ILLINOIS POLLUTION CONTROL BOARD
February 15, 1979

ILLINOIS POWER COMPANY,	)	
	)	
Petitioner,	)	
	)	
v.	)	PCB 79-7
	)	
ENVIRONMENTAL PROTECTION AGENCY,	)	
	)	
Respondent.	)	

SHELDON A. ZABEL, SCHIFF HARDIN & WAITE, APPEARED ON BEHALF OF *PETITIONER;*
JOHN D. WILLIAMS APPEARED ON BEHALF OF THE ENVIRONMENTAL PROTECTION AGENCY;
KEVIN GREENE APPEARED ON BEHALF OF CITIZENS FOR A BETTER ENVIRONMENT;
LEWIS GREEN APPEARED ON BEHALF OF COALITION FOR THE ENVIRONMENT.

OPINION AND ORDER OF THE BOARD (by Mr. Goodman):

This matter was initially filed before the Board on March 25, 1977 by Illinois Power Company (IPC) and the Illinois Environmental Protection Agency (Agency) as a proposed amendment to Rule 204 of the Air Pollution Control Regulations and was docketed as R77-9. Subsequent to a hearing on the merits in this matter, the Board promulgated new regulations under R75-5 and R74-2 which, inter alia, provided for the type of relief requested in R77-9 under an adjudicative-type procedure. On February 1, 1979 the Board redesignated this matter as a hearing pursuant to the newly promulgated Rule 204(e)(3) of Chapter 2: Air Pollution, and assigned it docket number PCB 79-7. The total record of R77-9 was incorporated into the record of PCB 79-7; R77-9 was dismissed, the Agency was named as Respondent, and the proceedings in PCB 79-7 were deemed in compliance with the proposed procedural rule in R78-6. This matter is therefore now adjudicative in nature, and the procedures followed are found to be suitable under the Board's procedural rules and under Rule 204(e)(3) of Chapter 2.

IPC owns and operates Baldwin Station, located in Randolph County, Illinois, which is a coal-burning power plant composed of three steam/electric generating units that have a combined design generating capacity of 1,826 megawatts at full load. Baldwin Station is a base load facility utilizing Illinois coal of approximately 3.0% sulfur by weight obtained from local mines.

Since it is located in a rural area of the State, Baldwin is subject to compliance with Rule 204(e) of Chapter 2 and has decided to petition the Board for approval of a site-specific emission rate for sulfur dioxide pursuant to the recently promulgated Rule 204(e)(3). Under Rule 204(e)(3), IPC bears the burden of proving in an adjudicative hearing that its proposed emission rate will not cause or contribute to a violation of primary or secondary sulfur dioxide ambient air quality standards or violate any applicable Prevention of Significant Deterioration (PSD) increment.

Any site-specific limitation approved pursuant to 204(e)(3) would substitute for that standard determined by Rule 204(e)(1) or Rule 204(e)(2). An emission standard approved pursuant to Rule 204(e)(3) will then be included as a condition to operating permits issued under Rule 103 of Chapter 2, under the condition that an ambient monitoring and dispersion modelling program shall be operated for at least one year commencing no later than six months after the date of the approval of the emission rate pursuant to Rule 204(e)(3). The purpose of the ambient monitoring and dispersion modelling program is to verify that the site-specific emission standard will not cause or contribute to violations of any applicable primary or secondary sulfur dioxide ambient air quality standard. No more than 15 months after the commencement of the ambient monitoring and dispersion modelling program the owner or operator of the emission source must apply for a new operating permit, submitting at the time of application a report containing results of the monitoring and modelling program.

The original Rule 204(e) limited the hourly emissions from the plant to approximately 81,000 lbs./hr of sulfur dioxide. The new Rule 204(e)(1) calls for an emission limitation of approximately 57,000 lbs./hr. IPC calculated that utilization of low-sulfur coal in order to meet the new Rule 204(e)(1) would cost approximately $146,000,000 for the period of 1978 through 1983 (1977 dollars). IPC therefore employed the services of Environmental Research & Technology, Inc. (ERT) to analyze the impact of Baldwin Station on ambient air quality and to prepare the necessary materials to permit IPC to implement an intermittent control system for the Baldwin Station with the ultimate objective of devising a permanant site-specific emission limitation for the Baldwin Station. The ERT analysis, "An Air Quality Assessment Study for the Baldwin Power Station," is contained in the record as Exhibit 1 and sets forth in detail the results of that analysis.

ERT as a supplement to the work on a proposed site-specific limitation for Baldwin prepared data concerning an intermittent control system entitled "Design of a Supplemental Control System for Baldwin Power Station" which is contained in the record as Exhibit 2. The required validation of the proposed emission limit will be accomplished using the monitoring system set forth in Exhibit 2. Although Rule 204(e)(3) calls for a one-year evaluation study as opposed to the three-year study requested by IPC in its Petition, data collection has already started, and there should be sufficient time for IPC to gather the data required under Rule 204(e)(3)(C).

The total sulfur dioxide emissions expected from Baldwin's three boilers under a maximum load are approximately 102,000 lbs./ hr. This maximum level forms the basis of the site-specific limitation requested for Baldwin by IPC. The U.S. Environmental Protection Agency (U.S. EPA) promulgated in the Federal Register (Vol. 43, No. 118) certain rules pertaining to the PSD of air quality in attainment areas. Randolph County, Illinois, in which Baldwin Station is situated, is a class 2 attainment area for sulfur dioxide. The PSD increments for class 2 areas are 20 ug/m^3 on an annual basis, 91 ug/m^3 for a 24-hour average, and 512 ug/m^3 for a 3-hour average (R.178). The PSD limits and the requested site-specific limitation noted above are the basic parameters which IPC must consider in their showing before the Board.

In order to determine whether sulfur dioxide emissions from the Baldwin plant would cause or contribute to a violation of any of the SO_2 standards, ERT modelled emissions from the plant using *ERT's Point Source Diffusion Model* (PSDM) Version 5. This model is based on the Gaussian plume equation which models short and long term SO_2 concentrations to a maximum of 20 km (12.43 miles) from the source for each of 16 wind directions, five stability classes, five mixing depths and six wind speed categories for a total of 2,400 possible meteorological conditions (R.27). Ground-level concentrations were not calculated for distances greater than 20 km(12.43 mi.) since the model becomes inaccurate at greater distances (R.111). It should be noted that no ground-level concentrations from a point source would be expected to be higher outside a 20 km (12.43 miles) radius than inside a 20 km radius from that source (R.152).

Since maximum load (firing-rate) at the Baldwin plant was determined to result in the highest ground-level concentrations ("worst-case"), the emission factors associated with maximum load were used in the model (R.31). Five years (1960-1964) of actual meteorological data were used to determine the sequential SO_2 concentrations (R.32).* Maximum 3-hour and 24-hour SO_2 levels attributable to Baldwin were calculated by averaging the appropriate 1-hour average concentrations during the specific sequence of hourly wind speed, wind direction, estimated mixing heights and stabilities (R.28). Annual averages were determined by using a four-dimensional wind-rose, a joint frequency distribution of wind direction, wind speed, stability and mixing heights.

A second model called FUMIG was used to solve for expected short-term SO_2 concentrations during fumigation of a plume emitted into a nocturnal inversion. FUMIG is a two-dimensional model based on the Egan-Mahoney advection-diffusion model (EGAMA)(R.28).

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* Hourly surface observation of wind speed and direction, temperature and local cloud cover were collected at Scott Air Force Base, Belleville, Illinois, approximately 25 miles north of the Baldwin site. Upper level meteorological statistics were obtained at Columbia, Missouri (R.31-32).

A third model, MONITOR, was used primarily as a tool to select the preferred SO_2 monitoring site locations for IPC's dual purpose air quality monitoring network. The locations for sites were determined by using the short-term pollutant concentrations around the Baldwin plant, which were computed by PSDM Version 5, and the representative frequency distribution of meteorological conditions from a four-dimensional wind-rose (R.32-33).

The results of the study are:

1) The estimated peak annual SO_2 concentration was equal to 28 ug/m^3 (primary standard is equal to 80 ug/m^3) and occurred at 8-11 km (4.97-6.84 miles) north of the Baldwin power plant.

2) During the five year data base period, no ground-level SO_2 concentrations exceeded 1300 ug/m^3 (three-hour secondary standard), and only 7 concentrations exceeded 1,000 ug/m^3 (R.38). (NOTE: These results are due to the Baldwin plant alone since background SO_2 concentrations were not included in the model.) For additional detail of the modeling study, see Exhibit number 1.

ERT also analyzed what effect the additional 20,000 lbs. of SO_2 per hour would have on the PSD increment. The 20,000 lbs./hr. figure is determined by subtracting approximately 80,000 lbs./hr., which the Baldwin plant was allowed under 204(e), from the proposed emission limitation of approximately 102,000 lbs./hr. This study found that the theoretical emissions do not exceed or cause an excess of the PSD increments for any of the averaged periods (R.52, Exh. 7). The appropriate modelled incremental concentrations and the respective allowable increments are: 203 versus 512 ug/m^3 for the 3-hour average, 64 versus 91 ug/m^3 for the 24-hour average, and 6 versus 20 ug/m^3 for the annual average. The concentration which was compared to the PSD increment was the second highest modelled concentration that occurred within 12 contiguous months of the highest SO_2 value.

The Agency also conducted a modelling study on Baldwin's impact on PSD using the Agency's Air Quality Short Term Model. They found that the proposed increase in emissions would not violate either the original or the new (as of June 19, 1978) increments (R.77-78). When operating at the maximum firing rate (101,966 lbs. of SO_2 per hour), Baldwin will consume approximately 21% of the available 3-hour PSD increment. However, even with Baldwin operating at full capacity the full 24-hour increment of 91 ug/m^3 is available for future growth in the area. They also found that the air quality impact on St. Louis from Baldwin will not exceed 50% of the applicable PSD Increments, which is the allowed portion for Illinois sources impacting Missouri, and will not exceed 50% of the PSD Increments in the vicinity of Kaskaskia or St. Genevieve, Missouri which are the closest populated areas of Missouri to Baldwin.

Aylesworth of ERT described the monitoring network located around the Baldwin Power Plant, the purpose of the network, and its performance to date. The monitoring network consisted of eleven monitoring sites (SO_2 analyzers) and one 100 meter (328 feet) meteorological tower site. The meteorological tower site was composed of wind direction and speed sensors, a temperature/temperature difference system, and an ERT standard deviation computer which was used to measure the standard deviation of wind speed and direction. As of the hearing date, data capture had been in excess of 90%. The monitoring network will be used to demonstrate the ambient concentrations of SO_2, to upgrade the model used to demonstrate the emission limitation, and to develop a data base to demonstrate the proposed emission limitation. The model is scheduled for upgrade on September 15, 1978 and April 1, 1979 (R.59). As of the hearing date, the model was slightly underpredicting observed concentrations (R.55).

Mr. Lewis C. Green, an attorney practicing in the city of St. Louis, Missouri, testified representing Coalition for the Environment. Mr. Green urged that the Board not relax Baldwin's emission limitations, citing its nearness to the city of St. Louis, sulfur dioxide problems in that city, and the potential problem with the respect to growth in the Wood River and Alton, Illinois areas. Mr. Lewis Green, in addition, cited potential problems with sulfates converted from the sulfur dioxide emissions and questioned the emphasis on management of the air quality in local areas with no consideration of the long-range transport of pollutants and its consequences.

Mr. Kevin Green testified on behalf of Citizens for a Better Environment (CBE) whose primary concern is that any relaxation in the sulfur dioxide standards should not consume a large portion of the increment so as to threaten potential growth. Although CBE's position is that IPC should continue to burn Illinois coal at Baldwin, they think that IPC should investigate the possibility of conducting a flue gas desulfurization program on one of the Baldwin units.

Based upon consideration of the evidence and testimony presented by the parties herein, the Board finds that IPC has sustained its burden of proof under Rule 204(e)(3) of the Board's Air Pollution Regulations with a showing that a proposed emission rate of 101,966 lbs. of sulfur dioxide per hour in the aggregate and at a rate not to exceed 6 pounds of sulfur dioxide per million btu's of heat input will not under any foreseeable operating conditions and potential meteorological conditions cause or contribute to a violation of any applicable primary or secondary sulfur dioxide ambient air quality standard or violate any applicable PSD increment. The Board will therefore grant the site-specific limitation as noted with certain conditions pursuant to Rule 204(e)(3).

This Opinion constitutes the finding of facts and conclusions of law of the Board in this matter.

ORDER

It is the Order of the Pollution Control Board that Illinois Power Company be granted a site-specific mass emission limitation for sulfur dioxide for its Baldwin Power Plant of 101,966 lbs. of sulfur dioxide per hour in the aggregate and an emission rate not to exceed 6 pounds of sulfur dioxide per million btu's of heat input pursuant to Rule 204(e)(3) of the Board's Air Pollution Control Regulations, subject to the following conditions:

1) Within 30 days of the date of this Order, Illinois Power Company shall apply to the Agency for a revision of its operating permit for Baldwin consistent with this Opinion and Order.

2) The Agency shall impose, as a condition to a permit to operate Baldwin Station, an ambient sulfur dioxide monitoring and dispersion modelling program designed to determine if the emission standard granted herein will not cause or contribute to violations of any applicable primary or secondary sulfur dioxide ambient air quality standards. The program shall be operated for at least one year commencing no later than six months after the date of this Order.

3) Illinois Power Company shall apply for a new operating permit no more than 15 months after commencement of the ambient monitoring and dispersion modelling program noted in (2) above and shall submit at the time of application a report containing the results of the ambient monitoring and dispersion modelling program.

Mr. Dumelle Concurs.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion and Order were adopted on the 15th day of February, 1979 by a vote of 3-0.

Christan L. Moffett/ss
Christan L. Moffett, Clerk
Illinois Pollution Control Board