

ILLINOIS POLLUTION CONTROL BOARD
October 14, 1971

U. S. INDUSTRIAL CHEMICALS COMPANY)
)
) #71-44
 v.)
)
 ENVIRONMENTAL PROTECTION AGENCY)

JAMES F. LEMNA (LEMNA & LEE), AND OWEN RALL (PETERSON, LOWRY, RALL,
BARBER & ROSS), ATTORNEYS FOR PETITIONER
FRED PRILLAMAN, JOHN McCREERY AND THOMAS SCHEUNEMAN, ATTORNEYS
FOR ENVIRONMENTAL PROTECTION AGENCY

OPINION OF THE BOARD (BY MR. LAWTON):

Petition for variance was filed by U. S. Industrial Chemicals Company, a Division of National Distillers and Chemical Corporation, for variance from the particulate emission limitations contained in the Rules and Regulations Governing the Control of Air Pollution relative to the operation of its five coal-fired boilers and the operation of its sulphuric acid plant. An electrostatic precipitator has been installed on one boiler which is presumably being operated in compliance with the Regulations.

The petitioner states that it is in the process of installing electrostatic precipitators to control the particulate emissions from the boiler operation pursuant to a previous Air Contaminant Emission Reduction Program (Acerp) approved by the Illinois Air Pollution Control Board and that the new hydration alcohol unit presently under construction, also pursuant to a previously approved Acerp, will supplant the sulphuric acid unit, thereby eliminating all emissions from this source.

The Tuscola plant of U. S. Industrial Chemicals Company manufactures petrochemical products and chemicals for use both as chemical feedstock and for sale. Among the petrochemical products manufactured are two liquified petroleum gases, propane and butane, synthetic ethyl alcohol, ethylene, diethyl ether and polyethylene resins. Inorganic chemicals manufactured are sulfuric and phosphoric acid.

The foregoing products are manufactured in several interrelated units all dependent upon a 35,000 kilowatt power unit which is a primary source of air pollution. The power plant provides approximately one-third of the electricity used by petitioner, as well as the heating and motive steam used for refrigeration and gas compression in the petrochemical complex. The plant's five boilers burn 400,000 to 500,000 tons of coal annually, and generate an amount

of steam equivalent to that needed to supply a city of 100,000 population with electricity.

The initial operation in the processing chain is the hydrocarbon recovery unit consisting of extraction and fractionation elements. Of the one-half billion cubic feet of natural gas Panhandle Eastern Pipeline Co. supplies the plant daily, 2% is removed for fuel, and 8% is removed by the extraction unit for processing and retention in the form of liquified petroleum gases. The remaining 90% is transmitted back to Panhandle Eastern Pipeline Company for uses by its other customers. This re-transmitted portion consists primarily of methane, which is suitable as fuel but unsuitable as chemical feedstock. Petitioner's present arrangement with its gas supplier does not allow use of this residual 90% for fuel burning.

Extraction occurs by contacting the natural gas with a cold, light oil which absorbs the heavy hydrocarbon components of the gas. The absorption oil is then sent to large absorption towers. Heat is applied to vaporize the desired hydrocarbons, which vapors are collected at the top of the towers and condensed to recover mixed hydrocarbons at a rate of 700 gallons per minute. These hydrocarbons, in turn, are pumped to the fractionation unit where through distillation, the hydrocarbon mixture is divided into its components -- ethane (15-20 Million Cubic Feet per day), propane (400,000 - 500,000 gallons per day), butane (100,000 gallons per day), and gasoline (25,000 to 30,000 gallons per day). About 41 million gallons of the propane and butane are stored at the plant, largely in a limestone strata 400 feet underground, for seasonal sales.

The extracted ethane is transferred as a chemical feedstock to the ethylene unit. A series of heat-induced catalytic reactions, gas compression and separation converts the ethane to ethylene, the active material in the production of all of the petrochemicals produced at the plant. It becomes the feedstock for the alcohol unit, the diethyl ether unit and the polyethylene units.

The alcohol unit, which is a mainstay of U. S. Industrial Chemicals Co., currently relies on the acid ester process for producing synthetic ethyl alcohol from ethylene. The ethylene is dissolved in 98.5% concentrated sulfuric acid to produce ethyl sulfates which are then contacted with water in a hydrolizer, from which reaction is produced ethyl alcohol, diethyl ether and dilute sulfuric acid (50% concentration). The alcohol (190 proof; 50-60 million gallons per year) and the ether (5-10 million gallons per year) are purified and sold. The ether is used for pharmaceuticals and for chemical solvents and reactants.

The sulfuric acid plant and the phosphoric acid plant (now shut down) are inextricably related to the production of alcohol and diethyl ether. The primary purpose of the sulfuric acid unit is to supply the

1,000 tons of 98.5% concentrated sulfuric acid needed daily in the alcohol unit. This is done by reconcentrating a portion of the 2,000 tons of 50% concentrated acid produced in the alcohol unit daily, and recycling it through the alcohol unit. The primary purpose of the phosphoric acid unit is to assist in the disposal of 40% of the dilute acid generated by the alcohol unit. This dilute acid is mixed with ground phosphate rock to produce phosphoric acid which is marketed

Evaporation of the water under closely controlled temperatures permits reconcentration of the "black acid" to 85%. The remainder of the concentration, up to 98.5%, is accomplished by adding sulphur trioxide to the black acid.

Sulphur trioxide production (SO_3) is initiated in the drying unit by absorbing water vapor from air pumped through a "drying tower". This dry air is then pumped to a sulphur burner where 10% of the combustion gases is sulphur trioxide. The SO_3 is sent to the absorption towers, large brick-lined vessels containing packing designed to distribute evenly downflowing concentrated acid and upflowing SO_3 . The SO_3 is absorbed and dilute acid is then injected into the towers to stabilize the concentration at 98.5%. SO_3 vapors leave these two "black acid" towers and are vented with vapors from a third absorption tower through a 200 foot stack to the atmosphere, which emissions are partially abated by "demisters" composed of packing. The third absorption tower produces virgin acid, part of which is sold and part of which is utilized both in the drying tower for absorbing water vapor from incoming air and in the acid reconcentration process in the black acid towers. Four hundred tons per day of sulfuric acid are produced by the reconcentration process and by the virgin acid tower. The reconcentrated black acid and the unsold virgin acid are stored for recycle back to the alcohol unit.

The remaining units, which do not appear to be sources of emission to the atmosphere, are the polyethylene unit which relies for its feedstock on the ethylene unit and the denaturing unit which renders the alcohol unpotable.

The foregoing description of the petitioner's operation is necessary, both to evaluate the propriety of the variance petition and the contentions raised by the Environmental Protection Agency in opposition to its allowance.

As noted above, the petition for variance requests permission to continue the operation of the four coal-fired boilers and the resulting fly ash emissions beyond the limits prescribed by regulation, pending the installation of electrostatic precipitators, the installation of

which has been approved pursuant to a time schedule contained in an Air Contaminant Emission Reduction Program (Acerp) granted by the Illinois Pollution Control Board on August 5, 1969, as will be more fully described below. The variance also requests permission to continue operation of the sulfuric acid unit, pending construction of a direct hydration industrial alcohol unit presently under construction, completion of which is contemplated for March 30, 1972, at which time the sulphuric acid plant will shut down.

The variance petition alleges the employment of 1,042 employees and an annual payroll of \$10,800,000.00, and that \$152,000,000.00 have been invested in "buildings, land improvements, pollution control devices and operating equipment" during the last nineteen years. 14,000 tons of natural gas (520,000,000 cubic feet), 172 tons of sulphur, 270 tons of phosphate rock and 1,400 tons of coal are used daily by petitioner in its manufacturing process. The ethane, propane, butane and gasoline extracted from the natural gas total 2,040 tons per day. Ethane is converted to ethylene for further processing to ethyl alcohol and polyethylene, propane, butane and gas are sold to commercial distributors for heating, industrial application and motor fuel. Sulphur is converted to sulphuric acid used in the manufacture of ethyl alcohol. Sulphuric acid used in the alcohol operation is reacted with phosphate rock to produce fertilizer. Some high quality sulphuric acid is marketed. Coal is used to fire the five boilers which generate steam for in-plant use, as well as 30% of the electric power used by the plant. Petitioner represents that three hydrocarbon double flares are employed for safety reasons, equipped with smokeless flare tips which do not constitute a source of pollution. 1.5 pounds of uncollected fly ash are emitted per million BTU's fired from the coal boilers. 40 milligrams of particulates are emitted from the sulphuric acid unit per cubic foot of stack gas.

Pursuant to Pollution Control Board Rule 310, the Hearing Officer allowed intervention of the following organizations:

Phillips Petroleum Company
Industrial Water Supply
Eastern Illinois Water Company
Morris Construction Company
Rottman-Hoke Construction Company
Tuscola Chamber of Commerce
Ecoff Trucking Company
J. L. Allen Company
Quality Wood Products

The events leading up to the present variance petition follow:

On July 14, 1969, R. H. Coleman, General Manager of Petitioner, wrote to C. W. Klassen, Technical Secretary of the Air Pollution Control Board, proposing as an Air Contaminant Emission Reduction Program to control boiler emissions, the purchase and installation on Boiler #1, of a so-called Anderson Separator and Aerodyne Collector for completion by June, 1970, which, if proven effective, would be installed on two additional boilers by June, 1971 and on the remaining two boilers by June, 1972. The precise details of this mechanism are of no current significance because the proposed Acerp provided as follows:

"Should we find - after our evaluation in the period January 15 to June 1970 - that the mechanical separation or collection equipment cannot be made to perform to meet the emission standard, an alternate plan will be followed to bring the No. 1 Boiler into compliance by June 1971, two additional boilers by June 1972, and the remaining two by June 1973. This alternate plan takes into account the long delivery time for electrostatic separation and collection equipment and the many economic factors outlined in previous correspondence and discussion."

This proposed Acerp, including the alternative proposal, was approved by the Illinois Air Pollution Control Board on August 6, 1969. Tests on the Anderson Aerodyne Collector demonstrated that this process did not bring the boiler emissions within the acceptable limits, (R.349, 1756), and, accordingly, the company embarked upon the alternative program, providing for the installation of electrostatic precipitators on all boilers, in keeping with the time schedule above outlined. One precipitator has been installed on Boiler #1 although continuing implementation of the program appears to have been suspended pending the present proceedings. (R.1326-1327).

On August 20, 1968, the petitioner wrote to C. W. Klassen, proposing an Acerp for its sulphuric acid plant, which provided for modification and re-design of its acid distributor in the absorbers and for the use of improved packing which would provide better absorption of the SO_3 . The program called for completion by October, 1970. (Pet. Ex. 19). This program was approved by the Air Pollution Control Board on November 7, 1968 (Pet. Ex. 20). On September 5, 1969, R. H. Coleman, on behalf of petitioner, advised Mr. Klassen that a direct hydration alcohol plant had been authorized which would supplant the existing sulphuric acid plant used in the alcohol manufacturing process. This program was embodied in an Acerp proposal dated September 15, 1969 and provided for shut-down of the sulphuric acid plant during the last quarter of 1971, and shut-down of the phosphoric acid unit within "six months to one year later". (Variance Pet. Ex. D). As an alternate to the previously approved program, petitioner proposed installation in the west black absorber of new acid distributor pans and a new York mesh demister to replace the saddle-packed demister bed, which together

with improved liquid distribution was anticipated to improve recovery of the sulphur trioxide. This second Acerp was approved by the Air Pollution Control Board on September 29, 1969. (Variance Pet. Ex. E). The record indicates that this program was followed.

The variance petition alleges that while this construction is proceeding, delays in delivery of major pieces of equipment require suspending shut-down of the acid unit until the "first quarter of 1972". It appears that the phosphoric acid plant has already been shut down and that at least during the period of the hearing, the sulphuric acid plant has operated at levels complying with particulate emission regulations, although variance relative to emissions from this plant is still sought pending completion of the direct hydration unit.

The petitioner asserts that denial of the variance will necessitate complete shut-down of the entire industrial complex, resulting in the unemployment of 1,042 employees, the loss of a \$10,800,000 payroll, the foreclosing of a major source of income to the suppliers of coal, electric power and water, reduction in the open market of one-fourth of the industrial alcohol produced in the United States, and the elimination of 500,000 gallons per day of propane as well as large quantities of diethyl ether from the open market.

The Environmental Protection Agency recommends that the variance be denied. The recommendation contains a summary of complaints received from citizens in the area alleging excessive odors, smoke, fumes, observed damage to metal surfaces and extensive crop damage as a consequence of particulate and fume emissions. The position of the Agency, both in its recommendation and as developed in the course of the proceeding, is that the variance should be denied for the following reasons:

1. Petitioner constitutes one of the largest purchasers of natural gas, which the Agency asserts could be used in its boiler operation and not only as a source of supply for hydrocarbons used in its manufacturing process;
2. Petitioner could purchase low sulphur coal and thereby reduce emissions of sulphur dioxide;
3. Petitioner manufactures commercial fuel which could be used in its boilers thereby eliminating the need for coal burning;
4. That the time schedule proposed for compliance is excessive and all installations could be made within a one-year period;

5. Until such time as the new alcohol hydration plant is in operation and the sulphuric acid plant shut down, Petitioner could purchase the sulphuric acid used in the alcohol process from commercial sources and thereby eliminate the need for operation of the sulphuric acid plant and its resulting emissions.

Petitioner devoted the major part of its case to meeting the contentions raised by the Agency as to the availability of alternative fuels, the acceleration of the time schedule for installation of the electrostatic precipitators and the desirability of sulphuric acid purchases as an alternate to its manufacture.

The unavailability of natural gas for fuel purposes and the limitations imposed by the Federal Power Commission were adequately set forth in the record (R.154-159), and support petitioner's position. As previously noted, petitioner is required to re-transmit the methane component of the natural gas after the hydrocarbon stripping has occurred. The record demonstrates a shortage of natural gas -- which is desperately needed elsewhere as in metropolitan areas where there is a critical need for alternatives to coal burning. With regard to the appropriateness of burning low sulphur coal, some amount of this fuel is available in the western states. However, its use would not solve the particulate problem and there has been no adequate proof of a sulphur problem calling for the use of this fuel. The evidence supports petitioner's contention that the use of low sulphur coal would make the electrostatic precipitators less effective for controlling fly ash emissions, as presently designed. Even if low sulphur coal was available, it would be far more appropriate to burn such coal in highly populated areas such as the Chicago and East St. Louis regions, where intense sulphur dioxide problems are known to exist, rather than in relatively sparsely populated areas where the sulphur dioxide problem is less acute. Nor does the substitution of fuels manufactured by petitioner for coal appear to be a suitable alternative. Propane manufactured by petitioner is sold to Phillips Petroleum Company which, in turn, is a major distributor of this product for home heating and agricultural operations (R.708-723). Perry E. Goth, Jr. testified that if this supply of propane was cut off, it would take Phillips at least two years to establish a new source. Approximately 15,000 homes in the immediate area are served by propane purchased from the Tuscola plant. Conversion to oil burning, while not seriously advocated by the Agency, would not appear to be an appropriate alternative in consideration of the costs necessary for such conversion. Nor does the record support the Agency's assertion that the time schedule previously approved in the Acerps could be accelerated. Petitioner's witness in this respect testified to a programmed schedule of installation which was not refuted by the Agency's witnesses. He pointed out that space limitations required installation of the precipitators in a sequential manner rather than simultaneously. Likewise, the proposal that sulphuric acid be purchased

to be used in the alcohol manufacturing process does not have merit. The approximate 1,000 tons per day of sulphuric acid used in the alcohol process must be 98.5% to permit its use in that process. After the sulphuric acid is used in the alcohol process, its strength is reduced 50% of which approximately 60% can be recycled and is refortified for further use. The remaining 40% is used in the phosphoric acid plant. Purchase of sulphuric acid from outside sources would create substantial problems of disposal in that the re-cycling process above described would be eliminated, and there is no market for the 50% acid created and no suitable storage facilities are available.

In summary, the Agency has not established on the record the availability of natural gas or the appropriateness of requiring low sulphur coal for use in the petitioner's boilers nor does use of fuels manufactured by petitioner appear to be a suitable alternative to coal burning. While purchase of sulphuric acid from outside sources might be possible, the problems it creates appear to be far worse than those it would solve. No solid evidence suggests acceleration of either Acerp program beyond that previously approved, nor can we on the present record order an immediate abatement program for air pollution resulting from sulphur dioxide as directed in Environmental Protection Agency v. City of Springfield, #70-9, c. f. Illinois Power Company v. Environmental Protection Agency, #71-193, #71-195, #71-196, #71-197, #71-198, p. 8. It is clear that sulphur dioxide and/or sulphuric acid has damaged plants in the area, but it is unclear to what extent this is attributable to the boilers and to what extent to the acid plant. We will therefore order that a study of the problem be made after the acid plant is closed and that appropriate corrective action be pursued if a serious problem remains, as specified below.

We believe petitioner has established its burden of proof for the granting of a variance. Variance is granted to petitioner in substantial conformity with its petition, but subject to the terms and conditions hereinafter set forth. While we allow the variance on the time schedules provided in the petition, we will insist on strict adherence to this program and countenance no delay in its achievement. We do not look favorably upon petitioner's cessation of activities during the pendency of this proceeding. Petitioner could certainly not have assumed that this Board would sanction a program for the installation of the electrostatic precipitators that would be slower than that previously sanctioned by our predecessor Board.

In granting this petition, we are not unmindful of the severe problems petitioner's operations have created for the residents in the area. Fly ash and particulate emissions attributable to the boiler and sulphuric acid operations have significantly interfered with the enjoyment of life and property in the community. The nuisance is severe and demonstrable. Damage to metals and crops unquestionably have resulted from emissions from petitioner's plant. However, petitioner is pursuing a program previously approved by the Illinois Air Pollution Control Board and while petitioner unquestionably could have done more

and done it faster, it was protected by the sanctions previously obtained and is pursuing a program previously approved. On this state of the record, no penalty can be asserted.

However, there is one facility that we will insist be improved as a condition of this variance.

The primary purpose for the sulphuric acid plant is the manufacture of acid used in the alcohol process. However, some virgin acid is manufactured for sale. This facility appears to be operating at the present time in compliance with emission regulations. As a condition to the variance which we grant relative to this operation, pending completion of the new hydration plant, we order that virgin acid production for external sale shall cease whenever the total sulphuric acid plant emissions exceed permissible limits as set forth in the regulations. This production limitation will permit the company to continue the major function of its sulphuric acid unit and exceed emission limits when necessary for the manufacture of alcohol, but at the same time, reduce the extent to which emissions from this unit violate the law.

In order to further control the possible plant damage from sulphur emissions from the boilers and after the shut-down of the sulphuric acid plant, U. S. Industrial Chemicals Co., through an independent recognized consultant, shall establish, operate and maintain continuous monitoring stations for SO₂ for the period from April 1, 1972 to September 1, 1972 in the area where crop damage has occurred in the past. Within 30 days after September 1, 1972, the company shall file with the Board and Agency a program for the alleviation of excess SO₂ levels sufficient to cause plant damage. The Board shall issue a further order as required.

Regrettably, one further matter must be mentioned in this Opinion. As is characteristic in many cases considered by this Board, great emotion is often generated by the proceedings and the issues created. Concern is expressed on the one hand for the future of the business involved, and on the other hand whether continuation of the alleged pollution will remain a lingering burden on the community. Intense feelings are aroused on all sides which frequently come to a head during the course of the trial and are often expressed through the media and outside of the hearing process. In cases of this sort, it is of great importance that the Board be fully apprised of all aspects of the issue and public participation is both sought and welcomed. However, the place where these views should be expressed is in the hearing itself, for this Board's decision can only be made on the basis of the record before it. Extra-judicial accusations, threats and innuendos can only serve to exacerbate an already difficult situation and impede, rather than assist, the Board's ability to render an equitable decision. It is unfortunate that such circumstances characterized, in part, the present proceedings and it is hoped that they will not recur in the future.

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

IT IS THE ORDER of the Pollution Control Board that petitioner be granted a variance to exceed the particulate emission limitations set forth in the Rules and Regulations Governing the Control of Air Pollution, subject to the terms, conditions and time schedules hereinafter set forth:

1. Variance is granted to petitioner to operate its four uncontrolled coal-fired boilers in a manner causing emission of particulates in excess of the regulation limits pending the installation of five electrostatic precipitators, the first of which has already been installed. Two additional precipitators shall be installed and in operation by May 30, 1972. Emissions from all boilers on which precipitators have or will be installed shall meet particulate emission limits as set forth in the regulations. This variance shall extend to October 13, 1972, prior to which date petitioner shall have initiated installation of the two remaining electrostatic precipitators on Boilers #4 and #5 for operation by May 30, 1973, and shall petition this Board 90 days in advance of expiration for an extension of this variance demonstrating that it has diligently pursued the time schedule for total installation as set forth in its variance petition.
2. Variance is granted to March 30, 1972 to operate the sulphuric acid plant in a manner causing particulate emissions in excess of those allowed in the Rules and Regulations Governing the Control of Air Pollution pending operation of the direct hydration alcohol plant. On March 30, 1972, the sulphuric acid plant shall be shut down. No virgin acid shall be manufactured for sale at any time when emissions from the sulphuric acid plant exceed maximum emission limits presently in force and effect in the Rules and Regulations Governing the Control of Air Pollution.
3. U. S. Industrial Chemicals Co., through an independent recognized consultant, shall establish, operate and maintain continuous monitoring stations for SO₂ for the period from April 1, 1972 to September 1, 1972 in the area where crop damage has occurred in the past. Within 30 days after September 1, 1972, the company shall file with the Board and Agency a program for the alleviation of excess SO₂ levels sufficient to cause plant damage. The Board shall issue a further order as required.

4. The company shall, within thirty-five days after receipt of this order, post with the Agency a bond or other security in the amount of \$500,000.00, in a form satisfactory to the Agency, which sum shall be forfeited to the State of Illinois in the event that the conditions of this order are not complied with or the facilities in question are operated after expiration of these variances in violation of regulation limits.

I, Regina E. Ryan, Clerk of the Pollution Control Board, certify that the Board adopted the above Opinion this 14 day of October, 1971.


