

MAIN BRANCH CHARTIERS CREEK

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MAJOR SOURCES 6034 and 6035 MAIN BRANCH CHARTIERS CREEK

A. Description of the Source Area

1. Major sources 6034 and 6035 are located in South Fayette Township, Allegheny County, Pennsylvania, about one mile south of Bridgeville. The locations of these sources are shown on the enclosed Dwg. 6034-35 - A and on the BRIDGEVILLE 7-1/2 minute quadrangle included in Appendix All.
2. Source 6034 is flowing and seeping from both banks of Coal Run. The many discharges emit from the Melrose Mine which is about 7 to 30 ft. below the surface of the ground.
3. Source 6035 consists of two discharges emitting from the bottom of a highwall which forms a pond. One discharge flows out a horizontal hole in the side of a hill. The other discharge emerges from an old mine opening which was probably broken into by the stripping operations. The pond does not appear to have any flow except at the north end.
4. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for sources 6034 and 6035:

Major Source 6034:	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	7.6	4.4	6.2
Flow (cfs)	14.03	.54	4.04
Acidity (mg/l)	334	96	205
Alkalinity (mg/l)	360	0	167
Iron (mg/l)	185	20	59.2
Manganese (mg/l)	37.5	0.8	8.7
Sulfate (mg/l)	4750	450	1960
Hardness (mg/l)	1290	510	860
Acid Load (lbs/day)	7560	580	3057
Alkalinity (lbs/day)	9230	0	3067
Temperature (degrees C)	18	6	12

Major Source 6035:	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	7.4	4.6	6.1
Flow (gpm)	320	60	158
Acidity (mg/l)	526	164	357
Alkalinity (mg/l)	304	20	170
Iron (mg/l)	140	7.5	68.1
Manganese (mg/l)	30.0	2.0	8.8
Sulfate (mg/l)	5000	2000	3255
Hardness (mg/l)	157	1091	860
Acid Load (lbs/day)	1033	187	631
Alkalinity (lbs/day)	595	36	329
Temperature (degrees C)	20	6	13.2

5. Sources 6034 and 6035 contribute approximately 0.5% of the total average acid load per day contributed by the major sources into Chartiers Creek, based on thirteen months of readings.
6. Laboratory analyses show that acid concentrations exceeded alkaline concentrations of the discharge from source 6035. In six out of 18 calculations for source 6034, the alkaline concentrations exceeded the acid concentrations. Calculations indicate that the net acid load contributed by the two sources is approximately 300 lbs. per day. Unfortunately, the high average concentrations of iron (63), manganese (8.7 ppm) and sulfate (3150 ppm) of the two sources exceed the standards of concentrations established by the Sanitary Water Board, Department of Health, Commonwealth of Pennsylvania. The mine drainage occurs at an elevation above the coal stratum, indicating that this portion of the mine is flooded.

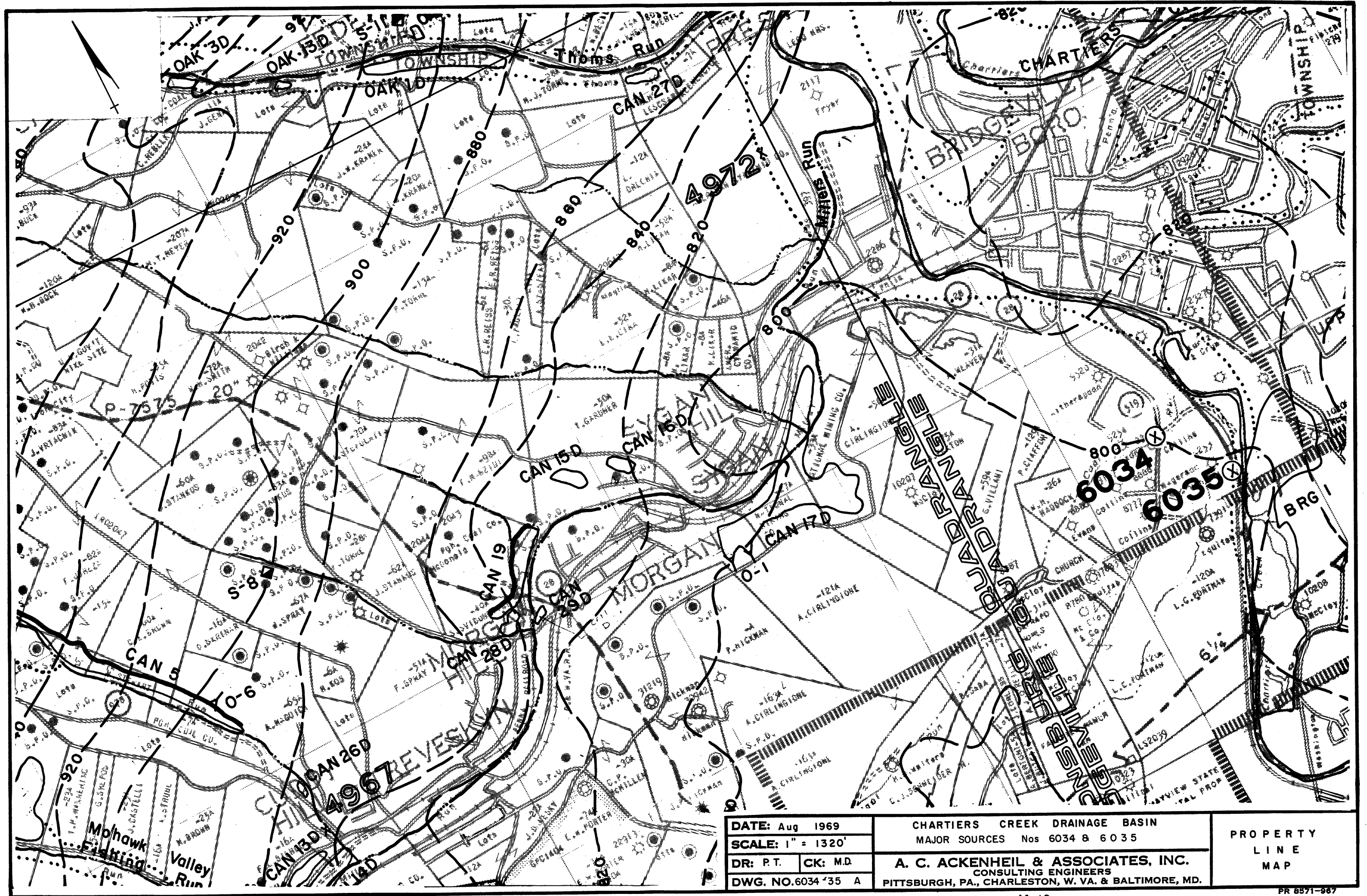
B. Drainage

1. Surface Drainage: The source area is drained by northwest-flowing Coal Run and its small tributaries. Coal Run discharges its waters into the main stream of Chartiers Creek. Approximately 1,000 ft. south of Coal Run an unnamed tributary near source 6035 also drains the source area. Field investigations revealed no flow in the tributary due to the presence of many sink holes in the stream channel.
2. Subsurface Drainage: Structure contours on the base of the Pittsburgh Coal indicate that the subsurface drainage is to the southwest toward the axis of the Nineveh Syncline. The axis of the syncline is approximately one mile west of the discharges. From the structure contours and surface elevations, it appears that the deep mines (Melrose and Slope) associated with the two sources are filled with water and, the discharges emit on the updip side of the Melrose Mine.
3. Residents near source 6034 reported that two wells located in a quarry east of source 6034 were used to maintain the water level in the mine during the mining operations. These wells are now plugged and abandoned; however, the casing is still in place. The residents stated that as long as the wells were pumped, source 6034 did not exist. The locations of the quarry and wells are shown on the CANONSBURG 7-1/2 minute quadrangle included in Part II, Appendix A11 of this report.

C. Field Investigations and Abatement Methods

1. Field investigations conducted southwest and northwest of the two major sources show that there are places where good quality water drains into the deep mines. The unnamed tributary located near source 6035 was never observed to have any flow of water in the stream and yet appears to be draining an area of approximately .5 square miles. All the precipitation runoff eventually enters the deep mines associated with the two sources.

2. Additional disruption of surface drainage was observed approximately 2 miles northwest of source 6034. An unnamed tributary located in Sygan Hollow is losing approximately 40 gpm into deep mines. Structure contours suggest that eventually this water will drain toward the Nineveh Syncline and add to the discharges at sources 6034 and 6035. This restoration of subsurface drainage will also add good quality water into Millers Run. Estimated costs for restoration of surface drainage of the stream in Sygan Hollow are presented in the individual source report for major source 4972.
3. Alternative methods of abatement for sources 6034 and 6035 are given in the Recommendations section of this report under Item D - Pollution Abatement.



DATE: Aug 1969
 SCALE: 1" = 1320'
 DR: P.T. CK: M.D.
 DWG. NO. 6034 '35 A

CHARTERS CREEK DRAINAGE BASIN
 MAJOR SOURCES Nos 6034 & 6035
A. C. ACKENHEIL & ASSOCIATES, INC.
 CONSULTING ENGINEERS
 PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

PROPERTY
 LINE
 MAP

MAJOR SOURCE 4972
 MAIN BRANCH CHARTIERS CREEK

A. Description of the Source Area

1. Source 4972 is located in Collier Township, Allegheny County, Pennsylvania, approximately one mile northwest of Bridgeville. The source discharges its waters directly into the main branch of Chartiers Creek. The location of the source is shown on the enclosed Dwg. 4972 - A and on the CANONSBURG 7-1/2 minute quadrangle included in Appendix All.

2. The discharge emerges from a pipe in a stone encasement at the base of a hill. It flows through a flat, swampy area along the road and then is piped under the road. The discharge has a bad sulfurous odor and the water has a milky cast, although the swamp ground is covered by yellow-boy deposits. The area northwest of source 4972 has been deep mined and is part of the Pittsburgh Coal Company's Essen No. 2 mine.

3. The Essen No. 2 mine was mined between 1893 and 1910 and produced approximately 2,450,000 net tons of coal. Adjacent to Essen No. 2 is Essen No. 3, which was mined between 1893 and 1935, and produced approximately 6,000,000 net tons of coal. Many pit mouths and country pits are shown on the coal maps in the vicinity of source 4972. There is no indication of any strip mining operations shown on any of the maps that we have been able to obtain.

4. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4972:

	Maximum	Minimum	Average
pH	3.7	6.5	5.2
Flow (cfs)	2.81	0.33	1.4
Acidity (mg/l)	244	104	189
Alkalinity (mg/l)	80	0	14
Iron (mg/l)	57.5	5.0	41.0
Manganese (mg/l)	7.5	.7	2.9
Sulfate (mg/l)	4250	925	1305
Hardness (mg/l)	1390	470	897
Acid Load (lbs/day)	2373	390	948
Alkalinity Load (lbs/day)	328	0	57
Temperature (degrees C)	17	6	12.5

5. Source 4972 supplies approximately 2.5% of the total average acid load contributed per day by the major sources into Chartiers Creek, based on thirteen months of readings. The slugging index of source 4972 is 3X.

B. Drainage

1. Surface Drainage: The area northwest of source 4972 is drained by two streams, Thorns Run and an unnamed stream flowing in Sygan Hollow. Thorns Run is north of source 4972 and discharges its waters directly into Chartiers Creek. The Sygan Hollow stream discharges into Millers Run. Additional drainage of the area is provided by a small tributary flowing past the Bethany Cemetery. The two unnamed tributaries have good quality water, whereas Thorns Run is polluted by acid mine drainage. Sources 4034 and 4035, which are south of Sygan Hollow, could also be affected by the interrupted surface drainage.
2. Subsurface Drainage: The subsurface drainage in the Essen Nos. 2 and 3 mines is to the southeast, as shown on the W.P.A. maps. The predominant factor influencing the drainage is the Nineveh Syncline. The axis of the syncline trends sinuously north by northeast and the plunge is gently to the south. Two smaller basins are associated with the syncline, one near Woodville and the other near Presto, Pennsylvania.

C. Field Investigations and Abatement Methods

Field studies were conducted northwest of source 4972 to determine if any surface flows are entering the deep mines through sink holes or stream channel fractures. The results of the field investigations are as follows:

1. Area A: Approximately 2.5 miles northwest of source 4972 near Hickman, Pennsylvania, a tributary of Thorns Run discharges its waters into a strip pit of a partially reclaimed strip mine. The flow of the tributary was measured to be approximately 100 gpm. For a more detailed description of the area and recommended methods of abatement, see Quick Start Project No. 3 correspondence dated May 8 and 14, 1969.
2. Area B: The unnamed tributary flowing past the Bethany Cemetery was observed to lose some of its flow through the fractures in the stream channel. Estimated loss of flow was approximately 40 gpm. The loss occurs on the American Cyanamid Company property and on the 52-acre and 8-acre parcels of H. Likar. Preventing the loss of good quality water into the deep mine will add an additional quantity of unpolluted water into Millers Run.
3. Area C: The unnamed tributary to Millers Run flowing in Sygan Hollow was observed to lose most of its flow through the fractures in the stream channel. The properties involved are: H. T. Meyer (207 acres), H. Potts (65 acres), W. H. Smith (72 acres), P. Torre (134 acres), and J. Stankus (88 acres). Sygan Hollow is approximately two miles long. In the lower two thirds of the valley the channel ranges from 5 to 15 ft. in width. Fractured rock is exposed in the bottom of this

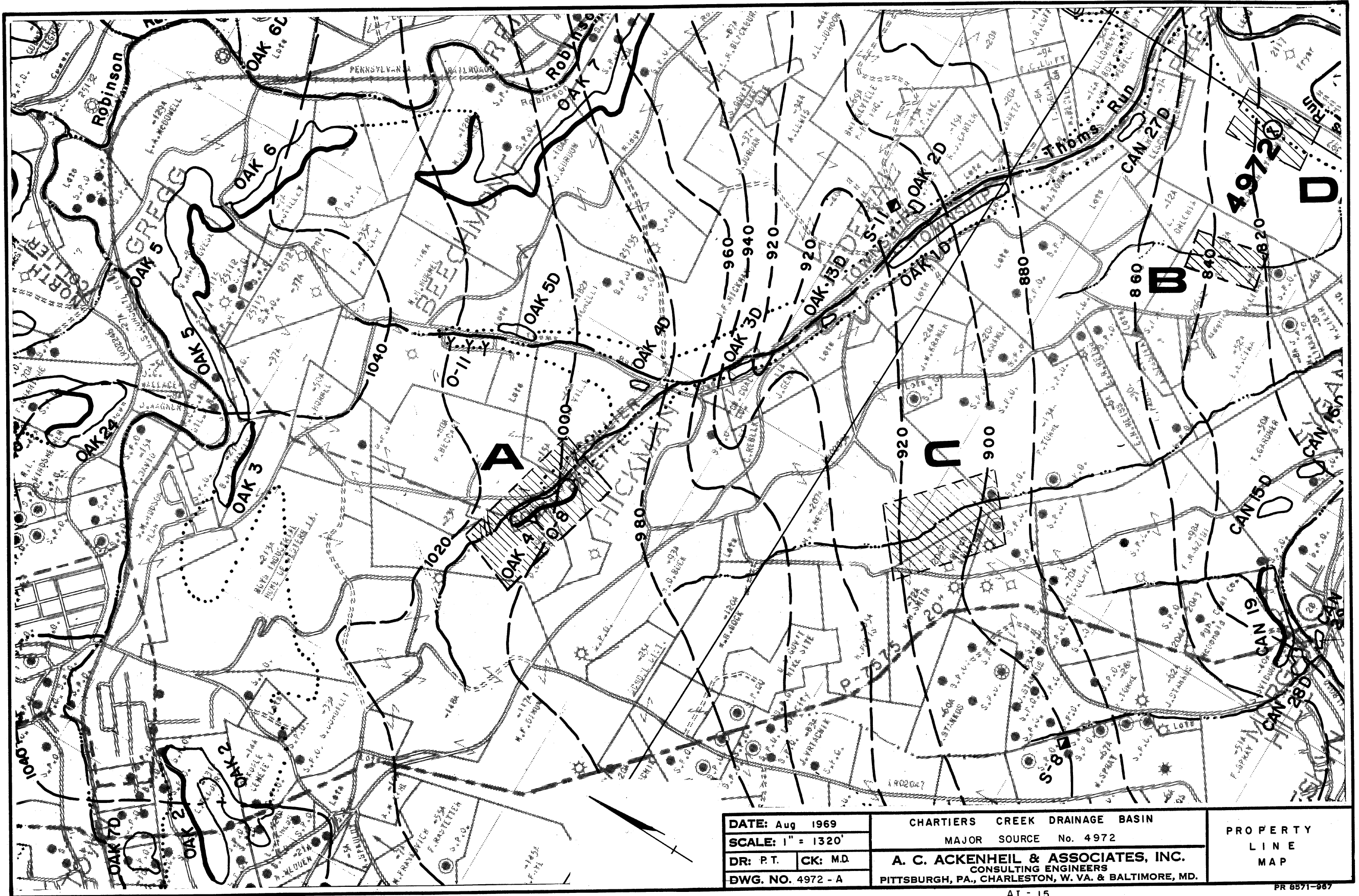
portion of the channel. The rock bottom of the channel is scoured and relatively free of soil debris which indicates that occasionally there is a large turbulent flow through this valley. At the time of site examinations no water was flowing. In this portion of the valley, the walls are steep which indicates a high surface runoff would occur into the valley. In the upper one-third of the valley there is heavy growth of vegetation and soil deposits in the stream valley. Sink holes were observed in the area. Although no sink holes were observed in the stream bottom itself, water had ponded in the stream and apparently could enter the deep mine through cracks in the subsurface. The area is indicated as C on Dwg. 4972 - A. Improvement of the drainage through this area may reduce the flow from sources 4972, 6034 and 6035.

4. Area D: The structure contours as shown on Dwg. 4972 - A indicate that it is possible to construct a watertight bulkhead at the discharge for source 4972. The coal outcrop should be grouted on either side of the source. The bulkhead will be approximately perpendicular to the structure contours and therefore should divert the subsurface flow toward sources 6034 and 6035 which are southeast of source 4972. This should be advantageous because high iron flows may be concentrated in the vicinity of sources 6034 and 6035. We recommend the performance of a bore hole camera survey prior to grouting to accurately determine the location and condition of the mine opening and to observe the condition of the in-place coal. The reason for such a survey is that the mine map does not provide this information.

D. Cost Methods of Abatement

Description	Estimated Cost	Estimated Per Cent Flow Reduction
<u>Area A:</u>		
Improve the natural Drainage through strip mine OAK 4 And provide a clay seal for opening O-8	\$21,000	25%
SUB-TOTAL	\$21,000	25%
<u>Area B:</u>		
Improve the drainage in Portions of Bethany Cemetary Run	\$15,000	10%
SUB-TOTAL	\$15,000	10%
<u>Area C:</u>		
Improve drainage and fill sink Holes in this portion of Sygan Hollow	\$40,000	20%
SUB-TOTAL	\$40,000	20%
<u>Area D:</u>		
1. Construct a watertight seal and Grout the outcrop 50 ft. right And left of the seal. 2. Explore and perform bore hole Camera survey.	\$22,500	100%
TOTAL	\$98,500	100%

*It is our opinion that the work recommended in Areas A, B, and C is necessary in order to reduce the slugging potential of the source and reduce the height of the hydrostatic head which could form behind the seal. These corrections will also reduce the flow from sources 6034 and 6035.



DATE: Aug 1969		CHARTIERS CREEK DRAINAGE BASIN		PROPERTY LINE MAP
SCALE: 1" = 1320'		MAJOR SOURCE No. 4972		
DR: P.T.	CK: M.D.	A. C. ACKENHEIL & ASSOCIATES, INC.		
DWG. NO. 4972 - A		CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		

MAJOR SOURCE 4655
MAIN STEM CHARTIERS CREEK

A. Description of the Source Area

1. Major source 4655 is located in Collier Township, Allegheny County, Pennsylvania, approximately one mile west of Carnegie. The location of this source is shown on the enclosed Dwg. 4655 - A and on the PITTSBURGH WEST 7-1/2 minute quadrangle included in Appendix AI I.
2. The discharge emits from a pipe in the ground in a randomly reclaimed strip mine. The area has also been deep mined and is part of the Pittsburgh Coal Company's Grant Mine. The high flow of the initial reading in May, 1968, indicates that the discharge comes from an opening into the deep mine which was probably created by stripping operations.
3. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for major source 4655:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	4.6	2.4	3.6
Flow (gpm)	300	10	58
Acidity (mg/l)	412	186	318
Iron (mg/l)	2.5	0.25	1.6
Manganese (mg/l)	7.5	2.2	3.5
Sulfate (mg/l)	1725	750	1277
Hardness (mg/l)	2220	460	944
Acid Load (lbs/day)	1240	45	232
Temperature (degrees C)	28.5	10.0	16.5

4. Calculations show this source, 4655, contributes daily about .5% of the average total acid load into Chartiers Creek. Analysis of 13 months of study indicates that the source is a potential slugger (slugging index 5X).

B. Drainage

1. Surface Drainage: Source 4655 is at the headwater of an unnamed tributary which flows south into the Main Stem Chartiers Creek. The flow enters Chartiers Creek west of Carnegie, Pennsylvania.
2. Subsurface Drainage: The trend of the subsurface flow is to the southeast based on the structure contours constructed on the base of the Pittsburgh Coal. (See Dwg. 4655 - B.) Therefore, surface water entering the deep mines through the strip mines to the north and northwest will eventually discharge at this source.

C. Field Investigations and Methods of Abatement

1. Review of the surface and subsurface drainage, coal outcrop pattern, topography of the area, and location of strip mines north and northwest of major source 4655 indicates that a certain percentage of water will enter the deep mines through unreclaimed strip mines and eventually discharge at source 4655.
2. Field studies conducted north and northwest of the source revealed a number of unreclaimed and randomly reclaimed strip mines. (See Dwg. 4655- A.) These strip mines, which are believed to have a significant effect on source 4655, are as follows:

Area A:

- a. Strip mine PGW 6 is north and east of source 4655. It occupies about 25 acres of land. It has been noted from aerial photographs that about five acres of this strip mine is unreclaimed. The remaining 20 acres is partially reclaimed, and the slope of the backfill will cause drainage toward the highwall. Part of this strip mine will probably be reclaimed during the construction of Interstate 279.
- b. Strip mine PGW 5 is east of source 4655 and is a 10-acre totally unreclaimed strip mine.
- c. The source is located on strip mine PGW 4. The strip mine presently occupies about 48 acres and is in various stages of reclamation, as observed on aerial photographs. The status is as follows:
 - (1) Approximately 18 acres - drainage into highwall
 - (2) Approximately 12 acres - drainage away from highwall
 - (3) Approximately 18 acres - reclaimed

Area B:

- a. Strip mine OAK 8 - PGW 7 is located northwest of the source and occupies about 24 acres and is graded so that the drainage is toward the highwall.
- b. Strip mine OAK 40 is northwest of strip mine OAK 8 - PGW 7 and occupies about 15 acres and is classified as unreclaimed. Corrective work in strip mine OAK 40 will probably also influence source 4654.
- c. Strip mine OAK 41 is northwest of strip mine OAK 40 and occupies about 6 acres, of which three acres are unreclaimed.

3. Improvement of the drainage through these strip mines should reduce the flow of surface water into the deep mine.

D. Cost of Methods of Abatement

Description	Estimated Cost	Estimated Per Cent Flow Reduction
<u>Area A:</u>		
Improve the surface drainage through:		
1. Strip Mine PGW 6 (Surface Owners Not Determined)	\$18,500	25%
2. Strip Mine PGW 5 (Surface Owners Not Determined)	15,500	12%
3. Strip Mine PGW 4 (Surface Owners Not Determined)	9,000	20%
Sub-Total (Area A):	\$43,000	57%
<u>Area B:</u>		
Improve the surface drainage through:		
1. Strip Mine OAK 8-PGW 7 (Surface Owners Not Determined)	\$12,000	15%
2. OAK 40 (Surface Owners Not Determined)	23,200	8%
3. Strip Mine OAK 41 (Surface Owners Not Determined)	4,500	2%
Sub-Total (Area B):	\$39,700	25%
TOTAL:	\$82,700	82%

