

APPENDIX A

EXPLANATION OF MAPS AND PLANS 1.

LOCATION MAP - PLATE 1

This is a comprehensive map of the areas that will orient the numbers indicated on the FlowData Charts interested reader of this report with the general location of the Dents Run Watershed area.

2. GEOLOGIC SECTION LINE - PLATE 2

This map shows the cross-sectional Area A to B at which the geologic section was taken.

3. GEOLOGICAL STRUCTURE MAP - PLATE 3

This map shows the areas of the different formations contained in the watershed and the contour lines at the base of the Mercer Coal which indicates the dip to the Caledonia-Pine Creek Syncline.

4. RAIN GAGE STATIONS - PLATE 4

This map shows the approximate location of rain gage stations. Rain gages were set in an attempt to briefly correlate rainfall, runoff and sub-surface drainage.

5. SUB-REGIONAL AREA WATERSHED MAP - PLATE 5

This map is a reproduction of the base map to show the total watershed and sub-regional watershed areas. Also, this map indicates private land and lands presently in the Pennsylvania Elk State Forest.

6. WEIR LOCATIONS AND SAMPLING POINTS - PLATE 6 This is a general area map with the total watershed outlined and showing the approximate weir locations and their identification number. The identification number corresponds to the Charts. The sampling points were chosen with respect to cross sections, uniformity of stream bottom and overall flows, accessibility and nearness to the confluence of merging streams.

7. MAJOR POLLUTION FLOWS - PLATE 7

This plan indicates the sub-regional tributaries that have a high pollution content and the streams.

8. DEEP MINE OPENINGS AND MINE REFUSE PILES - PLATE 8

This map shows the deep mines and mine refuse piles that were analysed in this study. Each pollution source has been given an identification number that corresponds to all Data Sheets included in this report.

9. STRIP MINE MAP - PLATE 9

This map shows the area of inactive and active strip mines contained within the watershed. The different areas have been assigned identification letters to delineate the different areas.

10. GAS WELL LOCATION AND DISTRIBUTION LINES - PLATE 10

This map shows, the approximate location of gas wells and distribution lines that have been drilled within the watershed area. Information for this map was provided by the Consolidate Gas Company and Pennsylvania Department of Forest and Waters.

11. GENERAL MAP OF DENTS RUN COAL FIELD - PLATE 11

Location of coal fields within the Dents Run Watershed along with location of old deep mines, strip mines and active strip mines are shown on this map.

12. CLARION COAL (TYPE A) CONTOUR MAP - PLATE 11A

The crop line of the Clarion Coal (Type A) layer as described and shown in the Geologic Section and Generalized Stratigraphic Section.

13. LAND OWNERSHIP MAP - PLATE 12

Owners of record or reputed owners of land within the Dents Run Watershed appear on this map.

14. INDEX MAP - PLATE 13

The index map is a composite of Plates 1, 6, 7, 8 and 9 to a larger scale.

15. GENERALIZED STRATIGRAPHIC SECTION - FIGURE 1

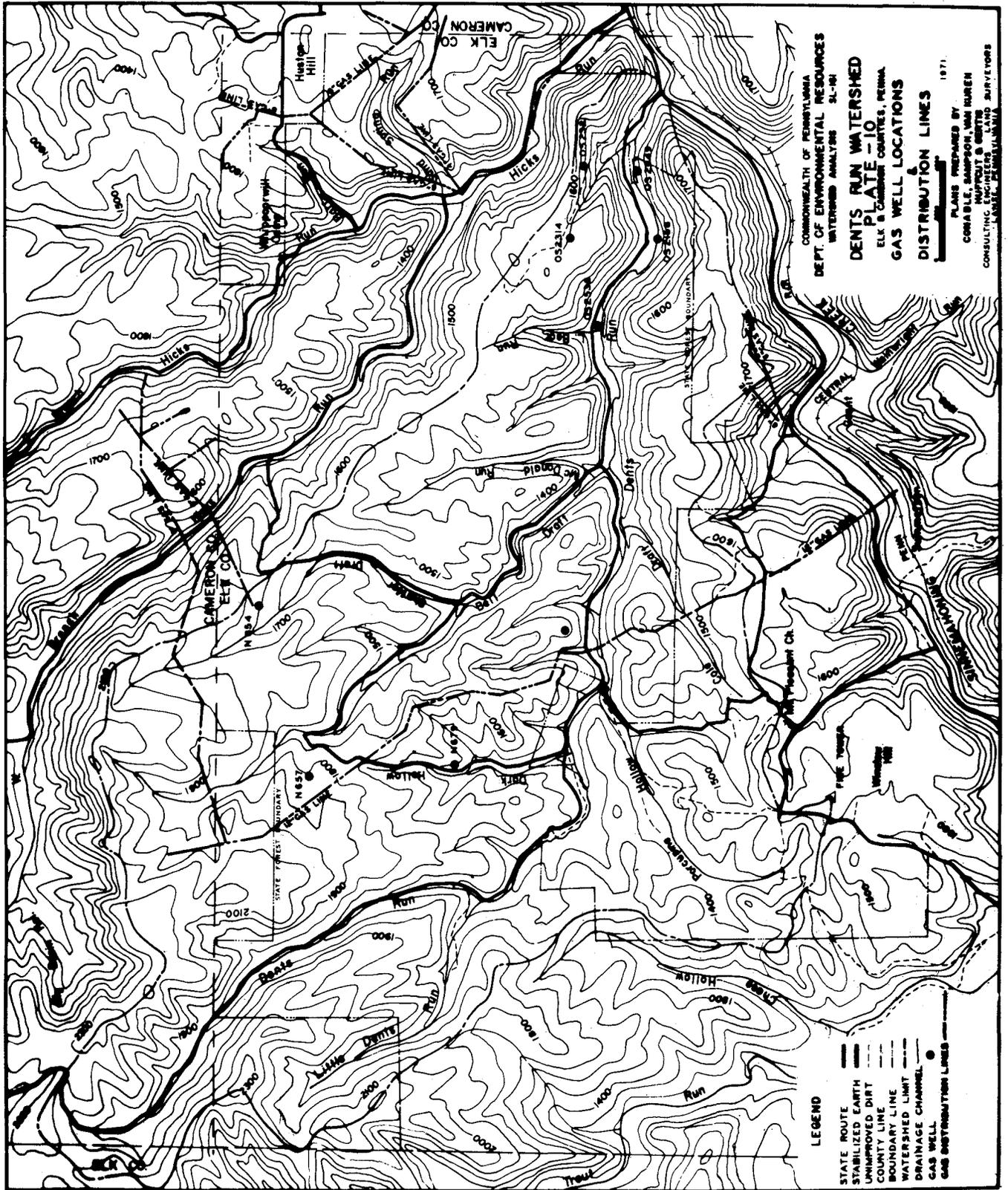
This graph shows a generalized columnar section of the exposed rocks in the watershed as found in the Allegheny, Pottsville, Pocono, Oswayo and Catskill formations.

16. GEOLOGIC SECTION - FIGURE 2

The geologic section is representative of the stratigraphy of the watershed through AB. Information was compiled from boring logs of gas wells, aerial photography and test pits information and geologic reports.

17. RAINFALL CHART - FIGURE 3

This graph is representative of the average rainfall over an eleven year period from January 1961 to December 1971. The total rainfall for each month is plotted respective to the average for that month. The area colored black is the above average rainfall for that month.



A. EXPLANATION OF INDEXES, CHARTS AND DATA SHEETS 1.

PRIORITY INDEX:

The Priority Number assigned to each pollution source is based on the amount of abatement of acid mine drainage for the Dents Run Watershed to be realized if the recommended reclamation project is performed. Pollution can best be remedied by solving the problems in the order of the Priority Index. In establishing the acid load contribution for the various sources, the estimated contribution from adjacent strip mine workings has been added to that determined by actual measurement for each source listed elsewhere since the recommendation for abatement of pollution from all sources involves total reclamation of all strip mine workings.

2. QUICK START INDEX:

The Quick Start Index has assigned a priority to pollution sources that will eliminate 31% of the total pollution contributed to Dents Run (3,898 lbs/day) if these pollution sources are abated based on average acid load in lbs/day contributed by these sources. It has been developed with the view of achieving the most pollution elimination in the shortest period of time for the estimated cost. Many of the work areas involved are located on private lands, and therefore an access or right of way entry problem may exist and must be resolved prior to commencement of the Quick Start Program. Two of the major pollution sources, 107 and 108, are not included in the Quick Start program due to their proximity to an active strip mine operation on private lands.

PRIORITY NUMBER INDEX

<u>PRIORITY#</u>	<u>SOURCE#</u>	<u>SUB-WATERSHED</u>	<u>DESCRIPTION OF SOURCE</u>
1	107	Porcupine Hollow	Strip Mine Discharge
2	108	Porcupine Hollow	Deep Mine Discharge
3	109	Porcupine Hollow	Deep Mine Discharge
4	103	Porcupine Hollow	Deep Mine Discharge
5	101&102	Porcupine Hollow	Deep Mine Discharge
6	124	Cole Draft	Strip Mine Workings
7	112	Porcupine Hollow	Deep Mine Discharge
8	113	Porcupine Hollow	Deep Mine Discharge
9	110	Dents Run	Deep Mine Discharge
10	123	Cole Draft	Strip Mine Workings
11	114	Dents Run	Mine Refuse Dump
12	122	Porcupine Hollow	Mine Refuse Dump
13	111	Dents Run	Deep Mine Discharge
14	104	Porcupine Hollow	Deep Mine Discharge
15	106	Porcupine Hollow	Deep Mine Discharge
16	118	Porcupine Hollow	Mine Refuse Dump
17	117	Porcupine Hollow	Mine Refuse Dump
18	120	Porcupine Hollow	Mine Refuse Dump
19	105	Porcupine Hollow	Deep Mine Discharge
20	119	Porcupine Hollow	Mine Refuse Dump
21	116	Porcupine Hollow	Mine Refuse Dump
22	115	Porcupine Hollow	Mine Refuse Dump
23	121	Porcupine Hollow	Mine Refuse Dump
24	125	Porcupine Hollow	Strip Mine Workings

Priority Listing is based on the percentage of the average daily acid load contributed to Dents Run in decreasing order by sources.

QUICK START PRIORITY INDEX

<u>PRIORITY#</u>	<u>SOURCE#</u>	<u>SUB-WATERSHED</u>	<u>SOURCE DESCRIPTION</u>
1	109	Porcupine Hollow	Deep Mine Discharge
2	103	Porcupine Hollow	Deep Mine Discharge
3	101&102	Porcupine Hollow	Deep Mine Discharge
4	112	Porcupine Hollow	Deep Mine Discharge
5	113	Porcupine Hollow	Deep Mine Discharge
6	110	Dents Run	Deep Mine Discharge
7	114	Dents Run	Mine Refuse Discharge
8	111	Dents Run	Deep Mine Discharge
9	118	Porcupine Hollow	Mine Refuse Dump
10	117	Porcupine Hollow	Mine Refuse Dump
11	120	Porcupine Hollow	Mine Refuse Dump
12	119	Porcupine Hollow	Mine Refuse Dump
13	116	Porcupine Hollow	Mine Refuse Dump
14	115	Porcupine Hollow	Mine Refuse Dump

3. WATER QUALITY CHARTS:

The water quality charts are a graphical representation of chemical analysis versus flows. It is through the use of these graphs that analysis of runoff, rainfall, stream flow and ground water seepage can be determined.

4. DATA SHEETS:

The data sheets are a comprehensive chart of all stream data collected throughout the duration of this project. These data sheets are preceded by a tabular summary of the average values based on those obtained by actual measurement, i.e. only values shown on data sheets for those days when both chemical analysis samples were taken and stream flow was measured.

5. MINE REFUSE PILES:

Contour maps of all mine refuse piles referred to in this report are presented herein.

APPENDIX C
DESCRIPTION OF SOURCES

MAJOR SOURCE 107 - PRIORITY INDEX NUMBER 1

1. Major Source 107 is located in the Porcupine Hollow sub-basin about half way upstream from the confluence of Porcupine Hollow and Dents Run and the flow from this source drains directly into Porcupine Hollow. It is located near an active strip mine on private property outside the boundary of the State Forest

lands.

2. Source 107 is flow from impounded water outside the barrier of a recently active strip that has not been regarded or revegetated. Water appears to be leeching through the barrier wall and spoil pile and impounding between the spoil and access road. It drains under the road and downhill into Porcupine Hollow. Average daily flow from this sources contributed 1.6% of the total measured average daily flow at Station 24. This source is a slugger with a slugging index of 4.66.

3. Field and laboratory studies yield the following maximum, minimum and average values for this source:

<u>SOURCE 107</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gal/day	55,000	3,000	13,500
pH	3.1	2.4	
Acidity mg/L	3,750	1,320	2,185
Iron mg/L	425	1	165
Sulfates mg/L	12,000	400	4,995

<u>SOURCE 107 (continued)</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Acid Load lbs/day	917	63	413
Iron lbs/day	87	24	47
Sulfates lbs/day	1,743	167	740

4. Major Source 107 contributes approximately 10.6% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 173 acres within the watershed is involved and the estimated cost of remedial work is \$865,000.

6. We estimate that this would achieve an abatement of approximately 80% of the pollution from this source including adjacent strip mine workings or 15.94% of the total pollution contributed to Dents Run, thus reducing average acid load contributed daily to Dents Run by some 621 pounds, average iron load by 64 pounds, and average sulfate load by 2,298 pounds.

MAJOR SOURCE 108 - PRIORITY INDEX NUMBER 2

1. Major Source 108 is located in the Porcupine Hollow sub-basin near the headwaters of Porcupine Hollow into which it drains. It is located on private lands outside the State Forest Boundaries.

2. Source 108 is a flow from an abandoned deep mine shaft opening. Physical samples and volumetric measurements were taken of flow from this mine opening, discharged through a partially buried 18 inch or 20 inch pipe prior to its entry into Porcupine Hollow. Average daily flow from this source constituted 2.97 of the measured average daily flow at Station 24. This source is not a slugger.

3. Field and laboratory study yield the following maximum, minimum and average values for this source:

<u>SOURCE 108</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	68,000	15,000	24,700
pH	2.8	2.1	-
Acidity mg/L	2,900	1,000	2,150
Iron mg/L	1,200	200	640
Sulfates mg/L	12,000	1,850	4,710
Acid Load lbs/day	567	241	412
Iron lbs/day	150	113	128
Sulfates lbs/day	1,049	524	843

4. Major Source 108 contributes approximately 10.6% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation is recommended for abatement of this source. An area of approximately 162 acres within the watershed is involved and the estimated cost of remedial work is \$696,000.

6. We estimate that this would achieve an abatement of approximately 65% of the pollution from this source, including adjacent strip mine workings or 12.567 of. the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 490 pounds, average iron load by 51 pounds and average sulfate load by 1,888 pounds daily.

MAJOR SOURCE 109 - PRIORITY INDEX NUMBER 3

1. Major Source 109 is located in the Porcupine Hollow sub-basin at the headwaters of Porcupine Hollow and the flow from this source would, in fact, appear to be the headwaters of Porcupine Hollow. It is located on private property outside the State Forest boundary.
2. Source 109 is the flow from an abandoned deep mine. The drainage is emitted from the drift opening as well as from an air shaft opening nearby. Average daily flow from this source constituted 2.4% of the measured average daily flow at Station 24. This source is not a slugger.
3. Field and laboratory study yield the following maximum, minimum and average values for this source:

<u>SOURCE 109</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gal/L	28,000	17,000	20,100
pH	2.9	2.3	
Iron mg/L	4,700	3,000	3,980
Acidity mg/L	1,8000	700	1,140

<u>SOURCE 109 (continued)</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Sulfates-mg/l	10,500	4,500	7,475
Acid Load-lbs/day	796	567	694
Iron-lbs/day	300	163	204
Total Ferrous	105	17	75
Sulfates-lbs/day	1,750	980	1,216

4. Major Source 109 contributes approximately 187 of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings including recontouring and revegetation is recommended for abatement of this source. An area of approximately 46 acres within the watershed is involved and the estimated cost is \$122,000.

6. We estimate that this would achieve an abatement of approximately 59% of the pollution from this source including adjacent strip mine workings or 11.97% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 467 pounds, average iron load by 48 pounds and average sulfate load by 1,799 pounds daily.

MAJOR SOURCE 103 - PRIORITY INDEX NUMBER 4

1. Major Source 103 is located in the Porcupine Hollow sub-basin above the headwaters of Porcupine Hollow into which it drains on private lands outside the State Forest.

2. Source 103 is a flow from an abandoned deep mine shaft opening.

Physical samples and volumetric measurements were taken of the flow prior to its entry into Porcupine Hollow. Average daily flow from this source constituted 2.27 of the measured average daily flow at Station 24. This source is not a slugger.

3. Field and laboratory study yield the following maximum, minimum and average values for this source:

<u>SOURCE 103</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow Gals/day	22,000	14,000	19,000
pH	2.7	2.3	
Acidity mg/L	3,900	1,200	2,950
Iron mg/L	1,025	350	725
Sulfates mg/L	14,500	3,400	6,630
Acid Load lbs/day	586	220	455
Iron lbs/day	133	91	112
Total Ferrous	60	27	45
Sulfates lbs/day	934	642	775

4. Source 103 contributes approximately 11.77% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 52 acres within the watershed is involved and the estimated cost of remedial work is \$200,000.

6. We estimate that this would achieve an abatement of approximately 61% of the pollution from this source, including adjacent strip mine workings or 8.83% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 228 pounds, average iron load by 36 pounds and average sulfate load by 1,322 pounds.

MINOR SOURCES 101 and 102 - PRIORITY INDEX NUMBER 5

1. Minor Sources 101 and 102 are located in the Porcupine Hollow sub-basin just upstream from the headwaters of the tributary to Porcupine Hollow in private property outside the State Forest lands.

2. Sources 101 and 102 are flows and seepages from abandoned and subsided deep mine shaft openings. Physical samples were taken at the mouth of each mine but volumetric measurements were taken downstream where the seepages and flows from both openings combined into a channel adequate for measuring purposes. Average daily flow from these two sources contributed 24% of the average daily measurable flow at Sampling Point No. 25 and the combined flow does constitute a major source and is a slugger with a slugging index of 6.

Field and laboratory study yield the following maximum, minimum and average values for these sources:

<u>SOURCE 101</u>	<u>MAXIMUM</u>	<u>MINIUM</u>	<u>AVERAGE</u>
pH	3.5	2.9	
Acidity mg/L	700	120	300
Iron mg/L	50	1.4	15
Sulfate mg/L	2,250	470	1,000

<u>SOURCE 102</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
pH	3.3	2.7	
Acidity mg/L	550	48	245
Iron mg/L	65	1.4	17
Sulfates mg/L	3,000	440	892

<u>COMBINED SOURCES</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	82,000	18,000	28,000
Acid Load lbs/day	417	29	161
Iron lbs/day	17	1	7
Sulfates lbs/day	1,795	88	673

4. Sources 101 and 102, combined, contribute approximately 5% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 18 acres within the watershed is involved and the estimated cost of remedial work is \$36,000.

6. We estimate that this would achieve an abatement of approximately 55% of the pollution from this source, including adjacent strip mine workings or 2.81% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 110 pounds, average iron load by 1 pound and average sulfate load by 422 pounds.

MINOR SOURCE 124 - PRIORITY INDEX NUMBER 6

1. Minor Source 124 is located near the headwaters of the Cole Draft sub-basin on private property outside the boundaries of the State Forest lands.
2. Source 124 is an abandoned strip mine working of approximately 30 acres of unreclaimed land and 40 acres of random reclaimed land.
3. Source 124 is estimated to contribute approximately 3.87 of the total average daily acid load entering Dents Run.
4. Total reclamation of this strip mine working, including recontouring and revegetation, is recommended at an estimated cost of \$230,000.
5. We estimate that this would achieve an abatement of approximately 54% of the pollution from this source, including adjacent strip mine workings, or 2.04% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 80 pounds, average iron load by 8 pounds and average sulfate load by 307 pounds.

MINOR SOURCE 112 - PRIORITY INDEX NUMBER 7

1. Minor Source 112 is located in the Porcupine Hollow sub-basin slightly upstream from and southeast of the junction of Porcupine Hollow and Dents Run in close proximity to inactive but unreclaimed strip mine workings within the State Forest lands. Flow discharges into Porcupine Hollow.

2. Source 112 is the flow from an abandoned deep mine which has been sealed but discharges through an 8 inch pipe placed in the seal.

3. Field and laboratory studies yield the following maximum, minimum and average values for this source:

<u>SOURCE 112</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	31,000	5,000	11,600
pH	3.0	2.3	
Acidity mg/L	600	100	307
Iron mg/L	85	10	40
Sulfates mg/L	2,800	525	1,270
Acid Load lbs/day	67	3	3
Sulfates	284	40	100

4. Minor Source 112 contributed approximately .74% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 46 acres within the watershed is involved and the estimated cost of remedial work is \$185,000.

6. We estimate that this would achieve an abatement of approximately 567 of the pollution from this source, including adjacent strip mine workings or 1.87 of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 70 pounds, average iron load by 7 pounds and average sulfate load by 270 pounds.

MINOR SOURCE 113 - PRIORITY INDEX NUMBER 8

1. Minor Source 113 is located in the Porcupine Hollow sub-basin in close proximity to Minor Source 112 and inactive but unreclaimed strip mine workings and lies within the State Forest lands. Flow discharges into Porcupine Hollow just upstream from its junction with Dents Run.

2. Source 113 is the flow from an abandoned deep mine which has been sealed but discharges through an 8 inch pipe placed in the seal.

3. Field and laboratory studies yield the following maximum, minimum and average values for this source:

<u>SOURCE 113</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	17,000	2,000	6,700
pH	3.5	2.6	
Acidity mg/L	280	48	160
Iron mg/L	22	2	22
Sulfates mg/L	1,050	350	637
Acid Load lbs/day	25	2	9
Iron lbs/day	1	11	15
Sulfates lbs/day	74	9	35

4. Minor Source 113 contributes approximately .237 of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 36 acres within the watershed is involved and the estimated cost of remedial work is \$145,000.

6. We estimate that this would achieve an abatement of approximately 57% of the pollution from this source, including adjacent strip mine workings or 1.24% of the total pollution contributed to Dents Run, thus reducing the average acid load in Dents Run by some 48 pounds, average iron load by 5 pounds and average sulfate load by 186 pounds.

MINOR SOURCE 110 - PRIORITY INDEX NUMBER 9

1. Minor Source 110 is located in the Dents Run main stream watershed between the confluence of Dark Hollow and Dents Run and

that of Porcupine Hollow and Dents Run and the discharge from this source flows into Dents Run. It is located on private lands above the abandoned mining settlement of Wilmer.

2. Source 110 is the flow from an abandoned deep mine which has been sealed but discharges through an 8 inch pipe placed in the seal.

3. Field and laboratory studies yield the following maximum, minimum and average volumes for this source:

<u>SOURCE 110</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	23,000	9,000	12,000
pH	3.4	2.8	
Acidity mg/L	300	90	167
Iron mg/L	10.5	1.5	3.6
Sulfates mg/L	750	160	473
Acid Load lbs/day	25	3	14
Iron lbs/day	21	.1	.3
Sulfates lbs/day	71	12	44

4. Minor Source 110 contributes approximately .367 of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 32 acres within the watershed is involved and the estimated cost of remedial work is \$124,000.

6. We estimate that this would achieve an abatement of approximately 57% of the pollution from this source, including adjacent strip mine workings or 1.19% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 46 pounds, average iron load by 5 pounds and average sulfate load by 178 pounds.

MINOR SOURCE 123 - PRIORITY INDEX NUMBER 10

1. Minor Source 123 is located in the Cole Draft sub-basin within the boundary of the State Forest lands.
2. Source 123 is an abandoned strip mine working of approximately 25 acres of unreclaimed land.
3. Source 123 contributes approximately 1.35% of the total average acid load daily entering Dents Run.
4. Total reclamation of this strip mine working, including recontouring and revegetation, is recommended at an estimated cost of \$100,000.
5. We estimate that this would achieve an abatement of approximately 80% of the pollution from this source, *including* adjacent strip mine workings or 1.08% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 42 pounds, average iron load by 4 pounds and average sulfate load by 162 pounds.

MINOR SOURCE 114 - PRIORITY INDEX NUMBER 11

1. Minor Source 114 is located on private land within Dents Run area between Dark Hollow and Porcupine Hollow. The source is shown on the map of Deep Mine Openings and Mine Refuse Piles Plate 8. This mine refuse pile is located near the entrance to Deep Mine Opening Sources 110 and 111. The estimated volume of this refuse pile is 20,000 cubic yards and indicates a sizable working in the associated deep mine area.
2. We recommend that the 20,000 cubic yards of mine refuse known as Source 114 be removed and placed in 2 foot layers **in Strip Mine Area B**. The existing spoil bank may be utilized to seal the deposit of mine refuse and to recontour the slopes to drain away from the high wall. All areas that will be recontoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at the site at the conclusion of the restoration.
3. Remove and place 20,000 cubic yards of deep mine refuse to Strip Mine Area B and reclaim Strip Mine Area B. The estimated cost of this abatement is \$47,700.
4. **We** estimate that this would achieve an abatement of approximately 72% of the pollution from this source and Strip Mine Area B or .99% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 39 pounds, average iron load by 4 pounds and average sulfate load by 149 pounds daily.

MINOR SOURCE 122 - PRIORITY INDEX NUMBER 12

1. Minor Source 122 is located on private land within the Porcupine Hollow area of the Dents Run watershed and is shown on the map of Deep Mine Openings and Refuse Pile Plate 8. This mine refuse pile is located near the entrance to Deep Mine Opening Source 108, The estimated volume of this refuse pile is 13,100 cubic yards.
2. We recommend that the 13,100 cubic yards of mine refuse known as Source 122 be removed and placed in 2 foot layers in Strip Mine Area D. The existing spoil banks may be used to seal the deposit of mine refuse and to contour the slopes away from the high wall. All areas that will be contoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at the site at the conclusion of the restoration and the grading.
3. Remove and place 13,100 cubic yards of deep mine refuse in Strip Mine Area D and reclaim Strip Mine Area D. The estimated cost of this abatement is \$32,300.
4. We estimate that this would achieve an abatement of approximately 87% of the pollution from this source and Strip Mine Area D or .78% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 30 pounds, average iron load by 3 pounds and average sulfate load by 117 pounds.

MINOR SOURCE 111 - PRIORITY INDEX NUMBER 13

1. Minor Source 111 is located in the Dents Run main stream watershed in close proximity to Minor Source 110 on private land above the abandoned mining settlement of Wilmer.

2. Source 111 is the flow from an abandoned deep mine which has been sealed but discharges through an 8 inch pipe placed in the seal.

3. Field and laboratory studies yield the following maximum, minimum and average values for this source:

<u>SOURCE 111</u>	<u>MAXIMUM</u>	<u>MINIMUM</u>	<u>AVERAGE</u>
Flow gals/day	8,000	1,000	3,000
pH	3.4	2.7	
Acidity mg/L	960	90	213
Iron mg/L	3.6	1.1	2.3
Sulfates mg/L	2,300	230	593
Acid Load lbs/day	10	1	4
Iron lbs/day	20	.01	.2
Sulfates lbs/day	23	4	11

4. Minor Source 111 contributes approximately .1% of the total average acid load per day entering Dents Run.

5. Total reclamation of adjacent strip mine workings, including recontouring and revegetation, is recommended for abatement of this source. An area of approximately 18 acres within the watershed is involved and the estimated cost of remedial work is \$81,000.

6. We estimate that this would achieve an abatement of approximately 70% of the pollution from this source, including adjacent strip mine workings or .75% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 29 pounds, average iron load by 3 pounds and average sulfate load by 113 pounds.

MINOR SOURCE 104 - PRIORITY INDEX NUMBER 14

1. Minor Source 104 is located in the Porcupine Hollow sub-basin between Porcupine Hollow and the headwaters of the tributary to Porcupine Hollow adjacent to abandoned strip mine workings. The discharge from this source drains into Porcupine Hollow downstream from its headwaters. It is located on private lands outside the boundary of the State Forest lands.
2. Source 104 is seepage from an abandoned deep mine and does not flow in such a way as to permit measurement of quantity. We estimate the acid load contribution from this source and the adjacent strip mine workings as 1.12% of the average daily load entering Dents Run.
3. Reclamation of this area will be accomplished in the work for Sources 103 and 109 and estimated cost figures are included therein.
4. We estimate that this would achieve an abatement of approximately 60% of the pollution from this source, including adjacent strip

mine workings or .67% of the total pollution in Dents Run, thus reducing average acid load in Dents Run by some 26 pounds, average iron load by 3 pounds and average sulfate load by 101 pounds.

MINOR SOURCE 106 - PRIORITY INDEX NUMBER 15

1. Minor Source 106 is located in the Porcupine Hollow sub-basin east of Porcupine Hollow adjacent to abandoned strip mine workings and the discharge from this source drains into Porcupine Hollow. It is located on private property outside the boundary of the State Forest lands.
2. Source 106 is the seepage from an abandoned deep mine opening and does not flow in such quantity as to allow for measurement of flow although the seepage is readily visible. We estimate the acid load contribution from this source and the adjacent strip mine workings as .97% **of** the average daily load entering Dents Run.
3. Reclamation of this area will be accomplished in the work for Sources 103 and 109 and estimated cost figures are included therein.
4. We estimate that this would achieve an abatement of approximately 60% of-the pollution from this source, including adjacent strip mine workings or .58% of the total pollution in Dents Run, thus reducing average acid load in Dents Run by some 23 pounds, average iron load by 1 pound and average sulfate load by 87 pounds.

MINOR SOURCE 118 - PRIORITY INDEX NUMBER 16

1. Minor Source 118 is located on private land within the Porcupine Hollow area of the Dents Run Watershed. The source is shown on the map of Deep Mine Openings and Mine Refuse Piles Plate 8. This mine refuse pile is located near the entrance to Deep Mine Opening Source 103. The estimated volume of this mine refuse pile is 8,800 cubic yards.

2. We recommend that the 8,800 cubic yards of mine refuse known as Source 118 be removed and placed in 2 foot layers in Strip Mine Area C. The existing spoil from the strip mine may be used to seal the deposit of refuse and to contour the slopes to drain away from the high wall. A revegetation program will be necessary where and when all contouring has been completed. The soil analysis and topography will determine the type of revegetation necessary at this site.

3. Remove and place 8,800 cubic yards of deep mine refuse to Strip Mine Area C and reclaim Strip Mine Area C. The estimated cost of this abatement is \$21,800.

4. We estimate that this would achieve an abatement of approximately 89% of the pollution from this source and Strip Mine Area C or .53% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 21 pounds, average iron load by 2 pounds and average sulfate load by 80 pounds daily.

MINOR SOURCE 117 - PRIORITY INDEX NUMBER 17

1. Minor Source 117 is located on Pennsylvania State Forest lands within the Porcupine Hollow area of the Dents Run Watershed and is shown on the map of Deep Mine Opening and Mine Refuse Piles Plate 8. This mine refuse pile is also located near the entrance to Deep Mine Opening Source 113. The estimated volume of this refuse pile is 6,500 cubic yards and indicates a sizable working within the associate deep mine area.
2. We recommend that the 6,500 cubic yards of mine refuse known as Source 117 be removed and placed in 2 foot layers in Strip Mine Area A. The existing spoil bank may be utilized to seal the deposit of mine refuse and to contour the slopes to drain away from existing high wall. All areas that will be contoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at the site at the conclusion of the restoration.
3. Remove and place 6,500 cubic yards of deep mine refuse to Strip Mine Area A and reclaim Strip Mine Area A. The estimated cost of this abatement is \$14,500.
4. We estimate that this would achieve an abatement of approximately 88% of the pollution from this source and Strip Mine Area A or .39% of the total pollution entering Dents Run, thus reducing average acid load in Dents Run by some 15 pounds, average iron load by 2 pounds and average sulfate load by 59 pounds daily.

MINOR SOURCE 120 - PRIORITY INDEX NUMBER 18

1. Minor Source 120 is located on private lands within the Porcupine Hollow area of the Dents Run Watershed and is shown on the map of Deep Mine Openings and Refuse Piles Plate 8. This mine refuse pile is located near the entrances to Deep Mine Opening Source 104. The estimated volume of this refuse pile is 6,200 cubic yards.

2. We recommend that the 6,200 cubic yards of mine refuse known as Source 120 be removed and placed in 2 foot layers in Strip Mine Area C. The existing spoil banks may be used to seal the deposit of mine refuse and to contour the slopes to drain away from the existing high wall. All areas that will be contoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at the site at the conclusion of the restoration and grading.

3. Remove and place 6,200 cubic yards of deep mine refuse to Strip Mine Area C and reclaim Strip Mine Area C. The estimated cost of the abatement is \$15,300.

4. We estimate that this would achieve an abatement of approximately 89% of the pollution from this source and Strip Mine Area C or .37% of the total pollution contributed to Dents Run thus reducing average acid load in Dents Run by some 14 pounds, average iron load by 1 pound and average sulfate load by 56 pounds daily.

MINOR SOURCE 105 - PRIORITY INDEX NUMBER 19

1. Minor Source 105 is located in the Porcupine Hollow sub-basin east of Porcupine Hollow and west of the headwaters of the tributary to Porcupine Hollow adjacent to abandoned strip mine workings, and the discharge from this source drains into Porcupine Hollow downstream from its headwaters. It is located on private lands outside the boundary of the State Forest lands.
2. Source 105 is seepage from an abandoned deep mine and does not flow in such quantity as to permit volumetric measurement. We estimate the acid load contribution from this source and the adjacent strip mine workings as .59% of the average daily load in Dents Run.
3. Reclamation of this area will be accomplished in the work for Sources 103 and 109 and estimated cost figures are included therein.
4. We estimate that this would achieve an abatement of approximately 60% of the pollution from this source, including adjacent strip mine workings or .35% of the total pollution entering Dents Run, thus reducing average acid load in Dents Run by some 14 pounds, average iron load by 1. pound and average sulfate load by 53 pounds.

MINOR SOURCE 119 - PRIORITY INDEX NUMBER 20

1. Minor Source 119 is located within the Porcupine area of the Dents Run Watershed. This source is shown on the map of Deep Mine Openings and Mine Refuse Piles Plate 8. This Mine Refuse Pile is located near the Deep Mine Opening Source 109. The estimated volume of the mine refuse pile is 5,200 cubic yards.
2. We recommend that the 5,200 cubic yards of mine refuse known as Source 119 be removed and placed in 2 foot layers in Strip Mine Area C. The existing spoil bank may be used for sealing the deposit of mine refuse and to contour the slopes away from the high wall to facilitate drainage. A revegetation program will be necessary wherever recontouring and grading has been completed. When recontouring and grading has been completed, a soil analysis should be performed to determine the best possible revegetation to be used.
3. Remove and place 5,200 cubic yards of deep mine refuse to Strip Mine Area C and reclaim Strip Mine Area C. The estimated cost of this abatement is \$14,000.
4. We estimate that this would achieve an abatement of approximately 89% of the pollution from this source and Strip Mine Area C or .31% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 12 pounds, average iron load by 1 pound and average sulfate load by 47 pounds daily.

MINOR SOURCE 116 - PRIORITY INDEX NUMBER 21

1. Minor Source 116 is located on the Pennsylvania State Forest lands within the Porcupine Hollow area of the Dents Run Watershed and is shown on the map of Deep Mine Openings and Refuse Piles Plate 8. This mine refuse pile is also located near the entrance to Deep Mine Opening Source 112. The estimated volume of this refuse pile is 2,500 cubic yards which also indicates limited workings in the associated deep mine.
2. We recommend that the 2,500 cubic yards of mine refuse known as Source 116 be removed and placed in 2 foot layers in Strip Mine Area A. The existing spoil bank may be used to seal the deposit of mine refuse and to recontour the slopes to drain away from the existing high wall. All areas that will be recontoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at this site at the conclusion of the restoration and grading.
3. Remove and place 2,500 cubic yards of deep mine refuse to Strip Mine Area A and reclaim Strip Mine Area A. The estimated cost of this abatement is \$8,800.
4. We estimate that this would achieve an abatement of approximately 88% of the pollution from this source and Strip Mine Area A or 15% of the total pollution contributed to Dents Run, thus reducing the average acid load in Dents Run by some 6 pounds, average iron load by 1 pound and average sulfate load by 23 pounds daily.

MINOR SOURCE 115 - PRIORITY INDEX NUMBER 22

1. Minor Source 115 is located on private property within Porcupine Hollow area of the Dents Run Watershed and is shown on the map of Deep Mine Openings and Mine Refuse Piles Plate 8. This mine refuse pile is also located near the entrances to Deep Mine Opening Sources 101 and 102. The relatively small volume of the refuse pile is 2,070 cubic yards and indicates the associated Sources 101 and 102 to be limited in size.
2. We recommend that the 2,070 cubic yards of mine refuse known as Source 115 be removed and placed in Strip Mine Area A in 2 foot layers. The existing spoil bank may be used to seal the deposit of mine refuse and contour slopes to drain away from the existing high wall. All areas that will be recontoured will necessitate a revegetation program which will be determined by the type of soil and topography exhibited at the site at the conclusion of the restoration.
3. Remove and place 2,070 cubic yards of deep mine refuse to Strip Mine Area A and reclaim Strip Mine Area A. The estimated cost of this abatement is \$8,500.
4. We estimate that this would achieve an abatement of approximately 86% of the pollution from this source and Strip Mine Area A or .12% of the total pollution contributed to Dents Run, thus reducing average acid load in Dents Run by some 5 pounds, average iron load by .5 pounds and average sulfate load by 18 pounds daily.

MINOR SOURCE 121 - PRIORITY INDEX NUMBER 23

1. Minor Source 121 is located on private lands within the Porcupine Hollow area of the Dents Run Watershed and is shown on the map of Deep Mine Openings and Refuse Piles Plate 8. This mine refuse pile is located near the entrance to Deep Mine Opening Source 107. The estimated volume of this refuse pile is 3,000 cubic yards.

2. We recommend that the 3,000 cubic yards of mine refuse known as Source 121 be removed and placed in 2 foot layers in Strip Mine Area E. The existing spoil bank may be used to seal the deposit of mine refuse and to contour the slopes away from the high wall. All areas that will be recontoured will necessitate a revegetation program which will be dependent upon a soils analysis and the topography exhibited at the site at the conclusion of the restoration and grading.

3. Remove and place 3,000 cubic yards of deep mine refuse in Strip Mine Area E and reclaim Strip Mine Area E. The estimated cost of this abatement is \$8,800.

4. We estimate that this would achieve an abatement of approximately 377 of the pollution from this source and Strip Mine Area E or .087 of the total pollution contributed to Dents Run, thus reducing the average acid load in Dents Run by some 3 pounds, average iron load by less than 1 pound and average sulfate load by 12 pounds daily.

MINOR SOURCE 125 - PRIORITY INDEX NUMBER 24

1. Minor Source 125 is located in the Porcupine Hollow sub-basin slightly upstream from the confluence of Porcupine Hollow and Dents Run. It is within the boundary of the State Forest land.
2. Source 125 is an abandoned strip mine working of approximately 25 acres of un-reclaimed land and approximately 25 acres of random reclaimed land.
3. Source 125 contributes approximately 4.6% of the total average daily acid load entering Dents Run. It has been listed as Priority Index Number 24, however, because the total reclamation of this area will provide the abatement for Sources 112 and 113 and the estimated contribution from this source has been applied to the estimated contribution from Sources 112 and 113 in the preparation of the Priority Index and the Phase B Cost Summary.

MISCELLANEOUS SOURCES - PRIORITY INDEX NUMBER - NONE ASSIGNED

1. Miscellaneous sources are additional active or abandoned strip mine areas within the watershed totaling an additional 596 acres of which 410 acres are un-reclaimed and 186 acres are randomly reclaimed. Only 210 of the total acres are located within the bounds of the State Forest land, the remainder being on private property.
2. We estimate that the total contribution from these areas to the average daily total acid load entering Dents Run is 28.7%.

3. A priority index number has not been assigned to these areas since total reclamation is the recommendation in order to abate pollution from the major and other minor sources and the estimated contribution to pollution from these areas has been prorated among the other identifiable sources in determination of the priority index and for use in the cost summary of Phase B.