ILLINOIS POLLUTION CONTROL BOARD
January 3, 1975

COMMONWEALTH EDISON CO. PETITIONER	)	
v.	)	PCB 74-16
ENVIRONMENTAL PROTECTION AGENCY RESPONDENT	)	

MESSRS. RICHARD E. POWELL and CHARLES E. WHALEN, ATTORNEYS, ISHAM, LINCOLN & BEALE, in behalf of COMMONWEALTH EDISON
MESSRS. MARVIN MEDINTZ and DELBERT HASCHEMEYER, ATTORNEYS, in behalf of the PEOPLE OF THE STATE OF ILLINOIS
MR. MICHAEL GINSBERG, ATTORNEY, in behalf of the ENVIRONMENTAL PROTECTION AGENCY

OPINION AND ORDER OF THE BOARD (by Mr. Marder)

This action involves a request for variance filed January 11, 1974, by Commonwealth Edison Co. (Edison), Petitioner. Relief is requested from Rules 203 and 204 of Chapter 2 of the Board's Rules and Regulations as they apply to five Edison generating facilities. A request is also filed for relief from Rules 103 and 104 as they apply to project completion schedules and compliance plans. Edison filed a motion on October 11, 1974, seeking to clarify its position. The motion contended that, although it was not inherently clear in the Petition, relief was also requested from Rule 3-3.112 for three Edison stations until May 30, 1975. Said Motion asks that the pleadings in 74-16 be deemed to include a request for variance from Rule 3-3.112. The Board finds that sufficient evidence has been generated at hearings to rule on a 3-3.112 variance as well as a 203 variance, and additional hearings would add nothing to our decision. The variance pleading will thus be deemed amended as requested by Edison.

At least in part, this case dates back to August 8, 1972, at which time the Board denied variance to Edison for its Waukegan and Sabrooke generating plants. Such denial was without prejudice and Edison refiled for variance on January 30, 1973. The Board at that time granted variance for six months, conditioning the variance on plant loading (variance granted until April 4, 1974). This was followed by the filing of 74-11 on January 4, 1974, seeking a six-month extension. Such variance was granted on September 27, 1974. The present variance seeks, in part, to again extend variance for one additional year. The above deals only with the Sabrooke and Waukegan generating stations, whereas PCB 74-16 in total deals with five generating stations.

As further background the reader is referred to the following Board

opinions: Commonwealth Edison Co. v. Environmental Protection Agency, PCB 72-91, 5 PCB 101; PCB 72-491-492, 73-40, 9 PCB 367; PCB 74-11, 13 PCB 235, 13 PCB 241, and PCB 74-11, September 27, 1974.

The instant Petition was filed on January 11, 1974. The separate facilities were consolidated for hearing in a rather unique manner. It was the Board's feeling that much of the information to be generated would be applicable to all facilities. However, it was also mandatory to hold hearings in the areas to be affected by their variance requests. This was done to allow the public the opportunity to participate at hearing. Twenty days of hearings were held as follows:

April 2,3,5,8,9, 1974	at Chicago
April 15, 16, 1974	at Waukegan
April 18, 1974	at Rockford
April 22, 1974	at Joliet
April 25, 1974	at Kincaid
April 29, 1974	at Chicago
May 7,8, 10, 20, 1974	at Chicago
June 5,7,20, 1974	at Chicago
July 9, 11, 1974	at Chicago

At these hearings the Board feels that a complete record was entered in this matter.

This Opinion will handle system-wide information first, and then apply this evidence to individual plant evidence in making its decisions. Before proceeding it is imperative to tabulate as much data as possible on the subject units. Table 1 includes such data as incorporated in this Opinion.

Statement of Hardship: Edison contends that the hardship which would be incurred should variance be denied would fall not only on itself but on its customers as well. This contention is based upon the premise that should variance be denied, Edison would be compelled to cease operations. This is not true, as pointed out by the Board and reiterated many times over (e.g., Androck Corp. v. Environmental Protection Agency, PCB 74-3; 48 Insulation v. Environmental Protection Agency, PCB 73-478; E.I. du Pont v. Environmental Protection Agency, PCB 73-533), failure to grant variance is not a shutdown order but rather a shield from prosecution. Thus Edison's true hardship, should variance be denied, is nothing more than being left open to an enforcement action. Edison, of course, has the option of shutting down certain equipment to avoid prosecution, and this course of action would cause hardship on Edison's customers who depend on a steady flow of electricity. To assess the potential hardship one must investigate the Edison system as a unit, looking at total capacity as well as required maintenance outages.

The Edison system (in 1974) has a total capacity of 17,066 mw. This breaks down as follows:

1. 14,016 mw of fossil and nuclear power.
2. 1,726 mw of fast start peakers.
3. 1,324 mw of purchased power.

Total 17,066 mw (Appelgren Ex. 3)

This capacity, due to ups and downs of the various equipment and differentials in sales and purchases of power through diverse exchanges, shifts almost constantly. The above figures are best used for a guide, and items (1) and (2) above reflect actual installed capacity.

Edison projects growth in its peak demands as well as growth in its total system. Since these figures seem to change constantly, the Board will not try to assess the validity of these numbers at some future date, but will rather deal with the supply and demand in the period which this variance request would cover. The peak load during 1975 (the area of major concern to this proceeding) is projected at 14,900 mw. Projected capacity for 1975 is 16,423 mw. All of these estimates lead to Edison's projections that, based on a 14% minimum reserve capacity, 1974 would show a reserve of 909 mw, while 1975 would show a deficit of 392 mw (Appelgren Ex. 4).

There is much discussion as to the validity of these numbers and the Board concludes that if different bases are used, many different estimates can be reached.

A typical example of this type of projection of numbers can be seen from examination of Appelgren Ex. 1 and 4, wherein growth in peak load is given and projected. Edison projects growth in peak load between 1974 and 1977 as 6.05%, 7.6%, and 7.5% respectively. The following history can be determined from simple mathematics on the above exhibits:

Year	Actual Peak Load MW	Growth in Peak Load Percent
1968	8950	-
1969	9265	3.5
1970	10,027	7.6
1971	10,943	9.1
1972	11,750	6.9
1973	12,462	5.7
1974	14,050	12.7
1975	14,900	6.1
1976	16,030	7.6
1977	17,230	7.5

The projected increase in peak load between 1973 and 1974 is thus projected at a very high 12.7%. Mr. Appelgren (R. 75) states that the 1973-1974 winter loads were 400 to 800 mw below what Edison anticipated, therefore casting even greater doubt on Edison's projections.

While there are many other factors which must be considered when assessing figures of this nature (e.g., purchases, sales, maintenance outages), a detailed description of how these numbers were generated was not afforded the Board. We can only go by past growth rates and actual 1974 load demand to project what future demands may require. The Board's conclusion on this subject is that Edison's estimates are significantly above what will actually occur, and Edison's fear of a serious hardship on its customers should certain units be curtailed is simply unfounded.

TABLE 1

PCB 74-16 Commonwealth Edison System Data

Plant/unit	MW	Startup Date	Fuel	Annual Fuel Usage Tons/Year	Part. Cont.	Emissions #/mmBTU	Part. Comp. Plan	SO_2 Cont.	Comp. Plan	Date Comp. Exp.	Stack Ht.
Joliet 5	117	1950	Coal	341,398	ESP	0.081 HSC	SO_x Inj.	L.S.C.	L.S.C.	10/1/75	258'
Joliet 6	344	1959	Coal	330,646	ESP	0.15	SO_x Inj.	LSC	LSC	3/1/76	431'
Joliet 7	617	1965	Coal	1,540,214	ESP	.061-.75	SO_x Inj.	LSC	LSC	10/76	550'
Joliet 8	617	1966	Coal	1,481,952	ESP	.061-.75	SO_x Inj.	LSC	LSC	10/76	550'
Sabrooke 1	20	1949	Coal	49,700	Mech.	1.5	Oil	Oil	Oil	FEA prob.	148'
Sabrooke 2	34	1952	Coal	113,052	Mech.	2.0	Oil	Oil	Oil	FEA prob.	148'
Sabrooke 3	35	1953	Oil	N/A	On	Oil	-	-	-	-	148'
Sabrooke 4	57	1961	Oil	N/A	On	Oil	-	-	-	-	148'
Waukegan 5	129	1931	Coal	338,850	Two ESP	0.5 on 1.6%S. coal	Split ductwk. SO_x Inj.	LSC	LSC	12/1/75	400'
Waukegan 6	119	1952	Coal	291,481	ESP	.29 on 2.4% S. coal	SO_x Inj.	LSC	LSC	6/1/76	336'
Waukegan 7	338	1958	Coal	981,055	ESP	1.5 on LS coal	New Hot ESP	LSC	LSC	12/1/76	450'
Waukegan 8	360	1962	Coal	928,448	ESP	0.4 on LSC-SO_3	SO_x In.	LSC	LSC	In Com.	450'
Powerton 5	850	1972	Coal	2,500,000	ESP	.027	In com.	None	Gas	Late 1980	500'
Kincaid 1	616	1967	Coal	1,316,616	ESP	.05	In com.	None	Gas	1982	500'

Thus, the Board finds that placing operational constraints on units which impact on the environment will not create an undue hardship, and in our final Order we will do so.

Further complicating the situation of availability is the area of maintenance, both planned and unexpected. Mr. Robert Engle (April 3, Pg. 422-434, April 8, Pg. 436-499) testified in detail as to how Edison plans for maintenance. Engle Exhibits 1-4 were entered as documentation as to Edison's contentions on this subject. Edison contends that actual outages for its units are 41% (based on 1961-1973 data) greater than its planned outages (R. 422). Although on the surface this seems like horrendous planning, it must be understood that "unplanned" outages are actually anticipated when developing the system strategy.

Engle Exhibit #2 then projects the expected outages for the 1974-1975 maintenance period and anticipates a net capacity deficit for the months of November, December, January, February, and March. This estimated deficit is including the capacity under question in the instant Petition. Edison then contends that during the difficult months, Edison would be forced to either institute voltage reductions or forestall the least critical maintenance (R. 429).

In analyzing Exhibit 2, one finds that the projected differences between estimated overhaul and projected total outages is very much greater than the 41% average depicted in Engle Exhibit 1. In fact, calculations during this period reveal the following:

Month	Est. Overhaul MW	Total Overhauled MW	Percent
Dec. '74	1800	5600	211
Jan. '75	2500	5600	124
Feb. '75	2700	5600	107

On their face these figures are completely out of context with Edison's historical averages. On the basis of information given to the Board, we can only conclude that these numbers cannot support Edison's contention that the capacity which is the subject of this Petition is required to maintain the system's integrity, but rather we conclude that this capacity would serve to increase the reserve capacity in the total system.

The overriding conclusion that the Board must draw from Edison's hardship plea is that while true in part, it is highly overexaggerated. When considering Edison's compliance plan, the Board will thus not hesitate to order speedy compliance even if it requires prolonged shutdown of individual units.

Efforts at Compliance and Economic Impact:

James Fancher described in detail what the history of Edison's environmental control activities is. Edison alleges a total environmentally-related expenditure of $733,000,000 since 1929. This includes an estimate of expenditures up to 1977. Upon cross-examination it was noted that much of the monies spent, while "technically" pollution abate-

ment projects, would have been spent for other reasons as well. For example, the construction of smoke stacks and much ash-handling equipment is needed for the safe and orderly operation of a plant. For instance, one can not simply dump ash on the plant site forever; within a short time the plant itself would be buried. The above, however, is not to indicate that Edison has not spent considerable money on pollution abatement equipment. As early as 1929 Edison installed and operated an electrostatic precipitator on one of its units.

Edison next details its intended compliance plan for the facilities in question. Said compliance plan was submitted on March 1, 1973 (R. 249, Exhibit F-3). The compliance plan (see Table 1) detailed Edison's intended method for each of the units in question. Basically five strategies have been considered:

I. Conversion to Oil: This is the compliance mode chosen for Sabrooke 1-4. Units 3 and 4 have already been converted to fuel oil. Units 1 and 2 are, as of this date, still embroiled in a controversy between the F.E.A. and Edison, but to date conversion to oil is still the goal.

Had Edison chosen conversion to oil for all other units, the alleged cost would have been about seven billion dollars over the life of the various plants.

II. Conversion to Low-Sulphur Coal with New Electrostatic Precipitator: This is the compliance mode chosen for Waukegan 7. This alternate includes the installation of a hot ESP.

Should this option have been chosen for all units under consideration, a cost of $1.937 billion was alleged.

III. Conversion to Low-Sulphur Coal with Flue Gas Injection: This compliance mode was chosen for Waukegan 5,6, and 8 and Joliet 5, 6, 7, and 8. This option, if considered for all units, is alleged to cost $1.546 billion.

IV. Gasification of Coal: This compliance mode was chosen for Powerton 5 and 6* and Kincaid 1 and 2. Had this option been picked for all units, the alleged cost was $4.504 billion.

Edison has chosen the mixed strategy detailed above because of numerous considerations which will be discussed further in this Opinion. The mixed strategy approach was estimated by Edison to cost $3.451 billion over the life of the plants, expressed as revenue required by

*Powerton 6 is mentioned numerous times during this record. Its impact on future decisions, both from an environmental impact as well as an economic point of view, are very helpful as an aid in formulating our decision. However, it must be remembered that this unit is not in question in this proceeding. Anticipated startup will be in late 1975. As such, it will in no way be affected by the decisions of the instant Petition.

Edison (this is equivalent to $594,000,000 capital costs [Brief Pg. 4]).

Fancher explained (R. 254) that while economics were considered, they were not an overriding item in developing the mixed strategy. This was done for the twin reasons that a detailed economic analysis done in the past indicated that "order of magnitude rankings" were the same and, secondly, because certain options were simply not available on certain units. For example, shortage of distillate fuel oil precluded the total system conversion to this fuel at any cost, and severe problems exist in burning low-sulphur coal on certain cyclone boilers.

During consideration of economic impact, Edison utilized a number of assumed costs, which should be noted:*

Cost of rebuilding ESP**	$17/kw
New ESP*	$27/kw
Cost of L.S.C. over Ill. coal	31 cents/mmBTU
Conversion to oil (Direct)	$30/kw
F.G.D. (Direct)	$63/kw
Coal gasification (Direct)	$80/kw

Under cross-examination, the subject of economics was hotly disputed (R. 303-412). Items of substantial concern were cost of replacement (R. 338) and a 15% figure for indirect escalation (R. 339). Particular concern was expressed over different figures given for identical costs at different times of these proceedings (e.g., cost of coal gasification capital).

Financial data are extremely difficult to analyze in that various methods of estimation are possible. Mr. Busch (economic evaluation for Agency) presented a "financial rebuttal" of Edison's $3.451 billion compliance estimate. Mr. Busch stated that the method of cost analysis was not a generally accepted method and that total cost by his methodology would be $347 million. Also calculated by Busch is the total increase in power production of $.001/kwh, or 3.2% of the 1983 kwh. production cost. Under cross-examination of Mr. Busch, a number of potential areas of concern were uncovered (e.g., kwh growth rate projection and cost of capital estimates, R. 46-47). Again, methodology and assumptions play a very significant part in the final number generated as a total cost projection.

Mr. Todd Bolen (Supervisor of Economic Research, Edison) was called as a witness to reaffirm the background for Edison's $3.451 billion estimate for compliance. Mr. Bolen countered the Busch testimony by stating that the method of financial analysis used was the "Revenue Requirement" method, which is commonly accepted by the utility field. He listed a number of textbooks which address themselves to this method (R. 129). It must be noted that Mr. Bolen is saying that the "Total revenue request to support the PCB 74-16 variance" is $3.451 billion

*This list is by no means complete. The reader is referred to the record (4/3/74, Pg. 260, Ex. F-6,7) for a detailed description. Also see cross-examination.

**Difficulty multipliers range from 1.1-2.7.

(R. 131). The thrust of Mr. Bolen's testimony is that after adjusting the bases of Fancher's numbers, the original Fancher numbers and the Bus number were similar. The key statement is found on Pg. 158:

> "From his testimony (Busch) I have very few leads as to how he developed that $113 million annual revenue requirement, but in my testimony I attempted by several different methods to show or to reconcile our two numbers, and I think rather successfully reconciled that we were definitely talking in the same order of magnitude, which leads me to believe he was using a revenue requirement technique similar to ours." (7/9/74, Pg. 158)

The many, many pages of financial data and cross-examination on these data serve to reaffirm our feeling, that depending on the bases used and assumptions made, different numbers can be generated. Although most numbers mean essentially the same thing, their impact seems vastly different, depending on the vehicle used as a basis (e.g., total costs, annualized costs, etc.). However, whichever way one chooses to look at these figures, they represent a significant outlay of capital. The Board, in reaching its final decision, is well apprised of the economic impact of our decision and we will use this as a factor in reaching such a decision.

The Options Available:

As mentioned above, Edison has submitted a compliance plan for the units in question. Allegedly, this program encompasses the most practical selection of options and the most rapid time frame possible. How realistic the time frame is will be discussed under the individual plant sections of this Opinion. This section will deal with the reasonableness and potential problem areas of each option.

I. Flue Gas Desulphurization (F.G.D.): As a quick glance at Edison's compliance plan (see Table 1) would show, Edison has opted not to use flue gas desulphurization in its plans. Edison has taken the position that F.G.D. is not presently a viable technology which is worthy of utilization at its plants, and has thus eliminated it from present consideration. The Board must, as part of its consideration, determine if Edison is making a good-faith effort to attain compliance in the shortest practical time. However, we are not interested in dictating what type of compliance mode is used. Our main concern with the testimony in this area is to determine whether Edison has rejected a viable method which could bring about earlier compliance than could its submitted plan.

Mr. Donald C. Gifford (Project Engineer, Scrubber Installation*) described Edison's past attempt at utilizing F.G.D. Edison first initiated an FGD project in the spring of 1970. Bechtel Engineering suggested a wet scrubber operation and the contract for construction was let to Babcock and Wilcox in September 1970. One-half of the operation was put in service on February 23, 1972. The system, commonly known as the Will County scrubber, is guaranteed to remove 98% of fly ash and 75% of SO_2.

*Not presently employed by Edison; now a Project Director with Universal Oil Products.

The system was retrofitted to the Will County Unit #1 which is rated at 177 mw. It is a wet limestone scrubber, complete with limestone milling, two-module (A and B) scrubber, and sludge treatment facilities. The second stage (A) scrubber became operational on April 7, 1972. The record (4/5/74, R. 47-60) details Edison's experience with the system. For various reasons the system did not function anywhere near guaranteed rating. Availability of the scrubber system was particularly disappointing. The longest consecutive run on the A scrubber was 21 days (R. 48). Availability is reported for A scrubber, 29.5%, and B scrubber, 25.2%. Edison decided on April 15, 1973, to discontinue work on the B scrubber and concentrate on the A scrubber. The problems during the startup phase were many and varied. Of major concern were demister pluggage, reheater pluggage and corrosion, vibration of fans, and stress cracking. Many problems have been resolved, and the main areas of concern at present are:

1) Stress cracking of reheater tubes.
2) Limestone blinding of scrubbant.
3) Sulphate scale formation.
4) Sludge disposal.

Edison details the costs to date for this scrubber at $16.8 million and operating costs at 9.4 mills/kwh at (35% capacity factor).

Under cross-examination, many of the facts and figures cited were challenged. The Board finds that, although there is a question as to the validity of the exact figures, the overriding impression is that this system was particularly troublesome. The fact that Will County I may not have been an ideal location for a scrubber installation (R. 70) is of little value to the Board in that all plants considered would be retrofit operations with varying degrees of difficulty. Discussions of closed loop pH control (R. 99) or sludge handling problems (R. 137) likewise do not answer the question of why the system did not function properly. While it is true that these techniques are being developed every day, Edison was in 1972 put in the position of having to develop such a system. They simply were not readily available at the time.

Edison further detailed its experimentation with an $8 million, 22 mw pilot program at its State Line plant. This system, termed the sulfoxyl system, produces elemental sulphur. Problems with the catalyst system have caused Edison to "mothball" the system, while consideration of future pilot plant runs is undertaken (R. 69).

Edison, however, contends that its decision to not consider F.G.D. is not solely based on its rather dismal record, but also on the current status of the systems on other plants. This area was perhaps the most hotly controversial subject in this matter, and one which has been presented to the Board in other forums (CILCO v. Environmental Protection Agency, PCB 73-65; SO_2 Inquiry Hearings, R74-2). In the instant Petition, we have the two divergent views on availability and technology presented by Mr. A. Slack for Edison and by Dr. H. Hesketh for the Agency.

The Board feels it would be useless to again detail the testimony on

t . subject. The pages of the record which the reader is directed to, ould he wish a detailed description of each plant, are May 8, 1974, . 1-151; June 5, 1974, R. 1-105; and June 20, 1974, R. 1-95. The following plants were discussed, along with their merits and disadvantages: Will County, Lawrence, Mitsui, Duquesne, Paddy Run, Cholla, Reed Gardner, Southern California Edison, Mohave, Boston Edison, and LaCygne.

The long, detailed discussion on the above plants leads the Board to a number of conclusions. Much progress has been made during the past few years on F.G.D. The hard lessons learned at Will County I and in the original injection processes have yielded new systems in which many of the original problems are being solved. The chemistry of the systems is becoming better understood, as is the necessity to closely control and monitor specific parameters such as pH. However, many problems still exist. Corrosion scaling, vibration, reheaters, and sludge disposal are among the problems which, while being solved, have not yet reached final resolution. The Board can understand Edison's hesitancy to install this technology when, in its opinion, the chances for success are below those compliance methods it has chosen.

The Board takes judicial notice of the document entitled "National Public Hearings on Power Plant Compliance with Sulphur Oxide Air Pollution Regulations," published in January, 1974. Referring to Page 63 of that report, time to install scrubbers is listed as between 27 to 60 months, depending on the source of information. Vendor estimates ranged from 30 to 36 months (obviously, dependent on degree of difficulty of installation and the size of the unit). The most obvious candidates for such systems are Powerton and Kincaid. Due to the fact that both of these units are large (850 mw and 1232 mw) and existing, a 36-month installation time would be expected. Thus, if one considered a jump-off date as the time of decision in this action, compliance could be anticipated (should scrubbers be opted for) by January 1978. Thus, if scrubbers were selected, compliance could theoretically be accomplished earlier than Edison's plans for gasification.

The question of the Board's position on the availability and reliability of scrubbers does not have to be determined in the instant proceeding, as once again the question is how will an extended compliance plan (beyond the theoretical 1978 date) affect the environment and thereby the citizens of the state. The function of the Board is not to support one method of compliance over another, but rather to support the most rapid, viable methodology consistent with environmental, economic, and technological considerations. Our decision on Edison's compliance plan is thus made on its impact on the state.

II. Coal Gasification: Edison's proposed compliance plan for Powerton 5 (850 mw) and Kincaid 1 and 2 (616 mw each) is the installation of a low BTU coal gasification unit, using high-sulphur Illinois coal as a feedstock. Mr. J. Augosta (Research Engineer, Edison) explained Edison's history in this area, as well as the intended plans for the future (5/7/74, R. 1-133).

Edison first began investigation of coal gasification in 1966 and se-

p a task force in 1970. This task force was to determine answers to three questions: 1) ability to produce gas from available coal, 2) environmental acceptability of the gas produced, 3) a timetable to install a commercial system. As a result of this study, Edison reached the conclusions that no technology is presently developed to reliably supply power generation gas, that the potential for such a system is very good, and that coal gasification offered the best option to meet Edison's compliance criteria on a relatively short-term basis.

Edison determined that before committing to a very large unit, a smaller prototype should be built. Powerton 4 was selected as the site (119 mw). On May 23, 1971, Edison entered into contract with Lurgi to provide engineering and other services to Edison. The cost of this (Powerton 4) project is listed at about 19 million dollars, with Edison committed to $7.75 million and the Electric Power Research Institute contributing $11.5 million. Groundbreaking is anticipated in late 1975, with operation starting 30 to 36 months later. Edison then contends that one year of operation would be needed to shake down and test the system, at which time (about 1977) design will start for Powerton 5 and Kincaid 1 and 2. A key point on technology is that Edison has had a 10,000-ton test run on a Westfield, Scotland, Lurgi gasifier. The results of this test were encouraging, according to Edison. However, they allege that more work is needed (R. 12).

Before moving to the cross-examination, a brief description of how a coal gasification plant operates is in order.

The heart of such a system is the Lurgi coal gasifier. This is a high-pressure vessel into which coal (crushed and screened) is injected via an air lock. Air and steam are also injected with the subsequent generation of hydrogen, which combines with the coal, under high temperature and pressure, to form methane gas and various other gases. The final gas stream has a heat content of about 175 BTU/ft^3*. Ash is removed from the gasifiers via an ash lock. The resultant gas is then fed to a desulphurization process where hydrogen sulphide (H_2S) is stripped out. The concentrated H_2S stream then passes through a Claus kiln (an acceptable and reliable unit process) which produces elemental sulphur.

The intended Powerton gasifier is to consist of three 12-foot-diameter Lurgi gasifiers (R. 44 and 88). It is assumed that any construction of Powerton 5 would be increased by multiples of the same size gasifiers. Edison predicts preoperation testing of this unit to commence during the last two months of 1976.

The cross-examination essentially explored two points: 1) the state of the technology, and 2) the rationale for Edison's extended compliance dates. It would seem that from experimentation at the Westfield, Scot-

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*This is in contrast to high BTU gasification, which is considered as a potential source of pipeline quality gas at 1000 BTU/#3. Low BTU gasification is economically feasible for power plants because there is no need to transport the resultant gas via pipeline. Low BTU gasification bviates the need for the costly and rather intricate methanation step, ich would boost the BTU value by reaction with excess hydrogen.

land, plant, a considerable part of the risk was removed; indeed, a substantial amount of Illinois coal was gasified successfully. SO_2 cleanup equipment was present and utilized on site. The Westfield operation started up about 1960 and has been supplying 240 BTU/ft^3 gas to the area residents since then.

Another plant of interest is the Sasol plant in South Africa. This plant consists of about thirteen 12-foot-diameter oxygen-blown gasifiers used to produce feed for a petrochemical operation. The tar generated is not recirculated; there is no pollution abatement, and a low-grade coal is gasified (R. 61). However, upon an inspection of the plant, Edison felt that the operation was relatively reliable.

It would seem that the major point of technology which is untried is the adaptation of a utility boiler to accept a low BTU gas feed. It must be remembered that in using low BTU gas as a feedstock, a much greater volume of gas must be fed and the boiler must be adapted to suit.

Taking all of the testimony into account, the Board finds that Edison is embarking on a project which has an excellent potential for success. Furthermore, it promises to open a viable alternate to SO_2 removal, one which can be economical, clean, and still use our abundant supplies of high-sulphur coal. However, the Board finds that Edison's timetable is unduly extended. Edison proceeded slowly and cautiously since its task force was formulated in 1970, and as such, valuable development time was lost. Attention is drawn to a memo (internal to Edison) proposing one gasifier on Powerton by 1973, and five gasifiers by 1975 (R. 84). There is no good reason why this program was not pushed harder than it was. Therefore, the Board feels that every possible barrier should be removed to expedite this program. We further feel that the 1980 date for Powerton 5 may be excessive. We do not feel that it is necessary to delay design of Powerton 5 until after one full year of experience on Powerton 4, nor do we feel Kincaid 1 and 2 should be further delayed. We do feel that the bulk of construction costs should not be spent until Powerton 4 is proven, but also feel that construction should start as soon as Powerton 4 is tested, e.g., early 1977. This rationale will be applied to our Opinion concerning the individual stations.

III. Low-Sulphur Coal: Switching from high-sulphur coal to low-sulphur coal is the option chosen for Waukegan 5, 6, 7, and 8 and Joliet 5, 6, 7, and 8. However, Edison alleges certain problems exist in burning low-sulphur coal. Before exploring these problems it is necessary to note that Edison discounted the use of low-sulphur coal on Powerton 5 and Kincaid 1 and 2. This decision goes in part to the alleged unavailability of low-sulphur coal.

Mr. G. Marcus (fuel agent, Edison) detailed Edison's attempts at securing additional low-sulphur coal (4/9/74, R. 615-624). It was explained that almost all low-sulphur coal must be imported from the West because Illinois produces no such coal for utility use.* An interest-

*Although small amounts of fairly low-sulphur coal (1.5%) are mined in Illinois, it is used for making coke.

ing statistic quoted by Marcus was that in 1969 the state of Montana mined 500,000 tons of coal and in 1973 Edison utilized 5.5 million tons from Montana. This figure was entered to point out the fact that new mines will have to be opened to generate more coal as it is needed. Marcus Exhibit #2, summarized below, shows Edison's deficits in committed low-sulphur coal ranging from 0.5 million tons in 1974 to 11.6 million tons in 1980, which indicates that new sources will have to be committed in the near future.

Year	Low Sulphur Coal Required	Low Sulphur Coal Obtained	Deficit
1974	9.35 million tons	8.9 million tons	0.45 million tons
1975	11.7	9.1	2.6
1976	12.0	9.3	2.7
1977	13.4	8.8	4.6
1978	15.4	8.7	6.7
1979	13.5	1.9	11.6
1980	13.5	1.9	11.6
		TOTAL DEFICIT	40.3 million tons

Mr. Marcus then detailed Edison's efforts to procure additional supplies of low-sulphur coal (R. 618-620). Efforts to date have been very disappointing (R. 621) as summarized below:

Date	Number Bids Let	Volume Coal Required (Years)	Number Valid Bids Received	Volume Obtained
March 73	11	24 Million Tons (1975-1978)	2	6.9 Million Tons
Sept. 73	21	16 Million Tons (1977-1987)	1	Bid under consideration (R 653)
Oct. 73	17	72 Million Tons 1979-1989)	1	Bid rejected (R 655)

Summing up this experience, Edison in 1973 was able to obtain only 14.3 million tons out of the 52 million tons required for the years 1974 to 1980 (R. 622). These deficits do not include the Powerton or Kincaid facilities where coal gasification is planned. If Powerton and Kincaid were included to use low-sulphur coal, the yearly deficits would increase to 15 million tons in 1979 and 1980 (Marcus Ex. 3). Because of the scarcity of low-sulphur coal and the fact that the Kincaid plant is a mine mouth operation, consideration of low-sulphur coal for these units (Powerton and Kincaid) was rejected. The logistics and reliability problem in transporting western coal was discussed by Edison in an attempt to rebut the Agency recommendation for coal blending at Powerton. To acquire the required low-sulphur coal (2.3 million tons per year), a new coal mine would have to be opened, which would take 3 to 4 years; five sets of locomotives and 500 railroad cars would be necessary. In addition existing coal cars in Illinois could not withstand the rigors of a 2500 mile round trip and thus could not be used (7/11/74, R. 24-25).

In 1970 Edison was the first midwestern user of unit train deliveries

of low-sulphur western coal. Today there are many customers for wester coal, in the midwest and elsewhere, and Edison expressed concern about the ability of the railroads to handle the unit train traffic efficiently and reliably, particularly since Edison needs reliable fuel supplies (7/11/74, R. 27). This concern was expressed in regards to the 2.3 million tons per year of low-sulphur coal if fuel blending at Powerton was to occur.

The Board is concerned about Edison's ability to obtain a sufficient and reliable supply of low-sulphur western coal based on our reading of the record in this case. We will therefore require at any future extensions of this variance firm showings that Edison 1) has obtained firm commitments for low-sulphur coal, 2) has obtained the ability to transport such coal to its plant site, 3) has worked out alternate compliance plans should the above two conditions be unfulfilled.

Edison next moved to detail the problems encountered in burning low-sulphur coal on existing units.

The problems center about two areas: first, the use of low-sulphur coal with conventional E.S.P.'s causes a degradation in the equipment's capture efficiency. This consequence, first noticed a number of years ago, is now a well-established fact. The following table details the loss of efficiency actually encountered at Commonwealth Edison's Waukegan #8:

	1	2	3	4	5
BTU Coal	10987	11069	10627	11371	9820
% Sulphur Coal	2.79	2.16	2.97	0.82	0.45
Outlet #/mm BTU	0.067	0.071	0.060	0.518	0.335
Efficiency	98.6%	98.4%	98.9%	87.2%	88.1%

The table clearly shows the mentioned degradation and resultant emissions of large amounts of particulates to the atmosphere. There are two possible solutions to this problem. One is the construction of "Hot" ESP's - which are units installed before the air preheaters. At this higher temperature the resistivity of the ash is such that ESP efficiency increases to acceptable levels. It should be noted that at these high temperatures the size of the ESP must be significantly larger so as to accept the increased volume of the gas. The retrofitting of such units is a long-range project and would not be available by May 1975 (see discussion on Waukegan 7); therefore, if low-sulphur coal was used, there could be a trade-off of pollutants. A second method of solving the ESP degradation problem is "flue gas conditioning." This project injects sulphur trioxide directly into the flue gas; the SO_3 then precipitates out on the particulates, which increases the migration velocity of the fly ash and thus increases ESP efficiency.

The second main area of concern in utilizing low-sulphur coal is the potential for fires or explosions in certain types of boilers. Cyclone boilers are particularly susceptible to this type of problem. The problem is essentially caused by high carbon carryover (unburned coal) which could then be ignited outside of the boiler, causing damage to the preheaters and ESP's. Information generated by Edison indicates that a solution to the problem is forthcoming.

The above problems are alleged to be the main reason why compliance with both Rules 203 and 204 cannot be accomplished simultaneously. The difficulties as they relate to each specific plant will be discussed later in this Opinion.

IV. Supplemental Control Systems (SCS): Although not a permanent system, SCS has the advantage of allowing attainment of the short-term air quality standards on an interim basis. Due to the reality that Edison will not be in compliance with Rules 203 and 204 at many locations by 1975, it is incumbent for the Board to investigate methods which would reduce the impact of such discharges on the citizens of the state until such time as permanent capture equipment (or fuel switching) can be installed.

A brief overview of what an ideal SCS system is and how it would function is given in the following paragraphs.

A supplementary control system can be defined as "Systems where the rate of emission from a source is curtailed when meteorological conditions conducive to high ground-level pollutant concentrations exist or are anticipated" (Federal Register, Vol. 38, No. 178, p. 25698, September 14, 1973). It is, in fact, a program incorporating real time monitoring of stack emissions, meteorological conditions, and air quality data with a numerical scheme for the determination of current and future ambient air quality in the vicinity of a specific source, such that when selected levels of ambient air quality are obtained or forecast, specific emission reduction activities can be taken.

As a practical matter, such controls can include: 1) fuel switching, 2) load shifting, or 3) curtailment of the industrial process to reduce emissions during periods when air conditions are not optimum for dispersing and diluting SO_2. These systems, though appearing under different names, have been used by such diverse entities as the Tennessee Valley Authority, at its Paradise plant, American Smelting and Refining Company, at its El Paso and Tacoma smelters, and Dow Chemical Company, at Midland, Michigan.

Though all interim control strategies are somewhat different, the basic elements of these systems are fairly common. The universal elements of all systems are as follows:

1. Equipment to measure the actual real time meteorological conditions surrounding the plant. This is necessary for both predictive functions and to keep the operator aware of the conditions at the actual time they are happening;

2. A model based on past meteorological and dispersion data that will predict atmospheric conditions as to both weather and as tc conditions which would influence dispersion of contaminants;

3. Actual source emissions. This must be real time and constant to the operator so as to be aware of what the plant is discharging to the atmosphere;

4. Predicted emissions. This is necessary for the operator to know in advance what conditions he will be operating under in the future so as to determine whether the atmospheric conditions will be adequate to disperse what will be emitted;

5. A dispersion model. This, of course, is necessary to predict the concentration of contaminants, once emitted under certain atmospheric conditions, so as to determine whether control strategies must be instituted.

6. Validation of model. This is necessary to determine whether the model is in fact reflecting actual conditions and would be done through real time monitoring of both contaminants in the ambient air and meteorological conditions;

7. Indications and trends as to potential violations. This is necessary in order to give the operator a framework in which to make decisions as to when to institute a control strategy;. and

8. A strategy to control emissions. This, of course, is the ultimate function of the control system. Such strategies can consist of load reduction, fuel switching, load shifting, and part-time use of permanent controls when dispersion conditions would seem to indicate.

It should be noted that there will be no standard supplementary control system. A supplementary control system must be developed for every plant to which it is applied. Such factors as terrain, meteorology, process, stack height, and congestion of the area are all factors which must be considered.

Though all systems will not be alike, they will all have certain basic hardware in common. These include monitors for the contaminants to be measured. The number of such monitors would depend on the plant and its location, and could range from just a few monitors to as many as 18 to 20. Also, the system would have to have certain weather monitoring devices so as to measure the conditions surrounding the plant. These would all have to be on direct hookup back to a central operations point where an operator of such a system could at any time get information from the monitors and the meteorological equipment. A third element would necessarily be a computer, which could be used to correlate all real-time data with all predicted data in the models so as to determine

what the conditions are and what the conditions are liable to be in the near future. Such data transmission might also be hooked into the enforcing agency directly for ease of enforcement. The most important element is not really a piece of hardware; it is, in fact, a plan which would indicate that when certain levels are reached or are predicted to be reached during a time span in the future, certain set plans would go into effect at the plant to bring emissions into line with those which would not cause violation of any standard that applies to the plant.

On September 14, 1973, the U.S. Environmental Protection Agency published rules and guidelines for supplementary control systems (38 Federal Register 25698 [September 14, 1973]). These rules have never been issued as final, but they do give insight into requirements for an SCS system that the federal government thought were minimal at that time. It should be noted that even at this time the proposed guidelines would only allow supplementary control systems to be used in situations where their use was necessary to augment constant emission limitation techniques which were available to a specific source, and only until completely adequate, constant emission limitation techniques became available. This could be summed up to mean that it would be allowed in situations where the sole alternatives are either cutting back production permanently or delaying the attainment date for the national standards.

The basic requirement of the federal guidelines is reliability in the system. Before allowing SCS to be used, the federal government also would require each user of an SCS to support and participate in appropriate research development and engineering and a demonstration program to insure that the SCS system can be replaced by constant emission limitation techniques as soon as possible. This would be expanded to indicate that SCS would not be allowed on new or newly-modified sources, but only on present existing sources.

One of the major concerns relates to the enforceability of the regulation for meeting the national ambient air quality standard if an SCS system is instituted for a stationary source. It is feared that citizen enforcement of the Environmental Protection Act would be discouraged because of the difficulty of determining whether ambient air quality is being met, as compared to a simple determination of whether emission limitations are being met. Indications are that an SCS system is validly enforceable under the regulatory scheme as exists today with certain modifications. There are basically two methods of enforceability. The first, of course, is actual measurement of the ambient air quality to determine whether the national standards are being violated. The second method is by making the SCS control plan enforceable on its face, with the regulatory determination that failure to comply with all terms of the plan is a prima facie violation of the standards.

Mr. Melvin (Illinois EPA) testified that an SCS would be applicable to Kincaid (R. 81) but that it would be very difficult in a major metropolitan area (Powerton). Mr. Melvin further testified that he could give no cost estimates for such a system, nor could he estimate the time required to install such a system. The Board feels that an SCS system is needed in areas where extended compliance plans are to be undertaken, but is fully aware that some time must be allowed for a form-

ulation of a plan. Our Order will require such planning and eventual installation of a viable permanent emission control system.

Environmental Impact and Compliance at Individual Power Stations

We will now turn to discussions of individual plants, detailing the intended methods of compliance and the environmental impact of each facility.

Waukegan Station: The Waukegan Station is located in Lake County, Illinois, a part of the Chicago MMA. As such, Rule 203 dictates particulate levels of 0.1 by May 31, 1975, and Rule 204 dictates levels of 1.8#/mmBTU SO_2 by May 31, 1975.

Environmental Impact: The subject of environmental impact is of critical interest in any decision the Board renders in this action. The Waukegan station is located within the city limits of Waukegan at Greenwood Drive near Lake Michigan.

On April 16, 1974, Mr. Jack Klingbeil (representative of CAP) testified to the effect that they were concerned that Edison's progress has not been good in complying with Board regulations. He urged the Board to put maximum pressure on Edison to insure speedy compliance.

The effect of Edison's discharges was discussed by both Fancher (4/15/74) and Melvin (7/11/74). Both witnesses discussed the results of model data that had been generated.

Fancher's data predicted the effect that the Waukegan Station* will have on ambient air quality by May 30, 1975. Assumptions include the following:

1. Edison's proposed compliance plan is on schedule.
2. Full load operation.
3. Stability Class 2 conditions.

The results of this computer model reveal the following:

Unit	SO_2 Rate	Max. 24 Hr.	Max. 3 Hr.	Part. Rate	Max. 24 Hr.	Max.3 Hr.
5	2.70#/MBTU	27.3ug/m^3	77.2 ug/m^3	0.50#/MBTU	5.0 ug/m^3	14.3ug/m^3
6	2.70	50.6	143.2	0.28	5.2	14.8
7	2.70	37.5	106.2	1.87	26.0	73.5
8	2.70	38.6	109.3	0.07	1.0	2.8
Total		134.0	379.1		37.2	105.0
Standards		365	1300		260	

*It must be noted that these figures, as well as Melvin's figures, detail the effect of plant emissions on the ambient air, NOT the projected air quality in the area as a result of all emissions. Of further importance is that in the immediate Waukegan area there are only four major SO_2 emitters (over 200 tons/yr.). Of these four, Edison accounts for about 87.5% of the total load. Therefore, Edison should have the dominant influence on ambient air quality as it pertains to SO_2. This discussion

Upon cross-examination, a number of weaknesses in the model were pointed out. Most notably, the model does not take into account fumigation or inversion effects. Fumigation is particularly important in this case, in that the plant is located directly adjacent to the lake. In addition, certain topographical conditions are not considered. Some of the omissions in the model presented cause the Board to conclude that the data are given slanted low. However, the fact that 100% load was used to generate the model would tend to overestimate the results. Before drawing any firm conclusions we will turn to Melvin's testimony.

Mr. G. Melvin (Ill. EPA Episode Unit) entered Melvin Ex. #2, which is an analysis of Edison's contribution to the air quality in the subject areas. Mr. Melvin's data was intended to predict concentrations at the worst conditions, as well as other conditions. The following is the result of his study.

1. Under trapping conditions, Waukegan will not cause (in itself) a violation of the 3-hr. SO_2 standard (Pg. 13, Ex. M. 2).

2. Under fumigation conditions, Waukegan has the potential for violating the o.5 ppm. 3-hr. secondary standard (see Ex. M-2 Table 12).

3. Estimates of daily (24-hr.) concentrations under normal meteorological conditions show both SO_2 and particulates below the standards (see M-2, Table 18, e.g., SO_2--.04 vs. Standard of 0.14, part. 28 vs. Standard 260).

The conclusion would be that under adverse conditions the Waukegan plant has the potential to exceed the short-term (24-hr. and 3-hr.) standards for SO_2 and particulates. This is best pointed out by Ex. M-2, Tables 21 and 22, which give maximum short-term concentrations under adverse meteorological conditions.

Under cross-examination, many of the assumptions (e.g., plume rise equations) were questioned, as were Fancher's assumptions.

In studying all data presented, the Board feels that a potential exists for violation of short-term standards. To protect against excess violations and yet allow the use of equipment which is needed for power generation, our Order will dictate operation loading for W-7, and early shutdown for W-6.

Unit 5 is a 129 mw unit fired by a pulverized coal, wet-bottom boiler. The boiler utilizes 1.3% sulphur coal and is anticipated to still utilize coal with this sulphur content on May 31, 1975. Emissions while burning this coal are expected to be 0.5#/mmBTU until December 1, 1975, at which time an SO_3 injection system will be installed. Edison states that the duct work on Unit 5 will be modified to incorporate two ESP's and this will thereby reach the aforementioned 0.5#/mmBTU. This work

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does not consider stack height and its effect on dispersion. This information is from the Illinois EPA emission inventory.

should be accomplished by December 1974.

The Board finds that this plan is reasonable and will endorse it. Variance will be granted from October 15, 1974, to October 15, 1975, subject to conditions of particulate discharge and sulphur content of the coal to be burned. Variance will also be granted to allow SO_2 emissions over the 1.8#/mmBTU level from May 31, 1975, to October 15, 1975, subject to conditions of maximum emissions tied to sulphur content of the coal. The provisions for monitoring and reporting of PCB 74-11 will also be required.

Unit 6 is an 119 mw unit fired by a cyclone coal-fired boiler. The boiler utilizes and will continue to utilize a blend of coal of about 1.6% sulphur. Emissions are presently in the range of 0.3#/mmBTU (run on 2.6% sulphur coal). Edison contends that when burning low-sulphur coal, deterioration of the system is encountered due to high carbon carryover. This problem will be attacked by boiler modifications as suggested by Babcock and Wilcox. Parts for this modification were to be delivered by November 1974, and Edison proposes a shutdown for modifications during the second quarter of 1975 (R. 12). Edison then proposed to start design of a flue gas injection system with eventual compliance by June 1976.

Under cross-examination the element of time was examined. In response to a question as to whether the modifications could be moved up to begin as soon as the part arrived, Mr. Holyoak replied: "I believe it might be possible, but it is a function of what else is going on in the system." (R. 51, 4/15/74)

The Board feels that particulates are a problem to the residents of the area and should be controlled in as short a time as possible. In line with our above reasoning in regards to the system availability and maintenance requirements, we will not grant variance any longer than needed to start boiler modifications. In relation to the SO_3 injection system, the Board must differ with Mr. Holyoak's statements that flue gas conditioning technology is still in the infant stage (R. 23) and that design of these systems should be staggered. The Board takes judicial notice of the article, entitled "The Performance of Electrostatic Precipitators in Relation to Low-Sulphur Fuels,"* in which reports of the commercial use of this technique date back to 1963. We find no reason for Edison to defer the design and installation of this equipment. Variance will be granted until October 15, 1975, subject to Edison initiating design and installation of its SO_3 system as soon as Unit 6 is modified and on stream.

Unit 7 is a 617 mw unit fired by a dry-bottom boiler which utilizes pulverized 1.6% sulphur coal. This 1.6% coal is intended for use after May 31, 1975 (R. 139, 4/15/74). Sulphur dioxide emissions from this unit will thus be approximately 3.2#/mmBTU (based on 10,000 BTU/# coal) but will vary with the heat value of the coal. Unit 7 is equipped with an ESP which was originally rated at 98% efficiency on high-sulphur coal. In an attempt to increase the ESP efficiency, Edison undertook testing

*By K. Darby and C. Whitehead, Second International Clean Air Congress, pg. 911 to 922.

with an additive known as Kopper K (testing about July 1971). Such testing did not increase efficiency and was discontinued. Upon inspection of the ESP, it was noted that the plates were coated with fly ash and Kopper K. This situation decreased the efficiency of the ESP so that further stack tests revealed an outlet of 1.27#/mBTU. (Test run 7/20/71, see 4/15/74 Ex. G.M.-2.) The projected repair bill was set at $4.8 million, with no assurance that low-sulphur coal may be used and compliance achieved. Edison then contacted Sargent and Lundy and contracted for the installation of a hot side ESP which would allow compliance with Rule 203 while burning low-sulphur coal. The anticipated completion date for this project is December 1976. The reader is referred to 4/15/74, R. 15-17, and Ex. H-3 and 4 for details on this plan. Edison contends that the length of time required for completion is necessitated by the location (120 feet in the air) of the new unit. Edison also contends that a recent experience with a retrofit ESP installation on Will County 3 dictates this length of time. Capital cost is estimated at $19 million (Exhibit F-7 [a]).

Upon cross-examination, the reasons for the delay were explored (R. 56-59, R. 75-78). Although the Board feels that some excess may be built into the schedule, Edison's recent experience with Will County 3 leads us to believe that the proposed schedule is realistic. We will allow the proposed timetable subject to review of progress at any further proceedings. Variance will be granted subject to many of the conditions detailed in the discussion of the Waukegan 5 and 6 units. However, due to the excessive particulates generated by this unit, its use will be curtailed.

Unit 8 is a 360 mw generator fired by a dry-bottom boiler burning pulverized 1.6% sulphur coal. Very little discussion is needed on this unit. A long series of testing has been undertaken by Edison in the use of SO_3 injection (details R. 18-21). The system should now be in operation. It is noted that in Petitioner's Motion for Modification (October 18, 1974) further delays to November 1, 1974, were anticipated. This Board has no sympathy in this regard. The operation of this system is an integral part of Edison's compliance plan and must be pursued with all possible vigor. The Petition will be denied.

Sabrooke Station: This is a small (146 mw) generating station located in Rockford, Illinois. The plant was purchased by Edison from Central Illinois Electric and Gas Co. in 1966. The plant is located on the east side of the Rock River in the southern part of the City of Rockford.

Units 3 and 4 are presently oil-fired; therefore, they are in compliance and will not be considered further.

Units 1 and 2 represent a rather unique problem. Edison's original prayer for relief was as follows:

> "...and in the event that Edison is not able to proceed with its plans to convert the Sabrooke Station to oil firing by the end of 1974, to such dates beyond May 30, 1975, as may be established by a compliance plan to be submitted

to the Board by July 15, 1974." (Pet. 74-11, Pg. 50)

As Fancher's testimony of July 11 reveals, Edison has not yet received final word on its appeal to the Federal Energy Office regarding its request to burn oil on Units 1 and 2. Neither has Edison supplied the Board with an alternate compliance plan. The first indication that Edison wishes to change its prayer for relief is revealed in Edison's closing brief as follows:

> "Accordingly, Edison requests a variance for Sabrooke Units 1 and 2 for one year, provided that within 60 days of a ruling by the FEO on Edison's request to burn oil in these units, Edison will submit to the Board and Agency a specific program for bringing these two units into compliance." (Brief of Petitioner, Pg. 42)

If the Board granted such a prayer for relief, it would condone a variance granting leave to file a compliance plan hinging on actions of a third party (FEO). This we cannot do. Furthermore, the unorthodox manner in which Edison chose to amend its prayer for relief is highly questionable (in a closing brief). The record, as it pertains to Sabrooke, is fairly complete and may be used in any future proceedings. The Board in particular takes note of the testimony of Weeks, Reeder, Estes, and Galinsk, all citizens of Rockford who attested to the nuisance generated by this facility.

The Board, however, realizes that Edison's attempt to achieve compliance was made in good faith and the failure of such compliance plan was not Petitioner's fault. We will thus grant a short variance to allow protection (subject to conditions), while a resolution of the FEO dilemma can be worked out. It is realized that by January 30, 1975, Edison can, if necessary, reinstitute proceedings in the Sabrooke matter and rely on the record generated in this proceeding.

Joliet Station: This consists of two separate facilities which lie on opposite sides of the Des Plaines River, in Will County, Illinois. Units 5 and 6 are located on one side, while Units 7 and 8 are on the opposite side of the river. The two complexes are connected by an overhead suspension bridge used to transport coal from the unloading facilities located on the Units 5-6 side of the river. The plant is about one mile from the city of Joliet and Units 7 and 8 adjoin the community of Rockdale.

Environmental Impact: As in the case of the Waukegan plant, modeling data was discussed by both Fancher (Edison) and Melvin (Ill. EPA). The cross-examination and assumptions used by both witnesses followed the same lines as in Waukegan and they will not be detailed in this section. One major point, however, must be raised: Edison bases its statistics on Units 5 and 6 burning 3.5% sulphur coal and Units 7 and 8 burning low-sulphur coal by May 31, 1975 (4/22/74, R. 84). Melvin Ex. 2 seemingly uses the same assumption (see Ex. 2, Table 2).

The following are results generated by Edison's study:

Unit	Emission	Rate #/mBTU	Average Conc. (ug/m^3) 24-hr. 3-hr.	
5 (1 stack)	SO_2	6.60	357.9	126.5
	Part.	0.08	4.4	1.6
5 (1 stack)	SO_2	6.60	357.9	126.5
	Part.	0.19	10.5	3.7
6	SO_2	6.60	243.8	86.1
	Part.	0.12	4.2	1.5
7	SO_2	2.10	74.3	26.3
	Part.	0.90	32.0	11.3
8	SO_2	2.10	74.3	26.3
	Part.	0.90	32.0	11.3
Total	SO_2	-	715.9	253.0
	Part.	-	73.0	25.7
Standards	SO_2	-	1300	365
	Part.	-	-	260

*

Mr. Melvin's study reveals the following:

1. Under fumigation conditions, the plant has the potential to violate the 0.5 secondary SO_2 standard (see M-2 Table 14).

2. Under fumigation conditions, Units 7 and 8 have the potential to violate the short-term particulate standards (see M-2 Table 17).

3. Under normal conditions, the expected contribution to the 24-hr. air quality with wind direction aligning Units 5 and 6 with Units 7 and 8 is as follows:

   0.06 ppm SO_2 (Standard 0.14)
   30 ug/m^3 part. (Standard 260 ug/m^3)

Table 17 from Melvin Exhibit 2 has been included in this Opinion so that the method of presenting data is available for examination (Fig. 2).

*Once again, the reader is reminded that this series of studies reflects the contribution of the plant on the air quality. In the Joliet area, the percent of load from Edison is not as great as it was in Waukegan. There are about 11 major SO_2 sources in the general Joliet area (200+ tons SO_2/yr.) between Lemont on the north and Channahan on the south. Total emissions from Edison are projected at 153,113 tons/yr.; Edison's contributions are 57.5%. It must also be noted that these figures are from the Ill. EPA emission inventory and reflect emissions prior to 1975. It is quite possible (in the case of Edison reduction pursuant to compliance plan) that both the total emissions and Edison's con-

FIGURE 2

SUMMARY OF CALCULATED CONTRIBUTION TO AMBIENT
AIR QUALITY FOR VARIOUS METEOROLOGICAL CONDITIONS

FACILITY Joliet Units 7 & 8

POLLUTANT Particulates (ugm^{-3})

Atmospheric Category	Windspeed Class (Knots) 1-3	4-6	7-10	11-16	17-21	21
Stability A	94 2 .356	128 1.3 .349				
Stability B	34 11.5 1.110	68 5.3 2.233	85 3.7 1.575			
Stability C	26 15 1.055	43 13.5 2.472	60 8.6 6.232	68 6.1 .952	68 4.9 .034	68 4.4 .021
Stability D	9 15 1.657	9 15 9.705	9 15 20.868	17 15 19.382	17 15 2.438	17 15 .555
Stability E & F	0 -- 7.082	0 -- 15.862	0 -- 6.061			
Trapping Stability B		196 3.8 --	222 2.8 --			
Trapping Stability D				43 15 --	68 15 --	
Fumigation * Stability B		554 2 --		264 .3 --		

KEY

Atmospheric Class	Windspeed Class (Knots)
	- Maximum Concentration - Location of Maximum Concentration (Kilometers) - Frequency of Occurrence (Percent)

*Three-hour average

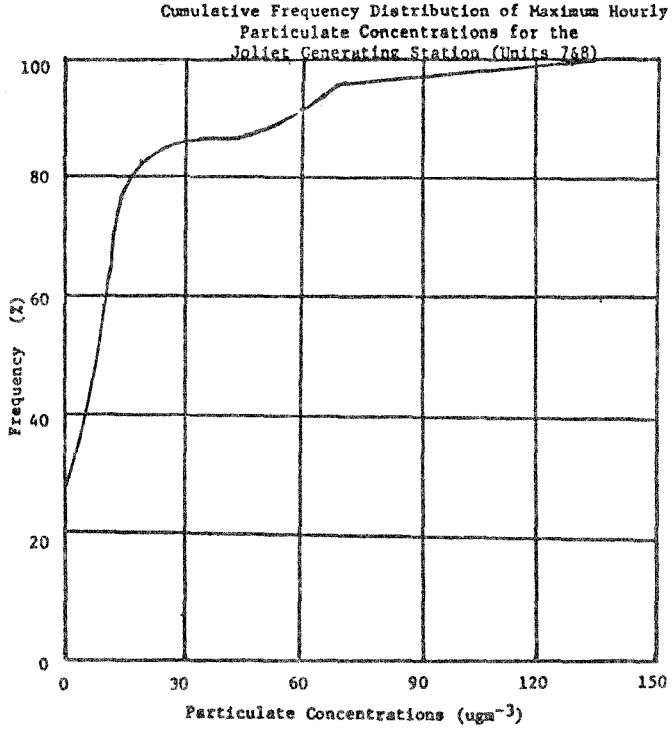

TABLE 17

From a review of the data presented, it is clear to the Board that the short-term SO_2 standard may be violated. Edison itself projects a maximum of 253.0 ug/m^3 at worst conditions. This is about 69.5% of the 365 ug/m^3, 24-hr. standard. When considering the length of Edison's compliance plan for SO_2 reduction at this plant, this potential violation will be kept firmly in mind.

At hearing on this facility, Mrs. John Keigher detailed the nuisance generated by the Joliet plant. Mrs. Keigher lived in the neighborhood for 13 years and contends that the problem has gotten worse every year. She feels that Edison is not working quickly enough to solve the problem. Mrs. Keigher registered complaints as to how the air quality affects her children, one of whom is an asthmatic (R. 139). The complaints registered have all the characteristics of a Section 9(a) complaint and, as such, portray a serious nuisance problem. This situation further prompts the Board to expedite any proposed compliance plan.

A discussion of the individual units at Joliet will now follow.

Joliet 5 is a 117 mw unit fired by two cyclone boilers burning 3.5% sulphur coal. It is anticipated that this 3.5% coal will be used after May 31, 1975, thereby necessitating a variance from Rule 204. Particulate data indicate that no variance from Rule 203 (g) is required (Fancher Ex. J-1).

Edison's proposed compliance plan calls for the installation of an SO_3 injection system on both boilers to be installed during October 1975. Edison has recently completed installation of new boiler tubes on both boilers (see discussion on Waukegan) to solve the problems of carbon carryover. Modifications are also in progress to upgrade the coal crushing equipment. The Board feels that this compliance plan is reasonable and will endorse it. It is therefore anticipated that Joliet 5 will be in full compliance with both Rules 203 and 204 by mid-October 1975.

Joliet 6 is a 344 mw unit fired by a cyclone boiler burning 3.5% sulphur coal. It is anticipated that the 3.5% sulphur coal will be in use after May 31, 1975. Emission of about 6.6#/mBTU will necessitate variance from Rule 204. Particulate testing indicates that no variance from Rule 204 (g) is required (Fancher Ex. J-1).

Edison's proposed compliance plan calls for installation of a flue gas injection system with design starting in January 1975 and completion in March 1976. All parties agree that this compliance plan is a viable one, and the plan would bring about compliance in the shortest possible time. The question facing the Board is the reasonableness of the time frame. Under cross-examination, a long exchange was undertaken detailing why the March 1976 deadline was reasonable. We will not detail the exchange, but refer to 4/22/74, R. 33-48, R. 58-75.

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tribution will change drastically by 1975. This note simply reveals [redacted] status prior to 1975.

After careful deliberation on the above exchange, the Board feels that Edison's proposed timetable is excessive. While it would be beneficial to Edison from a cost standpoint to delay design work, it is evident that this work must be done and the major components will be the same, no matter what the result of the design work. The Board sees no justification for not starting work on this program immediately, with a target startup date of December 1975.

Joliet 7 and 8 are 617 mw units fired by dry-bottom boilers burning pulverized coal. Both units burn low-sulphur coal with emissions calculated to be no higher than 2.1#/mBTU and, with the coal used, should meet the 1.8#/mBTU standard the majority of the time. A variance is thus needed to allow the slight abridgement and will be granted. Particulate data show a 0.9#/mBTU level, which would require variance.

Edison's compliance plan again calls for the installation of a flue gas injection system on both units. Work is scheduled to commence in June 1975, with compliance brought about by October 1976. Once more, discussions centered on the time frame rather than the method of compliance. The references detailed above (4/22/74, R. 33-48, R. 58-75) are the point in the record in question. Once again, the Board finds that Edison's compliance schedules are unduly exaggerated, and therefore we will condition our variance on a shorter time frame. The Agency has suggested (Brief Pg. 38) June 1976 as a reasonable date. The Intervenor has suggested (Brief Pg. 33) December 31, 1975. In light of the amount of work required and the size of the units involved, and being cognizant of the environmental impact of these units, the Board must agree with the Agency that June 1976 is a reasonable date.

Powerton Station: The Powerton Station is located about one mile southwest of Pekin, Illinois. It is located on the southeast bank of the Illinois River. At this time, there is only one unit in operation (P. 5). This unit burns high-sulphur Illinois coal which is washed down to about 3.7% sulphur. The unit is equipped with an ESP which was rated at 99.5% efficiency. Testing shows that the unit meets the 1975 particulate regulations when burning the 3.7% sulphur coal. However, compliance with Rule 204 is not anticipated by 1975.

Environmental Impact: As mentioned under the Waukegan Station, the subject of environmental impact was covered by Fancher (Edison) and Melvin (Ill. EPA). The results of their studies follow:

Fancher Ex. P-1:

*Unit	Emission	Emission Rate #/MBTU	Average Conc. 3-hr.	ug/m^3 24-hr.
5	SO_2	6.8	230.35	81.4
	Part.	0.05	1.7	0.6
**6	SO_2	6.8	230.35	81.4
	Part.	0.05	1.7	0.6
Total	SO_2	-	460.7	162.8
	Part.	-	3.4	1.2
Standards	SO_2	-	1300	365
	Part.	-	-	260

Melvin Ex.-2 draws the following conclusions:

1. Under trapping conditions, Powerton 5 and 6 indicate violations (Pg. 13) of the 3 hr. standard.

2. Under normal conditions there will be no violation of the 24-hr. SO_2 standard.

3. In a study conducted to determine the effect of a large point source in a major metropolitan area (Peoria) it was found that Powerton 5 could be anticipated to contribute a significant portion of the SO_2 in the area, for example, at the maximum receptors.

Receptor	Total Expected Read.	Powerton 5 Cont.
1	569 ug/m^3	252 ug/m^3
2	565 ug/m^3	309 ug/m^3
3	1000 ug/m^3	525 ug/m^3

Mr. Jay Norco also testified as to the effect of each Edison plant on air quality. Norco Exhibit #2 was entered to show the difference in the air quality if Edison were to be in compliance vs. if they were not in compliance by 1975. The validity of the assumptions was challenged upon cross-examination, and again distracted from its credibility. However, the Board feels that the exhibit has much value as an indication of what Edison's contributions to the total contaminant loading would be, and has used this as part of its consideration on all stations. The Norco Exhibit 2 will be included in this Opinion as Fig. 3.

The Board feels that Powerton has the potential to exceed the short-term SO_2 standards and will tailor its Order to reduce this impact.

*Once again, it is noted that this is the contribution of the plant. Edison contributed about 65% of the SO_2 in the Peoria area. Subject to change after 1975.

**Unit 6 is not a subject of this Petition. However, it is anticipated

FIGURE 3

ANNUAL AVERAGE AIR QUALITY CONCENTRATIONS

POINT OF MAXIMUM CONTRIBUTION FROM EDISON SOURCES

May 30, 1975

Commonwealth Edisor
PCB 74-16
Norco Exhibit 2

	1975 EXPECTED				1975 ALLOWABLE				Comparisons SO_2 Only	
	Particulates		SO_2		Particulates		SO_2			
	Max. Conc. (ug/m^3)	% Of Annual PRI. STD.*	Max. Conc. (ug/m^3)	% Of Annual PRI. STD.	Max. Conc. (ug/m^3)	% Of Annual PRI. STD.	Max. Conc. (ug/m^3)	% Of Annual PRI. STD.	Max. Conc. Diff. (ug/m^3)	Diff. in % Co to PRI. ST
ukegan 5-8	40.46	1.31	1.96	2.45	40.16	.46	1.30	1.63	.66	.82
liet 5-8	40.45	1.29	7.65	9.56	-	-	2.14	2.68	5.51	6.88
werton 5	40.12	.34	6.9	8.62	-	-	1.83	2.29	5.07	6.33
ncaid 1 & 2	40.1	.29	7.21	9.01	-	-	3.64**	4.55	3.57	4.46

* For particulates, the assumed background is 40 ug/m^3 Geometric Mean. The contribution of Edison sources is, therefore, calculated as the % of the difference between the standard (75) and the background (40), or 35.

** Exhibit 10 of Edison's Petition had assumed a 6.0 lbs/MBtu sulfur dioxide emission limitation; with the current stack height of the Kincaid Station, Rule 204(e) limits sulfur dioxide emissions to 4.34 lbs/MBtu. This Exhibit reflects the lower limitation.

Primary Annual Air Quality Standards:

Particulates - 75 ug/m^3 (geometric mean)
Sulfur Dioxide - 80 ug/m^3 (arithmetic mean)

(Discussions below on SCS and blending reflect this.)

As mentioned in the previous section of this Opinion dealing with coal gasification, the Board feels that while the program for compliance suggested by Edison is a good one, the timetable may be excessive. In answer to a question raised in the section of this Opinion of F.G.D. (e.g. will Edison's rejection of F.G.D. lead to undue delay and environmental damage?), the Board feels that in light of the problems of F.G.D. systems, the potential for development of a viable alternate (coal gasification), and the possibility of an SCS system to "shave the peaks" of short-term excursions over the standards, Edison's compliance plan is acceptable. The date for completion and what interim steps are to be taken are the only questions left to be answered.

Supplementary Control Systems: No long discussion of this item is needed. The bulk of this subject was covered earlier in this Opinion. The Board finds that an S.C.S. system is potentially a viable approach to be followed on an interim basis. Our Order will condition variance upon the undertaking of a cooperative effort between Edison and the Illinois EPA with the expected end result the operation of a workable, enforceable S.C.S. system.

Fuel Blending: Certainly another option open to Edison is the blending of coal to achieve a reduction of SO_2 until permanent controls can be installed. Mr. Hoffman (IEPA Electric Utility Specialist) testified as to the feasibility of this option (5/10/74). Mr. Hoffman pointed out that the methods of segregation of coal and conveyor belt mixing, or layering coal, could be used (R. 31). It was also pointed out that such methods are now in use by Edison at the Waukegan and State Line facilities (R. 33).

Mr. Ramey (7/11/74) was called by Edison to discuss the problems involved with coal blending. The major points center around the difficulty of securing additional supplies of low-sulphur coal. Further complicating the matter is the subject of contracts for coal which Edison now has for Powerton.

In its Brief, the Agency asks the Board to condition any grant of a variance on (among other things) a study of coal blending at Powerton. The evidence elicited at hearing indicates that coal blending is not a feasible alternate and that conducting such a study would serve no useful purpose.

Date of Compliance: The Agency suggests (Brief Pg. 41) that a compliance date of early 1980 would be reasonable for a coal gasification plant. The Board agrees. There is no justification for the delay proposed by Edison. Much design work can begin earlier than proposed by Edison. Compliance by 1980 is a reasonable date, and we will so condition our Order.

to start in late 1975. If it were to start up uncontrolled as to SO_2, the above predicts the combined impact on air quality.

Kincaid Station: The Kincaid Station is located approximately four miles west of the town of Kincaid, Christian County, Illinois. The plant is located on the shores of Lake Sangchris, which was impounded for the use of this plant. The station consists of two 616 mw coal-fired units, each fired by a B & W cyclone boiler. Each boiler is equipped with a dual Research-Cottrell ESP and discharges through twin 500' stacks. ESP efficiency tests while burning high-sulphur (4.1% sulphur) coal showed results well within Rule 203 specifications. Thus, no variance from Rule 203 is required.

Coal is supplied by Peabody Coal Co. from Mine #10, which is located adjacent to the station. The plant is considered a mine-mouth facility. To aid in the reduction of sulphur, Edison has contracted with Peabody to have all of the coal washed. Washing facilities are expected to cost $5 million and will be paid for by Peabody. These facilities are expected to be operable by November 1975. The following results are expected after washing at a 25% volume loss:

	Moisture %	Ash %	Sulphur %	BTU/#
Raw coal	14.5	15.7	4.2	9.730
Washed coal	17.5	8.7	3.5	10.340

When analyzing Rule 204 it is apparent that Rule 204 (e) is the most restrictive (comparison with 6.0#/mBTU). Allowable emissions are 4.34#/mBTU as per Rule 204 (e). If one assumes an average heat value of 10,000 BTU/#, it is apparent that Kincaid SO_2 emissions will be 8.4#/mBTU until November 1975 and 7.0#/mBTU after November 1975. Thus, a variance is required.

Environmental Impact: Due to the relatively isolated location of the Kincaid plant, its environmental impact can be considered as a single entity rather than as one source among many. This situation allows for more accurate predictions as to effect, less complicated impact assessment, and lends itself to an S.C.S. system which would predict and prevent short-term violations. Once again, Fancher (Edison) and Melvin (IEPA) entered evidence as to the potential impact of Kincaid's discharges on the environment. Questions as to assumptions used were similar to those raised in Waukegan and will not be reiterated.

The following results were reported by Fancher:

Unit	Emission	Emission Rate #/mBTU	Average Conc. 3-Hr.	ug/m^3 24-Hr.
1	SO_2	8.60	373.7	132.1
	Part.	0.05	2.2	0.8
2	SO_2	8.60	373.7	132.1
	Part.	0.05	2.2	0.8
Total	SO_2	-	747.5	264.2
	Part.	-	4.3	1.5
Standards	SO_2	-	1300	365
	Part.	-		260

(Fancher Exhibit K-1)

Melvin Exhibit #2 projects the following:

1. Under trapping conditions, Kincaid indicates violation of the 3-hr. SO_2 standard (indicates 0.74 ppm - M. Ex.-2, Pg. 13).

2. Under fumigation conditions, violations of the 3-hr. SO_2 standard are also projected.

3. No 24-hr. violations have been projected, although worst case analysis was not made.

It is the Board's opinion that adverse environmental impact can be kept to an absolute minimum at this station by the installation and operation of a viable S.C.S. system.

Edisn's compliance plans for this Station call for the installation of coal gasification units, with anticipated completion dates of 1982 and 1983. Other considerations included: building a taller smokestack to reduce the limitations of Rule 204 (e). This was rejected because of the fact that the 6#/mBTU level could still not be obtained. Edison again alleges that low-sulphur coal could cause damage to the cyclone boilers, and also that such a supply is not available. The problems with transportation and logistics were also cited. (Kincaid burns about 3 x 10^6 tons of coal per year , from Melvin Ex. 2.)

There is very little argument that coal gasification is a viable technology to pursue at Kincaid. The questions again center around the length of the compliance plan. Edison proposed to defer work on K-1 and K-2 until P-5 is well underway. There is no doubt that this conservative methodology is preferable from Edison's point of view, but we must balance the delay against the potential adverse environmental impact. We must also not lose sight of the enormous projected costs for these units, according to Edison's figures:

Powerton 4	$19,000,000	
Powerton 5	$65,895,000	UNIT Investment
Kincaid 1	$48,415,000	(Fancher Ex. 6 Ed.)
Kincaid 2	$48,415,000	

The Board at this time feels the compliance dates can be moved up significantly. We again express our feeling that preliminary design work can start before massive funds are committed. We will, however, not tie our variance to a firm date at this time, but will rather use the condition of an S.C.S. system to insure maintenance of the air quality in the area.

Summary: The Board will issue a very complex Order in this matter. This is due to the extremely complex nature of the system involved. In writing this Order the Board has very carefully considered all of the evidence presented. We have then weighed all of the aspects involved in this case. The environmental impact, technology, economics, and good faith efforts have all been considered. The Board finds that while Edison has indeed been the forerunner in new technology (e.g., Will County scrubber, Powerton gasification), this leadership is required so as to meet the mandate of the citizens of Illinois as voiced

by the State Legislature when they adopted the Environmental Protection Act. Such efforts are, in fact, to be expected of a major utility company, and Edison is indeed by far the largest electric utility in the State. The Board further finds that in many instances delay was a tool used to forestall the installation of equipment when technology could have been pushed. It is mainly for this reason that the Board has trimmed the dates on the various compliance plans. We are also very much aware of the enormous sums of money which will be expended to bring about compliance. We are further aware that this cost will eventually be borne by the consumer in the form of increased electric bills. This cost to the consumer is the price for the clean air he ordered when supporting the Environmental Protection Act and the Federal Clean Air Act.

In many instances compliance plans run beyond the one-year term granted in this variance. It is the intent of the Board to carefully review the facts in any future proceeding and act accordingly. It is also the intent of this Board to do everything it can to insure the viability of these compliance plans. To allow undue delay, to not folow up on such delay, would truly be to turn our back on our responsibilities.

This Opinion constitutes the findings of fact and conclusions of law of the Board.

ORDER

IT IS THE ORDER of the Pollution Control Board that:

1. With respect to the Waukegan Station, Unit 5:

   a) Variance is granted from Rule 3-3.112 from October 15, 1974, to May 31, 1975.
   b) Variance is granted from Rule 203 (g) from May 31, 1975, to October 15, 1975.

Subparagraphs (a) and (b) above are conditioned on the use of both the Unit 5 and the Units 1, 2, and 3 electrostatic precipitators at all times that Unit 5 is operating. Subparagraphs (a) and (b) are further conditioned on the conducting of stack tests to be performed within 60 days from the date of this Order. Said stack tests shall be performed in the presence of Agency personnel, if the Agency desires. Results of said stack tests shall be submitted to the Agency and the Board within fifteen days of the completion of such tests.

   c) Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, subject to the following conditions:

      i) Edison shall not emit sulphur dioxide in excess of 3.0#/MBTU.
      ii) The installation of an SO_3 injection system no later than December 31, 1975.
   d) This entire Order 1 is further conditioned upon the following

i) Within 30 days from the date of this Order, Petitioner shall submit to the Agency a detailed schedule for installing a flue gas conditioning system on Unit 5. Said schedule shall include as a minimum: dates for obtaining contracts, date of beginning design, date of completing design, date of scheduled delivery, date of outage for installation, and date of completion of said system.

ii) Petitioner shall submit quarterly reports to the Agency detailing work performed and progress made during the previous quarter and work to be performed in the following quarters.

iii) Within fifty (50) days of the date of this Order Petitioner shall submit a performance bond to the Agency in the amount of $35,000. Said bond shall insure completion of the flue gas conditioning system by the date detailed above in Order 1 (c)(ii).

iv) Edison shall continue to maintain and operate the monitoring system as ordered in PCB 73-40. All data generated by said system shall be submitted to the Board and the Agency as soon as it is available, but in no event later than six weeks after the last day of any month.

v) Edison shall apply for all necessary construction and operating permits.

2. With respect to the Waukegan Station Unit 6:

a) Variance is granted from Rule 3-3.112 from October 15, 1974, to a maximum of 30 days after Petitioner receives the fabricated furnace tubes from Babcock and Wilcox, but not later than June 30, 1975.

b) Variance is granted from Rule 203 (g) from May 31, 1975, to October 15, 1975, subject to the following condition:

i) Edison shall operate Unit 6 only after boiler modifications are completed, which would consist of as a minimum the installation of the new specially fabricated furnace tubes.

c) Variance is granted from Rule 204 from May 31, 1975, to October 15, 1975, subject to the following conditions:

i) Order 1 (c)(i), 1(d)(i), 1 (d)(ii), 1(d)(iv) and 1 (d)(v) shall be reapplied to Unit 6.

ii) The installation of an SO_3 injection system no later than February 1976.

iii) Within fifty (50) days from the date of this Order, Petitioner shall submit a performance bond to the Agency in the amount of $20,000. Said bond shall insure completion

of the flue gas conditioning system by the date detailed above in Order 2 (b)(ii).

3. With respect to the Waukegan Station Unit 7:

   a. Variance is granted from Rule 3-3.112 from October 15, 1974, to May 31, 1974.

   b. Variance is granted for Rule 203 (g) from May 31, 1974, to October 15, 1974.

   c. Subparagraphs (a) and (b) above are conditioned in that Waukegan Unit 7 shall be operated above 153 mw only after all other available Edison capacity has been utilized except Edison's fast start peakers and Sabrooke Units 1 and 2.

   d. Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, subject to the following conditions:

      i) Orders 1(c)(i), 1(d)(ii), 1(d)(iv), and 1(d)(v) shall be reapplied to Unit 7.

      ii) Petitioner shall install a hot electrostatic precipitator no later than December 1976.

      iii) Within 30 days from the date of this Order, Petitioner shall submit to the Agency a detailed compliance program and project completion schedule for the installation of a new hot ESP. The schedule shall include estimated dates of ordering equipment, delivery of equipment, installation of equipment, and startup of equipment.

      iv) Within fifty (50) days of the date of this Order, Petitioner shall submit a performance bond to the Agency in the amount of $150,000. Said bond shall insure completion of the hot ESP.

4. With respect to Waukegan Unit 8, the Petition for Variance is dismissed.

5. With respect to the Sabrooke Station Units 1 and 2, variance is granted from Rule 3-3.112 until January 30, 1975, subject to the following conditions:

   a) Sabrooke Units 1 and 2 shall be operated only after all available Edison capacity has been utilized, including Waukegan 7. However, one of the Sabrooke units (1 or 2) may be operated at the minimal level necessary to provide steam for water demineralizers, heating the station, or to prevent stack deterioration in the event that Units 3 or 4 cannot be used for such purposes.

6. With respect to the Joliet Station Unit 5:

   a) Variance from Rule 203 is dismissed.

b) Variance from Rule 3-3.112 is dismissed.

c) Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, subject to the following conditions:

i) The installation of a flue gas conditioning system no later than October 15, 1975.

ii) Within 30 days from the date of this Order, Petitioner shall submit to the Agency a detailed schedule for installing a flue gas conditioning system. Said schedule shall include as a minimum: dates for contracts, beginning design, completing design, date of scheduled delivery, date of outage of equipment, and date of completion of said system.

iii) Petitioner shall submit quarterly reports to the Agency detailing work performed and progress made during the previous quarter and work to be performed in the following quarter.

iv) Within fifty (50) days from the date of this Order, Petitioner shall submit a performance bond to the Agency in the amount of $35,000. Said bond shall insure completion of the flue gas conditioning system by the date detailed above in Order 6(c)(i).

v) Edison shall apply for all necessary construction and operating permits.

7. With respect to the Joliet Station Unit 6:

a) Variance from Rule 203 is dismissed.

b) Variance from Rule 3-3.112 is dismissed.

c) Variance is granted from Rule 204 from May 31, 1975, to October 15, 1975, subject to the following conditions:

i) The installation of a flue gas conditioning system no later than December 15, 1975.

ii) Within 30 days from the date of this Order, Petitioner shall submit to the Agency a detailed schedule for installing a flue gas conditioning system. Said schedule shall include as a minimum: dates for contracts, beginning design, completing design, date of scheduled delivery, date of outage of equipment, and date of completion of said system.

iii) Petitioner shall submit quarterly reports to the Agency detailing work performed and progress made during the previous quarter and work to be performed in the following quarter.

iv) Within fifty (50) days from the date of this Order, Petitioner shall submit a performance bond to the Agency in the amount of $65,000. Said bond shall insure completion of the flue gas conditioning system by the date detailed above in Order 7 (c)(i).

v) Edison shall apply for all necessary construction and operating permits.

8. With respect to the Joliet Station Units 7 and 8:

a) Variance from Rule 3-3.112 is granted from October 15, 1974, to May 31, 1975.

b) Variance from Rule 203 is granted from May 31, 1975, to October 15, 1975.

c) Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, to allow sulphur dioxide emissions up to 2.1#/MBTU.

The above Orders 8(a), (b), and (c) are conditioned upon the following:

i) The installation of a flue gas conditioning system on Units 7 and 8 no later than June 6, 1976.

ii) Within 30 days from the date of this Order, Petitioner shall submit to the Agency a detailed schedule for installing a flue gas conditioning system. Said schedule shall include as a minimum: dates for contracts, beginning design, completing design, date of scheduled delivery, date of outage of equipment, and date of completion of said system.

iii) Petitioner shall submit quarterly reports to the Agency detailing work performed and progress made during the previous quarter and work to be performed in the following quarter.

iv) Within fifty (50) days from the date of this Order, Petitioner shall submit a performance bond to the Agency in the amount of $200,000. Said bond shall insure completion of the flue gas conditioning system by the date detailed above in Order 8 (c)(i).

v) Edison shall apply for all necessary construction and operating permits.

9. With respect to the Powerton Station Unit 5:

a) Variance from Rule 3-3.112 and Rule 203 is dismissed.

b) Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, subject to the following conditions:

i) The installation of a low BTU coal gasification plant to fuel Powerton 5 by May 1980.

ii) Within thirty (30) days from the date of this Order, Edison shall begin a study regarding the installation and use of a supplementary control system at the Powerton plant. Such study shall seek to conform to the general guidelines of Federal Register, Vol. 38, No. 178, P. 25698, September 14, 1973. Edison shall seek the aid of the Agency in this matter and shall file a report of its findings with the Agency and the Board within four (4) months of the date of this Order.

iii) The Board retains jurisdiction to reopen hearings on the subject of S.C.S. on its own motion, or the motion of any other party during the term of this variance. Such hearings may result in further orders regarding the installation and operation of such S.C.S. systems. The Board may also issue any further orders regarding the proposed S.C.S. without holding hearings if it deems necessary.

iv) Within 30 days of the date of this Order, Edison shall submit to the Agency a detailed compliance plan. Said plan shall detail the proposed steps and dates for installation of a pilot gasification plant for Powerton 4, showing compliance no later than October 1976. Said compliance plan shall also detail the expected dates and steps to be undertaken towards installation of the coal gasification plant for Powerton 5.

v) Edison shall submit quarterly reports detailing its progress completed during the previous quarter and its expected progress during the following quarter.

vi) Within fifty (50) days from the date of this Order, Edison shall submit a bond in the amount of $1,000,000. Said bond is to insure the installation of the Powerton 4 pilot unit by October 1976, and the Powerton 5 gasification plant by 1980.

vii) Edison shall apply for all necessary construction and operating permits.

10. With respect to the Kincaid Station Units 1 and 2:

a) Variance from Rule 3-3.112 and Rule 203 is dismissed.

b) Variance from Rule 204 is granted from May 31, 1975, to October 15, 1975, subject to the following conditions:

i) Plans to burn only washed coal at the Kincaid Station shall be continued, with its use commencing by November 1975.

ii) Edison shall within six (6) months of the date of this Order file a compliance plan with the Agency for the installation of a coal gasification unit for Kincaid 1 and 2. Said plan shall include an anticipated date for completion of this project. Such date will be reviewable by the Board at any future requests for variance as regards these units.

iii) Within sixty (60) days from the date of this Order, Edison shall submit to the Board and the Agency a detailed proposal for implementing a supplemental control system at the Kincaid generating station. Such plan shall follow the general guidelines of Federal Register, Vol. 38, 178, P25698, September 14, 1973. The Agency shall within 30 days of the receipt of such proposal submit to the Board its comments on said proposal. The Board shall maintain jurisdiction in this matter and may schedule additional hearings at the request of any party or upon its own motion on the proposed S.C.S. The Board may also issue any further Orders regarding the proposed S.C.S. without holding hearings if it deems necessary.

iv) Within fifty (50) days from the date of this Order Edison shall submit to the Agency a performance bond in the amount of $100,000 to insure compliance with Order 10 (b)(i) above.

Mr. Henss dissents.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, certify that the above Opinion and Order was adopted by the Board on the 3rd day of January, 1975, by a vote of 4 to 1.

Christan L. Moffett