ILLINOIS POLLUTION CONTROL BOARD

February 7, 1974

MINERVA OIL COMPANY, Petitioner, v. ENVIRONMENTAL PROTECTION AGENCY, Respondent.	)	PCB 73-284
OZARK MAHONING COMPANY, Petitioner, v. ENVIRONMENTAL PROTECTION AGENCY, Respondent.	)	PCB 73-294

Joseph F. Hale, Attorney on behalf of Petitioners
Thomas A. Cengel, Assistant Attorney General, for the EPA

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

Petitioners Minerva Oil Company and Ozark-Mahoning Company request variance from certain sections of the Illinois Water Pollution Regulations. These two companies are engaged in the mining and concentration of fluorspar (CaF_2) at their mines and mills located in Hardin and Pope Counties, Illinois. Together they produce about 80% of the total U. S. production of fluorspar. Discharges from their mines and mills contain concentrations of calcium fluoride and suspended solids which exceed the turbidity limitations of Rule 203(a) and 403 and the fluoride and suspended solids limitations of Rule 408 of the Regulations.

Rule 203(a) in part requires that all waters of the State shall be free from "unnatural sludge or bottom deposits, ...unnatural color or turbidity" except as provided elsewhere in the Regulations. Rule 403 provides that no effluent shall contain "...sludge solids" and that "color, odor and turbidity must be reduced to below obvious levels". Rule 408 limits Petitioners'

effluent to no more than 2.5 mg/l fluoride and 15.0 mg/l total suspended solids.

In addition to their request for variance from the above cited Rules, Petitioners also seek variance from Rule 921(a) insofar as that Rule requires ultimate compliance with the fluoride standards before permits can be issued.

Operations involved in the current petitions include Minerva's No. 1, Spivey and Gaskins Mines, the No. 1 and Crystal Mills and Ozark-Mahoning's Rosiclare Mill. The Gaskin Mine, located at the eastern edge of Pope County, discharges an effluent which varies in suspended solids content from 0 to 400 mg/l depending on the time of day samples are taken. This effluent discharges to a natural drainage ditch channel tributary to Big Grand Pierre Creek.

Analyses of recent Agency samples indicate that the Gaskins Mine discharge contains obvious levels of color and turbidity. EPA investigation also indicates that the Gaskins Mine discharge contributes to the growth of unnatural benthic flora and/or fauna in the receiving drainage course and in portions of Big Grand Pierre Creek. The surveillance also confirmed that the discharges exceed the 15 mg/l standard of Rule 408. A summary of Agency sampling activity was shown as follows:

AGENCY GRAB SAMPLES AT AND IN THE VICINITY OF THE GASKINS MINE

Date	Location	F- (mg/l)	TS/EC* (mg/l)	SS (mg/l)	Turbidity
Mar 27/73	Upstream BGP+	0.1	85	-	Clear
	Downstream BGP	0.8	110	-	Slight
	Downstream BGP	0.2	90	-	Slight
	Mine effluent	2.1	300	460	Evident
	Mine effluent	2.2	300	390	Evident
	Drainage course	2.2	290	320	Evident
Aug 9/73	Upstream BGP	0.4	170	-	Clear
	Downstream BGP	1.1	360	-	Evident
	Mine effluent	1.2	400	-	Evident
Sep 5/73	Upstream BGP	-	-	-	Clear
	Downstream BGP	-	-	-	Evident
	Mine effluent	4.9	420	190	Evident (95 JTU)

* Total solids via electro conductivity
\+ Big Grand Pierre Creek

Minerva proposes to meet the turbidity and suspended solids standards for the Gaskins Mine discharge by constructing a clarification or settling pond near the facility at a cost of about $10,000. The Gaskins Mine is located on land owned by the United States Forest Service and Petitioner states that it is presently negotiating with the Forest Service for use of adjacent and adjoining land owned by the Forest Service for construction of the pond. If approval from the Forest Service is obtained Petitioner claims that construction of the pond can be accomplished within 90 to 180 days after the issuance of a permit.

Most of the mine water discharge from Minerva's Mine No. 1 flows to the Mill No. 1 water supply reservoir for use as process water. Water discharged from the mill flows to a series of four settling ponds which ultimately discharge to Rock Creek, an intermittent stream tributary to Harris Creek and the Saline River. No information as to the concentrations of contaminants in this effluent was provided. Petitioner admitted that the mill tailings effluent does not presently meet the Standards.

Minerva proposes to bring the mill tailings effluent into compliance with the turbidity and total suspended solids limitations through the installation of alum and lime chemical feed equipment at a cost of approximately $8,000. Minerva has the flocculation equipment on hand and is ready to install this equipment at pond #2 and arrange with its electric power supplier to extend an electric distribution line to that pond. Minerva estimates that the length of time required to install and place the equipment in operation would be approximately 90 to 180 days after receipt of a permit.

The remainder of Minerva's mine water from Mine #1 does not flow to the mill water supply reservoir but directly into Running Bear Branch, a tributary of Rock Creek. Minerva alleges that the total suspended solids of this discharge is below the maximum standards and creates no turbidity problem.

At its Crystal Mill, Minerva operates a heavy media plant about three weeks per month and anticipates that it will operate a flotation mill about one or two weeks per month. Mill tailings from the heavy media plant and the flotation mill are separately discharged into a settling pond which overflows into a natural drainage channel tributary to a privately owned lake known as the Big Sink, which Petitioner leases. No information was available on the current discharge concentrations of total suspended solids for this mill.

Minerva proposes to meet the suspended solids requirements at its Crystal Mill by raising the dike of its present pond and installing flocculation equipment. These changes will cost about $5,000 and take about 90 to 180 days for completion once a permit is issued.

Operations at Minerva's Spivey Mine are just beginning. Minerva estimates that suspended solids in the mine effluent will be about 50 ppm. About 180 days will be required to construct a settling pond for the mine effluent so as to reduce suspended solids to an allowable level.

At the Ozark-Mahoning Rosiclare Mill the discharge waters, containing from 800 to 2800 mg/l of total suspended solids, are discharged to a settling pond and then go by pipeline to the Ohio River. Petitioner proposes to achieve compliance with the turbidity and suspended solids standards by constructing another settling pond adjacent to the existing pond and to introduce into the pond a flocculant to clarify the mine tailings before discharge to the Ohio River. Petitioner alleges that the mine tailings discharge consist primarily of limestone (calcium carbonate) and some fluorspar and sand. Petitioner alleges that all of the discharge materials are inert and non-toxic but create a problem of turbidity and exceed the standards as to total suspended solids at the point of discharge.

Petitioners have discussed their control programs with the EPA or have applied for EPA permits to allow construction of the proposed control facilities. The Agency contends that it is prevented from issuing construction and operation permits for the control facilities by the provisions of Rule 921(a). The Agency concedes that if permits could have been issued when they were applied for, compliance with the turbidity and suspended solids standards might have been achieved by this time.

The prime reason for a denial of the permits appears to be that Petitioners have not shown that compliance with the fluoride limitations can be achieved. Petitioners allege that there is no economically reasonable and technologically feasible method of fluoride abatement for use at Petitioners operations.

Petitioners further allege that 1) for all practical purposes, fluorspar is considered an inert, non-toxic mineral. It has a solubility of 17.5 mg/l in soft water which is equivalent to a fluoride concentration of 8 mg/l. 2) Discharges of fluoride in present concentrations have caused and will cause no significant adverse environmental impact. 3) Water containing the mine discharge effluent has been used for livestock watering purposes and there is normal aquatic life in the intermittent streams receiving Petitioners' mine water. 4) There are no recorded cases of fluorosis known to man or animals which might have resulted from drinking Petitioners' mine waters.

Petitioners have relied on bioassay testing conducted by the Colorado School of Mines Research Institute on tailings effluent from Ozark-Mahoning's Colorado fluorspar operation. This report

details that no ill effects were found on fingerling trout subjected to process water with a fluoride ion concentration of 32 ppm. In another report submitted by Dr. William F. Sigler, Department of Wildlife Science, Utah State University, in support of Petitioners' contentions, it is stated that calcium fluoride has a solubility of 17.5 ppm while sodium fluoride, with a solubility of 19,000 ppm, is over 1,000 times more soluble in water. This is equivalent to a solubility of 19 gm/l for sodium fluoride and 0.0175 gr/l for calcium fluoride. The Sigler report continued: "Fluoride ion has a high affinity for calcium and its presence in the water in significant amounts seems to reduce the effective concentration of calcium in the body of the fish. Fluorspar, however, dissociates to form so few fluoride ions that evidently only light symptoms of fluorosis are produced. Moreover, the calcium ion made available by the dissociation of calcium fluoride would seem to provide a replacement for any calcium extracted from the body of the fish". This is a very important statement when compared with the solubility information stated above. Simply stated, it means that when the sodium fluoride is dissolved in water a tremendous concentration of fluoride ions is made available to combine with the calcium in the body of the fish. However, when the less soluble calcium fluoride dissociates, one of the dissociation products is calcium and there is no reason to believe that the fluoride available from the dissociation would have any more affinity for the calcium in the body of the fish than for the calcium available from the dissociation process.

In the March 7, 1972 Opinion adopting the Effluent Criteria and Water Quality Standard Revisions, the Board provided a short discussion of reasons why certain levels of water contaminants were selected. On fluoride, the Opinion stated: "Fluoride can delay the hatching of fish eggs and has been reported by McKee and Wolf to kill trout at concentrations ranging from 2.3 to 7.2 mg/l. They recommended a standard of 1.5 mg/l. The figure of 1.4, here repeated from the May 12 draft, is in line with that recommendation and also should assure a potable supply".

The reference to a trout kill at concentrations ranging from 2.3 to 7.2 mg/l above was taken directly from a Table in McKee and Wolf at page 191. The Table specifically states that the form of fluoride used in the original research was sodium fluoride (NaF).

Petitioners have submitted proposed changes to the Water Pollution Regulations relative to fluoride concentrations. The matter has been docketed as R73-15 and hearings on the proposed changes will be held in the near future. While it would be premature to judge the outcome of those proceedings, we have noted

that the section of McKee and Wolf dealing specifically with calcium fluoride (CaF_2) states that the lethal dose required to kill the fish Tinca Vulgaris was reported by Simonin to be 30,000 mg/l which is far greater than the solubility of calcium fluoride in water.

The record presented in the matter at hand thus shows that while Petitioners have presented control schemes capable of alleviating the problems with turbidity and suspended solids, they cannot obtain a permit to implement these control schemes due to their present inability to meet the fluoride standards. Without such permit Petitioners allege that they are presented with the alternatives of (1) closing down their fluorspar mining and milling operations, or (2) operating subject to prosecution and the imposition of potentially heavy fines.

Petitioners say they are unable to propose installation of equipment to control the fluoride concentrations because of a lack of any alternatives. The companies state that they continue to perform research to acquire new technology and new control processes but do not know of any feasible control system at present. The EPA expressed the belief that Petitioners have made a good faith effort at complying with the Regulations.

We do not believe that Petitioners are now seeking a permanent variance from the fluoride standards, but rather a temporary variance until such time as the Board can decide if the Regulations should be amended. The Agency states that the absence of an ultimate compliance date should not prevent the granting of limited relief. The Agency recommends granting the limited varianc pending discovery of a feasible method of fluoride abatement or until a decision has been made on Petitioners' Proposal to Amend the Water Pollution Regulations.

Without prejudging in any way the Proposal to Amend the Regulations we believe Petitioner has satisfied the requirements for receiving a temporary variance. The granting of this variance in our opinion, will benefit the Illinois environment because the installation of the control facilities will bring compliance with the turbidity and suspended solids standards. The calcium fluoride emitted by Petitioners seems not as great an environmental problem as the sodium fluoride which was the basis for our Regulation, but the burden will still be upon Petitioners to prove their case in the public hearings on the Regulation (R73-15).

The Agency acted correctly in denying operating permits under the Rules applicable to these two companies, but our grant of variance from Rule 921(a) should now remove the obstacle to issuance of permits. Upon reapplication for permit we would expect EPA approval and an early installation of control equipment by the Petitioners.

ORDER

It is the Order of the Pollution Control Board that Minerva Oil Company and Ozark-Mahoning Company be granted a variance from Rules 203(a) and 403 (as those Rules pertain to turbidity), Rule 408 (as that Rule pertains to suspended solids and fluoride) and Rule 921(a) (as that Rule requires ultimate compliance with the fluoride standards before permits can be issued) of the Illinois Water Pollution Control Regulations until October 15, 1974. This variance is subject to the following conditions:

1. Petitioners shall apply for and obtain all necessary permits for the installation of their proposed control projects.

2. Petitioners shall submit monthly progress reports to the Environmental Protection Agency. Such progress reports shall commence on March 1, 1974 and shall provide details of Petitioners' progress towards completion of the proposed control projects and results of effluent water quality sampling at each facility described in Part 3 of these conditions.

3. This variance shall apply solely to operations at Minerva's #1, Spivey and Gaskins Mines, #1 and Crystal Mills and Ozark-Mahoning's Rosiclare Mill.

4. Petitioners shall diligently pursue all possible avenues of research towards the development of fluoride abatement equipment capable of achieving compliance with the fluoride standards.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion and Order was adopted this 7th day of February, 1974 by a vote of 5 to 0.

Christan L. Moffett