VI POLLUTION ABATEMENT

This section contains recommended abatement works with order of magnitude cost estimates based on limitations and considerations as follows:

- -pollution loads. effects on receiving streams and geologic structure considerations as discussed in previous sections;
- -consideration of known abatement methods as discussed in Appendix C; and
- -available information on mine workings and existing conditions obtained by surface inspections and from old mine maps. primarily WPA maps.

Proposed works include mine sealing, surface restoration. surface water diversion and blending of favorable discharges.

Neutralization treatment. entailing continuing operating costs, has been generally considered as an alternative method for certain discharges and should be used only where necessary after carrying out the recommended plan. As an exception, neutralization treatment is proposed for the Indian Creek flume discharge since sealing this discharge would likely cause leakage from the flume system that would pollute the existing reservoir.

Cost estimates are based on reported costs for similar work of the types described below.

Hydraulic seals, proven effective at Moraine State Park. are water- I tight plugs constructed in mine openings to flood reactive deposits and reduce formation of pollutants. Such seals include front and rear bulkheads of crushed stone with a grout plug between the bulkheads. pres sure grouting of strata adjacent to the plug and an observation well behind the seal. Most entries for which hydraulic seals are proposed are caved and will require that seals be installed from the surface by drilling procedures. Costs for such seals at Moraine and later projects in western Pennsylvania have ranged from $5,000 to $70,000, primarily due to differing grout quantities for different sites. For order of magnitude estimating purposes. we have used a range of $15,000 to $20,000 per hydraulic seal.

For many of the proposed hydraulic seals it will be necessary to first clear a presumed caved entry overburden to confirm that the discharge is from an entry, and then pump or pipe the discharge to permit construction of the seal. It is possible at some sites the clearance work will permit determinations that the configuration and condition of the entry is such that seals might best be installed through the entry rather than by drilling techniques. Costs for such preparatory work have been estimated in this report from zero to over $100,000 per seal dependent on site conditions.

Grout curtain is a barrier placed in strata along coal outcrops to prevent mine water seepage. Grout curtain is also used at coal ribs adjacent to hydraulic seals to prevent mine water break-out. It involves drilling a series of vertical holes and pressure injection of a grout material such as cement or clay. Grout curtain costs depend on its depth, grout material and extent of required grouting. An average cost of $500 per linear ft was used in this report for order of magnitude estimate s.

Surface seals are airtight plugs constructed in dry drift openings, air shafts, and boreholes to prevent air and water going into mine workings, hence reducing the acid producing reaction. For bore-holes and shaft openings, surface sealing involve s filling the voids with soil and/or clay. For drift openings, single masonry wall, double masonry walls with clay filler and, clay or cement bulkheads are used. Costs for surface seals have been reported from $100 to $6,000. In this report, a range of $1,000 to $5,000 is used per surface seal, depend-ing on extent of required preparatory work.

Strip mine reclamation includes backfilling, soil treatment, planting and construction of surface water diversion ditches. Backfilling pro- posed is pasture type involving grading of the spoil to cover the pit and any acid producing strata, but not the entire highwall and with the graded spoil sloped away from the highwall. Diversion ditches should be constructed along the top of the highwall to reduce surface water entering the pit and graded spoil should be planted. Soil treatment, primarily liming might be needed. Costs varying from $500 to $2, 000 per acre have been reported for regrading and $100 to $300 per acre for planting. An average cost of $2,000 per acre, including backfilling, diversion ditches and planting was used for this report.

Refuse pile reclamation includes leveling mine refuse piles, covering, treating, and planting. Costs varying 0.50 to $2.00 for removing 1.0 cu yd of refuse material have been reported, and $800 to $3,000 for covering one acre of refuse pile have been also reported. Some of the refuse piles in the basin are so large that leveling them would be an unrealistic approach. For such a large refuse pile, surface water diversion and covering and planting are proposed. Costs varying from $1,000 to $4,000 per acre depending on extent of the remedial work required are used for the purpose of this report.

In-stream neutralization includes injection of hydrated lime directly into the polluted stream to neutralize its acidity. In-stream neutralization plants would be similar to the "Operation Scarlift", Little Scrubgrass Creek plant which consists of lime storage bin, metering equipment, lime feeder, and a mixing device. Treatment installation costs are estimated to be $50,000 including some site work which will vary with final site selection. Operating cost estimates are based on $30/ton of lime delivered to the plant.

Lime slurry injection into mine water pools is proposed at Melcroft Mine complex. In this area, mine water trapped in deep mine workings cause acid water seepages to Champion and Indian Creeks. It is expected that injection of lime slurry will form an insoluble iron slurry which will plug up the pores and reduce the seepages. Although its effectiveness is uncertain, it appears to be a worthy experiment. Costs of lime injection were based on $35 per ton of lime injected and $7,000 - $8,000 for site preparation.

Proposed order of priority for recommended projects is based on first assigning a priority to each major sub-basin and then a priority for each project area within the sub-basin.

Indian Creek, above the reservoir, is assigned the highest sub-basin priority since there is need to further protect the reservoir from mine drainage pollution. Indian Creek, below the reservoir, is given the lowest priority since the recommended abatement is neutralization entailing continuing operating costs. The other sub-basins are judged on the basis of the total of acid loads from individual sources versus estimated cost of abatement work. The proposed sub-basin priority order is:

	Net Acid lbs/day	Estimated Abatement	Ratio $/Acid
A. Indian Creek (A.R.)	4,640	$ 594,000	128
B. Sewickley Creek	50,580	790,000	16
C. Youghiogheny main stem	13,700	955,000	70
D. Casselman River	9,930	1,259,000	127
E. Jacobs Creek	810	130,000	160
F. Indian Creek (B.R.)	8,200	50,000	6

Within each sub-basin, project areas are assigned priority based on considerations of; source pollution load, estimated cost of abatement, and improvements expected in the receiving stream and ,downstream waters.

The proposed order of priority is listed on Table VI-A.

Table VI-A, Priority Order of Abatement Project Areas

		Refer Area/pg	Net Acid lbs/day	Estimated Abatement Costs
	Indian Creek			
A1	Melcroft Complex	42/VI-45	4,480	$ 441,000
A2	Poplar Run	43/VI-52	140	133,000
A3	L. Champion Cr	41/VI-43	20	20,000
F1	Flume Discharge	42/VI-51	8,200	50,000
	Sewickley Creek			
B1	Buffalo Run	25/VI-29	6,600	$ 35,000
B2	Marchand	28/VI-37	12,000	80,000
B3	Jacks Run	23/VI-23	7,200	50,000
B4	Brinkerton Overflow	22/VI-19	10,240	360,000
B5	Fayette Anticline	26/VI-32	3,540	185,000
B6	Hutchinson	27/VI-35	11,000	No work
B7	Wilson Run	24/VI -26	Iron	80,000
	Youghiogheny, main stem			
C1	Galley Run	11/VI-8	7,290	$ 470,000
C2	Warden Mine Area	13/VI-13	1,200	55,000
C3	Adelaide Station	12/VI-10	4,980	245,000
C4	Guffey Station	14/VI-16	130	185,000
	Casselman River			
D1	Pen Mar Mines	51/VI-54	1,250	$ 50,000
D2	Goodtown Area	52/VI-57	1,350	151,000
D3	Shober	53/VI-60	610	120,000
D4	Ponfeigh Mine Area	54/VI-62	4,240	290,000
D5	Wilson Creek	56/VI-70	1,290	175,000
D6	Rockwood	57/VI-73	60	200,000
D7	Shamrock	55/Vl-65	1,130	272,000
	Jacobs Creek			
E1	Stauffer Run	31/VI-40	810	$ 130,000

Recommended abatement works outlined in the following pages are considered as phase 1 of an abatement program for the Youghiogheny watershed. Subsequent phases for individual project areas are dependent on results of phase 1 work. Later work at various sites could include sealing new discharges resulting from higher mine water levels caused by phase I seals.

Many of the deep mines for which seals are recommended have been long abandoned and conditions within such mines are unknown. For this reason, phase 1 sealing projects are considered partly investigative and it is anticipated that costs for individual projects might vary widely from the order of magnitude estimates presented herein.

Table VI-B contains a list of symbols used on mine and inventory maps accompanying descriptive outlines of recommended abatement works.

Recommended abatement works are presented in numerical order of area location numbers shown on Fig I, pg IV-3, as follows:

	Area		Priority	Page
1.	11	Galley Run	Cl	VI-8
2.	12	Adelaide Station	C3	VI-I0
3.	13	Warden Mine Area	C2	VI-13
4.	14	Guffey Station	C4	VI-16
5.	22	Brinkerton Overflow	B4	VI-19
6.	23	Jacks Run	B3	VI-23
7.	24	Wilson Run	B7	VI-26
8.	25	Buffalo Run	B1	VI-29
9.	26	Fayette Anticline	B5	VI-32
10.	27	Hutchinson Mine	B6	VI-35
11.	28	Marchand Mine	B2	VI-37
12.	31	Stauffer Run	El	VI-40
13.	41	Little Champion Creek	A3	VI-43
14.	42	Melcroft Mine Complex	Al	VI-45
-	42	Flume Discharge	Fl	VI-51
15.	43	Poplar Run	A2	VI-52
16.	51	Pen Mar Mines	Dl	VI-54
17.	52	Goodtown Area	D2	VI-57
18.	53	Shober Area	D3	VI-60
19.	54	Ponfeigh Mine Area	D4	VI-62
20.	55	Shamrock Area	D7	VI-65
21.	56	Wilson Creek Area	D5	VI-70
22.	57	Rockwood Mine Area	D6	VI-73

Table VI-B, Symbols Used on
Deep Mine and Inventory Maps

DEEP MINE		INVENTORY	
Symbol	Description	Symbol	Description
	Coal Seam Contour		Open shaft
	Surface Contour		Sealed Shaft
	Barrier Pillar		Shaft Discharge
	Mine Boundary		Mine Opening-Dry
	Mining Haulageways		Mine Opening-Discharge
			Mine Opening-Sealed
			Mine Seal Discharge
			Borehole Discharge
			Borehole dry
			Pipe Discharge
			Artesian Discharge
			Seepage
			Subsidence
			Coke Ovens
			Gob Pile
			Unreclaimed Strip Mine

I. AREA 11, GALLEY RUN — Priority CI

A. Location

Area 11 is in Dunbar Twp, Fayette County, 105 mi NW of Connellsville, Pa. Locations of sources are shown on Fig 11. Discharge M56 is to the Youghiogheny River while M20, M57 to M59 are to Galley Run.

B. Description of Major Sources

This area consists of abandoned deep mines in the Pittsburgh coal of the Uniontown syncline.

		Discharge	Net lbs/day		
Source	Description	No.	Acid	Iron	Mine
1127	Wet seal	M59	270	50	Tip Top
1116,1119,1121	Artesian discharges	M58	380	30	Tip Top
1128	Pipe discharge	M57	400	50	Rist
1129	Pipe discharge	M20	5850	110	Henry Clay
1130	Shaft opening	M56	310	180	Henry Clay
			7210	420	

C. Abatement

Recommended

- -Hydraulic seals for 1116,1119,1121,1127,1128,1129, 1130; including overburden removal and pumping diversion for construction.
- -Backfill subsidence, 1115
- -Grout curtain (60 ft) 1109

Alternative

- -Gravity collection system for sampled discharges M20, M56-M59; and in-stream neutralization of combined discharge.

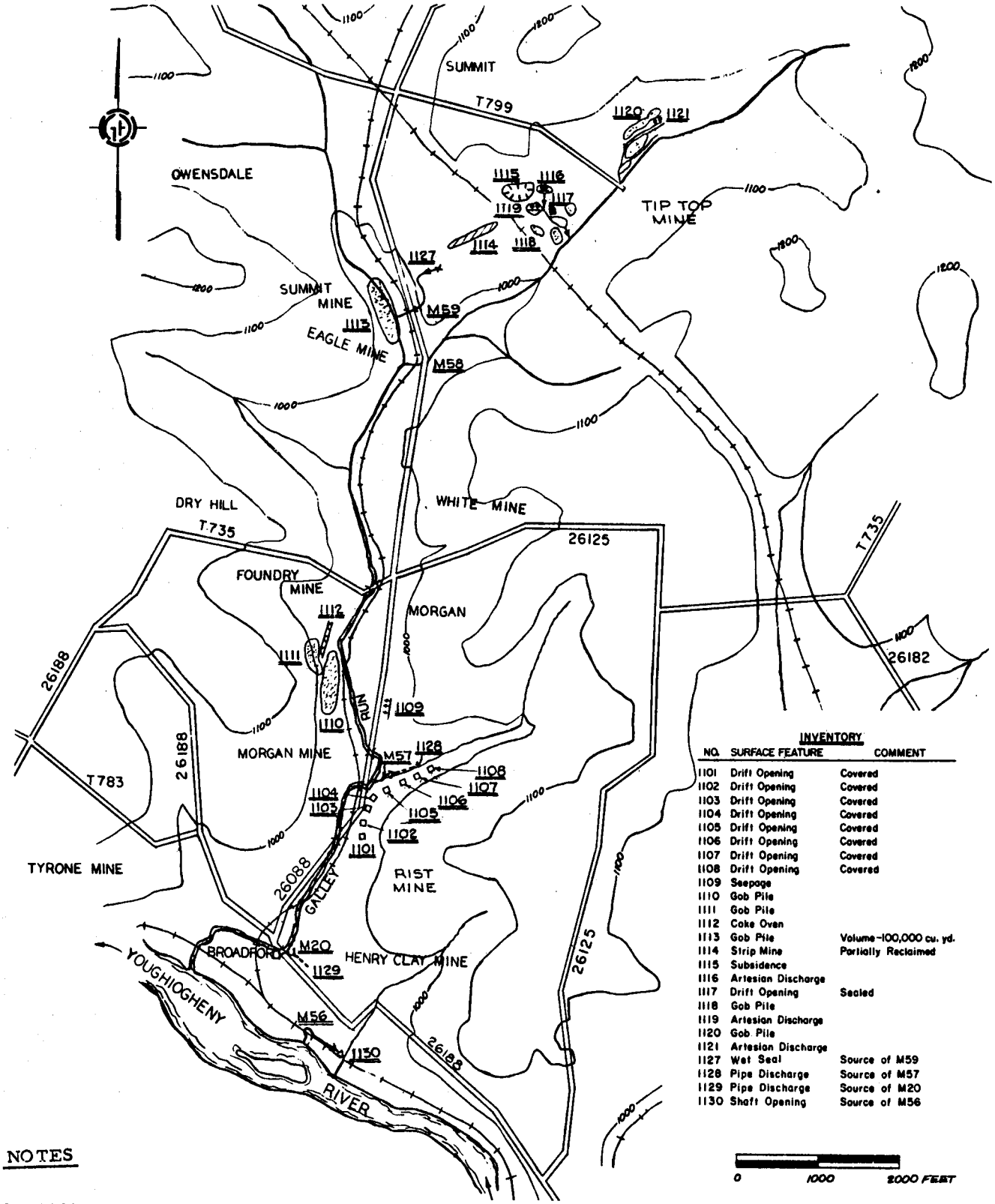
D. Costs, Estimated

Recommended Abatement

-6 Hydraulic seals	$430,000
-Subsidence backfill	10,000
-Grout curtain	30,000
	$470,000

Alternative

- -Treatment installation $ 90,000
  operating $ 85,000/yr



INVENTORY

NO.	SURFACE FEATURE	COMMENT
1101	Drift Opening	Covered
1102	Drift Opening	Covered
1103	Drift Opening	Covered
1104	Drift Opening	Covered
1105	Drift Opening	Covered
1106	Drift Opening	Covered
1107	Drift Opening	Covered
1108	Drift Opening	Covered
1109	Seepage	
1110	Gob Pile	
1111	Gob Pile	
1112	Coke Oven	
1113	Gob Pile	Volume-100,000 cu. yd.
1114	Strip Mine	Partially Reclaimed
1115	Subsidence	
1116	Artesian Discharge	
1117	Drift Opening	Sealed
1118	Gob Pile	
1119	Artesian Discharge	
1120	Gob Pile	
1121	Artesian Discharge	
1127	Wet Seal	Source of M59
1128	Pipe Discharge	Source of M57
1129	Pipe Discharge	Source of M20
1130	Shaft Opening	Source of M56

0 1000 2000 FEET

NOTES

1. 1101 thru 1108 are believed to be short drift or auger openings advanced from strip workings and not connected with sites of proposed seals. However, follow-up sealing may be necessary.

2. Presumed sealed drift opening 1117 may require remedial work, to be undertaken after completion of other abatement work in the area.

FIGURE 11, GALLEY RUN AREA
INVENTORY MAP

2. AREA 12, ADELAIDE STATION — Priority C3

A. Location

The Adelaide Station area mine discharges arc in Dunbar Twp, Fayette County, approximately 2 mi NW of Connellsville, Pa. Locations of sources
are shown on Fig 12 and mine wor1dngs on Fig l2A. Discharges are to the Youghiogheny River.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Pittsburgh coal seam and is associated with the Uniontown syncline.

		Discharge	Net lbs/day		
Source	Description	No.	Acid	Iron	Mine
1203	Seepage	M 55	740	200	Fort Hill
1209	Pipe discharge	M 54	540	540	Adelaide
1210	Artesian discharge	M 19	3700	5300	Adelaide
			4980	6040	

C. Abatement

Recommended

-Hydraulic seals at 1209, 1210; including overburden removal and pumping diversion for construction.
-Grout curtain (100 ft) at 1203.

Alternative

-Same as recommended with no hydraulic seal at 1210.
-Diversion of M54 and M55 to M19 for treatment of combined discharges by instream neutralization.

D. Costs, Estimated

Recommended Abatement

2 Hydraulic seals	$195,000
Grout curtain	50,000
	$245,000

Alternative

1 Hydraulic seal	$ 45,000
Grout curtain	50,000
	$ 95,000

Instream neutralization - Install - $150,000
Operating $ 90,000/yr

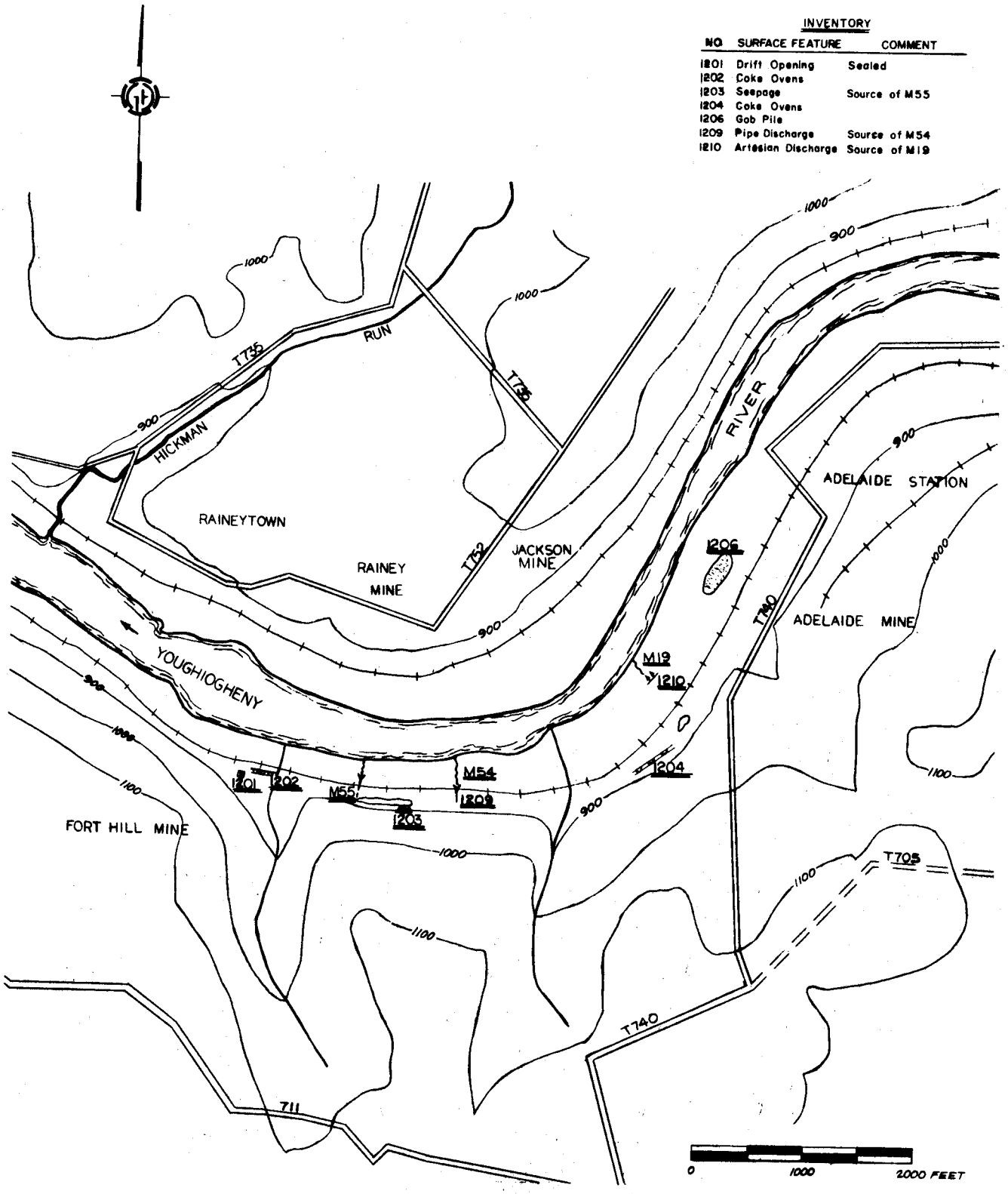


FIGURE 12, ADELAIDE STATION AREA
INVENTORY MAP

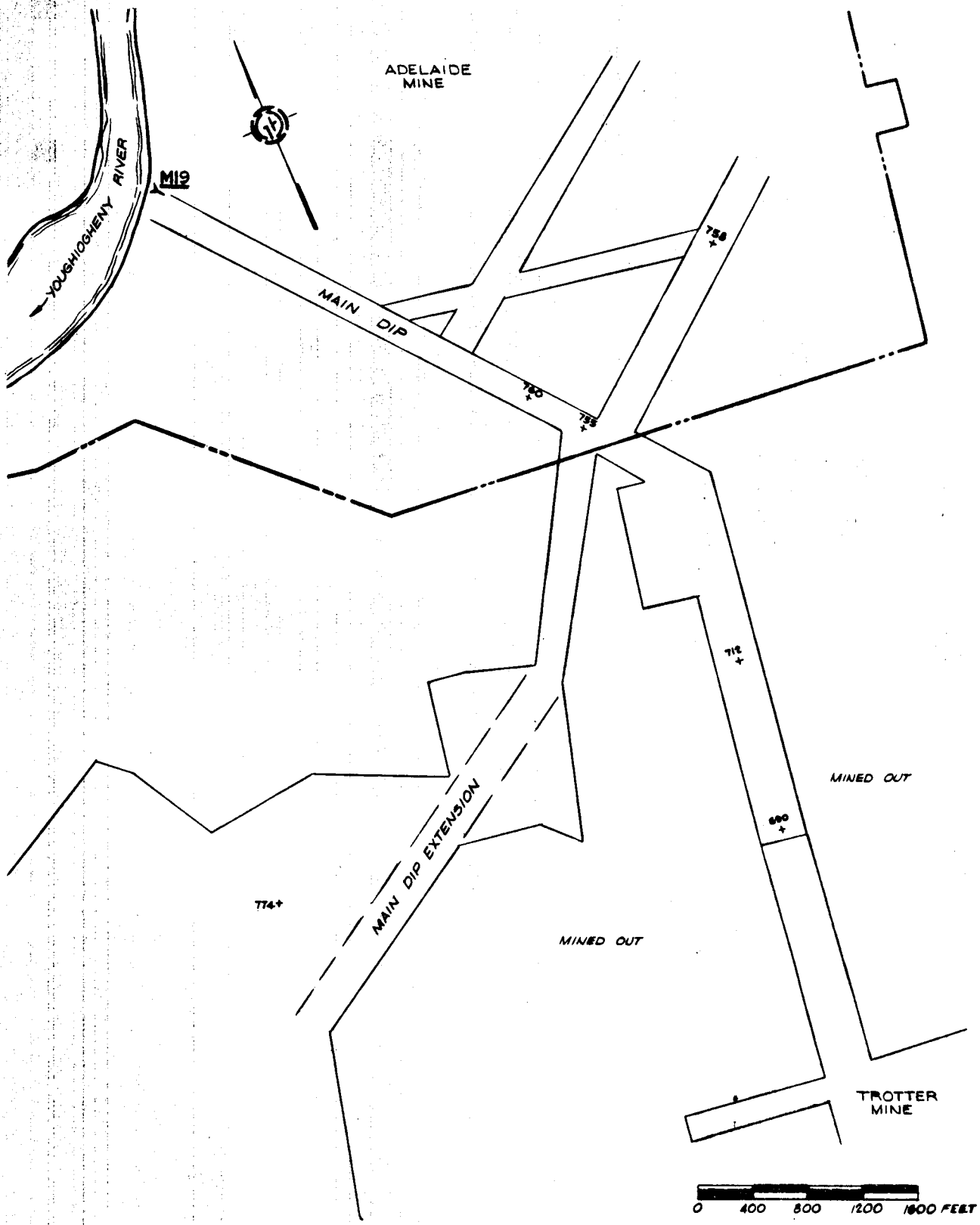


FIGURE 12-A, ADELAIDE STATION AREA
DEEP MINE MAP

3. AREA 13, WARDEN MINE AREA Priority C2

A. Location

The Warden Mine area is located in Elizabeth Twp, Allegheny County, 0,5 mi NW of Sutersville, Pa. Locations of sources are shown on Fig 13 and deep mine workings on Fig l3A,and Fig l4A for Ocean #2. Discharge M77 is to the Youghiogheny, MOl to Douglas Run, and M02 to Gillespie Run.

B. Description of Major Sources

This area consists of deep mine workings of Ocean #2 and Warden Mines Pittsburgh seam of the Pigeon Creek syncline.

		Discharge	lbs/day Net		
Source	Description	No.	Acid	Iron	Mine
1305	Pipe discharge	MOl	(-)450	20	Warden
1306	Mine drain	M02	(-)3000	800	Warden
1307&1308	Drift openings	M77	1200	200	Ocean#2
			1200	1020	

C. Abatement

Recommended -Stage 1

Hydraulic seals for 1305, 1307, 1308 including overburden removal. Sealing of 1307 and 1308 should increase flow at 1306.

Recommended – Stage 2

When 1307 and 1308 are sealed, their discharge is expected to join the alkaline Warden Mine pool and be neutralized by the pool water. The expected head at 1307 and 1308 is on the order of 50 feet, forcing the flow back to mix with the alkaline water flowing from 1306 at the Warden Mine. However, should the new discharge be acidic, as the extent and intactness of the barriers between the Ocean #2 and Warden Mines is unknown, instream neutralization will be required.

D. Costs, Estimated

Stage 1

3 Hydraulic seals $55,000

Stage 2

Dependent on acid load at 1306 after discharge mixing.

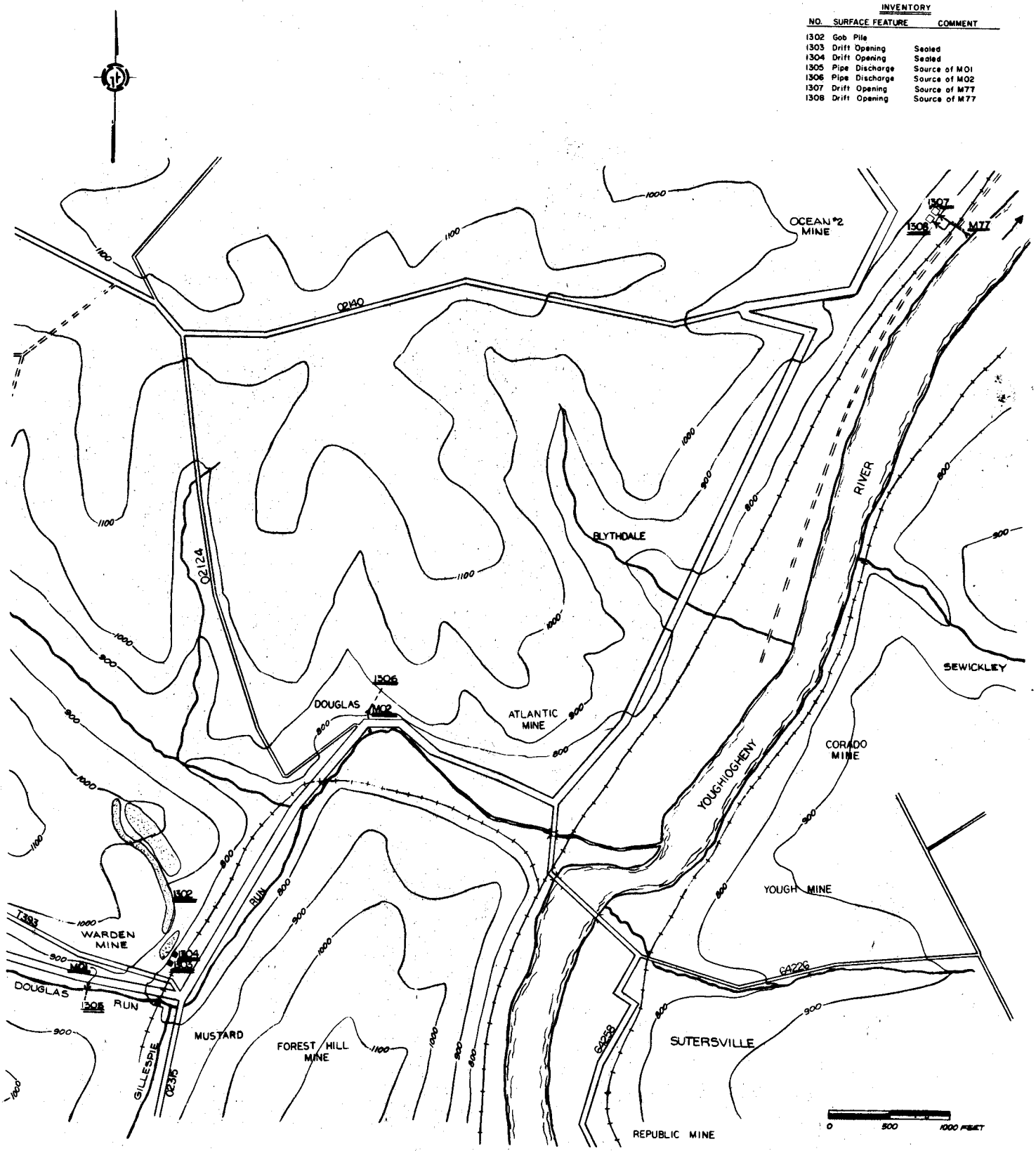


FIGURE 13, WARDEN MINE AREA
INVENTORY MAP

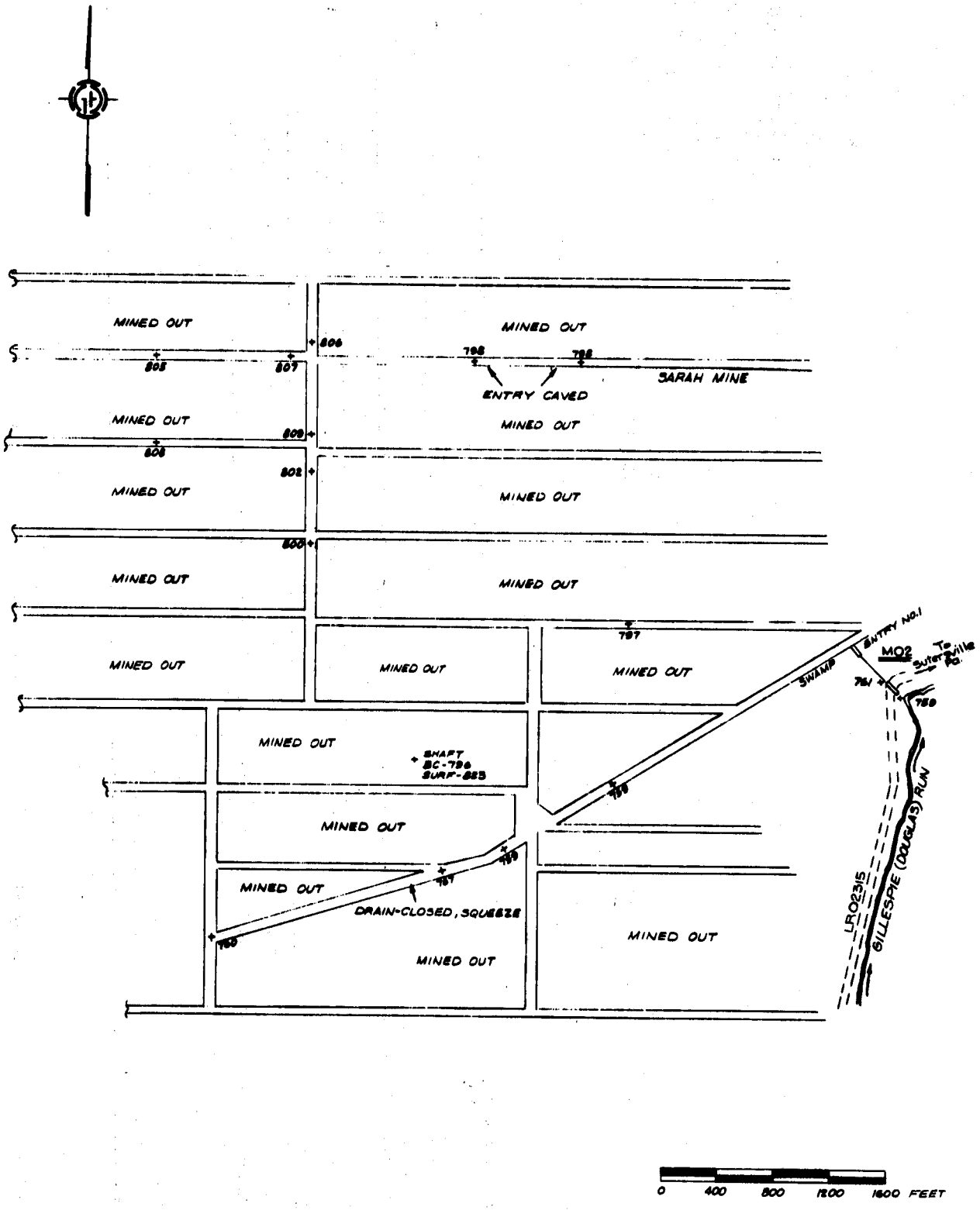


FIGURE 13-A, WARDEN MINE AREA
DEEP MINE MAP

4. AREA 14, GUFFEY STATION Priority C4

A. Location

The Guffey Station area is located in Sewick1ey Twp, in Westmoreland County, 5 mi north of West Newton, Pa. Locations of sources are shown on Fig 14 and deep mine workings on Fig 14A. Discharges are to the Youghiogheny River.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Pittsburgh coal seam of the Irwin syncline.

			Discharge	lbs/day Net		
Source	Description		No.	Acid	Iron	Mine
1412	Drift opening		M03	130	1200	Shaner
1413	Pipe discharge		M04	(-)3200	1000	Guffey
				130	2200	

C. Abatement

Recommended - Stage 1

-Hydraulic seals for 1407, 1411, 1412, 1413; including overburden removal and pumping diversion for construction.

-Hydraulic seals for 1402, 1403, 1404, 1409; including overburden removal.

D. Recommended – Stage 2

-Grout curtain for seepage 1405 and 1406, if required after Stage 1 sealing is completed.

D. Costs, Estimated

Stage 1

8 Hydraulic seals $185,000

Stage 2

Grout curtain (100 ft) $50,000

INVENTORY

NO.	FEATURE	COMMENT
1401	Shaft	Covered
1402	Drift Opening	Open, Dry
1403	Drift Opening	Open, Dry
1404	Drift Opening	Open, Dry
1405	Seepage	
1406	Seepage	
1407	Drift Opening	Wet
1408	Borehole	Sealed, Dry
1409	Seepage	
1410	Gob Pile	
1411	Drift Opening	Open, Wet
1412	Drift Opening	Source of MO_3
1413	Pipe Discharge	Source of MO_4

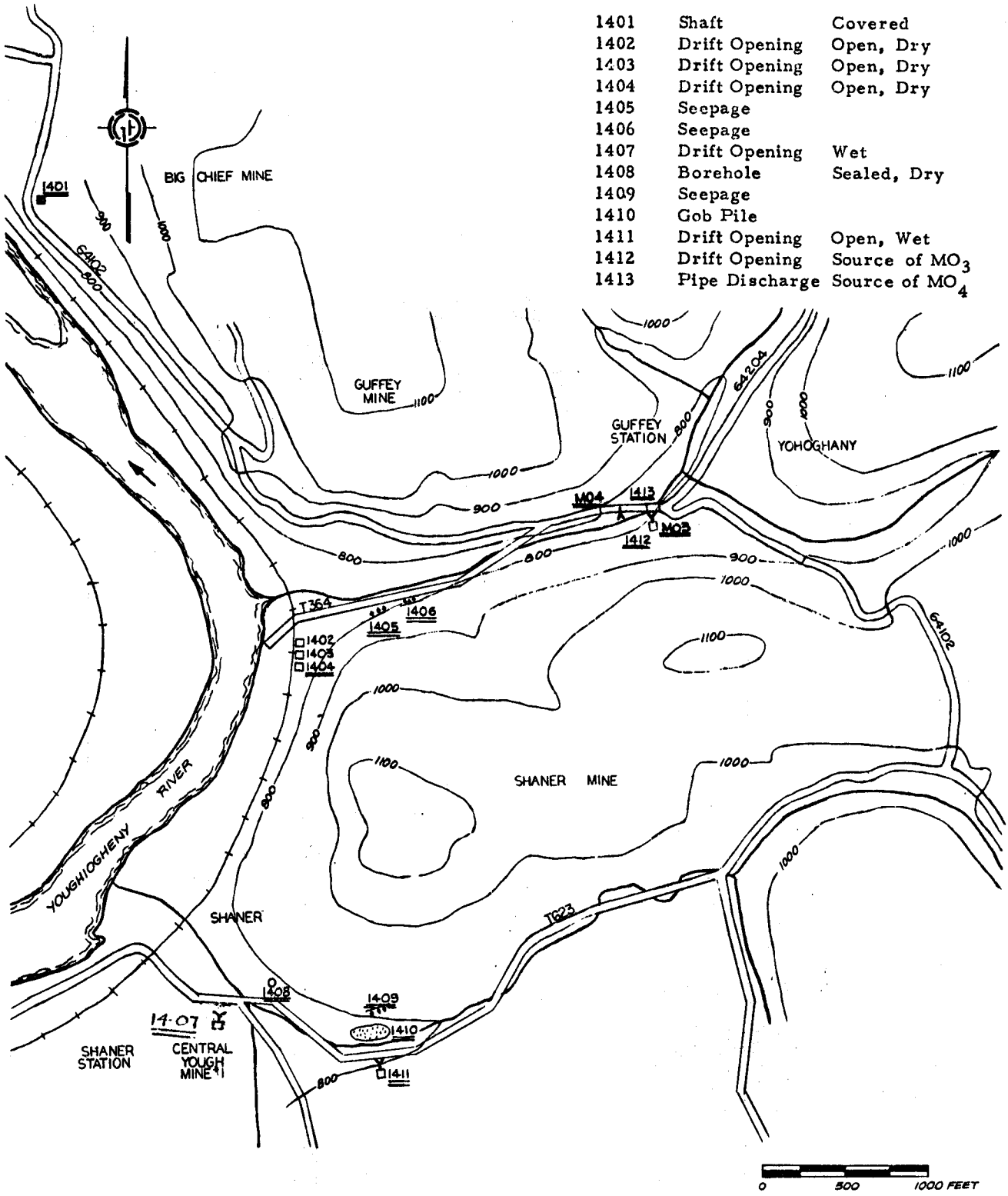


FIGURE 14, GUFFEY STATION AREA
INVENTORY MAP

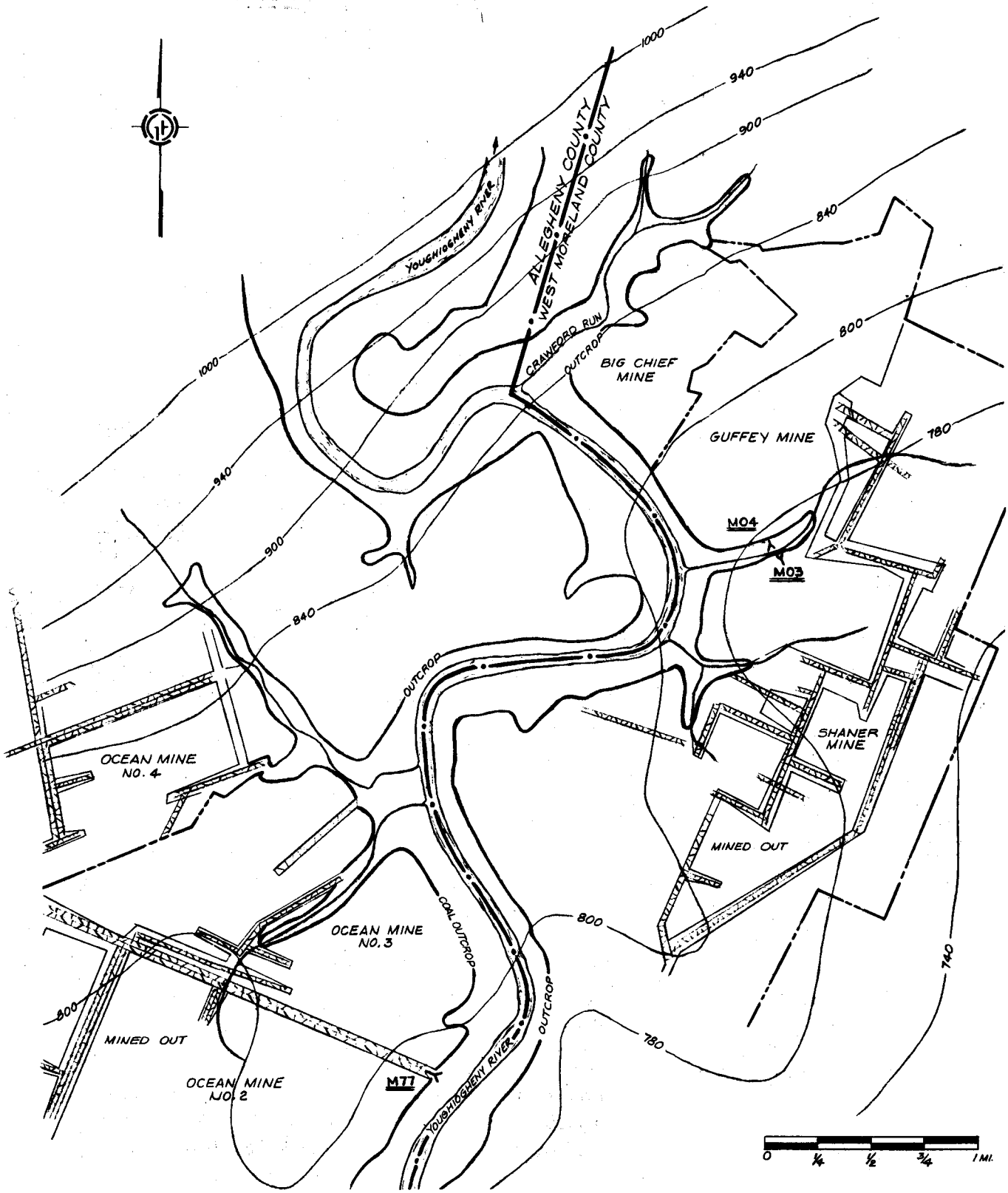


FIGURE 14-A, GUFFEY STATION AREA
DEEP MINE MAP

5. AREA 22, BRINKER TON OVERFLOW Priority B4

A. Location

Brinkerton overflow discharges are located in Mt. Pleasant Twp, Westmoreland County, 3.5 mi SE of Youngwood, Pa. Locations of sources are shown on Fig 22 and underground features on Fig 22A. Discharges M10, M1l, M12 are to Sewickley Creek and M08 and M09 to Boyer Run.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Redstone and Pittsburgh coal and strip mines in the coal seams above Pittsburgh.

			lbs/day Net		
Source	Description	Discharge No.	Acid	Iron	Mine
2202	Artesian discharge	M08	200	40	Hecla #1
2203	Artesian discharge	M09	(-)1400	260	Hecla #1
2204	Artesian discharge	M12	8400	6000	Brinkerton
2205	Artesian disd1arge	MI0	(-)3000	1600	Hecla #1
2222	Artesian discharge	M1l	1640	140	Brinkerton
			10,240	8,040	

M08 through M12 are overflows from different sections of a large mine water pool involving 75 sq mi of mine workings in the Latrobe syncline as discussed in Section IV and shown on Fig 5.

C. Abatement

Recommended

-Hydraulic seals at 2202, 2203, 2204, 2205, 2222; includes overburden removal and pumping diversion for construction.

-Grout curtains at 2225 (50 ft)

2229 (50 ft)

Alternative - Stage 1

Same as recommended abatement except that artesian spring 2205 is not sealed in order to prevent a new breakout by hydrostatic pressure buildup.

Alternative - Stage 2

Instream neutralization of combined discharges diverted by sealing to source 2205.

D. Costs, Estimated

Recommended Abatement

5 Hydraulic seals	310,000
Grout curtains (100 ft)	50,000
	$360,000

Alternative - Stage 1

4 Hydraulic seals	$220,000
Grout curtains	50,000
	$270,000

Alternative - Stage 2

To be determined after analysis of combined discharges.

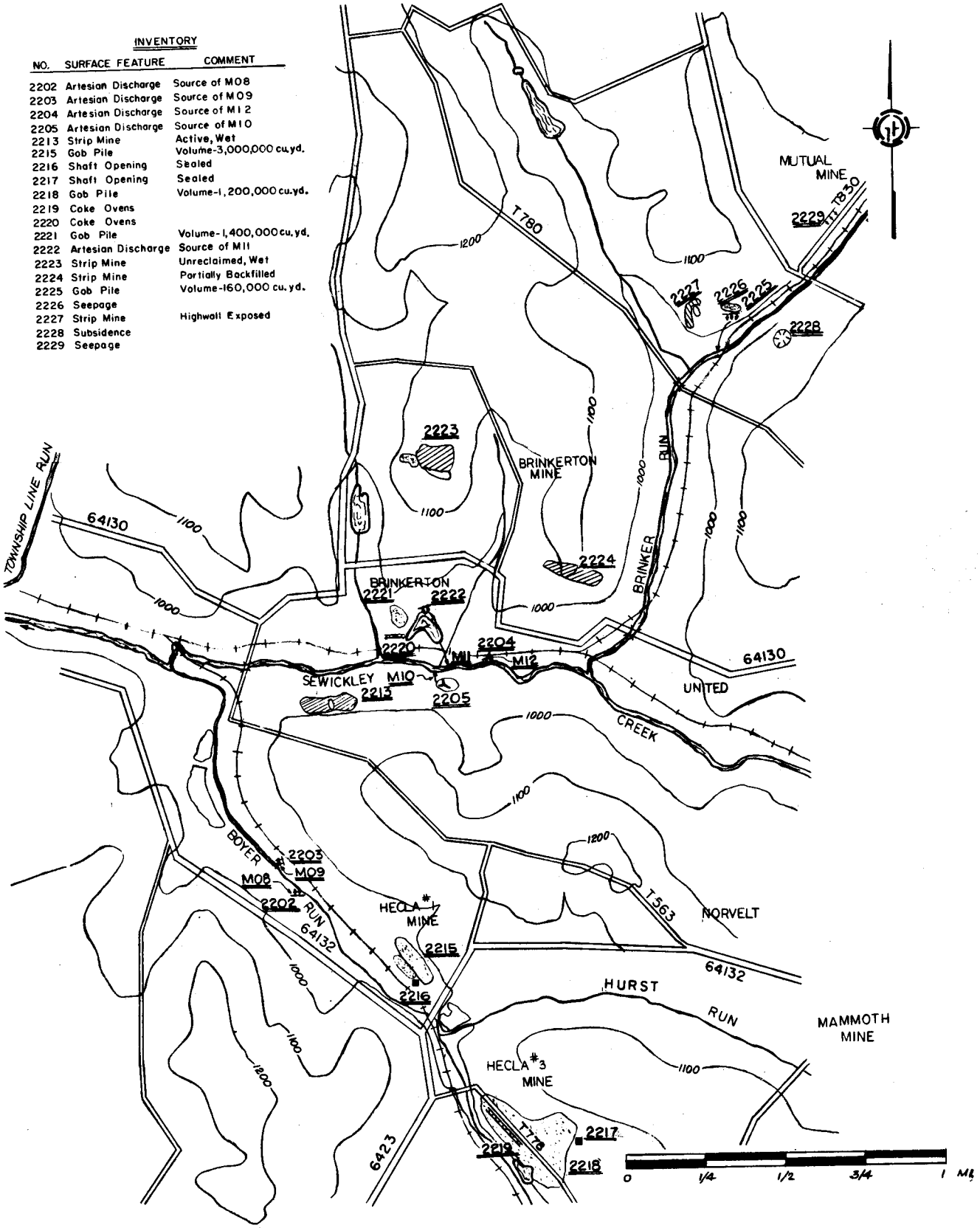


FIGURE 22, BRINKERTON OVERFLOW AREA
INVENTORY MAP

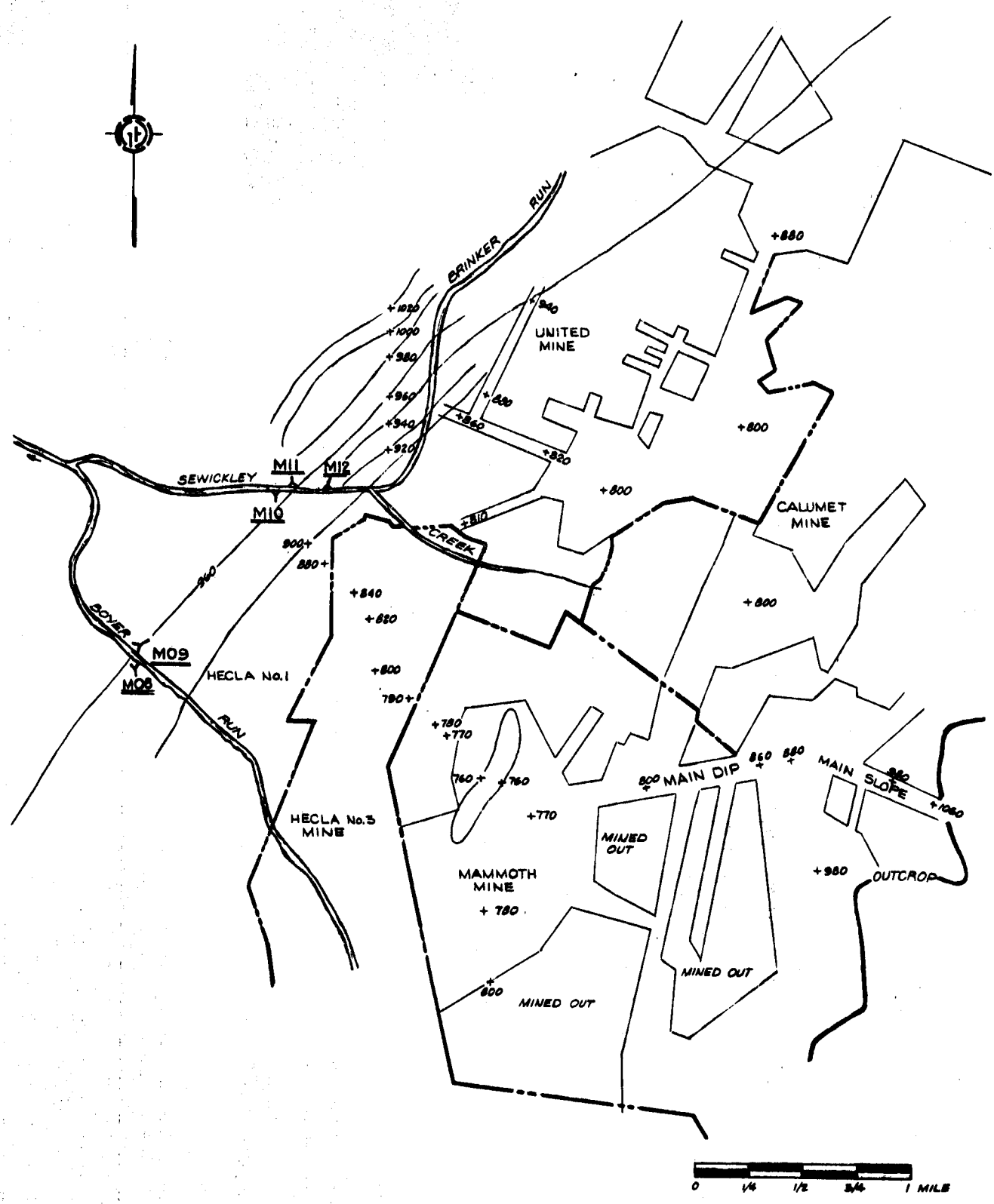


FIGURE 22-A, BRINKERTON OVERFLOW AREA
DEEP MINE MAP

6. AREA 23, JACKS RUN Priority B3

A. Location

This area is located in Hempfield Twp, Westmoreland County, 0.3 mi west of South Greensburg, Pa. Locations of sources are shown on Fig 23 and deep mine workings on Fig 23A. Discharge is to a tributary of Jacks Run.

B. Description of Major Sources

This area consists mainly of abandoned deep mine workings in the Pittsburgh coal of the Greensburg syncline basin. Some small strip mines exist in the area with one found to be active.

		Discharge	lbs/day Net	
Source	Description	No.	Acid	Iron
2317	Drift opening	M32	7200	1260

Drift opening 2317 is at the abandoned Greensburg #2 mine of the old Keystone Coal & Coke Co as discussed in Section IV, pg IV-l0.

C. Abatement

Recommended

-Hydraulic seal 2317 that requires pumping diversion for construction.
-Surface seals 2302, 2304, 2307.

Subsidence 2310, mapped from old USGS information, was not located in field. Backfilling and sealing may be required upon detailed field investigation.

D. Costs, Estimated

1 Hydraulic seal	$35,000
3 Surface seals	15,000
	$50,000

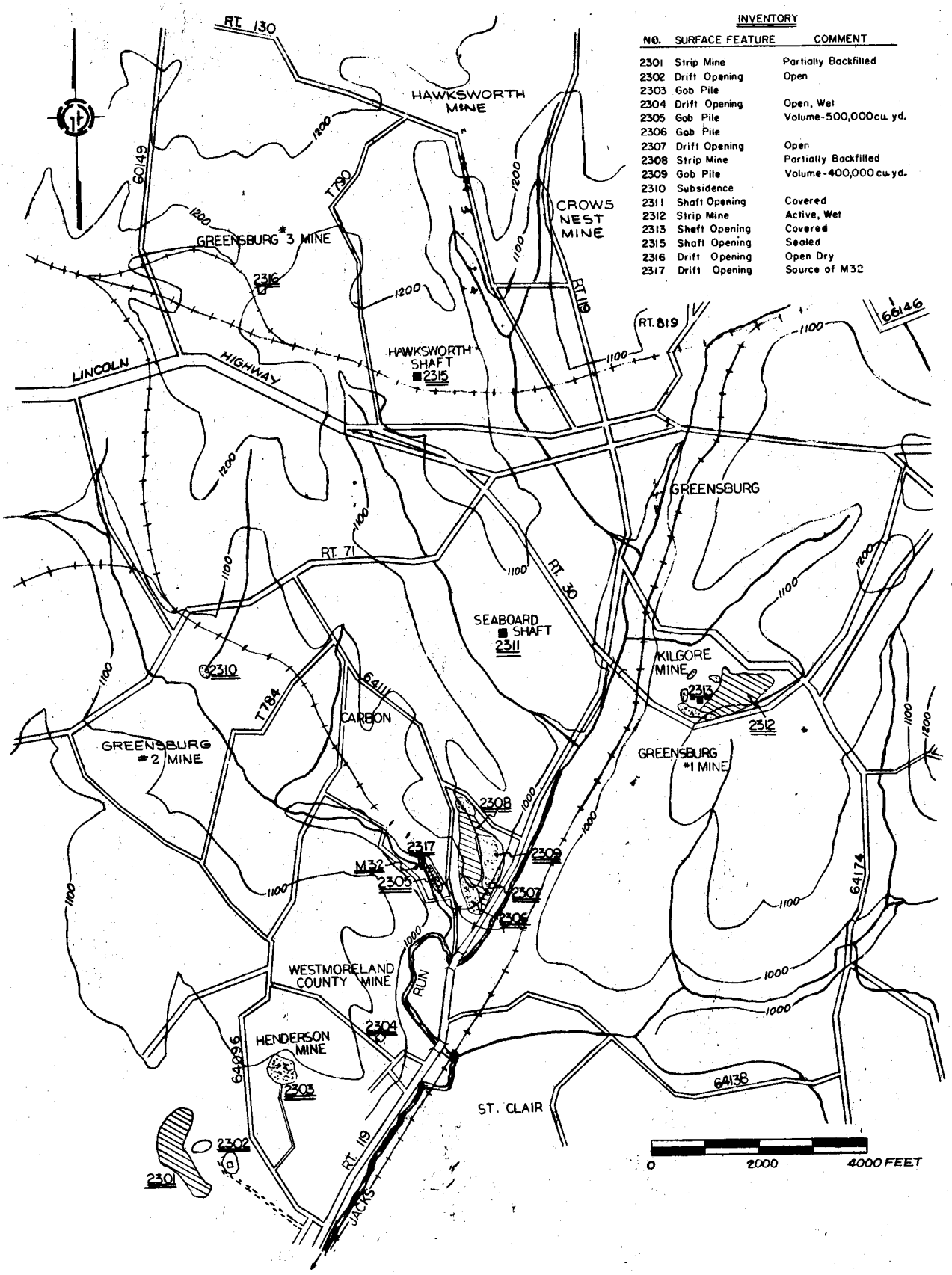


FIGURE 23, JACKS RUN AREA
INVENTORY MAP

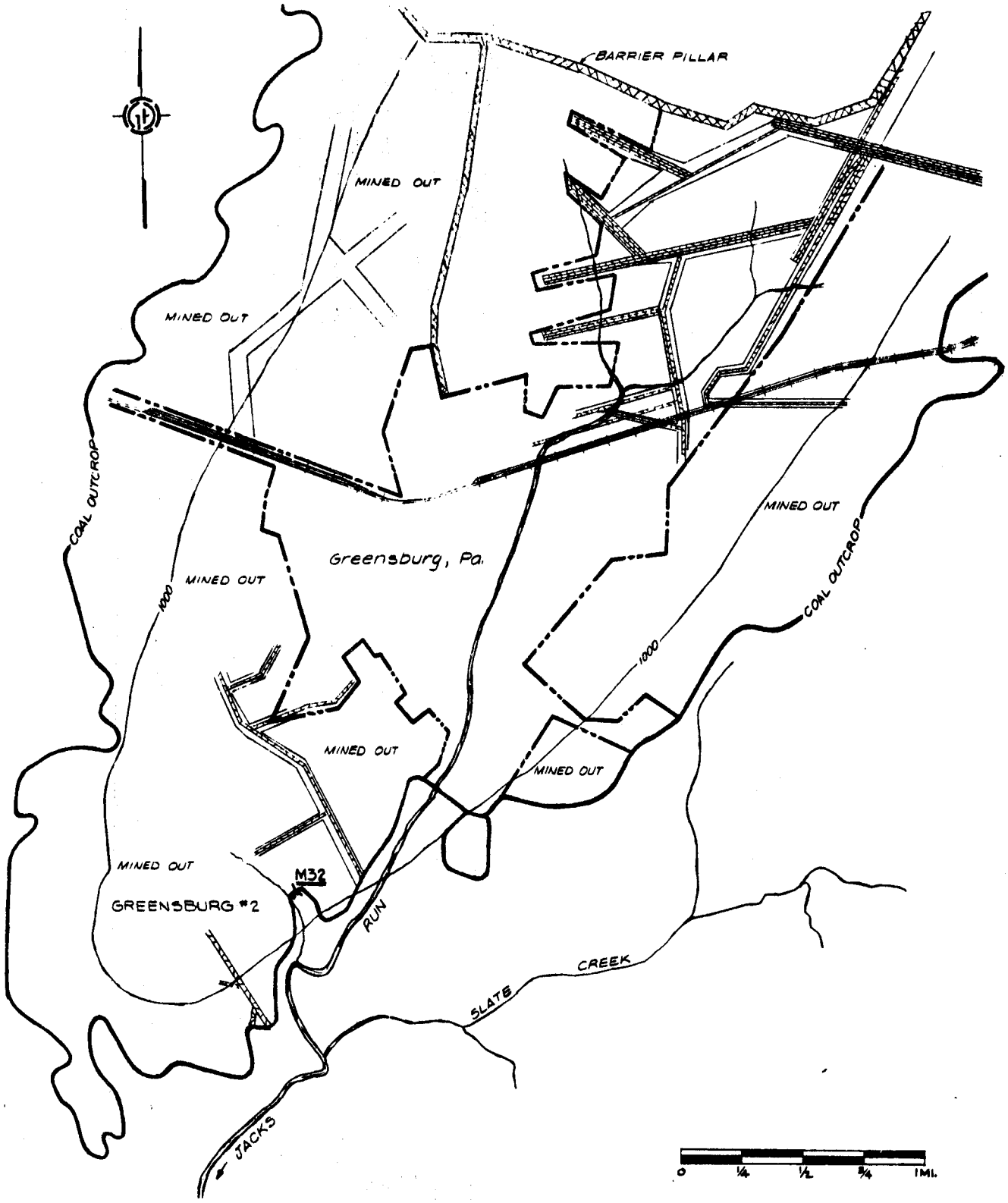


FIGURE 23-A, JACKS RUN AREA
DEEP MINE MAP

7. AREA 24, WILSON RUN Priority B7

A. Location

The Wilson Run Area is in Mt Pleasant Twp, Westmoreland County, 2 mi north of Mt Pleasant Pa. Source locations are shown on Fig 24 and deep mine workings on Fig 24A. Discharges are to Wilson Run.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Pittsburgh coal seam of the Latrobe syncline basin.

			Discharge	Lbs/day Net	
Source	Description	No.	Acid	Iron	Mine
2407	Artesian discharge	MO7	(-)450	30	Stewart
2408	Pipe discharge	M06	(-)580	640	Central
				670	

C. Abatement

Recommended

-Hydraulic seals at 2407 & 2408 including clearing caved entries and pumping during construction.

-Surface seals at 2401 & 2402.

Alternative

-Pipe M06 to existing pond for natural oxidation and iron settling. Pond improvements would be required to enhance settling and divert other inflows away from it. Periodic maintenance would include removal of iron sludge.

D. Costs, Estimated

Recommended

2 hydraulic seals	$75,000
2 surface seals	5,000
	$80,000

Alternative

Piping & pond improvements	$20,000
2 surface seals	5,000
Installation	$25,000

Maintenance including dredging some 4 times/yr might cost in order at $5,000 to $10,000 per yr.

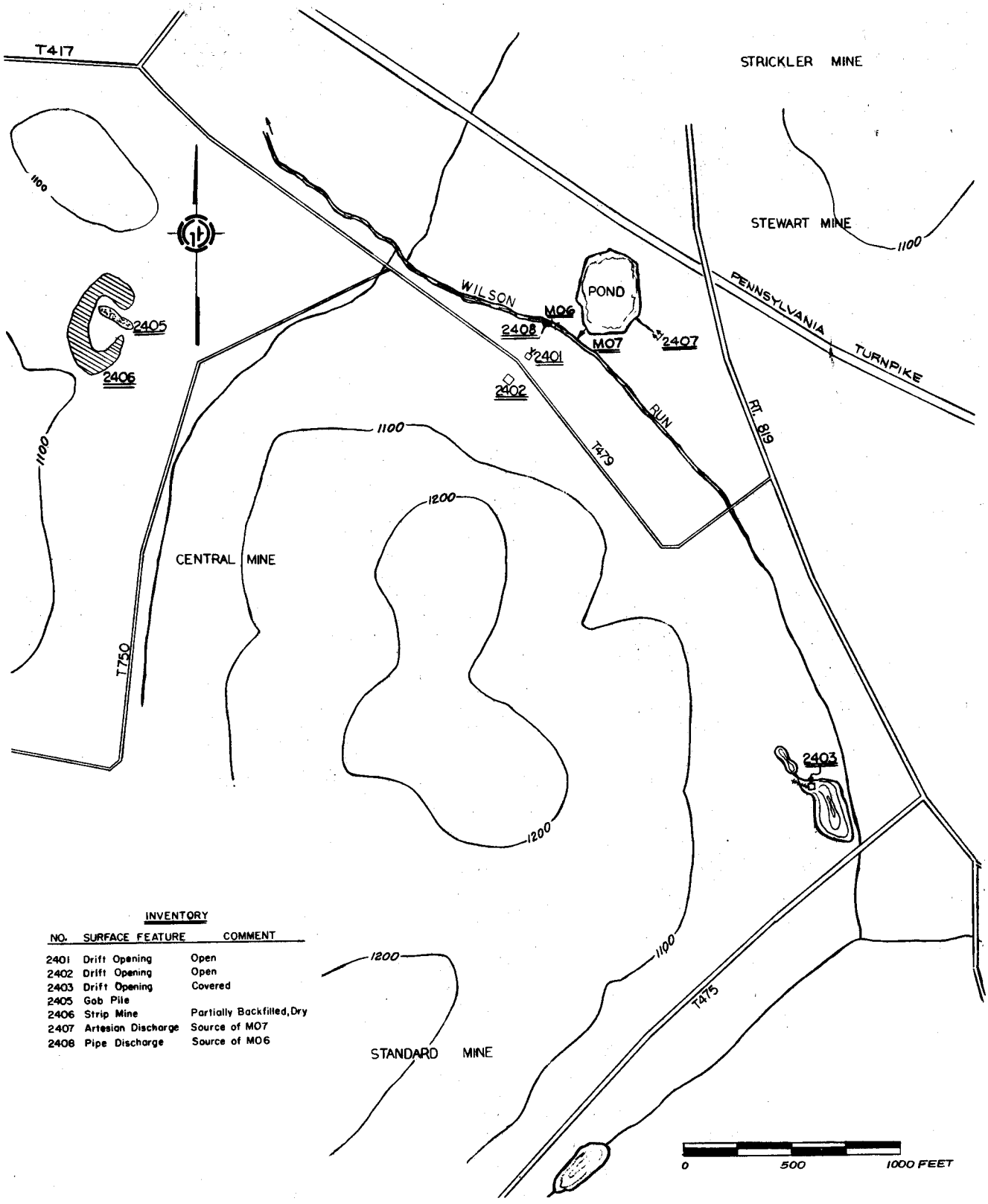


FIGURE 24, WILSON RUN AREA
INVENTORY MAP

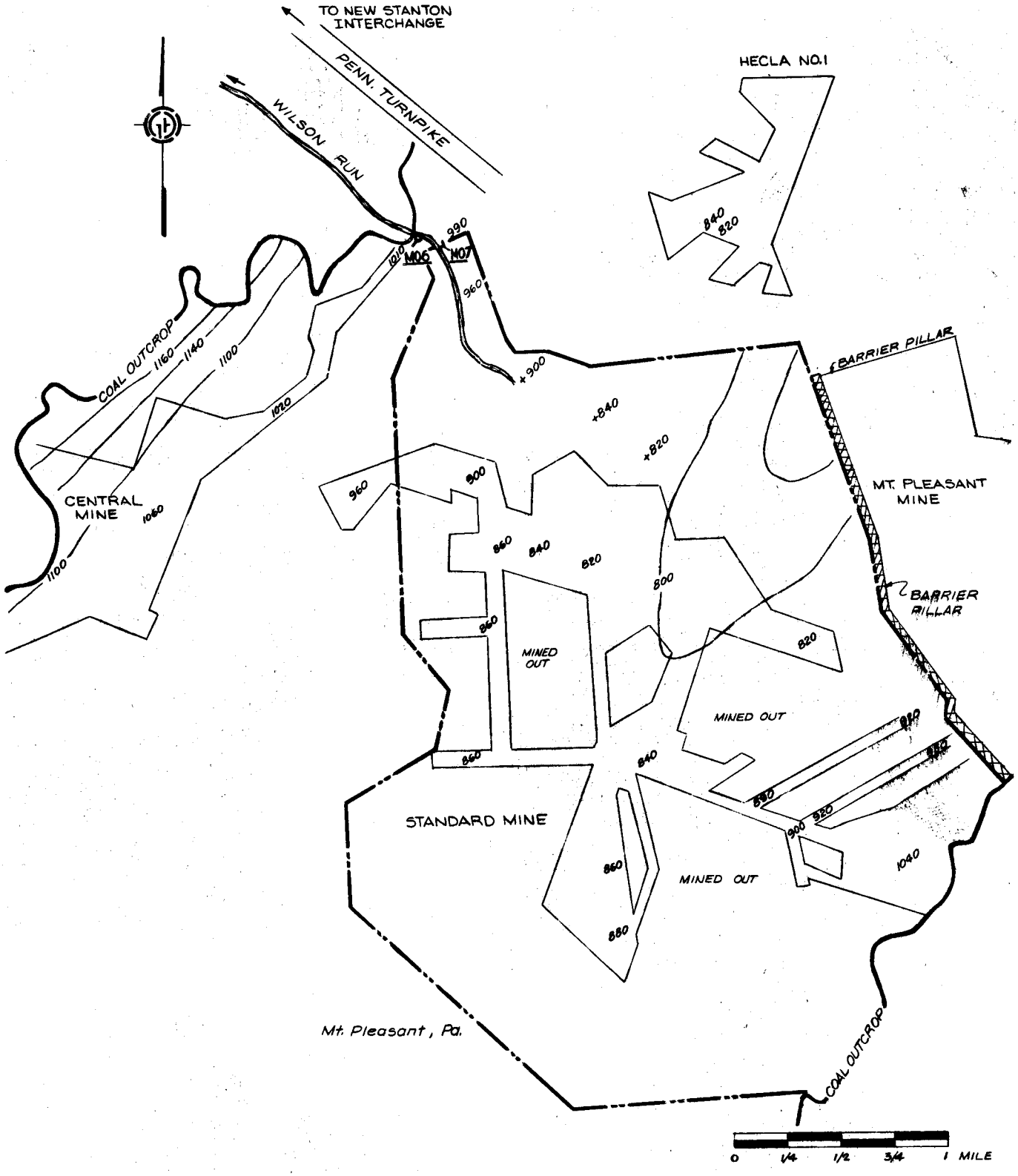


FIGURE 24-A, WILSON RUN AREA
DEEP MINE MAP

8. AREA 25, BUFFALO RUN Priority B1

A. Location

This area is located in East Huntington Twp, Westmoreland County, 2 mi west of Mt Pleasant, Pa. Source locations are shown on Fig 25 and deep mine workings on Fig 25A. Discharge is to Buffalo Run.

B. Description of Major Sources

Source of discharge M05 is an 18" tile drain pipe (2508) from a covered slope entry to Southwest #3 mine whose workings were in the Pittsburgh coal of the Latrobe syncline basin. The net acid load was 6,600 lbs /day and the iron load was 680 lbs/day.

C. Abatement

Recommended

Hydraulic seal at 2508 including pumping diversion for construction.

Alternative

Pipe diversion of discharge M05 to mine workings E of the present discharge where it should join the main alkaline Latrobe syncline pool.

D. Costs, Estimated

Recommended Abatement

1 Hydraulic seal	$35,000

Alternative

Piping diversion	$30,000

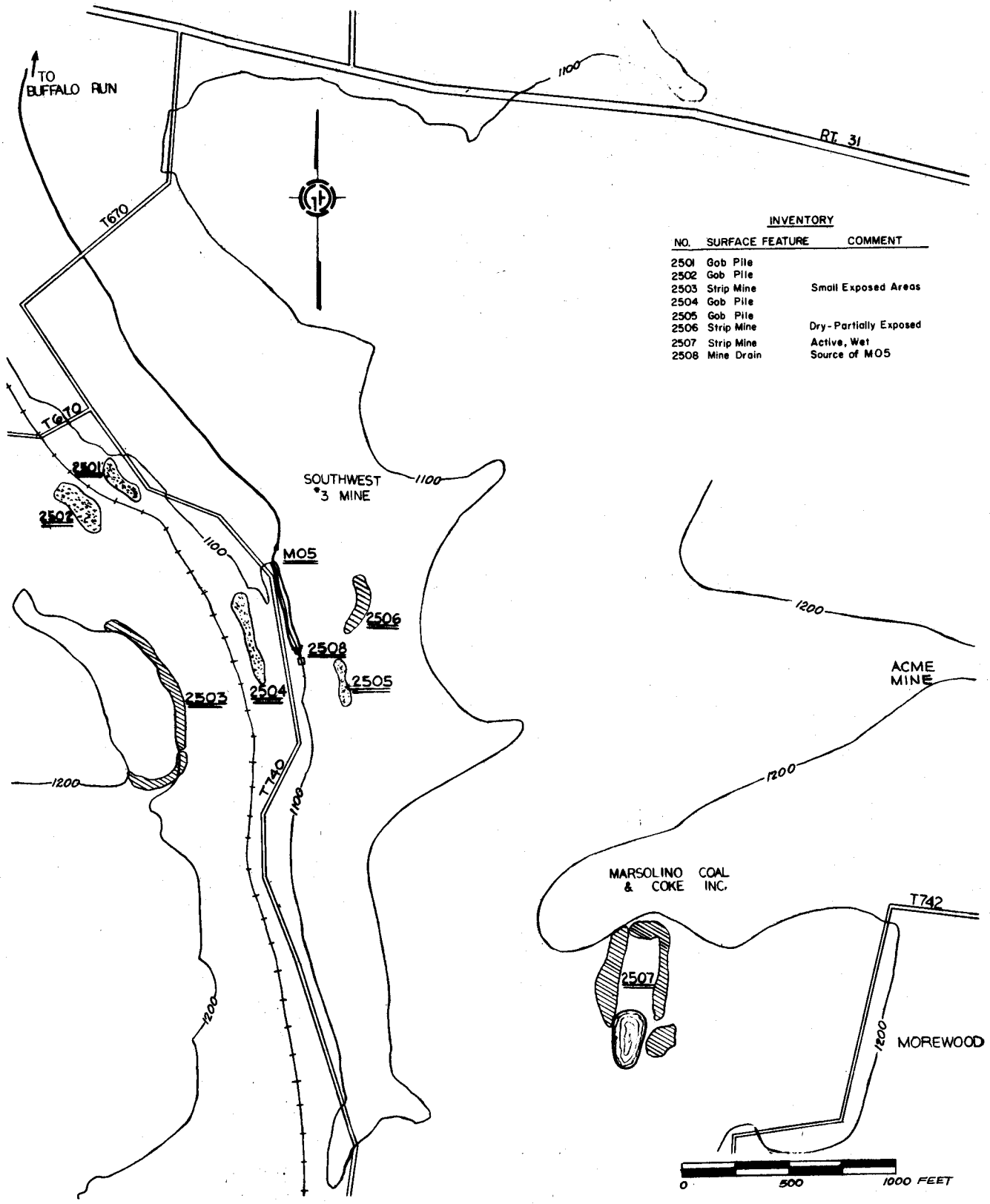


FIGURE 25, BUFFALO RUN AREA
INVENTORY MAP

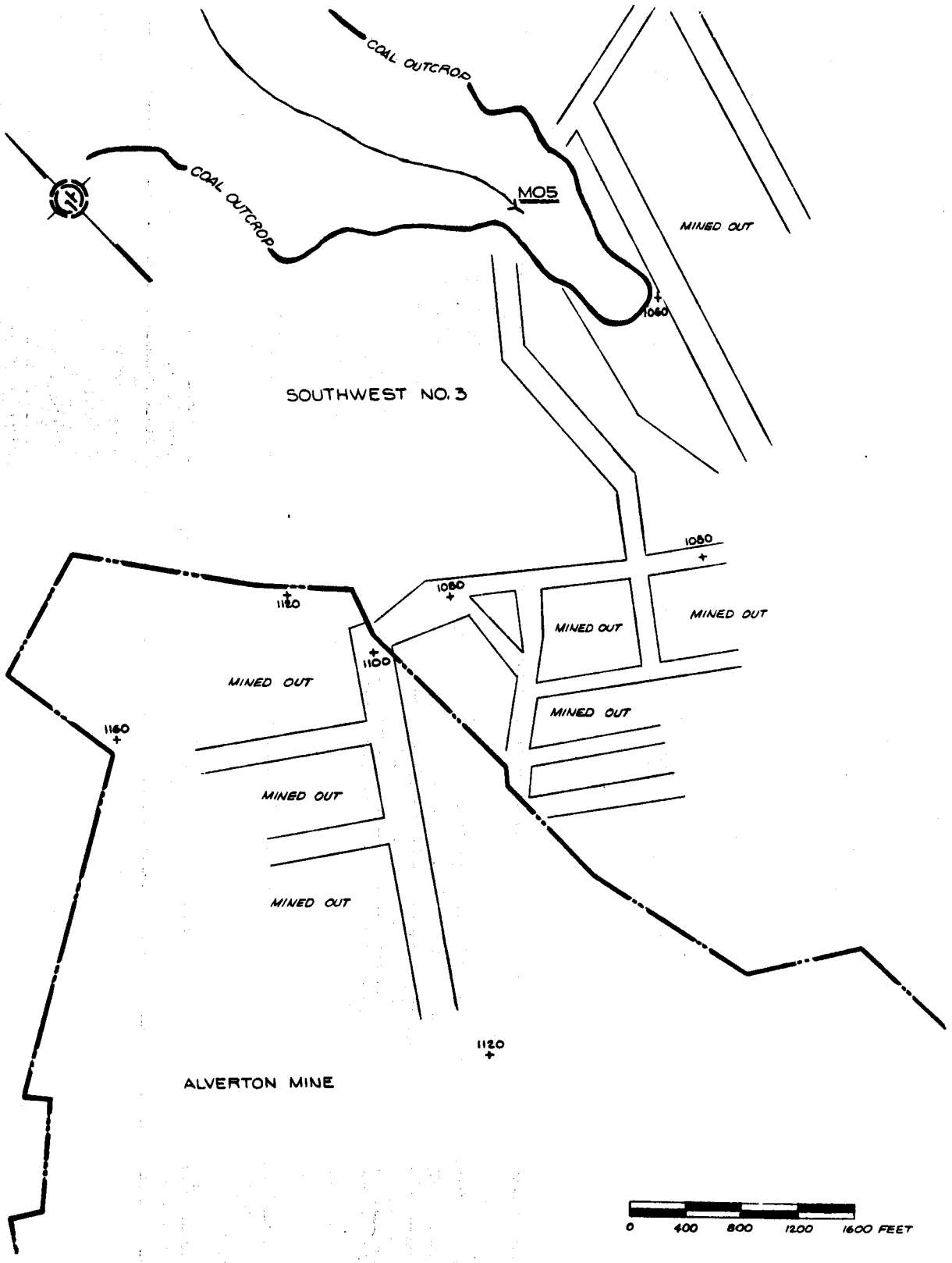


FIGURE 25-A, BUFFALO RUN AREA
DEEP MINE MAP

9. AREA 26, FAYETTE ANTICLINE Priority B5

A. Location

Fayette Anticline area is located in South Huntington Twp, Westmoreland County, near Hunkers, Pa. Source locations are shown on Fig 26 and deep mine workings on Fig 26A. Discharge M51 is to Sewick1ey Creek and M52 is to Buffalo Run.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Upper Freeport coal of the Fayette Anticline.

			lbs/day		
		Discharge	Net		
Source	Description	No.	Acid	Iron	Mine
-	Borehole	M51	3500	480	Greensburg#4
2602	Drift opening	M52	40	20	Ella *
2604 Seepage M52	Seepage	M52			Ella
			3540	500	

C. Abatement

Recommended - Stage 1

-Hydraulic seals at 2602,2603, 2605, 2606, and the bore-hole at M51
Pumping diversion will be required at M5l.
-Grout curtain at 2604.

Recommended - Stage 2

-Grout curtain sealing, if necessary, of new seepages along the outcrop after M 51 is sealed.

D. Costs, Estimated

Stage 1

5 Hydraulic seals	$110,000
Grout curtain (150 ft)	75,000
	$185,000

Stage 2

To be determined after completion of Stage 1.

*editor note: Acid and Iron loads of 40 and 20 are cumulative for the two Ella mines.

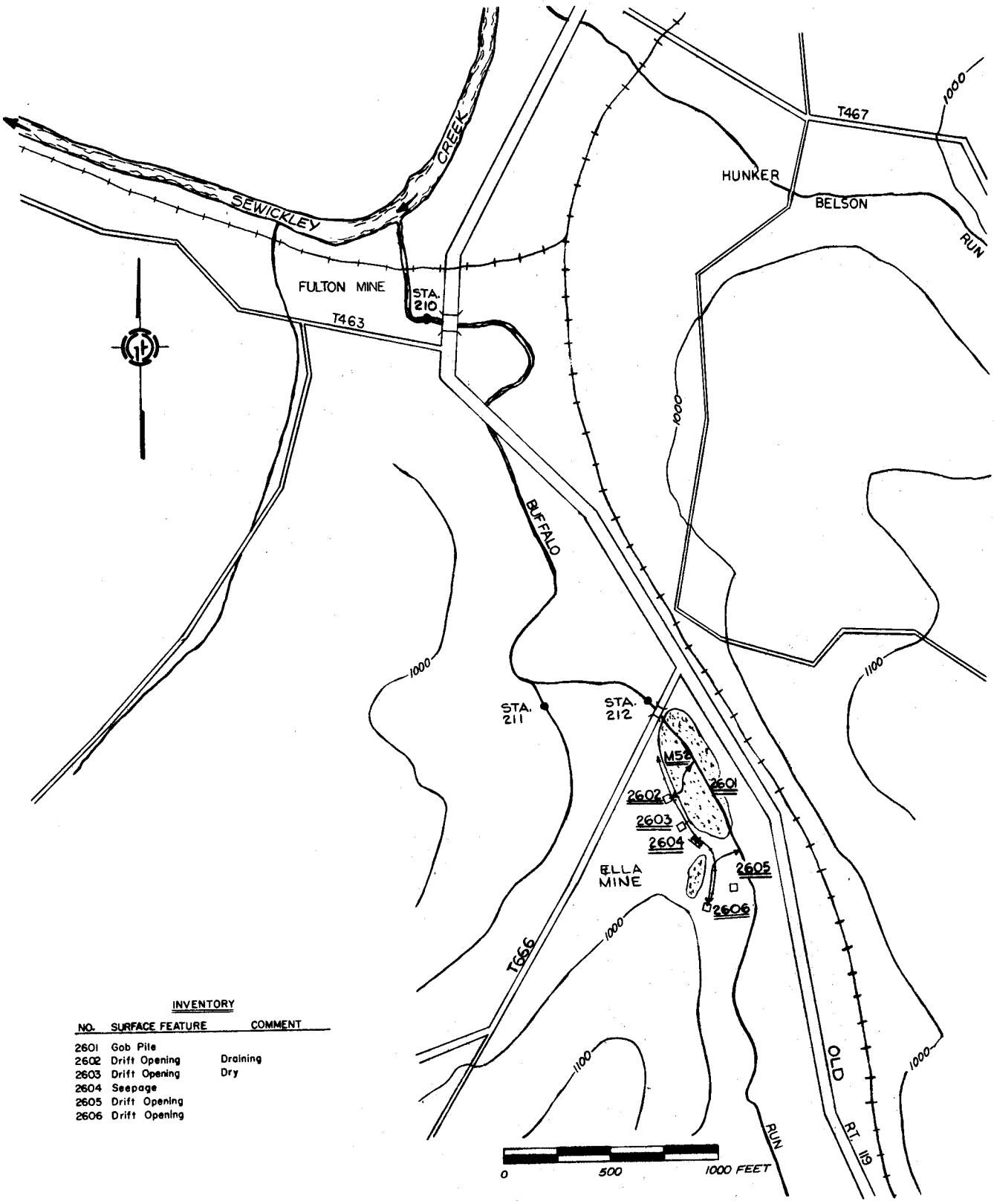
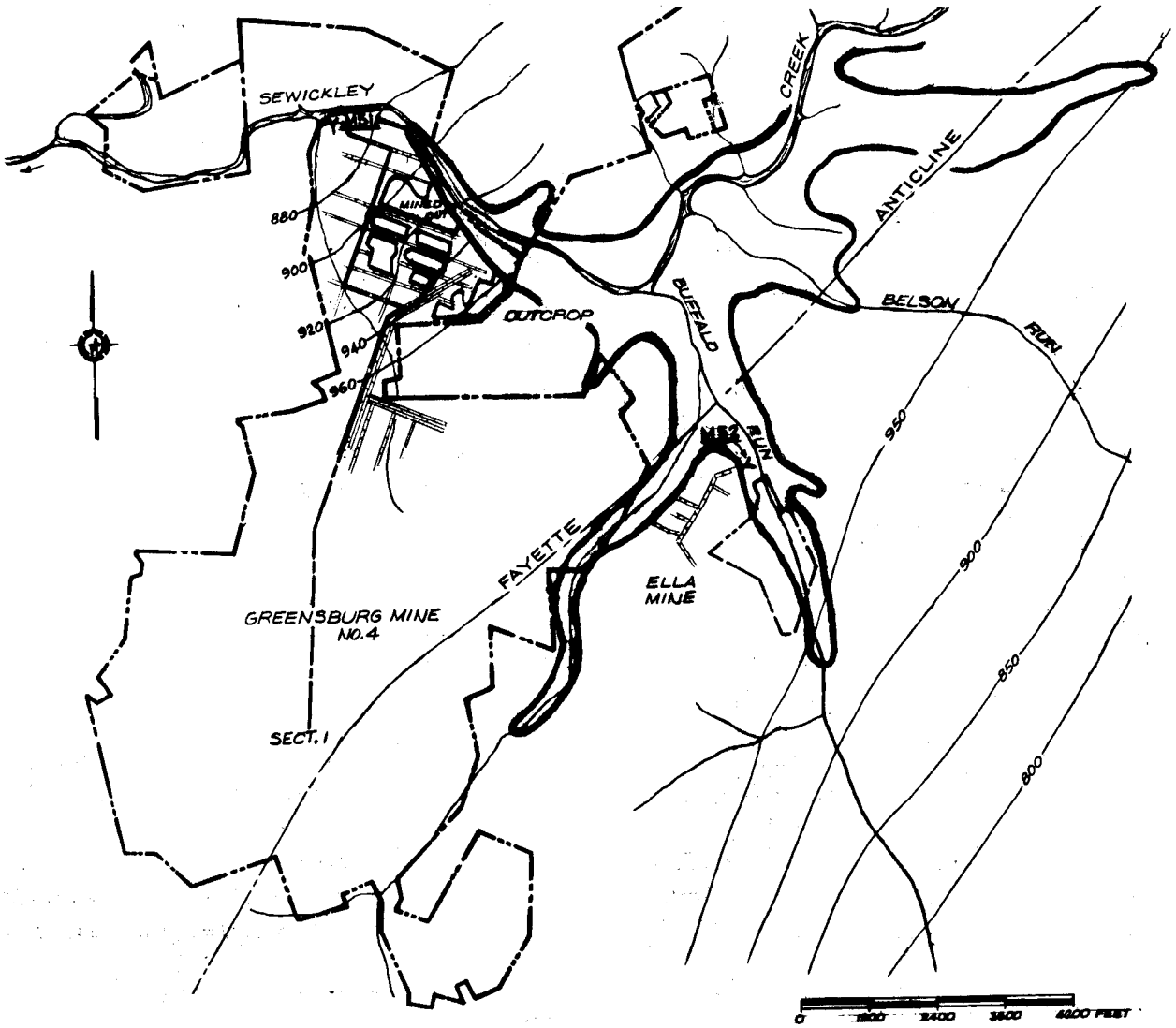


FIGURE 26, FAYETTE ANTICLINE AREA
INVENTORY MAP



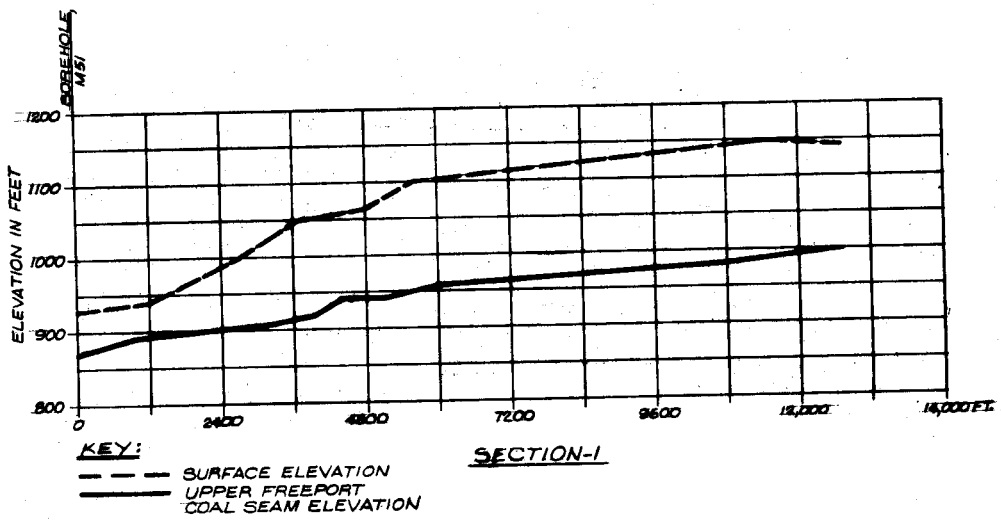


FIGURE 26-A, FAYETTE ANTICLINE AREA
DEEP MINE MAP

10. AREA 27, HUTCHINSON MINE — Priority B6

A. Location

Hutchinson Mine area is located in South Huntington Twp, Westmoreland County, at Hutchinson, Pa. There is only one major pollution source in the area, which is a pump discharge from active Hutchinson Mine. The deep mine workings of this area are shown on Fig 27.

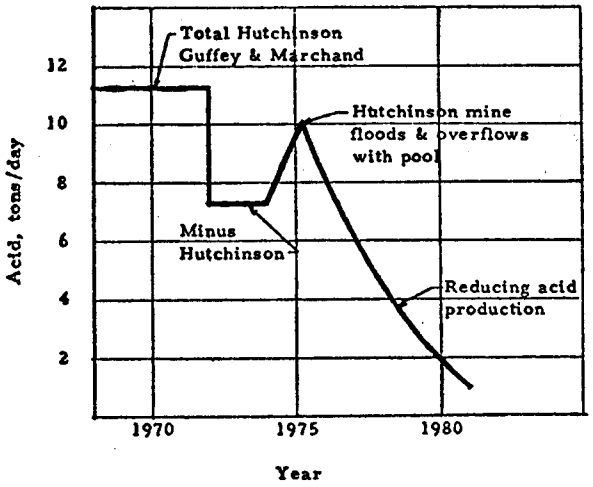
B. Description of Major Sources

The pump discharge (M13) of 4 MGD into Sewickley Creek had 11,000 lbs/day net acid load and 2990 lbs/day iron on June 4, 1969.

When mining stops at Hutchinson, it is believed that, the Irwin syncline pool water will rise and increase other existing discharges, M14 and M03. Relative elevations are:

Hutchinson	
Borehole discharge, M13	825'
Coal seam	604'
Marchand discharge, M14	764'
Guffey discharge, M03	785'

PHD report Hydrogeologic Investigation of Hutchinson Mine on February 20, 1969 by W. Gross and G. Emerich includes opinions that upon closing, the mine will flood and reestablish natural ground water elevations with no discharges in the Hutchinson vicinity. The flooded mine would become part of the Marchand, Ocean and Keystone pool which will continue to overflow at Guffey and Marchand but with a reduction of acid production after Hutchinson shuts down approximately as follows:



C. Abatement

It is recommended that treatment for the Hutchinson discharge M13 be provided by the mining company if legally possible for the Commonwealth to so require. Once the mining is stopped there should be no discharge.

FIGURE 27, HUTCHINSON MINE
DEEP MINE MAP

11. AREA 28, MARCHAND MINE PRIORITY B2

A. Location

Marchand Mine Area is located in Sewickley Twp, Westmoreland County, near Lowber, Pa. Locations of sources are shown on Fig 28 and pool profiles on Fig 28A. Discharge is to Sewickley Creek.

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Pittsburgh coal seam of the Irwin syncline basin.

			lbs/day		
		Discharge	Net		
Source	Description	No.	Acid	Iron	Mine
2801	Drift Opening	M14	12,000	5170	Marchand

C. Abatement

Recommended - Stage 1

-Hydraulic seal at 2801 that will require overburden removal and pumping diversion for construction. Coal seam depth near the Marchand discharge is shallow and the effectiveness of its being sealed is questionable since a ~ new discharge will breakout at any weak point along the outcrop after sealing. Subsequent outcrop grouting will probably be required.

-2805 (manway), 2807 (air shaft) and 2810 (shaft opening at connection of Ocean and Marchand Mines) may require sealing, upon site investigation prior to construction or monitoring after construction.

Recommended - Stage 2

-Neutralization plant.
After sealing 2801 the elevation of the water pool in the area will rise, and it will become advantageous at some point to relieve the hydrostatic pressure of the rising pool rather than to allow a random breakout at a weak point along the outcrop. The relief point may be located at a place convenient for treatment.

D. Cost, Estimated

Recommended - Stage 1

1 Hydraulic seal $80,000

Recommended - Stage 2

To be determined

INVENTORY

NO.	SURFACE FEATURE	COMMENT
2801	Drift Opening	Source of M14
2803	Gob Pile	
2804	Shaft Opening	Sealed
2805	Manway	Open
2806	Gob Pile	Volume - 900,000 cu yd

NO.	SURFACE FEATURE	COMMENT
2807	Airshaft	Open
2808	Borehole	Open
2809	Borehole	Open
2810	Shaft Opening at connection of Ocean & Marchand Mines	Open

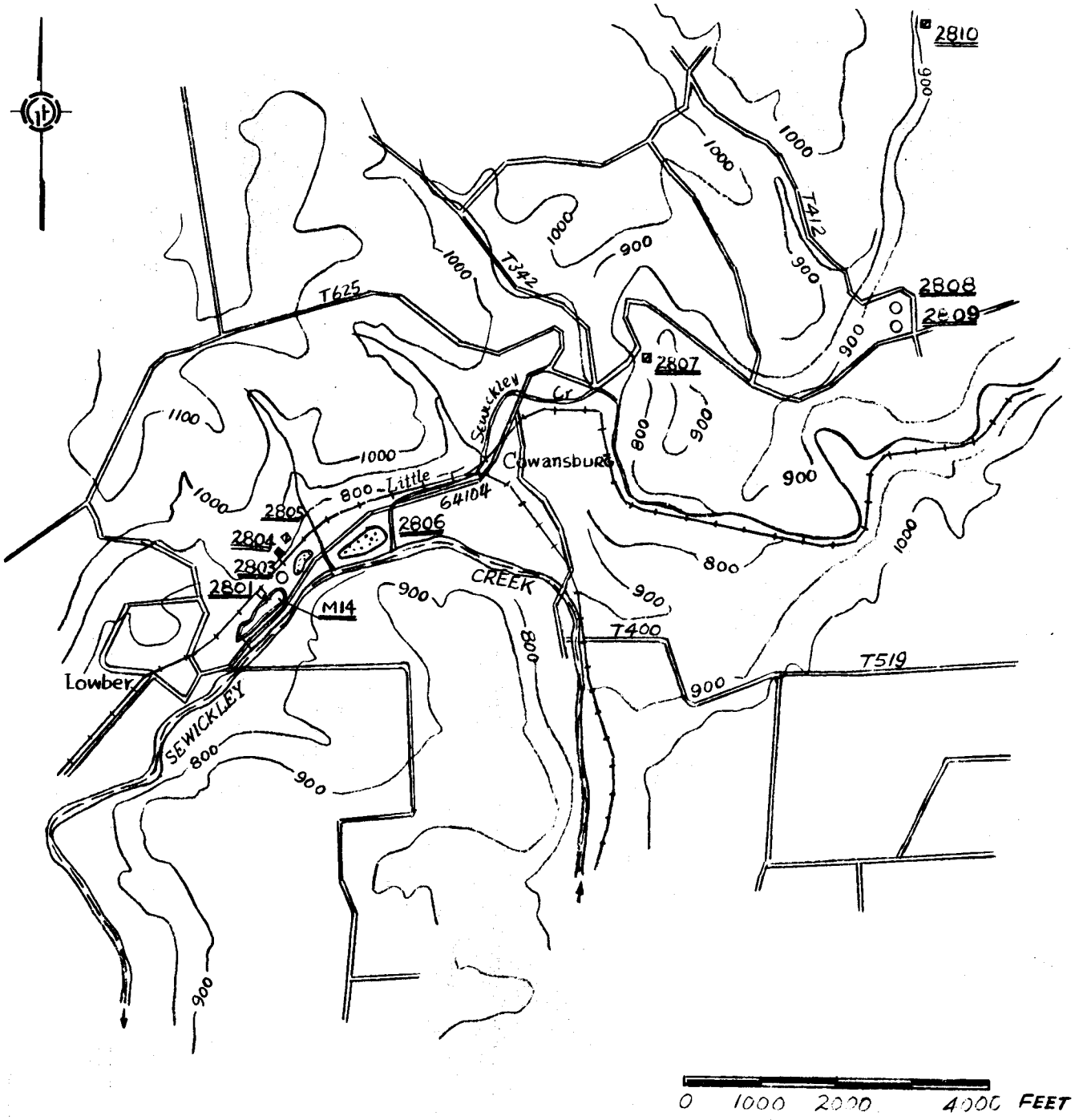
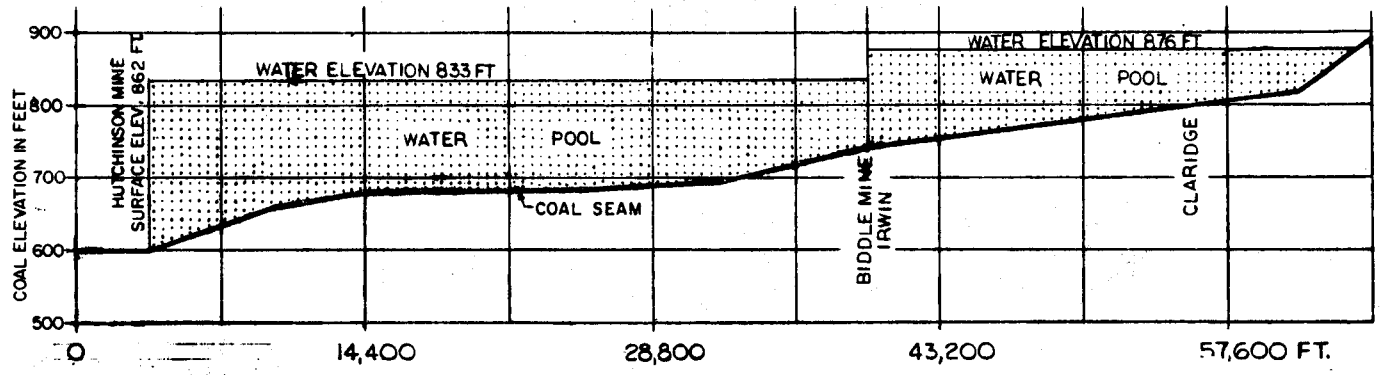
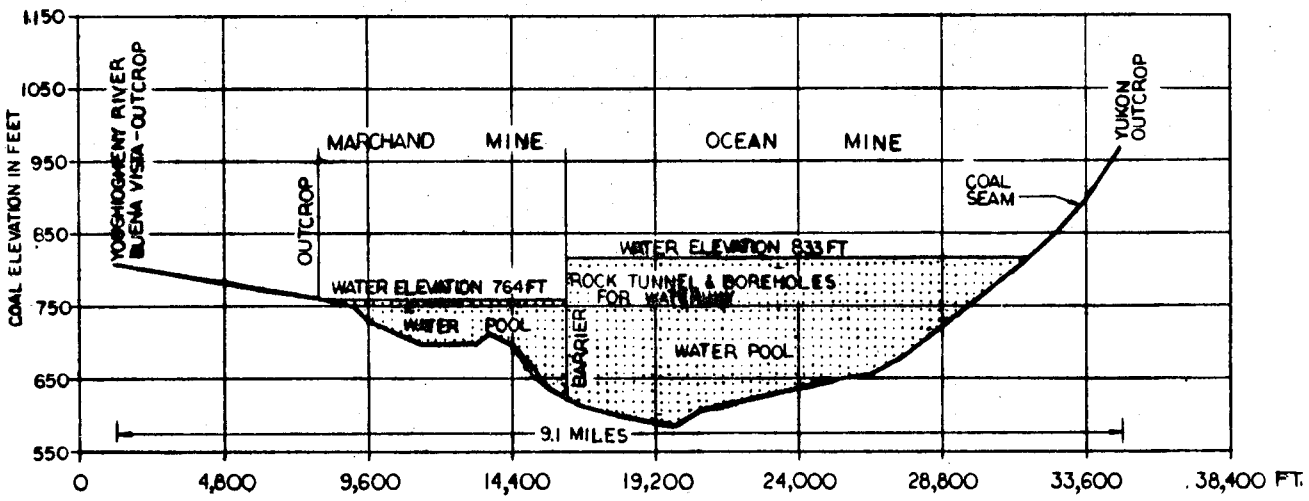


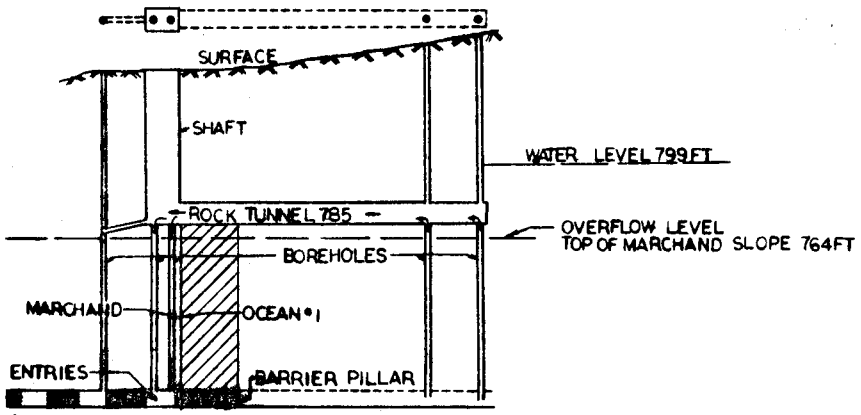
FIGURE 28, MARCHAND MINE AREA
INVENTORY MAP



ELEVATION – STRIKE
IRWIN BASIN



CROSS SECTION – IRWIN BASIN
BUENA VISTA - YUKON



SHAFT TUNNEL & BOREHOLES
TO CONNECT
MARCHAND & OCEAN #1 MINE
NOT TO SCALE

FIGURE 28-A, MARCHAND MINE AREA
DRAINAGE SYSTEM

12. AREA 31, STAUFFER RUN — Priority E1

A. Location

Stauffer Run area mine discharges are located in East Huntington Twp, Westmoreland County, 2. 5 mi north of Scottdale, Pa. Locations of surface sources are shown on Fig 31 and deep mine features on Fig 31A. Discharges are to Stauffer Run.

B. Description of Major Sources

This area is associated with abandoned deep mine workings of the Alverton mine in the Pittsburgh coal of the Latrobe syncline basin.

			lbs/day	
		Discharge	Net	
Source	Description	No.	Acid	Iron
3106	3 Air seal discharges	M63	220	30
3108	Air seal discharge	M62		
3109	Air seal discharge	M62	590	110*
3110	Artesian discharge	M62		
			810	140

These sources make up most of the dry weather flow of Stauffer Run.

C. Abatement

Recommended

-Hydraulic seals at 3106, 3108, 3109, 3110; overburden removal will be required.
-Surface seals at 3111, 3112, 3113, 3114.

Alternative

-Instream neutralization on Stauffer Run.

D. Costs, Estimated

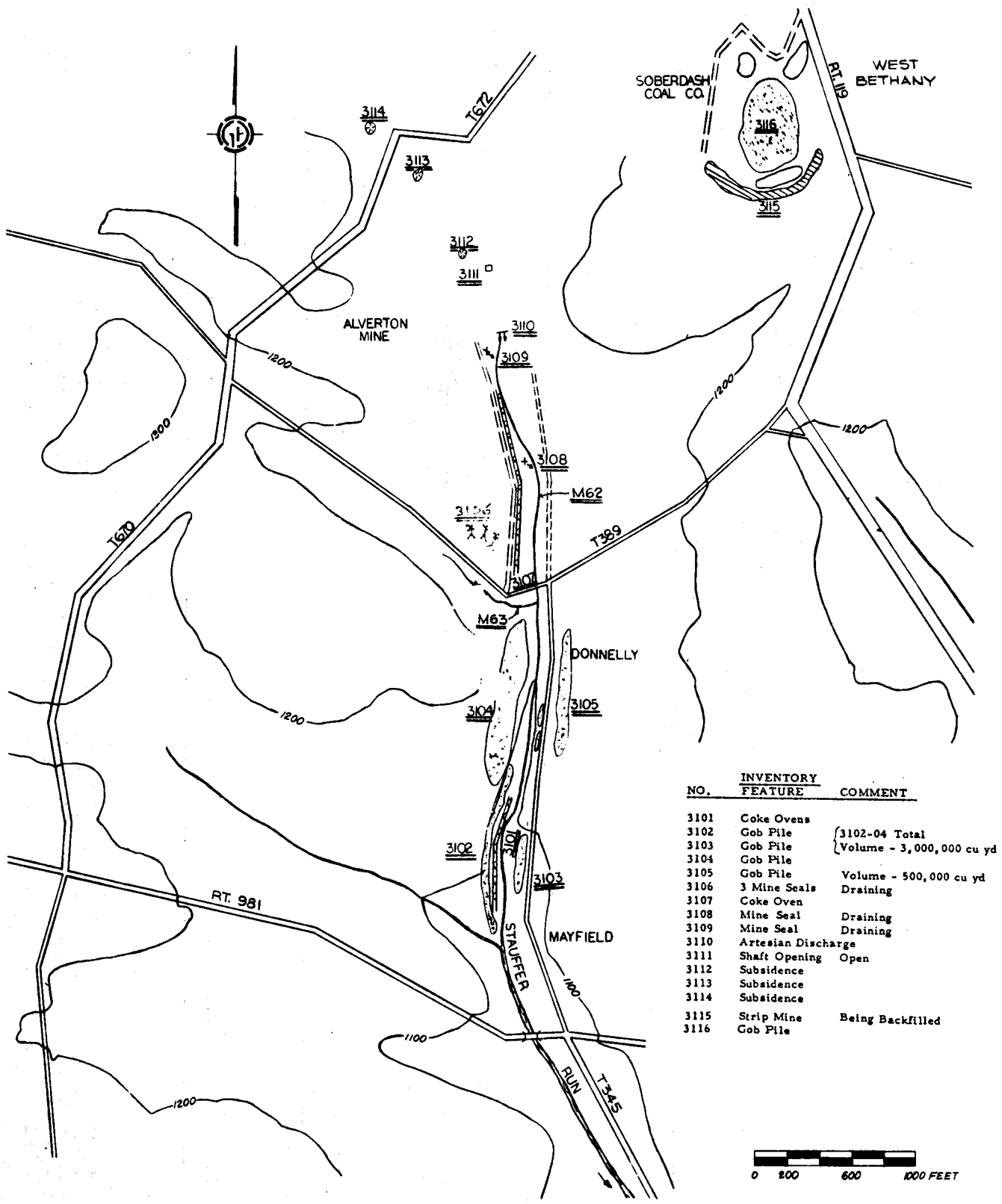
Recommended Abatement

6 Hydraulic seals	$120,000
4 Surface seals	10,000
	$130,000

Alternative

Treatment plant - Installation	$50,000
Operating	$15,000/yr

*Editor Note: Acid and Iron loads are cumulative for Sources 3108,3109,3110.



NO.	INVENTORY FEATURE	COMMENT
3101	Coke Ovens	
3102	Gob Pile	3102-04 Total
3103	Gob Pile	Volume - 3,000,000 cu yd
3104	Gob Pile	
3105	Gob Pile	Volume - 500,000 cu yd
3106	3 Mine Seals	Draining
3107	Coke Oven	
3108	Mine Seal	Draining
3109	Mine Seal	Draining
3110	Artesian Discharge	
3111	Shaft Opening	Open
3112	Subsidence	
3113	Subsidence	
3114	Subsidence	
3115	Strip Mine	Being Backfilled
3116	Gob Pile	

FIGURE 31, STAUFFER RUN AREA
INVENTORY MAP

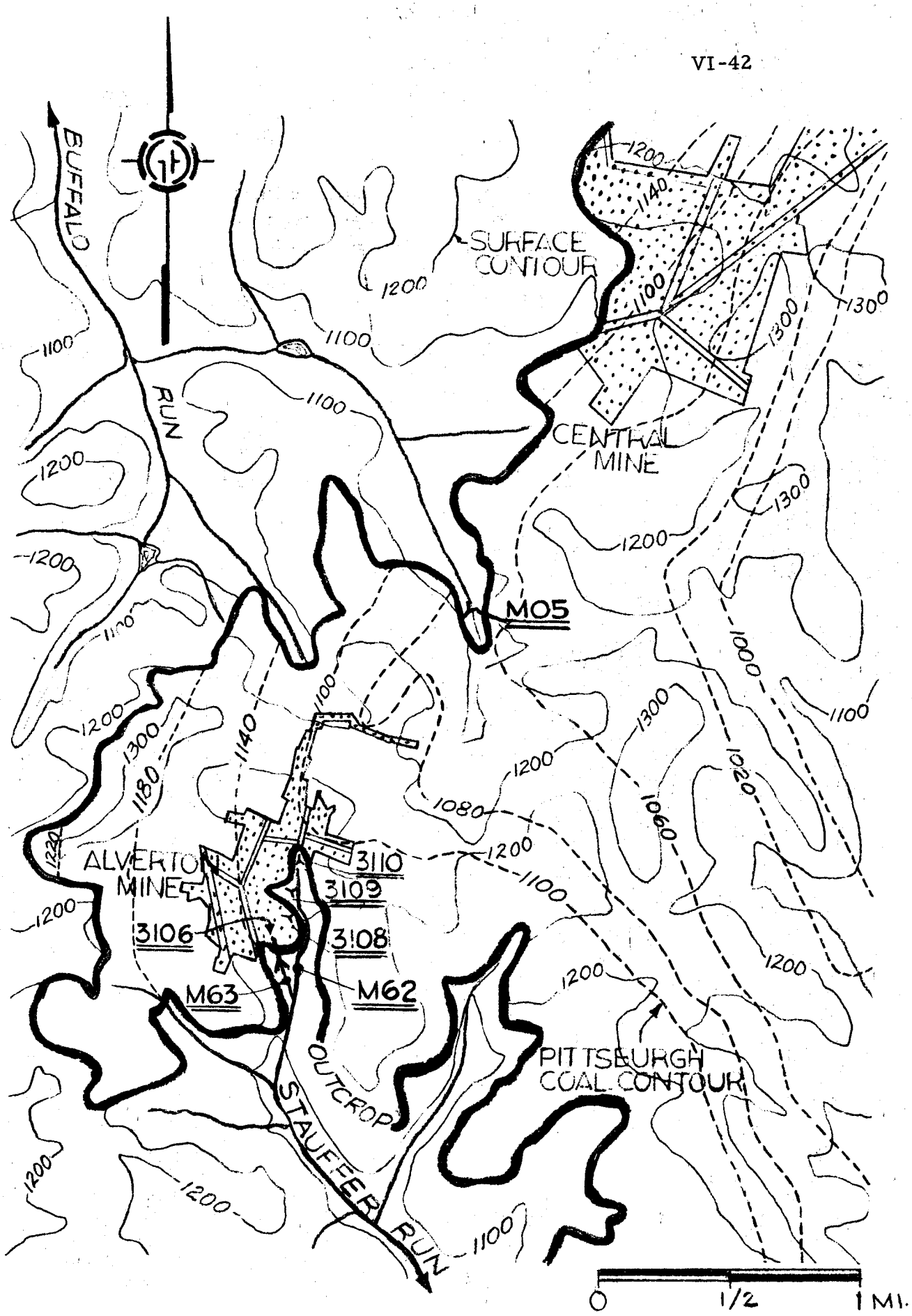


FIGURE 31A, STAUFFER RUN AREA
DEEP MINE MAP

13. AREA 41, LITTLE CHAMPION CREEK Priority A3

A. Location

The mine discharge in this area is located in Saltlick Twp, Fayette County, 2.5 mi NW of Melcroft, Pa. Locations of sources are shown on Fig 41. Discharge is to Little Champion Creek.

B. Description of Major Sources

This area consist of the small abandoned Coffman deep mine in the Lower Kittanning coal seam.

			lbs/day Net	
Source	Description	Discharge	Acid	Iron
4101	Drift opening	M60	20	-

C. Abatement

Recommended

-Hydraulic seal at 4101

D. Costs

Recommended Abatement

1 Hydraulic seal	$20,000

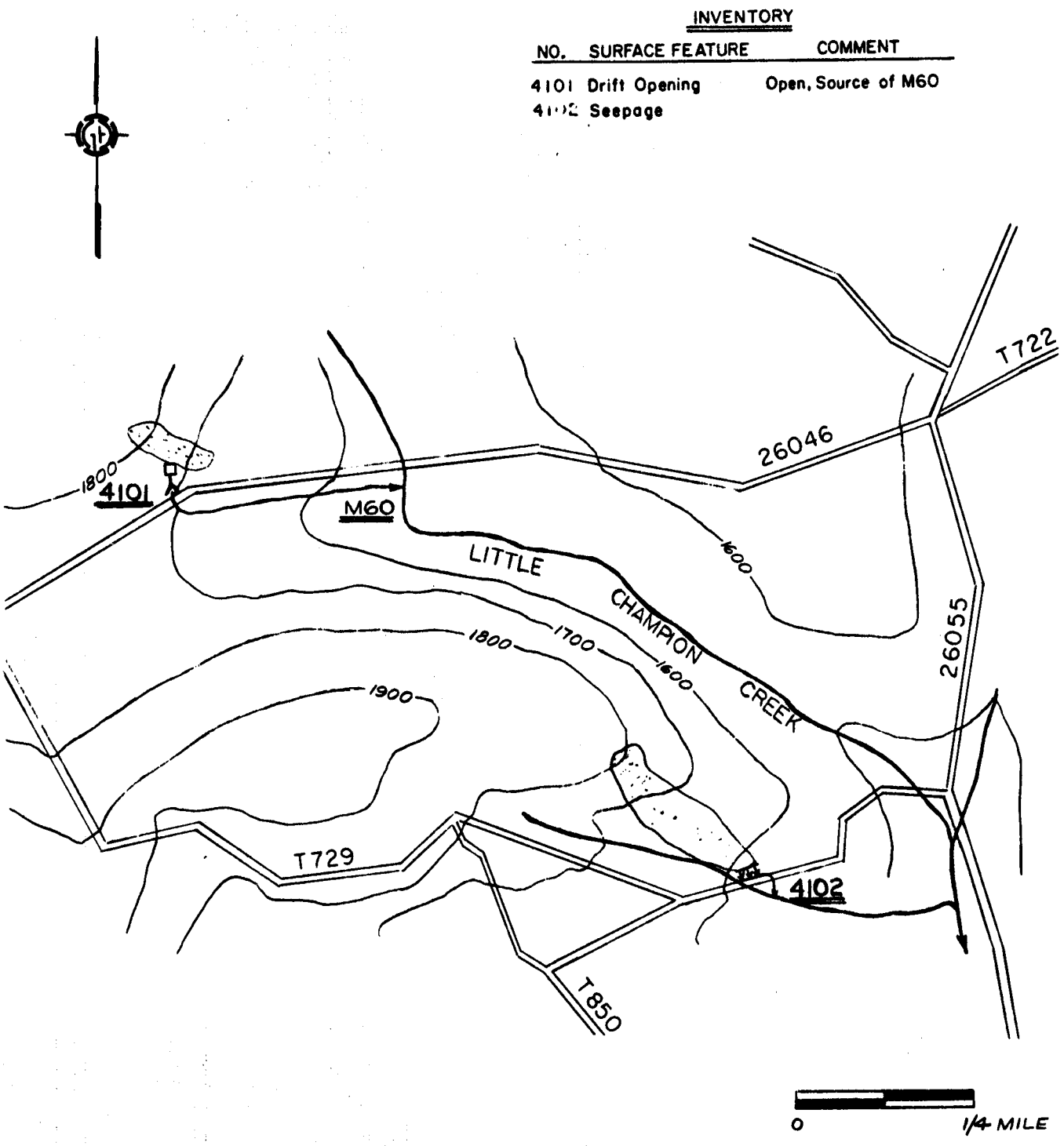


FIGURE 41, LITTLE CHAMPION CREEK AREA
INVENTORY MAP

14. AREA 42, MELCROFT MINE COMPLEX

The Melcroft Mine Complex is located in Saltlick Twp. Fayette County, 0.5 mi NW of Melcroft, Pa. Abatement recommendation for this mine complex will be separated for discussion into three areas: Melcroft Mine #3. Melcroft Mine #1, and the Flume Discharge. Locations of sources are shown on Fig 42 and deep mine workings on Fig 42A.

A. Description of Major Sources - Melcroft #3

Melcroft #3 has abandoned deep mine workings in the Lower Kittanning coal seam of the Ligonier syncline.

Acid Source	Iron Description	Discharge No.	lbs/day Net	
4224	Seepage	G&H 412	410	140
4231	Seepage	M22	4000	60
4232	Drain	M46	70	-
4235	Drift opening	M23	To flume	
4218-4222	Seepages	M24	To flume	

Abatement -Melcroft #3

Recommended

-Refuse pile reclamation at 4212,4214,4223.

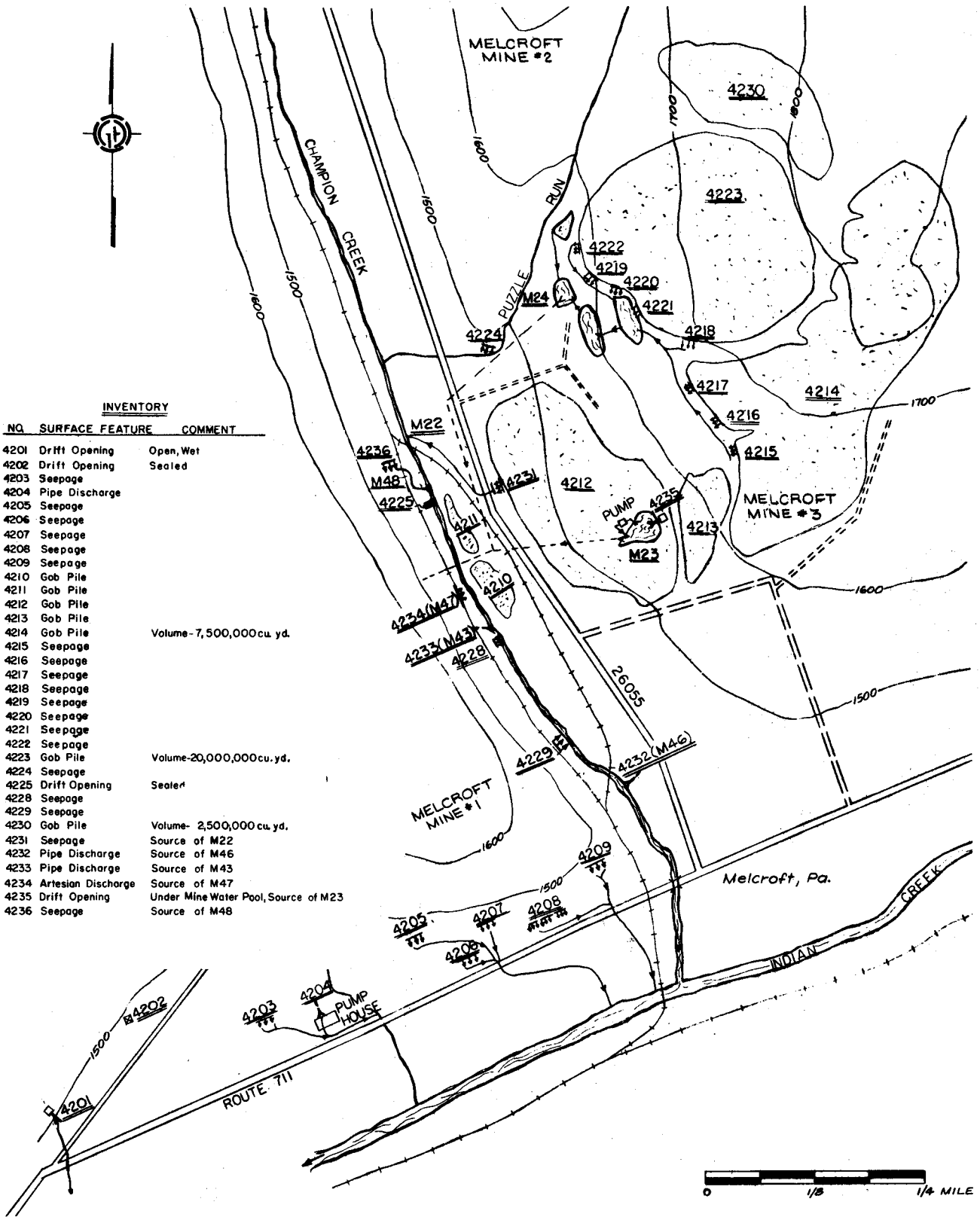
-Hydraulic seals at 4224, 4235; including overburden removal and pumping diversion for construction. The main drift opening to Melcroft #3 (4235) is already sealed but repair or modification of existing seal is required.

-Lime slurry injection into Melcroft #3. An estimated 100 million gal pool is contained within Melcroft #3 workings. Injection of a lime slurry may eliminate seepages along the SE crop line at Melcroft #3. believed the source of drain 4342.

Costs, Estimated

Recommended Abatement

-50 acre refuse pile reclamation	$200,000
-2 Hydraulic seals	70,000
-Lime injection	16,000
	$286,000



INVENTORY

NO.	SURFACE FEATURE	COMMENT
4201	Drift Opening	Open, Wet
4202	Drift Opening	Sealed
4203	Seepage	
4204	Pipe Discharge	
4205	Seepage	
4206	Seepage	
4207	Seepage	
4208	Seepage	
4209	Seepage	
4210	Gob Pile	
4211	Gob Pile	
4212	Gob Pile	
4213	Gob Pile	
4214	Gob Pile	Volume-7,500,000cu. yd.
4215	Seepage	
4216	Seepage	
4217	Seepage	
4218	Seepage	
4219	Seepage	
4220	Seepage	
4221	Seepage	
4222	Seepage	
4223	Gob Pile	Volume-20,000,000cu. yd.
4224	Seepage	
4225	Drift Opening	Sealed
4228	Seepage	
4229	Seepage	
4230	Gob Pile	Volume- 2,500,000 cu. yd.
4231	Seepage	Source of M22
4232	Pipe Discharge	Source of M46
4233	Pipe Discharge	Source of M43
4234	Artesian Discharge	Source of M47
4235	Drift Opening	Under Mine Water Pool, Source of M23
4236	Seepage	Source of M48

FIGURE 42, MELCROFT MINE AREA
INVENTORY MAP

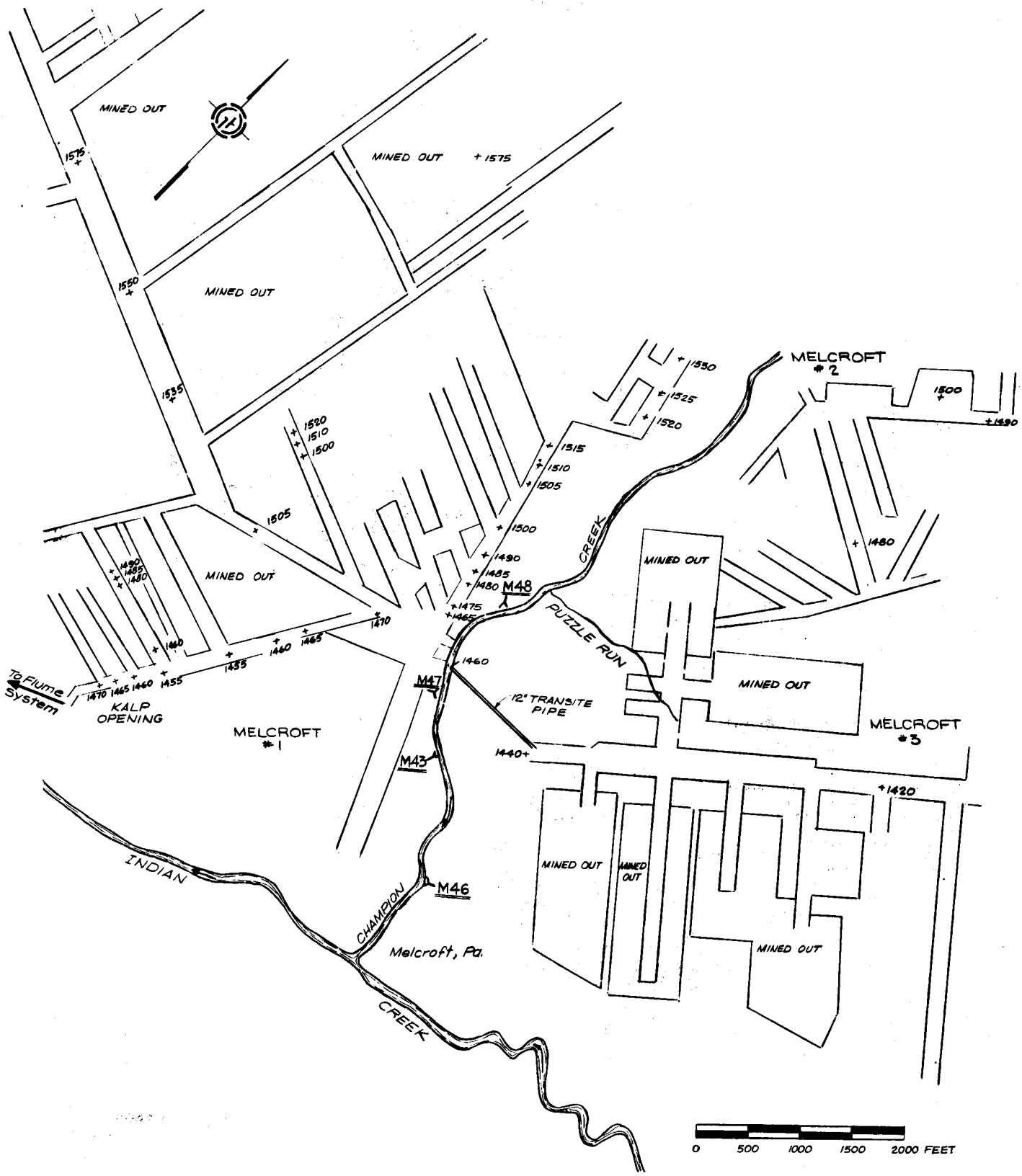
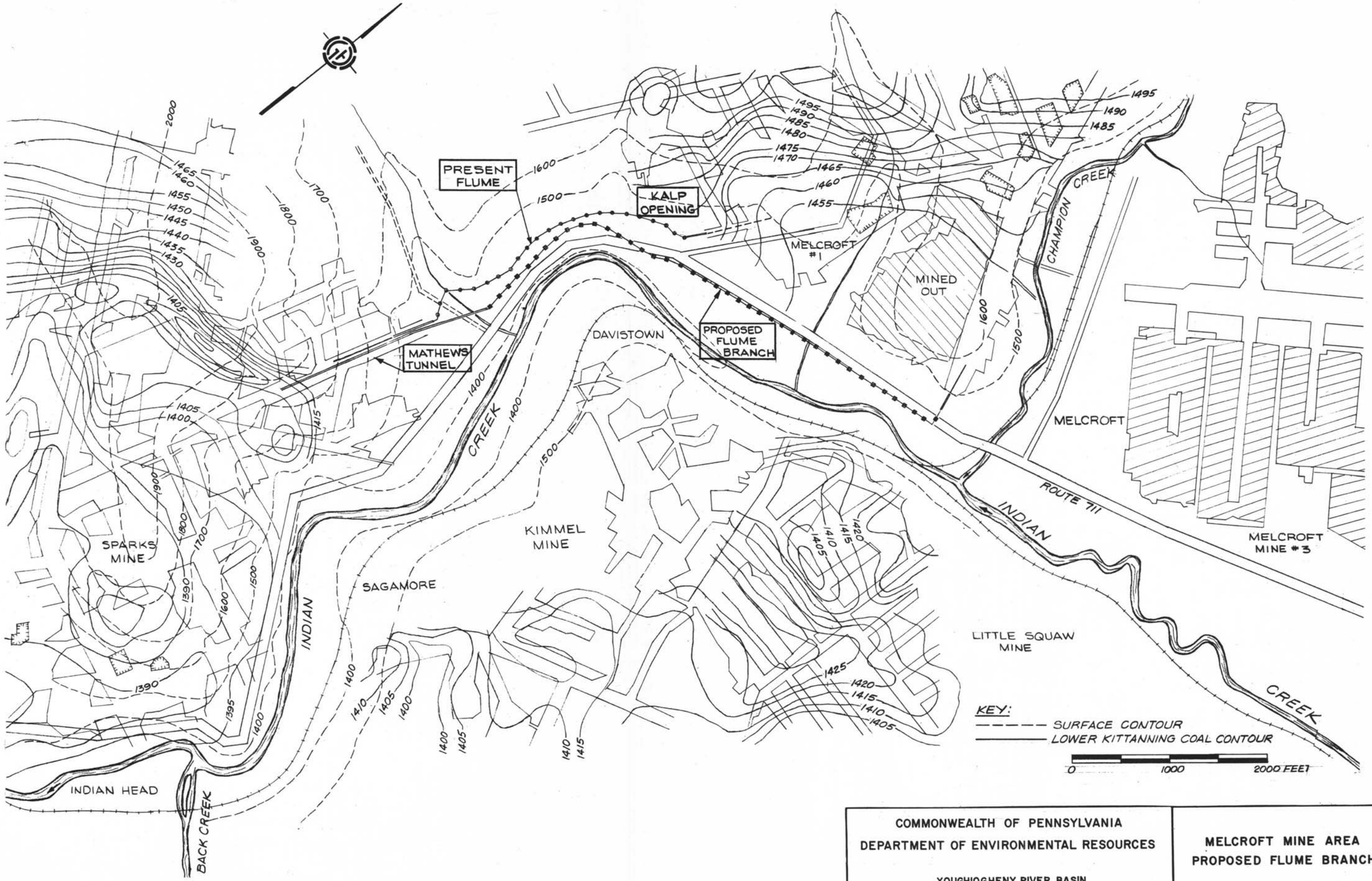


FIGURE 42-A, MELCROFT MINE AREA
DEEP MINE MAP



COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES YOUGHIOGHENY RIVER BASIN MINE DRAINAGE POLLUTION ABATEMENT PROJECT	MELCROFT MINE AREA PROPOSED FLUME BRANCH
Gibbs & Hill, Inc. A SUBSIDIARY OF DRAVO CORPORATION	FIGURE NO. 42-C

B. Description of Major Sources - Melcroft #1

Melcroft #1 mine consists of abandoned deep mine workings to the rise in the Lower Kittanning coal of the Ligonier syncline.

			lbs /day	
Source	Description	Discharge No.	Net Acid	Iron
4236	Seepage	M48	20	-
4234	Artesian discharge	M47	1000	100
4233	Pipe	M43	60	-
			1080	100

Minor sources are shown on Fig 42.

Abatement - Melcroft # 1

Recommended

-Hydraulic seal at 4201, 4234 including overburden removal
-Grout curtain 4236 (50 ft)
-Lime injection below coal seam el 1470 into mine water pool of Melcroft #1. An estimated 150 million gal pool exists in these workings. Lime injection would be intended to seal seepages along the cropline including 4203,4204,4205,4206,4207,4209, 4229,4228 and possibly 4233 (M43).

Alternative No. 1

-Pipe diversion - Flume branch
Water accumulation below el 1470 in mine workings of Melcroft #1 cause a number of seepages along the outcrop.
It appears feasible to drain this pool from the point of lowest elevation in the mine workings rather than the Kalp opening which will eliminate the seepages while collecting all mine drainage in the area. This new proposed flume branch is shown on Fig 42-C.
-Hydraulic seal at 4201
-Grout curtain at 4236

Alternative No. 2

Grout curtain of 7500 linear ft for outcrop of coal seam of Melcroft #1 starting at coal seam el 1500 at Champion Creek, proceeding down the west bank of Champion Creek to the outcrop along Rt. 711 and then along Rt. 711 to the Kalp Opening.

Cost - Melcroft # 1

Recommended

2 Hydraulic seals	$60,000
Grout curtain	75,000
Lime injection (500 tons)	20,000
	$155,000

Alternative No. 1

-New flume branch	$180,000
-1 Hydraulic seal	20,000
-Grout curtain	75,000
	$275,000

Alternative No. 2

-Grout curtain	$3,750,000

*editor note:

Page 50 missing.

C. Flume Discharge Priority F1

The flume discharge, a collection of mine drainage from above the Indian Creek, is located in Springfield Twp, Fayette County, 0.5 mi South of Normalville, Pa. A map of the entire flume system, Fig 42-B, is located in a pocket in the back of this report.

Description of Major Sources - Flume Discharge

The flume discharge (M21) to Charles Run is believed from workings of the abandoned Melcroft Complex and associated mines whose workings were in the Lower Kittanning coal. Acid load was 8200 lbs/day and iron load 1050 lbs/day.

Abatement

Recommended

Instream Neutralization using either of two approaches as follows:

- Instream neutralization on Charles Run, by adding lime at the flume discharge and with neutralization, oxidation and precipitation steps taking place in Charles Run. Precipitates would deposit in and along Charles Run, lower Indian Creek and the Youghiogheny. Portions of these streams that would receive deposits are already coated with iron precipitates.
- Instream neutralization within the Sparks mine section of the flume system would have to be undertaken as an experimental approach recognizing that detention time velocity patterns and availability of oxygen within the Sparks mine are all unknown. The optimum condition would be for neutralization, oxidation and precipitation steps to all take place within Sparks so that sludge disposal and deposits in stream beds would not be a problem. Additional benefits might accrue if pyrite sites within the flume mines became coated and thus lessened creation of pollutants. There is also some possibility that this scheme could create troubles if sludges clogged flume passages.

Costs, Estimated

Recommended

Treatment plant:

Installation	-	$50,000
Operating	-	$94,000/yr.

15. AREA 43, POPLAR RUN Priority A2

A. Location

Mine discharges to Poplar Run are located in Springfield Twp, Fayette County, 2.5 mi north of Normalville, Pa. Source locations are shown on Fig 43.

B. Description of Major Sources

This area consists of an abandoned strip mine (Marston) and two deep mines in the Lower Kittanning coal seam.

			lbs/day	
		Discharge	Net	
Source	Description	No	Acid	Iron
4306	Drift opening	M61		
4307	Seepage	M61		
4308	Seepage	M61		
4312	Seepage	M61		
			140	20 (for all sources)

C. Abatement

1 Recommended – Stage 1

-Hydraulic seal for 4306 including overburden removal.
-Surface seal for 4310,
-Strip Mine Reclamation (50 acres) for 4316.

Recommended -Stage 2

-After sealing 4306 the site should be monitored for new seepage s to the tributary, north of gob pile, #4301. Subsequent corrective work would be dependent on the nature of any such break-out.

D. Cost, Estimated

1 Recommended Abatement

1 Hydraulic seal	$30,000
Surface Seal	3,000
Strip Mine reclamation	100,000
	$133,000

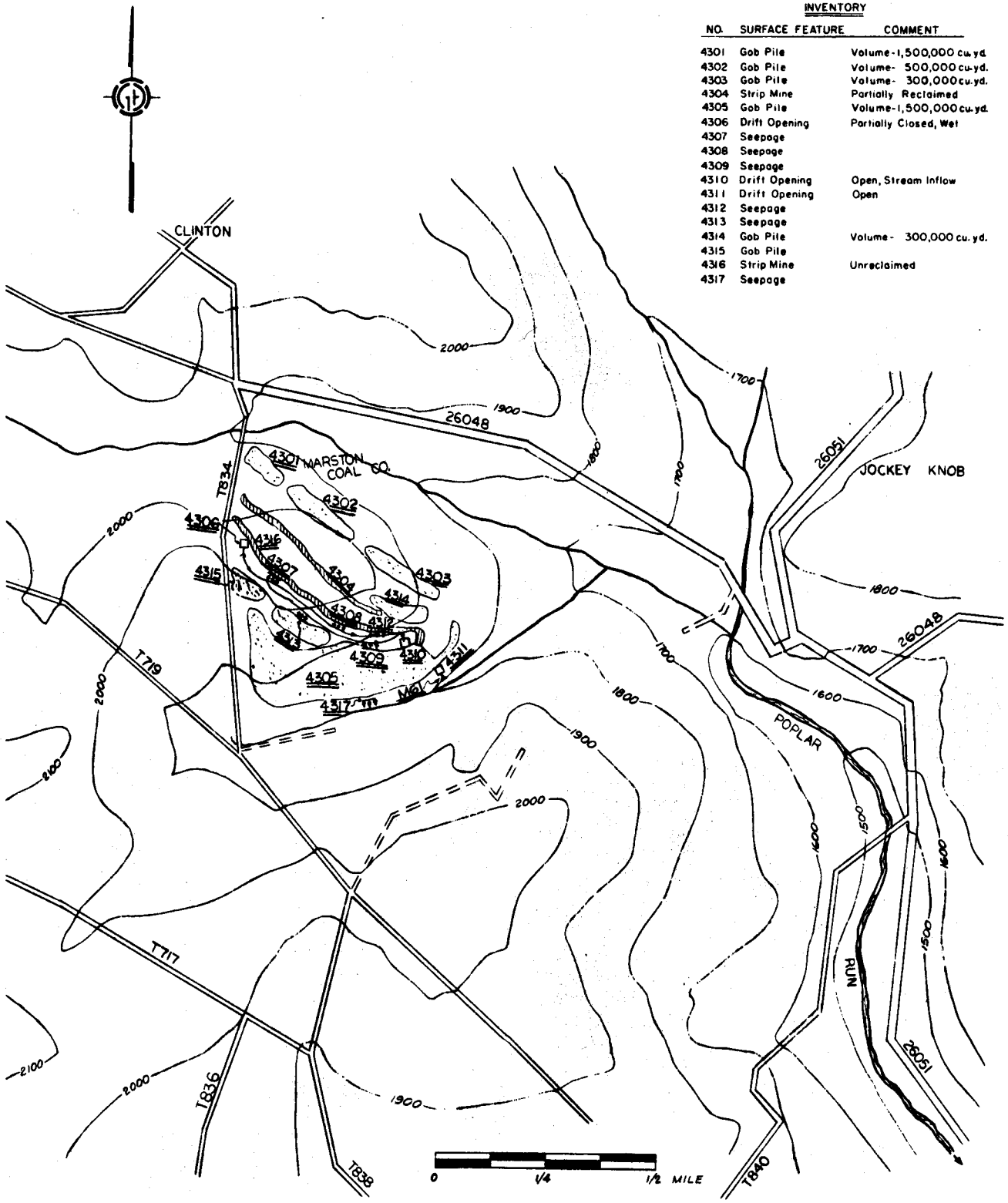


FIGURE 43, POPLAR RUN AREA
INVENTORY MAP

16. AREA 51, PEN MAR MINES Priority Dl

A. Location

The Pen Mar Mine area is located in Brothers Valley Twp, Somerset County, 1 mi southeast of Berlin, Pa. This area is shown on Fig 51 and 5lA. Discharge is to Buffalo Creek.

B. Description of Major Sources

This area consist of abandoned deep mines of Pen Mar #2,3,4, 5 in the Lower Kittanning coal seam. The source of discharge M76 is a shaft opening (5106) of Pen Mar #2. Acid load was 1250 lbs/day and iron load 440 lbs/day.

C. Abatement

Recommended - Stage 1

Hydraulic seal for 5106 that will require pumping diversion for construction.

Recommended - Stage 2

Pool elevation should be monitored after sealing 5106 to determine need for possible follow-up work including sealing of 5107 (Shaft #5)

D. Cost

Recommended Abatement	
Hydraulic seal	$50,000

NO.	INVENTORY FEATURE	COMMENT
5101	Gob Pile	
5102	Shaft	Covered
5103	Gob Pile	
5104	Strip Mine	Active
5105	Strip Mine	Active
5106	Shaft Opening	Source of M76
5107	Shaft Opening	Not found in field inspection

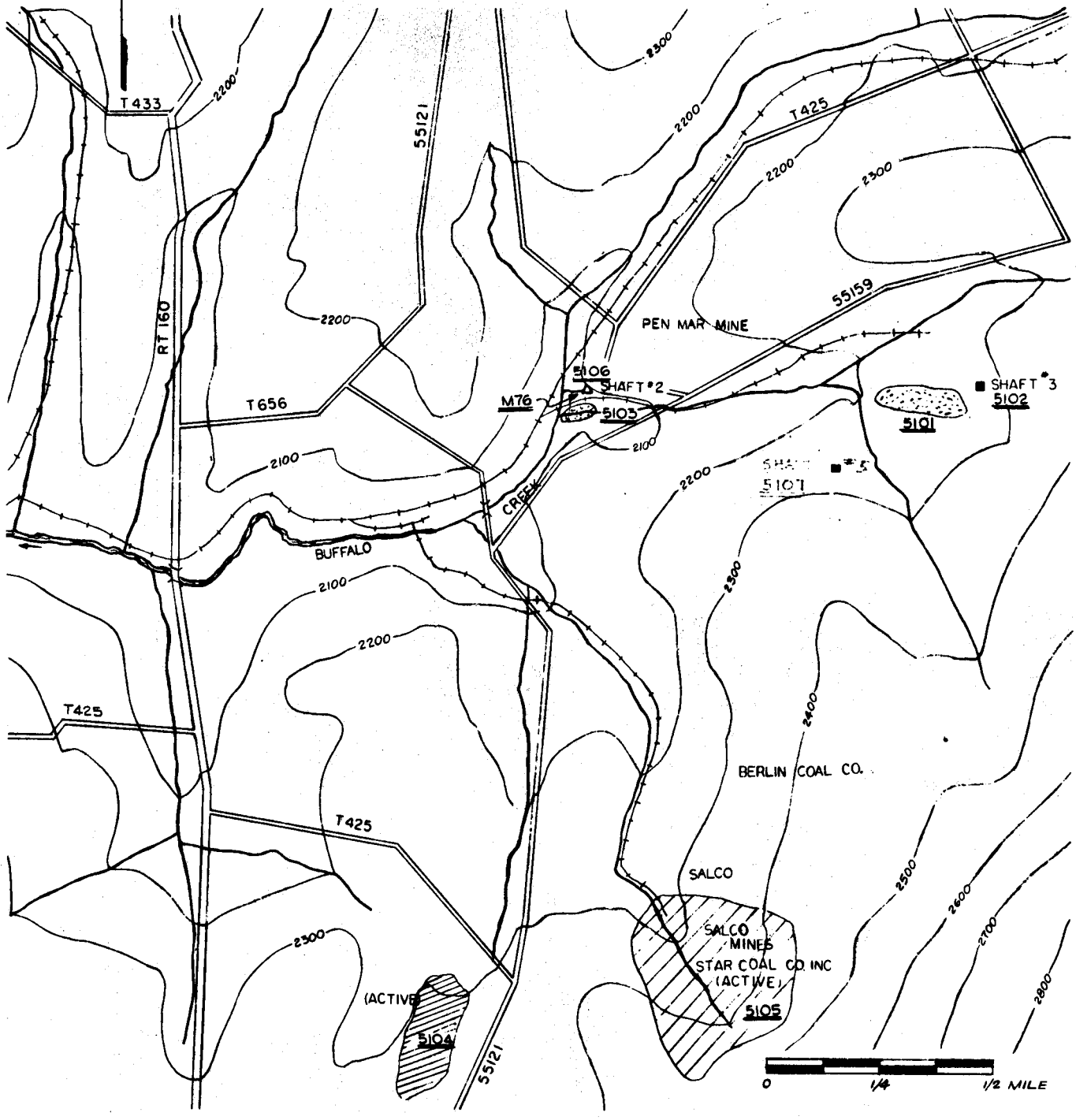


FIGURE 51, PEN MAR MINE AREA
INVENTORY MAP

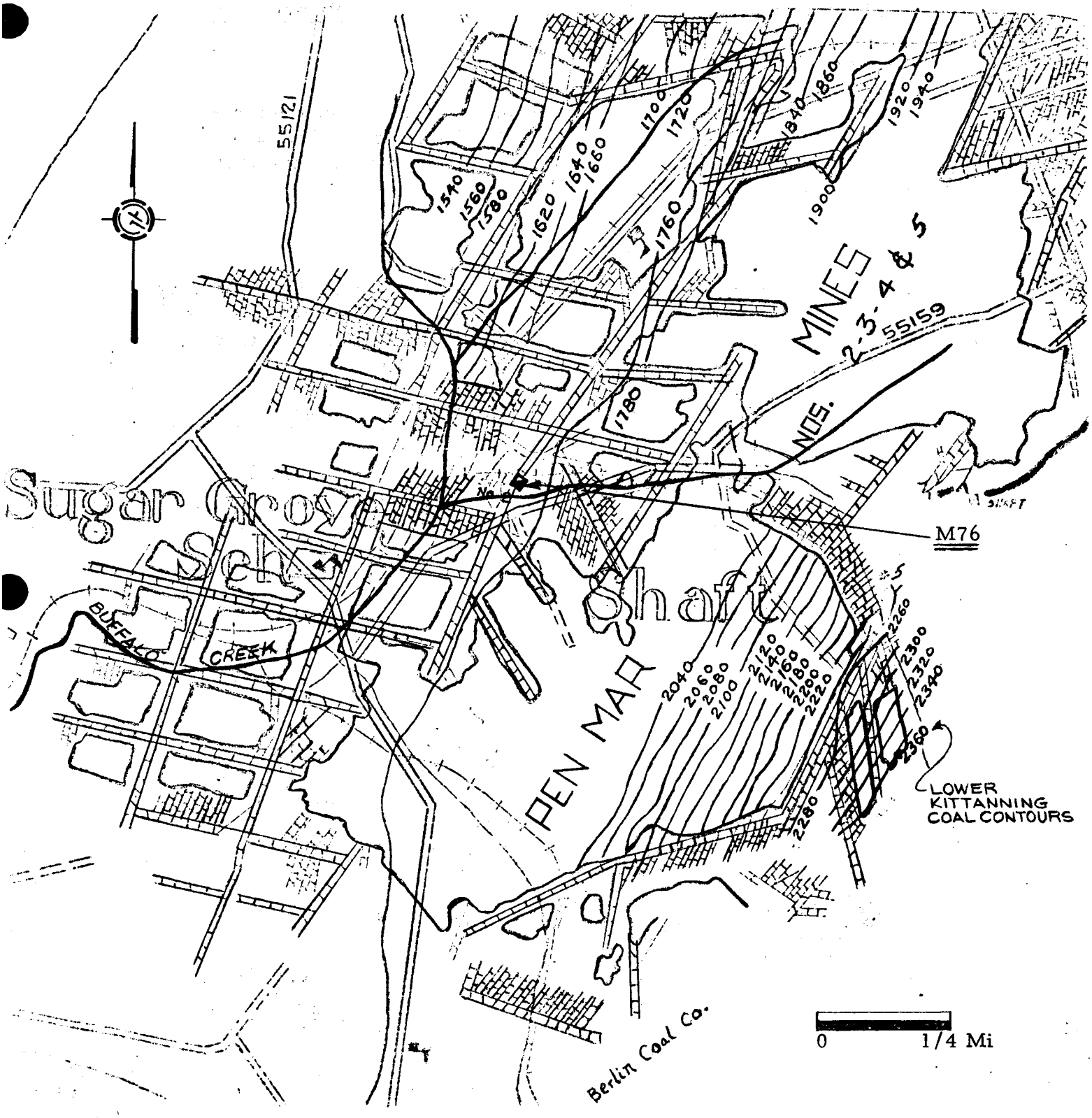


FIGURE 51A, PEN MAR MINES
DEEP MINE MAP

17. AREA 52, GOODTOWN AREA Priority D2

A. Location

The Goodtown Area is located in Brothers Valley Twp, Somerset County, 2.5 mi southwest of Berlin, Pa. The discharge, M75, is to Buffalo Creek, 7.8 mi from its mouth. Locations and deep mine features are shown on Fig 52 and 52A.

B. Description of Major Sources

This area consists of both abandoned and active strip mines and deep mines whose workings are believed to have been in all three coals of the Monongahela group in the Berlin syncline. Mines in this area include; Wills #1, Gambert #2, Quality #1 & 2, and Pine Hill #1.

		Discharge	lbs/day Net	
Source	Description	No.	Acid	Iron
5202	Drift opening			
5211	Drift opening	M75		
5215	Drift opening	M75		
5213	Seepage	M75		
5221	Drift opening	M72		
		M75	1350	390

C. Abatement

Recommended

-Hydraulic seals for 5202, 5211, 5213, 5215, 5221; including overburden removal and pumping diversion for construction.

-Surface seals for 5204, 5208, 5209, 5214.

D. Costs, Estimated

Recommended Abatement

5 Hydraulic seals	$140,000
4 Surface seals	12,000
	$152,000

NO.	INVENTORY FEATURE	COMMENT
5201	Gob Pile	Volume - 300,000 cu yd
5202	Drift Opening	Open, Wet
5203	Gob Pile	Volume - 500,000 cu yd
5204	Drift Opening	Open, Dry
5205	Gob Pile	Volume - 2,500,000 cu yd
5206	Strip Mine	Partially Reclaimed, Natural Vegetation
5207	Seepage	Minor
5208	Drift Opening	Open, Dry
5209	Drift Opening	Partially open, Dry
5210	Seepage	
5211	Drift Opening	Open, Wet
5212	Seepage	Believed from Active Strip
5213	Seepage	
5214	Drift Opening	Open, Dry
5215	Drift Opening	Open, Wet
5216	Gob Pile	Volume - 1,500,000 cu yd
5218	Strip Mine	Active
5220	Gob Pile	Volume - 2,000,000 cu yd
5221	Drift Opening	Open, Wet
5222	Drift Opening	Open, Dry
5223	Strip Mine	Active

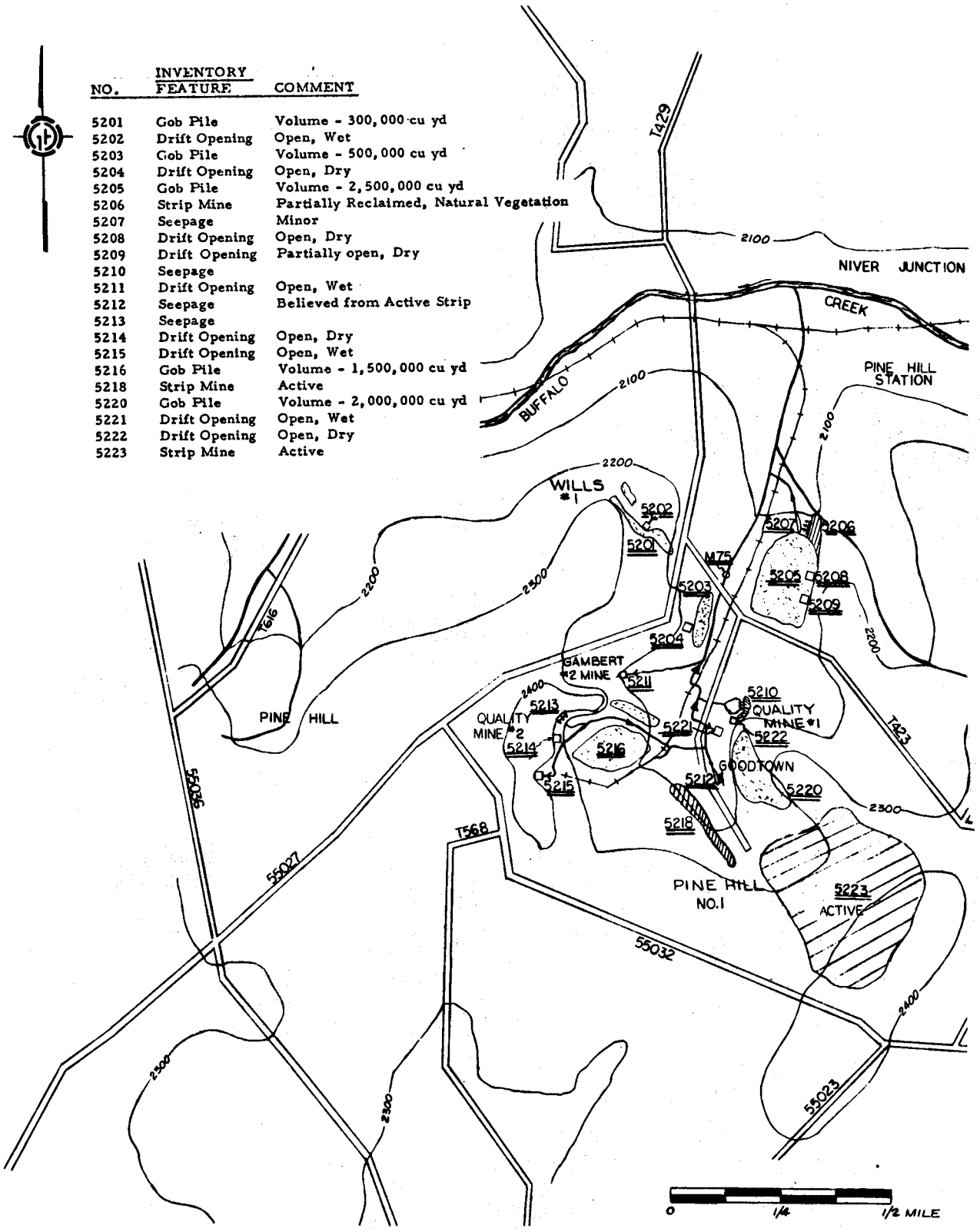


FIGURE 52, GOODTOWN AREA
INVENTORY MAP

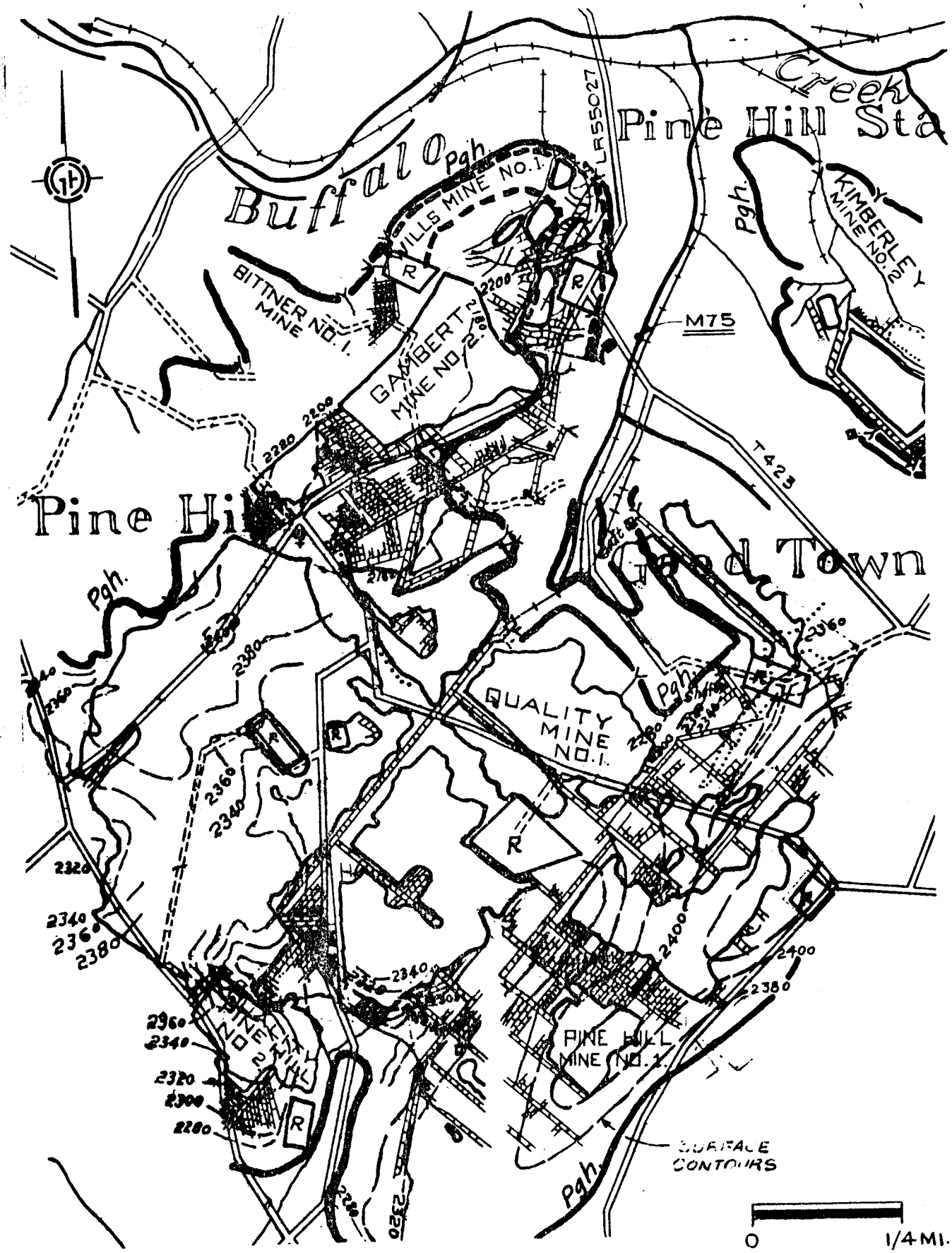


FIGURE 52A, GOODTOWN AREA
DEEP MINE MAP

18. AREA 53, SHOBER AREA — Priority D3

A. Area Location

The Shober area is located in Brothers Valley Twp, Somerset County, 2 mi northeast of Garrett, Pa. Locations of source~ are shown on Fig 53 and deep mine workings are shown on Fig 54A. Discharges are to Buffalo Creek.

B. Description of Major Sources

This area consists of abandoned deep mines and active and reclaimed strip mines in the Upper Kittanning coal.

		Discharge	lbs/day Net		
Source	Description	No.	Acid	Iron	Mine
5302	Seepage	M25			-
5305	Drift opening	M25	510	230	Shober*
5307	Pipe discharge	M25			Mt. Valley#2
5308	Borehole discharge	M34	100	80	Mt. Valley#2
			610	310	

C. Abatement

Recommended

-Hydraulic seals for 5305, 5307, and 5309, including overburden removal.
-Borehole cap for 5308.

-An 850,000 gpm discharge reported by FWQA in 1966 was not located in our field inspections. Abatement work may be necessary upon detailed site investigations.

D. Costs, Estimated

Recommended Abatement

3 Hydraulic seals	$90,000
1 Borehole cap, a hydraulic seal	30,000
	$120,000

*Editor Note: Acid and Iron loads are cumulative for Sources 5302, 5305, and 5307.

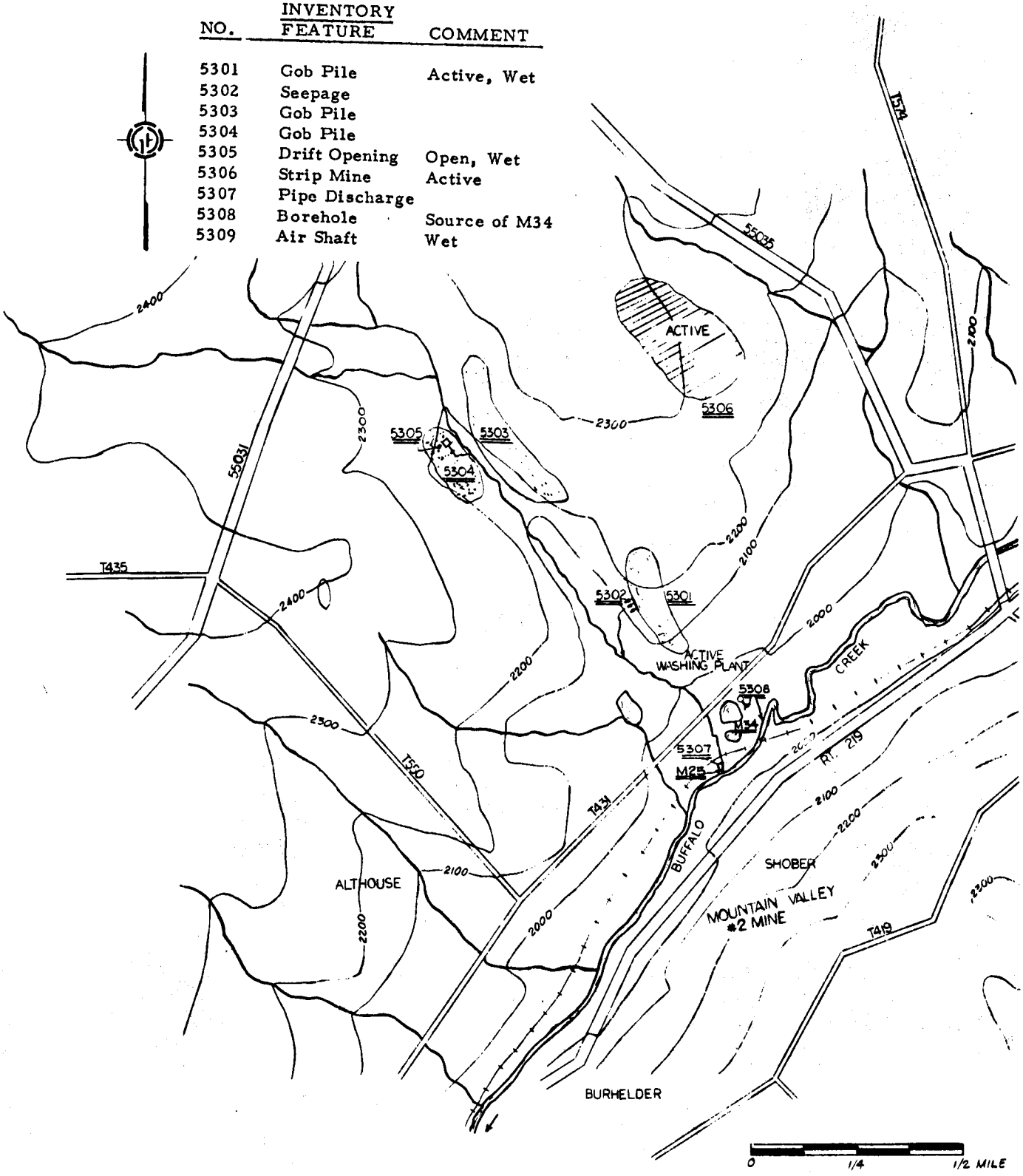


FIGURE 53, SHOBER AREA
INVENTORY MAP

19. AREA 54, PONFEIGH MINE AREA — Priority D1

A. Location

Ponfeigh mines 1 and 1A are located in Brothers Valley Twp, Somerset County, 0.5 mi northeast of Garrett, Pa. Locations of sources and deep mine workings are shown on Fig 54 and 54A. Discharges are to Buffalo Creek. .

B. Description of Major Sources

This area consists of abandoned deep mine workings in the Upper Kittanning coal. The area northwest of the deep mines has been extensively strip mined.

			lbs/day Net		
Source	Description	Discharge No.	Acid	Iron	Mine
5411	Drift opening	M73	140	-	Ponfeigh 1A
5412	Pipe discharge	M74	4100	490	Ponfeigh 1

Seasonal seepages from strip mines and refuse piles are also in the area.

C. Abatement

Recommended

-Hydraulic seals at 5411, 541Z;will require pumping diversion for construction.
-Surface water diversion for strip mines.

Alternative

-Hydraulic seal at 5412
-Surface water diversion for strip mines.
-Instream neutralization of combined discharges at 5411.

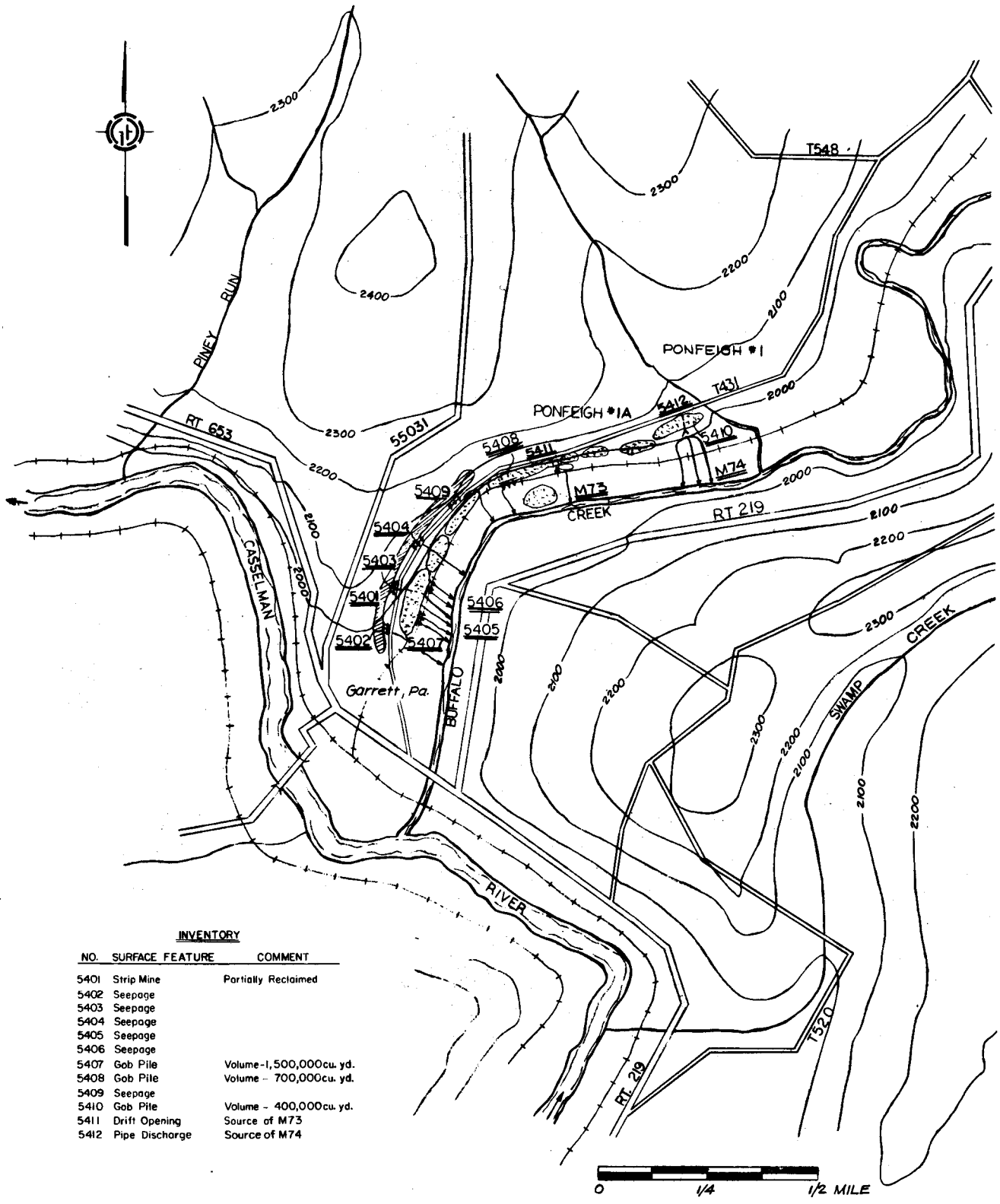
D. Costs, Estimated

Recommended Abatement

2 Hydraulic seals	$130,000
Surface water diversion	160,000
	290,000

Alternative

1 Hydraulic seal	$100,000
Surface water diversion	160,000
Instream neutralization	50,000
(60,000 yr)	$310,000



INVENTORY

NO.	SURFACE FEATURE	COMMENT
5401	Strip Mine	Partially Reclaimed
5402	Seepage	
5403	Seepage	
5404	Seepage	
5405	Seepage	
5406	Seepage	
5407	Gob Pile	Volume-1,500,000cu. yd.
5408	Gob Pile	Volume - 700,000cu. yd.
5409	Seepage	
5410	Gob Pile	Volume - 400,000cu. yd.
5411	Drift Opening	Source of M73
5412	Pipe Discharge	Source of M74

FIGURE 54, PONFEIGH MINES I & IA
INVENTORY MAP

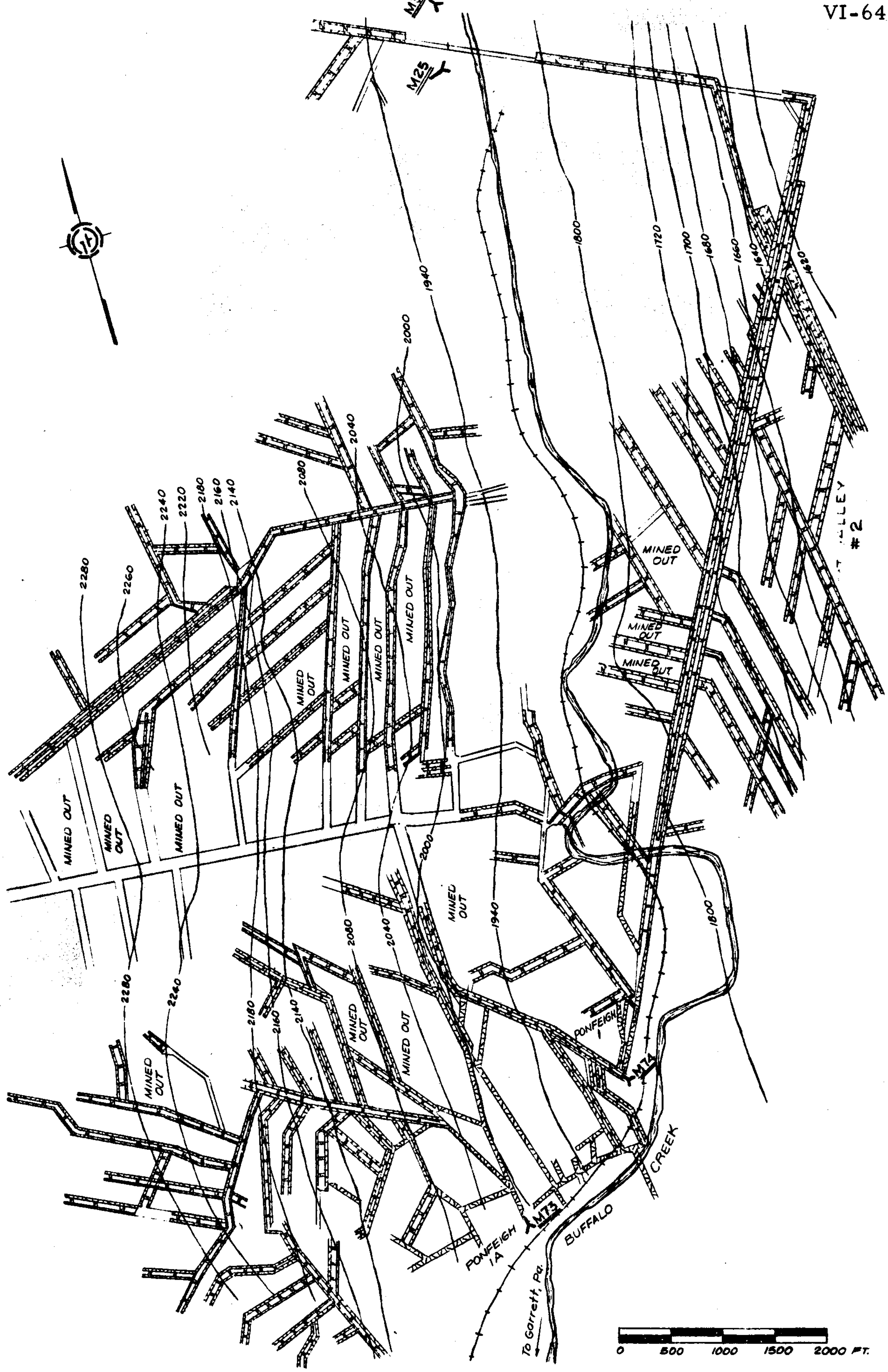


FIGURE 54-A, PONFEIGH MINES 1 & 1A
DEEP MINE MAP

20. AREA 55, SHAMROCK AREA — Priority D7

A. Location

The Shamrock area is located in Black Twp. Somerset County. 2 mi northeast of Rockwood. Pa. All discharges from this area are to Coxes Creek. Locations of sources and related deep mine workings are shown on Fig 55, 55A 55B and 55C.

B. Description of Major Sources

The pollution sources in this area involve a series of deep mines on the Eastern bank of Coxes Creek. All sources are from abandoned workings in the Lower Kittanning coal, with the exception of one source from the Betsy Slope in the Brookville coal.

			lbs/day		
Source	Description	Discharge No.	Net Acid	Iron-	Mine
5520	Drift opening	M67	50	10	MacGregor
5522	Drift opening	M38	110	20	Ruth
5512	Drift opening	M37			Ruth
5509	Drift opening	M37	970	110	Ruth
5510	Drift opening	M37			Betsy
5506,5507	Drift opening	M66	No data		Mary Jeanne
5503	Drift opening	M68			Hocking

C. Abatement

Recommended

-Hydraulic seals at 5503, 5506,5507,5509,5510,5512,5520,5522; that will require overburden removal.
-Refuse pile reclamation 5511, 5519.
-Surface seal 5518.
-Strip mine reclamation 5517.

Alternative

As an alternative to, or follow up after installation of the recommended seals. compartmentalized sealing should be investigated for abatement of drains from 5509, 5510, 5512. This would involve a series of seals to create isolated pools and minimize head against the lower ones. Seals would be arranged to isolate the lower mine (Betsy) and also to isolate the portion of Ruth lower than el 2,000 from the portion above el 2,000.

D. Costs, Estimated

Recommended Abatement

8 Hydraulic seals	$240,000
Refuse pile reclamation	20,000
1 Surface seal	2,000
Strip mine reclamation	10,000
	$272,000

NO.	INVENTORY FEATURE	COMMENT
5501	Strip Mine	Exposed Highwall
5502	Gob Pile	
5503	Seepage	
5505	Strip Mine	Exposed Highwall
5506	Drift Opening	Wet
5507	Drift Opening	Wet
5508	Gob Pile	
5509	Drift Opening	Open, Wet
5510	Drift Opening	Wet
5511	Gob Pile	
5512	Drift Opening	Open, Wet
5513	Seepage	
5514	Gob Pile	
5515	Gob Pile	
5517	Strip Mine	Exposed Highwall
5518	Drift Opening	Open Inflow
5519	Seepage	
5520	Drift Opening	Source of M67
5521	Gob Pile	
5522	Drift Opening	Source of M38
5523	Strip Mine	Exposed Highwall

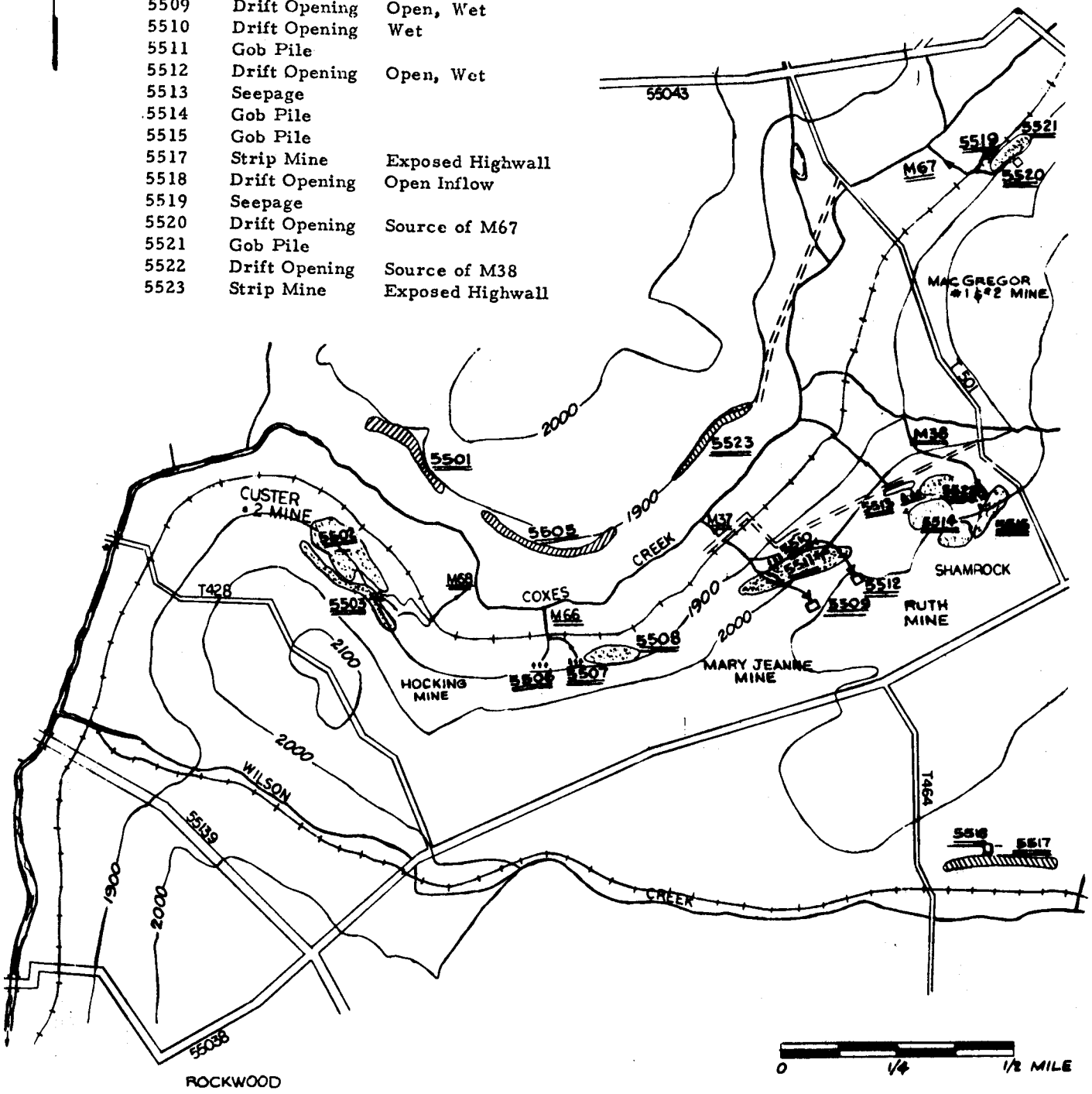


FIGURE 55, SHAMROCK AREA
INVENTORY MAP

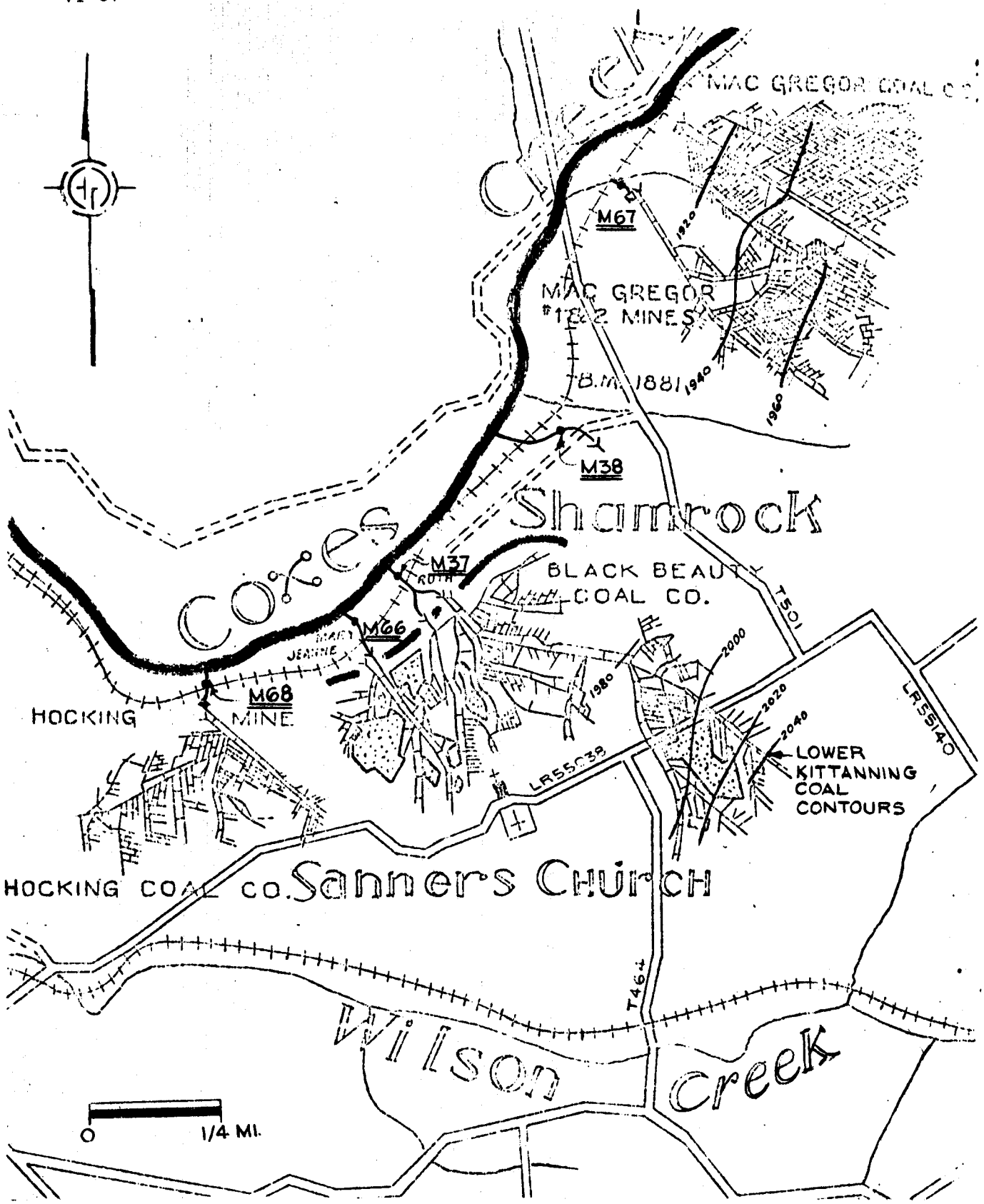


FIGURE 55A, SHAMROCK AREA
DEEP MINE MAP

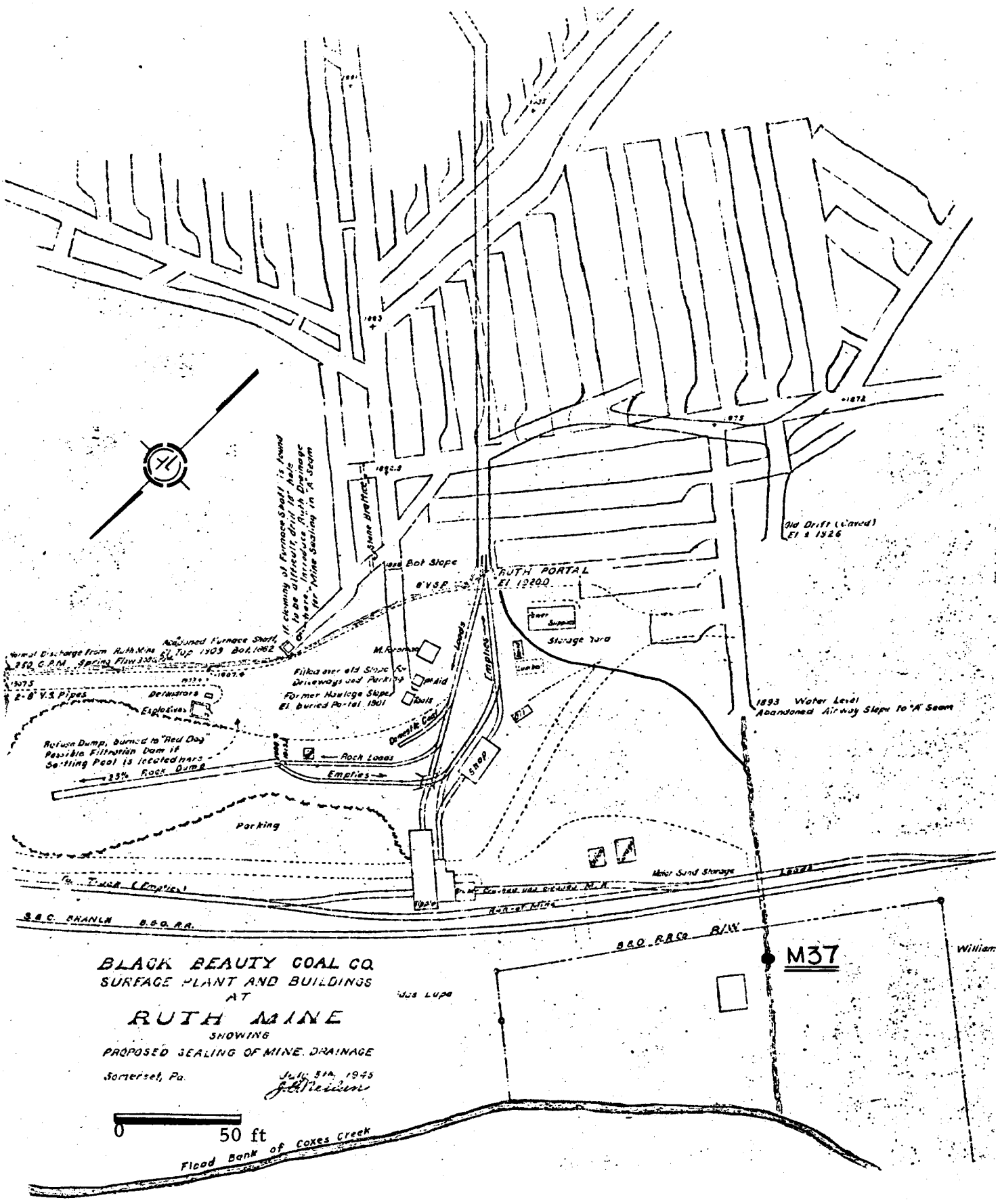


FIGURE 55B, SHAMROCK AREA
BETSY AND RUTH MINES
DEEP MINE MAP

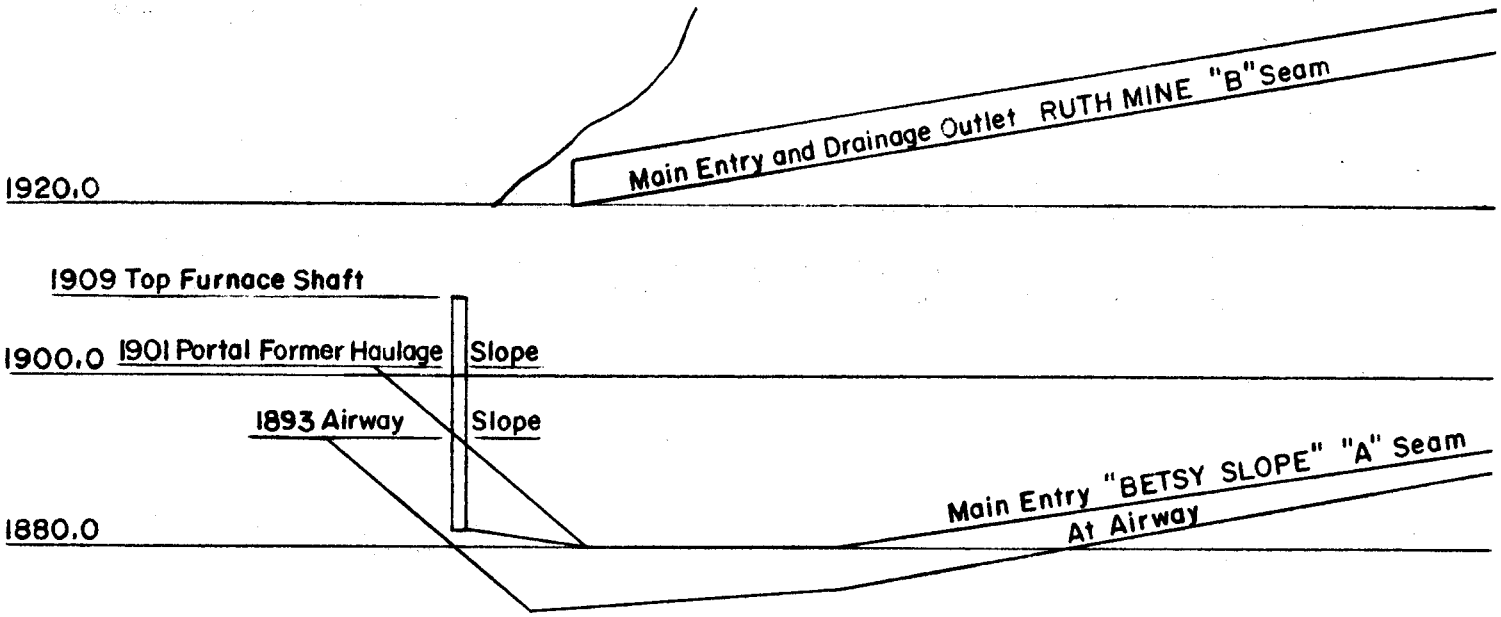


FIGURE 55C, SHAMROCK AREA
PROFILE OF BETSY AND RUTH MINES

21. AREA 56, WILSON CREEK AREA — Priority D5

A. Location

The Wilson Creek area is in Black Twp, Somerset County, 3 mi east of Rockwood, Pa. Discharges are to the upstream portion of Wilson Creek, tributary to Coxes Creek. Locations of sources are shown on Fig 56 and deep mine workings on Fig 56A.

B. Description of Major Sources

This area consists of abandoned deep mines, and a strip mine all in the Brookville coal of the Negro Mt anticline.

			lbs/day		
		Discharge	Net		
Source	Description	No.	Acid	Iron	Mine
5601,5602	Artesian discharge	M69	320	40	Fogle
5611	Drift opening	M70	970	10	Atlantic #2
			1290	50	

C. Abatement

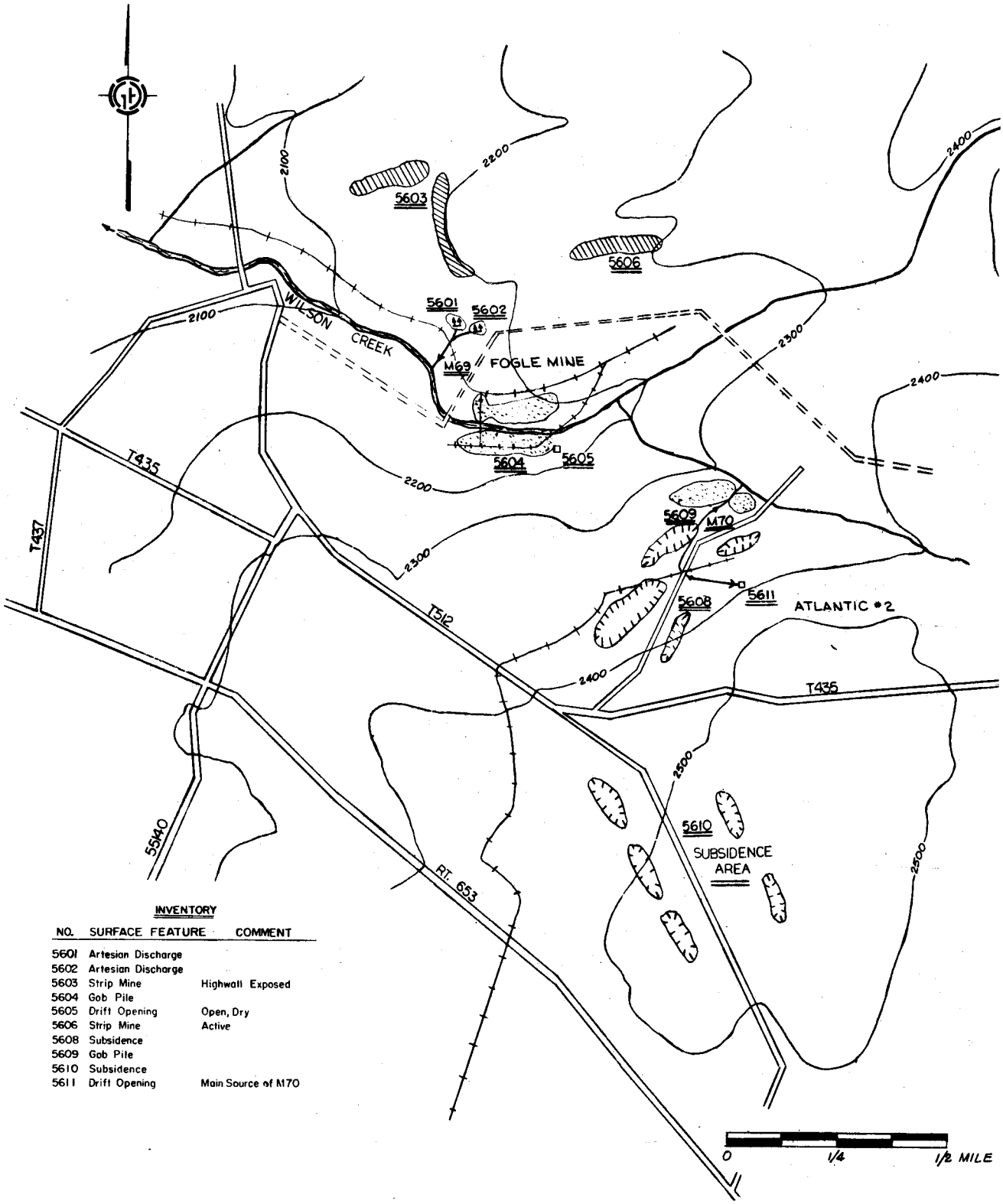
Recommended

- Hydraulic seals for 5601, 5602, 5611; overburden removal and pumping diversion required for construction.
- Subsidence backfilling 5610.

D. Costs

Recommended Abatement

3 Hydraulic seals	$115,000
Subsidence backfilling	60,000
	$175,000



INVENTORY

NO.	SURFACE FEATURE	COMMENT
5601	Artesian Discharge	
5602	Artesian Discharge	
5603	Strip Mine	Highwall Exposed
5604	Gob Pile	
5605	Drift Opening	Open, Dry
5606	Strip Mine	Active
5608	Subsidence	
5609	Gob Pile	
5610	Subsidence	
5611	Drift Opening	Main Source of M70

FIGURE 56, WILSON CREEK AREA
INVENTORY MAP

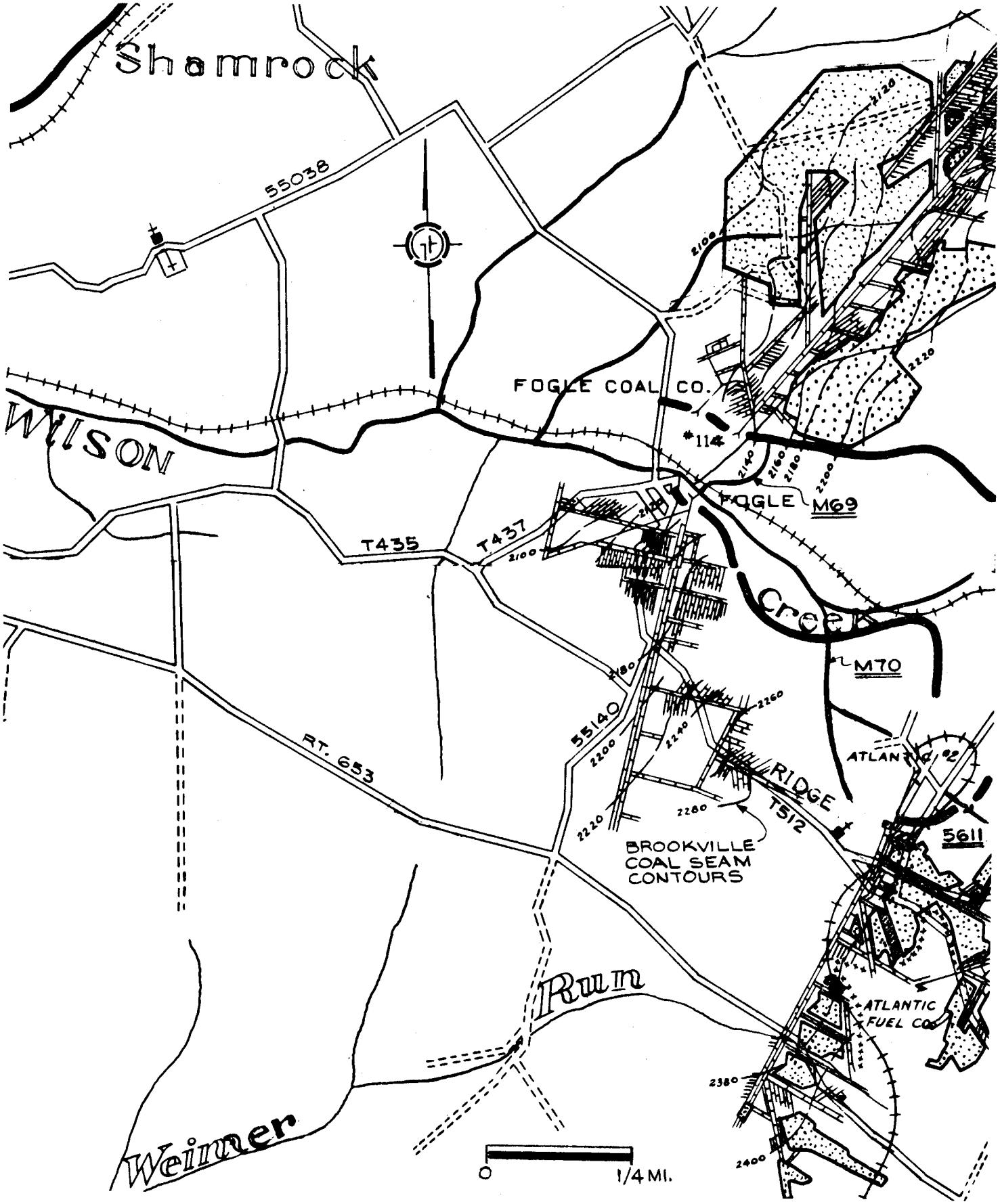


FIGURE 56A, WILSON CREEK AREA
DEEP MINE MAP

22. AREA 57, ROCKWOOD MINE AREA — Priority D6

A. Location

The Rockwood Mine area is located in Milford Twp, Somerset County, 1 mi north of Rockwood, Pa. Surface features are shown on Fig 57 and deep mine workings on Fig 57A. All discharges are to Coxes Creek.

B. Description of Major Sources

This area has mine pollution sources; one from the Hays mine and eight from the Rockwood mine. All workings are in the Lower Freeport coal and consist of abandoned deep and strip mines.

			Discharge	Net lbs/day		
Source	Description		No.	Acid	Iron	Mine
5702	Seepage		M72			Rockwood
5705	Drift opening		M72			Rockwood
5706	Seepage		M72	10	40	Hays*
5707	Drift opening		M72			Rockwood
5708	Drift opening		M72			Rockwood
5709-5712	Seepages		M71	50	20	Rockwood
				60	60	

C. Abatement

Recommended

- Hydraulic seals at 5705, 5706, 5707, 5708; some overburden removal will be required.
- Hydraulic seal for source of seepages 5709 to 5712. It is believed that these seepages are from a drift opening in the Rockwood mine. Overburden removal is required.
- Grout curtain at 5702 (100')

D. Costs, Estimated

Recommended Abatement

5 Hydraulic seals	$150,000
Grout curtain	50,000
	$200,000

*Editor Note: Acid and Iron loads cumulative for Sources 5702, 5705, 5706, 5707, 5708.

INVENTORY

NO.	SURFACE FEATURE	COMMENT
5701	Gob Pile	
5702	Seepage	From Highwall
5703	Strip Mine	Highwall Exposed
5704	Gob Pile	
5705	Drift Opening	Open, Wet
5706	Seepage	
5707	Drift Opening	Open, Wet
5708	Drift Opening	Open, Wet
5709	Seepage	
5710	Seepage	
5711	Seepage	
5712	Seepage	

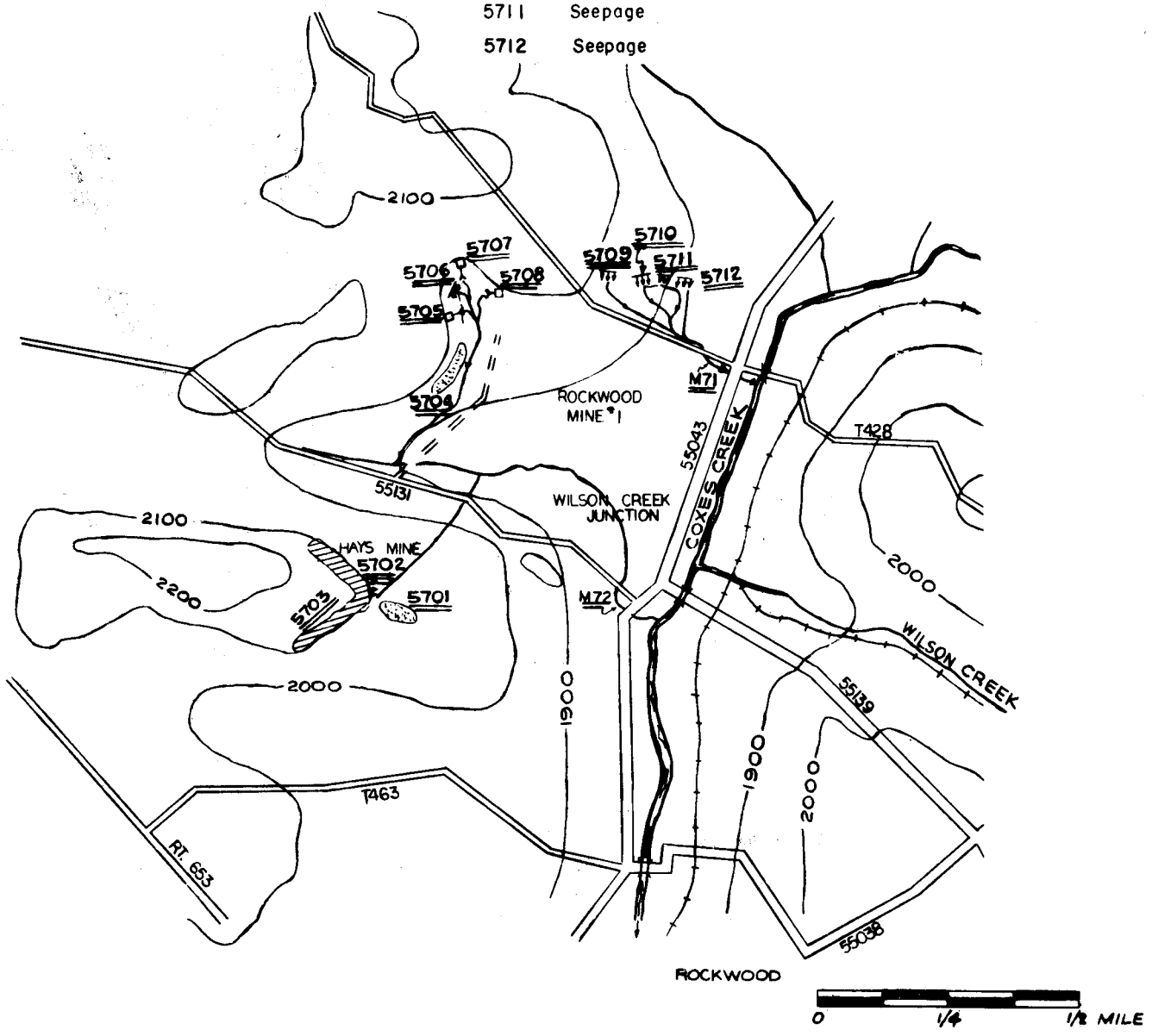


FIGURE 57, ROCKWOOD MINE AREA
INVENTORY MAP

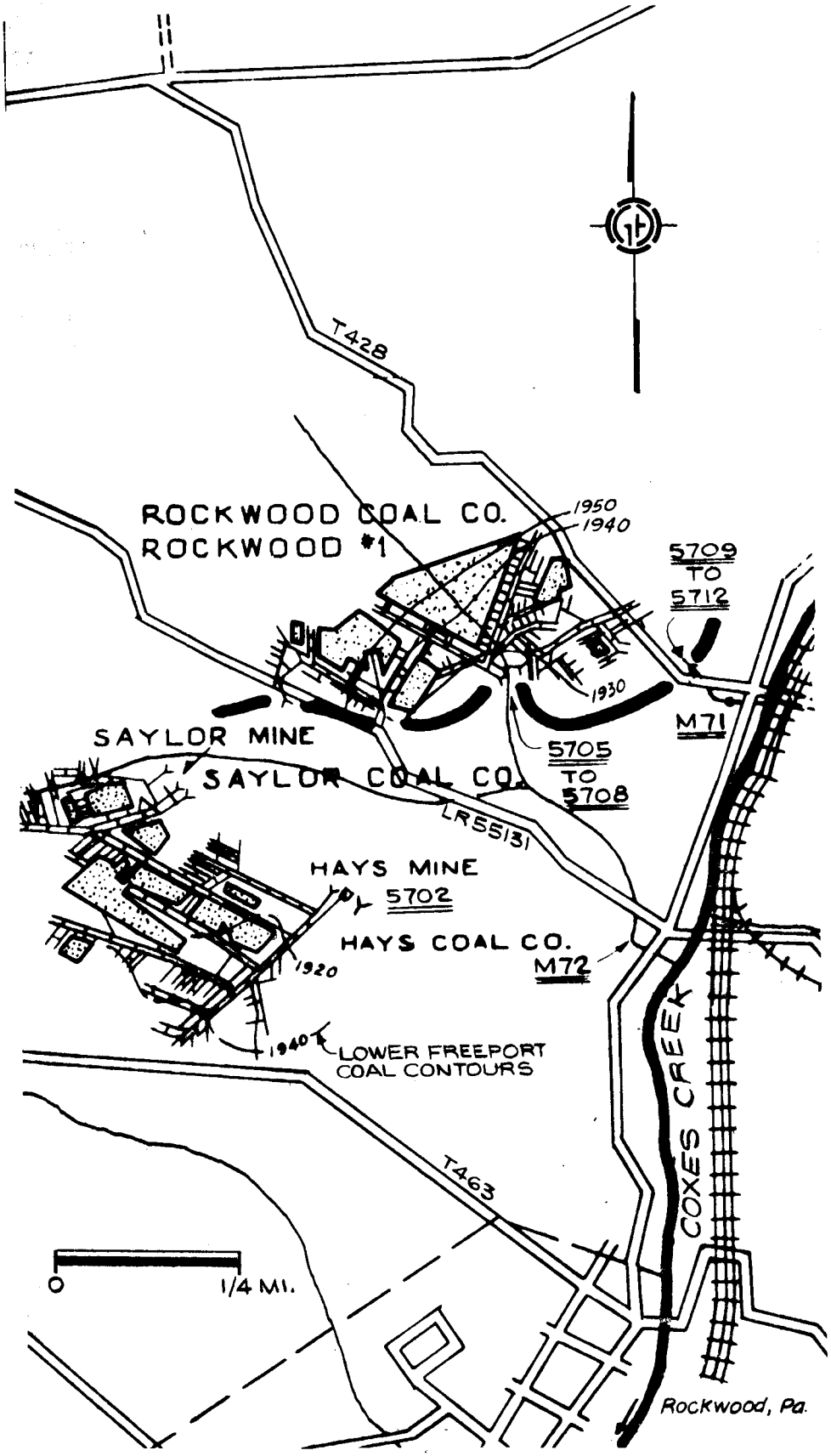


FIGURE 57A, ROCKWOOD MINE
DEEP MINE MAP

VII ACKNOWLEDGEMENTS

In addition to the references and other information sources mentioned in this report we greatly appreciate the cooperation and assistance given by many State and Federal agencies, mining companies and private individuals.

Offices which were then part of the State Health Department and Department of Mines and Mineral Industries provided records and maps of old mines and other data. These offices are now under the Department of Environmental Resources.

The Wheeling, W. Va. offices of the U.S. Environmental Protection Agency, Water Quality Office, (then the FWQA) provided information used to supplement our sampling and mapping data.

Coal companies, mine inspectors and concerned individuals were also cooperative and provided valuable information.

Respectfully submitted,

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