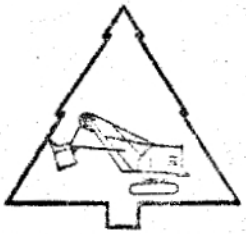
MEAD RUN

MINE DRAINAGE POLLUTION

ABATEMENT PROJECT

OPERATION SCARLIFT



COMMONWEALTH OF PENNSYLVANIA

MILTON J. SHAPP, GOVERNOR

DEPT. OF ENVIRONMENTAL RESOURCES

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METHODS OF STUDY

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The study was planned and executed in phases.

COLLECT AND REVIEW ALL DATA

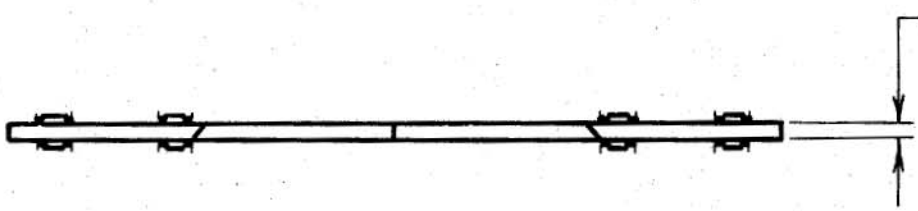
All available existing information was gathered and examined in detail. Data collection include existing mine mapping, surface maps, mining records, stream data, soil information, coal structure contours, geology, ground water data, available planning information, tax maps, and important historical data.

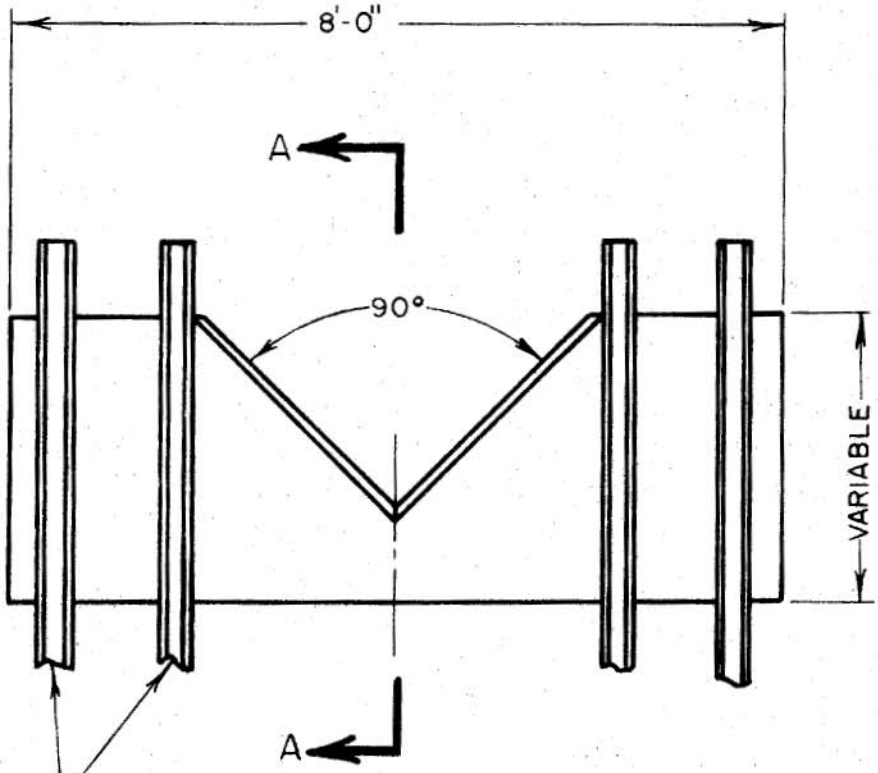
Liaison and data gathering include agencies such as: Pennsylvania Department of Environmental Resources, The Coal Industry, U. S. Department of Agriculture, Pennsylvania Geological Survey, local Sportsmans' Groups, local Watershed Association, local citizens, and any other agency that may have pertinent information.

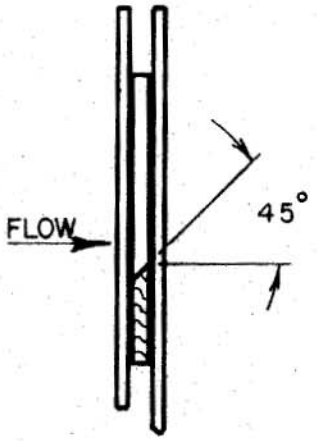
RECONNAISSANCE

An initial field reconnaissance has been made along Mead Run, sampling all discharges and tributaries. The field reconnaissance established exact locations of flow measuring and water sampling stations. The stations were marked and permission to enter the property for sampling and/or to construct weirs was obtained where feasible.

The specific locations for weirs and/or stream cross sections were selected to assure the most uniform channel (stream) configuration. Weir widths and types were selected, and the most expeditious sampling and measuring route developed. The specific scope of the sampling and measuring program was



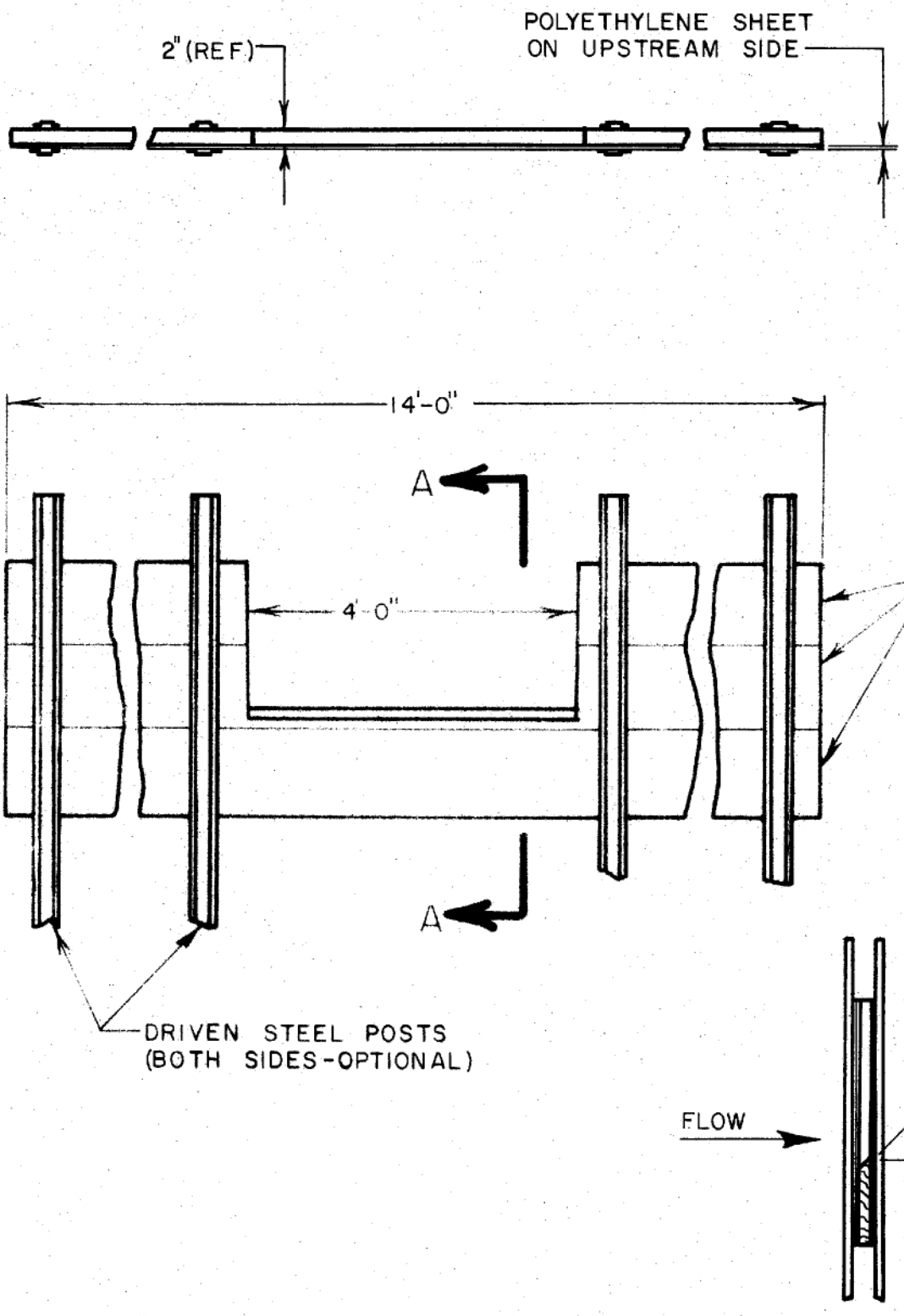




SECTION A-A

TYPICAL V-NOTCH WEIR

JAN 15, 1974
SCALE: 1/2" = 1'



TYPICAL RECTANGULAR WEIR

JAN 15, 1974
SCALE: 1/2" = 1'

established, with the control stations and access routes plotted on watershed maps.

The initial reconnaissance was completed and has revealed many unusual aspects of the watershed which had to be considered for proper direction of the sampling program. Samples were taken and flows estimated at the time of the initial reconnaissance to help guide the study efforts in delineating the major problem areas.

CONTROL SAMPLING

A watershed sampling and measuring study was, performed which included the construction of 14 weirs where stream flows were of a size to accommodate economical weir construction. At other locations where weir construction was not feasible, cross sections of the stream were taken, water areas measured, velocities obtained by the "floating chip" method and the flows computed. Any cross sections required were taken at one foot horizontal intervals, plotted on cross section paper and used throughout the course of the study.

Water samples were collected at each station and flow measurements taken on a regular basis. Sampling and measuring were done bi-weekly, with some rounds omitted during periods of extremely high water or hard freeze and additional rounds added to compensate whenever possible.

The ultimate goal of this study does not warrant the sophistication usually associated with an academic study. The purpose of this study is to provide sufficiently accurate data to develop conclusions and recommendations for abatement of acid mine drainage and restoration of aquatic life to a desired level.

Water samples were analyzed for pH, acidity, alkalinity, ferrous iron, total iron, sulphates, aluminum, magnesium, manganese. Calcium and sodium were later added to determine their impact at all sampling locations.

All pH values presented in the sample data were measured according to Method 221 of the Standard Methods for the Examination of Water and Wastewater. Acidity and alkalinity were determined by Method 201 at boiling temperatures. Ferrous Iron was determined by Method. 124A, Part 4C and sulfates were measured in strict accordance with Method 156C. Magnesium, manganese, aluminum, total iron, calcium and sodium were determined by atomic absorption.

The results of the chemical analysis were converted to loadings in pounds per day at each sampling station by multiplying the chemical analysis results (ppm) by the computed flows, using the appropriate mathematical conversion factors.

Throughout the sampling and flow measurement study, the analyses and loadings were examined to locate areas where deviations occur in the quantities of acid produced. Possible "sluggers" were delineated by selective sampling when suitable hydrological conditions prevail.

Employees of the Ebensburg District Office, Department of Environmental Resources, with the cooperation of interested local citizens, constructed all weirs. Field explorations and sampling and measuring were accomplished by the Ebensburg District Office.

DETAILED FIELD EXPLORATIONS

Detailed field explorations were conducted to gather hydrologic and geologic information, to verify previously collected information, and to catalog pollution sources.

The field explorations included walking of the stream to account for all sources of water. These explorations also entailed the walking of all known mined lands, both underground and strip, to determine their affect on the watershed and to locate possible drifts, shafts, airways, slopes, and caved areas. Detailed descriptions of all pollution sources were logged as discovered. Complete logs of field data are available for use or inspection at any time.

The extent of the stripping operations, both active and abandoned, subsidence areas or other photo interpreted features, as defined from topographic maps, were verified in the field.

Where available, mine maps of the area were procured and studied to determine the best and most economic methods to control any acid mine drainage.

EVALUATION OF SOURCES AND CORRECTIVE MEASURES

After the location, size, source and physical condition of each polluting discharge was determined, they were individually ranked in terms of pollutional magnitude, probability of abatement success and cost of feasible pollution abatement measures. The evaluation strived for maximum improvement of Mead Run while minimizing costs.

The latest technology in the mine drainage field was considered for use in the abatement plans to be applied to each source of pollution.

Various adaptations and combinations of the following techniques were considered for use in the watershed:

1. Diversion of surface waters around strip mine cuts and deep mine fractures.
2. Rechannelization of water through abandoned strip mines.

3. Terrace backfilling.

4. Soil treatment and planting of strip pits.
5. Surface treatment or removal of refuse piles.
6. Sealing deep mine openings.

7. Aeration of mine discharges utilizing settling ponds.