

NORTH BRANCH ROBINSONS RUN

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MAJOR SOURCE 4039 NORTH BRANCH ROBINSONS RUN

A. Description of the Source Area

1. Major source 4039 is located in Robinson Township, Washington County, Pennsylvania, approximately one mile northwest of McAdams. The location of this source is shown on the enclosed Dwg. 4039 - A and on the CLINTON 7-1/2 minute quadrangle included in Appendix All.
2. The discharge emerges in a field from the base of a randomly reclaimed strip mine, CLN 11. The area has been deep mined and is part of the Pittsburgh Coal Company's Montour No. 9 mine complex.
3. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4039:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	5.5	2.8	4.4
Flow (gpm)	90	10	31
Acidity (mg/l)	1350	88	367
Alkalinity (mg/l)	160	0	27
Iron (mg/l)	52.5	1.25	11.0
Manganese (mg/l)	23.0	6.0	11.0
Sulfate (mg/l)	3500	1200	2060
Hardness (mg/l)	2200	732	1500
Acid Load (lbs/day)	1460	11	220
Alkaline Load (lbs/day)	19	0	5
Temperature (degrees C)	21.5	0.5	12

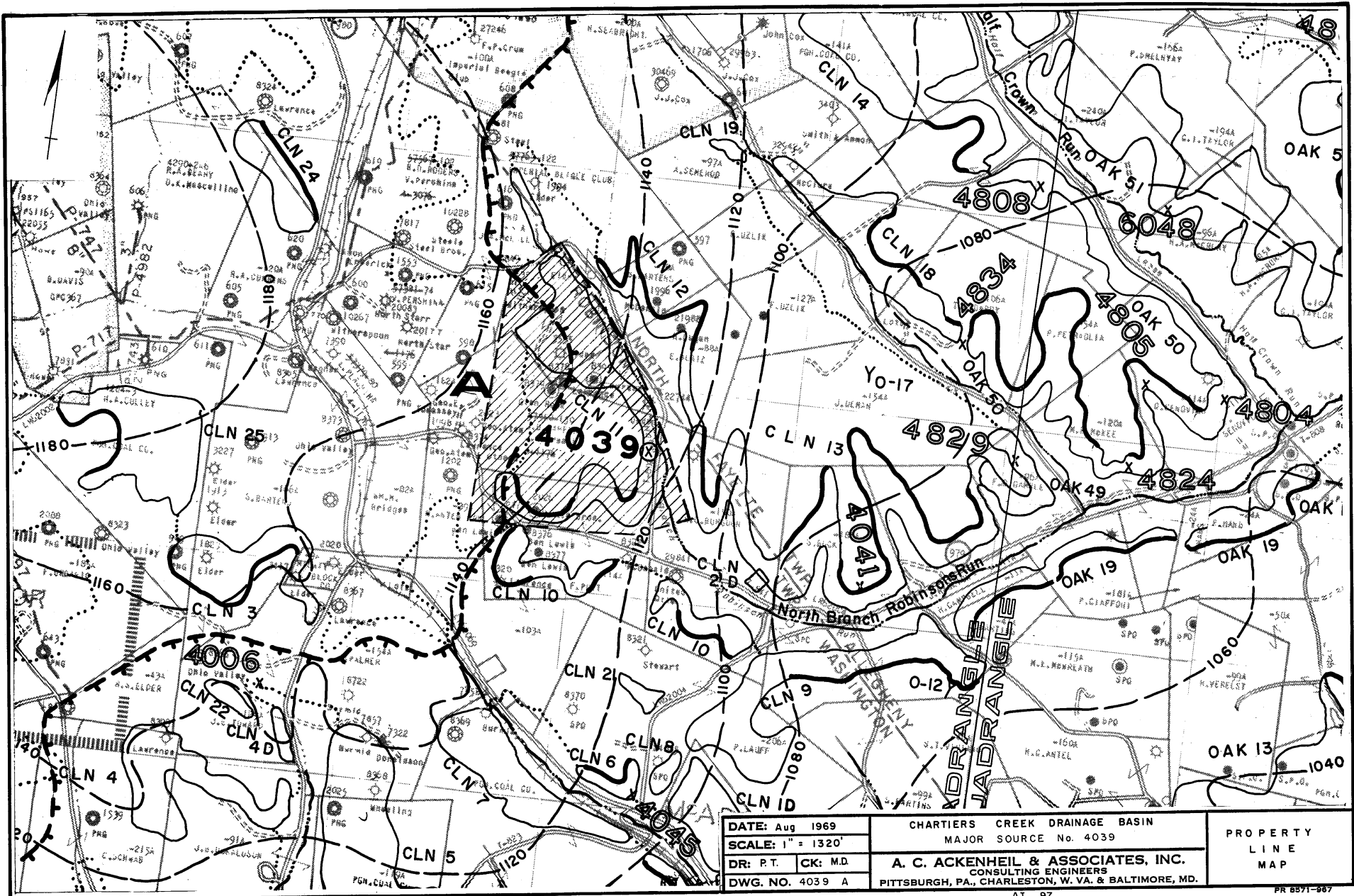
4. Source 4039 supplies approximately 0.5% of the total average acid load contributed per day by the major sources into Chartiers Creek, based on thirteen months of readings. Major source 4039 is a potential slugger with a slugging index of 7X.

B. Drainage

1. Surface Drainage : Source 4039 flows south along a township road and empties into North Branch Robinsons Run. It is near the headwater of North Branch Robinsons Run and is the first major source to pollute the stream.
2. Subsurface Drainage: The subsurface flow is generally to the southeast in the vicinity of source 4039. This source should only drain a small subsurface area because of the narrow width of the coal to the west and north of the source. The large variation in the acid load and the high slugging index (7X) suggest that the discharge is more easily controlled by entry of surface water into the deep mine rather than normal drainage from a deep mine. See Dwg. 4039 - B.

### C. Field Investigation and Abatement Methods

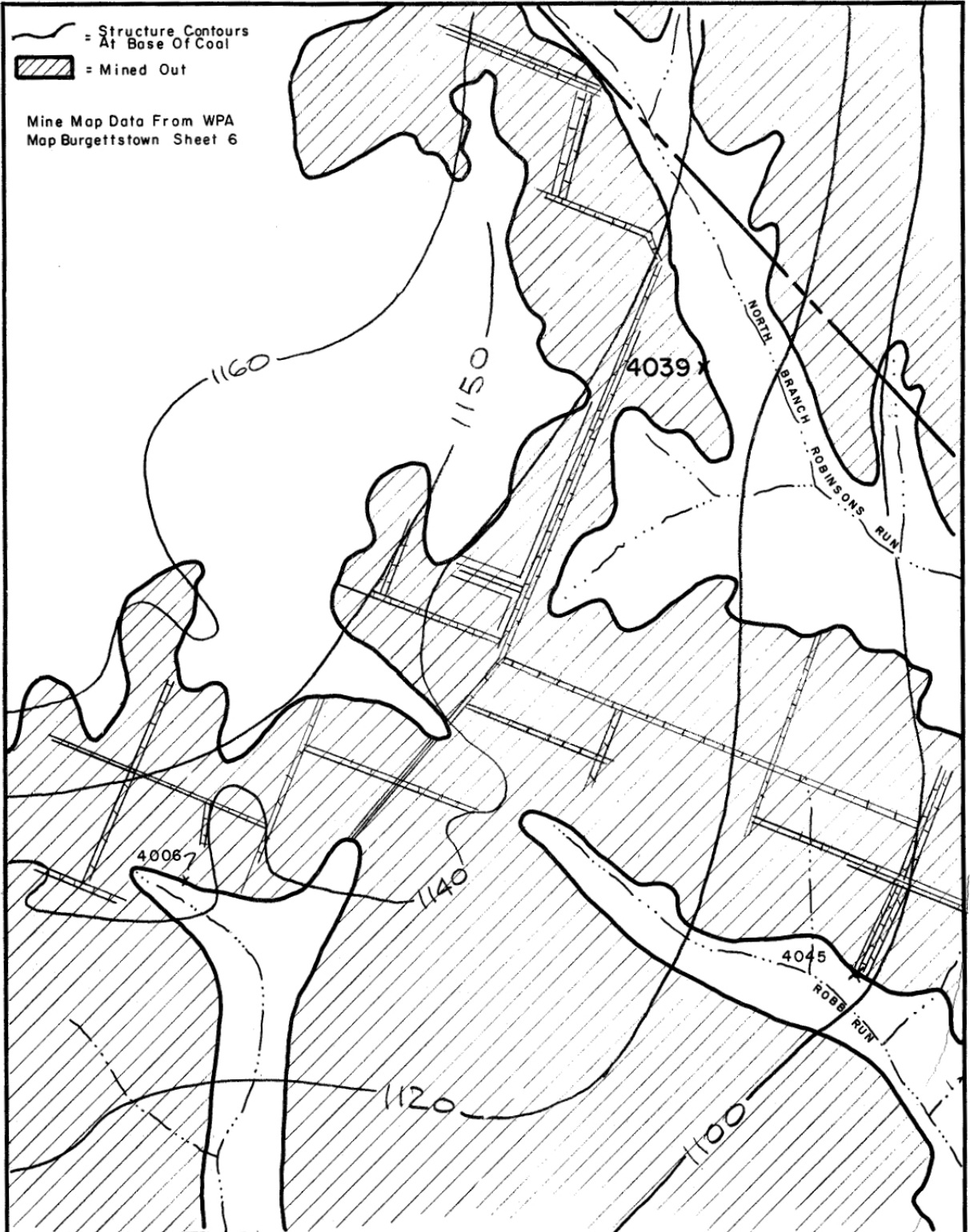
- I. To reduce the amount of acid discharge from source 4039, it is recommended that the drainage be improved through strip mine CLN II. Strip mine CLN II occupies about 76 acres, 46 of which are classified as unreclaimed. Twenty-two of the remaining acres are graded so that drainage is away from the highwall. This would contribute little water to the source. Eight acres of the strip mine are classified as reclaimed.
2. Source 4039 is located on the southern third of CLN 11 and therefore the strip mine area north of 4039 could transmit water to source 4039. Strip mine CLN II traverses from north to south across the properties of J. A. McNall (59 acres), S. Bartens (70 acres), E. Blatz (88 acres), J. D. Bamford (150 acres) and F. Putt (114 acres).
3. Improvement of the drainage through the unreclaimed portions of CLN II should reduce the flow of acid water from source 4039 and reduce its slugging ability.



DATE: Aug 1969  
 SCALE: 1" = 1320'  
 DR: P.T. CK: MD  
 DWG. NO. 4039 A

CHARTIERS CREEK DRAINAGE BASIN  
 MAJOR SOURCE No. 4039  
**A. C. ACKENHEIL & ASSOCIATES, INC.**  
 CONSULTING ENGINEERS  
 PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

PROPERTY  
 LINE  
 MAP



DATE: July 1969		CHARTIERS CREEK DRAINAGE BASIN		D E E P M I N E M A P
SCALE: 1" = 1200'		MAJOR SOURCE No. 4039		
DR: PT	CK: MTD	A. C. ACKENHEIL & ASSOCIATES, INC.		
DWG. NO. 4039 - B		CONSULTING ENGINEERS PITTSBURGH, PA. & CHARLESTON, W. VA.		

10 7189 ALBANENS A. & B. SMITH CO., PGH., PA.

AI - 98

PR 6156-1066

AI-98

MAJOR SOURCES 4041 and 4829 NORTH BRANCH ROBINSONS RUN

A. Description of the Source Area

1. Sources 4041 and 4829 are located in North Fayette Township, Allegheny County, Pennsylvania, approximately two miles northwest of McDonald. The locations of the sources are shown on the enclosed Dwg. 4041-29-A included in Appendix All.
2. The discharge for source 4041 is emerging from a mine entry which has been disturbed by stripping. This entry was used as a drain during deep mining. Mine maps obtained from the Pittsburgh Coal Company show that the area was part of the Partridge Mine. The Partridge Mine was one of the larger underground mines in the area of investigation. Deep mining commenced in 1898 and terminated in the 1930's. Over 10 million net tons of coal were produced from this mine. Strip mining took place in 1944, 1949 and the early 1950's. The W.P.A. coal maps show that this portion of the mine had four additional mine entries in the vicinity of the source. The stripping operation has apparently covered these entries because they could not be located during the field investigation of this source. A portion of the W.P.A. map, Burgettstown No. 6, is shown on Dwg. 4041-4829 - B. Source 4829 emerges from a mine opening in the high wall of a reclaimed strip mine (OAK 49).
3. These sources supply approximately 10% of the total average acid load per day contributed by the major sources into Chartiers Creek, based on thirteen months of readings.
4. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4041:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	4.4	1.2	3.0
Flow (gpm)	360	120	248
Acidity (mg/l)	1225	578	780
Iron (mg/l)	62.5	37.5	50.4
Manganese (mg/l)	9.1	2.6	6.2
Sulfate (mg/l)	2750	1450	2108
Hardness (mg/l)	1360	495	996
Acid Load (lbs/day)	4410	988	2360
Temperature (degrees C)	17	7	13.4

5. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4829:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	3.2	1.9	2.7
Flow (gpm)	300	2	31
Acidity (mg/l)	1090	548	776
Iron (mg/l)	75.0	10.75	31.0
Manganese (mg/l)	17.5	3.2	6.5

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
Sulfate (mg/l)	3500	1175	2354
Hardness (mg/l)	2710	660	1404
Acid Load (lbs/day)	3924	22	370
Temperature (degrees C)	19.5	5.0	13

6. A comparison of the first readings taken on June 3, 1968, for source 4829, with the rest of the readings shows that the highest concentrations of acidity, iron and manganese, as well as the highest flow and acid load, were recorded at the time of the first reading. From these readings it is evident that source 4829 is a potential slugger (slugging index IIX).

## B. Drainage

- I. Surface Drainage: The discharge emitting from source 4041 flows directly into North Branch Robinsons Run. Source 4829 flows through a pipe under a road to an unnamed tributary of North Branch Robinsons Run. All the surface streams that drain the area flow in a southeasterly direction. In a few places surface drainage has been interrupted due to water flowing into sink holes, especially north of the sources.
2. Subsurface Drainage: We have obtained coal maps showing the sources and the areas north and northwest of the sources. Structure contours constructed on the base of the coal show that the lowest area in the portion of the mine occurs approximately 1,800 ft. northwest of source 4041. It appears that much of the subsurface water collects in this low area and flows southeastward until it discharges at the sources. Source 4041 is believed, because of its continuous high flows and acid load, to drain the deep mine. Source 4829 shows very great variations in flows and acid loads and therefore is a slugger. Based on this, it is assumed that direct openings probably occur between the surface and the portion of the deep mine drained by source 4829.

## C. Field Investigations and Abatement Methods

To evaluate the relationship between the surface and subsurface drainage, field studies were conducted north, northeast and northwest of the sources. Field reconnaissance of the area showed that the coal has been stripped on both sides of the hill. There are many areas in which runoff water can accumulate in the strip pits and seep into the deep mine. In a few places the strip mine operations have broken through into the deep mine. The results of the field investigations are as follows:

- I. Approximately two miles northwest of source 4041, on a 200-acre parcel owned by H. Seabright (Area A), sink holes interrupt the surface flow of an unnamed tributary of North Branch Robinsons Run. The flow into the sink hole was 50 gpm. A sketch of Area A is shown on Dwg. 4041-4829 - A. Filling the sink holes and providing drainage across the sink area should reduce access of water into the mine.

2. On the adjoining 97-acre parcel owned by A. Semerod (Area B) a sink hole occurs in a ravine above the highwall of a small strip mine (CLN 19). The flow into the sink hole was measured to be 15 gpm. (See a sketch of Area B on Dwg. 4041-4829 - A.) We believe this condition can be corrected by filling the sink hole and providing drainage through the strip mine.
3. The portion of partially reclaimed strip (CLN 12) located on a 70 acre parcel belonging to S. Bartens (Area C) contains a stream that flows into a small pond in the strip. The flow was measured to be 25 gpm. There is no drainage from the pond. The W.P.A. coal maps show a deep mine entry in this area and it is assumed that water from the pond is seeping into this entry. (See a sketch of Area C on Dwg. 4041-4829 - A.) The seepage into the mine should be reduced by filling the pond and improving the drainage through the strip mine.
4. On the 154-acre parcel belonging to J. Deman and 150-acre parcel belonging to R. C. Burgoon (Area D) a number of sink holes behind an earth dam and along the highwall of strip mine CLN 13 prevent surface waters from flowing to North Branch Robinsons Run. The flow is approximately 23 gpm. In addition, adjacent to the dam is a strip pit which contains stagnant water.. Fill the sink holes and improve the surface drainage through the strip mine to reduce access of water into the mine at this site. (See Dwg. 4041-4829 - A.)
5. Shallow sink holes occur on the 188-acre parcel belonging to S. Bock (Area E). The natural flow of the drainage is disrupted by the sink holes and spoil material on top of the highwall. The flow, as measured in February, 1969, was 5 gpm. (See sketch of Area E on Dwg. 4041-4829 - A.) To restore the drainage, fill in the sink holes and improve the stream channel through the strip mine.
6. The randomly reclaimed strip mine (CLN 13) was observed to have a large surface runoff in times of heavy rainfall. The surface runoff collects in the strip mine pits and eventually a percentage of this water drains into the deep mine. Hydrologic data from previous studies by others suggests that 30% of the total annual precipitation percolates down into the mine. If this is so, then approximately 90 gpm enters the deep mine through the unreclaimed strip (CLN 13). Placing a drainage ditch through the strip mine and covering the areas where strip mining has broken into the deep mine will probably prevent three-fourths of the water from entering the deep mine. (See Area F, Dwg. 4041-4829 - A.)
7. It is estimated that construction of all the recommended abatement methods will reduce the flow from this source by 66%

#### D. Minor Sources

- I. Minor sources that discharge in the vicinity of major sources 4041 and 4829 include the following: 4825, 4826, 4827 and 4832. (See Dwg. 4041-4829 - B.)

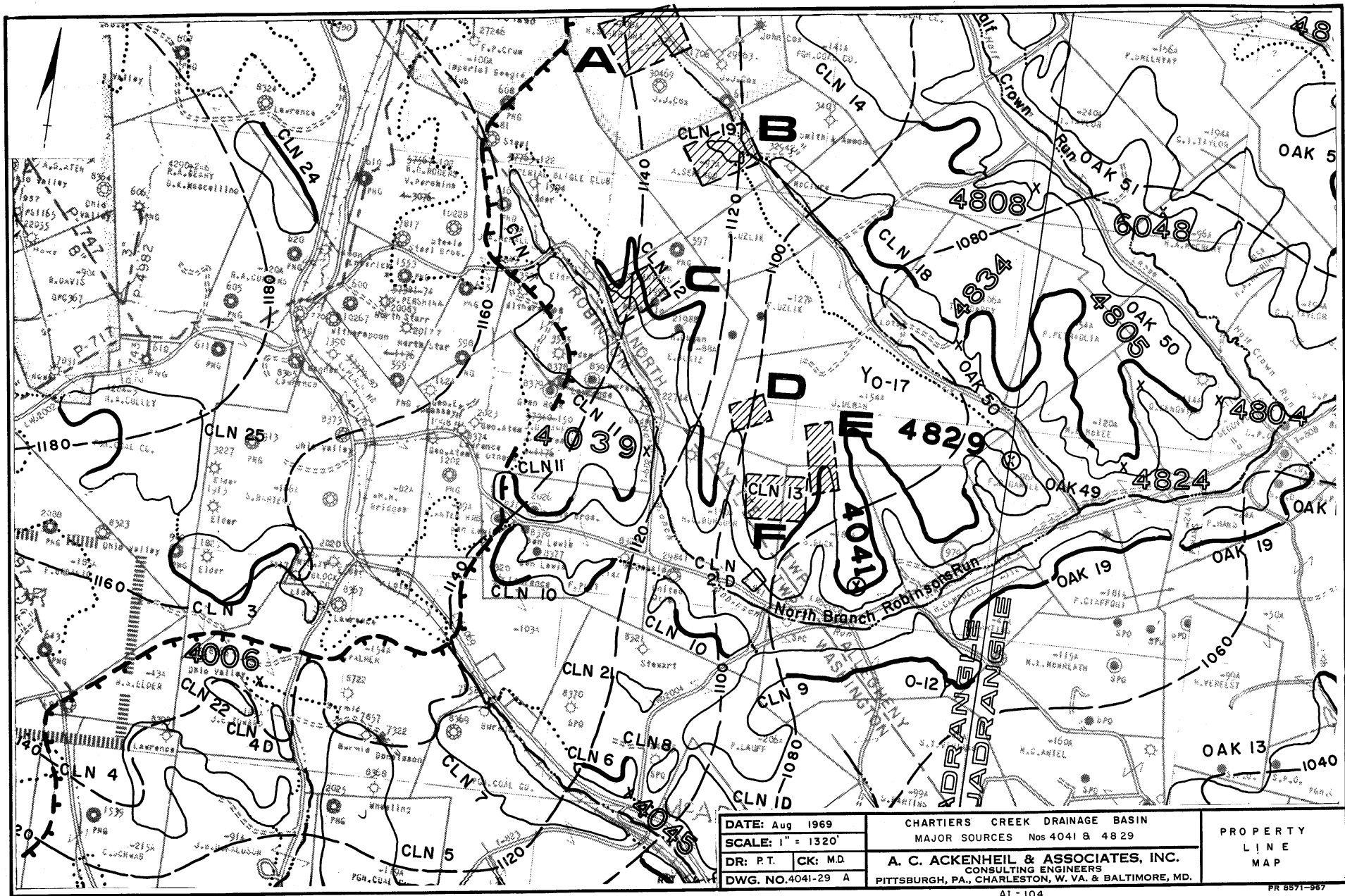


2. The total flow of the minor sources, as measured in the beginning of June, 1968, was 85 gpm. The acid load of these minor sources was calculated to be 730 lbs/day, which is less than 1% of the total acid load contributed to Chartiers Creek from the major sources.
3. Correlation between the locations of these sources and the deep mine map indicates that the drainage from these sources probably originates in the deep mine.
4. Source 4825 originates as an upward flow at the base of an unreclaimed strip spoil pile. The flow follows the strip drainage ditch and joins an unnamed tributary in a swampy area.
5. Discharge from source 4826 appears to emerge from beneath an unreclaimed strip mine. It flows through a natural valley and a number of wide marshy areas until it merges with the effluent from source 4827.
6. The discharge from source 4827 emerges from an indentation in the side of a hill in a natural valley. The area around the source has been stripped. The discharge is milky in color and the flow channel is covered with white residue. The flow merges with source 4826 and they flow through a wide, slightly sloping valley. The surface of the valley is grass covered and the water is practically stagnant.
7. The discharge from source 4832 flows from the base of a spoil pile in a partially reclaimed strip mine.

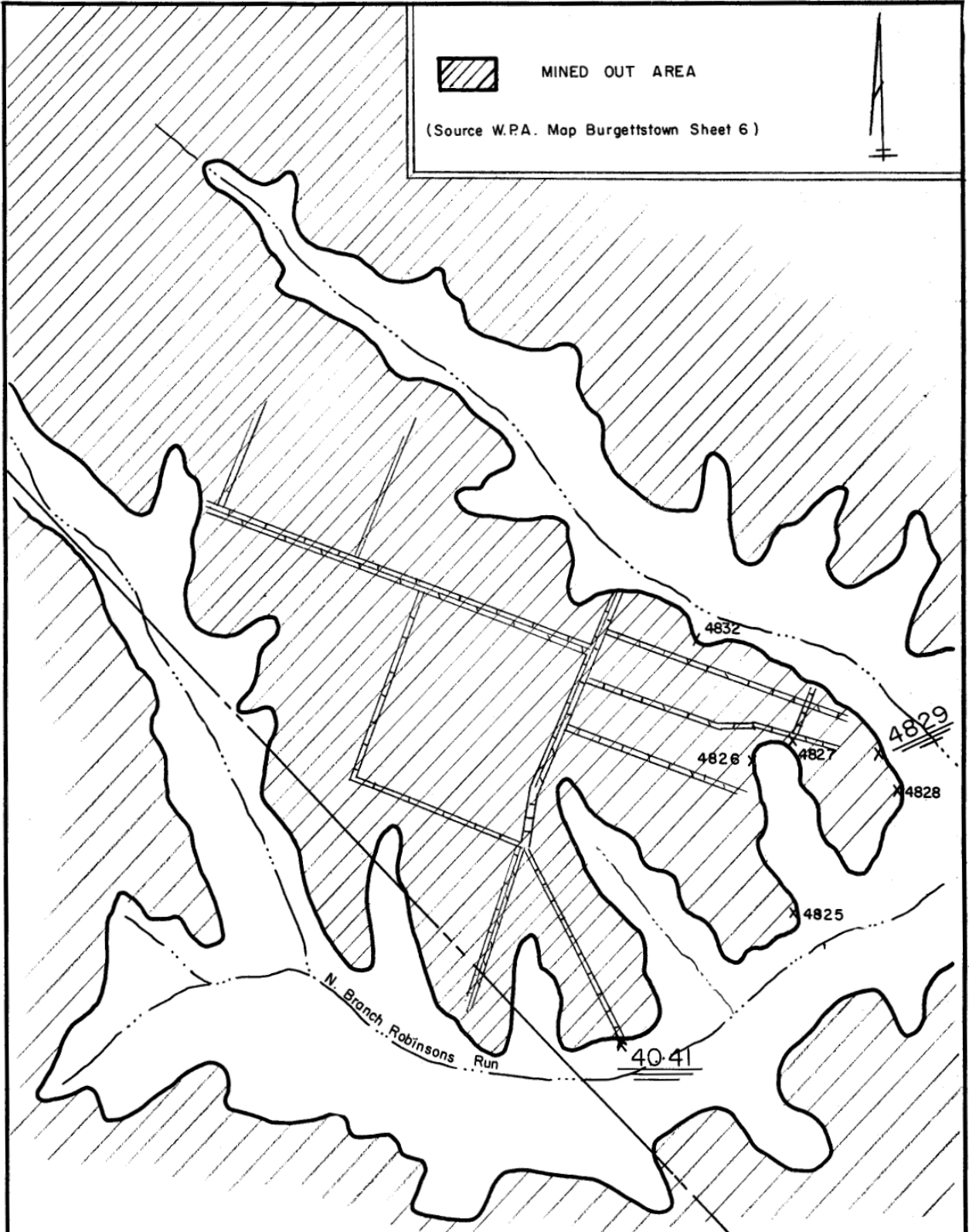
E. Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Cost</u>	<u>Estimated Per Cent Flow Reduction</u>
<u>Area A:</u> H. Seabright	\$3,000	20
I. Fill in sink holes and improve channel		
Sub-Total:	\$3,000	20%
<u>Area B:</u> A. Semerod	\$2,000	5
I. Fill in the sink hole and provide channel through the partially reclaimed strip (CLN 19)		
Sub-Total:	\$5,000	25%

<u>Description</u>	<u>Estimated Cost</u>	<u>Estimated Per Cent Flow Reduction</u>
<u>Area C:</u> S. Bartens	\$3,000	10
1. Provide a diversion ditch for flow into normal stream channel		
2. Fill in pond		
Sub-Total:	\$8,000	35%
<u>Area D:</u> J. Deman	\$4,000	5
1. Fill in the sink hole in dam area and provide drainage through the strip mine area		
Sub-Total:	\$12,000	40%
<u>Area E:</u> S. Bock	\$5,000	2
1. Fill in the sink hole and provide an improved stream channel through strip mine area		
Sub-Total:	\$17,000	42%
<u>Area F:</u> R. C. Burgoon, J. Deman, S. Bock		
1. Provide drainage through the strip mine and prevent water from entering the strip mine	\$109,200	18
TOTAL:	\$126,200	60%



DATE: Aug 1969		CHARTERS CREEK DRAINAGE BASIN		PROPERTY LINE MAP
SCALE: 1" = 1320'		MAJOR SOURCES Nos 4041 & 4829		
DR: P.T.	CK: M.D.	A. C. ACKENHEIL & ASSOCIATES, INC.		
DWG. NO. 4041-29 A		CONSULTING ENGINEERS		
		PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		



MINED OUT AREA

(Source W.P.A. Map Burgettstown Sheet 6)



DATE: July 1969  
 SCALE: 1" = 1200  
 DR: PT    CK: I. H.  
 DWG. NO. 4041-29-B

CHARTIERS CREEK DRAINAGE BASIN  
 MAJOR SOURCES Nos 4041 and 4829  
**A. C. ACKENHEIL & ASSOCIATES, INC.**  
 CONSULTING ENGINEERS  
 PITTSBURGH, PA. & CHARLESTON, W. VA.

DEEP MINE MAF

MAJOR SOURCE 4834 NORTH BRANCH ROBINSONS RUN

A. Description of Source Area

- I. Source 4834 is located in North Fayette Township, Allegheny County, Pennsylvania. The source is approximately two miles southeast of the Borough of Santiago. The location of the source is shown on the enclosed Dwg. 4834 - A and on the CLINTON 7-1/2 minute quadrangle included in Appendix All.
2. The discharge is emitting from a partially reclaimed strip mine (CLN 18). The stripping in the area has uncovered the deep mine entries and other portions of the Partridge Mine. The deep mining was completed in 1947 and the stripping was completed in 1953.
3. Based on the 13 months of readings, this source contributes an average of 2 per cent of the total acid load per day into Chartiers Creek. The figure is based on the total average load contributed by the 45 major sources.
4. Thirteen months of field testing and laboratory analysis show the following maximum, minimum, and weighted average parameters of source 4834:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	3.7	1.5	2.9
Flow (gpm)	240	60	120
Acidity (mg/l)	700	348	460
Iron (mg/l)	67.5	20.0	26.8
Manganese (mg/l)	22.5	2.6	6.9
Sulfate (mg/l)	3125	1175	1745
Hardness (mg/l)	2060	530	1185
Acid Load (lbs/day)	1890	292	688
Temperature (degrees C)	17	3	12.9

B. Drainage

- I. Surface Drainage: The discharge flows into an unnamed tributary to the North Branch Robinsons Run. The flow of the smaller tributaries to the northwest and northeast appears to have been interrupted during deep mining operations, based on the field investigations.
2. Subsurface Drainage: The structure contours on the bottom of the Pittsburgh coal indicate subsurface drainage would be in a southeastern direction with a noticeable structural trough located in the area where source 4834 discharges. The average flow was about 120 gpm over the past 13 month period.

### C. Field Investigations and Abatement Methods

Field investigations were conducted to determine the relationship between the surface and subsurface drainage in the areas to the north and northwest of the source as shown on Dwg. 4834 - A.

1. Area A: There are four ponds in the strip mine (CLN 14) approximately three-fourths of a mile northwest of source 4834 on the 141-acre parcel owned by the Pittsburgh Coal Company. Two of these ponds are located in the unreclaimed portion of the strip and may feed surface water to the deep mine. The remaining two ponds are in a reclaimed area and appear to have no influence on the source. The ponds in the unreclaimed portion of the strip mine are presently being backfilled and should reduce flow of water into the mine.

2. Area B: Stripping (CLN 18) has interrupted the normal flow of an intermittent stream northwest of the source in the vicinity of minor source 4836. The strip mine is partially reclaimed and the intermittent stream flows into the strip pit where ponding occurs.

On May 14, 1969, the area was damp, indicating water seepage from the impounded pond into the deep mine and/or into the strip spoil. The seepage into the mine could be reduced by filling the low area and providing drainage through the strip.

#### 3. Area C:

a. Stripping has exposed the deep mine approximately 1,500 ft. east of source 4834. An erosion channel was observed extending into the mine opening. It is assumed that during periods of heavy rainfall the surface runoff flows into the deep mine in this area and could have a direct effect on minor source 4833 and an undetermined influence on major source 4834.

b. The southern portion of strip mine CLN 14 is unreclaimed and an intermittent stream was observed entering the strip. There was no natural drainage through the strip mine, and based on the structure contours on the deep mine map, it appears water entering the strip may seep into the deep mine and have a direct influence on source 4834. Improved drainage through the strip could reduce the percolation into the deep mine.

c. We are of the opinion that some of the recommendations submitted for major sources 4041 and 4810 may reduce the discharge at source 4834. There appears to be a direct relationship between source 4834 and the methods of abatement recommended for source 4810, Area B, and the methods of abatement recommended for source 4041, Area A.

d. The abatement measures recommended for major source 4834 are estimated to reduce the flow from the source by approximately 30 per cent.

D. Surface Owners

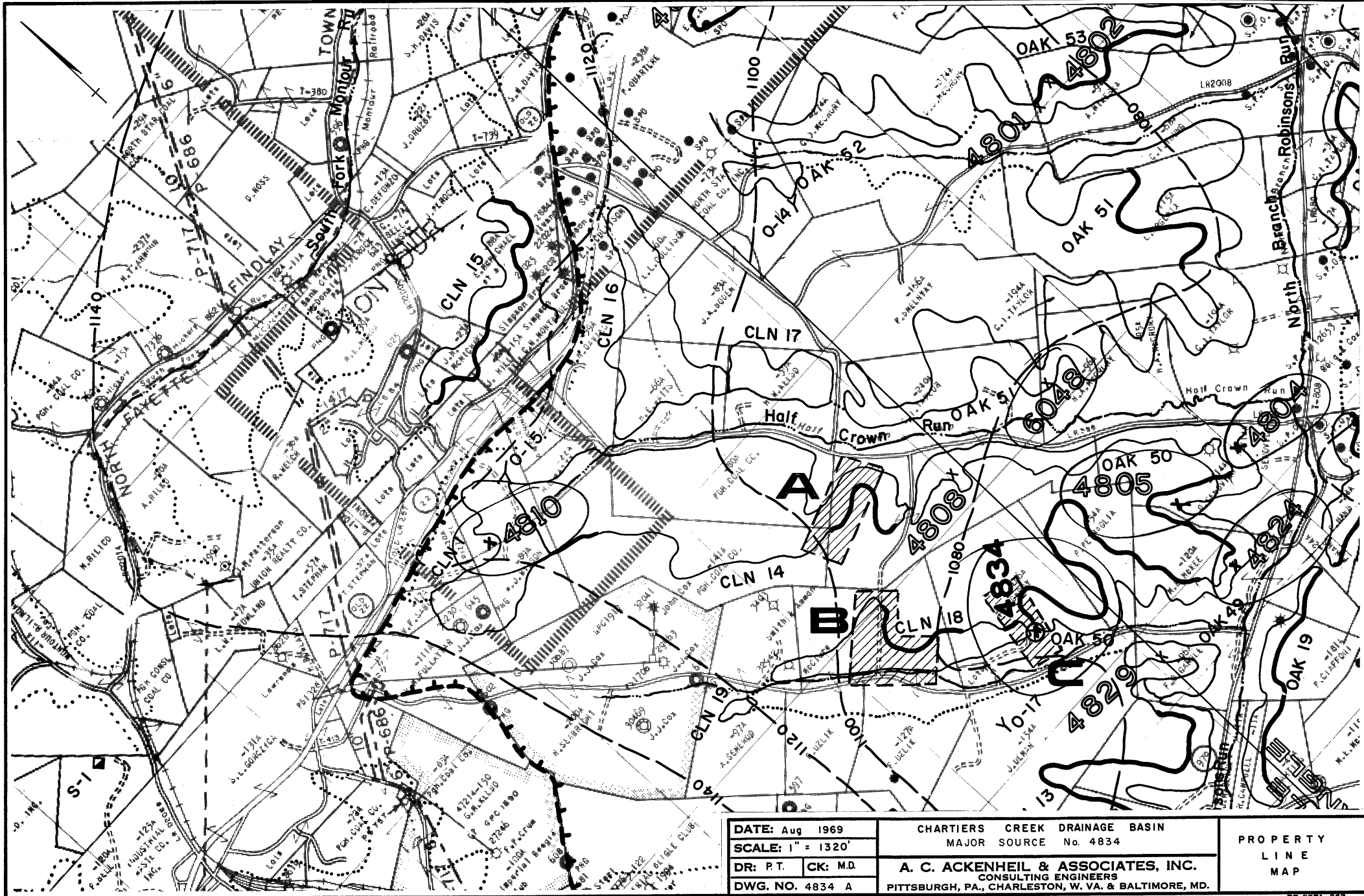
1. Major source 4834 is located on a 106-acre parcel belonging to T. D. DeRoy. T. O. DeRoy's acreage is bounded on the northwest by a 127-acre parcel owned by F. Uzlik on which minor sources 4836 and 4837 are located.
2. The ponds in the unreclaimed strip are located on a portion of the 141-acre parcel belonging to Pittsburgh Coal Company.
3. P. Petraglia owns the 54-acre parcel at the location of minor source 4833 where the stripping has exposed the deep mine.

E. Minor Sources

1. The total flow of minor sources 4833, 4836 and 4837 measured in June, 1968, was 42 gpm. These minor sources are contributing less than 1% total acid load to Chartlers Creek. The mine map indicates these sources emit where stripping operations had broken into the deep mine. Source 4833 emerges from the bottom in the unreclaimed portion of the strip mine and sources 4836 and 4837 from the base of the spoil pile in the partially reclaimed strip.

F. Cost of Methods of Abatement

<u>Description</u>	<u>Estimated Cost</u>	<u>Estimated Per Cent Flow Reduction</u>
<u>Area A:</u> Pittsburgh Coal Company Property		11%
1. No additional corrective measures necessary		
Sub-Total:		11%
<u>Area B:</u> F. Uzlik Property	\$11,000	11%
1. Improve natural drainage channel from strip mine		
Sub-Total:	\$11,000	22%
<u>Area C:</u> T. D. DeRoy Property	\$11,000	8%
1. Fill opening into the deep mine (0-14)		
2. Provide drainage channel through strip mine		
Total:	\$22,000	30%





MAJOR SOURCES 4805-4804-4824 NORTH BRANCH ROBINSONS RUN

A. Description of Source Area

1. Sources 4805, 4804 and 4824 are located in North Fayette Township, Allegheny County, Pennsylvania, and are approximately two miles southeast of the Borough of Santiago. The locations of these sources are shown on the enclosed Dwg. 4805 - A and on the OAKDALE 7-1/2 minute quadrangle which is included in Appendix All.
2. The flow of the discharge is from a partially reclaimed strip (OAK 50) and is a combination of seepages from a deep mine entry exposed on the strip mine highwall, a strip pond, discharges from other portions of the strip, and seepages from the base of spoil piles. The deep mining occurred between 1936 and 1953 and the stripping, according to the deep mine map, had extracted the coal from 1943 to 1945. The deep mine is the Partridge Mine.
3. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4805:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	5.0	1.4	3.4
Flow (gpm)	340	60	123
Acidity (mg/l)	540	218	369
Iron (mg/l)	27.5	4.5	9.2
Manganese (mg/l)	13.5	3.5	5.2
Sulfate (mg/l)	3125	1075	1650
Hardness (mg/l)	1670	510	1106
Acid Load (lbs/day)	1836	108	584
Temperature (degrees C)	20	5	13.5

4. Source 4805 supplies approximately 1.5% of the total average acid load contributed per day by the major sources into Chartiers Creek, based on thirteen months of readings. Comparison of the readings indicates that source 4805 is a potential slugger (slugging index 6X).
5. Source 4804 emerges from an area that has been strip (OAK 50) and deep mined. The discharges emerge from drift openings that were exposed by strip mining. The total flow measured is the sum of all discharges that merge in the strip valley formed by the strip mine spoil bank and the strip highwall. The deep mine was smoldering at the time of field inspection.

6. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4804:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	3.8	1.8	2.8
Flow (gpm)	240	0	27
Acidity (mg/l)	1430	220	785
Iron (mg/l)	135	4.25	45
Manganese (mg/l)	17.5	2.8	7.6
Sulfate (mg/l)	3750	1200	2030
Hardness (mg/l)	1840	640	1120
Acid Load (lbs/day)	4118	16	455
Temperature (degrees C)	26	1	15

7. The highest concentrations of acidity, iron and manganese, as well as acid load and flow were recorded at the time of initial reading in May, 1968, at the period of heavy precipitation. This indicates that source 4805 is a potential slugger. Sources 4805, 4804 and 4824 supply approximately 1.5% of the total average acid load contributed per day by the major sources into Chartiers Creek, based on thirteen months of readings.
8. The discharge from source 4824 is composed of four different flows:
- A drift opening in the coal seam of the strip highwall
  - A small strip pond
  - Discharge from the strip mine via a natural gully
  - Seepages from the base of the spoil piles

The effluent flows through a natural valley to a flood plain and then is piped under the road into North Branch Robinsons Run.

9. Thirteen months of field and laboratory study show the following parameters for source 4824:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	3.9	1.9	2.8
Flow (gpm)	200	3	25
Acidity (mg/l)	1052	208	789
Iron (mg/l)	75	13.25	42
Manganese (mg/l)	17.5	5.6	9.4
Sulfate (mg/l)	3750	1325	2370
Hardness (mg/l)	2460	720	1190
Acid Load (lbs/day)	2496	26	290
Temperature (degrees C)	25	4	15

10. Source 4824 supplies approximately 1% of the total average acid load contributed per day by the major sources into Chartiers Creek, based on thirteen months of readings.

11. The three closely interrelated sources contribute on the average approximately 3.5% of the total acid load into Chartiers Creek and all are potential sluggers.

B. Drainage

1. Surface Drainage: The discharges within the strip area flow through a small gully into North Branch Robinsons Run. The intermittent stream flow in the area has been interrupted by the stripping operations but generally the streams had flowed in a southeasterly direction.

2. Subsurface Drainage: The structure contours on the bottom of the Partridge Mine indicate that subsurface flow would be from the northwest of the source and flow in a southeasterly direction into the partially reclaimed strip. The average flow at source 4805 is about 123 gpm based on a 12-month period.

C. Field Investigations and Abatement Methods

Field investigations were conducted to determine the relationship between the surface and subsurface drainage in the area northwest of the source, as shown on Dwg. 4805 - A.

1. Area A: Northwest of the source on the 54-acre parcel belonging to P. Petraglia, the strip is unreclaimed. A large abandoned strip pit is located at the head of the valley, and the spoil from this area was placed within the strip to the southeast of the strip pit, thus blocking natural drainage. No water was observed in the strip at the time of our field investigation; however, the bottom of the strip was soft and moist, indicating that ponding of surface runoff does occur in this area. Removing the spoil blocking the natural drainage and placing it against the highwall should reduce the percolation of surface water into the deep mine in this area.

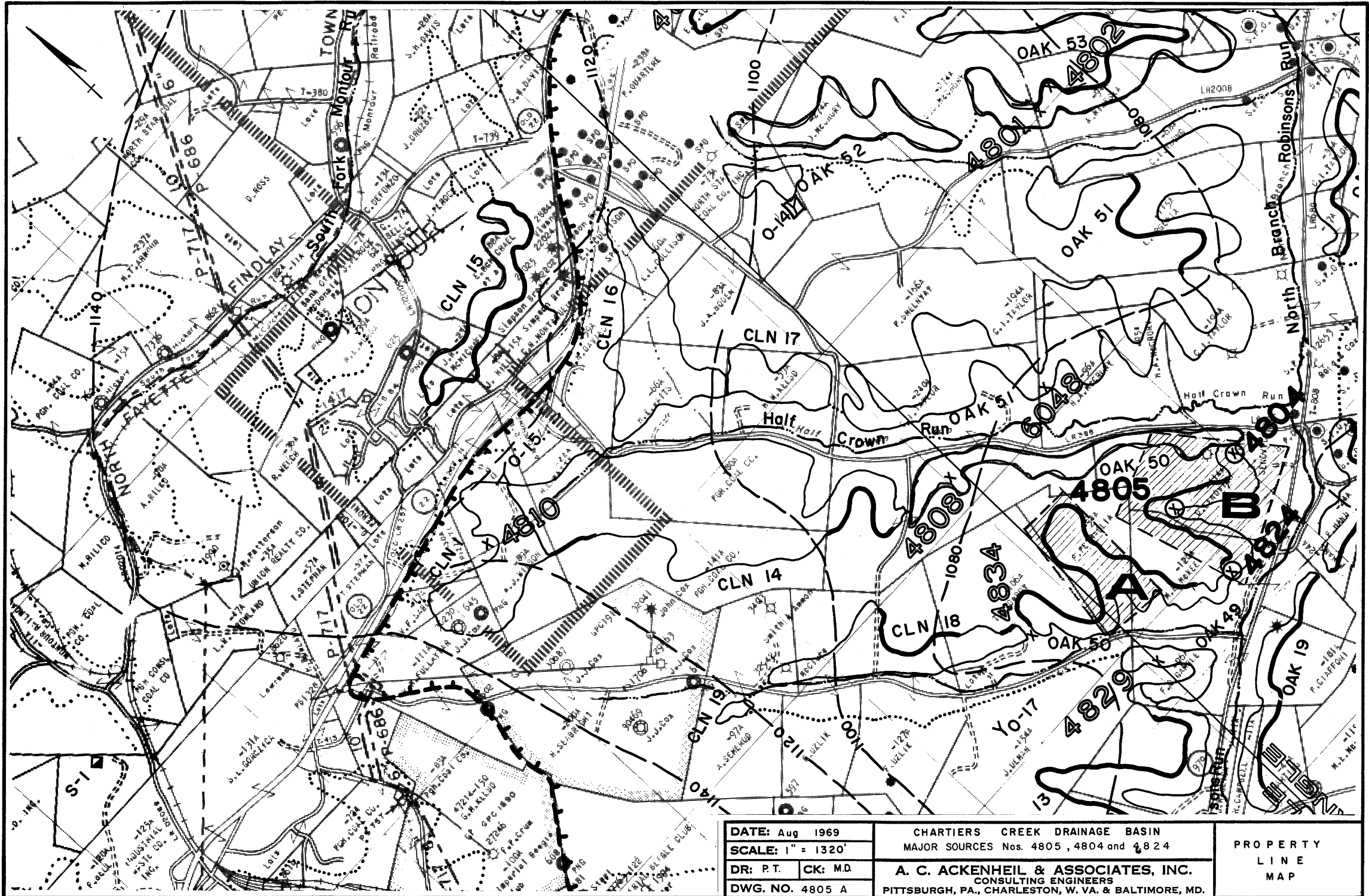
2. Area B: The strip mining (OAK 50) operations on the 114-acre parcel belonging to D. Senovich, the 120 acres belonging to M. E. McKee and 240 acres belonging to C. 1. Taylor, has uncovered the deep mine working in certain areas. The exposure of the deep mine creates a direct route into the mine at periods of heavy precipitation and causes the slugging effect of the three sources.

3. The recommended methods of abatement will reduce the surface flow into the deep mine by about 26% and probably prevent the slugging capacity of the three sources.

D. Cost of Methods of Abatement

Description	Estimated Cost	Estimated Per Cent Flow Reduction
<u>Area A:</u> P. Petraglia	\$26,000	10%
1. Provide drainage from the unreclaimed strip mine		
<hr/>		
Sub-Total:	\$26,000	10%
<u>Area B:</u> D. Senovich, M. E. McKee, C.I. Taylor	\$51,500	16%
1. Fill in ponds		
2. Cover up deep mine openings in the strip		
3. Provide drainage		
<hr/>		
Total:	\$77,500	26%

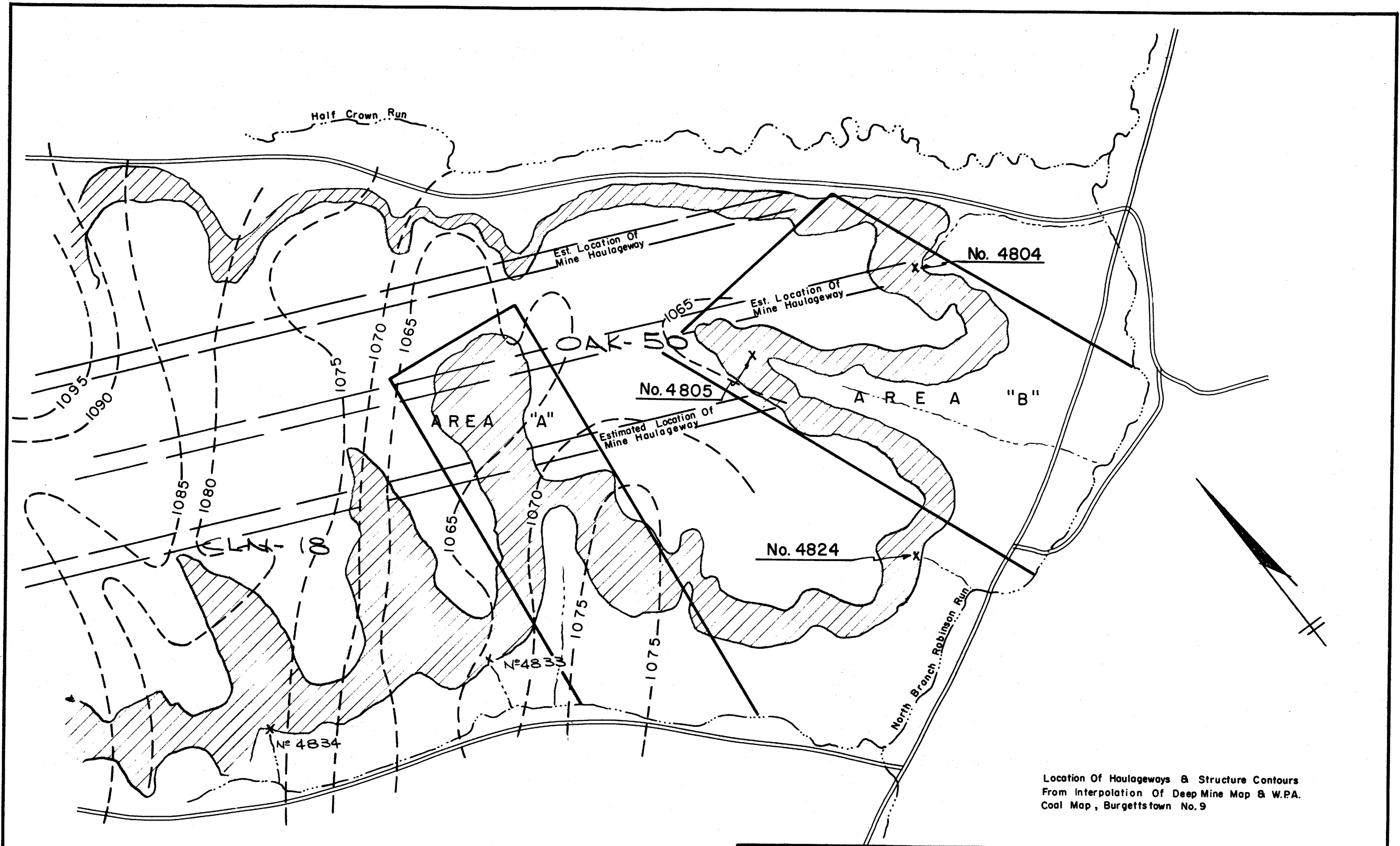
An additional abatement measure such as the use of a box cut between strip mines OAK 50 West and OAK 50 East should be considered. Costs for this work have not been estimated but should be included during the design of abatement methods. The general location of the proposed box cut is shown on Dwg. 4805 - A.



DATE: Aug 1969  
 SCALE: 1" = 1320'  
 DR: P.T. CK: M.D.  
 DWG. NO. 4805 A

CHARTIERS CREEK DRAINAGE BASIN  
 MAJOR SOURCES Nos. 4805, 4804 and 4824  
 A. C. ACKENHEIL & ASSOCIATES, INC.  
 CONSULTING ENGINEERS  
 PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

PROPERTY  
 LINE  
 MAP



Location Of Haulageways & Structure Contours  
 From Interpolation Of Deep Mine Map & W.P.A.  
 Coal Map, Burgettstown No. 9

<b>DATE:</b> June 1969		CHARTIERS CREEK DRAINAGE BASIN MAJOR SOURCES Nos. 480, 480 and 4824	STRIP and DEEP MINE LOCATION MAP
<b>SCALE:</b> 1" = 500'			
<b>DR:</b> PT	<b>CK:</b> I.H	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	
<b>DWG. NO.</b> 4805-B			

MAJOR SOURCE 4810 NORTH BRANCH ROBINSONS RUN

A. Description of the Source Area

- I. Major source 4810 is located in North Fayette Township, Allegheny County, Pennsylvania, and is approximately one mile south of Santiago (Tyre, P.O.). The location of the source is shown on the enclosed Dwg. 4810 - A and on the center of the eastern portion of the CLINTON 7-1/2 minute quadrangle which is included in Appendix All. The area has been deep and strip mined (CLN I), as indicated by spoil banks and refuse piles. The source is a narrow strip pond approximately 300 ft. long, 10 to 20 ft. wide and about 10 ft. deep. Adjacent to the pond are two deep mine refuse piles; the pile north of the pond is smoldering. Numerous seeps stain the surface surrounding the source. At the same time, a number of small strip ponds at higher elevations may contribute acid water into the source pond.
  
2. Laboratory and field studies indicate that major source 4810 is a potential slugger (slugging index 6X). At the time of initial measurement (May 29, 1968), a flow of 800 gpm was recorded, and acid load was calculated to be over 5,000 lbs. per day. Thirteen months of field and laboratory study indicate the following maximum, minimum and weighted average parameters for source 4810:

	<u>Maximum</u>	<u>Minimum</u>	<u>Average</u>
pH	4.4	1.6	3.1
Flow (gpm)	800	45	145
Acidity (mg/l)	664	254	455
Iron (mg/l)	65.0	4.6	25.0
Manganese (mg/l)	32.5	3.6	17.5
Sulfate (mg/l)	3000	1350	1980
Hardness (mg/l)	1900	640	1260
Acid Load (lbs/day)	5088	212	820
Temperature (degrees C)	25	2	13

Source 4810 supplies approximately 2.5% of the total average acid load contributed per day by the major sources into Chartiers Creek, excluding the flow from the two active mines which are being treated.

B. Drainage

- I. Surface Drainage: Source 4810 is the beginning of Half Crown Run. The run flows southeasterly for 2.5 miles and then discharges its polluted waters into North Branch Robinsons Run. North and west of source 4810 are the topographic highs that separate the Chartiers Creek drainage basin from the Racoon Creek and Montour Run drainage basins. (See Dwg. 4810 - B.)

2. Subsurface Drainage: Structure contours from the WPA deep mine maps updated by the Bureau of Mines in 1960 show that a low occurs in the vicinity of Bald Knob, approximately two miles northwest of 4810 (see Dwg. 4810-B) and then continues toward source 4810. This means that even though the areas north and west of source 4810 are in different surface drainage basins, the subsurface flow in the mines will be discharged through openings in the Chartiers Creek watershed. As an example, a large area in Findlay Township, which is part of the Racoon Creek and Montour Run surface drainage basins, has been extensively stripped and contains many strip ponds. It is probable that a percentage of the water from the strip ponds enters the deep mines and eventually discharges in the Chartiers Creek drainage basin.

C. Field Investigations and Abatement Methods

Field reconnaissance was conducted northwest and west of source 4810 to determine where surface waters enter the deep mine or the strip mine areas. These areas are shown on Dwg. 4810 - A.

1. Area A:

- a. Surface runoff northwest of U.S. Rt. 22 is drained by five culverts emerging from under the roadway embankment. Four of the five culverts are 12-in. diameter pipe. The fifth is a 36-in. diameter pipe that carries a stream from the north side of the highway into a partially reclaimed strip area.
- b. A flow of two to three gpm was observed coming from a 3-in. diameter pipe west of source 4810. It is believed that this flow is from a small spring. The area into which all these flows drain is approximately 500 ft. west of source 4810. The flows are dispersed in the partially reclaimed strip. The flow from this area is through irregular gullies. A high percentage of the water probably seeps underground into unreclaimed strip mines and refuse piles in the vicinity of the areas designated as B and C.
- c. At the time of the field investigations the flow was very low, but it appears that during periods of heavy rainfall large volumes of water could be added to the acid-producing materials present in the area. The pollution from source 4810 can be reduced by improving surface drainage to collect the water from the culverts and springs and carry it across the partially reclaimed strip mine area. This would prevent surface waters from coming in contact with the acid-producing materials.



2. Area B: The strip mine to the south of source 4810 is designated as Area B. A stream south of the highwall was observed to flow over the highwall and enter the deep mine. Along the eastern highwall a large area of surface wash is occurring. It is estimated that during periods of heavy precipitation large quantities of water could enter the deep mine. The slugging potential of source 4810 can probably be reduced by providing drainage for the stream to Half Crown Run. The low areas along the base of the highwall should be regraded to provide drainage for surface water which occurs as runoff from the areas above the highwall. Large gullies were observed above the highwall which may indicate large flows of water during times of heavy precipitation.
3. Area C: Area C is a small stream valley formed by two deep mine refuse piles. At the head of the valley numerous seepages of water occur. The water percolates from the base of the spoil pile and up from the bottom of the stream channel. Structural contours on the bottom of the Pittsburgh seam indicate that the natural flows of mine water would be in the general direction of this small, man-made valley. The highwall of the strip mine is about 100 ft. south of the head of the valley. Because the flow has been continuous at this source, it is believed that this water is from the deep mine rather than ground water stored in the surrounding strip pile and deep mine refuse piles. The map of the deep mine in the immediate vicinity of this area shows a drain and a main entry which are probably the source of the water. The remedial measure recommended for the other areas should decrease the amount of surface water entering the deep mine and lower, in time, the discharges at Area C.
4. Area D: Approximately 3,000 ft. northeast of source 4810 a partially reclaimed strip mine (CLN 15) was observed to accumulate water around an abandoned slumped-over mine entry to the J. H. McMichael property. On the E. McMichael property flows from the springs above the reclaimed strip highwall discharge into the strip mine backfill and probably seep into the deep mine. Structure contours indicate that any water entering this area will eventually come out at 4810. A drainage channel should be provided away from the mine entry, the depressions filled, and drainage provided through the strip mine backfill to provide natural drainage.
5. Area E: Approximately 7,000 ft. west of source 4810, on the 217-acre parcel owned by the Pittsburgh Coal Company, and 125-acre parcel owned by Industrial Waste Co., Inc., a flow of water was observed into an abandoned air shaft of the Boggs Mine of the M. and L.E. Coal Co. (see Dwgs. 4810 - A and B). An estimated flow of 30 gpm was observed to enter this air shaft. Approximately 100 ft. from the air shaft an opening into the deep mine was observed. The opening has been partially backfilled with red dog

material. The method to alleviate this condition would be to seal the air shaft to prevent entry of water into the mine through the air shaft. Drainage should be restored from the shaft and the deep mine opening to the existing natural drainage.

It is our estimate that providing the necessary surface drainage to prevent the water from entering the deep mine will reduce the flow from this source by 50% and probably eliminate the slugging potential of the source. The acid load contribution will be reduced from the existing estimated 2.5% to 1.0%. This estimate does not include the potential diluting effect of the good quality waters on polluted Half Crown Run.

D. Minor Sources

Approximately 2,000 ft. downstream from, and associated with major source 4810, is minor source 4811. The discharge is emerging from an indentation at the base of a reclaimed strip mine. Coal maps do not indicate any entries in this location; therefore, stripping operations may have broken into the deep mine workings. (See Dwg. 4810 - B.) At the time of the initial measurement (May 29, 1968) the recorded flow was 40 gpm and the source contributed 202 lbs. of acid per day into Half Crown Run. It is estimated that the abatement procedures recommended for source 4810 will also reduce the flow from minor source 4811.

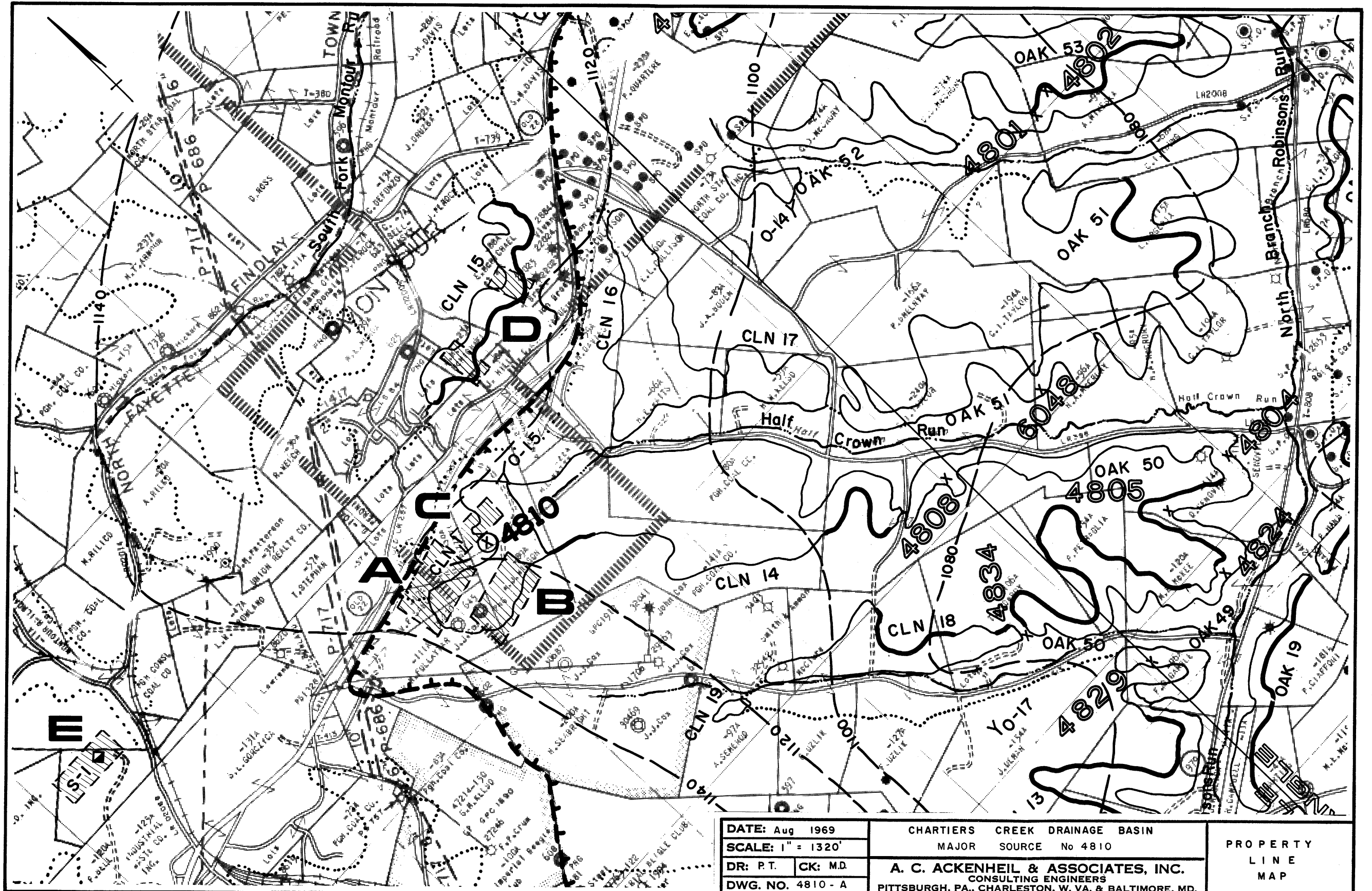
E. Surface Property Owners

Source 4810 appears to be located on the 89-acre property owned by W. J. Wilson. Source 4811 is on a 22-acre parcel owned by H. L. Watts; however, it is probably located within the right-of-way for the Manufacturer's Light and Heat Company's 16-in. diameter gas line. West of source 4810 the landowners are S. Pizzuti - 30 acres, V. F. Sabow - 17 acres, V. M. Fallaytar - III acres. East of source 4810 and north of source 4811 the 27-acre parcel belongs to A. M. Tunning. South of source 4811 the Pittsburgh Coal Company owns 141 acres. North of source 4810 the acreage is subdivided into lots. Strip mine CLN 15 is located on a 23-acre parcel belonging to J. H. McMichael and an 88-acre parcel belonging to E McMichael et. al.

F. Cost of Methods of Abatement

Description	Estimated Cost	Estimated Per Cent Flow Reduction
Area A: V.F. Sabow, S. Pizzuti, V. M. Fullaytar	\$20,000	20
1. Provide surface drainage from culverts beneath U.S. Rt. 22 into Half Crown Run (CLN 1)		
Sub-Total :	\$20,000	20%

<u>Description</u>	<u>Estimated Cost</u>	<u>Estimated Per Cent Flow Reduction</u>
<u>Area B:</u> W. J. Wilson	\$50,000	12
1. Restore natural drainage to prevent runoff from entering deep mine		
2. Provide drainage to Half Crown Creek (CLN 1)		
<hr/>		
Sub-Total:	\$70,000	32%
<u>Area C:</u> Pittsburgh Coal Co. and/or Industrial Waste Co.	\$ 7,000	20
1. Seal the airshaft to prevent water flow into the deep mine (S-1)		
<hr/>		
Sub-Total:	\$77,000	52%
<u>Area D:</u> J. H. McMichael, E. McMichael, et. al.	\$ 2,000	1
1. Restore natural drainage in portions of the strip mine CLN 15		
<hr/>		
TOTAL:	\$79,000	53%



DATE: Aug 1969  
 SCALE: 1" = 1320'  
 DR: P.T. CK: M.D.  
 DWG. NO. 4810 - A

CHARTIERS CREEK DRAINAGE BASIN  
 MAJOR SOURCE No 4810  
**A. C. ACKENHEIL & ASSOCIATES, INC.**  
 CONSULTING ENGINEERS  
 PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

PROPERTY  
 LINE  
 MAP

BALD KNOB

LEGEND



= MINED OUT

~1140~ = STRUCTURE CONTOURS AT BASE OF PGH. COAL



= COAL OUTCROP



1140

1140

SOUTH FORK MONTGOMERY RUN

POTATO GARDEN RUN

AREA "E"

1120

No. 4811

No. 4810

HALF CROWN RUN

1100

1160

ALLEGHENY WASHINGTON

1160

1160

1140

1120

NOTE:

DEEP MINE MAP INFORMATION FROM DATA SHOWN ON W.P.A. MAP BURGETTSTOWN SHEET NO 3

DATE: APRIL 1969  
SCALE: 1" = 1200'  
DR: PT CK:  
DWG. NO. 4810 - B

CHARTIERS CREEK DRAINAGE BASIN  
MAJOR SOURCE #4810  
A. C. ACKENHEIL & ASSOCIATES, INC.  
CONSULTING ENGINEERS  
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

DEEP MINE MAP