

ILLINOIS POLLUTION CONTROL BOARD
November 2, 1989

ALLIED SIGNAL, INC.)
)
 Petitioner,)
)
 v.) PCB 88-172
) (Variance)
 ILLINOIS ENVIRONMENTAL)
 PROTECTION AGENCY,)
)
 Respondent.)

OPINION AND ORDER OF THE BOARD (by M. Nardulli):

This matter comes before the Board on a petition for variance filed October 21, 1988, as amended on December 19, 1988 and as amended again on February 21, 1989 by petitioner Allied-Signal, Inc. ("Allied"). Allied seeks a one-year variance from 35 Ill. Adm. Code 304.102 governing dilution of effluent in wastewater or, in the alternative, a one-year variance from 35 Ill. Adm. Code 304.124 governing the allowable concentration of arsenic in an effluent. On April 18, 1989, Allied filed its response to the Agency's Recommendation. A hearing was held on April 20, 1989 at which a member of the public attended and gave testimony. Jan Thomas of the Association of Concerned Environmentalist ("ACE") expressed ACE's objection to the variance and also raised objections as to the propriety of the hearing based on allegations of lack of notice. By order of the Board, ACE was allowed to submit written questions for Allied's witnesses who were present at the April 20, 1989 hearing. Allied submitted written responses to these questions. A second hearing was held on August 25, 1989 to accommodate members of the public's concerns. No members of the public attended this hearing. On August 21, 1989, the Agency filed an Amended Recommendation altering two of the conditions which the Agency recommended as part of the variance.

BACKGROUND

Allied owns and operates a facility in Metropolis, Illinois which is engaged in the production of uranium hexafluoride (UF₆) and other fluoride compounds. (Pet. at par. 1.) Allied is one of only two producers of UF₆ in the country. (Id. at par. 3.) UF₆ is an essential element of the nuclear fuel cycle which supplies nuclear power plants in the United States. (Id.) Allied employs approximately 365 persons and has a total annual payroll in excess of \$13 million.

UF₆ is produced from uranium ore concentrates which are received at the Metropolis plant from various suppliers. (Pet. Exh. A.) Allied uses a unique fluoride volatility process in its manufacture of UF₆. (Pet. at par. 4.) An important part of this process involves the reaction of a prepared uranium feed with fluorine gas. (Id.) The fluorine gas is produced at the facility by electrolyzing hydrofluoric acid (HF). (Id.) The HF used in this process is produced at a separate Allied facility from fluorspar, a naturally occurring mineral rich in calcium fluoride. (Id.) The naturally occurring element arsenic is present in fluorspar. (Id. at par. 5.) The arsenic remains as a contaminant of the HF when the fluorspar is processed and enters the Metropolis facility with the raw material HF. (Id.) Arsenic also enters the facility as a component of the uranium ore concentrates which customers deliver to the plant for processing. (Id.) The level of arsenic varies depending on the source of uranium ore. (Id.) Additionally, other raw materials and treating agents used by petitioner contain small amounts of arsenic. (Id.)

The electrolyzation of the anhydrous hydrofluoric acid takes place in closed vessels in the presence of an electrolyte or "melt." (Id. at par. 6.) Periodically, it is necessary to replace the spent melt. (Id.) Allied directs spent melt to its Environmental Protection Facility ("EPF"). (Id.) The treated effluent is discharged into the Ohio River under NPDES Permit No. IL0004421. (Id.) Allied's current NPDES permit contains no effluent limitation for arsenic, but requires Allied to monitor and report arsenic concentrations to the Agency monthly. (Id. at 8.)¹ Sampling for arsenic is performed at a point before mixing with Allied's other wastestreams occurs. (Id.) The results of this monitoring typically indicated arsenic concentrations in the range of 0.02 to 0.30 mg/l, a range acceptable under 35 Ill. Adm. Code 304.124(a). (Id. at par. 9.)

In the summer of 1988, after submitting its NPDES renewal application, Allied performed arsenic tests in its wastestream. (Id. at par. 9; Presubmitted testimony of Larry Bruce at par. 5 and J.E. Honey at par. 9.) These test results indicated arsenic concentrations significantly greater than the typical range previously found by Allied and those levels found by the Agency in its own compliance monitoring of Allied's wastewater discharge. (Id.) This discrepancy resulted from Allied's use of a more aggressive wastewater testing procedure than that used by Allied's previous independent labs testing and by the Agency. (Id.) Allied reported the results of this testing to the Agency and began a

¹Although Allied's permit was due to expire on July 1, 1988, the permit remains in effect because Allied made a timely application for renewal. (Ill. Rev. Stat. 1987, ch. 111 1/2, par. 1012(f).)

program of continued analysis and evaluation of arsenic in its wastestream. (Id.)

Additional investigations established the presence of an extremely rare and highly stable form of arsenic, $(AsF_6)^{-1}$, or hexafluoroarsenate. (Id. at par. 10; Bruce at par. 7; Honey at par. 10.)

On September 30, 1988, the Agency issued Allied an NPDES permit containing an effluent limitation for arsenic and requiring Allied to monitor arsenic at a point upstream from other controlled parameters. The levels of arsenic present in the form of hexafluoroarsenate in Allied's discharge result in violations of the new permit standard for arsenic. (Id. at par. 11.) Allied's NPDES permit became effective December 31, 1988. (Pet. attachment F.)

RELIEF REQUESTED

Allied seeks a one-year variance from 35 Ill. Adm. Code 304.102 which provides that dilution of the effluent from any wastewater source is not acceptable as a method of treatment of wastes in order to meet the arsenic standard set forth in 35 Ill. Adm. Code 304.124. "Rather, it shall be the obligation of any persons discharging contaminants of any kind in to the waters of the state to provide the best degree of treatment of wastewater consistent with technological feasibility, economic reasonableness and sound engineering judgment." (35 Ill. Adm. Code 304.102(a).) Section 304.102(b) further provides that "measurement of contaminant concentrations to determine compliance with the effluent standards shall be made at the point immediately following the final treatment process and before mixture with other waters, unless another point is designated by the Agency in an individual permit" (35 Ill. Adm. Code 304.102(b).) Allied requests that it be allowed to comply with the 0.25 mg/l arsenic effluent limitation by measuring the concentration of arsenic at the facility's final outfall (002), or by allowing Allied to monitor compliance by calculating the arsenic effluent concentration at the EPF which takes into account the mixing of Allied's EPF wastestream with other wastewaters before discharge into the Ohio River. (Pet. at par. 6.) Alternatively, Allied seeks a one-year variance from the 0.25 mg/l arsenic effluent limitation set forth in 35 Ill. Adm. Code 304.124 as measured at the EPF outfall, before mixing with other wastewaters, to allow Allied to meet a 4.5 mg/l limitation. (Id.)

COMPLIANCE PLAN

Allied maintains that information about the chemistry or treatability of the hexafluoroarsenate ion is virtually non-existent since few other manufacturing processes result in generation of this ion. (Pet. at par. 12; presubmitted testimony of Dr. William E. Rinehart at par. 3.) Dr. Howell R. Clark, a

chemist retained by Allied to assess, inter alia, whether hexafluoroarsenate could be removed by the application of current technology (without regard to economic feasibility) testified that very little hexafluoroarsenate was being removed from the wastewater at either EPF outfall. (Presubmitted testimony of Howell R. Clark at par. 6(D).) According to Clark, the only means of decomposing hexafluoroarsenate is to apply a combination of high heat and concentrated acid. (Id. at par. 7(A).) After discussing this theoretical treatment system, Clark testified that the compound resulting from such treatment ($\text{Ca}_3(\text{ASO}_4)_2$) would be far more toxic than the hexafluoroarsenate itself. (Id. at par. 9.)

Allied believes that there is no existing demonstrated technology for the practical treatment of hexafluoroarsenate. Therefore, Allied's compliance plan is, in essence, a plan to research and investigate methods of dealing effectively with the hexafluoroarsenate. Allied has instituted a two-phase study to address this contamination. (Pet. at par. 13.) Phase one consists of an arsenic material balance investigation to adequately confirm the source of the hexafluoroarsenate. (Id.) Phase two consists of a treatability study to assess the technical feasibility and economic reasonableness of treatment of the contaminant. (Id.) In an effort to minimize the arsenic concentration, Allied has identified a source of low arsenic hydrofluoric acid and is obtaining all of the hydrofluoric acid needed at the facility from this facility. (Id. at par. 14.)

The Agency recognizes that Allied has not submitted a concrete compliance plan but suggests that the unique circumstances of this cause warrant an exception from the compliance plan requirement (35 Ill. Adm. Code 104.121(f)). The Agency agrees that further study is needed. (Agency Rec. at par. 19.) In particular, the Agency seeks to determine the best degree of treatment for arsenic at Allied's facility. (Id.)

The Board has recognized that some factual circumstances prompt some flexibility regarding the compliance plan requirement. (Anderson Clayton Foods v. IEPA, PCB 84-147 (January 24, 1985).) The Board has granted a variance in the absence of a concrete compliance plan where more information regarding new technology needed to be gathered in order to recommend methods of compliance. (Id.) Similarly, the Board has found that research aimed at finding a means of compliance may justify a short-term variance (Mobil Oil Co. v. IEPA, PCB 84-37 (September 20, 1984).)

The Board concludes that, under the instant circumstances where a new permit condition has been imposed and where no demonstrated technology exists for achieving compliance, the granting a short-term variance is justified. Allied has submitted ample evidence of the unique nature of hexafluoroarsenate and the lack of available data and literature on means of removing the contaminant from wastewater. Moreover, the parties agree that it

is not reasonable to expect Allied to immediately comply with the arsenic effluent limitation.

HARDSHIP AND ENVIRONMENTAL IMPACT

Allied asserts that it will incur an arbitrary or unreasonable hardship if it is required to immediately comply with the arsenic effluent limitation (35 Ill. Adm. Code 304.124) at its EPF outfall because Allied would be required to substantially curtail or possibly cease its manufacturing activity at the Metropolis facility. (Pet. at par. 19.) Allied also notes that, if it ceases operations, the community of Metropolis and the nuclear energy industry would also suffer hardship. (Id.)

The Agency agrees that the facility's fluorine process would have to shut down in order to achieve immediate compliance with the arsenic effluent limitation. (Agency Rec. at par. 21.)² The Agency states that, in the absence of a presently known treatment technology to control the amount of arsenic discharged from the facility, there is no alternative to compliance other than shutting down the operation. (Id.) Therefore, the Agency agrees that immediate compliance would impose an arbitrary or unreasonable hardship on Allied. (Id.)

According to Allied, the concentration of arsenic in its discharge to the Ohio River from its 002 outfall would consistently fall below 0.25 mg/l as provided for in 35 Ill. Adm. Code 304.124. (Pet. at par. 9; presubmitted testimony of Larry Bruce at par. 22.) Because of the very high level of flow of the Ohio River at Metropolis, Allied asserts that allowing its discharge to continue at current levels for the period of the variance will not result in a violation of the Board's arsenic water quality standards (35 Ill. Adm. Code 302.2089).³ In support of its assertion that the requested variance would result in minimal adverse environmental impact, Allied introduced the testimony of Dr. William E. Rinehart, a toxicologist. Rinehart testified that hexafluoroarsenate does not exhibit the level of toxicity noted for other arsenic compounds because the former ion is so stable that it is not converted by the body to the more toxic oxygenated forms of arsenic. (Presubmitted testimony at par. 5.)⁴ Rinehart concluded that the presence of

²The Agency notes that Allied has appealed the NPDES permit conditions and that Section 16(b) of the Administrative Procedure Act stays the contested condition pending resolution of the appeal.

³Allied also notes that it would also be in compliance with the Board's proposed amendment to 302.208 (see R88-21).

⁴Dr. Howell R. Clark, a chemist-consultant, testified as to the unique stability of the hexafluoroarsenate ion. (Presubmitted testimony at par. 7(A).)

hexafluoroarsenate in Allied's effluent should not be equated with concerns over the presence of other arsenic ions and that the presence of hexafluoroarsenate in the concentrations indicated would not lead to an appreciable toxic hazard to the environment. (Id. at par. 10.)

The Agency states in its Recommendation that the high dilution ratio of Allied's discharge to the Ohio River, the short time period of the requested variance and the absence of any public water supply intakes until 40 miles downstream of Allied's Metropolis facility support the conclusion that the variance will not result in any significant adverse environmental impact. (Agency Rec. at par. 16.)

Based upon the foregoing, the Board finds that Allied has presented adequate proof that immediate compliance with the arsenic effluent limitation would impose an arbitrary and unreasonable hardship upon Allied and that granting the variance will not result in any significant adverse environmental impact.

COMPLIANCE WITH FEDERAL LAW

The Agency states that there are no federal arsenic effluent limitations governing Allied's discharge and that the requested variance may be granted consistent with federal law.

CONCLUSION

In view of the hardship demonstrated, as well as the minimal environmental impact expected during the term of the requested variance, the Board finds that adequate proof has been demonstrated that immediate compliance with the arsenic effluent limitation would impose an arbitrary or unreasonable hardship upon Allied. The Agency recommends that Allied be granted the requested alternate variance from the arsenic effluent limitation (35 Ill. Adm. Code 304.124) subject to certain conditions. The Agency does not recommend that Allied be granted a variance from the dilution rule (35 Ill. Adm. Code 304.102) because the information submitted by Allied does not establish that Allied's treatment works provides the "best degree of treatment" for meeting the arsenic effluent standard. (See, 35 Ill. Adm. Code 304.102(a).) Indeed, it appears that data concerning the unique hexafluoroarsenate ion is scarce. The Board agrees with the Agency and concludes that the variance will be granted from 35 Ill. Adm. Code 304.124 subject to the conditions recommended by the Agency, including those two conditions subsequently amended, as outlined in the Order below. We note that this variance is retroactive to June 22, 1989, the date which the Board would have had to render its decision if their had not been improper notice of hearing. Additionally, the Board has extended the length of the variance an additional 120 days with the requirement that Allied submit its engineering evaluation and

petition for extension of variance no later than 120 days prior to the expiration of this variance.

This Opinion constitutes the Board's findings of fact and conclusions of law in this matter.

ORDER

Allied Signal, Inc. is hereby granted a variance from the arsenic effluent limitation set forth at 35 Ill. Adm. Code 304.124 for its Metropolis facility subject to the following conditions:

1. This variance begins June 22, 1989 and expires February 17, 1991;
2. Allied shall conduct a comprehensive engineering evaluation of the treatability of arsenic from its facility including the effect of process changes, improved housekeeping, and waste component recovery and reuse with economic estimates for each option. This evaluation shall be due 120 days before the end of the variance granted herein;
3. Together with the engineering evaluation, Allied shall submit a petition to extend the variance which includes a complete compliance plan as required by Section 104.121(f);
4. Allied shall make interim quarterly progress reports to the Agency during the term of this variance;

These interim progress reports should be sent to:

Illinois Environmental Protection Agency
Compliance Assurance Section
Division of Water Pollution Control
ATTN: Ms. Barb Conner
2200 Churchill Road
Springfield, IL 62794-9276

5. Allied shall conduct the following two-phase bioassay test:
 - a. As a first phase, Allied shall perform a 96 hour acute static bioassay on minnows with samples that contain several concentration levels of potassium hexafluoroarsenate. The purpose of

this test should be to statistically determine the LC50 for the hexafluoroarsenate ion. If the LC50 of this ion is greater than or equal to 25 times higher than the LC50 for pentavalent arsenic oxide as shown in the literature, no further chronic or bioaccumulation testing should be required.

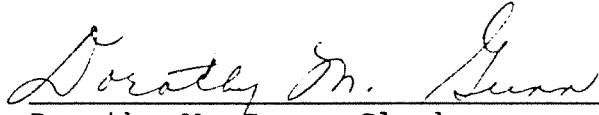
- b. If the LC50 of hexafluoroarsenate is less than 25 times higher than the LC50 of pentavalent arsenic oxide as determined under (a), above, petitioner shall perform a Phase II early life stage (28 days post-hatch) bioassay of the chronic toxicity and bioaccumulations potential of hexafluoroarsenate. The test should be performed as a single, combined test of both the chronic and bioaccumulative effects of a prepared effluent sample on minnows. The prepared effluent sample should be made up of concentrations of potassium hexafluoroarsenate and pentavalent arsenic oxide in a ratio that is consistent with the ratio of hexafluoroarsenate and conventional arsenic forms in the effluent from Allied's final outfall 002. These samples should include one at the arsenic levels found in the actual effluent from 002, and at 5 times that level, and one at 10 times that level.
6. During the variance period, Allied shall limit its discharge of arsenic as measured by the aggressive digestion protocol at its EPF outfall to 8.1 lbs/day monthly average and 16.2 lbs/day maximum daily average. The combined discharge shall not exceed 0.25 mg/l;
7. All other uncontested provisions of the NPDES permit shall be followed, including reporting of load and concentration units;
8. Allied must execute and send a certification of acceptance within 45 days of the date of this Order to the following address:

Illinois Environmental Protection Agency
ATTN: Pat Lindsay
Division of Water Pollution Control
Compliance Assurance Section
2200 Churchill Road
P.O. Box 19276
Springfield, IL 62794-9276

IT IS SO ORDERED.

Section 41 of the Illinois Environmental Protection Act provides for appeal of final orders of the Board within 35 days. (Ill. Rev. Stat. 1987, ch. 111 1/2, par. 1041.) The Rules of the Supreme Court of Illinois establish filing requirements.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board hereby certify that the above Opinion and Order was adopted on the 2nd day of November, 1989 by a vote of 6-0.



Dorothy M. Gunn, Clerk
Illinois Pollution Control Board