CHAPTER X

PROPOSED ABATEMENT PLANS

This chapter contains a group of quick start project proposals which outline ways, means, and costs for implementing most of action programs recommended throughout the report. These proposals were purposely made brief to present the basic concepts in their simplest form and to indicate the general order of magnitude for project costs.

Cost estimates have been made on the basis of accomplishing the stated objectives with a minimum of expenditure. Obviously, most of these projects could be expanded greatly to fulfill a variety of needs. It is hoped that the proposal format used will provide the basic essential information for each project, from which more detailed, specific proposals can be generated.

QUICK START PROJECT LIST

No. 1	Modification of Unit Operations at the Duman Plant
No. 2	D-Seam Borehole Diversion to Moss Creek Watershed
No. 3	Sterling #7 Diversion to Underground Pool System
No. 4	Victor Mine Complex Water Treatment
No. 5	Delta Complex - Diversion of West Branch Flow
No. 6	Delta Complex - Combined Mine Water-Sewage Treatment Facility
No. 7-1	Refuse Area No. 1
No. 7-2	Refuse Area No. 2
No. 7-3	Refuse Area No. 3
No. 7-4	Refuse Area No. 4
No. 7-5	Refuse Area No. 5
No. 7-6	Refuse Area No. 6
No. 7-7	Refuse Area No. 7
No. 7-8	Refuse Area No. 8
No. 7-9	Refuse Area No. 9
No. 7-10	Refuse Area No. 10
No. 7-11	Refuse Area No. 11
No. 7-12	Refuse Area No. 12

QUICK START PROJECT NO. I

MODIFICATION OF UNIT OPERATIONS AT THE DUMAN PLANT

The study has shown that an integrated implementation of related Quick Start Project No. 1 and 2 could result in lowering pollution control costs for the Duman plant very significantly. This project is concerned with the phase of program that involves modification of equipment and treatment procedures within the plant.

Objectives:

The three major objectives in this project are:

(1) to develop simple, effective methods for utilizing limestone as the neutralizing agent.
(2) to improve sludge handling methods to reduce the recycle return flow to the pool by at least 0.5 MGD.
(3) to reduce operating labor costs.

Proposed Modifications:

1. Install 44 sets of limestone mixing baffles in the transfer ditch; the first 20 on 20 ft. centers, and the balance on 100 ft. centers. These would be used to evaluate (a) neutralizing and oxidation efficiency, and (b) settled sludge characteristics using various types of fine limestone. Some auxilliary limestone feeding equipment might also be necessary.

   Estimated Cost of Installation - $30,000

2. Install a 60' x 60' HYDRA-hydraulic rake unit in the aeration pond, together with sludge return facilities from the settling and polishing pond. Also install sludge flow control baffles (see Aeration Pond Modification sketch).

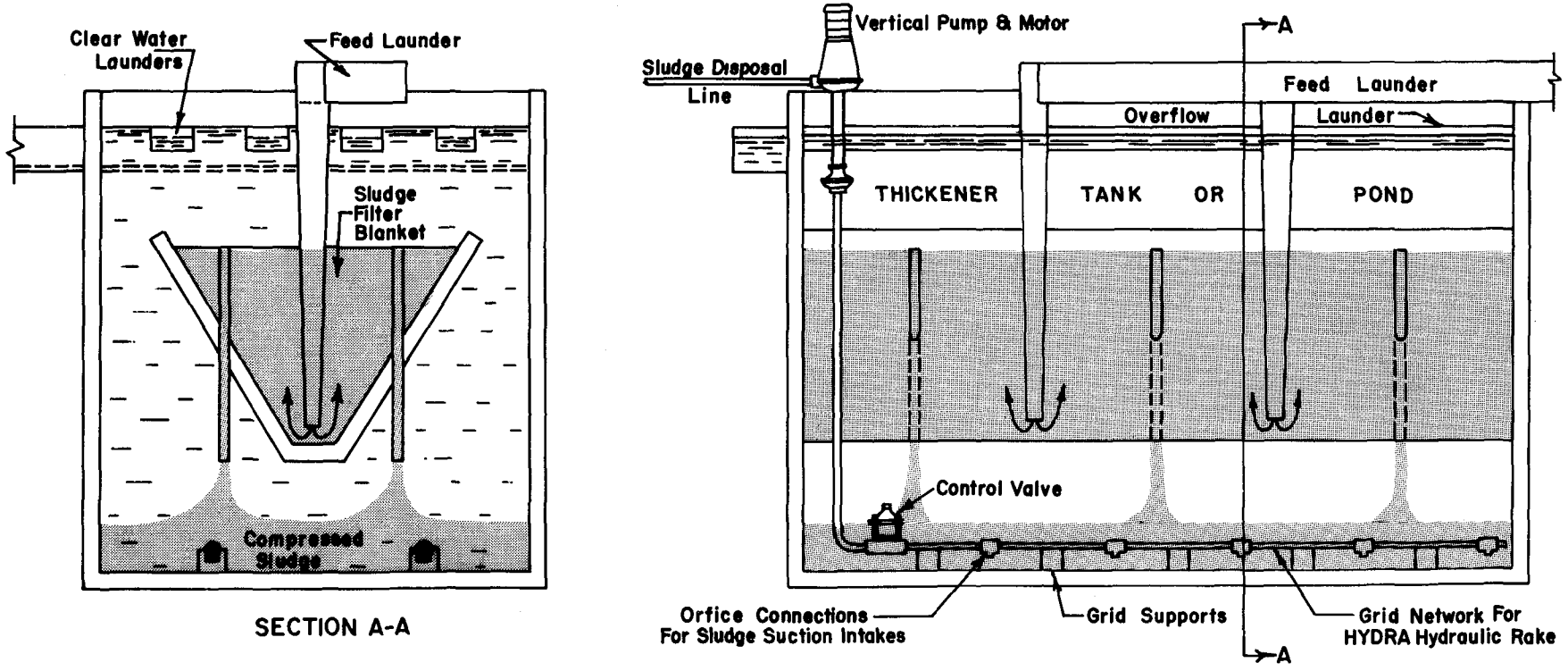
   Estimated Cost of Installation - $30,000

3. Divide one settling pond into three equal compartments and install a 120' x 170' HYDRA-hydraulic rake unit in the upper section (see Figure VIII-11 in Chapter VIII).

   Estimated Cost of Installation - $60,000

Benefits to be Derived:

Substitution of limestone for pebble lime could result in a chemical cost saving of $650 per day or $237,000 per year. Reducing sludge return volume by 0.5 MGD could save $50,000 per year in recycle treatment cost. See Chapter VIII for general discussion of other advantages to be gained.



NOTE:
This concept combines features of a design by de Villers[16] and the Barrett Haentjens HYDRA hydraulic rake static thickener.

QUICK START PROJECT NO 1
GENERAL SCHEMATIC FOR MODIFIED SETTLING POND DESIGN

QUICK START PROJECT NO. 2

D-SEAM BOREHOLE DIVERSION TO MOSS CREEK WATERSHED

This project is a sequential, multi-phase operation, the major objective of which is to divert as much water as possible from the Lancashire No. 15 pool. An important secondary objective is to divert neutral water into the Moss Creek watershed to create a new recreational stream and storage reservoir in the North Cambria area.

Project Phases:

Phase I - carry out a one year engineering management program for flow control in the Lancashire No. 15 deep mine pool. This would permit determination of optimum economic operating level for the pool and provide information regarding the maximum flow which could be diverted into the D-seam for natural neutralization.

Phase II - depending upon the feasibility of diversion into D-seam as established in Phase I, explore possibility of maximizing diversion by borehole pumping from D-seam. This would involve an exploratory drilling and pumping program to determine optimum location of a borehole for ultimate discharge into Moss Creek.

Phase III - drill a 14" borehole at the optimum location (in the Nicktown area) indicated in Phase II, and install pumping equipment to handle up to 3 MGD for diversion into Moss Creek.

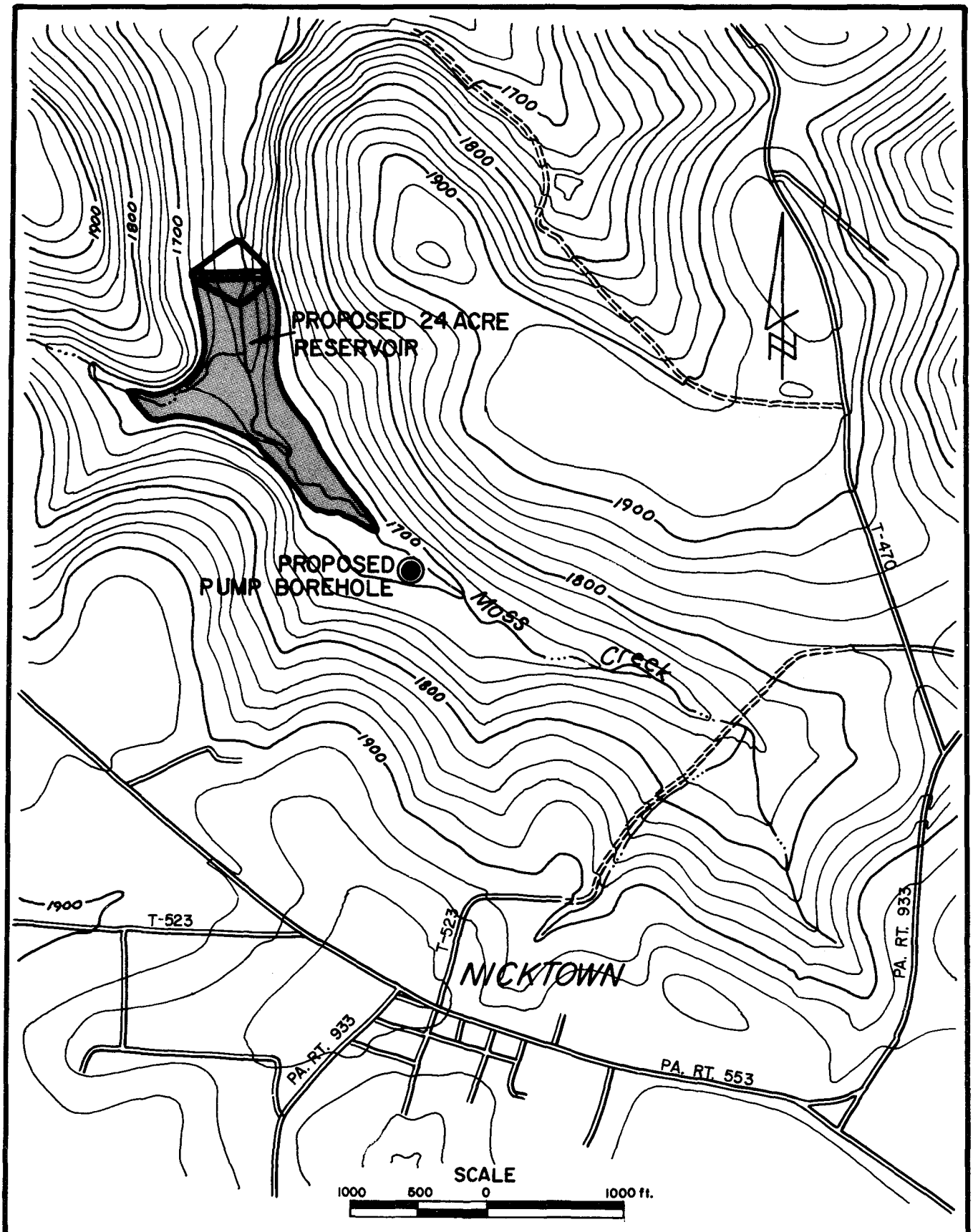
Phase IV - upon completion of Phase III, construct a dam to impound a 24 acre recreational and fishing reservoir in the Moss Creek headwaters area. (See map location on accompanying sketch).

Benefits to be Derived:

The main objective of this overall program is to reduce the volume of water being treated at the Duman plant by 3 MGD. This could mean an annual treatment cost saving of $270,000. The beneficial environmental impact effect is to create a new fishing and recreational stream in the upper West Branch area which would include a small lake and a stream with a base flow of 4 MGD. The Fish Commission has indicated interest in a project of this type.

Estimated Project Costs:

Phase I -	$42,000
Phase II -	10,000
Phase III-	73, 250
Phase IV -	575,000



QUICK START PROJECT NO. 2
DISCHARGE BOREHOLE AND RECREATIONAL RESERVOIR LOCATIONS
FOR DEEP MINE POOL DIVERSION TO MOSS CREEK WATERSHED

QUICK START PROJECT NO. 3

DIVERSION OF STERLING NO. 7 DISCHARGE TO DEEP MINE POOL SYSTEM

Sterling No. 7 is the largest single deep mine acid flow still discharging into the West Branch headwater. The flow ranges from an average rate of 1 MGD to a maximum of 3 MGD. Average acid loading equivalent is 6000 ppd. This flow can be very easily diverted into the Lancashire No. 15 pool for ultimate treatment at the Duman plant or possible diversion into D-seam if Quick Start Project No. 2 were successful.

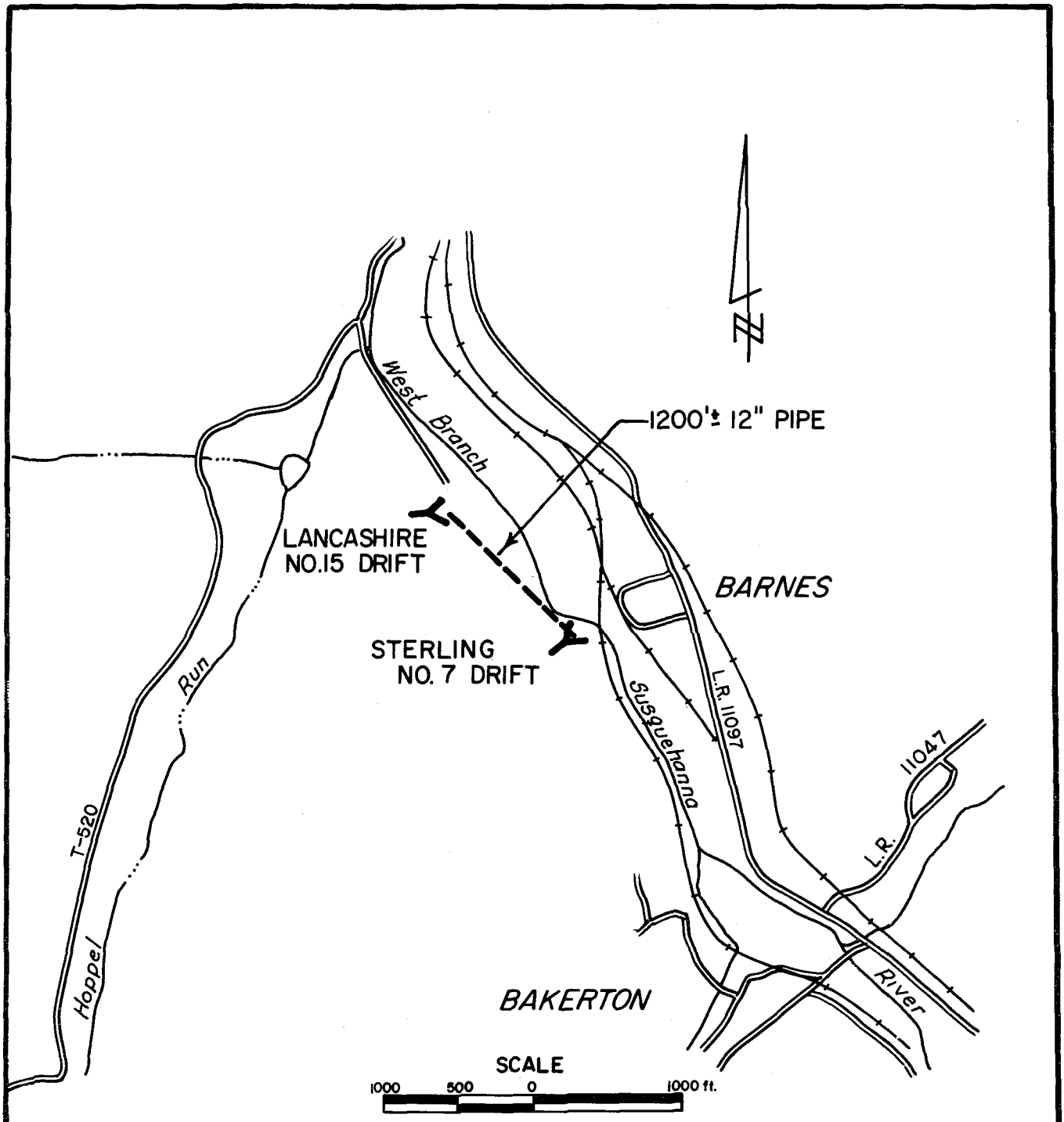
Project Scope:

This work would involve the installation of a 1200 ft. length of 12" pipe to provide gravity flow of Sterling No. 7 discharge into Lancashire No. 15 portal (see accompanying sketch).

Benefits to be Derived:

This diversion would decrease an average acid loading in the upper West Branch by 6000 ppd.

Estimated Cost of Installation - $30,000



QUICK START PROJECT NO. 3

STERLING NO. 7 DISCHARGE DIVERSION TO DEEP MINE POOL SYSTEM

QUICK START PROJECT NO. 4
VICTOR MINE COMPLEX WATER TREATMENT

The east bank of the headwaters of West Branch Susquehanna River has been extensively deep mined. Approximately 4,000 acres were mined out in Victor #9 and #10, Binder, Sterling #3 and #5, Heisley #2 and Peerless operations (see Plates 3, 5 and 6 indicating B-seam deep mine workings and Figure IX-1, B-seam mine pool areas on page 124). This mine pool complex is discharging its drainage into the West Branch at its west side and into Fox Run at its north side. The mined area is geographically enveloped by Carrolltown, Bakerton, Watkins, Spangler and St. Benedict.

The Lower Kittanning "B" seam coal was the seam mined in this complex.

POLLUTION SOURCE

There are 17 mine water discharge points from this mine complex, but three points contribute most of the pollutant loading:

Weir #40: drainage slope located at Watkins along Carrolltown road. This discharge drains into the West Branch.

Weir #50: a 100 ft. deep borehole located south of Spangler along Penn Central railroad tracks. This borehole spring flows directly into the West Branch.

Weir #75: drainage slope located 1 mile east of Spangler along U.S. Route 219. The flow drains into Fox Run.

Pictures of these points are shown on Figure VII-7.

All three drainage points are located at the northern or westerly end of the mine complex where the lowest coal structure exists. The pollution loads produced are described in the following table:

POLLUTION LOAD FROM MAJOR DISCHARGING POINTS
FROM VICTOR MINE COMPLEX

SAMPLING POINT	FLOW (GPM) AVG.	FLOW (GPM) MAX.	ACID (PPD) AVG.	ACID (PPD) MAX.	IRON (PPD) AVG.	IRON (PPD) MAX.	SULFATE (PPD) AVG.	SULFATE (PPD) MAX.
#40	694	3216	3341	13,970	696	2586	6,192	24,081
#50	392	695	2521	4,170	474	859	4,821	8,490
#75	518	846	1519	2,479	273	386	3,916	6,142
TOTAL	1604	4757	7381	20,619	1443	3831	14,929	38,713

Abatement Project Potential

A potential hydraulic head of 500 feet prohibits consideration of any pollution abatement methods involving inundating whole or part of the mined area by hydraulic sealing of all drainage discharge points. Mine sealing could result in fresh breakouts anywhere along the outcrop or shallow cover.

A lime neutralization treatment plant for the combined flow can be considered as a potential abatement method.

Project Description:

The three major discharges can be converted into a single source by sealing the drift and plugging the boreholes.

A single source borehole outlet can be drilled somewhere between Watkins and Spangler near a suitable treatment plant site. The acid mine water would be neutralized by limestone and the sludge would be collected by hydraulic rake system and be returned back into the mine cavity through another borehole.

Estimated Project Costs:

The cost is estimated to be $600,000 for the capital investment including construction of a 6 MGD treatment plant, a mine drainage collecting system, and a sludge disposal system.

The annual operating cost is estimated to be $100,000 per annum.

QUICK START PROJECT NO. 5

DIVERSION OF WEST BRANCH FLOW INTO DELTA MINE COMPLEX

The main objective of this project is to determine the maximum natural neutralization capacity of the abandoned Detla Mine complex. The workings contain about 2000 acres of pool area in which neutralization and settling processes can be induced. The ultimate goal would be to divert the full base flow of the West Branch at North Barnesboro (20 CFS) through the complex to emerge as an alkaline flow into Beaver Run (see map for locations). This type of diversion was successfully piloted at the 3 MGD level by the Barnes and Tucker Co. in 1966-1967.

Construction Required

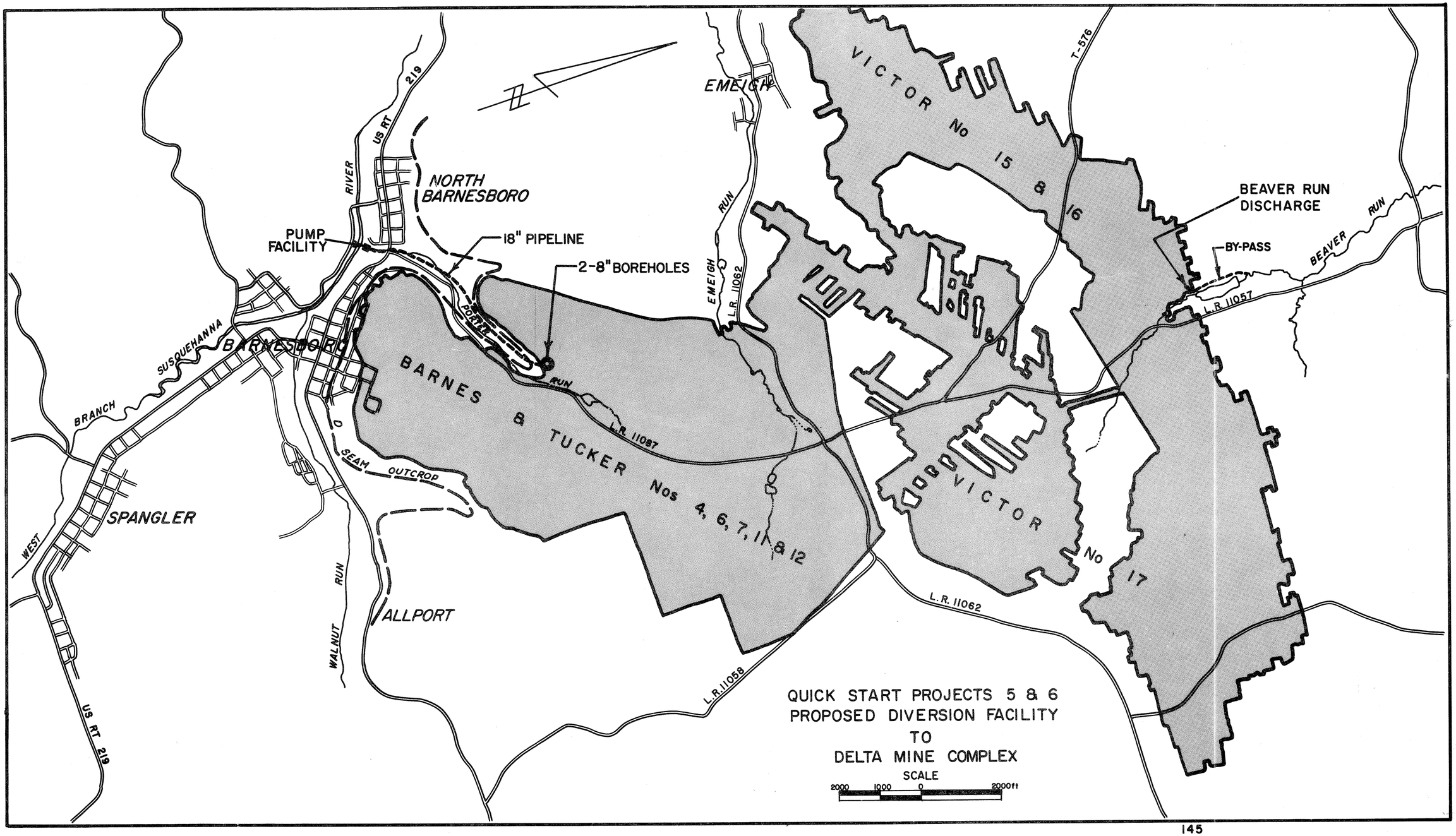
The project would involve the construction of an 18" pipeline 6,000 ft. long with pumping facilities for diverting 3 to 6 MGD from the West Branch into the Delta complex through two 8" boreholes used in the original project.

Potential Benefits

At a 6 MGD flow rate, this diversion would remove a fairly constant acid loading of about 5000 ppd from the West Branch, and discharge 6 MGD of alkaline water into Beaver Run to enhance its recreational value and increase its alkaline loading by 5000 ppd. This should result in a net reduction in acidity in the West Branch of 10,000 ppd.

This facility could also be provided with emergency lime feeding equipment for treating the West Branch in the event of another breakout.

Estimated Cost of Project - $180,000


VICTOR No 15 & 16
T-576
EMEIGH
NORTH BARNESBORO
US RT 219
RIVER
PUMP FACILITY
18" PIPELINE
2-8" BOREHOLES
BEAVER RUN DISCHARGE
BY-PASS
BEAVER RUN
EMEIGH RUN
L.R. 11062
L.R. 11057
SUSQUEHANNA
BARNESBORO
BRANCH
NORTH RUN
BARNES & TUCKER Nos 4, 6, 7, 11 & 12
L.R. 11087
D SEAM OUTCROP
VICTOR No 17
SPANGLER
WEST
WALNUT RUN
ALLPORT
L.R. 11062
L.R. 11058
US RT 219
QUICK START PROJECTS 5 & 6
PROPOSED DIVERSION FACILITY
TO
DELTA MINE COMPLEX
SCALE
2000 1000 0 2000 ft

QUICK START PROJECT NO. 6

DELTA MINE COMPLEX - COMBINED MINE WATER - SEWAGE TREATMENT FACILITY

An important ultimate consideration in controlling water quality in the upper West Branch is that of handling sewage contamination. Several research projects have demonstrated that acid mine waters and sewage streams can be co-processed very effectively. It would, therefore, be logical to explore the possibilities of treating sewage and mine water simultaneously in treatment plants which may ultimately be built in the Spangler-Barnesboro region.

This project would be a logical extension of Quick Start Project No. 5

Project Objectives

The combined treatment plant could be designed to perform several functions:

1. provide primary sewage treatment and chlorination facilities to accomodate a population of 10,000 (100,000 GPD).

2. provide pumping facilities for diverting 1 to 2 MGD from contaminated Porter Run into the Delta complex.

3. provide mixing facilities for blending West Branch acid water with sewage streams in various ratios prior to underground disposal.

Construction Costs

In addition to the equipment cited in Quick Start Project No. 5, it would be necessary to construct a primary sewage treatment plant (Imhoff type) and large flow blending tanks or basins.

Estimated Cost of Equipment - $552,000

A pilot plant project of this type could be initiated very quickly at the Pennsylvania State University Mine Drainage Pilot Plant at Hollywood, Pennsylvania. Dr. Lovell, Director of the facility has indicated an interest in exploring the possibility of a joint project of this nature. This pilot program, if planned properly, would not only provide basic information for a demonstration plant at North Barnesboro, but could equip the Hollywood plant to function as an actual sewage treatment facility for the town of Hollywood, which has none at present.

QUICK START PROJECT NO. 7

Quick Start Project No. 7 is actually a group of action programs involving twelve refuse pile areas. These are presented in the following section for which the following index is provided:

QUICK START PROJECT NO. 7 - SECTION INDEX

SUGGESTED ABATEMENT PROCEDURES FOR REFUSE PILE AREAS

Although the refuse piles contribute the major portion of the West Branch headwater pollution loading during basic flow periods, for several reasons pointed out in other sections of this report, complete abatement treatment of these piles would be extremely costly and would not result in the attainment of a pH-stable stream from the headwaters to Bower Station. However, special treatment of several of the piles could be considered from the standpoints of (1) improving the esthetics of an area, (2) providing self-sustaining economic entities, such as recreation sites or agriculturally productive areas (e.g. orchards), or (3) recovering appreciable tonnages of saleable coal. Relocation of portions of these pile areas in direct contact with the West Branch or its tributaries would be one of the desirable side benefits to be realized from special projects.

GENERAL TYPES OF REFUSE AREA ABATEMENT TREATMENT

Refuse pile area abatement projects could involve one or more of the following types of treatment:

(1) Removal and burial of entire pile, with revegetation of the surface.

(2) Removal and burial of portions of the pile in contact with the stream.

(3) Leveling and covering of piles in situ with top sealing and revegetation with trees and grasses.

(4) Channelling through or around piles, using lined ditches and/or limestone barriers to prevent stream-pile contact.

(5) Reprocessing of all or part of the pile to recover saleable coal.

(6) Reforming of piles in situ with surface treatment and covering to create crop producing areas, such as orchards, vineyards, christmas tree farms, etc.

(7) Shaping and contouring of piles to produce recreational areas, such as motor bike trails.

(8) Levelling and sealing of pile surfaces to produce industrial or housing development acreage.

RELOCATION AND REVEGETATION POTENTIAL

The unfortunate location of most of the refuse piles (reasons for which are discussed in Chapter III), in conjunction with the tremendous tonnages involved and the lack of free acreage in the narrow valleys, makes consideration of relocation of these tremendous masses economically impossible. Most of the piles are also so high (35 to 80 feet) that space again is not available to permit any appreciable amount of levelling of the surfaces for revegetation purposes. The steepness and height of the sides of most piles are also too great to permit utilization of conventional revegetation equipment and techniques. Several of the piles are partially burned (two are still burning), but only three have areas from which red dog (burned cinders) can be recovered in commercial quantity.

Two refuse areas, Springfield No. 4 and Moss Creek, are essentially the only locations where relocation, resurfacing and/or revegetation are technically feasible and economically justifiable. Details of these possibilities are presented under subsequent individual pile discussions.

POTENTIAL FOR COAL RECOVERY

There is a distinct possibility that some of the refuse piles in the study area contain economic quantities of reclaimable coal. Preliminary spot sampling of several piles has indicated coal contents ranging from 30 to 70%. However, extensive confirmatory information concerning the average quality, quantity, and distribution of coal in the interior of the piles would be required before any reliable value estimates could be made. Therefore, a program of exploratory drilling and sampling is recommended. This will provide the information necessary to determine the economic feasibility of some of the coal reclamation projects in the headwater area.

If and where reclamation is found to be feasible, the refuse could be processed in a semi-portable heavy media treatment plant which could ultimately recover coal from several piles. A 50-TPH refuse treatment plant which processed refuse from Barnes and Tucker Co. No. 25 has been fully described, (5, 6) and a complete review of all U.S. and European heavy media refuse reclamation technology has also been published (7) by the Mineral Preparation Department of the Pennsylvania State University. The refuse remaining after coal recovery could be transported to nearby inactive strip mine pits and buried. The burial area should then be graded and stabilized according to accepted engineering practices.

Preliminary calculations using the limited data available show that as much as three million tons of recoverable coal may be present in the refuse piles. Of course, this is a very rough estimate and, in fact, a large portion of the coal may not be marketable because of its high sulfur content.

Ultimate coal reclamation plants would most logically be operated by private operating companies on a lease and royalty arrangement with the refuse pile owner. Under some circumstances, there could be legal, economic, or environmental factors that would make a reclamation operation infeasible. However, one of the major pile owners has indicated their willingness to discuss reclamation possibilities on their properties with responsible operating people.

The most significant ecological side benefit to be derived from coal reclamation is that stream-contact sections of the piles being processed could be relocated at low unit costs. Appreciable savings in refuse moving costs could be realized by paying the mining company a reasonable unit fee to deposit their final refuse in a prescribed manner in selected locations.

ALTERNATIVE TREATMENT METHODS

Consideration could be given to removal of some piles to nearby strip pits in conjunction with local stream rechannelization. This could apply both to piles containing no salvageable coal and to those that do. In the former case, the entire pile volume would have to be covered. In the latter case, only the refuse remaining after coal removal would require covering. Preliminary data indicates that some of the piles could be reduced by as much as seventy percent (70%) upon completion of a coal reclaiming operation.

Sufficient clean earth cover with a clay underseal should be applied to prevent percolation of precipitation and to sustain stabilizing vegetative growth. In addition, lime neutralization and fertilization of an outer layer of the refuse before covering may be required.

Conversion of some piles (particularly Springfield No. 4 at Spangler and Moss Creek at Marsteller) to agriculturally productive areas is a future possibility when new sewage plants are installed in the area and sewage secondary effluent and sludge would become available as nutrient sources. Research in this field has been successfully piloted at the Pennsylvania State University, and full scale installations are being used in several locations.

Where the stream bed is directly or very closely bounded by the refuse pile, rechannelization and/or channel lining is recommended to prevent subsurface intrusion. This, of course, will not be necessary where the refuse is moved to abandoned strip mines for burial.

SUGGESTED PROJECTS FOR INDIVIDUAL REFUSE AREAS

The following section contains index maps to show general locations of the twelve refuse areas studied and individual sketches of each area together with a brief discussion of the refuse pile characteristics, their pollution generation capacity, and possible methods of treatment. Direct (and very costly) abatement treatment of individual piles to eliminate single pollutant source loadings is definitely not recommended, since our study has shown that such treatment would have a minor immediate effect on critical water quality in the West Branch. Instead, we have determined that several piles do seem to contain large tonnages of recoverable coal and recommend that more extensive exploratory sampling and testing be carried out.

These low cost, exploratory, quick-start projects could be completed quickly and initiated at any time.

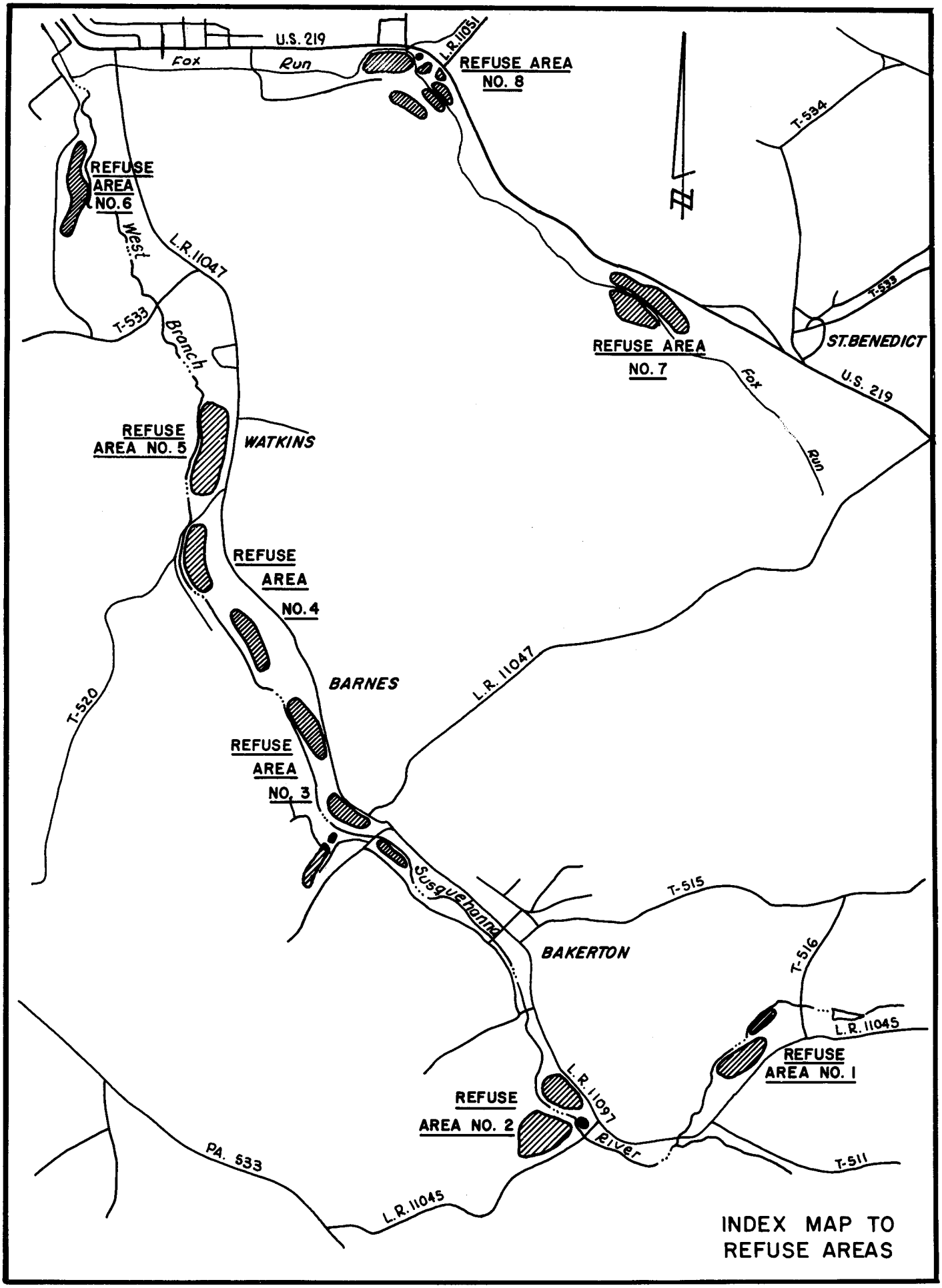
The confirmation of the presence of economic quantities of saleable coal could provide the impetus for new industry and increased employment in the area.

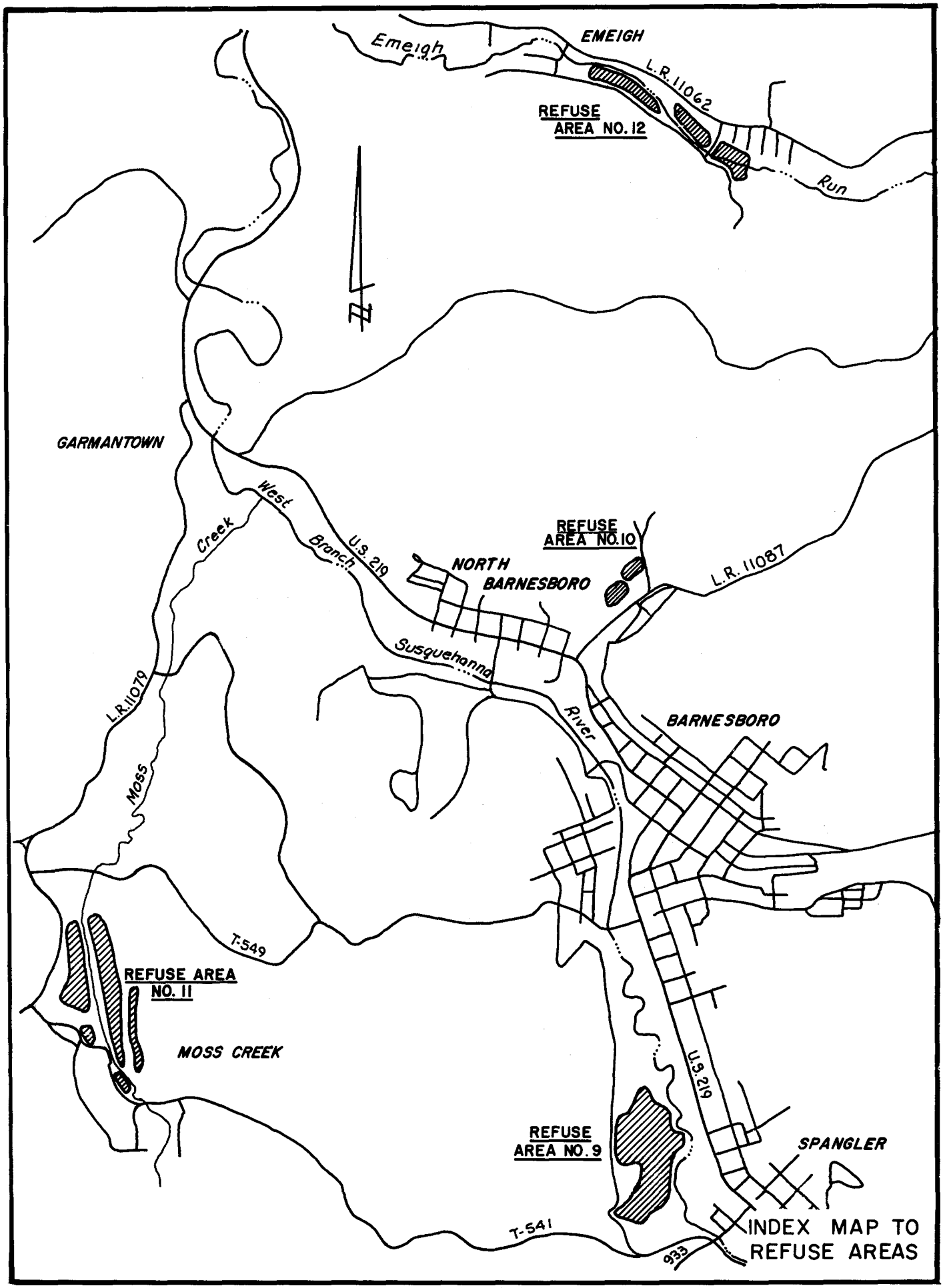
Ecological, aesthetic, and ultimate economic benefits to be derived from well planned coal reclamation operations are:

(1) lowest cost removal of refuse from stream contact to prevent future erosion and deposition of acid generating material in the lower reaches of the West Branch (cause of high flow acid slugging).

(2) reduction of the secondary refuse to significantly smaller volumes which could be buried, re-shaped, covered, or revegetated to produce land areas of attractive appearance.

(3) conversion of the restored land areas into profitable operations such as recreational parks (camp-sites), agricultural acreage, industrial parks, housing development sites, etc.


U.S. 219
Fox Run
L.R.11051
REFUSE AREA NO. 8
T-534
REFUSE AREA NO. 6
West Branch
L.R.11047
T-533
REFUSE AREA NO. 7
T-533
ST. BENEDICT
U.S. 219
Fox Run
REFUSE AREA NO. 5
WATKINS
REFUSE AREA NO. 4
BARNES
L.R. 11047
T-520
REFUSE AREA NO. 3
Susquehanna
T-515
BAKERTON
T-516
L.R. 11045
REFUSE AREA NO. 1
L.R. 11097
REFUSE AREA NO. 2
River
T-511
PA. 533
L.R. 11045
INDEX MAP TO REFUSE AREAS


Emeigh
EMEIGH
L.R. 11062
REFUSE AREA NO. 12
Run
GARMANTOWN
West Branch
Creek
U.S. 219
REFUSE AREA NO. 10
NORTH BARNESBORO
L.R. 11087
Susquehanna
River
BARNESBORO
L.R. 11079
Moss
T-549
REFUSE AREA NO. 11
MOSS CREEK
U.S. 219
REFUSE AREA NO. 9
SPANGLER
T-541
933
INDEX MAP TO REFUSE AREAS

REFUSE AREA NO. 1: LANCASHIRE NO. 20

LOCATION: S.W. OF BAKERTON ESTIMATED VOLUME: 128,700 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 4.3

TOWNSHIP: WEST CARROLL ABATEMENT PRIORITY RATING: 2

The two piles in this area are about 40 feet high (see photo in Figure VII-4). They are located a very short distance upstream from the old Lancashire No. 20 treatment plant. One section of the large pile is burning. The orange colored sides visible in the photo are the remains of a plastic coating applied a few years ago in an attempt to provide an air seal to prevent combustion.

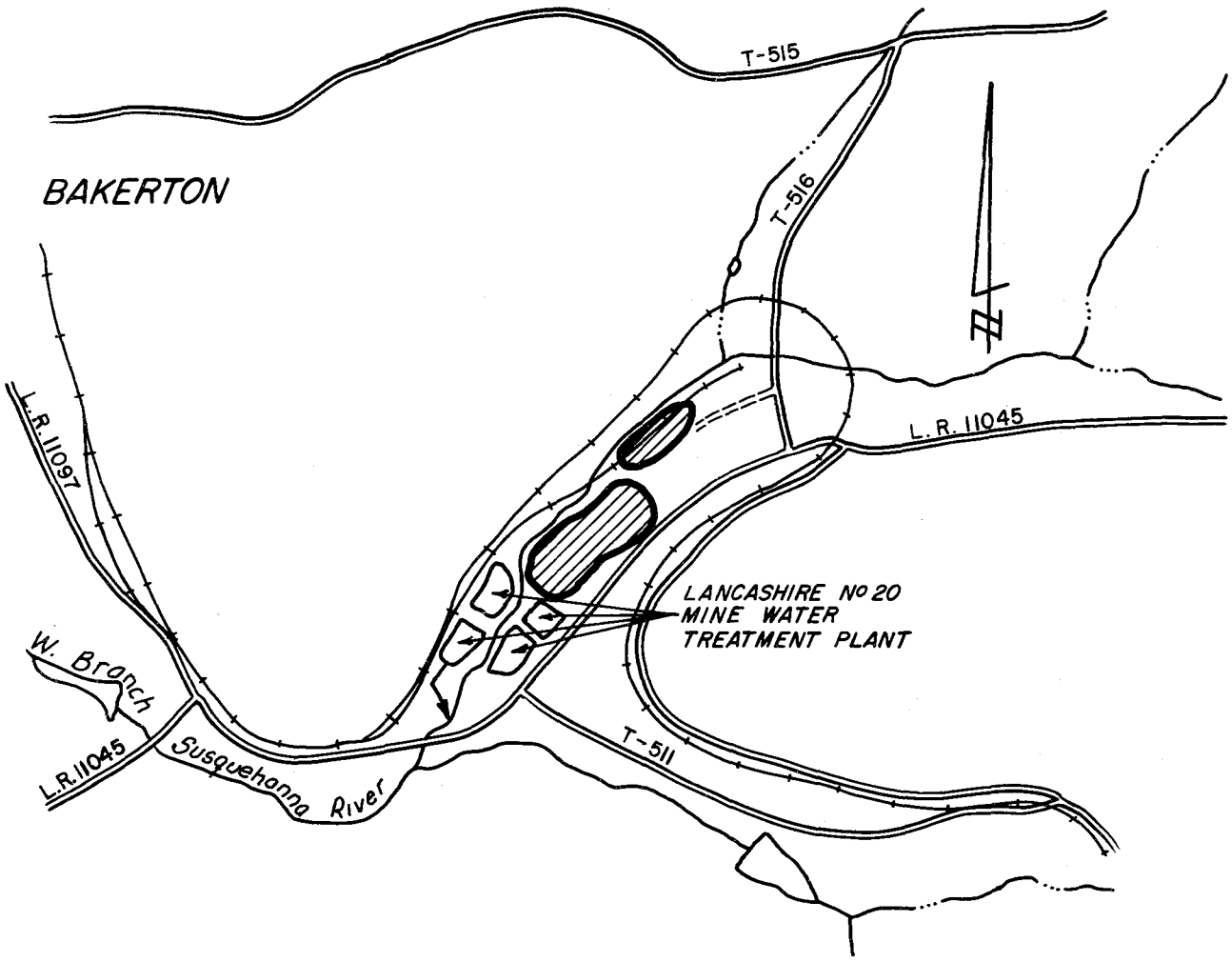
POLLUTANT LOADING

The pollutant loadings into the West Branch headwater from this area as determined in this study during summer low stream flow were: 801 ppd acidity, 1 ppd iron, and 1,296 ppd sulfates. The acidity from this pile is sometimes completely neutralized by excess alkalinity in the effluent from the adjacent Barnes and Tucker Co. treatment plant.

RECOMMENDED TREATMENT

The only treatment suggested for this pile is that it be sampled for coal content. A sampling project would include drilling and sampling, washability testing of samples and evaluation of results to determine the feasibility of reclaiming coal. The abatement potential for a coal reclamation project is that the secondary refuse could be relocated and buried at lower unit costs.

Estimated Cost for Sampling Project - $11,000



SCALE

1000 500 0 1000 ft.

LANCASHIRE NUMBER 20
REFUSE AREA No. 1

REFUSE AREA NO. 2: STERLING NO. 6

LOCATION: BAKERTON ESTIMATED VOLUME: 659,000 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 15.3

TOWNSHIP: WEST CARROLL ABATEMENT PRIORITY RATING: 1

The two piles in this area border the West Branch for an appreciable distance and contribute seepage and refuse erosion sediments directly into the stream. Portions of these piles are burned, but no red dog is recoverable. The maximum height of the piles is about 40 feet.

POLLUTANT LOADING

Data obtained in this study during the summer low flow season indicated that this area was a major pollution source. Measured pollutant additions to the West Branch were: 5,329 ppd acidity, 213 ppd iron, and 6,319 ppd sulfates. (See Sampling Point Record No. 13 in Appendix A). No direct abatement methods appear feasible.

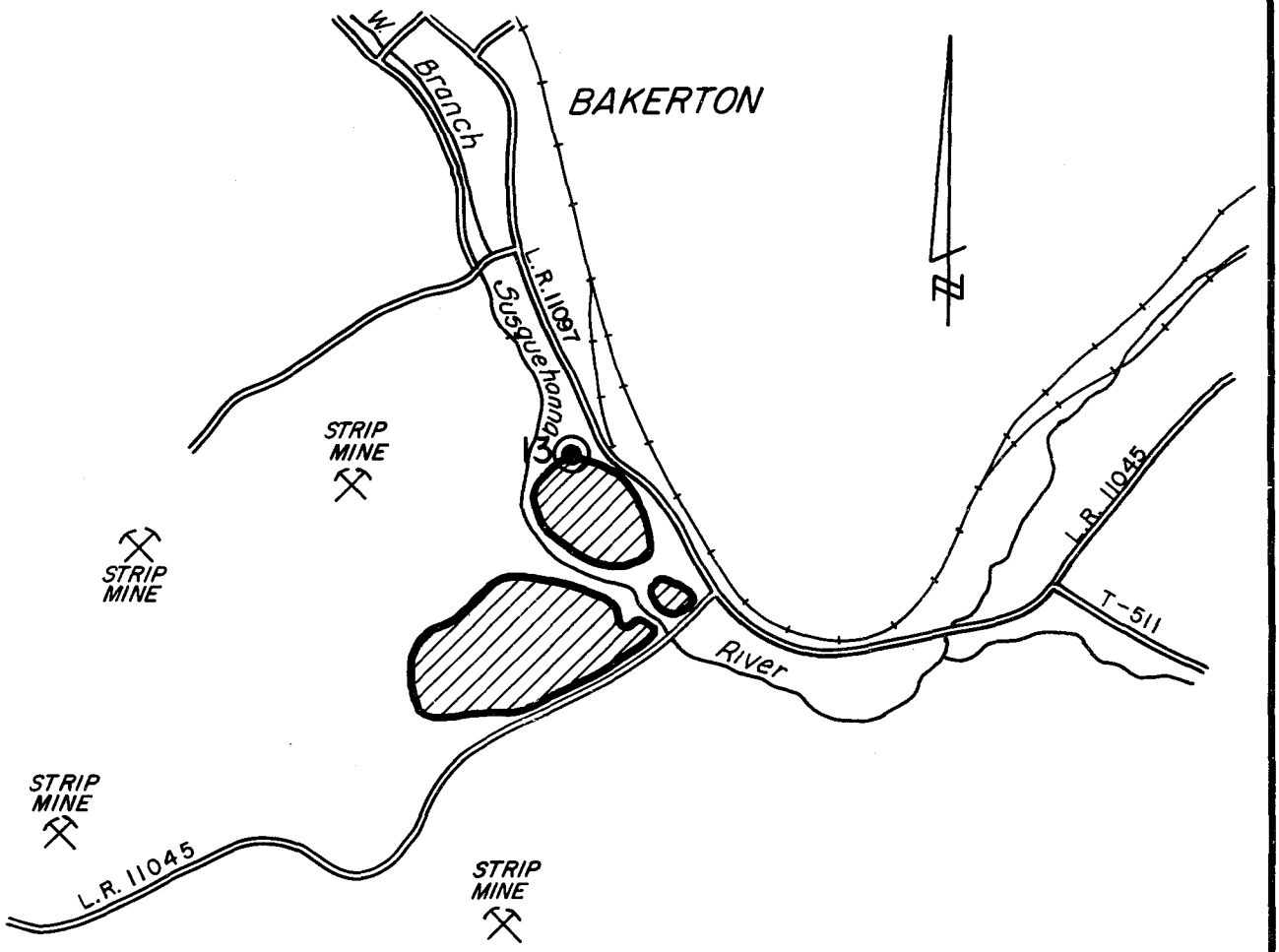
RECOMMENDED TREATMENT

This area has potential for coal reclamation, with some "second" refuse being relocated for burial in neighboring abandoned strip pit sites. A washability test on a sample taken from the surface of the pile yielded 70% (by wt.) float product at specific gravity 1.60 of the following quality:

Moisture: 2.48%
Ash: 18.89%
Sulfur: 1.00%
B.T.U.: 11,751

On the basis of this sample, more extensive sampling seams justified, and a sampling project is, therefore, recommended.

Estimated Cost for Sampling Project - $11,000



SCALE

1000 500 0 1000 ft.

STERLING NUMBER 6
REFUSE AREA NO. 2

REFUSE AREA NO. 3: STERLING NO. 1 AND LANCASHIRE NO. 14

LOCATION: BAKERTON ESTIMATED VOLUME: 620,000 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 15.7

TOWNSHIP: WEST CARROLL ABATEMENT PRIORITY RATING: 2

This large refuse area is in direct contact with the West Branch for about 0.5 miles. Maximum height of the piles is about 50 feet. Portions of the pile are burned, but no red dog is readily recoverable.

POLLUTANT LOADING

Pollutant loadings contributed to the West Branch during the summer low flow period were significant: 2,485 ppd acidity, 13 ppd iron, and 14,811 ppd sulfates. No direct abatement treatments are feasible, but pile relocation and burial is a possibility if carried out as a secondary operation in conjunction with a coal reclamation project. (See Sampling Point Record No. 31, in Appendix A).

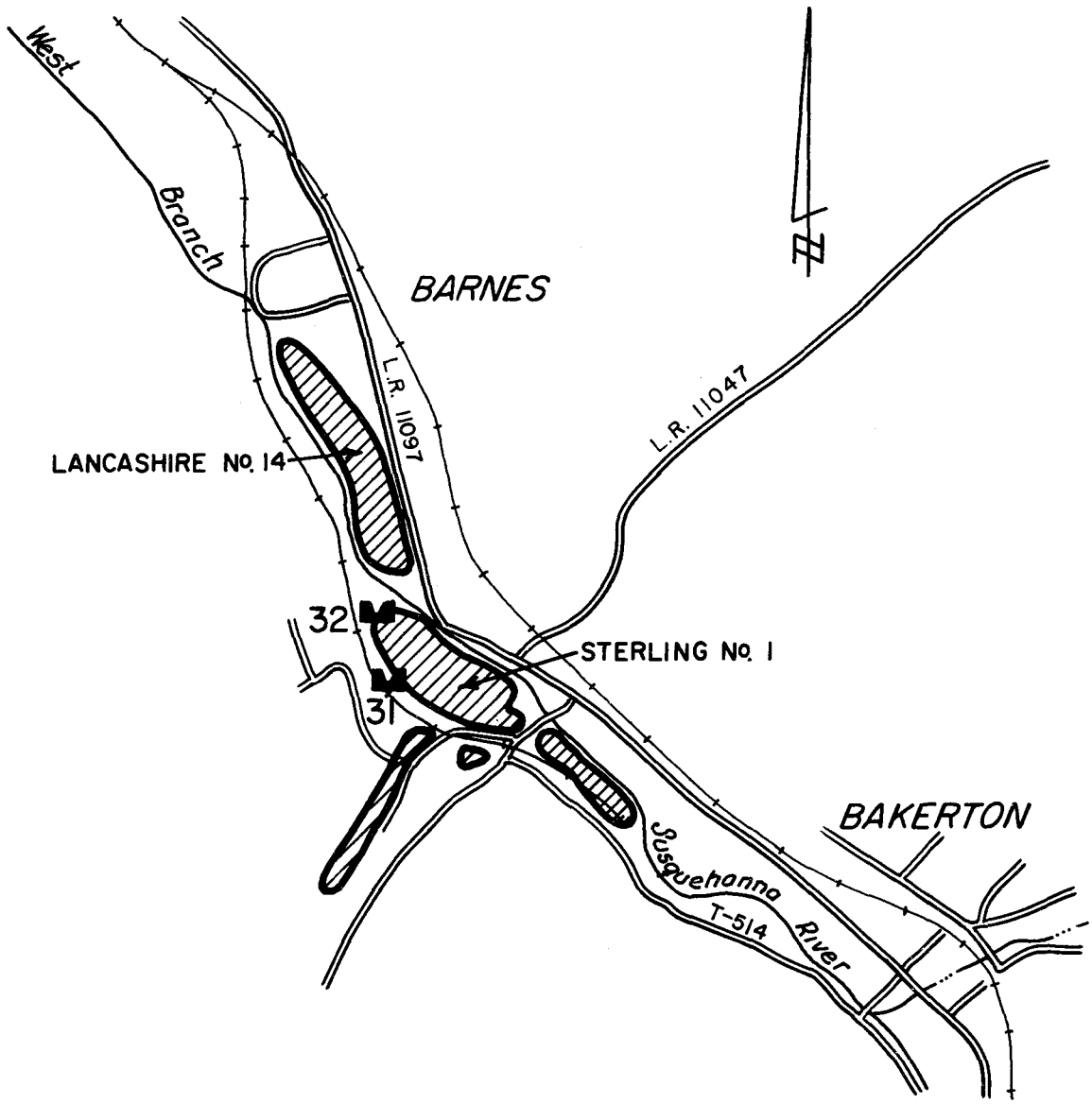
RECOMMENDED ACTION

A washability test on a surface sample showed that a 61.4% weight recovery could be obtained at specific gravity 1.6, yielding a coal of the following quality:

Moisture: 1.40%
Ash: 17.6%
Sulfur: 1.64%
B.T.U.: 12,314

These excellent results indicate that a formal sampling project is justified to determine the feasibility of a combined coal recovery - pile relocation burial operation.

Estimated Cost for Sampling Project - $12,000



LANCASHIRE NUMBER 14
STERLING NUMBER 1
REFUSE AREA N° 3

REFUSE AREA NO. 4: LANCASHIRE NO. 15

LOCATION: WATKINS ESTIMATED VOLUME: 555,500 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 17.5

TOWNSHIP: BARR & WEST CARROLL ABATEMENT PRIORITY RATING: 1

These two large piles are located directly alongside the West Branch between the stream and the railroad. The lower pile is appreciably eroded by stream action. These piles have a maximum height of about 70 feet.

POLLUTANT LOADING

These piles contributed a very heavy pollutant loading directly into the West Branch during the summer low flow period: 12,990 ppd acidity, 490 ppd iron, and 15,079 ppd sulfates. Because of their size and location, no standard direct abatement treatment is feasible.

RECOMMENDED ACTION

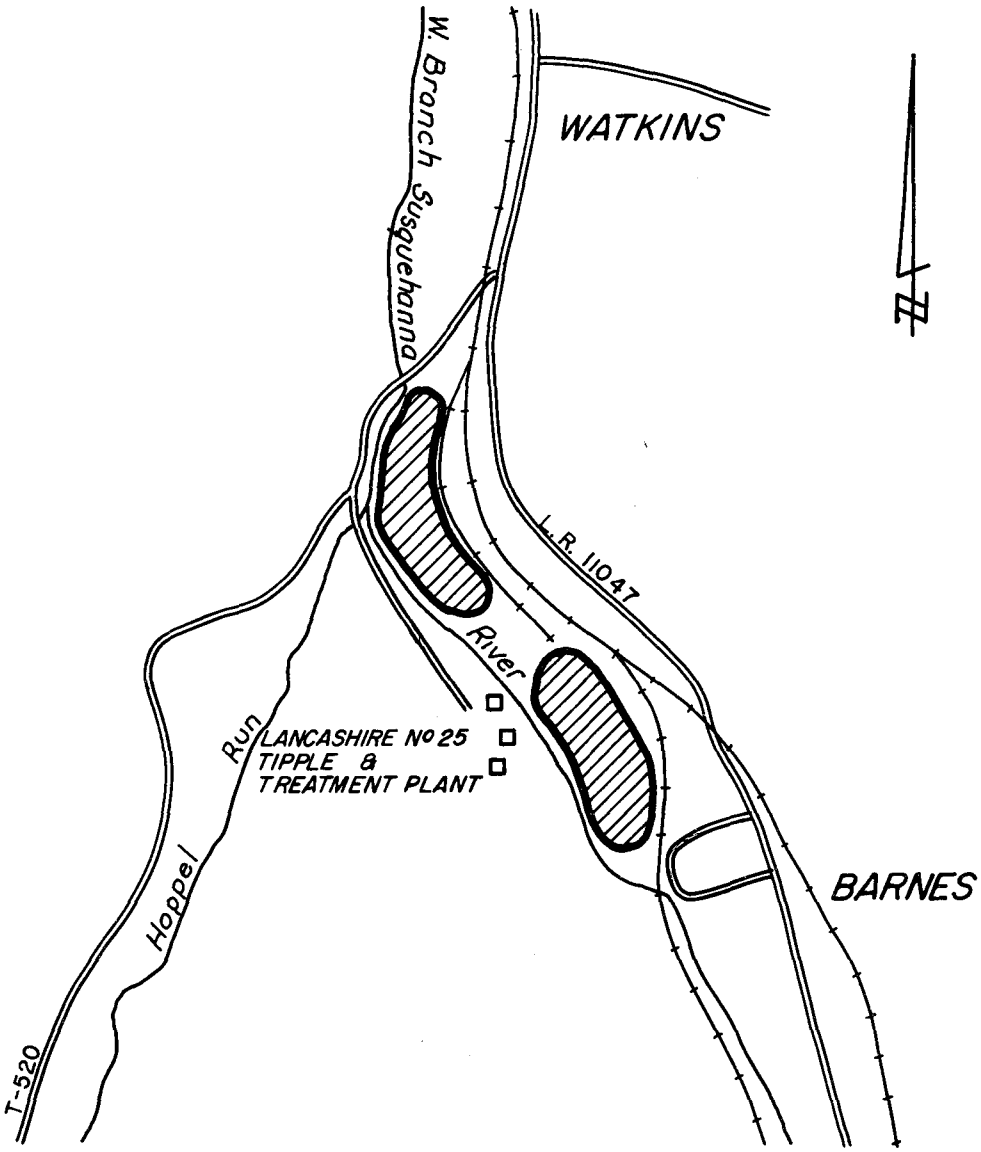
The large tonnage and location of these piles does make the consideration of a combined coal reclamation - secondary refuse burial project of definite interest. Coal recovery in this area is particularly feasible because of the location of a large operating treatment plant between the two piles, with rail facilities located along the edge of each pile for ease of transportation.

A washability test on a sample collected from the surface indicated a 62.9% weight recovery at 1.60 specific gravity of a coal product of the following quality:

Moisture: 4.47%
Ash: 18.96%
Sulfur: 4.89%
B.T.U.: 10,286

The high sulfur and ash content obtained at the separation gravity used is not especially attrative. However, further sampling and testing at lower gravities may indicate the processing of significant tonnages of saleable coal, and a sampling project is strongly recommended.

Estimated Cost For Sampling Project - $12,000



LANCASHIRE NUMBER 15
REFUSE AREA No. 4

REFUSE AREA NO. 5: WATKINS

LOCATION: WATKINS ESTIMATED VOLUME: 833,300 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 15.5

TOWNSHIP: BARR ABATEMENT PRIORITY RATING: 1

This is the largest single pile located on the West Branch and the second largest pile in the study area. It is located between the West Branch and the railroad, and borders directly on both. Its maximum height is 80 feet (see photo in Figure VII-4), and its stream side is badly eroded. Portions of the pile smoke visible and emit sulfurous fumes.

POLLUTANT LOADING

This pile heavily polluted the West Branch directly during the summer low flow period with the following contaminants: 5,522 ppd acidity, 1,323 ppd iron, and 11,892 ppd sulfates. (See Sampling Point Record No. 41 in Appendix A). Location and size prohibit consideration of any direct abatement treatment.

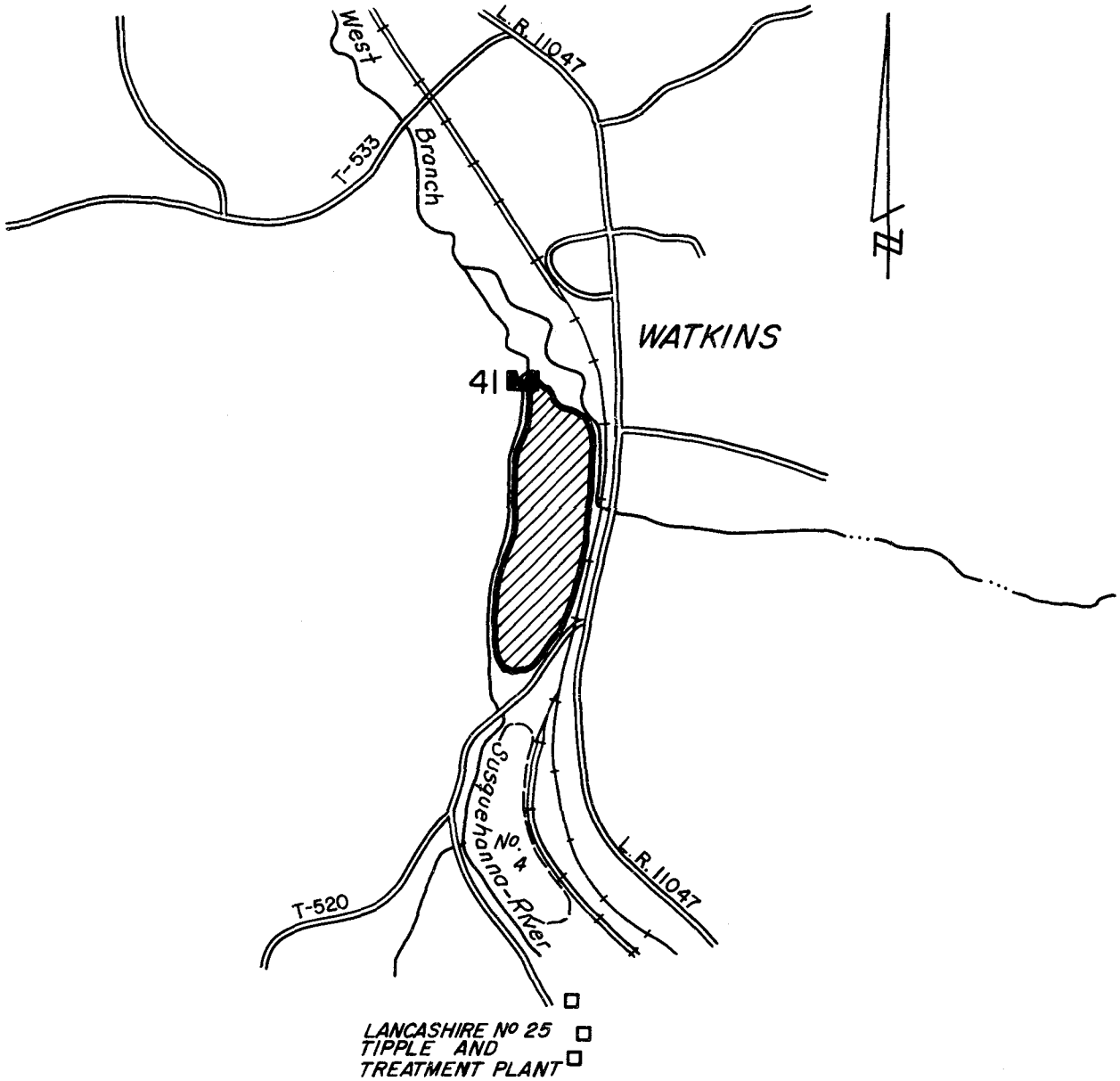
RECOMMENDED ACTION

Since this pile is located only a few hundred feet downstream from Refuse Area 4, the conditions for considering a combined coal recovery - secondary refuse burial project are essentially identical. A washability test on a surface sample of the refuse yielded a 33.7% by weight float product at 1.60 specific gravity containing:

Moisture	2.10%
Ash	13.40%
Sulfur	4.22%
B.T.U.	12,456

The yield and quality (with the exception of the sulfur) are sufficiently promising to warrant more formal sampling and testing. A sampling project is, therefore, recommended to determine the feasibility of combined recovery abatement processing.

Estimated Cost of Sampling Project - $12,000



WATKINS
REFUSE AREA No. 5

REFUSE AREA NO. 6: SUSQUEHANNA NO. 1

LOCATION: SPANGLER ESTIMATED VOLUME: 111,100 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 6.9

TOWNSHIP: BARR ABATEMENT PRIORITY RATING: 4

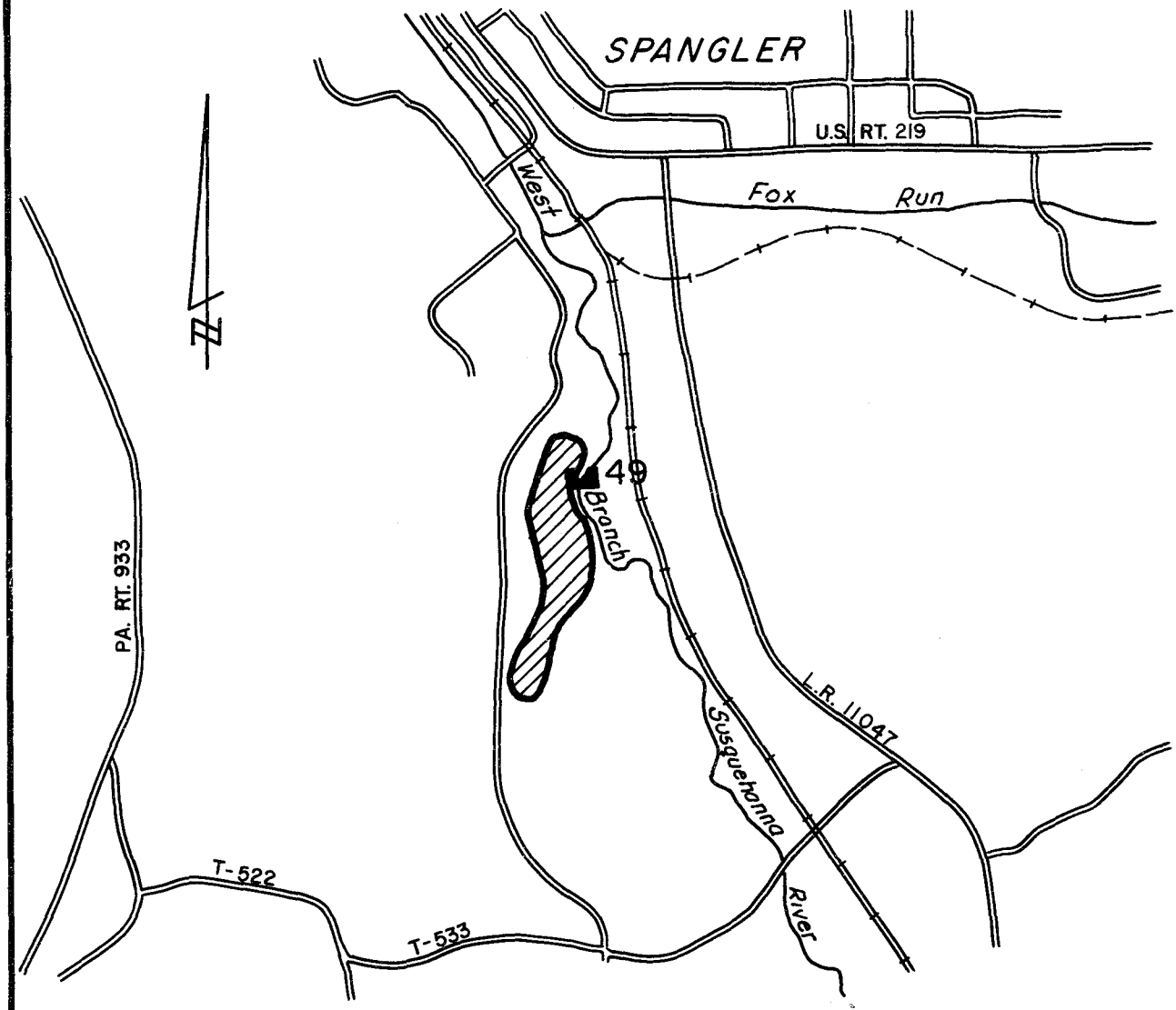
This is an innocuous pile which presents no pollution problems. It has a maximum height of about 20 feet. Since it produces alkaline seepage, the pile material might be considered for fill usage in potential stream impoundment projects.

POLLUTANT LOADING

The drainage from this pile is alkaline with a pH range of 6.5-7.3. There was no measureable seepage from this pile during the period April thru December 1971. (See Sampling Point Record No. 49 in Appendix A).

RECOMMENDED ACTION

There is a possibility of recovering coal from this pile, which reclamation could be associated with reclamation processing on neighboring piles upstream. Cost of a sampling and testing project to determine economic feasibility would be $3,000.



SUSQUEHANNA NUMBER 1
REFUSE AREA No. 6

REFUSE AREA NO. 7: VICTOR NO. 10

LOCATION: ST. BENEDICT ESTIMATED VOLUME: 255,600 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 18.4

TOWNSHIP: WEST CARROLL ABATEMENT PRIORITY RATING: 3

This pile area is bisected by Fox Run, an acid tributary to the West Branch. Maximum height of the piles is about 20 feet.

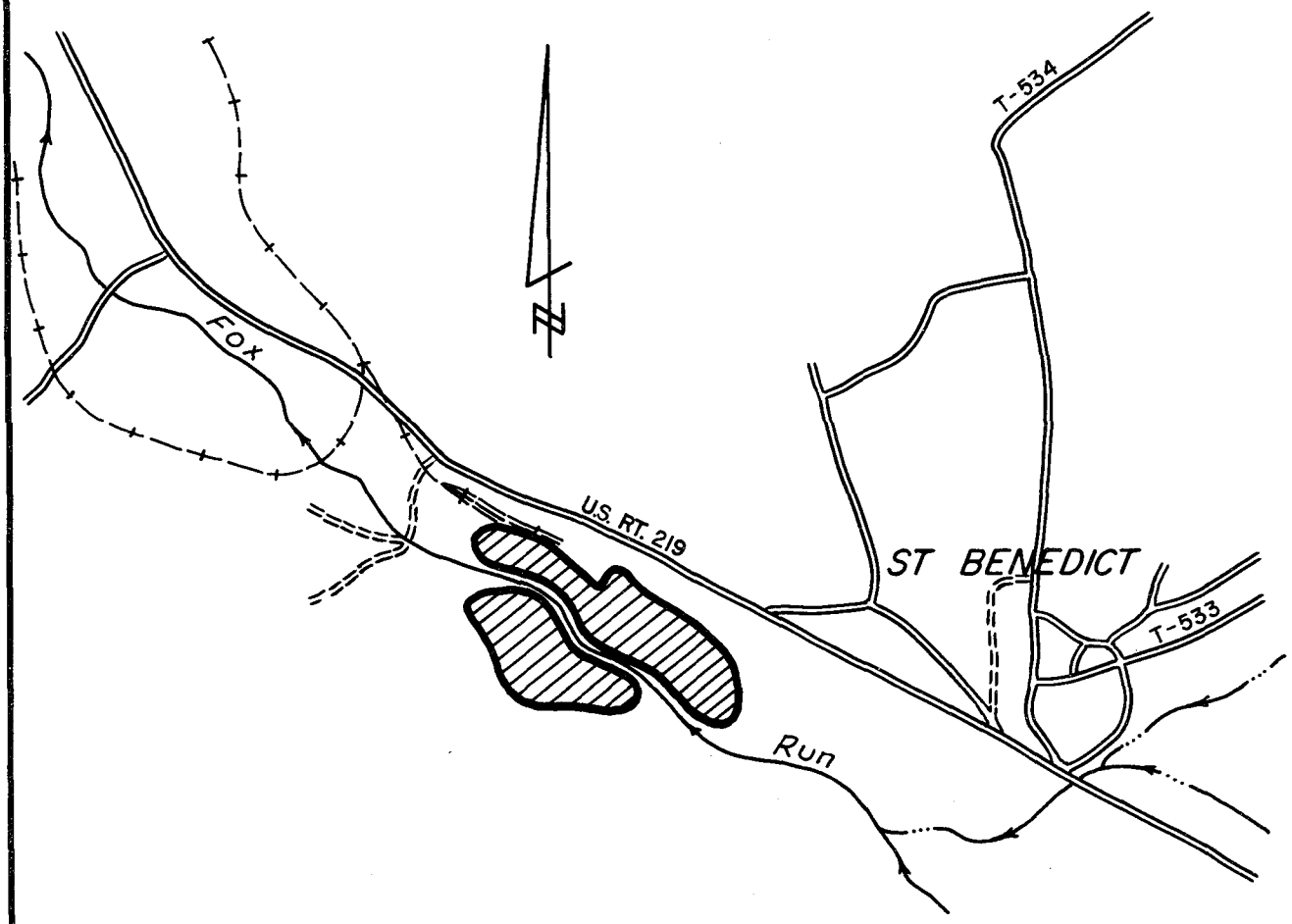
POLLUTANT LOADING

This area increased acid loading to Fox Run during the summer low flow period by only 25 ppd, and hence is a minor pollution contributor.

RECOMMENDED ACTION

No abatement treatment is justified for this particular pile, but sampling to indicate coal recovery potential could be of interest.

Estimated Cost for Sampling Project - $5,000



SCALE

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VICTOR NUMBER 10
REFUSE AREA No. 7

REFUSE AREA NO. 8: VICTOR NO. 9

LOCATION: SPANGLER

COUNTY: CAMBRIA

TOWNSHIP: SUSQUEHANNA TWP. & BOROUGH OF SPANGLER

ESTIMATED VOLUME: 513,900 cu. yds.

ESTIMATED BASE ACREAGE: 14.3

ABATEMENT PRIORITY RATING: 2

This group of seven piles is located on Fox Run, with which four of the piles are in direct contact. The maximum height of the piles is 60 feet. Much of this pile area has undergone extensive burning and is a source of red dog fill material (see photo in Figure VII-4).

POLLUTANT LOADING

This area contributed the following pollutant loadings to Fox Run during the summer low flow sampling period: 2,232 ppd acidity, 133 ppd iron, and 8,544 ppd sulfate. Size and location of these piles precludes any direct, standard abatement treatment.

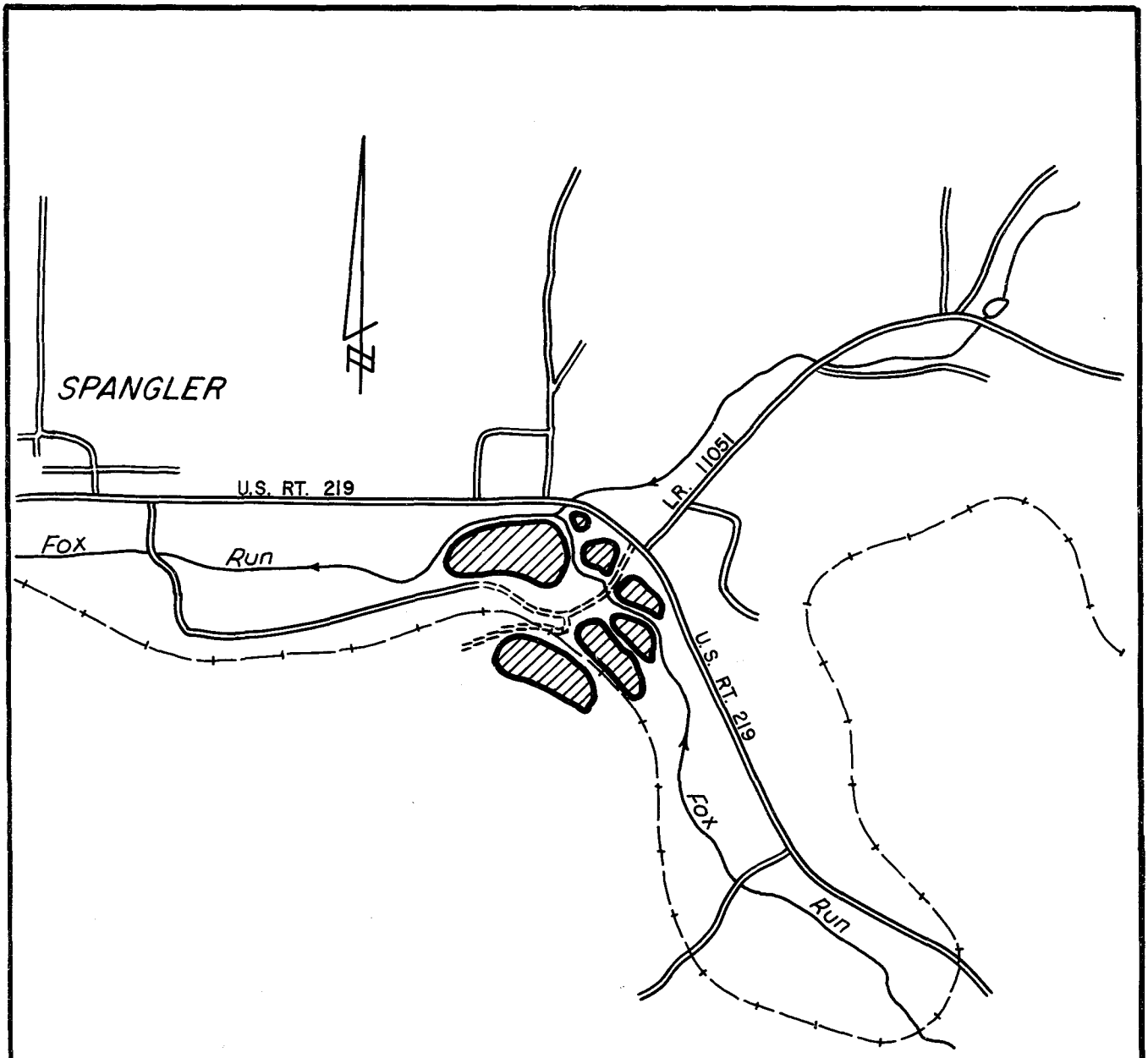
RECOMMENDED ACTION

The large tonnage involved in this area again suggests consideration of the joint coal reclamation-secondary refuse burial concept. A washability test on a surface sample resulted in a weight recovery of 76.3% float coal at specific gravity 1.6 of the following analysis:

Moisture	4.40%
Ash	15.0%
Sulfur	1.08%
B.T.U.	11,426

This high recovery of good quality coal strongly suggests additional confirmatory sampling and testing. A drilling, sampling, and reclamation evaluation project is, therefore, recommended.

Estimated Cost For Sampling Project - $10,000



SCALE

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VICTOR NUMBER 9
REFUSE AREA No. 8

REFUSE AREA NO. 9: SPRINGFIELD NO. 4

LOCATION: SPANGLER ESTIMATED VOLUME: 281,500 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 34.9

TOWNSHIP: BOROUGH OF SPANGLER ABATEMENT PRIORITY RATING: 1

This pile is unique in that it covers a large area to a depth of only 5 to 6 feet. It is located on the edge of Spangler adjacent to housing and recreational areas. The pile is in direct contact with a small alkaline mine stream and is very close to Browns Run and the West Branch which flow around its eastern flank. This is the youngest pile in the study area, but appears to contain appreciable amounts of coal. It has never been on fire, and has a relatively flat surface that is easily accessible.

POLLUTANT LOADING

This pile is one of the largest sources of pollution in the study area. (See Sampling Point Records No.'s 79 and 80 in Appendix A). During summer low flow conditions, pollution loadings directly into the West Branch were: 11,659 ppd acidity, 624 ppd iron. A re-check of acidity generation in June 1972 indicated a lower loading of 6,000 ppd. This variation is probably due to differences in meterological conditions prior to the time of measurements.

RECOMMENDED ACTION

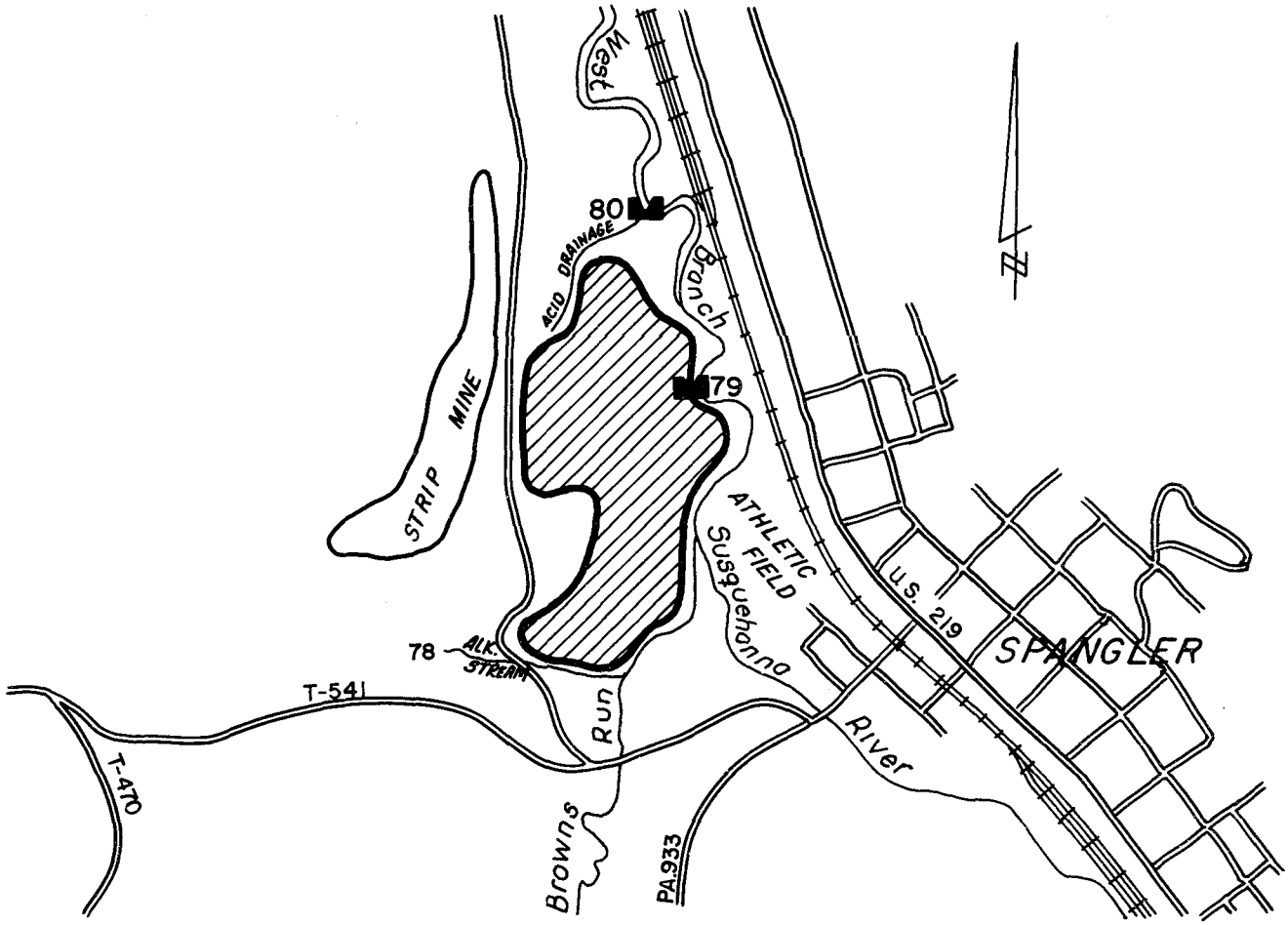
The section of this pile near the stream could be removed for burial to an adjacent abandoned strip pit. As an adjunct to this treatment, the remaining area could be sealed, covered and revegetated or converted into agricultural or commercial acreage. Cost of a project of this type would range from $500,000 to $600,000. Since the abatement effect on the West Branch to be anticipated from this project would only be a 15% reduction in total stream acidity, it is difficult to justify this project expenditure if no effective abatement treatments are available for the remaining 85% of the stream loading.

However, the large tonnage and easy accessibility of the pile coupled with the potential for converting the area into valuable land makes the consideration of the joint coal reclamation - spoil burial concept particularly attractive for this refuse area. To get an indication of the coal content of the pile, a surface sample was subjected to washability testing at specific gravity 1.6. The coal float product obtained was 32.6% by weight and had the following analysis:

Moisture	1.53%	Sulfur	2.03%
Ash	20.43%	B.T.U.	11,744/lb.

This is a good indication that coal reclamation is a viable possibility and that further sampling and testing is warranted. Therefore, a sampling project is recommended, data from which would permit a reasonable evaluation of the feasibility of a combination coal reclamation - pollution abatement - land reclamation undertaking.

Estimated Cost For Sampling Project - $3,500



SPRINGFIELD NUMBER 4
REFUSE AREA Nº. 9

REFUSE AREA NO. 10: LANCASHIRE NO. 9

LOCATION: NORTH BARNESBORO ESTIMATED VOLUME: 121,900 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 5.2

TOWNSHIP: BOROUGH OF BARNESBORO ABATEMENT PRIORITY RATING: 4

The two piles in this area have a maximum height of 55 feet and straddle Porter Run, which is an alkaline tributary.

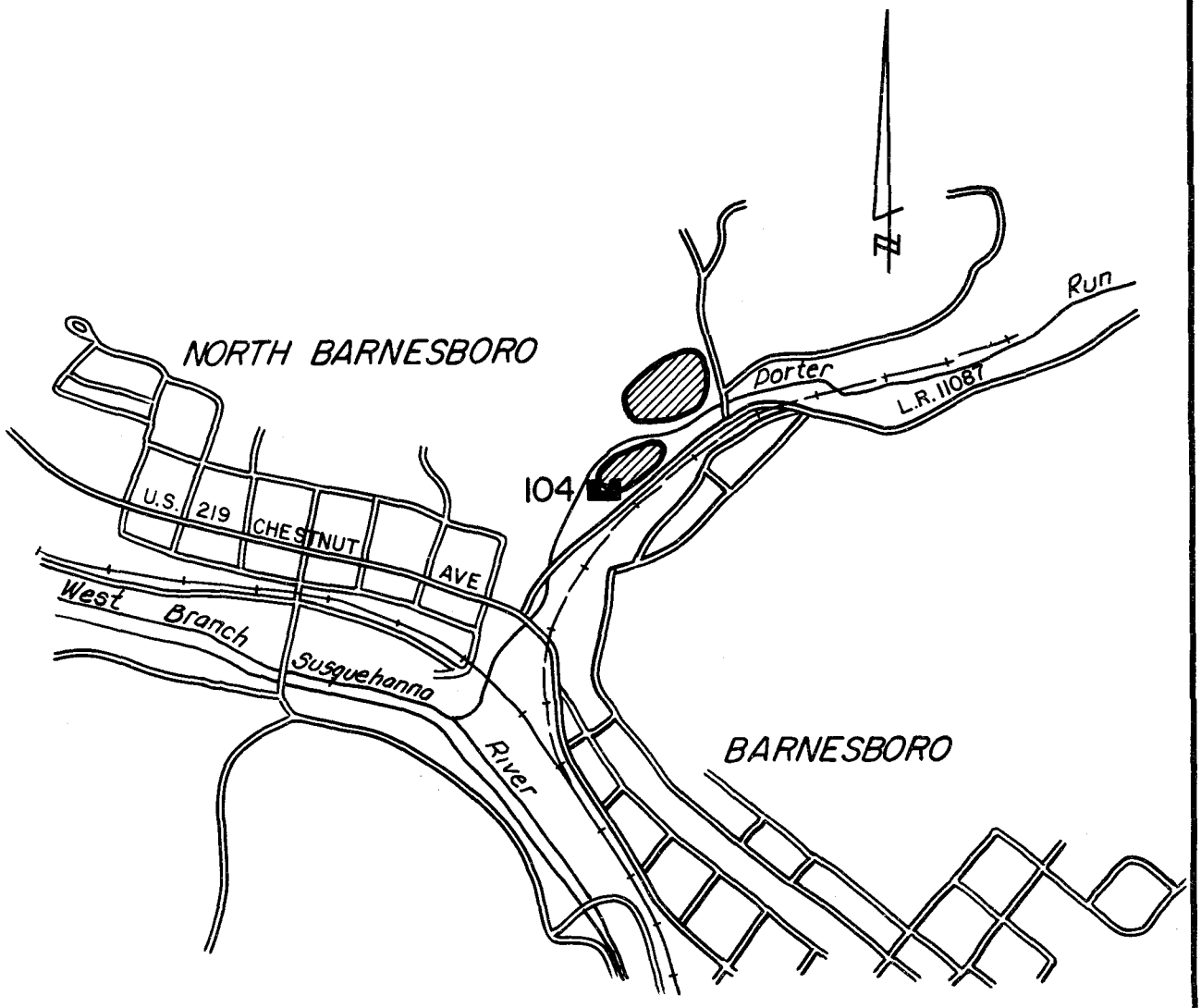
POLLUTANT LOADING

Drainage from these piles is alkaline, having a pH range of 6.7 to 7.3 (see Sample Point Report No. 104 in Appendix A).

RECOMMENDED ACTION

No abatement treatment is required for this area. Sampling to determine the feasibility of coal recovery could be considered.

Estimated Cost For Sampling Project - $4,000



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LANCASHIRE NUMBER 9
REFUSE AREA No. 10

REFUSE AREA NO. 11: MOSS CREEK

LOCATION: MOSS CREEK (MARSTELLER) ESTIMATED VOLUME: 1,215,700 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 32.8

TOWNSHIP: BARR ABATEMENT PRIORITY RATING: 3

This is the largest refuse area in the West Branch watershed with a maximum height of about 60 feet. A longitudinal corridor through the center of the main pile accommodated an operating coal plant (Barr Coal Co.) and its service railroad until this operation was abandoned in 1971. The major portion of the pile has burned and contains large tonnages of good quality red dog. Moss Creek flows along the entire length of the east side of the large pile, but is not degraded, probably because the refuse in this portion of the pile is from the D-seam.

POLLUTANT LOADING

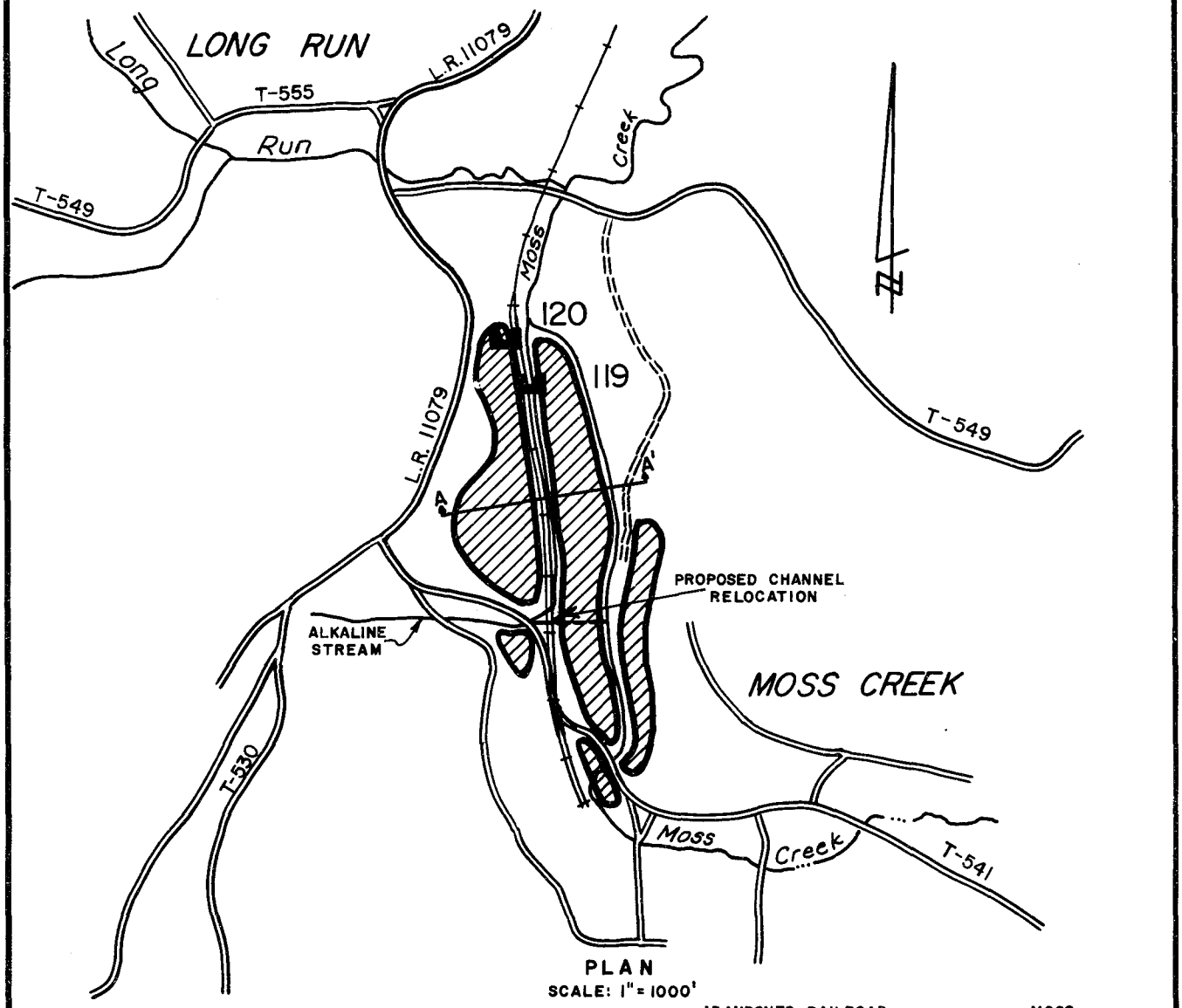
The pollutant loading to Moss Creek from this area results primarily from the leaching action of a small unnamed stream that flows through the pile corridor. During summer low flow conditions, the pollutants generated by this area were: 517 ppd acidity, 1.3 ppd iron, and 2,149 ppd sulfate. The acidity is almost immediately neutralized by the alkalinity in Moss Creek. (See Sample Point Reports No. 119 and 120 in Appendix A and Stream Station No. 276 in Appendix B). However, certain impurities harmful to fish life must be introduced by the refuse drainage since no fish are found below the refuse area, while a good fishing pond exists upstream.

RECOMMENDED ACTION

A proposal for a comprehensive quick-start project for converting Moss Creek into a larger recreational stream is presented in another section of this report. A logical supplement to that project would be to apply abatement treatment to this refuse area to prevent its contamination of the lower two mile reach of the stream so that fish life can thrive.

Treatment would include regrading the pile into a gentle smooth slope in the cross-section. A final vegetated cover would provide a usable land area and eliminate future erosion problems.

Estimated Cost For Project - $80,000 to $100,000



MOSS CREEK
REFUSE AREA No. 11

REFUSE AREA NO. 12: VICTOR NO. 17

LOCATION: EMEIGH ESTIMATED VOLUME: 312,000 cu. yds.

COUNTY: CAMBRIA ESTIMATED BASE ACREAGE: 12.2

TOWNSHIP: SUSQUEHANNA ABATEMENT PRIORITY RATING: 3

The three piles have a maximum height of 40 feet and are composed largely of weathered red dog, which is intermittently recovered. They are located along the stream bed of Emeigh Run, which is an alkaline stream.

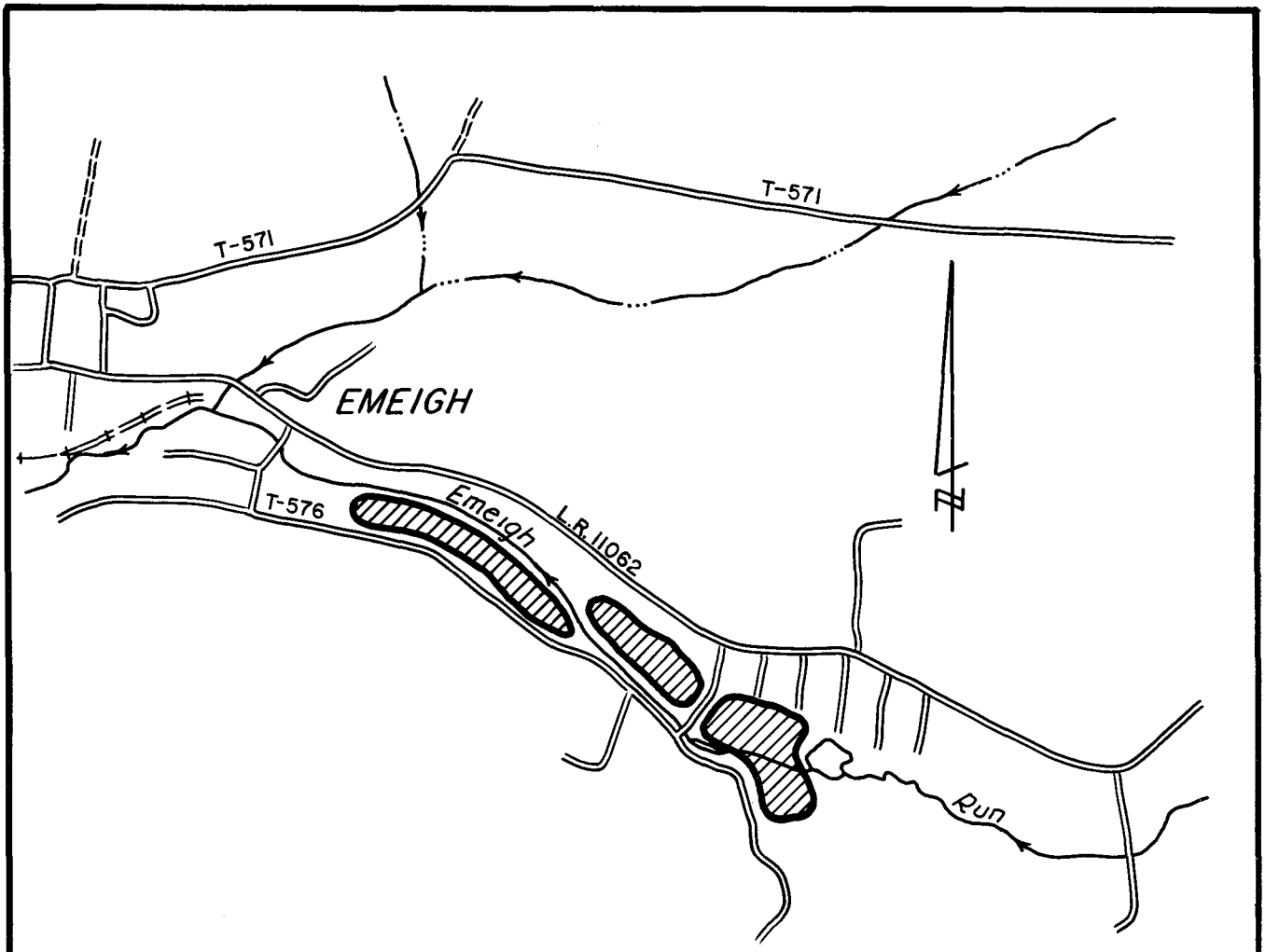
POLLUTANT LOADING

The pollutant loadings generated by these piles during the summer low flow period were: 118 ppd acidity, and 52 ppd sulfates. This low loading is completely neutralized by the natural stream alkalinity.

RECOMMENDED ACTION

No abatement methods appear justified for this area but sampling to determine the amount of recoverable coal present could be considered.

Estimated Cost For Sampling Project - $6,000



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VICTOR NUMBER 17
REFUSE AREA No. 12