAL MILL VENT	160 - 0"
T	COAL MILL BIN VENT	170' - 0"

GRAPHIC SCALE

0 25 50 100

SCALE IN FEET
1"=50'

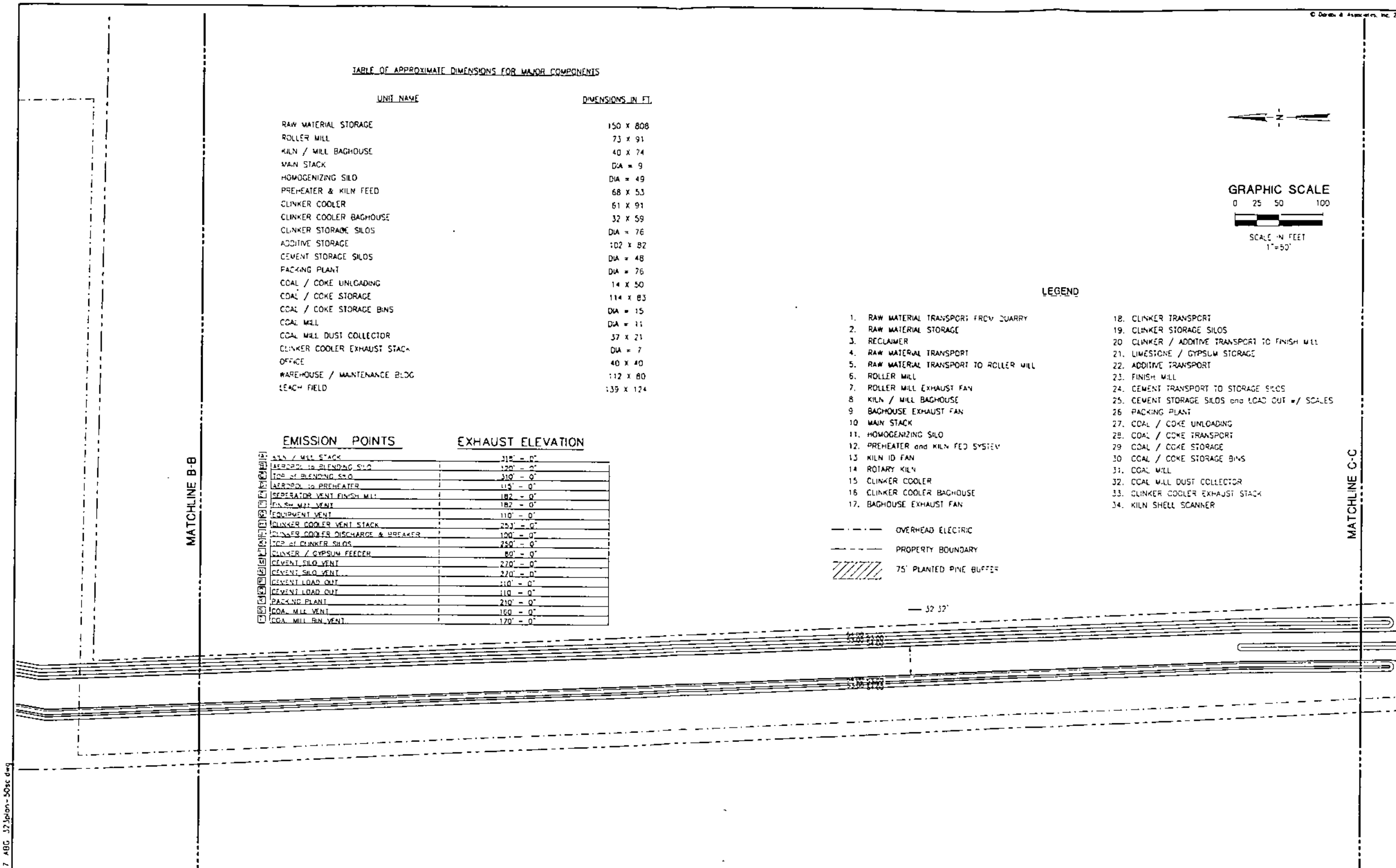
LEGEND

1. RAW MATERIAL TRANSPORT FROM QUARRY
2. RAW MATERIAL STORAGE
3. RECLAIMER
4. RAW MATERIAL TRANSPORT
5. RAW MATERIAL TRANSPORT TO ROLLER MILL
6. ROLLER MILL
7. ROLLER MILL EXHAUST FAN
8 KILN / MILL BAGHOUSE
9 BAGHOUSE EXHAUST FAN
10 MAIN STACK
11. HOMOGENIZING SILO
12. PREHEATER and KILN FED SYSTEM
13 KILN ID FAN
14 ROTARY KILN
15 CLINKER COOLER
16 CLINKER COOLER BAGHOUSE
17. BAGHOUSE EXHAUST FAN
18. CLINKER TRANSPORT
19. CLINKER STORAGE SILOS
20 CLINKER / ADDITIVE TRANSPORT TO FINISH MILL
21. LIMESTONE / GYPSUM STORAGE
22. ADDITIVE TRANSPORT
23. FINISH MILL
24. CEMENT TRANSPORT TO STORAGE SILOS
25. CEMENT STORAGE SILOS and LOAD OUT w/ SCALES
26 PACKING PLANT
27. COAL / COKE UNLOADING
28. COAL / COKE TRANSPORT
29 COAL / COKE STORAGE
30 COAL / COKE STORAGE BINS
31. COAL MILL
32. COAL MILL DUST COLLECTOR
33. CLINKER COOLER EXHAUST STACK
34. KILN SHELL SCANNER

OVERHEAD ELECTRIC

PROPERTY BOUNDARY

75' PLANTED PINE BUFFER

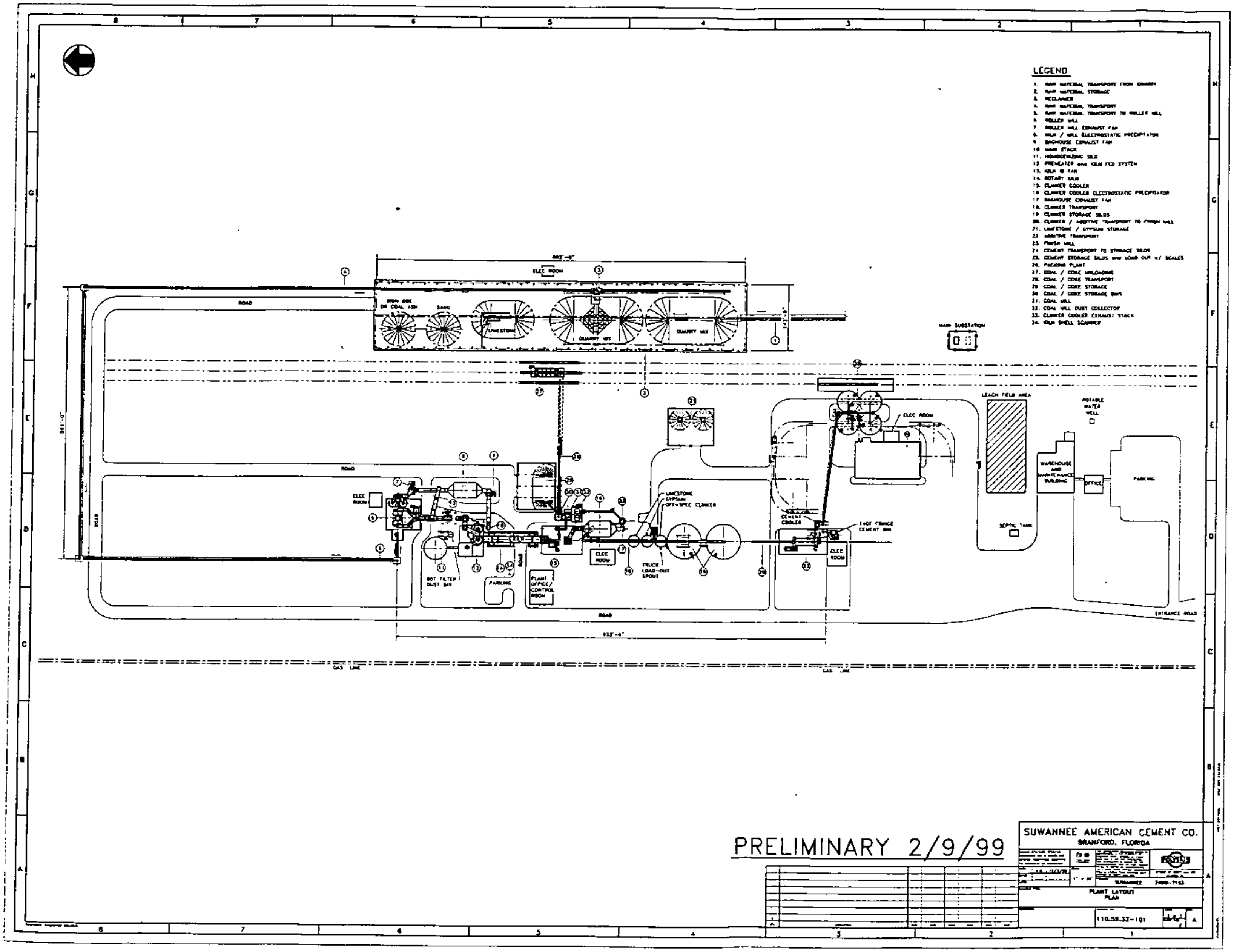


DESIGNED FAD DRAWN TED CHECKED FAD F.A. DARABI P.E. PROJECT ENGINEER	DARABI AND ASSOCIATES INC. 730 Northeast Waldo Road Suite A · Gainesville, Florida 32641 · (352) 376-6533	SUWANNEE AMERICAN CEMENT Co BRANFORD PLANT	ACCESS ROAD	APPROVED FOR D&A BY F.A. DARABI P.E. REG. PROF. ENGINEER

DATE	PROJECT NO
NOV 1998	04100-323-01
SCALE	DWG NO
1"=50'	

LTR | DATE | REVISIONS | BY | APPRD

01/08/99 08:47 ABG 323plan-50sc.dwg


LEGEND
1. RAW MATERIAL TRANSPORT FROM QUARRY
2. RAW MATERIAL STORAGE
3. RECLAIMER
4. RAW MATERIAL TRANSPORT
5. RAW MATERIAL TRANSPORT TO ROLLER MILL
6. ROLLER MILL
7. ROLLER MILL EXHAUST FAN
8. KILN / MILL ELECTROSTATIC PRECIPITATOR
9. BAGHOUSE EXHAUST FAN
10. MAIN STACK
11. HOMOGENIZING SILO
12. PREHEATER AND KILN FEED SYSTEM
13. KILN ID FAN
14. ROTARY KILN
15. CLINKER COOLER
16. CLINKER COOLER ELECTROSTATIC PRECIPITATOR
17. BAGHOUSE EXHAUST FAN
18. CLINKER TRANSPORT
19. CLINKER STORAGE SILOS
20. CLINKER / ADDITIVE TRANSPORT TO FINISH MILL
21. LIMESTONE / GYPSUM STORAGE
22. ADDITIVE TRANSPORT
23. FINISH MILL
24. CEMENT TRANSPORT TO STORAGE SILOS
25. CEMENT STORAGE SILOS AND LOAD OUT W/ SCALES
26. PACKING PLANT
27. COAL / COKE UNLOADING
28. COAL / COKE TRANSPORT
29. COAL / COKE STORAGE
30. COAL / COKE STORAGE BINS
31. COAL MILL
32. COAL MILL DUST COLLECTOR
33. CLINKER COOLER EXHAUST STACK
34. KILN SHELL SCANNER
ELEC ROOM
ROAD
IRON ORE OR COAL ASH
SAND
LIMESTONE
QUARRY MIX
MAIN SUBSTATION
LEACH FIELD AREA
POTABLE WATER WELL
WAREHOUSE AND MAINTENANCE BUILDING
OFFICE
PARKING
SEPTIC TANK
LIMESTONE
GYPSUM
OFF-SPEC CLINKER
CEMENT COOLER
TRUCK LOAD-OUT SPOUT
PLANT OFFICE/ CONTROL ROOM
ENTRANCE ROAD
GAS LINE
PRELIMINARY 2/9/99
SUWANNEE AMERICAN CEMENT CO.
BRANFORD, FLORIDA
PLANT LAYOUT
PLAN
110.58.32-101
A

17. The emission sources used for both the NAAQS and PSD compliance modeling were selected based on the 20D rule. This rule does not consider the additive effects of a number of sources located in the same general location. Review of the 20D rule eliminated sources reveals a few NOx and many PM_{10} sources that may need to be included in the impact modeling emission inventories. In addition, the application of the 20D rule starts at the edge of the significant impact area (7 km in this case) instead of at the center of the facility.

Response:

All inventory sources for PM10 and NOx with suitable information in the Department-provided source list were modeled with the facility. For PM10, 138 additional sources were modeled with the 18 Suwannee American Cement sources. The first-high concentrations are used in the table.

PM10 Modeling Results with all Inventory Sources		
Year & Avg. Period	**Source-Alone, µg/m^3**	**Source + Inventory**
1989, Annual	1.87	2.90
1989, 24-hour	9.86	13.12
1990, Annual	1.76	2.89
1990, 24-hour	9.16	11.04
1991, Annual	1.75	2.71
1991, 24-hour	12.01	13.08
1992, Annual	1.71	2.61
1992, 24-hour	9.68	10.91
1993, Annual	1.73	2.69
1993, 24-hour	11.92	12.47

For NOx, 43 additional sources were modeled with the one (1) Suwannee American Cement source. The first-high concentrations are used in the table.

NOx Modeling Results with all Inventory Sources		
Year & Avg. Period	**Source-Alone, µg/m^3**	**Source + Inventory**
1989, Annual	2.05	3.33
1990, Annual	2.52	3.88
1991, Annual	2.08	3.43
1992, Annual	2.12	3.31
1993, Annual	2.13	3.50

18. Regarding secondary emissions, the PSD application does not address any increase in quarry production due to the operation of the Portland cement facility. Any increase in quarry emissions associated solely with the operation of the cement plant must be included in the cement company's PSD air quality impact assessment.

Response:

The estimated PM10 emissions from the quarry production due to the operation of the cement plant were addressed in the permit application. The quarry emissions associated with the operation of the cement plant have been addressed in the air quality impact assessment.

The quarry emissions were modeled as an area source of PM10:

Name	X	Y	Q	Lx	Ly	Vol
QUARRY	321654	3315618	1.24E-7	402	402	969624

Where:

X is the east-west coordinate for the southwest corner of the quarry
Y is the north-south coordinate for the southwest corner of the quarry
Q is the area source particulate matter emission rate in grams/second/m^2
Lx is the length of the X-side of the quarry in meters
Ly is the length of the Y-side of the quarry in meters
Vol is the volume of the open pit in m^3 (6.0 meter depth)

19. The PSD application does not provide specific modeling emission information associated with the cement company's operation. The individual emission sources for each applicable pollutant should be provided along with the location, emission rates, and stack/vent exit variables (e.g., exit temperature, velocity, etc.) for each appropriate level of operation (e.g., 50%, 75% and 100% loads). Where applicable, the emission rates and exit variables should be provided for each fuel source. The basis for each pollutant emission rate should be provided.

Response:

This information is provided with the response to Item 16. Only 100% operational load was modeled. Typical operation will approach 100% load (see response to Item 11). Emission rates and exit variables are considered to be independent of fuel source.

The basis for each emission rate was provided in the application. For this project, the emission rates used in modeling were those proposed as BACT in the application or suggested by the Department in the information request letter (PM10).

The emission rate of PM10 for the kiln/raw mill is equal to 0.11 lb/ton of dry feed. The emission rate of PM10 for the clinker cooler is equal to 0.07 lb/ton of dry feed. The emission rate used for NOx (45.89 g/s) is equal to 3.8 lb/ton of clinker, which is the proposed temporary NOx emission rate. The emission rate used for SO_2 (3.38 g/s) is equal to 0.28 lb/ton of clinker.. The emission rate used for CO (43.47 g/s) is equal to 3.6 lb/ton of clinker.

20. Lennon Anderson of the Bureau of Air Regulation provided comments related to the MACT determination for the proposed facility. Please provide a proposed MACT pursuant to 40 CFR 63.43(d) and (e). Please provide a MACT analysis including any new, similar emission sources contacted (best performing source).

Response:

This response, in combination with the application and report, constitutes an application for a case-by-case MACT determination. 40 CFR 63.43(c) provides that the MACT emission limitation and requirements established shall be consistent with the principles established in 40 CFR 63.43(d) and supported by the information listed in 40 CFR 63.43(e)

The Administrator has proposed a relevant emission standard pursuant to section 112 of the Clean Air Act. This application for a MACT determination considered those MACT emission limitations and requirements of the proposed standard determination.

APPLICATION FOR A CASE-BY-CASE MACT DETERMINATION

PER SECTION 112(g), CAAA 1990

<u>Introduction</u>

Suwannee Materials Corporation plans to construct a new dry-process, precalciner cement manufacturing kiln near Branford, Suwannee County, Florida.

This is subject to the Prevention of Significant Deterioration (PSD) application review process. The following background information will explain the justification for the submittal of this Application for Case-By-Case MACT determination for this project.

Background

On July 16, 1992, the USEPA published an initial list of source categories for which air toxics emission standards are to be promulgated. By November 2000, the USEPA must develop for all these categories rules that require the maximum achievable reduction in emissions, considering cost and other factors. These rules are generally known as "Maximum Achievable Control Technology" (MACT) standards.

In developing the 1990 Amendments to the Clean Air Act (CAAA), Congress recognized that the USEPA could not immediately issue MACT standards for all of the affected industries and that, as a result, there was a potential for significant new sources of toxic air emissions to remain uncontrolled for some time.

As a result, Section 112(g) of CAAA requires MACT-level control of air toxics when a new major source of any hazardous air pollutant (HAP) is constructed or reconstructed. The permitting authority must determine MACT for the source on a case-by-case basis when the USEPA has not yet issued a final (not proposed) relevant MACT standard.

On December 27, 1996, the USEPA promulgated regulations implementing certain provisions in Section 112(g) pertaining to construction and reconstruction. In accordance with FDEP policy effective July 1, 1997, all owners or operators of major sources of HAPs that are to be constructed or reconstructed in Florida will be required to install MACT.

The proposed project is a Portland cement plant, and the Section 112(d) MACT standard was promulgated March 24, 1998.

Application Requirements for a Case-By-Case MACT Determination

Specified Control Technology

The control technologies selected by Suwannee are:

- For inorganics (including metals) and dioxins/furans: Electrostatic Precipitator (ESP), with control device inlet temperature <400°F.
- For organics: Typically low levels of organic materials in raw materials, and the dry-process precalciner kiln design.

The ESP and the pyroprocessing system, when properly operated and maintained, will meet the MACT emission standards as determined according to the principles set forth in 40 CFR 63.43(d), and specifically 40 CFR 63.43(d)(4), as follows:

> *If the Administrator has either proposed a relevant emission standard pursuant to Section 112(d) or Section 112(h) of the Act or adopted a presumptive MACT determination for the source category which includes the constructed or reconstructed major source, then the MACT requirements applied to the constructed or reconstructed major source shall have considered those MACT emission limitations and requirements of the proposed standard or presumptive MACT determination.*

Name and Address of Source

Suwannee Materials Corporation
Branford Cement Plant
County Road 49 at US 27, east of Branford

Branford, Suwannee County, Florida

UTM Coordinates: Zone 17, 321.4 km East, 3315.9 km North

Brief Description of the Source

Suwannee Materials Corporation plans to construct a new dry-process, precalciner cement manufacturing kiln near Branford, Florida. This kiln has a design capacity of 839,500 tons/year of clinker.

This source is included in the source category *Portland Cement Manufacturing*.

Expected Commencement and Completion Dates for Construction

Expected commencement date for the construction of the source: June 1, 1999

Expected completion date for the construction of the source: June 1, 2001

Anticipated Start-up Date

Assuming completion of construction on June 1, 2001, the start-up of plant operations is anticipated by September 1, 2001.

HAP Emitted by the Source

The HAP potentially emitted from this source were determined from AP-42, and estimated emission rates were provided in the report.

Federally Enforceable Emission Limitations Applicable to the Source

This project will be subject to federally-enforceable emission limitations imposed by NSPS, BACT and MACT. Federally-enforceable emission limitations are anticipated for:

- PM
- PM10
- SO_2
- NOx
- CO
- VOC/THC
- Dioxins/furans

Maximum and Expected Utilization of Capacity of the Source

Typical utilization of capacity for cement kilns is estimated at approximately 85%, with a maximum utilization of 100%.

Recommended MACT Emission Limitations for the Source

The recommended MACT emission limitations for the source are contained in the proposed NESHAP. These limitations were considered in the application and report.

Selected Control Technology

An electrostatic precipitator (ESP) has been selected as the control technology for this plant. An ESP will be used to control emissions from the raw mill and the kiln, with a separate ESP for the clinker cooler. Baghouses will be used to control emissions from materials handling processes.

Technical information on the design, operation, size, and estimated control efficiency of the control technology (and the manufacturer's name, address, telephone number, and relevant specifications and drawings) are included with the response to Item 3.

References

Guidance on the Implementation of the Section 112(g) Program, FDEP--DARM, Howard Rhodes to Distribution List, July 28, 1997.

40 CFR 63.43 -- Maximum Achievable Control Technology (MACT) Determinations for Constructed and Reconstructed Major Sources, USEPA, promulgated December 27, 1996.

Work Group Draft -- 1/3/97, Summary of Proposed Emission Limits for Affected Sources at Portland Cement Plants, faxed from Joe Wood (USEPA) to Lennon Anderson (FDEP) on August 28, 1997. Tables 2, 3, 4.

[Draft 2/14/97] Fact Sheet -- Proposed Air Toxics Regulation for Portland Cement Manufacturing Plants, faxed from Joe Wood (USEPA) to Lennon Anderson (FDEP) on August 28, 1997.

Clean Air Permits -- Manager's Guide to the 1990 Clean Air Act, Thompson Publishing Group, 1991.

AP-42 -- Compilation of Air Pollutant Emission Factors, Fifth Edition, Section 11.6 -- Portland Cement Manufacturing, USEPA, January 1995.

Emission Factor Documentation for AP-42 Section 11.6 -- Portland Cement Manufacturing, Midwest Reassert Institute, May 1994.

Role of Minor Elements in Cement Manufacture and Use, Portland Cement Association, 1995.

Summary of Emission Measurements under Baseline and Coal/TDF Firing Conditions -- Kiln No. 1, Florida Mining & Materials, Brooksville, Florida, Koogler & Associates, May 4-5, 1993 and June 8-9, 1993.

21. In addition to addressing the previous comments from Mr. Anderson, please comment on the likely emissions of hydrogen chloride from the proposed process considering the design, fuels, and raw materials.

Response:

Hydrogen chloride emissions from the proposed process are likely. EPA data show HCl emissions from certain plants of less than 1 tpy, with ten plants reporting emissions of HCl greater than 10 tpy.

Analyses indicate that the ambient concentrations of HCl produced by emissions from existing kilns and in-line kiln/raw mills are below the health effects reference concentration for HCl.

No technologies that control HCl emissions have been identified that are currently being used by more than six percent of the cement kilns in the U.S. For this reason, there is no MACT floor for existing kilns. One technology considered as potential MACT for new kilns was an alkaline scrubber, since two kilns in the U.S. operate scrubbers to control sulfur emissions. However, these scrubbers are operated only intermittently . For this reason there is no MACT floor for new kilns.

Alkaline scrubbers were considered as a beyond-the-floor option for HCl control. Based on the costs of control and the emissions reductions that would be achieved, the Administrator determined that beyond-the-floor controls are not warranted. Therefore, there is no proposed emission limit for HCl from new and existing kilns and in-line kiln/raw mills.[1]

[1] Federal Register: March 24, 1998 (Volume 63, Number 56, Page 14181-14248)]. Proposed Rules. National Emission Standards for Hazardous Air Pollutants; Proposed Standards for Hazardous Air Pollutants Emissions for the Portland Cement Manufacturing Industry; Proposed Rule

22. The NPS commented to the Department that the applicant should re-evaluate the feasibility of applying SNCR to control NOx emissions from its proposed cement kiln. The NPS commented that the applicant incorrectly rejected SNCR by questioning its availability, by failing to document and compare estimated control costs, and by overstating environmental risks associated with the use of ammonia. The NPS suggested that the applicant provide well-documented costs for application of SNCR as well as a comparison to the costs of applying SNCR to the similar Great Star Cement facility. Please address these comments.

Response:

See Responses 6-8.

23. The NPS commented to the Department that the applicant did not perform visibility analyses to evaluate potential impacts to regional haze at Okefenokee or Chassahowitzka wildernesses. The NPS commented that the applicant incorrectly concluded that because predicted impacts to the Class I increments were less than significant, no air quality related values (AQRV) analyses were required. The NPS stated that increment analyses are independent of AQRV analyses; Class I increments were never intended to protect Class I AQRVs. Therefore, the applicant should perform regional haze analyses, following the recommendations of the Interagency Workgroup on Air Quality Modeling at: http://www.epa.gov/scram001/; "Model Support"; "6th Modeling Conference"; "IWAQM". Please address these comments.

Response: Regional haze analyses were conducted for the Okefenokee, Chassahowitzka, and St. Marks wilderness areas. The analysis for St. Marks is included with the response to item 24. These analyses followed the recommendations of the Interagency Workgroup on Air Quality Modeling and also the guidance provided by NPS staff.

The primary purpose of this analysis is to identify regional haze impacts. For sources located more than 50 kilometers from a Class I area, the regional haze analysis is appropriate.

The primary sources of anthropogenically induced regional visibility degradation (also referred to as regional haze), measured as light extinction, are fine particles in the atmosphere. In the eastern U.S., these anthropogenic particles are composed primarily of sulfate (SO_4) compounds, organic compounds, and to a much lesser extent, nitrate (NO_3) compounds SO_4 has been identified as the primary constituent of visibility degradation in the eastern U.S. Therefore, it is critical to have estimates of SO_4 in order to estimate visibility impacts. Estimates of nitrates are also desirable. The methods are based upon analysis of ambient, speciated fine particulate data, correlated with visibility parameters.

The generally observed sulfate compound is ammonium sulfate {$(NH_4)_2SO_4$}, Particles composed of nitrate compounds usually take the form of ammonium nitrate {NH_4NO_3}. These compounds are generally not directly emitted from air pollutant sources, but are formed through a series of chemical reactions in the atmosphere. The gaseous emissions of oxides of sulfur and nitrogen (SO_X and NO_X), ultimately react with natural and anthropogenic emissions of ammonia. In the presence of both SO_4 and HNO_3, $(NH_4)_2SO_4$ will be formed preferentially to NH_4NO_3.

In order to adequately account for the contribution to light extinction of either $(NH_4)_2SO_4$ or NH_4NO_3 the mass of these constituents and the relative humidity of the atmosphere in which these particles reside must be known. The most important constituents in these calculations are the concentrations of sulfate and the relative humidity. The calculations of the extinction due to primary fine particulates are assumed to be non-hygroscopic.[1]

Method – Regional Haze Analysis

I. Apply an appropriate air quality model to obtain 24-hour average concentrations of

- SO_2
- NOx
- PM10

The ISC model was used to evaluate concentrations of PM10, NOx and SO_2 with respect to PSD Class I Area Significance levels. These analyses were documented in the original Report. Further analysis regarding regional haze and other visibility included St. Marks.

The concentrations for the highest 24-hour average sulfate impact were determined by the significance review. The receptor location and date are also obtained. The PM10 concentration at that receptor and date was retrieved. The NOx annual average provided by the significance review is used and multiplied by a factor of 5.0 to estimate 24-hour average impacts.[2]

II. Multiply the 24-hour average estimated concentrations of SO_2 and NO_X by the ratios of the molecular weights of the secondary species to the primary species.

- The molecular weights of SO_2 and SO_4 are 64 and 96. Multiplying the concentration of SO_2 by 1.5 will yield the concentration of SO_4
- The molecular weights of NO_2 and NO_3 are 46 and 62. Multiplying the concentration of NO_2 by 1.35 will yield the concentration of NO_3.

III. Correct the mass concentrations of SO and NO for the presence of NH_4. The PM10 is <u>not</u> be corrected for NH_4.

- Multiply the mass concentration of SO by 1.375 to obtain $(NH_4)_2SO_4$
- Multiply the mass concentration of NO by 1.29 to obtain NH_4NO_3

IV. Obtain an estimate of relative humidity appropriate for all receptors.

Guidance provided by John Notar (NPS-AQD) states to use 80% relative humidity for Florida. The relative humidity correction factor (*f(RH)*) is 3.5.[3]

V. Calculate the extinction based on the following equation.

$$b_{ext} = 0.003 \times concentration \times f(RH)$$

where

b_{ext} = The extinction coefficient due to particle scattering (km^{-1})
0.003 = a nominal dry scattering efficiency
Concentration of $(NH_4)_2SO_4$, NH_4NO_3 and PM10 in $\mu g/m^3$
f(RH) = The RH correction factor.

To calculate the extinction due to PM10, use the above equation, but set the relative humidity correction factor (*f(RH)*) equal to 1.

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[1] IWAQM Guidance on
[2] User's Guides for CTSCREEN and TSCREEN models.
[3] Facsimile memorandum. John Notar (NPS-AQD) to Pradeep Raval (Koogler & Associates). March 29, 1995.

VI. Obtain a value for the background visual range and calculate background extinction (b_{bgd})

Guidance provided by John Notar (NPS-AQD) states to use 65 km for the background visual range. Background extinction (b_{bgd}) is calculated by:

b_{bgd} = 3.912 divided by background visual range = 3.912/65 = 0.0602

VII. Calculate change in deciviews (dV) by the following equation:

$$\Delta dV = \ln (1 + b_{ext} / b_{bgd}) \times 10$$

NPS-AQD personnel stated recently that less than 0.5 dV change is acceptable.

Chassahowitzka NWA – Regional Haze Analysis

The maximum 24-hour average SO_2 concentration was calculated to be 0.0314 $\mu g/m^3$ [February 6, 1993 @ UTM Zone 17, 331.5 km E, 3183.4 km N].

The PM10 concentration at the same location and date was calculated to be 0.0407 $\mu g/m^3$ and the NOx concentration was calculated to be 0.0665 $\mu g/m^3$.

Multiply the concentration of SO_2 by 1.5 will yield the concentration of SO_4.
0.0314 $\mu g/m^3$ x 1.5 = 0.0471 $\mu g/m^3$

Multiply the mass concentration of SO_4 by 1.375 to obtain $(NH_4)_2SO_4$
0.0471 $\mu g/m^3$ x 1.375 = 0.0648 $\mu g/m^3$

Multiply the concentration of NO_2 by 1.35 will yield the concentration of NO_3.
0.0665 $\mu g/m^3$ x 1.35 = 0.0898 $\mu g/m^3$

Multiply the mass concentration of NO_3 by 1.29 to obtain NH_4NO_3
0.0898 $\mu g/m^3$ x 1.29 = 0.1158 $\mu g/m^3$

Calculate the extinction by the following equation:

$b_{ext} = 0.003 \times concentration \times f(RH)$

$(NH_4)_2SO_4$ **NH_4NO_3** **PM10**
= [0.003 x 0.0648 x 3.5] + [0.003 x 0.1158 x 3.5] + [0.003 x 0.0407 x 1.0]

= 0.0007 + 0.0012 + 0.0001 = 0.0020

Calculate change in deciviews (dV) by the following equation:

$\Delta dV = \ln (1 + b_{ext}/ b_{bgd}) \times 10 = \ln (1 + 0.0020/0.0602) \times 10 =$ <u>0.33 dV Change</u>

Okefenokee NWA -- Regional Haze Analysis

The maximum 24-hour average SO_2 concentration was calculated to be 0.0400 $\mu g/m^3$ [February 19, 1990 @ UTM Zone 17, 359.4 km E, 3384.2 km N].

The PM10 concentration at the same location and date was calculated to be 0.0786 $\mu g/m^3$ and the NOx concentration was calculated to be 0.0883 $\mu g/m^3$.

Multiply the concentration of SO_2 by 1.5 will yield the concentration of SO_4.
0.0400 $\mu g/m^3$ x 1.5 = 0.0600 $\mu g/m^3$

Multiply the mass concentration of SO_4 by 1.375 to obtain $(NH_4)_2SO_4$
0.0600 $\mu g/m^3$ x 1.375 = 0.0825 $\mu g/m^3$

Multiply the concentration of NO_2 by 1.35 will yield the concentration of NO_3.
0.0883 $\mu g/m^3$ x 1.35 = 0.1192 $\mu g/m^3$

Multiply the mass concentration of NO_3 by 1.29 to obtain NH_4NO_3
0.1192 $\mu g/m^3$ x 1.29 = 0.1538 $\mu g/m^3$

Calculate the extinction by the following equation:

$b_{ext} = 0.003 \times concentration \times f(RH)$

$(NH_4)_2SO_4$		**NH_4NO_3**		**PM10**
= [0.003 x 0.0825 x 3.5]	+	[0.003 x 0.1538 x 3.5]	+	[0.003 x 0.0786 x 1.0]

= 0.0009 + 0.0016 + 0.0002 = 0.0027

Calculate change in deciviews (dV) by the following equation:

$\Delta dV = \ln (1 + b_{ext}/ b_{bgd}) \times 10 = \ln (1 + 0.0027/0.0602) \times 10 =$ <u>0.44 dV Change</u>

24. In addition to addressing the previous comments from the NPS for the Okefenokee or Chassahowitzka wildernesses, please address these issues for the St. Marks and Bradwell Bay wilderness areas, and perform an increment analysis and analysis of other AQRVs for these areas as well.

Response:

St. Marks NWA -- Regional Haze Analysis

The maximum 24-hour average SO_2 concentration was calculated to be 0.05228 $\mu g/m^3$ [February 6, 1993 @ UTM Zone 17, 331.5 km E, 3183.4 km N].

The PM10 concentration at the same location and date was calculated to be 0.09044 $\mu g/m^3$ and the NOx concentration was calculated to be 0.0883 $\mu g/m^3$.

Multiply the concentration of SO_2 by 1.5 will yield the concentration of SO_4.
0.05228 $\mu g/m^3$ x 1.5 = 0.0784 $\mu g/m^3$

Multiply the mass concentration of SO_4 by 1.375 to obtain $(NH_4)_2SO_4$
0.0784 $\mu g/m^3$ x 1.375 = 0.1078 $\mu g/m^3$

Multiply the concentration of NO_2 by 1.35 will yield the concentration of NO_3.
0.0883 $\mu g/m^3$ x 1.35 = 0.1192 $\mu g/m^3$

Multiply the mass concentration of NO_3 by 1.29 to obtain NH_4NO_3
0.1192 $\mu g/m^3$ x 1.29 = 0.1538 $\mu g/m^3$

Calculate the extinction by the following equation:

$b_{ext} = 0.003 \times concentration \times f(RH)$

$(NH_4)_2SO_4$ **NH_4NO_3** **PM10**
= [0.003 x 0.1078 x 3.5] + [0.003 x 0.1538 x 3.5] + [0.003 x 0.09044 x 1.0]

= 0.0011 + 0.0016 + 0.0003 = 0.0030

Calculate change in deciviews (dV) by the following equation:

$\Delta dV = \ln(1 + b_{ext}/b_{bgd}) \times 10 = \ln(1 + 0.0030/0.0602) \times 10 =$ <u>0.49 dV Change</u>

St. Marks NWA – PSD Incremental Analysis

The concentrations of PM10, SO_2, and NOx at St. Marks are well below the significance thresholds. No further incremental analysis is warranted.

Pollutant	Averaging Period	Max. Concentration $\mu g/m^3$	Significance Level $\mu g/m^3$
PM10	Annual	0.006	0.2
	24-hour	0.142	0.3
SO_2	Annual	0.003	0.1
	24-hour	0.052	0.2
	3-hour	0.300	1.0
NOx	Annual	0.042	0.1

St. Marks NWA – Analysis of Other AQRVs

No other AQRVs have been identified by the Federal Land Manager (FLM) for St. Marks.

Bradwell Bay – Regional Haze Analysis

The Forest Service screening procedure states that visibility has been determined to be an important AQRV in all Class I areas except Bradwell Bay (FL).[1]

Rule 62-212.400(5)(e)(1)(c) requires an analysis of:

> The impairment to visibility, if any, which would occur in any Federal Class I area within 100 kilometers of the facility or modification, with the exception of the Bradwell Bay National Wilderness Area, as a result of emissions from the facility or modification. [emphasis added].

Bradwell Bay – PSD Incremental Analysis

The concentrations of PM10, SO_2, and NOx at Bradwell Bay are well below the significance thresholds. No further incremental analysis is warranted.

Pollutant	Averaging Period	Max. Concentration μg/m^3	Significance Level μg/m^3
PM10	Annual	0.004	0.2
	24-hour	0.095	0.3
SO_2	Annual	0.002	0.1
	24-hour	0.045	0.2
	3-hour	0.190	1.0
NOx	Annual	0.027	0.1

[1] Forest Service

Bradwell Bay – Analysis of Other AQRVs

The Forest Service has developed a list of AQRVs for Bradwell Bay. The list is included in Table 1.

All sensitive receptors for the flora AQRV reference visible ozone injury as the indicator. No levels of concern or critical loads have been identified by the FLM with respect to these other AQRVs.

Table 24-1
Bradwell Bay Wilderness

Air Quality Related Value Information

AQRV Name	Sensitive Receptor Name	Sensitive Receptor Indicator Name	Unit Of Measure
FLORA	BLACKBERRY	OZONE INJURY VISIBLE FROM 6 FT	PERCENT
	STAGHORN SUMAC	OZONE INJURY VISIBLE FROM 6 FT	PERCENT
	SWEETGUM	OZONE INJURY VISIBLE FROM 6 FT	PERCENT
	T & E PLANT SPECIES	PRESENCE / ABSENCE	N/A
	YELLOW POPLAR	OZONE INJURY VISIBLE FROM 6 FT	PERCENT
ODOR	WILDERNESS USERS	UNNATURAL ODORS	N/A
SOILS	SURFACE SOILS	ACID NEUTRALIZING CAPACITY	MICROEQUIV. / LITER
		BASE SATURATION	PERCENT
		CATION EXCHANGE CAPACITY	MILLIEQUIV. / 100GMS
		EXCHANGEABLE ALUMINUM	PARTS PER MILLION
		EXCHANGEABLE CATIONS	PARTS PER MILLION
		NITRATE	MILLIGRAMS PER LITER
		SOIL PH	PH
		SULFUR	PERCENT

25. The segment description of the application for the in-line kiln/raw mill for natural gas usage shows the proposed maximum annual rate is equivalent to operating the pyroprocessing system continuously on natural gas. This is inconsistent with the segment comment that natural gas is to be used as a startup and supplemental fuel. Please comment. Also, please evaluate the feasibility of operating the pyroprocessing system exclusively on natural gas, or primarily on natural gas with coal and petcoke used for supplemental or backup fuels. Provide an estimate of emissions of all pollutants under these scenarios. Please provide an estimation of the number of truck trips that would be reduced by these scenarios considering the offset of coal and petcoke that must be delivered to the proposed plant site by truck.

Response:

According to Krupp Polysius, use of natural gas as a primary fuel (i.e., 100 percent of the fuel input to the main kiln burner, the kiln inlet burner and the precalciner burner) will result in about a 10 percent volume increase in the combustion products, an increase in the water vapor in the exhaust gas and, as a result, a decrease in the clinker production by as much as 20 percent. This production decrease is a product and financial penalty that Suwannee American cannot afford.

Total gas firing would lead to greater thermal NOx generation at the main kiln burner but lower fuel NOx. As a result, the net NOx emissions from the kiln burner will remain approximately the same as with coal firing (pounds of NOx per ton of clinker). The 20 percent capacity reduction would however result in a decrease in mass emission rate of NOx from the kiln burner.

Krupp Polysius does not have much experience with MSC in gas fired calciners. It is expected, however, that if Suwannee American was to switch to 100 percent gas firing at the kiln inlet burner and in the precalciner, the overall mass emission rate of NOx would stay about the same or decrease slightly (as a result of the 20 percent decrease in production). The pounds of NOx per ton of clinker is anticipated to be higher than with 100 percent coal firing.

The principal of MSC as applied to NOx reduction is the creation of a reducing zone (low oxygen in the presence of free radicals) between the kiln inlet in the upper stages of the precalciner. Firing natural gas at the kiln inlet burner and in the precalciner can be accomplished under starved oxygen conditions; however, natural gas combustion will not generate the free radicals that a fuel with more volatiles will generate (e.g., tires and coal).

The most practical mode of operation, if natural gas was considered as a fuel, would be the firing of 50-60 percent gas at the main kiln burner and with the remaining 40-50 percent of the total system heat input provided in the precalciner by coal or a mix of coal and tires. This mode of operation would allow the MSC system to operate most effectively as more free radicals and longer chain hydrocarbons are released from the combustion of tires and coal and from the combustion of natural gas.

For either of the scenarios (100 percent gas firing or a gas/coal/tires mix), the mass emission rate of NOx is expected to stay about the same as expected from coal/tire firing and the mass emission rates of SO_2 and CO are expected to be reduced somewhat. Reduced SO_2 and CO emissions are a result of the decreased production and not a lower SO_2 and CO emission rate per ton of clinker produced. There will be no significant reduction in SO_2 emission (pounds of SO_2 per ton of clinker) due to the firing of natural gas as SO_2 emissions from precalciner kilns are due to sulfur in the raw feed and not sulfur in the fuel.

In summary, the firing of 100 percent natural gas will result in a production decrease of approximately 20 percent. As a result of the reduced production, the SO_2 emissions (pounds per hour) and the CO emissions rate (pounds per hour) are expected to decrease. The emission rate of SO_2 and CO per ton of clinker produced are not expected to change. Even with the expected production decrease, the mass emission rate of NOx is not expected to decrease and the NOx emissions per ton of clinker are expected to increase. This is because of the decrease efficiency of the MSC system as a result of natural gas firing.

If the plant were to operate entirely on natural gas, approximately 14 round-trip truck trips per day (for coal/coke delivery) would be eliminated. Fourteen truck trips per day at a facility the size of the Suwannee American plant and on the highways serving the plant are not considered significant or excessive.

26. Please evaluate the feasibility of using low NOx burner technologies such as precessing gas jet burners (Gyro-Therm from Fuel and Combustion Technology, Inc.) or other burner technologies. Please provide a detailed cost analysis for these technologies in terms of overall and marginal cost effectiveness (annualized dollars/ton of nitrogen oxides removed) for NOx control using these technologies, including all references and assumptions.

Response:

Low NOx burner technology, as commonly used in power plants, has not been found effective in the cement industry. Krupp Polysius has installed and operated, at client's request, numerous "Low NOx" burners in cement kilns around the world. These burners are always the main burner and are commonly provided from Pillard (Rotaflam) or from KHD (Pyrojet). The only way these burners have demonstrated significant NOx reduction is through reduced heat output of the burner and the associated decrease in production. The quality of the clinker is dependent upon the quality of the main burner flame, consequently resulting in a short, compact, intense flame which generates thermal NOx. The best control method to reduce the thermal NOx in a precalciner kiln is to operate the calciner with reducing zones to reduce the NOx back to N_2. This is best accomplished with Multi-Stage Combustion. Krupp Polysius has no evidence of any main burner that appreciably reduces NOx without reducing capacity or that reduces the overall NOx emission of precalciner plants, as well as MSC.

27. The NPS has commented that Holnam Cement in Colorado is proposing a new cement plant using a wet scrubber at 85% efficiency to control SO_2 and has requested that you evaluate installation of a wet scrubber for your proposed project.

Response:

See responses to Item 5 and Item 21.

A press release from Holnam states that the installation of a scrubber at their Dundee, Michigan plant was to eliminate odors. The press release further states that the odors stem from the limestone raw material that contains oily compounds in the rock formation.

The raw materials (limestone) at the Suwannee American Cement plant have consistently low levels of organic materials, and essentially no pyritic sulfur. Very low emission rates of SO_2 are expected from this plant due to the alkaline environment of the pyroprocessing system.

The system and raw materials proposed for the Suwannee American Cement plant represent BACT for SO_2.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

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

David B. Struhs
Secretary

February 16, 1999

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Joe Anderson, III
President
Suwannee American Cement Company, Inc.
PO Box 410
Branford, Florida 32008

Re: Additional Request for Additional Information
DEP File No. 1210465-001-AC (PSD-FL-259)
Proposed Portland Cement Plant

Dear Mr. Anderson:

The Department previously sent letters dated December 29, 1998 and January 8, 1999 requesting additional information required to make your application complete for an air construction permit for a Portland cement plant at US 27 at County Road 49, east of Branford. The Department has received additional comments from the National Park Service (NPS) regarding this application. Please also provide a response to the NPS comments. Should your response to any of the below items require new calculations, please submit the new calculations, assumptions, reference material and appropriate revised pages of the application form.

1. The NPS has commented that Holnam Cement in Colorado is proposing a new Portland cement plant using a wet scrubber at 85% efficiency to control SO_2 and has requested that you evaluate installation of a wet scrubber for your proposed project.

The Department has also received a letter regarding phosphate mining wastes at or near your proposed project site. A copy of that letter is enclosed. Note that I contacted the Florida Department of Health's (DOH) office of Environmental Radiation Programs (407/297-2095) and spoke with Mr. Charlie Adams about this matter. Mr. Adams told me that waste from phosphate mining is often slightly radioactive (elevated gamma radiation) and that typically the only problem associated with such waste is radon accumulation in enclosed, unventilated structures. He also stated that DOH does not believe that there is scientific evidence that elevated gamma radiation is generally an environmental problem, but he does recommend that the property owner have the property surveyed for gamma radiation. Since this is a DOH matter, this information is being provided to you as a courtesy and should not be construed as a request of the Department.

Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. If there are any questions, please call me at 850/921-9519.

Sincerely,

Joseph Kahn, P.E.
New Source Review Section

/jk

Enclosure

cc: Mr. Frank Darabi, P.E.
Mr. Steve Cullen, P.E.
Mr. Gregg Worley, EPA
Mr. John Bunyak, NPS
Mr. Chris Kirts, NED
Mr. Jim Stevenson, DEP Ecosystem Mgmt.
Mr. Tom Workman, DEP Recreation & Parks
Ms. December McSherry
Mr. Svenn Lindskold
Mr. Tom Greenhalgh
Mr. Al Mueller
Mr. Dave Bruderly
Mr. J. Calvin Gaddy
Ms. Patrice Boyes, Esq.
Mr. Chris Bird, Alachua County DER
Ms. Kathy Cantwell
Mr. Chuck Clemons, Chairman, Alachua Co. Board of Co. Commissioners

P.O. Box 147
St. James City, Fl. 33956

RECEIVED

JAN 14 1999

BUREAU OF
AIR REGULATION

BOARD OF COUNTY COMMISSIONERS
Suwannee County Offices
224 Pine Ave.
Live Oak, Fl. 32060

Ref: ANDERSON MINING COOP.
AND
SUWANNEE AMERICAN CEMENT CO. INC.

Please be advised property shown on applicant notice was in or very near a staging area used by T.A. Thompson's processing plant for hard rock phosphate. Proof of this would be high radiation count on said property. This operation was in late 1895 - 1918 era.

Slag from this operation would also be radioactive and should never be used for anything.

Use of that property for anything other than farming and lime rock mining is not in the best interest of the people of your county.

Please seek advice from the Radiation Division of Dept of Health, phone No. 800-543-8279, before taking action in this matter.

Sincerely,

J. Calvin Gaddy

cc:
Senator, Burt Saunders
Jax.office DEP
Tall. Dept.of Health

RECEIVED

DEC -7 1998

DEPT. OF ENV. PROTECTION
NORTHEAST DISTRICT - JAX

Is your RETURN ADDRESS completed on the reverse side?

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

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery

Consult postmaster for fee.

3. Article Addressed to:
Joe Anderson, III, Pres.
Suwannee American Cement
PO Box 410
Branford, Fl 32008

4a. Article Number
P 265 659 422

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

7. Date of Delivery
2/26/99

5. Received By: (*Print Name*)

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

6. Signature: (*Addressee or Agent*)
X [signature]

PS Form 3811, December 1994 102595-97-B-0179 Domestic Return Receipt

Thank you for using Return Receipt Service.

P 265 659 422

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

Sent to Joe Anderson	
Street & Number Suwannee Ameri.	
Post Office, State, & ZIP Code Branford, Fl	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to Whom & Date Delivered	
Return Receipt Showing to Whom, Date, & Addressee's Address	
TOTAL Postage & Fees	$
Postmark or Date 2-16-99 POD-F1-259	

PS Form 3800, April 1995

Date: 02/10/1999 1:46:44 PM
From: Alvaro Linero TAL
Subject: FWD: Fwd:Suwannee Cement
To: Joseph Kahn TAL

See Park Sevice message. Al.

Date: 02/10/1999 8:50:19 AM
From: Ellen_Porter
Subject: Fwd:Suwannee Cement

Al, please see note below.

______________ Forward Header ______________
Subject: Suwannee Cement
Author: Don Shepherd
Date: 02/09/1999 12:11 PM

Ellen,

Since we submitted comments on Suwannee, I have learned that Holnam Cement in Colorado is proposing a new portland cement plant using a wet scrubber at 85% efficiency to control SO2. I suggest that we send along a message to FDEP requesting that Suwannee evaluate installation of a wet scrubber there.

Don

RFC-822-headers:
Received: from oriole.itc.nps.gov by EPIC66.DEP.STATE.FL.US (PMDF V5.1-4 #7204)
 with ESMTP id <01J7KRFH5QWG002W6N@EPIC66.DEP.STATE.FL.US> for
 linero_a@dep.state.fl.us; Wed, 10 Feb 1999 11:06:06 EST
Received: from ccmail.itd.nps.gov (ccmail.itd.nps.gov [165.83.216.134])
 by oriole.itc.nps.gov (8.8.7/8.8.7) with SMTP id MAA06236 for
 <linero_a@dep.state.fl.us>; Wed, 10 Feb 1999 12:12:38 -0500
Received: from ccMail by ccmail.itd.nps.gov
 (IMA Internet Exchange 2.12 Enterprise) id 000DE13A; Wed,
 10 Feb 1999 10:57:01 -0500
Content-description: cc:Mail note part

Board of County Commissioners

Kurt Larsen, AICP
Growth Management
Director

Richard E. Wolf
Director
Codes Enforcement

Wendy V. Kinser
Principal Planner
Development Services

Ken Zeichner
Principal Planner
Comprehensive Planning

Marilyn Wagener
Director
Tourist Development

ALACHUA COUNTY
DEPARTMENT OF GROWTH MANAGEMENT

[illegible] 2nd Avenue • Third Floor • Gainesville, Florida 32601-6294
Tel: (352) 374-5249 • Fax: (352) 338-3224
Suncom: 651-5249
Home Page: www.co.alachua.fl.us

January 29, 1999

Florida Department of Environmental Protection
Division of Air Resource Management
2600 Blairstone Road
Tallahassee, FL 32399-2400

Gentlemen:

Please add the Alachua County Board of County Commissioners to your notification list for the proposed cement plant in Suwannee County. The Board would like to receive a copy of the permit application (1210465-001-AC) and all responses.

Please direct the information to the following person:

Chuck Clemons, Chairman
Alachua County Board of County Commissioners
P. O. Box 2877
Gainesville, FL 32602
(352) 374-5210

Thank you for your attention to this matter.

Sincerely,

Wendy V. Kinser

Wendy V. Kinser, AICP
Chief of Development Services

WVK/hec

xc: Kurt Larsen, AICP, Director of Growth Management

Attachment