SL-145-1 REPORT ABSTRACT

GENERAL INFORMATION

Location and Geographics (p. 2)

The Babb Creek Watershed is located in North Central Pennsylvania, occupying the southern portion of Tioga County and a small portion of northern Lycoming County. The area within the watershed is approximately 129 square miles, 65% of which is forested. The remaining 35% is agriculture and rural residential. The primary traffic arteries are Pa. T.R. 287 and U.S. Rt. 15.

Topography and Drainage (pp. 3-4)

The study area is in the upland plateau section of the Appalachian Physiographic Province. Elevation extremes are from a low of 860 feet above sea level at the confluence of Babb Creek and Pine Creek to more than 2200 feet along the sandstone ridges. Drainage forms a dendrite pattern commonly associated with plateau regions. Drainage into Babb Creek is received from three major tributaries--Lick Creek, Wilson Creek and Stony Fork Creek.

Geology and Mining (pp. 5-12)

Coal bearing strata in the project area are referable primarily to the Allegheny Group of Pennsylvania age. The coals are found in the Blossburg Syncline which traverses the study area northeastward from Pine Creek to Arnot.

Six coals are present, four of which were mined. The major coal horizon is the Bloss vein which is tentatively correlated with Lower Kittanning of standard Pennsylvania Bituminous Coals.

History of Deep Mining Activities (pp. 13-15)

Coal was discovered at Blossburg in 1792, with the first drift opening"

around 1815. The first mines in the Babb Creek Watershed were probably opened in Arnot around 1865.

At the turn of the century production from mines in Tioga County had begun to decline. There is evidence that 50% of the estimated 8,000 acres of workable coal were mined.

WATERSHED INVESTIGATION

Method of Investigation (pp. 16-19)

The Babb Creek Watershed Mine Drainage Project was conducted in three (3) phases.

Phase I - Watershed Reconnaissance Survey

Data Collection: The watershed boundary was outlined and all pertinent maps and literature were collected and reviewed.

Field Reconnaissance: Grab samples from all streams, tributaries and suspected sources of mine drainage were collected and chemically analyzed. A thorough field examination of deep mine and surface mine areas was conducted to define sources of acid mine drainage within the complex. Results of reconnaissance water sampling is given in Appendix B.

Phase II - Watershed Investigation

After review of the reconnaissance data, water sampling stations were established. A total of 27 weirs were constructed at source points of deep mine and surface mine drainage. Twenty-five (25) cross-sectional flow measuring sites were selected on affected streams and at several locations where unaffected water was to be monitored. The complete monthly flow data, water analysis and loading for each station is listed in Appendix C.

Phase III - Office Engineering

Preparation of Maps: Maps were prepared showing the extent of deep mines,

surface mines, coal outcrops, and structures. Two maps illustrating the location and extent of deep mines and the geology and structure of coals were also prepared.

Maps of some complexes are inadequate to accurately determine the extent of mining activity. Run-off per acre constants are used to establish estimates of deep mined area.

Preparation of Abatement Plans: After receiving all available information, abatement methods and alternatives were developed. Amount of stream improvement and cost effectiveness ratio were used to establish priorities.

RESULTS OF THE INVESTIGATION (pp. 20-31)

Results

It was found that approximately 23 miles of stream are affected by acid mine drainage. The average pH in these streams is less than 5.0 with concentrations of net acidity of 14 mg/L or greater during low flows. Of these affected streams, 6.5 miles carry a net acidity of 39 mg/L or greater and have a pH of 3.8 or less.

Twenty-seven (27) points of drainage referable to coal mining have been located and identified throughout the watershed. The majority of acid mine drainage is discharged from 12 abandoned underground mines at 22 mine openings which are located within 6 separate areas of mining activity or "mining complexes". Collectively they contribute 11,191 pounds of acid per day to Babb Creek and its tributaries. Table A (p.21) lists the percentages of contribution of acid mine drainage from the six mining complexes.

Drainage from the Arnot No. 1 Mine is generally alkaline at both points of discharge and it has been designated a non-polluting source of mine drainage.

See description of Arnot No. 1 Mine (p. 43) and water analysis (p. 45 and p. 124).

Because most strip mines were in coal horizons above abandoned underground mines, the downward percolation of water through the disturbed material and into

the mines is affecting the quality of water flowing from the mines. Run-off from unreclaimed or partially reclaimed surface mined areas and mine waste material was sampled and measured at three locations on a regular monthly basis. Other samples were taken periodically during periods of heavy rainfall; however, this data does not register the true impact of these areas on stream water quality.

Description of 12-Month Sampling Stations (pp. 23-25)

The 12-month sampling stations have been divided into the following categories: (1) Sources sites, (2) Affected streams, and (3) Control stations. A table listing each site, its elevation, description, and net average acidity is given. A complete location description is given in Appendix A. Estimates of Deep Mined Area (pp. 27-29)

Maps of some complexes are inadequate to accurately determine the extent of mining activity. Run-off per acre constants are used to establish estimates of deep mined area.

Miles of Possible Stream Improvement (pp.30-31)

"Miles of Possible Stream Improvement" represents the miles of Babb Creek and its tributaries affected by each mining complex within a representative sub-watershed. Babb Creek at Morris has been designated the cut-off point for stream improvement in the "C" sub-watershed because of the high acid loads from Wilson Creek.

Priorities for Abatement Proposals (p. 33)

Abatement priorities are listed on a mine complex basis. Factors that were used in assigning priorities include: miles of stream that could be improved, amount of A.M.D. abated, cost, cost effectiveness (A.M.D. abated per dollar), surface ownership, future mining potential as well as aesthetics and public visibility. Emphasis has been placed on "miles of stream that could be improved" because the major land and water use in the Babb Creek Watershed is outdoor recreation.

Abatement (pp. 33-40)

Abatement plans for the six mining complexes place emphasis on known procedures which prevent uncontaminated ground water from coming in contact with acid forming materials in abandoned deep mines. Where the cost effectiveness of such procedures appear prohibitive, other alternatives have been considered. One or more of the following abatement procedures are included in abatement plans for each mining complex:

Inundation

1. Hydraulic Double Bulkhead Seals
2. Sealing Trenches
3. Clay Pack Seals

Daylighting

A.M.D. Neutralization

Stream Neutralization

Abatement Plans for Specific Complexes (pp. 42-83)

The individual abatement plans for each complex are presented in order of their priorities. Description of the abatement plan for each complex follows the same general format:

1. Brief general description of complex with mining history, coal geology and summary of water analysis.

2. Abatement: Specific proposals with estimated costs. 3. Cost effectiveness for each proposal.

Stream Improvement Plan - Limestone Neutralization of Lick Creek and Upper Babb Creek (pp. 84-91)

A plan to use crushed limestone to effect stream benefication is discussed as a means of renovating Lick Creek and Upper Babb Creek.

Approximately 6750 tons of limestone, installed in gabions or channel linings at accessible locations in the creek bed and tributaries, could result in sufficient water quality improvement to restore to public use nearly 10 miles of polluted stream, particularly during periods of average and low flow.

A list of the estimated cost for the collection and treatment of acid mine drainage from the combined mine discharges in each mining complex is given. Capital costs and yearly operation and maintenance costs are listed.