

ILLINOIS POLLUTION CONTROL BOARD

December 5, 1974

UNION OIL COMPANY )  
CHICAGO REFINERY )  
PETITIONER )  
 )  
v. ) PCB 74-333  
 )  
ENVIRONMENTAL PROTECTION AGENCY )  
RESPONDENT )

MR. ARTHUR T. LENNON, ATTORNEY, of MURPHY, TIMM, LENNON & SPESIA,  
in behalf of UNION OIL  
MR. PAUL G. CHROMEK, ATTORNEY, in behalf of UNION OIL  
MR. JAMES SCHLIFKE, ATTORNEY, in behalf of the ENVIRONMENTAL PROTECT-  
ION AGENCY

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

This action involves a variance request filed by Petitioner, Union Oil Company, on September 9, 1974. Relief was requested from Rule 408 (a) of Chapter 3 of the Board's Water Pollution Control Regulations, as it applies to cyanide. Variance is requested from December 6, 1974, through December 6, 1975.

The Agency filed its Recommendation October 18, 1974. This Recommendation states the Agency's opinion that the variance should be granted, subject to certain conditions.

Hearing was held October 23, 1974, in Joliet, Illinois.

This variance request is for a one-year extension of the variance granted in our Opinion and Order of December 6, 1973, Union Oil Company of California v. Environmental Protection Agency, PCB 72-447, Vol. 10 PCB Opinions 217, wherein the Board discussed the problems of measurement of cyanide in the amounts in question, along with the question of free vs. complex cyanide. (The reader is recommended to read the previous Opinion for a more detailed handling of those questions than will be given here.)

Union Oil Company owns and operates a petroleum refinery two miles west of Lemont, Illinois, known as the Chicago Refinery. The refinery has a gross capacity of 150,000 barrels of crude oil per day. The refinery turns out a complete line of petroleum products. It has a work force of 650 employees.

The effluent stream from the refinery, after treatment and holding, is discharged into the Sanitary and Ship Canal. The discharge into the canal at the time of the original variance request almost continuously violated the standard of 0.025 mg/l. At the present time, the plant meets the effluent criteria approximately two-thirds of the time.

Cyanide is a rather recent problem for refineries. Cyanide is produced by what is alleged to be unknown reactions in the fluid catalytic cracker (FCC) and the "coker" units. In recent years, the cyanide concentration in effluent streams has increased because of a concerted effort on the refineries' part to lower the amount of water used in the facility (see Mobil Oil Co. v. Environmental Protection Agency, 73-452, 13 PCB Opinions 179).

In the previous matter, the Board determined that there were indeed problems in measuring cyanide levels in the range in question. Further, the Board determined that at that time there was not an adequate method developed to remove cyanide from the effluent stream at the levels in question. The Board in granting Union its variance indicated that Union was to work at a research program to control the cyanide, as well as keeping the discharge to as low a concentration as possible.

In the previous matter the Board ordered:

- "1. Petitioner's cyanide effluent concentration shall not exceed an average of 0.20 mg/l during the period of this variance.
2. At no time shall Petitioner's single month average be over 0.3 mg/l cyanide.
3. Petitioner shall utilize any methods it may find useful to keep its effluent at the lowest possible cyanide level.
4. Petitioner shall continue to diligently pursue its program of research and development in regards to cyanide reduction.
5. Petitioner shall submit to the Agency bi-monthly reports. Said reports shall include as a minimum:
  - A) Progress on all methods being pursued by Petitioner regarding cyanide reduction.
  - B) Future work anticipated on methods being pursued by Petitioner.
  - C) Any and all records of cyanide concentrations in Petitioner's effluent. At least one determination of cyanide shall be run per week.
  - D) What methods if any are being used to comply with (3) of this Order.
6. As soon as a technologically feasible program for cyanide reduction has been found, Petitioner shall commence on a compliance plan to implement this program. "

This Order was based on the fact that Union would continue in its research. At that time Union was considering the following methods to control cyanide:

- 1) Carbon adsorption
- 2) Chlorination
- 3) Incineration
- 4) Polysulfide injection
- 5) Precipitation
- 6) A compound produced by Nalco
- 7) Ozonation
- 8) Wet oxidation
- 9) Peroxide treatment

At hearing and in the Petition Union claims the most success with the ammonia polysulfide injection system with the recycle and ultimate incineration of the cyanide-contaminated water.

1) Recycle and Incineration:

Union is presently installing pipe work so as to segregate and recycle cyanide-contaminated water for the FCC and cokers (R. 54). The engineering is completed on this part of the plan and actual installation is proceeding (R. 55). The plan is to then take this water and recycle it so as to build up the concentration of contaminants. At certain times the recycle water will be "blown down" with steam so as to take part of the water and divert it to the coking unit, where the water will be used for quenching the hot coke (circa 2000°F.). It is hoped that the amount of water will be small enough for this to take care of the problem. If this method of control is successful, then there will be no cyanide discharge from the refinery. Work on this project should be completed by Spring of 1975. Union points out that if this method proves to be acceptable, it will not be generally applicable to the refinery industry as a whole (R. 60).

2) Ammonia Polysulfide Injection:

This method will hopefully convert the cyanide to thiocyanate (R. 40). Thiocyanate is used in medication for high blood pressure and is far less toxic than cyanide (Agency Rec. P. 14). At the present time Union has been working on achieving the proper dosage necessary to reduce the cyanide in its effluent.

Union feels that the injection system is probably doing the job, but at this time results are inconclusive. Problems with the system are centered around sulphur fouling other equipment in the refinery's waste treatment plant. To counter this, Union has been adding ammonia to the solution, but feels the ammonia standard might be in jeopardy. The results of this method are uncertain because of an interruption in testing when the FCC was taken out of use in the spring of 1974. When the unit came back on line the cyanide levels jumped. It is not known whether the reduction that occurred later was because of the polysulfide injection or from the FCC unit reaching an optimum operating mode, thereby reducing cyanide formation. Union anticipates

further work on this method, even if the recycle and incineration does solve the problem, as an anti-corrosive measure.

Hardship: Hardship alleged by Union in the event of denial centered around the need to close the facility in order to comply with the Regulations of the Board. It has been, and still is, the position of the Board that a failure to grant a variance is not a shut-down order. Amerock Corp. v. Environmental Protection Agency, PCB 74-3; Forty-Eight Insulations, Inc. v. Environmental Protection Agency, 73-478; Velsicol Chemical Corp. v. Environmental Protection Agency, PCB 73-543; E.I. du Pont de Nemours & Co. v. Environmental Protection Agency, PCB 73-533. The Board agrees with the Agency Recommendation, that though shut-down is not sufficient as a reason for granting a variance, coupled with the newness of the problem, the unavailability of control technology, and the good faith effort of Union, Petitioner has met its burden as to hardship.

Environmental Impact: In its Recommendation, the Agency concludes that the environmental impact in the canal is the same as it was described in the original Opinion in PCB 72-447.

"The Agency has calculated that the increase of cyanide in the Sanitary and Ship Canal would be from 0.0255 mg/l to 0.0257 mg/l. This is an increase of .0002 ppm. Petitioner's figures show that during the 7-day 20-year low flow of the canal the increase of cyanide would be 0.0015 ppm. It is alleged that although this amount of cyanide can be mathematically calculated it could not be analytically determined in a sample of canal water (R. 334). The opinion of Dr. Gingham was elicited (R. 335) as to the effect of such an increase on the canal. His response was that there would be none. The Agency in its recommendation also stated that it felt no significant harm to the canal would occur due to this increase in cyanide concentration."

Union alleges minimal impact on the stream. Therefore it appears that the increase of cyanide in the canal would be from 0.0255 mg/l to 0.0257 mg/l, for an increase of .0002 ppm. It is thought that this increase in cyanide would not cause any significant harm.

The major problems in this case center around the Agency's desire to make the conditions of a continued variance more restrictive than those of the present variance. Union asserts the present variance conditions are fair and that it can work with them, but not more restrictive measures. At issue are the effluent levels that Union would be required to meet during the variance period. Also at issue is the date to which the variance should run. The Agency recommends that Union's effluent not be allowed to exceed a monthly average of 0.1 mg/l, whereas the present variance allows Union to discharge a monthly average of 0.3 mg/l. The Agency also recommends that Union's cyanide discharge not be allowed to exceed 0.3 mg/l. The present variance does not allow Union to have an average effluent above 0.20 mg/l for the period of the variance. The Agency's reason for this more restrictive effluent standard is based on the decrease of Union's effluent to date, in that what the Agency is asking for is being achieved, except for a

two-month period when Union is restarting the FCC. The effluent results on monthly averages are as follows:

Month	Effluent to Canal
December 1973	.052
January 1974	.054
February 1974	.065
March 1974	.017
April 1974	.014
May 1974	.296
June 1974	.244
July 1974	.025
August 1974	.019

On its face, this is a persuasive argument. Union contends that a more restrictive standard will not allow it to experiment in its research program. Union states that it cannot guarantee a 0.3 mg/l effluent every day of the variance. Also Union is worried that with more crude oil from the Mid-East being used in the Union Oil system, they don't know how much cyanide will be produced by the FCC. There appears to be a positive correlation between nitrogen in the crude feed and cyanide formation in the FCC (R. 66). Union also feels that it is difficult for them to run a research program with a moving target.

The Board feels that because of Union's good faith effort in its research program, which seems to be nearing success, that Union should be given the benefit of the levels incorporated in the previous action. The Board has just set for hearing a proposed regulation change on the rule here in question. Therefore, since the cyanide standard will be under review during the next calendar year, the criteria shall remain the same, with the proviso that Union shall report to the Agency why it has excursions above the levels suggested by the Agency.

The Agency also suggests that the variance be granted only until October 6, 1975. It feels that this should give Union enough time to digest the operating results of both the recycle-incinerator program and the ammonia polysulfide injection system. The Board will grant Union variance for the full year or the date that compliance can be achieved, whichever is shorter.

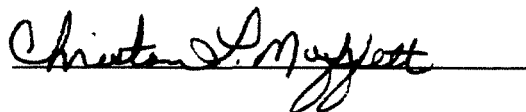
This Opinion constitutes the findings of fact and conclusions of law of the Board.

ORDER

IT IS THE ORDER of the Pollution Control Board that the Union Oil Company refinery, located two miles west of Lemont, Illinois, is granted variance from Rule 408 (a) (as it applies to cyanide) until the date when such effluent is in compliance with the applicable standard or December 6, 1975, whichever is sooner, subject to the following conditions:

- 1) Petitioner's cyanide effluent concentration shall not exceed an average of .20 mg/l during the period of the variance.
- 2) At no time shall Petitioner's single monthly average of cyanide exceed 0.3 mg/l.
- 3) Petitioner shall continue its efforts of developing a cyanide effluent control program to accomplish elimination of cyanide from the refinery effluent via waste water reuse or any other means of control so that the effluent conforms to the numerical limit for cyanide in Rule 408 (a) of Chapter 3.
- 4) Petitioner shall at all times keep its cyanide effluent level to the smallest possible amount.
- 5) Petitioner shall submit to the Agency bi-monthly reports. Said reports shall include as a minimum:
  - A) Progress on all methods being pursued by Petitioner regarding cyanide reductions and specifically the ammonia polysulfide injection system and the water-recycle-incinerator technique;
  - B) Progress on other work being done or anticipated or alternate methods to meet the cyanide standard;
  - C) Any and all records of cyanide concentrations in the Petitioner's effluent. At least four (4) determinants shall be run per week;
  - D) Reasons why effluent levels had higher than a 0.1 mg/l monthly average during the reporting period and why the effluent at any time exceeded 0.3 mg/l during the reporting period.
- 6) As soon as technically feasible program for reduction of effluent levels is found, Petitioner shall report this to the Agency.

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 5<sup>th</sup> day of December, 1974, by a vote of 5 to 0.

  
\_\_\_\_\_