

G. LOWER KITTANNING CROPLINE AT HOLLYWOOD

1. Hollywood Area Pollution

SOURCE AND TRIBUTARY DATA

Mine No.	Mine/Stream Name	Source No.	Acid Loading (Lbs/Day)	Loading Discrepancy (Lbs/Day)
D210	Bennett Branch	BB20	2,795	
	Tyler No.14 Watercourse	BB21	1,891	
	Tyler No.14 (CB)	TR45	2	
	Tyler Reservoir Run	TR36	8,333	
	Proctor No.2 Refuse	S08	<u>1,663(e)</u> 14,684	
R305	Bennett Branch	BB47	26,392	= 11,708
	Tyler Run (Adjusted)	T23	10,440	
	Tyler Coke Oven Refuse	S07	<u>358(e)</u> 37,190	
R307	Bennett Branch	BB48	60,709	= 23,519
Sources Entering Bennett Branch at Scattertown				
D208	Proctor #1 (Delullo)	SC50, 53	221	
D208	Proctor #1 (Smith)	SC49	114	
D211	Tyler Mines, No.7, 8, 11 Drifts	TR42,43,44	382	See Section F
D211	Tyler Mine, No.9, CB Drift	UN180,181	217	See Section F
(e) Estimated loading				

When the Proctor No.2 mine sump develops a 140 foot hydraulic head, the bore holes on Mill Run (M15) begin to flow. During the eight month sampling period, these bore holes averaged 7,400 Lbs/Day acid when they were discharging and have been measured as high as 45,000 Lbs/Day. In the period when this source did not discharge a series of water samples were taken along Bennett Branch from Mill Run to Tyler Reservoir Run at 1,000 feet intervals (BB150 through BB158). A dramatic increase in acidity was noted at Station BB-155 which was located immediately downstream from the Tyler Point State Forest and the Lower Kittanning Cropline.

Even though the Tyler No.14 watercourse (BB-21) discharges in the same general area, the total acid loading increase in the stream far exceeds the point source contribution.

Two possible factors are offered for this change in water quality. First, in the Hollywood area, the Lower Kittanning coal with its immediately overlying sandstone and shale strata is considered paleoenvironmentally to be of a "marine back barrier" nature. This type of structure has been found to contain larger percentages of frambooidal pyrite, more so than the higher, fresh water associated veins. As storm runoff flushes the leached acid from pyritic roof rocks,, new fresh material is exposed. The oxidizing process then continues to repeat itself and significant quantities of both acid and hydrous iron sulfate will accumulate in a matter of days.

Bennett Branch Acidity - Mill Run to Tyler Run

Sampling Station	Flow (gpm)	Acid Loading Lbs/Day		Chemical Data (mg/l)					Remarks
		Tributary or Point Source	Bennett Branch	pH	Acid	Iron	SO4		
BB11	44,726		2,767	-	5	-	-	Avg. Acid Mill Run	
M12	7,699	5,036		6.6	(-3)	0.5	58		
BB150	*			6.7	(-7)	0.5	34		
BB151	*			5.4	4	0.2	38		
BB152	*			-	6	-	-	Avg. Acid	
BB20	37,387		2,795	5.1	10	1.9	77		
BB153	*			4.5	14	2.8	96		
BB154	*			3.5	54	1.0	140		
BB21	156	1,891		3.7	46	0.9	100		(D210)
BB155	*			3.8	40	0.5	96		
BB156	*			3.7	38	0.4	86		
BB157	*							Tyler Reser.Run	
BB158	*							Avg. Acid	
TR36	7,512	8,333						Adjusted Flow	
BB47	52,463		26,392	-	42	-	-	Avg. Acid	
T23	2,329	10,440							
BB48	55,191		60,709	-	91	-	-	Avg. Acid	

*Spot chemical analysis taken 8-22-73 with no flow data;
M15 was not discharging during this period.

The second possible factor for the rapid increase in Bennett Branch's acidity concerns the large areas of deep mine refuse from Proctor No.2 (D206). The refuse (R305, 306), 600,000 cubic yards, is the product of nearly 80 years of mining, covers 40 acres over the stream's flood plain. By relating the acid concentrations from the mine's two major discharge points (1300 mg/l to 2500 mg/l), it is entirely possible that there are areas of refuse which exceed the 104 mg/l determined by Soil Sample S08. (For example: 1000 mg/l acid could yield as much as a 16,000 lbs/day loading from the Proctor No.2 refuse).

After a thorough evaluation of these described factors, it is apparent that both causes have their merit and both could contribute to Hollywood's mine drainage problem as a combination of effects rather than separate entities.

Within the Proctor No.2 refuse area are several items which are significant to the area's pollution.

The Commonwealth owned experimental mine drainage treatment facility is located on Tyler Run. This treatment plant has a 0.5 MGD capacity and can selectively treat water from either Proctor No.1, Proctor No.2, Tyler Run, or Bennett Branch. Currently, the facility is inactive. During the period 1970-1974, the Pennsylvania State University performed a varied array of AMD abatement techniques under Dr. Harold L. Lovell. The bulk of work was done either under a grant from the U. S. Environmental Protection Agency and the Commonwealth's Department of Environmental Resources or were graduate student research projects. Sampling Stations P22A and P34 are located at two of the three pump stations which supplied raw water to the facility but now contribute AMD to Tyler Run.

During the heavier rainfalls, Tyler Run overflows its banks and a secondary channel meanders through the Hollywood refuse area collecting leached acid prior to returning to the original stream bed downstream.

From Sampling Station T-24 downstream to its' confluence, Tyler Run receives AMD from the two Proctor mines which have been well documented. In addition to the point sources, the stream accepts a large acid loading from the refuse and acidic swampy areas lying adjacent to its' channels. The total raw acid loading on Tyler Run appears to be excessive and apparently is a result of high readings at the gaging Station T-23. By adjusting the measured flow at T-23 and by using laboratory results for the acid concentration, a loading differential of some 4500 lbs/day apparently enters Tyler Run from the refuse area.

Tyler Run Acid Loading Beyond Hollywood (T24 to T23)

	Flow gpm	Acid lbs/day	
T23 (Gaged Field Data) Point Source Loading	6,153	27,583	= 372 mg/l acid avg.
Weir data contributing to T23:			
T24	757	524	From Section D
P22	12	91	
P22A	315	2,717	
P34	665	2,578	
Sum Total of Weirs	1,749	5,910	
71 Ac.Avg. overland runoff	580		
Total Flow	2,329		
Water Quality Data (Avg.)			372 mg/l acid
Total Acid = (.01205) (2329) (372) =	10,440	T23 Adjusted Loading	
Nonpoint Source Loading = 10,440 - 5,910 = 4,530		T24 to T23	

Lastly, within the Proctor No.2 refuse area (R305) and near the mine's abandoned tipple, a 75,000 CY refuse bank covering approximately two acres is in an advanced state of burning and is a source of air pollution to the local communities. Refuse area, R305, also contains an undetermined quantity of "red-dog" from previous burning banks. This red-dog does have a limited economic value as a construction material.

In the 1500 feet from Sampling Station BB47 to BB48, the acidity concentration in Bennett Branch doubles from 42 mg/l to 91 mg/l. This change in water quality again cannot be determined from point source data solely and does imply that AND from non-point sources are contributing to the stream. There is, in fact, some 23,000 lbs/day acid measured at Station BB-48 which is attributed to non-point sources.

The two areas which could contribute AMD to Bennett Branch are the acid swampy area (approximately 10 acres) influenced by Tyler Run and the refuse area attributed to an abandoned coke oven - active loading tipple complex (R307) covering 28 acres along the streams south bank. The entire site lies on the Bennett Branch flood plain and is immediately adjacent to the stream.

Bennett Branch from Sampling Station BB-48 to Cherry Run is influenced by several point sources which flow directly into the stream. Three major deep mines contribute an acid loading; Proctor No.1 on the north bank, Tyler Mines on the south and Penfield Coal and Coke No.2 on the south bank.

Sampling Station	Mine	Flow gpm	Acid Loading lbs/day
BB48		55,191	60,709
TR42	Tyler Mine No.8 Drift	114	232
TR43	Tyler Mine No.11 Drift	124	68
TR44	Tyler Mine No.7 Drift	122	82
SC50	Proctor #1 (Delullo)	255	221
SC49	Proctor #1 (Smith)	97	114
SC53	McComber Run	46	ALK
*UN180	Tyler Mine No.9 Drift	172	216
*UN181	Tyler Mine	8	1
BB67		87,830	35,042
*UN183	Penfield C&C No.2	156	626
*UN184	D.R. Betta	87	53

*Designated as "Southern Bank Region" for purposes of this abatement discussion.

The Tyler Mines Complex discharge points have been discussed earlier in Section E and are mentioned here only to show their relationship to the entire Hollywood complex.

On the northern bank of Bennett Branch (Scattertown) and interconnected to the Proctor No.1 mine are several smaller and older workings. Two of these, the Smith Mine (SC49) and the DeLullo Mine (SC50) discharge AMD directly into Bennett Branch.

Beyond the Hollywood complex and along Bennett Branch's southern bank are two sources which are not associated with watersheds but emit significant acid discharges. The Penfield Coal and Coke #2 Mine (D212) which lies adjacent to the Tyler Mines ranks as a major point source exceeding an average 625 lbs/day loading (UN183). The smaller D. R. Betta Mine covers approximately 36 acres and has an average acid loading 53 lbs/day (UN184).

Both mines are in the Lower Kittanning vein. The Penfield Coal and Coke #2 Mine has a maximum hydraulic head approximately 50 feet and the Betta Mine, approximately 25 feet. Portions of each mine has been reworked in retreat by several operations. The cropline adjacent to Bennett Branch has been both stripped and augered (S121, S132).

2. Hollywood Area Abatement

To abate the acid mine drainage in the Hollywood area (see Plate No.71) it is recommended to:

A. Design and construct a 4 MGD mine drainage treatment facility with an associated collection system to treat water originating at point sources, M15, P22/P22A, P32/P33, SC49 and SC51/SC52/ SC54.

B. Remove the Proctor #2 Deep Mine Refuse, R305, (710,000 CY) from the Bennett Branch flood plain. The stockpiled "red-dog" material in the area should be retained for use as necessary or used as a land fill material for the proposed treatment plant.

C. Relocate Tyler Run away from its meandering course through the refuse and place it on a more direct route to Bennett Branch (1600 l.f. channel).

D. Extinguish the burning refuse bank near the Proctor #2 tipple and use the 75,000 C.Y. as land fill material.

E. Drain and backfill the swampy area at the Tyler Run mouth (10 acres, 80,000 C.Y. fill).

F. Regrade approximately 14 acres of the abandoned coke oven area such that the refuse and spoil does not oxidize and contribute AMD to the stream. Approximately 200,000 C.Y. material to be graded.

To abate the acid mine drainage along Bennett Branch's Southern Bank (See Plate No.72), it is recommended to:

G. Seal the Penfield Coal and Coke No.2 Mine with four hydraulic seals (Direct Abatement).

H. Seal the D. R. Betta Mine with five hydraulic seals. (Direct Abatement).

3. Hollywood Area Costs and Benefits

Benefits to the stream watershed from Proposed Acid Mine Drainage Projects:

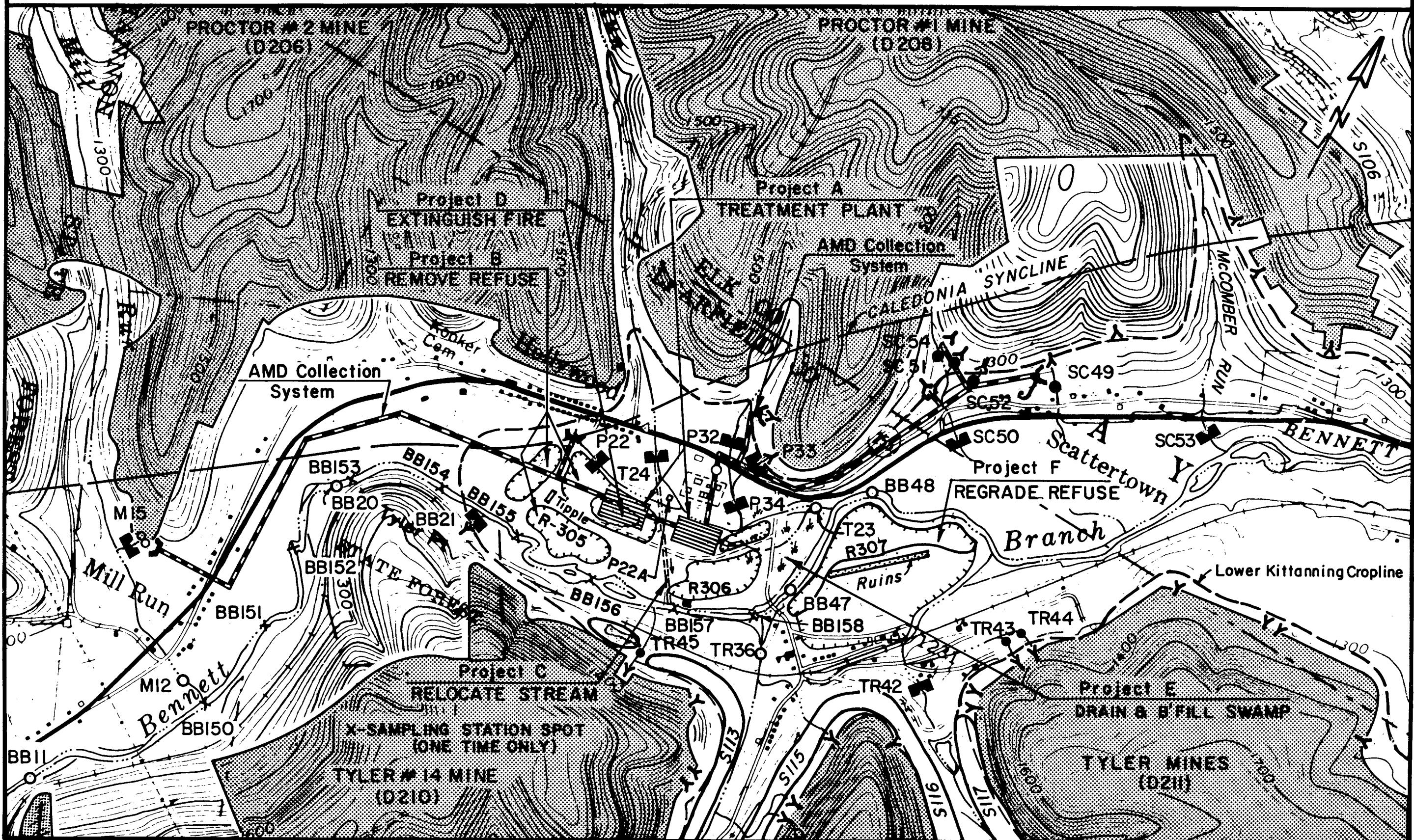
Project No.	Type Project	Efficiency %	AMD Removed (ppd)	Cost
A	4 MGD Treatment Facility Treating D206, D208	100%	10,757	\$1,570,000.*
B	Remove Refuse (R305) 600,000 CY	70%	1,165(e)	461,000.
C	Relocate Tyler Run 1,600 LF	50%	2,265(e)	60,000.
D	Extinguish Refuse Fire (R305) (75,000 CY)	0	0	48,000.
E	Drain and backfill Swamp (80,000 CY)	50%	225(e)	52,000.
F	Regrade "coke oven" Refuse (R307) 14 Acres	70%	251(e)	70,000.
Southern Bank of Bennett Branch Benefits (Direct Abatement to Bennett Branch):				
G	Mine Seals (D212) 4 Each	90%	562	45,000.
H	Mine Seals (D. R. Betta) 5 Each	90%	48	50,000.
Totals Less Project D			16,165	\$2,356,000. 48,000. \$2,308,000.
*20 Year Average Cost				
Watershed Benefits: \$142.00 per pound of Acid Removed from the Hollywood Area.				
46% of AMD Abated from Watershed (BB48 less BB47 = 34,317 ppd)				
(e) Estimated loading				

4. Hollywood Area Mine Drainage Permits and Property Owners

The following is a listing of those Mine Drainage Permits and Property Owners which will affect abatement projects in the Hollywood Area. For additional data concerning ownership refer to Clearfield County Assessment Map No. H1 and Elk County Assessment Photograph 6-205.

Project No.	Mine Drainage Permit No.	Property Owner
A	284	Commonwealth of Pennsylvania New Shawmut Mining Company Stella G. Friday
B		Commonwealth of Pennsylvania New Shawmut Mining Company
C		Commonwealth of Pennsylvania
D		New Shawmut Mining Company
E		New Shawmut Mining Company
F		New Shawmut Mining Company
G	Unknown	Americo & Florence Betta, Weedville, Pa. 15868
H	Unknown	J.V. Hammond, Spangler, Pa. 15775

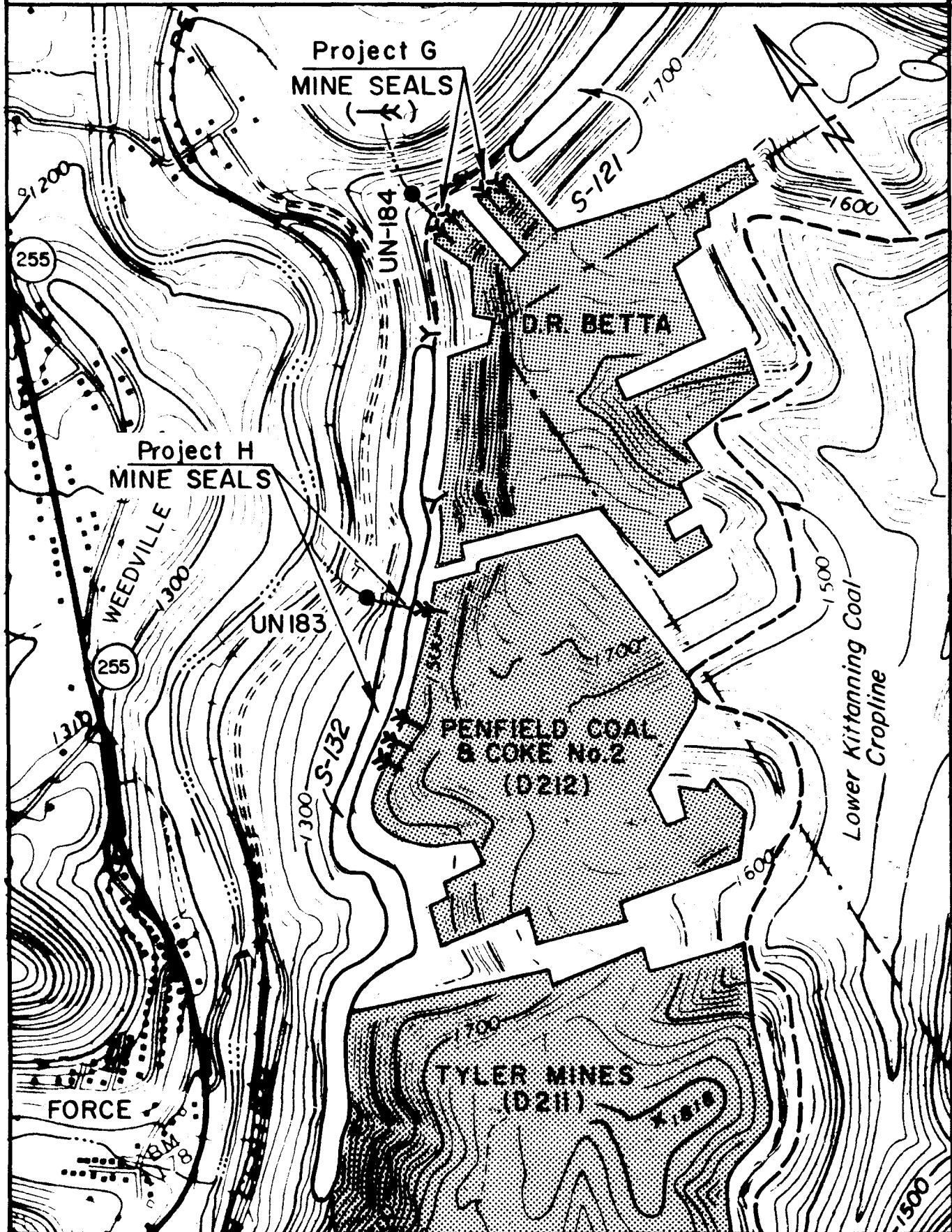
HOLLYWOOD AREA ABATEMENT MEASURES



SCALE : 1" = 1000'

PLATE NO.71

SOUTHERN BANK ABATEMENT MEASURES



SCALE : 1" = 1000'

PLATE NO. 72

VIII-51

H. CHERRY RUN

1. Cherry Run Acid Discharge Pollution

Mine No.	Mine Name	Source No.	Lbs/Day Acid Load
<u>Point Sources</u>			
D209	Shawmut No.41 Mine No.4 Drift No.5 Drift No.8 Drift	- C-56 C-58 C-59	- 674 404 19
D209	Country Bank Mine	C-61A	1
D208	Proctor No.1 Mine Bootleg Entry Maple Hill Mine	- C-63 C-64	- 8 1
<u>Non Point Sources</u>			
R311	Five Points Mine Refuse and S107/108	C-65	165
R312	Refuse at Cardiff (Ruins)	SO-15	36(e)
R310	Proctor No.1 Refuse Seep	C-62	26
R310	Proctor No.1 Refuse	C-61- Less C-65	148
S123	Strip updip of Shawmut #41	Assumed load	635(e)
Known Source Loading Measured Loading at Stream Mouth (C-60 plus C-61)* Acid Loading from Undisclosed Non Point Sources			
2,101 lbs/day 1,364 lbs/day 737 lbs/day			
*Sampling Station C-55 at stream mouth is considered unreliable, thus, C60 plus C61 is utilized for stream loading.			
(e) Estimated loading			

The bulk of pollutants enter Cherry Run from two acid producing tributaries. The first is located about one mile west of Force and accounts for the point source discharges into the stream at the abandoned Village of Cardiff. This stream collects discharges from the Shawmut No.41-42 Mine (D209).

The second tributary (at C65) is located about 2.5 miles west of Force and is affected by discharges from the Five Points Mine (D207).

The Proctor No.1 Mine (D208) is along Cherry Run's southern wall. However, because of the synclinal plunge, only two small discharges affect the watershed (Sampling Stations C-63, C-64). The bulk of the Proctor No.1 Mine discharges influence the Hollywood/Scattertown areas.

Deep mine refuse is the major non-point discharge source and within the watershed there are three areas:

Two acres at Cardiff (R312) which has spilled into the stream to a 40 foot height.

Two acres at Five Points (R311) which lies adjacent to the channel.

Eight acres at the Proctor No.1, No.1 Drift (R310) which is adjacent to the main channel. Large percentages of this refuse has been burned and the ashes have been used by local agencies as construction and anti-skid material.

Because the Shawmut No.41-42 Mine's geologic structure is essentially down dip, it has been strip mined in isolated areas only. Those applications to strip the Lower Kittanning cropline in the Cardiff area have been refused.

The northern cropline of the Proctor No.1 Mine and virtually the entire cropline of the Five Points Mines has been stripped (S106, S107, S108). The Five Points area is currently undergoing a second cutting and the final effect on Cherry Run has not be determined. The acid loading prior to the current mining operations was 165 lbs/day. After the new workings have been reclaimed by the operator, a re-evaluation of pollution to Cherry Run should be made.

Storm runoff that stripping S106 intercepts is directed into the Proctor No.1 deep mine working and affects Tyler Run's AMD loading.

The Shawmut No.41-42 Mine is the predominate pollution source in Cherry Run. This mine has been totally worked out and has two major discharges which flow into the stream - the No.4 Drift (Sampling Station C-56) and the No.5 Drift (C-58).

The mine is similar to the Tyler Mines complex in that the degree of acid discharging is significantly high but for all purposes the total iron discharging from the mine meets current clean water standards and does not require a further iron content reduction.

Strip mine 5123 (Plate No.74), which is located in the Kersey Run watershed and along the northern Shawmut No.41 cropline has a pronounced effect on the water entering the Shawmut No.41 Mine. The grading has been terraced steeply toward the highwall and thus all runoff which enters the stripping is trapped and can eventually seep into the deep mine workings. An assumed 10 mg/l acid has been used in calculating the stripping's contribution to the Shawmut No.41 Mine, and is considered to be a conservative estimate to the potential AMD.

2. Cherry Run Abatement

To abate the acid mine drainage originating in the Cherry Run watershed (See Plate No.73) it is recommended to:

A. Seal the two Proctor No.1 Mine portals (the discharging bootleg entry and the Maple Hill Mine) with three double bulkhead hydraulic mine seals (Transfers AND to Hollywood Area for Treatment).

B. Remove and bury the Proctor No.1 refuse bank, eight acres and 264,000 c.y. of material in Stripping S106. (Approximately one-half of the refuse is "red dog" and should be stockpiled away from the stream).

C. Remove and bury the Shawmut No.41-42 refuse bank, two acres and 108,000 c.y. material in Stripping S106.

D. To abate runoff contributing to the Proctor No.1 Mine acid discharges, it is recommended to regrade strip mine S106 by reversing the terrace away from the highwall (37 acres).

To abate the runoff contributing to the Shawmut No.41-42 Mine acid discharges it is recommended to:

E. Regrade strip mine S123 on the mine's northern cropline by reversing the terrace away from the highwall (40 acres). This stripping should be considered as a burial site for Refuse Bank R318 in Kersey Run.

To eliminate acid mine drainage from those mine adits discharging into Cherry Run (Cardiff) the following is recommended: (See Plate C8).

F. A treatment facility designed to treat only the source's acid discharge. (Further reference should be made to Section M, "Treatment Plant Recommendations").

3. Cherry Run Costs and Benefits

Benefits to the stream watershed from proposed acid mine drainage projects:

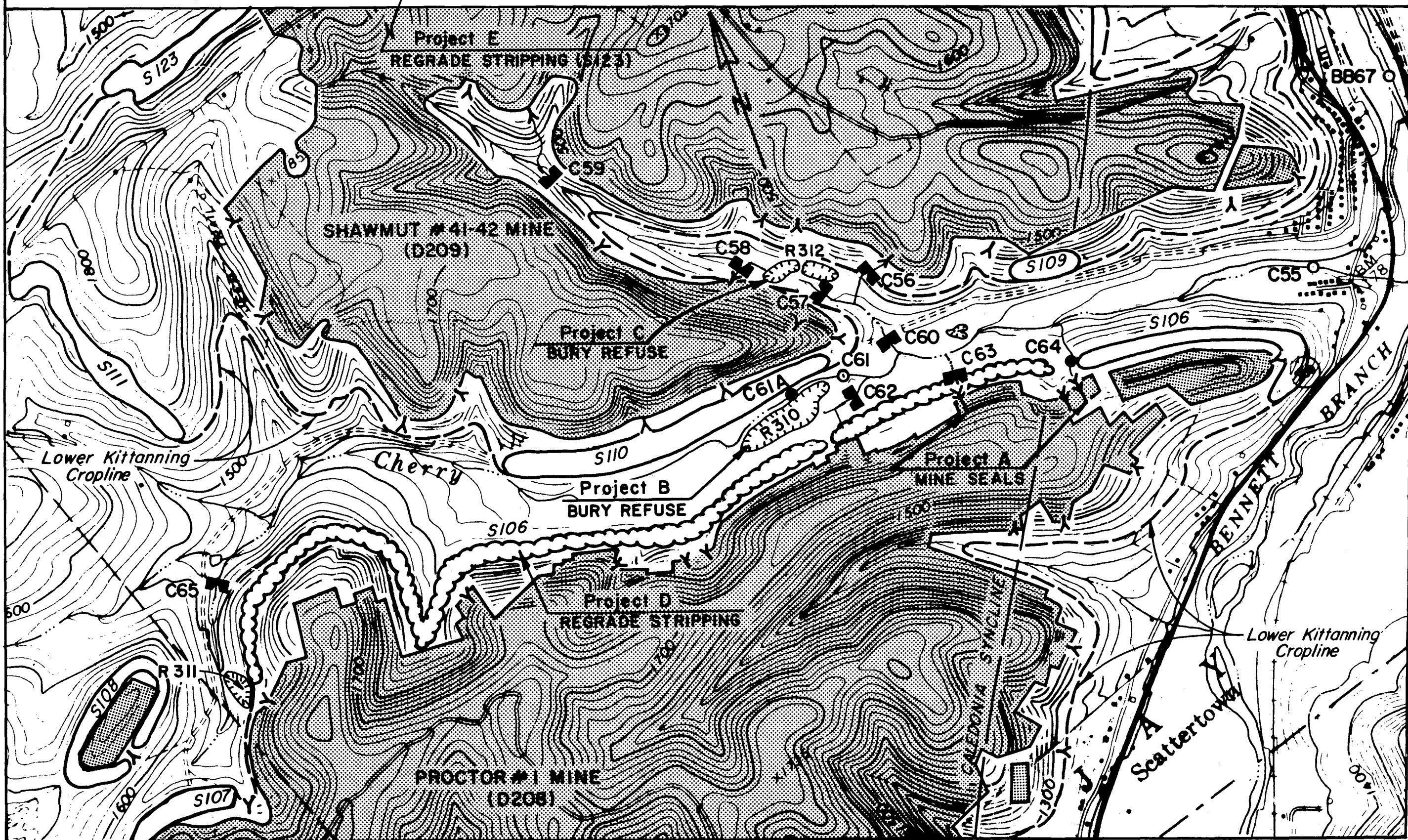
Project No.	Type Project	Efficiency Percent	AMD Removed Lbs/Day	Cost
Cherry Run Benefits				
A	Double Bulkhead Seal (D208) Three each	90	8	\$ 15,000
B	Bury Refuse (R310) 200,000 c.y. (S0-16,17)	70	124(e)	150,000
C	Bury Refuse (R312) 150,000 c.y. (S0-15)	70	25(e)	115,000
F	Treatment Facility (One each, treating C56, C58, C59)	100	1,097	165,000
Shawmut No.41-42 Benefits (Influence to Cherry Run)				
E	Reverse Terraces (S123) 40 Acres (10 mg/l acid assumed)	70	445(e)	100,000
Totals			1,699	\$545,000
Proctor No.1 Benefits (Influence to Hollywood Area)				
D	Reverse Terrace (S106) (10 mg/l acid assumed)	70	245(e)	93,000
<u>Watershed Benefits</u>				
\$254 per pound of acid removed from Cherry Run 29 percent of AMD abated from watershed by reclamation 81 percent of AMD abated from watershed including treatment				
(e) Estimated loading				

4. Cherry Run Mine Drainage Permits and Property Owners

The following is a listing of those Mine Drainage Permits and Property Owners that will affect abatement projects on Cherry Run. For additional data concerning ownership refer to Elk County Assessment Photograph No.6-190 and 6-207.

Project No.	Mine Drainage Permit No.	Property Owner
A	3066BSM28 10959 11849	Byrnedale Coal Company St. Marys, Pennsylvania 15857
B	4672SM1	New Shawmut Mining Company St. Marys, Pennsylvania 15857
C	3066BSM51	New Shawmut Mining Company
D	3067BSM22	New Shawmut Mining Company
E	Unknown	Rachel Hayes & Dorothy Callahan 117 S. Highland St., DuBois, Pa. 15801 Jeremiah K. & Victor A. Beck R. D. #2, Weedville, Pa. 15868 New Shawmut Mining Company St. Marys, Pennsylvania 15857
F	284	New Shawmut Mining Company

CHERRY RUN ABATEMENT MEASURES



I. KERSEY RUN

1. Kersey Run Acid Discharge Pollution

Mine No.	Mine Name	Source No.	Lbs/Day Acid Load
<u>Point Sources</u>			
D209	Shawmut No.42, No.3 Drift	BR-71	204
-	Country Bank Mine	BR-72	74
D214	Shawmut No.31, No.2 Drift	K-82	40
-	Gustafson Mine	K-83/K-84	27
D214	Shawmut No.31 (Potash Run)	K-90	78
<u>Non Point Sources</u>			
R313	Shawmut No.42 Refuse	BR-70 less BR-71	214
R324	Proctor No.4 Refuse	K-79	209
R318	Coke Oven Refuse	K-85/SO-26	120(e)
R317	Shawmut No.31 Refuse	K-87/K-90	109
R316/ 319	Potash Run Refuse at Ponds	K-88/K-87	98
R315	Shawmut No.31, No.2 Refuse	SO-22	60(e)
Known Source Loading		1,233 lbs/day	
Measured Loading at Stream Mouth (K-74)		2,127 lbs/day	
Acid Loading from Undisclosed Non Point Source		894 lbs/day	

The water quality of Kersey Run, above Byrnedale, is essentially that of a clean stream. Between Byrnedale and Weedville the stream is polluted by three minor tributaries (see Plate No.74); Browns Run, producing an estimated average of 800 lbs/day of acid (BR68, 70, 71); Potash Run, yielding an estimated average of 325 lbs/day (K88); and an unnamed stream north of Potash Run which parallels Pennsylvania Route 255 and produces an estimated average 254 lbs/day acid (K78).

Along Kersey Run and south of Byrnedale is a series of coke oven ruins and an associated refuse area (R318) which covers five acres

with approximately 84,000 c.y. refuse material. Based upon Soil Sample S0-26, there is a potential 120 lbs/day acid which can enter Kersey Run from this refuse. An average 34 lbs/day has been measured at Sampling Station K-85.

The principle source along Browns Run is the Shawmut No.42 Mine, No.3 Drift (Sampling Station BR-71) which has been stripped through and collapsed. Runoff enters the deep mine through stripings S123 and S124, portions of which discharge from the portal as Kersey Run's largest point source.

The country bank mine (BR-72) is a small isolated mine which has been extensively stripped (S131). The mine has a high acid concentration with a relatively small discharge.

Adjacent to the channel is 4.6 acres of refuse (R313) from the Shawmut No.42 Mine (D209). The refuse volume is about 136,000 cubic yards of which 50 percent, has been burned.

Potash Run receives AMD from the Shawmut No.31 Mine and its several refuse banks. Because of the mine's relationship to the geologic structure and to the Caledonia Syncline, only a small portion of the ground water is routed into Potash Run. Most of this discharge is from Sampling Station K-90, a collapsed adit near the stream headwaters and from the No.2 Drift located near the mouth. The smaller Gustafson Mine is an intermittent flowing source (K-83/K-84) which is isolated from the Shawmut Mines and contributes to the pollution only during periods of wet weather.

In addition to the deep mine discharges, there are four areas of deep mine refuse. The first (R317) is located near the headwaters where 20,000 c.y. of refuse has been deposited directly in the stream. The second area (R316), contains some 20,000 c.y. refuse and is located at the No.31 Drift (assumed to be the original entry into the mine). The third refuse area (also R316) is located from the tributary mouth to a point nearly 1,200 feet along Potash Run and contains 115,000 c.y. material. The fourth and final refuse bank (R315) is associated with the Shawmut No.31 Mine, No.2 Drift and contains 26,000 c.y. which covers 0.7 acres.

The unnamed stream which parallels Pennsylvania Route 255 receives acid from the Proctor No.4 refuse (R319), the small Russell Mine, the two stripings (S125, S126) and several unnamed country bank mines. All of these sources are involved either with active stripping or proposed stripping. Because of the pending changes to this subwatershed it is recommended to review its acid mine characteristics at some future date.

2. Kersey Run Abatement

To abate the acid mine drainage into Browns Run it is recommended to (Plate No.74):

- A. Seal the Shawmut No.42, No.3 Drift (D209) with two double bulkhead seals capable of withstanding a hydraulic head of 75 feet (Transfers AMD to Cherry Run for Treatment).
- B. Seal the small country bank mine located near Strip Mine S131 with double bulkhead hydraulic seal (Direct Abatement).
- C. Remove and bury the pyritic material in the Shawmut No.42 refuse. The "red dog" material should be separated and stockpiled in a more suitable place for future use. Consider using S122 as a possible burial site.

To abate the acid mine drainage to Potash Run it is recommended to:

- D. Remove the existing air seals at the Shawmut No.31, No.2 Drift and replace with two double bulkhead hydraulic seals capable of withstanding a 25 foot head.
- E. Seal the Shawmut No.31 Drift located near the stream headwaters with three double bulkhead hydraulic seals (Transfer AMD to Dixon Run for Treatment).
- F. Seal the Gustafson Mine with double bulkhead seal (Direct Abatement).
- G. Remove and bury in S129, the refuse located near the stream headwaters (R317).
- H. Remove and bury in S129, the refuse located both at the No.31 Drift and for 1,200 feet along the stream (R316).
- J. Remove and bury in S130 the refuse located at the No.2 Drift (R315).

To abate the acid mine drainage which directly affects Kersey Run it is recommended to:

- L. Remove and bury the refuse remaining from the abandoned coke oven operations near Byrnedale (R318). Consider S123 as a potential burial site.

To reduce the runoff contributing to the Shawmut No.41-42 Mine acid discharges it is recommended to:

- M. Regrade portions of Strip Mine S124 along the mine's cropline by reversing the terrace to carry runoff away from the highwall (10 acres).

3. Kersey Run Costs and Benefits

Benefits to the stream watershed from proposed acid mine drainage projects:

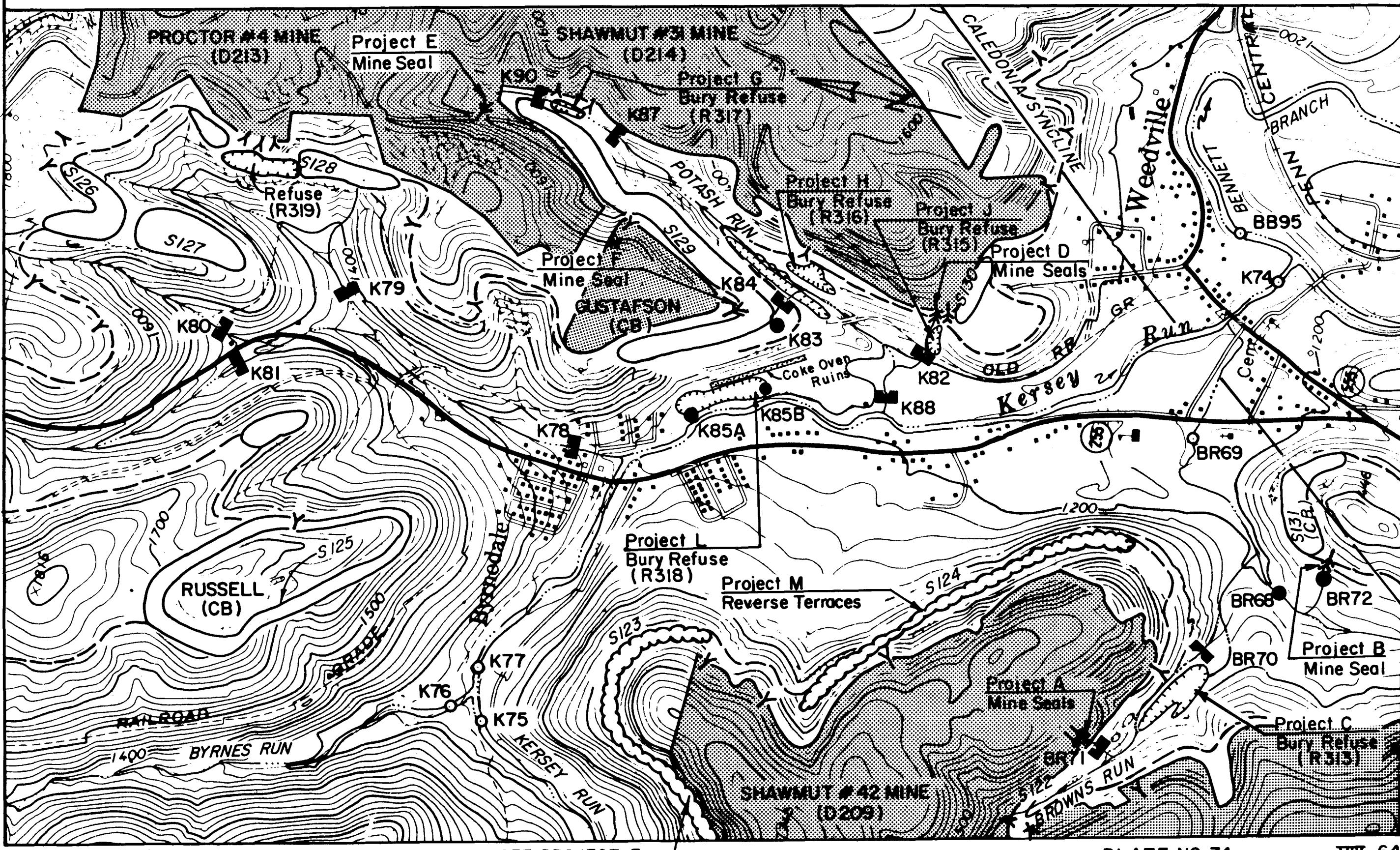
Project No.	Type Project	Efficiency Percent	AMD Removed Lbs/Day	Cost
Browns Run Benefits				
A	Mine Seal (D209, No.3 Drift) Two Each	90	184	\$ 25,000
B	Mine Seal (CB/S131) Two Each	90	67	5,000
C	Remove and Bury Refuse (R313) 136,000 c.y.	70	29(e)	83,000
Potash Run Benefits				
D	Mine Seal (D214, No.2 Drift) Two Each	90	36	20,000
E	Mine Seal (D214) Three Each	90	70	15,000
F	Mine Seal (Gustafson) One Each	90	24	5,000
G	Remove and Bury Refuse at Headwaters (R317) (20,000 c.y.)	70	55(e)	10,000
H	Remove and Bury Refuse (R316) 134,000 c.y.	70	70(e)	159,000
J	Remove and Bury Refuse (R315) 26,000 c.y.	70	42(e)	26,000
Kersey Run Benefits				
L	Remove and Bury Refuse (Coke Oven Ruins, R318) 84,000 c.y.	70	84(e)	89,000
Totals			815	437,000
Shawmut No.41-42 (Brown's Run Benefits)				
M	Reverse Terraces (S124) 10 Acres	70	287(e)	30,000
Watershed Benefits				
\$530 per pound of acid removed from Kersey Run 44 percent of AMD abated from watershed				
(e) Estimated loading				

4. Kersey Run Mine Drainage Permits and Property Owners

The following is a listing of those Mine Drainage Permits and Property Owners that will affect abatement projects on Kersey Run. For additional data concerning ownership refer to Elk County Assessment Photograph No.6-190 and 6-207.

Project No.	Mine Drainage Permit No.	Property Owner
A	261M135	New Shawmut Mining Company St. Marys, Pennsylvania 15857
B		Glen Irvan Corporation R. D. #1, Sidman, Pa. 15955
C		Bernardino Palumbo Est. 57 Johnson St., Gowanda, New York 14070
D	1131 9266	New Shawmut Mining Company
E	4673SM1 18711	New Shawmut Mining Company
F	4673SM3 18711	New Shawmut Mining Company
G	4673SM3 1131	New Shawmut Mining Company
H	1131	New Shawmut Mining Company
J	9266	New Shawmut Mining Company
L	Unknown	Unknown
M	9916	New Shawmut Mining Company

KERSEY RUN ABATEMENT MEASURES



SCALE : 1" = 1000'

SEE PROJECT E
CHERRY RUN

PLATE NO. 74

VIII-64

J. DIXON RUN

1. Dixon Run Acid Discharge Pollution

Mine No.	Mine Name	Source No.	Lbs/Day Acid Load
<u>Point Sources</u>			
D214	Shawmut No.31 Mine Complex Caledonia Hollow Tunnel No.33 Drift Shaffer Hollow No.1 Drift Shaffer Hollow No.2 Drift Shaffer Hollow, Auger Hole No.22 Drift No.22 Water Course	CA-99 CA-100 CA-103 CA-104 CA-105 CA-109 CA-111 CA-107	3,294 23 221 171 958 2,017 190 1,053
D215	Proctor No.3 Water Course Proctor No.3, No.1 Drift Proctor No.3, No.3 Drift	CA-108 CA-110	839 24
D127	Hand No.13 Mine	CA-97/98	14
Known Source Loading 8,804 lbs/day Measured Loading at Stream Mouth (CA-101/CA-102)* 7,978 lbs/day Acid Loading from Undisclosed Non Point Sources - 826 lbs/day			
*Sampling Station CA96 is considered low reliability			

The Shawmut No.31 Mine (D214) which dates back to 1890 is the oldest major deep mine system in the study area. It is commonly known by this name although it includes Shawmut No.22, Shawmut No.33, and Shaffer Hollow No.2. Additional deep mines are included in this review because of their direct connection to Shawmut No.31 or direct influence on Dixon Run (See Plate C6).

The Proctor No.4 Mine (D213) lies up dip structurally to Shawmut No.22 and has cut into the abandoned workings to facilitate drainage. The extent of coal removed from Proctor No.4 is unknown; however, it is estimated that a maximum 437 acres were worked since the mine began operations in 1956.

The Hand Coal No.13 Mine (D217) is in the Middle Kittanning Vein and lies 80 feet vertically above the Shawmut No.22-31 workings. Boreholes were drilled down into the abandoned mine to remove ground water. The workings cover an estimated 75 acres.

The predominant polluting source on Dixon Run is by far the Shawmut No.31 Mine complex which totals over 1,290 acres. There are 18 known adits into the mine. Of the seven discharging sources, six are considered to be major pollutants.

These sources are clustered into two small areas, one on each branch of Dixon Run. In Caledonia Hollow the Shawmut No.33 Tunnel, the Shawmut No.22 Watercourse, and the No.22 Drift all lie near the syncline axis and account for 5,500 lbs/day acid and have concentrations which average $400 \pm$ mg/l. In Shaffer Hollow, the Shaffer Hollow No.2 Mine has three highly acidic adits (500 mg/l); both the No.1 and No.2 drifts and a pair of auger holes apparently drilled into the workings which were never sealed. These Shaffer Hollow sources yield an accumulated 1,360 lbs/day acid.

Dixon Run Sources in Shawmut No.31 Mine Complex		
Portal	Sampling Station	Acid Loading Lbs/Day
Caledonia Hollow Area		
Shawmut No.33, Caledonia Hollow Tunnel	CA-99	3,294
Shawmut No.22 Tunnel	CA-109	2,017
Shawmut No.22 Water Course	CA-111	190
Shaffer Hollow Area		
Shaffer Hollow No.2, No.1 Drift	CA-103	221
Shaffer Hollow No.2 Drift	CA-104	171
Shaffer Hollow Auger Holes	CA-105	958

Virtually the entire cropline within the watershed has been stripped (S143, 144, 145, 146 and 147) and auger mined. With the exception of the recent strip operation, S144, all of the surface mines have been regraded with the terrace sloped to the highwall and direct the runoff into the deep workings.

In the Shawmut No.22 workings, there is at least one open portal in the highwall S145 through which surface water flows directly into the mine.

Two other mines lie within the Dixon Run watershed but are not interconnected to the Shawmut No.31 complex.

The Proctor No.3 Mine (D215) is located 0.3 miles north of the Village of Caledonia and is in the east wall of the watershed. The workings cover approximately 258 acres and are generally located on the axis of the Caledonia Syncline. This mine has three major drainage sources of interest: the No.1 Drift (Sampling Station CA-108); the water course (CA-107) located 1,000 feet left of the No.1 Drift; and a minor drift (CA-110). The three sources combined have a discharge of 200 g.p.m. and the total acid load exceeds 1,915 lbs/day.

The entire cropline along both the southern and western flanks has been both stripped (5142) and auger mined. The number of auger holes that penetrated the deep workings is unknown; however, to date none have shown evidence of leaking.

The smaller Owens Mine (D216) lies up dip and is interconnected with Proctor No.3. Ground water from these workings appears to enter Proctor No.3. During the sampling period the Owens Mine did experience a single flush out following a rather prolonged wet period. Before a sampling program could be established the mine apparently resealed itself and ceased flowing.

The Owens Mine's entire cropline has been both stripped and augered (S14I). Reclamation performed by the operator was to slope the terrace toward the highwall, thus trapping any storm runoff in the workings.

The Lower Kittanning cropline in Spring Run, which lies adjacent to Proctor No.4 and to Shaffer Hollow No.2, has been both stripped and augered (S133 and S138). Again the stripings were graded with the terrace sloping to the highwall. In an effort to protect Spring Run from AMD, the operators who auger mined were apparently instructed to intercept the deep workings in order to direct the ground water down dip and away from Spring Run. Portions of this particular cropline are being actively surface mined and should be reviewed at a later date for compliance to State regulations.

2. Dixon Run Abatement

To abate the acid mine drainage originating in Dixon Run (See Plate No.75) it is recommended to:

A. Seal the Hand Coal No.13 Mine with three double bulkhead hydraulic seals and force all water to flow into the Shawmut No.31 complex. (Transfers AMD to Shawmut No.31 Complex for Treatment).

B. Seal the Proctor No.3 Mine, No.3 Drift with one double bulkhead hydraulic seal in order to route flow toward the mine's water course.

C. Seal the Shawmut No.33 Drift with one double bulkhead hydraulic seal (Transfers AMD to Shawmut No.31 Complex for Treatment).

D. Seal the Shawmut No.22 portal with a single concrete block seal to intercept runoff from S145 (Direct Abatement).

To reduce the runoff infiltration into the Shawmut No.31 Mine complex it is recommended to:

E. Reverse the terrace of stripping S133 (57 acres) in Spring Run (Plate C6).

F. Reverse the terraces of stripings S143 (13 acres) and S145 (22 acres) in Shaffer Hollow.

G. Reverse the terrace of stripping S146 (7 acres) in Caledonia Hollow.

To reduce the runoff infiltration into Proctor No.3 and the Owens Mines it is recommended to:

H. Reverse the terraces of stripings S141 (24 acres) and S142 (14 acres).

To eliminate acid mine drainage from both the Shawmut No.31 complex and Proctor No.3 it is recommended to:

I. Collect the discharge from the six previously described portals in Shawmut No.31 and the two remaining sources in Proctor No.3; transport the flow via open channel flumes to a central location near the Village of Caledonia for treatment.

For further discussion concerning the abatement of Dixon Run pollution the following articles in this chapter should also be reviewed:

1. Section M, "Treatment Plant Recommendations".

3. Dixon Run Costs and Benefits

Benefits to the stream watershed from proposed acid mine drainage projects:

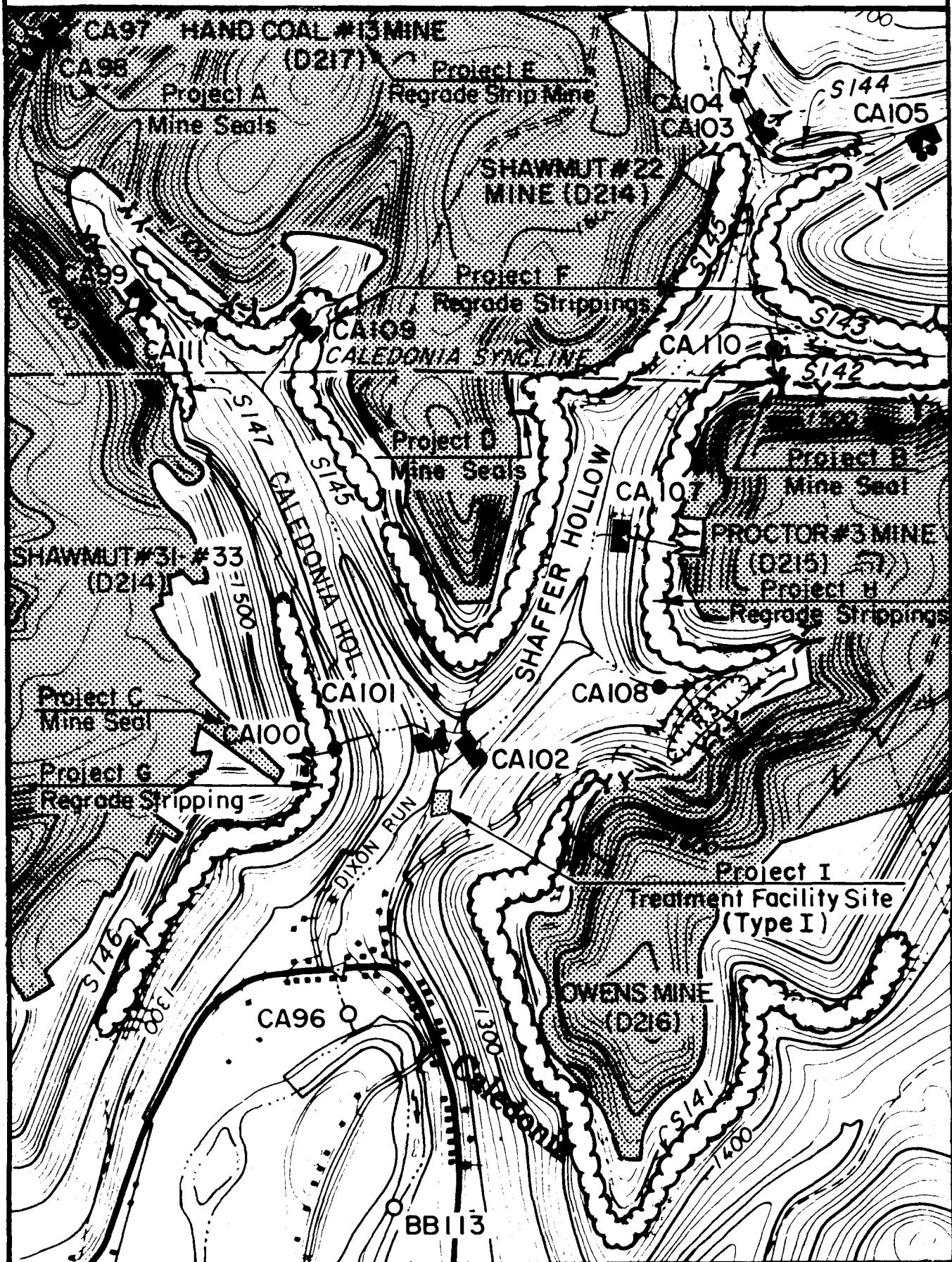
Project No.	Type Project	Efficiency Percent	AMD Removed Lbs/Day	Cost
A	Double Bulkhead Seal (D217) Three Each	90	13	\$ 15,000
B	Double Bulkhead Seal (D215, No.3 Drift) One Each	90	22	5,000
C	Double Bulkhead Seal (D214, No.33 Drift) One Each	90	21	5,000
D	Single Concrete Block Seal (D219)	Preventative Work		5,000
Totals			56	\$ 30,000
Shawmut No.31 Mine Complex Infiltration Benefits				
E	Regrade Stripping S133 (57 Acres)	70	517(e)	\$143,000
F	Regarde Strippings S143, S145 (35 Acres)	70	642(e)	88,000
G	Regrade Stripping S146 (7 Acres)	70	101(e)	180,000
Proctor No.3 and Owens Mines Infiltration Benefits				
H	Regrade Strippings S141, S142 (38 Acres)	70	1,389(e)	100,000
Shawmut No.31 - Proctor No.3 Treatment				
I	Collect and transport acid mine drainage from Shawmut No.31, No.33, No.22, Shaffer Hollow No.2 and Proctor No.3 to proposed treatment facility	100	8,767	1,328,000*
<u>Watershed Benefits</u>				
\$502 per pound of acid removed from Dixon Run using reclamation methods. \$163 per pound of acid removed by treatment (20 year average) 1% of AMD abated from watershed without treatment 100% of AMD abated from watershed using treatment				
(e) Estimated loading		*20 Year Average Cost		

4. Dixon Run Mine Drainage Permits and Property Owners

The following is a listing of those Mine Drainage Permits and Property Owners that will affect abatement projects on Dixon Run. For additional data concerning ownership refer to Elk County Assessment Photograph No.6-191 and 6-205.

Project No.	Mine Drainage Permit No.	Property Owner
A	267M023	New Shawmut Mining Company St. Marys, Pennsylvania 15857
B	9915	New Shawmut Mining Company
C	18984	New Shawmut Mining Company
D		New Shawmut Mining Company
E	4673SM14	James P. & Shirley Burke R.D., Weedville, Pennsylvania 15868
F	9917 3068BSM27	New Shawmut Mining Company
G	9917 3067BSM27	New Shawmut Mining Company
H	3068BSM27 3164SM15	New Shawmut Mining Company
I		New Shawmut Mining Company

DIXON RUN ABATEMENT MEASURES



SCALE : 1" = 1000'

PLATE NO. 75

VIII-71

K. TROUT RUN

1. Trout Run Discharge Pollution

<u>Point Sources</u>			
Mine No.	Mine Name	Source No.	(ppd) Acid Load
D220	Spring Run	ST114	3
D218	Cool Springs	ST116, 117	37
D219	Pine Valley	ST118	56
D221	B. Winslow (CB)	TT123	489
	Country Bank	TT124	5
	Cummings (CB)	TT125	21
	Country Bank	TT131	3

<u>Non-Point Sources (Surface Mines)</u>			
Mine No.	Mine Name	Source No.	(ppd) Acid Load
S135	Unknown	ST115	73
S134	Unknown	ST120	6
S165	Unknown	TT132	61
S175	Eph Morey Hollow Mine	TT133	11
S161	Chase Hollow Mine	CH189	78
	Unknown	CH190	245
S161	Chase Hollow Mine	CH191	17
S162	Chase Hollow Mine	CH192	5
	Unknown	CH193	268
S179	Unknown	W196	16

Known Source Loading: 1,394 ppd
 Measured Loading at Stream Mouth (TT122): 3,500 ppd
 Acid Loading from Undisclosed Non-Point Sources: 2,106 ppd

Only eight percent of Trout Run's 106 stream miles is affected by acid mine drainage. Most of the polluting sources are concentrated into two distinct areas; the Winslow Hill region adjacent to the watershed mouth and the upper reaches of Spring Run. The vast balance of the watershed is outside of the coal bearing formations and thus sustains water at a high quality. By eliminating the acid pollution from Trout Run, over 57 square miles of terrain (one-half of the study area) would meet the standards established by the Pennsylvania Clean Streams Law (1970).

Three tributaries of Trout Run display definite acidic characteristics and three smaller watersheds which have been strip mined are mildly acid in nature. Coal Bank Run, Chase Hollow Run and Spring Run contain the vast majority of polluting sources.

Both Chase Hollow and Coal Bank Run are within the most geologically complex region of the study area (Plates Nos.76 and 77). Three coal veins, the Clarion (Clermont), Lower Kittanning, and Middle Kittanning have been stripped; the Lower Kittanning has also been deep mined.

For the most part strip mining operations have been recorded; however, only sparse data is available for any deep mining operation. Most of the mines were operated during World War I and closed soon afterward. They were generally small in nature and maps were not kept. The only source of information about the conditions of these mines are the local miners who worked in them and still live in the area. Realizing that these "country bank" operations are now as much as 60 years old, it is possible that mine locations may never be totally identified in this region.

The one exception to the deep mine mapping data is the Winslow Hill No.1 Mine (D221) in the Lower Kittanning Vein. The Winslow Hill No.1 Mine was worked until 1969 when the operator sealed the active entries. The original watercourse was apparently permitted to flow freely. Basically, the mine portal lies on the Caledonia Syncline axis and discharges to the Dents Run Watershed where it was the subject of a separate study. Because of an extremely high acid concentration cited by Project SL-161, Source 109, (4,000 mg/l and 700 lbs/day acid) it is worthy of note. A spot sample of the original watercourse and a nearby pond (PH284, PH285) show that the effluent into Porcupine Hollow is still acid. The Mine does have a secondary discharge into Coal Bank Run. Spot samples at this portal (TT257 and 258) indicate acid concentrations at 200 mg/l. Surface mining operations in Coal Bank Run has recently disturbed this secondary discharge and the discharge is significantly reduced. It is recommended that any abatement projects to this source be reviewed for consideration after the surface mine has been reclaimed.

Coal Bank Run has received mine discharge from at least two country bank mines and from heavily stripped croplines along all three veins. Currently, there is active stripping in the two Kittanning Veins in the watershed's upper reaches and reclamation will be performed to these workings under existing state regulations. Because of the proposed mining in Coal Bank Run, no abatement reassures in the Lower Kittanning Vein are proposed until all coal reserves have been taken. After active mining has ceased then a reevaluation of Coal Bank Run should be determined.

The stripping operation in the Clarion Vein between Coal Bank Run and Chase Hollow Run, "Gobblers Knob", has been regraded as part of a U.S. Bureau of Mines' demonstration project known as the E1 Camton Project (Plates No.4 and 5). This project was discussed previously in the report.

Chase Hollow Run, near its mouth, has an average acid of 703 lbs/day (TT126) and has at least seven sources which contribute to the stream quality deterioration. Six of the sources discharge from surface mining operations, both the Clermont (A) and Lower Kittanning (B) veins. There is one known discharging deep mine, the Cummings Mine (TT125) whose cropline has been stripped but apparently has not been cut into.

The Cummings Mine is a small "country bank" type working that was never mapped. In discussions with some of the older miners in the area, a generalized sketch was developed showing that the workings covered some 9 acres and went approximately 600 feet into the Lower Kittanning seam.

Mine No.	Source No.	Acid Loading (lbs/day)
S161	CH189/191	95
S162	CH192	5
S165/S167	TT132	61
"B" Vein Discharge Cummings (CB)	CH190/193	513
	TT125	21
Accumulated Total		695
Measured Total		703

During several field investigations, spot water quality analyses indicated that acid mine drainage exists as impoundments in stripings S160, S163 and 5164.

Along Trout Run's southern bank are four minor tributaries, Eph Morey Hollow, Whiskey Run, and two unnamed streams. Eph Morey Hollow is not considered an acid stream; however, the others do display mildly acid characteristics. Whiskey Run collects runoff from stripings S175, 176, 177 and is monitored by Sampling Station TT282. The western unnamed

tributary receives AMD from Strippings S177, 178, 179 at TT281 and the eastern tributary receives the bulk of its loading from Strip S179 (TT253) outfall.

The Stony Brook tributary of Spring Run received its major mine drainage from; the Cool Springs Mine (D218), Pine Valley (D219), and the Spring Run Mine (D220); in addition to the discharges strip mines S134 and S135 (Plate No.78).

Mine No.	Source No.	Acid Loading (lbs/day)
D218	ST116/117	37
D219	ST118	56
D220	ST114	3
S134	ST120	6
S135	ST115	73
Accumulated Total		175
Measured Total (ST119)		774

Sampling Station ST119 also displays 2,057 lbs/day alkalinity

The Cool Springs Mine (D218) is in the Clarion coal seam, covers approximately 23 acres and has a hydraulic head of some thirty feet. Local miners have stated that drill holes from the overlying Spring Run Mine (D220) have been cut into the lower workings to facilitate drainage. As a result the Cool Springs Mine could quite possibly be the source for the strip mine S135 discharge.

The Pine Valley Mine (D219), also in the Clarion Vein, has had approximately 20 acres of coal removed. Its hydraulic head is in the 35 to 40 feet range. The mine's portals have deteriorated and collapsed. Both entries discharge a total 68 gpm of mine drainage to Spring Run. The western cropline line of this mine has been stripped (S-137) but apparently has not been cut into the deep workings.

The Spring Run Mine (D220) in the Lower Kittanning Seam and covers 12 acres. The mine has been stripped on three sides, (S135, S136) but does not appear to have been cut into. There has been only one portal driven into this mine. The airway was developed from an airshaft which will not be a factor for considering any corrective action.

TROUT RUN SPOT SAMPLES DATA
(See Plate Nos.76 & 77)

Sampling Station	Date	pH	Acid mg/l	Alkalinity mg/l	Iron mg/l	Sulfate mg/l	Mine No.
TT-250	7/1/75	6.5	0	18	2	12	
TT-251	7/1/76	6.6	0	30	1	24	
TT-252	4/29/75 2/26/76	4.3 4.5	16 16	0 10	0 0	250 225	
TT-253	4/29/75 2/26/76 8/24/76	4.1 5.3 4.4	10 4 46	0 10 6	0 0 2	300 110 245	S179
TT-254	4/29/75	4.0	16	0	0	275	S179
TT-255	4/29/75	3.7	72	0	0	450	S177
TT-256	4/29/75 8/24/76	6.2 6.6	4 6	16 22	0 0	275 260	
TT-257	7/1/75 2/26/76	3.5 4.0	200 210	0 0	93 54	790 1,125	D221
TT-258	2/26/76	3.7	192	0	29	1,125	D221
TT-259	7/1/75 2/26/76	4.3 4.7	20 10	4 4	0 0	176 150	S157
TT-260	7/1/75 2/26/76	6.1 4.7	4 6	12 6	1 0	30 110	S158
TT-261	2/26/76	7.7	8	94	0	360	S159
TT-262	2/26/76	8.0	4	26	0	160	
TT-263	2/26/76	3.7	190	0	6	925	S160
TT-264	2/26/76	7.1	6	24	2	375	S160
TT-265	2/26/76	4.0	226	0	10	1,600	S160
TT-266	2/26/76	7.2	8	44	0	1,250	S161
TT-267	2/26/76	4.4	22	6	0	100	S162
TT-268	4/7/75	6.0	2	6	0	175	S171

Sampling Station	Date	pH	Acid mg/1	Alkalinity mg/1	Iron mg/1	Sulfate mg/1	Mine No.
TT-269	4/29/75 2/27/76	6.6 4.3	4 20	14 6	0 0	275 310	S171
TT-270	2/26/76	4.2	24	4	0	210	S164
TT-271	2/26/76	4.5	42	6	0	700	S164
TT-272	4/7/75	4.0	12	0	0	300	
TT-273	4/7/75	5.4	2	4	0	200	
TT-274	4/7/75	6.2	2	6	0	225	
TT-275	4/7/75	5.5	2	6	0	250	
TT-276	4/7/75	4.1	10	0	0	275	
ST-277	4/7/75	4.7	4	2	0	325	
ST-278	4/7/75	6.8	2	28	0	225	
TT-279	8/24/76	6.8	10	36	0	170	
TT-280	8/24/76	4.2	36	2	0	188	
TT-281	8/24/76	4.3	56	2	1	235	
TT-282	8/24/76	5.8	40	12	1	290	
TT-283	8/24/76	6.7	16	16	0	218	
PH-284	8/24/76	2.2	1,530	-	510	3,175	
PH-285	8/24/76	2.4	346	-	18	1,088	

2. Trout Run Abatement

To abate the acid mine drainage originating in Chase Hollow Run (See Plate No.76) it is recommended to:

- A. Reverse the terrace of Strippings S-159, S-160, S-161, S-162, S-163, S-164, S-165 and S-167 (59 Acres).
- B. Seal the Cummings Mine with two double bulkhead hydraulic mine seals (Direct Abatement).

To abate the acid mine drainage originating in Coal Bank Run (See Plate No.76) it is recommended to:

- C. Reverse the terrace of Strippings S-157 and S-158, (11 Acres).
- D. Seal the B. Winslow Mine with two double bulkhead hydraulic mine seals (Direct Abatement).

To abate the acid mine drainage in Trout Run (See Plates No.76 and No.77) it is recommended to:

- E. Reverse the terrace of Strippings S-175, S-176, S-177, S-178 and S-179 (34 Acres) at Whiskey Run and Eph Morey Hollow.

F. Reverse the terraces of Strippings S-169, S-170, S-171 (13 Acres) north of Chase Hollow.

To abate the acid mine drainage originating in Spring Run (See Plate No.78) it is recommended to:

G. Seal the Cool Springs Mine (D218) with three double bulkhead hydraulic mine seals (Direct Abatement).

H. Seal the Pine Valley Mine (D219) with three double bulkhead hydraulic mine seals (Direct Abatement).

I. Seal the Spring Run Mine (D220) with one double bulkhead hydraulic mine seal (Direct Abatement).

J. Reverse the terrace of stripping S134 (3 Acres).

K. Construct 600 LF grout curtain above the highwall of stripping (S135), then regrade by reversing the terrace (2 Acres).

3. Trout Run Costs and Benefits

Benefits to the stream watershed from proposed acid mine drainage projects:

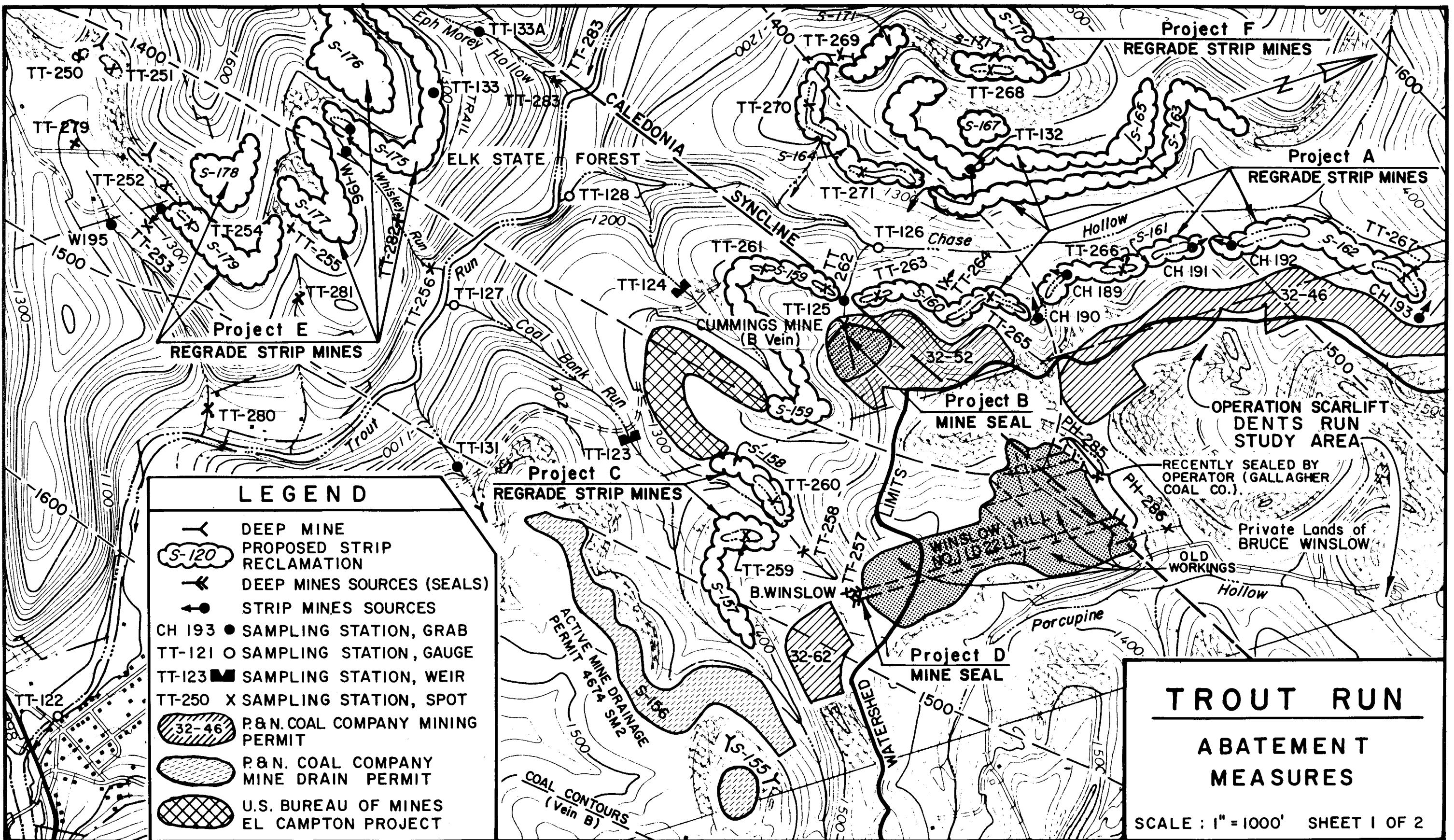
Project No.	Type Project	Efficiency Percent	AMD Removed Lbs/Day	Cost
Chase Hollow Benefits				
A	Regrade Stripping S159, S165, S167 (59 Acres)	70	186(e)	\$141,600
B	Double Bulkhead Seal (Cumming Mine) Two Each	90	19	24,000
Coal Bank Run Benefits				
C	Regrade Stripping S157, S158 (11 Acres)	70	60(e)	26,000
D	Double Bulkhead Seal (B. Winslow) Two Each (D221)	90	364	24,000
Trout Run Benefits				
E	Regrade Strippings S175, S179 (34 acres)	70	58(e)	82,000
F	Regrade Strippings S169, S171 (13 Acres)	70	23(e)	31,000
Spring Run Benefits				
G	Double Bulkhead Seal (D218) Three Each	90	34	36,000
H	Double Bulkhead Seal (D219) Three Each	90	51	36,000
I	Double Bulkhead Seal (D220) One Each	90	6	12,000
J	Regrade Stripping S134 (3 Acres)	70	5(e)	7,000
K	Grout Curtain (600 LF) Regrade Stripping, S135 (Two Acres)	70	50	35,000
Totals			856	\$455,000
Watershed Benefits				
\$531 per pound of acid removed from Trout Run 24 percent of AMD abated from watershed				
(e) Estimated loading				

4. Trout Run Drainage Permits and Property Owners

The following is a listing of those Mine Drainage Permits and Property Owners that will affect abatement projects on Trout Run. For additional data concerning ownership refer to Elk County Assessment Photograph Nos.6-153, 6-164 and 6-191.

Project No.	Mine Drainage Permit No.	Property Owner
A	12166 14244	Commonwealth of Pennsylvania
B	Unknown	Commonwealth of Pennsylvania
C	3069 BSM 6 12166	Bruce Winslow, et al Benezette, Pa. 15868 Harriet McCullough DuBois, Pa. 15801
D	Unknown	Bruce Winslow
E	16598 16599	Commonwealth of Pennsylvania
F	14222 14244	Commonwealth of Pennsylvania
G	13467	Alice M. Dill, et al Emporium, Pa. 15834
H	13234	New Shawmut Mining Company St. Marys, Pa. 15857
I	Unknown	Charles Dennison Estate c/o M. A. Geer Oakridge, Oregon 97463
J	Unknown	Alice M. Dill, et al
K	Unknown	Alice M. Dill, et al

MATCH LINE TO SHEET 2 OF 2



TROUT RUN ABATEMENT MEASURES

SCALE : 1" = 1000' SHEET 1 OF 2

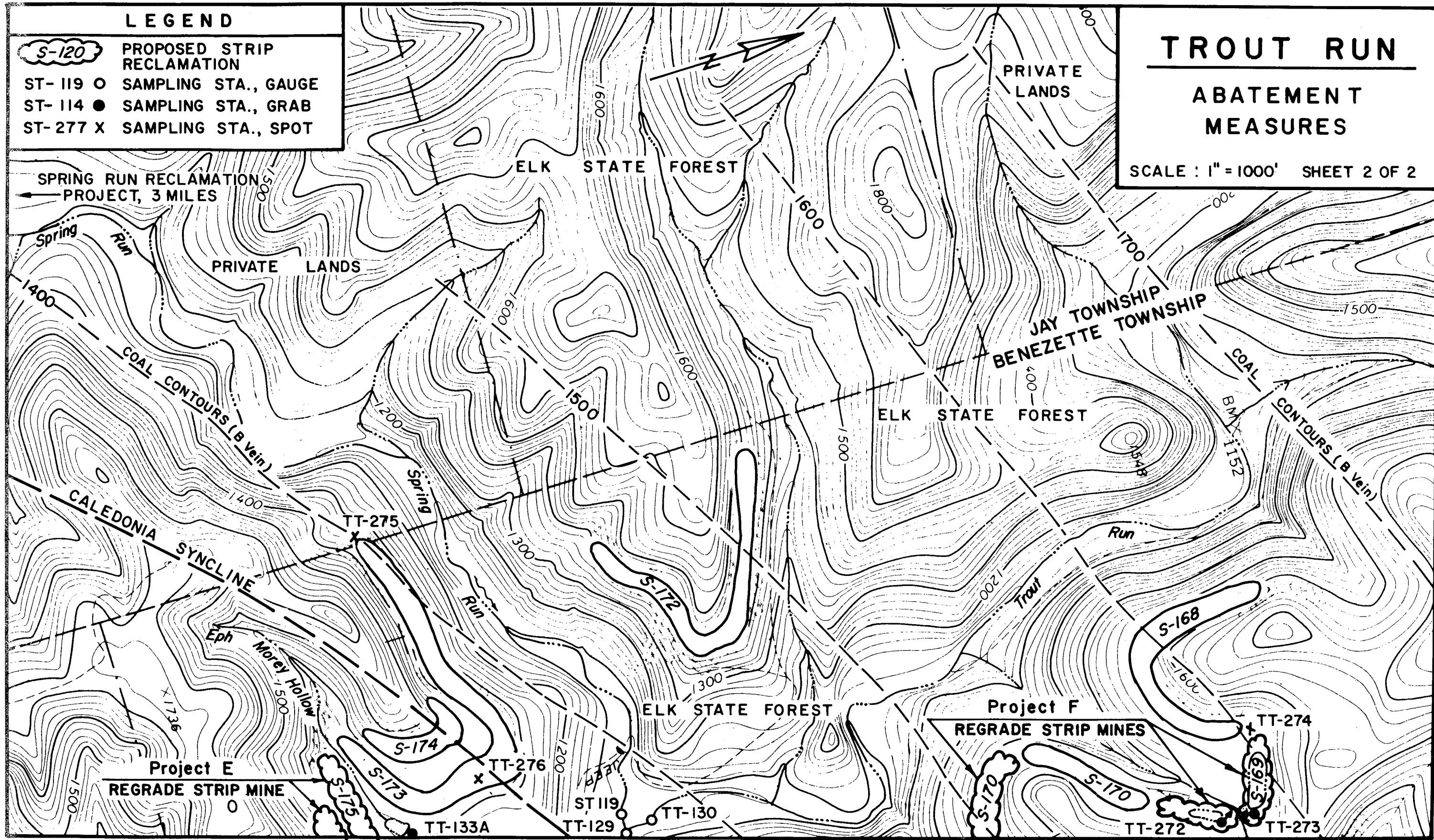
LEGEND

- S-120 PROPOSED STRIP RECLAMATION
- ST-119 O SAMPLING STA., GAUGE
- ST-114 ● SAMPLING STA., GRAB
- ST-277 X SAMPLING STA., SPOT

TROUT RUN

ABATEMENT MEASURES

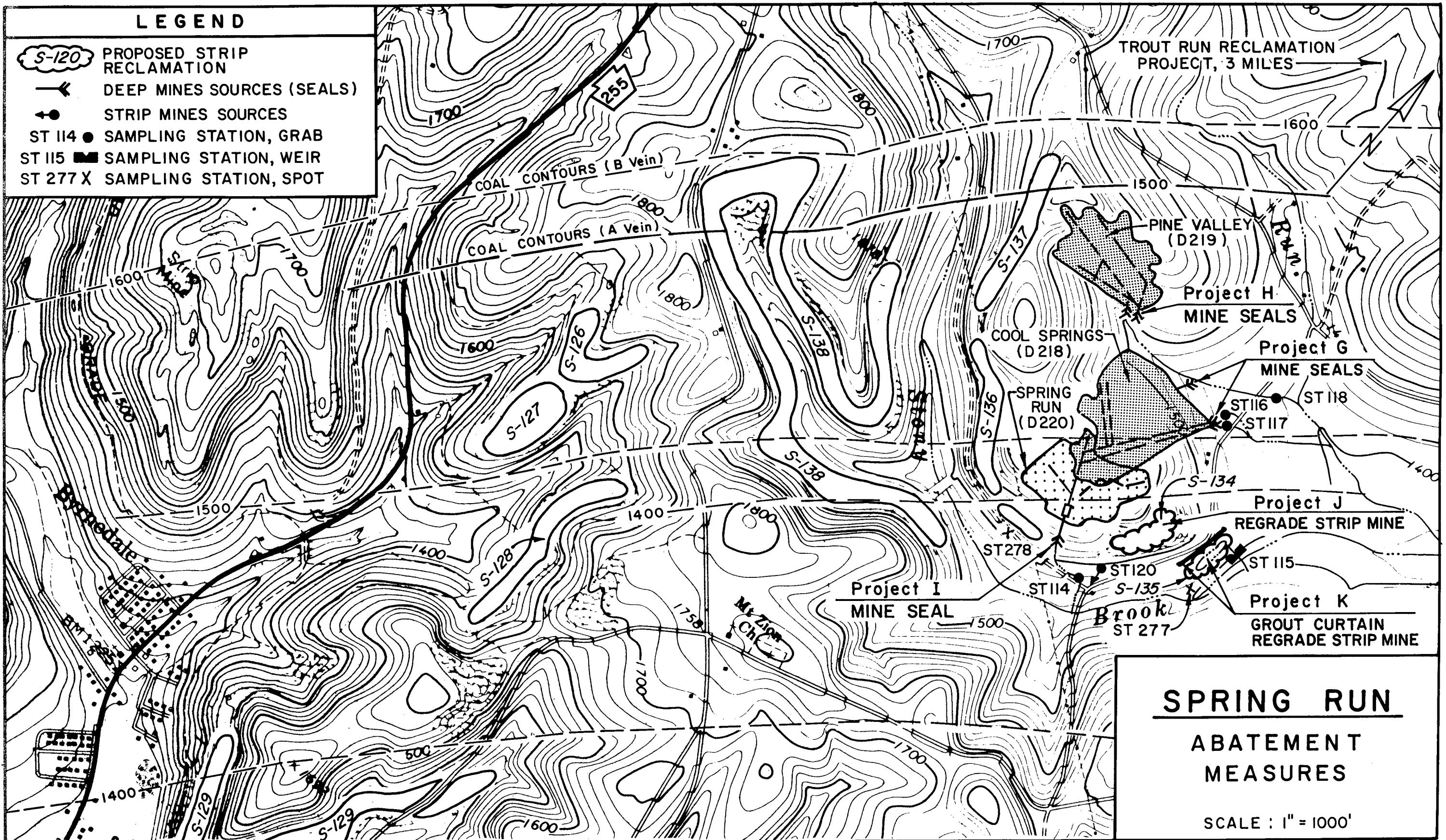
SCALE : 1" = 1000' SHEET 2 OF 2



MATCH LINE TO SHEET 1 OF 2

PLATE NO.77

VIII-84



L. MT. PLEASANT CHURCH RUN

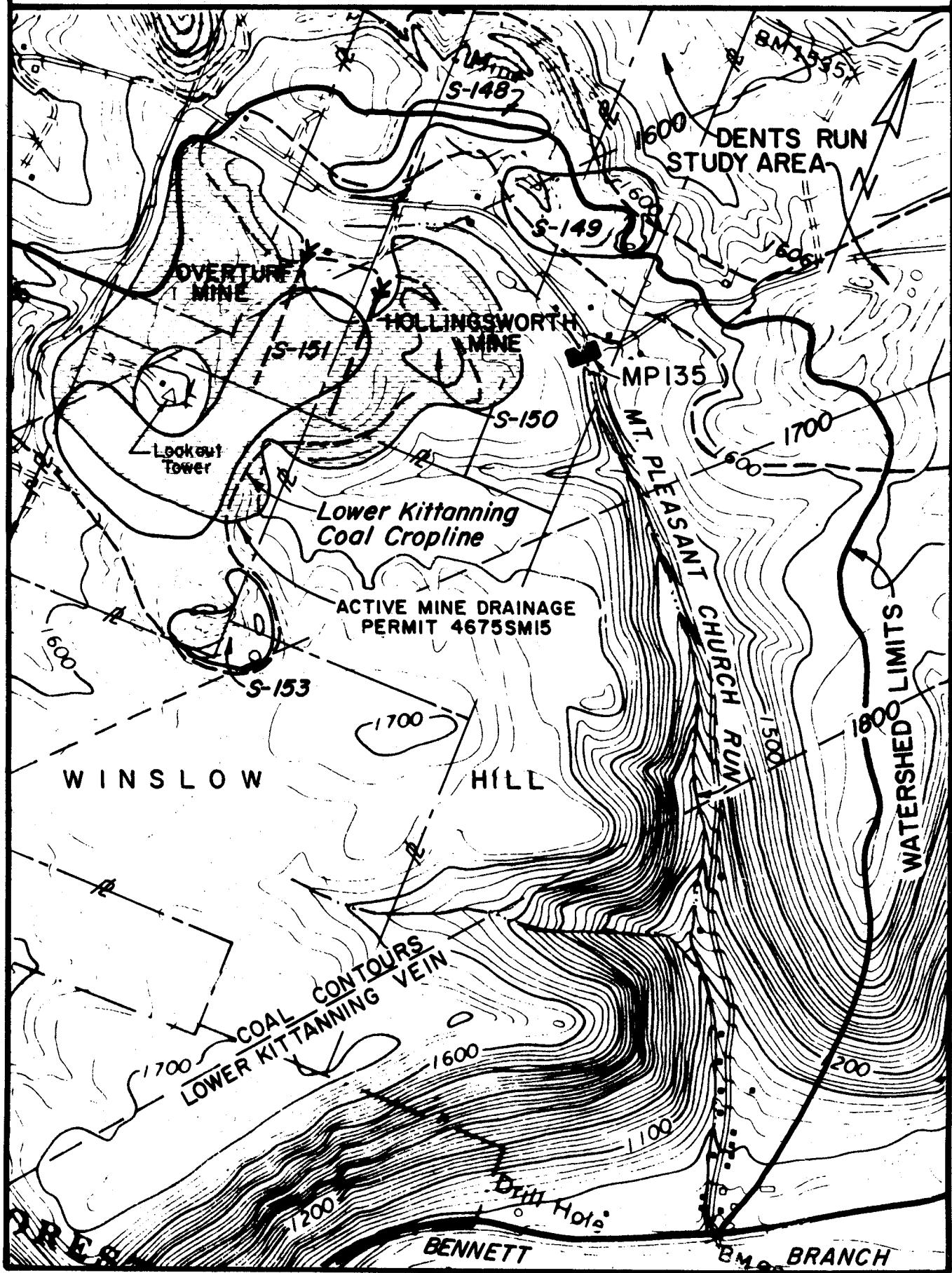
1. Mt. Pleasant Church Run Discharge Pollution			
Mine No.	Mine Name	Source No.	Lbs/Day Acid Load
<u>Sources</u>			
CB	Overturf Mine	-	-
S150	Winslow Hill Stripping	-	-
S151	Fire Tower Stripping	-	-
Measured Loading at Stream Mount (MP135)		110 lbs/day	

Two strip mine discharges and the effluent from the country bank, Overturf Mine, comprise the extent of pollution in Mt. Pleasant Church. The combined effect of pollution originating in this watershed was monitored at Sampling Station MP135.

During the period after the water sampling program was completed, the P&N Coal Company has filed Mine Drainage Permit 4675M15 for the purpose of removing 29 acres of Lower Kittanning coal and 78 acres of Middle Kittanning. The proposed surface operation is in the general vicinity of the Winslow Hill fire tower and encompasses the three known acid mine drainage sources.

Because of the pending strip and auger operation, it is recommended that any attempt to abate the acid discharge originating in this watershed be suspended until all active mining has ceased.

MT. PLEASANT CHURCH ABATEMENT MEASURES



SCALE : 1" = 1000'

PLATE NO. 79

VIII - 88