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DEPARTMENT OF ENVIRONMENTAL RESOURCES

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OPERATION SCARLI FT

BENNETT BRANCH OF SINNEMAHONING CREEK
MINE DRAINAGE ABATEMENT MEASURES
CLEARFIELD, ELK AND CAMERON COUNTIES

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DEPARTMENT OF ENVIRONMENTAL RESOURCES
REVIEW NOTICE

This report, prepared by outside consultants, has been reviewed by the Department of Environmental Resources and approved for publication. The contents indicate the conditions that are existing as determined by the consultant, and the consultant's recommendations for correction of the problems. The foregoing does not signify that the contents necessarily reflect the policies, views or approval of the Department.

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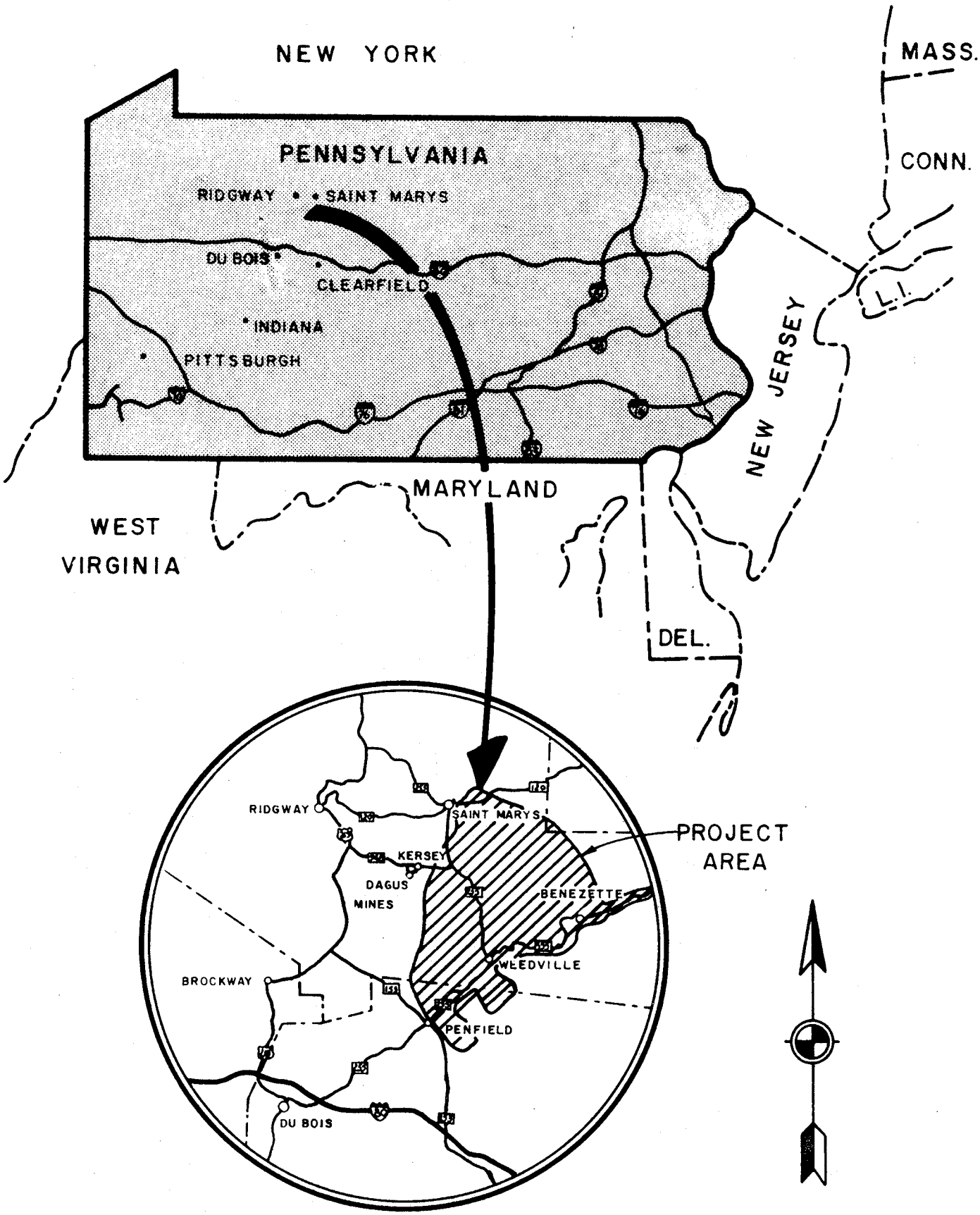

LOCATION MAP

PLATE No. 1

GENERAL SUMMARY OF REPORT

ABSTRACT

This report presents the results of an engineering study which was performed to:

1. Determine sources and amounts of acid mine drainage pollution.
2. Analyze the results of the pollution survey.
3. Formulate recommendations for the abatement of acid mine drainage along 34.5 miles of the Bennett Branch of Sinnemahoning Creek Watershed, located in Clearfield, Elk and Cameron Counties.

The area of study consisted of approximately 106 square miles. In general this area included the acidic tributary streams between St. Mary's, Penfield, and Mt. Pleasant Church Run, and includes the main stem of Bennett Branch from Penfield downstream to the Driftwood Branch of Sinnemahoning Creek (See Plates No.2 and No.3).

The main purposes in undertaking an acid mine drainage study in this area were a definite concern for this heavily polluted headwaters area. Improvement of the water quality in this headwaters region will also have a beneficial effect on Sinnemahoning Creek and the West Branch of the Susquehanna River.

BRIEF RESULTS OF POLLUTION SURVEY

On Bennett Branch at Driftwood (Sampling Station BB233) a maximum acid load of over 163,000 lbs/day was recorded and the maximum iron load was 8,000 lbs/day. The average acid load at this same point was 68,000 lbs/day and the average iron load was 700 lbs/day. The pH range was 3.6 to 4.4. The acidity range was 14 to 30 ppm, the total iron range was a trace to 1.4 ppm, and the sulfates ranged from 50 ppm to 223 ppm.

Two areas of most concern (discounting the Dents Run watershed, which was studied by Conable, Sampson, Van Kuren, Huffcut and Gertis) were in the areas surrounding the Villages of Hollywood and Caledonia. About Hollywood are approximately 5,400 acres (8.5 square miles) of abandoned and discharging deep mines in the Lower Kittanning coal vein. The acid loading in Bennett Branch at Hollywood was an average 60,000 lbs/day (Sampling Station BB-48). The main stem appears to recover somewhat from this impact with 26,000 lbs/day (BB95) recorded near Weedville. An apparent reason for the acid reduction except for the

possibility of remotely isolated areas of Vanport limestone near the village of Scattertown (Force). At Caledonia, where 2,500 acres (4 square miles) of abandoned mines discharge into the stream, Bennett Branch again measures over 44,000 lbs/day of acid (BB113).

ABANDONED MINES

It became apparent early in the study that abandoned deep mines were the most serious problem in the study area. The area has been exhaustively deep mined since the 1850's. Except for one area near Penfield most of the coal mineable by deep mining methods has been taken and the mines abandoned. The total area of these mines is 10,500 acres or more than 16 square miles. Eleven of the major abandoned deep mines (9,358 Acres) collectively have an estimated potential capacity of 6,927,000,000 gallons of water. These abandoned mine discharges were estimated collectively to produce three percent of the flow and 48 percent of Bennett Branch's acid loading downstream from the Village of Benezette (Sampling Station BB-36).

Deep Mine	Acreage	Average Recorded		
		Flow (gpm)	Acid (lbs/day)	Total Iron (lbs/day)
Proctor No.2 (D206)	1,435	1,024	8,793	2,651
Shawmut No.31 (D214)	1,290	1,204	7,011	994
Proctor No.1 (D208)	1,074	1,218	3,332	415
Tyler Mines (D211)	2,159	1,374	2,463	62
Proctor No.3/Owens No.3 (D215/D216)	438	219	1,958	320
Tyler No.14 (D210)	366	156	1,891	539
Shawmut No.41-No.42 (D209)	1,241	1,181	1,473	39
Penfield Coal & Coke No.2 (D212)	344	156	626	37
Five Points Mine (D207)	148	104	318	26
Gobblers Knob No.1/Penfield Coal & Coke No.1 (D201/D202)	450	99	356	31
Proctor No.4 (D213)	413	181	209	8
TOTAL	9,358	6,916	28,430	5,122

COAL MINE REFUSE

Coal mine refuse accounts for the second worst source of AMD in the study area. Coal refuse covers some 150 acres. D. M. Good presented a paper at the Third Symposium on Coal Mine Drainage (1970) which found that on certain banks, the acid loading could be as high as 185 lbs/ acre-day. Based upon a soil sample analysis used to determine the degree of acidity, an average loading for refuse banks in the project area was 9 lbs/acre-day. Thus, the total acid contribution from refuse is 1,350 lbs/day.

STRIP MINES

Of the total study area some 1,415 acres (two percent) has been disturbed by strip mining. The vast bulk of this strip mining occurred after the Second World War and extending to the present. At the time of this report there are eighteen active stripping operations in the study area. Coal reserves within the area which are capable of being strip mined are being rapidly depleted.

ACTIVE MINES

Within the study area there is one active deep mine, the Stott No.1 Mine, which is operated by Lady Jane Collieries in the Moose Run watershed. During 1973 the mine produced 260,000 tons of coal from the Lower Kittanning Vein and employed 75 men.

AMD from the mine is currently treated with hydrated lime in a flash mixer and is then transported by open flumes to a series of four settling basins having a total capacity of 17,000,000 gallons. Water is retained for a minimum of 12 days prior to entering Moose Run.

TYPES OF ABATEMENT MEASURES

In recommending abatement measures it is necessary to study the particular site in question since no one measure will apply to every situation. Some of the different types of remedial measures recommended as part of the various project are as follows:

1. Interceptor ditches above the stripping areas.

2. Flumes across heavily strip mined areas to collect drainage from the interceptor ditches and discharge it to the stream.

3. Stream and ditch restoration. Drainage presently lost to strip mines usually ends up as MID emanating from a deep mine overflow.

4. Impervious lining on stream channels to prevent water loss to either acid bearing refuse material, or to deep mine workings which presently have acid discharges.

5. Partial regrading of strip mines and overflowing ponds by reversing the terraces in order to prevent storm runoff from ponding adjacent to the highwall and to provide for positive and rapid drainage control to the area streams.

6. Bury scattered refuse material in designated strip pits. An alternate procedure would be to reduce the refuse bank side slopes by spreading out the material, covering with soil and planting in place.

7. Hydraulic mine seals used to flood the deep mine workings and eliminate or minimize direct air contact with the exposed carbonaceous shale preventing the formation of acid salts.

8. Treatment. In the case of concentrated areas of deep mine overflows and other sources for which there appears no feasible and/or economic abatement measure, treatment is necessary to comply with the Clean Streams Law, as amended.