1186080 - R8 SDMS

COLORADO DEPARTMENT OF HEALTH

Richard D. Lamm
Governor

Thomas M. Vernon, M.D.
Executive Director

April 4, 1985

CERTIFIED MAIL NO: 396 718 652

RECEIVED
APR 05 1985
WQCD - FIELD SERVICES & MONITORING SECTION
DENVER

Mr. Arthur O'Hayre
Hydrology Advisor
Anaconda Minerals Company
555 Seventeenth St.
Denver, Colorado 80202

RE: Proposed Variance Decision
Anaconda Minerals Company
St. Louis Tunnel
CDPS NO: CO-0029793
Dolores County

Dear Mr. O'Hayre:

The Division has reached a tentative decision with regard to the variance request from Anaconda Minerals Company. Enclosed is a copy of the proposed variance rationale for your review and comment.

Your comments are needed within 10 days of the receipt of this letter. A final decision will then be made and the division will then proceed to amend the existing permit accordingly. The permit amendment will have to go through the public notice requirements under the Clean Water Act and the Colorado Water Quality Control Act.

If you have any questions, do not hesitate to contact Don Holmer at the Department of Health.

Sincerely,

Ronald G. Schuyler

Ronald G. Schuyler, P.E. Chief
Permits and Enforcement Section
WATER QUALITY CONTROL DIVISION

RGS/DH/lc

xc: Cary Unkelbach, Attorney General's Office
Bob Burm, Permits Section, Environmental Protection Agency
Fred Hinman, D.E., Field Services and Monitoring Section, WQCD
Karen Young, Permits and Enforcement Section, WQCD
Don Holmer, Permits and Enforcement Section, WQCD

Enclosure

PROPOSED VARIANCE RATIONALE

ANACONDA MINERALS COMPANY
ST. LOUIS TUNNEL

PERMIT NO. CO-0029793

In a letter dated October 19, 1984, from Arthur O'Hayre, Anaconda Minerals Company requested consideration of obtaining a variance from the existing Rico/St. Louis Tunnel permit limitations for total cadmium of 0.0086 and 0.017 lb/day. This request was received at the Division on October 22, 1984, accompanied by studies of treatability comparisons and water quality and aquatic life relevant to the Dolores River in the vicinity of the mine site (References 1 and 2). The Water Quality Control Division reviewed this information, and then sent a letter dated November 19, 1984 requesting additional information related to economic estimates and biological considerations. In a letter dated January 21, 1985, this additional material was addressed by Anaconda.

Based upon all the above information, the Division has determined that a temporary variance for the cadmium limits is appropriate. Maximum values for seasonal total recoverable cadmium concentrations have been calculated using the following mass balance equation.

$$\text{Seasonal Effluent Concentration} = \frac{(Q_{7-10} + Qdf)\ Cs - (Q_{7-10})\ Ca}{Qdf}$$

Where:

Q_{7-10} = the seasonal 7 day-10 year low flow values which have been reevaluated by the Division:

20.6 cfs - May through July
11.0 cfs - August through December
5.7 cfs - January through April

Qdf = design flow of the facility = 4.0 cfs (or 2.6 MGD)
Cs = tentative assumed stream standard revision for total recoverable cadmium = 0.002 mg/l
Ca = ambient upstream concentration of total recoverable cadmium, based upon data from existing permit rationale = 0.0006 mg/l

Thus, the seasonal effluent concentrations were determined from the mass balance equation as follows, with the May through July calculation shown as an example.

$$\frac{(20.6 + 4.0)\ (0.002) - (20.6)\ (0.0006)}{4.0} = 0.009 \text{ mg/l total recoverable cadmium}$$

Table 1 shows the seasonal concentrations for total recoverable cadmium.

TABLE 1

Total Recoverable Cadmium Seasonal Effluent Concentrations

Season	30-Day Average Conc., mg/l	Daily Maximum Conc., mg/l
May-July	0.009	0.018
Aug.-Dec.	0.006	0.012
Jan.-April	0.004	0.008

Table 2 gives the seasonal limitations for total recoverable cadmium in pounds per day, determined by: Conc., mg/l X 8.34 X 2.6 MGD

TABLE 2
Total Recoverable Cadmium Seasonal Effluent Limitations

Season	30-Day Average Limit, lb/day	Daily Maximum Limit, lb/day
May-July	0.20	0.39
Aug.-Dec.	0.13	0.26
Jan.-April	0.09	0.17

Thus, the above total recoverable cadmium limitations will be incorporated into the amended page 3 of the permit. These limits will be effective until the time when revised water quality standards for cadmium are adopted by the Water Quality Control Commission. After that time, when the new water quality standard(s) are in effect and when a revised ambient cadmium concentration has been determined, the Division will reevaluate to determine appropriate effluent limitations for total recoverable cadmium. Although the stream standards triennial review informational hearing for this stream segment is scheduled for May, a decision for the revised water quality standards might not be in effect until the end of 1985.

Since February 1984, Anaconda has operated a new treatment system at the Rico Mine site for achieving lower metal concentrations to attain better compliance in meeting effluent limitations for cadmium, copper, lead and zinc. Anaconda has stated that this new treatment system, which involves lime/polymer precipitation, should result in concentrations which can be in compliance with limits for copper, lead and zinc. Since February 1984, discharge monitoring report data have shown compliance with permit limitations for these three parameters.

Effluent discharge monitoring report data for total cadmium are included in Appendix A. This information indicates that most of the monthly average and maximum total cadmium loading values (in lb/day) have been in compliance with the proposed seasonal limitations listed in Table 2.

One month (June 1984) had a maximum daily cadmium loading value which exceeded the proposed seasonal daily limitation. It is possible that future violations might also occur, especially during the two seasons of May-July and January-April. Even if additional violations of the seasonal cadmium limits should occur, the Division has determined that the existing ambient water quality characteristics and uses of the Dolores River cannot be degraded, and that any further relief beyond these variance limitations and the stream standard revision is precluded. In the future event of permit limitation violations, enforcement actions would have to be considered. The Division has taken many factors into consideration to maximize permit limitations for cadmium and also protect the existing conditions in the Dolores River. These factors included the consideration of seasonal Q_{7-10} low flow values to reflect the time of spring runoff when previous higher effluent cadmium concentrations have occurred, the use of pound/day limitations to allow for greater flexibility in meeting permit limitations, and a proposed recommendation to consider a higher stream standard for cadmium to reflect updated water quality data.

This variance request has been approved by the Division based upon the following considerations.

Stream Standards Uncertainties: The existing stream standard for cadmium is 0.0004 mg/l, the "table" value at hardness/alkalinity in the 0-100 mg/l range. The data available at that time was from the WQCD and Anaconda and included a large number of "less than" values or zeroes. The mean plus standard deviation of that data resulted in a value below the table value of 0.0004 mg/l. Also, the small amount of alkalinity data indicated a range of 0-100 mg/l as appropriate.

The recent (1981-83) data supplied by Anaconda indicates that the original basis for a cadmium standard is suspect. Fifteen samples taken in 1981 above the discharge point showed a mean of 0.0006 mg/l and a standard deviation of 0.0012 mg/l after outliers were rejected. Other data in the segment below the discharge showed many exceedances of the 0.0004 mg/l standard. Also, the ambient alkalinity may be higher than earlier data indicated.

It is the Division's intention to present a general discussion of this new information at the triennial review of the standards in May of this year, and recommend that the Water Quality Control Commission reopen this segment for reevaluation of metals standards.

Mass Loading Percentage: The average mass loading of cadmium to the Dolores River from the source to the end of segment 3 (station D13) is about 0.3 kg/day (0.66 lb/day) from Table 3.10 in Anaconda's Summary Report. Of this amount, about 0.11 lb/day to 0.14 lb/day can be attributed historically to Anaconda's St. Louis ponds discharge. This level was prior to the operation of treatment facilities in February 1984. If this percentage (15-20%) of mass loading were reduced to current levels exiting the wastewater treatment facilities, about 0.59 lb/day of cadmium loading to the stream would result (a decrease of 0.07 lb/day or about 10%). Further reduction of the concentration to current permit levels would produce only an additional 0.08 lb/day reduction in cadmium loading to the segment. This additional reduction in loading would have a negligible impact on the instream level of cadmium over the annual hydrologic cycle. At low flows, there would be an effect on the instream concentrations directly below the effluent, but at this time the effect cannot be adequately assessed. Extrapolating average flow and quality conditions to a low flow occurance yields mass balance results at current treatment levels in a range which should be compatible with a recalculated standard of approximately 0.002 mg/l.

Aquatic Life Impacts: Anaconda has provided a large amount of benthic invertebrate data on the segment, but has not studied the impact of cadmium on aquatic life using bioassays. However, from the insect data and the general understanding of the loading from the St. Louis ponds in relation to total cadmium loading, it is not realistic to suggest that any correlation between enhanced insect populations or diversity and improved quality from Anaconda can be expected. Anaconda was unable to establish correlation between water quality and insect populations and concluded that external events such as streamflow and natural population cycles are probably responsible for year-to-year differences in populations. The Division therefore concludes that the very slight improvement which could occur to the segment from strict adherence to the existing permit limit probably would be unrecognizeable in the kinds and quantity of insect life. The fact that populations are greatest at station D05 directly below the discharge suggests that historic levels of effluent quality are supportive of aquatic life rather than detrimental. A continuance of the recent achievable levels of cadmium seems reasonable.

Economic Impacts: From the information supplied by Anaconda, it appears that an additional $100,000/year in treatment cost would be required to reach "state-of-the-art" levels with no assurance that standards would be met all the time. As noted above, very little if any benefit to the stream could be expected from this improved treatment due to loading from other non-point sources. Also, the insect populations have historically been richest directly below the discharge during a period when metals levels were elevated over levels achieved with the new treatment system. Therefore, although the additional treatment cost is not excessive in comparison to other installations, the near absence of any measurable benefits to the stream suggests that requiring added treatment may not be economically reasonable.

WQCC Subcommittee Activities: This request for a variance illustrates some of the reasons the Water Quality Control Commission has authorized the three basic standards submcommittees to investigate changes to the regulation. Analytical techniques (precision, reliability, replicability, detection levels, etc.) all are cited as reasons why it is doubtful that the 0.0004 mg/l cadmium standard can be met. There is no certainty that the subcommittee work will result in changes to the basic standards, but such change is certainly possible. The subcommittees are also investigating the possibility of additional classification for aquatic life and further interpretation of the level of protection concept. Granting of a variance will allow time to complete committee activities without causing economic harm to Anaconda in the interim. If the WQCC eventually adopts changes to the Basic Standards Regulation which dissallows the basis for a variance for Anaconda, the Division could reissue the permit with a compliance schedule to meet stricter limits.

Don Holmer
March 26, 1985

APPENDIX A

Effluent Total Cadmium Data
Anaconda Minerals Company
St. Louis Tunnel Discharge
Permit, CO-0029793

Season	Avg. Cd, lb/day	Max.Cd, lb/day	Avg. Cd, mg/l	Max. Cd, mg/l	Avg./Max. Flow MGD
A. May-July					
5-84	0.131	0.214	0.009	0.013	1.74/2.12
6-84	0.056	0.635	0.028	0.032	2.4/3.4
7-84	0.110	0.198	0.006	0.010	2.2/2.4
B. August-December					
8-84	0.016	0.040	0.001	0.0018	1.9/2.8
9-84	0.013	0.0125	0.0009	0.0010	1.7/2.0
10-84	0.0043	0.005	0.00035	0.0004	1.5/1.6
11-84	0.021	0.041	0.0019	0.0035	1.3/1.4
12-84	0.012	0.013	0.00115	0.0012	1.2/1.3
C. January-April					
2-84	0.048	0.072	0.005	0.008	1.14/1.28
3-84	0.030	0.049	0.003	0.005	1.20/1.28
4-84	0.052	0.063	0.0043	0.0050	1.44/1.73
1-85	0.0078	0.012	0.00085	0.0012	1.06
2-85	0.013	0.019	0.0016	0.0026	0.96

REFERENCES

1. Report on Laboratory Testing of Alternative Approaches for Treating St. Louis Mine Water, December 8, 1982. Prepared for Morrison-Knudsen Company, Inc., P.O. Box 7808, Boise, Idaho 83701. Prepared by Colorado School of Mines Research Institute, P.O. Box 112, Golden, Colorado 80402.

2. Summary of Water Quality Sampling and Modeling, Dolores River, 1980-1983, September 1984. Prepared for Anaconda Minerals Company, 555 Seventeenth Street, Denver, Colorado 80202. Prepared by Steffen Robertson and Kirsten, (Colorado) Inc., 7510 West Misssissippi Avenue, Suite 210, Lakewood, Colorado 80226 in association with Chadwick & Associates, 5767 South Rapp Street, Littleton, Colorado 80120.