STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

IN RE: APPLICATION FOR POWER PLANT CERTIFICATION OF FLORIDA POWER CORPORATION POLK COUNTY SITE PA 92-33	)	DOAH CASE NO. 92-5308 EPP OGC CASE NO. 92-1494

FLORIDA POWER CORPORATION'S NOTICE OF FILING RESPONSES TO SUFFICIENCY QUESTIONS OF THE DEPARTMENT OF ENVIRONMENTAL REGULATION AND SUPPLEMENTAL INFORMATION AMENDING THE SITE CERTIFICATION APPLICATION

Applicant, Florida Power Corporation (FPC), by and through its undersigned counsel, hereby gives notice of filing its responses to the comments and questions of the Department of Environmental Regulation (DER) contained in DER's October 19, 1992, letter regarding the sufficiency of the Site Certification Application. FPC's responses are contained in a one-volume document dated November 1992. These responses are submitted in accordance with Section 403.5067, Florida Statutes (1991).

Also included in the sufficiency responses is the supplemental information amending the Site Certification Application. This supplemental information is set forth in Exhibit B to DER Sufficiency Comment 82 (Exhibit FDER-82) and provides information on three alternate corridor segments which have been added to the proposed natural gas pipeline corridor in Polk County. This supplemental information is being provided pursuant to the Notice of Amendment to Site Certification Application and Stipulated Motion to Alter Time Limits filed by FPC with the Division of Administrative Hearings and served on DER and all other parties on November 17, 1992.

RECEIVED
NOV 30 1992
D. E. R.
SITING COORDINATION

Respectfully submitted this 30th day of November, 1992.

HOPPING BOYD GREEN & SAMS

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- and -

Pamela I. Smith
Corporate Counsel
FLORIDA POWER CORPORATION
3201 - 34th Street, S.
Post Office Box 14042
St. Petersburg, FL 33733-4042
813-866-5777

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing has been included in FPC's Sufficiency Responses, and additionally has been furnished to the following by U. S. Mail, postage prepaid, this 30th day of November, 1992:

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Lawton Chiles, Governor

Carol M. Browner, Secretary

October 19, 1992

Ms. Diane K. Kiesling
Division of Administrative Hearings
The Desoto Building
1230 Apalachee Parkway
Tallahassee, Florida 32399-1550

Re: Florida Power Corporation Polk County Site,
DOAH Case No. 92-5308EPP, PA 92-33

Dear Ms. Kiesling:

The Florida Department of Environmental Regulation has reviewed the Florida Power Corporation (FPC) Polk County Site application for sufficiency pursuant to Section 403.5067, F.S. The Department in conjunction with reviewing agencies finds the application to be insufficient in a number of areas. The sufficiency comments from the Department of Community Affairs, Southwest Florida Water Management District, Polk County, Central Florida Regional Planning Council, Department of Natural Resources, and Department of Transportation are attached and incorporated herein.

The following are comments from the DER:

1. The emission calculations for the criteria and non-criteria pollutants are not adequately shown in the application. All calculations affecting emissions should be shown in their entirety, and not just summarized in tabular form. This includes showing the equations used, assumptions made and any supporting documents for emission calculations.

2. Please propose a maximum value for fuel bound nitrogen (FBN) for both natural gas and fuel oil. Also, calculate the maximum NOx emissions based upon the proposed maximum value for FBN for the Integrated Coal Gasification Combined Cycle (IGCC) unit, Pulverized Coal (PC) boiler and the Thermal Oxidation (TO) units.

3. Please submit a detailed process flow diagram for the IGCC unit showing the volumetric air flow rates for each stream when burning fuel oil and coal derived gas. Also, submit the same for the PC boiler when burning coal.

4. Please provide the net heating value of the gas being combusted by the flare, the exit velocity of the flare and what device will be used to detect the presence of a flame.

5. The applicant did not provide an economic evaluation

or the cost effectiveness of the various control technologies for the BACT analysis. Without the presentation of an economic evaluation of the different control technologies for the regulated pollutants, the BACT analysis is not complete. Please provide the necessary information to do a meaningful BACT evaluation based on the cost effectiveness of the various technologies.

6. Please provide the overall IGCC NOx emission rate in lbs/MMBtu including the IGCC Combustion turbine and the Thermal Oxidation Units.

7. Please provide a detailed analysis of all the fugitive sources and emissions to include particulate matter emissions from coal handling sources, IGCC process sources and any other pollutant emissions from process vents, etc. The emission calculations should be shown in their entirety, including the equations used, assumptions made and any supporting documents used for emission calculations.

8. Please provide the Summary Air Quality Analysis information for Section 10.6 in Volume 6.

9. The applicant needs to supply the stack parameters and emission rates for each source in each of the various emission inventories.

10. A detailed listing of which sources were combined for modeling purposes and a listing of the combined sources' stack parameters and emission rates are needed.

11. A copy of the complete analysis (including data and calculations) used to determine the particulate matter background concentrations for both the annual and 24-hour averaging periods is needed.

12. The applicant must submit a complete comparison of predicted source impacts with the appropriate de minimus value.

13. Printouts of the particulate matter significant impact area modeling for the years 1982 through 1985 must include the entire printout, including input parameters.

14. The particulate matter significant impact area modeling did not include the four thermal oxidation units. This omission needs to be explained.

15. Table 5.6.1-23 reports maximum concentration for NOx, SO_2, PM, Be, H_2SO_4 and As. How were these values obtained? The modeling submitted does not directly address these values. Include any calculations or assumptions used to obtain any values not explicitly modeled.

16. The modeling for the PSD increments and the AAQS analyses need to be redone to include additional sources,

such as TECO's proposed Polk Power Station.

17. Modeling for the 1 g/s, 8-hour average case was omitted for the years 1982 through 1985. Modeling for the 1 g/s, 1-hour average case was omitted for the years 1982, 1983, 1985, and 1986. Please explain this omission.

18. What formulations were used to obtain the predicted impacts presented in Tables 5.6.1-28, 5.6.1-44, and 5.6.1-45? A detailed explanation of each calculation must be supplied.

19. Please submit the complete modeling run for the VISCREEN exercise.

20. It is not appropriate to use the era's significant impact levels for the PSD Class I analysis. The National Park Service's significance levels should be used for this analysis.

21. Table 5.6.1-7 lists the PC stack gas exit velocity for both the 50% and the 75% load cases as 80 ft/s (24.38 m/s). The modeling for these two cases used exit velocities of 13.96 m/s and 20.47 m/s, respectively. Which set of velocities is correct?

22. On pages 5.6-18 and 5.6-19, the applicant notes that, for arsenic, the maximum predicted annual ambient impact exceeds the annual No Threat Level, which is based on a risk of one in a million from 70 years of continuous exposure. An adjustment is made to reduce the risk estimate by factoring the economic lifetime of the proposed facility against the 70 year lifetime risk estimate. This calculation results in a 30/70 reduction of the risk estimate, bringing it below the one in a million risk based No Threat Level.

The Department does not allow for this type of adjustment because the No Threat Levels are not designed to be adjustable to various plant operating schedules. That is, a facility that operates for 35 years does not represent half the risk of a similar facility that operates for 70 years and therefore, it is not appropriate to allow it to emit twice as much.

23. The applicant notes that the maximum annual concentration and risk of arsenic drops to much lower levels at the location of the nearest residence and that "more refined modeling would undoubtedly reduce the impact further." What further modeling can be done and would it show that the maximum annual concentration at the fenceline meets the Annual No Threat Level without the plant lifetime adjustment? If not, what other measures can the applicant take to further reduce the maximum annual concentration at the fenceline?

24. The Department's annual No Threat Level for Chromium VI is 8.3E-06 ug/m^3. The applicant has adjusted the total chromium emissions from bituminous coal combustion by an

"EPA emission factor" to drive the Chromium VI emissions. This derived value is 2.3E-06 ug/m^3 which is three times lower than the No Threat Level. Please provide documentation to support this derivation.

25. The Class III surface water criteria cited in Table 2.3.4-6 do not incorporate recent (June 18, 1992) revisions to Rule 17-302.560, F.A.C. FPC should update Table 2.3.4-6 to reflect the revised Class III surface water criteria.

26. Provide a more complete description of the quantity and final off-site disposition of the waters seeping from the cooling pond. Consider near-term and long-term plans for the size of the cooling pond. Will there be collection ditches surrounding the cooling pond?

27. Over the life of the proposed facility, how will the water quality characteristics described in Table 3.5.1-5 vary?

28. Will any of the current NPDES permits for the site (IMC Noralyn, IMC Phosphoria, Estec Silver City, and USAC Rockland Mine) be required to be maintained (as monitoring stations for off-site flows)? Would any new NPDES outfalls be created for these sites due to the proposed construction?

29. A construction inspection program and a post construction inspection/operation program for all dams should be developed in accordance with 17-672, F.A.C.

30. Provide calculations to confirm that the clay slimes liner for the brine pond will provide an equivalent clay liner to that required by Chapter 17-701, F.A.C., at the thinnest layer.

31. A quality assurance plan will be required for the installation of the synthetic liner system in accordance with Chapter 17-701, F.A.C.

32. Figure 3.4.4-4 shows a wastewater biological treatment unit off the coal gasification process. Please provide design details for this system.

33. What process will be used to treat leachate from the brine pond and what criteria will be used to determine if the leachate water quality is acceptable to return to the system.

34. Will emergency outfall structures be provided for the cooling pond and brine pond systems?

35. Run off from the miscellaneous plant drain and potential spills will be treated through an oil/water separator. Please provide details in regards to the efficiency of the proposed system. Evaluate the alternative to connect the effluent from the oil/water separator to the wastewater pretreatment system or the recycle basin for

additional treatment of the effluent.

36. Please describe in detail the Wastewater Biological treatment process.

37. Secondary containment has been proposed around site facilities containing significant amounts of oil. Please explain if the proposed containment system will hold 110% of the volume of the largest tank in case of any spill or tank failure.

38. The following information must be included in the site certification application in order to allow for review of the proposed option for an on-site potable water system:

A. Complete and fully executed application [D.E.R. Form 17-555.910(1)] pursuant to the requirements of F.A.C.Rule 17-555.520(1);

B. Well driller's well completion report for construction of each well to be approved as a potable water supply source pursuant to F.A.C. Rules 17-555.500 and 17-555.520(1), (3), and (4);

C. Analysis of the raw water from each well to be approved as a potable water supply source for primary inorganics, primary volatile organics, turbidity, radionuclides, and unregulated organic contaminants pursuant to F.A.C. Rules 17-555.500, 17-555.520(1), (3), and (4), and .530(1) (a);

D. Engineering construction drawings which include well head detail, raw water transmission line(s), treatment elements, storage facilities, and finished water transmission lines pursuant to F.A.C. Rule 17-555.520(4) (c);

E. Site plan showing all proposed and existing features within a complete two hundred (200) foot radius of each potable supply well in order to demonstrate compliance with F.A.C Rule 17-555.312 pursuant to F.A.C. Rules 17-555.500,.520, and .530; and

F. Complete specifications of the potable water system or material and workmanship pursuant to F.A.C. Rule 17-555.520(3) and (4) (d).

39. The following information must be included in the site certification application in order to allow for review of the proposed option for the use of a municipal water supply:

A. Complete and fully executed application [D.E.R Form 17-555.910(1) or 17-555.910(7)] pursuant to the requirements of F.A.C. Rule 17-555.520(1);

B. Engineering construction drawings of the on-site and off-site water transmission lines to the point of connection with the municipal line(s) pursuant to F.A.C. Rule 17-555.520(4) (c); and

C. Complete specifications of the potable water system for material and workmanship pursuant to F.A.C. Rule 17-555.520(3) and (4)(d).

40. The Department requires the following documentation for filing construction permits for domestic wastewater treatment/disposal facilities:

A. DER Form 17-600.910(1), Application to Construct a Domestic Wastewater Facility.

B. DER Form 17-610.9101, Application to Construct a Reuse/Land Application System.

C. DER Form 17-640.900(1), Agricultural Use Plan, or DER Form 17-640(2), Dedicated Disposal Site Plan.

D. Preliminary Design Report, in accordance with Section 17-600.710, FAC. (Minimum Class III Reliability features must be indicated. A Reduced Pressure Zone Backflow Preventer must be designated for potable water isolation.

E. An Engineering Report, in accordance with Section 17-610.310 for disposal/reuse.

F. 8 1/2" x 11" copies of: (a) WWTP and effluent site locations, (b) sludge disposal site, indicating all public or private drinking water wells within 0.5 miles, (c) roadmap, or drawing of roads leading to the WWTP, (d) flow process diagram, showing all piping and tank volumes.

41. Geotechnical boring records included within SCA are thorough and concise. However, no loss of circulation (LOC) zones or intervals have been documented. Should any LOC zones have been encountered these should also be documented. The Department requests that copies of the drillers' personal logs be photocopied and submitted.

42. Three investigative borings were conducted in the vicinity of the proposed brine storage pond in order to investigate the potential for sinkhole development. However, this information alone is not sufficient. The Department remains concerned with the potential of sinkhole development due to hydraulic and physical loading of the proposed cooling pond. Several fracture traces have been interpreted within and around the proposed pond areas, including an intersection of two fracture traces within the cooling pond area. Since cover-collapse or cover-subsidence sinkhole development within the pond boundaries or along the berms could potentially catastrophically contaminate waters of the State the FPC should provide additional information on the potential for sinkhole development within the pond

boundaries. Additional borings or surface geophysical methods, within the pond areas, are suggested for consideration.

43. The results of the model indicate that significant potential drawdown impacts to 82 neighboring wells are likely to occur. The majority of these wells are categorized for use as potable water supply or irrigation supply. However, the FPC states that the actual results would differ from the modeled results and be minimal. Whereas the results of the model have not been refuted, the FPC effectively does not accept the model results. The FPC states that ground water usage will decline at a faster rate than the projected growth rate thereby offsetting the potential impact due to the facility's ground water withdrawal. However, no values were assigned to this reduction of the predicted results. Additionally it is stated in the SCA that the drawdown impacts would be mitigated as compared to the model results should the mean daily withdrawal rate be considered. It should also be noted that the projected peak withdrawal rate of 31.6 MGD is approximately 19% greater than the projected mean daily demand of 26.6 MGD. Although the FPC has qualified the mitigation consideration the FPC did not provide any quantification. The FPC should indicate how the areal extent of the zone of influence would be reduced for this rationale to be reviewed. The rationale for the minimization of the predictive model ground water withdrawal impact is not adequately quantified nor have results been provided for the estimated impact based on this rationale. The FPC should sufficiently quantify this rationale or run the model again with what the FPC considers to be more accurate parameters.

44. The data sets used to run the final MODFLOW simulations are requested in a 3.5 inch floppy disk format.

45. The reverse osmosis system in combination with the brine concentration system is anticipated to yield a final waste stream concentration 30 to 40 times the native TDS levels. The results of the seepage model indicate that 140,000 gpd of effluent will seep from the pond. A portion of this effluent will recharge the intermediate aquifer. Therefore the Department considers lining of the pond necessary in order to provide reasonable assurance that the waters of the State will be protected form potential contamination.

46. The GWMP is proposed only for the construction phase of the facility and is not acceptable since the potential for contamination exists so long as the plant continues to operate. Therefore a revised GWMP is necessary.

47. The FPC states that the aquifer storage and recovery is not currently part of the the plant system design. The Department interprets this statement to mean the FPC no

longer wishes to consider an injection well system as part of the SCA.

48. Should shallow well (Class V) injection be considered in the future the appropriate application and fee shall be submitted to the Southwest District office.

49. FDER jurisdictional wetland areas cannot be adequately interpreted from the drawings and aerial photographs supplied in the application. Please identify on a large scale (1:200 or larger) aerial FDER jurisdictional wetland areas which are anticipated to be encroached upon. Cross-hatching these areas with a fine tip marker would suffice. Consideration should be given to the power plant build out area, gas pipeline installation and reclaimed water line installation.

50. Section 6.1.7.2 of the application states that wetlands associated with ditches along C.R. 555, C.R. 630 and wetlands associated with phosphate mining line within the transmission line corridor. Are these wetland areas to be impacted by the installation of transmission structures or by the removal of existing 230 kV transmission structures? If so, please consider clear spanning these areas as proposed within the McCullough Creek region.

51. Section 6.1.3 describes how unpaved finger roads, approximately 25 feet in width, may be required for construction and access within wetland areas. Alternative construction methodologies exist which might be employed to eliminate the finger roads thus minimizing wetland impacts. Please discuss utilizing alternatives such as heli-transport for installing transmission structures within jurisdictional wetland areas.

52. Wetland right-of-way clearing and access as discussed within section 6.1.8.1 will involve clearing an "area around each structure to avoid conflict with the foundation installation." Approximately what area would require clearing around the foundation and could this area be further minimized?

53. A variety of construction techniques exist for the installation of gas pipelines and water lines. Some are more desirable when attempting to minimize environmental impacts while working within wetland areas. Please discuss construction methodologies such as trenching which may be implemented to further reduce wetland encroachment.

54. The "pit" dewatering system described in section 4.3.1.3 exhibits a potential to impact various surrounding wetland regions such as Camp Meeting Ground Branch and McCullough Creek headwaters. If monitoring of these regions indicates the recharge barriers are not functioning as predicted what contingency plans might be implemented to restore the hydrology within these environmentally sensitive areas?

55. Compensation for disturbance of wetland areas was touched upon with the application; presented as enhancement. FDER jurisdictional impacts have not been totally quantified. The area of impact along with the type and quality of wetland systems must be determined to establish criteria for mitigation. A detailed mitigation plan should be submitted addressing planting elevations, hydrology, species to be installed, amount of plant installation, and a comparison of how closely the mitigation will offset accrued impacts.

56. We must receive compaction and geotechnical data from the construction of the existing phosphate ponds you intend to use. The original specifications for the construction would be needed in addition to the QA/QC documents. A typical specification should include proctor density (e.g. 95% modified) and lift thickness of compacted fill (e.g. 10 inches or less). If these documents are not available the ponds will be unacceptable for use.

57. The brine pond will undoubtedly receive RCRA regulated substances at times. Please tell us what these substances will be (i.e., amines, vanadium, acid, cleaning solvents, heavy metals, etc.)

58. The brine pond must be totally lined to RCRA standards and the bottom compacted to 95% modified proctor density. The plans for leachate collection and the leak detection system must be submitted.

59. The solid waste disposal area must be lined to solid waste standards and a leachate collection system installed.

60. Please refer to p.3.2-5 in the last paragraph. Will the berms referred to handle the 100 year storm event? Are all fluid containment systems designed for the 100 year storm? Please refer to paragraph 3.3.4 on page 3.3-3 regarding the coal pile run-off area. Design for a ten year storm is inadequate for environmental protection.

61. TCLP analysis must be performed on all solid waste produced including but not limited to slag, ash, and any sludge produced.

62. Since a geotextile and geonet underliner are already being put under the liner for the coal pile run-off area, it would be relatively easy to include a leak detection system. Also, using clay as the prepared subgrade material and compacting it to 95% modified proctor density would be better liner protection (para. 3.3.4).

63. The permeable drainage overliner for the coal pile area must be specified to be non-angular so as to prevent puncture of the liner. Placing geotextile over the liner would be desirable also but slope stability must be considered.

64. The run-off pond system should be hydrotested, as should any lined pond. Details of all ponds and liner systems are needed.

65. SCR will produce a number of amines. Please list those that may be produced and which are hazardous materials. Will ammonia vandate be produced? (Listed a P119).

66. If permanent damage to the catalyst occurs (p.3.4-7) will the vandium all be wasted? How will you dispose of it? Who will dispose of it and where?

67. Speculative accumulation of vanadium peotoxide is regulated under RCRA. Please list all hazardous catalysts and accumulation and storage schedule. Also detail storage facilities as applies to RCRA regulated chemicals for speculative accumulation.

68. What is the "downflow catalyst" referred to at the bottom of p. 3.4-11?

69. On p. 3.4-13, it refers to "off line water washings are necessary to remove soluble deposits." Is any cleaning solvent used? What hazardous materials (i.e., amines, vanadium) will be present in the washwater? Where does the solution go?

70. Again in p.3.4-13, where does the arsenic go? Is it washed into the cleaning solution? What is the likely concentration?

71. On page 3.4-23, there appears to be potential for hazardous constituents in the fabric filter. TCLP should be performed on these solids collected (bottom of page).

72. In figure 3.5.1-35, it refers to "dozer placed fill". All fill placed in an embankment or under a pond or under a waste area must be compacted to 95% modified proctor density.

73. Please show cross sections and details for the neutralization basin mentioned in para. 3.6.2.5. What will be the thickness of the polyethylene liners. What is the brand and transmissivity of the geonet in the leak detection area?

74. Will the neutralization basin handle the 100 year storm?

75. TCLP must be performed on all wastes listed at the top of page 3.7-4 with the exception of sulfur.

76. On p. 3.7-7, if the Phosphoria or any other area is used for solid waste disposal it must be built to solid waste (RCRA subtitle D) standards.

77. What is the total cost of vanadium pentoxice in the NOX

reduction? What is its cost in oxidation of CO and sulfur dioxide? How must is lost in the process and will not be recycled? In other words, how much is unaccounted for and lost in wastes or into the air. Use SCR data from Germany if necessary.

Attached please find the memo from Clair Fancy dated August 31, 1992, concerning technical questions on air pollution related impacts.

Sincerely,

Hamilton S. Oven, P.E.
Administrator
Siting Coordination Office

HSO/ah

Attachments

cc: All Parties

Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400
Lawton Chiles, Governor Carol M. Browner, Secretary

August 31, 1992

D. E. R.

SEP 3 1992

SOUTHWEST DISTRICT
TAMPA

Ms. Kathleen L. Small
Environmental Project Manager
Florida Power Corporation
3201 Thirty-fourth Street South
P. O. Box 14042
St. Petersburg, Florida 33733

Dear Ms. Small:

Re: Completeness Review for Application to Construct 940 MW of Combined Cycle Units and an Auxiliary Boiler

AC 53-217434 and PSD-FL-195

The Department has reviewed the above referenced application package received on August 4, 1992. Based on our initial review of your proposal, we have determined that additional information is needed in order to process this application. Please complete the application by providing the information requested below:

1. The emission calculations are not adequately shown in Attachment CCU-1. All calculations affecting emissions should be shown in their entirety. This includes showing all the equations used, assumptions made and any supporting documents used for emission calculations.

2. The application must indicate which turbine will be used for the project. Based on the information presented, the application will be processed on the assumption that the GE turbine will be selected. If another turbine is installed, the application would have to be revised to include all required data for the turbine selected.

3. Please provide the basis for the emission factors used for Benzene and Formaldehyde emission calculations in Attachment CCU-1, and also include any supporting documents (i.e., table, actual vendor testing data, AP-42, etc.) used in the calculations.

4. The emission information provided for the PG-7221 FA combustion turbine at different load conditions and ambient temperatures in Attachment CCU-1 was based on GE recommended measurement methods. Please identify any differences between the different

GE test methods employed and the EPA test methods. Also provide stack test information and data for each pollutant tested, and fuel analysis data for the fuel burned during the test.

5. Please submit a detailed process flow diagram for the combined cycle units and the auxiliary boiler showing the volumetric air flow rates for each stream when burning natural gas and fuel oil. Also provide a plot plan for both alternatives giving a detailed overview of all equipment and stacks associated with the project, if available. Figure 2-2 submitted with the application is not sufficient.

6. The application states that the liquid and solid wastes generated by the combined cycle units and the auxiliary boiler will be properly disposed of at the site. Please give details of the methods of disposal and the contents of the waste material.

7. The project has not been narrowed down to the configuration of combined cycle units that will be employed to generate approximately 940 MW. The Department must know which configuration of the combined cycle units will be used for the project so that a complete BACT determination can be made. Also, provide emissions based on the alternate configuration of two 470 MW combined cycle units.

8. Please submit the manufacturer's design specifications for the proposed diesel generator. What will be the maximum operating hours per year for the diesel generator?

9. Please provide the calculations and supporting document for the emissions listed in Table 2-5, page 2-8 for Beryllium, Lead, Mercury and Inorganic Arsenic.

10. What is the efficiency of the combustion turbine? Calculate Y (refer to NSPS 40 CFR 60, Subpart GG) in kilojoules per watt hour, showing all the calculations.

11. Submit manufacturer's name, model number, generator name plate rating (gross MW), maximum steam production rate for the Heat Recovery Steam Generator (HRSG).

12. What is the maximum and nominal power (MW) output of the steam turbine generator? What is the steam input to this turbine?

13. Please submit the manufacturer's design specification for the proposed auxiliary boiler. Based on the information submitted, the application will be processed on the assumption that the

Nebraska boiler will be selected. If another boiler is installed, the application would have to be revised to include all required data for the boiler selected.

14. What is the estimated annual throughput and the type of air pollution control for the fuel oil storage tanks? What are the estimated emissions?

15. The incremental removal cost of $6,400 per ton of CO removed seems excessive. Please provide the basis and the supporting documents of arriving at this figure. The application states that combustion control will limit CO emissions to a maximum of 25 ppmvd. What will be the actual CO emissions? Also, provide the incremental removal cost to limit CO emissions to 10 ppm.

16. Please submit a detailed listing of all the continuous emission monitoring systems (CEMs) required for this project. This should include the type of the CEM (in-situ or extractive), the make and model number, the pollutant it will monitor, and any associated data acquisition system.

17. What kind of control and monitoring equipment do you propose to use for continuously recording power generation (MWS), fuel injection rate (MMCF/hr or Gal/hr) and the water injection rate (Gal/hr)?

18. Please provide the names and addresses of all the manufacturers and suppliers that were contacted for budgetary quotations and engineering estimates in developing capital and annualized cost estimates for this project and a summary of all the equipment, raw material and the fuel costs, and also, associated economic parameters (i.e., fixed charges on capital %, AFUDC % etc.).

19. Does the applicant propose to do combination fuel (natural gas and fuel oil) firing for the combined cycle units? If so, provide details on how this will be accomplished.

20. Please propose a maximum value for fuel bound nitrogen for both natural gas and fuel oil. Also, calculate the maximum NOx emissions based upon the proposed maximum value for fuel bound nitrogen for both natural gas and fuel oil.

21. While the emission inventory used in the modeling included all sources that were originally agreed upon, additional modeling must be performed, taking into account the TECO Polk, Auburndale Cogeneration, and Ridge Cogeneration facilities. These are new facilities whose stack and emissions data were not known at the time FPC did its air quality analysis. This

modeling will be performed by the Department unless you would prefer to do the remodeling yourself. A response as to who is going to perform this modeling is required as a part of FPC's reply to DER's incompleteness letter.

The processing of your application will continue upon receipt of the above requested information. If there are any questions, please call Syed Arif at (904)488-1344, or write to me at the above address.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF:cjh

cc: Darrel J. Graziani, P.E., Ebasco
Bill Thomas, SWD
Buck Oven, FDER
Syed Arif, FDER
Max Linn, FDER

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Source: H. Oven letter to D. Kiesling (October 19, 1992)

Comment #1:

"The emission calculations for the criteria and non-criteria pollutants are not adequately shown in the application. All calculations affecting emissions should be shown in their entirety, and not just summarized in tabular form. This includes showing the equations used, assumptions made and any supporting documents for emission calculations."

Response:

Exhibits FDER-1A through FDER-1L summarize the source emission calculations for all criteria and non-criteria pollutants assessed in the application. There is one exhibit for each source/fuel/case combination. Each exhibit identifies by pollutant the calculation used, assumptions made, and references cited to determine the source emission rates. The calculational basis for each emission determination is presented after the applicable table. In addition, a sample calculation is provided.

The cover sheet and applicable pages from each reference cited in the calculations are included at the end of the exhibits.

Comment #2:

"Please propose a maximum value for fuel bound nitrogen (FBN) for both natural gas and fuel oil. Also, calculate the maximum NOx emissions based upon the proposed maximum value for FBN for the Integrated Coal Gasification Combined Cycle (IGCC) unit, Pulverized Coal (PC) boiler and the Thermal Oxidation (TO) units."

Response:

There will be no fuel bound nitrogen (FBN) in the natural gas, coal derived gas, or tail gas combusted by the Thermal Oxidation (TO) units. The nitrogen present in these gases is inert molecular nitrogen (N_2). The maximum NO_x emissions for the IGCC units (burning coal gas) and all other sources are those currently presented in SCA Tables 3.4.3-1 through 3.4.3-7.

In contrast to gaseous fuels, fuel oil has FBN which contributes to NO_x formation. The anticipated NO_x emission level from the IGCC combustion turbines firing fuel oil are based on an outlet NO_x concentration of 42 parts per million by dry volume (ppmdv). The proposed NO_x emission levels, listed in SCA Tables 3.4.1-1 and 3.4.1-2, assume a maximum FBN content of 0.015 percent by weight. The maximum proposed FBN level for fuel oil is 0.03 percent by weight, although it is not anticipated that FBN levels of this magnitude will be experienced. However, the NO_x emissions from the IGCC combustion turbines, firing fuel oil, will increase above those presented in the SCA tables as the FBN level rises above 0.015 percent by weight.

Exhibit FDER-2A presents an assessment of combustion turbine NO_x emissions versus FBN content. As shown, the maximum potential increase in annual emissions per unit is 45 tons if fuel oil with 0.03 percent by weight FBN is used as compared to annual emissions using fuel oil with 0.015 percent by weight FBN. Based on the October 15, 1992 meeting with FDER staff, FPC requests a maximum allowable FBN content of 0.03 percent by weight. Revised NO_x emissions are included in Exhibit FDER-2B.

Coal has very small amounts of FBN, and the amounts typically do not vary appreciably. Thus, FBN variability is generally not a concern. The maximum NO_x emission level proposed for the PC units is 0.17 lb/mm Btu which is achievable under all anticipated coal FBN contents.

Comment #3:

"Please submit a detailed process flow diagram for the IGCC unit showing the volumetric air flow rates for each stream when burning fuel oil and coal derived gas. Also, submit the same for the PC boiler when burning coal."

Response:

Exhibit FDER-3A is a process flow diagram which provides the volumetric flow rates for one IGCC block of 1,000 MW producing and burning coal derived gas. The flows associated with each IGCC block would be the same as shown. Exhibit FDER-3B is a process flow diagram which provides the volumetric flow rates for one IGCC block of 1,000 MW when coal gas is not being produced and the combustion turbines are burning fuel oil. Again, the flows associated with each IGCC block would be the same as shown. Exhibit FDER-3C is a process flow diagram which provides the volumetric flow rates for each of the 600 MW PC boiler units firing coal.

Comment #4:

"Please provide the net heating value of the gas being combusted by the flare, the exit velocity of the flare and what device will be used to detect the presence of a flame."

Response:

During periods of startup and malfunctions, during which the combustion turbines cannot utilize the gas produced by the gasification plant, the gas being combusted by the flare is coal derived gas. The estimated net heating value of the coal derived gas is 4,650 Btu per pound (Btu/lb), as listed in SCA Table 3.3.3-2. This is equivalent to 250 Btu per standard cubic foot (Btu/scf), assuming a specific volume of approximately 18.6 cubic feet per pound at standard temperature and pressure. Using a flare to combust a gas with this net heating value meets the specifications described in 40 CFR 60.18(c)(3) for maintaining a 98 percent destruction efficiency.

Details of the gasification plant design are not final, thus the exact exit velocity of the flare has not yet been determined. The final design, however, for informational purposes, will result in an exit velocity which will meet the specifications described in 40 CFR 60.18(c)(4) for maintaining a 98 percent destruction efficiency.

A thermocouple will be utilized to detect the presence of a flare pilot flame. The pilot flame will be fueled with natural gas (i.e., 1,050 Btu/SCF).

Comment #5:

"The applicant did not provide an economic evaluation or the cost effectiveness of the various control technologies for the BACT analysis. Without the presentation of an economic evaluation of the different control technologies for the regulated pollutants, the BACT analysis is not complete. Please provide the necessary information to do a meaningful BACT evaluation based on the cost effectiveness of the various technologies."

Response:

The emission limitations presented in the SCA for ultimate site capacity are representative of values which are currently considered BACT by the various state and local agencies. Beyond the initial phase, FPC is not requesting that these emission limitations be viewed as "final" BACT values, but rather as "preliminary" values based on 1992 control technologies and regulations. These preliminary values are used only to support the various air quality impact analyses required to demonstrate the ultimate site capacity of 3,200 MW. As such, and in the case of ultimate site capacity, neither the control technology nor the cost effectiveness apply to the preliminary BACT for ultimate site capacity. If these assumed values are considered not stringent enough to represent BACT, then it is to FDER's advantage, due to the conservatism used in the emissions modeling.

The proposed FPC Polk County Site is a phased project with an initial phase consisting of 940 MW of generating capacity. The first installment of this capacity will be 470 MW. A detailed BACT analysis, including the control technologies and cost effectiveness values, is presented for the initial phase in the PSD application. As later phases begin, FPC will be required to file supplemental site certification applications and additional PSD applications. When these applications are filed, detailed BACT analyses will be provided which will reflect control technologies and regulations in place at the time of each filing.

Because of the time frame involved in the development of the ultimate site capacity, it is not possible nor appropriate for FPC to conduct or to attempt to lock FDER into a final BACT determination at this time. Consequently, it is neither prudent nor appropriate for FDER to request FPC to conduct this level of analysis when, in fact, a future analysis will be required. FPC requests FDER to continue processing the application based on the preliminary BACT analysis, which was based on information contained in the EPA's BACT/LAER clearinghouse, the current NSPS regulations, and recent permits issued by FDER.

Comment #6:

"Please provide the overall IGCC Nox emission rate in lbs/MMBtu including the IGCC Combustion turbine and the Thermal Oxidation units."

Response:

The overall NO_x emission level is projected to be 0.086 lb/MBtu (pounds per million Btu of heat input). The total NO_x emission rate from the combustion turbines and thermal oxidation units for Case B is 1,532 lb/h. This is based on 1,304 lb/h from combustion turbines as listed in SCA Table 3.4.1-2, and 228 lb/h from thermal oxidation units as listed in SCA Table 3.4.1-4. The total heat input to the IGCC units is projected to be 17,860 MBtu/h. This results in an overall NO_x emission level of 0.086 lb/MBtu (1,532 lb/h divided by 17,860 MBtu/h).

Comment #7:

"Please provide a detailed analysis of all the fugitive sources and emissions to include particulate matter emissions from coal handling sources, IGCC process sources and any other pollutant emissions from process vents, etc. The emission calculations should be shown in their entirety, including the equations used, assumptions made and any supporting documents used for emission calculations."

Response:

Exhibits FDER-7A and FDER-7B are spreadsheets which summarize the total suspended particulate (TSP) and PM_{10} fugitive dust emission calculations performed for the proposed project, respectively. The sources for which emissions were calculated include all coal and limestone handling systems associated with the pulverized coal fired boilers and the coal gasification units. The identification of these sources and their location is described in the response to Polk County comment #95. There will be no significant sources of fugitive emissions associated with the IGCC process sources and vents. Standard plant design is such that these emissions are minimized.

The fugitive dust emission rate for each potential source is determined by applying predictive emission factor equations to the particular source usage rate. Exhibit FDER-7C lists the emission factor equations referenced in Exhibits FDER-7A and FDER-7B. Each of the equations is found in the EPA publication entitled "Compilation of Air Pollutant Emission Factors" (AP-42). The calculated uncontrolled emission factor is then adjusted to reflect the anticipated control efficiency associated with the dust mitigation measure listed. It should be noted that except for those associated with the coal stacker/reclaimer conveyors, all conveyors will be totally enclosed and are thus not included in Exhibits FDER-7A and FDER-7B because there will be no significant fugitive dust emissions resulting.

Assumptions used in the calculation of fugitive dust emissions are listed in Exhibit FDER-7D. The operational parameters are based on the anticipated coal and limestone delivery and handling rates. The references for other assumptions for material characteristics, meteorological conditions, and control effectiveness are also listed in Exhibit FDER-7D.

As listed in Exhibits FDER-7A and FDER-7B the material storage piles are not anticipated to be significant sources of fugitive dust emissions. This conclusion is based on use of the predictive wind erosion technique provided in Section 11.2.7 of AP-42. The use of this technique is summarized in Exhibit FDER-7E. As indicated, a threshold friction velocity of 1.12 meters per second (m/s) would be required to initiate fugitive dust emissions from the storage piles. To create a friction velocity of 1.12 m/s at the pile surface a fastest 1-minute wind speed of 51 mph (measured at 10 meters) would be required. Historical meteorological records for Tampa, Florida indicate that the fastest 1-minute wind does not exceed 51 mph. Thus, it is estimated (using EPA calculation techniques) that there will not be significant fugitive dust emissions resulting from wind erosion of the material storage piles. Revised emission estimates are contained in Exhibit FDER-7F.

Comment #8:

"Please provide the Summary Air Quality Analysis information for Section 10.6 in Volume 6."

Response:

The Summary Air Quality Analysis information for Section 10.6 of the SCA has been submitted to FDER. Four copies of the information and a computer diskette containing the information were submitted. A copy of the letter of submittal is included here as Exhibit FDER-8.

Comment #9:

"The applicant needs to supply the stack parameters and emission rates for each source in each of the various emission inventories."

Response:

Expanded emission inventories for PM, SO_2, and NO_x for the sources actually modeled have been submitted to FDER. A copy of the cover letter for that transmittal is attached as Exhibit FDER-9. The inventories include the stack parameters and emission rates modeled as well as the source of the data and the basis for selecting stack parameters, where multiple stacks were combined.

PSD Application (940 MW)
SO_2 Class II PSD & AAQS

SCA (3,200 MW)
SO_2 Class II PSD & AAQS
NO_x Class I PSD, Class II PSD & AAQS
PM Class II PSD & AAQS

The SO_2 Class I PSD inventory was supplied by FDER and, as such, is not included.

Comment #10:

"A detailed listing of which sources were combined for modeling purposes and a listing of the combined sources' stack parameters and emission rates are needed."

Response:

Please refer to the response to FDER comment #9.

Comment #11:

"A copy of the complete analysis (including data and calculations) used to determine the particulate matter background concentrations for both the annual and 24-hour averaging periods is needed."

Response:

As indicated in the modeling protocol, the monitoring data were segregated by wind direction so that some of the "double counting" (which occurs when modeling existing sources which contribute to monitored background concentrations) could be eliminated. Exhibit FDER-11 contains the requested analysis, including data and calculations. The sources being modeled were plotted for particulate matter (PM) with respect to the monitoring site location. Sources within 20 miles (32.2 km) were considered for this analysis. As indicated on the attached figure, several existing sources were located between 200° and 342° from the monitoring site. Given those extremes of ±45°, wind direction sectors determined to be upwind of the monitoring site which do not include modeled PM sources are northeast through southeast (i.e. winds from 33.76°-146.25°).

The hourly occurrence of winds within the 16 wind direction sectors were plotted for those days on which PM_{10} samples were collected (meteorological data attached). Wind sector distribution plots for all days sampled within the four month monitoring period also are attached. Days were selected for use in determining a "background" concentration if at least 18 of the 24 hours in the day had hourly average wind from the northeast through southeast directions. The particular days and respective concentrations used to develop the background values based on this analysis are as follows:

Date	PM_{10} Concentration ($\mu g/m^3$)
10/21/91	8.6
10/27/91	12.8
11/20/91	10.5
12/08/91	9.8
12/20/91	18.1

Given these concentrations, the long-term average value is 11.96 $\mu g/m^3$, and the second highest 24-hour value is 12.8 $\mu g/m^3$. These values correspond to the 12 $\mu g/m^3$ and 13 $\mu g/m^3$ values which appear in SCA Table 5.6.1-27.

Comment #12:

"The applicant must submit a complete comparison of predicted source impacts with the appropriate de minimus value."

Response:

Exhibit FDER-12 contains information on the de minimis levels of the pollutants including, but not limited to, lead and mercury. The de minimis levels are listed in Table 5.6.1-3 of the SCA.

Comment #13:

"Printouts of the particulate matter significant impact area modeling for the years 1982 through 1985 must include the entire printout, including input parameters."

Response:

The requested printouts were submitted to FDER. A copy of the letter of submittal is included here as Exhibit FDER-13.

Comment #14:

"The particulate matter significant impact area modeling did not include the four thermal oxidation units. This omission needs to be explained."

Response:

Total particulate matter (PM) emissions from the 4 thermal oxidation units is 0.8 g/sec. To a 1 km resolution, this additional source would not change (increase) the significant impact radius and, therefore, was not included in this modeling.

Comment #15:

"Table 5.6.1-23 reports maximum concentration for NOx, SO_2, PM, Be, H_2SO_4 and As. How were these values obtained? The modeling submitted does not directly address these values. Include any calculations or assumptions used to obtain any values not explicitly modeled."

Response:

The modeling submitted does directly address CO, SO_2 and PM concentrations. The other pollutant concentrations were obtained by "rationing". The CO numbers come from the CO significance area model runs (FPC-8X.0B3C files). The SO_2 numbers can be found in the FPC source only, SO_2 model runs (FPC-8X.0X3 files). The other pollutant concentrations can be obtained from the maximum SO_2 concentrations projected in the source group breakouts (for CTs, PCs and thermal oxidizer groups) found in the FPC-8X.0J3 files. This is done by taking the ratios of the emission rate of the pollutant of interest to the SO_2 emission rate of the source multiplied by the projected SO_2 concentration for that source.

For nitrogen oxides, the annual impact was estimated based on the source group runs contained in the file "FPC_8X.OT3." The estimate was made based on the location (receptor) of the maximum annual impact for each source group. At these receptors the annual impacts associated with the other source categories were summed. The highest summed concentration of these receptors is the value contained in Table 5.6.1-23.

For particulate matter, the 24-hour and annual impacts can be found in file FPC_8X.OT3.

For beryllium, sulfuric acid and arsenic, emission estimates were obtained from the procedure described in response to FDER comment #18. Please note that the sulfuric acid and arsenic values listed in SCA Tables 5.6.1-23 and 5.6.1-24 are incorrect. The correct values are listed in revised Tables 5.6.1-23 and 5.6.1-24 contained in response to FDER comments #16 and #20.

Comment #16:

"The modeling for the PSD increments and the AAQS analyses need to be redone to include additional sources, such as TECO's proposed Polk Power Station."

Response:

The modeling has been redone to include the additional sources identified by FDER as well as use of the National Park Service (NPS) significance values as required by FDER comment #20. The additional modeling identified by FDER involved adding several facilities which were not included in FPC's approved emission inventories, including TECO's proposed Polk Power Station, whose application had not been filed at the time the initial modeling was performed. Additionally, FPC has also been required to identify all significant impacts within the nearest PSD Class I area using the NPS suggested significance values rather than the Environmental Protection Agency (EPA) suggested significance values which were used during the initial modeling exercises.

Revisions to emission inventories included the addition of the TECO Polk Power Station, the Auburndale Cogeneration facility, the Ridge Cogeneration facility, the Kissimmee Utilities facility and in some cases the addition of the McKay Bay Refuse to Energy Facility.

The revised Class II area PSD NO_x source inventory is contained in Exhibit FDER-16A. The additional sources indicated above are included as Sources 44 through 47. The McKay Bay Refuse to Energy Facility had already been included in the inventory. The

North Carolina Screen Procedure was applied and indicated that only the TECO source should be modeled.

The revised Class II area PSD SO_2 source inventory is contained in Exhibit FDER-16B. The additional sources indicated above are included as Sources 36 through 39. The McKay Bay Refuse to Energy Facility had already been included in the inventory. The North Carolina Screen Procedure was applied and indicated that only the TECO source should be modeled.

The revised Class II area PSD PM source inventory is contained in Exhibit FDER-16C. The additional sources indicated above are included as Sources 45 through 47. The McKay Bay Refuse to Energy Facility had already been included in the inventory. The North Carolina Screen Procedure was applied and indicated that only the TECO and Auburndale Cogeneration facilities needed to be modeled. As such, the proposed Ridge Cogeneration and the Kissimmee Utilities facility were not included in the PSD Class II area modeling.

The revised Class I PSD NO_x source inventory is contained in Exhibit FDER-16D. The additional sources requested are included as Sources 75 through 78. The McKay Bay Refuse to Energy Facility had already been included in the inventory.

The revised Class I PSD SO_2 source inventory is contained in Exhibit FDER-16E. The additional sources requested are included as Sources 75 through 78. The McKay Bay Refuse to Energy Facility had already been included in the inventory. Oman Construction (previously Source 63) was eliminated from the inventory as it was moved out of the area, and emission and/or stack parameter changes were made for FPC Intercession City (Sources 2 and 3), Florida Crushed Stone (Source 4), Orlando Utilities Stanton Units 1 and 2 (Sources 18 and 19) per conversations with FDER.

The revised NO_x AAQS source inventory is contained in Exhibit FDER-16F. The additional sources requested are included as Sources 76 through 79. The McKay Bay Refuse to Energy Facility had already been included in the inventory. The proposed Ridge Cogeneration facility and Kissimmee Utilities facility were not included in the modeling due to the North Carolina Screen results.

The revised SO_2 AAQS source inventory is contained in Exhibit FDER-16G. The additional sources requested are included as Sources 42 through 46. The McKay Bay Refuse to Energy facility was not included in the modeling due to the North Carolina screen results.

The revised PM AAQS source inventory is contained in Exhibit FDER-16H. The additional sources requested are included as Sources 98 through 101. The proposed Ridge Cogeneration facility and the McKay Bay Refuse to Energy facility were not included in the modeling due to the North Carolina Screen results.

Use of the NPS significance values in lieu of EPA suggested significance values used during initial modeling required by FDER comment #20, caused the identification of several additional days when the proposed Polk County Site's impacts were significant. The modeling also identified periods of significant project impacts which correspond to predicted exceedances of the PSD Class I increment at common receptor points. Additional long-range modeling (MESOPUFF-II) was required to demonstrate compliance with the PSD Class I increment for SO_2.

For NO_x, use of the NPS significance values during modeling, identified a significant impact as did the EPA significance values in the earlier modeling. Additional multiple source modeling for NO_x was conducted to demonstrate compliance with the PSD Class I increment.

For the PSD Class I SO_2 increment, the inclusion of the TECO Polk Power Station has produced an exceedance of the allowable increment for a period which corresponded to a significant impact (NPS significance values) by the FPC Polk County Site following both ISCST and MESOPUFF II modeling. The exceedance (5.04 $\mu g/m^3$) and FPC's Polk County Site's contribution (0.071 $\mu g/m^3$) were very marginal and predicted using the ISCST dispersion model for receptor # 2 on Day 147 of 1986. Further analysis revealed that reducing the project's impact to insignificance (<0.07 $\mu g/m^3$) can be demonstrated by increasing the SO_2 scrubber removal efficiency of the PC Units by only 0.2 percent. This is possible using either wet limestone or lime scrubbers, if it is determined to be necessary. As such, the exceedance was eliminated from further analysis (i.e., MESOPUFF II modeling).

For the PM Class II PSD analysis, problems were encountered with the inclusion of the TECO Polk Power Station. One receptor (-12,124, -7,000) showed annual impacts (1982 - 45.0 $\mu g/m^3$, 1983 - 65.6 $\mu g/m^3$, 1984 - 66.2 $\mu g/m^3$, 1985 - 65.4 $\mu g/m^3$ and 1986 - 70.5 $\mu g/m^3$) which were unacceptable. This receptor is located within the proposed TECO Polk Power Station's property and FPC's Polk County Site's impacts were determined to be insignificant. After discussions with FDER staff the receptor has been eliminated and values from the next highest receptor are shown in Exhibit FDER-16I.

The MESOPUFF II model inputs and outputs are shown in Exhibits FDER-16J through FDER-16Z.

As indicated by use of revised emission inventories and the additional modeling, the proposed FPC Polk County Site will not cause or contribute to any violations of the allowable PSD increments or AAQS. As such, the State of Florida can provide site certification for an ultimate site capacity of 3,200 MW.

Comment #17:

"Modeling for the 1 g/s, 8-hour average case was omitted for the years 1982 through 1985. Modeling for the 1 g/s, 1-hour average case was omitted for the years 1982, 1983, 1985, and 1986. Please explain this omission."

Response:

From the SCA CO significance area modeling analysis (FPC-8X.0B3C runs), the worst-case years for both 1-hour (1984) and 8-hour (1986) CO concentrations were already known. Only these worst-case years were rerun for the 1-hour and 8-hour determinations.

Comment #18:

"What formulations were used to obtain the predicted impacts presented in Tables 5.6.1-28, 5.6.1-44, and 5.6.1-45? A detailed explanation of each calculation must be supplied."

Response:

The calculation of the predicted impacts for the pollutants presented in SCA Tables 5.6.1-28, 5.6.1-44 and 5.6.1-45 begins with the estimated maximum short-term and annual emission rates presented in SCA Tables 5.6.1-5 through 5.6.1-8. These emission rates, when coupled with the normalized impacts (based on SO_2 and CO modeling) for the 1-hour, 3-hour, 8-hour, 24-hour and annual averaging periods, produce the predicted ambient impacts.

The normalized data for each analysis are as follows:

Toxics Analysis

Highest values ($\mu g/m^3$ per g/s)

Period	CTs	PCs	TOUs	Year
8-hour	1.13	0.13	0.91	1986
24-hour	0.3851	0.0479	0.5004	1985
Annual	0.0184	0.0065	0.0546	1982

AQRV Analysis - Class I Area

Highest, Second Highest Values ($\mu g/m^3$ per g/s)

Period	CTs	PCs	TOUs	Year
1-hour	7.07×10^{-2}	3.39×10^{-2}	7.45×10^{-2}	1986
3-hour	3.89×10^{-2}	1.09×10^{-2}	3.33×10^{-2}	1982
8-hour	1.78×10^{-2}	5.40×10^{-3}	1.53×10^{-2}	1982
24-hour	6.32×10^{-3}	2.55×10^{-3}	6.32×10^{-3}	1986
Annual	5.60×10^{-4}	2.50×10^{-4}	5.40×10^{-4}	1982

AQRV Analysis - Class II Area

Highest, Second Highest Values ($\mu g/m^3$ per g/s)

Period	CTs	PCs	TOUs	Year
1-hour	4.11	0.47	2.76	1986
3-hour	1.75	0.246	1.52	1983
8-hour	0.83	0.110	0.71	1986
24-hour	0.28	0.0341	0.468	1985
Annual	0.0184	0.0065	0.0546	1982

For each of the twenty pollutants identified and for each of the six analyses (Initial Phase and Ultimate Site Capacity for toxics, Class I and Class II) the following calculations were made:

Short-Term Impact (STI)

$$STI = (8)(ER_{CT})(NI_{CT}) + (2)(ER_{PC})(NI_{PC}) + (4)(ER_{TOU})(NI_{TOU}) \quad \text{Eq. 1}$$

where: ER = Maximum Short-Term Emission Rate (g/s)
NI = Normalized Impact ($\mu g/m^3$ per g/s)

Annual Impact (AI)

$$AI = (8)(ER_{CT})(NI_{CT}) + (2)(ER_{PC})(NI_{PC}) + (4)(ER_{TOU})(NI_{TOU}) \quad \text{Eq. 2}$$

where:

$$ER_{CT} = [(ER_{fuel\ oil})(500) + (ER_{coal\ gas})(8260)][1/8760] \quad \text{Eq. 3}$$

$$= ER_{coal\ gas} \quad \text{Eq. 4}$$

Because emissions of some pollutants are higher when firing fuel oil than when firing coal gas, a correction (Eq.3) must be made to the annual impact to include the limited fuel oil usage. For short-term emissions only, the maximum emission rate (coal gas or fuel oil) was used. The information contained in SCA Tables 5.6.1-28, 5.6.1-44 and 5.6.1-45, as well as in the PSD application, reflect approximately 520 calculations using equations 1, 2, and 3. Because of the repetitive nature of the calculations, the Lotus 1-2-3 spreadsheet software was used. For example, calculations for the pollutant cadmium (Ultimate Site Capacity), which has higher emissions on fuel oil, are as follows:

Cadmium

Emission Rates (g/s)

CTs:	$ER_{coal\ gas}$ = 0.0008		$ER_{fuel\ oil}$ = 0.00238
PCs:	ER_{coal} = 0.00120		
TOUs:	ER = 0.0001		

Toxics Analysis (Table 5.6.1-28)

Maximum Impacts ($\mu g/m^3$)

$$MI_{8\text{-hour}} = (8)(0.00238)(1.13)+(2)(0.00120)(0.13)+(4)(.0001)(0.91)$$
$$= 0.0222\ \mu g/m^3$$

$$MI_{24\text{-hour}} = (8)(0.00238)(0.3851)+(2)(0.00120)(0.0479)+(4)(.0001)(0.5004)$$
$$= 0.0076\ \mu g/m^3$$

$$ER_{CT} = [(.0008)(8260)+(0.00238)(500)][1/8760]$$
$$= 0.0009\ g/s$$

$$MI_{Annual} = (8)(0.0009)(0.0184)+(2)(0.00120)(0.0065)+(4)(0.0001)(0.0546)$$
$$= 0.0002\ \mu g/m^3$$

AQRV PSD Class I Analysis (Table 5.6.1-44)

Highest, Second Highest Impacts ($\mu g/m^3$)

$$HSH_{1\text{-hour}} = (8)(.00238)(7.07x10^{-2})+(2)(0.0012)(3.39x10^{-2}) +(4)(0.0001)(7.45x10^{-2})$$
$$= 0.0015\ \mu g/m^3$$

$$HSH_{3\text{-hour}} = (8)(.00238)(3.89x10^{-2})+(2)(0.0012)(1.09x10^{-2}) +(4)(0.0001)(3.33x10^{-2})$$
$$= 0.0008\ \mu g/m^3$$

$$HSH_{8\text{-hour}} = (8)(.00238)(1.78x10^{-2})+(2)(0.0012)(5.40x10^{-3}) +(4)(0.0001)(1.53x10^{-2})$$
$$= 0.0004\ \mu g/m^3$$

$$HSH_{24\text{-hour}} = (8)(.00238)(6.32x10^{-3})+(2)(0.0012)(2.55x10^{-3}) +(4)(0.0001)(6.32x10^{-3})$$
$$= 0.0001\ \mu g/m^3$$

$$HSH_{Annual} = (8)(.0009)(5.60x10^{-4})+(2)(0.0012)(2.5x10^{-4}) +(4)(0.0001)(5.40x10^{-4})$$
$$= 4.85x10^{-6}\ \mu g/m^3$$

AQRV PSD Class II Analysis (Table 5.6.1-45)

Highest, Second Highest Impacts ($\mu g/m^3$)

$$HSH_{1\text{-hour}} = (8)(0.00238)(4.11)+(2)(0.0012)(0.47)+(4)(.0001)(2.76)$$
$$= 0.0805\ \mu g/m^3$$

$$HSH_{3\text{-hour}} = (8)(0.00238)(1.75)+(2)(0.0012)(0.246)+(4)(.0001)(1.52)$$
$$= 0.0345\ \mu g/m^3$$

$$HSH_{8\text{-hour}} = (8)(0.00238)(0.83)+(2)(0.0012)(0.110)+(4)(.0001)(0.71)$$
$$= 0.0164\ \mu g/m^3$$

$$HSH_{24\text{-hour}} = (8)(0.00238)(0.28)+(2)(0.0012)(0.0341)+(4)(.0001)(0.468)$$
$$= 0.0056\ \mu g/m^3$$

$$HSH_{Annual} = (8)(0.0009)(0.0184)+(2)(0.0012)(0.0065)+(4)(.0001)(0.0546)$$
$$= 0.0002\ \mu g/m^3$$

A copy of the Lotus 1-2-3 files containing the appropriate calculations was provided to FDER. A copy of the letter of transmittal is included as Exhibit FDER-18. The Lotus 1-2-3 files are contained on the computer diskette in the following files:

PSD Application

Toxics Analysis	-	TOXPSD.WK1
AQRV Class I	-	AQRVC1.WK1
AQRV Class II	-	AQRVC2.WK1

SC Application

Toxics Analysis	-	TOXANA.WK1
AQRV Class I	-	USCAQRV1.WK1
AQRV Class II	-	USCAQRV2.WK1

If any help is needed using these files, please contact Darrel Graziani (Ebasco Environmental) at (407) 225-8712.

Because of the problems associated with modeling three source classes with varying emission rates and stack parameters, some conservative assumptions were made. The initial assumptions ignored the individual receptors, the day of the occurrence and the time of the occurrence. These assumptions place one receptor in the Class I area and one receptor in the Class II area. The next assumption added the normalized CT, PC and TOU impacts for the years 1982 through 1986 for the five averaging periods. This allowed selection of a maximum impact for an averaging period for a given year, as presented earlier. These assumptions produced a conservative approach for predicted impacts associated with the Toxics and AQRV Analyses.

Comment #19:

"Please submit the complete modeling run for the VISCREEN exercise."

Response:

The complete modeling run for the VISCREEN exercise is shown in Exhibit FDER-19.

Comment #20:

"It is not appropriate to use the EPA's significant impact levels for the PSD Class I analysis. The National Park Service's significance levels should be used for this analysis."

Response:

A revised PSD Class I area analysis using the significant impact levels suggested by the National Park Service (NPS), and other changes as well, has been submitted to FDER in response to FDER comment #16. However, FPC respectfully disagrees that the significance values suggested by the NPS are appropriate for comparison with the project's modeled impact at the nearest Class I area. FPC believes that FDER is obligated to enforce the current definition of the "significant impact" as defined in Rule 17-2.100(193), F.A.C. If FDER believes that the NPS's suggested significance values are more appropriate, then FDER should initiate the appropriate legal steps to amend the current Rule. In the interim, FDER needs to enforce the current regulation and allow FPC and the NPS to settle the difference on the NPS suggested significance values.

Comment #21:

"Table 5.6.1-7 lists the PC stack gas exit velocity for both the 50% and the 75% load cases as 80 ft/s (24.38 m/s). The modeling for these two cases used exit velocities of 13.96 m/s and 20.47 m/s, respectively. Which set of velocities is correct?"

Response:

The modeling data are correct. A revised Table 5.6.1-7 is being submitted as Exhibit FDER-21.

Comment #22:

"On pages 5.6-18 and 5.6-19, the applicant notes that, for arsenic, the maximum predicted annual ambient impact exceeds the annual No Threat Level, which is based on a risk of one in a million from 70 years of continuous exposure. An adjustment is made to reduce the risk estimate by factoring the economic lifetime of the proposed facility against the 70 year lifetime risk estimate. This calculation results in a 30/70 reduction of the risk estimate, bringing it below the one in a million risk based No Threat Level.

The Department does not allow for this type of adjustment because the No Threat Levels are not designed to be adjustable to various plant operating schedules. That is, a facility that operates for 35 years does not represent half the risk of a similar facility that operates for 70 years and therefore, it is not appropriate to allow it to emit twice as much."

Response:

The FDER's draft air toxics guidelines identify 8-hour, 24-hour and annual averaging periods for the No Threat Levels. Some of the annual No Threat Levels were based on a risk of 1 in a million and EPA's Unit Risk Values. Use of the EPA's Unit Risk Values by the FDER for development of No Threat Levels implies use of risk assessment/risk management methodologies. Standard risk assessment methodologies are based on the duration of one's exposure as well as the exposure concentration. The EPA's unit risk values are based on an exposure duration of seventy years and a pollutant concentration of one microgram per cubic meter. This defines the Unit Risk Value. The risk value associated with any given situation is estimated by use of the unit risk value, the pollutant concentration and the duration of exposure. The risk value can be estimated as follows:

Risk Value = (Unit Risk Value) x (Pollutant Concentration) x (Duration/70)

Without adjusting the unit risk value for the expected duration of exposure, the proposed estimated risk value at the FPC Polk County Site is 2.13 in a million versus 0.9 in a million when adjusted for duration. FPC believes that when properly assessed and managed, the overall estimated risk posed by the facility should and can be deemed insignificant and acceptable.

Comment #23:

"The applicant notes that the maximum annual concentration and risk of arsenic drops to much lower levels at the location of the nearest residence and that 'more refined modeling would undoubtedly reduce the impact further.' What further modeling can be done and would it show that the maximum annual concentration at the fenceline meets the Annual No Threat Level without the plant lifetime adjustment? If not, what other measures can the applicant take to further reduce the maximum annual concentration at the fenceline?"

Response:

The technique for estimating the total maximum annual impact for the various hazardous and toxic air contaminants is outlined in the response to FDER comment #18. This technique summed the maximum impacts from the various source groups regardless of the receptor. Additional modeling for arsenic would produce a total maximum impact at a specific receptor that would be lower than the current estimated level. However, further modeling would not reduce the total maximum impact below the FDER's draft No Threat Level, since the estimated maximum impact from the CTs alone is 0.000294 $\mu g/m^3$ (a risk of 1.27 in a million).

Additional measures which would reduce fenceline concentrations include: moving the fenceline further from the sources; extending the exhaust stacks; and reducing arsenic emissions. Due to the low-risk level associated with the residual arsenic emissions, the FDER's current stack height policy and the proposed application of BACT, none of these options may be appropriate. Since the FDER's current air toxics policy specifies "No Threat Levels" but does not define "Unacceptable Threat Levels", each project must be reviewed separately on a case by case basis. As a result of the 1990 Clean Air Act Amendments, air toxics must be regulated through a "Control Technology" approach with the application of Maximum Achievable Control Technology (MACT). In this case, the applicant has proposed BACT, which is representative of MACT. The residual risk associated with the site after the application of BACT should and can be considered insignificant.

Comment #24:

"The Department's annual No Threat Level for Chromium VI is 8.3E-06 $\mu g/m^3$. The applicant has adjusted the total chromium emissions from bituminous coal combustion by an 'EPA emission factor' to drive (sic) the Chromium VI emissions. This derived value is 2.3E-06 $\mu g/m^3$ which is three times lower than the No Threat Level. Please provide documentation to support this derivation."

Response:

The Chromium VI emission impacts were estimated based on a mass balance approach. From the EPA document "Estimating Air Toxics From Coal and Oil Combustion Sources" (see Exhibit FDER-24), an uncontrolled emission factor for total chromium (1,880 lb/10^{12} Btu) and a controlled emission factor for Chromium VI (0.0034 lb/10^{12} Btu) were available. Both factors were for pulverized dry bottom bituminous coal-fired utility boilers. A fabric filter control efficiency (99.1%) for Chromium VI also was available.

In order to determine the ratio of Chromium VI emissions to total chromium emissions, the uncontrolled Chromium VI emission factor had to be estimated as follows:

$$EF_{uncont.} = (0.0034 \text{ lb}/10^{12} \text{ Btu})(1/[1-0.991])$$
$$= 0.3778 \text{ lb}/10^{12} \text{ Btu}$$

The ratio of Chromium VI to total chromium emissions was calculated as follows:

$$Cr^{+6}/Cr^{T} = 0.3778/1880 = 2.010 \times 10^{-4}$$

The estimated Chromium VI impact was next calculated based on the total chromium impact (0.01 $\mu g/m^3$) as follows:

$$MI_{Cr^{+6}} = (2.01 \times 10^{-4})(0.01 \ \mu g/m^3) = 2.01 \times 10^{-6} \ \mu g/m^3$$

This value is slightly lower than that presented in the SCA due to an earlier assumption that the fabric filter had a control efficiency of 99.92%, which results in higher uncontrolled Cr^{+6} emissions and impacts.

Comment #25:

"The Class III surface water criteria cited in Table 2.3.4-6 do not incorporate recent (June 18, 1992) revisions to Rule 17-302.560, F.A.C. FPC should update Table 2.3.4-6 to reflect the revised Class III surface water criteria."

Response:

The table has been updated to include the revisions and is attached as Exhibit FDER 25.

Comment #26:

"Provide a more complete description of the quantity and final off-site disposition of the waters seeping from the cooling pond. Consider near-term and long-term plans for the size of the cooling ponds. Will there be collection ditches surrounding the cooling pond?"

Response:

The ultimate cooling pond layout is shown on Figure 3.5.1-1 of the SCA (page 3.5.1-63). It includes 4 separate basins: N-15, N-11C, N-11B, and N-16. All of these basins except N-16 will be underlain by 30 feet or more of impermeable clay; therefore, vertical seepage from those basins will be negligible. Seepage collection ditches (existing) along CR 555 and CR 640 will collect horizontal seepage through the western and northern dams of these three basins. Horizontal seepage through the southern dams will enter the surface water management system (N-15 dam) or the cooling pond itself. Horizontal seepage to the east will be prevented by the clays consolidated in the buffer areas. Seepage which is collected by the surface water management system and the ditches along CR 555 and CR 640 will be returned to the cooling pond.

The N-16 parcel alone will be the initial cooling pond. Seepage from N-16 is discussed in Section 5.3.2 of the SCA (pp. 5.3-14 through 5.3-19). Briefly, seepage vertically from N-16 will eventually enter the Intermediate Aquifer, from which it will be recaptured by the plant's groundwater withdrawal.

Comment #62:

"Since a geotextile and geonet underliner are already being put under the liner for the coal pile run-off area, it would be relatively easy to include a leak detection system. Also, using clay as the prepared subgrade material and compacting it to 95% modified proctor density would be better liner protection (para. 3.3.4)."

Response:

FPC agrees that a leak detection system could be installed. However, since FPC is planning to monitor the ground water, such a system is unnecessary. Clay is unsuitable as a subgrade material because of the extreme changes in loading that will occur as coal is added to, and removed from, the coal pile.

Comment #63:

"The permeable drainage overliner for the coal pile area must be specified to be non-angular so as to prevent puncture of the liner. Placing geotextile over the liner would be desirable also but slope stability must be considered."

Response:

FPC agrees with this statement.

Comment #64:

"The run-off pond system should be hydrotested, as should any lined pond. Details of all ponds and liner systems are needed."

Response:

All synthetically lined ponds will be hydrotested. Details of this testing have not been finalized and will be submitted to the FDER in response to a Condition of Certification.

Comment #65:

"SCR will produce a number of amines. Please list those that may be produced and which are hazardous materials. Will ammonia vandate be produced? (Listed a P119)."

Response:

It is concluded in the preliminary Best Available Control Technology (BACT) analysis (see SCA Section 3.4.3), that SCR will not be used as an emission control technology at the Polk County Site. As such, a discussion of amines and ammonia vandate is not applicable for the proposed site and thus was not included in the SCA. Nevertheless, the following discussion is being provided for information purposes.

Secondary amines and diethylamine are toxic chemical compounds which might theoretically be emitted from SCR units or be formed by subsequent chemical reaction of other species emitted from SCR units. The risk presented by the formation of these compounds was analyzed in a preliminary study published in 1987. However, the author of the study later stated that the preliminary results for chemical conversion were "grossly overstated" and that the revised risk estimate was about 3,000 times less than the 1 in a million risk usually considered insignificant by regulatory districts. In addition, a California Air Resources Board test performed to detect nitrosamine emissions found none present within the limits of detectability. The minimum level of detectability was below the parts per billion range.

Ammonia vanadate is used in some catalyst manufacturing processes. The ammonia compound should vaporize below catalyst operating temperatures during the manufacturing process and form vanadium pentoxide and ammonia. Essentially, no ammonia vanadate should be emitted from an operating SCR.

Comment #66:

"If permanent damage to the catalyst occurs (p.3.4-7) will the vandium all be wasted? How will you dispose of it? Who will dispose of it and where?"

Response:

It is concluded in the preliminary Best Available Control Technology (BACT) analysis (see SCA Section 3.4.3), that SCR will not be used as an emission control technology at the Polk County Site. As such, a discussion of vanadium disposal specifics is not applicable for the proposed project and thus was not included in the SCA. However, for informational purposes the following comments are offered:

For selective catalytic reduction, the most commonly used catalyst is a vanadium oxide/titanium oxide composite catalyst. The active catalyst compound in this composite catalyst is vanadium pentoxide (P120), which is a RCRA listed hazardous waste. In most cases, spent catalyst will be returned to the manufacturer for regeneration. However, should the manufacturer be unable to regenerate the catalyst, FPC would be required to dispose of the catalyst at an approved landfill. Since the vanadium pentoxide is a RCRA listed hazardous waste, FPC would be required to meet all applicable RCRA requirements when transporting the spent catalyst to either the manufacturer or the approved landfill. As such, only a licensed transporter would be allowed to handle the spent catalyst.

Because of the additional requirements and costs associated with handling a RCRA listed hazardous waste, SCR is an undesirable control technology for this project. FPC is aware of the RCRA requirements and will be able to comply with them should SCR be required.

Comment #67:

"Speculative accumulation of vanadium pentoxide is regulated under RCRA. Please list all hazardous catalysts and accumulation and storage schedule. Also detail storage facilities as applies to RCRA regulated chemicals for speculative accumulation."

Response:

It is concluded in the preliminary Best Available Control Technology (BACT) analysis (see SCA Section 3.4.3), that SCR will not be used as an emission control technology at the Polk County Site. As such, a discussion of vanadium pentoxide accumulation and storage specifics is not applicable for the proposed project and thus was not included in the SCA. However, for informational purposes the following comments are offered:

As discussed in response to FDER comment #66, should FPC be required to use SCR as a control technology, it is very likely that the catalyst will contain vanadium pentoxide. With SCR units, the catalyst is normally expected to last three or more years before replacement is needed. In any case, catalyst performance is monitored by measuring stack gas emissions (NO_x and NH_3). Once a catalyst has degraded to a certain level, it would be scheduled for replacement during the next outage. A scheduled outage may be planned as far as six months in advance in order to ensure that needed parts and services are available. Because of the ability to schedule the outage, accumulation of spent catalyst is not expected. Spent catalyst should be shipped off-site within ninety days of removal from the SCR unit. FPC will comply with all applicable RCRA regulations should FDER require SCR.

Comment #74:

"Will the neutralization basin handle the 100 year storm?"

Response:

The neutralization basin will be sized with sufficient freeboard to retain the incident rainfall resulting from a 100-year storm. Please refer to the response to FDER comment #73 for further information on the neutralization basin.

Comment #75:

"TCLP must be performed on all wastes listed at the top of page 3.7-4 with the exception of sulfur."

Response:

The wastes listed at the top of page 3.7-4 are subject to the same regulatory exclusion referenced in response to FDER comment #71. Water/wastewater solids are not expected to contain any hazardous wastes.

Comment #76:

"On p. 3.7-7, if the Phosphoria or any other area is used for solid waste disposal it must be built to solid waste (RCRA subtitle D) standards."

Response:

RCRA subtitle D standards are not legally effective until October 9, 1993. Before this time, it is FPC's understanding that FDER hopes to demonstrate the "equivalency" of state solid waste rules, thereby avoiding the applicability of Subtitle D standards in Florida. In the meantime, FPC proposes that the areas used for solid waste disposal will be built to the standards proposed in the SCA and in accordance with applicable provisions of Chapter 17-701, F.A.C. (please refer to the response to FDER comment #59).

Comment #77:

"What is the total cost of vanadium pentoxide in the NOx reduction? What is its cost in oxidation of CO and sulfur dioxide? How much is lost in the process and will not be recycled? In other words, how much is unaccounted for and lost in wastes or into the air. Use SCR data from Germany if necessary."

Response:

It is concluded in the preliminary Best Available Control Technology (BACT) analysis (see SCA Section 3.4.3), that SCR will not be used as an emission control technology at the Polk County Site. As such, a discussion of vanadium pentoxide utilization specifics is not applicable for the proposed project and thus was not included in the SCA. Nevertheless, the following discussion is being provided for information purposes.

Vanadium pentoxide (V_2O_5) is the active catalyst compound in one of the most commonly used SCR catalysts (vanadium oxide/titanium oxide composite catalysts). Experimental data suggests that the oxidation of SO_2 to SO_3 in the presence of a V/Ti catalyst is directly (and linearly) related to the relative catalyst loading (amount of catalytic material per volume of catalyst). Typical vendor guarantees limit SO_2 oxidation to approximately three percent of the SO_2 in the flue gas. Carbon monoxide oxidation is not catalyzed by V/Ti catalysts.

Some catalyst material is lost due to erosion of the catalyst by particulate matter. However, estimates of the catalyst lost through the stack indicate that the concentration of V_2O_5 is a million times less than its industrial health standard threshold limiting value.

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
BUREAU OF WETLAND RESOURCE MANAGEMENT

Source: T. Bell memo to H. Oven (October 20, 1992)

Comment #78:

"The process of consolidating the clays in a settling area is a long process. Please clarify what criteria are being used to determine when a settling area is sufficiently consolidated for use either as a solid waste area or a brine pond. Please discuss how long it will take for the individual settling areas to reach the point of being sufficiently consolidated to be used and how that time period relates to the proposed construction and operation schedule for the plant."

Response:

The predicted consolidation over time for the first solid waste area (SA-8) and the brine pond (SA-9) are shown on SCA Figures 3.7.1-21 and 3.7.1-22 respectively. Similarly, solids content profiles are shown in SCA Figures 10.5.3-239 through 10.5.3-247. Based on these predictions, these two areas should be ready to receive wastes by 1998.

FPC plans to periodically monitor both the surface elevations and the solids content according to conditions expected to be agreed upon with FDNR. Such monitoring is typical in the phosphate industry.

As described on SCA page 3.7-8, the next solid waste area to be utilized is expected to be SA-10, beginning about the year 2014. Since consolidation typically is completed in about 4 years, there is sufficient time available for consolidation to be completed in areas needed at later times.

Comment #79:

"Please discuss what will happen to the consolidated clays during the usage of the areas as ponds. Will the clays be resuspended? If so, to what extent?"

Response:

During the consolidation, a crust several feet thick will be formed on top of the clays. This crust will have solids content of at least 50%. When the pond is filled, the crust will be submerged but will not then deteriorate. Water velocities in the ponds will be kept low (below 1.5 feet per second) to avoid scouring. Thus the consolidated clays are expected to remain in place during operation, with no resuspension.

Comment #80:

"Please provide the base assumptions and calculations for the wave height and run-up distance used to establish the necessary amount of free-board in the cooling pond."

Response:

A copy of the calculation is attached as Exhibit FDER-80. The assumptions are listed within the calculations.

Comment #81:

"Please clarify why no wetland systems are proposed to be created in the buffer area enhancement."

Response:

FDNR has indicated that the creation of wetlands on above grade clay settling areas is not encouraged. Furthermore, because the need to create additional wetlands for mitigation beyond that created by the mining companies has not been established and local environmental interests have expressed an emphasis in upland habitats, the buffer area is designed without wetlands. If mitigation is required for linear facility impacts to wetlands, additional review of the feasibility of wetlands creation in the buffer area will be undertaken. Additionally, Tiger Bay and McCullough Creek enhancement programs are proposed by FPC to provide environmental benefit to local wetlands ecological resources.

Comment #82:

"Please provide good quality, recent (flight date labeled) 1:400 aerial photographs of the transmission line corridor outside of the plant site, the pipeline corridor and the reclaimed water line corridor. The aerial photographs should have the corridor boundaries shown on them."

Response:

The requested photographs have been provided to the FDER. Exhibit FDER-82A is the documentation for this submittal. Additionally, supplemental information on the alternate segments for the natural gas pipeline corridor is provided in Exhibit FDER-82B.

Comment #83:

"Could the Suncoast pipeline be expected to follow the same or a similar corridor to the one proposed for the FGT lateral? If not, please clarify why not."

Response:

Since the preparation of the SCA, FPC's preferred pipeline - the Suncoast pipeline - has evolved into two alternatives. At this time, these two alternatives to the FGT lateral are being considered. FPC has not yet committed to any pipeline proposal. Specific routing for the alternatives is not currently available and will be the subject of an independent permitting review process to be initiated by the developer of the pipeline project.

Comment #84:

"Please provide a copy of the Section 10 or 404 application."

Response:

The Section 10/404 applications for the site and linear facilities have not been prepared. FPC will forward copies of the Section 10/404 application for activities in Tiger Bay when that application has been submitted to the Corps of Engineers. As to associated linear facilities, once the final right-of-ways have been selected, a Section 10/404 application will be prepared, and a copy of that application will be submitted to FDER.

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
BUREAU OF AIR REGULATION

Source: C. Fancy letter to K. Small (August 31, 1992)

Responses to these comments were submitted to the Bureau of Air Regulation by FPC on October 13, 1992. A copy of the letter of submittal is included here as Exhibit FDER-85.

EXHIBITS BEGIN ON NEXT PAGE

EXHIBIT FDER-1A
(5 pages)

EXHIBIT DER-1A
Summary of Emission Calculations for the Coal Gasification
Combined Cycle Units (3,000 MW) CASE A

COAL-DERIVED GAS FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	12 Unit Emission Rate** lb/h	12 Unit Annual Emission*** tpy
Carbon Monoxide	1	(a)	100 lb/h/unit	1,200	5,256
Nitrogen Oxides	1	(a)	163 lb/h/unit	1,956	8,567
Sulfur Dioxide	2	(b)	98.5% removal	2,328	10,197
Particulate (PM/PM_{10})	1	(a)	36 lb/h/unit	432	1,892
Volatile Organic Compounds	1	(a)	12 lb/h/unit	144	631
Lead	3	(c)	1.2×10^{-2} ppmdv	3.3	14.45
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	1.4×10^{-3} ppmdv	0.0165	0.072
Mercury	3	(c)	1.0×10^{-3} ppmdv	0.269	1.16
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Not Detected	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	7% SO_2 conversion	260	1,141
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur	N/A	(d)	N/A	N/A	N/A
Benzene	--	(c)	Not Detected	Negligible	Negligible
Arsenic	3	(c)	1.9×10^{-3} ppmdv	0.19	0.83
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.

**Total for 12 GE Frame 7F CC units operating at 100 percent load, 40F, and 70 percent relative humidity with water injection with a heat input of 1779.9 MBtu/h. Value shown matches that listed in SCA Table 3.4.1-1. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.

***Total for 12 CC units operating at 100 percent load for 8,760 hours per year calculated using the following equation: (12 unit emission rate lb/h)(8,760 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and General Electric performance data (Reference DER-1.1).
(b) Based on sulfur material balance and 98.5 percent sulfur removal from raw coal gas.
(c) Based on emission testing results (ppm) at a similar facility. Cool Water Coal Gasification Program: Fifth Progress Report, EPRI AP-5931, October 1988 (Reference DER-1.2).
(d) Based on best engineering judgement.
(e) Assumes a 7 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

EXHIBIT DER-1A (CONTINUED)

Calculation Number 1

$$Emission\ Basis\ \frac{lb/h}{Unit} \times 12\ Units = Total\ (12\ Unit)\ Emission\ Rate\ lb/h$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	100
NO_x	163
PM/PM_{10}	36
VOC	12

Assumptions:

(1) Each unit will emit at rate specified in Reference DER-1.1 at full load.

Example: CO

$$\frac{100\ lb/h}{Unit} \times 12\ Units = 1{,}200\ lb/h$$

EXHIBIT DER-1A (CONTINUED)

Calculation Number 2

$$\text{Coal Use } \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{Percent\ Sulfur\ (S)}{100}$$
$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{(100 - Control\ Efficiency)}{100} \times \frac{1\ IGCC\ Plant}{4\ CC\ Units}$$
$$\times\ 12\ CC\ Units = Total\ (12\ Unit)\ SO_2\ Emission\ Rate\ lb/h$$

Given:

Coal Use = 8,856 t/d
Percent Sulfur = 3.5 percent
Control Efficiency = 98.5 percent

$$8{,}856\ \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{3.5\%}{100}$$
$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{(100 - 98.5)}{100} \times \frac{1\ IGCC\ Plant}{4\ CC\ Units} \times 12\ CC\ Units$$
$$= 2{,}325\ lb\ SO_2/h$$

Calculation Number 3

$$\textit{Emission Basis (ppmdv)} \times \frac{\textit{1 mole of emission}}{10^6 \textit{ mole gas/ppmdv}} \times \frac{\textit{moles of gas flow per unit}}{h} \times \textit{Molecular Weight} \frac{lb}{\textit{mole emission}} \times 12 \textit{ Units} = \textit{Total (12 Unit) Pollutant Emission Rate lb/h}$$

Given:

Pollutant	Emission Basis ppmdv	Molecular Weight
Lead	1.2×10^{-2}	207
Beryllium	1.4×10^{-3}	9
Mercury	1.0×10^{-3}	200.6
Arsenic	1.9×10^{-3}	75

Moles of gas flow per unit = 110,048 mol/h

Assumption:

(1) Emission of toxic is at the concentration as measured in Reference DER-1.2.

Example: Lead

$$1.2 \times 10^{-2} \textit{ ppmdv} \times \frac{\textit{1 mole}}{10^6 \textit{ moles of gas/ppmdv}} \times 110{,}048 \frac{\textit{moles of gas/unit}}{h} \times 207 \frac{lb}{mole} \times 12 \textit{ units} = 3.28 \textit{ lb/h}$$

Calculation Number 4

$$12\ Unit\ SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100} \times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ (12\ Unit)\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:

SO_2 Emission Rate = 2,328 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 7 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$2{,}328\ lb/h \times \frac{7}{100} \times \frac{98}{64} = 250\ lb/h$$

EXHIBIT FDER-1B
(5 pages)

EXHIBIT DER-1B
Summary of Emission Calculations for the Coal Gasification
Combined Cycle Units (3,000 MW) CASE A

FUEL OIL FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	12 Unit Emission Rate** lb/h	12 Unit Annual Emission*** tpy
Carbon Monoxide	1	(a)	96 lb/h/unit	1,152	288
Nitrogen Oxides	1	(a)	318 lb/h/unit	3,816	954
Sulfur Dioxide	2	(b)	0.05% S oil	1,164	291
Particulate (PM/PM_{10})	1	(a)	17 lb/h/unit	204	51
Volatile Organic Compounds	3	(a)	15 lb UHC/h/unit	144	36
Lead	4	(c)	0.0000089 lb/MBtu	0.192	0.048
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	4	(c)	0.0000025 lb/MBtu	0.054	0.0135
Mercury	4	(c)	0.000003 lb/MBtu	0.066	0.0165
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	1	(a)(e)	10 lb/h/unit	120	30
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	(d)	N/A	N/A	N/A
Benzene	N/A	(d)	N/A	N/A	N/A
Arsenic	4	(c)	0.0000042 lb/MBtu	0.091	0.022
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for 12 GE Frame 7F CC units operating at 100 percent load, 40F, and 70 percent relative humidity with water injection with a heat input of 1799.8 MBtu/h. Value shown matches that listed in SCA Table 3.4.1-1. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for 12 CC units operating at 100 percent load for 500 hours per year calculated using the following equation: (12 unit emission rate lb/h)(500 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and General Electric performance data (Reference DER-1.3).
(b) Based on full conversion of 0.05 percent sulfur in fuel to SO_2.
(c) EPA-450/2-89-001, April 1989; "Estimating Air Toxic Emissions From Coal and Oil Combustion Sources" (Reference DER-1.4).
(d) Based on best engineering judgement.
(e) Assumes a 7 percent conversion of SO2 to SO3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Calculation Number 1

$$\text{Emission Basis } \frac{lb/h}{Unit} \times 12 \text{ Units} = \text{Total (12 Unit) Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	96
NO_x	318
PM/PM_{10}	17
Sulfuric Acid Mist	10

Assumptions:

(1) Each unit will emit at rate specified in Reference DER-1.3 at full load.

Example: CO

$$\frac{96\ lb/h}{Unit} \times 12 \text{ Units} = 1{,}152\ lb/h$$

Calculation Number 2

$$\frac{0.05\%\ S\ (lb\ S)}{100\ (lb\ oil)} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{Heating\ Value\ Btu} \times \frac{Heat\ Input\ Btu}{h\text{-}unit}$$

$$\times\ 12\ Units = Total\ (12\ Unit)\ Emission\ Rate\ lb/h$$

Assumptions:

Heating Value of oil = 18,550 Btu/lb
Heat Input per unit = 1,799.8 x 10^6 Btu/h, Reference DER-1.3.
100 percent conversion of sulfur to SO_2

$$\frac{0.05\%\ S\ lb\ S}{100\ lb\ oil} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{18{,}550\ Btu} \times \frac{1{,}799.8 \times 10^6\ Btu}{h\text{-}unit}$$

$$\times\ 12\ Units = 1{,}164\ lb/h$$

EXHIBIT DER-1B (CONTINUED)

Calculation Number 3

$$\text{Unburned Hydrocarbon (UHC)}\ \frac{lb/h}{Unit} \times 0.80\ \frac{lb\ VOC}{lb\ UHC} \times 12\ Units$$

$$= \text{Total (12 Unit) Emission Rate } lb/h$$

Assumptions:

(1) Each unit will emit UHC at rate specified in Reference DER-1.3 at full load.
(2) VOCs comprise 80 percent of UHC emissions.

$$\frac{15\ lb/h}{Unit} \times 0.8 \times 12\ Units = 144\ lb/h$$

EXHIBIT DER-1B (CONTINUED)

Calculation Number 4

$$Emission\ Basis\ \frac{lb}{MBtu} \times \frac{MBtu/h}{Unit} \times 12\ Units$$
$$= Total\ (12\ Unit)\ Emission\ Rate\ lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu
Lead	8.9×10^{-6}
Beryllium	2.5×10^{-6}
Mercury	3.0×10^{-6}
Arsenic	4.2×10^{-6}

Assumptions:

(1) Heat Input Per Unit = 1,799.8 MBtu/h. Reference DER-1.3.
(2) Toxic emissions per Reference DER-1.4.

Example: Lead

$$0.0000089\ \frac{lb}{MBtu} \times \frac{1799.8\ MBtu/h}{Unit} \times 12\ Units = .192\ lb/h$$

EXHIBIT FDER-1C
(5 pages)

EXHIBIT DER-1C
Summary of Emission Calculations for the Coal Gasification
Combined Cycle Units (2,000 MW) CASE B

COAL-DERIVED GAS FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	8 Unit Emission Rate** lb/h	8 Unit Annual Emission*** tpy
Carbon Monoxide	1	(a)	100 lb/h/unit	800	3,504
Nitrogen Oxides	1	(a)	163 lb/h/unit	1,304	5,712
Sulfur Dioxide	2	(b)	98.5% removal	1,552	6,798
Particulate (PM/PM_{10})	1	(a)	36 lb/h/unit	288	1,261
Volatile Organic Compounds	1	(a)	12 lb/h/unit	96	420
Lead	3	(c)	1.2×10^{-2} ppmdv	2.2	9.64
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	1.4×10^{-3} ppmdv	0.011	0.048
Mercury	3	(c)	1.0×10^{-3} ppmdv	0.176	0.77
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Not Detected	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	7% SO_2 conversion	174	760
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur	N/A	(d)	N/A	N/A	N/A
Benzene	--	(c)	Not Detected	Negligible	Negligible
Arsenic	3	(c)	1.9×10^{-3} ppmdv	0.13	0.56
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for 8 GE Frame 7F CC units operating at 100 percent load, 40F, and 70 percent relative humidity with water injection with a heat input of 1779.9 MBtu/h. Value shown matches that listed in SCA Table 3.4.1-2. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for 8 CC units operating at 100 percent load for 8,760 hours per year calculated using the following equation: (12 unit emission rate lb/h)(8,760 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and General Electric performance data (Reference DER-1.1).
(b) Based on sulfur material balance and 98.5 percent sulfur removal from raw coal gas.
(c) Based on emission testing results (ppm) at a similar facility. Cool Water Coal Gasification Program: Fifth Progress Report, EPRI AP-5931, October 1988 (Reference DER-1.2).
(d) Based on best engineering judgement.
(e) Assumes a 7 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Calculation Number 1

$$Emission\ Basis\ \frac{lb/h}{Unit} \times 8\ Units = Total\ (8\ Unit)\ Emission\ Rate\ lb/h$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	100
NO_x	163
PM/PM_{10}	36
VOC	12

Assumptions:

(1) Each unit will emit at rate specified in Reference DER-1.1 at full load.

Example: CO

$$\frac{100\ lb/h}{Unit} \times 8\ Units = 800\ lb/h$$

EXHIBIT DER-1C (CONTINUED)

Calculation Number 2

$$\text{Coal Use } \frac{t/d}{\text{IGCC Plant}} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{\text{Percent Sulfur } (S)}{100}$$
$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{(100 - \text{Control Efficiency})}{100} \times \frac{1\ \text{IGCC Plant}}{4\ \text{CC Units}}$$
$$\times\ 8\ \text{CC Units} = \text{Total (8 Unit) } SO_2 \text{ Emission Rate } lb/h$$

Given:

Coal Use = 8,856 t/d

Percent Sulfur = 3.5 percent

Control Efficiency = 98.5 percent

$$8{,}856\ \frac{t/d}{\text{IGCC Plant}} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{3.5\%}{100}$$
$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{(100 - 98.5)}{100} \times \frac{1\ \text{IGCC Plant}}{4\ \text{CC Units}} \times 8\ \text{CC Units}$$
$$= 1{,}550\ lb\ SO_2/h$$

Calculation Number 3

$$\textit{Emission Basis (ppmdv)} \times \frac{\textit{1 mole of emission}}{10^6 \textit{ mole gas/ppmdv}}$$
$$\times \frac{\textit{moles of gas flow per unit}}{h} \times \textit{Molecular Weight} \frac{lb}{\textit{mole emission}}$$
$$\times 8 \textit{ Units} = \textit{Total (8 Unit) Pollutant Emission Rate lb/h}$$

Given:

Pollutant	Emission Basis	Molecular Weight
	ppmdv	
Lead	1.2×10^{-2}	207
Beryllium	1.4×10^{-3}	9
Mercury	1.0×10^{-3}	200.6
Arsenic	1.9×10^{-3}	75

Moles of gas flow per unit = 110,048 mol/h

Assumption:

(1) Emission of toxic is at the concentration as measured in Reference DER-1.2.

Example: Lead

$$1.2 \times 10^{-2} \textit{ ppmdv} \times \frac{\textit{1 mole}}{10^6 \textit{ moles of gas/ppmdv}} \times 110{,}048 \frac{\textit{moles of gas/unit}}{h}$$
$$\times 207 \frac{lb}{mole} \times 8 \textit{ units} = 2.19 \textit{ lb/h}$$

EXHIBIT DER-1C (CONTINUED)

Calculation Number 4

$$8\ Unit\ SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100}$$

$$\times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ (8\ Unit)\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:

SO_2 Emission Rate = 1,552 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 7 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$1{,}552\ lb/h \times \frac{7}{100} \times \frac{98}{64} = 166\ lb/h$$

EXHIBIT FDER-1D
(5 pages)

EXHIBIT DER-1D
Summary of Emission Calculations for the Coal Gasification
Combined Cycle Units (2,000 MW) CASE B

FUEL OIL FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	8 Unit Emission Rate** lb/h	8 Unit Annual Emission*** tpy
Carbon Monoxide	1	(a)	96 lb/h/unit	768	192
Nitrogen Oxides	1	(a)	318 lb/h/unit	2,544	636
Sulfur Dioxide	2	(b)	0.05% S oil	776	194
Particulate (PM/PM_{10})	1	(a)	17 lb/h/unit	136	34
Volatile Organic Compounds	3	(a)	15 lb UHC/h/unit	96	24
Lead	4	(c)	0.0000089 lb/MBtu	0.128	0.032
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	4	(c)	0.0000025 lb/MBtu	0.036	0.009
Mercury	4	(c)	0.000003 lb/MBtu	0.044	0.011
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	1	(a)(e)	10 lb/h/unit	80	20
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	(d)	N/A	N/A	N/A
Benzene	N/A	(d)	N/A	N/A	N/A
Arsenic	4	(c)	0.0000042 lb/MBtu	0.061	0.015
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.

**Total for 8 GE Frame 7F CC units operating at 100 percent load, 40F, and 70 percent relative humidity with water injection with a heat input of 1799.8 MBtu/h. Value shown matches that listed in SCA Table 3.4.1-2. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.

***Total for 8 CC units operating at 100 percent load for 500 hours per year calculated using the following equation: (12 unit emission rate lb/h)(500 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and General Electric performance data (Reference DER-1.3).
(b) Based on full conversion of 0.05 percent sulfur in fuel to SO_2.
(c) EPA-450/2-89-001, April 1989; "Estimating Air Toxic Emissions From Coal and Oil Combustion Sources" (Reference DER-1.4).
(d) Based on best engineering judgement.
(e) Assumes a 7 percent conversion of SO2 to SO3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

EXHIBIT DER-1D (CONTINUED)

Calculation Number 1

$$\textit{Emission Basis } \frac{lb/h}{Unit} \times 8 \textit{ Units} = \textit{Total (8 Unit) Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	96
NO_x	318
PM/PM_{10}	17
Sulfuric Acid Mist	10

Assumptions:

(1) Each unit will emit at rate specified in Reference DER-1.3 at full load.

Example: CO

$$\frac{96\ lb/h}{Unit} \times 8 \textit{ Units} = 768\ lb/h$$

EXHIBIT DER-1D (CONTINUED)

Calculation Number 2

$$\frac{0.05\%\ S\ (lb\ S)}{100\ (lb\ oil)} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{Heating\ Value\ Btu} \times \frac{Heat\ Input\ Btu}{h\text{-}unit}$$

$$\times\ 8\ Units = Total\ (8\ Unit)\ Emission\ Rate\ lb/h$$

Assumptions:

Heating Value of oil = 18,550 Btu/lb
Heat Input per unit = 1,799.8 x 10^6 Btu/h, Reference DER-1.3.
100 percent conversion of sulfur to SO_2

$$\frac{0.05\%\ S\ lb\ S}{100\ lb\ oil} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{18{,}550\ Btu} \times \frac{1{,}799.8 \times 10^6\ Btu}{h\text{-}unit}$$

$$\times\ 8\ Units = 776\ lb/h$$

Calculation Number 3

$$\text{Unburned Hydrocarbon (UHC)}\ \frac{lb/h}{Unit} \times 0.80\ \frac{lb\ VOC}{lb\ UHC} \times 8\ \text{Units}$$

$$= \text{Total (8 Unit) Emission Rate } lb/h$$

Assumptions:

(1) Each unit will emit UHC at rate specified in Reference DER-1.3 at full load.
(2) VOCs comprise 80 percent of UHC emissions.

$$\frac{15\ lb/h}{Unit} \times 0.8 \times 8\ \text{Units} = 96\ lb/h$$

EXHIBIT DER-1D (CONTINUED)

Calculation Number 4

$$\text{Emission Basis } \frac{lb}{MBtu} \times \frac{MBtu/h}{Unit} \times 8 \text{ Units}$$
$$= \text{Total (8 Unit) Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu
Lead	8.9×10^{-6}
Beryllium	2.5×10^{-6}
Mercury	3.0×10^{-6}
Arsenic	4.2×10^{-6}

Assumptions:

(1) Heat Input Per Unit = 1,799.8 MBtu/h. Reference DER-1.3.

(2) Toxic emissions per Reference DER-1.4.

Example: Lead

$$0.0000089 \frac{lb}{MBtu} \times \frac{1799.8 \; MBtu/h}{Unit} \times 8 \text{ Units} = .128 \; lb/h$$

EXHIBIT FDER-1E
(4 pages)

EXHIBIT DER-1E
Summary of Emission Calculations for the PC Units

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis lb/MBtu	2 Unit Emission Rate** lb/h	2 Unit Annual Emission*** tpy
Carbon Monoxide	1	(a)	0.15	1,784	7,814
Nitrogen Oxides	1	(a)	0.17	2,021	8,852
Sulfur Dioxide	1 & 2	(a)(b)	0.26	3,091	13,539
Particulate (PM/PM_{10})	1	(a)	0.020	238	1,042
Volatile Organic Compounds	1	(a)	0.015	178	780
Lead	1	(c)	0.0000168	0.2	0.87
Asbestos	--	(d)(f)	Negligible	Negligible	Negligible
Beryllium	1	(e)	0.00000011	0.0013	0.0057
Mercury	1 & 3	(c)(f)	0.000011	0.12	0.52
Vinyl Chloride	--	(d)	Negligible	Negligible	Negligible
Total Fluorides	1 & 4	(g)	0.0000769	0.914	4.00
Sulfuric Acid Mist	1 & 5	(h)	0.0433	520	2,278
Hydrogen Sulfide	--	(d)	Negligible	Negligible	Negligible
Total Reduced Sulfur (including H_2S)	--	(d)	Negligible	Negligible	Negligible
Benzene	--	(d)	Negligible	Negligible	Negligible
Arsenic	1	(e)	0.000017	0.205	0.898
Radionuclides	6	(e)	110 pCi/MBtu	1.31μCi/h	11.5mCi/yr

*The calculations are shown by number on the pages following this table.

**Total for 2x600 MW units, 5,945 MBtu/h heat input each. Value shown matches that listed in SCA Table 3.4.1-3. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.

***Total for 2x600 MW units operating at a 100 percent load for 8,760 hours per year calculated using the following equation: (2 unit emission rate lb/h)(8,760 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3).
(b) Assumes 95.5 percent SO_2 removal using 3.5 percent sulfur, 12,100 Btu/lb coal.
(c) EPA-450/2-89-001, April 1989; "Estimating Air Toxic Emissions From Coal and Oil Combustion Sources". (Reference DER-1.4)
(d) Based on best engineering judgement.
(e) EPA-450/2-88-006a, October 1988; "Toxic Air Pollutant Emission Factors - A Compilation For Selected Air Toxic Compounds and Sources". (Reference DER-1.5)
(f) Assumes a 70 percent control efficiency.
(g) Based on average concentration of fluorine in coal per "Trace Elements in Coal" by Vlado Valkovic (Reference DER-1.6). Also assumes 99 percent removal by the scrubber.
(h) Assumes a 1 percent conversion of uncontrolled SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4. Also assumes a 50 percent control efficiency.

EXHIBIT DER-1E (CONTINUED)

Calculation Number 1

$$Emission\ Basis\ \frac{lb/h}{Unit} \times 2\ Units = Total\ (2\ Unit)\ Emission\ Rate\ lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu	Reference
CO	0.15	BACT
NO_x	0.17	BACT
SO_2	0.26*	BACT (95.5% control)
PM/PM_{10}	0.02	BACT
VOC	0.015	BACT
Lead	1.68×10^{-5}	DER-1.4
Beryllium	1.1×10^{-7}	DER-1.5
Mercury	1.1×10^{-5}**	DER-1.4 (70% control)
Fluorides	7.69×10^{-5}***	DER-1.6 (99% control)
Arsenic	1.7×10^{-5}	DER-1.5
Sulfuric Acid Mist	0.0433****	BACT (50% control)

Example: CO

$$\frac{0.15\ lb/h}{Unit} \times 2\ Units = 0.3\ lb/h$$

*See Calculation Number 2.
**See Calculation Number 3.
***See Calculation Number 4.
****See Calculation Number 5.

EXHIBIT DER-1E (CONTINUED)

Calculation Number 2

$$\frac{3.5\%\ S\ lb\ S}{100\ lb\ coal} \times \frac{lb\ coal}{12{,}100\ Btu} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{1 \times 10^6\ Btu}{MBtu}$$

$$\times \frac{100 - 95.5\%}{100} = 0.260\ \frac{lb}{MBtu}$$

Calculation Number 3

$$\frac{35\ lb\ Hg}{10^{12}\ Btu} \times \frac{(100 - 70\%)}{100} \times \frac{1 \times 10^6\ Btu}{MBtu} = 1.1 \times 10^{-5}\ \frac{lb}{MBtu}$$

Calculation Number 4

$$\frac{93\ lb\ Fl}{10^6\ lbcoal} \times \frac{lbcoal}{12{,}100 Btu} \times \frac{(100 - 99\%)}{100} \times \frac{1 \times 10^6\ Btu}{MBtu}$$

$$= 7.69 \times 10^{-5}\ \frac{lb}{MBtu}$$

Calculation Number 5

$$\frac{0.26\ lb\ SO_2\ (controlled)}{MBtu} \times \frac{100\ (uncontrolled)}{(100 - 95.5)} \times \frac{1\%\ conversion}{100}$$

$$\times \frac{1.5\ lb\ H_2SO_4}{lb\ SO_2} \times \frac{(100 - 50\%)}{100} = 0.0433\ \frac{lb}{MBtu}$$

Calculation Number 6
Note: Ci = Curies

$$(Ci\ U\text{-}238/MBtu + Ci\ Th\text{-}232/MBtu) \times \frac{Heat\ Input\ MBtu/h}{Unit} \times 2\ Units = Total\ Radionuclides\ Ci/h$$

Given:

Emission Factor = 73.7×10^{-12} Ci/MBtu (U-238)
= 36.5×10^{-12} Ci/MBtu (Th-232)

Heat Input = 5,945 MBtu/h

$$(73.7 \times 10^{-12}\ Ci/MBtu + 36.5 \times 10^{-12}\ Ci/MBtu) \times \frac{5{,}945\ MBtu/h}{Unit} \times 2\ Units$$

$$= 1.31 \times 10^{-6}\ Ci/h \quad (1.31\ \mu Ci/h)$$

EXHIBIT FDER-1F
(5 pages)

EXHIBIT DER-1F
Summary of Emission Calculations for the Thermal Oxidation Units
(3,000 MW) Case A

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	3 IGCC Plant Emission Rate** lb/h	3 IGCC Plant Annual Emission*** tpy
Carbon Monoxide	1	(a)	9.0 lb/h/IGCC Plant	27	118
Nitrogen Oxides	1	(a)	114 lb/h/IGCC Plant	342	1,498
Sulfur Dioxide	2	(b)	mass balance	153	670
Particulate (PM/PM_{10})	1	(a)	2.0 lb/h/IGCC Plant	9	39
Volatile Organic Compounds	--	(a)	Negligible	Negligible	Negligible
Lead	3	(c)	0.0031 ppmdv	0.012	0.052
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	0.012 ppmdv	0.0002	0.0009
Mercury	3	(c)	0.010 ppmdv	0.039	0.17
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Not Detected	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	1% SO_2 conversion	2.3	10
Hydrogen Sulfide	--	(c)	Negligible	Negligible	Negligible
Total Reduced Sulfur	N/A	(d)	N/A	N/A	N/A
Benzene	--	(c)	Not Detected	Negligible	Negligible
Arsenic	3	(c)	0.0041 ppmdv	0.007	0.031
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for 3 IGCC plants operating at full load. Value shown matches that listed in SCA Table 3.4.1-4. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for 3 IGCC plants operating at 100 percent load for 8,760 hours per year calculated using the following equation: (3 IGCC Plant emission rate lb/h)(8,760 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on IGCC manufacturer design data for similar facilities.
(b) Based on material balance for sulfur (S). Assumes 98.5 percent S removal and 99.9 percent S recovery.
(c) Based on measured emission concentrations on similar facility per EPRI. (Reference DER-1.2)
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

EXHIBIT DER-1F (CONTINUED)

Calculation Number 1

$$\textit{Emission Basis}\ \frac{lb/h}{\textit{IGCC Plant}} \times 3\ \textit{IGCC Plants}$$

$$= \textit{Total (3 Plant) Emission Rate lb/h}$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	9.0
NO_x	114
PM/PM_{10}	2.0
VOC	Negligible

Example: CO

$$\frac{9.0\ lb/h}{\textit{IGCC Plant}} \times 3\ \textit{IGCC Plants} = 27\ lb/h$$

Calculation Number 2
Note: Thermal Oxidation Unit = TOU

$$Coal\ Use\ \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{Percent\ Sulfur\ (S)}{100}$$

$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{Sulfur\ Removal\ Efficiency}{100}$$

$$\times\ \frac{(100 - Sulfur\ Recovery\ Efficiency)}{100} \times 3\ IGCC\ Plants$$

$$= Total\ (3\ IGCC)\ TOU\ SO_2\ Emission\ Rate\ lb/h$$

Given:

Coal Use = 8,856 t/d
Percent Sulfur = 3.5 percent
Sulfur Removal Efficiency = 98.5 percent
Sulfur Recovery Efficiency = 99.9 percent

$$8{,}856\ \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{3.5\%}{100}$$

$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{98.5}{100} \times \frac{(100 - 99.9)}{100} \times 3\ IGCC\ Plants$$

$$= 153\ lb\ SO_2/h$$

Calculation Number 3
Note: Thermal Oxidation Unit = TOU

$$\textit{Emission Basis (ppmdv)} \times \frac{\textit{1 mole of emission}}{10^6 \textit{ mole gas/ppmdv}}$$

$$\times \frac{\textit{moles of gas flow per IGCC TOU}}{h} \times \textit{Molecular Weight} \frac{lb}{\textit{mole emission}}$$

$$\times \frac{2\ TOU}{IGCC} \times 3 \textit{ IGCC Plants} = \textit{Total (3 IGCC) Pollutant Emission Rate lb/h}$$

Given:

Pollutant	Emission Basis ppmdv	Molecular Weight
Lead	3.1×10^{-3}	207
Beryllium	1.2×10^{-2}	9
Mercury	1.0×10^{-2}	200.6
Arsenic	4.1×10^{-3}	75

Moles of gas flow per unit = 3,262 mol/h

Assumption:
(1) Emission of toxic is at the concentration as measured in Reference DER-1.2.

Example: Lead

$$3.1 \times 10^{-3} \textit{ ppmdv} \times \frac{\textit{1 mole}}{10^6 \textit{ moles of gas/ppmdv}} \times 3{,}262 \frac{\textit{moles of gas/IGCC TOU}}{h}$$

$$\times 207 \frac{lb}{mole} \times \frac{2\ TOU}{IGCC} \times 3\ IGCC = 0.0126\ lb/h$$

Calculation Number 4

$$3\ IGCC\ SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100} \times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ (3\ IGCC)\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:

SO_2 Emission Rate = 153 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$153\ lb/h \times \frac{1}{100} \times \frac{98}{64} = 2.3\ lb/h$$

EXHIBIT FDER-1G
(5 pages)

EXHIBIT DER-1G
Summary of Emission Calculations for the Thermal Oxidation Units
(2,000 MW) Case B

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	2 IGCC Plant Emission Rate** lb/h	2 IGCC Plant Annual Emission*** tpy
Carbon Monoxide	1	(a)	9.0 lb/h/IGCC Plant	18	78
Nitrogen Oxides	1	(a)	114 lb/h/IGCC Plant	228	999
Sulfur Dioxide	2	(b)	mass balance	102	447
Particulate (PM/PM_{10})	1	(a)	2.0 lb/h/IGCC Plant	6	26
Volatile Organic Compounds	--	(a)	Negligible	Negligible	Negligible
Lead	3	(c)	0.0031 ppmdv	0.008	0.035
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	0.012 ppmdv	0.0001	0.0006
Mercury	3	(c)	0.010 ppmdv	0.026	0.11
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Not Detected	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	1% SO_2 conversion	1.5	6.7
Hydrogen Sulfide	--	(c)	Negligible	Negligible	Negligible
Total Reduced Sulfur	N/A	(d)	N/A	N/A	N/A
Benzene	--	(c)	Not Detected	Negligible	Negligible
Arsenic	3	(c)	0.0041 ppmdv	0.005	0.021
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for 2 IGCC plants operating at full load. Value shown matches that listed in SCA Table 3.4.1-4. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for 2 IGCC plants operating at 100 percent load for 8,760 hours per year calculated using the following equation: (2 IGCC Plant emission rate lb/h)(8,760 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on IGCC manufacturer design data for similar facilities.
(b) Based on material balance for sulfur (S). Assumes 98.5 percent S removal and 99.9 percent S recovery.
(c) Based on measured emission concentrations on similar facility per EPRI. (Reference DER-1.2)
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Calculation Number 1

$$\text{Emission Basis } \frac{lb/h}{\text{IGCC Plant}} \times 2 \text{ IGCC Plants}$$

$$= \text{Total (2 Plant) Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/h/unit
CO	9.0
NO_x	114
PM/PM_{10}	2.0
VOC	Negligible

Example: CO

$$\frac{9.0\ lb/h}{IGCC} \times 2\ IGCC = 18\ lb/h$$

Calculation Number 2

Note: Thermal Oxidation Unit = TOU

$$Coal\ Use\ \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{Percent\ Sulfur\ (S)}{100}$$

$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{Sulfur\ Removal\ Efficiency}{100}$$

$$\times\ \frac{(100 - Sulfur\ Recovery\ Efficiency)}{100} \times 2\ IGCC\ Plants$$

$$=\ Total\ (2\ IGCC)\ TOU\ SO_2\ Emission\ Rate\ lb/h$$

Given:

Coal Use = 8,856 t/d
Percent Sulfur = 3.5 percent
Sulfur Removal Efficiency = 98.5 percent
Sulfur Recovery Efficiency = 99.9 percent

$$8{,}856\ \frac{t/d}{IGCC\ Plant} \times 1\ d/24\ h \times 2{,}000\ lb/t \times \frac{3.5\%}{100}$$

$$\times\ 2\ lb\ SO_2/lb\ S \times \frac{98.5}{100} \times \frac{(100 - 99.9)}{100} \times 2\ IGCC\ Plants$$

$$=\ 102\ lb\ SO_2/h$$

Calculation Number 3
Note: Thermal Oxidation Unit = TOU

$$\text{Emission Basis (ppmdv)} \times \frac{1 \text{ mole of emission}}{10^6 \text{ mole gas/ppmdv}}$$

$$\times \frac{\text{moles of gas flow per IGCC TOU}}{h} \times \text{Molecular Weight } \frac{lb}{\text{mole emission}}$$

$$\times \frac{2 \text{ TOU}}{\text{IGCC}} \times 2 \text{ IGCC Plants} = \text{Total (2 IGCC) Pollutant Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis ppmdv	Molecular Weight
Lead	3.1×10^{-3}	207
Beryllium	1.2×10^{-2}	9
Mercury	1.0×10^{-2}	200.6
Arsenic	4.1×10^{-3}	75

Moles of gas flow per unit = 3,262 mol/h

Assumption:
(1) Emission of toxic is at the concentration as measured in Reference DER-1.2.

Example: Lead

$$3.1 \times 10^{-3} \text{ ppmdv} \times \frac{1 \text{ mole}}{10^6 \text{ moles of gas/ppmdv}} \times 3,262 \frac{\text{moles of gas/IGCC TOU}}{h}$$

$$\times 207 \frac{lb}{mole} \times \frac{2 \text{ TOU}}{\text{IGCC}} \times 2 \text{ IGCC} = 0.0084 \ lb/h$$

Calculation Number 4

$$2\ IGCC\ SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100} \times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ (2\ IGCC)\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:

SO_2 Emission Rate = 102 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$102\ lb/h \times \frac{1}{100} \times \frac{98}{64} = 1.6\ lb/h$$

EXHIBIT FDER-1H
(4 pages)

EXHIBIT DER-1H

Summary of Emission Calculations for the Auxiliary Boiler

NATURAL GAS FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	Emission Rate**	Annual Emission***
			lb/MBtu	lb/h	tpy
Carbon Monoxide	1	(a)	0.05	4.9	0.25
Nitrogen Oxides	1	(a)	0.1	9.9	0.50
Sulfur Dioxide	2	(b)	0.3 lb/MCF	0.0641	0.0032
Particulate (PM/PM_{10})	1	(a)	0.005	0.50	0.025
Volatile Organic Compounds	1	(a)	0.005	0.50	0.025
Lead	--	(c)	Negligible	Negligible	Negligible
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	--	(c)	Negligible	Negligible	Negligible
Mercury	--	(c)	Negligible	Negligible	Negligible
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	3	(e)	1% SO_2 conversion	0.00099	0.0000495
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	(d)	N/A	N/A	N/A
Benzene	1	(f)	0.000068	0.0067	0.00033
Arsenic	--	(c)	Negligible	Negligible	Negligible
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.

**Total for one auxiliary boiler operating at maximum load (99 MBtu/h). Value shown matches that listed in SCA Table 3.4.1-5. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.

***Total for one auxiliary boiler operating a maximum of 100 hours per year at full load calculated using the following equation: (Emission rate lb/h)(100 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and manufacturer's performance data.

(b) Based on USEPA AP-42. (Reference DER-1.7)

(c) EPA-450/2-88-006a, October 1988, "Toxic Air Pollutant Emission Factors - A Compilation For Selected Air Toxic Compounds and Sources."

(d) Based on best engineering judgement.

(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

(f) Virginia Department of Air Pollution Control Intra-Agency Memorandum from Air Toxics Program Coordinator to Director DTE, "Toxic Air Emissions from Utility-Sized Boilers", October 26, 1989. (Reference DER-1.8)

N/A = Not applicable to this type of system.

EXHIBIT DER-1H (CONTINUED)

Calculation Number 1

$$\text{Emission Basis } \frac{lb}{MBtu} \times MBtu/h = \text{Total Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu
CO	0.05
NOx	0.10
$PM \backslash PM_{10}$	0.005
VOC	0.005
Benzene	0.000068

Assumptions:

(1) Heat Input Per Unit = 99 MBtu/h.
(2) Benzene emissions per Reference DER-1.8.

Example: CO

$$0.05 \frac{lb}{MBtu} \times 99\ MBtu/h = 4.95\ lb/h$$

EXHIBIT DER-1H (CONTINUED)

Calculation Number 2

$$\frac{0.3\ lb\ S}{10^6\ ft^3} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{1\ ft^3}{918\ Btu} \times \frac{99 \times 10^6\ Btu}{h} = 0.065\ lb/h$$

Assumptions:

Heat Input = 99 MBtu/h
Sulfur Content = 2,000 grains/10^6 ft^3 per AP-42. (Reference DER-1.7)
Natural Gas = 918 Btu/ft^3

Calculation Number 3

$$SO_2 \text{ Emission } lb/h \times \frac{\text{Percent Conversion}}{100}$$

$$\times \frac{\text{Molecular Weight } H_2SO_4}{\text{Molecular Weight } SO_2} = \text{Total } H_2SO_4 \text{ Emission Rate } lb/h$$

Given:

SO_2 Emission Rate = 0.0641 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$0.0641 \; lb/h \times \frac{1}{100} \times \frac{98}{64} = 0.00098 \; lb/h$$

EXHIBIT FDER-1I
(4 pages)

EXHIBIT DER-1I
Summary of Emission Calculations for the Auxiliary Boiler

FUEL OIL FIRED

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Factor	Emission Rate**	Annual Emission***
			lb/MBtu	lb/h	tpy
Carbon Monoxide	1	(a)	0.05	4.9	0.25
Nitrogen Oxides	1	(a)	0.2	19.8	0.99
Sulfur Dioxide	2	(b)	0.05% Sulfur	5.27	0.26
Particulate (PM/PM_{10})	1	(a)	0.05	4.9	0.25
Volatile Organic Compounds	1	(a)	0.01	0.99	0.05
Lead	1	(c)	0.0000089	0.000881	0.000044
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	1	(c)	0.0000025	0.00025	0.000013
Mercury	1	(c)	0.000003	0.000297	0.000015
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	3	(e)	1% SO_2 conversion	0.082	0.0041
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	(d)	N/A	N/A	N/A
Benzene	N/A	(d)	N/A	N/A	N/A
Arsenic	1	(c)	0.0000042	0.000415	0.00002
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for one auxiliary boiler operating at maximum load (99 MBtu/h). Value shown matches that listed in SCA Table 3.4.1-5. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for one auxiliary boiler operating a maximum of 100 hours per year at full load calculated by the following equation: (Emission rate lb/h)(100 h/y)(1/2,000 t/lb) = tpy.

(a) Anticipated emission level based on conclusions of preliminary BACT analysis (SCA Section 3.4.3) and manufacturer's performance data.
(b) Based on full conversion of 0.05 percent sulfur in fuel oil to SO_2.
(c) EPA-450/2-89-001, April 1989; "Estimating Air Toxic Emissions From Coal and Oil Combustion Sources". (Reference DER-1.4)
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

EXHIBIT DER-1I (CONTINUED)

Calculation Number 1

$$\text{Emission Basis } \frac{lb}{MBtu} \times MBtu/h = \text{Total Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu
CO	0.05
NO_x	0.2
$PM\backslash PM_{10}$	0.05
VOC	0.01
Lead	8.9×10^{-6}
Beryllium	2.5×10^{-6}
Mercury	3.0×10^{-6}
Arsenic	4.2×10^{-6}

Assumptions:
(1) Heat Input Per Unit = 99 MBtu/h.
(2) Toxic emissions per Reference DER-1.4.

Example: CO

$$0.05 \frac{lb}{MBtu} \times 99\ MBtu/h = 4.95\ lb/h$$

Calculation Number 2

$$\frac{0.05\%\ S\ (lb\ S)}{100\ (lb\ oil)} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{Heating\ Value\ Btu} \times \frac{Heat\ Input\ Btu}{h}$$

$= Total\ Emission\ Rate\ lb/h$

Assumptions:

Higher Heating Value of oil = 19,100 Btu/lb
Heat Input per unit = 99 x 10^6 Btu/h
100 percent conversion of sulfur to SO_2

$$\frac{0.05\%\ S\ lb\ S}{100\ lb\ oil} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{19{,}100\ Btu} \times \frac{99 \times 10^6\ Btu}{h}$$

$= 5.18\ lb/h$

Calculation Number 3

$$SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100} \times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:

SO_2 Emission Rate = 5.27 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$5.27\ lb/h \times \frac{1}{100} \times \frac{98}{64} = 0.081\ lb/h$$

EXHIBIT FDER-1J
(4 pages)

EXHIBIT DER-1J
Summary of Emission Calculations for the Diesel Generator

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	Emission Rate** lb/h	Annual Emission*** tpy
Carbon Monoxide	1	(a)	2.18 g/hp-h	12	0.60
Nitrogen Oxides	1	(a)	9.82 g/hp-h	53	2.65
Sulfur Dioxide	2	(b)	0.05% Sulfur	0.91	0.044
Particulate (PM/PM_{10})	1	(a)	0.09 g/hp-h	0.48	0.024
Volatile Organic Compounds	1	(a)	0.05 g/hp-h	0.27	0.014
Lead	3	(c)	0.0000089 lb/MBtu	0.00016	0.000008
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	0.0000025 lb/MBtu	0.000044	0.0000022
Mercury	3	(c)	0.000003 lb/MBtu	0.000052	0.0000026
Vinyl Chloride	N/A	(d)	N/A	N/A	N/A
Total Fluorides	--	(c)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	1% SO_2 conversion	0.014	0.00065
Hydrogen Sulfide	N/A	(d)	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	(d)	N/A	N/A	N/A
Benzene	N/A	(d)	N/A	N/A	N/A
Arsenic	3	(c)	0.0000042 lb/MBtu	0.000073	0.0000037
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Total for one 1,300 kW diesel generator with a heat input of 17.4 MBtu/h. Value shown matches that listed in SCA Table 3.4.1-6. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Total for one diesel generator operating at full load calculated using the following equation: (Emission rate lb/h)(100 h/y)(1/2,000 t/lb) = tpy.

(a) Based on manufacturer's performance data. (Reference DER-1.9)
(b) Based on full conversion of 0.05 percent sulfur in fuel oil to SO_2.
(c) EPA-450/2-89-001, April 1989; "Estimating Air Toxic Emissions From Coal and Oil Combustion Sources". (Reference DER-1.4)
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Calculation Number 1

$$\text{Emission Basis } \frac{g}{hp\text{-}h} \times \text{Diesel Horsepower } hp \times \frac{1\ lb}{453.6\ g}$$

$$= \text{Diesel Generator Emission } lb/h$$

Given:

Pollutant	Emission Basis g/hp-h
CO	2.18
NO_x	9.82
PM/PM_{10}	0.09
VOC	0.05

Assumptions:

(1) Diesel will emit at rate listed in Reference DER-1.9.

(2) Diesel horsepower is 2,437 hp.

Example: CO

$$2.18\ \frac{g}{hp\text{-}h} \times 2{,}437\ hp \times \frac{1\ lb}{453.6\ g} = 11.7\ lb/h$$

Calculation Number 2

$$\frac{0.05\%\ S\ (lb\ S)}{100\ (lb\ oil)} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{Heating\ Value\ Btu} \times \frac{Heat\ Input\ Btu}{h}$$

$= Total\ Emission\ Rate\ lb/h$

Assumptions:

Higher Heating Value of oil = 19,100 Btu/lb
Heat Input per unit = 17.4 x 10^6 Btu/h
100 percent conversion of sulfur to SO_2

$$\frac{0.05\%\ S\ lb\ S}{100\ lb\ oil} \times \frac{2\ lb\ SO_2}{lb\ S} \times \frac{lb\ oil}{19{,}100\ Btu} \times \frac{17.4 \times 10^6\ Btu}{h}$$

$= 0.91\ lb/h$

Calculation Number 3

$$\text{Emission Basis } \frac{lb}{MBtu} \times MBtu/h = \text{Total Emission Rate } lb/h$$

Given:

Pollutant	Emission Basis lb/MBtu
Lead	8.9×10^{-6}
Beryllium	2.5×10^{-6}
Mercury	3.0×10^{-6}
Arsenic	4.2×10^{-6}

Assumptions:
(1) Heat Input Per Unit = 17.4 MBtu/h.
(2) Toxic emissions per Reference DER-1.4.

Example: Lead

$$0.0000089 \frac{lb}{MBtu} \times 17.4\ MBtu/h = 0.00015\ lb/h$$

Calculation Number 4

$$SO_2 \text{ Emission } lb/h \times \frac{\text{Percent Conversion}}{100}$$

$$\times \frac{\text{Molecular Weight } H_2SO_4}{\text{Molecular Weight } SO_2} = \text{Total } H_2SO_4 \text{ Emission Rate } lb/h$$

Given:
SO_2 Emission Rate = 0.91 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$0.91\ lb/h \times \frac{1}{100} \times \frac{98}{64} = 0.014\ lb/h$$

EXHIBIT FDER-1K
(27 pages)

EXHIBIT DER-1K
Summary of Emission Calculations for the Emergency Flares
(3,000 MW) Case A

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	Emission Rate** lb/h	Annual Emission*** tpy
Carbon Monoxide	1	(a)	0.2 lb/MBtu	327	1.3
Nitrogen Oxides	1	(a)	0.07 lb/MBtu	114.5	0.46
Sulfur Dioxide	2	(b)	mass balance	2,874	11.5
Particulate (PM/PM_{10})	3	(c)	mass balance	72.8	0.29
Volatile Organic Compounds	3	(c)	mass balance	24.0	0.96
Lead	3	(c)	mass balance	0.551	0.0022
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	mass balance	0.0028	0.000011
Mercury	3	(c)	mass balance	0.047	0.00019
Total Fluorides	--	(d)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	1% SO_2 conversion	44	0.18
Hydrogen Sulfide	--	(d)	Negligible	Negligible	Negligible
Total Reduced Sulfur	--	(d)	Negligible	Negligible	Negligible
Benzene	--	(d)	Negligible	Negligible	Negligible
Arsenic	3	(c)	mass balance	0.032	0.000128
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.

**Based on one 80 minute flare at any one time, normalized to an hourly emission rate. Value shown matches that listed in SCA Table 3.4.1-7. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.

***Based on one startup sequence per flare per year. Thus, annual emissions are based on six flares per year calculated using the following equation: (Emission rate per flare lb/h)(6 flares/y)(1/2,000 t/lb) = tpy.

(a) Based on flare manufacturer design data.
(b) Based on use of 3.5 percent sulfur, 12,100 Btu/lb coal and 40 minutes of raw gas (no sulfur removal) and 40 minutes of clean gas (with 96 percent sulfur removal) flow to flare.
(c) Assumes 40 minutes of raw gas emissions equal to two CGCC units plus one thermal oxidation unit, and 40 minutes of clean gas emissions equal to two CGCC units.
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Reference: Shell Coal Gasification Process where flow is 85,760 m^3/h at 73.85 MW.

Assume:
1 gasification unit startup per year
40 minutes of 1/4 gas flow with raw gas
40 minutes of 2/3 gas flow with clean gas
1 flare per sulfur receiving unit

270.5 Btu/scf average gas heating value

The following equations support the determination of flare flow rate and heat input:

$$\left[2\ \frac{\text{CTs}}{\text{flare}}\right]\left[85{,}760\ \frac{\text{m}^3}{\text{h}}\right]\left[\frac{162\ \text{MW}}{73.85\ \text{MW}}\right]\left[\frac{\text{h}}{60\ \text{min}}\right]\left[35.315\ \frac{\text{ft}^3}{\text{m}^3}\right] = 221{,}455.9\ \frac{\text{ft}^3}{\text{min}}$$

Total flow per start-up

$$\left[221{,}456\ \frac{\text{ft}^3}{\text{min}}\right](40\ \text{min})\ [0.25 + 0.66] = 8{,}060{,}995\ \text{ft}^3$$

Normalize to hourly flow rate

$$\left[8{,}060{,}995\ \frac{\text{ft}^3}{80\ \text{min}}\right] = 100{,}762\ \text{scfm}$$

Heat content

$$\left[270.5\ \frac{\text{Btu}}{\text{scf}}\right]\left[100{,}762\ \frac{\text{scf}}{\text{min}}\right]\left[60\ \frac{\text{min}}{\text{h}}\right] = 1635\ \frac{\text{MBtu}}{\text{h}}$$

Calculation Number 3

Particulate, VOC, and trace elements, assume raw gas emissions equal to CGCC + Incinerator. Clean gas emissions equal to CGCC.

Particulate

Raw Gas

$$\left[\left[432\ \frac{\text{lb}}{\text{h}}\right]\left[\frac{2\ \text{CTs}}{12\ \text{CTs}}\right] + \left[9\ \frac{\text{lb}}{\text{h}}\right]\left[\frac{2}{12}\right]\right]\left[\frac{\text{h}}{60\ \text{min}}\right](40\ \text{min}) = 49\ \text{lb}$$

Clean Gas

$$\left[\left[432\frac{\text{lb}}{\text{h}}\right]\left[\frac{2}{12}\right]\left[\frac{40}{60}\right]\right] = 48\ \text{lb}$$

$$\text{Normalized} = \frac{(48 + 49)}{80\ \text{min}}\ \text{lb}\left[\frac{60\ \text{m}}{\text{h}}\right] = 72.8\ \text{lb/h}$$

VOC

$$[(2)(144) + 0]\left[\frac{2}{12}\right]\left[\frac{40}{60}\right]\left[\frac{60}{80}\right] = 24\ \text{lb/h}$$

Check of compressed format using particulate equation

$$[(2)(432) + (9)]\left[\frac{2}{12}\right]\left[\frac{40}{80}\right] = [(2)\ (432) + 9]\ (0.0833) = 72.8\ lb/h$$

Arsenic

$$[(2)(0.19) + 0.007)]\ (0.0833) = 0.032\ lb/h$$

Beryllium

$$[(2)\ (0.0165) + (0.0002)]\ (0.0833) = 0.0028\ lb/h$$

Lead

$$[(2)\ (3.3) + 0.012]\ (0.0833) = 0.551\ lb/h$$

Mercury

$$[(2)\ (0.264) + 0.039]\ (0.0833) = 0.047\ lb/h$$

Calculation Number 4

$$SO_2\ Emission\ lb/h \times \frac{Percent\ Conversion}{100} \times \frac{Molecular\ Weight\ H_2SO_4}{Molecular\ Weight\ SO_2} = Total\ H_2SO_4\ Emission\ Rate\ lb/h$$

Given:
SO_2 Emission Rate = 2,874 lb/h
Percent Conversion of SO_2 to H_2SO_4 = 1 percent
Molecular Weight H_2SO_4 = 98
Molecular Weight SO_2 = 64

$$2{,}874\ lb/h \times \frac{1}{100} \times \frac{98}{64} = 44\ lb/h$$

Be

Suprenant et al. (1980a, 1980b) studies. The reference stated that emission factors were calculated assuming all beryllium present in the oil feed is emitted; however, the numbers presented for beryllium levels in oil and corresponding emission factors do not agree with this statement (see Table 4-6). The calculated beryllium factors reported by Tyndall et al. (1978), Shih et al. (1980b), and Anderson (1973) are in closer agreement with the summarized factor than are the values reported by Suprenant et al. (1980a, 1980b).

Measured beryllium emission factors for residual oil combustion vary over three orders of magnitude, from 0.14 to 250 $lb/10^{12}$ Btu, as shown in Table 4-7. The causes of this variation are uncertain. Since beryllium contents of many of the fuels were below the detection limit, mass balance closure for the test runs cannot be calculated.

The summarized beryllium emission factor for distillate oil is 2.5 $lb/10^{12}$ Btu as shown in Table 4-8. This is higher than that reported in previous studies by Suprenant et al. (1980a; 1980b); but as explained in the preceding paragraph and in Table 4-8, there is a discrepancy between the values Suprenant et al. (1980b) reported for beryllium content of oil and the corresponding calculated emission factors reported. The values are not consistent with the assumptions stated in that reference about the calculation procedures. Three tests of beryllium emissions from distillate oil-fired sources are shown in Table 4-9. Measured beryllium emission factors range from 0.52 to 1.2 $lb/10^{12}$ Btu, which are slightly below the summarized value of 2.5 $lb/10^{12}$ Btu, but much higher than the values previously calculated by Suprenant et al. (1980a, 1980b).

Cadmium Emission Factors

The summary uncontrolled cadmium emission factor for residual oil combustion sources is 15.7 $lb/10^{12}$ Btu. Table 4-10 compares this factor with values calculated in six previous studies. It is in general agreement with values for domestic residual oil combustion calculated by Shih et al. (1980b) and Anderson (1973). The validity of emission factors calculated in Suprenant et al. (1980b) is uncertain because the level of cadmium in oil and

The summarized copper emission factor for distillate oil, 280 lb/10^{12} Btu, is essentially the same as the summarized value for residual oil. It is between the distillate oil emission factors calculated in the two previous studies shown in Table 4-20. Table 4-21 summarizes measured emission factors. Five of the six reported measured emission factors are less than 63 lb/10^{12} Btu, well below the summary value; however, the mass balances for the Castaldini et al. (1981b, 1982) tests do not close, with only about 10 to 20 percent of the copper that enters in the oil feed being emitted.

Mercury Emission Factors

The mercury emission factor for residual oil combustion derived in this study is 3.2 lb/10^{12} Btu. This is in close agreement with previously calculated values shown in Table 4-22, which range from 0.47 to 6.67 lb/10^{12} Btu. Measured mercury emission factors are well below calculated factors, ranging from 0.052 to 1.4 lb/10^{12} Btu. Mercury is volatile and it is suspected that a substantial portion of mercury present in the vapor phase escaped detection. For those test runs on Table 4-23 where mass balances can be calculated, only about 3 to 20 percent of the mercury entering in the oil feed was measured in the emissions.

The summary emission factor for mercury from distillate oil combustion is 3.0 lb/10^{12} Btu. This is based on a level of mercury in oil of 0.06 ppm, the same concentration used for residual oil. As described in Section 3, only a single value for the mercury content of distillate oil (0.40 ppm) was recorded in the literature. It was felt that rather than using a single data point to represent all distillate oil, it would be more appropriate to use the same mercury concentration for both residual and distillate oils. This concentration is based on several tests of residual oils (see Section 3). As shown in Tables 4-24 and 4-25, the summary emission factor of 3.0 lb/10^{12} Btu is in close agreement with previously calculated and measured values reported in Suprenant et al. (1980b, 1979). Measured mercury emission factors reported by Castaldini et al. (1981b), are somewhat higher (14-17 lb/10^{12} Btu) due to the higher mercury content of the oil (0.40 ppm).

emission factors reported in the literature (see Table 4-32). Measured emission factors reported in Table 4-33 range from 2.7 to 674 $lb/10^{12}$ Btu, but are generally lower than calculated values. For some tests, this appears to be due to lower than average nickel content of the oil feed.

Lead Emission Factors

Emission factors for lead from oil combustion were taken from an EPA background document supporting the national ambient air quality standard (NAAQS) for lead (U. S. Environmental Protection Agency, 1985). In that document, emission factors for distillate and residual oil combustion were presented, based on the concentration of lead in oil (either distillate or residual) and the assumption that 50 percent of the lead in the fuel is emitted to the atmosphere. Separate emission factors for boiler types by sector of boiler use were not included in this reference. Therefore, it was assumed that utility boilers burned residual oil and all other sectors burned distillate oil. All emission factors assume emissions are uncontrolled. Heating values of 150,000 Btu/gal and 141,000 Btu/gallon were used for residual and distillate oil, respectively. Based on these data, the uncontrolled emission factor for lead from utility oil combustion is 28 $lb/10^{12}$ Btu. The uncontrolled emission factor for industrial, commercial, and residential boilers is 8.9 $lb/10^{12}$ Btu. X

POM Emission Factors

In the evaluation and comparison of POM emission factors for oil combustion, consideration should be given to:

- the methods used to take and analyze samples,
- the measurement of particulate POM only or of gaseous and particulate POM,
- the physical phase in which emissions predominantly occur,
- the number of POM compounds analyzed for, and
- the specific POM compounds analyzed for.

TABLE 4-86. SUMMARY OF MEASURED MERCURY EMISSION FACTORS FOR BITUMINOUS COAL-FIRED UTILITY BOILERS

Boiler Type Control Status	Emission Factor ($lb/10^{12}$ Btu) Average[a]	Emission Factor ($lb/10^{12}$ Btu) Range	Number of Boilers	Number of Data Points
Pulverized Dry Bottom:				
Uncontrolled	35	3.9-308	3	12
Mechanical Ppt.	8.5	3.7-21.2	1	7
ESP or Mech. Ppt/ESP	11.0	0.41-22.3	13	42
2 ESPs in Series	0.20	0.011-0.56	1	5
Scrubber	ND[b]	---	1	1
Pulverized Wet Bottom:				
ESP or Mech. Ppt/ESP	4.7	2.6-6.3	5	5
Scrubber	0.16	---	1	1
Cyclone:				
Uncontrolled	10	---	1	1
ESP	8.5	3.95-17.7	5	5
Scrubber	4.9	---	1	1
Stoker:				
Mech. Ppt. or Multiclone	14.2	2.5-26	2	2
Fabric Filter	4.6	---	1	1

[a]Each boiler tested was weighted equally in determining this average. An arithmetic mean value was calculated for each boiler and then a mean of these means was calculated.

[b]Not detectable.

TABLE 4-116. SUMMARY OF MEASURED LEAD EMISSION FACTORS FOR BITUMINOUS COAL-FIRED UTILITY BOILERS

Boiler Type/ Control Status	Emission Factor ($lb/10^{12}$ Btu) Average[a]	Emission Factor ($lb/10^{12}$ Btu) Range	Number of Boilers Tested	Number of Data Points
Pulverized Dry Bottom:				
Uncontrolled	316	2.8 - 1249	4	5
ESP or Mechanical Ppt./ESP	49	7.0 - 90.9	2	26
Scrubber	16.8	2.8 - 24.2	3	2
Tangential Cyclone + 2 ESP	163	95 - 282	1	4
Wall Fired Cyclone + 2 ESP	98	76 - 107	1	4
Pulverized Wet Bottom:				
ESP	63.8	1.1 - 183.8	7	7
Mechanical Ppt./ESP	646	---	1	1
Scrubber	22.3	22.3	1	1
Cyclone:				
ESP	15.3	4.0 - 19.2	6	6
Mechanical Ppt.	213	---	1	1
Wet Scrubber	4	---	1	1
Stoker:				
Mechanical Ppt. or Multiclone	1408	1154 - 1663	3	3
Fabric Filter	2.6	---	1	1
Cyclone + ESP + Scrubber	50	0.2 - 149	2	4

[a]Each boiler tested was weighted equally in determining this average. An arithmetic mean value was calculated for each boiler, and then a mean of these means was calculated.

REFERENCE DER-1.5

PB89-135644

United States Environmental Protection Agency

Office of Air Quality Planning and Standards Research Triangle Park NC 27711

EPA-450/2-88-006a
October 1988

Air

EPA

TOXIC AIR POLLUTANT EMISSION FACTORS— A COMPILATION FOR SELECTED AIR TOXIC COMPOUNDS AND SOURCES

POLLUTANT	CAS NUMBER	SIC CODE	INDUSTRIAL PROCESS	EMISSION SOURCE	SCC	EMISSION FACTOR	NOTES	REFERENCE
Arsenic	7440382		Oil combustion	Residual oil-fired boilers, util/commerc/industr/residenti al	1	9.31 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Arsenic	7440382		Oil combustion	Residual oil-fired boilers, util/commerc/industr/residenti al	1	2.28 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Arsenic	7440382		Oil combustion	Residual oil-fired boilers, util/commerc/industr/residenti al	1	1.90 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized dry bottom boilers, util/commerc/industr	1	684 lb/10E12 Btu	Uncontrolled, based on emission test data	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized dry bottom boilers, util/commerc/industr	1	335 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized dry bottom boilers, util/commerc/industr	1	40.1 lb/10E12 Btu	Controlled with ESP, based on source tests	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized dry bottom boilers, util/commerc/industr	1	17.2 lb/10E12 Btu	Controlled with scrubber, based on source tests	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized wet bottom boilers, util/commerc/industr	1	1340 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized wet bottom boilers, util/commerc/industr	1	658 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized wet bottom boilers, util/commerc/industr	1	168 lb/10E12 Btu	Controlled with ESP, based on source tests	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired pulverized wet bottom boilers, util/commerc/industr	1	76.7 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired cyclone boilers, util/commerc/industr	1	115-310 lb/10E12 Btu	Uncontrolled, based on measured and calculated emission factors	36
Arsenic	7440382		Coal combustion	Bituminous coal-fired cyclone	1	56-152 lb/10E12 Btu	Multiclone, calculated based on	36

POLLUTANT	CAS NUMBER	SIC CODE	INDUSTRIAL PROCESS	EMISSION SOURCE	SCC	EMISSION FACTOR	NOTES	REFERENCE
				pulverized (dry or wet bottom) boilers, util/comm/ind			source tests	
Beryllium	7440417		Coal combustion	Bituminous coal-fired pulverized (dry or wet bottom) boilers, util/comm/ind	1	0.11 lb/10E12 Btu	Controlled with scrubber, based on one source test	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired pulverized (wet or dry bottom) boilers, util/comm/ind	1	50 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired pulverized (wet or dry bottom) boilers, util/comm/ind	1	32 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired pulverized (wet or dry bottom) boilers, util/comm/ind	1	1.8 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired pulverized (wet or dry bottom) boilers, util/comm/ind	1	0.07 lb/10E12 Btu	Controlled with scrubber, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired cyclone boilers, util/commerc/industr	1	<50 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired cyclone boilers, util/commerc/industr	1	<32 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired cyclone boilers, util/commerc/industr	1	0.32 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired stoker boilers, util/commerc/industr	1	45 lb/10E12 Btu	Uncontrolled, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired stoker boilers, util/commerc/industr	1	6-28 lb/10E12 Btu	Controlled with multiclone, calculated based on engineering judgement	36
Beryllium	7440417		Coal combustion	Anthracite coal-fired stoker boilers, util/commerc/industr	1	3.6 lb/10E12 Btu	Controlled with ESP, calculated based on engineering judgement	36
Beryllium	7440417	1099	Beryl ore mining	Entire process	305	0.2 lb/ton ore mined	Engineering judgement	113
Beryllium	7440417	226	Woven fabric finishing	Tenter frames - resin finishing	330001	0.0096 mg/kg fabric	Uncontrolled, one test	52

POLLUTANT	CAS NUMBER	SIC CODE	INDUSTRIAL PROCESS	EMISSION SOURCE	SCC	EMISSION FACTOR	NOTES	REFERENCE
Radionuclides		3334	Aluminum reduction	Anode bake plant	30300105	1.6 nCi Po-210/metric ton Al	Controlled with fluidized-bed scrubber, rough est.	37
Radionuclides		3334	Aluminum reduction	Anode bake plant	30300105	0.25 nCi Th-232/metric ton Al	Controlled with fluidized-bed scrubber, rough est.	37
Radionuclides		3334	Aluminum reduction	Anode bake plant	30300105	0.25 nCi Ra-228/metric ton Al	Controlled with fluidized-bed scrubber, rough est.	37
Radionuclides		4911	Coal combustion	Utility boiler	1	9 pCi U-238/g fly ash		37
Radionuclides		4911	Coal combustion	Utility boiler	1	4 pCi Th-232/g fly ash		37
Radionuclides		4911	Coal combustion	Utility	101	3.0 -17.2 pCi of U238/kg coal burned	Calculated from information in reference	35
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boilers	101	295.3 pCi U-238/10E6 Btu	Range 6.3 to 675.9 pCi U-238/10E6 Btu, controlled with ESP	36
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boilers	101	22.5 pCi U-238/10E6 Btu	Controlled with ESP and scrubber	36
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boilers	101	73.7 pCi U-238/10E6 Btu	Controlled with scrubber	36
Radionuclides		4911	Coal combustion	Cyclone utility boiler	101	68.0 pCi U-238/10E6 Btu	Controlled with ESP	36
Radionuclides		4911	Coal combustion	Cyclone utility boiler	101	1757.8 pCi U-238/10E6 Btu	Controlled with scrubber, range = 301.2 - 3214.3 pCi U-238/10E6 Btu	36
Radionuclides		4911	Coal combustion	Stoker utility boiler	101	13.8 pCi U-238/10E6 Btu	Controlled with ESP	36
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boiler	101	170.0 pCi Th-232/10E6 Btu	Controlled with ESP, range 50.3-180.7 pCi Th-232/10E6 Btu	36
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boiler	101	22.7 pCi Th-232/10E6 Btu	Controlled with ESP and scrubber	36
Radionuclides		4911	Coal combustion	Pulverized coal dry bottom utility boiler	101	36.5 pCi Th-232/10E6 Btu	Controlled with scrubber	36
Radionuclides		4911	Coal combustion	Cyclone utility boiler	101	40.8 pCi Th-232/10E6 Btu	Controlled with ESP	36
Radionuclides		4911	Coal combustion	Cyclone utility boiler	101	170.0 pCi Th-232/10E6 Btu	Controlled with scrubber, range 110.2-229.7 pCi Th-232/10E6 Btu	36
Radionuclides		4911	Coal combustion	Stoker utility boiler	101	13.8 pCi Th-232/10E6 Btu	Controlled with ESP	36

REFERENCE DER-1.6

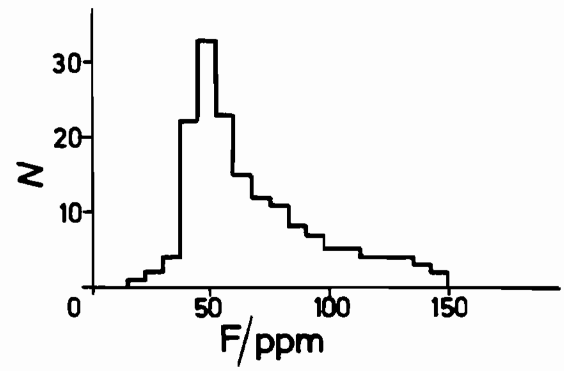


FIGURE 6. Distribution of fluorine concentration values for U.S. coals. (As reported by Gluskoter.[137])

Table 44
FLUORINE IN SOME U.S. COALS

Area	Conc range (ppm)	Arithmetic mean (ppm)	Geometric mean (ppm)	Number of samples
Western U.S.	19—140	62	57	29
Eastern U.S.	50—150	89	84	23
Illinois Basin	29—140	67	63	113

After Gluskoter, H. J., Trace Elements in Coal: Occurrence and Distribution, Circ. 499, Illinois State Geological Survey, Urbana, 1977.

Table 45
FLUORINE IN SOME U.S. COALS

Region	Coal	Conc range (ppm)	Arithmetic mean (ppm)	Geometric mean (ppm)
Applachian	Bituminous	20—1900	93	69
Interior province	Bituminous	18—630	71	59
N Great Plains	Lignite	15—1300	130	22
N Great Plains	Subbituminous	20—1400	79	54
Rocky Mountain	Subbituminous	2—900	100	74
Rocky Mountain	Bituminous	15—940	110	77
All U.S.	Different	0.45—1900	86	64

After Zubovic, P., Hatch, J. R., and Medlin, J. H., Proc. U.N. Symp. World Coal Prospects, Katowice, 15—23. 10, 1979.

9. Sodium (Na)

Interest in sodium concentration determination has increased recently because sodium can be a source of corrosion in a combined-cycle power system, particularly corrosion of the blades of a high-temperature, gas turbine.

From the studies of the material balances it appears that Na is retained by the particulate matter during combustion. A small amount of sodium is present as NaCl, whereas a large quantity is present as Na_2SO_4. Comparison of ash fouling tendencies of high- and low-sodium lignites is discussed by Gronhovd et al.[161] Results for sodium determination in U.S. coals as summarized by Gluskoter[137] are shown in Table 46.

REFERENCE DER-1.7

AP-42
Fourth Edition
September 1985

COMPILATION OF AIR POLLUTANT EMISSION FACTORS

Volume I: Stationary Point And Area Sources

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office Of Air And Radiation
Office Of Air Quality Planning And Standards
Research Triangle Park, North Carolina 27711

September 1985

TABLE 1.4-1. UNCONTROLLED EMISSION FACTORS FOR NATURAL GAS COMBUSTION[a]

Furnace size & type (10^6 Btu/hr heat input)	Particulate[b]		Sulfur dioxide[c]		Nitrogen oxides[d]		Carbon monoxide[e]		Volatile organics			
									Nonmethane		Methane	
	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$	$kg/10^6 m^3$	$lb/10^6 ft^3$
Utility boilers (> 100)	16 - 80	1 - 5	9.6	0.6	8800[h]	550[h]	640	40	23	1.4	4.8	0.3
Industrial boilers (10 - 100)	16 - 80	1 - 5	9.6	0.6	2240	140	560	35	44	2.8	48	3
Domestic and commercial boilers (< 10)	16 - 80	1 - 5	9.6	0.6	1600	100	320	20	84	5.3	43	2.7

[a]Expressed as weight/volume fuel fired.
[b]References 15-18.
[c]Reference 4. Based on avg. sulfur content of natural gas, 4600 $g/10^6 Nm^3$ (2000 $gr/10^6$ scf).
[d]References 4-5, 7-8, 11, 14, 18-19, 21.
[e]Expressed as NO_2. Tests indicate about 95 weight % NO_x is NO_2.
[f]References 4, 7-8, 16, 18, 22-25.
[g]References 16, 18. May increase 10 - 100 times with improper operation or maintenance.
[h]For tangentially fired units, use 4400 $kg/10^6 m^3$ (275 $lb/10^6 ft^3$). At reduced loads, multiply factor by load reduction coefficient in Figure 1.4-1. For potential NO_x reductions by combustion modification, see text. Note that NO_x reduction from these modifications will also occur at reduced load conditions.

REFERENCE DER-1.8

920916DTG01 REF. No. 2

RECEIVED

NOV 6 1989

S.A.P.C.B.
REGION VII

DTE-543-89

COMMONWEALTH OF VIRGINIA
Department of Air Pollution Control

INTRA-AGENCY MEMORANDUM

RECEIVED

S.A.P.C.B.
REGION VII

TO: Director, DTE

FROM: Air Toxics Program Coordinator

SUBJECT: Toxic Air Pollutants and Emission Factors for Utility-Sized Boilers

DATE: October 26, 1989

Per your request, I have assembled information on the possible toxic emissions from utility-sized (e.g. cogenerators) boilers. Most of the information presented here is based on limited testing or worse. These factors are intended to be used in the absence of facility-specific information or as a check to such information. The following tables represent a summary of the emissions information for the most common fuels, combustion types and control devices.

Coal Combustion / Spreader Stoker
(pounds per trillion Btu's)

Pollutant	Uncontrolled	Multiclone	ESP
Arsenic	403	197	50
Beryllium		27.9	5.9
Cadmium[1]	32	18.3	8.2
Chromium	1256	725	357.5
Copper	697.5	427.5	107.5
Manganese[1]	2170	603	253
Mercury[1]	16	16	12
Nickel	1032.5	523	281.5
Selenium[1]		127	
Vanadium	135.1	57.9	91.6
Formaldehyde	170.5		170.5

1 These pollutants are not exempt by strict interpretation of the regulation. However, in all but the most unusual circumstances (e.g. extremely large facilities or very poor release characteristics) the resulting emissions are insignificant and could be ignored.

Distillate Oil Combustion

(pounds per trillion Btu's)

Pollutant	Uncontrolled	Multiclone	ESP	Scrubber
Arsenic[1]	4.2	2.06	0.50	0.42
Beryllium[1]	2.8	1.58	0.35	0.15
Cadmium[1]	10.5	7.45	1.58	0.63
Chromium[1]	47.5	27.8	13.92	3.84
Copper	280	165.2	42	25.2
Manganese[1]	14	6.44	3.08	1.54
Mercury[1]	3.0	3.0	2.25	0.78
Nickel	170	86.7	47.6	6.8
Selenium[1]	6.4			
Vanadium	69.6			
Formaldehyde	1182			

Residual Oil Combustion

(pounds per trillion Btu's)

Pollutant	Uncontrolled	Multiclone	ESP	Scrubber
Arsenic[1]	19	9.31	2.28	1.90
Beryllium	4.2	2.65	0.59	0.25
Cadmium	15.7		9.9	3.96
Chromium[1]	21	12.18	6.09	1.68
Copper	278	165.2	42.0	25.2
Manganese[1]	26	11.96	5.72	2.86
Mercury[1]	3.2	3.2	2.4	0.83
Nickel	1260	642.6	352.8	50.4
Vanadium	3517		703	
Formaldehyde	3390			

1 These pollutants are not exempt by strict interpretation of the regulation. However, in all but the most unusual circumstances (e.g. extremely large facilities or very poor release characteristics) the resulting emissions are insignificant and could be ignored.

Wood Combustion[2]

(pounds per trillion Btu's)

Pollutant	Uncontrolled
Benzene	14,708
Benzo (a)pyrene[3]	700
Chrysene[3]	1858
Fluoranthene[3]	2604
Formaldehyde	513
Napthalene	33,950
Phenanthrene[3]	13,089
Phenol	5317
Pyrene[3]	2604

2 Emission factors for wood combustion were derived from VOC weight percentages as measured from residential wood stoves and applied to VOC emission factors for utility boilers. They are highly variable with wood moisture content and species and boiler type. The factors should be used with a great deal of caution. Emission testing should be specified on future permits for large wood-burning boilers in order to establish better emission factors.

3 These substances have no TWA but are suspected carcinogens and their emissions should be minimized to the extent possible.

Natural Gas Combustion

Pollutant	Uncontrolled (pounds per trillion Btu's)
Benzene	68
Formaldehyde	136

I have supplied copies of this memo to the Air Toxics Engineers and request comments, corrections and additions. In its present form, this information represents the best estimates that I can make with limited emissions data. The attached printouts are from the Air Toxics Emission Factor database.

Charles E. Holmes

Charles E. Holmes

attachments (addressee only)

cc: Air Toxics Engineers

REFERENCE DER-1.9

2MW

CATERPILLAR

Interoffice Memorandum

Engine Division

Date	September 10, 1991
Plant/Office	Engine Division
Department	3500 Product Design
Attention	R. L. Pribble
CC:	D. C. Dowdall, P. S. & E. C. - AB6480

Plant or Office	Department	Attention
		Request # 91100
Destroy	File Until (Date)	

The requested emissions data* presented below is based on tests conducted at Caterpillar Inc. using instrumentation and procedures equivalent to those outlined in SAE 177a & 215.

Engine Model: 3516 DITA running at 100% load, 2847 Hp at 1800 RPM, with dry manifolds. Set at standard production timing. Arr#: 7C8116 PL#: 2A2586

Application: A 60HZ standby generator set rated at 2000EKW.

	Lb/Hr	g/Hr	g/Hp-Hr	PPM (Wet)	% BY Vol.	%BY Wt.
CO2	3069.1	1392120	488.98	80187	8.02	12.35
N2	18292.3	8297220	2914.38	758957	75.90	73.61
O2	2215.8	1005051	353.02	80559	8.06	8.92
20	1214.4	550858	193.49	78064	7.81	4.89
	13.6	6200	2.18	569	0.06	0.05
N	40.2	18300	6.43		0.16	0.16
→ NOx~	61.6	27955	9.82	1568	0.00	0.00
HC	0.3	138	0.05	25	0.00	0.00
SO2^	3.9	1769	0.62	71	0.01	0.02
DPM+	0.5	246	0.09			

	g/Hr	g/Hp-Hr	g/n cu.M'
NOx	27955	9.82	3.948
CO	6200	2.18	0.876
HC	138	0.05	0.019
SMOKE (Cat Number).....			0.035
FUEL RATE..............			975.80 Lb/Hr
INLET AIR FLOW..........			23874 Lb/Hr
EXHAUST FLOW:			
Rate.....................			24850 Lb/Hr
at 60 deg F and 760mm Hg.			5452 SCFM
at 1027 deg F stack temp.			15590 CFM

Notes: * This data is based on steady-state engine operating conditions of 85 deg. F and 29.38 in. Hg. and No. 2 diesel fuel. This data is also subject to instrumentation, measurement and engine-to-engine variations.

- The NOx shown is not actually present in the exhaust. It is based on the assumption that the NO present in the exhaust is converted to NOx in the atmosphere. NO and NOx are corrected to 75 grains humidity.

^ SO2 is proportional to a sulfur content of 0.20 % by weight of the fuel. x .05%/.2

+ DPM (Dry Particulate Matter) is an approximation based on a correlation to smoke density, and is not included in the total exhaust flow rate.

' Grams per normal cubic meter values are corrected to 5% oxygen.

This report provides the best information available at this time. It should not be used at a future date without verification as to its validity for the current engine.

EXHIBIT FDER-1L
(19 pages)

EXHIBIT DER-1L
Summary of Emission Calculations for the Emergency Flares
(2,000 MW) Case B

Pollutant	Calculation Number*	General Comments & Assumptions	Emission Basis	Emission Rate** lb/h	Annual Emission*** tpy
Carbon Monoxide	1	(a)	0.2 lb/MBtu	327	0.87
Nitrogen Oxides	1	(a)	0.07 lb/MBtu	114.5	0.31
Sulfur Dioxide	2	(b)	mass balance	2,874	7.7
Particulate (PM/PM_{10})	3	(c)	mass balance	72.8	0.19
Volatile Organic Compounds	3	(c)	mass balance	24.0	0.064
Lead	3	(c)	mass balance	0.551	0.0015
Asbestos	N/A	(d)	N/A	N/A	N/A
Beryllium	3	(c)	mass balance	0.0028	0.000007
Mercury	3	(c)	mass balance	0.047	0.00013
Total Fluorides	--	(d)	Negligible	Negligible	Negligible
Sulfuric Acid Mist	4	(e)	1% SO_2 conversion	44	0.12
Hydrogen Sulfide	--	(d)	Negligible	Negligible	Negligible
Total Reduced Sulfur	--	(d)	Negligible	Negligible	Negligible
Benzene	--	(d)	Negligible	Negligible	Negligible
Arsenic	3	(c)	mass balance	0.032	0.000085
Radionuclides	N/A	(d)	N/A	N/A	N/A

*The calculations are shown by number on the pages following this table.
**Based on one 80 minute flare at any one time, normalized to an hourly emission rate. Value shown matches that listed in SCA Table 3.4.1-7. However, evaluation of applicable calculation may not exactly match the value listed due to rounding.
***Based on one startup sequence per flare per year. Thus, annual emissions are based on four flares per year calculated using the following equation: (Emission rate per flare lb/h)(4 flares/y)(1/2,000 t/lb) = tpy.

(a) Based on flare manufacturer design data.
(b) Based on use of 3.5 percent sulfur, 12,100 Btu/lb coal and 40 minutes of raw gas (no sulfur removal) and 40 minutes of clean gas (with 96 percent sulfur removal) flow to flare.
(c) Assumes 40 minutes of raw gas emissions equal to two CGCC units plus one thermal oxidation unit, and 40 minutes of clean gas emissions equal to two CGCC units.
(d) Based on best engineering judgement.
(e) Assumes a 1 percent conversion of SO_2 to SO_3, with 100 percent of the SO_3 oxidizing to SO_4 and subsequently converting to H_2SO_4.

N/A = Not applicable to this type of system.

Reference: Shell Coal Gasification Process where flow is 85,760 m^3/h at 73.85 MW.

Assume: 1 gasification unit startup per year
40 minutes of 1/4 gas flow with raw gas
40 minutes of 2/3 gas flow with clean gas
1 flare per sulfur receiving unit

270.5 Btu/scf average gas heating value

The following equations support the determination of flare flow rate and heat input:

$$\left[2\ \frac{\text{CTs}}{\text{flare}}\right]\left[85{,}760\ \frac{m^3}{h}\right]\left[\frac{162\ \text{MW}}{73.85\ \text{MW}}\right]\left[\frac{h}{60\ \text{min}}\right]\left[35.315\ \frac{ft^3}{m^3}\right] = 221{,}455.9\ \frac{ft^3}{\text{min}}$$

Total flow per start-up

$$\left[221{,}456\ \frac{ft^3}{\text{min}}\right](40\ \text{min})\ [0.25 + 0.66] = 8{,}060{,}995\ ft^3$$

Normalize to hourly flow rate

$$\left[8{,}060{,}995\ \frac{ft^3}{80\ \text{min}}\right] = 100{,}762\ \text{scfm}$$

Heat content

$$\left[270.5\ \frac{\text{Btu}}{\text{scf}}\right]\left[100{,}762\ \frac{\text{scf}}{\text{min}}\right]\left[60\ \frac{\text{min}}{h}\right] = 1635\ \frac{\text{MBtu}}{h}$$

Calculation Number 1

NO_x Emission per flare - (0.07 lb/MBtu per flare manufacture)

$$\left[0.07 \ \frac{\text{lb}}{\text{MBtu}}\right] \left[1635 \ \frac{\text{MBtu}}{\text{h}}\right] = 114.5 \text{ lb/h}$$

CO Emissions per flare - (0.2 lb/MBtu per flare manufacture)

$$(0.2)\ (1635) = 327 \text{ lb/h}$$

Calculation Number 2

SO_2 from raw gas

$$\left[0.035 \ \frac{\text{lb S}}{\text{lb}_{coal}}\right] \left[\frac{\text{lb}_{coal}}{12100 \text{ Btu}}\right] \left[270.5 \ \frac{\text{Btu}}{\text{scf}}\right] \left[221{,}456 \ \frac{\text{scf}}{\text{min}}\right] (40 \text{ min})\ (0.25) \left[2 \ \frac{\text{lb } SO_2}{\text{lb S}}\right]$$

$$= 3{,}465.5 \text{ lb } SO_2$$

SO_2 from clean gas assuming 96 percent removal of S

$$(0.04)\ (0.035) \left[\frac{1}{12100}\right] (270.5)\ (221{,}456)\ (40)\ (0.66)\ (2) = 366.0 \text{ lb } SO_2$$

Normalize to hourly rate

$$\left[3465.5 + 366.0 \ \frac{\text{lb}}{80 \text{ min}}\right] \left[60 \ \frac{\text{m}}{\text{h}}\right] = 2{,}873.6 \ \frac{\text{lb } SO_2}{\text{h}}$$

Calculation Number 3

Particulate, VOC, and trace elements, assume raw gas emissions equal to CGCC + Incinerator. Clean gas emissions equal to CGCC.

Particulate

Raw Gas

$$\left[\left[432\ \frac{lb}{h}\right]\left[\frac{2\ CTs}{12\ CTs}\right] + \left[9\ \frac{lb}{h}\right]\left[\frac{2}{12}\right]\right]\left[\frac{h}{60\ min}\right](40\ min) = 49\ lb$$

Clean Gas

$$\left[\left[432\frac{lb}{h}\right]\left[\frac{2}{12}\right]\left[\frac{40}{60}\right]\right] = 48\ lb$$

$$\text{Normalized} = \frac{(48 + 49)}{80\ min}\ lb\left[\frac{60\ m}{h}\right] = 72.8\ lb/h$$

VOC

$$[(2)(144) + 0]\left[\frac{2}{12}\right]\left[\frac{40}{60}\right]\left[\frac{60}{80}\right] = 24\ lb/h$$

Check of compressed format using particulate equation

$$[(2)(432) + (9)]\left[\frac{2}{12}\right]\left[\frac{40}{80}\right] = [(2)\ (432) + 9]\ (0.0833) = 72.8 \text{ lb/h}$$

Arsenic

$$[(2)(0.19) + 0.007)]\ (0.0833) = 0.032 \text{ lb/h}$$

Beryllium

$$[(2)\ (0.0165) + (0.0002)]\ (0.0833) = 0.0028 \text{ lb/h}$$

Lead

$$[(2)\ (3.3) + 0.012]\ (0.0833) = 0.551 \text{ lb/h}$$

Mercury

$$[(2)\ (0.264) + 0.039]\ (0.0833) = 0.047 \text{ lb/h}$$

Calculation Number 4

$$SO_2 \ Emission \ lb/h \times \frac{Percent \ Conversion}{100}$$
$$\times \frac{Molecular \ Weight \ H_2SO_4}{Molecular \ Weight \ SO_2} = Total \ H_2SO_4 \ Emission \ Rate \ lb/h$$

Given:
- SO_2 Emission Rate = 2,874 lb/h
- Percent Conversion of SO_2 to H_2SO_4 = 1 percent
- Molecular Weight H_2SO_4 = 98
- Molecular Weight SO_2 = 64

$$2{,}874 \ lb/h \times \frac{1}{100} \times \frac{98}{64} = 44 \ lb/h$$

REFERENCE DER-1.1

FEB 03 '92 01:19PM PROPOSALS 2-4

FLORIDA POWER CORP (COAL GAS RUNS)
****

ESTIMATED PERFORMANCE - PG7211(F) COAL GAS

LOAD CONDITION			BASE	BASE	BASE
AMBIENT TEMP.		- Deg F.	40	72	95
AMBIENT RELATIVE HUMID		- %	70	80	48
OUTPUT		- kW	177460.	162240.	149780.
HEAT RATE (LHV)		- Btu/kWh	10030.	10240.	10480.
HEAT CONS. (LHV)	X10-6	- Btu/h	1779.9	1661.3	1569.7
EXHAUST FLOW	X10-3	- lb/h	3830.0	3569.0	3384.0
EXHAUST TEMP		- Deg F.	1029.	1067.	1095.
EXHAUST HEAT	X10-6	- Btu/h	1007.3	957.3	917.7
WATER FLOW		- lb/h	100510.	87160.	80260.

NOX	- ppmvd @ 15% O2	25.	25.	25.
NOX AS NO2	- lb/h	163.	152.	144.
CO	- ppmvd	30.	30.	30.
CO	- lb/h	100.	92.	88.
UHC	- ppmvw	7.	7.	7.
UHC	- lb/h	15.	14.	13.
PART	- lb/h	36.	34.	32.

EXHAUST ANALYSIS % VOL.

ARGON	0.83	0.80	0.81
NITROGEN	68.24	67.43	67.16
OXYGEN	12.47	12.27	12.22
CARBON DIOXIDE	8.38	8.36	8.32
WATER	10.08	11.14	11.49
MW	28.93	28.82	28.77
ACFM @ 700	1,069,000	999,700	949,500

SITE CONDITIONS
****

No SCR backpressure

ELEVATION	- ft.	163
SITE PRESSURE	- psia	14.62
INLET LOSS	- in. Water	3.5
EXHAUST LOSS	- in. Water	10
FUEL TYPE	-	CUST GAS
FUEL LHV	- Btu/lb	4650 4650
APPLICATION	-	317S HYDROGEN COOLED GENERATOR
COMBUSTION SYSTEM	-	STANDARD

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS.
NOX EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE
NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i).
NOX LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE
SPEEDTRONIC CONTROL SYSTEM.

COAL GAS FUEL WITH WATER INJECTION

TB-8585GA
MAD 2/3/92

REFERENCE DER-1.2

Electric Power Research Institute

Topics:
Coal gasification
Demonstration plants
Cool Water project
Texaco coal gasification process
GCC power plants
Environmental quality

EPRI AP-5931
Project 1459
Interim Report
October 1988

Cool Water Coal Gasification Program: Fifth Progress Report

Prepared by
Cool Water Coal Gasification Program
Daggett, California
and
Radian Corporation
Austin, Texas

Table 4-25

SUMMARY DATA - TURBINE EXHAUST STACK

STREAM NUMBER: G-14
MONITORING PERIOD: SUFCO Coal - 02/17/85-02/22/85 and Indicator Phase 1985
Illinois No. 6 Coal - 03/09/86-03/13/86
Pittsburgh No. 8 Coal - 05/02/86-05/06/86

PARAMETER	UNITS	SUMMARY OF RESULTS, MEAN TEST VALUES: SUFCO COAL TESTS		ILLINOIS NO. 6 COAL TEST		PITTSBURGH NO. 8 COAL TEST	
PROCESS DATA							
HRSG Stack Outlet Temp.	Deg.C	2.021E+02		2.298E+02		1.937E+02	
Combustion Turbine Exhaust Temp	Deg.C	6.101E+02		5.491E+02		5.654E+02	
CHEMICAL DATA							
Major Gases							
Carbon Dioxide	mol%	7.82E+00		7.00E+00		6.52E+00	
Carbon Monoxide	mol%	1.40E-04		1.90E-04		< 1.00E-04	ND
Methane	ppmv	1.70E+00		< 1.00E+00	ND		
Sulfur Species							
Carbon Disulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Carbonyl Sulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Dimethylsulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND		
Ethyl Mercaptan	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Hydrogen Sulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Methyl Mercaptan	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Sulfate	ppmv	<2.0E-03	ND				
Sulfur Dioxide	ppmv	5.08E+00		1.54E+01		2.66E+01	
Sulfuric Acid	ppmv					< 5.80E-01	ND
Ammonia	ppmv	2.9E+00		< 2.0E-01	ND	1.3E-01	
Nitrogen Oxides	ppmv	2.5E+01		3.0E+01		2.1E+01	
C2-C6 Hydrocarbons							
Butene	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Ethane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Pentane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Propane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Benzene >1 ppm	ppmv	<1.0E+00	ND	< 1.0E-03	ND		
Hydrogen Chloride	ppmv	<1.0E+00	DET	< 2.0E-01	ND	2.2E-01	
Hydrogen Fluoride	ppmv	<1.0E+00	DET	< 1.0E-02	ND	< 1.0E-02	ND
Selexol Solvent	ug/M3	<8.0E+06	ND	< 1.0E+02	ND	< 2.5E+02	ND
Moisture	%	5.0E+00		8.7E+00		8.9E+00	
Radon - 222	pCi/L	2.5E-01		< 7.0E-02	ND	4.2E+00	
Particulate Loading	ug/M3	8.7E+03		5.4E+03		5.9E+03	

Table 4-25

(Continued)

STREAM NUMBER: G-14

MONITORING PERIOD: SUFCO Coal - 02/17/85-02/22/85 and Indicator Phase 1985
Illinois No. 6 Coal - 03/09/86-03/13/86
Pittsburgh No. 8 Coal - 05/02/86-05/06/86

PARAMETER	UNITS	SUMMARY OF RESULTS, MEAN TEST VALUES: SUFCO COAL TESTS		ILLINOIS NO. 6 COAL TEST		PITTSBURGH NO. 8 COAL TEST	
CHEMICAL DATA							
Volatile Trace Elements							
Antimony	ppmv	<5.0E-02	DET	< 1.0E-03	DET	< 1.0E-03	ND
Arsenic	ppmv	<4.0E-02	DET	1.9E-03		1.3E-03	
Barium	ppmv	<4.0E-02	DET	4.1E-03		2.9E-03	
Beryllium	ppmv	<1.0E+00	ND	< 1.0E-02	ND	1.4E-03	
Boron	ppmv	1.2E-01		4.5E-01		< 5.7E-02	ND
Cadmium	ppmv	<1.0E-02	DET	< 1.0E-03	DET	< 1.0E-03	ND
Calcium	ppmv	5.3E-01		1.4E-01		4.9E-01	
Chromium, total	ppmv	1.3E-02		4.0E-02		1.2E-02	
Cobalt	ppmv	<1.0E-02	DET	1.4E-03		< 1.2E-03	ND
Copper	ppmv	<1.0E-02	DET	8.8E-03		< 1.0E-03	ND
Iron	ppmv	9.9E-02		9.9E-02		1.2E-01	
Lead	ppmv	<1.0E-02	DET	1.2E-02		< 1.2E-03	ND
Magnesium	ppmv	<1.6E-01	DET	3.3E-02		< 1.5E-02	ND
Manganese	ppmv	<4.0E-02	DET	3.2E-03		4.9E-03	
Mercury	ppmv	<1.0E-02	DET	< 9.0E-03	ND	< 1.0E-03	DET
Molybdenum	ppmv	<1.0E-01	DET	< 4.2E-03	ND	< 1.0E-03	DET
Nickel Carbonyl	ppmv	<3.8E-02	ND	< 1.0E-03	ND	< 1.0E-03	DET
Nickel, total	ppmv	3.2E-02		1.6E-02		2.5E-02	
Potassium	ppmv	<2.5E-01	DET	1.8E-01		< 1.5E-02	ND
Selenium	ppmv	<1.0E-03	DET	3.0E-03		< 1.0E-03	ND
Silicon	ppmv	7.2E-01		2.6E-01		4.4E-01	
Silver	ppmv	<1.0E-02	DET	< 1.0E-03	ND	< 1.0E-03	ND
Sodium	ppmv	2.4E-01		1.1E+00		1.7E+00	
Strontium	ppmv	<1.0E-02	DET	< 1.0E-03	DET	< 1.0E-03	DET
Thallium	ppmv	<7.0E-03	DET	< 1.0E-03	ND	< 1.0E-03	DET
Tin	ppmv	1.7E-02		< 3.4E-02	ND	< 1.0E-02	ND
Titanium	ppmv	<2.0E-02	DET	< 8.4E-03	ND	< 1.3E-03	ND
Vanadium	ppmv	<2.0E-01	DET	< 3.2E-03	ND	< 1.0E-03	ND
Zinc	ppmv	4.6E-02		9.7E-02		2.3E-01	
Polycyclic Aromatic Hydrocarbons			ND		ND		ND
Volatile Aromatic Compounds			ND		ND		ND

DET: DETECTED
ND: NOT DETECTED

Table 4-27

SUMMARY DATA - INCINERATOR COMBUSTION PRODUCTS

STREAM NUMBER: G-15
MONITORING PERIOD: SUFCO Coal - 02/17/85-02/22/85 and Indicator Phase 1985
Illinois No. 6 Coal - 03/09/86-03/13/86
Pittsburgh No. 8 Coal - 05/02/86-05/06/86

		SUMMARY OF RESULTS, MEAN TEST VALUES					
PARAMETER	UNITS	SUFCO COAL TESTS		ILLINOIS NO. 6 COAL TEST		PITTSBURGH NO. 8 COAL TEST	
PROCESS DATA							
SCOT Offgas Rate to Incin/Turbine	SCMH	5.31E+03		4.48E+03		4.55E+03	
Incin. Stack Outlet Temp.	Deg.C	7.286E+02		7.906E+02		7.878E+02	
CHEMICAL DATA							
Major Gases							
Carbon Dioxide	mol%	2.89E+01		3.20E+01		2.51E+01	
Carbon Monoxide	mol%	1.38E-02		4.90E-03		< 1.00E-04	ND
Methane	ppmv	2.07E+00		2.00E+00			
Sulfur Species							
Carbon Disulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Carbonyl Sulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Dimethylsulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND		
Ethyl Mercaptan	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Hydrogen Sulfide	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Methyl Mercaptan	ppmv	<5.00E-02	ND	< 1.50E-01	ND	< 5.00E-01	ND
Sulfate	ppmv	<2.0E-03	ND				
Sulfur Dioxide	ppmv	1.16E+02		2.14E+02		4.35E+02	
Ammonia	ppmv	7.8E+00		< 5.0E-01	ND	5.1E-01	
Nitrogen Oxides	ppmv	1.4E+02		3.5E+01		3.6E+01	
C2-C6 Hydrocarbons							
Butane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Ethane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Pentane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Propane	ppmv	<1.0E+00	ND	< 1.0E+00	ND	< 1.0E+00	ND
Benzene >1 ppm	ppmv	<1.0E+00	ND	< 1.0E-03	ND		
Hydrogen Chloride	ppmv	<1.0E+00	DET	< 2.0E-02	ND	2.2E-01	
Hydrogen Fluoride	ppmv	<1.0E+00	DET	< 1.2E-02	ND	< 1.0E-02	ND
Selexol Solvent	ug/M3	<8.0E+06	ND	< 1.2E+02	ND	< 2.3E+02	ND
Radon - 222	pCi/L	5.0E-01		8.1E-01			
Particulate Loading	ug/M3	1.8E+05		1.5E+04		2.5E+04	
Volatile Trace Elements							
Aluminum	ppmv	<3.8E-01	DET	< 8.0E-02	ND	< 2.0E-02	ND
Antimony	ppmv	<1.0E-01	DET	< 1.0E-03	DET	< 1.0E-03	ND
Arsenic	ppmv	<8.0E-02	DET	< 4.1E-03		< 1.0E-03	ND

Table 4-27

(Continued)

STREAM NUMBER: G-15
MONITORING PERIOD: SUFCO Coal - 02/17/85-02/22/85 and Indicator Phase 1985
Illinois No. 6 Coal - 03/09/86-03/13/86
Pittsburgh No. 8 Coal - 05/02/86-05/06/86

PARAMETER	UNITS	SUMMARY OF RESULTS, MEAN TEST VALUES: SUFCO COAL TESTS		ILLINOIS NO. 6 COAL TEST		PITTSBURGH NO. 8 COAL TEST	
CHEMICAL DATA							
Volatile Trace Elements							
Barium	ppmv	<8.0E-02	DET	4.9E-03		2.1E-03	
Beryllium	ppmv	<1.0E+00	ND	< 1.2E-02	ND	1.2E-03	
Boron	ppmv	2.7E-01		5.5E-01		< 4.9E-02	ND
Cadmium	ppmv	<1.0E-02	DET	1.7E-03		< 1.0E-03	ND
Calcium	ppmv	6.5E-01		4.7E+00		4.0E-01	
Chromium, total	ppmv	1.8E+00		1.2E+00		2.8E-01	
Cobalt	ppmv	<1.0E-02	DET	6.7E-03		2.1E-02	
Copper	ppmv	<2.0E-02	DET	6.7E-02		1.6E-02	
Iron	ppmv	1.1E+00		5.5E+00		7.6E+00	
Lead	ppmv	<2.0E-02	ND	3.1E-03		< 1.0E-03	ND
Magnesium	ppmv	3.5E-01		8.1E-02		< 1.3E-02	ND
Manganese	ppmv	<7.8E-01	DET	1.7E-01		1.7E-01	
Mercury	ppmv	1.9E-02		1.0E-02	ND	< 1.0E-03	DET
Molybdenum	ppmv	<2.2E-01	DET	7.7E-02		3.0E-03	
Nickel Carbonyl	ppmv	<1.2E-01	DET	< 1.0E-03	ND	< 1.0E-03	DET
Nickel, total	ppmv	8.9E+00		7.1E-01		4.5E+00	
Potassium	ppmv	<5.3E-01	DET	3.3E-01		1.3E-02	
Silicon	ppmv	2.0E+00		1.7E+00		7.5E-01	
Silver	ppmv	<1.0E-02	DET	< 1.0E-03	DET	< 1.0E-03	ND
Sodium	ppmv	<4.5E-01	DET	2.2E+00		8.7E-01	
Strontium	ppmv	<1.0E-02	DET	1.6E-03		< 1.0E-03	DET
Thallium	ppmv	<1.0E-03	DET	< 1.0E-03	ND	< 1.0E-03	ND
Tin	ppmv	<2.0E-02	DET	< 4.2E-02	ND	< 8.9E-03	ND
Titanium	ppmv	<4.0E-02	DET	< 1.0E-02	ND	< 1.1E-03	ND
Vanadium	ppmv	<4.1E-01	DET	9.7E-03		< 1.0E-03	ND
Zinc	ppmv	5.8E-02		4.4E-01		1.1E-02	
Polycyclic Aromatic Hydrocarbons			ND		ND		ND
Volatile Aromatic Compounds			ND		ND		ND

DET: DETECTED
ND: NOT DETECTED

REFERENCE DER-1.3

BLACK & VEATCH - FLORIDA POWER
****

ESTIMATED PERFORMANCE - PG7221(FA)

LOAD CONDITION		BASE	80%	60%	40%	20%
AMBIENT TEMP.	- Deg F.	40	40	40	40	40
AMBIENT RELATIVE HUMID	- %	70	70	70	70	70
OUTPUT	- kW	178200.	143200.	106900.	70500.	35800.
HEAT RATE (LHV)	- Btu/kWh	10100.	10860.	12270.	14580.	18880.
HEAT CONS. (LHV) X10-6	- Btu/h	1799.8	1555.2	1311.7	1027.9	675.9
EXHAUST FLOW X10-3	- lb/h	3652.0	3028.0	2551.0	2152.0	2027.0
EXHAUST TEMP	- Deg F.	1071.	1142.	1200.	1200.	1027.
EXHAUST HEAT X10-6	- Btu/h	997.5	900.1	809.4	684.5	527.0
WATER FLOW	- lb/h	129530.	109860.	88920.	63480.	0.

NOX	- ppmvd @ 15% O2	42.	42.	42.	42.	240.
NOX AS NO2	- lb/h	318.	273.	228.	177.	660.
CO	- ppmvd	30.	30.	50.	80.	*
CO	- lb/h	96.	79.	112.	152.	*
UHC	- ppmvv	7.	10.	20.	40.	*
UHC	- lb/h	15.	17.	29.	51.	*
SO2	- ppmvv	11.	12.	12.	11.	8.
SO2	- lb/h	92.	80.	67.	53.	35.
SO3	- ppmvv	1.	1.	1.	1.	0.
SO3	- lb/h	6.	5.	5.	3.	2.
SULFUR MIST	- lb/h	10.	8.	7.	6.	4.
PART	- lb/h	17.0	17.0	17.0	17.0	17.0

EXHAUST ANALYSIS % VOL.

ARGON	0.87	0.86	0.86	0.87	0.92
NITROGEN	71.09	70.92	71.10	71.91	76.13
OXYGEN	10.93	10.61	10.72	11.56	14.96
CARBON DIOXIDE	5.31	5.49	5.45	5.04	3.57
WATER	11.81	12.13	11.88	10.62	4.42

SITE CONDITIONS
****

ELEVATION	- ft.	163
SITE PRESSURE	- psia	14.62
INLET LOSS	- in. Water	3.5
EXHAUST LOSS	- in. Water	12
RELATIVE HUMIDITY	- %	70
FUEL TYPE	-	DISTILLATE
FUEL LHV	- Btu/lb	18550
APPLICATION	-	317S HYDROGEN COOLED GENERATOR
COMBUSTION SYSTEM	-	DRY LOW NOX

EMISSION INFORMATION BASED ON GE RECOMMENDED MEASUREMENT METHODS. NOx EMISSIONS ARE CORRECTED TO 15% O2 WITHOUT HEAT RATE CORRECTION AND ARE NOT CORRECTED TO ISO REFERENCE CONDITIONS PER 40CFR 60.335(a)(1)(i). NOx LEVELS SHOWN WILL BE CONTROLLED BY ALGORITHMS WITHIN THE SPEEDTRONIC CONTROL SYSTEM.

DISTILLATE FUEL IS ASSUMED TO HAVE .015% FUEL BOUND NITROGEN, OR LESS. FBN AMOUNTS GREATER THAN .015% WILL ADD TO THE REPORTED NOx VALUE. SULFUR EMISSIONS BASED ON .05 WT% SULFUR CONTENT IN THE FUEL.

* DATA CURRENTLY NOT AVAILABLE

IPS-8585
JAH 7-22-92

REFERENCE DER-1.4

PB89-194229

United States Environmental Protection Agency

Office of Air Quality Planning And Standards Research Triangle Park, NC 27711

EPA-450/2-89-001
April 1989

AIR

EPA

ESTIMATING AIR TOXICS EMISSIONS FROM COAL AND OIL COMBUSTION SOURCES

The effect of particulate control technologies on POM and formaldehyde emissions is another area lacking data. There are few measurements of POM in controlled emission streams, and little data on the distribution of POM and formaldehyde in the vapor versus particulate phases. Theoretically, a large portion of POM and formaldehyde should be present in vapor form and would therefore escape collection; however, very limited test data for residual oil-fired sources appears to indicate lower POM emission factors for controlled versus uncontrolled boilers.

Arsenic Emission Factors

Based on a typical residual oil arsenic content of 0.36 ppm, the summarized uncontrolled arsenic emission factor for residual oil combustion is 19 lb/10^{12} Btu. This is in the middle range of values calculated in five previous studies, which range from less than 0.5 to 42 lb/10^{12} Btu (see Table 4-2). Eight measured arsenic emission factors from the literature are shown in Table 4-3. Uncontrolled emission factors reported by two authors range from 4.2 to 37 lb/10^{12} Btu, and are in good agreement with the recommended value of 19 lb/10^{12} Btu. Since levels in fuels were often below the detection limit, it is not possible to calculate mass balance closure for the test runs. Leavitt et al. (1980) reports higher emission factors, despite the presence of control devices. The reason for this is unknown.

The summarized distillate oil arsenic emission factor is X 4.2 lb/10^{12} Btu based on a typical level of 0.085 ppm in distillate oil. This is in good agreement with previously calculated factors of 3.0 and 8.1 lb/10^{12} Btu from two studies summarized in Table 4-4. Only four measured values are reported in the literature, ranging from 1.5 to 3.5 lb/10^{12} Btu (see Table 4-5).

Beryllium Emission Factors

The summarized uncontrolled beryllium emission factor for residual oil is 4.2 lb/10^{12} Btu. This is in general agreement with previously calculated values shown in Table 4-6 which range from 0.05 to 5.57 lb/10^{12} Btu. There is some uncertainty regarding the calculated values reported in the

EXHIBIT FDER-2A
MAXIMUM CT NO_X EMISSIONS WHEN FIRING DISTILLATE WITH FUEL BOUND NITROGEN AMOUNTS EQUAL TO AND GREATER THAN 0.015 PERCENT

72° F, Base Load, Distillate Oil

Fuel Bound Nitrogen (percent)	Emission Concentration (ppmvd)	Emission Level (lb/MBtu)	Hourly Emission* (lb/h/unit)	Annual Emission** (tpy)	Emission Increase*** (tpy)
0.015	42	0.176	289	289	0
0.020	44	0.184	303	303	14
0.025	46	0.192	316	316	27
0.030	48	0.201	330	330	41
0.035	50	0.209	344	344	55

* See Equation C2-1

** (lb/h/unit)(500 h/yr)(4 units)/(2,000 lb/t)

*** Annual emission for specific fuel bound nitrogen over the annual emission for 0.015 percent fuel bound nitrogen (i.e., 289 tpy)

Note: Heat input per GE performance data sheets is 1,644.5 MBtu/h based on lower heating value (LHV).

EXHIBIT FDER-2A

MAXIMUM CT NO_X EMISSIONS WHEN FIRING DISTILLATE WITH FUEL BOUND NITROGEN AMOUNTS EQUAL TO AND GREATER THAN 0.015 PERCENT

40° F, Base Load, Distillate Oil

Fuel Bound Nitrogen (percent)	Emission Concentration (ppmvd)	Emission Level (lb/MBtu)	Hourly Emission* (lb/h/unit)	Annual Emission** (tpy)	Emission Increase*** (tpy)
0.015	42	0.176	317	317	0
0.020	44	0.184	332	332	15
0.025	46	0.193	347	347	30
0.030	48	0.201	362	362	45
0.035	50	0.209	377	377	60

* See Equation C4-1

** (lb/h/unit)(500 h/yr)(4 units)/(2,000 lb/t)

*** Annual emission for specific fuel bound nitrogen over the annual emission for 0.015 percent fuel bound nitrogen (i.e., 317 tpy)

Note: Heat input per GE performance data sheets is 1,799.8 MBtu/h based on lower heating value (LHV).

EXHIBIT FDER-2A

MAXIMUM CT NO_X EMISSIONS WHEN FIRING DISTILLATE WITH FUEL BOUND NITROGEN AMOUNTS EQUAL TO AND GREATER THAN 0.015 PERCENT

95° F, Base Load, Distillate Oil

Fuel Bound Nitrogen (percent)	Emission Concentration (ppmvd)	Emission Level (lb/MBtu)	Hourly Emission* (lb/h/unit)	Annual Emission** (tpy)	Emission Increase*** (tpy)
0.015	42	0.175	269	269	0
0.020	44	0.184	282	282	13
0.025	46	0.192	295	295	26
0.030	48	0.201	308	308	39
0.035	50	0.209	321	321	52

* See Equation C6-1

** (lb/h/unit)(500 h/yr)(4 units)/(2,000 lb/t)

*** Annual emission for specific fuel bound nitrogen over the annual emission for 0.015 percent fuel bound nitrogen (i.e., 269 tpy)

Note: Heat input per GE performance data sheets is 1,532.8 MBtu/h based on lower heating value (LHV).

EXHIBIT FDER-2B
COAL GASIFICATION COMBINED CYCLE UNITS (3,000 MW)
POLLUTANT EMISSION RATES
(CASE A)

Pollutant	Coal-Derived Gas		Fuel Oil	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Carbon Monoxide	1,200	5,256	1,152	288
Nitrogen Oxides	1,956	8,567	4,344	1,086
Sulfur Dioxide	2,328	10,197	1,106	277
Particulate (PM/PM_{10})	432	1,892	204	51
Volatile Organic Compounds	144	631	134	34
Lead	3.3	14.45	0.192	0.048
Asbestos	N/A	N/A	N/A	N/A
Beryllium	0.0165	0.072	0.054	0.0135
Mercury	0.269	1.16	0.066	0.0165
Vinyl Chloride	N/A	N/A	N/A	N/A
Total Fluorides	Negligible	Negligible	Negligible	Negligible
Sulfuric Acid Mist	260	1,141	108	27
Hydrogen Sulfide	N/A	N/A	N/A	N/A
Total Reduced Sulfur	N/A	N/A	N/A	N/A
Benzene	Negligible	Negligible	N/A	N/A
Arsenic	0.19	0.83	0.091	0.022
Radionuclides	N/A	N/A	N/A	N/A

Notes:
1. Emission rates are based on performance data for twelve GE Frame 7F CC units operating at 100 percent capacity, 40°F, and 70 percent relative humidity with water injection. Other manufacturers' units may be utilized provided emission rates are equal to or less than those represented.
2. Coal-derived gas emission rates are based on 8,760 hours of operation per year burning an eastern bituminous coal-derived gas.
3. Fuel oil emission rates are based on 500 hours of operation per year, burning No. 2 fuel oil with a sulfur content of 0.05 percent by weight and a maximum FBN content of 0.03 percent by weight**, and a maximum FBN content of 0.03 percent by weight.**
4. Worst case annual emissions for some pollutants are a combination of fuel usages.

N/A = Not applicable to this type of system

Source: Black & Veatch, 1992

EXHIBIT FDER-2B
COAL GASIFICATION COMBINED CYCLE UNITS (2,000 MW)
POLLUTANT EMISSION RATES
(CASE B)

Pollutant	Coal-Derived Gas		Fuel Oil	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Carbon Monoxide	800	3,504	768	192
Nitrogen Oxides	1,304	5,712	2,896	724
Sulfur Dioxide	1,552	6,798	737	184
Particulate (PM/PM_{10})	288	1,261	136	34
Volatile Organic Compounds	96	420	90	22
Lead	2.2	9.64	0.128	0.032
Asbestos	N/A	N/A	N/A	N/A
Beryllium	0.011	0.048	0.036	0.009
Mercury	0.176	0.77	0.044	0.011
Vinyl Chloride	N/A	N/A	N/A	N/A
Total Fluorides	Negligible	Negligible	Negligible	Negligible
Sulfuric Acid Mist	174	760	72	18
Hydrogen Sulfide	N/A	N/A	N/A	N/A
Total Reduced Sulfur (including H_2S)	N/A	N/A	N/A	N/A
Benzene	Negligible	Negligible	Negligible	Negligible
Arsenic	0.13	0.56	0.061	0.015
Radionuclides	N/A	N/A	N/A	N/A

Notes:
1. Emission rates are based on performance data for eight GE Frame 7F CC units operating at 100 percent capacity, 40°F, and 70 percent relative humidity with water injection. Other manufacturers' units may be utilized provided emission rates are equal to or less than those represented.
2. Coal-derived gas emission rates are based on 8,760 hours of operation per year burning an eastern bituminous coal-derived gas.
3. Fuel oil emission rates are based on 500 hours of operation per year burning No. 2 fuel oil with a sulfur content of 0.05 percent by weight and a maximum FBN content of 0.03 percent by weight, **and a maximum FBN content of 0.03 percent by weight.**
4. Worst case annual emissions for some pollutants are a combination of fuel usages.

N/A = Not applicable to type of system

Source: Black & Veatch, 1992

EXHIBIT FDER-2B
COAL GASIFICATION COMBINED CYCLE UNITS
SUMMARY OF PRELIMINARY BACT ANALYSIS

Pollutant	Emission Rate (CG/FO) (lb/hr)		Control Technology
	Case A	Case B	
Carbon Monoxide	1,200/1,152	800/768	Advanced design combustion control.
Nitrogen Oxide	1,956/4,344	1,304/2,896	Advanced design combustion control and water injection when required while burning coal-derived gas and fuel oil. Limited annual fuel oil operation.
Sulfur Dioxide	2,328/1,106	1,552/737	Good design and operation of CG sulfur recovery process and low fuel oil sulfur content (0.05 percent).
Particulate	432/204	288/136	Advanced design combustion control and good CG facility performance.
Volatile Organic Compounds	144/134	96/90	Advanced design combustion control.
Lead	3.3/0.192	2.2/0.128	Advanced design combustion control and good CG facility performance.
Beryllium	0.0165/0.054	0.011/0.036	Advanced design combustion control and good CG facility performance.
Mercury	0.269/0.066	0.176/0.044	Advanced design combustion control and good CG facility performance.
Sulfuric Acid Mist	260/108	174/72	Good design and operation of CG sulfur recovery process and low fuel oil sulfur content (0.05 percent).
Arsenic	0.19/0.091	0.13/0.06	Advanced design combustion control and good CG facility performance.

Notes:

1. Emission rates based on G.E. Frame 7F CC units operating at 40° F and 80 percent relative humidity. Other manufacturers' units may be utilized provided emission rates are equal to or less than those represented. Case A includes 12 CGCC units. Case B includes 8 CGCC units.
2. The control technologies listed are assumed BACT for the CGCC units. The facility will be subject to actual PSD review at a later date.

Source: Black & Veatch, 1992

EXHIBIT FDER-2B
COMPARISON OF CASE B EMISSIONS
WITH SIGNIFICANT EMISSION RATES [1]

Pollutant	8 CTs [2] (TPY)	2 PCs (TPY)	4 TOUs (TPY)	Auxiliary Boiler [3] (TPY)	Diesel Generator [3] (TPY)	Totals (TPY)	Significant Emission Rate (TPY)
CO	3,504	7,814	78	0.25	0.6	11,396	100
NO_x	**6,110**	8,852	999	0.99	2.65	**15,965**	40
SO_2	6,798	15,102	447	0.264	0.044	22,347	40
PM (TSP)	1,261	1,042	26	0.25	0.024	2,329	25
PM (PM_{10})	1,261	1,042	26	0.25	0.024	2,329	15
VOC	420	780	Neg.	0.05	0.014	1,200	40
Pb	9.45	0.87	0.035	0.000044	0.000008	10.355	0.6
Asbestos	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	0.007
Beryllium	0.054	0.0057	0.0006	0.000013	0.0000022	0.0603	0.004
Mercury	0.77	0.52	0.11	0.000015	0.0000026	1.400	0.1
Vinyl Chloride	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	1
Fluorides	Neg.	4.00	Neg.	Neg.	Neg.	4.00	3
Sulfuric Acid Mist	762	2,277.6	6.7	0.0041	0.00065	3,046	7
H_2S	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Any
Total Reduced Sulfur	Neg.	Neg.	Neg.	Neg.	Neg.	10	10
Benzene [4]	Neg.	Neg.	Neg.	0.00034	Neg.	0.00034	Any
Inorganic Arsenic	0.56	0.898	0.021	0.00002	0.0000037	1.479	Any
Radionuclides	Neg.	11.5 mC_i/yr	Neg.	Neg.	Neg.	11.5 mC_i/yr	Any

Notes:
(1) Emission rates based on the application of BACT as discussed in SCA Section 3.4.
(2) Emission rates based on worst-case scenario for combination of fuel usage (i.e., coal gas 8,260 hrs/yr and fuel oil 500 hrs/yr).
(3) Auxiliary boiler and diesel generator totals are not included in the totals column (except for benzene) since these sources will not be operated simultaneously with the CTs or PCs, except during startup and for brief periods of testing.
(4) Emission rate based on natural gas combustion (EPA, 1989).

CTs = Combustion Turbines PCs = Pulverized Coal Units TOUs = Thermal Oxidation Units Neg. = Negligible

Source: Black & Veatch, 1992

EXHIBIT FDER-2B
SUMMARY OF SIGNIFICANT IMPACT AREAS (CASE B)

Pollutant	Averaging Period	Maximum[1] Predicted Concentration ($\mu g/m^3$)	Location[2] X (m)	Location[2] Y (m)	Year	Significance Level ($\mu g/m^3$)	Distance to Significance (km)	Off-site Significant Impact (Yes/No)
Carbon Monoxide	1-Hour 8-Hour	439.3 114.2	2,000 3,000	-500 -500	1984 1986	2,000 500	None None	No No
Nitrogen Dioxide	**Annual**	**4.7**	-2,000	1,000	1986	1	33	Yes
Sulfur Dioxide	3-Hour 24-Hour Annual	358.1 80.2 4.8	1,000 1,000 -2,000	-500 -500 1,000	1983 1985 1986	25 5 1	>50 >50 40	Yes Yes Yes
Particulate Matter (PM_{10} or TSP)[3]	24-Hour Annual	36.6 4.7	-2,320 -2,000	0 -500	1983 1982	5 1	12 7	Yes Yes
Beryllium	24-Hour	0.0018	1,000	-500	1985	N/A	N/A	N/A
Sulfuric Acid	24-Hour	**9.78**	1,000	-500	1985	N/A	N/A	N/A
Inorganic Arsenic	24-Hour	**0.00769**	1,000	-500	1985	N/A	N/A	N/A

(1) Short-term values are highest rather than highest, second-highest values for this analysis.

(2) With respect to zero point of 414.30 km E; 3,073.88 km N.

(3) The allowable PSD increment is evaluated for TSP whereas the AAQS compliance is evaluated for PM_{10}. As a conservative approach, all project emissions of particulate matter were assumed to be in the form of PM_{10}.

N/A = Not applicable

Source: Ebasco Environmental, 1992

EXHIBIT FDER-2B
SUMMARY OF MAXIMUM OFF-SITE IMPACTS (CASE B)

Pollutant	Averaging Period	Maximum[1] Predicted Concentration ($\mu g/m^3$)	Location[2] X (m)	Location[2] Y (m)	Year	PSD Increment ($\mu g/m^3$)	AAQS ($\mu g/m^3$)
Carbon Monoxide	1-Hour 8-Hour	414.5 97.2	2,000 2,000	-500 -500	1984 1983	N/A N/A	40,000 10,000
Nitrogen Dioxide	**Annual**	**4.7**	-2,000	1,000	1986	25	100
Sulfur Dioxide	3-Hour 24-Hour Annual	263.7 65.5 4.8	1,000 1,000 -2,000	-500 -500 1,000	1983 1984 1986	512 91 20	1,300 260 60
Particulate Matter (PM_{10} or TSP)[3]	24-Hour Annual	30.4 4.7	-2,000 -2,000	-500 -500	1986 1982	37 19	150 50
Beryllium	24-Hour	0.0018	1,000	-500	1985	N/A	N/A
Sulfuric Acid Mist	24-Hour	**9.78**	1,000	-500	1985	N/A	N/A
Inorganic Arsenic	24-Hour	**0.00769**	1,000	-500	1985	N/A	N/A

(1) Short-term values are highest, second-highest values for this analysis, except for beryllium, sulfuric acid mist, and inorganic arsenic.

(2) With respect to zero point of 414.30 km E; 3,073.88 km N.

(3) The allowable PSD increment is evaluated for TSP whereas the AAQS compliance is evaluated for PM_{10}. As a conservative approach, all project emissions of particulate matter were assumed to be in the form of PM_{10}.

N/A = Not applicable

Source: Ebasco Environmental, 1992

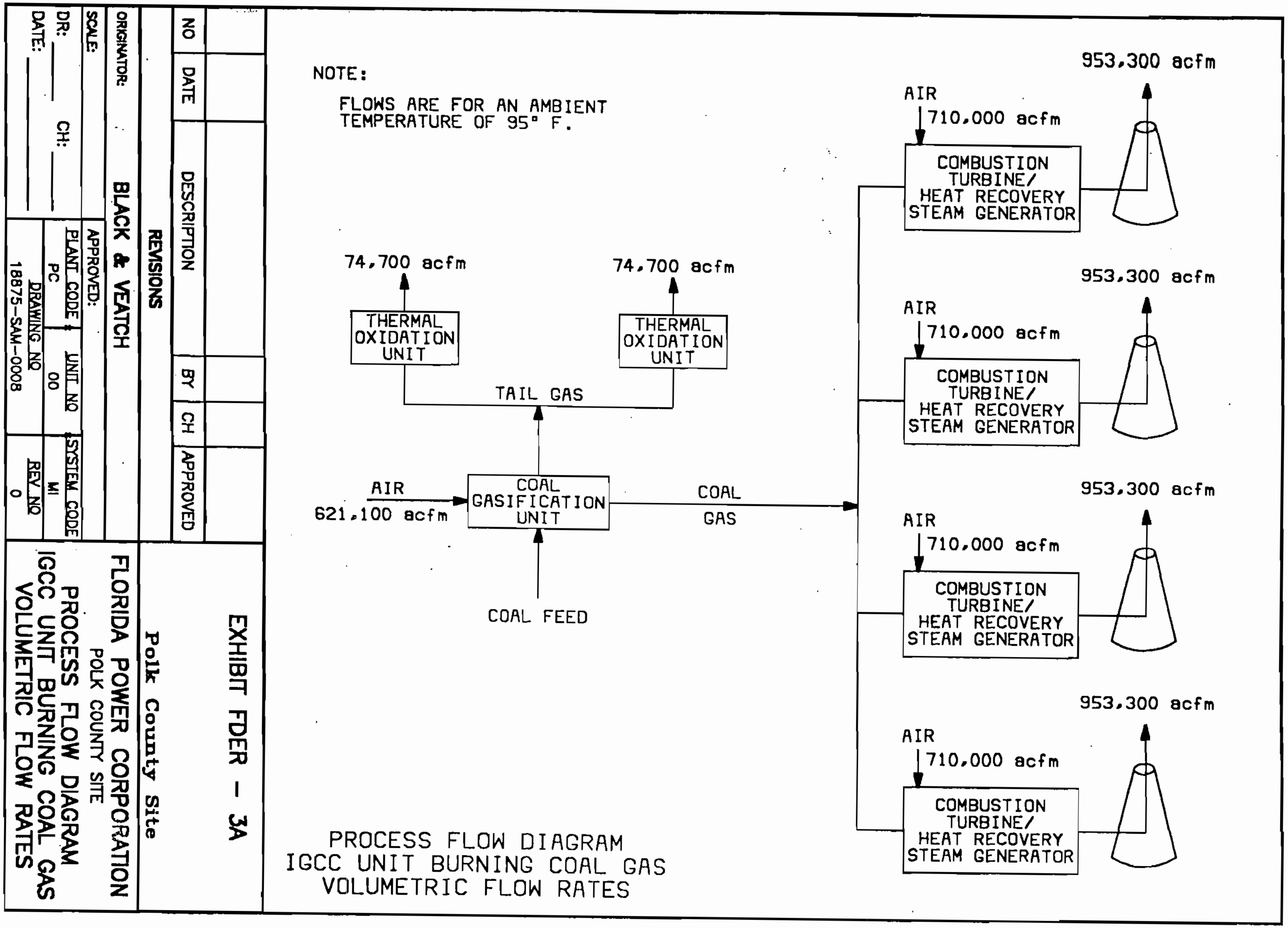
EXHIBIT FDER-2B
COMBUSTION TURBINE (235MW)
ESTIMATED[1] PERFORMANCE ON FUEL OIL

CONDITIONS			
Ambient Temperature (°F)	40	72	95
Ambient Relative Humidity (%)	70	80	48
Load Condition (%)	100	100	100
Elevation (ft) (above MSL)	163	163	163
Maximum Heat Input Rate (mmBtu/hr)	1,799.8	1,644.5	1,532.8
EMISSIONS (lb/hr)			
Carbon Monoxide (30 ppm)	96	89	84
Nitrogen Oxides[2]	362	330	308
Sulfur Dioxide	98	90	83
Particulate Matter (PM_{10})	17	17	17
Volatile Organic Compounds	12	11.2	10.4
Lead[3]	0.016	0.0146	0.0136
Asbestos	Neg.	Neg.	Neg.
Beryllium[3]	0.0045	0.0041	0.00383
Mercury[3]	0.0054	0.0049	0.0046
Vinyl Chloride	Neg.	Neg.	Neg.
Total Fluorides	Neg.	Neg.	Neg.
Sulfuric Acid Mist	10	9	8
Hydrogen Sulfide	Neg.	Neg.	Neg.
Total Reduced Sulfur	Neg.	Neg.	Neg.
Benzene	Neg.	Neg.	Neg.
Inorganic Arsenic[3]	0.00756	0.00691	0.00644
Radionuclides	Neg.	Neg.	Neg.
STACK PARAMETERS			
Stack Height (ft)	213	213	213
Stack Diameter (ft)	13.5	13.5	13.5
Stack Gas Temperature (°F)	260	260	260
Stack Gas Exit Velocity (ft/sec)	133	125	117

Notes: [1] Emission estimates based on application of BACT as discussed in SCA Section 3.4.
[2] Not corrected to ISO reference conditions, includes FBN content allowance.

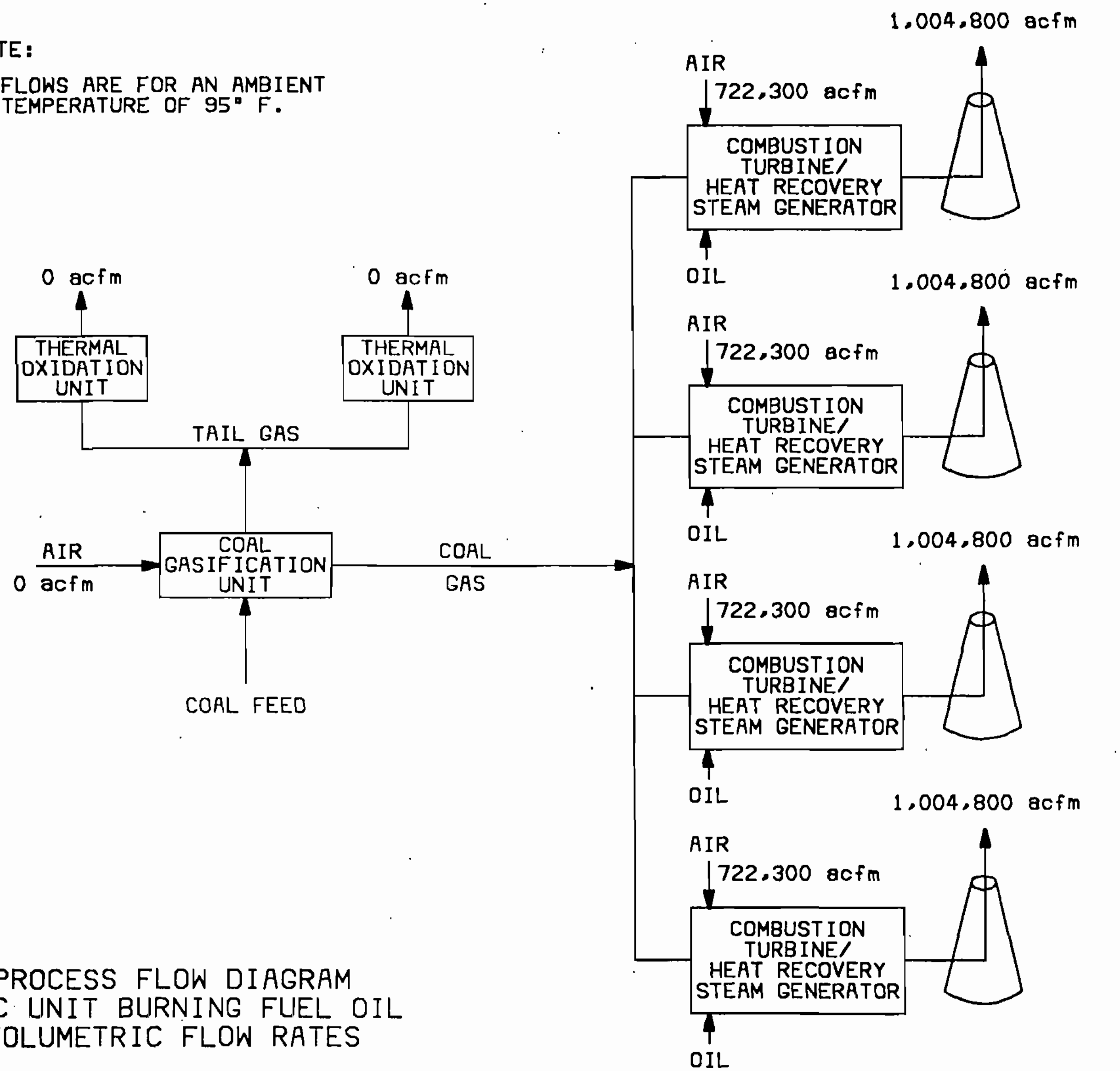
MSL = Mean Sea Level   Neg. = Negligible

Source: Black & Veatch, 1992


NOTE:
FLOWS ARE FOR AN AMBIENT TEMPERATURE OF 95° F.
74,700 acfm
THERMAL OXIDATION UNIT
74,700 acfm
THERMAL OXIDATION UNIT
TAIL GAS
AIR
621,100 acfm
COAL GASIFICATION UNIT
COAL FEED
COAL GAS
AIR
710,000 acfm
COMBUSTION TURBINE/ HEAT RECOVERY STEAM GENERATOR
953,300 acfm
AIR
710,000 acfm
COMBUSTION TURBINE/ HEAT RECOVERY STEAM GENERATOR
953,300 acfm
AIR
710,000 acfm
COMBUSTION TURBINE/ HEAT RECOVERY STEAM GENERATOR
953,300 acfm
AIR
710,000 acfm
COMBUSTION TURBINE/ HEAT RECOVERY STEAM GENERATOR
953,300 acfm
PROCESS FLOW DIAGRAM
IGCC UNIT BURNING COAL GAS
VOLUMETRIC FLOW RATES
NO
DATE
DESCRIPTION
BY
CH
APPROVED
REVISIONS
ORIGINATOR:
BLACK & VEATCH
SCALE:
APPROVED:
DR:
CH:
DATE:
PLANT CODE
PC
UNIT NO
00
SYSTEM CODE
MI
DRAWING NO
18875-SAM-0008
REV NO
0
EXHIBIT FDER - 3A
Polk County Site
FLORIDA POWER CORPORATION
POLK COUNTY SITE
PROCESS FLOW DIAGRAM
IGCC UNIT BURNING COAL GAS
VOLUMETRIC FLOW RATES

NOTE:

FLOWS ARE FOR AN AMBIENT TEMPERATURE OF 95° F.



PROCESS FLOW DIAGRAM
IGCC UNIT BURNING FUEL OIL
VOLUMETRIC FLOW RATES

EXHIBIT FDER - 3B

Polk County Site

NO	DATE	DESCRIPTION	BY	CH	APPROVED

REVISIONS

ORIGINATOR: BLACK & VEATCH

SCALE: APPROVED:

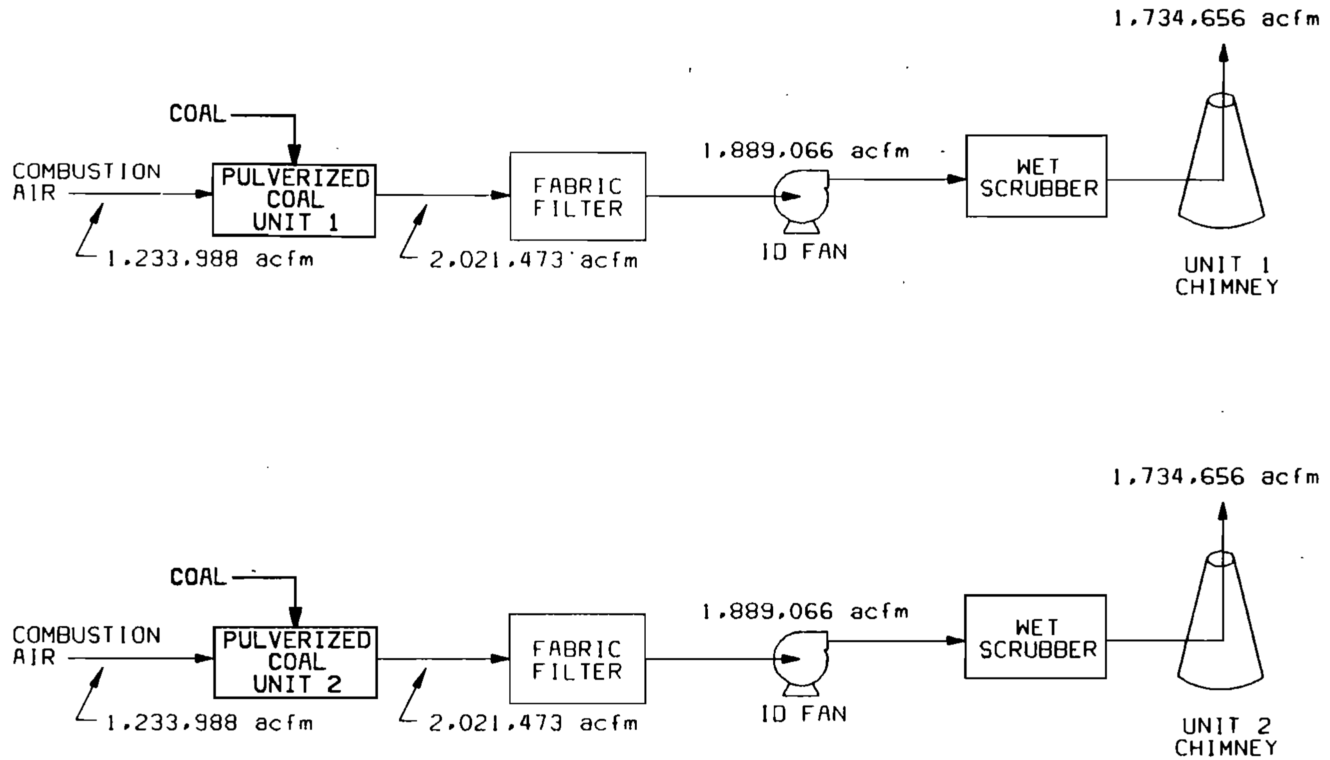
DR: CH:

DATE:

PLANT CODE: PC | UNIT NO: 00 | SYSTEM CODE: MI

DRAWING NO: 18875-SAM-0009 | REV NO: 0

FLORIDA POWER CORPORATION
POLK COUNTY SITE
PROCESS FLOW DIAGRAM
IGCC UNIT BURNING FUEL OIL
VOLUMETRIC FLOW RATES



PROCESS FLOW DIAGRAM
PULVERIZED COAL UNITS
VOLUMETRIC AIR FLOW RATES

NO	DATE	DESCRIPTION	BY	CH	APPROVED

REVISIONS

ORIGINATOR: **BLACK & VEATCH**

SCALE:
DR: CH:
DATE:

APPROVED:

PLANT CODE	UNIT NO	SYSTEM CODE
PC	00	MI

DRAWING NO	REV NO
18875-SAM-0006	0

EXHIBIT FDER-3C

Polk County Site

FLORIDA POWER CORPORATION
POLK COUNTY SITE

PROCESS FLOW DIAGRAM
PULVERIZED COAL UNITS
VOLUMETRIC AIR FLOW RATES

EXHIBIT FDER-7A
(5 pages)

EXHIBIT FDER-7A
POLK COUNTY TSP PARTICULATE EMISSION ESTIMATES FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
Coal Car Unloading Building (A1)	Railcar Dumping to Hopper	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr 40,000 t/dy	6.4393 t/yr 2.3449 lb/hr	Water & Partial Enclosure	0.850 0.850	0.965888 t/yr	0.351733 lb/hr
	Hopper to Belt Feeder	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr 40,000 t/dy	6.4393 t/yr 2.3449 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.193178 t/yr	0.070347 lb/hr
	Belt Feeder	Conveying			0.0034 lb/t	9,153,616 t/yr 40,000 t/dy	15.561 t/yr 5.667 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.466834 t/yr	0.17 lb/hr
	Belt Feeder to Conveyor 1	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr 40,000 t/dy	6.4393 t/yr 2.3449 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.193178 t/yr	0.070347 lb/hr
										========	========
									TOTAL (f)	1.819078 t/yr 0.052326 g/s	0.662426 lb/hr 0.083461 g/s
CTB1 (P1)	Conveyor 1 to Conveyor 2	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr 40,000 t/dy	6.4393 t/yr 2.3449 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.006439 t/yr	0.002345 lb/hr
										========	========
									TOTAL (f)	0.006439 t/yr 0.000185 g/s	0.002345 lb/hr 0.000295 g/s
CTB2 (P2)	Conveyors 2 to Conveyors 3 & 4	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr 40,000 t/dy	6.4393 t/yr 2.3449 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.006439 t/yr	0.002345 lb/hr
										========	========
									TOTAL (f)	0.006439 t/yr 0.000185 g/s	0.002345 lb/hr 0.000295 g/s
Emergency Coal Pile Stockout (A2)	Stockout to Emergency Coal Pile	Drop	8.6	4.8	0.0014 lb/t	0 t/yr 0 t/dy	0.0000 t/yr 0.0000 lb/hr	Previously Wetted & Telescopic Chute	0.925 0.925	0 t/yr	0 lb/hr
										========	========
									TOTAL (f)	0 t/yr 0 g/s	0 lb/hr 0 g/s
Emergency Coal Pile (A3)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2 0 g/m2	2,323 m2/yr 2,323 m2/dy	0.0000 t/yr 0.0000 lb/hr	Previously Wetted	0.700 0.700	0 t/yr	0 lb/hr
										========	========
									TOTAL (f)	0 t/yr 0 g/s	0 lb/hr 0 g/s

EXHIBIT FDER-7A
POLK COUNTY TSP PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
S/R 1 (A4)	Conveyor 4 to S/R1	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Prev Wetted/Watered	0.955	0.289766 t/yr	
						40,000 t/dy	2.3449 lb/hr	& Partial Enclosure	0.955		0.10552 lb/hr
	S/R 1 Boom Belt	Conveying			0.0034 lb/t	9,153,616 t/yr	15.561 t/yr	Previously Wetted	0.700	4.668344 t/yr	
						40,000 t/dy	5.667 lb/hr		0.700		1.7 lb/hr
	Stacking	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Previously Wetted	0.775	1.448832 t/yr	
						40,000 t/dy	2.3449 lb/hr	& Adjustable Height	0.775		0.527599 lb/hr
										=========	=========
									TOTAL (f)	6.406943 t/yr	2.333119 lb/hr
										0.184298 g/s	0.293955 g/s
S/R2 (A5)	Bucket Wheel Reclaim to S/R2 Boom Belt	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Previously Wetted	0.850	0.965888 t/yr	
						39,339 t/dy	2.3061 lb/hr	& Watered	0.850		0.345917 lb/hr
	S/R2 Boom Belt	Conveying			0.0034 lb/t	9,153,616 t/yr	15.561 t/yr	Previously Wetted	0.700	4.668344 t/yr	
						39,339 t/dy	5.5730 lb/hr		0.700		1.671889 lb/hr
	Reclaim to Conveyor 5	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Previously Wetted	0.910	0.579533 t/yr	
						39,339 t/dy	2.3061 lb/hr	& Partial Enclosure	0.910		0.20755 lb/hr
										=========	=========
									TOTAL (f)	6.213765 t/yr	2.225356 lb/hr
										0.178741 g/s	0.280377 g/s
Active Coal Pile (A6)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2	12,635 m2/yr	0.0000 t/yr	Previously Wetted	0.700	0 t/yr	
					0 g/m2	12,635 m2/dy	0.0000 lb/hr		0.700		0 lb/hr
										=========	=========
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
Inactive Coal Pile (A7)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2	232,258 m2/yr	0.0000 t/yr	Previously Wetted	0.700	0 t/yr	
					0 g/m2	232,258 m2/dy	0.0000 lb/hr		0.700		0 lb/hr
										=========	=========
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
CTB2 (P3)	Conveyor 5 to Conveyor 6	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Total Enclosure	0.999	0.006439 t/yr	
						39,339 t/dy	2.3061 lb/hr	& Fabric Filter	0.999		0.002306 lb/hr
										=========	=========
									TOTAL (f)	0.006439 t/yr	0.002306 lb/hr
										0.000185 g/s	0.000291 g/s

EXHIBIT FDER-7A
POLK COUNTY TSP PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
CTB1 (P4)	Conveyor 6 to	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Total Enclosure	0.999	0.006439 t/yr	
	Conveyor 7					39,339 t/dy	2.3061 lb/hr	& Fabric Filter	0.999		0.002306 lb/hr
										=========	=========
									TOTAL (f)	0.006439 t/yr	0.002306 lb/hr
										0.000185 g/s	0.000291 g/s
Coal Crusher (P5)	Conveyor 7 to	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Total Enclosure	0.999	0.006439 t/yr	
	Crusher					39,339 t/dy	2.3061 lb/hr	& Fabric Filter	0.999		0.002306 lb/hr
	Crusher	Crushing			0.2800 lb/t	9,153,616 t/yr	1281.5 t/yr	Total Enclosure	0.999	1.281506 t/yr	
						39,339 t/dy	458.95 lb/hr	& Fabric Filter	0.999		0.45895 lb/hr
	Crusher to	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Total Enclosure	0.999	0.006439 t/yr	
	Conveyor 8					39,339 t/dy	2.3061 lb/hr	& Fabric Filter	0.999		0.002306 lb/hr
										=======	=======
									TOTAL (f)	1.294385 t/yr	0.463562 lb/hr
										0.037233 g/s	0.058405 g/s
CTB3 (P6)	Conveyor 8 to	Drop	8.6	4.8	0.0014 lb/t	9,153,616 t/yr	6.4393 t/yr	Total Enclosure	0.999	0.006439 t/yr	
	Conveyors 9 and 10					39,339 t/dy	2.3061 lb/hr	& Fabric Filter	0.999		0.002306 lb/hr
										=========	=========
									TOTAL (f)	0.006439 t/yr	0.002306 lb/hr
										0.000185 g/s	0.000291 g/s
GCC1 (P7)	Conveyor 9 to	Drop	8.6	4.8	0.0014 lb/t	2,747,574 t/yr	1.9328 t/yr	Total Enclosure	0.999	0.001933 t/yr	
	Day Storage					11,808 t/dy	0.6922 lb/hr	& Fabric Filter	0.999		0.000692 lb/hr
										========	========
									TOTAL (f)	0.001933 t/yr	0.000692 lb/hr
										0.000056 g/s	0.000087 g/s
CTB4 (P8)	Conveyor 10 to	Drop	8.6	4.8	0.0014 lb/t	6,406,042 t/yr	4.5064 t/yr	Total Enclosure	0.999	0.004506 t/yr	
	Conveyors 11, 12 & 14					27,531 t/dy	1.6139 lb/hr	& Fabric Filter	0.999		0.001614 lb/hr
										========	========
									TOTAL (f)	0.004506 t/yr	0.001614 lb/hr
										0.00013 g/s	0.000203 g/s
CTB5 (P9)	Conveyor 11 to 13a &	Drop	8.6	4.8	0.0014 lb/t	3,658,468 t/yr	2.5736 t/yr	Total Enclosure	0.999	0.002574 t/yr	
	Conveyor 12 to 13b					15,723 t/dy	0.9217 lb/hr	& Fabric Filter	0.999		0.000922 lb/hr
										=======	=======
									TOTAL (f)	0.002574 t/yr	0.000922 lb/hr
										0.000074 g/s	0.000116 g/s

EXHIBIT FDER-7A
POLK COUNTY TSP PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
PC1 (P10)	Conveyor 13a to Day Storage	Drop	8.6	4.8	0.0014 lb/t	1,829,234 t/yr	1.2868 t/yr	Total Enclosure	0.999	0.001287 t/yr	
						7,861 t/dy	0.4608 lb/hr	& Fabric Filter	0.999		0.000461 lb/hr
										========	========
									TOTAL (f)	0.001287 t/yr	0.000461 lb/hr
										0.000037 g/s	0.000058 g/s
PC2 (P11)	Conveyor 13b to Day Storage	Drop	8.6	4.8	0.0014 lb/t	1,829,234 t/yr	1.2868 t/yr	Total Enclosure	0.999	0.001287 t/yr	
						7,861 t/dy	0.4608 lb/hr	& Fabric Filter	0.999		0.000461 lb/hr
										========	========
									TOTAL (f)	0.001287 t/yr	0.000461 lb/hr
										0.000037 g/s	0.000058 g/s
CTB6 (P12)	Conveyor 14 to Conveyor 15	Drop	8.6	4.8	0.0014 lb/t	2,747,574 t/yr	1.9328 t/yr	Total Enclosure	0.999	0.001933 t/yr	
						11,808 t/dy	0.6922 lb/hr	& Fabric Filter	0.999		0.000692 lb/hr
										========	========
									TOTAL (f)	0.001933 t/yr	0.000692 lb/hr
										0.000056 g/s	0.000087 g/s
GCC2 (P13)	Conveyor 15 to Day Storage	Drop	8.6	4.8	0.0014 lb/t	2,747,574 t/yr	1.9328 t/yr	Total Enclosure	0.999	0.001933 t/yr	
						11,808 t/dy	0.6922 lb/hr	& Fabric Filter	0.999		0.000692 lb/hr
										========	========
									TOTAL (f)	0.001933 t/yr	0.000692 lb/hr
										0.000056 g/s	0.000087 g/s
Limestone Car Unloading Building (P14)	Railcar Dumping to Hopper	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Total Enclosure	0.999	0.001205 t/yr	
						2,000 t/dy	0.4291 lb/hr	& Fabric Filter	0.999		0.000429 lb/hr
	Hopper to Belt Feeder	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Total Enclosure	0.999	0.001205 t/yr	
						2,000 t/dy	0.4291 lb/hr	& Fabric Filter	0.999		0.000429 lb/hr
	Belt Feeder	Conveying			0.0034 lb/t	468,000 t/yr	0.7956 t/yr	Total Enclosure	0.999	0.000796 t/yr	
						2,000 t/dy	0.2833 lb/hr	& Fabric Filter	0.999		0.000283 lb/hr
	Belt Feeder to Conveyor A	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Total Enclosure	0.999	0.001205 t/yr	
						2,000 t/dy	0.4291 lb/hr	& Fabric Filter	0.999		0.000429 lb/hr
										========	========
									TOTAL (f)	0.00441 t/yr	0.001571 lb/hr
										0.000127 g/s	0.000198 g/s

EXHIBIT FDER-7A
POLK COUNTY TSP PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(e)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
Limestone Pile Stockout (A8)	Conveyor A to Limestone Pile	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Telescopic Chute	0.750	0.301239 t/yr	
						2,000 t/dy	0.4291 lb/hr		0.750		0.107279 lb/hr
										========	========
									TOTAL (f)	0.301239 t/yr	0.107279 lb/hr
										0.008665 g/s	0.013516 g/s
Limestone Pile (A9)	Wind Erosion	Wind Erosion	(See wind erosion		0 g/m2	2,323 m2/yr	0.0000 t/yr	None	0.000	0 t/yr	
					0 g/m2	2,323 m2/dy	0.0000 lb/hr		0.000		0 lb/hr
										========	========
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
Reclaim Hopper (A10)	Hopper to Conveyor B	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Partial Enclosure	0.700	0.361487 t/yr	
						2,011 t/dy	0.4315 lb/hr		0.700		0.129461 lb/hr
										========	========
									TOTAL (f)	0.361487 t/yr	0.129461 lb/hr
										0.010398 g/s	0.016311 g/s
SCB (P15)	Conveyor B to Day Storage	Drop	8.6	1.9	0.0051 lb/t	468,000 t/yr	1.2050 t/yr	Total Enclosure	0.999	0.001205 t/yr	
						2,011 t/dy	0.4315 lb/hr	& Fabric Filter	0.999		0.000432 lb/hr
										========	========
									TOTAL (f)	0.001205 t/yr	0.000432 lb/hr
										0.000035 g/s	0.000054 g/s

Footnotes

(a) See Polk County Exhibit 95-B.
(b) See equation shown in Exhibit DER-7C.
(c) See list of assumptions in Exhibit DER-7D.
(d) Evaluated AP-42 equation using assumptions shown.
(e) Result of emission factor times use rate. TPY value is based on typical annual use rate which accounts for an 85 percent capacity factor. LB/HR value is based on maximum 24-hour use rate.
(f) Total for source. g/s value is directly converted from the tpy or lb/hr level shown.

Legend

U - Mean Wind Speed (mph)
M - Material Moisture Content (percent)
p - Number of Days with Precipitation >0.01 inch

EXHIBIT FDER-7B
(5 pages)

EXHIBIT FDER-7B
POLK COUNTY PM10 PARTICULATE EMISSION ESTIMATES FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
Coal Car Unloading Building (A1)	Railcar Dumping to Hopper	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr 40,000 t/dy	3.0456 t/yr 1.1091 lb/hr	Water & Partial Enclosure	0.850 0.850	0.456839 t/yr	0.16636 lb/hr
	Hopper to Belt Feeder	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr 40,000 t/dy	3.0456 t/yr 1.1091 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.091368 t/yr	0.033272 lb/hr
	Belt Feeder	Conveying			0.0002 lb/t	9,153,616 t/yr 40,000 t/dy	0.9154 t/yr 0.3333 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.027461 t/yr	0.01 lb/hr
	Belt Feeder to Conveyor 1	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr 40,000 t/dy	3.0456 t/yr 1.1091 lb/hr	Previously Wetted & Total Enclosure	0.970 0.970	0.091368 t/yr	0.033272 lb/hr
									TOTAL (f)	0.667036 t/yr 0.019188 g/s	0.242904 lb/hr 0.030604 g/s
CTB1 (P1)	Conveyor 1 to Conveyor 2	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr 40,000 t/dy	3.0456 t/yr 1.1091 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.003046 t/yr	0.001109 lb/hr
									TOTAL (f)	0.003046 t/yr 0.000088 g/s	0.001109 lb/hr 0.00014 g/s
CTB2 (P2)	Conveyors 2 to Conveyors 3 & 4	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr 40,000 t/dy	3.0456 t/yr 1.1091 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.003046 t/yr	0.001109 lb/hr
									TOTAL (f)	0.003046 t/yr 0.000088 g/s	0.001109 lb/hr 0.00014 g/s
Emergency Coal Pile Stockout (A2)	Stockout to Emergency Coal Pile	Drop	8.6	4.8	0.0007 lb/t	0 t/yr 0 t/dy	0.0000 t/yr 0.0000 lb/hr	Previously Wetted & Telescopic Chute	0.925 0.925	0 t/yr	0 lb/hr
									TOTAL (f)	0 t/yr 0 g/s	0 lb/hr 0 g/s
Emergency Coal Pile (A3)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2 0 g/m2	2,323 m2/yr 2,323 m2/dy	0.0000 t/yr 0.0000 lb/hr	Previously Wetted	0.700 0.700	0 t/yr	0 lb/hr
									TOTAL (f)	0 t/yr 0 g/s	0 lb/hr 0 g/s

EXHIBIT FDER-7B
POLK COUNTY PM10 PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
S/R1 (A4)	Conveyor 4 to S/R1	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Previously Wetted	0.910	0.274103 t/yr	
						40,000 t/dy	1.1091 lb/hr	& Partial Enclosure	0.910		0.099816 lb/hr
	S/R 1 Boom Belt	Conveying			0.0002 lb/t	9,153,616 t/yr	0.9154 t/yr	Previously Wetted	0.700	0.274608 t/yr	
						40,000 t/dy	0.3333 lb/hr		0.700		0.1 lb/hr
	Stacking	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Previously Wetted	0.775	0.685259 t/yr	
						40,000 t/dy	1.1091 lb/hr	& Adjustable Height	0.775		0.24954 lb/hr
									TOTAL (f)	1.23397 t/yr	0.449356 lb/hr
										0.035496 g/s	0.056615 g/s
S/R2 (A5)	Bucket Wheel Reclaim to S/R2 Boom Belt	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Previously Wetted	0.850	0.456839 t/yr	
						39,339 t/dy	1.0907 lb/hr	& Watered	0.850		0.163609 lb/hr
	S/R2 Boom Belt	Conveying			0.0002 lb/t	9,153,616 t/yr	0.9154 t/yr	Previously Wetted	0.700	0.274608 t/yr	
						39,339 t/dy	0.3278 lb/hr		0.700		0.098346 lb/hr
	Reclaim to Conveyor 5	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Previously Wetted	0.910	0.274103 t/yr	
						39,339 t/dy	1.0907 lb/hr	& Partial Enclosure	0.910		0.098166 lb/hr
									TOTAL (f)	1.005551 t/yr	0.360121 lb/hr
										0.028925 g/s	0.045372 g/s
Active Coal Pile (A6)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2	12,635 m2/yr	0.0000 t/yr	Previously Wetted	0.700	0 t/yr	
					0 g/m2	12,635 m2/dy	0.0000 lb/hr		0.700		0 lb/hr
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
Inactive Coal Pile (A7)	Wind Erosion	Wind Erosion	(See wind erosion table)		0 g/m2	232,258 m2/yr	0.0000 t/yr	Previously Wetted	0.700	0 t/yr	
					0 g/m2	232,258 m2/dy	0.0000 lb/hr		0.700		0 lb/hr
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
CTB2 (P3)	Conveyor 5 to Conveyor 6	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Total Enclosure	0.999	0.003046 t/yr	
						39,339 t/dy	1.0907 lb/hr	& Fabric Filter	0.999		0.001091 lb/hr
									TOTAL (f)	0.003046 t/yr	0.001091 lb/hr
										0.000088 g/s	0.000137 g/s

EXHIBIT FDER-7B
POLK COUNTY PM10 PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
CTB1 (P4)	Conveyor 6 to	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Total Enclosure	0.999	0.003046 t/yr	
	Conveyor 7					39,339 t/dy	1.0907 lb/hr	& Fabric Filter	0.999		0.001091 lb/hr
									TOTAL (f)	0.003046 t/yr	0.001091 lb/hr
										0.000088 g/s	0.000137 g/s
Coal Crusher (P5)	Conveyor 7 to	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Total Enclosure	0.999	0.003046 t/yr	
	Crusher					39,339 t/dy	1.0907 lb/hr	& Fabric Filter	0.999		0.001091 lb/hr
	Crusher	Crushing			0.0170 lb/t	9,153,616 t/yr	77.806 t/yr	Total Enclosure	0.999	0.077806 t/yr	
						39,339 t/dy	27.865 lb/hr	& Fabric Filter	0.999		0.027865 lb/hr
	Crusher to	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Total Enclosure	0.999	0.003046 t/yr	
	Conveyor 8					39,339 t/dy	1.0907 lb/hr	& Fabric Filter	0.999		0.001091 lb/hr
									TOTAL (f)	0.083897 t/yr	0.030046 lb/hr
										0.002413 g/s	0.003786 g/s
CTB3 (P6)	Conveyor 8 to	Drop	8.6	4.8	0.0007 lb/t	9,153,616 t/yr	3.0456 t/yr	Total Enclosure	0.999	0.003046 t/yr	
	Conveyors 9 and 10					39,339 t/dy	1.0907 lb/hr	& Fabric Filter	0.999		0.001091 lb/hr
									TOTAL (f)	0.003046 t/yr	0.001091 lb/hr
										0.000088 g/s	0.000137 g/s
GCC1 (P7)	Conveyor 9 to	Drop	8.6	4.8	0.0007 lb/t	2,747,574 t/yr	0.9142 t/yr	Total Enclosure	0.999	0.000914 t/yr	
	Day Storage					11,808 t/dy	0.3274 lb/hr	& Fabric Filter	0.999		0.000327 lb/hr
									TOTAL (f)	0.000914 t/yr	0.000327 lb/hr
										0.000026 g/s	0.000041 g/s
CTB4 (P8)	Conveyor 10 to	Drop	8.6	4.8	0.0007 lb/t	6,406,042 t/yr	2.1314 t/yr	Total Enclosure	0.999	0.002131 t/yr	
	Conveyors 11, 12 & 1					27,531 t/dy	0.7633 lb/hr	& Fabric Filter	0.999		0.000763 lb/hr
									TOTAL (f)	0.002131 t/yr	0.000763 lb/hr
										0.000061 g/s	0.000096 g/s
CTB5 (P9)	Conveyor 11 to 13a &	Drop	8.6	4.8	0.0007 lb/t	3,658,468 t/yr	1.2172 t/yr	Total Enclosure	0.999	0.001217 t/yr	
	Conveyor 12 to 13b					15,723 t/dy	0.4359 lb/hr	& Fabric Filter	0.999		0.000436 lb/hr
									TOTAL (f)	0.001217 t/yr	0.000436 lb/hr

EXHIBIT FDER-7B
POLK COUNTY PM10 PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
PC1 (P10)	Conveyor 13a to Day Storage	Drop	8.6	4.8	0.0007 lb/t	1,829,234 t/yr 7,861 t/dy	0.6086 t/yr 0.2180 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.000609 t/yr	0.000218 lb/hr
									TOTAL (f)	0.000609 t/yr 0.000018 g/s	0.000218 lb/hr 0.000027 g/s
PC2 (P11)	Conveyor 13b to Day Storage	Drop	8.6	4.8	0.0007 lb/t	1,829,234 t/yr 7,861 t/dy	0.6086 t/yr 0.2180 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.000609 t/yr	0.000218 lb/hr
									TOTAL (f)	0.000609 t/yr 0.000018 g/s	0.000218 lb/hr 0.000027 g/s
CTB6 (P12)	Conveyor 14 to Conveyor 15	Drop	8.6	4.8	0.0007 lb/t	2,747,574 t/yr 11,808 t/dy	0.9142 t/yr 0.3274 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.000914 t/yr	0.000327 lb/hr
									TOTAL (f)	0.000914 t/yr 0.000026 g/s	0.000327 lb/hr 0.000041 g/s
6CC2 (P13)	Conveyor 15 to Day Storage	Drop	8.6	4.8	0.0007 lb/t	2,747,574 t/yr 11,808 t/dy	0.9142 t/yr 0.3274 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.000914 t/yr	0.000327 lb/hr
									TOTAL (f)	0.000914 t/yr 0.000026 g/s	0.000327 lb/hr 0.000041 g/s
Limestone Car Unloading Building (P14)	Railcar Dumping to Hopper	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr 2,000 t/dy	0.5699 t/yr 0.2030 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.00057 t/yr	0.000203 lb/hr
	Hopper to Belt Feeder	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr 2,000 t/dy	0.5699 t/yr 0.2030 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.00057 t/yr	0.000203 lb/hr
	Belt Feeder	Conveying			0.0002 lb/t	468,000 t/yr 2,000 t/dy	0.0468 t/yr 0.0167 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.000047 t/yr	0.000017 lb/hr
	Belt Feeder to Conveyor A	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr 2,000 t/dy	0.5699 t/yr 0.2030 lb/hr	Total Enclosure & Fabric Filter	0.999 0.999	0.00057 t/yr	0.000203 lb/hr
									TOTAL (f)	0.001757 t/yr 0.000051 g/s	0.000626 lb/hr 0.000079 g/s

EXHIBIT FDER-7B
POLK COUNTY PM10 PARTICULATE EMISSION ESTIMATES
FROM MATERIAL HANDLING AND STORAGE OPERATIONS

Source (ID#) (a)	Activity	AP-42 Equation (b)	U(c)	M(c)	Emission Factor (d)	Use Rate (c)	Uncontrolled Emissions (e)	Control Method	Control Effcy.(c)	Annual Controlled Emissions	24-Hour Worst-Case Controlled Emissions
Limestone Pile	Conveyor A to	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr	0.5699 t/yr	Telescopic Chute	0.750	0.142478 t/yr	
Stockout (A8)	Limestone Pile					2,000 t/dy	0.2030 lb/hr		0.750		0.05074 lb/hr
									TOTAL (f)	0.142478 t/yr	0.05074 lb/hr
										0.004098 g/s	0.006393 g/s
Limestone Pile	Wind Erosion	Wind Erosion	(See wind		0 g/m2	2,323 m2/yr	0.0000 t/yr	None	0.000	0 t/yr	
(A9)			erosion table)		0 g/m2	2,323 m2/dy	0.0000 lb/hr		0.000		0 lb/hr
									TOTAL (f)	0 t/yr	0 lb/hr
										0 g/s	0 g/s
Reclaim Hopper	Hopper to	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr	0.5699 t/yr	Partial Enclosure	0.700	0.170974 t/yr	
(A10)	Conveyor B					2,011 t/dy	0.2041 lb/hr		0.700		0.061231 lb/hr
									TOTAL (f)	0.170974 t/yr	0.061231 lb/hr
										0.004918 g/s	0.007715 g/s
SCB (P15)	Conveyor B to	Drop	8.6	1.9	0.0024 lb/t	468,000 t/yr	0.5699 t/yr	Total Enclosure	0.999	0.00057 t/yr	
	Day Storage					2,011 t/dy	0.2041 lb/hr	& Fabric Filter	0.999		0.000204 lb/hr
									TOTAL (f)	0.00057 t/yr	0.000204 lb/hr
										0.000016 g/s	0.000026 g/s

Footnotes

(a) See Polk County Exhibit 95-B.
(b) See equation shown in Exhibit DER-7C.
(c) See list of assumptions in Exhibit DER-7D.
(d) Evaluated AP-42 equation using assumptions shown.
(e) Result of emission factor times use rate. TPY value is based on typical annual use rate which accounts for an 85 percent capacityfactor. LB/HR value is based on maximum 24-hour use rate.
(f) Total for source. G/S value is directly converted from the TPY or LB/HR level shown.

Legend

U - Mean Wind Speed (mph)
M - Material Moisture Content (percent)
p - Number of Days with Precipitation >0.01 inch

EXHIBIT FDER-7C
FUGITIVE DUST EMISSION FACTOR EQUATIONS AND REFERENCES

BATCH OR CONTINUOUS DROP (Reference: AP-42 Section 11.2.3)

$E\ (lb/ton) = (k) \times (0.0032) \times (U/5)^{1.3}/(M/2)^{1.4}$,

where

E = pounds of emission per ton of material throughput (lb/ton),
k = particle size multiplier (TSP = 0.74, PM_{10} = 0.35),
U = mean wind speed (mph) = 8.6 mph (Tampa, FL)
M = material moisture content = 4.8 %

Example: Railcar Dumping to Hopper (Coal Car Unloading Building)

$E = 0.74 \times 0.0032 \times (8.6/5)^{1.3}/(4.8/2)^{1.4}$
$= 0.0014$ lb/t (TSP)

Annual Emissions, A, are calculated by multiplying the actual average coal usage per year in tons by the lb/t emission factor.

A = 9,153,616 t/yr x 0.0014 lb/t x 1t/2,000lb
= 6.439 t/yr

24 Hour Worst Case Emissions, S, are calculated by multiplying the maximum daily coal delivery rate by the lb/t emission factor.

S = 40,000 t/dy x 0.0014 lb/t x 1dy/24hr
= 2.345 lb/hr

EXHIBIT FDER-7C (continued)

INDUSTRIAL WIND EROSION (Reference: AP-42 Section 11.2.7)

$$E = k \sum_{i=1}^{N} P_i,$$

where

- E = grams of emission per year per square meter of exposed surface ($g/m^2/yr$),
- k = particle size multiplier (TSP = 1.0, PM10 = 0.5),
- N = number of disturbances per year,
- P_i = erosion potential corresponding to the observed (or probable) fastest mile of wind for the i^{th} period between disturbances (g/m^2), and
- P_i =(58) x $(u^* - u_t^*)^2$ + (25) x $(u^* - u_t^*)$ for $u^* > u_t^*$ (g/m^2)

where

- u^* = friction velocity (m/s) and
- u_t^* = threshold friction velocity (m/s).

Flat Piles (height to base ratio <= 0.2):

$u^* = (0.4) \times (u_{10})/\ln(z/z_o)$,

where

- u_{10} = fastest mile wind speed at 10 meter anemometer height (m/s),
- z = measurement height of u_{10} (1,000 cm), and
- z_o = roughness height (cm).

EXHIBIT FDER-7C (continued)

Tall Piles (height to base ratio > 0.2):

$u^* = (0.4) \times (u_s/u_r) \times (u_{10})/\ln(25/z_o)$,

where

u_s/u_r = ratio of surface wind speed to approach wind speed (from AP-42).

Example: Active Coal Pile

Pile diameter = 340 ft
Pile height = 60 ft
Height to base ratio = 0.18

Because the ratio is less than 0.2, the flat pile formulas should be used.

The wind speed required to cause erosion is calculated using Table 11.2.7-2 from the AP-42 manual.

z_o = 0.3 (Uncrusted coal pile)
u^* = 1.12 (Uncrusted coal pile)
z = 1,000

From the above formula, solve for u_{10}

$$u_{10} = (1.12 \times \ln(1{,}000/0.3))/0.4$$
$$= 22.71 \text{ m/s} \times 2.2369 \text{ mph/m/s}$$
$$= 50.8 \text{ mph}$$

Data for Tampa is recorded for an anemometer height of 19 feet (5.79m) an must be converted to a 10m reference height.

$$u_{5.79} = u_{10} \times ((\ln z/0.005)/(\ln 10/0.005))$$
$$= 47.2 \text{ mph}$$

No period during the years of data (1982 through 1986) used has a wind speed equal to or in exceedance of this value. Therefore, no emissions are anticipated due to wind erosion.

EXHIBIT FDER-7C (continued)

<u>TUNNEL BELT CONVEYING</u> (Source: AP-42 Section 8.9.2, Crushed Stone Conveying)

TSP: E = 0.0034,

where E = pounds of emission per ton of material throughput (lb/ton)

PM10: E = 0.0002,

where E = pounds of emission per ton of material throughput (lb/ton)

<u>STONE CRUSHING</u> (Source: AP-42 Section 8.9.2, Primary or Secondary Dry Material)

TSP: E = 0.28,

where E = pounds of emission per ton of material throughput (lb/ton)

PM10: E = 0.017,

where E = pounds of emission per ton of material throughput (lb/ton)

EXHIBIT FDER-7D

(2 pages)

EXHIBIT FDER-7D
FUGITIVE DUST EMISSION CALCULATION ASSUMPTIONS

OPERATIONAL PARAMETERS		ASSUMPTIONS
Maximum Hourly Fuel Burn Rates: Pulverized Coal (PC) Unit Gasification Combined Cycle (GCC) Unit	 245.66 tph 369.01 tph	General: PC heat input = 5,945 MBtu/h GCC heat input = 8,930 MBtu/h Coal heat content = 12,100 Btu/lb PC = ($5,945 \times 10^6$ Btu/h) x (1/12,100 lb/Btu) x (1/2,000 t/lb) GCC = ($8,930 \times 10^6$ Btu/h) x (1/12,100 lb/Btu) x (1/2,000 t/lb)
Maximum Daily Fuel Burn Rates: PC Unit GCC Unit	 5,896 tpd 8,856 tpd	General: Maximum hourly fuel burn rate for 24 hours. PC = (245.66 t/h) x (24 h/d) GCC = (369.01 t/h) x (24 h/d)
Average Annual Fuel Consumption Rates: PC Unit GCC Unit	 1,829,234 tpy 2,747,574 tpy	General: Maximum daily fuel burn rate at an 85 percent annual capacity factor. PC = (5,896 t/d) x (365 d/y) x (0.85) GCC = (8,856 t/d) x (365 d/y) x (0.85)
Total Annual Fuel Consumption Rate: Total Plant	 9,153,616 tpy	General: Average annual coal consumption of two PC units and two GCC units. Total = (1,829,234 t/y/PC unit) x (2 PC units) + (2,747,574 t/y/GCC unit) x (2 GCC units)
Maximum Daily Coal Delivery Rate: Total Plant	 40,000 tpd	General: Four unit trains per day, 100 cars per train, and 100 tons per car. Total = (100 t/car) x (100 cars/train) x (4 trains/d)
Maximum Daily Limestone Consumption Rate: Total Plant	 1,508 tpd	General: Maximum daily use per PC unit = 754.1 tpd. Based on mass balance for maximum load for 24 hours at a 95.5 percent SO_2 removal rate. Total = (754.1 t/d/unit) x (2 units)
Average Annual Limestone Consumption Rate: Total Plant	 468,000 tpy	General: Maximum daily use rate at an 85 percent annual capacity factor. Total = (1,508 t/d) x (365 d/y) x (0.85)
Maximum Daily Limestone Delivery Rate: Total Plant	 2,000 tpd	General: 20 railcars per day, 100 tons per car. Total = (100 t/car) x (20 cars/d)
Material Use Rates (to calculate emissions): Annual (t/y) Worst-Case 24-Hour (t/d) Worst-Case 24-Hour (receiving and stockout)	(As stated in Exhibit DER-7A)	General: Annual use rate is the average annual consumption rate at the applicable material transfer point, worst-case 24-hour use rate is the maximum daily consumption rate plus the filling of day bins with 8-hour storage at maximum load (i.e., max daily times 1.3333), worst-case 24-hour receiving and stockout rate is the maximum daily delivery rate. Annual Use = Average annual consumption rate as applicable Worst-Case 24-Hr = (maximum daily consumption t/d) x (1.3333) Worst-Case 24-Hr (Material receiving and stockout) = (Maximum material delivery rate tpd)
MATERIAL CHARACTERISTICS		REFERENCES
Coal Surface Moisture, M	4.8 percent	Source A: Table 2.1-1, Page 2-2, (average)
Limestone Moisture Content, M	1.9 percent	Source A: Table 2.1-1, Page 2-2, (average)

EXHIBIT FDER-7D (CONTINUED)
FUGITIVE DUST EMISSION CALCULATION ASSUMPTIONS

METEOROLOGICAL CONDITIONS		REFERENCES
Wind Speed, U	8.6 mph	Source B: Tampa, Florida (Highest historical mean during the years 1982 through 1986)
PARTICULATE CONTROL		**REFERENCES**
Partial Enclosure	70 percent	Source A: Table 3.2.3-2, Page 3-17, Enclosure w/o Bag Filter
Total Enclosure	90 percent	Source A: Table 3.2.17-2, Page 3-52, Enclosure
Watering	50 percent	Source A: Table 3.2.16-2, Page 3-49, Water Spray
Total Enclosure & Fabric Filter	99.9 percent	Source A: Table 3.2.17-2, Page 3-52, Enclosure with Control Device
Previously Wetted Material	70 percent	Source A: Table 3.2.18-2, Page 3-55, Sprays or Previously Wetted Material
Adjustable Height Stacker	25 percent	Source A: Table 3.2.12-2, Page 3-37, Adjustable Height Stackers
Telescopic Chute	75 percent	Source A: Table 3.2.12-2, Page 3-37, Telescopic Chutes

SOURCE A: Workbook on Estimation of Emisions and Dispersion Modeling for Fugitive Particulate Sources (September 1981), ERT, Washington, D.C., September 1981, Utility Air Regulatory Group document P-A857.

SOURCE B: Local Climatological Data published by the National Oceanic and Atmospheric Administration (1982 - 1986).

EXHIBIT FDER-7E
(4 pages)

EXHIBIT FDER-7E
PREDICTIVE WIND EROSION TECHNIQUE

Active Coal Pile

Roughness Height (Zo)	=	0.3 cm (based on AP-42 "Uncrusted coal pile" estimate)
Material Threshold Friction Velocity (TFV)	=	1.12 m/s (based on AP-42 "Uncrusted coal pile")
Pile Surface Area	=	12,635 m2
Fastest Mile equal to the TFV	=	51 mph
Yearly Fastest 1-Minute Wind For Tampa, Fl.	=	37.7 mph*

1-Minute Wind Gust mph*	Friction Velocity m/s	Threshold Friction Velocity m/s	TSP Erosion Potential Function g/m^2	PM10 Erosion Potential Function g/m^2	Pile Area m^2	Uncontrolled Annual TSP Emissions lb/yr	Uncontrolled Annual PM10 Emissions lb/yr
37.7	0.83	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
0.0	0.00	1.12	0.00	0.00	12,635	0.00	0.00
		TOTAL ANNUAL	0.00 g/m2	0.00 g/m2		0.00 lb/yr	0.00 lb/yr
						0.00 tpy	0.00 tpy
						0.000 g/s	0.000 g/s
		WORST CASE DAY	0.00	0.00		0.00 lb/dy	0.00 lb/dy
						0.00 g/s	0.00 g/s

*Period of Record: 1/1/82 - 12/31/86
(Adjusted to an anecometer height of 10m)

EXHIBIT FDER-7E (CONTINUED)
PREDICTIVE WIND EROSION TECHNIQUE

Inactive Coal Pile

Roughness Height (Zo)	=	0.3 cm (based on AP-42 "Uncrusted coal pile" estimate)
Material Threshold Friction Velocity (TFV)	=	1.12 m/s (based on AP-42 "Uncrusted coal pile")
Pile Surface Area	=	12,635 m2
Fastest Mile equal to the TFV	=	51 mph
Yearly Fastest 1-Minute Wind For Tampa, Fl.	=	37.7 mph*

1-Minute Wind Gust mph	Friction Velocity m/s	Threshold Friction Velocity m/s	TSP Erosion Potential Function g/m²	PM10 Erosion Potential Function g/m²	Pile Area m²	Uncontrolled Annual TSP Emissions lb/yr	Uncontrolled Annual PM10 Emissions lb/yr
37.7	0.83	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
0.0	0.00	1.12	0.00	0.00	232,258	0.00	0.00
	TOTAL ANNUAL		0.00 g/m2	0.00 g/m2		0.00 lb/yr	0.00 lb/yr
						0.00 tpy	0.00 tpy
						0.000 g/s	0.000 g/s
	WORST CASE DAY		0.00	0.00		0.00 lb/dy	0.00 lb/dy
						0.00 g/s	0.00 g/s

*Period of Record: 1/1/82 - 12/31/86
(Adjusted to an aneometer height of 10m)

EXHIBIT FDER-7E (CONTINUED)
PREDICTIVE WIND EROSION TECHNIQUE

Emergency Coal Pile

Roughness Height (Zo)	=	0.3 cm (based on AP-42 "Uncrusted coal pile" estimate)
Material Threshold Friction Velocity (TFV)	=	1.12 m/s (based on AP-42 "Uncrusted coal pile")
Pile Surface Area	=	12,635 m2
Fastest Mile equal to the TFV	=	51 mph
Yearly Fastest 1-Minute Wind For Tampa, Fl.	=	37.7 mph*

1-Minute Wind Gust mph	Friction Velocity m/s	Threshold Friction Velocity m/s	TSP Erosion Potential Function g/m^2	PM10 Erosion Potential Function g/m^2	Pile Area m^2	Uncontrolled Annual TSP Emissions lb/yr	Uncontrolled Annual PM10 Emissions lb/yr
37.7	0.83	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
		TOTAL ANNUAL	0.00 g/m2	0.00 g/m2		0.00 lb/yr	0.00 lb/yr
						0.00 tpy	0.00 tpy
						0.000 g/s	0.000 g/s
		WORST CASE DAY	0.00	0.00		0.00 lb/dy	0.00 lb/dy
						0.00 g/s	0.00 g/s

*Period of Record: 1/1/82 - 12/31/86
(Adjusted to an aneometer height of 10m)

EXHIBIT FDER-7E (CONTINUED)
PREDICTIVE WIND EROSION TECHNIQUE

Limestone Pile

Roughness Height (Zo)	=	0.3 cm (based on AP-42 "Uncrusted coal pile" estimate)
Material Threshold Friction Velocity (TFV)	=	1.12 m/s (based on AP-42 "Uncrusted coal pile")
Pile Surface Area	=	12,635 m2
Fastest Mile equal to the TFV	=	51 mph
Yearly Fastest 1-Minute Wind For Tampa, Fl.	=	37.7 mph*

1-Minute Wind Gust mph*	Friction Velocity m/s	Threshold Friction Velocity m/s	TSP Erosion Potential Function g/m²	PM10 Erosion Potential Function g/m²	Pile Area m²	Uncontrolled Annual TSP Emissions lb/yr	Uncontrolled Annual PM10 Emissions lb/yr
37.7	0.83	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
0.0	0.00	1.12	0.00	0.00	2,323	0.00	0.00
		TOTAL ANNUAL	0.00 g/m2	0.00 g/m2		0.00 lb/yr	0.00 lb/yr
						0.00 tpy	0.00 tpy
						0.000 g/s	0.000 g/s
		WORST CASE DAY	0.00	0.00		0.00 lb/dy	0.00 lb/dy
						0.00 g/s	0.00 g/s

*Period of Record: 1/1/82 - 12/31/86
(Adjusted to an aneometer height of 10m)

EXHIBIT FDER-7F
PULVERIZED COAL UNITS (1,200 MW)
POLLUTANT EMISSION RATES
(CASE B)

Pollutant	Emission Rate (lb/hr)	Annual Emission (tpy)
Carbon Monoxide	1,784	7,814
Nitrogen Oxides	2,021	8,852
Sulfur Dioxide	3,448	15,103
Particulate (PM/PM_{10})	238	1,042
Volatile Organic Compounds	178	780
Lead	0.20	0.87
Asbestos	Negligible	Negligible
Beryllium	0.0013	0.0057
Mercury	0.12	0.52
Vinyl Chloride	Negligible	Negligible
Total Fluorides	0.914	4.00
Sulfuric Acid Mist	520	2,278
Hydrogen Sulfide	Negligible	Negligible
Total Reduced Sulfur (including H_2S)	Negligible	Negligible
Benzene	Negligible	Negligible
Arsenic	0.205	0.898
Radionuclides	1.31μ/Ci/hr	11.5mCi/yr

Notes: 1. Pollutant emission rates are based on two 600 MW PC steam electric power plants (5,945 mmBtu/hr per unit).
2. Pollutant emission rates based on eastern bituminous coal.
3. Emission rates listed are representative of emissions from similar types of facilities.

Source: Black & Veatch, 1992

EXHIBIT FDER-7F
BULK MATERIAL HANDLING SYSTEMS
FUGITIVE DUST EMISSION RATES

Dust Type	Total Suspended Particulate Emissions		PM_{10} Emissions	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Coal	**5.70**	**15.8**	**1.09**	**3.01**
Limestone	**0.24**	**0.67**	**0.11**	**0.32**

Notes: 1. Emission rates based on worst-case development scenarios of three CG plants and two PC boilers. Emission factors and control efficiencies from EPA reference document AP-42. Hourly rates are based on worst-case emissions. Annual emissions are based on nominal rates, 8,760 hours per year.

Source: Black & Veatch, 1992

EXHIBIT FDER-7F
BULK MATERIAL HANDLING SYSTEMS
SUMMARY OF PRELIMINARY BACT ANALYSIS

Pollutant	Emission Rate (TSP/PM_{10}) (lb/hr)	Control Technology
Particulate		
Coal	**5.70/1.09**	Good engineering design and operating practice.
Limestone	**0.24/0.11**	Good engineering design and operating practice.

Notes:

1. Emission rates based on worst-case development scenarios of three CG plants and two PC boilers. Emission factors and control efficiencies from EPA reference document AP-42.

2. The control technologies listed are assumed BACT for the bulk materials handling systems. The facility will be subject to actual PSD review at a later date.

Source: Black & Veatch, 1992

EXHIBIT FDER-7F
FUGITIVE DUST SOURCES MODELLED AS AREA SOURCES

Source	Emission Rate[1] (g/sec/m^2)	Location[2] (x,y) (m)	Size (m)	Drop Height (m)
Stacker Reclaim 1	**.000392**	-1573, -10	27.4 x 27.4	21.34
Stacker Reclaim 2	**.000373**	-1624, -37.8	27.4 x 27.4	18.29
Coal Car Unloading Building	**.0000572**	-1207, -622	38.2 x 38.2	1.5
Limestone Pile Stacker/Reclaim Hopper	**.0000128**	-1122, 37	**48.2 x 48.2**	9.4

Notes: (1) Emission estimates obtained from EPA AP-42.
(2) With respect to zero point of 414.30 kmE; 3073.88 kmN

Source: Black & Veatch, 1992

EXHIBIT FDER-8

Florida Power
CORPORATION

October 27, 1992

Mr. Hamilton S. Oven
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Oven:

Re: Polk County Site
PSD - Air Quality Impact Analysis
SCA - Section 10.6

Enclosed are four copies of the Air Quality Impact Analysis for the Florida Power Corporation Polk County Site Prevention of Significant Deterioration (PSD) Permit application and Section 10.6 for the Site Certification Application, as requested by Mr. Max Linn. Also enclosed is a diskette with the computer files for these documents. Please relay this diskette to Mr. Max Linn.

Should you have any questions, please call me at (813) 866-5529.

Very truly yours,

Kathy Small

Kathleen L. Small
Environmental Project Manager

Enclosures

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EXHIBIT FDER-9

Florida Power
CORPORATION

November 24, 1993

Mr. Max Linn
Florida Department of Environmental
 Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJECT: POLK COUNTY SITE
<u>SUFFICIENCY RESPONSES</u>

Dear Mr. Linn:

Florida Power Corporation (FPC) is pleased to provide the enclosed emission inventories and stack parameters in response to Florida Department of Environmental Regulation (FDER) sufficiency comments on the Site Certification Application for FPC's Polk County Site. Due to the specific technical nature of FDER's comments No. 9 and 10, and the size of the response, a copy will not be included in the final FPC sufficiency response. Four copies of the emission inventories and stack parameters are provided for your review.

Should you have any questions, please call me at (813) 866-5529.

Very truly yours,

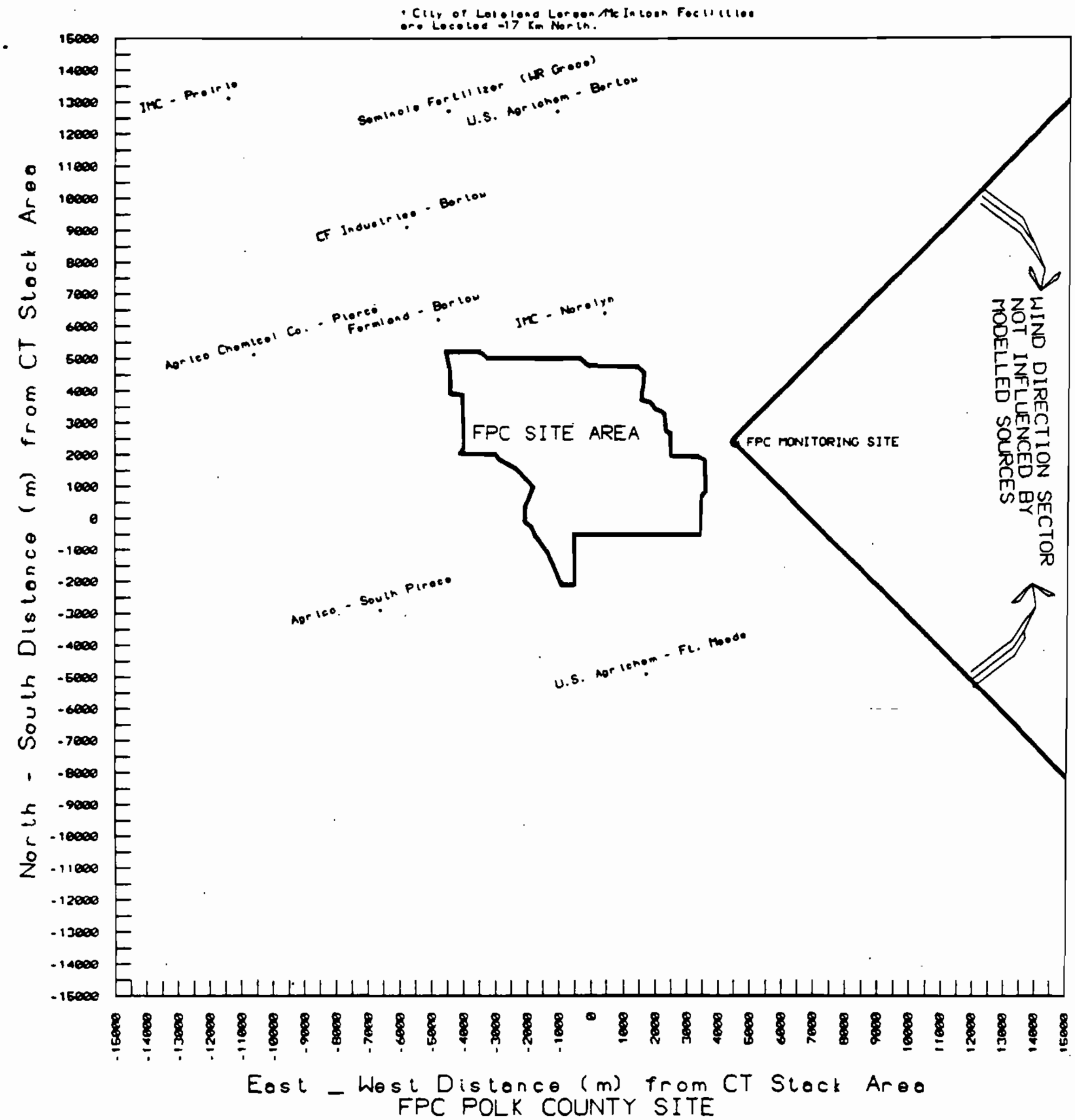
Kathy Small

Kathleen L. Small
Environmental Project Manager

Enclosures

cc: H. S. Oven (FDER) - w/o encs.

EXHIBIT FDER-11
(26 pages)



Source: Ebasco Environmental, 1992

Florida Power CORPORATION
Polk County Site

FIGURE 5.6.1-3
LOCATIONS OF SELECTED NEAR-SITE MODELLED PM SOURCES AND WIND DIRECTION SECTOR CONSIDERED FOR BACKGROUND PM CONCENTRATIONS

EBASCO ENVIRONMENTAL
FLORIDA POWER CORPORATION
POLK COUNTY SITE (HOMELAND)

AIR QUALITY/METEOROLOGY DATA SUMMARY

04-30-1992

STATE: FLORIDA:
AGENCY: PRIVATE
PROJECT: BACKGOUND SURVEILLANCE

POLLUTANT: WIND DIRECTION
METHOD: INSTRUMENTAL ELECT/MACHINE AVERAGE
UNITS: DEGREES

FROM: 10/ 15 /91
TO: 10/ 31 /91

HOUR

DAY	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OBS
15	41	41	51	46	53	25	25	37	65	80	109	129	167	284	26	13	10	15	71	67	24	169	245	265	24
16	256	264	278	287	292	335	333	343	345	350	347	339	324	314	315	321	298	290	293	300	309	328	331	342	24
17	354	352	357	13	24	81	51	12	30	46	49	53	56	71	92	98	80	62	26	32	56	64	73	52	24
18	44	37	28	32	26	30	36	42	49	57	67	74	69	85	70	66	70	71	71	67	53	46	28	8	24
19	24	18	15	4	10	6	15	13	16	31	39	46	36	29	30	23	48	57	77	61	41	41	53	41	24
20	28	19	19	23	19	19	34	19	29	40	59	48	89	83	83	70	65	62	68	69	69	50	52	51	24
21	51	38	48	39	24	36	19	26	49	78	83	75	79	81	69	76	69	59	69	79	86	76	36	39	24
22	37	30	38	37	43	32	24	34	47	53	65	57	63	71	66	73	60	63	70	68	68	45	41	26	24
23	41	20	23	18	17	28	37	42	58	79	92	92	80	88	80	80	86	84	75	76	73	55	50	46	24
24	45	45	45	50	46	46	40	39	54	71	78	71	86	98	91	86	79	76	73	64	66	59	51	47	24
25	33	45	43	47	50	48	53	55	69	75	83	81	82	94	46	53	60	70	58	46	41	53	54	43	24
26	33	27	29	34	32	39	43	42	54	69	87	113	102	88	34	43	32	69	74	66	49	60	41	38	24
27	55	55	32	22	8	28	50	41	56	74	75	85	74	68	63	57	60	56	63	65	68	60	35	39	24
28	33	20	27	7	18	31	40	27	33	40	53	57	54	34	51	68	74	69	61	60	50	42	39	29	24
29	28	17	15	0	0	6	357	4	18	40	51	55	98	74	53	55	67	63	60	59	37	41	46	34	24
30	34	44	24	35	25	36	30	51	72	82	86	74	62	66	68	63	56	62	56	60	49	38	34	40	24
31	36	40	25	40	30	10	15	20	50	51	85	297	305	283	273	323	340	21	42	57	49	79	109	128	24

999 Indicates missing data or calibration activities.

MONTHLY SUMMARY

OBSERVATIONS: 408
% DATA RECOVERY: 100.0

EBASCO ENVIRONMENTAL
FLORIDA POWER CORPORATION
POLK COUNTY SITE (HOMELAND)

AIR QUALITY/METEOROLOGY DATA SUMMARY

04-30-1992

STATE: FLORIDA:
AGENCY: PRIVATE
PROJECT: BACKGOUND SURVEILLANCE

POLLUTANT: WIND DIRECTION
METHOD: INSTRUMENTAL ELECT/MACHINE AVERAGE
UNITS: DEGREES

FROM: 11/ 1 /91
TO: 11/ 30 /91

HOUR

DAY	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OBS
1	130	140	142	123	144	152	154	161	176	177	171	193	200	212	207	215	188	155	176	268	261	201	143	170	24
2	171	198	217	114	137	166	173	172	183	183	185	202	210	231	224	221	299	356	27	333	23	7	322	318	24
3	344	331	333	345	6	8	18	25	32	59	79	56	332	349	350	1	10	10	17	10	11	7	9	351	24
4	359	349	12	19	4	357	2	11	7	12	21	21	26	23	17	27	9	1	1	357	2	16	14	353	24
5	343	345	358	11	7	359	2	1	3	12	23	14	26	38	39	31	32	23	18	11	10	8	12	9	24
6	1	358	21	5	355	353	358	2	4	354	18	30	16	355	31	354	10	358	2	360	359	24	17	18	24
7	18	16	14	20	15	14	22	28	19	14	27	345	358	3	13	31	9	353	1	8	39	50	39	12	24
8	14	18	9	18	38	15	5	359	337	344	358	349	336	335	346	354	355	358	350	342	350	9	349	336	24
9	335	335	355	358	336	347	340	333	352	345	335	345	333	329	320	321	329	360	350	353	3	348	345	359	24
10	338	355	308	309	297	324	316	323	321	318	306	314	307	290	286	280	292	294	301	295	304	149	162	179	24
11	193	180	201	218	227	227	244	231	274	307	313	290	290	282	288	303	308	310	313	309	301	325	80	94	24
12	344	338	325	346	358	345	344	351	8	7	41	205	269	327	302	311	325	300	300	305	305	313	328	346	24
13	357	353	353	356	3	3	350	355	21	21	27	36	33	30	40	59	63	45	47	40	40	31	29	19	24
14	15	16	22	27	26	29	24	24	40	48	75	97	98	113	95	99	61	62	61	70	71	69	65	35	24
15	23	39	34	23	25	35	33	27	57	83	94	87	77	71	51	87	74	67	75	61	77	71	40	5	24
16	5	9	1	17	25	17	27	37	46	69	70	58	43	43	44	44	47	63	60	48	41	48	47	45	24
17	40	43	36	44	40	38	43	42	47	61	77	81	76	74	78	76	80	79	56	47	49	61	54	56	24
18	54	38	36	27	26	38	46	59	61	101	108	117	98	101	93	78	79	82	82	87	89	86	70	72	24
19	65	65	66	66	73	91	82	65	70	96	108	108	99	113	106	100	99	84	82	85	87	93	83	80	24
20	85	97	102	106	99	82	92	101	114	118	132	133	136	124	116	110	88	79	91	108	113	120	132	129	24
21	104	102	90	80	77	82	98	106	113	133	137	135	127	125	131	138	135	132	124	112	146	147	153	159	24
22	164	150	157	142	127	147	171	148	135	164	167	176	190	191	183	194	202	210	215	220	152	173	193	189	24
23	210	199	174	180	189	241	284	292	287	323	341	11	300	293	262	228	265	268	270	289	301	303	305	300	24
24	296	294	297	296	296	305	317	314	320	345	339	339	326	319	298	316	312	313	309	311	329	333	345	348	24
25	352	352	2	3	6	5	358	0	7	11	14	20	28	23	34	25	24	11	7	1	2	32	27	10	24
26	8	5	359	357	5	4	6	10	10	17	23	28	21	33	39	40	34	31	40	35	25	20	13	6	24
27	9	10	15	5	2	358	0	6	13	24	30	43	44	57	55	53	61	62	44	35	29	23	16	13	24
28	6	5	360	2	2	1	7	8	20	47	65	79	81	73	75	82	74	72	62	57	49	42	40	48	24
29	45	39	46	37	39	38	40	40	53	76	104	120	95	90	83	83	86	83	77	86	86	76	81	86	24
30	65	93	92	104	81	87	93	89	98	106	116	121	124	111	114	101	99	103	89	85	91	100	109	98	24

999 Indicates missing data or calibration activities.

MONTHLY SUMMARY

OBSERVATIONS: 720
% DATA RECOVERY: 100.0

EBASCO ENVIRONMENTAL
FLORIDA POWER CORPORATION
POLK COUNTY SITE (HOMELAND)

AIR QUALITY/METEOROLOGY DATA SUMMARY

04-30-1992

STATE: FLORIDA:
AGENCY: PRIVATE
PROJECT: BACKGOUND SURVEILLANCE

POLLUTANT: WIND DIRECTION
METHOD: INSTRUMENTAL ELECT/MACHINE AVERAGE
UNITS: DEGREES

FROM: 12/ 1 /91
TO: 12/ 31 /91

HOUR

DAY	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OBS
1	78	78	90	107	103	95	93	105	113	124	135	125	124	119	121	137	140	132	110	95	103	112	123	136	24
2	114	119	121	126	111	116	122	123	130	140	144	141	156	153	153	155	143	136	122	130	143	173	170	145	24
3	136	145	159	175	185	184	177	177	176	174	186	206	206	211	209	218	218	214	218	232	220	244	309	315	24
4	311	325	318	310	321	339	344	353	347	353	354	351	349	359	346	336	352	357	354	333	335	346	360	12	24
5	5	4	353	353	359	355	6	1	6	8	32	40	50	64	73	62	70	49	22	20	14	31	31	18	24
6	5	2	9	17	10	17	19	13	25	34	53	61	65	56	70	86	99	54	44	53	69	58	26	36	24
7	48	44	42	55	82	37	3	10	6	41	73	93	101	66	59	49	40	80	86	61	70	80	92	92	24
8	97	83	96	107	19	9	24	35	48	80	118	123	88	79	59	46	45	44	54	73	67	74	78	80	24
9	23	11	337	21	23	35	16	348	39	61	140	149	119	122	94	300	249	86	281	294	314	342	45	124	24
10	176	276	256	244	250	231	273	252	196	227	235	284	276	269	273	277	274	272	288	298	330	333	26	52	24
11	30	32	19	14	3	2	13	18	30	44	48	64	51	100	66	32	50	16	37	27	26	15	39	61	24
12	55	45	40	43	49	48	28	40	39	57	68	75	999	999	113	104	85	81	74	79	89	92	91	62	22
13	76	71	42	26	25	26	29	34	38	68	112	132	147	153	155	115	128	94	90	110	96	112	134	176	24
14	163	160	159	159	134	188	198	211	136	201	206	224	242	258	279	295	285	284	279	293	300	329	347	9	24
15	13	27	20	9	10	7	15	8	15	24	26	28	14	19	33	24	17	27	25	15	10	9	6	6	24
16	3	4	4	5	8	10	11	13	17	27	25	17	22	20	15	15	28	32	19	21	39	53	34	17	24
17	8	10	8	5	3	4	1	356	1	19	40	61	65	82	69	89	103	78	48	44	46	42	21	4	24
18	321	342	347	357	10	25	29	27	42	48	52	17	302	300	306	276	340	357	349	347	347	357	4	11	24
19	23	6	2	7	13	7	6	12	21	33	38	48	57	58	57	57	53	56	54	54	52	52	57	55	24
20	53	55	57	54	55	56	46	40	49	58	76	84	84	92	89	86	88	85	66	43	55	55	103	37	24
21	27	53	65	71	265	338	7	21	19	52	90	118	40	335	356	28	166	77	83	62	64	77	85	100	24
22	64	28	359	26	50	8	13	5	360	64	263	293	274	272	268	325	290	122	83	53	276	342	17	9	24
23	318	304	67	187	243	259	186	214	206	191	203	231	237	235	238	239	234	236	240	231	248	201	175	189	24
24	174	209	233	228	233	246	244	214	226	236	272	280	298	298	295	303	309	306	293	259	286	322	334	341	24
25	330	336	332	349	356	350	353	355	11	16	39	66	91	304	305	65	65	337	282	310	312	28	63	35	24
26	37	25	36	13	27	39	38	45	46	55	78	114	153	156	188	186	188	181	240	312	346	337	106	141	24
27	82	61	61	82	129	82	131	130	134	135	149	155	153	150	139	148	114	85	79	78	89	89	87	83	24
28	86	111	82	41	61	54	70	58	147	147	169	176	175	186	201	211	221	240	260	287	266	203	195	206	24
29	228	208	218	283	284	310	308	303	297	319	317	300	296	305	314	299	304	308	318	315	318	331	271	268	24
30	271	265	269	109	162	169	286	345	339	355	354	330	308	298	293	313	331	13	26	337	328	305	341	7	24
31	15	8	10	18	35	22	8	351	30	18	15	24	13	29	29	24	22	24	9	8	23	24	18	17	24

999 Indicates missing data or calibration activities.

MONTHLY SUMMARY

OBSERVATIONS: 742
% DATA RECOVERY: 99.7

EBASCO ENVIRONMENTAL
FLORIDA POWER CORPORATION
POLK COUNTY SITE (HOMELAND)

AIR QUALITY/METEOROLOGY DATA SUMMARY

04-30-1992

STATE: FLORIDA:
AGENCY: PRIVATE
PROJECT: BACKGOUND SURVEILLANCE

POLLUTANT: WIND DIRECTION
METHOD: INSTRUMENTAL ELECT/MACHINE AVERAGE
UNITS: DEGREES

FROM: 01/ 1 /92
TO: 01/ 31 /92

	HOUR																								
DAY	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OBS
1	12	17	25	24	3	7	31	41	35	33	37	37	38	44	41	32	14	353	16	8	31	22	42	35	24
2	66	23	16	25	25	57	35	27	23	28	28	36	43	48	45	47	44	35	20	14	329	313	299	304	24
3	312	305	314	283	234	282	294	288	307	310	304	301	296	295	294	286	288	277	286	295	283	284	275	276	24
4	277	289	309	301	296	287	284	290	283	287	291	292	297	288	284	290	287	291	300	314	320	324	286	290	24
5	288	333	325	312	292	288	292	326	322	295	296	292	281	270	308	282	292	256	278	276	309	314	307	283	24
6	251	190	143	182	239	277	152	176	188	202	229	258	271	282	265	272	268	268	272	279	281	291	295	296	24
7	298	301	306	288	289	305	322	331	350	15	24	9	332	318	311	344	341	44	47	58	57	67	68	61	24
8	51	44	38	4	32	42	27	39	53	73	82	105	136	141	140	128	118	134	114	81	104	113	121	131	24
9	128	132	138	153	299	67	335	264	131	175	184	195	203	212	240	236	243	264	259	266	228	228	220	224	24
10	216	197	230	249	234	228	236	219	237	250	255	259	271	272	286	302	310	302	316	311	294	296	319	323	24
11	336	345	351	352	352	356	358	355	360	25	39	29	41	35	51	63	84	108	107	79	67	46	40	39	24
12	42	45	46	52	52	67	57	82	85	77	122	139	138	137	144	136	130	124	108	124	130	144	150	153	24
13	160	163	159	152	153	157	157	159	159	175	186	191	206	223	215	212	210	201	205	200	189	193	194	196	24
14	192	196	194	199	197	264	255	256	282	286	281	277	274	273	277	274	278	276	284	298	301	301	315	322	24
15	328	320	333	4	358	353	358	350	359	352	347	329	999	999	999	306	318	327	313	304	311	311	327	326	21
16	333	351	4	352	347	348	345	359	349	346	344	327	320	319	316	313	307	298	307	311	324	321	333	340	24
17	350	353	9	15	17	19	17	17	25	30	30	328	999	999	999	310	313	348	19	341	315	299	348	357	21
18	3	349	358	2	14	29	20	26	28	59	83	161	201	207	231	162	199	154	61	163	146	97	66	54	24
19	71	138	195	17	43	77	119	154	169	169	157	186	184	196	212	228	321	8	12	19	17	20	13	8	24
20	7	7	1	357	357	348	346	353	999	343	344	341	335	340	352	358	360	2	8	2	355	319	333	339	23
21	334	331	343	349	353	350	347	353	7	15	31	47	47	47	64	40	37	55	36	52	71	75	69	66	24
22	63	64	57	62	52	48	47	31	57	94	119	121	119	116	132	136	129	125	120	100	108	116	123	127	24
23	133	143	159	165	175	162	166	171	178	183	199	210	215	225	249	228	240	225	228	225	221	217	255	284	24
24	273	275	284	286	295	310	320	317	320	317	332	339	326	301	304	314	311	305	296	306	309	327	333	347	24
25	348	357	3	359	360	12	13	7	11	30	32	37	34	47	77	45	26	359	357	349	355	351	6	1	24
26	5	13	5	354	359	0	6	358	3	25	31	40	45	65	85	82	70	71	39	25	41	41	44	38	24
27	28	26	34	37	28	33	17	25	50	85	95	117	115	96	109	144	144	143	134	123	72	60	60	69	24
28	94	84	86	88	109	108	113	92	106	136	143	153	143	160	157	181	149	127	136	119	16	14	38	75	24
29	62	88	91	105	120	133	120	142	109	190	205	238	233	237	263	315	312	314	328	12	37	48	58	44	24
30	39	36	35	58	31	89	223	124	157	211	199	224	225	219	221	222	224	225	227	236	266	279	284	279	24
31	279	277	275	282	281	291	296	303	314	295	293	304	307	297	291	294	293	286	271	264	275	286	289	286	24

999 indicates missing data or calibration activities.

MONTHLY SUMMARY

OBSERVATIONS: 737
% DATA RECOVERY: 99.1

EBASCO ENVIRONMENTAL
FLORIDA POWER CORPORATION
POLK COUNTY SITE (HOMELAND)

AIR QUALITY/METEOROLOGY DATA SUMMARY

04-30-1992

STATE: FLORIDA:
AGENCY: PRIVATE
PROJECT: BACKGOUND SURVEILLANCE

POLLUTANT: WIND DIRECTION
METHOD: INSTRUMENTAL ELECT/MACHINE AVERAGE
UNITS: DEGREES

FROM: 02/ 1 /92
TO: 02/ 14 /92

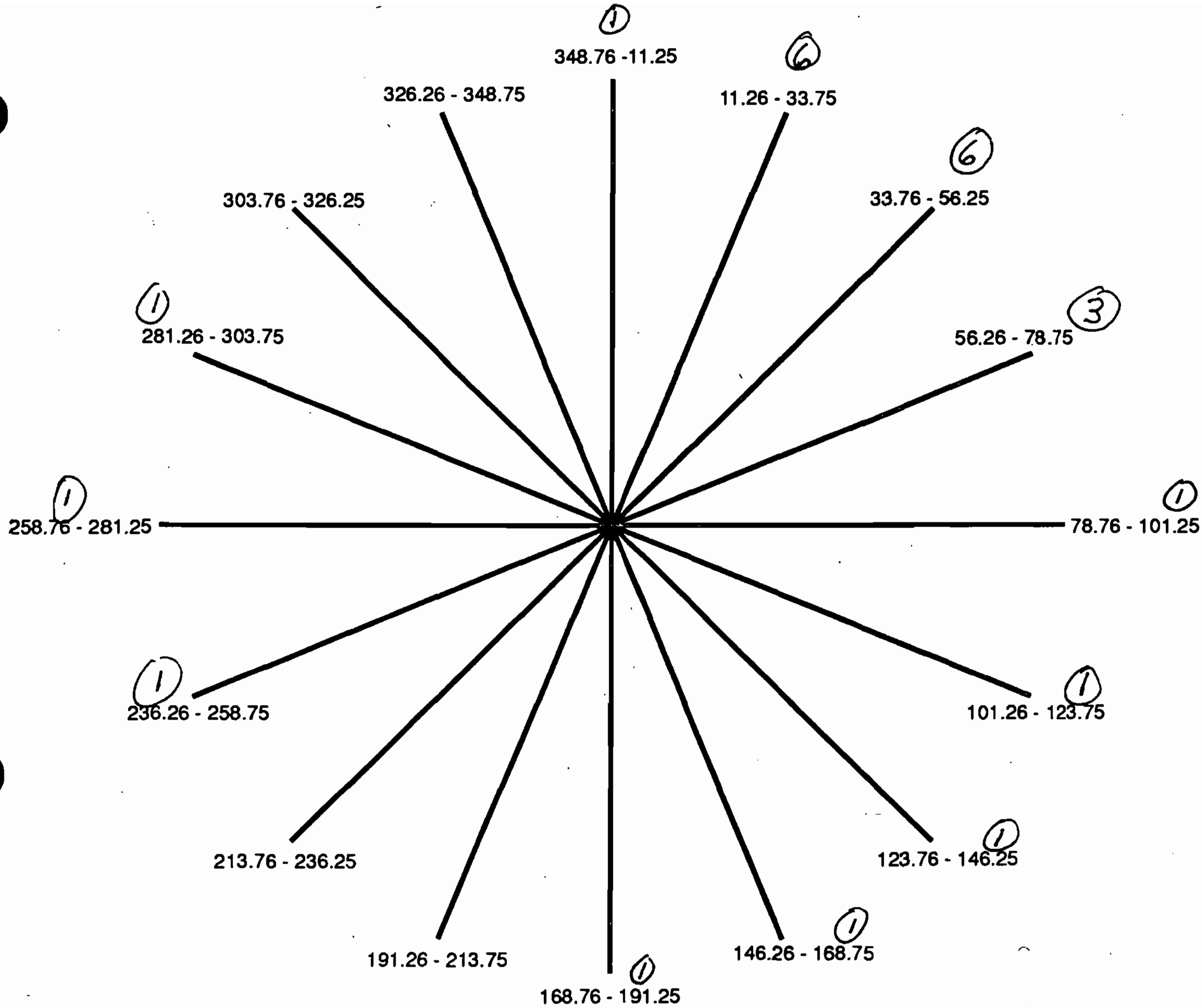
HOUR

DAY	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	OBS
1	289	290	297	291	301	310	298	298	296	312	325	322	317	302	296	301	303	295	292	309	320	309	306	19	24
2	26	3	328	322	359	7	21	16	22	39	51	48	47	48	54	58	37	46	39	45	45	47	51	47	24
3	37	43	37	33	359	10	31	23	31	51	69	66	38	66	35	47	44	46	37	61	80	92	89	78	24
4	70	60	76	139	166	155	62	42	58	102	121	143	143	147	147	180	160	147	131	126	121	127	142	130	24
5	127	121	120	118	137	216	290	147	117	121	145	176	189	181	183	184	200	201	192	207	215	219	198	205	24
6	207	191	206	197	208	204	214	234	245	255	273	276	271	272	274	276	283	290	291	296	291	287	301	289	24
7	283	299	299	298	298	304	291	298	293	301	308	303	325	279	245	262	265	268	270	263	304	309	244	265	24
8	280	287	281	280	279	234	236	268	296	317	303	289	281	285	287	270	251	254	264	280	288	293	305	319	24
9	334	335	352	8	6	11	13	25	25	32	49	49	59	67	45	27	19	7	357	17	24	35	26	7	24
10	2	6	19	13	10	11	20	24	19	47	47	56	59	70	65	52	51	31	35	41	48	40	25	10	24
11	10	19	22	13	11	9	10	21	17	14	9	3	340	349	11	22	11	38	37	27	41	65	53	57	24
12	63	62	44	39	37	21	24	25	41	29	25	32	33	35	25	9	40	33	24	80	180	72	100	118	24
13	108	70	88	92	103	84	103	72	53	69	67	159	251	259	315	302	302	293	312	308	332	20	94	331	24
14	22	42	329	16	18	26	41	42	42	66	110	120	183	194	244	260	249	308	277	286	334	17	171	102	24

999 Indicates missing data or calibration activities.

MONTHLY SUMMARY

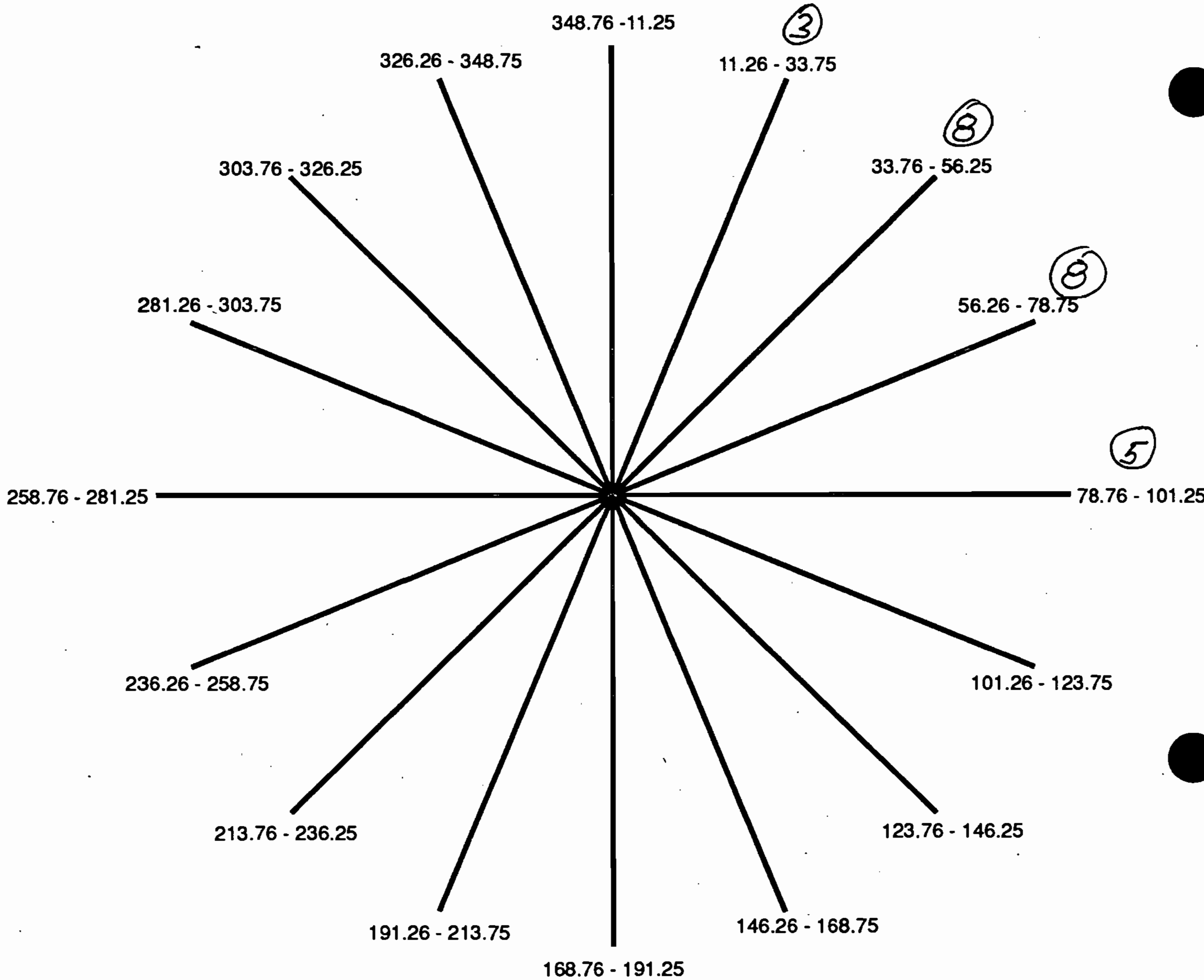
OBSERVATIONS: 336
% DATA RECOVERY: 100.0



DATE: 10-15-91

CONCENTRATION: 18.9 ug/M^3

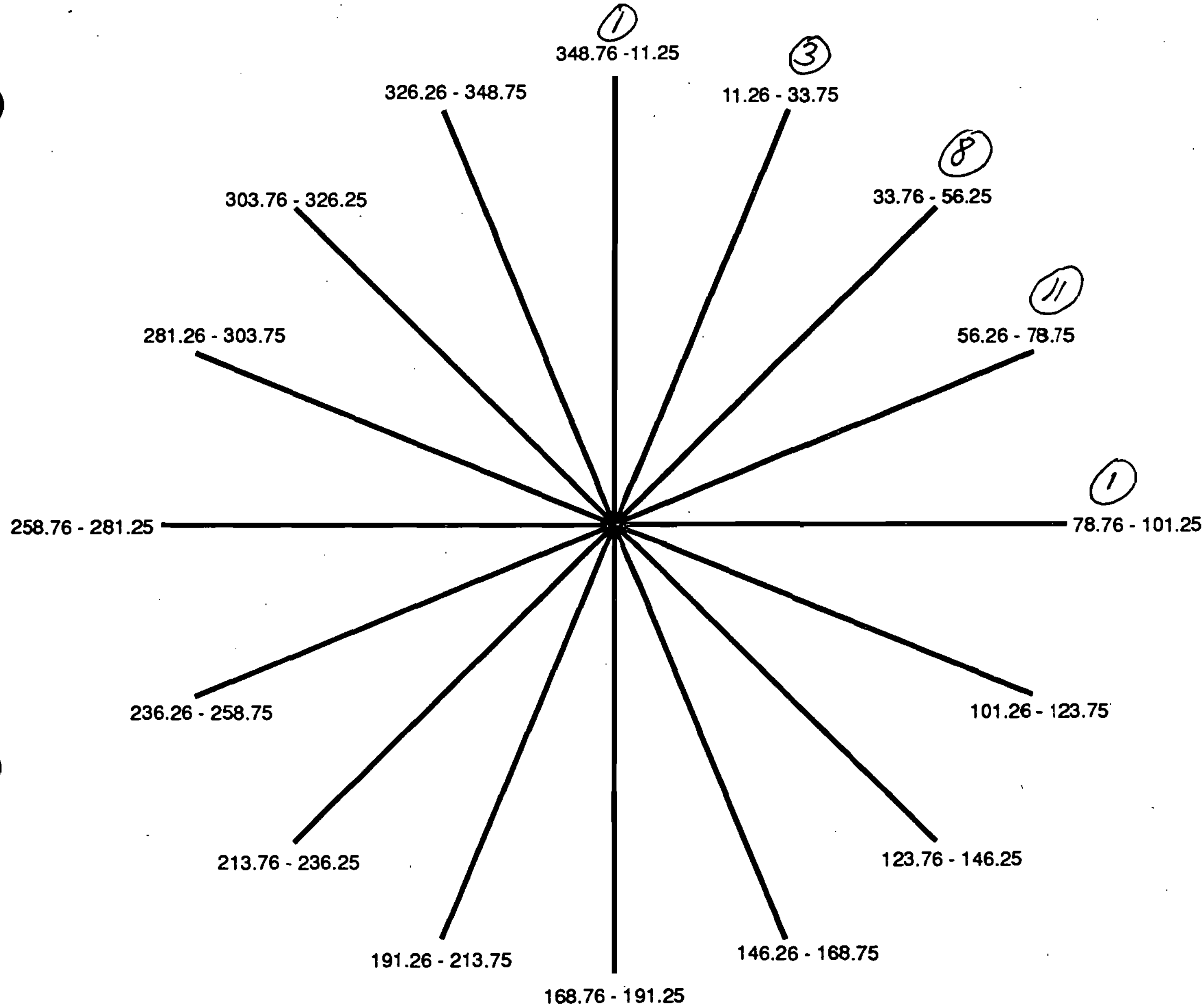
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 10-21-91

CONCENTRATION: 8.6 ug/M^3

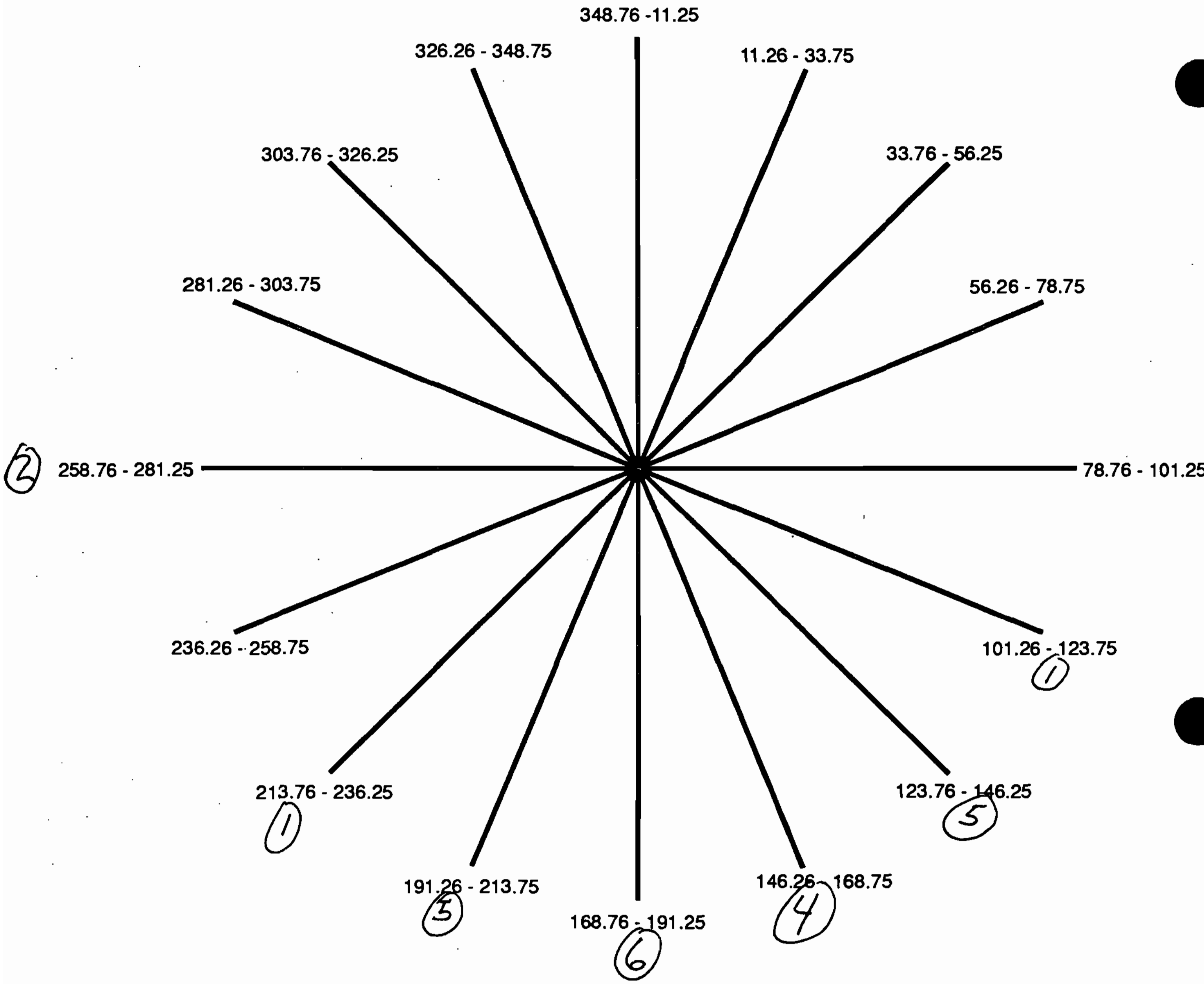
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 10-27-91

CONCENTRATION: 12.8 ug/M^3

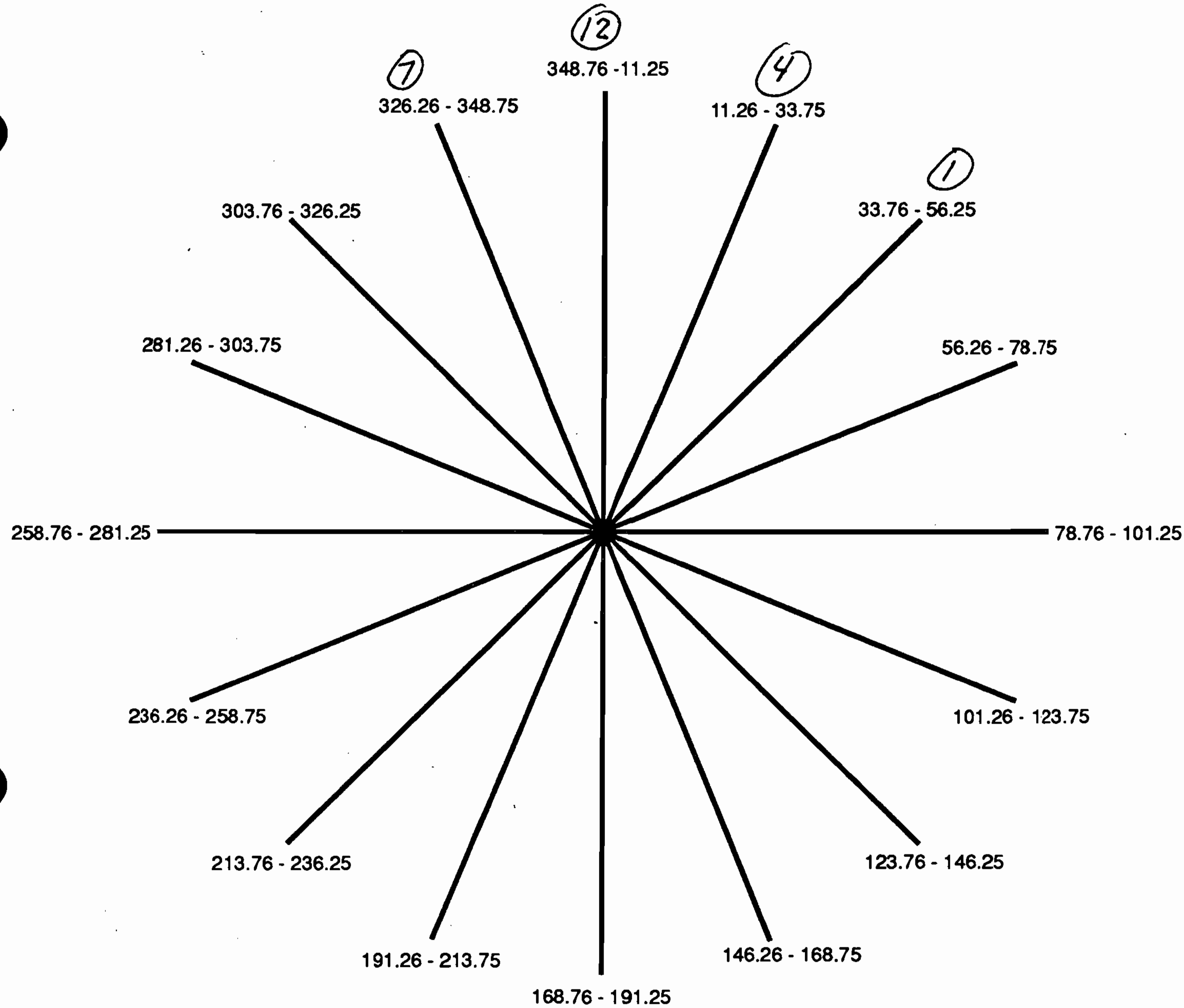
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 11-01-91

CONCENTRATION: 14.7 ug/M^3

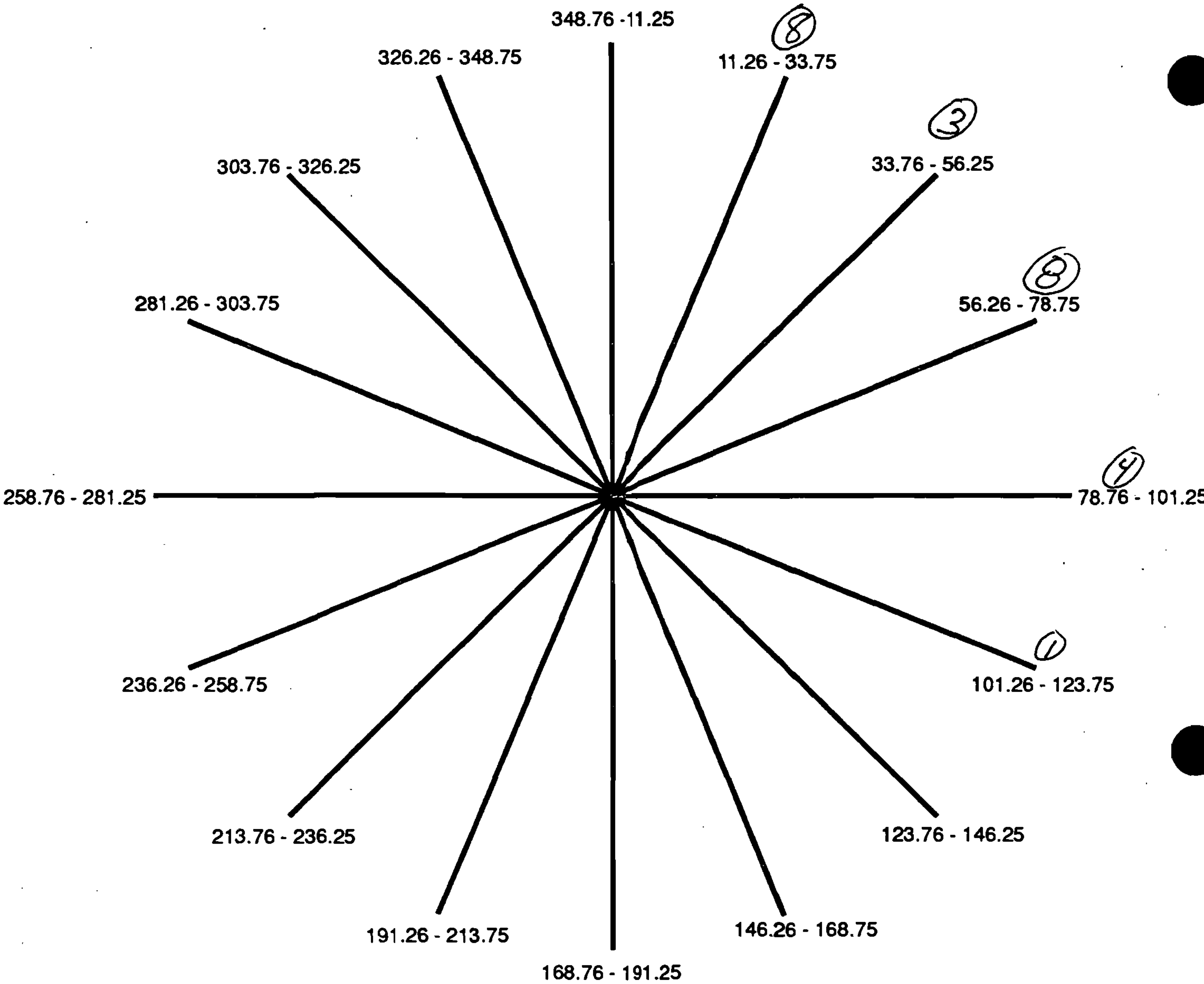
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 11-08-91

CONCENTRATION: 38.1 ug/M^3

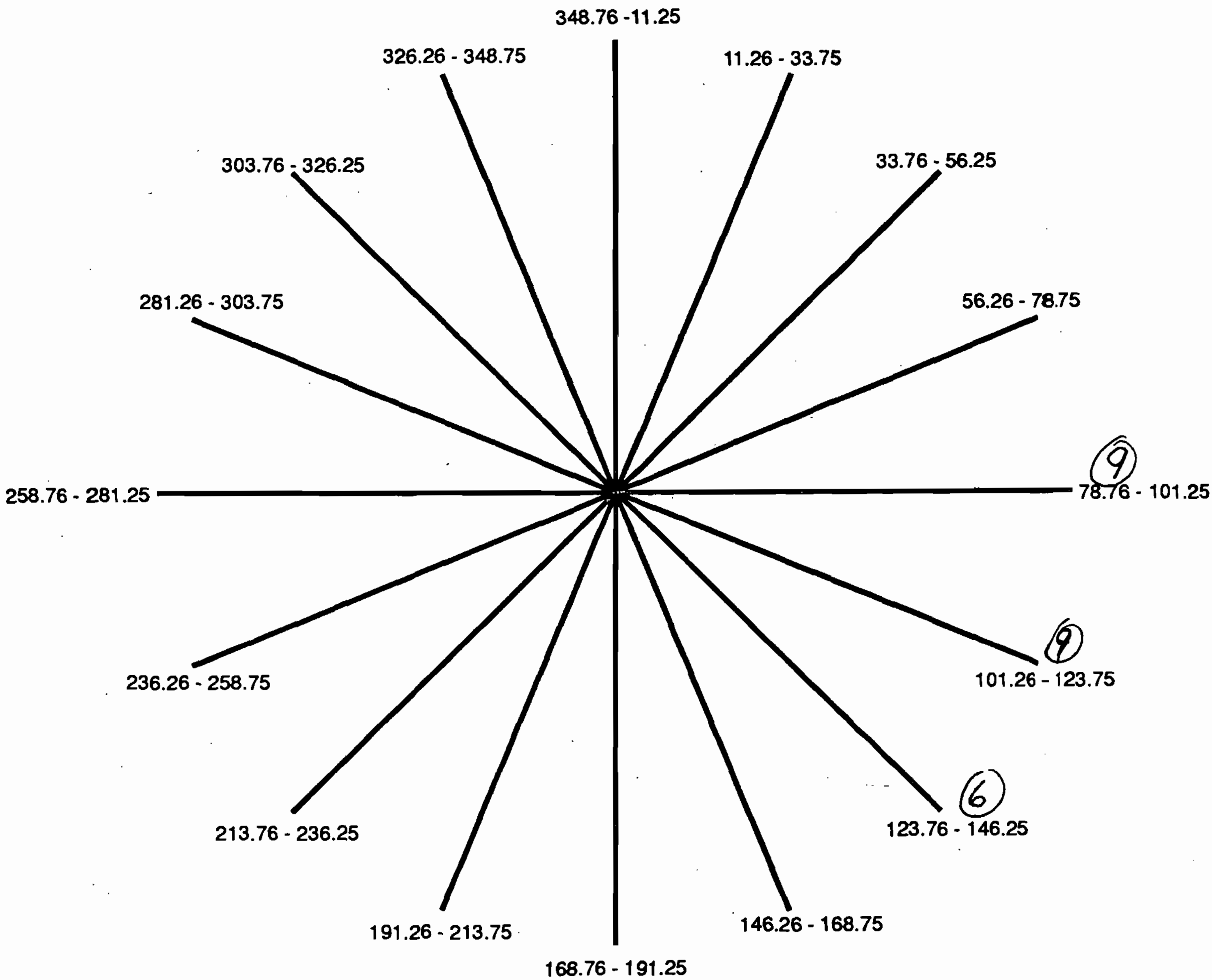
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 11-14-91

CONCENTRATION: 17.0 ug/M^3

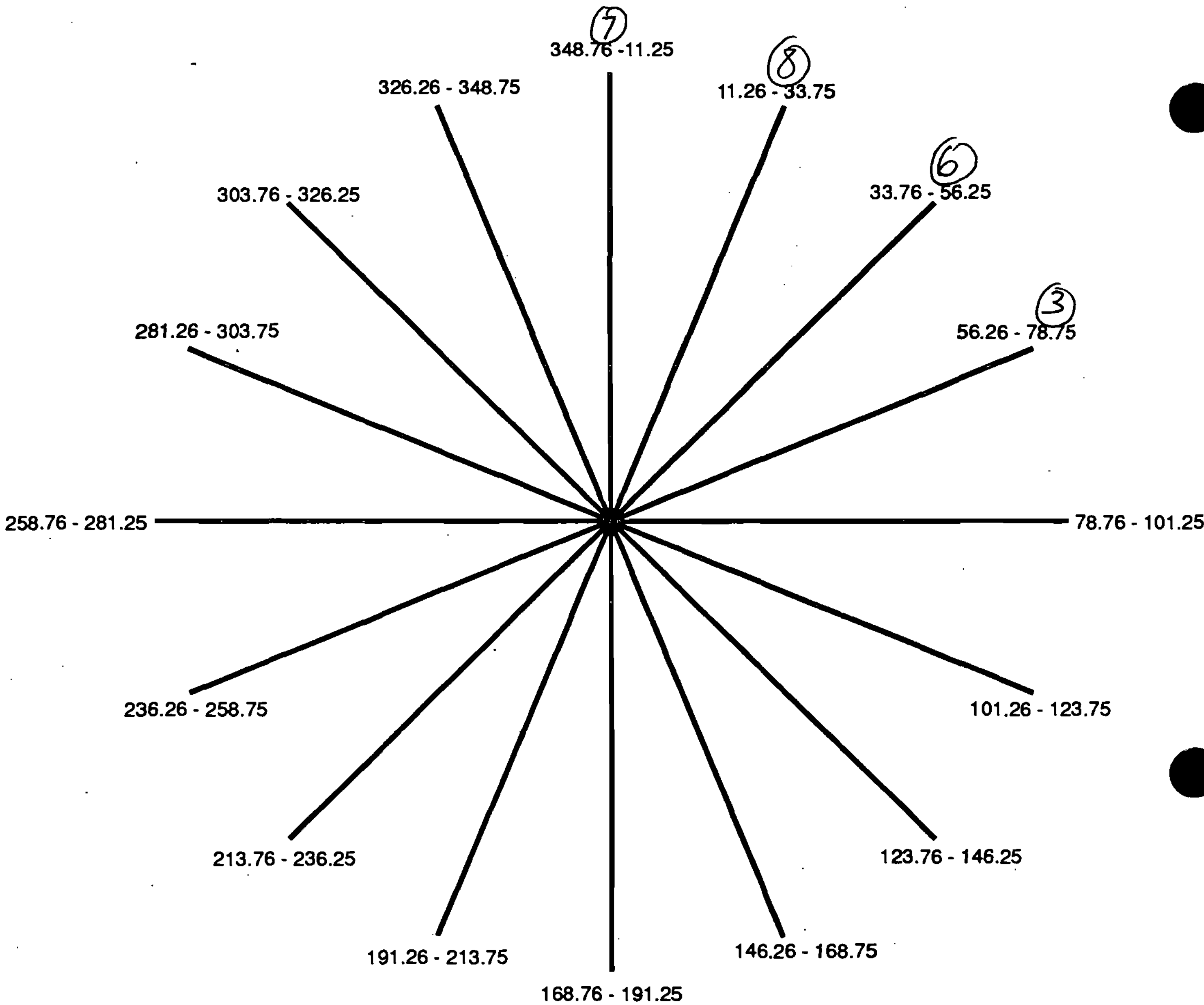
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 11-20-91

CONCENTRATION: 10.5 ug/M^3

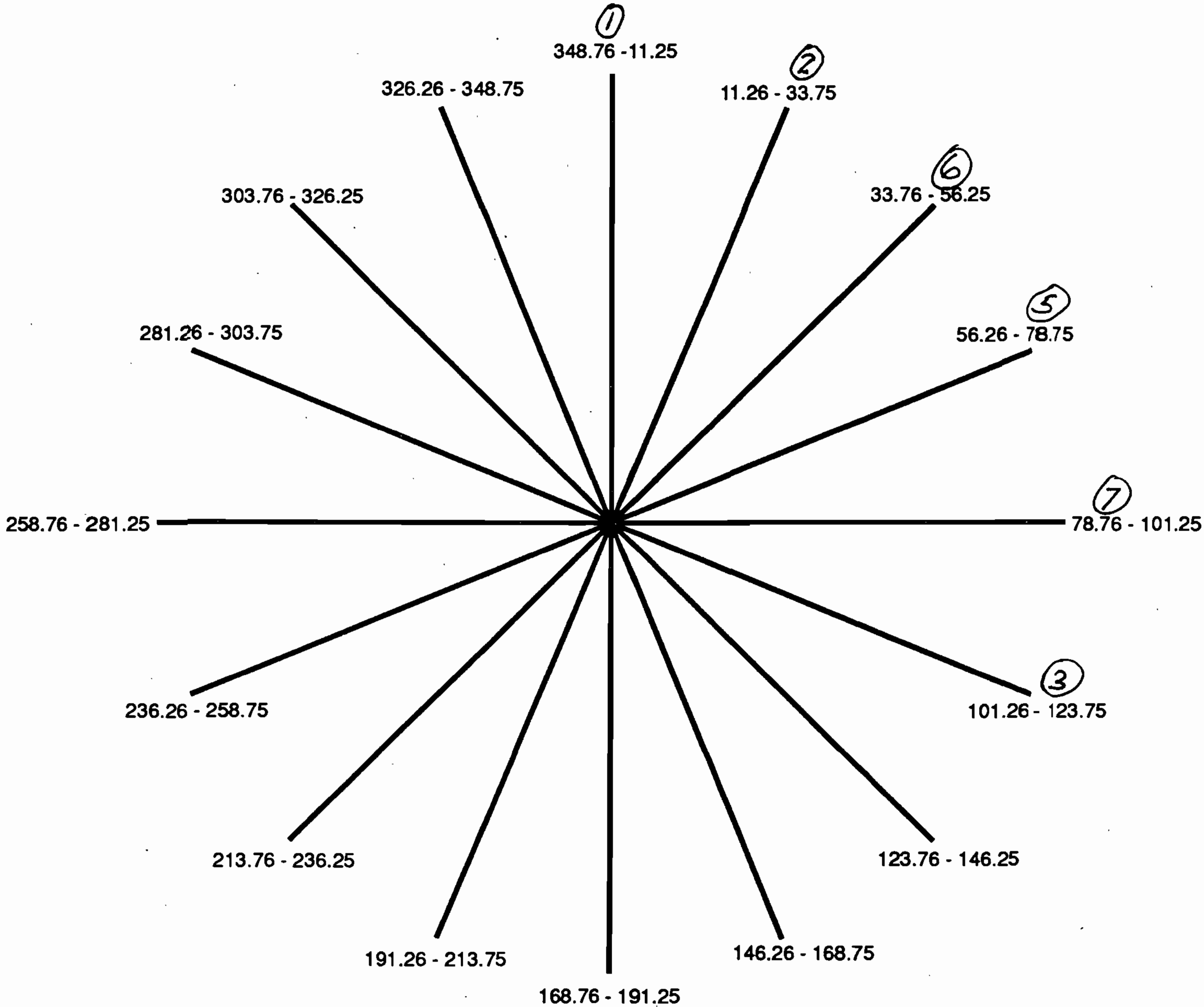
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 11-27-91

CONCENTRATION: 14.6 ug/M^3

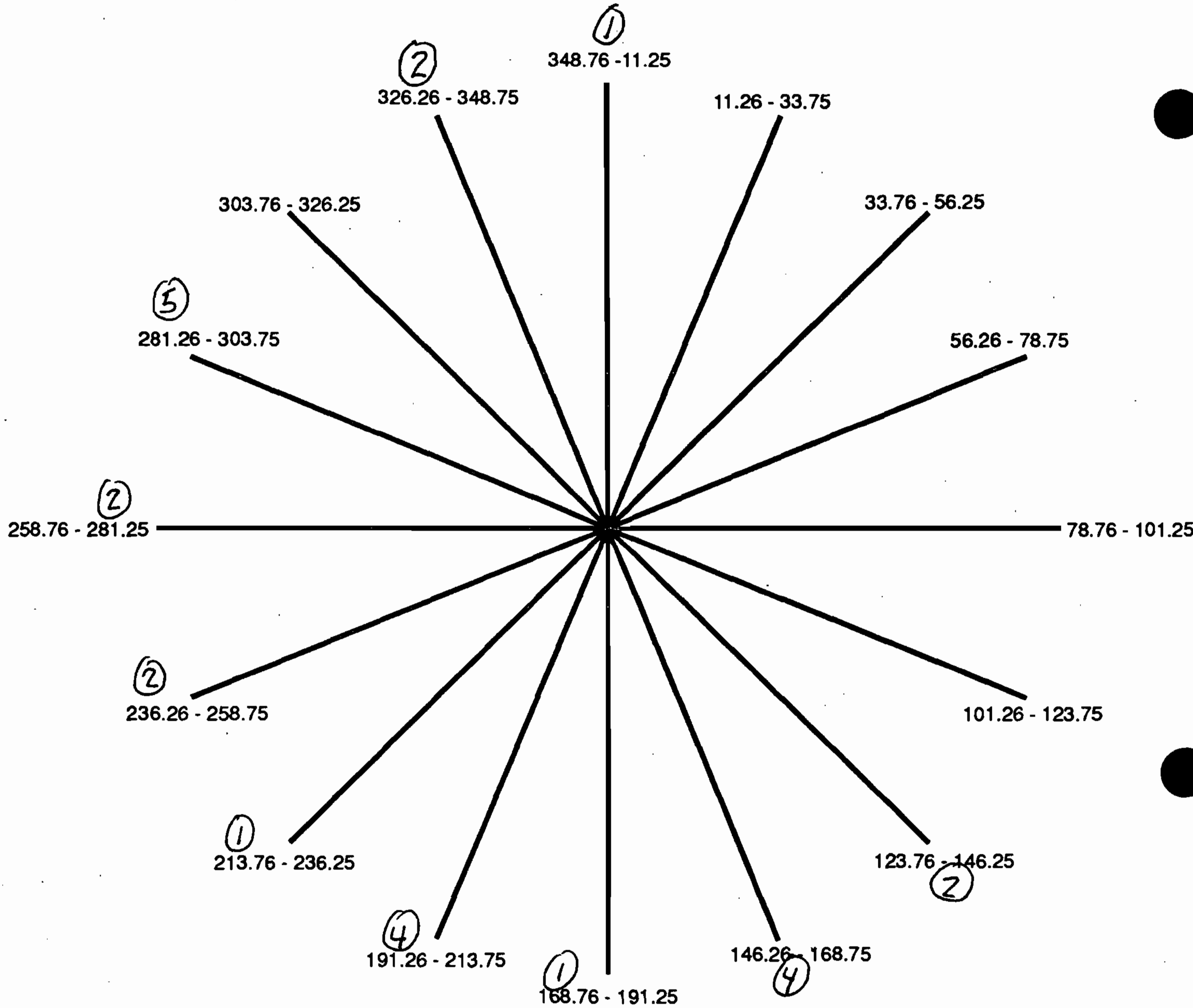
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 12-08-91

CONCENTRATION: 9.8 ug/M^3

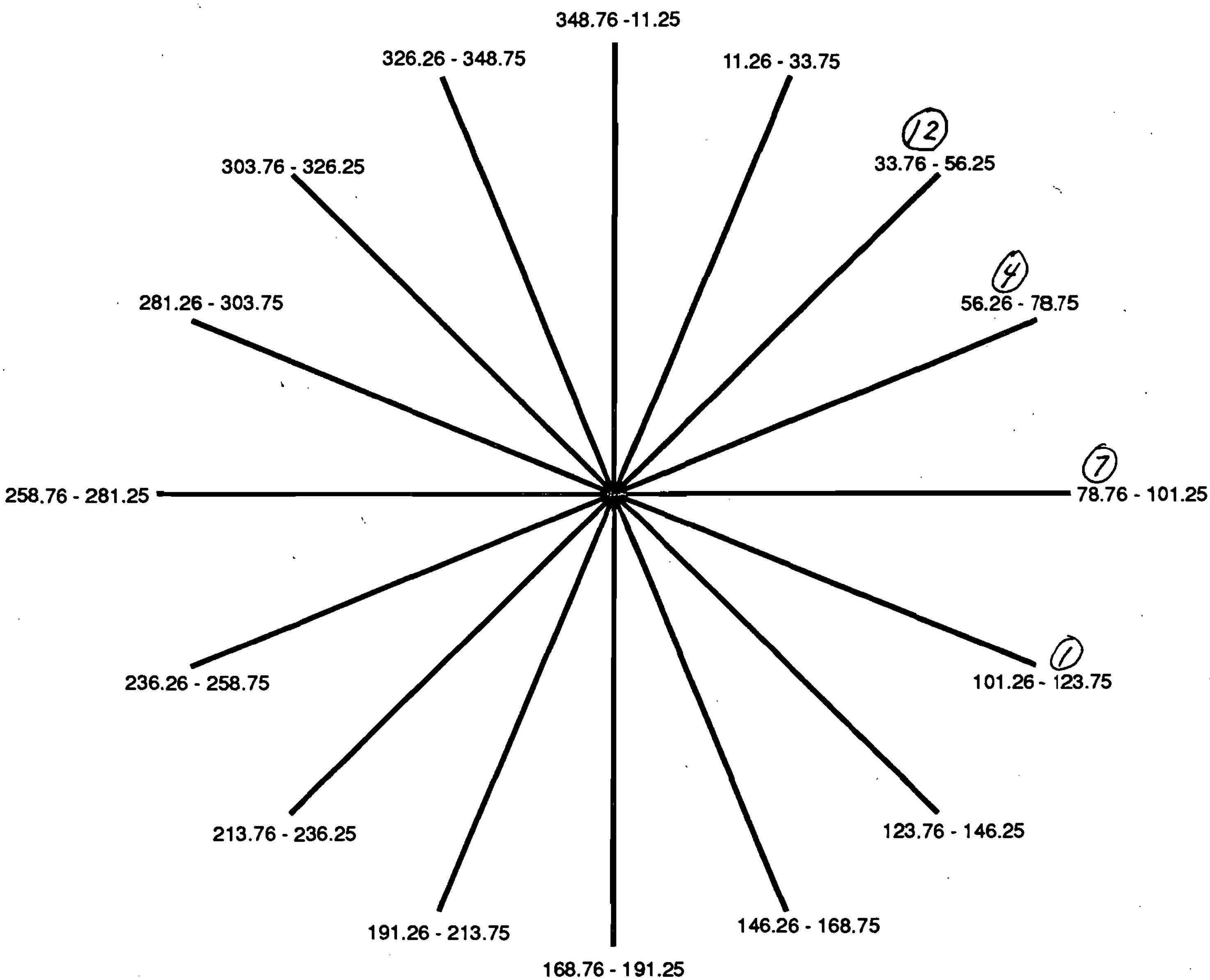
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 12-14-92

CONCENTRATION: 12.2 ug/M^3

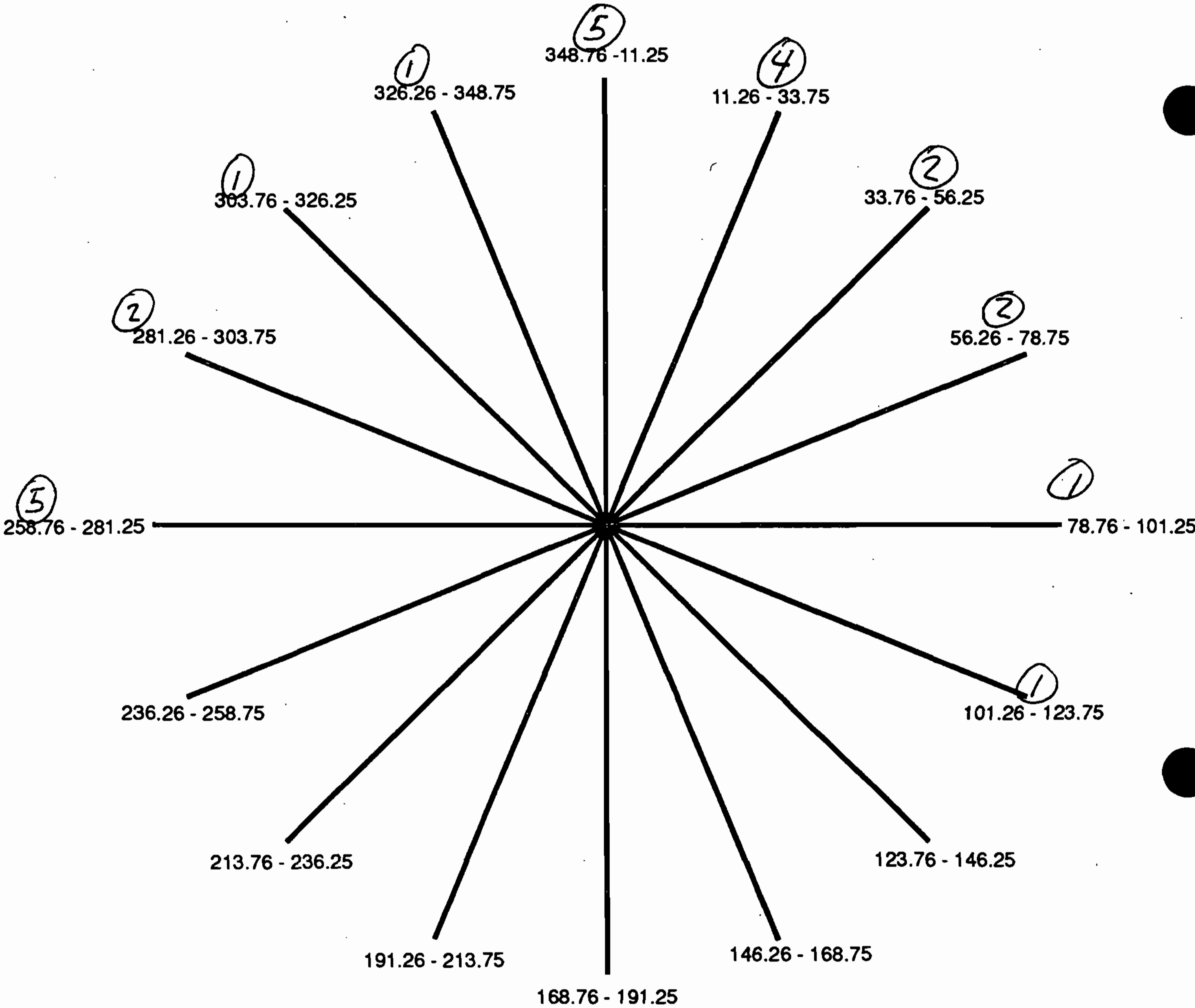
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 12-20-91

CONCENTRATION: 18.1 ug/M^3

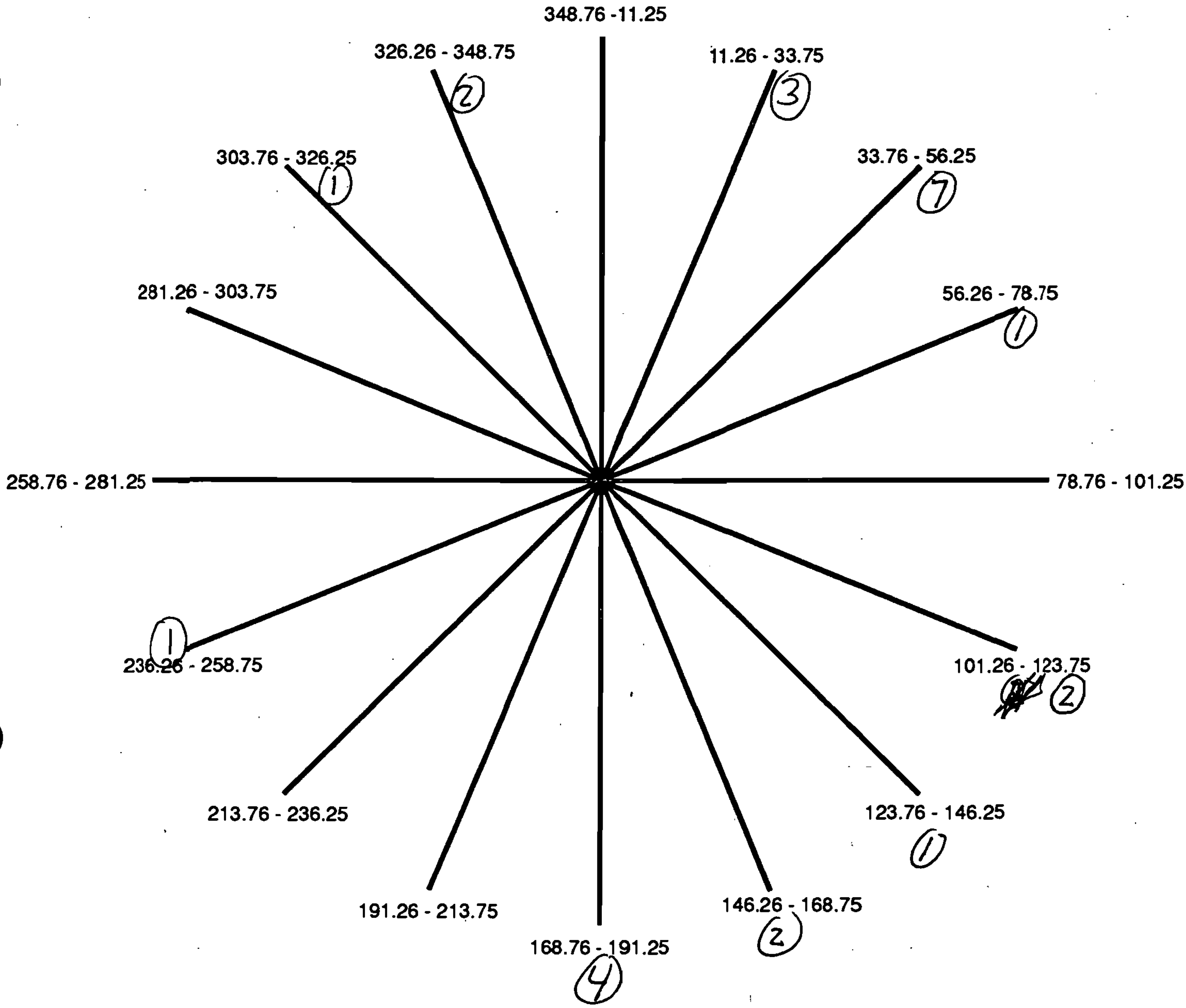
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 12-22-91

CONCENTRATION: 18.01 ug/M^3

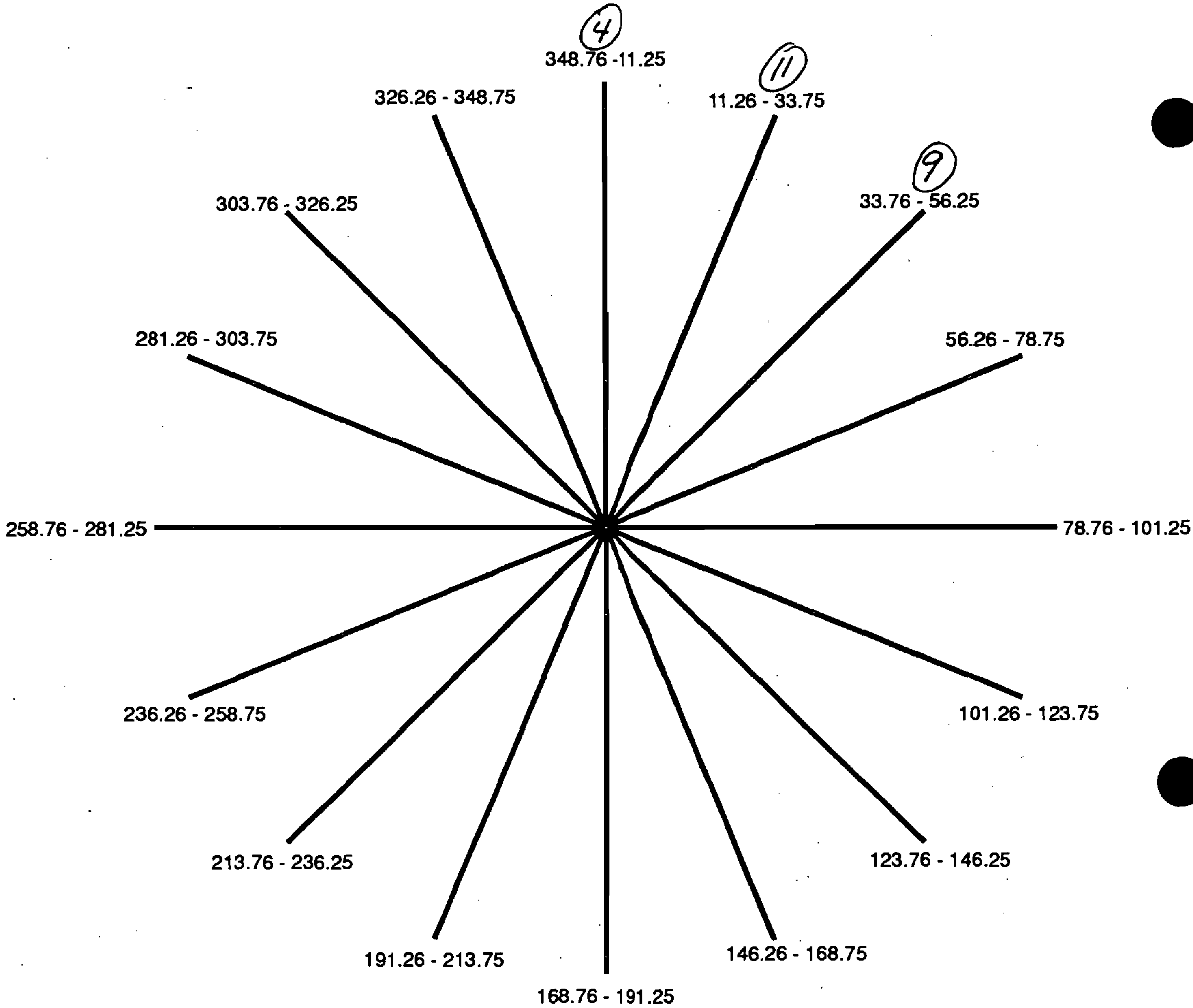
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 12-26-91

CONCENTRATION: 24.1 ug/M^3

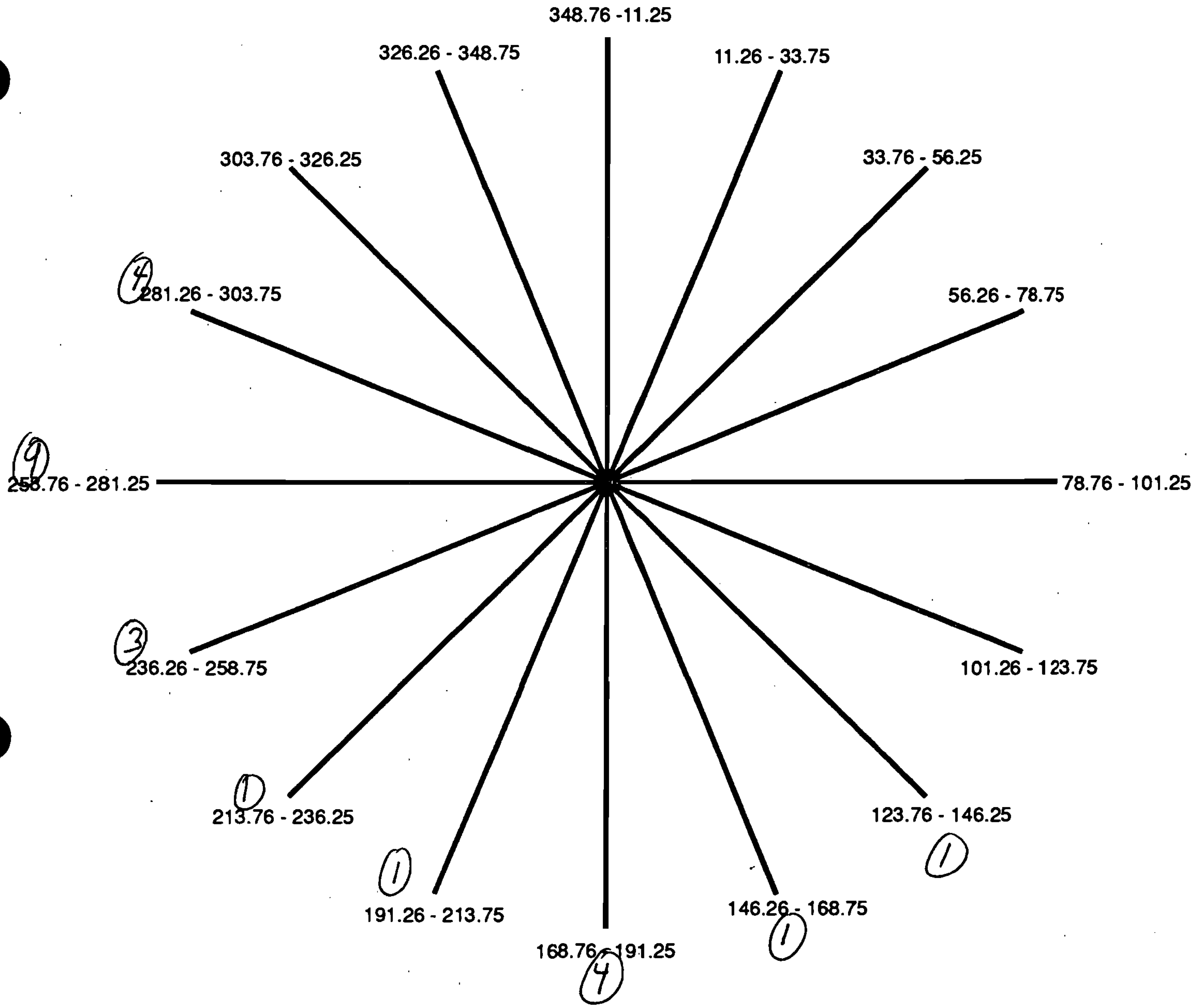
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-01-92

CONCENTRATION: 11.1 ug/M^3

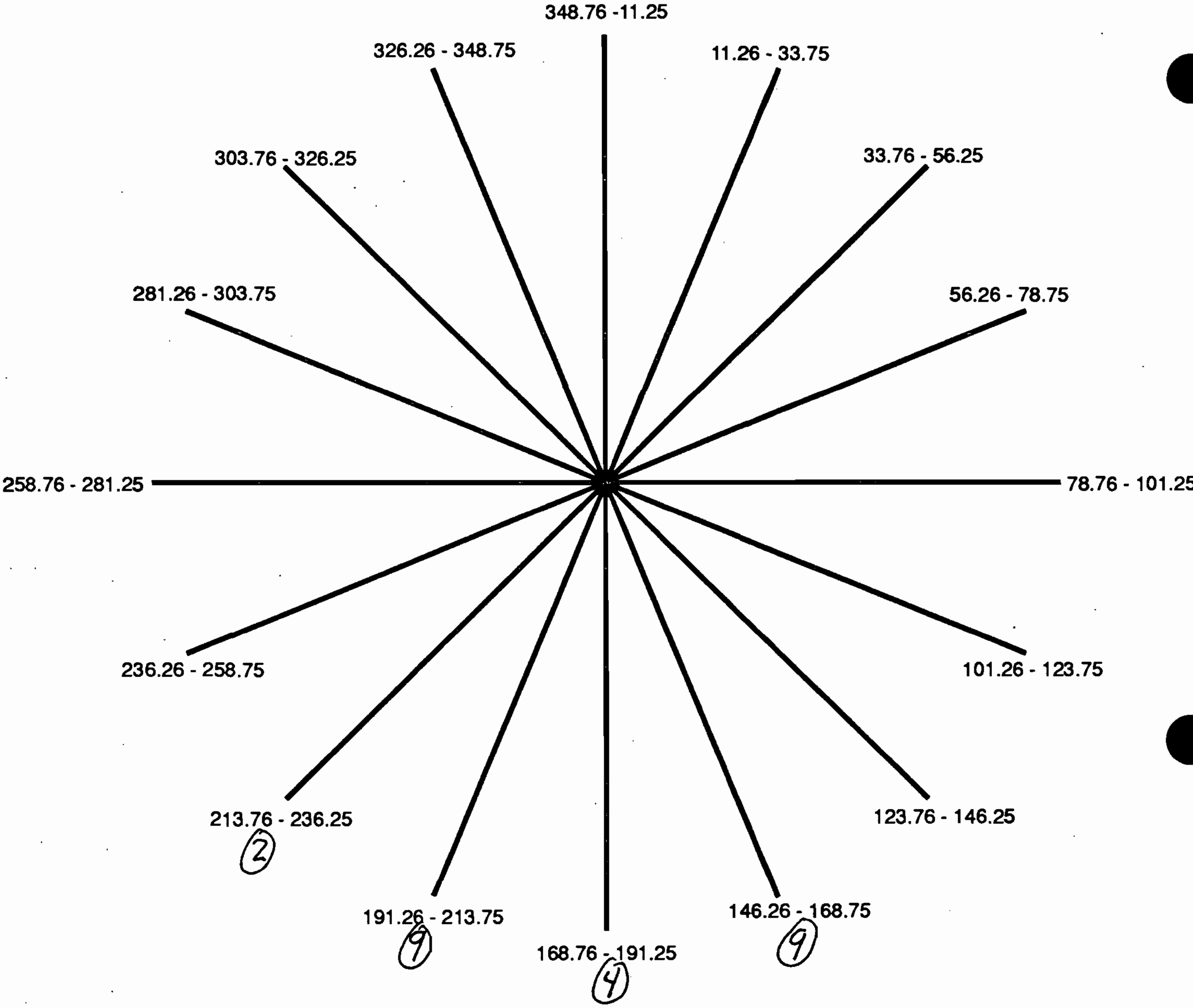
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-06-92

CONCENTRATION: 20.6 ug/M^3

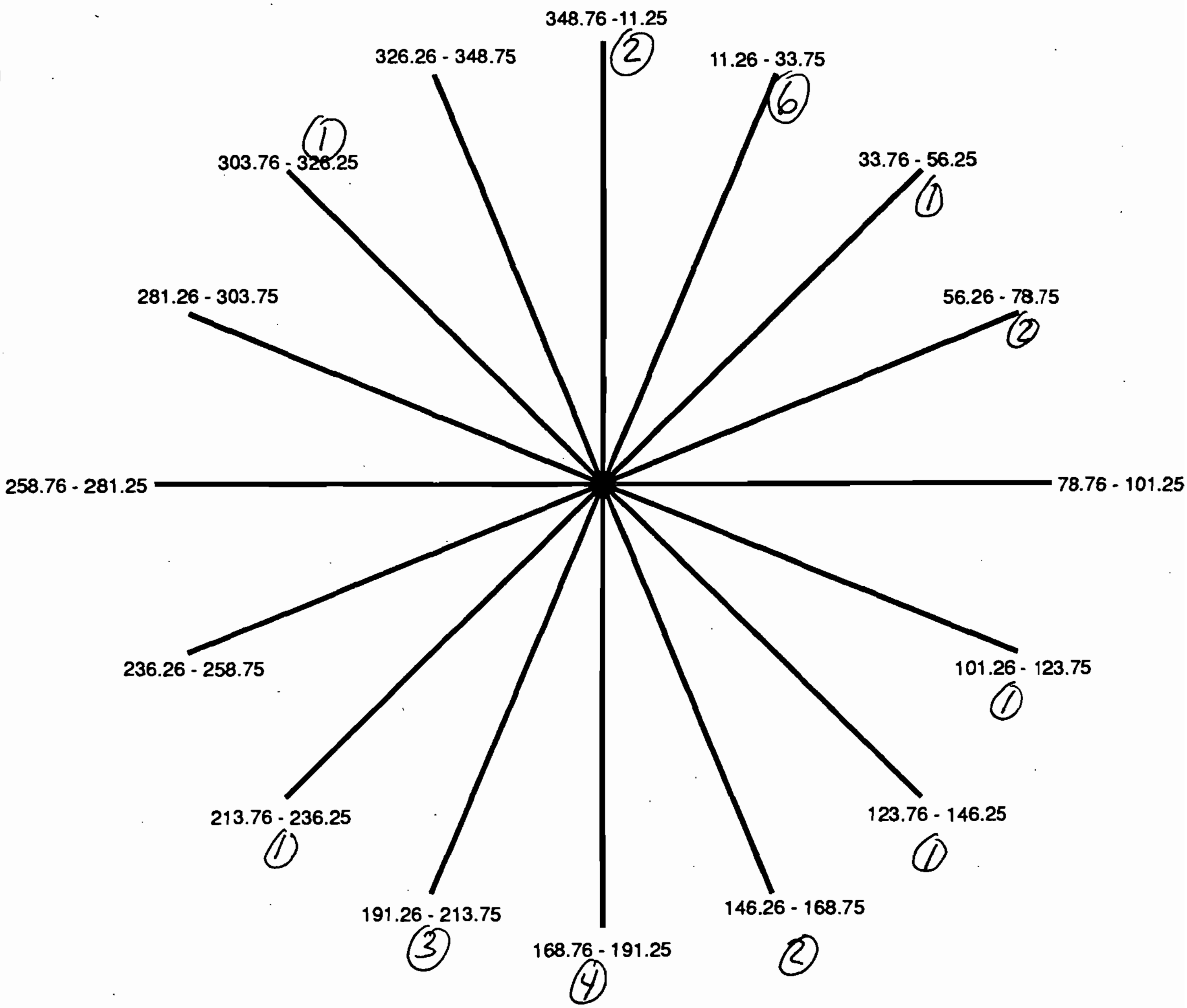
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-13-92

CONCENTRATION: 15.9 ug/M^3

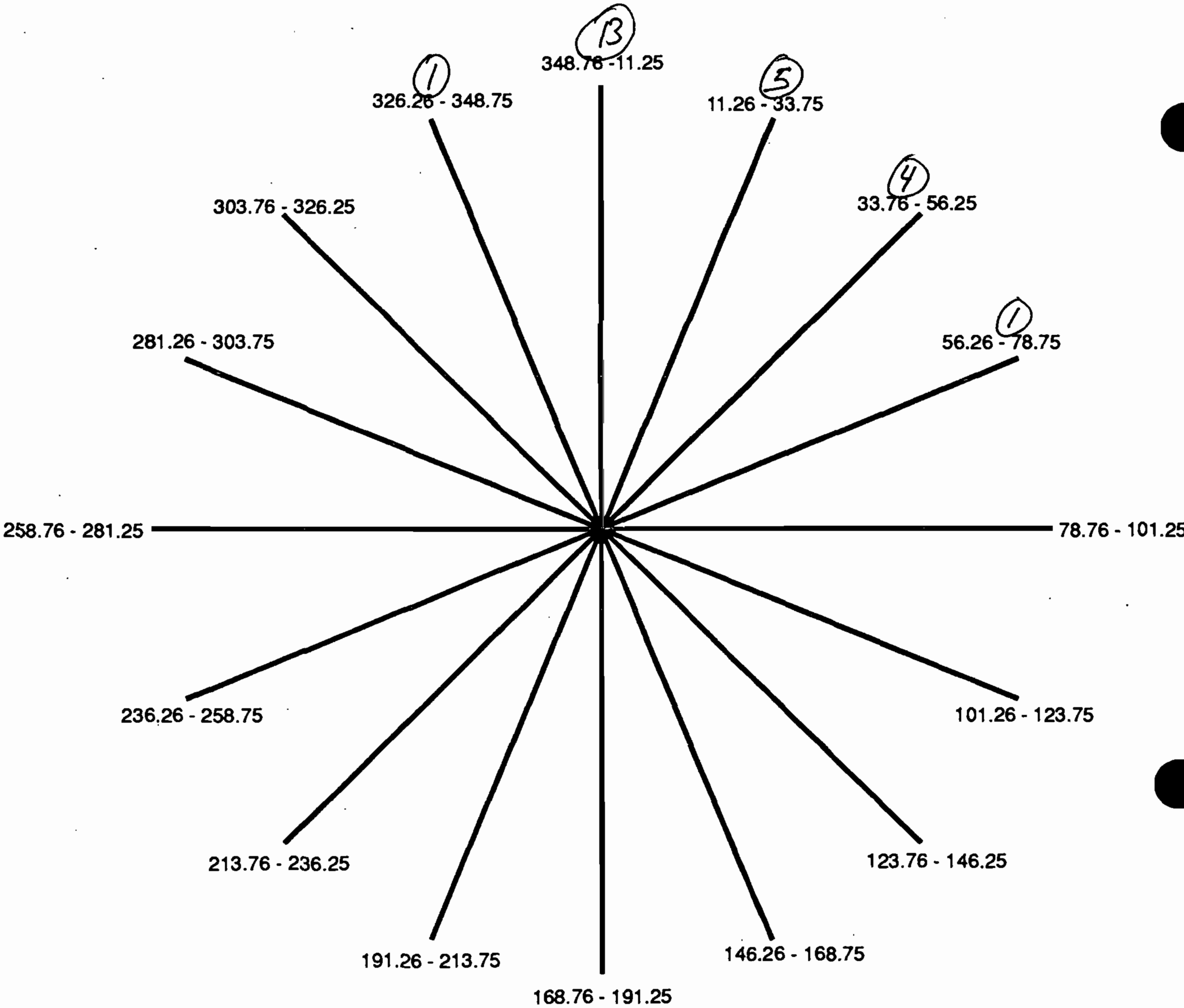
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-19-92

CONCENTRATION: 24.1 ug/M^3

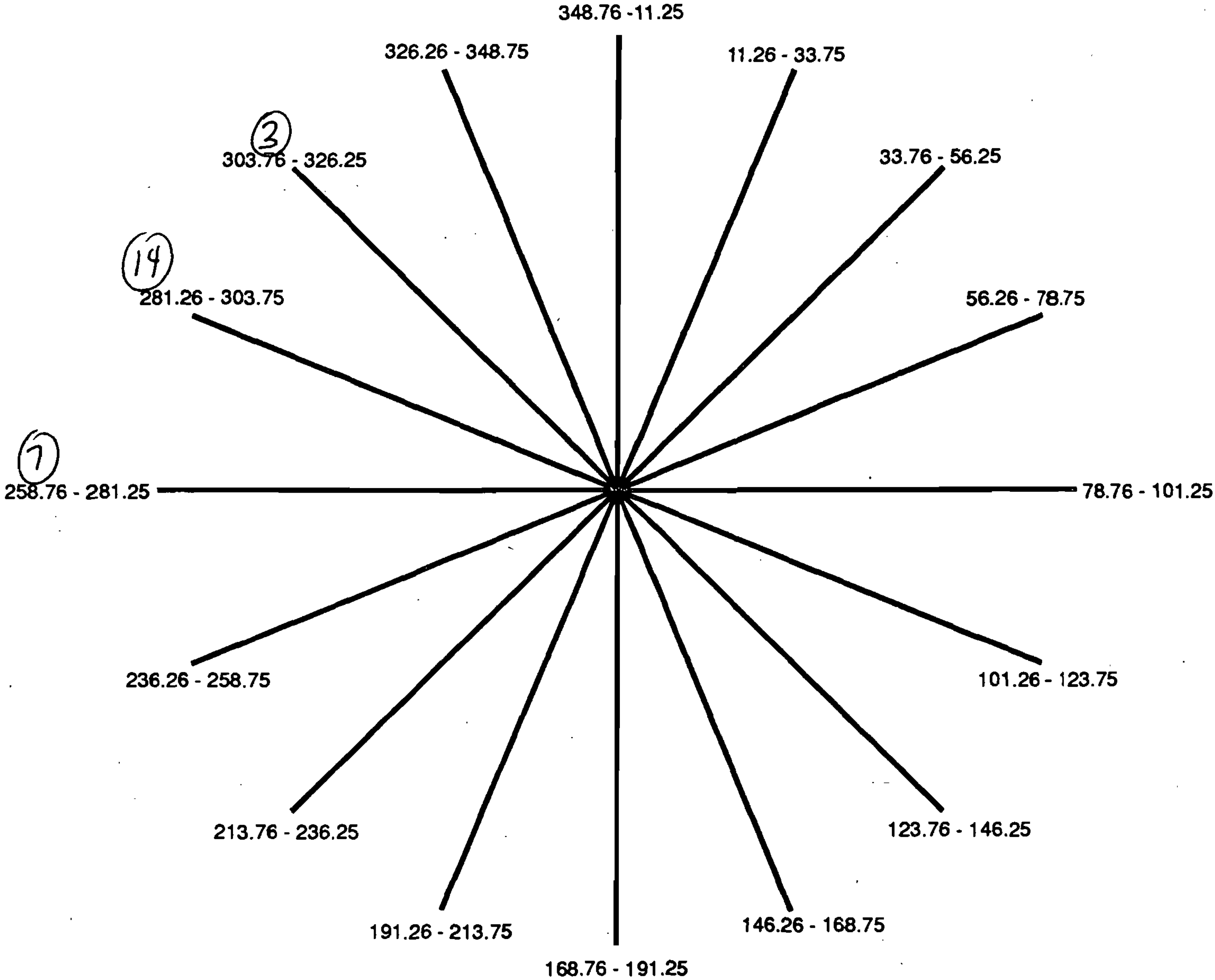
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-25-92

CONCENTRATION: 17.6 ug/M^3

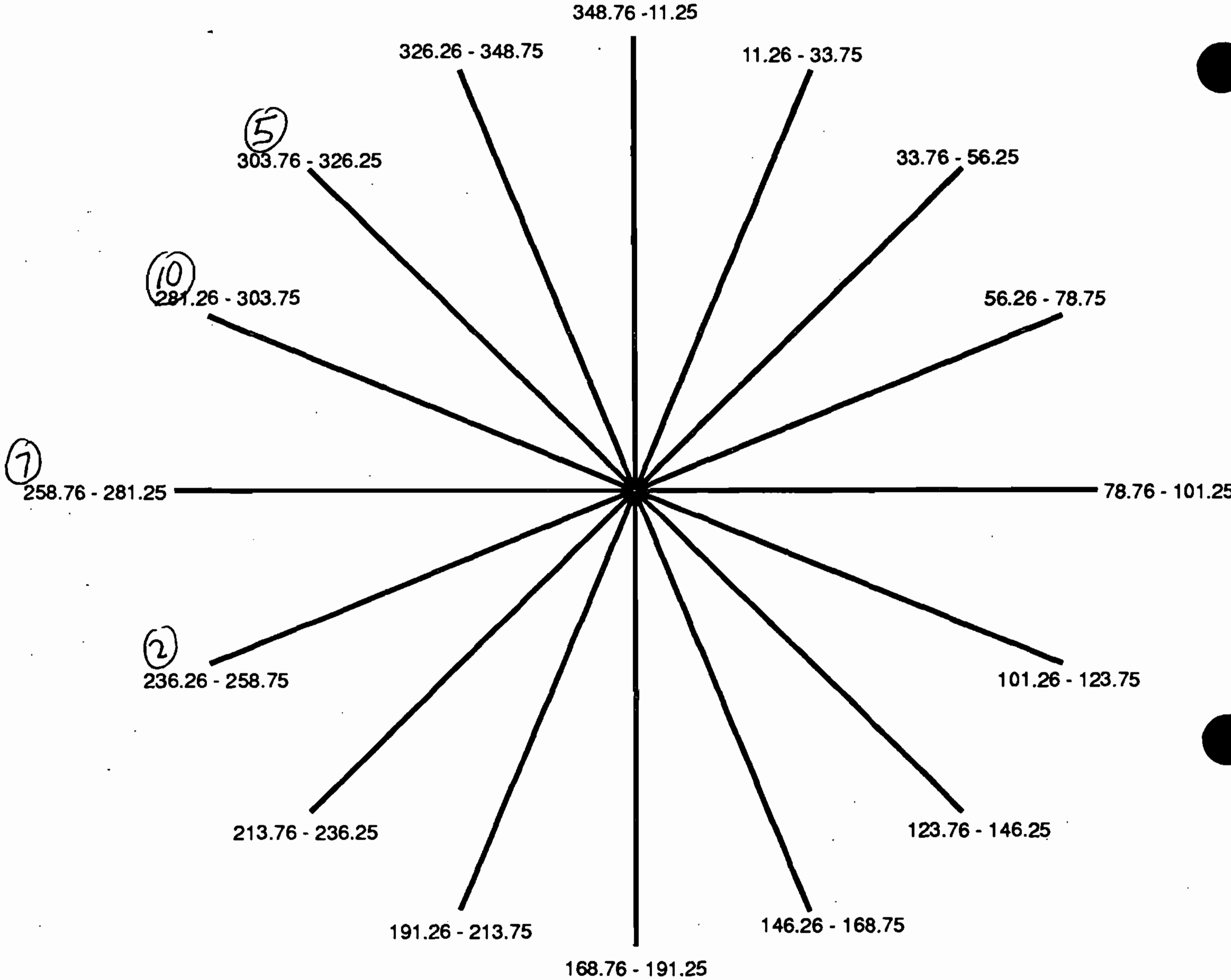
SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 01-31-92

CONCENTRATION: 160.9 ug/M^3

SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE



DATE: 02-07-92

CONCENTRATION: 140 ug/M^3

SUMMARY OF WIND DIRECTION OCCURRENCE
DURING PM_{10} SAMPLING PERIOD
FPC POLK COUNTY SITE

EXHIBIT FDER-12
SUMMARY OF SIGNIFICANT IMPACT AREAS (CASE B)

Pollutant	Averaging Period	Maximum[1] Predicted Concentration ($\mu g/m^3$)	Location[2]		Year	De minimus[5] Level ($\mu g/m^3$)	Significance Level ($\mu g/m^3$)	Distance to Significance (km)	Off-site Significant Impact (Yes/No)
			X (m)	Y (m)					
Carbon Monoxide	1-Hour 8-Hour	439.3 114.2	2,000 3,000	-500 -500	1984 1986	N/A 575	2,000 500	None None	No No
Nitrogen Dioxide	Annual	4.6	-2,000	1,000	1986	14	1	33	Yes
Sulfur Dioxide	3-Hour 24-Hour Annual	358.1 80.2 4.8	1,000 1,000 -2,000	-500 -500 1,000	1983 1985 1986	N/A 13 N/A	25 5 1	>50 >50 40	Yes Yes Yes
Particulate Matter (PM_{10} or TSP)[3]	24-Hour Annual	36.6 4.7	-2,320 -2,000	0 -500	1983 1982	10 N/A	5 1	12 7	Yes Yes
Beryllium	24-Hour	0.0018	1,000	-500	1985	0.001	N/A	N/A	N/A
Sulfuric Acid Mist	24-Hour	9.78	1,000	-500	1985	N/A	N/A	N/A	N/A
Inorganic Arsenic	24-Hour	0.00769	1,000	-500	1985	N/A	N/A	N/A	N/A
Lead[4]	Quarterly	0.107	1,000	-500	1985	0.1	N/A	N/A	N/A

(1) Short-term values are highest rather than highest, second-highest values for this analysis.
(2) With respect to zero point of 414.30 km E; 3,073.88 km N.
(3) The allowable PSD increment is evaluated for TSP whereas the AAQS compliance is evaluated for PM_{10}. As a conservative approach, all project emissions of particulate matter were assumed to be in the form of PM_{10}.
(4) Lead impact is for a 24-hour averaging period. Due to the low level, when averaged over a quarter, this would be less than the de minimus value.
(5) De minimus levels are only for purposes of determining the need for monitoring.

N/A = Not applicable

Source: Ebasco Environmental, 1992

EXHIBIT FDER-13

EBASCO

November 19, 1992
EED-2563-FDER-92-594

Mr. Max Linn
Meteorologist
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Linn:

SUBJECT: FLORIDA POWER CORPORATION
POLK COUNTY SITE
PM SIGNIFICANT IMPACT AREA PRINTOUTS 1982-1985

In response to your request, please find enclosed the particulate matter significant impact area printouts for the years 1982 through 1985, including both input and output files.

We trust that these printouts satisfy your requirements. Please call Mr. Doug Fulle at (404) 662-2377 should you have any questions.

Very truly yours,

[signature] for

James R. Jackson
Project Manager

JRJ:DF:jtm

Enclosure
cc: D. Fulle
D. Graziani
M. Mitckes
K. Small (FPC)
S. Osbourn (FPC)
File 2563.1326
2563.311

EBASCO ENVIRONMENTAL *A Division of Ebasco Services Incorporated*
145 TECHNOLOGY PARK • NORCROSS, GA 30092-2979 • (404) 662-2300 • FAX (404) 662-2408

EXHIBIT FDER-16
(2 pages)

Florida Power
CORPORATION

November 25, 1993

Mr. Max Linn
Florida Department of Environmental
Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

SUBJECT: POLK COUNTY SITE
<u>SUFFICIENCY RESPONSES</u>

Dear Mr. Linn:

Florida Power Corporation (FPC) is pleased to provide the enclosed copy of the MESOPUFF II computer modeling printouts and a disk copy of the input and output files for FPC's Polk County Site's Class I modelling analyses in response to Florida Department of Environmental Regulation sufficiency comments on the Site Certification Application. Due to the specific technical nature of FDER's comment Nos. 16 and 20 and the amount of the printouts, only a summary of the results will be provided in the final FPC sufficiency response package. A single copy of the printouts and three diskettes are provided for your review.

Please note that the disk files have been archived using the PKZIP program. The PKUNZIP software is on disk 1 of the diskette set in order to dearchive the modeling files.

The modeling printouts have been initially grouped by year. Within each year the modeling runs for the FPC source are presented first, followed by the runs for all other sources (beyond 50 km of the Class I area). Within each of these two source groups the model runs are grouped in chronological order (i.e., based on the meteorological day of interest). All runs for any day of interest will be grouped together. Typically, the sources beyond 50 km of the Class I area were split into eight separate runs. Each run is presented in group order (i.e., 1 through 8). Occasionally, a source group was split into two runs. For example, group 3 may have been split into 3A and 3B, so that there may be more than 8 output runs for a particular day. At the end of each run group (i.e., the 8 or so source groups) there will be a summary printout which summarizes the total impact for all the source groups. For any particular day, the inert model option runs are presented first. If subsequent analyses were performed for the day (i.e., the model was run in dynamic mode), these runs will follow the inert printouts.

The following is an example of how the printouts might be grouped:

1. 1982 FPC only
   - A. Day 10, inert run
   - B. Day 100, inert run
   - C. Day 100, dynamic run 1
   - D. Day 100, dynamic run 2
   - E. Day 200, inert run

2. 1982 other sources
   - A. Day 10, inert run, groups 1 through 8, summary
   - B. Day 100, inert run, groups 1 through 8, summary
   - C. Day 100, dynamic run 1, groups 1 through 8, summary

Should you have any questions, please call me at (813) 866-5529.

Very truly yours,

Kathy Small

Kathleen L. Small
Environmental Project Manager

Enclosures

cc: H. S. Oven (FDER) - w/o encs.

EXHIBIT FDER 16A through 16Z
(55 pages)

EXHIBIT FDER-16A

CLASS II PSD SOURCE INVENTORY - NO_x

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
1	Glades	ER Janna Lime Dryer (No PSD #)	386.7	3155.8	86.5	0.3	1730	No	No No_x
2	Hardee	TECO Hardee Station (#140)	404.8	3057.4	19.0	1419	380	Yes	
3	Hillsborough	Cargill (Gardinier) (#178)	363.4	3082.5	52.0	0	1040	No	No No_x
4	Hillsborough	CF Industries (#155)	388.0	3116.0	49.6	0	992	No	No No_x
5	Hillsborough	CLM Chloride Metals (Closed)	361.8	3088.3	54.3	0	1087	No	Closed
6	Hillsborough	Hillsborough County Resource Recovery (#104)	368.2	3092.7	49.7	Not PSD	994	No	Date<88
7	Hillsborough	IMC - Ft. Lonesome (#88)	389.6	3067.9	25.3	Not PSD	506	No	Date<88
8	Hillsborough	McKay Bay Res. Rec. (#86)	360.0	3091.9	57.1	Not PSD	1142	No	Date<88
9	Hillsborough	TECO Big Bend 4 (#40)	361.9	3075.0	52.3	Not PSD	1046	No	Date<88
10	Orange	Orlando Utilities Stanton #1	483.5	3150.6	103.0	Not PSD	2060	No	Date<88
11	Orange	Orlando Utilities Stanton #2	483.5	3150.6	103.0	3188	2060	Yes	
12	Osceola	FPC Intercession City 7EA and 7FA Turbine (#180)	446.3	3126.0	61.2	1748	1224	Yes	
13	Osceola	Kissimmee Util (#182)	460.1	3129.3	71.9	0	1439	No	PSD for SO_2
14	Pasco	Couch Const - Odessa (No PSD #)	340.7	3119.5	86.5	251	1730	No	
15	Pasco	Couch Const - Zephyrhills (No PSD #)	390.3	3129.4	60.4	69	1209	No	
16	Pasco	DRIS Paving (Asphalt) (No PSD #)	340.6	3119.2	86.4	Approx. 100	1728	No	
17	Pasco	Evans Packing (Shutdown)	383.3	3135.8	69.2	0	1384	No	Shut Down
18	Pasco	NP Richy Hosp Boiler 1 (No PSD #)	331.2	3124.5	97.2	Too far	1944	No	Too far
19	Pasco	Overstreet Paving (No PSD #)	355.9	3143.7	90.9	Too far	1819	No	Too far
20	Pasco	Pasco CoGen (#177)	385.6	3139.0	71.1	405	1422	No	
21	Pasco	Pasco Co. RRF. (#127)	347.1	3139.2	93.6	Too far	1873	No	Too far
22	Pinellas	Pinellas Co. RRF (#11)	335.2	3084.1	79.7	Not PSD	1593	No	Date<88
23	Pinellas	Pinellas Co. RRF (#98)	335.2	3084.1	79.7	Not PSD	1593	No	Date<88
24	Pinellas	Stauffer (Shut Down) (Increment Expanding)	325.6	3116.7	98.4	Too far	1968	No	Too far
25	Polk	Agrico - S. Pierce - New SAP 10,11 (#179)	407.5	3071.3	7.2	118.2	142	Yes	

EXHIBIT FDER-16A

CLASS II PSD SOURCE INVENTORY - NO_x

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
26	Polk	Agrico - S. Pierce - Old SAP 10,11 (#179)	407.5	3071.3	7.2	-102.4	142	Yes	
27	Polk	AMAX (Mobil Big 4) (#1)	394.8	3067.7	19.7	Not PSD	395	No	Date<88
28	Polk	AMAX (Mobil Big 4) (#94)	394.9	3069.8	19.7	Not PSD	395	No	Date<88
29	Polk	CF Bartow - SAP 4	408.5	3083.0	10.7	0	215	No	No No_x
30	Polk	CF Bartow - SAP 3,4 (Shutdown)	408.5	3083.0	10.7	0	215	No	Shut Down
31	Polk	Conserve (#76)	398.7	3084.2	18.6	Not PSD	372	No	Date<88
32	Polk	Farmland SAP 5	409.5	3079.5	7.3	52	156	Yes	
33	Polk	Farmland #143 SAP 1,2 (Shutdown)	409.5	3079.5	7.3	0	156	No	
34	Polk	IMC New Wales (#170)	396.7	3078.9	18.3	190.5	367	Yes	
35	Polk	Lakeland CT's	409.2	3102.8	29.3	1860	584	Yes	
36	Polk	Lakeland Power McIntosh 3 (#008)	408.5	3105.8	32.4	Not PSD	648	No	Date<88
37	Polk	Mobil (#102)	398.4	3085.3	19.5	Not PSD	390	No	Date<88
38	Polk	Royster (#106)	406.8	3085.1	13.4	Not PSD	268	No	Date<88
39	Polk	Seminole (WR Grace) (#157)	409.7	3086.0	12.9	35	258	Yes	
40	Polk	Seminole (WR Grace) (#68)	409.3	3086.9	13.4	Not PSD	269	No	Date<88
41	Polk	US Agrichem - Fort Meade (#107)	416.2	3068.7	5.6	Not PSD	111	No	Date<88
42	Polk	US Agrichem - Fort Meade (#64)	416.2	3068.7	5.6	Not PSD	111	No	Date<88
43	Sumter	FDOC Boiler #3 (No PSD #)	382.2	3166.1	97.6	Too Far	1952	No	Too Far
44	**Polk**	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**9093.7**	**270.0**	**Yes**	**Max Linn**
45	**Polk**	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**736.6**	**602.6**	**Yes**	**Max Linn**
46	**Polk**	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**309.1**	**532.6**	**Yes**	**Max Linn**
47	**Osceola**	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**962.1**	**2276.6**	**Yes**	**Max Linn**

EXHIBIT FDER-16B

CLASS II PSD SOURCE INVENTORY - SO_2

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)
1	Pasco	Pasco CoGen	385.6	3139.0	71	175	1420	No
2	Hardee	TECO Hardee Station	404.8	3057.4	19.0	9641	380	Yes
3	Pinellas	Pinellas Co Resource Recovery Facility (2 Sources)	335.2	3084.1	79.7	2162	1593	Yes
4	Hillsborough	CF Industries (Cent. Phos) (4 Sources)	388.0	3116.0	49.6	292	992	No
5	Hillsborough	Cargill (Gardinier) (3 Sources)	362.9	3082.5	52.0	-7304	1040	Yes
6	Hillsborough	TECO - Big Bend (3 Sources)	361.9	3075.0	52.3	-104176	1046	Yes
7	Hillsborough	McKay Bay Resource Recovery Facility (2 Sources)	360.0	3091.9	57.1	372	1142	No
8	Hillsborough	Hillsborough County Resource Recovery Facility	368.2	3092.7	49.7	743	994	No
9	Hillsborough	IMC - Ft. Lonesome (2 Sources)	389.6	3067.9	25.3	1375	506	Yes
10	Polk	Conserv (2 Sources)	398.7	3084.2	18.6	931	372	Yes
11	Polk	Agrico - S. Pierce (2 Sources)	407.5	3071.5	7.1	1316	142	Yes
12	Polk	Farmland (3 Sources)	409.5	3080.1	7.8	1896	156	Yes
13	Polk	Seminole (WR Grace) (2 Sources)	409.7	3086.0	12.9	-4946	258	Yes
14	Polk	Seminole (WR Grace)	409.5	3086.5	13.4	2501	269	Yes
15	Polk	IMC - New Wales (10 Sources)	396.7	3079.4	18.3	4869	367	Yes
16	Polk	Royster (2 Sources)	406.8	3085.1	13.4	-7707	268	Yes
17	Polk	Mobil - Nichols	398.4	3085.3	19.5	85	390	No
18	Osceola	FPC Intercession City 7EA Turbine (2 Sources)	446.3	3126.0	61.2	20387	1224	Yes
19	Pasco	Pasco Co Resource Recovery Facility	347.1	3139.2	93.6	490	1873	No
20	Osceola	Kissimmee Utilities (Existing)	460.1	3129.3	71.9	1115	1439	No
21	Pinellas	Stauffer (Shut Down)	325.6	3116.7	98.4	-1808	1968	No
22	Polk	City of Lakeland - McIntosh 3	408.5	3105.8	32.4	17369	648	Yes
23	Pasco	Evans Packing	383.3	3135.8	69.2	7	1384	No
24	*Polk*	*City of Lakeland - Combustion Turbines*	409.2	3102.8	29.3	1011	587	Yes
25	Polk	CF Bartow (3 Sources)	408.5	3083.0	10.7	-1858	215	Yes

EXHIBIT FDER-16B

CLASS II PSD SOURCE INVENTORY - SO_2

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)
26	Hillsborough	CLM Chloride Metals	361.8	3088.3	54.3	729	1087	No
27	Polk	US Agrichem - Fort Meade (3 Sources)	416.2	3068.7	5.6	1639	111	Yes
28	Polk	AMAX (Mobil) Big 4 Mine (2 Sources)	394.9	3069.8	19.7	589	395	Yes
29	Sumter	FDOC boiler #3	382.2	3166.1	97.6	104	1952	No
30	Glades	ER Janna Lime Dryer	386.7	3155.9	86.5	28	1730	No
31	Pasco	DRIS Paving (asphalt)	340.6	3119.2	86.4	8	1728	No
32	Pasco	Overstreet Paving	355.9	3143.7	90.9	127	1819	No
33	Pasco	New Port Richy Hospital Boiler 1 (2 Sources)	331.2	3124.5	97.2	3	1944	No
34	Pasco	Couch Construction - Odessa	340.7	3119.5	86.5	252	1730	No
35	Pasco	Couch Construction - Zephyrhills	390.3	3129.4	60.4	123	1209	No
36	**Polk**	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**4074.1**	**270.0**	**Yes**
37	**Polk**	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**222.5**	**603.0**	**Yes**
38	**Polk**	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**479.7**	**532.6**	**Yes**
39	**Osceola**	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**1022**	**2276.6**	**Yes**

EXHIBIT FDER-16C

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
		East	North			
1	FPC/Debary Prop Turbines	467.5	3197.2	134.3	125.2	16199
2	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	10798
3	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	9589
4	Florida Crushed Stone Kiln 1 * changed 12/26/91	360.0	3162.4	103.8	20.0	3418
5,7	CF Ind. Baseline C, D	388.0	3116.0	49.6	68.9	-3501
6,8	CF Ind. Proposed C, D	388.0	3116.0	49.6	68.9	3793
9	Florida Mining & Materials Kiln 2	356.2	3169.9	112.2	14.6	50
10	TECO Big Bend- Unit 4	361.9	3075.0	52.3	93.2	22739
11	TECO Big Bend- Units 1 & 2.(24-hr) * combined 1/3/92	361.9	3075.0	52.3	93.2	-84605
12	TECO Big Bend- Unit 3 (24-hr)	361.9	3075.0	52.3	93.2	-42303
13	Pasco County Resource Recovery Facility	347.1	3139.2	93.6	27.4	490
14,15	FPC - Crystal River 4, 5	334.2	3204.5	153.2	21.1	70074
16	FPC - Crystal River 1	334.2	3204.5	153.2	21.1	-10906
17	FPC - Crystal River 2	334.2	3204.5	153.2	21.1	-64565
18	Orlando Utility Stanton 1	483.5	3150.6	103.4	142.5	3661
19	Orlando Utility Stanton 2 24 hr	483.5	3150.6	103.4	142.5	8419
20	Kissimmee Utility Existing	460.1	3129.3	71.9	125.2	1115
21	TECO Hardee Station	404.8	3057.4	19.0	126.1	9641
22	Stauffer (Shut Down)	325.6	3116.7	98.4	51.2	-1808
23	City of Lakeland - McIntosh 3	408.5	3105.8	32.4	90.8	17369
24	Hillsborough County Resource Recovery Facility	368.2	3092.7	49.7	78.1	743
25	Pinellas County Resource Recovery Facility	335.3	3084.4	79.6	81.5	2162
26	Evans Packing (Shut Down)	383.3	3135.8	69.2	52.4	0
27	Asphalt Pavers No. 4 * changed 1/3/92 * changed 12/26/91	361.4	3168.4	108.3	20.0	78

EXHIBIT FDER-16C

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
28	Asphalt Pavers No. 3 * changed 1/3/92 * added 12/26/91	359.9	3162.4	103.8	19.9	78
29	City of Lakeland - Combustion Turbines	409.2	3102.8	29.3	93.3	1011
30	IMC - New Wales SAP #1, 2, 3 Baseline	396.6	3078.9	18.3	103.5	-5908
31	IMC - New Wales SAP #1, 2, 3 Projected	396.6	3078.9	18.3	103.5	6351
32	IMC - New Wales SAP #4, 5 Projected	396.6	3078.9	18.3	103.5	4234
33	IMC - New Wales DAP	396.6	3078.9	18.3	103.5	192
34	Proposed Pasco County Cogeneration Facility	385.6	3139.0	71.1	52.6	175
35	Proposed Lake County Cogeneration Facility	434.0	3198.8	126.5	92.6	175
36	CF Bartow Retired SAP	408.5	3083.0	10.7	107.2	-3841
37	CF Bartow DAP	408.5	3083.0	10.7	107.2	149
38	CF Bartow #7 SAP	408.5	3083.0	10.7	107.2	1837
39	CLM Chloride Metals (Shut Down)	361.8	3088.3	54.3	80.3	0
40	Conserve	398.4	3084.2	18.9	100.1	-528
41	Conserve No. 1 SAP	398.4	3084.2	18.9	100.1	1459
42	Farmland SAP 1, 2	409.5	3079.5	7.3	110.5	-1895
43	Farmland SAP 3, 4	409.5	3079.5	7.3	110.5	2333
44	Farmland SAP 5	409.5	3079.5	7.3	110.5	1457
45	IMC - Lonesome Mine Dry 1	389.6	3067.9	25.4	109.5	639
46	IMC - Lonesome Mine Dry 2	389.6	3067.9	25.4	109.5	735
47	Royster #1	406.7	3085.2	13.6	104.4	-8947
48	Royster #2	406.7	3085.2	13.6	104.4	1240
49,50	US Agrichem Fort Meade SAP 1, 2	416.1	3068.6	5.6	123.2	4376
51	US Agrichem Fort Meade SAP X	416.2	3068.7	5.5	123.1	-2737
52	Seminole (WR Grace) Retired SAP	409.7	3086.0	12.9	105.7	-7502

EXHIBIT FDER-16C

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
		East	North			
53	Seminole (WR Grace) 2 46 16	409.7	3086.0	12.9	105.7	2556
54	Seminole (WR Grace) 2 46 17	409.5	3086.5	13.4	105.2	2501
55	Cargill (Gardinier) SAP 4, 5, 6	363.4	3082.4	51.5	86.4	-6818
56,57	Cargill (Gardinier) SAP 7 Existing, Modification	363.4	3082.4	51.5	86.4	-485
58	AMAX (Mobil) Big 4 Mine	394.8	3067.7	20.4	112.1	21
59	AMAX (Mobil) Big 4 Mine	394.9	3069.8	19.8	110.4	568
60	Mobil - Nichols	398.3	3084.3	19.0	7.0	83
61	FDOC Boiler #3 * changed 1/3/92 * changed 1/8/92	382.2	3166.1	97.6	40.4	104
62	ER Jahna (Lime Dryer)	386.7	3155.8	86.4	47.4	28
63	Oman Construction (Asphalt Plant) (Shut down)	359.8	3164.9	106.0	19.5	0
64	Dris Paving (Asphalt Plant)	340.6	3119.2	86.4	46.5	8
65	Overstreet Paving (Asphalt) * changed 1/3/92 * changed 1/8/92	355.9	3143.7	90.9	27.0	127
66,67	New Port Richey Hospital Boiler #1, #2 * changed 1/3/92	331.2	3124.5	97.2	42.2	3
68,69	Hospital Corporation of America Boiler #1	333.4	3141.0	105.0	25.6	6
70	Couch Construction - Odessa (Asphalt) * changed 1/3/92	340.7	3119.5	86.5	46.2	252
71	Couch Construction - Zephyrhills (Asphalt) * changed 1/3/92	390.3	3129.4	60.4	61.8	123
72	Agrico Baseline	407.5	3071.3	7.2	115.9	-2626
73	Agrico Proposed	407.5	3071.3	7.2	115.9	3942
74	McKay Bay Refuse to Energy	360.0	3091.9	57.1	76.4	743
75	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**116.4**	**4074.1**
76	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**101.9**	**222.5**
77	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**100.5**	**479.7**
78	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**63.6**	**1270.0**

EXHIBIT FDER-16D

CLASS I PSD SOURCE INVENTORY - NO_x

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	NO_x Emissions (TPY)	Comments
1	FPC/Debary Prop Turbines (No PSD #)	467.5	3197.2	134.3	125.2	4794	
2	FPC Intercession City Prop. Turbines 7 EAs (#180)	446.3	3126.0	61.2	113.2	616	
3	FPC Intercession City Prop. Turbines 7 FAs (#180)	446.3	3126.0	61.2	113.2	1132	
4	Florida Crushed Stone Kiln 1 * changed 12/26/91 (#90, #91)	360.0	3162.4	103.8	20.0	–	Date <88
5,7	CF Ind. Baseline C, D (Increment Expanding)	388.0	3116.0	49.6	68.9	–	
6,8	CF Ind. Proposed C, D (#155)	388.0	3116.0	49.6	68.9	0	No NO_x
9	Florida Mining & Materials Kiln 2 (#124)	356.2	3169.9	112.2	14.6	711	
10	TECO Big Bend - Unit 4 (#040)	361.9	3075.0	52.3	93.2	–	Date <88
11	TECO Big Bend - Units 1 & 2 (24-hr) * combined 1/3/92 (Increment Expanding)	361.9	3075.0	52.3	93.2	0	
12	TECO Big Bend- Unit 3 (24-hr) (Increment Expanding)	361.9	3075.0	52.3	93.2	0	
13	Pasco County Resource Recovery Facility (#127)	347.1	3139.2	93.6	27.4	1183	
14,15	FPC - Crystal River 4, 5 (#33)	334.2	3204.5	153.2	21.1	–	Date <88
16	FPC - Crystal River 1 (#007)	334.2	3204.5	153.2	21.1	–	Date <88
17	FPC - Crystal River 2 (#007)	334.2	3204.5	153.2	21.1	–	Date <88
18	Orlando Utility Stanton 1 (#84)	483.5	3150.6	103.4	142.5	–	Date <88
19	Orlando Utility Stanton 2	483.5	3150.6	103.4	142.5	3188	
20	Kissimmee Utility Existing (#182)	460.1	3129.3	71.9	125.2	0	PSD for SO_2 only
21	TECO Hardee Station (#140)	404.8	3057.4	19.0	126.1	1419	
22	Stauffer (Shut Down) (Increment Expanding)	325.6	3116.7	98.4	51.2	-28	
23	City of Lakeland - McIntosh 3 (#008)	408.5	3105.8	32.4	90.8	–	Date <88
24	Hillsborough County Resource Recovery Facility (#104)	368.2	3092.7	49.7	78.1	–	Date <88
25	Pinellas County Resource Recovery Facility (#098, #11)	335.3	3084.4	79.6	81.5	–	Date <88
26	Evans Packing (Shut Down)	383.3	3135.8	69.2	52.4	0	

EXHIBIT FDER-16D

CLASS I PSD SOURCE INVENTORY - NO_X

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	NO_X Emissions (TPY)	Comments
27	Asphalt Pavers No. 4 * changed 1/3/92 * changed 12/26/91 (Not PSD)	361.4	3168.4	108.3	20.0	Approx. 40	Estimated
28	Asphalt Pavers No. 3 * changed 1/3/92 * added 12/26/91 (Not PSD)	359.9	3162.4	103.8	19.9	Approx. 40	Estimated
29	City of Lakeland - Combustion Turbines (#166)	409.2	3102.8	29.3	93.3	1860	
30	IMC - New Wales SAP #1, 2, 3 Baseline	396.6	3078.9	18.3	103.5	--	
31	IMC - New Wales SAP #1, 2, 3 Projected (#170)	396.6	3078.9	18.3	103.5	190.5	
32	IMC - New Wales SAP #4, 5 Projected (#170)	396.6	3078.9	18.3	103.5	--	Date <88
33	IMC - New Wales DAP (#114)	396.6	3078.9	18.3	103.5	--	Date <88
34	Proposed Pasco County Cogeneration Facility (#177)	385.6	3139.0	71.1	52.6	404.7	
35	Proposed Lake County Cogeneration Facility (#176)	434.0	3198.8	126.5	92.6	404.7	
36	CF Bartow Retired SAP (Increment Expanding)	408.5	3083.0	10.7	107.2	0	
37	CF Bartow DAP (#155)	408.5	3083.0	10.7	107.2	0	
38	CF Bartow #7 SAP (#155)	408.5	3083.0	10.7	107.2	0	
39	CLM Chloride Metals (Closed)	361.8	3088.3	54.3	80.3	--	
40	Conserve (Increment Expanding)	398.4	3084.2	18.9	100.1	--	
41	Conserve No. 1 SAP (#076)	398.4	3084.2	18.9	100.1	--	Date <88
42	Farmland SAP 1, 2 (Increment Expanding)	409.5	3079.5	7.3	110.5	0	
43	Farmland SAP 3, 4 (No PSD #)	409.5	3079.5	7.3	110.5	--	Date <88
44	Farmland SAP 5 (#143)	409.5	3079.5	7.3	110.5	52.2	
45	IMC - Lonesome Mine Dry 1 (#088)	389.6	3067.9	25.4	109.5	--	Date <88
46	IMC - Lonesome Mine Dry 2 (#088)	389.6	3067.9	25.4	109.5	--	Date <88
47	Royster #1 (#106)	406.7	3085.2	13.6	104.4	--	Date <88
48	Royster #2 (#106)	406.7	3085.2	13.6	104.4	--	Date <88
49,50	US Agrichem Fort Meade SAP 1, 2 (#107)	416.1	3068.6	5.6	123.2	--	Date <88

EXHIBIT FDER-16D

CLASS I PSD SOURCE INVENTORY - NO_X

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	NO_X Emissions (TPY)	Comments
51	US Agrichem Fort Meade SAP X (Increment Expanding)	416.2	3068.7	5.5	123.1	--	
52	Seminole (WR Grace) Retired SAP (Increment Expanding)	409.7	3086.0	12.9	105.7	0	
53	Seminole (WR Grace) Gas Turbine (#157)	409.7	3086.0	12.9	105.7	35	
54	Seminole (WR Grace) 2 46 17 (#68)	409.5	3086.5	13.4	105.2	--	Date <88
55	Cargill (Gardinier) SAP 4, 5, 6 (Increment Expanding)	363.4	3082.4	51.5	86.4	--	
56,57	Cargill (Gardinier) SAP 7 Existing, Modification (#178)	363.4	3082.4	51.5	86.4	0	
58	AMAX (Mobil Big 4) (#1, #094)	394.8	3067.7	20.4	112.1	--	Date <88
59	AMAX (Mobil Big 4) (#1, #094)	394.9	3069.8	19.8	110.4	--	Date <88
60	Mobil - Nichols (#102)	398.3	3084.3	19.0	7.0	--	Date <88
61	FDOC Boiler #3 * changed 1/3/92 * changed 1/8/92 (No PSD #)	382.2	3166.1	97.6	40.4	Approx. 50	Estimated
62	ER Jahna (Lime Dryer) (No PSD #)	386.7	3155.8	86.4	47.4	0.3	
63	Oman Construction (Asphalt Plant) (No PSD #) (Shut down)	359.8	3164.9	106.0	19.5	--	Relocated
64	Dris Paving (Asphalt Plant) (No PSD #)	340.6	3119.2	86.4	46.5	Approx 100	Estimated
65	Overstreet Paving (Asphalt) * changed 1/3/92 * changed 1/8/92 (No PSD#)	355.9	3143.7	90.9	27.0	34	
66,67	New Port Richey Hospital Boiler #1 * changed 1/3/92 (No PSD#)	331.2	3124.5	97.2	42.2	0.2	
68,69	Hospital Corporation of America Boiler #1, #2 (No PSD #)	333.4	3141.0	105.0	25.6	Approx. 24	Estimated
70	Couch Construction - Odessa (Asphalt) * changed 1/3/92 (No PSD #)	340.7	3119.5	86.5	46.2	251	
71	Couch Construction - Zephyrhills (Asphalt) * changed 1/3/92 (No PSD #)	390.3	3129.4	60.4	61.8	69.2	
72	Agrico Baseline (Increment Expanding)	407.5	3071.3	7.2	115.9	-102.4	
73	Agrico Proposed (#179)	407.5	3071.3	7.2	115.9	118.2	
74	Mckay Bay Refuse to Energy (#086)	360.0	3091.9	57.1	76.4	--	Date <88
75	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**116.4**	**9093.7**	**Max Linn**
76	**Auburndale Cogeneration**	**420.8**	**3100.3**	**26.63**	**101.9**	**736.9**	**Max Linn**

EXHIBIT FDER-16D

CLASS I PSD SOURCE INVENTORY - NO_X

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	NO_X Emissions (TPY)	Comments
		East	North				
77	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**100.5**	**309.4**	**Max Linn**
78	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**113.8**	**962.9**	**Max Linn**

EXHIBIT FDER-16E

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
1	FPC/Debary Prop Turbines	467.5	3197.2	134.3	125.2	16199
2	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	10798
3	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	9589
4	Florida Crushed Stone Kiln 1 * changed 12/26/91	360.0	3162.4	103.8	20.0	3418
5,7	CF Ind. Baseline C, D	388.0	3116.0	49.6	68.9	-3501
6,8	CF Ind. Proposed C, D	388.0	3116.0	49.6	68.9	3793
9	Florida Mining & Materials Kiln 2	356.2	3169.9	112.2	14.6	50
10	TECO Big Bend- Unit 4	361.9	3075.0	52.3	93.2	22739
11	TECO Big Bend- Units 1 & 2 (24-hr) * combined 1/3/92	361.9	3075.0	52.3	93.2	-84605
12	TECO Big Bend- Unit 3 (24-hr)	361.9	3075.0	52.3	93.2	-42303
13	Pasco County Resource Recovery Facility	347.1	3139.2	93.6	27.4	490
14,15	FPC - Crystal River 4, 5	334.2	3204.5	153.2	21.1	70074
16	FPC - Crystal River 1	334.2	3204.5	153.2	21.1	-10906
17	FPC - Crystal River 2	334.2	3204.5	153.2	21.1	-64565
18	Orlando Utility Stanton 1	483.5	3150.6	103.4	142.5	3661
19	Orlando Utility Stanton 2 24 hr	483.5	3150.6	103.4	142.5	8419
20	Kissimmee Utility Existing	460.1	3129.3	71.9	125.2	1115
21	TECO Hardee Station	404.8	3057.4	19.0	126.1	9641
22	Stauffer (Shut Down)	325.6	3116.7	98.4	51.2	-1808
23	City of Lakeland - McIntosh 3	408.5	3105.8	32.4	90.8	17369
24	Hillsborough County Resource Recovery Facility	368.2	3092.7	49.7	78.1	743
25	Pinellas County Resource Recovery Facility	335.3	3084.4	79.6	81.5	2162
26	Evans Packing (Shut Down)	383.3	3135.8	69.2	52.4	0
27	Asphalt Pavers No. 4 * changed 1/3/92 * changed 12/26/91	361.4	3168.4	108.3	20.0	78

EXHIBIT FDER-16E
CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
28	Asphalt Pavers No. 3 * changed 1/3/92 * added 12/26/91	359.9	3162.4	103.8	19.9	78
29	City of Lakeland - Combustion Turbines	409.2	3102.8	29.3	93.3	1011
30	IMC - New Wales SAP #1, 2, 3 Baseline	396.6	3078.9	18.3	103.5	-5908
31	IMC - New Wales SAP #1, 2, 3 Projected	396.6	3078.9	18.3	103.5	6351
32	IMC - New Wales SAP #4, 5 Projected	396.6	3078.9	18.3	103.5	4234
33	IMC - New Wales DAP	396.6	3078.9	18.3	103.5	192
34	Proposed Pasco County Cogeneration Facility	385.6	3139.0	71.1	52.6	175
35	Proposed Lake County Cogeneration Facility	434.0	3198.8	126.5	92.6	175
36	CF Bartow Retired SAP	408.5	3083.0	10.7	107.2	-3841
37	CF Bartow DAP	408.5	3083.0	10.7	107.2	149
38	CF Bartow #7 SAP	408.5	3083.0	10.7	107.2	1837
39	CLM Chloride Metals (Shut Down)	361.8	3088.3	54.3	80.3	0
40	Conserve	398.4	3084.2	18.9	100.1	-528
41	Conserve No. 1 SAP	398.4	3084.2	18.9	100.1	1459
42	Farmland SAP 1, 2	409.5	3079.5	7.3	110.5	-1895
43	Farmland SAP 3, 4	409.5	3079.5	7.3	110.5	2333
44	Farmland SAP 5	409.5	3079.5	7.3	110.5	1457
45	IMC - Lonesome Mine Dry 1	389.6	3067.9	25.4	109.5	639
46	IMC - Lonesome Mine Dry 2	389.6	3067.9	25.4	109.5	735
47	Royster #1	406.7	3085.2	13.6	104.4	-8947
48	Royster #2	406.7	3085.2	13.6	104.4	1240
49,50	US Agrichem Fort Meade SAP 1, 2	416.1	3068.6	5.6	123.2	4376
51	US Agrichem Fort Meade SAP X	416.2	3068.7	5.5	123.1	-2737
52	Seminole (WR Grace) Retired SAP	409.7	3086.0	12.9	105.7	-7502

EXHIBIT FDER-16E

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
		East	North			
53	Seminole (WR Grace) 2 46 16	409.7	3086.0	12.9	105.7	2556
54	Seminole (WR Grace) 2 46 17	409.5	3086.5	13.4	105.2	2501
55	Cargill (Gardinier) SAP 4, 5, 6	363.4	3082.4	51.5	86.4	-6818
56,57	Cargill (Gardinier) SAP 7 Existing, Modification	363.4	3082.4	51.5	86.4	-485
58	AMAX (Mobil) Big 4 Mine	394.8	3067.7	20.4	112.1	21
59	AMAX (Mobil) Big 4 Mine	394.9	3069.8	19.8	110.4	568
60	Mobil - Nichols	398.3	3084.3	19.0	7.0	83
61	FDOC Boiler #3 * changed 1/3/92 * changed 1/8/92	382.2	3166.1	97.6	40.4	104
62	ER Jahna (Lime Dryer)	386.7	3155.8	86.4	47.4	28
63	Oman Construction (Asphalt Plant) (Shut down)	359.8	3164.9	106.0	19.5	0
64	Dris Paving (Asphalt Plant)	340.6	3119.2	86.4	46.5	8
65	Overstreet Paving (Asphalt) * changed 1/3/92 * changed 1/8/92	355.9	3143.7	90.9	27.0	127
66,67	New Port Richey Hospital Boiler #1, #2 * changed 1/3/92	331.2	3124.5	97.2	42.2	3
68,69	Hospital Corporation of America Boiler #1	333.4	3141.0	105.0	25.6	6
70	Couch Construction - Odessa (Asphalt) * changed 1/3/92	340.7	3119.5	86.5	46.2	252
71	Couch Construction - Zephyrhills (Asphalt) * changed 1/3/92	390.3	3129.4	60.4	61.8	123
72	Agrico Baseline	407.5	3071.3	7.2	115.9	-2626
73	Agrico Proposed	407.5	3071.3	7.2	115.9	3942
74	McKay Bay Refuse to Energy	360.0	3091.9	57.1	76.4	743
75	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**116.4**	**4074.1**
76	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**101.9**	**222.5**
77	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**100.5**	**479.7**
78	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**63.6**	**1270.0**

EXHIBIT FDER-16F

AAQS SOURCE INVENTORY - NO_X

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
1	Glades	ER Janna Lime Dryer	386.7	3155.9	86.7	0	1730	No	Q<20D
2	Hardee	American Orange Corp. (Permit Expired)	429.8	3047.3	30.8	0	616	No	Q<20D
3	Hardee	TECO Hardee Station	404.8	3057.4	19.0	5039	380	Yes	Q>20D
4	Hardee	Wachula Power	418.4	3047.0	27.2	65	545	No	Q<20D
5	Highlands	FPC - Avon Park	451.4	3050.5	43.9	27	877	No	Q<20D
6	Hillsborough	Alumax Extrusions	385.6	3097.0	36.8	129	737	No	Q<20D
7	Hillsborough	AMAX Mobil Mining - Big Four Mine	394.7	3069.6	20.1	0	401	No	Q<20D
8	Hillsborough	Cargill	362.9	3082.5	52.1	471	1042	No	Q<20D
9	Hillsborough	Cargill (Gardinier)	358.1	3091.7	59.0	0	1179	No	Q<20D
10	Hillsborough	CF Industries	388.0	3116.0	49.6	1116	993	Yes	Q>20D
11	Hillsborough	Hillsborough Co. Resource Recovery	368.2	3092.7	49.8	657	996	No	Q<20D
12	Hillsborough	IMC - Fort Lonesome	389.6	3067.9	25.3	608	506	Yes	Q>20D
13	Hillsborough	International Petroleum Corp. (Nat. Gas Fired)	389.0	3098.0	34.9	0	699	No	Q<20D
14	Hillsborough	John Carlo, Inc.	348.0	3096.4	70.0	0	1400	No	Q<20D
15	Hillsborough	Mckay Bay Refuse-To-Energy	360.0	3091.9	57.2	1310	1144	Yes	Q>20D
16	Hillsborough	TECO - Big Bend Station	361.9	3075.0	52.4	41912	1048	Yes	Q>20D
17	Hillsborough	TECO - Gannon Station	360.0	3087.5	56.0	28083	1120	Yes	Q>20D
18	Hillsborough	TECO - Hookers Station	358.0	3091.0	58.8	3573	1177	Yes	Q>20D
19	Hillsborough	Consolidated Minerals	393.8	3096.3	30.4	148	607.3	No	Q<20D
20	Hillsborough	CLM - Chloride Metals (Shut Down)	361.8	3088.3	54.4	0	1089	No	Q<20D
21	Orange	Orlando Utilities Stanton #1	483.5	3150.6	103.0	10982	2060	No	Too Far
22	Orange	Orlando Utilities Stanton #2	483.5	3150.6	103.0	3188	2060	No	Too Far
23	Osceola	FPC Intercession City	446.3	3126.0	61.2	1748	1224	Yes	Q>20D
24	Osceola	Kissimee Utilities	460.1	3129.3	71.9	1625	1437.6	Yes	Q>20D
25	Pasco	Couch Construction Co. (Zepherhills)	390.3	3129.4	60.5	0	1209	No	Q<20D

EXHIBIT FDER-16F

AAQS SOURCE INVENTORY - NO_X

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
26	Pasco	Couch Const. Odessa	340.7	3119.5	86.6	6	1732	No	Q<20D
27	Pasco	Dris Paving	340.6	3119.2	86.4	100	1728	No	Q<20D
28	Pasco	Evans (Shut Down)				0		No	Q<20D
29	Pasco	New Port Richey Community Hospital	333.4	3133.0	100.2	2	2004.0	No	Q<20D
30	Pasco	Overstreet Paving Co.	355.9	3143.7	91.0	5	1820	No	Q<20D
31	Pasco	Pasco Cogen	385.6	3139.0	71.1	405	1422.9	No	Q<20D
32	Pasco	Pasco County Resource Recovery	347.0	3139.0	93.6	1183	1873	No	Q<20D
33	Pinellas	Pinellas Resource Recovery Facility	335.2	3084.1	79.8	947	1595	No	Q<20D
34	Pinellas	Stauffer Chemical Co. (Shut Down)	325.6	3116.7	98.5	0	1970	No	Q<20D
35	Polk	Adams Packing	421.7	3104.2	31.2	16	623	No	Q<20D
36	Polk	Agrico Chemical Co. - Pierce	403.7	3079.0	11.8	81	235	No	Q>20D
37	Polk	Alcoma Packing Co.	451.6	3085.5	39.1	59	781	No	Q<20D
38	Polk	Allsun Products (Shut Down)	413.5	3093.8	19.9	0	398	No	Q<20D
39	Polk	Bordo Citrus Product Co.	427.8	3097.5	27.2	29	544	No	Q<20D
40	Polk	Cargill (Gardinier)	415.3	3063.3	10.7	176	213	No	Q<20D
41	Polk	CF - Bartow	408.5	3083.0	10.8	0	216	No	Q<20D
42	Polk	Citrus Hill Manufacturing Co.	411.6	3081.4	8.0	11	159	No	Q<20D
43	Polk	Citrus Hill Manufacturing Co. (Frost Proof)	447.9	3068.3	34.2	313	684	No	Q<20D
44	Polk	Citrus World	441.0	3087.3	30.0	1303	599	Yes	Q>20D
45	Polk	City of Lakeland CT's	409.2	3102.8	29.2	186	584	No	Q<20D
46	Polk	City of Lakeland - Larsen Station	409.0	3106.2	32.7	92	654	No	Q<29D
47	Polk	City of Lakeland - McIntosh	408.5	3105.8	32.4	1557	648	Yes	Q>20D
48	Polk	Coca Cola	421.6	3103.7	30.7	270	614	No	Q<20D
49	Polk	Conserve (Nichols)	398.7	3084.2	18.7	13	374	No	Q<20D
50	Polk	Dundee Citrus	438.8	3099.9	35.7	17	714	No	Q<20D

EXHIBIT FDER-16F

AAQS SOURCE INVENTORY - NO_X

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
51	Polk	Estech-Agricola (Shut Down)						No	Shut Down
52	Polk	Farmland (SAP 5)	409.5	3080.1	7.8	52	156	No	Q<20D
53	Polk	Farmland Industries	409.5	3080.1	7.8	205	156	Yes	Q>20D
54	Polk	Florida Distillers - Lake Alfred	428.0	3108.1	36.8	17	737	No	Q<20D
55	Polk	Florida Distillers Co. (Aubrundale)	421.4	3102.9	29.9	194	597	No	Q<20D
56	Polk	Holly Hill Fruit Products	441.0	3115.4	49.3	15	987	No	Q<20D
57	Polk	IMC - New Wales	396.7	3079.4	18.3	367	367	Yes	Q=20D
58	Polk	IMC Noralyn	414.7	3080.3	6.4	0	128	No	Q<20D
59	Polk	IMC Prairie	402.9	3087.0	17.4	0	348	No	Q<20D
60	Polk	John Carlo Inc.	426.2	3104.1	32.5	12	649	No	Q<20D
61	Polk	Juice Bowl Products	409.4	3099.9	26.5	39	529	No	Q<20D
62	Polk	Kaplan Industries, Inc.	418.3	3079.3	6.7	20	134	No	Q<20D
63	Polk	Laidlaw Env. Services, Inc.	424.0	3091.9	20.4	0	409	No	Q<20D
64	Polk	Mobil - Electrophos Division (Shut Down)							Shut Down
65	Polk	Mobil Mining & Minerals	398.4	3085.3	19.5	125	390	No	Q<20D
66	Polk	Owens Brockway (Illinois)	423.4	3102.3	28.9	393	675	No	Q<20D
67	Polk	Owens-Illinois	406.0	3102.3	29.6	391	591	No	Q<20D
68	Polk	Pavex Corp.	413.0	3086.2	12.4	24	247	No	Q<20D
69	Polk	Royster Mulberry	406.8	3085.1	13.2	20	265	No	Q<20D
70	Polk	Schering Berlin Polymers,Inc.	410.7	3098.9	25.3	530	505	Yes	Q>20D
71	Polk	Seminole Fertilizer Corp. (WR Grace)	409.8	3086.6	13.5	552	269	Yes	Q>20D
72	Polk	US Agrichem - Bartow	413.2	3086.3	12.3	21	247	No	Q<20D
73	Polk	US Agrichem - Fort Meade	416.0	3069.0	5.2	13	104	No	Q<20D
74	Polk	Agrico - S. Pierce	407.5	3071.5	7.2	139	144	No	Q<20D
75	Sumter	FDOC Boiler #3	382.2	3166.1	97.6	100	1952	No	Q<20D

EXHIBIT FDER-16F

AAQS SOURCE INVENTORY - NO_X

No.	County	Source Name	UTM Coordinates		Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
			East (km)	North (km)					
76	Polk	TECO Polk County	402.4	3067.4	13.4	9093.7	270.0	Yes	Max Linn
77	Polk	Auburndale Cogeneration	420.8	3100.3	30.13	736.9	603	Yes	Max Linn
78	Polk	Ridge Cogeneration	416.7	3100.4	26.63	309.4	532	No	Q<20D
79	Osceola	Kissimmee Utilities	447.68	3127.9	113.83	962.9	1271	No	Q<20D

EXHIBIT FDER-16G
AAQS SOURCE INVENTORY - SO_2

No.	County	Source Name	UTM Coordinates East (Km)	UTM Coordinates North (Km)	Distance (Km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)
1	Polk	Adams Packing	421.7	3104.2	31.2	94	624	No
2	Polk	Agrico - S. Pierce	407.5	3071.5	7.1	3206	142	Yes
3	Polk	Alcoma Packing	451.6	3085.5	39.2	328	783	No
4	Hardee	American Orange Corp.	429.8	3047.3	30.8	198	617	No
5	Polk	Brewer/Pavex Co.	413.0	3086.2	12.4	75	247	No
6	Polk	CF - Bartow	408.4	3082.4	10.3	3904	206	Yes
7	Polk	Citrus Hill	447.9	3068.3	34.2	410	683	No
8	Polk	Citrus World	441.0	3087.3	30.0	877	599	Yes
9	Polk	Conserve - Nichols	398.7	3084.2	18.6	1582	372	Yes
10	Hillsborough	Consolidated Minerals	393.8	3096.3	30.3	817	606	Yes
11	Polk	Farmland - Green Bay	409.5	3080.1	7.8	3825	156	Yes
12	Highlands	FPC - Avon Park	451.4	3050.5	43.9	58	879	No
13	Polk	Gardinier Mine (Cargil) Ft. Meade	415.3	3063.3	10.7	1173	213	Yes
14	Hardee	TECO - Hardee Station	404.8	3057.4	19.0	16081	380	Yes
15	Polk	Holly Hill Fruit	441.0	3115.4	49.4	398	988	No
16	Hillsborough	IMC - Lonesome Mine	389.6	3067.9	25.3	1547	506	Yes
17	Polk	IMC - New Wales	396.7	3079.4	18.3	10561	367	Yes
18	Polk	IMC - Noralyn	414.7	3080.3	6.4	505	128	Yes
19	Polk	IMC - Prairie	402.9	3087.0	17.3	137	346	No
20	Hillsborough	International Petroleum	389.0	3098.0	34.9	61	697	No
21	Polk	John Carlo Florida	426.2	3104.1	32.5	33	650	No
22	Polk	City of Lakeland - Larsen Station	409.0	3106.2	32.7	3998	654	Yes
23	Polk	City of Lakeland - McIntosh Station	409.2	3106.2	32.7	30176	654	Yes
24	Polk	Mobil - Nichols	398.4	3085.3	19.5	898	390	Yes

EXHIBIT FDER-16G

AAQS SOURCE INVENTORY - SO_2

No.	County	Source Name	UTM Coordinates East (Km)	UTM Coordinates North (Km)	Distance (Km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)
25	Polk	Owens-Illinois Glass	406.0	3102.3	29.6	21	591	No
26	Polk	Royster - Mulberry	406.8	3085.1	13.4	1265	268	Yes
27	Polk	WR Grace (Seminole)	409.8	3086.6	13.4	8674	269	Yes
28	Hillsborough	TECO - Big Bend	361.9	3075.0	52.3	237646	1046	Yes
29	Hillsborough	TECO - Gannon	360.0	3087.5	55.9	126940	1118	Yes
30	Hillsborough	TECO - Hookers PT	358.0	3091.0	58.7	13522	1175	Yes
31	Polk	Laidlaw Environmental Services	422.7	3091.9	19.9	240	398	No
32	Polk	US Agrichem - Fort Meade	416.0	3069.0	5.2	2710	104	Yes
33	Hardee	Wachula City Power	418.4	3047.0	27.2	180	545	No
34	Hillsborough	CF Industries	388.0	3116.0	49.4	7096	988	Yes
35	Hillsborough	Hillsborough County Resource Recovery Facility	368.2	3092.7	49.7	893	994	No
36	Polk	AMAX (Mobil) Big 4 Mine	394.7	3096.6	20.0	569	399	Yes
37	Polk	US Agrichem - Bartow	413.2	3086.3	12.4	423	249	Yes
38	Polk	Coca Cola	421.6	3103.7	30.7	119	614	No
39	Polk	Agrico - Pierce	403.7	3079.0	11.7	417	233	Yes
40	Polk	Kaplan Industries	418.3	3079.3	6.8	337	136	Yes
41	Polk	Bordo Citrus	427.8	3097.5	27.2	60	545	No
42	**Polk**	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**4074.1**	**270**	**Max Linn**
43	**Polk**	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**222.5**	**603**	**Max Linn**
44	**Polk**	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**479.7**	**532**	**Max Linn**
45	**Osceola**	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**1022**	**1271**	**Max Linn**
46	**Hillsborough**	**McKay Bay Refuse to Energy**	**360.0**	**3091.9**	**57.1**	**743.9**	**1137**	**No**

EXHIBIT FDER-16H

AAQS SOURCE INVENTORY - PM

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
1	Glades	ER Janna Lime Dryer	386.7	3155.9	86.7	139.0	1730.0	No	Q<20D
2	Hardee	American Orange Corp. (Permit Expired)	429.8	3047.3	30.8	0.0	615.7	No	Q<20D
3	Hardee	TECO Hardee	404.8	3057.4	19.0	131.0	380.0	No	Q<20D
4	Hardee	Wachula Power	418.4	3047.0	27.4	20.0	547.0	No	Q<20D
5	Highlands	FPC - Avon Park	451.4	3050.5	43.9	422.8	877.3	No	Q<20D
6	Hillsborough	Alumax Extrusions	385.6	3097.0	36.8	57.9	736.8	No	Q<20D
7	Hillsborough	AMAX Mobil Mining - Big Four Mine	394.7	3069.6	20.1	50.2	401.3	No	Q<20D
8	Hillsborough	Cargill	362.9	3082.5	52.1	874.7	1042.3	No	Q<20D
9	Hillsborough	Cargill (Gardinier)	358.1	3091.7	59.0	5.8	1179.0	No	Q<20D
10	Hillsborough	CF Industries	388.0	3116.0	49.6	878.5	992.8	No	Q<20D
11	Hillsborough	CLM - Chloride Metals (Shut Down)	361.8	3088.3	54.4	0.0	1089.0	No	Q<20D
12	Hillsborough	Consolidated Minerals	393.8	3096.3	30.4	507.0	607.3	No	Q<20D
13	Hillsborough	Hillsborough Co. Resource Recovery	368.2	3092.7	49.8	174.1	995.7	No	Q<20D
14	Hillsborough	IMC - Fort Lonesome	389.6	3067.9	25.2	634.0	503.0	Yes	Q>20D
15	Hillsborough	International Petroleum Corp. (Nat. Gas Fired)	389.0	3098.0	34.9	0.0	698.8	No	Q<20D
16	Hillsborough	John Carlo, Inc.	348.0	3096.4	70.0	8.0	1400.3	No	Q<20D
17	Hillsborough	Mckay Bay Refuse-To-Energy	360.0	3091.9	57.2	250.9	1144.1	No	Q<20D
18	Hillsborough	TECO-Gannon Sta.	360.0	3087.5	56.0	6305.8	1119.5	Yes	Q>20D
19	Hillsborough	TECO-Hookers Sta.	358.0	3091.0	58.8	1227.4	1176.8	Yes	Q>20D
20	Hillsborough	TECO-Big Bend Sta.	361.9	3075.0	52.4	7869.8	1048.2	Yes	Q>20D
21	Manatee	FPL Manatee	367.3	3054.2	50.7	2965.0	1014.0	Yes	Q>20D
22	Orange	Orlando Utilities Stanton #1	483.5	3150.6	103.0	548.0	2060	No	Too Far
23	Orange	Orlando Utilities Stanton #2	483.5	3150.6	103.0	375.0	2060	No	Too Far
24	Osceola	FPC Intercession City	446.3	3126.0	61.2	108.0	1224.0	No	Q<20D

EXHIBIT FDER-16H

AAQS SOURCE INVENTORY - PM

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
25	Osceola	Kissimee Utilities	460.1	3129.3	71.9	102.5	1437.6	No	Q<20D
26	Pasco	Couch Const. Odessa	340.7	3119.5	86.6	2.8	1731.6	No	Q<20D
27	Pasco	Couch Construction - Zepherhills	390.3	3129.4	60.5	15.9	1209.3	No	Q<20D
28	Pasco	Dris Paving	340.6	3119.2	86.4	100.0	1728.0	No	Q<20D
29	Pasco	Evans (Shut Down)				0.0		No	Q<20D
30	Pasco	New Port Richey Community Hospital	333.4	3133.0	100.2	0.2	2004.0	No	Q<20D
31	Pasco	Overstreet Paving Co.	355.9	3143.7	91.0	3.5	1820.2	No	Q<20D
32	Pasco	Pasco Cogen	385.6	3139.0	71.1	27.0	1422.9	No	Q<20D
33	Pasco	Pasco County Resource Recovery	347.0	3139.0	93.6	59.1	1872.7	No	Q<20D
34	Pinellas	Pinellas Resource Recovery Facility	335.2	3084.1	79.8	373.4	1595.1	No	Q<20D
35	Pinellas	Stauffer Chemical Co. (Shut Down)	325.6	3116.7	98.5	0	1969.7	No	Q<20D
36	Polk	Adams Packing	421.7	3104.2	31.2	144.0	623.0	No	Q<20D
37	Polk	Agrico - Pierce	403.7	3079.0	11.8	605.2	229.0	Yes	Q>20D
38	Polk	Agrico - S. Pierce	407.7	3071.5	7.2	232.0	144.0	Yes	Q>20D
39	Polk	Alcoa	416.8	3116.0	42.1	446.0	842.0	No	Q<20D
40	Polk	Alcoma Packing Co.	451.6	3085.5	39.1	59.7	781.2	No	Q<20D
41	Polk	Allsun Products (Shut Down)	413.5	3093.8	19.9	0.0	398.3	No	Q<20D
42	Polk	Bordo Citrus Product Co.	427.8	3097.5	27.2	0.0	543.8	No	Q<20D
43	Polk	Cargill (Gardinier) - Fort Meade	415.3	3063.3	10.8	132.0	216.0	No	Q<20D
44	Polk	CF - Bartow	408.5	3083.0	10.8	805.0	215.8	Yes	Q>20D
45	Polk	Citrus Hill Manufacturing Co.	411.6	3081.4	8.0	0.4	159.4	No	Q<20D
46	Polk	Citrus Hill Manufacturing Co. (Frost Proof)	447.9	3068.3	34.2	50.0	684.0	No	Q<20D
47	Polk	Citrus World	441.0	3087.3	30.1	412.0	602.0	No	Q<20D
48	Polk	Coca Cola	421.6	3103.7	30.7	332.0	613.0	No	Q<20D

EXHIBIT FDER-16H

AAQS SOURCE INVENTORY - PM

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
49	Polk	Conserve	398.7	3084.2	18.4	1590.0	368.0	Yes	Q>20D
50	Polk	C&M Products	405.5	3079.1	9.9	37.0	198.0	No	Q<20D
51	Polk	Dundee Citrus	438.8	3099.9	35.7	0.0	714.5	No	Q<20D
52	Polk	Earl Massey	440.4	3103.4	39.5	39.0	790.0	No	Q<20D
53	Polk	Eger Concrete	428.1	3102.0	31.3	34.0	627.0	No	Q<20D
54	Polk	ER Carpenter	397.0	3131.5	60.0	55.0	1199.0	No	Q<20D
55	Polk	Erly Juice	399.0	3101.8	31.6	13.0	632.0	No	Q<20D
56	Polk	Estech-Agricola (Shut Down)							Q<20D
57	Polk	Ewell Industries	406.3	3092.9	20.4	103.0	408.0	No	Q<20D
58	Polk	Farmland - Bartow	409.5	3080.1	7.6	230.0	152.0	Yes	Q>20D
59	Polk	Farmland (SAP 5)	409.5	3080.1	7.8	0.0	156.8	No	Q<20D
60	Polk	Florida Distillers Co. (Aubrundale)	421.4	3102.9	29.9	2.3	597.1	No	Q<20D
61	Polk	Florida Distillers - Lake Alfred	428.0	3108.1	36.8	4.1	736.8	No	Q<20D
62	Polk	Florida Mining & Materials (Eger)	420.8	3103.4	30.2	118.0	604.0	No	Q<20D
63	Polk	Florida Privitization	418.3	3048.0	26.4	279.6	527.0	No	Q<20D
64	Polk	Florida Tile	405.4	3102.4	29.7	73.0	593.0	No	Q<20D
65	Polk	Holly Hill Fruit Products	441.0	3115.4	49.3	94.0	986.9	No	Q<20D
66	Polk	IMC - Kingsford	398.2	3075.7	15.9	162.0	318.0	No	Q<20D
67	Polk	IMC - New Wales	396.7	3079.4	18.1	1322.0	362.0	Yes	Q>20D
68	Polk	IMC - Noralyn	414.7	3080.3	6.3	682.0	127.0	Yes	Q>20D
69	Polk	IMC - Prairie	402.9	3087.0	17.1	5.0	342.0	No	Q<20D
70	Polk	Imperial Phosphates	404.8	3069.5	10.2	39.0	205.0	No	Q<20D
71	Polk	John Carlo (Asphalt Plant)	426.2	3104.1	32.5	12.4	649.0	No	Q<20D
72	Polk	Juice Bowl Products	409.4	3099.9	26.5	0.3	529.2	No	Q<20D
73	Polk	Kaiser Aluminum	408.3	3085.5	12.8	95.5	257.0	No	Q<20D

EXHIBIT FDER-16H

AAQS SOURCE INVENTORY - PM

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
74	Polk	Kaplan Industries,Inc.	418.3	3079.3	6.7	12.0	134.4	No	Q<20D
75	Polk	Laidlaw Env. Services,Inc.	424.0	3091.9	20.4	1.3	408.9	No	Q<20D
76	Polk	City of Lakeland CT's	408.5	3105.8	29.2	74.0	584.0	No	Q<20D
77	Polk	City of Lakeland - Larsen Station	409.0	3106.2	32.6	128.0	652.0	No	Q>20D
78	Polk	City Of Lakeland - McIntosh	408.5	3105.8	32.4	2358.0	648.5	Yes	Q>20D
79	Polk	Macasphalt	423.1	3101.5	29.0	49.0	579.0	No	Q<20D
80	Polk	Mobil Electrophos (Shut Down)	405.6	3079.4	10.0	0	200.0	No	Q<20D
81	Polk	Mobil - Nichols	398.4	3085.3	19.3	385.0	385.0	Yes	Q=20D
82	Polk	Orange Company of Florida	418.7	3083.6	10.7	91.0	214.0	No	Q<20D
83	Polk	Owens Brockway (Illinois)	423.4	3102.3	28.9	188.2	596.4	No	Q<20D
84	Polk	Pavers Inc.	414.0	3098.2	24.2	113.0	484.0	No	Q<20D
85	Polk	Pavex Corp.	413.0	3086.2	12.4	12.6	247.4	No	Q<20D
86	Polk	Quikrete	412.8	3099.0	25.0	190.0	501.0	No	Q<20D
87	Polk	Ridge Pallets	418.6	3084.1	11.1	78.0	222.0	No	Q<20D
88	Polk	Rinker Cencon	412.4	3099.0	25.1	159.0	501.0	No	Q<20D
89	Polk	Royster (PSD)	406.8	3085.1	13.2	105.0	265.0	No	Q<20D
90	Polk	Schering Berlin Polymers,Inc.	410.7	3098.9	25.3	27.6	505.2	No	Q<20D
91	Polk	Seminole Fertilizer Corp. (WR Grace)	409.8	3086.6	13.5	948.7	269.5	Yes	Q>20D
92	Polk	Standard Sand & Silica	441.5	3118.2	52.1	286.0	1041.0	No	Q<20D
93	Polk	Sun Pac	422.7	3092.6	20.5	62.0	411.0	No	Q<20D
94	Polk	US Agrichem - Bartow	413.2	3086.3	12.3	268.0	247.0	Yes	Q>20D
95	Polk	US Agrichem - Fort Meade	416.0	3069.0	5.2	691	103.7	Yes	Q>20D
96	Polk	Vigoro	427.9	3097.4	27.2	136.0	544.0	No	Q<20D
97	Sumter	FDOC Boiler #3	382.2	3166.1	97.6	100.0	1952.0	No	Q<20D
98	**Polk**	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**1337.4**	**270**	**Yes**	**Max Linn**

EXHIBIT FDER-16H

AAQS SOURCE INVENTORY - PM

No.	County	Source Name	UTM Coordinates East (km)	UTM Coordinates North (km)	Distance (km)	Emissions (TPY)	Screen (Q=20*D)	Model? (Yes/No)	Comments
99	**Polk**	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**1279.2**	**603**	**Yes**	**Max Linn**
100	**Polk**	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**414.0**	**532**	**No**	**Q<20D**
101	**Hillsborough**	**McKay Bay Refuse to Energy**	**360.0**	**3091.9**	**56.8**	**244**	**1137**	**No**	**Q<20D**

EXHIBIT FDER-16I

CLASS II PSD INCREMENT ANALYSES RESULTS

Pollutant	Averaging Period	Maximum[1] Concentration ($\mu g/m^3$)	Receptor Location[2] X (m)	Receptor Location[2] Y (m)	Period Julian Day	Period Ending Hour	Period Year	Allowable Class II Increments ($\mu g/m^3$)
Nitrogen Dioxide	Annual	**5.3**	2,500	-500	N/A	N/A	1986	25
Sulfur Dioxide	3-Hour	271.8	1,000	-500	42	3	1983	512
	24-Hour	67.2	1,000	-500	226	N/A	1984	91
	Annual	**3.5**	**-13,156**	**-4,789**	N/A	N/A	1982	20
Particulate Matter (TSP)	24-Hour	**17.8**	**-13,156**	**-4,789**	361	N/A	1986	37
	Annual	**2.1**	**-2,320**	**0**	N/A	N/A	1986	19

(1) Maximum short-term concentrations are highest, second-highest values.

(2) With respect to zero point of 414.30 km E; 3,073.88 km N.

N/A = Not Applicable

Source: Ebasco Environmental, 1992

EXHIBIT FDER-16J
CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates East	UTM Coordinates North	Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
1	FPC/Debary Prop Turbines	467.5	3197.2	134.3	125.2	16199
2	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	10798
3	FPC Intercession City Prop. Turbines	446.3	3126.0	61.2	113.2	9589
4	Florida Crushed Stone Kiln 1 * changed 12/26/91	360.0	3162.4	103.8	20.0	3418
5,7	CF Ind. Baseline C, D	388.0	3116.0	49.6	68.9	-3501
6,8	CF Ind. Proposed C, D	388.0	3116.0	49.6	68.9	3793
9	Florida Mining & Materials Kiln 2	356.2	3169.9	112.2	14.6	50
10	TECO Big Bend- Unit 4	361.9	3075.0	52.3	93.2	22739
11	TECO Big Bend- Units 1 & 2 (24-hr) * combined 1/3/92	361.9	3075.0	52.3	93.2	-84605
12	TECO Big Bend- Unit 3 (24-hr)	361.9	3075.0	52.3	93.2	-42303
13	Pasco County Resource Recovery Facility	347.1	3139.2	93.6	27.4	490
14,15	FPC - Crystal River 4, 5	334.2	3204.5	153.2	21.1	70074
16	FPC - Crystal River 1	334.2	3204.5	153.2	21.1	-10906
17	FPC - Crystal River 2	334.2	3204.5	153.2	21.1	-64565
18	Orlando Utility Stanton 1	483.5	3150.6	103.4	142.5	3661
19	Orlando Utility Stanton 2 24 hr	483.5	3150.6	103.4	142.5	8419
20	Kissimmee Utility Existing	460.1	3129.3	71.9	125.2	1115
21	TECO Hardee Station	404.8	3057.4	19.0	126.1	9641
22	Stauffer (Shut Down)	325.6	3116.7	98.4	51.2	-1808
23	City of Lakeland - McIntosh 3	408.5	3105.8	32.4	90.8	17369
24	Hillsborough County Resource Recovery Facility	368.2	3092.7	49.7	78.1	743
25	Pinellas County Resource Recovery Facility	335.3	3084.4	79.6	81.5	2162
26	Evans Packing (Shut Down)	383.3	3135.8	69.2	52.4	0
27	Asphalt Pavers No. 4 * changed 1/3/92 * changed 12/26/91	361.4	3168.4	108.3	20.0	78

EXHIBIT FDER-16J

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
		East	North			
28	Asphalt Pavers No. 3 * changed 1/3/92 * added 12/26/91	359.9	3162.4	103.8	19.9	78
29	City of Lakeland - Combustion Turbines	409.2	3102.8	29.3	93.3	1011
30	IMC - New Wales SAP #1, 2, 3 Baseline	396.6	3078.9	18.3	103.5	-5908
31	IMC - New Wales SAP #1, 2, 3 Projected	396.6	3078.9	18.3	103.5	6351
32	IMC - New Wales SAP #4, 5 Projected	396.6	3078.9	18.3	103.5	4234
33	IMC - New Wales DAP	396.6	3078.9	18.3	103.5	192
34	Proposed Pasco County Cogeneration Facility	385.6	3139.0	71.1	52.6	175
35	Proposed Lake County Cogeneration Facility	434.0	3198.8	126.5	92.6	175
36	CF Bartow Retired SAP	408.5	3083.0	10.7	107.2	-3841
37	CF Bartow DAP	408.5	3083.0	10.7	107.2	149
38	CF Bartow #7 SAP	408.5	3083.0	10.7	107.2	1837
39	CLM Chloride Metals (Shut Down)	361.8	3088.3	54.3	80.3	0
40	Conserve	398.4	3084.2	18.9	100.1	-528
41	Conserve No. 1 SAP	398.4	3084.2	18.9	100.1	1459
42	Farmland SAP 1, 2	409.5	3079.5	7.3	110.5	-1895
43	Farmland SAP 3, 4	409.5	3079.5	7.3	110.5	2333
44	Farmland SAP 5	409.5	3079.5	7.3	110.5	1457
45	IMC - Lonesome Mine Dry 1	389.6	3067.9	25.4	109.5	639
46	IMC - Lonesome Mine Dry 2	389.6	3067.9	25.4	109.5	735
47	Royster #1	406.7	3085.2	13.6	104.4	-8947
48	Royster #2	406.7	3085.2	13.6	104.4	1240
49,50	US Agrichem Fort Meade SAP 1, 2	416.1	3068.6	5.6	123.2	4376
51	US Agrichem Fort Meade SAP X	416.2	3068.7	5.5	123.1	-2737
52	Seminole (WR Grace) Retired SAP	409.7	3086.0	12.9	105.7	-7502

EXHIBIT FDER-16J

CLASS I PSD SOURCE INVENTORY - SO_2

No.	Name	UTM Coordinates		Distance to Polk Site (km)	Nearest Class I Recept. (km)	Emissions (TPY)
		East	North			
53	Seminole (WR Grace) 2 46 16	409.7	3086.0	12.9	105.7	2556
54	Seminole (WR Grace) 2 46 17	409.5	3086.5	13.4	105.2	2501
55	Cargill (Gardinier) SAP 4, 5, 6	363.4	3082.4	51.5	86.4	-6818
56,57	Cargill (Gardinier) SAP 7 Existing, Modification	363.4	3082.4	51.5	86.4	-485
58	AMAX (Mobil) Big 4 Mine	394.8	3067.7	20.4	112.1	21
59	AMAX (Mobil) Big 4 Mine	394.9	3069.8	19.8	110.4	568
60	Mobil - Nichols	398.3	3084.3	19.0	7.0	83
61	FDOC Boiler #3 * changed 1/3/92 * changed 1/8/92	382.2	3166.1	97.6	40.4	104
62	ER Jahna (Lime Dryer)	386.7	3155.8	86.4	47.4	28
63	Oman Construction (Asphalt Plant) (Shut down)	359.8	3164.9	106.0	19.5	0
64	Dris Paving (Asphalt Plant)	340.6	3119.2	86.4	46.5	8
65	Overstreet Paving (Asphalt) * changed 1/3/92 * changed 1/8/92	355.9	3143.7	90.9	27.0	127
66,67	New Port Richey Hospital Boiler #1, #2 * changed 1/3/92	331.2	3124.5	97.2	42.2	3
68,69	Hospital Corporation of America Boiler #1	333.4	3141.0	105.0	25.6	6
70	Couch Construction - Odessa (Asphalt) * changed 1/3/92	340.7	3119.5	86.5	46.2	252
71	Couch Construction - Zephyrhills (Asphalt) * changed 1/3/92	390.3	3129.4	60.4	61.8	123
72	Agrico Baseline	407.5	3071.3	7.2	115.9	-2626
73	Agrico Proposed	407.5	3071.3	7.2	115.9	3942
74	McKay Bay Refuse to Energy	360.0	3091.9	57.1	76.4	743
75	**TECO Polk County**	**402.4**	**3067.4**	**13.4**	**116.4**	**4074.1**
76	**Auburndale Cogeneration**	**420.8**	**3100.3**	**30.13**	**101.9**	**222.5**
77	**Ridge Cogeneration**	**416.7**	**3100.4**	**26.63**	**100.5**	**479.7**
78	**Kissimmee Utilities**	**447.68**	**3127.9**	**113.83**	**63.6**	**1270.0**

EXHIBIT FDER-16K
OPTIONS SELECTED FOR MESOPUFF II PROGRAM
PROPOSED FPC POLK COUNTY SITE

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NSYR, NSDAY, NSHR	Year, start day and hour	As needed
NADVTS	Number of hours in run	As needed
NPTS	Number of point sources	As needed
NAREAS	Number of area sources	Not used
NREC	Number of non-gridded receptors	13 (Class I area)
NSPEC	Number of chemical species to model	1 (SO_2)
3. CARD GROUP 3 - COMPUTATIONAL VARIABLES		
IAVG	Concentration averaging time	24 hours
NPUF	Puff release rate for each source	1 puff/hour
NSAMAD	Minimum sampling rate	2 samples/hour
LVSAMP	Variable sampling rate option	True (increase rate with higher wind speeds)
WSAMP	Reference wind speed used in variable sampling rate option (used if LVSAMP is true)	2 m/s
LSGRID	Control variable for concentration computations at sampling grid points	False (sampling at non-gridded points only)
AGEMIN	Minimum age of puffs to be sampled	900 seconds (should not be larger than 3600 seconds)
4. CARD GROUP 4 - GRID INFORMATION		
Various	Numbers that define the beginning and end of the meteorological and computational grids	1,15

EXHIBIT FDER-16K
OPTIONS SELECTED FOR MESOPUFF II PROGRAM
PROPOSED FPC POLK COUNTY SITE

Variable	Description	Selected Value
MESHDN	Sampling grid spacing factor	1
5. CARD GROUP 5 - TECHNICAL OPTIONS		
LGAUSS	Vertical concentration distribution option	True
LCHEM	Chemical transformation option	False (1)
LDRY	Dry deposition option	False (1)
LWET	Wet deposition option	False (1)
L3VL	Three vertical layer option	False (1)
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
Various	Disk and printer option to write data to disk	As needed
LPRINT	Printer output option (Print every IPRINT hours)	True
IPRINT	Printing interval	24 hours
7. CARD GROUP 7 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Control variable for input of dispersion parameters	1 (see Card Group 8)
IOPTS(2)	Control variable for input of diffusivity constants	0 (Default)
IOPTS(3)	Control variable for input of SO2 canopy resistance	0 (Default)
IOPTS(4)	Control variable for input of dry deposition parameters	0 (Default)
IOPTS(5)	Control variable for input of wet removal parameters	0 (Default)
IOPTS(6)	Control variable for input of chemical transormation method	0 (Default)

EXHIBIT FDER-16K
OPTIONS SELECTED FOR MESOPUFF II PROGRAM
PROPOSED FPC POLK COUNTY SITE

Variable	Description	Selected Value
8. CARD GROUP 8 - DISPERSION PARAMETERS		
AY, BY, AZ, BZ, AZT	Arrays of dispersion coefficients	Default
TMDEP	Distance beyond which the time-dependent equations are used for sigma y and z	50,000 m (Default is 100,000 m)
JSUP	Stability class used to determine growth rates for puffs above boundary layer	5 (Default)
9.- 13. CARD GROUPS 9 TO 13		
Various	Options input to override default values	Not used
14. CARD GROUP 14 - POINT SOURCE DATA		
Various	Point source information-location, stack and emission data	As needed
15. CARD GROUP 15 - AREA SOURCE DATA		
Various	Area source information-location, initial dispersion and emission data	Not used
16. CARD GROUP 16 - NON-GRIDDED RECEPTOR COORDINATES		
XREC, YREC	X- and Y-coordinates of non-gridded receptors	Used

(1) This option was not used when the MESOPUFF II model was run in the inert mode. In the enhanced mode, this option was considered.

EXHIBIT FDER-16L
SUMMARY OF 1982 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
3-Hour Concentration Analysis												
161	3	6/10	5	28.21	1.40	0.11	26.92	No				
161	3	6/10	11	26.21	2.20	0.091	24.10	No				
161	3	6/10	12	40.64	0.67	0.091	40.06	No				
24-Hour Concentration Analysis												
22	24	1/22	1	5.34	0.58	0.14	4.90	No				
30	24	1/30	3	5.79	0.40	1.08	6.47	Yes	1.25	2.55	4.88	No
154	24	6/3	5	5.54	0.26	0.11	5.39	Yes	1.86	-4.39	-2.42	No
154	24	6/3	6	5.82	0.23	0.11	5.70	Yes	1.89	-4.16	-2.15	No
154	24	6/3	7	5.51	0.20	0.13	5.43	Yes	1.61	-3.95	-2.22	No
154	24	6/3	10	5.07	0.21	0.14	5.01	Yes	0.92	-3.67	-2.60	No
154	24	6/3	11	5.21	0.22	0.13	5.12	Yes	1.06	-3.52	-2.33	No
154	24	6/3	12	5.07	0.24	0.12	4.95	No				
155	24	6/4	6	5.74	0.25	0.00	5.48	No				
155	24	6/4	7	6.11	0.24	0.00	5.87	No				
155	24	6/4	8	5.70	0.24	0.00	5.46	No				
155	24	6/4	9	5.18	0.24	0.00	4.94	No				
155	24	6/4	10	5.22	0.21	0.00	5.01	No				
161	24	6/10	12	5.99	0.087	0.045	5.95	No				
177	24	6/26	5	5.09	0.36	0.024	4.76	No				
177	24	6/26	6	5.12	0.31	0.027	4.83	No				
177	24	6/26	7	5.27	0.28	0.028	5.02	No				
188	24	7/7	1	5.03	0.68	2.01	6.36	Yes	0.75	-3.01	-0.25	No
192	24	7/11	4	5.14	0.17	2.10	7.06	Yes	0.74	-1.62	1.21	No

EXHIBIT FDER-16L
SUMMARY OF 1982 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)			Concentration (µg/m³)			
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)	Is Increment Exceeded and FPC's Impact Above SIL?	ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	Is Increment Exceeded and FPC's Impact Above SIL?
194	24	7/13	4	5.18	0.29	1.53	6.42	Yes	2.23	4.41	8.17	Yes
196	24	7/15	2	5.48	0.21	0.36	5.64	Yes	1.03	1.15	2.54	No
196	24	7/15	3	6.21	0.18	0.37	6.40	Yes	0.73	1.12	2.22	No
196	24	7/15	4	6.36	0.15	0.36	6.58	Yes	0.92	1.11	2.39	No
200	24	7/19	2	5.43	0.24	0.11	5.30	Yes	1.00	-13.45	-12.35	No
205	24	7/24	4	5.52	0.60	0.00074	4.92	No				
221	24	8/9	3	5.24	1.11	3.22	7.35	Yes	0.12	-0.53	2.81	No
221	24	8/9	4	5.53	1.39	3.28	7.42	Yes	0.51	-0.35	3.44	No
223	24	8/11	2	5.65	0.085	0.46	6.02	Yes	0.54	0.52	1.51	No
223	24	8/11	3	5.92	0.14	0.43	6.20	Yes	0.64	0.46	1.52	No
230	24	8/18	4	5.72	0.58	0.85	6.00	Yes	0.80	-3.17	-1.52	No
230	24	8/18	5	5.49	0.59	0.88	5.78	Yes	0.46	-2.81	-1.47	No
230	24	8/18	12	5.41	0.56	1.04	5.89	Yes	0.32	-4.18	-2.82	No
230	24	8/18	13	6.23	0.50	1.05	6.78	Yes	0.30	-4.27	-2.92	No
332	24	11/28	13	5.22	0.68	0.64	5.17	Yes	0.46	2.05	3.15	No
335	24	12/1	6	5.33	0.077	0.80	6.05	Yes	2.06	1.72	4.58	No
356	24	12/22	3	5.02	0.46	0.019	4.58	No				
356	24	12/22	4	5.89	0.52	0.016	5.38	No				

EXHIBIT FDER-16L

SUMMARY OF 1982 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
358	24	12/24	2	5.09	0.30	1.66	6.45	Yes	0.28	0.54	2.48	No
358	24	12/24	3	5.59	0.30	1.40	6.69	Yes	0.95	1.57	3.92	No
358	24	12/24	4	5.53	0.29	1.11	6.35	Yes	1.17	2.62	4.90	No
358	24	12/24	5	5.21	0.24	0.81	5.78	Yes	1.42	3.46	5.69	Yes
361	24	12/27	1	5.94	1.05	1.20	6.09	Yes	0.76	3.75	5.71	Yes

Note: MESOPUFF II modeling is performed in the inert mode (i.e., without chemical transformation or wet/dry deposition).

(1) No additional analysis is needed if no exceedance of the increment is predicted or the proposed FPC facility's impacts are less than the National Park Service (NPS) significant impact levels.

EXHIBIT FDER-16M
SUMMARY OF 1983 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (μg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (μg/m³)			Concentration (μg/m³)			
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)	Is Increment Exceeded and FPC's Impact Above SIL?	ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	Is Increment Exceeded and FPC's Impact Above SIL?
24-Hour Concentration Analysis												
26	24	1/26	1	5.56	0.96	0.0013	4.60	No				
32	24	2/1	4	5.17	1.70	1.35	4.82	No				
32	24	2/1	11	5.23	1.43	1.48	5.28	Yes	0.57	-3.38	-1.33	No
32	24	2/1	12	5.85	1.49	1.44	5.80	Yes	0.62	-3.48	-1.42	No
32	24	2/1	13	6.07	1.49	1.39	5.97	Yes	0.67	-3.13	-1.07	No
64	24	3/5	1	5.25	1.26	0.061	4.05	No				
64	24	3/5	6	5.06	1.27	0.76	4.55	No				
104	24	4/14	12	5.11	0.36	0.038	4.79	No				
104	24	4/14	13	5.08	0.45	0.12	4.75	No				
121	24	5/1	1	7.56	0.42	0.025	7.17	No				
121	24	5/1	2	7.34	0.42	0.022	6.94	No				
121	24	5/1	3	6.46	0.43	0.019	6.05	No				
122	24	5/2	4	5.52	0.52	0.54	5.54	Yes	0.80	3.58	4.92	No
123	24	5/3	11	5.39	0.078	0.45	5.76	Yes	0.075	-3.25	-2.73	No
130	24	5/10	6	5.47	0.25	0.20	5.42	Yes	1.20	1.77	3.17	No
130	24	5/10	13	5.22	0.24	0.18	5.16	Yes	0.81	1.51	2.50	No
135	24	5/15	9	5.06	0.90	1.45	5.61	Yes	0.65	1.79	3.89	No
192	24	7/11	5	5.51	0.14	0.00027	5.37	No				
194	24	7/13	3	5.36	0.12	0.11	5.35	Yes	0.59	1.44	2.14	No
211	24	7/30	1	5.53	0.15	1.00	6.38	Yes	1.42	3.00	5.42	Yes
211	24	7/30	2	5.33	0.15	0.97	6.15	Yes	0.54	2.67	4.18	No
211	24	7/30	3	6.29	0.15	0.96	7.10	Yes	1.40	2.31	4.67	No

EXHIBIT FDER-16M
SUMMARY OF 1983 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
211	24	7/30	4	5.23	0.15	0.97	6.05	Yes	0.81	1.92	3.70	No
216	24	8/4	1	6.84	0.082	2.16	8.92	Yes	0.60	-3.18	-0.42	No
216	24	8/4	2	6.89	0.16	2.09	8.82	Yes	1.13	-2.96	0.26	No
216	24	8/4	3	5.11	0.29	2.02	6.84	Yes	0.39	-2.67	-0.26	No
235	24	8/23	4	5.05	0.18	4.03	8.90	Yes	0.76	2.92	7.71	Yes
235	24	8/23	5	5.58	0.081	4.09	9.59	Yes	1.32	3.49	8.91	Yes
243	24	8/31	3	5.98	0.20	0.14	5.91	Yes	1.25	-13.60	-12.22	No
243	24	8/31	4	5.38	0.26	0.15	5.27	Yes	0.75	-13.47	-12.57	No
246	24	9/3	1	5.76	0.079	0.00	5.68	No				
247	24	9/4	5	5.14	0.72	0.21	4.64	No				
247	24	9/4	10	5.12	0.68	0.23	4.67	No				

Note: MESOPUFF II modeling is performed in the inert mode (i.e., without chemical transformation or wet/dry deposition).

(1) No additional analysis is needed if no exceedance of the increment is predicted or the proposed FPC facility's impacts are less than the National Park Service (NPS) significant impact levels.

EXHIBIT FDER-16N

SUMMARY OF 1984 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)			Concentration (µg/m³)			
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)	Is Increment Exceeded and FPC's Impact Above SIL?	ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	Is Increment Exceeded and FPC's Impact Above SIL?
24-Hour Concentration Analysis												
64	24	3/4	3	5.54	0.51	0.31	5.34	Yes	2.12	3.72	6.15	Yes
83	24	3/23	2	5.72	0.072	0.36	6.01	Yes	0.82	0.30	1.48	No
83	24	3/23	3	5.89	0.12	0.34	6.11	Yes	1.21	0.19	1.75	No
83	24	3/23	4	5.01	0.22	0.33	5.12	Yes	1.14	0.087	1.55	No
143	24	5/22	2	5.06	0.11	0.73	5.68	Yes	0.26	1.75	2.73	No
143	24	5/22	3	6.25	0.10	0.69	6.84	Yes	0.77	1.51	2.96	No
143	24	5/22	4	7.10	0.088	0.65	7.65	Yes	1.34	1.21	3.19	No
143	24	5/22	5	6.33	0.088	0.60	6.84	Yes	1.10	0.80	2.49	No
143	24	5/22	11	5.40	0.082	0.57	5.88	Yes	1.05	1.07	2.68	No
143	24	5/22	12	5.02	0.077	0.58	5.53	Yes	0.82	1.33	2.74	No
149	24	5/28	1	5.42	0.52	0.61	5.51	Yes	0.81	1.11	2.53	No
166	24	6/14	4	5.26	0.31	1.04	5.99	Yes	0.16	0.99	2.19	No
166	24	6/14	5	6.53	0.41	1.08	7.20	Yes	0.68	0.60	2.36	No
166	24	6/14	6	6.00	0.50	1.12	6.61	Yes	0.50	0.22	1.84	No
166	24	6/14	7	5.54	0.59	1.16	6.11	Yes	0.75	-0.048	1.87	No
166	24	6/14	8	5.08	0.59	1.14	5.63	Yes	0.88	-0.089	1.93	No
170	24	6/18	1	5.70	0.30	1.63	7.04	Yes	0.48	1.74	3.85	No

Note: MESOPUFF II modeling is performed in the inert mode (i.e., without chemical transformation or wet/dry deposition).

EXHIBIT FDER-16N
SUMMARY OF 1984 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
365	24	12/30	2	5.67	0.59	1.76	6.84	Yes	0.43	-3.98	-1.79	No
365	24	12/30	3	6.55	0.61	1.80	7.75	Yes	0.70	-3.67	-1.17	No
365	24	12/30	4	6.97	0.61	1.87	8.23	Yes	0.66	-3.17	-0.64	No
365	24	12/30	5	5.92	0.60	1.99	7.31	Yes	0.28	-2.31	-0.04	No
365	24	12/30	6	5.23	0.55	2.08	6.76	Yes	1.44	-1.69	1.83	No
365	24	12/30	13	5.13	0.55	1.74	6.32	Yes	0.36	-6.50	-4.40	No

(1) No additional analysis is needed if no exceedance of the increment is predicted or the proposed FPC facility's impacts are less than the National Park Service (NPS) significant impact levels.

EXHIBIT FDER-160

SUMMARY OF 1985 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
3-Hour Concentration Analysis												
302	3	10/29	9	25.54	1.36	0.058	24.25	No				
24-Hour Concentration Analysis												
54	24	2/23	1	5.26	0.20	0.90	5.97	Yes	0.46	2.11	3.47	No
54	24	2/23	2	5.50	0.24	0.91	6.17	Yes	0.56	2.01	3.49	No
54	24	2/23	3	5.39	0.34	0.90	5.95	Yes	0.60	1.89	3.39	No
176	24	6/25	12	6.02	0.30	0.00	5.72	No				
176	24	6/25	13	6.60	0.19	0.00	6.41	No				
201	24	7/20	5	5.02	0.16	0.63	5.49	Yes	2.02	-9.76	-7.11	No
212	24	7/31	2	5.03	0.68	0.39	4.75	No				
212	24	7/31	3	5.62	0.67	0.38	5.34	Yes	0.66	1.02	2.06	No
232	24	8/20	1	5.20	0.14	0.0060	5.06	No				
232	24	8/20	2	5.36	0.18	0.0075	5.19	No				
242	24	8/30	1	6.00	1.32	1.80	6.48	Yes	0.18	-2.21	-0.23	No
242	24	8/30	2	5.24	1.23	1.88	5.89	Yes	0.21	-1.79	0.30	No
242	24	8/30	6	6.32	0.89	2.26	7.68	Yes	2.46	2.74	7.46	Yes
242	24	8/30	11	5.56	0.84	2.11	6.83	Yes	1.51	1.77	5.39	Yes
242	24	8/30	12	6.12	0.88	1.94	7.18	Yes	2.10	1.17	5.21	Yes
242	24	8/30	13	5.41	0.94	1.83	6.30	Yes	1.67	0.52	4.02	No
302	24	10/29	8	5.22	0.73	0.16	4.65	No				
302	24	10/29	9	5.34	0.67	0.21	4.89	No				
302	24	10/29	10	5.30	0.83	0.20	4.67	No				
329	24	11/25	1	5.32	0.27	0.00075	5.06	No				

EXHIBIT FDER-16O

SUMMARY OF 1985 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)			Concentration (µg/m³)			
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)	Is Increment Exceeded and FPC's Impact Above SIL?	ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	Is Increment Exceeded and FPC's Impact Above SIL?
334	24	11/30	2	6.36	0.083	0.013	6.29	No				
334	24	11/30	3	8.00	0.13	0.019	7.89	No				
334	24	11/30	4	9.05	0.20	0.033	8.88	No				
334	24	11/30	5	8.41	0.32	0.070	8.16	No				
334	24	11/30	6	6.84	0.42	0.12	6.54	Yes	0.39	-1.24	-0.73	No
334	24	11/30	7	6.52	0.48	0.17	6.21	Yes	1.31	-1.61	-0.13	No
334	24	11/30	8	5.89	0.47	0.15	5.56	Yes	0.73	-1.41	-0.54	No
334	24	11/30	9	5.33	0.48	0.14	4.99	No				
334	24	11/30	10	6.19	0.42	0.070	5.84	No	0.48	-0.71	-0.16	No
334	24	11/30	11	5.92	0.34	0.032	5.61	No				
335	24	12/1	1	5.01	1.19	0.035	3.85	No				
357	24	12/23	13	5.37	1.00	0.00	4.36	No				

Note: MESOPUFF II modeling is performed in the inert mode (i.e., without chemical transformation or wet/dry deposition).

(1) No additional analysis is needed if no exceedance of the increment is predicted or the proposed FPC facility's impacts are less than the National Park Service (NPS) significant impact levels.

EXHIBIT FDER-16P

SUMMARY OF 1986 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)			Concentration (µg/m³)			
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)	Is Increment Exceeded and FPC's Impact Above SIL?	ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	Is Increment Exceeded and FPC's Impact Above SIL?
3-Hour Concentration Analysis												
205	3	7/24	4	32.34	1.01	0.00	31.32	No				
205	3	7/24	12	29.36	1.97	0.00	27.39	No				
205	3	7/24	13	42.88	0.67	0.00	42.20	No				
24-Hour Concentration Analysis												
36	24	2/5	10	5.04	0.25	0.00	4.79	No				
36	24	2/5	11	5.07	0.10	0.00	4.98	No				
41	24	2/10	4	5.25	0.77	0.0078	4.49	No				
41	24	2/10	11	6.09	1.52	0.014	4.59	No				
41	24	2/10	12	6.17	0.99	0.013	5.19	No				
41	24	2/10	13	5.13	0.59	0.012	4.55	No				
94	24	4/4	2	5.10	0.13	0.00	4.97	No				
94	24	4/4	3	5.32	0.12	0.00	5.21	No				
166	24	6/15	3	5.35	0.32	1.04	6.07	Yes	1.53	-20.14	-17.57	No
167	24	6/16	1	5.22	0.98	0.29	4.53	No				
167	24	6/16	2	5.27	0.99	0.29	4.57	No				
167	24	6/16	5	5.51	0.12	0.32	5.70	Yes	0.58	-2.95	-2.05	No
167	24	6/16	6	6.21	1.39	0.33	5.15	Yes	0.72	-3.05	-2.00	No
167	24	6/16	7	5.58	1.56	0.34	4.36	No				
167	24	6/16	8	5.02	1.55	0.32	3.79	No				
167	24	6/16	10	5.70	1.39	0.28	4.58	No				
167	24	6/16	11	6.94	1.21	0.24	5.97	Yes	0.91	-2.88	-1.73	No
167	24	6/16	12	6.52	1.09	0.21	5.64	Yes	0.83	-2.86	-1.82	No
167	24	6/16	13	5.02	0.98	0.19	4.23	No				
179	24	6/28	3	5.54	0.12	0.0054	5.42	No				

EXHIBIT FDER-16P

SUMMARY OF 1986 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
186	24	7/5	4	5.32	0.17	0.90	6.06	Yes	1.87	-3.31	-0.53	No
186	24	7/5	5	6.20	0.20	0.92	6.91	Yes	1.05	-2.53	-0.56	No
186	24	7/5	6	6.03	0.23	0.95	6.74	Yes	1.02	-2.01	-0.05	No
186	24	7/5	7	5.12	0.25	0.97	5.84	Yes	0.79	-1.77	-0.01	No
186	24	7/5	8	5.11	0.25	0.94	5.80	Yes	0.85	-1.76	0.03	No
186	24	7/5	10	5.21	0.23	0.85	5.83	Yes	0.68	-2.13	-0.59	No
186	24	7/5	11	5.38	0.20	0.78	5.96	Yes	0.47	-2.76	-1.51	No
186	24	7/5	12	5.46	0.17	0.72	6.00	Yes	0.50	-3.52	-2.31	No
205	24	7/24	1	9.29	0.16	0.0021	9.14	No				
205	24	7/24	2	8.20	0.24	0.0023	7.96	No				
205	24	7/24	3	7.66	0.36	0.0025	7.30	No				
205	24	7/24	12	6.17	0.78	0.0026	5.40	No				
205	24	7/24	13	8.30	0.46	0.0022	7.84	No				
215	24	8/3	4	5.98	0.82	0.14	5.30	Yes	1.62	-1.07	0.69	No
215	24	8/3	5	5.36	0.59	0.15	4.92	No				
215	24	8/3	6	6.21	0.46	0.15	5.90	Yes	0.47	-1.14	-0.52	No
215	24	8/3	7	7.53	0.43	0.16	7.26	Yes	0.79	-1.20	-0.25	No
215	24	8/3	8	7.67	0.42	0.16	7.41	Yes	0.53	-1.26	-0.57	No
215	24	8/3	9	8.43	0.43	0.16	8.17	Yes	0.90	-1.35	-0.29	No
215	24	8/3	10	7.28	0.41	0.16	7.04	Yes	0.40	-1.37	-0.81	No
215	24	8/3	11	6.82	0.48	0.15	6.49	Yes	0.37	-1.42	-0.90	No
215	24	8/3	12	6.62	0.61	0.14	6.16	Yes	0.55	-1.50	-0.81	No
215	24	8/3	13	5.33	0.79	0.13	4.67	No				
220	24	8/8	1	5.00	0.60	0.47	4.87	No				
220	24	8/8	2	5.13	0.49	0.44	5.08	Yes	0.92	3.08	4.44	No
220	24	8/8	3	5.08	0.37	0.41	5.12	Yes	1.32	2.93	4.66	No
223	24	8/11	4	5.43	0.16	0.59	5.86	Yes	1.91	2.19	4.69	No
242	24	8/30	1	5.79	0.83	0.20	5.17	Yes	0.48	-6.83	-6.15	No
242	24	8/30	2	7.07	0.85	0.21	6.43	Yes	0.55	-6.87	-6.11	No
242	24	8/30	3	8.65	0.86	0.22	8.01	Yes	0.92	-6.95	-5.81	No

EXHIBIT FDER-16P
SUMMARY OF 1986 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
USING THE ISCST AND MESOPUFF II MODELS
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
242	24	8/30	4	8.35	0.85	0.24	7.74	Yes	0.77	-7.12	-6.12	No
242	24	8/30	5	5.90	0.80	0.26	5.36	Yes	0.29	-7.32	-6.78	No
253	24	9/10	4	5.30	0.45	1.37	6.22	Yes	0.43	-10.76	-8.96	No
253	24	9/10	5	5.51	0.54	1.37	6.34	Yes	0.72	-10.27	-8.18	No
256	24	9/13	10	5.44	0.55	0.16	5.05	Yes	0.39	-1.75	-1.20	No
256	24	9/13	11	6.73	0.69	0.15	6.19	Yes	0.62	-1.66	-0.89	No
256	24	9/13	12	7.49	0.76	0.15	6.88	Yes	0.76	-1.59	-0.68	No
256	24	9/13	13	7.54	0.76	0.14	6.91	Yes	1.01	-1.51	-0.36	No
270	24	9/27	2	5.59	0.28	0.10	5.41	Yes	0.66	1.82	2.58	No
270	24	9/27	3	6.04	0.21	0.11	5.94	Yes	0.94	1.77	2.82	No
272	24	9/29	1	5.05	0.40	0.00	4.64	No				
272	24	9/29	2	5.06	0.40	0.00	4.66	No				
275	24	10/2	4	5.01	0.083	0.045	4.97	No				
298	24	10/25	5	5.18	0.22	1.80	6.77	Yes	1.21	0.18	3.20	No
298	24	10/25	12	6.00	0.12	1.53	7.40	Yes	0.87	-2.70	-0.30	No
299	24	10/26	8	5.05	0.57	0.00	4.48	No				
299	24	10/26	9	5.68	0.58	0.00	5.10	No				
309	24	11/5	3	5.41	0.10	0.56	5.87	Yes	1.04	-6.61	-5.01	No
328	24	11/24	1	5.10	0.16	1.61	6.55	Yes	0.77	7.30	9.69	Yes
328	24	11/24	4	5.40	0.20	0.88	6.08	Yes	1.80	5.76	8.44	Yes
328	24	11/24	5	5.03	0.20	0.60	5.43	Yes	1.61	4.29	6.50	Yes
328	24	11/24	6	5.28	0.19	0.41	5.50	Yes	2.31	3.01	5.73	Yes
329	24	11/25	1	6.29	0.79	1.08	6.58	Yes	0.11	5.25	6.44	Yes
329	24	11/25	2	5.51	0.87	0.86	5.50	Yes	0.13	5.36	6.35	Yes
329	24	11/25	3	5.47	0.93	0.67	5.21	Yes	0.45	5.25	6.37	Yes
329	24	11/25	4	5.79	1.01	0.50	5.29	Yes	0.43	4.93	5.86	Yes

EXHIBIT FDER-16P

SUMMARY OF 1986 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT USING THE ISCST AND MESOPUFF II MODELS

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the ISCST Model)

Time Period			Receptor	ISCST Concentrations (µg/m³)		MESOPUFF Step 1 (1)			MESOPUFF Step 2			
						Concentration (µg/m³)		Is Increment Exceeded and FPC's Impact Above SIL?	Concentration (µg/m³)			Is Increment Exceeded and FPC's Impact Above SIL?
Julian Day	Hour Ending	Calendar Date Month/Day	Receptor Number	All Sources (A)	Proposed FPC Sources (B)	MESOPUFF II FPC Only (C)	Adjusted Total (A-B+C)		ISCST for Sources <=50 km of Class I Area (D)	MESOPUFF for Non-FPC Sources >50 km of Class I Area (E)	Adjusted Total (C+D+E)	
329	24	11/25	5	5.38	1.10	0.31	4.59	No				
329	24	11/25	12	5.51	0.96	0.37	4.92	No				
329	24	11/25	13	6.36	0.88	0.53	6.02	Yes	0.76	3.92	5.21	Yes
344	24	12/10	13	5.81	2.64	0.17	3.35	No				
353	24	12/19	7	6.43	0.12	0.97	7.28	Yes	1.38	-0.38	1.96	No
353	24	12/19	8	5.64	0.12	0.92	6.44	Yes	0.97	-0.28	1.62	No

Note: MESOPUFF II modeling is performed in the inert mode (i.e., without chemical transformation or wet/dry deposition).

(1) No additional analysis is needed if no exceedance of the increment is predicted or the proposed FPC facility's impacts are less than the National Park Service (NPS) significant impact levels.

EXHIBIT FDER-16Q

SUMMARY OF 1982 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model through Step 2)

Time Period			Rec.	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³)						MESOPUFF Step 4 Concentration (µg/m³)					
						Case 1 (1)		Case 2 (2)		Case 3 (3)		Case 1 (1)		Case 2 (2)		Case 3 (3)	
Julian Day	Hour End	Month/ Day	Rec. No.	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 2 for Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adj. Total (A+B+C)	MESOPUFF FPC Only (D)	Adj. Total (A+B+D)	MESOPUFF FPC Only (E)	Adj. Total (A+B+E)	Non-FPC Src. >50 km of Class I Area (F)	Adj. Total (A+C+F)	Non-FPC Src. >50 km of Class I Area (G)	Adj. Total (A+D+G)	Non-FPC Src. >50 km of Class I Area (H)	Adj. Total (A+E+H)
24-Hour Concentration Analysis																	
194	24	7/13	4	2.23	4.41	0.78	7.42	0.76	7.40	0.65	7.29	2.83	5.84	2.77	5.76	2.31	5.19
358	24	12/24	5	1.42	3.46	0.74	5.62	0.74	5.62	0.74	5.62	3.27	5.43	3.27	5.43	3.26	5.42
361	24	12/27	1	0.76	3.75	1.10	5.61	1.10	5.61	1.10	5.61	3.19	5.05	3.19	5.05	3.19	5.05

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
(2) Case 2 includes options in Case 1 plus wet deposition.
(3) Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.

EXHIBIT FDER-16R

SUMMARY OF 1982 PREDICTED CONCENTRATIONS COMPARED TO THE SO_2 PSD CLASS I INCREMENT
AFTER MESOPUFF II MODEL, STEPS 3 AND 4, CASE 4 (1)
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model through Step 4, Case 3)

Time Period			Receptor	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³) Case 4		MESOPUFF Step 4 Concentration (µg/m³) Case 4	
Julian Day	Hour Ending	Month/ Day	Receptor Number	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 4, Case 3 Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adjusted Total (A+B+C)	Non-FPC Src. >50 km of Class I Area (D)	Adjusted Total (A+C+D)
24-Hour Concentration Analysis									
194	24	7/13	4	2.23	2.31	0.45	4.99	NA	NA
358	24	12/24	5	1.42	3.26	0.45	5.13	0.79	2.66
361	24	12/27	1	0.76	3.19	0.64	4.59	NA	NA

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
Case 2 includes options in Case 1 plus wet deposition.
Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.
Case 4 includes options in Case 3 plus option for uniform vertical concentration distribution instead of Gaussian.

EXHIBIT FDER-16S

SUMMARY OF 1983 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT
REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4
(Based on the FPC Facility's Impacts
Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 2)

Time Period			Rec.	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³)						MESOPUFF Step 4 Concentration (µg/m³)					
						Case 1 (1)		Case 2 (2)		Case 3 (3)		Case 1 (1)		Case 2 (2)		Case 3 (3)	
Julian Day	Hour End	Month/ Day	Rec. No.	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 2 for Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adj. Total (A+B+C)	MESOPUFF FPC Only (D)	Adj. Total (A+B+D)	MESOPUFF FPC Only (E)	Adj. Total (A+B+E)	Non-FPC Src. >50 km of Class I Area (F)	Adj. Total (A+C+F)	Non-FPC Src. >50 km of Class I Area (G)	Adj. Total (A+D+G)	Non-FPC Src. >50 km of Class I Area (H)	Adj. Total (A+E+H)
24-Hour Concentration Analysis																	
211	24	7/30	1	1.42	3.00	0.89	5.31	0.88	5.30	0.88	5.30	2.69	4.999	NA	NA	NA	NA
235	24	8/23	4	0.76	2.92	2.68	6.36	2.68	6.36	3.22	6.89	1.91	5.35	1.91	5.35	1.74	5.72
235	24	8/23	5	1.32	3.49	2.74	7.56	2.74	7.56	3.21	8.03	2.35	6.42	2.35	6.42	2.21	6.75

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
(2) Case 2 includes options in Case 1 plus wet deposition.
(3) Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.

EXHIBIT FDER-16T
SUMMARY OF 1983 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4, CASE 4 (1)
(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 4, Case 3)

Time Period			Receptor	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³) Case 4		MESOPUFF Step 4 Concentration (µg/m³) Case 4	
Julian Day	Hour Ending	Month/ Day	Receptor Number	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 4, Case 3 Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adjusted Total (A+B+C)	Non-FPC Src. >50 km of Class I Area (D)	Adjusted Total (A+C+D)
24-Hour Concentration Analysis									
235	24	8/23	4	0.76	1.74	1.78	4.28	NA	NA
235	24	8/23	5	1.32	2.21	1.88	5.41	0.82	4.03

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
Case 2 includes options in Case 1 plus wet deposition.
Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.
Case 4 includes options in Case 3 plus option for uniform vertical concentration distribution instead of Gaussian.

EXHIBIT FDER-16U

SUMMARY OF 1984 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT

REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4

(Based on the FPC Facility's Impacts Predicted to be

Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 2)

Time Period			Rec.	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³)						MESOPUFF Step 4 Concentration (µg/m³)					
				ISCST for Sources <=50 km of Class I Area	MESOPUFF Step 2 for Non-FPC Sources >50 km of Class I Area	Case 1 (1)		Case 2 (2)		Case 3 (3)		Case 1 (1)		Case 2 (2)		Case 3 (3)	
Julian Day	Hour End	Month/ Day	Rec. No.	(A)	(B)	MESOPUFF FPC Only (C)	Adj. Total (A+B+C)	MESOPUFF FPC Only (D)	Adj. Total (A+B+D)	MESOPUFF FPC Only (E)	Adj. Total (A+B+E)	Non-FPC Src. >50 km of Class I Area (F)	Adj. Total (A+C+F)	Non-FPC Src. >50 km of Class I Area (G)	Adj. Total (A+D+G)	Non-FPC Src. >50 km of Class I Area (H)	Adj. Total (A+E+H)
24-Hour Concentration Analysis																	
64	24	3/4	3	2.12	3.72	0.24	6.08	0.24	6.08	0.22	6.06	2.89	5.25	2.89	5.25	2.84	5.18

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
(2) Case 2 includes options in Case 1 plus wet deposition.
(3) Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.

EXHIBIT FDER-16V

SUMMARY OF 1984 PREDICTED CONCENTRATIONS COMPARED TO THE SO_2 PSD CLASS I INCREMENT AFTER MESOPUFF II MODEL, STEPS 3 AND 4, CASE 4 (1)

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 4, Case 3)

Time Period			Receptor	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³) Case 4		MESOPUFF Step 4 Concentration (µg/m³) Case 4	
Julian Day	Hour Ending	Month/ Day	Receptor Number	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 4, Case 3 Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adjusted Total (A+B+C)	Non-FPC Src. >50 km of Class I Area (D)	Adjusted Total (A+C+D)
24-Hour Concentration Analysis									
64	24	3/4	3	2.12	2.84	0.19	5.15	1.75	4.06

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
Case 2 includes options in Case 1 plus wet deposition.
Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.
Case 4 includes options in Case 3 plus option for uniform vertical concentration distribution instead of Gaussian.

EXHIBIT FDER-16W

SUMMARY OF 1985 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 2)

Time Period			Rec.	Concentration (μg/m³)		MESOPUFF Step 3 Concentration (μg/m³)						MESOPUFF Step 4 Concentration (μg/m³)					
						Case 1 (1)		Case 2 (2)		Case 3 (3)		Case 1 (1)		Case 2 (2)		Case 3 (3)	
Julian Day	Hour End	Month/ Day	Rec. No.	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 2 for Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adj. Total (A+B+C)	MESOPUFF FPC Only (D)	Adj. Total (A+B+D)	MESOPUFF FPC Only (E)	Adj. Total (A+B+E)	Non-FPC Src. >50 km of Class I Area (F)	Adj. Total (A+C+F)	Non-FPC Src. >50 km of Class I Area (G)	Adj. Total (A+D+G)	Non-FPC Src. >50 km of Class I Area (H)	Adj. Total (A+E+H)
24-Hour Concentration Analysis																	
242	24	8/30	6	2.46	2.74	2.10	7.30	1.95	7.15	1.95	7.15	2.56	7.12	2.51	6.92	2.51	6.92
242	24	8/30	11	1.51	1.77	1.94	5.22	1.85	5.13	1.85	5.13	1.58	5.03	1.50	4.86	NA	NA
242	24	8/30	12	2.10	1.17	1.80	5.07	1.74	5.01	1.74	5.01	1.01	4.91	NA	NA	NA	NA

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
(2) Case 2 includes options in Case 1 plus wet deposition.
(3) Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.

EXHIBIT FDER-16X

SUMMARY OF 1985 PREDICTED CONCENTRATIONS COMPARED TO THE SO_2 PSD CLASS I INCREMENT

AFTER MESOPUFF II MODEL, STEPS 3 AND 4, CASE 4 (1)

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 4, Case 3)

Time Period			Receptor	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³)		MESOPUFF Step 4 Concentration (µg/m³)	
						Case 4		Case 4	
Julian Day	Hour Ending	Month/ Day	Receptor Number	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 4, Case 3 Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adjusted Total (A+B+C)	Non-FPC Src. >50 km of Class I Area (D)	Adjusted Total (A+C+D)
24-Hour Concentration Analysis									
242	24	8/30	6	2.46	2.51	1.17	6.14	1.32	4.95

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
Case 2 includes options in Case 1 plus wet deposition.
Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.
Case 4 includes options in Case 3 plus option for uniform vertical concentration distribution instead of Gaussian.

EXHIBIT FDER-16Y

SUMMARY OF 1986 PREDICTED VIOLATIONS OF THE SO_2 PSD CLASS I INCREMENT REMAINING AFTER MESOPUFF II MODEL, STEPS 3 AND 4

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 2)

Time Period			Rec.	Concentration ($\mu g/m^3$)		MESOPUFF Step 3 Concentration ($\mu g/m^3$)						MESOPUFF Step 4 Concentration ($\mu g/m^3$)					
						Case 1 (1)		Case 2 (2)		Case 3 (3)		Case 1 (1)		Case 2 (2)		Case 3 (3)	
Julian Day	Hour End	Month/ Day	Rec. No.	ISCST for Sources <=50 km of Class I Area (A)	MESOPUFF Step 2 for Non-FPC Sources >50 km of Class I Area (B)	MESOPUFF FPC Only (C)	Adj. Total (A+B+C)	MESOPUFF FPC Only (D)	Adj. Total (A+B+D)	MESOPUFF FPC Only (E)	Adj. Total (A+B+E)	Non-FPC Src. >50 km of Class I Area (F)	Adj. Total (A+C+F)	Non-FPC Src. >50 km of Class I Area (G)	Adj. Total (A+D+G)	Non-FPC Src. >50 km of Class I Area (H)	Adj. Total (A+E+H)
24-Hour Concentration Analysis																	
328	24	11/24	1	0.77	7.30	1.35	9.42	1.35	9.42	1.33	9.40	5.97	8.09	5.97	8.09	5.94	8.04
328	24	11/24	4	1.80	5.76	0.73	8.30	0.73	8.30	0.72	8.28	4.35	6.88	4.35	6.88	4.30	6.82
328	24	11/24	5	1.61	4.29	0.50	6.40	0.50	6.40	0.49	6.39	3.18	5.29	3.18	5.29	3.11	5.21
328	24	11/24	6	2.31	3.01	0.34	5.66	0.34	5.66	0.33	5.65	2.22	4.87	NA	NA	NA	NA
329	24	11/25	1	0.11	5.25	0.90	6.25	0.90	6.25	0.90	6.25	4.51	5.51	4.51	5.51	4.41	5.41
329	24	11/25	2	0.13	5.36	0.71	6.21	0.71	6.21	0.71	6.21	4.40	5.25	4.40	5.25	4.30	5.15
329	24	11/25	3	0.45	5.25	0.55	6.25	0.55	6.25	0.56	6.25	4.16	5.16	4.16	5.16	4.06	5.06
329	24	11/25	4	0.43	4.93	0.41	5.77	0.41	5.77	0.41	5.77	3.77	4.61	NA	NA	NA	NA
329	24	11/25	13	0.76	3.92	0.40	5.08	0.40	5.08	0.40	5.08	2.70	3.86	NA	NA	NA	NA

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
(2) Case 2 includes options in case 1 plus wet deposition.
(3) Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.

EXHIBIT FDER-16Z

SUMMARY OF 1986 PREDICTED CONCENTRATIONS COMPARED TO THE SO_2 PSD CLASS I INCREMENT AFTER MESOPUFF II MODEL, STEPS 3 AND 4, CASE 4 (1)

(Based on the FPC Facility's Impacts Predicted to be Greater than the Significant Impact Levels (SIL) Using the MESOPUFF II Model Through Step 4, Case 3)

Time Period			Receptor	Concentration (µg/m³)		MESOPUFF Step 3 Concentration (µg/m³)		MESOPUFF Step 4 Concentration (µg/m³)	
						Case 4		Case 4	
Julian Day	Hour Ending	Month/ Day	Receptor Number	ISCST for Sources <=50 km of Class 1 Area (A)	MESOPUFF Step 4, Case 3 Non-FPC Sources >50 km of Class 1 Area (B)	MESOPUFF FPC Only (C)	Adjusted Total (A+B+C)	Non-FPC Src. >50 km of Class I Area (D)	Adjusted Total (A+C+D)
24-Hour Concentration Analysis									
328	24	11/24	1	0.77	5.94	0.46	7.18	1.94	3.17
328	24	11/24	4	1.80	4.30	0.25	6.35	1.16	3.21
328	24	11/24	5	1.61	3.11	0.17	4.89	0.86	2.64
329	24	11/25	1	0.11	4.41	0.44	4.96	NA	NA
329	24	11/25	2	0.13	4.30	0.34	4.78	NA	NA
329	24	11/25	3	0.45	4.06	0.26	4.77	NA	NA

Note: NA is not applicable because the proposed FPC's impacts are less than the SIL or the predicted total concentration is less than the PSD Class I increment.

(1) Case 1 includes chemical transformation, dry deposition, Gaussian vertical concentration distribution.
Case 2 includes options in Case 1 plus wet deposition.
Case 3 includes options in Case 2 plus option for 3 vertical layers used for deposition.
Case 4 includes options in Case 3 plus option for uniform vertical concentration distribution instead of Gaussian.

EXHIBIT FDER-18

Florida Power
CORPORATION

November 24, 1992

Mr. Max Linn
Meteorologist
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Linn:

Re: Polk County Site
Sufficiency Response

Enclosed are the computer diskettes as requested by the Florida Department of Environmental Regulation (FDER) sufficiency comment 18 on the Florida Power Corporation (FPC) Site Certification Application for the Polk County Site.

Should you have any questions, please call me at (813) 866-5529.

Very truly yours,

Kathy Small

Kathleen L. Small
Environmental Project Manager

Enclosures

cc: H. S. Oven (FDER) - w/o encs.

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EXHIBIT FDER-19
(3 pages)

Visual Effects Screening Analysis for
Source: FPC POLK COUNTY SITE
Class I Area: CHASSAHOWITZKA WILDERNES

*** Level-1 Screening ***

Input Emissions for

Particulates	67.06	G /S
NOx (as NO2)	457.02	G /S
Primary NO2	.00	G /S
Soot	.00	G /S
Primary SO4	.00	G /S

**** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	25.00 km
Source-Observer Distance:	117.90 km
Min. Source-Class I Distance:	117.90 km
Max. Source-Class I Distance:	137.30 km
Plume-Source-Observer Angle:	11.25 degrees
Stability: 6	
Wind Speed: 1.00 m/s	

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria

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

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	84.	117.9	84.	2.00	.242	.05	-.000
SKY	140.	84.	117.9	84.	2.00	.063	.05	-.003
TERRAIN	10.	84.	117.9	84.	2.00	.013	.05	.000
TERRAIN	140.	84.	117.9	84.	2.00	.004	.05	.000

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

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	75.	114.1	94.	2.00	.252	.05	-.000
SKY	140.	75.	114.1	94.	2.00	.066	.05	-.003
TERRAIN	10.	65.	110.0	104.	2.00	.019	.05	.000
TERRAIN	140.	65.	110.0	104.	2.00	.005	.05	.000

```
"FPC POLK COUNTY SITE    "
"CHASSAHOWITZKA WILDERNES"
    1    1
   67.060   457.020      .000      .000      .000
  117.900   117.900   137.300    25.000
    1      1.500     3
    1      2.500     8
    1      2.500     6
    1      2.000     1
    1      1.500     4
    1       .040     1.000     6
    1     11.250
 34
  1 0     5.0  163.8   36.7   82.2   97.7  .22   .050   2.00   .00   2.00   .00   2.00   .00   2.00   .00
  2 0    10.0  158.8   56.5   63.5   84.0  .32   .050   2.00   .00   2.00   .00   2.00   .00   2.00   .00
  3 0    15.0  153.8   69.0   52.0   74.1  .41   .050   2.00   .01   2.00   .00   2.00   .00   2.00   .00
  4 0    20.0  148.8   77.7   44.3   66.8  .49   .050   2.00   .02   2.00   .01   2.00   .00   2.00   .00
  5 0    25.0  143.8   84.3   38.9   61.2  .57   .050   2.00   .03   2.00   .02   2.00   .00   2.00   .00
  6 0    30.0  138.8   89.4   34.9   56.9  .64   .050   2.00   .05   2.00   .02   2.00   .01   2.00   .00
  7 0    35.0  133.8   93.6   31.8   53.5  .71   .050   2.00   .08   2.00   .03   2.00   .01   2.00   .00
  8 0    40.0  128.8   97.2   29.5   50.9  .77   .050   2.00   .11   2.00   .04   2.00   .01   2.00   .00
  9 0    45.0  123.8  100.3   27.7   48.8  .82   .050   2.00   .14   2.00   .04   2.00   .01   2.00   .00
 10 0    50.0  118.8  103.0   26.2   47.3  .87   .050   2.00   .17   2.00   .05   2.00   .02   2.00   .00
 11 0    55.0  113.8  105.5   25.1   46.2  .91   .050   2.00   .19   2.00   .06   2.00   .02   2.00   .01
 12 0    60.0  108.8  107.8   24.3   45.5  .95   .050   2.00   .22   2.00   .06   2.00   .02   2.00   .01
 13 0    65.0  103.8  110.0   23.7   45.2  .98   .050   2.00   .24   2.00   .06   2.00   .02   2.00   .01
 14 0    70.0   98.8  112.1   23.3   45.2 1.00   .050   2.00   .25   2.00   .07   2.00   .02   2.00   .01
 15 0    75.0   93.8  114.1   23.1   45.5 1.01   .050   2.00   .25   2.00   .07   2.00   .02   2.00   .00
 16 0    80.0   88.8  116.1   23.0   46.2 1.02   .050   2.00   .25   2.00   .07   2.00   .02   2.00   .00
 17 1    85.0   83.8  118.2   23.1   47.3 1.01   .050   2.00   .24   2.00   .06   2.00   .01   2.00   .00
 18 1    90.0   78.8  120.2   23.5   48.8 1.00   .050   2.00   .23   2.00   .06   2.00   .01   2.00   .00
 19 1    95.0   73.8  122.3   24.0   50.9  .98   .050   2.00   .20   2.00   .05   2.00   .01   2.00   .00
 20 1   100.0   68.8  124.6   24.7   53.5  .96   .050   2.00   .18   2.00   .05   2.00   .01   2.00   .00
 21 1   105.0   63.8  127.0   25.6   56.9  .93   .050   2.00   .15   2.00   .04   2.00   .00   2.00   .00
 22 1   110.0   58.8  129.6   26.9   61.2  .89   .050   2.00   .12   2.00   .04   2.00   .00   2.00   .00
 23 1   115.0   53.8  132.5   28.5   66.8  .84   .050   2.00   .09   2.00   .03   2.00   .00   2.00   .00
 24 1   120.0   48.8  135.8   30.6   74.1  .78   .050   2.00   .07   2.00   .02   2.00   .00   2.00   .00
 25 0   125.0   43.8  139.7   33.3   84.0  .72   .050   2.00   .04   2.00   .02   2.00   .00   2.00   .00
 26 0   130.0   38.8  144.3   36.7   97.7  .66   .050   2.00   .03   2.00   .01   2.00   .00   2.00   .00
 27 0   135.0   33.8  150.1   41.4  117.9  .59   .050   2.00   .01   2.00   .01   2.00   .00   2.00   .00
 28 0   140.0   28.8  157.6   47.8  150.0  .51   .050   2.00   .01   2.00   .00   2.00   .00   2.00   .00
 29 0   145.0   23.8  167.9   57.1  208.5  .43   .050   2.00   .00   2.00   .00   2.00   .00   2.00   .00
 30 0   150.0   18.8  183.4   71.6  345.7  .35   .050   2.00   .00   2.00   .00   2.00   .00   2.00   .00
 31 0   155.0   13.8  209.6   96.8  999.0  .26   .050   2.00   .00   2.00   .00   2.00   .00   2.00   .00
 32 0      .1  168.7    1.0  116.9  117.4  .03   .376  21.20   .00   6.42   .00  21.20   .00   6.42   .00
 33 1    84.4   84.4  117.9   23.1   47.1 1.01   .050   2.00   .24   2.00   .06   2.00   .01   2.00   .00
 34 1   122.0   46.7  137.3   31.6   77.8  .76   .050   2.00   .06   2.00   .02   2.00   .00   2.00   .00
 34
  1 0   5.000   .050   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
  2 0  10.000   .050   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
  3 0  15.000   .050   .000   .000  -.000   .000   .000   .000   .000   .000   .000   .000  -.000   .000
  4 0  20.000   .050   .000   .000  -.000   .000   .000   .000   .000   .000   .001   .000  -.000   .000
  5 0  25.000   .050   .000   .000  -.001   .000  -.000   .000  -.000   .000   .001   .000  -.001   .000
  6 0  30.000   .050   .000   .000  -.001   .000  -.000   .000  -.000   .000   .001   .000  -.001   .000
  7 0  35.000   .050  -.000   .000  -.001   .000  -.001   .000  -.001   .000   .002   .000  -.001   .000
  8 0  40.000   .050  -.000   .000  -.002   .000  -.001   .000  -.001   .000   .002   .000  -.001   .000
  9 0  45.000   .050  -.000   .000  -.002   .000  -.001   .000  -.002   .000   .003   .000  -.001   .000
 10 0  50.000   .050  -.000   .000  -.003   .000  -.002   .000  -.002   .000   .003   .000  -.002   .000
 11 0  55.000   .050  -.000   .000  -.003   .000  -.002   .000  -.003   .000   .003   .000  -.002   .000
 12 0  60.000   .050  -.000   .000  -.003   .000  -.002   .000  -.003   .000   .003   .000  -.002   .000
```

13	0	65.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
14	0	70.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
15	0	75.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
16	0	80.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
17	1	85.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
18	1	90.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
19	1	95.000	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
20	1	100.000	.050	-.000	.000	-.003	.000	-.002	.000	-.002	.000	.003	.000	-.001	.000
21	1	105.000	.050	-.000	.000	-.002	.000	-.001	.000	-.002	.000	.002	.000	-.001	.000
22	1	110.000	.050	-.000	.000	-.002	.000	-.001	.000	-.002	.000	.002	.000	-.001	.000
23	1	115.000	.050	-.000	.000	-.002	.000	-.001	.000	-.001	.000	.002	.000	-.001	.000
24	1	120.000	.050	.000	.000	-.001	.000	-.001	.000	-.001	.000	.001	.000	-.001	.000
25	0	125.000	.050	.000	.000	-.001	.000	-.000	.000	-.000	.000	.001	.000	-.001	.000
26	0	130.000	.050	.000	.000	-.000	.000	-.000	.000	-.000	.000	.001	.000	-.000	.000
27	0	135.000	.050	.000	.000	-.000	.000	.000	.000	.000	.000	.000	.000	-.000	.000
28	0	140.000	.050	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	-.000	.000
29	0	145.000	.050	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
30	0	150.000	.050	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
31	0	155.000	.050	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
32	0	.096	.376	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
33	1	84.375	.050	-.000	.000	-.003	.000	-.002	.000	-.003	.000	.003	.000	-.002	.000
34	1	122.037	.050	.000	.000	-.001	.000	-.000	.000	-.001	.000	.001	.000	-.001	.000

EXHIBIT FDER-21
PULVERIZED COAL UNIT (600MW)
ESTIMATED[1] PERFORMANCE

CONDITIONS			
Ambient Temperature (°F)	40	40	40
Ambient Relative Humidity (%)	70	70	70
Load Condition (%)	50	75	100
Elevation (ft) (above MSL)	163	163	163
Maximum Heat Input Rate (mmBtu/hr)	3,272.68	4,780.99	5,945
EMISSIONS (lb/hr)			
Carbon Monoxide	491	717	892
Nitrogen Oxides	556	813	1,011
Sulfur Dioxide	949.1	1386.5	1,724
Particulate Matter (PM_{10})	66	96	119
Volatile Organic Compounds	49	72	89
Lead	0.054	0.08	0.10
Asbestos	Neg.	Neg.	Neg.
Beryllium	0.00036	0.00053	0.00065
Mercury	0.033	0.048	0.06
Vinyl Chloride	Neg.	Neg.	Neg.
Total Fluorides	0.252	0.368	0.457
Sulfuric Acid Mist	143.1	209.1	260
Hydrogen Sulfide	Neg.	Neg.	Neg.
Total Reduced Sulfur	Neg.	Neg.	Neg.
Benzene	Neg.	Neg.	Neg.
Inorganic Arsenic	0.056	0.0820	0.102
Radionuclides (mCi/hr)	0.3605	0.527	0.655
STACK PARAMETERS			
Stack Height (ft)	625	625	625
Stack Diameter (ft)	21.5	21.5	21.5
Stack Gas Temperature (°F)	160	160	160
Stack Gas Exit Velocity (ft/sec)	46	67	80

Notes: [1] Emission estimates based on the application of BACT as discussed in Section 3.4

MSL = Mean Sea Level Neg. = Negligible

Source: Black & Veatch, 1992

EXHIBIT FDER-24
(3 pages)

PB89-194229

United States
Environmental Protection
Agency

Office of Air Quality
Planning And Standards
Research Triangle Park, NC 27711

EPA-450/2-89-001
April 1989

AIR

EPA

ESTIMATING AIR TOXICS EMISSIONS FROM COAL AND OIL COMBUSTION SOURCES

TABLE 4-69. SUMMARY OF MEASURED CHROMIUM EMISSION FACTORS FOR BITUMINOUS COAL-FIRED UTILITY BOILERS

Boiler Type/ Control Status	Emission Factor ($lb/10^{12}$ Btu) Average[a]	Emission Factor ($lb/10^{12}$ Btu) Range	Number of Boilers	Number of Data Points
Pulverized Dry Bottom:				
Uncontrolled	1880	244-7900	4	11
Mechanical Ppt.	8980	510-29,700	2	10
ESP or Mech. Ppt/ESP	2860	1.6-7970	12	20
2 ESPs in Series	740	<74-1740	1	4
Scrubber	21.3	4.5-290	3	5
ESP/Scrubber	17.3	---	1	1
Fabric Filter	0.0034[b]	___	1	3
Pulverized Wet Bottom:				
ESP or Mech. Ppt/ESP	1770	86-3320	5	5
Scrubber	0.60	---	1	1
Cyclone:				
Uncontrolled	1150	1000-1300	1	2
ESP	1810	18-5340	5	6
Scrubber	107	---	1	1
Stoker:				
Mech. Ppt or Multiclone	1440	455-2420	2	2
Fabric Filter	153	---	1	1

[a]Each boiler tested was weighted equally in determining this average. An arithmetic mean value was calculated for each boiler, and then a mean of these means was calculated.

[b]This factor is for hexavalent chromium (Cr^{+6}). The average factor was reported in the reference, but the range of values was not.

TABLE 4-68. CHROMIUM REMOVAL EFFICIENCY OF CONTROLS[a]

Control Device	Percent Control Average[b]	Percent Control Range	Number of Boilers	Number of Data Points
Mechanical Ppt.	42.3	38.9-49.0	1	3
ESP or Mech. Ppt/ESP	71.5	46.7-98.6	5	9
2 ESPs in Series	93.7	82.4-99.4	1	4
ESP/Scrubber	92.9	---	1	1
Scrubber	91.8	90.0-95.2	2	3
2 Multicyclones in series	50.0[c]	___	1	3
Fabric Filter	99.1[c]	___	1	3

[a]These control efficiencies represent measured control levels reported in the literature. They may or may not be indicative of the long-term performance of these types of controls on chromium emissions from combustion sources. Although it can not be unequivocally determined with the available data, these control device efficiencies may be biased low due to contamination from sampling equipment. Emission factors calculated using these efficiencies probably represent, in most cases, upper bound estimates. The average values should not be construed to represent an EPA-recommended efficiency level for these devices.

[b]Each emission test weighted equally in determining average.

[c]These control efficiencies are for hexavalent chromium (Cr^{+6}); the remaining values are for total chromium.

EXHIBIT FDER-25 STANDARDS APPLICABLE TO CLASS III WATERS	
General	
Arsenic	0.05 mg/l
Chlorides	shall not be increased more than 10% above b.g.
Hexavalent Chromium	11 ug/l
Copper	0.5 mg/l
Detergents	0.5 mg/l
Fluorides	10 mg/l
Lead	0.05 mg/l
Oil & Grease	5.0 mg/l
pH	6 - 8.5
Phenols	1 μg/l
Radium 226 + Radium 228	5 pCi/l
Alpha Radioactivity	15 pCi/l
Specific Conductance	1,275 μmho/cm
Turbidity	29 NTU
Zinc	1 mg/l
Total Chlorinated Phenols (exceptions follow):	1 μg/l
Pentachlorophenol	30 μg/l
2,4-Dinitrophenol	14.26 mg/l
Phenol	4.6 g/l
2-Chlorophenol	400 μg/l
2,4-dichlorophenol	790 μg/l
2,4,6-trichlorophenol	6.5 μg/l
1,1-dichloroethene	3.2 μg/l annual avg. flow
Methylene Chloride	1.58 mg/l annual avg. flow
2,4-dinitrotoluene	9.1 μg/l annual avg. flow
Bromoform	360 μg/l annual avg. flow
Chlorodibromomethane	34 μg/l annual avg. flow
Chloroform	470.8 μg/l annual avg. flow
Chloromethane	470.8 μg/l annual avg. flow
Dichlorobromomethane	22 μg/l annual avg. flow
Hexachlorobutadiene	49.7 μg/l annual avg. flow
Pentachlorophenol	8.2 μg/l annual avg. flow or 30 μg/l at any time

Planning Division

Imperial

Polk County

Board of County Commissioners

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October 9, 1992

Site Coordination Office
Division of Air/Rivers Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Attention: Mr. Hamilton S. Oven, Administrator

Sufficiency Review Comments
FPC Polk Power Station
For Polk County and the Central
Florida Regional Planning Council

Gentlemen:

Listed below are comments obtained from Polk County and the Central Florida Regional Planning Council's (CFRPC) review of the Florida Power Corporation (FPC) Polk County Site (PCS) Site Certification Application (SCA). The review comments are labelled numerically. Behind each numeric number is generally listed the page followed by our comments:

Section 1.4 Technology Section

(1) (page 1.4-2)

It is stated that the units do not pose any unusual risks in the event of some of the key planning assumptions used by FPC turn out to vary according to the expected probability distribution. **Please explain what these risks are and what are the expected probability distributions in key planning assumptions.**

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OCT 12 1992

D. E. R.
SITING COORDINATION

Section 1.5 Polk County Site Strategic Assessment

1.5.2 Fuel Flexibility

(2) (page 1.5-1)

The Polk County site provides FPC with its flexibility to convert to Coal Gasification (CG) or to add Pulverized Coal (PC) capacity in the future should circumstances warrant. **What circumstances would warrant such a change? Please explain the difference between burning natural gas or distillate fuel oil. What circumstances would require FPC to utilize different fuels and what are the expected impacts? Please explain.**

Chapter 2.1 Site & Associated Site Facilities Delineation

2.1.2 Establishment of the Baseline Condition

(3) Have mining and reclamation plans approved by Department of Natural Resources. **If so, what is the proposed disposition of the project site if the power plant was not to be constructed on the site? Please explain.**

(4) (page 2.1.2)

2.0 SITE AND VICINITY CHARACTERISTICS

2.1.1 Description of the Site and Surrounding Area

(5) (page 2.1.9)

What is the source of data used in preparing the map included as Fig. 2.1.1-2A, Existing Topography of Site and Adjacent Areas? How were the contour lines drawn? How were the decisions made to draw only the contour lines shown? Please explain.

(6) (page 2.1.11)

What is the source of data used in preparing the map included as Fig. 2.1.2-1, Mandatory and Non-Mandatory Reclamation Lands? How were the hatched areas drawn?

(7) (pages 2.1.13/14)

What is the source of data used in preparing the map included as Fig. 2.1.2-2A, -2B, Vegetation/Land Use Map;

Baseline Conditions? How were the outlined areas delimited? Please explain?

2.3.1 Geohydrology

(8) (page 2.3.1-2)

What consideration was given to the potential recovery of high grade phosphate particles from settled clays in proposed cooling ponds? If none, please explain why not?

2.3.2.2 Karst Hydrogeology

(9) In examination of the immediate area for sinkholes/karst features were the mining company files and or mining companies personnel surveyed for karst features? If not why not? In the past twenty years sinks have been reported in the area immediately north (ie, within two miles) of areas N-11c and N-11a in the proposed plant site area. Were the Polk County sinkhole maps reviewed for solution features in the immediate area? If not why not? What would be the impacts to the ground water resources and the plant facilities if a solution/sinkhole were to develop in the plant site and cooling pond/recirculation areas? Please explain.

(10) (page 2,3,2-38, Figure 2.3.2-17)

The proposed Polk County Site is just south of the border between Area III where sinkholes are numerous and Area IV where sinkhole development is predicted as lower. **How was this line between the two areas developed? Please provide the site specific information used to develop this change in area classifications. What is the chance that this line was incorrectly plotted? Is not this map considered general in nature?** Please provide additional documentation as to the potential for sinkhole formation and the potential impacts if such and event were to occur in or near to the Polk County Site.

2.3.3 Site Water Budget and Area Uses

(11) (page 2.3.3-1)

Was a water budget for the area in fact prepared as the subtitle suggests? What were the sources of data for such quantitative estimates? Are quantitative water-budget

estimates presented in the SCA document? If so, where? If not, please provide.

(12) (page 2.3.2-5)

What is the location of the 4 wells used for aquifer performance tests? Please locate and describe.

2.3.5 Vegetation/Land Use

(13) (page 2.3.3-13)

There appears to be an error in the well depth provided for the U.S. Agri-Chemical 4" well. The casing is reported to be deeper than the well. **Please provide the correct information.**

(14) (page 2.3.5-2)

Was a classification of vegetation prepared on the basis of consumptive-use characteristics? If so, how was this prepared and using what sources of data? If not, why not? For example, are rooting depths, seasonal variations and maximum ET rate quantified? if not, how is it proposed to make estimates of vegetative consumptive use in a site water budget?

2.3.7 Meteorology and Ambient Air Quality

(15) **Have estimates been prepared for net evaporation rates from wet ground surfaces and open water bodies? How were these prepared? Were seasonal variations were taken into account?**

Brine Pond

(16) (page 3.2-4)

Describe the proposed synthetic liner for the brine pond. **How will the synthetic liner be keyed to the compacted clays?**

(17) (page 3.2-4)

How was it determined that the brine pond could achieve zero discharge? Please describe and explain in detail.

Figures

(18) (page 3.2.7, Figure 3.2.1-1)

Please explain the purpose and use of "emergency coal stockout" facility.

(19) (page 3.2-7, Figure 3.2.1-1)

Please provide elevation views of Case A.

(20) (page 3.2-8, Figure 3.2.1-2)

Please explain the purpose and use of "emergency sludge stockout" facility. Please define the nature of groundwater protection provided in the plant area.

3.3.3 Coal

(21) (page 3.3-2)

Please explain apparent contradiction between statement of maximum coal pile height of 60 feet and Figure 3.2.1-3 elevation indication of 120 feet.

3.3 Fuel and Fuel Handling Characteristics

3.3.4 Groundwater protection//runoff Collection and Treatment

(22) (page 3.3-3)

What is the total collected volume of water from 10-year/24-hour rain event? Please explain/describe the drainage patterns that the excess rainfall will follow to the recycle basin. What other sources and volumes of water will be directed to this recycle basin. What is the capacity of this recycle basin. What is the potential for overflow and the impacts if it were to overflow?

(23) (page 3.3-3)

What typical thickness is proposed for the coal storage area liner and why? Please explain the ground water protection provided.

(24) (page 3.3-3)

Why was uncovered coal storage selected over enclosed storage? Please explain.

(25) (page 3.3-3)

What methods will be used to control coal dust air emissions? Please describe.

(26) (page 3.3-7)

What radioactivity is associated with the proposed coals?

Is there is any potential for radioactive emissions or pathways to the air and water.

3.4 Air Emissions and Controls

(27) (page 3.4-2)

What is the basis for the assertion that the emergency diesel generator will only burn low-sulfur fuel? What advanced designs will minimize pollutant emissions? Please explain.

(28) (page 3.4-2)

Please explain the elements of "good engineering design and operating practices" for the coal and lime bulk handling systems. **How is "good" defined? Please explain.**

(29) (page 3.4-3)

In addition to the emergency diesel generator, explain if critical lube oil, and similar systems will be served by storage batteries.

(30) (page 3.4-3)

What are the potential air pollutant emissions from a coal pile fire? What are the potential impacts? Please explain.

(31) (page 3.4-3)

How are the maximum emission rates for air pollutants estimated? What assumptions are involved in this estimation? What data are involved? How is it anticipated that higher emission rates will occur only for short periods of time? Higher than the maxima stated? Table 3.4.1-9 needs more clarifications.

(32) (page 3.4-5)

What precisely constitute the "worst-case" assumptions for the BACT analysis? How were these assumptions derived?

(33) (page 3.4-7)

What reference documents are available to substantiate the stated flue-gas properties for the SCR and the SNCR? How were the design parameters and those identifying their expected outcome, derived?

(34) (page 3.4-20)

Please identify the recent coal gas fired cc unit performance tests resulting in SO_2 emission rates of 15 parts per million by volume wet. **Are these average results or maximums?**

(35) (page 3.4-20)

Please explain why sulfuric acid recovery is not employed in the coal gas tail gas treatment for SO_2 emission reduction.

(36) (page 3.4-21)

Please explain the basis of selecting 2-3 percent control margins to calculate outlet emissions of SO_2 from wet scrubbers.

(37) (page 3.4-39)

Please explain why radionuclides are not applicable to pollution emission rates from coal-derived gas systems.

(38) (Page 3.4-46, Table 3.4.1-8)

Please explain the criteria that defines "worst case" for fugitive dust emission rates.

Please describe how the settled clays in the N-16 area will be managed while the bottom of the area is leveled.

3.5.1 Heat Dissipation System

(39) (page 3.5.1-1)

Where, in the SCA, are details of the steady-state energy balance model provided? Why was a steady-state model adopted for use?

(40) (page 3.5.1-2)

How were the assumed conditions for the four scenarios under which runoff yield estimates were made, derived? Is it possible to prescribe other, equally-probable, scenarios in which the yield could be substantially different?

(41) (page 3.5.1-4)

How are the details of the water blow-down and recycling needs taken account of in the model? Can details of this model, its input data and sample output, be produced in electronic form?

(42) (page 3.5.1-7)

Please describe how the settled clays in the N-16 area will be managed while the bottom of the area is leveled.

(43) (page 3.5.1-16)

Please explain the source of pumped tails for east and north exterior slopes of N-16 dams.

(44) (page 3.5.1-16)

What will be the disposition of the sand tailings and waste clays from the N-11C pond area?

(45) **(page 3.5.1-19)**

Can details of the PCSTABL5M and SEEPN computer programs, their input data sets and sample output be provided in electronic forms?

(46) (page 3.5.1-31)

How will the placement or redistribution of clays in the over-excavated area of N-11C pond be physically performed? How will the success of obtaining an impervious blanket in the area be determined?

(47) (page 3.5.1-31)

What is the estimate of waste clays that will be disposed of off-site? Where will these clays be disposed?

(48) (page 3.5.1-31)

With regard to consolidation modeling in the buffer areas and comparisons of analysis, please quantify "comparable" and "acceptable".

(49) (page 3.5.1-32)

Seepage flow rates from the N-16 area alone (1200 acres) are estimated at 578,000 gpd but mass balance figures show only 680,000 gpd from the total pond system (2600 acres). **Please explain.**

(50) (page 3.5.1-55)

The category identification for the west and south walls of area N-16 appears to be misplaced. **Please correct.**

(51) (page 3.5.1-87)

Please explain the difference between "total estimated evaporation" and "estimated natural evaporation" terms.

(52) (page 3.5.1-91)

Please explain the purpose of the two spillways shown in the south east corner of pond area N-16.

(53) (page 3.5.1-97)

Please describe the mechanism to prevent leakage from the solid waste disposal area (SA-8) through the common dam with N-16 and into ground water.

(54) (page 3.5.1-101)

Please explain the purpose for the spillways located in the southern and western dams of area N-15.

(55) (page 3.5.2-2)

What would be the net effect on well water use with sanitary water exported to Ft. Meade?

(56) (pages 3.5.4-6 thru 9)

What consideration was given to cooling pond surface floatation covering to reduce evaporation and well water requirements during time periods that maximum cooling is not required?

(57) (pages 3.5.4-6 thru 9)

Why is seepage from the site run-off pond not quantified? Please provide.

(58) (pages 3.5.4-6 thru 9)

Why is no evaporation indicated from the neutralization basin? What quantity of evaporation should be used and why?

(59) (pages 3.5.4-6 thru 9)

How much make-up water is available from nearby industrial facilities, i.e. Alcoa, Farmland, U.S. Agri-Chemicals?

3.6 Chemical and Biocide Waste

(60) (page 3.6-1)

Precisely how will blowdown of water from the cooling pond be used to control dissolved solids in it in such a way that scaling is limited? Is the pond assumed to be fully mixed in dissolved solids for purposes of analyzing this possibility? Please explain.

(61) (page 3.6-2)

What will be the fate, local and ultimate, of waste solids and sludges that result from treatment of the cooling pond circulating water?

(62) (page 3.7-2)

Please explain the radioactivity of slag waste and the potential impacts.

(63) (page 3.7-7)

Please define the stacking or sloping characteristics of waste water treatment sludge and scrubber sludge.

(64) (page 3.7-8)

What provisions have been made for stage capping of:

- **the waste disposal areas, and**
- **the brine pond?**

Please explain.

4.3 Ground Water Impacts (of Site Preparation)

(65) (page 4.3-5)

Was water quality modelling, at the same time as the CDI flow modelling, undertaken to evaluate impacts? If not, why not? Please explain.

(66) (page 4.3-8-13)

Was the CDI model calibrated prior to its being used to evaluate potential impacts of dewatering? If so, explain if not, why not?

5.1 Effects of the Heat Dissipation System

(67) (page 5.1-1)

Why will the discharge of water from the heated cooling system not have an impact on the cooling water pond, and through its connections with the surficial aquifer, impacts on neighboring surface and ground waters?

(68) (page 5.1-3)

Why will the elevated temperatures of the cooling pond, which receives discharges at least 20°F above the <u>local ambient temperature</u> not contribute to fog in abnormal amounts? Why will this fog issuing from the elevated pond area not flow by density gradients towards nearby roadways?

(69) (page 5.3-6)

Precisely how were the quantities of make-up water needs for the cooling system established from 8 MGD to 31.6 MGD? Was a range in these numbers employed in ground water flow modelling for impact analyses? if so, what range and with what consequences? if not, why not?

(70) (page 5.3-8)

In Step-1 of the ground water modelling undertaken for the pre-development conditions, what were the flow boundary conditions employed? Why was a steady-state assumed for runs in this step? Did the calculated steady-state water levels differ from the prescribed initial conditions? By what quantitative amounts, spatially? To what causes were such differences attributed?

(71) (page 5.3-9)

How were vertical connections between the Upper Floridian and the Intermediate aquifers treated in Steps 1 and 2 of the model runs for the pre-development conditions? Please explain.

(72) (page 5.3-9)

In Step-1 of the ground water modelling undertaken to evaluate FPC withdrawals on existing users, what were the flow boundary conditions employed? Was the model calibrated in any way for these runs? If so, please explain. If not, why not? Please explain?

(73) (page 5.3-9)

90-days with zero discharge would be a very rare event. **Should it be "recharge" not discharge? Please explain.**

(74) (page 5.3-9,10)

How were vertical connections between the Upper Floridian and the Intermediate as well as surficial aquifers treated in Steps 1 and 2 of the model runs for evaluating the impacts on existing users?

(75) (page 5.3-11)

Why are the modelling assumptions "with respect to climatology" inherently conservative? Are all other assumptions equally conservative? Will changes to vertical conductance between model layers cause these assumptions to remain conservative? Is the neglect of consumptive use by vegetation cause these assumptions to remain conservative? Please explain.

(76) (page 5.3-12)

Precisely how do field measurements made during the Aquifer Performance Tests "consistently indicate that the requested withdrawal will have no effect on the water table of the surficial aquifer"? Precisely how do results of computer simulations "consistently indicate that the requested withdrawal will have no effect on the water table of the surficial aquifer"? Please explain.

(77) (page 5.3-16)

Are any of the results obtained by using the SEEP/G computer code dependent on the magnitude of input parameter values? If so, please explain. If not, please explain. Were any sensitivity runs made with this model using different values? If so, for what parameters and in what ranges? If not, why not?

(78) (page 5.3-21)

In estimating rates of seepage through clay layers of the solid-waste disposal areas, what specific values of vertical hydraulic conductivity were used in model runs? Was a range of values tested? With what consequences? Were any effects of discontinuities in the clay layer investigated?

(79) (pages 5.3-39 through 50)

What method of contouring was adopted to prepare the Figures from 5.3.2-4 through 15? Does the method of contouring bias the model results in any way? Please explain.

(80) (page 5.6)

Please provide a block flow diagram illustrating stack atmospheric emissions.

(81) (page 5.6)

What are pollutant or hazardous material emissions from upset operating conditions and accidental conditions, such as fire or structural failures? What is their reach? Please describe the method for this estimation. What emergency procedures are provided. Please explain.

5.6 Air Quality Impacts

(82) (page 5.6-4)

Can a copy of the modelling protocol that was provided to the FDER, be produced for review?

(83) (page 5.6-4)

Has a spatial map of the stacks proposed within the FPC site been prepared? How were stack heights designed? What detailed justifications were offered for employing the ISCST model's building downwash options? Were runs made without using these options? Can a copy of the model, its input data and sample output be produced for review?

(84) (page 5.6-16)

As part of the AAQS analysis, were any long term modelling runs made with, for example, ISCLT? If so,with what quantitative results? If not, why not?

(85) (page 5.6-26)

Can a copy of the MESOPUFF-II model as used, its input data and sample output be produced for review?

(86) (page 8, section 10.5.4)

What criteria establishes 96°F as the maximum condenser inlet water temperature?

(87) (page 9, section 10.5.4)

Why are the eastern end and northwestern corner of the cooling pond non-effective in stage "A" but effective in stage "B"? Please explain.

(88) (page 10.5.3-1)

Why is the character of clays in the N-16 area not as critical as any other area?

(89) (page 18, section 10.5.4)

Where is the quality of the water crop used in modeling tabulated? Please provide.

(90) (page WRS-14, section 10.5.4)

What is the 25-year/24-hour storm event in inches?

(91) (page WRS-14, section 10.5.4)

In light of an earlier stated potential for 31 inches of rain, why is a 25-year/24-hour event considered adequate for design?

(92) (page WRS-19, section 10.5.4)

Explain what happens if the pumps don't work during a storm event?

(93) (page WRS-29, section 10.5.4)

What is the PMP storm event in inches and duration?

General Questions and Comments:

(94) Provide process flow diagrams with major mass material balance indicated on diagram for:

- Fuel oil system
- Coal handling system
- Coal gasification system
- Sulfur recovery system
- Waste water treatment
- Coal pulverization system
- Flue gas scrubbing system
- Blow down water treatment

(95) **What provisions are provided to control fugitive dust emissions from the coal storage area, unloading equipment and reclaim transfer equipment. Will individual bag houses be utilized or one central dust control unit? How will bag house or cyclone exhaust stacks be monitored?**

(96) **What provisions will be employed to control fugitive coal dust in rail transit?**

(97) **Please provide spill and accidental release of material plans.**

(98) Define major or critical structures and buildings including stacks and their design ability to withstand wind loads associated with a major hurricane (class 5). Define what

level of operation would continue at the facility during hurricane conditions.

(99) Detail and define emergency and evacuation procedures for the following:

- Hurricanes
- Fires
- Hazardous material release.

(100) Define the level of training that will be provided to personnel for response to emergency situations.

(101) Please list and define emergency equipment that will be available on site.

(102) Please define provisions and mechanism for freeze protection of critical service streams, instrument measuring devices, safety systems, fire control, and similar systems.

(103) Please list and quantify the amounts of hazardous materials that will be stored on-site such as caustic soda, hydrazine, chlorine, etc.

(104) Were all existing and proposed air and water impact sources and users within a twenty mile radius for the duration of the project considered in the modelling of the impacts? In not, why not? Was the impact of the Tampa Electric Company Proposed polk power station included in these calculations? If not why not? What would be the impacts is these were considered?

(105) What will the groundwater impacts be on the Polk/Highlands water use caution area for the duration of the project? Please explain.

-oOo-

If you have any questions regarding our sufficiency review comments, please feel free to contact us at your earliest convenience.

Very truly yours,

Robert D. Anders, AICP
Planning Director

RDA:amn/FPCD.SRC

cc: Mr. Brian Sodt
Mr. Chuck Foss
Mr. Jeff Spence
Mr. Michael Finch
Ms. Linda Novak
Mr. Donald S. Martin

For purposes of the site water budget, evapotranspiration was estimated as a whole through the use of a relationship derived by the SWFWMD as described in Section 2.3.3 of the SCA. The results are presented in Table. 2.3.3-3 (page 2.3.3-8) of the SCA.

Comment #15: (Section 2.3.7)

"Have estimates been prepared for net evaporation rates from wet ground surfaces and open water bodies? How were these prepared? Were seasonal variations taken into account?"

Response:

Detailed estimates for net evaporation rates from open water bodies are part of the cooling pond model. The computational procedure is described by Patterson, et al (1971) (see SCA Section 3.5.1.6 References, page 3.5.1-39). Additionally, data for natural evaporation was obtained from the National Weather Service (see page 3.5.1-15 of the SCA). The predicted and measured evaporation rate were plotted on SCA Figure 3.5.1-24 (page 3.5.1-86). Estimated natural and forced (caused by heat rejected from the power plant added to natural) evaporation were also presented on Figure 3.5.1-25 (page 3.5.1-87) of the SCA. Because these estimates and data were presented on a monthly basis, they do take seasonal variations into account.

Comment #16: (Page 3.2-4)

"Describe the proposed synthetic liner for the brine pond. How will the synthetic liner be keyed to the compacted clays?"

Response:

A description of the proposed synthetic liner system is provided in SCA Section 3.7.13 (pages 3.7-16 and 3.7-17), and is graphically presented on Figure 3.7.1-42. The liner consists of 60 mil H.D.P.E., keyed two feet into the clay surface and backfilled with clay. The liner will extend out on the clay surface for a minimum distance of 25 feet from the edge of the clay. Two (2) feet of soil cover is to be placed over the liner for protection purposes on non-sloping areas. The liner will be exposed along the dam slopes of the impoundment area.

Comment #17: (Page 3.2-4)

"How was it determined that the brine pond could achieve zero discharge? Please describe and explain in detail."

Response:

The amount of wastewater entering the pond each year was predicted based on the plant water balance. The level in the brine pond was then determined based on the historical data on site precipitation and evaporation, and a consideration of the impact of dissolved solids on evaporation rate. The calculations indicate that, within the 30 year period modeled, the pond will not fill to a level which will compromise the zero discharge capability of the site. If the pond level does approach its limit, additional wastewater volume reduction treatment, such as crystallizers, will be added as part of the plant wastewater treatment process.

Comment #18: (Page 3.2.7, Figure 3.2.1-1)

"Please explain the purpose and use of 'emergency coal stockout' facility."

Response:

The purpose of the emergency coal stockout facility is to provide an area to off-load coal from a coal unit train in the event the coal stacker/reclaimer equipment and its associated conveyors are temporarily out-of-service. The coal unit train can be off-loaded as scheduled with the use of this equipment if necessary.

Comment #27: (Page 3.4-2)

"What is the basis for the assertion that the emergency diesel generator will only burn low-sulfur fuel? What advanced designs will minimize pollutant emissions? Please explain."

Response:

The emergency diesel generator is an optional piece of equipment which may be added as the design requires. The design of diesel generator engines has advanced in recent years with the goal of increasing fuel efficiency and minimizing pollutant emissions. One such design advancement is the electronic fuel injection system which controls the flow of diesel fuel. In addition, the injection timing can be retarded by some margin (typically 4 to 7 degrees) to further reduce emissions. It is anticipated that the diesel generator purchased for this project (if a diesel generator is needed at all) will have electronic fuel injection and other recently developed advancements for fuel efficiency and emissions reduction.

This is a standard commitment (to burn only low-sulfur fuel oil) which would be reflected in the Site Certification Order.

Comment #28: (Page 3.4-2)

"Please explain the elements of 'good engineering design and operating practices' for the coal and lime bulk handling systems. How is 'good' defined? Please explain."

Response:

Fugitive dust emissions will be minimized as much as practicable through use of good engineering design and operating practices. Good engineering design is the use of the best fugitive dust control technique, method, or equipment available for each potential dust emission source. Good engineering design for fugitive dust control associated with bulk material handling includes the following:

- Material transfer and processing points enclosed
- Dust enclosures vented through fabric filter type particulate collection devices
- Material conveyors enclosed
- Material wetted as appropriate during handling
- Stackout conveyors adjustable to minimize material drop height
- Stackout conveyors equipped with telescopic chutes to contain generated dust and prevent exposure of falling material to the wind

Fugitive dust control at the proposed project will include the above techniques, practices, and devices. Specific application of these to the potential dust sources at the project is discussed in the response to Polk County comment #95. Good operating practices include the performance of preventive maintenance and regular cleaning of important dust control equipment, including the following examples:

- Water sprayers in the coal unloading building and on the stacker/reclaimer checked regularly to prevent clogging
- The dust collector fabric filter bags checked for wear and holes
- The fabric filter cleaning systems inspected often to guarantee consistent operation

These and other appropriate operating practices will be employed at the proposed project to ensure that the fugitive dust emissions are minimized as much as practicable.

Comment #29: (Page 3.4-3)

"In addition to the emergency diesel generator, explain if critical lube oil, and similar systems will be served by storage batteries."

Response:

The emergency diesel generator would have its own 24 volt storage battery system for startup separate from the plant storage batteries. If installed, the emergency diesel generator would be connected to the plant 480 volt system and would provide power to storage battery chargers, emergency lighting, other plant critical loads, and freeze protection of appropriate equipment, if necessary. The plant storage batteries will operate the turbine's emergency bearing lube oil pump, circuit breakers, uninterruptable power supply (UPS), and other DC power loads.

Comment #30: (Page 3.4-3)

"What are the potential air pollutant emissions from a coal pile fire? What are the potential impacts? Please explain."

Response:

The potential air pollutant emissions from a coal pile fire are the same as the emissions from coal combustion in a boiler since the same materials are being oxidized. The constituents would be the same, but the quantities emitted would be different and would depend upon the quantities of coal actually combusted and the amount of oxygen available to the fire. Modern power plant practice is to keep the coal piles compacted so as to maximize the pile density and minimize the potential for coal pile fires. Should a coal pile fire occur, standard practice is to use bulldozers to excavate the burning coal and let it burn itself out or to use water sprays from a mobile water tanker truck to extinguish the fire. The coal is then recompacted in thin layers to minimize infiltration air. Based upon FPC's experience at the Crystal River Energy Complex, the frequency of coal pile fires is expected to be very small and the quantities of coal burned in this way insignificant. Therefore, the potential air quality impacts from coal pile fires are expected to be inconsequential.

Comment #31: (Page 3.4-3)

"How are the maximum emission rates for air pollutants estimated? What assumptions are involved in this estimation? What data are involved? How is it anticipated that higher emission rates will occur only for short periods of time? Higher than the maxima stated? Table 3.4.1-9 needs more clarifications."

Response:

The calculation of the emission rates shown in SCA Tables 3.4.1-1 through 3.4.1-8 is discussed in the response to FDER comment #1. Assumptions are also presented in that response. The emission levels listed in the tables are maximum because they are estimated for full load operating conditions and are based on the proposed emission limitation or highest anticipated emission rates under those operating conditions. For example, the emission levels from the pulverized coal units are maximum because the estimations are based on the highest anticipated fuel firing rate, 5,945 MBtu/hr/unit, and proposed emission limitations (e.g., 0.17 lb/MBtu for NO_x).

During the relatively short periods of time when the units are started up or during a temporary malfunction, emissions may exceed those listed in the tables cited above. The higher emissions may result because of the greater frequency and extent of operational transients for which the control systems are not capable of following sufficiently to minimize emission levels. The units, however, are exempt from meeting permitted emission limits during these periods of startup and malfunction (17-2.250[1], F.A.C.). The applicant will maintain the units so that excess emission periods will be kept to a minimum.

Table 3.4.1-9 of the SCA is a listing of the significant emission rate thresholds listed by EPA (40 CFR 51.24) and FDER (Table 500-2, 17-2.500[2][e][2], F.A.C.). For new or modified major sources of air pollution, PSD review is triggered for each pollutant which has the potential to be emitted in excess of these rates. PSD review for the pollutant basically means the application of BACT for that pollutant, and the evaluation of ambient impacts versus a PSD increment or ambient standard if appropriate.

Comment #32: (Page 3.4-5)

"What precisely constitute the 'worst-case' assumptions for the BACT analysis? How were these assumptions derived?"

Response:

The preliminary BACT analysis for addressing ultimate site capacity assumed that the "worst-case" combination of air pollutant sources would be a combination of coal gasification/combined cycle (CGCC) units (2,000 MW) and the pulverized coal boilers (1,200 MW). The alternative scenario would only include the CGCC units (3,000 MW). By assuming this "worst-case" scenario, the pollutant control technologies for all potential pollutant sources were discussed in the BACT analysis.

Comment #33: (Page 3.4-7)

"What reference documents are available to substantiate the stated flue-gas properties for the SCR and the SNCR? How were the design parameters and those identifying their expected outcome, derived?

Response:

Expected flue gas properties of the combustion turbines for the CGCC BACT analysis were provided by General Electric Company. Reaction products from the SCR process can be verified in EPRI (Electric Power Research Institute), 1991; NO_x Emissions: Best Available Control Technology. A Gas Turbine Permitting Guidebook; EPRI GS-7486; prepared by Radian Corporation, Research Triangle Park, North Carolina. Optimum reaction temperatures and impacts from operating outside of the optimum range can be verified in EPRI. Sulfur dioxide oxidation rates can be verified in Durilla et al. (Durilla, M., J. M. Chen, B. K. Speronello, and R. M. Heck; Composite SCR Catalysts for NO_x Reduction; Unpublished manuscript). Ammonia sulfate salts formation is discussed in EPRI. Catalyst poisoning is discussed in Chen et al. (Chen, J. P., M. A. Buzanowski, R. T. Yang, and J. E. Cichanowicz; 1990; Deactivation of the Vanadia Catalyst in the Selective Catalytic Reduction Process; Journal of Air and Waste Management Association; 40:1403-1409). Discussions concerning SNCR operation on combustion turbines are presented in EPRI and Smith (Smith, D. J.; 1992; NO_x Emission Control Demands a Range of Solutions; Power Engineering; pp. 44-47, July).

Speronello et al. (Speronello, B. K., J. M. Chen, M. Durilla, R. M. Heck; 1991; Application of Composite NO_x SCR Catalysts in Commercial Systems; presented at The 1991 Joint EPA/EPRI Symposium on Stationary Combustion NO_x Control; Washington, D. C.), Hurst (Hurst, B. E.; 1983; Improved Thermal DeNO_x Process for Coal-Fired Utility Boilers; Presented at 11th Annual Stack Gas/Coal Utilization Meeting; Paducah, Kentucky), and the above mentioned sources all provide comprehensive discussions concerning SCR and SNCR applications on coal fired boilers.

Comment #34: (Page 3.4-20)

"Please identify the recent coal gas fired cc unit performance tests resulting in SO_2 emission rates of 15 parts per million by volume wet. Are these average results or maximums?"

Response:

Pages 3.4-37 and 3.4-38 of the SCA provide the references used in developing the text in Section 3.4. For this specific question, the reference listed is "EPRI" (Electric Power Research Institute). The information was extracted from the "Cool Water Coal Gasification Program: Final Report (1990)".

The sulfur dioxide emission rates from the combustion turbines at the Cool Water Coal Gasification Program are averages (performance tests are normally three 1-hour runs). As for the Polk County project, sulfur dioxide emission rates (maximums) are presented in SCA Table 5.6.1-5. These rates are based on a mass balance approach beginning with the sulfur content of the coal, the removal efficiency of the coal gasification system and complete conversion of any sulfur in the coal-gas to sulfur dioxide.

Comment #35: (Page 3.4-20)

"Please explain why sulfuric acid recovery is not employed in the coal gas tail gas treatment for SO_2 emission reduction."

Response:

The acid gas formed as part of the gasification process is hydrogen sulfide (H_2S). This H_2S is removed from the coal-gas by the acid gas removal system and sent to the sulfur recovery process which produces elemental sulfur. The sulfur recovery process removes 99.9 percent of the sulfur going to the tail gas thermal oxidation units, which virtually eliminates the emission of SO_2. Sulfuric acid (H_2SO_4) is not formed as a result of the acid gas removal and sulfur recovery processes. Thus, H_2SO_4 recovery as a means of SO_2 reduction for tail gas treatment is not applicable in this system.

Comment #36: (Page 3.4-21)

"Please explain the basis of selecting 2-3 percent control margins to calculate outlet emissions of SO_2 from wet scrubbers."

Response:

Black & Veatch recently performed an extensive analysis of wet scrubbing unit removal efficiencies for the OUC Stanton Energy Center Unit 2. The analysis concluded that variation in removal rates can occur because of control and reliability problems. Control variation occurs when parameters that control removal efficiency vary from their design or "target" values. Variation due to reliability occurs when a mechanical failure affects the capacity or performance of the system. A "typical" wet limestone scrubber would have an average equivalent availability of about 96 to 98 percent. That means that about 2 to 4 percent of the system's full capacity is lost as a result of mechanical failures.

Comment #37: (Page 3.4-39)

"Please explain why radionuclides are not applicable to pollution emission rates from coal-derived gas systems."

Response:

Please refer to the response to Polk County comment #26. The small amount of radionuclides associated with coal is likely to be retained in the slag produced in the coal gasification process. Thus, no radionuclides are anticipated to be contained in the coal-derived gas sent to the combustion turbines. Also, radionuclides are not anticipated to be contained in the product combusted in the thermal oxidation units of the gasification plant.

Comment #38: (Page 3.4-46, Table 3.4.1-8)

"Please explain the criteria that defines 'worst case' for fugitive dust emission rates. Please describe how the settled clays in the N-16 area will be managed while the bottom of the area is leveled."

Response:

The criteria which was used to determine the scenario producing worst-case fugitive dust emissions is the amount of bulk material handling anticipated. As indicated in the footnote to SCA Table 3.4.1-8, the fugitive dust emission rates are estimated for the ultimate site development scenario of three CG plants and two pulverized coal boilers (i.e., Case B). This is the "worst-case" scenario because a greater amount of bulk material handling is associated with Case B as compared to Case A. More coal is handled with Case B as compared to Case A. In addition, limestone must be handled with Case B whereas with Case A little, if any, limestone is used.

Please refer to the response to Polk County comment #42 for a discussion of how the clays in the N-16 area will be managed while the bottom of this area is levelled.

unit, emissions of SO_2 from the two PC units could increase from 3,448 lb/hr to 19,784 lb/hr at full load, assuming two modules are used per 600 MW unit. Should this rate continue for two hours, an average emission rate for three hours would be 14,336 lb/hr. Scaling up the maximum impacts for the PC units in SCA Table 5.6.1-21 by the emission ratio of 4.2 leads to an estimated impact increase from the PC units to 449 $\mu g/m^3$ from 106.8 $\mu g/m^3$. This is still within the three hour average ambient standard of 1,300 $\mu g/m^3$.

It is possible to have failure of one or more sections of a fabric filter system on a PC unit. If 20% of the fabric filter system failed on one unit during peak load conditions, emissions from the 1,200 MW PC unit could increase from 238 lb/hr to 6,601 lb/hr. Should this occur for two hours, the 24-hour average PM emission rate would increase to 768 lb/hr. Scaling up the maximum PM impacts due to the PC units by the emission ratio of 2.9 leads to an estimated impact increase from the PC units to 5 $\mu g/m^3$ from 1.7 $\mu g/m^3$. This impact is still very small compared with the 24-hour average ambient standard of 150 $\mu g/m^3$.

NO_x emissions from a PC boiler could increase due to the failure of the SNCR system. Emissions from a boiler would increase from 0.17 lb/mmBtu to 0.30 lb/mmBtu (1,010.5 lb/hr to 1,783 lb/hr for one 600 MW unit). Should this happen for two hours on one of the two units, the annual PC units' NO_x emissions would increase by far less than one percent, a clearly insignificant increase.

Emergency procedures including those for hazardous material emissions (i.e., chlorine) are described in responses to Polk County comments #99 through #101.

Comment #82: (Page 5.6-4)

"Can a copy of the modelling protocol that was provided to the FDER, be produced for review?"

Response:

Please refer to Appendix A of the Plan of Study. Exhibit PC-82 contains the MESOPUFF protocol.

Comment #83: (Page 5.6-4)

"Has a spatial map of the stacks proposed within the FPC site been prepared? How were stack heights designed? What detailed justifications were offered for employing the ISCST model's building downwash operations? Were runs made without using these options? Can a copy of the model, its input data and sample output be produced for review?"

Response:

Plot plan maps indicating the location of all stacks within the FPC site are included in the SCA as Figures 3.2.1-1 (Case A) and 3.2.1-2 (Case B). Elevation views are included in the SCA as Figure 3.2.1-3 (Case B) and have been provided to Polk County in response to Polk County comment #19 (Case A).

Stack heights for the PC units were placed at GEP height (2.5 H, where H is the maximum height of "nearby" buildings). For the thermal oxidation units, the stack height was set at 1.5 H. For the CT units, the 65 meter stack height was selected by an interactive process which evaluated air quality impacts for heights between 1.5 H and 2.5 H.

No detailed justification is required for using the building downwash option since this is a regulatory requirement set forth for this and other modeling options by the FDER and the EPA. The model selects the appropriate algorithm automatically.

No ISCST modeling runs supporting the SCA analyses were made without using the building downwash features. Some preliminary analyses supporting the monitoring plan and CUP application were made without using the building downwash features since the building dimensions were not available at the time those analyses were conducted.

Copies of the ISCST model are available to the public through EPA. The input and output files for the FPC site have been submitted to Polk County. A copy of the letter of submittal is included as Exhibit PC-83.

Comment #84: (Page 5.6-16)

"As part of the AAQS analysis, were any long term modelling runs made with, for example, ISCLT? If so, with what quantitative results? If not, why not?"

Response:

Long-term modeling runs for the annual concentrations were made using the ISCST model (365, 24-hour averages). The ISCST model was used rather than ISCLT because it provides the required long-term (annual) averaging period as well as the required short-term (1-hour, 3-hour, 8-hour and 24-hour) averaging periods.

Comment #85: (Page 5.6-26)

"Can a copy of the MESOPUFF-II model as used, its input data and sample output be produced for review?"

Response:

The MESOPUFF-II model is available for purchase through the National Technical Information Service as a part of the UNAMAP system of dispersion models or possibly through the FDER at no cost. Input and output data files were submitted to FDER. A copy of the letter of submittal is included here as Exhibit PC-85.

A revised analysis is included in the response to FDER comment #16.

Comment #86: (Page 8, Section 10.5.4)

"What criteria establishes 96°F as the maximum condenser inlet water temperature?"

Response:

The temperature that has been established in order for conventional steam condensing equipment to supply a reasonable back pressure to a conventional steam turbine is 96°F. With a 96°F maximum condenser inlet temperature, a back pressure on the order of 2-1/2 inches of mercury is achievable.

Comment #87: (Page 9, Section 10.5.4)

"Why are the eastern end and northwestern corner of the cooling pond non-effective in state 'A' but effective in stage 'B'? Please explain."

Response:

In stage "A", the northwest corner of N-16 is a dead end; in the two-stage pond it is not. The eastern end of N-16 was assumed non-circulating for stage "A" because the pond velocity was lower due to decreased circulating water flow rates. In stage "B", the full flow development is expected to increase the velocity around the splitter dike and the resulting increased momentum will cause the water to enter that area.

Comment #88: (Page 10.5.3-1)

"Why is the character of clays in the N-16 area not as critical as any other area?"

Response:

See response to Polk County comment #42. The clays are below the required pond bottom elevation of 150 ft MSL and do not require consolidation to achieve the required cooling pond depth of 10 feet.

Comment #94:

"Provide process flow diagrams with major mass material balance indicated on diagram for:

- **Fuel oil system**
- **Coal handling system**
- **Coal gasification system**
- **Sulfur recovery system**
- **Waste water treatment**
- **Coal pulverization system**
- **Flue gas scrubbing system**
- **Blow down water treatment"**

Response:

The requested process flow diagrams are included as Exhibits PC-94A through PC-94H.

Comment #95:

"What provisions are provided to control fugitive dust emissions from the coal storage area, unloading equipment and reclaim transfer equipment. Will individual bag houses be utilized or one central dust control unit? How will bag house or cyclone exhaust stacks be monitored?"

Response:

Exhibit PC-95A lists the measures proposed to control fugitive dust emissions from each potential source at the project. Each source listed has an identifier letter and number which can be used to locate the particular source on Exhibit PC-95B. Note that each coal and limestone handling point, transfer point, and conveyor is listed. The controls used consist of good engineering design as described in the response to Polk County comments #25 and #28. A brief summary of the fugitive dust control methods anticipated is provided below.

Coal and limestone rail cars will be unloaded in enclosed buildings equipped with fabric filter dust collectors. The coal will be watered at key handling points which include the rail car unloading building, the stacker load out transfer point, and the bucket wheel reclaimer. In addition, the coal stacker conveyor arm height will be adjustable to minimize drop height related emissions. The limestone stack out and emergency coal stack out conveyors will be equipped with telescopic chutes to minimize the generation of dust.

As listed in Exhibit PC-95A, no dust control measures are anticipated to be necessary for the coal and limestone storage piles. The majority of the coal pile will be for inactive storage and will not normally be disturbed. The natural crust which forms on the inactive surface serves to protect the pile from wind erosion. Use of applicable emission factor equations recommended by EPA indicates that wind erosion from the coal and limestone piles will not be significant (see response to FDER comment #7).

With the exception of the coal stacker/reclaimer conveyors, all material handling conveyors and conveyor transfer points will be totally enclosed. In addition, each material transfer building will be ventilated through individual fabric filter type particulate collection devices (i.e., baghouses). It is not anticipated that continuous type monitoring devices will be necessary on the baghouse exhaust stacks. Good operating practices, as described in the response to Polk County comment #28, should result in the devices performing at top effectiveness at all times. In the case of a baghouse failure, such as that resulting from a bag tear for example, the resulting visible emissions would indicate the failure and operating personnel would perform the necessary inspection and repair.

<u>Comment #96</u>:

"What provisions will be employed to control fugitive coal dust in rail transit?"

<u>Response</u>:

Fugitive coal dust emissions associated with rail transit in the vicinity of the Polk County Site are not anticipated to be significant. The majority of any coal dust exposed in the rail cars after loading is lost within a short distance of its transit from the mine. In

Comment #103:

"Please list and quantify the amounts of hazardous materials that will be stored on-site such as caustic soda, hydrazine, chlorine, etc."

Response:

Specific information on the types of hazardous materials and qualities of such substances which will be stored on the Polk County Site is not available at this time. However, listed below are typical hazardous materials, as regulated under the Emergency Planning and Community Right-to-Know Act of 1986 (also known as SARA Title III) for a comparably sized power plant complex:

Chemical	Average Daily Amount (lbs.)	Maximum Daily Amount (lbs.)
Morpholine	11,500	12,000
Carbon Dioxide	13,000	19,000
Hydrazine 35	2,300	2,400
Calcium Hydroxide	42,000	120,000
Sodium Hydroxide	77,000	247,000
Ammonium Hydroxide	47,000	47,200
Sulfur Dioxide	47,000	89,000
Anhydrous Ammonia	5,700	11,800
Sulfuric Acid	115,500	316,300
Nitrogen	20,700	28,000
Chlorine	7,100	13,600
Unleaded Gasoline	43,000	64,000
Boric Acid Granular	13,400	20,000
Diesel Fuel	408,000	461,000
Fuel Oil #2	3,500,000	5,255,000
Ash Dust	1,000	4,000
Coal Dust	1,000	10,000
Sodium Nitrite	5,300	7,600
Hydraulic Fluids	3,200	5,200
Lubricants	540,000	700,000

Such information is reported annually on Tier Two forms. As required by Special Condition 10 of the Conditional Use Permit, FPC will provide these annual reports to Polk County for actual hazardous materials inventories on-site.

Comment #104:

"Were all existing and proposed air and water impact sources and users within a twenty mile radius for the duration of the project considered in the modelling of the impacts? If not, why not? Was the impact of the Tampa Electric Company proposed Polk Power Station included in these calculations? If not, why not? What would be the impacts if these were considered?"

Response:

With respect to air pollution sources, SCA Section 5.6.1.6 provides a discussion of which existing and proposed sources were considered for the modeling analyses and why they were or were not included. These inventories were all pre-approved by the FDER prior to any air dispersion modeling. It is unnecessary to consider all existing and proposed sources within a fixed radius (e.g. 20 miles) in the air quality modeling analysis. The significant impact areas for the proposed project must be considered in order to comply with EPA and FDER modeling guidance. Projects which had active air quality permits as well as planned projects which had complete applications filed with FDER were considered for the air quality modeling. The proposed Tampa Electric Company Polk Power Station was not considered initially, since TECO did not have a complete application filed with FDER at the time the modeling analyses were completed. However, additional modeling results are being provided in response to FDER Comment #16 which include the Tampa Electric Company Polk Power Station as well as a few other proposed sources not included in the original modeling.

A detailed discussion of the ground water supply model (GWS), the input parameters, validation procedures and analysis techniques is included in SCA Section 10.5.9. The following discussion will review the methods used to assess the impact on permitted and other legal users, proposed users or applicants that have not received permits at the present time and future users identified only by an estimated quantity of use.

The model used to evaluate the impacts of FPC groundwater withdrawals included an area 32.3 miles in a north-south direction and 33.9 miles in an east-west direction. The plant site is approximately centered in this rectangular area, providing a boundary radius of approximately 16 to 17 miles from each side of the plant island. Although this is less than the 20 mile radius requested in the question, all of the impacts related to plant development and use of ground water are within the modeled area. Therefore, all impacts within a 20 mile radius were considered, because no impacts were found to extend beyond the boundaries of the existing model.

All existing permitted users were considered. This was accomplished by incorporating the location and withdrawal rate of all permitted ground water users from SWFWMD's computerized data-base of Consumptive Use Permits into the ground water supply model. This included a total of 2,469 permitted wells. These wells were subdivided into these use categories: mining, irrigation, industrial, public supply and recreational use, based on the information included on the permit file.

Existing users of ground water without permits, such as residences or other users that do not pump over 100,000 gpd, were not explicitly included in the model. However, most of these users withdraw water from the shallow Surficial Aquifer or rarely from the Intermediate Aquifer. Those non-permitted users relying on the Surficial Aquifer will not be adversely impacted because the maximum drawdown found with the GWS model in the Shallow Aquifer was less than 1 foot. Non-permitted users relying on the Intermediate Aquifer were evaluated by considering those areas delineated in SCA Figure 5.3.2-15. As shown on this figure, those areas expected to experience drawdowns greater than five feet in the Intermediate Aquifer are limited to an area very near the plant site boundaries. No records are available to determine if there are impacted users in this area other than those listed in the permit record file shown in SCA Table 5.3.2-3. However, based on land use, the number of potentially impacted wells, if any, other than the residential wells in Homeland, is thought to be small. As stated in the SCA, FPC is prepared to provide mitigation, if necessary.

The impact of the TECO plant was not included at the time of the original groundwater modeling because information on the location and rate of withdrawals was not available. In response to this question, additional analyses have been completed and are included with this text.

There are six major applications (proposed but not permitted as of the date of this analysis, including TECO) within a 20 mile radius for groundwater use that were not included in the 2,469 existing permitting wells within the model domain. The six applicants are summarized below:

MAJOR GROUND WATER USE APPLICANTS WITHIN 20 MILE RADIUS FPC POLK COUNTY SITE

Applicant	Quantity	Impact on FPC Site	Comments
Florida First	.36 MGD	none	quantity is not significant in relation to FPC, no discernable impact
Ridge Energy (Decker Site)	1.0 MGD ave day	none	wellfield is outside area of influence of FPC site
Cogenerating Facility, (Destec)	1.7 MGD ave day 2.1 MGD max day	limited to local area	wellfield is within the FPC radius of influence, however impact is minimal
Lakeland Northeast wellfield	9 MGD ave day 16 MGD max day	none	wellfield is outside the area of influence of FPC well field
TECO Polk Power Station	6.6 MGD ave day 9.3 MGD max day	overlaps FPC, adds one ft. drawdown	Analysis in TEC PPS SCA Section 11.7.0, Figures 7 & 8
TECO Hardee County Site	3.8 MGD ave day 8.6 MGD max day	overlaps FPC, adds 0.5 ft. drawdown	Analysis in TEC PPS SCA Section 11.7.0, Figures 7 & 8

The TECO Polk Power Station is the largest proposed industrial user. The combined effect of both the TECO and FPC power plants was analyzed by the superpositioning of the TECO plant predicted drawdowns onto the FPC drawdowns. The TECO plant drawdown included the effects of future Hardee Station withdrawals. Information provided to Polk County in response to their comment #105 illustrates the cumulative impact of TECO withdrawals imposed on the FPC withdrawals of 26 MGD and 31.6 MGD. The effect of including TECO's use with FPC's proposed use is to add approximately one foot of additional drawdown at the southwest quadrant of the FPC site in the upper Floridan Aquifer. The area between the TECO and FPC site also experiences some additional drawdown, but increases are restricted to the southwest quadrant and to one foot or less of additional decline in water levels. The proposed Destec cogeneration facility is also within the area of FPC's cone of depression, but their use will apparently not adversely impact the FPC site significantly. This opinion is based on the results of the FPC aquifer performance test, presented in SCA Section 10.5.8, which indicated that a pumping rate of approximately 7 MGD had little impact beyond a radius of 1,000 feet. The Destec facility will be located at the USAC Rockland Mine on CR 630, and will be the nearest proposed user to the FPC site. However, the likely Destec withdrawal rate of 1.7 MGD to 2.1 MGD will have little effect at the FPC site, as indicated by the pump test measurements, and will not add substantially to the cumulative impact due to FPC and TECO withdrawals.

Future users were also incorporated into the model although in a less direct manner than existing users. To incorporate definitively a pumping well into a quantitative groundwater model, the location of the well and magnitude of the pumpage must be known. This information is obviously not available for future users that are not individually identifiable. SWFWMD provides projections of future quantities of water use by category, but does not provide information on the location and withdrawal rates of future users except by county. To evaluate the proposed FPC use against future users, some assumptions must be made regarding the location and quantity of future groundwater withdrawals. These assumptions were based on the projections of water use by category in the SWFWMD "Needs and Sources" (1992) document. Following is a summary of projected water demand by type of use for the period from 1990 through 2020 for Polk County:

SWFWMD PROJECTED WATER DEMAND FOR POLK COUNTY							
Type Of Use	Projected Water Use For Years					Overall Increase Or Decrease From 1990 Rate	
	1990	1995	2000	2010	2020	Percent Change	ΔMGD
Mining	90.7	84.3	57.1	43.3	37.1	-60%	-53.6
Irrigation (with conservation)	140.4	157.6	161.4	178.4	195.5	39%	55.1
Industrial	67.7	75.7	88.8	128.0	128.2	89%	60.5
Public Supply	73.3	82.7	86.4	97.7	108.4	48%	35.1
Recreational	7.6	8.8	9.1	10.1	11.3	49%	3.7
Totals	379.7	409.1	402.8	457.5	480.5	27%	100.8

As noted above, SWFWMD estimated 1990 mining water use within Polk County to be 90.7 MGD. An examination of the well permit file and confirmation calls with the mining companies found a more realistic estimate of mining water use to be 106.7 MGD.

By reference to the preceding table, SWFWMD forecasts a net increase in total ground water consumption of 101 MGD from the year 1990 to 2020, which includes the FPC Polk County Site. The FPC pumpage will be 31.6 MGD; therefore, the net growth in all other users is forecast to be about 70 MGD.

The present mining industry pumpage is about 107 MGD (based on their SWFWMD water use permit files) and is projected by SWFWMD to decrease to about 37 MGD by the year 2020, a decrease of about 70 MGD.

The increased pumpage projected for future unidentified individual users cannot be modeled because that would require knowing the exact location and pumpage of each new well. One cannot simulate increased pumpage by simply increasing the pumpage from the existing wells. Therefore, to approximate the impact of the growth in pumpage in some sectors and the simultaneous reduction in the mining industry pumpage, both of which are approximately equal to 70 MGD, the drawdowns were calculated by keeping the mining usage constant at the 1990 rate and not increasing the other sector pumpage.

Information provided to Polk County in response to their comment #105 presents the predicted drawdown due to the combined FPC and TECO withdrawals. That prediction is conservative because it assumes a 90 day drought with no recharge and no reduction in future mining consumption. The actual effects on the potentiometric levels in the Floridan Aquifer due to FPC's pumpage is thought likely to be more limited.

A map showing the potentiometric levels as they existed in the 1991 dry season has been submitted to Polk County. In addition, another map presenting a more realistic case with the same baseline potentiometric levels for FPC and all other permitted users, but with the mining usage reduced 60 percent from the present usage rate, as forecast by SWFWMD (1992), was also supplied to Polk County. Comparison of these two maps shows the potentiometric levels to fall less than 5 feet in the plant vicinity and to be essentially unchanged in the Bartow and Mulberry areas. On this broader regional basis, the mining industry reductions in consumption nearly balance the power plant usage and result in little overall adverse impact. Another map supplied to Polk County presenting the more conservative approach of no reduction in mining usage shows that the potentiometric levels are affected by FPC's pumpage only in the southwestern part of the county near the site and that the regional trends and overall levels are not changed. Exhibit PC-104 is a copy of the letter transmitting these maps to Polk County.

Comment #105:

"What will the groundwater impacts be on the Polk/Highlands water use caution area for the duration of the project? Please explain."

Response:

The maximum extent of impact for the FPC project will occur at full build out, sometime after the year 2018. Water use for the plant at that time may reach 31.6 MGD, if additional municipal water reuse or recycling is not available. The GWS model was used to simulate the extent of drawdowns in the source aquifer for a pumping rate of 31.6 MGD. A map presenting the maximum extent of drawdowns with the boundaries of the Polk/Highlands water use caution area has been supplied to Polk County. This map indicates that the effects of the combined FPC and TECO use will not extend to the water use caution area, nor does it extend downgradient to the area identified at the "red hole" in Hillsborough and Manatee Counties. Development of the information contained in this map is explained in the response to Polk County comment #104. Exhibit PC-105 provides documentation of the transmittal of this map to Polk County.

EXHIBIT PC-82
(40 Pages)

APPENDIX A

SOURCE IMPACT ANALYSIS/MODELLING PROTOCOL

AIR QUALITY MODELLING PROTOCOL

INTRODUCTION

The development of and agreement on a modelling protocol is suggested by the EPA and FDER prior to embarking on any major air quality modelling exercise. This protocol describes, in some detail, the models and model options which will be used, the meteorological and emissions data which will be input to the model, the receptor grids which will be utilized, and the analyses which will use the model results. It is submitted as a part of this POS for FDER review and comment.

GENERAL MODELLING APPROACH

The air quality impact assessment will consist of a proposed source significant impact area analysis, a PSD increment consumption analysis, an ambient air quality standards impact analysis, and an additional impacts analysis. These analyses are discussed in greater detail below. The modelling approach will follow EPA and FDER modelling guidelines for determining compliance with applicable PSD increments and ambient air quality standards. EPA modelling guidance is provided in the Modelling Guideline (EPA, 1986) and Supplement A (1987) and draft Supplement B (1990 as well as the New Source Workshop Manual (EPA, 1990a). FDER guidance on conducting the analyses is provided in Chapters 17-2.260 and 17-2.500, F.A.C.

Based on current EPA and FDER policies, the highest annual average and highest, second-highest short-term (i.e., 24 hours or less) predicted (critical) concentrations will be selected for comparison to applicable standards. The use of a five-year meteorological data base in the modelling analysis, as proposed below, allows a comparison of the predicted highest, second-highest short-term concentration to applicable short-term PSD increments and ambient air quality standards. The highest, second-highest concentration is calculated for a receptor field by:

- eliminating the highest concentration predicted at each receptor
- identifying the second-highest concentration predicted at each receptor, and
- selecting the highest concentration among those second-highest concentrations.

This approach is consistent with the air quality standards and PSD increments which permit one short-term average exceedance per year at each receptor.

The general modelling approach for each air quality impact analysis for the source area will consist of a screening phase and a refined phase. The major difference between the two phases is the receptor grid used when predicting concentrations and the number of meteorological data periods evaluated. In general, concentrations for the screening phase will be predicted using a coarse mesh receptor grid and a five-year meteorological data base. The screening phase will identify the critical receptors associated with highest and highest, second-highest short-term concentrations for all applicable pollutants and averaging periods which will be evaluated further in greater detail in the refined phase of the analysis.

The refined phase of the analysis will be performed by predicting concentrations using a fine mesh receptor grid centered over each of the critical receptors identified in the screening phase of the modelling analysis. Several critical receptors will be evaluated for each pollutant and averaging time. The refined phase will use only the full years of meteorological data containing the meteorological conditions which caused the critical concentrations identified for analysis in the screening phase. This approach will be used to ensure that valid highest, second-highest (critical) short-term concentrations will be obtained for comparison to applicable air quality standards.

MODEL SELECTION AND USE

The most current version of ISCST dispersion model (EPA, 1987a), available at the time modelling is performed (currently version 90346), will be used to evaluate the emissions from the proposed units. This model is contained in the EPA User Network for Applied Modelling of Air Pollution (UNAMAP), Version 6. The ISCST model was selected primarily for the following reasons:

1. EPA and FDER have approved the general use of the model for air quality dispersion analysis because the model assumptions and methods are consistent with those in the Guideline on Air Quality Models (EPA, 1986).

2. The ISCST model is capable of predicting the impacts from stack, area, and volume sources that are spatially distributed over large areas and located in flat or gently rolling terrain.

3. The results from the ISCST model are appropriate for addressing compliance with AAQS and PSD increments since it can predict the maximum as well as the highest, second-highest concentration and period of occurrence for 1-hour, 3-hour, 8-hour, 24-hour, and annual averaging periods at each receptor for each full year of hourly meteorological data used.

The ISCST model has several options and features that allow it to handle certain situations in a variety of ways. For this analysis, the EPA regulatory default options will be used to predict the maximum impacts from the facility.

AREA CLASSIFICATION

The ISCST model has rural and urban options which affect the wind speed profile exponent law, dispersion rates, and mixing-height formulations used in calculating ground-level concentrations. The criteria used to determine when the rural or urban mode is appropriate are based on land use near the proposed plant's surroundings (Auer, 1978). If the land use is classified as heavy industrial, light-moderate industrial, commercial, or compact residential for more than 50 percent of the area within a 3 km radius circle centered on the proposed source, the urban option should be selected. Otherwise, the rural option is more appropriate.

Based on the use of USGS topographic maps, a review of aerial photography, and site visits, the initial conclusion is that the land use is consistent with the use of the rural rather than urban options.

GEP STACK HEIGHT/DOWNWASH CONSIDERATIONS

If the stacks for the proposed units are less than Good Engineering Practice (GEP), based upon the dimensions of nearby buildings, then the potential for building downwash to occur exists and must be considered in the modelling analysis.

The procedures used for addressing the effects of building downwash are those recommended in the ISC Dispersion Model User's Guide and are incorporated into the ISCST model. The height, length, and width of major structures are input to the model and are used to modify the dispersion parameters. If the ratio of stack height to building height is less than 1.5, then building wake effects are calculated using the Schulman-Scire procedures. Otherwise, building wake effects are calculated using the Huber-Snyder procedure. These selections are automatically made within ISC.

PLANT LOADS

Operating load can affect plume dispersion, and therefore ground-level impacts, since exit temperature and velocity change. For the PC units, three operating load cases will be analyzed at the screening level. These loads will be selected to cover the range of normal plant operations. The PC load case shown in the screening analysis to cause the highest impacts for each source will be used in the refined analyses. The CC units are not expected to operate at less than full load under normal plant conditions. Therefore, they will be modelled at full load, and other scenarios will not be examined. The CC units will be modelled in the screening analysis at the ambient temperatures to determine which produces the highest impacts.

METEOROLOGICAL DATA

The air quality modelling analysis will use hourly preprocessed National Weather Service (NWS) surface meteorological data from Tampa and concurrent twice-daily upper air soundings from Ruskin, Florida, for the years 1982-1986. The preprocessed hourly meteorological data file for each year of record used in the analysis obtained from FDER will contain randomized wind direction, wind speed, ambient temperature, atmospheric stability using the Turner (1970) stability classification scheme, and mixing heights. The anemometer height of 6.7 meters, to be used in the modelling analysis, was obtained from NWS Local Climatological Data summaries for Tampa.

EMISSIONS INVENTORY

Emissions and stack parameters for the proposed source will be generated from the most recent engineering information available at the time the modelling is performed. Stacks which have similar emission parameters will be modelled as co-located sources to simplify the analysis. The details of any source combinations made in this manner will be provided. Further, stacks which have similar stack gas compositions will be modelled using a unit emission rate and results scaled when appropriate to obtain the impacts for each separate pollutant. For materials handling activities, the ISCST model will be run in the area source mode. Emissions estimates for materials handling will be based upon the methods in AP-42 (EPA, 1985), and Supplement A (EPA, 1986a) and Supplement B (EPA, 1988).

For those pollutants for which the project will have a significant impact, it will be necessary to consider other sources in the air quality impact analysis. The sources to be considered will be determined in accordance with guidance in the EPA Modelling Guideline and New Source Review Workshop Manual. Sources located beyond the significant impact area of the proposed source will be screened based on the "Screening Threshold" method (North Carolina DWR, 1985) to determine whether they should be included in the modelling analysis. These calculations will be provided. Source information will be obtained from FDER and from other recent air quality modelling studies for the area. Maximum allowable emission rates will be used as required by FDER. A listing of sources in the inventory will be submitted to FDER for review and concurrence prior to the initiation of detailed modelling effort. Existing sources will be categorized as PSD sources or non-PSD sources depending upon whether they commenced construction after or before the PSD baseline date for the area, which also will be obtained from FDER.

RECEPTOR LOCATIONS

Receptors will be placed at locations considered to be "ambient air," which EPA has defined as "that portion of the atmosphere, external to buildings, to which the general public has access" [40 CFR 50.1(e)]. Most of the site will not be ambient air since access will be restricted. Therefore, the closest receptors will be on the site property lines. A plot plan showing the plant boundary and areas where public access is precluded will be provided, as will a description of the measures taken to prohibit public access (e.g., fences).

The significant impact area analysis will use a polar receptor grid centered over the proposed source. The polar receptor grid will consist of 36 radials, each separated by 10 degree increments and extending out from the fenced plant boundary line in all 36 directions. The length of the radials will depend upon the distance at which the proposed source impacts reach the significant impact levels as defined for each applicable pollutant in the PSD regulations, but will be no more than 50 kilometers (km).

The screening phase for the air quality impact analysis will use a coarse mesh polar receptor grid (0.50 km distance between rings with radials spaced 10 degrees apart out to 6 km and then at 1.0 km spacing out to at least 14 km) centered over the proposed source. The receptor grid will begin coverage at the fenced plant boundary line and extend outward in all directions. The receptor grid will provide sufficient receptor coverage to determine the locations of all critical receptors to be evaluated in the refined phase of the analysis.

The refined phase of the air quality impact analysis will use a fine mesh cartesian receptor grid (0.10 km grid resolution) composed of 121 discrete receptors within a 1.0 km square grid centered over each critical receptor.

BACKGROUND CONCENTRATIONS

To analyze impacts relative to ambient air quality standards (AAQS), estimates of background pollutant concentrations will be needed. Background concentrations should include contributions from sources not included in the modelling analyses as well as contributions from natural sources. The Modelling Guidelines (EPA, 1986) provide some guidance regarding the determination of background concentrations. The data collected as part of the preconstruction monitoring program described elsewhere will be interpreted following this guidance. Initially, concentrations from the monitoring program will be used without regard to the wind directions existing at the time of monitoring. Highest long-term and second-highest short-term values will be used. If this approach proves to be problematic, then the monitoring data will be segregated by wind direction and the following approach utilized. For annual average concentrations, background values will be calculated by averaging the hourly concentrations when the monitor is not downwind of major sources which will be included in the modelling analyses. The monitor will be considered downwind of an existing source if it is inside a 90-degree sector downwind of the source, i.e., wind vector ± 45 degrees. For shorter-term averaging times, meteorological conditions will be examined more closely, and representative maximum background values for each averaging time will be proposed and discussed with the FDER. Background values for pollutants not monitored at the site will be obtained from other regional monitoring sites using 1990 (or 1991, if available) data.

PROPOSED ANALYSES

Proposed Source Significant Impact Area Analysis - The proposed source will be modelled using the emissions data discussed above. The significant impact area will be defined on a pollutant-specific basis for all applicable averaging periods according to the significant impact levels defined in the PSD regulations. Highest rather than highest, second-highest short-term values will be used in this analysis. The greatest significant impact area resulting from an analysis of all applicable averaging periods for a given pollutant will be the significant impact area for that pollutant. The significant impact area will be used to determine the source interaction zone for the screening phase of the air quality impact analysis.

PSD Increment Consumption Analysis - The area around the Polk County site is a Class II PSD area. The nearest designated Class I PSD area is the Chassahowitzka Wilderness Area which is located over 100 km northwest of the site. The Class II PSD increment consumption analysis will consist of modelling the PSD source emissions inventory for SO_2, particulate matter, and NO_2 using the ISCST model as described above, and comparing the highest, second-highest short-term average and highest annual average impacts to the appropriate Class II PSD increments. Given that the Polk County site is located greater than 100 km from the Chassahowitzka Wilderness Area, we will not use the ISCST model to assess Class I PSD increment consumption. Further discussions with the FDER and the Federal Land Manager will be required to finalize the approach to this analysis. If necessary, the MESOPUFF-II model (EPA, 1984; EPA, 1988a) will be used to assess the project's impact on the Class I area.

Ambient Air Quality Standards Impact Analysis - The area around the Polk County site is attainment for all of the criteria pollutants. The ambient air quality standards impact analysis will consist of modelling all PSD and existing sources identified on the emissions inventory for each criteria air pollutant and applicable averaging time. The highest, second-highest short-term and highest annual average impacts will be combined with appropriate background concentrations for each applicable air pollutant and averaging time and compared to the appropriate state and federal ambient air quality standards to determine whether the ambient air quality standards are violated. The background concentrations for each applicable air pollutant will be determined using the procedures described above.

Additional Impacts Analysis - Additional impacts analysis will be performed for those criteria and non-criteria air pollutants emitted in significant quantities to determine air pollution impacts on soils and vegetation caused by emissions from the proposed source and emissions resulting from associated growth. Specifically, a growth projection analysis including population growth projection and industrial growth projection data will be performed. The impacts of this growth on air quality will be estimated. A survey of soils and vegetation types in the area will be conducted to determine vegetation with any commercial value and to identify sensitive species. Modelled concentrations and/or depositions will be used to determine if there will be any significant impacts on soils or vegetation. A screening (level-1) visibility impact analysis will be conducted for the nearest Class I Area using the technical guidance provided in the Workbook for Plume Visual Impact Screening and Analysis (EPA, 1988b).

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Florida Power
CORPORATION

March 9, 1992

Mr. Thomas Rogers
Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399

Dear Mr. Rogers:

Re: Polk County Site
MESOPUFF II Modeling Protocol

Enclosed please find the modeling protocol for Florida Power Corporation's (FPC) proposed power plant facility to be located within Polk County. This modeling analysis will use the long-range transport model, MESOPUFF II, to assess the prevention of significant deterioration (PSD) Class I increment consumption for sulfur dioxide concentrations at the Chassahowitzka National Wilderness Area. This proposed protocol follows guidance provided by both the Florida Department of Environmental Regulation and the National Park Service in discussions with FPC on another recent project. Your review and concurrence with this protocol is requested at your earliest convenience.

Should you have any questions on this document, please call me at (813) 866-5529 or Mr. Scott Osbourn at (813) 866-5158.

Very truly yours,

Scott Osbourn for

Kathleen L. Small
Environmental Project Manager

Enclosure

cc/enc: L. Nagler (EPA, Region IV)
H. S. Oven (DER)
J. Vimont/J. Notar (National Park Service)

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ATTACHMENT 1

PROPOSED MESOPUFF II MODELING PROTOCOL FOR FLORIDA POWER CORPORATION'S PROPOSED 940-MEGAWATT FACILITY, POLK COUNTY

Florida Power Corporation (FPC) has prepared this proposed protocol for long-range transport modeling analysis to assess the prevention of significant deterioration (PSD) Class I increment consumption for sulfur dioxide (SO_2) concentrations at the Chassahowitzka National Wilderness Area (NWA). This modeling analysis will use the long-range transport model, MESOPUFF II, to address impacts from the proposed FPC facility to be located in Polk County, as well as other PSD increment consuming sources as specified by the Florida Department of Environmental Regulation (FDER).

This analysis will be used in support of the PSD permit application to be prepared and submitted to the FDER. As part of the application, ambient air quality analyses will be performed to demonstrate the compliance of the proposed project with Ambient Air Quality Standards (AAQS) and PSD Class II increments. The model selection and application for those analyses will be based on recommendations in the U.S. Environmental Protection Agency (EPA) "Guideline on Air Quality Models (Revised)", 1990. The air dispersion model to be used in these analyses will be the Industrial Source Complex Short-Term (ISCST) model, which is intended to predict impacts out to 50 kilometers (km) from a source. This model is referenced in Appendix A ("Appendix A" model) of the modeling guidelines, which means that the model may be used without justifying the use of technical methods and procedures provided the recommended regulatory options are selected. Because the proposed FPC facility is more than 100 km from the Class I area, the ISCST model may not be appropriate for addressing impacts at the Class I area. However, the modeling guideline does not specify a preferred model or protocol for long-range transport beyond 50 km. Based on previous discussions with FDER, the use of a long-range transport model, such as the MESOPUFF II model, has been recommended to address impacts for this application. Although the MESOPUFF II model is not an "Appendix A" model from the EPA modeling guidelines, it is referenced in Appendix B ("Appendix B" model) of the modeling guidelines and can be used on a case-by-case basis provided it can perform critical calculations or routines that are not available from an "Appendix A" model. In this case, the ISCST model, an "Appendix A" model, does not have the necessary dispersion and transport routines to adequately address long-range transport of plumes from emission sources. Since the proposed facility is more than 50 km from the critical receptors, FPC proposes to use the MESOPUFF II model as an appropriate method in addressing impacts at the Chassahowitzka NWA.

The proposed modeling protocol for using the MESOPUFF II model, including a brief description of the project and the model, is presented in the following sections.

PROJECT DESCRIPTION AND SITE LOCATION

The proposed FPC facility is to be located in Polk County, which has been designated by EPA and FDER as an attainment area for all criteria pollutants. The proposed project will consist of multiple generating units to be constructed and operated at the site beginning in 1998. The initial phase of generating units which will provide approximately 940 MW, will consist of natural gas fired combined cycle (CC) units capable of converting to coal gasification in the future. These initial units will use low sulfur fuel oil as a backup fuel. Later units within the 3,000 MW of ultimate site capacity may include pulverized coal units. The PSD application will address the impacts of the initial 940 MW only; the Site Certification Application will address the 3,000 MW ultimate site capacity in addition to the initial phase.

BRIEF DESCRIPTION OF MESOPUFF II MODEL

MESOPUFF II is a long-range transport model that is currently recommended by EPA for determining source impacts at distances greater than 100 km. Based on discussions with FDER, this model can be used for the PSD Class I increment consumption analysis in support of air permit applications for proposed sources located more than 100 km from a Class I area. The MESOPUFF II model has two preprocessor programs, READ56 and MESOPAC II, and one postprocessor program, MESOFILE II. The READ56 program is a preprocessor program to MESOPAC II and is designed to read raw upper air (sounding) data obtained from the National Climatic Data Center (NCDC) in Asheville, North Carolina, and to reformat the data for use in the MESOPAC II program. The READ56 program also identifies missing data records. Missing data identified by READ56 must be filled in manually before input to the MESOPAC II program.

The MESOPAC II program is the meteorological preprocessor program for MESOPUFF II. The MESOPAC II program reads the upper air data file output from the READ56 program; as well as hourly surface meteorological data and hourly precipitation data collected at stations within the modeling area. Other data required for the MESOPUFF II model include land use and surface roughness lengths for each receptor grid point to be modeled.

The MESOPUFF II model outputs concentration results for user-specified averaging times. The results can be processed by the MESOFILE II program to obtain additional statistical information about the concentrations produced from MESOPUFF II (e.g., annual average values). A postprocessor to produce highest, second-highest (HSH) short-term concentrations from MESOPUFF II model's output has been developed. The annual average and HSH concentrations for the 3- and 24-hour averaging period can be compared directly to allowable PSD Class I increments.

PROPOSED MODELING PROTOCOL

TASK 1–PREPARATION OF UPPER AIR METEOROLOGICAL DATA WITH READ56 PROGRAM

The general grid in which the meteorological data will be prepared and processed by the READ56 and MESOPAC II programs will be consistent with recent modeling analyses that are being performed to address the PSD increment consumption in the Class I area (see Figure 1). The model domain for the recent analyses covers an area of 90,000 km², 300 km in the east-west and north-south directions. There are a total of 225 cells within the grid, with each cell covering a 400-km² area or 20 km in the east-west and north-south directions. The Class I area and emission sources are located within the grid and generally are 100 km or more from the grid's edges.

The upper air data will be read by the READ56 program to identify missing soundings and missing data for specific levels within a sounding. The program has been modified to account for the data format changes that have occurred since the program originally was developed. The options selected for this program are presented in Table 1.

Meteorological data for the 5-year period of 1982 to 1986 from the National Weather Service (NWS) stations located within or near the grid will be used in the analysis. This time period was selected because it is the same period during which air dispersion modeling will be performed with the ISCST model in the permit application to address compliance with AAQS and PSD Class II increments.

Upper air rawinsonde data from the following upper air NWS stations will be used:

1. Ruskin, Florida (located within the grid),
2. West Palm Beach, Florida (located to the southeast of the grid), and
3. Waycross, Georgia (located to the north of the grid).

These stations were selected because they are the nearest upper air stations to the study area. The data will be reduced into 1-year records suitable for input to the READ56 program. Each station-year will be run with the READ56 model to determine any missing data. The missing data will be filled in by assuming data persistence from the previous valid observation (e.g., if data for the 12Z sounding are missing, the 12Z sounding from the previous day will be used) or persistence from a lower level. Because the program expects data from the mandatory levels of 850, 700, and 500 millibars (mb), data will be inserted at these levels: wind data persisted from a lower level, and temperature data persisted for the same level from the previous sounding. A final set of data will be prepared for input to the MESOPAC II program.

TASK 2- PROCESSING OF SURFACE AND UPPER AIR METEOROLOGICAL DATA WITH MESOPAC II PROGRAM

The MESOPAC II program will be run to process the surface and upper air surface meteorological data for a format acceptable to the MESOPUFF II model. The options selected for this program are presented in Table 2. The program will be modified to account for the data format changes that have occurred since the program originally was developed. The surface meteorological data will be obtained for the 5-year period of 1982 to 1986, when available, from the following NWS stations, all located within the grid:

1. Tampa (located in the southwestern quadrant);
2. Orlando (located near the center of the grid); and

3. Gainesville (located in the northern portion of the grid) for 1984 to 1986 (digitized data are not available from Gainesville for 1982 or 1983; data from Jacksonville will be substituted for this period).

Hourly precipitation data also will be obtained for each surface meteorological station. However, the precipitation data will not be used in the initial model runs (i.e., wet deposition will not be calculated). These data may be used if a more realistic account of wet deposition processes is warranted. Land use data will be developed for this grid from existing data developed by Argonne National Laboratory ("A Guide for Estimating Dry Deposition Velocities of Sulfur over the Eastern United States and Surrounding Regions," C.M. Sheih, et al., 1979). Since the model allows only a single land use type to be specified for each grid square, the land use category covering the greatest fraction of the total area within each grid square will be selected.

TASK 3—PREDICTION OF AMBIENT CONCENTRATIONS WITH MESOPUFF II

The MESOPUFF II model will be used to predict ambient concentrations at receptors in the Chassahowitzka NWA. The model will be run for select periods identified by the ISCST model as potential violations of the PSD Class I increment. The options selected for the model are presented in Table 3. Based on a discussion with the National Park Service, the distance to which the Turner dispersion parameters apply will be set to 50 km (the model default distance is 100 km). After that distance, the dispersion parameters are based on time-dependent equations.

Emission and stack parameters for all SO_2 PSD increment consuming sources will be processed into the MESOPUFF II model input format. This inventory will consist of the most current inventory available from FDER for the Chassahowitzka NWA airshed plus the proposed FPC source. Concurrence on the appropriate inventory will be obtained from FDER during a meeting and discussion held upon submittal of this protocal. Concentrations will be predicted at the 13 FDER discrete receptors along the boundary of the PSD Class I area. Predicted highest and HSH SO_2 concentrations for each year will be determined using a postprocessor program.

For increment consumption purposes, an emission source is deemed not to have a significant impact in the Class I area if the impact is less than the recommended EPA significance levels for Class I areas. These recommended levels for SO_2 concentrations are 1.23, 0.275, and 0.1 $\mu g/m^3$ for the 3-hour, 24-hour, and annual averaging periods, respectively. If a source's impact (as determined with MESOPUFF II) is less than the Class I significance level, then a source does not have a significant impact or contribution to a predicted violation and can be permitted regardless of the impacts from other sources.

The modeling approach will follow general procedures to identify concentrations in excess of the PSD Class I increment. This approach will consist of the following steps:

1. Concentrations will be calculated at the Class I area using the ISCST model for the 5-year period of meteorological data collected at the NWS station in Tampa.

2. Based on the results of the ISCST model, concentrations that are predicted to violate the PSD Class I increment will be identified at specific receptors and during specific time periods. The sources that contribute to the predicted violations will be identified, including the proposed source's contribution, and compared to EPA's significance levels. If the proposed source's impacts are less than significant, no additional modeling is necessary. If the proposed

source's impacts are significant, additional modeling will be performed with the MESOPUFF model.

3. The use of the MESOPUFF II model is recommended for sources located 20 kilometers (km) or more from the critical receptors (i.e., Class I area). Because the sources in the current emission inventory are 20 km or more from the Class I area, the impact assessment will be performed with the MESOPUFF II model only. No specific guidance has been provided to address impacts from sources within 20 km of the Class I area if the final inventory indicates that sources exist within that distance. If applicable, this issue would need to be resolved before a final impact analysis is performed.

Concentrations will be calculated with the MESOPUFF model for the specific periods of potential violations identified in Step 2 and at least 3 days before and 2 days after those periods. Concentrations will not be calculated for averaging times during which there were no predicted violations of the increments according to the ISCST model. For example, if the ISCST model predicts impacts that violate the increment for the 24-hour averaging period in 1986, the MESOPUFF II model will be run only for the 24-hour averaging period.

The MESOPUFF model calculations will be performed without using chemical transformation processes or wet or dry deposition. However, the results will be reviewed and assessed to determine if the use of these processes would account for more realistic concentration calculations. Based on discussions with the reviewing agencies, additional model runs may be performed that incorporate the use of these processes.

4. Based on the results from the MESOPUFF II model from Step 3, the highest annual and HSH short-term concentrations, where applicable, will be developed for the periods considered in the modeling. The project's contribution to the maximum predicted concentrations will be identified and compared to EPA's recommended significance levels.

Table 1. Options Selected for READ56 Program- Proposed FPC Polk County Site

Variable	Description	Selected Value
1. CARD 1 - STARTING AND ENDING HOURS, UPPER PRESSURE LEVEL		
IBYR, IBDAY, IBHR, IEYR, IEDAY, IEHR	Starting and ending year, day, hour	As needed
PSTOP	Top pressure level for which data are extracted	500 mb
2. CARD 2 - MISSING DATA CONTROL VARIABLES		
LHT	Height field control variable	True (1)
LTEMP	Height field control variable	True (1)
LWD	Wind direction field control variable	True (1)
LWS	Wind speed field control variable	True (1)

(1) Program run a second time with value set to false in order provide a missing value indicator for mandatory levels of 850, 700, and 500 mb. Data for these levels are input by user.

Table 2. Options Selected for MESOPAC II Program- Proposed FPC Polk County Site (Page 1 of 2)

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NYR, IDYSTR, IHRMAX	Year, start day, and number	As needed
NSSTA, NUSTA	Number of surface and rawinsonde stations	As needed
3. CARD GROUP 3 - GRID DATA		
IMAX, JMAX	Number of grid points in the X and Y directions	15, 15
DGRID	Grid spacing	20 km
4. CARD GROUP 4 - OUTPUT OPTIONS		
Various	Disk and printer control variables for writting data to disk	As needed
5. CARD GROUP 5 - LAND USE CATEGORIES AT EACH GRID POINT		
ILANDU	Land use categories at each grid point	15 by 15 array
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Surface wind speed measurement heights control variable	0 (Default- 10 m)
IOPTS(2)	von Karman constant control variable	0 (Default)
IOPTS(3)	Friction velocity constants control variable	0 (Default)
IOPTS(4)	Mixing height constants control variable	0 (Default)
IOPTS(5)	Wind speed control variable	0 (Default - RADIUS = 99 km, ILWF = 2, IUWF = 4)

Table 1. Options Selected for READ56 Program- Proposed FPC Polk County Site

Variable	Description	Selected Value
1. CARD 1 - STARTING AND ENDING HOURS, UPPER PRESSURE LEVEL		
IBYR, IBDAY, IBHR, IEYR, IEDAY, IEHR	Starting and ending year, day, hour	As needed
PSTOP	Top pressure level for which data are extracted	500 mb
2. CARD 2 - MISSING DATA CONTROL VARIABLES		
LHT	Height field control variable	True (1)
LTEMP	Height field control variable	True (1)
LWD	Wind direction field control variable	True (1)
LWS	Wind speed field control variable	True (1)

(1) Program run a second time with value set to false in order provide a missing value indicator for mandatory levels of 850, 700, and 500 mb. Data for these levels are input by user.

Table 2. Options Selected for MESOPAC II Program- Proposed FPC Polk County Site (Page 1 of 2)

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NYR, IDYSTR, IHRMAX	Year, start day, and number	As needed
NSSTA, NUSTA	Number of surface and rawinsonde stations	As needed
3. CARD GROUP 3 - GRID DATA		
IMAX, JMAX	Number of grid points in the X and Y directions	15, 15
DGRID	Grid spacing	20 km
4. CARD GROUP 4 - OUTPUT OPTIONS		
Various	Disk and printer control variables for writting data to disk	As needed
5. CARD GROUP 5 - LAND USE CATEGORIES AT EACH GRID POINT		
ILANDU	Land use categories at each grid point	15 by 15 array
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Surface wind speed measurement heights control variable	0 (Default- 10 m)
IOPTS(2)	von Karman constant control variable	0 (Default)
IOPTS(3)	Friction velocity constants control variable	0 (Default)
IOPTS(4)	Mixing height constants control variable	0 (Default)
IOPTS(5)	Wind speed control variable	0 (Default - RADIUS = 99 km, ILWF = 2, IUWF = 4)

Table 2. Options Selected for MESOPAC II Program- Proposed FPC Polk County Site (Page 2 of 2)

Variable	Description	Selected Value
IOPTS(6)	Surface roughness lengths control variable	0 (Default)
IOPTS(7)	Option to adjust heat flux estimate	0 (Default)
IOPTS(8)	Radiation reduction factors control variable	0 (Default)
IOPTS(9)	Heat flux constant control variable	0 (Default)
IOPTS(10)	Option to begin run at date other than at start of meteorological data files	0 or 1, as needed
7.- 14. CARD GROUPS 7 TO 14		
Various	Options input to override default values	Not used
15. CARD GROUP 15 - SURFACE STATION DATA		
Various	Surface meteorological station information	As needed
16. CARD GROUP 16 - RAWINSONDE STATION DATA		
Various	Rawinsonde meteorological station information	As needed

Note: Precipitation data are available but will not be used in the modeling analyses (i.e., for wet deposition) without discussions with the regulatory agencies concerning appropriate technical assumptions.

Table 3. Options Selected for MESOPUFF II Program- Proposed FPC Polk County Site (Page 1 of 3)

Variable	Description	Selected Value
1. CARD GROUP 1 - TITLE		
TITLE	Title of run	As needed
2. CARD GROUP 2 - GENERAL RUN INFORMATION		
NSYR, NSDAY, NSHR	Year, start day and hour	As needed
NADVTS	Number of hours in run	As needed
NPTS	Number of point sources	As needed
NAREAS	Number of area sources	Not used
NREC	Number of non-gridded receptors	13 (Class I area)
NSPEC	Number of chemical species to model	1 (SO2)
3. CARD GROUP 3 - COMPUTATIONAL VARIABLES		
IAVG	Concentration averaging time	24 hours
NPUF	Puff release rate for each source	1 puff/hour
NSAMAD	Minimum sampling rate	2 samples/hour
LVSAMP	Variable sampling rate option	True (increase rate with higher wind speeds)
WSAMP	Reference wind speed used in variable sampling rate option (used if LVSAMP is true)	2 m/s
LSGRID	Control variable for concentration computations at sampling grid points	False (sampling at non-gridded points only)
AGEMIN	Minimum age of puffs to be sampled	900 seconds (should not be larger than 3600 seconds)

Table 3. Options Selected for MESOPUFF II Program- Proposed FPC Polk County Site (Page 2 of 3)

Variable	Description	Selected Value
4. CARD GROUP 4 - GRID INFORMATION		
Various	Numbers that define the beginning and end of the meteorological and computational grids	1,15
MESHDN	Sampling grid spacing factor	1
5. CARD GROUP 5 - TECHNICAL OPTIONS		
LGAUSS	Vertical concentration distribution option	True
LCHEM	Chemical transformation option	False (1)
LDRY	Dry deposition option	False (1)
LWET	Wet deposition option	False (1)
L3VL	Three vertical layer option	False (1)
6. CARD GROUP 6 - DEFAULT OVERRIDE OPTIONS		
Various	Disk and printer option to write data to disk	As needed
LPRINT	Printer output option (Print every IPRINT hours)	True
IPRINT	Printing interval	24 hours
7. CARD GROUP 7 - DEFAULT OVERRIDE OPTIONS		
IOPTS(1)	Control variable for input of dispersion parameters	1 (see Card Group 8)
IOPTS(2)	Control variable for input of diffusivity constants	0 (Default)
IOPTS(3)	Control variable for input of SO2 canopy resistance	0 (Default)
IOPTS(4)	Control variable for input of dry deposition parameters	0 (Default)
IOPTS(5)	Control variable for input of wet removal parameters	0 (Default)

Table 3. Options Selected for MESOPUFF II Program- Proposed FPC Polk County Site (Page 3 of 3)

Variable	Description	Selected Value
IOPTS(6)	Control variable for input of chemical transformation method	0 (Default)
8. CARD GROUP 8 - DISPERSION PARAMETERS		
AY, BY, AZ, BZ, AZT	Arrays of dispersion coefficients	Default
TMDEP	Distance beyond which the time-dependent equations are used for sigma y and z	50,000 m (Default is 100,000 m)
JSUP	Stability class used to determine growth rates for puffs above boundary layer	5 (Default)
9.- 13. CARD GROUPS 9 TO 13		
Various	Options input to override default values	Not used
14. CARD GROUP 14 - POINT SOURCE DATA		
Various	Point source information-location, stack and emission data	As needed
15. CARD GROUP 15 - AREA SOURCE DATA		
Various	Area source information-location, initial dispersion and emission data	Not used
16. CARD GROUP 16 - NON-GRIDDED RECEPTOR COORDINATES		
XREC, YREC	X- and Y-coordinates of non-gridded receptors	Used

(1) Model runs will not use this feature. However, this feature may be used to account for this process after discussions are held with the reviewing agencies.

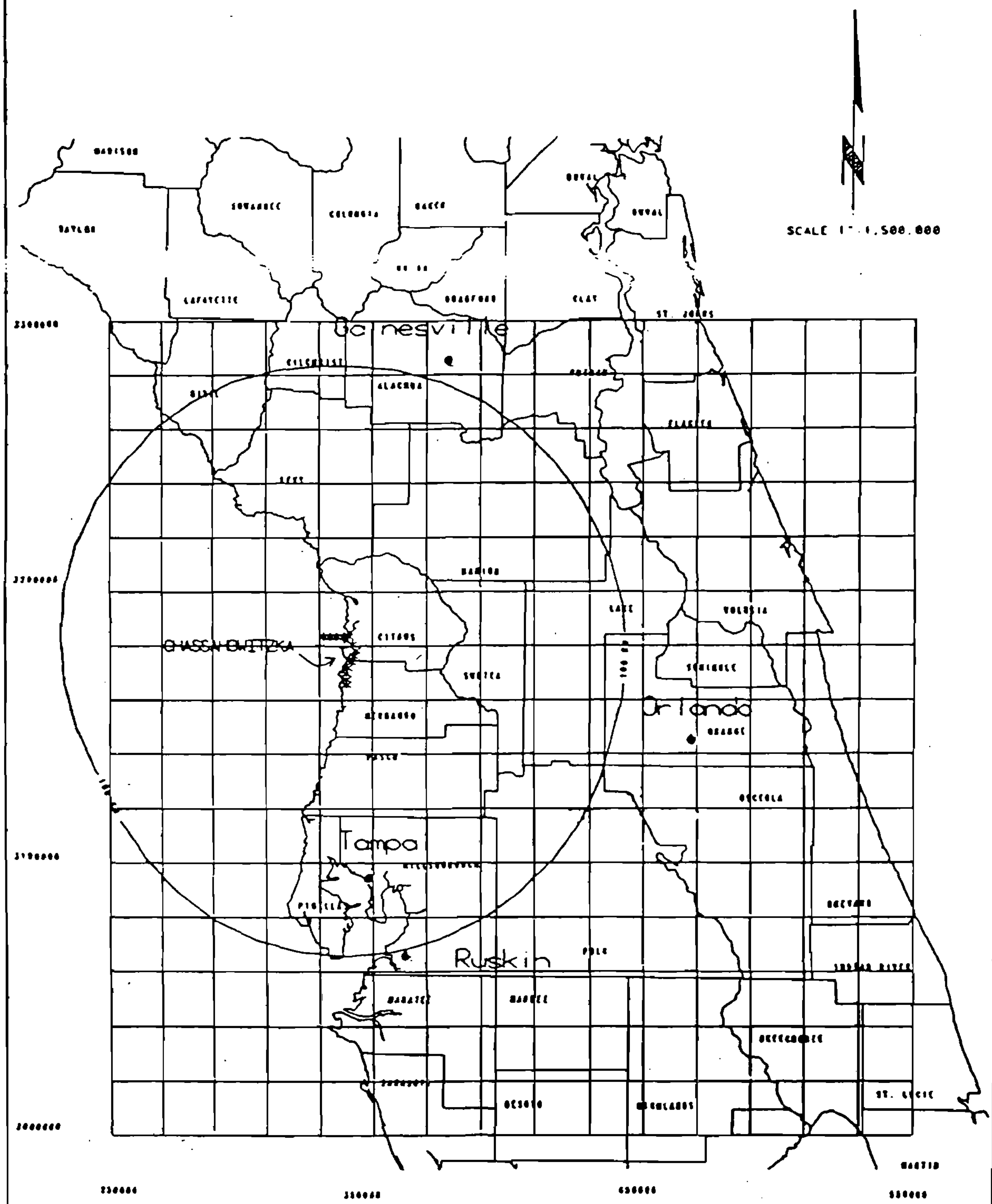

Figure 1.

METEOROLCICAL AND COMPUTATIONAL CRID USED IN THE MESOPUFF MODELINC

Florida Power
CORPORATION

April 16, 1992

Mr. John Notar
Air Quality Division
National Park Service
P. O. Box 25287
Denver, CO 80225-0287

Dear Mr. Notar:

Re: Florida Power Corporation's Polk County Site
MESOPUFF II Modeling Sensitivity Analysis

A modeling protocol for the use of MESOPUFF II in evaluating the impacts of the proposed Florida Power Corporation (FPC) Polk County Site on the Chassahowitzka National Wilderness Area was submitted to you, the Florida Department of Environmental Regulation and the U.S. Environmental Protection Agency on March 5, 1992. You subsequently discussed the emission inventory to be used in this analysis with Mr. Doug Fulle of Ebasco Environmental, and on March 17, 1992, you asked that FPC perform four one-month runs with MESOPUFF II to help determine the sensitivity of the model to eliminate small sources at great distances and to consolidate distant sources. The results of these analyses, which were run by KBN, are attached.

You asked for four model runs: (1) a 40 TPY source at 99 km distance, (2) a 100 TPY source at 149 km distance, (3) four 1,000 TPY sources at the corners of a 20x20 km box centered at a distance of 125 km, and (4) a 4,000 TPY source at the 125 km distance. We chose to model these four scenarios for two different stack heights in order to also evaluate the sensitivity of the model to stack height. Thus, rather than four scenarios, eight are presented in Table 1. The month of November 1986 was used for the analysis.

The results for scenarios 1 through 4 indicate that the small sources evaluated at 99 and 149 km have insignificant impacts for either stack height. Scenarios 5 through 8 indicate that source consolidation produces higher predicted impacts than individually analyzed sources. The results also indicate that significant differences in predicted impacts result from relatively small differences in stack height, particularly at greater distances.

We trust that these results are helpful to you in your evaluation of our modeling protocol. We ask that you complete your evaluation as quickly as possible since our project schedule is being impacted.

Should you have any questions, please call me at (813) 866-5529 or Mr. Scott Osbourn at (813) 866-5158.

Very truly yours,

Kathleen L. Small
Environmental Project Manager

Attachment

cc: T. Rogers (DER)
H. S. Oven (DER)
L. Nagler (EPA Region IV)

pag/KLS&Notar.Let

Table 1. Sensitivity Analysis of Predicted 24-hour SO_2 Impacts at the PSD Class I Area of the Chassahowitzka National Wildlife Refuge - November, 1986 Meteorology

Modeling Scenario Concentration	Modeled Source (1) No. Sources	Emission (TPY)	Stack Height (m)	Representative Distance from Class I Area (2) (km)	Highest Predicted SO_2 24-Hour (ug/m3)
1	1	40	34.4	99	0.0122
2	1	40	65.0	99	0.0119
3	1	100	34.4	149	0.0140
4	1	100	65.0	149	0.0105
5	1	4,000	34.4	125	0.861
6	1	4,000	65.0	125	0.730
7	4	1,000	34.4	125	0.712
8	4	1,000	65.0	125	0.670

(1) Based on operating parameters for combined cycle unit firing fuel oil. Exit gas temperature and exit velocity were 400° k and 37 m/s, respectively.

(2) Actual distance varies depending upon Class I receptor location. Modeled source(s) located approximately in a direction of 140 degrees from the Class I area.

Florida Power
CORPORATION

May 14, 1992

Mr. Thomas Rogers
Bureau of Air Regulation
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32399

Dear Mr. Rogers:

Re: Polk County Site
MESOPUFF II Modeling Protocol Clarifications

Florida Power Corporation (FPC) has reviewed the comments provided in a draft letter from Mr. James W. Pulliam, Jr. to Mr. C. H. Fancy, regarding our March 5, 1992 Supplemental Modeling Protocol for the Chassahowitzka Wilderness Area. Based on these comments, we offer the following clarifications:

1. As proposed in the original protocol, increment consumption will be calculated at the Class I area using the ISCST model for the five-year period of meteorological data collected from 1982 to 1986 at the National Weather Service (NWS) station in Tampa. Based on the results of the ISCST model, potential violations of the Prevention of Significant Deterioration (PSD) Class I increment will be identified that occurred at specific receptors and during specific time periods for the five-year period. If the proposed FPC source does not have a significant impact on the location and time period when a potential violation is predicted, then no additional analysis for that time period or receptor is required. For the time periods when the predicted violations occur and the proposed FPC source has a predicted significant impact, additional air dispersion modeling analyses will be performed using the MESOPUFF II model. The application of the MESOPUFF II model will be restricted to those sources located more than 50 km from the Class I area. The predicted impacts of emission sources located at or within 50 km of the Class I area will be determined using the ISCST model.

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2. The MESOPUFF II model is proposed to be used in a step-wise approach to focus initially on the proposed source and then those sources located more than 50 km from the Class I area.

   The first step will include calculating concentrations for the proposed source using the MESOPUFF II model for those periods and receptors when potential violations were predicted using the ISCST model. The results for the proposed source will be added to the impacts from the other PSD sources predicted using the ISCST model. If the proposed FPC source does not have a significant impact when a potential violation is predicted or the total impacts are less than the PSD increment, then no additional analysis for that time period or receptor is required. For the time periods when the predicted violations occur and the proposed FPC source has a significant impact, an additional modeling analysis will be performed.

   The second step will complete the analysis by applying the MESOPUFF II model for the proposed source and other PSD sources located more than 50 km from the Class I area. Again, the same procedures will be followed to identify potential violations.

   The model calculations will be performed initially without using chemical transformation processes or wet or dry deposition. However, the results will be reviewed and assessed to determine if the use of these processes or other model options would account for more realistic concentration calculations. Based on discussions with the Florida Department of Environmental Regulation (FDER), the National Park Service (NPS), and the Environmental Protection Agency (EPA), step three will be performed which will consist of additional model runs performed which incorporate the use of these model options in order to determine compliance with PSD Class I increments.

3. Because the results from the MESOPUFF II and ISCST models are added together, the total impacts are specific to individual receptors and time periods. Therefore, the days to be addressed when the MESOPUFF II model is used are the same days as those during which the ISCST model predicted potential violations.

   It is recommended that the periods to be modelled in the MESOPUFF II model include the periods of potential violations and the three days prior to and the two days after the periods of potential violations. These periods are needed in order to generate an adequate number of puffs that will be transported from the emission source to the Class I receptors. However, only the period or day of predicted violation will be evaluated. It is our experience that running the model for one additional day prior to and one additional day after the day of interest (ie., 4 and 3, rather than 3 and 2) is unnecessary to stabilize the wind field for the day of interest.

4. The significance values presented by the NPS are suggestions only and have no standing as regulation or guidance within the EPA and FDER. Only the EPA and the FDER have jurisdiction in the area of increment consumption. The NPS values are, in fact, so low as to be impractical for evaluation of source impacts. As an example, even small sources at great distances may have modelled impacts above these levels using the current generation of agency-approved dispersion models. The NPS suggested values also seem to have no particular relationship to the Air Quality Related Values (AQRVs) which the Federal Land Manager is charged with protecting. The NPS offers no rationale or basis in support of their suggested significance values. Finally, the NPS suggested values are not included in the only guidance available from the NPS on evaluating project impacts on Class I areas, the "Draft Permit Application Guidance for New Air Pollution Sources," dated March, 1992.

   Guidance is available from EPA, however, on Class I area significance values, consisting of a memo dated September 10, 1991, from Mr. John Calcagni, Director, AQMD, to Mr. Thomas J. Maslany, Director, Air, Radiation and Toxics Division. In this memo, Mr. Calcagni indicates that EPA is in the process of rulemaking to address the general need for Class I significant impact levels. He also indicates that since this process will be lengthy, he sees the need for more immediate guidance on the issue of Class I significant impact levels. Finally, he indicates that the methodology proposed by Virginia for determining significance values is "a reasonable interpretation of the relevant statutory and regulatory requirements . . ." Discussions with Mr. Lewis Nagler, EPA Region IV, on May 7, 1992, confirmed that it is EPA's position that the significant impact levels presented in the Virginia memo are non-binding but can be used as interim guidance by each state.

   It is very important to recognize that the issue of the significance values is being discussed in our modeling protocol from the standpoint of whether the proposed project will cause or contribute to a violation of a Class I PSD increment. That is, if the applicant can demonstrate that the project impacts are "insignificant", even if there are predicted Class I PSD increment violations due to other sources, then the application should be approved by FDER and EPA. The significance values are not being proposed as a test for the need for an AQRV analysis; FPC has already agreed to conduct such an analysis. The independence of these two issues is confirmed by the Virginia memo; Mr. Calcagni states that "this analysis [the need for an AQRV assessment] is independent of the inquiry into whether a proposed source would have any significant impact on any applicable Class I increment."

It is, therefore, proposed that the evaluation of the project's significance with respect to Class I PSD increment consumption be based upon the available EPA guidance (ie., the Virginia values) and that the ISCST and the MESOPUFF II models be run as described above. Since an AQRV analysis has already been agreed to by FPC, the question of which set of significance values would be used to determine the need for such an analysis should not be an issue, nor hold up approval of the protocol.

This issue has remained unresolved since our protocol submittal of March 5, 1992. Your response to these clarifications is needed by May 21, 1992, in order to maintain our project schedule. Please direct any questions on this letter to Mr. Scott Osbourn of FPC at (813) 866-5158 or Mr. Doug Fulle of Ebasco at (404) 662-2377.

Very truly yours,

Kathy Small

Kathleen L. Small
Environmental Project Manager

cc: J. Bachmann (OAQPS)
L. Nagler (EPA)
J. Notar/J. Vimont (NPS)

peg/KLS.Rogers.Let

United States Department of the Interior

FISH AND WILDLIFE SERVICE
75 Spring Street, S.W.
Atlanta, Georgia
30303

June 15, 1992

Mr. C. H. Fancy, P.E.
Chief, Bureau of Air Regulation
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Fancy:

We have reviewed Florida Power Corporation's (FPC) May 14, 1992, letter that clarifies the modeling protocol for their proposed power plant facility in Polk County, Florida. The proposed facility would be located approximately 110 km southeast of the Chassahowitzka Wilderness Area (WA), a Fish and Wildlife Service (Service) Prevention of Significant Deterioration (PSD) Class I area.

It is our understanding that FPC will initially model the proposed Polk County facility and all other increment-consuming sources in the Florida Department of Environmental Regulation (FDER) supplied inventory with the EPA ISCST model using 1982-86 National Weather Service data from Tampa, Florida. If a Class I increment violation is predicted in the cumulative ISCST analysis, and the proposed FPC source does not significantly contribute to the modeled increment violation, then no additional analysis for that averaging period or receptor is necessary. During the averaging periods when modeled violations occur, and the proposed FPC source has a predicted significant impact, additional air quality modeling will be performed with the EPA MESOPUFF II model.

In the MESOPUFF II Step 1 analysis, FPC will model the proposed Polk County facility emissions alone. FPC will then add their MESOPUFF II concentrations to the ISCST cumulative PSD impacts (minus the FPC ISCST predicted impacts). If this substitution of FPC MESOPUFF concentrations results in receptor concentrations below the Class I increments, then the analysis is complete for that averaging period and receptor.

If the Class I increment violation persists after MESOPUFF II Step 1, FPC will model all sources in the inventory which are greater than 50 km from the Chassahowitzka WA with MESOPUFF II for the cumulative PSD increment analysis for the respective averaging periods and receptors which still exceed the Class I increment. This analysis constitutes MESOPUFF II Step 2. All source(s) which are 50 km or less from the Chassahowitzka WA will be modeled with the EPA ISCST model during all steps of this analysis. These "near" source(s) will have their impact added to the respective ISCST or MESOPUFF II cumulative analysis. To allow the MESOPUFF II model to be initialized, a 3-day period before the event in question and 2 days afterward will be modeled to allow the MESOPUFF II model to reach stabilization. These initial MESOPUFF II calculations will be performed by adhering to the EPA guidance of modeling sulfur dioxide (SO_2) as inert. Upon Service review of these inert SO_2 results, we may accept MESOPUFF II calculations with some or all of the chemical transformation and deposition options available in the MESOPUFF II model.

All other issues of this modeling protocol have been agreed to in our May 13, 1992, letter. The "fine tuning" portions of this protocol were decided on a case-by-case basis for this specific air quality analysis. From our standpoint, the acceptance of the protocol should allow FPC to proceed with the air quality modeling analysis.

With regards to the issue of PSD Class I increment significant levels which FPC discussed in their May 14, 1992, letter, we believe they should be as conservative as possible and consistent with the methodology originally used to establish the significant impact levels for the National Ambient Air Quality Standards (NAAQS). In other words, the Class I significant impact levels should be established by ratioing the NAAQS significant levels to the NAAQS, and then multiplying by the respective Class I increments. For example, the ratio of the 24-hour significance level (5 ug/m^3) to the 24-hour NAAQS (365 ug/m^3), is 0.014. Multiplying this ratio by the Class I SO_2 increment, 24-hour average, yields a significance level of 0.07 ug/m^3 (rounded to the nearest hundredth). Similarly, the annual and 3-hour significant levels would be 0.025 and 0.48 ug/m^3, respectively. The resulting significant levels are more conservative than the State of Virginia's proposal because they are proportional to the NAAQS rather than the Class II increments.

As proposed, the significant impact levels would not be applied to determine whether a source or modification might have an adverse impact on an Air Quality Related Value (AQRV) at a Class I area, or whether a source has to conduct a cumulative modeling analysis to assess the total ambient concentrations used in such an analysis. The proposed significant levels are for the purpose of assessing whether a source causes or contributes to Class I increment violations, but <u>not</u> for determining whether a source needs to conduct an AQRV analysis. FPC acknowledged this distinction, and will be performing an AQRV analysis.

Regarding the AQRV analysis, we have received a second letter dated May 22, 1992, from FPC asking us to provide them with a list of sensitive resources in the Chassahowitzka WA that may potentially be affected by increased concentrations of pollutants. We will send the following information to both you and FPC under separate cover within the next week: a map of the Chassahowitzka National Wildlife Refuge that outlines the boundaries of the WA; the most recent plant, amphibian, reptile, bird, and mammal lists for the refuge; and selected pages from the 1991 Annual Narrative of the Chassahowitzka National Wildlife Refuge that list endangered and threatened species found on the refuge, in addition to discussing habitat types and associated dominant plant species.

We would like FPC to address the effects of increased concentrations of primary pollutants, such as sulfur dioxide and nitrogen oxides, on resources, in addition to addressing the effects of secondary pollutants such as ozone, nitrates, and sulfates. Although we are of course concerned about impacts on resources throughout the refuge, FPC can limit their AQRVs analysis to those resources located in the WA. FPC should do a literature survey to help them assess the effects of pollutants on vegetation in the hardwood swamplands and the mangrove forest, since these habitat types are found exclusively in the WA. They should focus particular attention to assessing the effects on lichens because some of these species are known to be sensitive to SO_2. As far as the wetlands species are concerned, we do not expect the rushes and marsh grasses to be sensitive to air pollutants; however, the effects of pollutants on the species found on the tree islands--the cabbage palms and Eastern red cedars--should be addressed.

Although SO_2 modeling is important for the increment analysis, we do not anticipate that wildlife on the refuge will be directly affected by gaseous pollutant emissions. However, we are concerned about the effects on wildlife resulting from acid deposition (i.e., loss of invertebrate food base, death of fish and amphibian eggs and larvae). Freshwater creeks flowing into the WA provide important feeding areas for the Federally-endangered peregrine falcon and bald eagle; and therefore, their integrity is essential to support these species in the WA. FPC should assess the effects of increased acid deposition on the invertebrates, fish, and amphibians that inhabit these freshwater creeks in addition to addressing any indirect effects on other wildlife species. A literature review should help them with this assessment as well.

Visibility is another AQRV of concern at Chassahowitzka WA. In addition to plume impacts, regional haze is a pervasive problem in the area that can detract from the experience of visitors to the WA. We would like FPC to address the visibility issue also.

If you have any concerns regarding the modeling protocol for the FPC Polk County facility, please contact Mr. John Notar of our Air Quality Branch in Denver at 303/969-2071. Any questions regarding the AQRV analysis should be directed to Ms. Tonnie Maniero at the same phone number.

Sincerely yours,

John R. Eadie

for James W. Pulliam, Jr.
Regional Director

cc:
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EXHIBIT PC-83

Virginia B. Wetherell
Executive Director

FLORIDA DEPARTMENT OF NATURAL RESOURCES

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

October 2, 1992

OCT 7 1992

Mr. Hamilton S. Oven Jr. P.E.
Administrator of Siting Coordination
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Oven:

RE: Comments from the Department of Natural Resources Bureau of Mine Reclamation concerning the Florida Power Corporation Site Certification Application

VOLUME I:

2.1-2 Florida Power Corporation (FPC) lists some of the reasons for locating the plant site on mined and disturbed lands as: 1) the area has already been severely impacted, and 2) cost considerations of land purchase as opposed to purchasing undisturbed lands. The bureau feels FPC has not fully illustrated the fact that these mined and disturbed areas are to be reclaimed and restored according to Chapter 16C-16, Florida Administrative Code (F.A.C.). Compensation for the lost land use values must now be considered along with the construction costs and future impacts as a consequence the plant construction.

3.5.1-13 Florida Power Corporation states, "Seepage through the dam along the southern end of N-16 has been proposed as a source of replenishing water to revitalize Tiger Bay." At the time FPC requested approval of alterations to the Florida Department of Natural Resources (FDNR) approved reclamation plans, the Army Corps of Engineers (COE) and the Environmental Protection Agency (EPA) stated they would not allow seepage from the N-16 cooling pond to maintain hydration of Tiger Bay if the FPC plant was permitted as a zero discharge facility. If the COE and EPA have altered their stance on the seepage, a clear statement as to their approval to allow seepage from the dam needs to be provided.

3.5.1-33 FPC indicates the seepage from the N-16 cooling pond as entering Tiger Bay below the water level. FPC needs to provide more detailed information concerning the tests and results utilized to make this determination.

VOLUME II:

4.1-4 SECTION: 4.1.1.4

FPC states the inner slopes of the Brine Pond will be lined to avoid seepage through the dams of the soluble waste product. What precautions does FPC plan to take to avoid seepage through the unlined portion of the Brine Pond? If FPC is assuming the consolidated clays will provide the necessary impermeable layer for the unlined portion of the pond, tests need to be conducted to give assurances that a non-reactive condition exists between the proposed waste material and the existing consolidated clays.

4.1-5 SECTION: 4.1.1.5

FPC states, "At this time, FPC's plans for Tiger Bay are still conceptual." FPC has proposed the enhancement of the area by regrading and realignment of the wetlands in a general east-west direction. FPC intends to provide for better flow of water through the wetlands and align land areas to compliment a wildlife corridor concept. The FLUCCS map provided in Figure 4.4.1-1 does not indicate any changes to the FDNR approved FLUCCS map. The bureau feels the enhancement of Tiger Bay could be improved by routing the drainage from the Buffer Area (Non-mandatory) on the eastern side of the cooling pond, through Tiger Bay, in lieu of a direct connection to Camp Meeting Ground Branch. This measure would also provide for additional filtration of runoff from the buffer area before discharge takes place.

4.2-2 SECTION: 4.2.1.2

FPC states that water levels in Tiger Bay are artificially maintained by the impoundment in Camp Meeting Ground Branch at the IMC NPDES outfall. This is not the case. Water levels in Tiger Bay are maintained through rainfall and seepage from other ground water sources. A vegetated swale in the southeastern corner of Tiger Bay acts as a natural spillway and seepage drain. If seepage through the southern dam of the N-16 cooling pond is allowed to occur, this will help maintain the water levels in the Tiger Bay wetland once the facility is in place. To positively ensure the hydration of Tiger Bay after plant construction, routing the runoff from the non-mandatory buffer area to the Tiger Bay wetland should be a part of the enhancement plan.

4.3-3 SECTION: 4.3.1.3

FPC needs to provide a more detailed plan for maintaining the hydrated states of the following areas: Camp Meeting Ground Branch; Tiger Bay; the pond area between SA-11, N-8, McCullough Creek and N-9; N-8; and the McCullough Creek headwaters. The plan should also include protection measures FPC plans to utilize to control invasive and exotic species during the dewatering and construction process.

4.3-5 FPC discusses mitigative measures taken for the 2.5 year period of dewatering and how the hydraulic barrier will prohibit the leachate plume underneath the Estech gypsum stack from migrating. What measures will FPC take to off set the effects of the zero discharge facility and lack of ground water recharge for the 8,000 acre site? What affect will the lack of ground water recharge over the 8,000 acre site have on the leachate plume underneath the Estech gypsum stack?

4.3-6 SECTION: 4.3.2

The bureau feels FPC is wise to institute a water monitoring program while dewatering is taking place; however, the bureau also feels the monitoring program should continue until a time when it can be determined no adverse impacts to the ground water quality and supply are realized from the operations at the zero discharge facility.

4.4-4 FPC has to this date failed to address the bureau's concerns regarding the hydrological needs of the McCollough Creek head waters. Additional information has been requested by the bureau; however, the conceptual plan modification for the Silver City Mine filed by Estech on FPC's behalf remains in a pending status. The bureau feels FPC's proposed zero discharge facility could have very adverse impacts on the ecology, water quality and quantity, along with the existing wildlife of McCollough Creek and its watershed basin.

4.4-6 FPC states, "The other created or enhanced habitats and vegetation communities including lakes, herbaceous wetlands, hardwood forest wetlands, mixed forested wetlands, upland mixed forests, and upland hardwood forests, have potentially significant ecological value." FPC then states that none of these communities are scarce in the region, therefore the loss is not considered significant. This conclusion should not be made simply based on the statements above. The bureau requests that a more thorough analysis be made.

Utilization of these communities may be significant when considering regional habitat loss and considering the reclaimed habitats mentioned above are much more desirable landscapes than the landscape pictured in Figure 7.2.2-1.

Although it is correctly stated that the Silver City Mine plans compensated for wetlands in excess of premining acreage, it is proposed that 172 acres of already reclaimed and established wetlands will be lost as a result of this facility.

4.4-7 FPC states the Buffer Area will compensate for the loss of currently approved reclaimed land uses within the Silver City and Noralyn/Phosphoria mines. Acreages for the restored habitats (FLUCCS acreages) in the Buffer Area are absent from the application. In order for the bureau to properly evaluate compensation for lost habitats, these acreages need to be provided in the application.

SECTION: 4.4.1.5

Enhancements of Tiger Bay and the Buffer Area committed to by FPC in this section are very worthwhile. As previously mentioned routing drainage from the Buffer Area through Tiger Bay would greatly enhance the quality of Tiger Bay and its discharge to Camp Meeting Ground Branch.

4.4-12 SECTION: 4.4.2

FPC states annual inspections will be made for purposes of monitoring and controlling the spread of exotic vegetation such as Brazilian pepper. The bureau feels FPC needs to expand their list of exotic and nuisance species to include cogon grass, cattail, and other invasive, exotic species common to the mine district. Control measures may be required more frequently than just on an annual basis, until adequate control of these exotics is achieved.

5.3-4 FPC states that Six-Mile Creek and Barber Branch have been destroyed as a result of mining activities and will not be restored. This is incorrect. Reclamation of the area is definitely planned, as is rehabilitation of the flows of the two streams. There are plans to restore a major portion of Six-Mile Creek in the North Noralyn area and on into the Clear Springs Mine, where the creek once entered the Peace River.

5.3-15 FPC indicates the seepage from the brine pond will be restricted by a geomembrane on the inside slope of the dams, and the impermeable waste clay liner on the bottom of the pond. The bureau feels the liner should be placed throughout the entire brine pond, including the clay base, to avoid seepage of brine into groundwater.

5.3-20 FPC states in the discussion concerning the solid waste disposal sites, "...no synthetic liner is planned beneath the solid waste disposal area because of the thick layer of low permeability clays." Dams for both of the proposed solid waste disposal areas have been abandoned and breached. What remains of the dams is very permeable and subject to horizonal seepage. Seepage through the highly permeable remaining dam structures would in fact be a considerable problem without a liner being placed over what remains of the interior slopes.

5.4-1 Please explain how FPC has determined no mixing of solid wastes and consolidated clays will occur. Please explain to what extent the clay layer will serve as a protective liner preventing waste disposal residues from infiltrating the ground water. Provide the scientific background for these conclusions.

The bureau's technical section suggests FPC should be prevented from the approach that the clays will support greater weight as consolidation and dehydration takes place. Industry experience, and various attempts made to cap waste clays with sand tailings by depositing them directly on the clays have proven unsuccessful. Tailings tend to sink and displace the clays at the bottom of the pond. The bureau's technical section suggests stockpiling the solid waste on stable ground adjacent to the clay settling area and pushing the waste over the consolidated clays in successional thin layers.

VOLUME III:

10.1.4-1

FPC's proposed enhancement of the Tiger Bay wetland system (especially if the drainage from the reclaimed buffer area is routed through it) will have a very positive affect on the flow to Camp Meeting Ground Branch and the water quality entering the Peace River System from this area. The bureau would strongly encourage FPC to consider routing the reclaimed buffer area drainage through Tiger Bay.

VOLUME VI:

10.5.6 Air quality is a concern of all Floridians, especially those residents of Polk County. Although mining and the processing of fertilizer in the southern portion of Polk County has degraded the air quality, it is only a temporary condition since mining and eventually processing will move south as the phosphate matrix layer is mined out, thus air quality should improve. The proposed construction of three coal fired power generating facilities within the southern quarter of the county will alter this scenario in a negative way and does not seem to be in the best interest of the people in this region.

10.9.1 and 10.9.3

Currently none of the proposed reclamation plan amendments submitted to FDNR by IMC Fertilizer, Incorporated, or Estech, Incorporated, have been approved and are in a pending status until further information is provided by the companies on behalf of FPC. Review by the bureau's technical section indicated no reference to the methods of provision of volume of flow to the McCullough Creek headwaters. Maps and calculations are also absent. There is no reference as to any form of mitigation for loss of volume to McCullough Creek because of FPC site development.

Appendices Program: EST-SC-SP(7)

Item 5 The bureau's technical section indicates the preliminary modeling they conducted shows that this area is not required to reclaim the flows to the McCullough Creek system. Two points are raised:
1) The modeling was preliminary, as described. The modeling needed for a power plant siting should be somewhat more thorough.
2) Only the McCullough Creek system is mentioned. In the reclamation schemes for this area, this program area may have the potential for rerouting of flow to another basin, for instance Mill Branch or Hooker's Prairie. The technical support section did not state that the flow should be lost or that the program area should be hydrologically isolated.

We appreciate the opportunity to comment on the Florida Power Corporation Site Certification Application. Should you have any questions regarding the bureau's comments, you may call staff at (904)488-8217.

Sincerely,

C Salkin

for W. Chris Cooksey
Environmental Specialist III

WCC/se

embankments and fill areas over very soft ground conditions. Project personnel are well familiar with published documentation regarding unsuccessful efforts to cap clay settling areas with slurried sand tails. We concur with FDNR's suggestion of placing the waste over the consolidated clay in successional thin layers and have provided such descriptions and analyses in SCA Section 3.7.1.3.

Comment #19: (Page 10.1.4-1)

"FPC's proposed enhancement of the Tiger Bay wetland system (especially if the drainage from the reclaimed buffer area is routed through it) will have a positive affect on the flow to Camp Meeting Ground Branch and the water quality entering the Peace River System from this area. The bureau would strongly encourage FPC to consider routing the reclaimed buffer area drainage through Tiger Bay."

Response:

FPC has presented its plan for routing drainage to both McCullough Creek and Camp Meeting Ground Branch (see response to FDNR comment #5). Enhancements within Tiger Bay will be discussed in a Section 10/404 permit application to the Army Corps of Engineers.

Comment #20: (Section 10.5.6)

"Air quality is a concern of all Floridians, especially those residents of Polk County. Although mining and the processing of fertilizer in the southern portion of Polk County has degraded the air quality, it is only a temporary condition since mining and eventually processing will move south as the phosphate matrix layer is mined out, thus air quality should improve. The proposed construction of three coal fired power generating facilities within the southern quarter of the county will alter this scenario in a negative way and does not seem to be in the best interest of the people in this region."

Response:

FPC recognizes that air quality is a concern to most Floridians, including many of the residents of Polk County. Additionally, air quality is a major concern of FPC, and, in fact, was one of the major factors considered in the siting process which led to the selection of the Polk County Site. However, FPC strongly disagrees with the FDNR's statement that the facility (together with the two other proposed coal-fired power generating facilities) "...does not seem to be in the best interest of the people in this region." In fact, FPC believes that its facility will be an asset to the residents of Polk County.

If the Polk County phosphate mining and processing industry's future is as temporary as FDNR predicts, then the increased tax base as well as the new jobs associated with the proposed facility will help offset the predicted losses from this industry, thus benefitting Polk County. In addition, through FPC's planning for a state-of-the-art facility which will incorporate the best available control technologies (BACT) for air pollution control, FPC will be producing electricity in a very clean and cost-effective manner. This planning and (BACT) design criteria benefits all Floridians as well as the residents of Polk County by controlling electricity costs while minimizing air pollutant emissions and air quality impacts.

As for the "degraded" air quality in the southern portion of Polk County as reported by FDNR, one must look at the area's classification as well as monitored air pollutant concentrations in rating the air quality. Based upon EPA and FDER classifications, the southern portion of Polk County is listed as attainment for all criteria pollutants. This