Florida Power
CORPORATION

January 22, 1998

Mr. Clair Fancy
Bureau of Air Regulation
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, FL 32399

Dear Mr. Rhodes:

Re: FPC Used Oil Modeling

At a meeting regarding the used oil burning provisions in Florida Power Corporation's (FPC) Title V permits during the fall, FPC committed to provide ambient air quality dispersion modeling results demonstrating the impact of lead emissions from the Anclote and Bartow plants. I have enclosed the model outputs and summary reports for these analyses. The ISC model was used with a full year of meteorological data and maximum potential lead emission rates. The model results show that for all averaging times, the predicted maximum ambient lead concentrations are well below the 1.5 ug/m^3 NAAQS for lead.

I apologize for the lengthy period of time to complete and submit this modeling. Please feel free to contact me at (813) 866-4344 if you have any questions.

Sincerely,

J. Michael Kennedy
Manager, Air Programs

Enclosure

2/16/98 cc: Cleve Holladay

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Florida Power Corporation Anclote Plant

Used Oil Lead Emissions Modeling

Introduction: The ambient air quality impact of lead emissions from Florida Power Corporation's (FPC) Anclote Plant was assessed with the use of dispersion modeling. Lead emissions from permitted used oil burning (representing 10% of the total heat input) were combined with those from the use of the predominant #6 oil fuel and input to the Industrial Source Complex (ISC) model. The total lead emissions impact from Anclote was predicted in an area covering up to a distance of 3 kilometers (km) from the plant. Predicted ambient lead concentrations are well below the National Ambient Air Quality Standard (NAAQS) of 1.5 ug/m^3, averaged on a quarterly basis.

Model Used: The latest version of EPA's ISC model, which is called ISC3, was used. For conservatism, FPC utilized the short-term version, which computes concentrations on an hourly basis. The highest 1-hour, 8-hour, 24-hour, and annual lead concentrations were compared to the NAAQS.

In accordance with EPA modeling guidance, the regulatory default option was chosen for addressing plume rise, calm periods, wind profiles, and temperature gradients with height. Since the area surrounding the plant is dominated by water (Gulf of Mexico) and a suburban landscape, the rural dispersion option was used.

A full year (1986) of hourly meteorological data taken at the Tampa National Weather Service office was input to the model for this analysis.

The receptor network input to the model is comprised of a rectangular grid. The receptors were placed at 400 meter intervals with the Anclote stack at the center of the grid. Receptors were placed to a distance of 3 km from the center. Maximum predicted concentrations were well inside the boundaries of the receptor network, at a distance of approximately 1.5 km from the plant.

Emissions Input: Maximum total lead emissions from the Anclote plant were modeled. The plant has 2 units with a capacity of approximately 535 megawatts (MW) each that discharge emissions through a common stack. Stack parameters input to ISC are as follows:

Height	152.1 meters (499 feet)
Diameter	7.6 meters (24.9 feet)
Temperature	430 degrees K
Exit Velocity	35.1 meters/sec.

Lead emissions used as input were calculated by adding together the emissions from #6 oil and those from used oil. The current operation permit and the draft Title V permit for Anclote authorize the burning of on-specification used oil in an amount up to 10% of the total heat input to each boiler. On-specification used oil may contain up to 100 ppm

of lead, so calculations were based on that maximum allowable level. Number 6 oil averages approximately 3.5 ppm of lead content, and a corresponding emission factor of 194 lb/10^{12} Btu was obtained from the Pinellas County Department of Environmental Management. For purposes of conservatism, emissions were calculated based on full load operation using the maximum allowable amount of used oil and assuming 100 ppm of lead content in the used oil. Lead emissions calculations are as follows:

#6 Oil

Heat input limits: Unit 1 - 4964 mmBtu/hr Unit 2 - 4850 mmBtu/hr
Total heat input at maximum load: 9814 mmBtu/hr

#6 oil lead emissions: 9814 mmBtu/hr x 194 lb/10^{12} Btu x 453.6 g/lb x 1/3600 sec/hr
= 0.239 g/sec

If 10% of heat input is used oil, then #6 oil lead emissions = 0.9 x 0.239 = 0.215 g/sec

Used Oil

From the previous Pinellas County DEM analysis of FPC's Bartow plant, the heating value of used oil was assumed to be 152,000 Btu/gal and density = 6.83 lb/gal. Conservatively assume lead content to be 100 ppm.

Used oil lead emissions: 9814 mmBtu/hr x 0.1 x 1/0.152 mmBtu/gal x 6.83 lb/gal x
x 453.6 g/lb x 100 ppmw lead/10^{6} x 1/3600 sec/hr = 0.55 g/s

Total lead emissions = 0.215 + 0.55 = 0.765 g/sec. Used as emissions input to ISC.

Modeling Results and Conclusion

Although the lead NAAQS is based on a 3-month average, the maximum short-term averages were modeled and are given in the table below, ensuring a conservative approach to the analysis. The following are the highest predicted concentrations for the 24-hour, 8-hour, and 1-hour averaging times:

Highest 24-hour avg. = 0.02 ug/m^3
Highest 8-hour avg. = 0.05 ug/m^3
Highest 1-hour avg. = 0.22 ug/m^3

Highest predicted annual average concentrations are two orders of magnitude less than the highest 24-hour average. The NAAQS for lead is 1.5 ug/m^3, 3-month average. The model results show that the maximum potential impact of lead emissions from the Anclote plant are well below the health-based NAAQS for lead.

A complete ISC model output of this analysis is attached to this summary.

Florida Power Corporation Bartow Plant

Used Oil Lead Emissions Modeling

Introduction: The ambient air quality impact of lead emissions from Florida Power Corporation's (FPC) Bartow Plant was assessed with the use of dispersion modeling. Lead emissions from permitted used oil burning (representing 10% of the total heat input) were combined with those from the use of the predominant #6 oil fuel and input to the Industrial Source Complex (ISC) model. The total lead emissions impact from Bartow was predicted in an area covering up to a distance of 3 kilometers (km) from the plant. Predicted maximum ambient lead concentrations are well below the National Ambient Air Quality Standard (NAAQS) of 1.5 ug/m^3, averaged on a quarterly basis.

Model Used: The latest version of EPA's ISC model, which is called ISC3, was used. For conservatism, FPC utilized the short-term version, which computes concentrations on an hourly basis. The highest 1-hour, 8-hour, 24-hour, and annual lead concentrations were compared to the NAAQS.

In accordance with EPA modeling guidance, the regulatory default option was chosen for addressing plume rise, calm periods, wind profiles, and temperature gradients with height. Since the area surrounding the plant is dominated by water (Tampa Bay) and a suburban landscape, the rural dispersion option was used.

A full year (1986) of hourly meteorological data taken at the Tampa National Weather Service office was input to the model for this analysis.

The receptor network input to the model is comprised of a rectangular grid. The receptors were placed at 400 meter intervals with the Bartow plant at the center of the grid. Receptors were placed to a distance of 3 km from the center. Maximum predicted concentrations were well inside the boundaries of the receptor network, at a distance of approximately 1.5 km from the plant.

Emissions Input: Maximum total lead emissions from the Bartow plant were modeled. The plant has 3 units that each discharge emissions through a single stack. For convenience and conservatism, all three stacks were modeled from a single point. Stack parameters input to ISC are as follows:

Height	91.5 meters (300 feet)
Diameter	2.74 meters (9 feet)
Temperature	425 degrees K
Exit Velocity	31.3 meters/sec.

Lead emissions used as input were calculated by adding together the emissions from #6 oil and those from used oil. The current operation permit and the draft Title V permit for Bartow authorize the burning of on-specification used oil in an amount up to 5% of the total heat input to each boiler on an annual basis, and up to 10% of the total heat input in any one month. Therefore, as a conservative approach, the 10% amount was modeled. On-specification used oil may contain up to 100 ppm of lead, so calculations

were based on that maximum allowable level. Number 6 oil averages approximately 3.5 ppm of lead content, and a corresponding emission factor of 194 lb/10^{12} Btu was obtained from the Pinellas County Department of Environmental Management. For purposes of conservatism, emissions were calculated based on full load operation using the maximum allowable amount of used oil and assuming 100 ppm of lead content in the used oil. Lead emissions calculations are as follows:

#6 Oil

Heat input limits: Unit 1 - 1220 mmBtu/hr; Unit 2 - 1317 mmBtu/hr; Unit 3 - 2211 mmBtu
Total heat input at maximum load: 4748 mmBtu/hr

#6 oil lead emissions: 4748 mmBtu/hr x 194 lb/10^{12} Btu x 453.6 g/lb x 1/3600 sec/hr
= 0.116 g/sec

If 10% of heat input is used oil, then #6 oil lead emissions = 0.9 x 0.116 = 0.104 g/sec

Used Oil

From the previous Pinellas County DEM analysis of the Bartow plant, the heating value of used oil was assumed to be 152,000 Btu/gal and density = 6.83 lb/gal. Conservatively assume lead content to be 100 ppm.

Used oil lead emissions: 4748 mmBtu/hr x 0.1 x 1/0.152 mmBtu/gal x 6.83 lb/gal x
x 453.6 g/lb x 100 ppmw lead/10^{6} x 1/3600 sec/hr = 0.268 g/s

Total lead emissions = 0.104 + 0.268 = 0.372 g/sec. Used as emissions input to ISC.

Modeling Results and Conclusion

Although the lead NAAQS is based on a 3-month average, the maximum short-term averages were modeled and are given in the table below, ensuring a conservative approach to the analysis. The following are the highest predicted concentrations for the 24-hour, 8-hour, and 1-hour averaging times:

Highest 24-hour avg. = 0.05 ug/m^3
Highest 8-hour avg. = 0.13 ug/m^3
Highest 1-hour avg. = 0.36 ug/m^3

Highest predicted annual average concentrations are an order of magnitude less than the highest 24-hour average. The NAAQS for lead is 1.5 ug/m^3, 3-month average. The model results show that the maximum potential impact of lead emissions from the Bartow plant are well below the health-based NAAQS for lead.

A complete ISC model output of this analysis is attached to this summary.