GENERAL DISCUSSION

General Discussion

The primary concentration of acid mine drainage pollution as shown in Tables 3 and 4 is found in the northern or downstream, half of the watershed. There are, however, considerable amounts of AMD pollution in all sections of this study area. To better understand where this pollution exists, this section of the report will describe the sub-watersheds individually with information as to their effect on the main stream, Stony Creek, starting from the headwaters in the south, just north of the town of Berlin.

There are a number of different approaches that could be taken in making our recommendations as to which area of the Stony Creek Watershed should receive first attention and which the second, and so on. Priority could first be given to the areas that are most heavily populated, such as Hooversville, where the quality of the water supply is greatly in need of improvement. There are other, smaller communities along Stony Creek that have this same problem. Those areas that are primarily used for recreation or areas that would have the most pollution abated regardless of cost could head the list. Another approach could be the number of stream miles cleaned up of the sub-watersheds recovered.

Using information from the monitoring stations on Stony Creek, it was found that the quality of the stream changes from alkaline to acid somewhere between stations SC7 and SC6. Since there are 4 sub-watersheds draining into Stony Creek between these two stations, three additional temporary monitoring stations were established to more accurately determine pollution effects on this segment of Stony Creek. Station SC6A was established between the tributaries draining sub-watersheds 6L (Lamberts Run) and 7L (Grove Run). Station SC6B was established between the tributaries of 7L (Grove Run) and 5R (unnamed). And station SC6C was located between the tributaries of

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5R (unnamed) and 6R (Buck Run). From the information gathered at these temporary stations, it was established that the quality of water significantly changes between stations SC6 and SC6A.

This indicates the AMD from Lamberts Run, draining sub-watershed 6L, is of such magnitude that Stony Creek no longer has the ability to recover via dilution by alkaline water. This also agrees with the rank of polluting tributaries in Table 4 that is found in the Watershed Study section of this report. Lamberts Run according to the "Pollution Index Number" carries the highest pollution load within the study area.

The following parameters were used in our consideration of what work is to be done in the Watershed area:

1. The effects of the pollution load on the main seam, Stony Creek, is given first priority; thus the highest priority is assigned to the stream or sub-watershed that overrides the natural alkalinity. From this point downstream, as polluted tributaries enter Stony Creek, they are given correspondingly decreasing priorities. For example, as mentioned above, the pollution load from Lamberts Run overrides the natural alkalinity of Stony Creek; therefore this sub-watershed would be given first priority. The next polluted tributary entering Stony Creek downstream from Lamberts Run is Wells Creek; hence this sub-watershed is given second priority. However, for the reasons mentioned in the general discussion of the Watershed Study section of this report on p. 34, the Wells Creek Sub-watershed will be the first area of work. Other than this one exception, this system of setting priorities will continue downstream until Stony Creek leaves the study area. The sub-watersheds that fall into this category are given priorities 1 through 7 inclusive in Table 7.

2. After attention is given to the streams or sub-

watersheds that presently deposit large amounts of AMD into the main stream, priorities are assigned to those areas that are of a potential danger in making Stony Creek a polluted stream or are an obvious detriment to local environs. It should also be mentioned that as the AMD is eliminated from these sub-watersheds, the additional alkalinity that will enter the main stream will help to maintain Stony Creek as a clean stream and could possibly be of great help in cleaning a portion of this stream outside of the study area. The sub-watersheds that fall into this category are given priorities 8 through 17 inclusive in Table 7.

3. As mentioned in the Watershed Study section of this report, the Fish Commission reports that stocking of game fish had taken place from the headwaters of Stony Creek downstream to the area of Beaverdam Creek, the next major tributary downstream from Wells Creek. However, this stocking was to be sharply reduced, if not entirely eliminated, due to the amount of AMD that was entering Stony Creek from Wells Creek and other smaller tributaries upstream.

When it was found that three of the mines in the Wells Creek watershed contributed 130% of the pollution load as measured at the mouth of Wells Creek, the Department of Environmental Resources made an early selection of these mines for site evaluation. This decision was made prior to the formation of Table 7, and is the reason Wells Creek is not included in the table.

General Discussion (contd.)

TABLE 7

RECOMMENDED LIST FOR REMEDIAL ACTION OF SUB-WATERSHEDS IN ORDER OF IMPORTANCE TO STONY CREEK

Rank	Sub-watershed	Stream Name
1	6L	Lamberts Run
2	5L	Three unnamed tributaries
3	4L	Oven Run
4	3L	Pokeytown Run
5	2L	Fallen Timber Run
6	1L	Dixie Run
7	1R	Three unnamed tributaries
8	10L	Rhoads Creek
9	13L	Reitz Creek
10	7R	Schrock Run
11	7L	Grove Run
12	11L	Glade Church Run
13	8R	Three unnamed tributaries
14	5R	One unnamed tributary
15	11R	One unnamed tributary
16	10R	Three unnamed tributaries
17	12L	Downey Run

The difference in rank between Table 7 above and Table 4 in the Watershed Study section is that Table 7 will be most beneficial to Stony Creek. A change in the quality of water and an increased potential for recreational utilization of the main stem can be realized as AMD in each sub-watershed is abated.

The proposed work recommended in the following sub-sections and the estimated costs, include deep mine sealing, surface restoration and surface water diversion. The feasibility of abatement for each mine will have to be weighed and may alter the priority of work due to the possible lack of mine maps and the fractured strata that lies above the coal seam. Other considerations such as

General Discussion (contd.)

extensive heads against a proposed seal, potential grout curtains required for complete sealing and the additional sealing of bore holes to affect the desired inundation. These problems may cause the cost per pound to increase significantly and adds to the uncertainty of priority and feasibility.

Neutralization or treatment plants have been considered as an alternative method; however, the initial cost accompanied by the continuing operating cost of treatment plants have proven them to be economically unfeasible.

In the sub-watershed sections of this report, in the table of Abandoned Deep Mines under the column title "Name of Mine or Operator" there are cases where instead of a name listed there appears a reference in parentheses to another deep mine complex. This indicates there is a possible inter-connection between the two mines. If these mines are listed in the table titled "Recommended Abatement Procedures - Cost Benefication" it may be necessary that construction work planned for one must include the second mine. In this same table, the columns listed as potential sources include openings that are shown on various mine maps, however, have not been located in the field due to stripping operations or various other reasons. The openings included in this column could also be part of another mine complex that must be worked with that particular mine.

In the table titled "Benefication - Recommended Plans", Plan "A" always lists the total inventoried sources of pollution within the sub-watershed with a 60% reduction. There are cases where the plans recommended in this table, show more than 100% reduction. This is primarily due to two reasons: first, the economy of removal; and second, the benefits of additional alkalinity being introduced into Stony Creek at this point.

The cost estimates, as described in Table 8 are based on reported costs for similar work done throughout the Commonwealth.

TABLE 8

CONSTRUCTION COSTS

Hydraulic Seals - The cost for each seal, recommended in this report, is estimated at $20,000 if mine map is on hand. However, if a mine map is not presently available, the seal cost is estimated to be $25,000. This cost includes a normal 100 feet of grout curtain, 50 feet on either side of the portal opening.

Grout Curtains - There are many factors that determine the cost of these curtains such as depth, material used, and length of curtain. The cost, where recommended in this report, is estimated to be $140 per linear foot.

Surface Seals - The costs for surface seals recommended in this report are as follows:

Bore holes	- $ 8,000
Small diameter air shafts	- $ 8,000
Large air shafts	- $12,000

Strip Mine Reclamation - The following is a list of these procedures with cost estimates:

1. Regrading (both terracing and selected grading to provide for channelization):
   a. Totally unreclaimed strip mine (no attempt previously made to reclaim the area): $1,800 per acre.
   b. Spoil pile sloping towards the highwall (partially regraded; however, the spoil pile is sloping towards the highwall allowing ponding and infiltration at the base of the highwall): $600 per acre.
2. Revegetation for grass and tree cover: $600 per acre.
3. Clearing and grubbing for terrace areas: $100 per acre.
4. Stream channelization:
   a. Unlined: $5 per linear foot.
   b. Clay lined: $15 per linear foot.

5. Diversion ditches: $1 per linear foot.
6. Backfill subsidence holes, moderate size: $250 each.
7. Clay surface seals where the strip mine has broken into a deep mine: $1,000 each.

For this report, where recommendations are made to reclaim a strip mine, an estimated cost of $2,000 per acre has been used.