UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF ENFORCEMENT

MEMORANDUM

TO: Acting Chief, Industrial Permits Branch

FROM: Chemist, Industrial Permits Branch

SUBJECT: Asbestos Limits in NPDES Permits - Response to Memorandum of August 31, 1976 from Region III

Introduction

I have reviewed the subject memorandum from Stephen R. Wassersug, Director of Enforcement Division, Region III to Stanley W. Legro, Assistant Administrator for Enforcement. This memorandum requests our advice and concurrence on the issuance of NPDES permits for three asbestos products facilities within the greater Philadelphia area. Region III has been alerted to the results of the recent Office of Toxic Substances (OTS) study released in April 1976, which found measurable amounts of asbestos fibers in some samples of treated and untreated drinking water in Philadelphia. The issuance of NPDES permits for the three asbestos products facilities in question was delayed until Region III was able to conduct a more detailed study of these facilities. Their memorandum describes the results of the Region III study as well as their recommended approach to the issuance of NPDES permits for these facilities.

Issue

Region III recommends that the three permits require limitations and monitoring of total suspended solids (TSS) and pH; these are the only parameters contained in current EPA effluent guidelines for this industry. The parameter, "asbestos," is excluded from the effluent guideline limitations and Region III does not include limits for this parameter in

the three permits because Region III states that there is no legitimate rationale establishing a numerical limitation and industrial monitoring by use of electron diffraction in conjunction with electron microscopy would be too expensive, take too much time for analysis, and would provide variable results.

However, Region III is aware of the potential danger of these discharges and instead recommends that the three permits contain a schedule of compliance that would require closed-cycle, zero process discharge (i.e., BAT) conditions at each facility by July 1, 1981. The permits would be issued for five years. The Region asked for the Assistant Administrator's concurrence on their approach in this matter.

Discussion

Asbestos fibers in water have been indicated as causing gastro-intestinal (GI) cancer during the Reserve Mining proceeding. Asbestos has been designated as one of the 65 toxic chemicals in the recent NRDC-EPA settlement - Appendix A to Consent Agreement following NRDC v. Train, 8, ERC 2120 et. 2129 (U.S. District Court, D.C., June 8, 1976). A good discussion on the health aspects as well as on the removal of asbestos fibers from potable water is given in the publication by J. Lawrence et al. in Water Res. 9(4): 397 - 400 (April 1975).

Asbestos is a generic name that applies to a number of hydrated mineral silicates. These minerals have a fibrous structure, silky luster, are difficultly fusible, and generally, highly inert. Chrysatile, a fibrous form of serpentine, having the formula

$$H_4Mg_3Si_2O_9 \quad \text{or} \quad (OH)_6Mg_6SiO_4O_{11} \cdot H_2O$$

and which accounts for 95% of the world's asbestos consumption, is the most common form found in the aquatic environment. Chrysatile consists of parallel bundles of submicroscopic fibers which tend to separate on milling or abrading. Thereby, all sizes of fibers are found in the environment from the very finest to those visible with the naked eye. However, the majority of those found in surface water are less than five microns and about one-tenth micron in diameter.

The three facilities described in the Region III memorandum are:

(1) Nicolet Industries Incorporated
Ambler Asbestos Division
Ambler, Pennsylvania

(2) Nicolet Industries Incorporated
Norristown Asbestos Division
Norristown, Pennsylvania

(3) Certain-teed Products Corporation
Plant Number 58
Ambler, Pennsylvania

A description of the waste treatment practice for all of these plants is given in Attachment A of the Region III memorandum of August 31, 1976. Influent and effluent sampling data, although limited in quantity, was available for the Nicolet, Ambler, Pennsylvania facility (Plant 1), above, from OTS. I discussed this matter with Dr. R. Carton, OTS. The waste treatment for this plant involves settling, recycling of solids (asbestos) to process, secondary settling and finally filtration and pH adjustment. Generally, I would consider this good treatment for this kind of industry and the responsible Region III engineer, Mr. J. Davis, agrees.

According to my best information and as affirmed by Dr. C. H. Anderson, ORD, EPA's acknowledged expert on asbestos analysis, the only reasonably reliable method for analyzing for asbestos in water is by electron diffraction in conjunction with electron microscopy. This is a relatively sophisticated analytical process and its application in the determination of asbestos can cause the problems described in the Region III memorandum and as outlined above in the "Introduction." The OTS data for the Nicolet, Ambler, Pennsylvania plant contains total fiber counts as determined by electron diffraction-electron microscopy, asbestos fiber counts for fibers larger than five microns as determined by optical microscopy, and TSS as determined by Standard Methods for influent and effluent streams.

I have deduced the following correlation from the trend of these data:

(1) As the total asbestos fiber count/liter increases, the asbestos fiber count/liter of asbestos fibers larger than five microns increases as well. Apparently, all sizes of asbestos fibers are removed during waste treatment and smaller fibers exist in much higher concentrations.

(2) The TSS value appears to vary in the same direction as does the asbestos fiber count/liter.

(3) The net addition of asbestos fibers larger than five microns to the receiving stream by this facility is minimal, if not "zero" at this point in time.

Thus, the inclusion of the parameter, "asbestos fibers larger than five microns," in the NPDES permits for these facilities and the requirement that concentration of these larger fibers be "zero" for BPCTCA to be achieved by July 1, 1977, would assure reasonably good control of the total asbestos discharges of these facilities for the interim period prior to July 1, 1981. Once again, this is based on the premise that control of the discharge of larger asbestos fibers implies that the discharge of smaller fibers is under control, although the latter is always present in higher concentrations.

In my opinion, this approach affords us a better and more direct control of asbestos fiber content being discharged than TSS, which at best, is still a generic pollutant parameter and is likely to contain other contaminants than asbestos as well. From a monitoring standpoint, the determination of asbestos fibers larger than five microns can be made by means of ordinary, relatively inexpensive optical microscopes (about $1,000) in a routine manner.

In addition to my discussions of this approach with Mr. Davis of Region III, it has been discussed with Dr. Carton of OTS and with Dr. Anderson of ORD - Athens, Georgia. All have agreed that it is the best that we could do at this point in view of the problem at hand.

Recommendation

On the basis of my review of the August 31, 1976 memorandum from Region III, discussions with OTS (Dr. R. Carton), ORD (Dr. C. H. Anderson), and Region III (J. Davis) and on the basis of my review and analysis of data developed by ORD and data submitted by Region III, I recommend the inclusion in the three permits under review of an "asbestos" parameter with a limitation of zero discharge of asbestos fibers larger than five microns as determined by optical microscope for BPCTCA to be achieved by July 1, 1977.

Due to our present knowledge of potential health effects, removal of asbestos in these permits should be required. My proposal would solve the problems posed by Region III since it would establish a legitimate numerical limitation (zero fibers over five microns) and would not be costly for an industry to monitor (optical microscope analysis is fairly inexpensive).

The treatment rationale for achieving this limitation is described for one of the three facilities in Attachment A of Region III's August 31, 1976 memorandum. Monitoring data for this facility from the OTS survey, although somewhat limited, indicates that this facility may already be meeting this limitation, or else, is very close to it. My approach was discussed during the past month with the responsible Region III engineer on this project (Mr. J. Davis), who thought it to be worthwhile. To verify that my deduction of a correlation between small sized and large sized particles, I would recommend a requirement of electron diffraction-electron microscopy at least once a year.

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