

SECTION VII

THE EFFECTS OF ACID DRAINAGE DISCHARGES
ON BASIN WATER QUALITY

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ON BASIN WATER QUALITY

The amount of acid carried into Loyalhanna Reservoir as measured during an 18 month sampling period has varied from 8, 000 to 248, 000 lbs. per day. The total average daily acid discharge from inventoried sources in the watershed is estimated to be in the order of 63, 50Q lbs. per day. Other investigators have also made estimates of daily average acid release into the Loyalhanna Watershed the range of 60, 000 to 65, 000 lbs. per day.

SOURCES OF ACIDITY

Sources of acidity below Loyalhanna Dam from the Elders Ridge Syncline area account for 8, 000 lbs. of daily acidity. The average acid inflow into Loyalhanna Reservoir from non runoff sources is calculated as 55, 000 lbs. per day. This daily average does not include the effects of surface runoff from refuse piles which could not be accounted for on a daily basis. Runoff from these surface refuse piles is associated with the shock or slug loadings of acidity which accompany initial periods of high stream flow into the reservoir after precipitation.

The average acid inflow from all acid sources into the reservoir based upon monthly samples taken during the 18 month sampling program was calculated as 79, 000 lbs. per day. To compensate for the effects of slug loadings upon this average, the three highest acid inflows were reduced by the estimated acidity produced by surface runoff. The resulting

average acid inflow was reduced to 58, 000 lbs. per day. Because the estimated magnitude of surface generated acidity production was partially derived on a basis of excess acid flows associated with sampling performed on days coinciding with the first day of precipitation, the close agreement of estimated average acidity production and daily acid inflow (excluding surface generated slug loads) is not complete proof of the accuracy of estimation. However, it is felt that these estimates give a close indication of average daily non-runoff associated acid inflow, and the effects of runoff generated slug inflow expressed on a daily basis. A second estimate of average acid inflow to the reservoir was made by excluding from the average the three high flows corresponding with slug acid discharges. This average inflow was calculated as 55, 000 lbs. per day. The average probably understates the value slightly by excluding high subsurface flows which accompanied the high surface flows. The observed acid production acid inflow relationship may be summarized as follows:

Estimated daily average acid inflow to Loyalhanna Reservoir (18 month sampling program)	79, 000 lbs/day
Estimated daily average acid inflow to Loyalhanna Reservoir excluding runoff from refuse piles (slug load surcharges excluded from average)	58, 000 lbs/day
Estimated daily average acid discharge above Loyalhanna Reservoir excluding runoff from refuse piles (50 lbs/acre/day or 24, 000 lbs/day).	55, 000 lbs/day

Sum of average discharges
all inventoried flows above
the reservoir 54, 375 lbs. /day

Estimated daily equivalent acid
discharge, all sources (sum of all
discharge sources plus refuse
pile runoff) 79, 500 lbs/day

Perhaps more significant is the relationship between daily acid inflow to the reservoir and acid discharge from the three major sources.

Total daily non-runoff acid production in the watershed above Loyalhanna Dam is estimated at 55, 000 tbs. per day. The contribution in pounds and as a percentage of total inflow for the three major discharges is as follows:

<u>Discharge #</u>	<u>Lbs/day</u>	<u>% of acid inflow above reservoir</u>
#5356	19,600	36%
#5177	14,050	25%
#5364	<u>14,300</u>	26%
Total 3 Major Discharges	48,000	87%
All Other Discharges	7,400	13%

The seemingly disproportionate effect on the reservoir of these 3 discharges

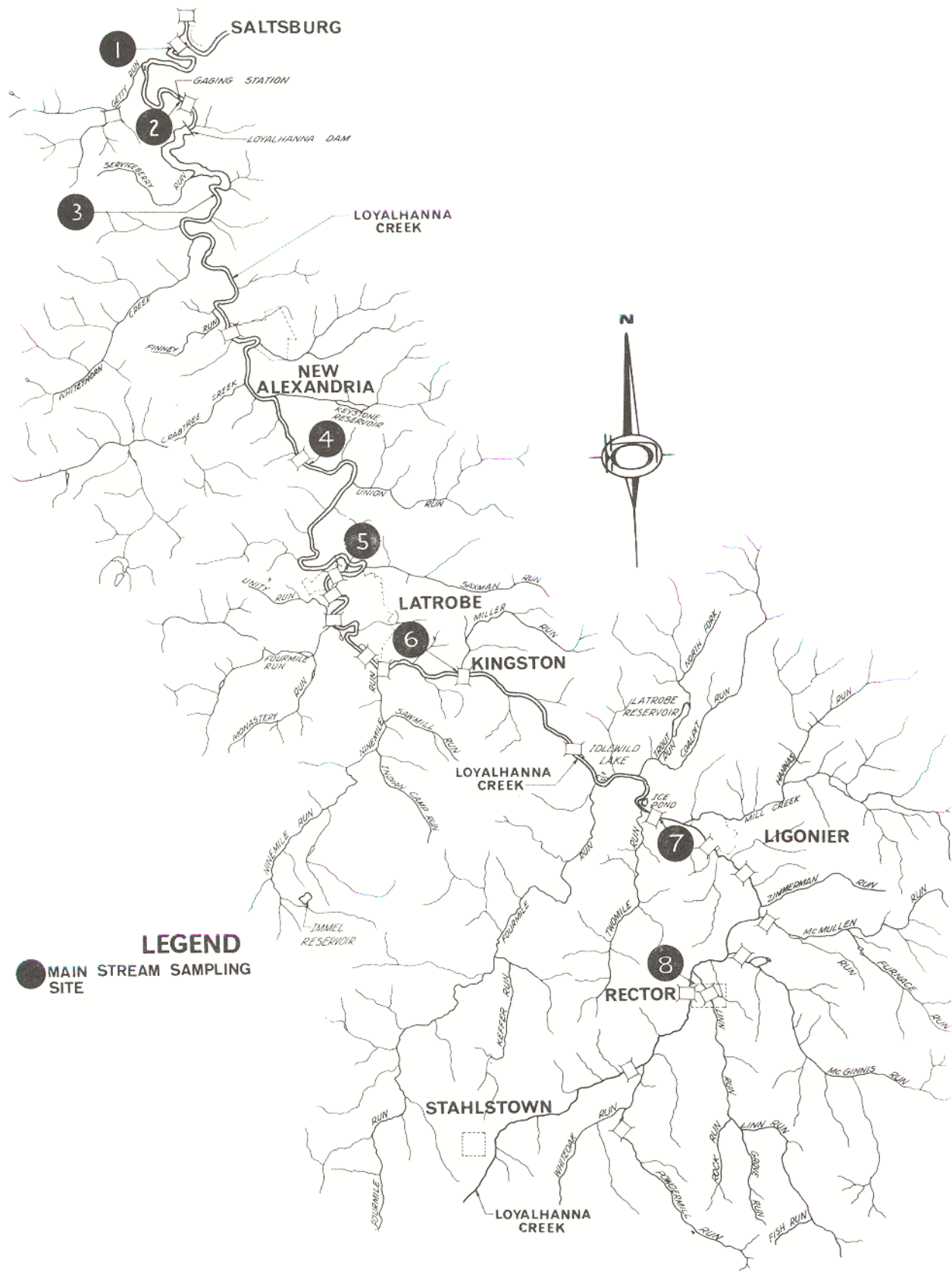
is due to the function of these discharges as the drainways for 39. 95 square

miles of coal seam or 90% of the 44. 34 square miles of Pittsburgh coal

seam in the watershed (excluding Elders Ridge and Freeport Seam)

STREAM SAMPLING PROGRAM OBSERVATIONS

During the field portion of the survey, stream samples were taken at 8 points along the mainstream Loyalhanna. Sampling Station 3 represents



LOCATION PLAN - LOYALHANNA CREEK
 MAIN STREAM SAMPLING STATIONS

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 ABATEMENT MEASURES FOR THE
 LOYALHANNA WATERSHED

PLATE
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Sampling stations 1 and 2 are located downstream of the reservoir. Values of pH at station 2 were less subject to wide variations than were other stations because of the stabilizing effect of the reservoir pool. Station 1, at the mouth of Loyalhanna Creek demonstrates the effects of Getty Run discharges on flows from the total watershed.

Acidity concentration measurements taken at each sampling point indicated the cumulative effects of each discharge and tended to confirm the estimated effects of the major discharges.

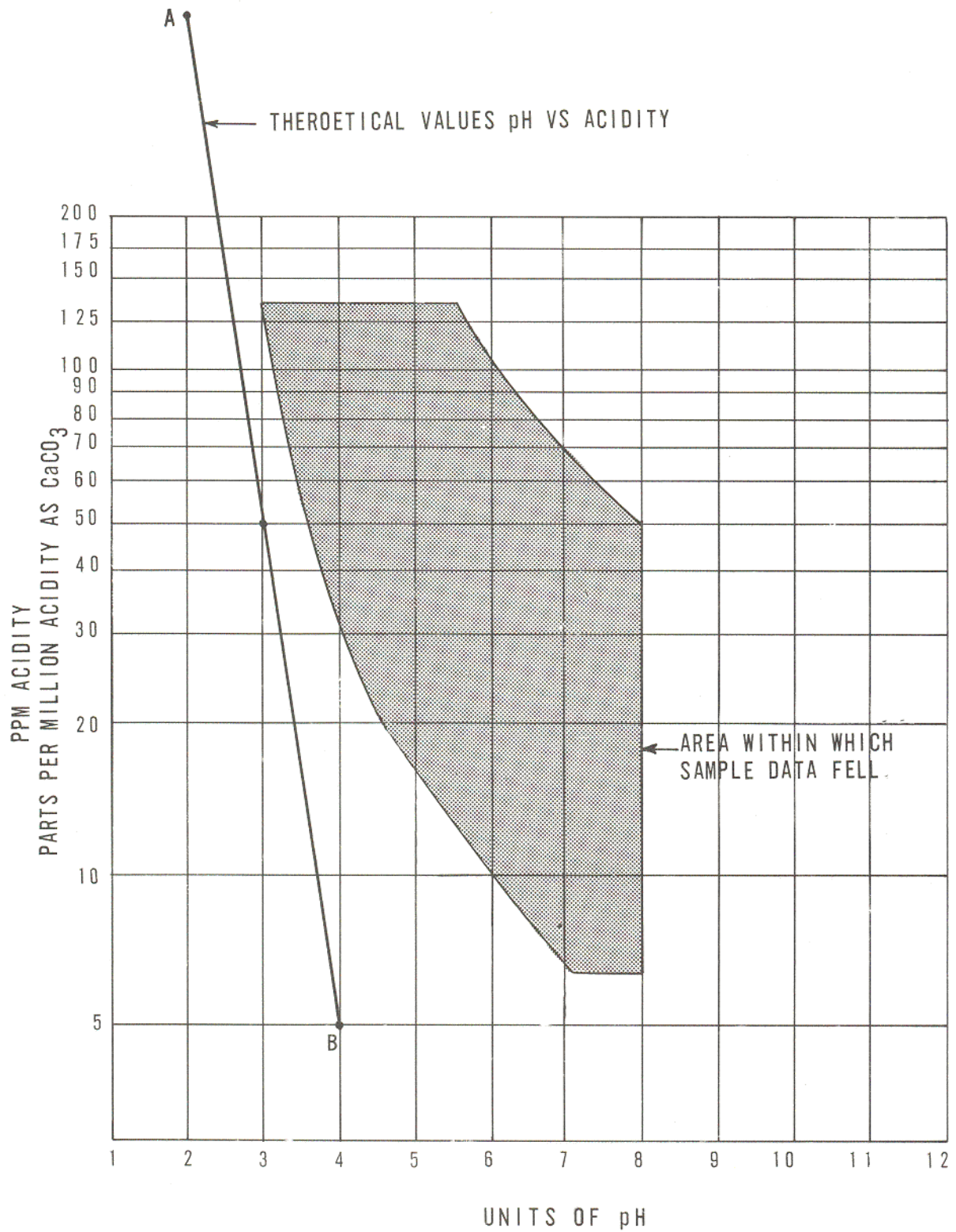
A pattern of changing acid discharges throughout the water year is indicated by the sampling program. During periods without surface runoff the major sources of mine acid discharges into the reservoir are the Latrobe and Greensburg syncline discharges. During low flows, the three major discharges #5177, #5353 and #5364 predominate. As the ground water table rises in the late spring, secondary discharges such as those on Four Mile Run and Union Run begin to flow and water quality in these tributaries deteriorates. In periods immediately following precipitation, runoff from spoil banks and gob piles increases the acid loading several fold, but dilution from unaffected tributaries lowers overall acid concentration.

pH, ACIDITY AND WATER QUALITY RELATIONSHIPS

As indicated by a review of published literature sources, the detrimental effects caused by increasing concentrations of acid mine drainage upon

stream ecology and water uses are normally related to the increased hydrogen ion concentration or lowered pH of the water. To improve water quality the pH must be raised by reducing the hydrogen ion concentration. Hydrogen ion concentration expressed as pH, however is a dependent parameter, the end result of the ionic equilibrium of acids, alkalies and buffers. Hydrogen ions cannot be removed from solution directly. Only acids, alkalies and buffer can be added, under certain conditions or removed. The relationship between acidity and pH will not be explored in, this text except to note the following:

1. pH is defined as the negative of the logarithm to the base 10 of the hydrogen ion concentration as expressed in gram molecular weights (moles) per liter. A concentration of . 1 gram per liter of hydrogen ions in solution is equal to. a concentration of 10^{-1} or pH = 1.0.
2. Acidity is defined as the equivalent weight of a known base required to neutralize an acid solution to a pH of 8.0.
3. In a pure solution containing no other ions except those of a fully dissociated acid, the measured acidity expressed as hydrogen ion equivalents will equal the pH also expressed as hydrogen ion equivalents. In a non-pure or non-ideal solution, the pH will be higher than its acidity equivalent because of the buffering effects of other solutes.



pH VS ACIDITY CONCENTRATION -
LOYALHANNA WATERSHED

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VII-2

4. In a pure solution, the following pH/acidity relationship holds:
 $\text{Acidity as CaCO}_3 = 50 \times 10^{(\text{pH}-3)}$ or
 $\text{PH} = 3.0 - \log_{10} \frac{\text{Acidity as mg/L CaCO}_3}{50}$

50

The theoretical relationship between PH and acidity as CaCO₃ in a pure

solution is as follows:

Acidity as CaCO ₃	pH
50.0 mg /L	3
5.0 mg/L	4
0.5 mg/L	5
0.05 mg/L	6

The relationship of acidity to PH for a given water is a function of the total concentration of dissolved and ionized solids within it. This relationship changes with the ionic composition of the water. In a natural stream these variations occur from day to day and season to season. The eighteen month sampling program measurements of acidity, hardness and sulfate concentration and PH taken in the mainstream Loyalhanna produced values within the envelope as shown in Figure VII-1. At no time did PH drop to its theoretical value in a pure solution as predicted by acidity alone. Theoretical PH can be determined from the line AB. It was observed that PH values were lower in summer months than in winter months for the same degree of acidity. (This would tend to indicate a higher buffering capacity is present in winter months than in warmer summer months.)

From an analysis of the pH vs. acidity relationship at, and above Loyalhanna reservoir, it has been observed that at no time has an acidity of 30 ppm produced a pH lower than 4.0; at no time has an acidity of 20 ppm produced a pH lower than 4.5, and at no time has an acidity of 10 ppm produced a pH of less than 6.0. This relationship of acidity as CaCO₃ vs. observed pH, (with unbuffered pH shown for reference) is as follows:

Acidity	pH observed not less than	Minimum or theoretical pH
30	4.0	3.25
20	4.5	3.45
10	6.0	3.70

The observed acidity/pH relationship allows pH to be related to pounds of acidity per cubic foot per second (CFS) of inflow. One part per million (ppm) or milligram per liter of acidity is equal to 5.4 lbs. per cfs. If the stream or reservoir pH is to be maintained above 4.5, then no more than 20 ppm of acidity or 10.8 lbs/cfs may be discharged into the stream. At a typical summer flow of 100 cfs, according to this relationship, no more than 10,800 lbs. of acidity per day may be discharged into Loyalhanna Creek upstream of the Reservoir, if pH is to remain at 4.5 or above. To maintain the desired pH of 6.0, acid discharges cannot exceed 5,400 lbs. of acid per day at 100 cfs inflow.

TABLE VII-1
 LOYALHANNA CREEK
 FLOWS CORRESPONDING TO SAMPLING DATES
 ALL FLOWS IN CUBIC FEET PER SECOND

DATE	STATION							
	1	2	3	4	5	6	7	8
4-20-69	1752	1702	519	428	378	398	232	48
5-6-69	339	329	249	206	181	157	92	19
6-5-69	117.5	115	103	85	75	51	29.8	6.2
7-3-69	49.4	48	50	40	36	13	7.0	1.6
8-26-69	463	448	82	68	60	82	48	9.9
9-17-69	115.2	112	51	42	37	27	15.6	3.3
10-12-69	113	110	58	48	42	42	24.6	5.1
11-2-69	51.5	50	142	114	104	III	64.5	13.4
12-11-69	478	464	3996	3300	2910	2740	1601	332
1-27-70	463	449	1151	950	840	1100	644	133
2-24-70	928	900	824	680	600	505	296	61
3-18-70	226	219	635	525	463	283	165	34
4-21-70	416	404	514	424	374	342	200	41
5-30-70	113	110	261	215	190	147	86	17.7
6-27-70	930	902	1512	1248	1110	1010	590	122
7-28-70	134	130	104	86	76	70	41	8.5
8-30-70	51.5	50	300	248	219	173	101	21
9-28-70	82.4	80	323	266	236	154	90	18.7
Average Flow	379	369	600	496	438	412	248	51

NOTE: Flows at station 6 from USGS station at Kingston Dam
 Flows at station 3 from U.S. Army Corps of Engineers data
 Flows at station 2 from USGS data at Loyalhanna Dam
 Flows at station 1 based upon station 2 data
 Flows at station 4 and 5 based upon station 3 data
 Flows at station 7 and 8 based upon station 6 data

TABLE VII-2
LOYALHANNA CREEK
pH Corresponding to Sampling Dates

SITE	1	2	3	4	5	6	7	8
<u>Date</u>								
4-20-69	4.7	6.4	4.1	6.7	6.9	7.5	7.4	7.4
5-6-69	3.4	3.6	4.1	7.0	7.9	8.1	7.7	7.7
6-5-69	3.4	3.6	3.6	4.3	5.9	7.5	7.3	7.5
7-3-69	3.3	3.5	3.5	3.3	5.9	7.5	7.6	7.6
8-26-69	5.0	5.6	4.2	4.8	6.7	7.9	8.0	7.8
9-17-69	3.8	3.8	4.0	3.6	5.6	7.4	7.7	7.7
10-12-69	3.6	3.7	3.7	5.8	6.8	7.3	7.2	7.2
11-2-69	3.7	3.7	3.7	4.5	6.5	7.4	7.3	7.2
12-11-69	2.6	6.5	7.2	7.5	7.2	7.8	8.0	8.0
1-27-70	5.8	6.4	6.4	6.6	6.6	6.8	6.8	6.4
2-24-70	5.0	5.1	5.6	5.7	6.2	6.2	6.2	6.1
3-12-70	5.0	5.9	6.2	6.0	6.5	6.7	6.7	7.0
4-21-70	3.75	3.7	3.8	4.1	6.1	6.5	6.5	7.0
5-30-70	4.8	4.1	6.5	6.3	6.8	7.1	7.1	7.2
6-27-70	6.5	6.2	4.7	6.7	7.0	7.2	7.2	7.4
7-28-70	3.4	3.7	3.7	3.3	5.5	7.4	7.3	7.7
8-30-70	6.4	6.5	5.6	6.7	6.8	7.1	7.2	7.3
9-28-70	3.7	3.7	3.7	4.6	6.5	7.0	7.2	7.4

TABLE VII-3
 LOYALHANNA CREEK
 Acidity (mg/l)
 Corresponding to Sampling Dates

SITE	1	2	3	4	5	6	7	8
<u>Date</u>								
4-20-69	48	40	50	25	28	28	3	4.5
5-6-69	120	70	40	25	10	1	3	2.0
6-5-69	70	65	65	30	15	2	5	8
7-3-69	60	70	70	80	35	5	10	5
8-26-69	25	20	30	20	5	5	10	7
9-17-69	110	215	32.5	50	72	7.7	9.5	9.5
10-12-69	60	80	50	100	4	2	4	6
11-2-69	95	75	55	70	2	1	10	6
12-11-69	54.	40	10	6	3	5	7	20
1-27-70	70	55	40	75	60	40	6	10
2-24-70	60	50	30	30	24	20	10	40
3-18-70	50	40	25	20	5	5	5	25
4-21-70	33	23	25	29	34	3.6	2.8	18
5-30-70	45	65	55	35	65	10	35	55
6-27-70	50	45	20	25	20	25	30	35
7-28-70	95	45	45	90	30	5	5	5
8-30-70	8	7	5	9	5	2	4	8
9-28-70	36	31	37	26	4	3	2	2
Average Acid Concentration	60	61	42	41	23	9	9	15

TABLE VII-4
 LOYALHANNA CREEK
 Acid Load (lbs/day)
 Corresponding to Sampling Dates

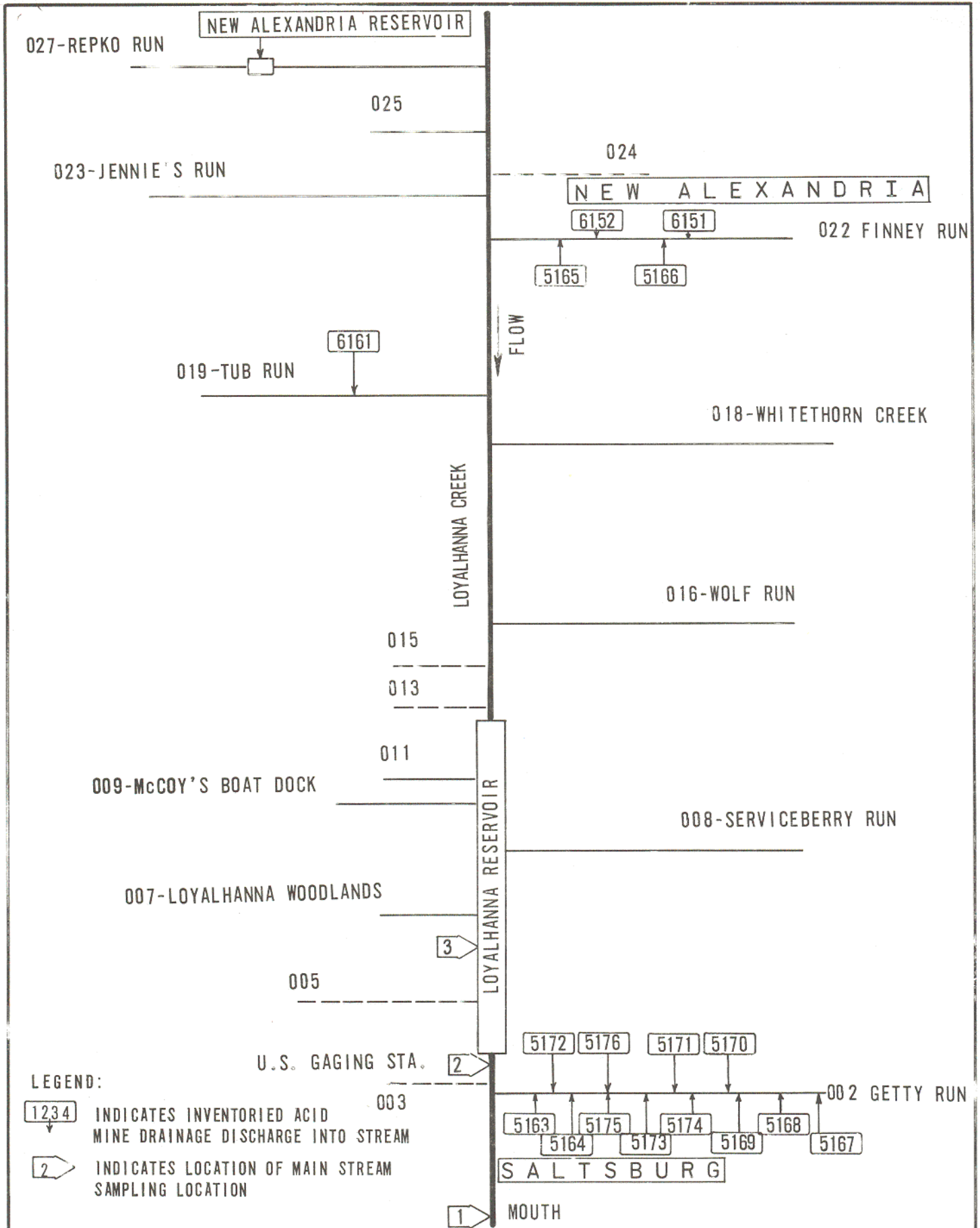
SITE	1	2	3	4	5	6	7	8
<u>Date</u>								
4-20-69	453,000	367,155	139,948	57,690	56,000	59,026	5,530	1,116
5-6-69	219,000	124,201	53,714	27,790	9,750	847	1,485	204
6-5-69	44,300	40,313	36,106	13,750	6,075	688	805	2,670
7-3-69	15,900	18,120	18,687	17,290	6,790	350	410	43
8-26-69	62,250	48,321	13,267	7,320	1,618	2,211	2,581	374
9-17-69	68,250	129,863	8,904	11,300	14,450	1,121	797	169
10-12-69	36,580	47,458	15,748	25,810	906	453	530	165
11-2-69	26,330	20,224	42,119	43,000	1,222	599	3,478	434
12-11-69	139,000	100,094	215,504	106,500	46,500	73,884	60,400	35,780
1-27-70	174,000	133,155	248,347	383,400	272,000	237,292	20,800	7,160
2-24-70	278,000	242,685	133,000	111,000	77,600	54,469	15,890	13,120
3-18-70	60,750	47,243	85,500	56,600	12,480	7,631	4,430	5,380
4-21-70	72,500	50,112	70,000	66,400	69,500	6,548	3,080	3,979
5-30-70	27,400	38,560	77,500	40,600	66,700	7,928	16,200	5,250
6-27-70	251,000	218,902	164,000	168,000	119,500	136,173	95,500	23,000
7-28-70	58,500	45,517	25,000	41,750	12,290	1,888	1,105	228
8-30-70	2,220	1,887	8,000	12,020	5,900	1,866	2,179	906
9-28-70	16,000	13,375	64,500	35,360	5,085	2,492	970	207
Average Acid Load	110,000	93,500	79,000	68,000	43,500	32,500	13,000	5,500

TABLE VII-5
 LOYALHANNA CREEK
 Sulfate (mg/L)
 Corresponding to Sampling Dates

SITE	1	2	3	4	5	6	7	8
<u>Date</u>								
4-20-69	305	250	380	112	230	46	64	23
5-6-69	350	350	385	210	105	150	120	105
6-5-69	660	540	540	265	245	95	101	34
7-3-69	410	450	450	738	85	185	140	85
8-26-69	210	190	350	230	180	80	41	18
9-17-69	470	500	380	440	250	130	120	25
10-12-69	460	450	370	225	160	27	65	26
11-2-69	520	480	480	230	230	68	104	32
12-11-69	330	550	220	108	72	42	32	32
1-27-70	230	240	120	80	350	36	36	29
2-24-70	230	230	340	210	110	80	80	27
3-18-70	270	240	260	150	110	50	50	25
4-21-70	270	270	180	140	110	25	25	21
5-30-70	105	270	120	175	130	54	54	21
6-27-70	250	220	230	120	124	52	52	21
7-28-70	420	490	490	350	100	80	40	11
8-30-70	110	125	200	155	115	40	41	150
9-28-70	350	370	365	240	400	94	88	215
Average Sulfate Concentration	330	345	325	232	172	74	69	50

TABLE VII-6
LOYALHANNA CREEK
Sulfate Load(lbs/day)
Corresponding to Sampling Dates

SITE	1	2	3	4	5	6	7	8
<u>Date</u>								
4-20-69	2,880,000	2,390,000	1,060,000	258,000	371,000	975,000	11,800	5,940
5-6-69	640,000	620,000	517,000	234,000	102,000	127,000	59,400	10,800
6-5-69	415,000	334,000	300,000	121,000	99,000	26,100	16,200	10,400
7-3-69	107,000	116,000	121,000	159,000	16,500	13,000	57,400	733
8-26-69	552,000	458,000	154,000	84,500	58,200	3,540	10,600	960
9-17-69	292,000	302,000	104,000	99,500	49,700	1,890	10,100	445
10-12-69	280,000	267,000	116,000	58,200	36,200	6,100	8,600	727
11-2-69	144,000	129,000	368,000	141,000	1,290,000	40,700	36,000	2,310
12-11-69	854,000	1,370,000	4,730,000	1,920,000	1,120,000	620,000	277,000	55,500
1-27-70	593,000	580,000	745,000	408,000	1,570,000	214,000	125,000	20,400
2-24-70	1,150,000	1,120,000	1,510,000	770,000	356,000	218,000	127,000	8,850
3-18-70	329,000	284,000	890,000	425,000	274,000	76,000	44,400	4,570
4-21-70	604,000	588,000	497,000	320,000	221,000	46,000	26,900	4,640
5-30-70	640,000	161,000	169,000	203,000	133,000	42,700	24,900	2,010
6-27-70	1,250,000	1,070,000	1,870,000	806,000	735,000	283,000	165,000	13,800
7-28-70	304,000	342,000	274,000	164,000	40,900	30,200	8,730	5,050
8-30-70	30,600	33,700	323,000	207,000	129,000	37,200	22,300	16,900
9-28-70	154,000	159,000	635,000	344,000	508,000	780,000	425,000	21,600
Average Sulfate Load	630,000	575,000	800,000	353,000	400,000	196,000	80,000	10,000



<p align="center">SCHEMATIC MAP - STREAMS AND MINE DISCHARGES OF THE LOYALHANNA WATERSHED</p>	<p align="center">MINE DRAINAGE POLLUTION ABATEMENT MEASURES FOR THE LOYALHANNA WATERSHED</p>	<p align="center">PLATE VII-3</p>
<p align="center">BUCHART-HORN CONSULTING ENGINEERS & PLANNERS</p>		

KINGSTON

055 U.S. GAGING STA. 6

5351

054-NINEMILE RUN

FLOW

050-2 - MONASTERY RUN

5353

051

5362

050-FOURMILE RUN

5359

5361

5360

5352

5364

048-UNITY RUN

047-SAXMAN RUN

LATROBE

5

6160

5075

5074

5177

045

044

039

042

040

037 UNION RUN

5301

6156

038

6154

6158

6157

5302

5303

6153

034

5357

5358

HART BRIDGE

4

031 KEYSTONE

KEYSTONE LAKE

6159

030

5355

LEGEND:

1234

INDICATES INVENTORIED ACID MINE DRAINAGE DISCHARGE INTO STREAM

2

INDICATES LOCATION OF MAIN STREAM SAMPLING LOCATION

LOYALHANNA CREEK

5356

5354

5355

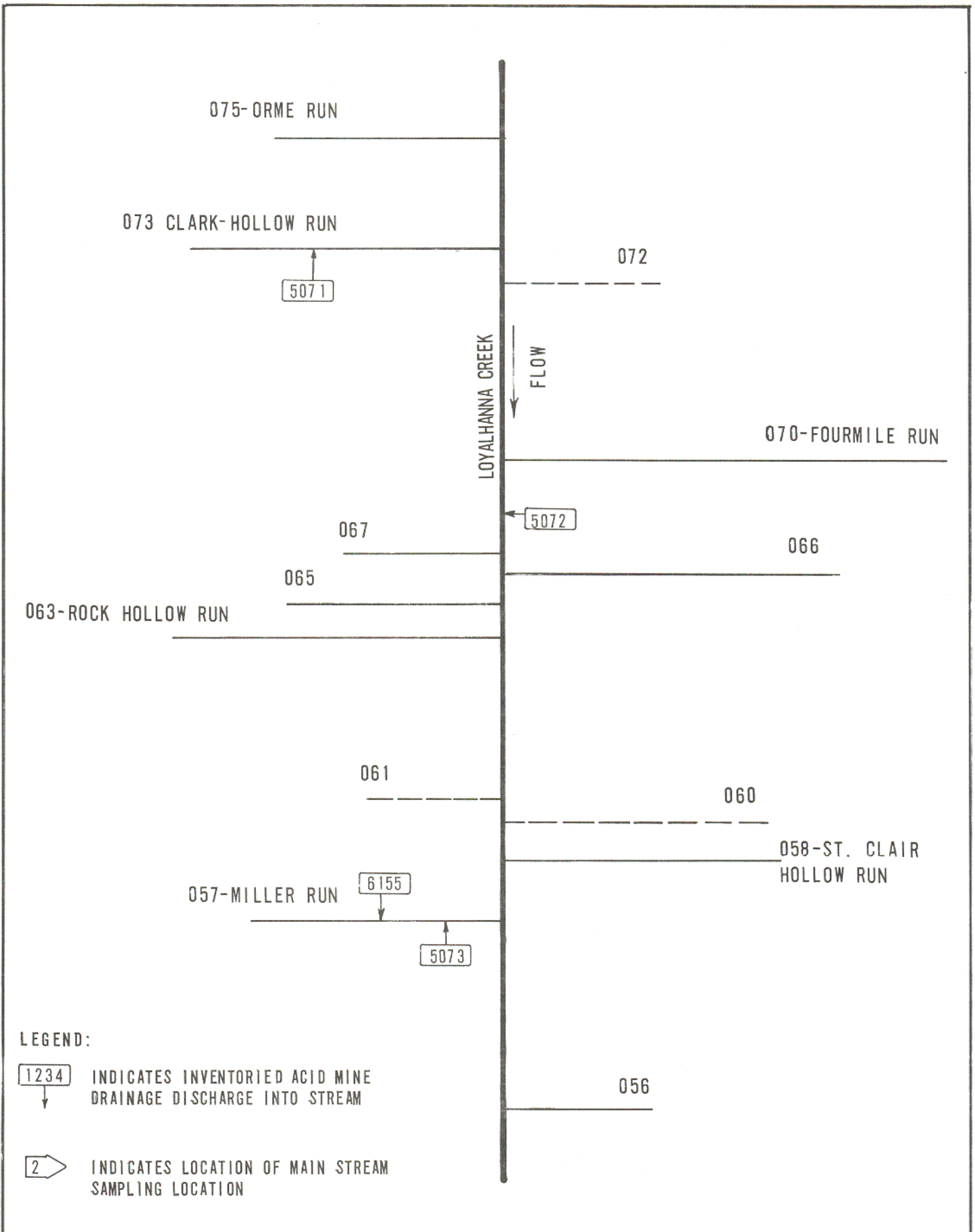
028 CRABTREE CREEK

SCHMATIC MAP - STREAMS AND MINE DISCHARGES OF THE LOYALHANNA WATERSHED

MINE DRAINAGE POLLUTION ABATEMENT MEASURES FOR THE LOYALHANNA WATERSHED

PLATE VII-4

BUCHART-HORN CONSULTING ENGINEERS & PLANNERS

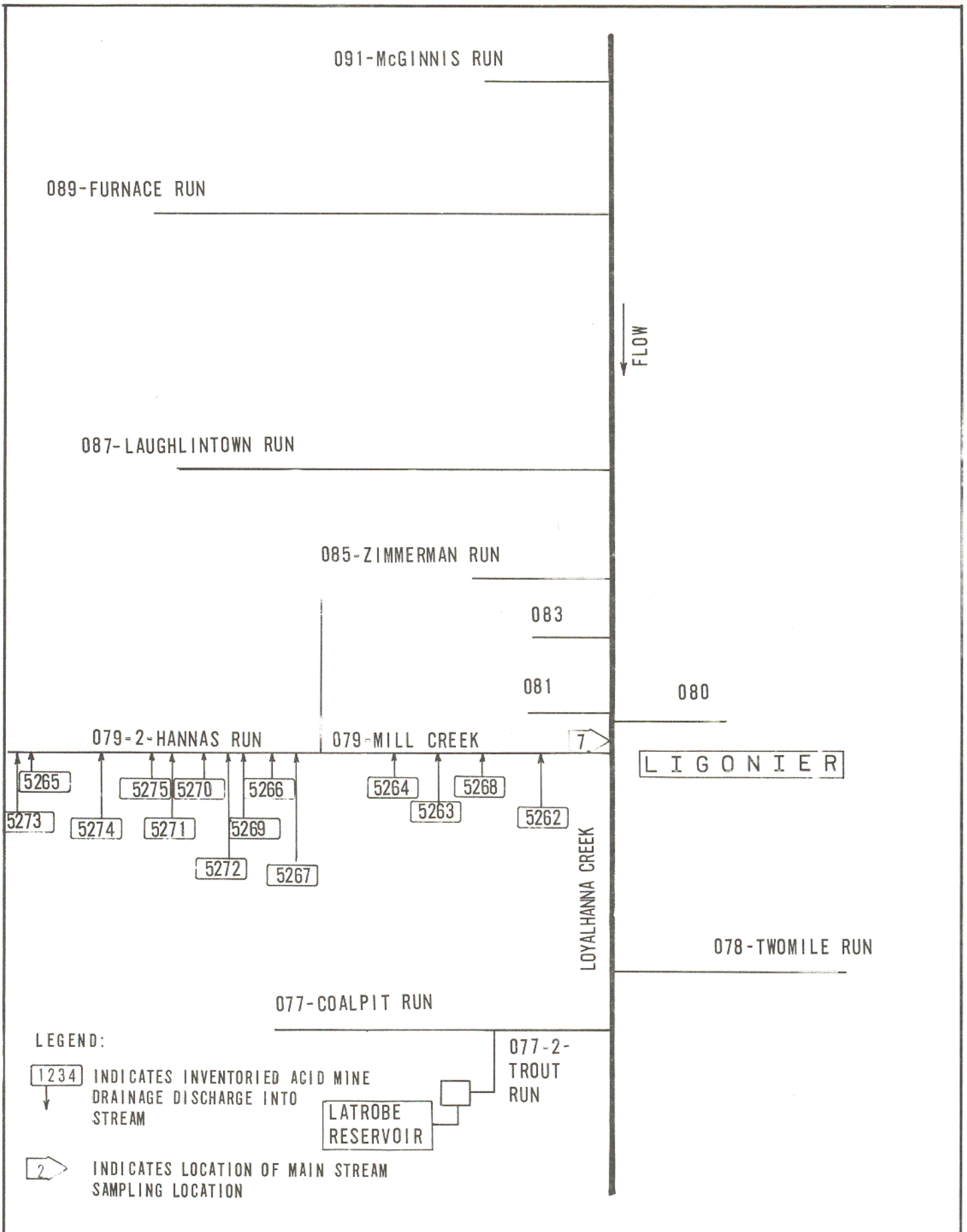


SCHMATIC MAP - STREAMS AND MINE DISCHARGES OF THE LOYALHANNA WATERSHED

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MINE DRAINAGE POLLUTION ABATEMENT MEASURES FOR THE LOYALHANNA WATERSHED

PLATE VII - 5



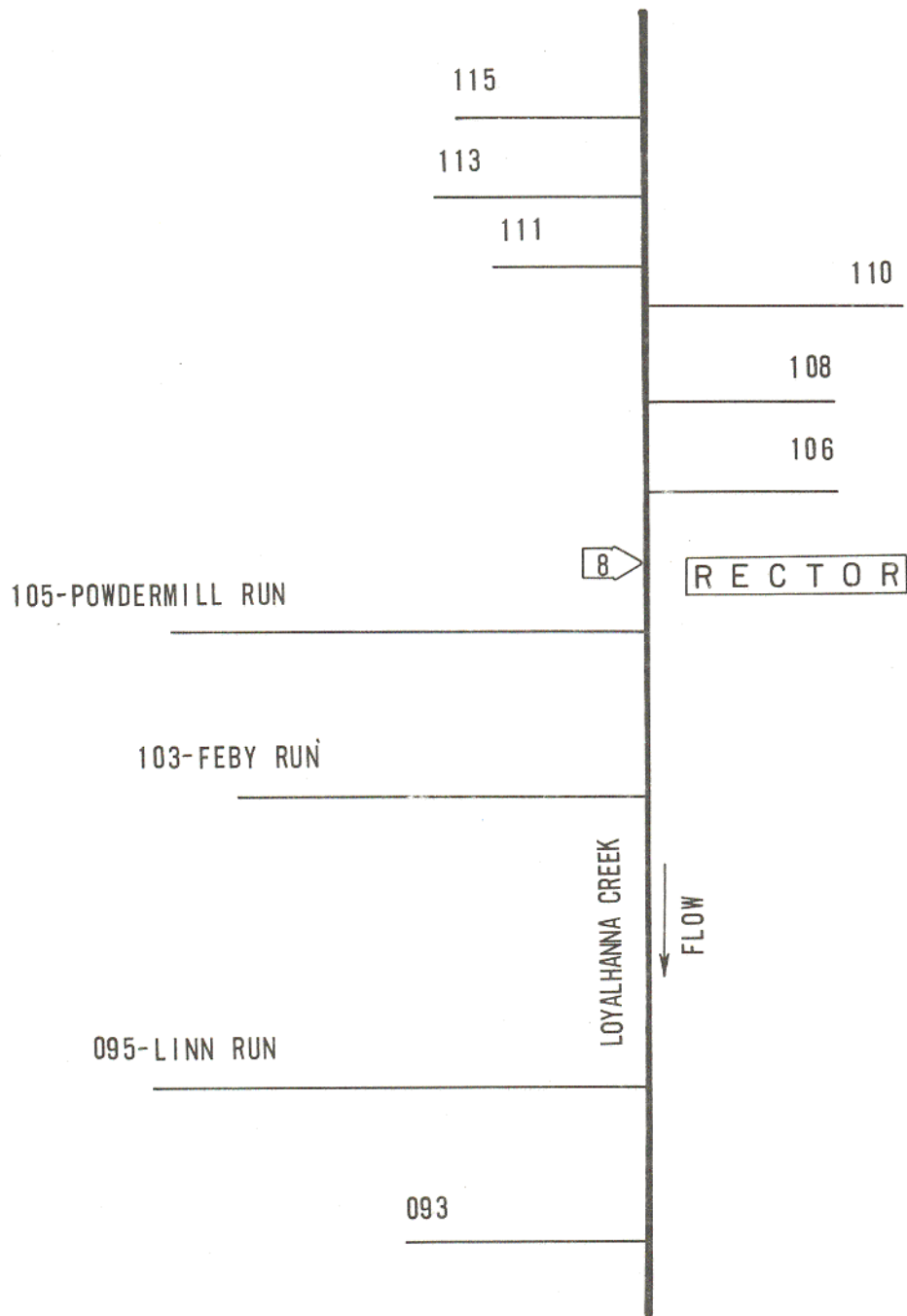
SCHEMATIC MAP - STREAMS AND MINE DISCHARGES OF THE LOYALHANNA WATERSHED

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MINE DRAINAGE POLLUTION ABATEMENT MEASURES FOR THE LOYALHANNA WATERSHED

PLATE VII-6

SOUTH
STAHLSTOWN



LEGEND:

 INDICATES LOCATION OF MAIN STREAM SAMPLING LOCATION

SCHMATIC MAP - STREAMS AND MINE
DISCHARGES OF THE LOYALHANNA WATERSHED

BUCHART-HORN
CONSULTING ENGINEERS & PLANNERS

MINE DRAINAGE POLLUTION
ABATEMENT MEASURES FOR THE
LOYALHANNA WATERSHED

PLATE
VII-7

TABLE VII-7

SUMMARY OF LOYALHANNA WATERSHED STREAM SAMPLING PROGRAM

Trib. No. Schematic Map	Stream Name	pH Range		Acidity		Hardness		Sulfate		Iron		Contributory Sources Discharge Nos.
		Low	High	Low	High	Low	High	Low	High	Low	High	
002**	Getty	2.6	4.5	100	1690	236	252	750	1900	34.8	168.0	5163,5164, 5167, 5168, 5169, 5170 5171, 5172, 5173, 5174, 5175, 5176
003	Unnamed	6.5	7.6	10	60	106	128	30	160	0.0	0.6	
005*	Unnamed	4.8	6.8	16	125	88	110	110	250	0.8	2.0	Refuse pile
007	Loyalhanna Woodlands	6.4	6.8	10	13	28	38	39	49	1.6	3.6	
008	Serviceberry Run	5.9	6.7	0	8	25	54	20	44	0.6	2.2	
009	McCoy's Boat Dock	5.8	6.9	0	10	32	38	29	38	1.2	12.0	
011	Unnamed	7.2	7.8	0	5	32	38	66	90	0.0		
013	Unnamed	7.5	7.7	0		65	81	36	42	0.0		
015	Unnamed	7.3	7.5	0		59	67	27	34	0.0		
016	Wolf Run	7.8	8.2	0		54	78	39	44	0.6	2.4	
018	Whitehorn Creek	7.0	10.6	0	10	80	215	95	142	0.0	1.8	
019*	Tub Run	6.1	7.6	0	80	65	263	24	325	0.0	1.2	6161
022**	Finney Run	2.6	4.2	11	1460	96	453	185	2700	0.2	196.0	5165, 5166, 6151, 6152
023	Jennies Run	6.4	7.4	0	50	64	231	35	220	0.2	8.0	

**Indicates Acid Pollution Major Portion of Year

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TABLE VII-7

SUMMARY OF LOYALHANNA WATERSHED STREAM SAMPLING PROGRAM (continued)

Trib. No. Schematic Map	Stream Name	pH Range		Acidity		Hardness		Sulfate		Iron		Contributory Sources Discharge Nos.
		Low	High	Low	High	Low	High	Low	High	Low	High	
024*	Unnamed	5.4	8.7	0	85	102	262	92	310	0.1	1.6	Refuse Piles
025	Unnamed	6.6	7.5	0		117	160	36	46	0.0	1.2	
027	Repko Run	6.7	7.5	2	25	32	164	35	120	0.1	0.6	
028**	Crabtree Creek	3.2	5.9	100	770	69	762	75	1850	0.6	74.0	5356, 5355, 5354
030	Unnamed	6.3	7.8	0	65	43	222	40	140	0.0	1.2	
031*	Keystone Run	3.8	7.1	25	90	16	333	34	380	0.0	5.4	6159
034	Unnamed	6.6	7.1	0	2.5	135	210	40	100	0.2	0.6	5357, 5358
035	Nichol's Run	7.0	7.2	0		200	242	200	230	0.2	0.4	
037*	Union Run	3.2	8.3	5	100	21	134	76	340	0.0	9.0	6158, 6157, 6156, 5301, 5302, 5303
038**	Unnamed	3.6	3.8	220	240	520	800	920	1100	0.3	3.0	6153
039*	Unnamed	6.4	8.1	35	100	119	215	45	180	0.1	0.2	Unknown seepage
040**	Unnamed	2.6	4.5	250	750	388	631	920	2600	0.3	117.6	6154
042**	Unnamed	3.2	3.8	235	325	251	557	820	1350	4.5	14.0	Seepage
044	Unnamed	6.1	7.4	10	45	57	195	110	240	0.0	0.6	

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TABLE VII-7

SUMMARY OF LOYALHANNA WATERSHED STREAM SAMPLING PROGRAM (Continued)

Trib. No. Schematic Map	Stream Name	pH Range		Acidity		Hardness		Sulfate		Iron		Contributory Sources Discharge Nos.
		Low	High	Low	High	Low	High	Low	High	Low	High	
047**	Saxman Run	3.1	6.9	35	275	82	440	130	1230	0.1	97.5	5177, 5075, 5074
048	Unity Run	6.0	7.7	0	95	35	149	70	380	0.0	0.5	
050*	Monastery Run	6.8	8.2	0	50	62	274	115	560	0.2	8.0	
050-2*	Four Mile Run	3.7	8.0	0	210	114	818	115	760	0.0	4.8	5352, 5360, 5361, 5362, 5359, 535
051	Unnamed	6.6	6.8	0		55	60	50	56	0.0		
054**	Nine Mile Run	4.6	6.2	10	285	61	240	50	245	0.5	4.2	5351
055	Unnamed	6.8	7.1	0		52	68	50	54	0.0		
056	Unnamed	7.5	7.7	0	5.0	46	63	27	30	0.2	0.5	
057*	Miller Run	5.8	6.8	0	125	22	96	36	100	0.2	4.1	5073, 6155
058	St. Clair Hollow Run	6.2	6.8	2.2	3.1	45	62	25	42	0.0		
063	Rock Hollow Run	6.6	7.1	10	20	26	40	19	28	0.0		
065	Unnamed	6.7	7.2	40	55	32	50	74	84	0.0	0.3	
066	Unnamed	6.4	6.8	0	10	16	40	23	26	0.0		
067	Unnamed	6.8	8.0	0	60	91	195	134	142	0.2	0.8	

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TABLE VII-7

SUMMARY OF LOYALHANNA WATERSHED STREAM SAMPLING PROGRAM (Continued)

Trib. No. Schematic Map	Stream Name	pH Range		Acidity		Hardness		Sulfate		Iron		Contributory Sources Discharge Nos.
		Low	High	Low	High	Low	High	Low	High	Low	High	
070	Four Mile Run	6.7	7.8	0	2.5	42	51	29	31	0.1	0.3	
073	Clark Hollow Run	6.1	7.3	7.5	10	42	83	31	84	0.0		5071
075	Orme Run	7.1	7.6	10	40	53	96	30	43	0.2	0.2	
077	Coal Pit Run	7.3	7.5	8	19	30	83	10	30	0.0	1.0	
078	Two Mile Run	7.4	7.7	0		96	108	25	30	0.0		
079*	Mill Creek	2.9	9.2	5	500	16	320	50	800	0.0	20.0	5262, 5263, 5264, 5265, 5266, 5267, 5268, 5269, 5270, 5271, 5272, 5273, 5274, 5275
080	Unnamed	7.2	7.6	10	13	130	165	70	78	0.2	0.5	
081	Unnamed	7.4	7.6	0		54	70	30	40	0.0		
083	Unnamed	7.2	7.4	0		41	65	30	36	0.0	0.2	
085	Zimmerman Run	6.9	7.3	0		38	81	30	36	0.0	0.2	
087	Laughlintown Run	6.6	7.7	0	25	40	106	26	50	0.1	0.2	
089	Furnace Run	6.8	7.3	0	5	36	38	15	25	0.2	0.3	
091	McGinnis Run	6.4	6.8	0	5	39	47	20	30	0.2	0.4	

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TABLE VII-7

SUMMARY OF LOYALHANNA WATERSHED STREAM SAMPLING PROGRAM (Continued)

Trib. No. Schematic Map	Stream Name	pH Range		Acidity		Hardness		Sulfate		Iron		Contributory Sources Discharge Nos.
		Low	High	Low	High	Low	High	Low	High	Low	High	
093	Unnamed	6.7	7.4	0	15	28	56	22	30	0.1	0.5	
095	Linn Run	6.3	7.1	0	70	12	49	12	18	0.0	0.1	
103	Feby Run**	4.9	6.5	15	155	11	68	14	40	0.0	2.6	
105	Powdermill Run	6.8	7.1	13	75	43	58	18	100	0.1	0.3	
106	Unnamed	7.1	7.6	3	15	62	74	25	32	0.0	0.1	
108	Unnamed	6.4	7.7	0	5	51	63	25	32	0.0	0.2	
110	Unnamed	7.4	7.6	2	4	45	57	20	40	0.0		
111	Unnamed	7.0	7.2	0		36	41	25	30	0.1	0.6	
113	Unnamed	6.7	7.1	5	12	57	71	33	37	0.1	0.5	
115	Unnamed	6.8	7.1	10	22	47	51	26	37	0.0		

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