CONCLUSIONS

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EXTENT AND SEVERITY OF POLLUTION

Alder Run is severely polluted by mine drainage almost entirely emanating from abandoned surface and deep bituminous coal mines. This pollution extends from its headwaters to its mouth and affects all of its tributaries except Hubler Run and a small unnamed tributary. With the two noted exceptions, the pollution is in the form of acid and acid salts which have depressed the pH consistently below 4.0. In addition, the streams contain acid in concentrations ranging from -10 mg/L to 2100 mg/L; iron concentrations ranging from 0.1 mg/L to 500 mg/L; and sulfates of 12 mg/L to 3800 mg/L.

Although the State Sanitary Water Board has not yet established specific water quality standards for Alder Run, the traditional minimum standards it has thus far set for similar streams are pH between 6 and 8.5; zero acid (alkalinity titration exceeding acidity titration); total iron not to exceed 1 .5 mg/L and sulfates not to exceed 250 mg/L.

With the exception of Hubler Run the streams of the watershed are not fish-ed, since their pollution levels are too high to support aquatic life except for a few species which typically thrive in streams composed largely of mine drainage. The streams have no present uses except stock watering and in one location for private bathing.

This area of the state is in need of more waters supporting a sport fishery. The rural nature of the watershed lends itself best to providing such form of recreation. There does not appear to be an immediate need of these waters for public water supply or industrial use.

The watershed is practically devoid of natural alkalinity sources such as limestone formations and other potentially alkaline deposits. This situation has resulted in surface and ground waters being too low in buffering capacity to counteract the effect of the acid forming constituents exposed by mining. Small amounts of acid on this watershed will quickly depress the pH below levels tolerable to most desirable aquatic organisms.

Since mine reclamation measures almost always involve some residual pollution, however small, the return of a stream to neutral or alkaline conditions is dependent upon the natural alkaline reserve inherent in the geologic strata of the watershed. Whether a sufficient amount of this natural alkalinity reserve is present in the Alder Run watershed to raise the quality of its waters high enough to support a game fishery is not certain. Analyses of Hubler Run, a tributary not affected by mining, are not encouraging on this point.

THE POLLUTION SOURCE INVENTORY

The four seasons study 'of the watershed revealed fifty-eight (58) sources of pollution or other adverse conditions which have some detrimental effect upon Alder

Run or its tributaries. Fifteen (15) of these pollution sources emanate from openings in deep mines and account for almost 70% of the average pollution load of the entire watershed. The magnitude of the deep mine pollution load is significantly increased by unrestored surface mines which funnel rain and ground water to the deep mines. Also, several surface streams flow into deep mine workings via fractures or old portals. The most serious of these diverts the entire flow in the Alder Run headwaters comprising a watershed area of 3.1 square miles. This diverted stream enters old mine workings and ultimately discharges several miles away on the Hawk Run watershed. This situation is now being corrected by Quick Start Project No. 1 .

The tributary with the greatest intensity of pollution is Browns Run which contributes an average of 9185 pounds of acid per day or 2.3 pounds per acre of watershed. Its acid contribution comprises 56% of the total load on the basin although the tributary area is only 26% of the total watershed area. In view of these facts, abatement measures should be immediately focused on the Browns Run sub-basin.

The majority of the pollution load entering Alder Run and its tributaries can be abated by construction of seals in deep mine openings. This abatement measure has a very good cost/abatement ratio on this watershed; approximately $30 per pound of acid abated. The average ratio for all projects on the watershed is $98 per pound. This fact has been given considerable weight in placing mine sealing projects high on the priority list of abatement projects.

EFFECT OF ALDER RUN ON WEST BRANCH SUSQUEHANNA RIVER

Alder Run contributes an average of 8% of the pollution load of the West Branch, and, due to its extensive disturbed area, contributes a much higher percentage during high runoff periods. This pollution load is of considerable importance to the eight mile stretch of river between Alder Run and Moshannon Creek because the water in this stretch of river is improving and is now supporting some fish life. Substantial reduction in Alder Run's acid contribution would improve the environment for fish habitat in these eight miles of river. Abatement measures to accomplish significant pollution reduction should be undertaken since additional waters for fishing are in great demand in this area of the State.

REMEDIAL MEASURES

Pollution abatement measures have been set forth in the report for each problem area on the watershed. The projects have been listed in order of priority based on a number of factors, but weighted heavily toward projects with low cost/abatement ratios. The cost for implementation of the total pollution abatement program is $1,612,000, including the $117,100 already authorized under the "Quick Start" No. 1 project.

Consideration was given to in-stream treatment in order to achieve desired water quality goals. Treatment with and without precipitate settling was investigated,

as well as possible advantages of locating treatment plants near the headwaters of Alder Run and its tributaries, compared to a plant below the confluence of Alder Run and Browns Run.

It is concluded that treatment is not justified at this time, but should be re-evaluated if reclamation measures fail to achieve desired water quality levels and the concomitant establishment of a sport fishery.

Significant reduction in the pollution load in Alder Run and its tributaries can be achieved by implementation of the remedial measures set forth in this report. Between 60% and 70% of the total acid load can be eliminated from the watershed by completion of the remedial measures contained in Priority Numbers one through four. This would cost $487,000 in addition to the funds already committed for the Quick Start No. 1 project presently under construction. As previously indicated, the overall cost of abatement might be significantly reduced if a coal company would resume operations which would re-affect previously mined areas which are now sources of pollution.

I n any event, the overall abatement costs on the watershed of $1,612,000 are within reason for all of the projects listed to be implemented in the order of priority established.