# SECTION III

# RECOMMENDED ABATEMENT SCHEME

## 3.0 GENERAL CONSIDERATIONS

Direct treatment is recommended for reducing the pollution loads emitted by the Irwin, Marchand, Coal Run, Upper Guffey Station and Lower Guffey Station discharges to a desirable minimum. Based on preliminary estimates of design flows and corresponding facility sizes, a treatment plant cannot be constructed adjacent to any of the discharges with the exception of Marchand. Using Irwin as an example, initial estimates indicate that the acreage needed for a treatment facility, including an equalization lagoon sized for three days storage of flow in excess of plant design will exceed the maximum useful space adjacent to this outfall. The unique location of this discharge may dictate inordinately high property acquisition costs, and thus the possibility exists that the Irwin discharge may have to be piped elsewhere for treatment. The cost for collecting the awkwardly situated Coal Run discharge may be disproportionately excessive relative to its acid and iron loads. However, it can be shown that if Coal Run is treated integrally with the Irwin discharge, the unit costs for iron and acid abatement remain essentially unchanged from those for the Irwin discharge alone. The shortage of suitable land applies to the Guffey Station discharges as well.

It is proposed that the Export and Delmont discharges be abated by allowing them to be absorbed by the Irwin Syncline basin pool from which they are hydrologically independent. This method should result in unit pollution load removal costs substantially lower than those required by a neutralization facility designed to treat the combined discharges.

Inasmuch as there are several treatment methods for accommodating the many variations in mine drainage characteristics, the best means for a specific AMD source will depend on the quality of the discharge and the ultimate use of the water. Treatment to meet stream water standards will be different from that needed to meet domestic and industrial water use standards. The mine drainage treatment processes that have been reliably demonstrated to be economically feasible include neutralization, ion-exchange and reverse osmosis. Freezing, electrodialysis, foam separation and neutradesulfating have not been developed beyond laboratory or bench scale studies and are generally too costly to implement at full scale. While it is not the intent of this report to discuss the merits or disadvantages of each process, they may be compared on a cost-effectiveness basis. Primarily because of its low operating costs, a neutralization process is employed.

The main aim of neutralization is to remove the acidity and reduce the soluble iron concentration to the lowest acceptable limit. Alkalis which can be used to treat coal mine drainage are hydrated lime, limestone, quicklime, caustic soda and soda ash. The choice depends on several factors:

(1) cost, (2) availability, (3) the amount of reacting alkali per unit weight of material sometimes called the basicity factor, (4) reaction time and (5) resulting sludge characteristics. For the total plant operation, a prime factor governing the cost is the amount of ferrous and/or ferric iron. Neutralization of mine drainage with high ferric iron content can be accomplished more easily and at less cost compared to treatment of mine drainage high in ferrous iron.

A typical neutralization facility that might be implemented at the sites where treatment is recommended may be described as follows: The AMD is directed to a flash mixer where the water is neutralized to a pH of approximately 7.5. The neutralized liquor flows from the flash mixer to an aeration chamber where the ferrous iron is oxidized to the more unsoluble ferric state. Sufficient oxygen is introduced to raise the dissolved oxygen content of the water to the required level, typically, to a concentration greater than 5 parts per million. As the aerated water flows to the clarifier a polymer may or may not be added to enhance solids settling. Depending primarily on the raw water quality, it may be necessary to recycle a portion of the clarifier underflow, or sludge, and dispose of the excess.

Sludge control may incorporate three stages: solid-fluid separation of the sludge, sludge dewatering and sludge disposal. Two techniques may be satisfactorily employed in the solid-fluid separation: settling lagoons and mechanical clarifier-thickeners. Lagoons are most commonly employed. Although the choice is usually determined by land availability and process economics, there are other more subtle differences which should not be ignored. The process economics do not consistently favor either practice.

Solid-fluid separation in a settling lagoon may provide limited sludge storage or permit permanent disposal. Limited storage requires sludge transfer but uses less land. Settling and disposal in the same lagoon necessitates large land areas, but involves minimal design and construction. In contrast, mechanical clarifier-thickener systems require the least land area and provide the least sludge storage. They are more versatile in process control by permitting continuous, automatic sludge removal, and their mechanical nature does not necessarily imply higher costs.

Further dewatering of the settled sludge prior to disposal may be indicated by its voluminous nature, low percentage of solids and tendency to gel. It may involve some form of in situ evaporative drying or direct water removal by a drying basin, by a filter, or by a centrifuge. The settled sludge usually may be pumped through pipes to the disposal area or to a tanker truck for haulage to the disposal site requiring multiple handling. In either case, handling large volumes of water increases costs. Ultimate disposal is usually made into abandoned mines or to landfills.

## 3.1 ABATEMENT OF THE EXPORT DISCHARGE

Citing some alternatives for eliminating the Export discharge will serve to illustrate the attractiveness of the proposed abatement scheme. As discussed in Section 2.4.1, the partial coal reserve coincident with the railroad corridor retains the water in the No. 1 Export mine, forming a small pool which extends over to the lower mains and drain entry. By removing enough of the reserve coal, the retained water would drain and the Export discharge would be eliminated. At a minimum, the Export discharge could be sealed to force future water entering the mine to join the basin pool via this new route. (Sealing the discharge without providing any relief would be futile. As water accumulated in the mine, the pressure head would gradually increase enough to erupt elsewhere, most likely along the coal cropline). However, the extent of subsurface work necessary to insure success of this method cannot be properly estimated and the final cost could be exorbitant.

As noted in Section 2.2, the Export and Delmont discharges could conceivably be combined and treated. Major drawbacks of this scheme, which can be overcome at some cost, include awkward hydraulics and procuring a suitable plant site, plus plant and pipeline right-of-way acquisition and easements. Although higher costs are involved, a treatment facility is an effective means of abatement and constitutes the best alternative to the recommended schemes for eliminating the pollution load of the Export and Delmont discharges.

To convey the Export discharge to the vast Irwin pool, the apparent choice would be via the No. 2 Export mine "mains" as shown on Plate 32. It would appear that the numerous small haulways on its downdip side would insure sufficient drainage toward the mine pool. The extent of subsidence within these haulways and the remedial work required to insure sufficient drainage would have to be confirmed, thus necessitating exploratory excavation of the No. 2 Export mine "mains." Flow in excess of that accommodated via these small downdip haulways would be expected to continue along the mains, reaching the mine pool via the dip mains. However, the No. 2 mains are oriented updip from the outlet (surface elevation 978±) assuming that the coal contours indicate the true grade. Pumping would then be necessary to force the AMD into the mains. Even if the No. 2 mains do slope toward the dip mains, another problem arises. At their intersection, dams in the No. 2 mains are indicated on the mine maps and would have to be removed.

Pumping the Export discharge directly to the dip mains would provide better internal hydraulics, although pumping against an initial head of about 40'± would be required (The surface elevation at the bulkhead is 1018±). The No. 2 dip mains are much wider than the No. 2 mains and they slope rapidly towards the synclinal axis which implies greater hydraulic capacity. No dams are indicated along this path.

### RECOMMENDED SCHEME

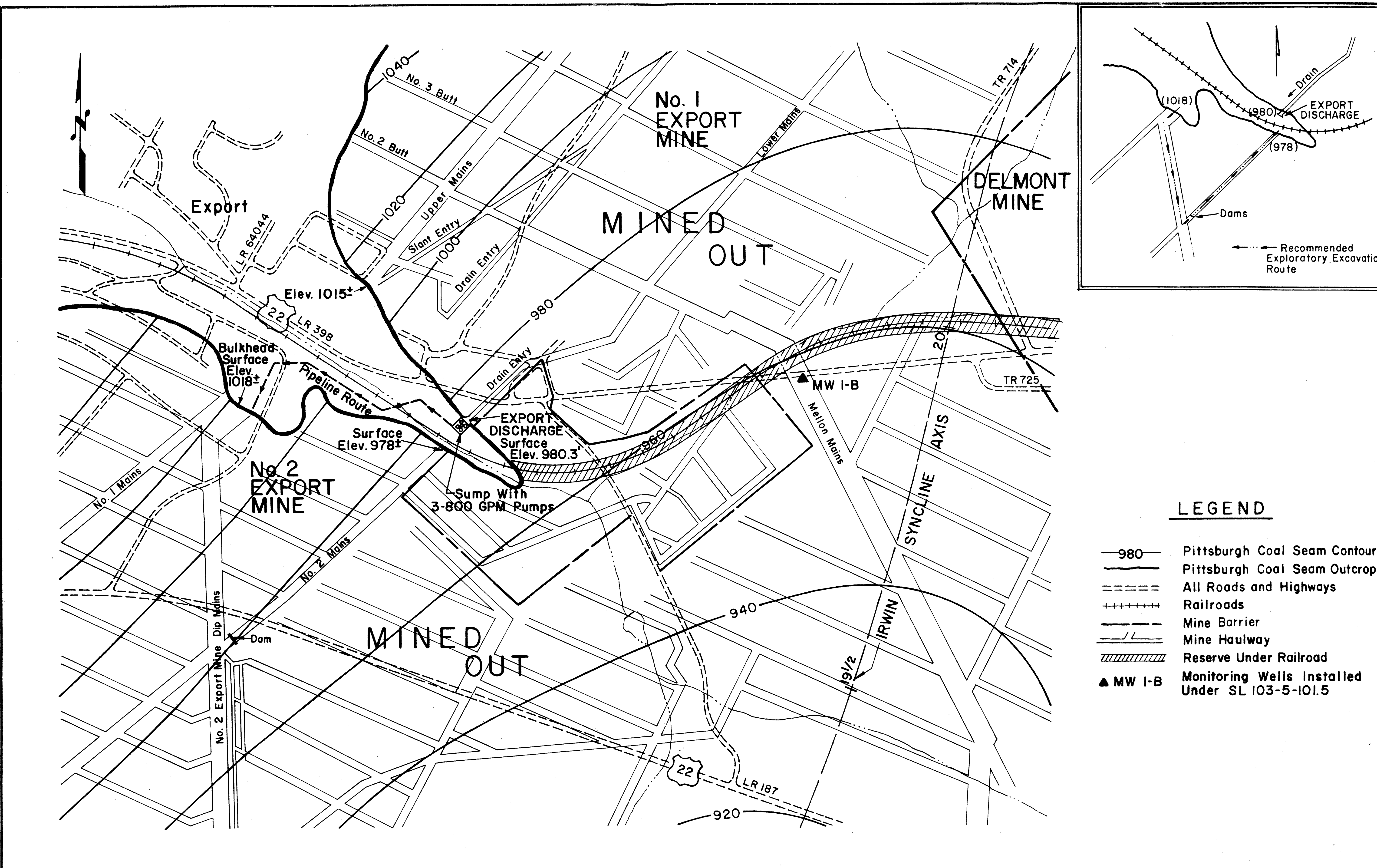
1. The extent of subsidence within the No. 2 dip mains should be ascertained. The bulkhead, at surface elevation 1018'±, is accessible from an adjacent roadway but

is blocked with debris consisting mainly of concrete rubble. After removing the bulkhead, exploratory excavation would be pursued along the path depicted in the insert on Plate 32, initially advanced along the No. 2 dip mains. Upon reaching the mains, the dams would be removed. Exploration can then continue along the mains in a northeasterly direction toward the Export discharge. The work is expected to consist mainly of removing gob and subsided material and installing adequate shoring. Borehole camera surveillance might also be implemented to determine the internal conditions.

2. Pending the results of the exploratory excavation, or camera survey, several alternatives are available. The recommended scheme is premised on the No. 2 dip mains being used. At the Export discharge a sump housing three 800 GPM vertical pumps would be constructed. The average Export discharge flow rate of 1.14 MGD converts to 792 GPM, i.e., one pump shall always be operating. All three pumps would be required when maximum observed flow of 3.6 MGD occurs. Flow in excess of maximum and breakdown situations can be accommodated in different ways; a fourth pump could be provided or an overflow storage lagoon constructed. The recommended scheme utilizes the lagoon storage alternative. A standby generator would insure power if local electrical failures occurred.

3. The Export AMD is delivered to the No. 2 dip mains bulkhead via the pipeline path indicated on Plate 32. A minimum of right-of-way problems are expected since it is not in a residential area. Sufficient acreage is available to accommodate all facets of the project. Personnel from the Irwin Coal treatment facility (re: Section 3.3) can provide daily maintenance checks. An alarm system is also included to direct the AMD to the lagoon and alert the proper authorities if a failure occurs.

4. An estimate of capital construction costs follows based on exploratory excavation. Annual operation and maintenance costs are estimated at $12,000. In-depth economic evaluation is addressed in Section 5.0.

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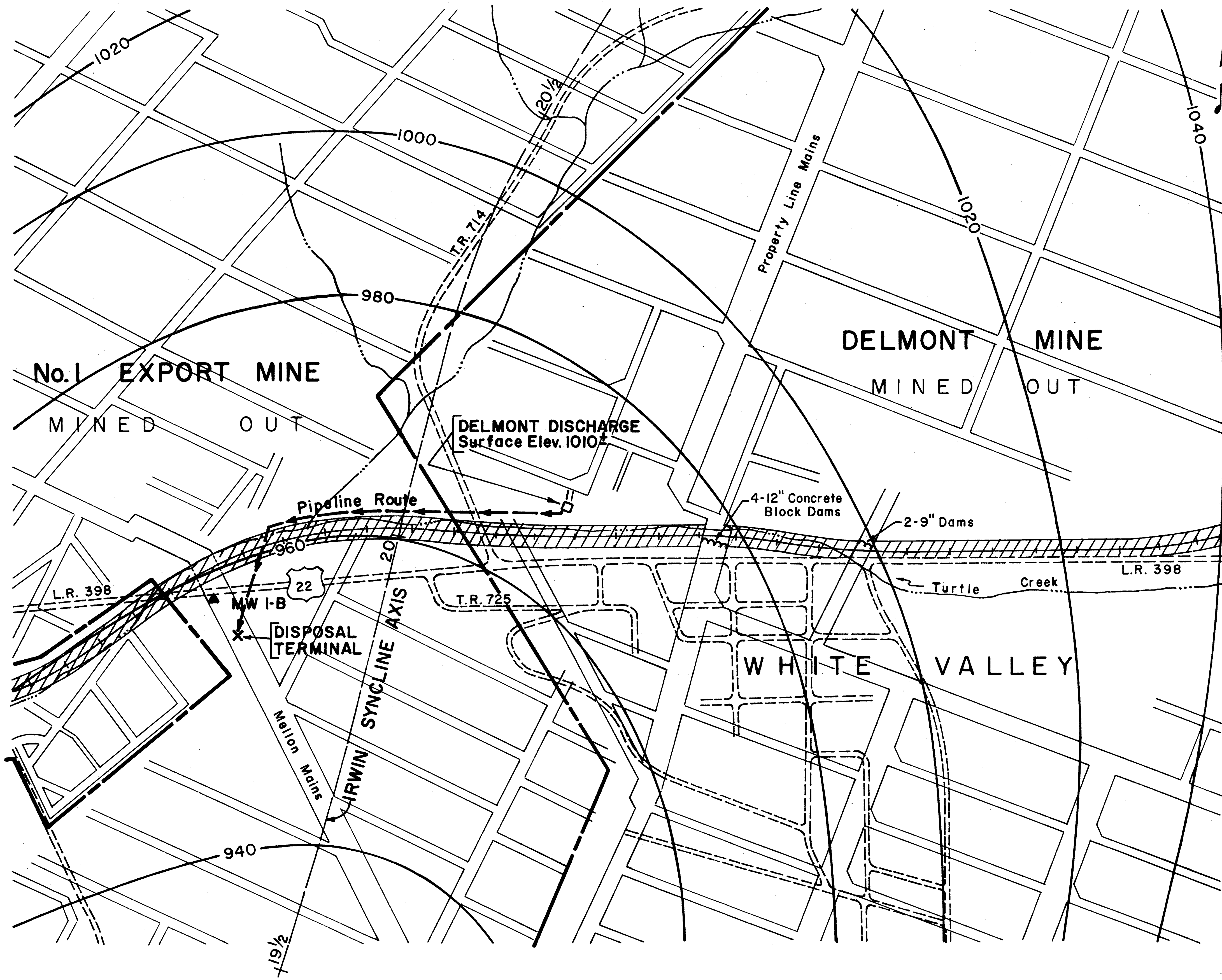
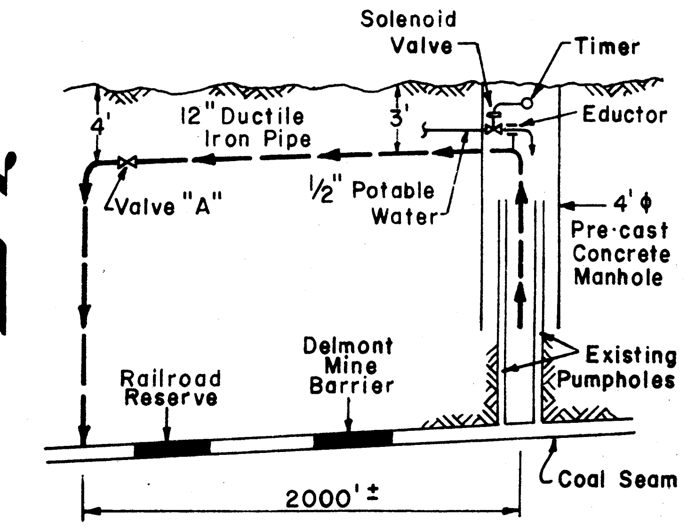
| OPERATION SCARLIFT PROJECT No. SL 103-5 | COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES | DRAWN W.J.M.<br>CHECKED R.C.O.<br>SCALE 1" = 600' | IRWIN SYNCLINE BASIN MINE DRAINAGE POLLUTION ABATEMENT PROJECT<br>EXPORT DISCHARGE ABATEMENT SCHEME DETAILS | PLATE 32<br>DRAWING NO. |

PS CONTRACT NO.

ATLAS LITHO CO., PGH., PA. 1020 CLEARPRINT




## LEGEND

| | |
|---|---|
| 980 | Pittsburgh Coal Seam Contour |
| | Pittsburgh Coal Seam Outcrop |
| | All Roads and Highways |
| | Railroads |
| | Mine Barrier |
| | Mine Haulway |
| | Partial Coal Reserve Under Railroad |
| ▲MW 1-B | Monitoring Wells Installed Under SL 103-5-101.5 |
| | Raw AMD Pipeline |

| | | | | |
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| OPERATION SCARLIFT PROJECT No. SL 103-5 | · COMMONWEALTH OF PENNSYLVANIA · DEPARTMENT OF ENVIRONMENTAL RESOURCES | DRAWN B.M.C.<br>CHECKED R.C.O.<br>SCALE 1" = 600' | IRWIN SYNCLINE BASIN MINE DRAINAGE POLLUTION ABATEMENT PROJECT<br>DELMONT DISCHARGE ABATEMENT SCHEME DETAILS | PLATE 33<br>DRAWING NO. |

PS CONTRACT NO.

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COST ESTIMATE OF RECOMMENDED SCHEME

FOR ABATEMENT OF EXPORT DISCHARGE

| | |
|---|---|
| Exploratory excavation | $ 20,000 |
| 3 - 800 GPM stainless steel vertical pumps @ 90' TDH | 36,000 |
| Standby diesel generator | 16,000 |
| Pump House | 16,000 |
| Wet well | 11,000 |
| Installation | 65,000 |
| Equalization Lagoon | 20,000 |
| 1800 Lin. Feet 12" diameter ductile iron pipe (polyethylene lined) | 33,000 |
| Watercourse & railroad crossings | 5,000 |
| Bulkhead at No. 2 dip mains | 8,000 |
| Subtotal | $230,000 |
| Contingencies @ 10% | 23,000 |
| Engineering @ 8% | 20,250 |
| Total Cost | $273,250 |

## 3.2 DELMONT DISCHARGE

Sealing the Delmont discharge would eventually cause others to occur elsewhere and combining it with Export for treatment is costly as mentioned before. The discharge could probably be abated by draining the mine. The corner of the mine southwest of the railroad could be severed and the dams in the haulageways (four (4) twelve inch and two (2) nine inch thick concrete block dams) that traverse the railroad reserve could be removed. Once this drainage process is begun it would be practically impossible to abort.

It is proposed that the Delmont discharge be deposited in the unflooded portion of the coal seam, and in the same fashion as the Export abatement project, the redirected AMD will then be absorbed by the vast Irwin syncline basin pool. The pressure in the Delmont mine due to the pooled water will force the AMD through the conduit, thus the mine will be self-draining. At some time, the water level will fall below that required for pressurized flow. To compensate, a syphoning mechanism can be designed into the system, basically by constructing the outlet end of the AMD conduit at a lower elevation than the intake in the Delmont mine. If it is interrupted, the syphoning process can be automatically re-established.

### RECOMMENDED SCHEME

1. A four (4) foot diameter pre-cast manhole should be constructed to a depth of approximately 30 feet to form a wet well at the discharge. Within the manhole a twelve (12) inch diameter pipe would be situated. Refer to the insert on Plate 33. Flow is maintained by the artesian conditions.

2. The conduit will parallel the north edge of the railroad grade until it changes direction to the south, crosses the railroad and L.R. 398, terminating in the Mellon mains. Borehole camera surveillance will probably be necessary to determine the best terminal point. Preliminary estimates favor a twelve (12) inch diameter conduit to accommodate average flow conditions and minimize drawdown within the mine.

3. An eductor system will maintain the syphon action by automatically removing any air that might accumulate at the highest point in the line, i.e., at the first elbow where the eductor system would be situated. If enough air accumulates the syphon action fails but it can be automatically restored: Valve 'A' is closed and pressurized local water is forced through the eductor to remove all the air in the line and completely fill it with water. The syphon is restored when Valve 'A' is opened. Water passing through the eductor falls into the manhole.

4. As with the Export discharge no unusual right-of-way difficulties are expected since the conduit will parallel the railroad for most of its length. Daily maintenance checks can be provided by the Coal Run-Irwin treatment facility personnel. Annual operation and maintenance costs are estimated at 53,000.

DELMONT DISCHARGE

COST ESTIMATE SUMMARY FOR ABATEMENT

| | |
|---|---|
| Excavation ........................................ | $9,000 |
| 2200 Lin. Ft. 12" diameter ductile iron pipe (polyethylene lined) ........................ | 38,500 |
| Borehole camera surveillance ........................ | 5,000 |
| Manhole ........................................ | 2,200 |
| Syphoning system (solenoid, eductor, etc.) ........................ | 500 |
| Utilities (potable water, electricity) ........................ | 500 |
| Watercourse and railroad crossings ........................ | 5,000 |
| Total | $60,700 |
| Contingencies @ 10% | 6,070 |
| Engineering @ 8% | 5,340 |
| | $72,110 |

The addition of the Export and Delmont discharges to the Irwin pool can be accommodated easily, resulting in less than a ten foot rise in the wet weather pool elevation at the northernmost edge of the pool. Referring to Section 2.4.1 this maximum pool elevation was estimated at 954± based on a projection of the pool surface at McCullough Shaft and monitoring well 5. The maximum elevation the pool will reach with the addition of these AMD sources is estimated at 965±, fifteen feet lower than the Export discharge. It should be noted that this estimate does not take the overburden storage capacity into account.

To arrive at this estimate a combined average and a sustained maximum flow of Delmont and Export were assumed to discharge for nine (9) months and three (3) months respectively. Average combined equals 2.27 MGD. The combined maximum is actually 5.72 MGD but does not occur continuously, thus a sustained maximum of 4.0 MGD is assumed for the three month maximum flow period.

The area of influence that could accept this flow is assumed to extend around the perimeter of the present pool down to the McCullough Shaft, a distance of about four miles. The average slope of the seam along the perimeter of the mine pool was estimated at 47 and the mined out portion of the mine seam was assumed at 50% void.

The total inflow of approximately $10 \times 10^8$ gallons results in a pool increase of 30'±. Added to the estimated average pool elevation of 935± (re: Section 2.4.1) at the north edge, the new maximum pool is approximately 965'±. The new maximum may also be arrived at by using the difference in flow of 1.72 MGD over the three month period, added to the original 954' maximum.

3.2.1 Associated Work - Thorn Run Watershed

It is proposed that the TR-1 discharge in the Thorn Run watershed (re: Section 6.0) be remedied in conjunction with the recommended abatement scheme for the Delmont discharge. Brunot[3] suggested that dams be constructed to divert the water into some other portion of the mine. Without positively knowing what direction the water will move in response to these dams, this is not a sound proposal. The dams could conceivably cause additional outbreaks along the cropline. However, the same basic concept should be implemented: diversion of the water.

It is recommended that exploratory excavation be conducted, commencing in the immediate vicinity of the TR-1 discharge and advanced in a southeasterly direction along the barrier reported to be in place at the TR-1 discharge. Re: Plate 24 or 37. In this manner the exact nature of the TR-1 discharge can be established. Analysis of the known subsurface conditions would then allow a scheme to be designed whereby all of the water is directed into the Delmont mine and consequently abated via the proposed abatement scheme just outlined. The estimated cost including exploratory excavation to redirect this discharge is $100,000.

3.2.2 Associated Work - White Valley Discharge

Abatement of the White Valley discharge may be accomplished by one of the following means:

1. Conveying the AMD through a separate pipeline to an unflooded portion of the Irwin basin such as recommended for the Export and Delmont discharges.

2. Convey the AMD to the Delmont mine pool from which it would be syphoned to the Irwin pool via the recommended abatement project described for the Delmont discharge.

3. Inasmuch as the local municipalities in this area are currently studying long term wastewater disposal plans, the White Valley discharge could possibly be collected and treated with the sanitary flow. Combining the AMD with the alkaline sewage would reduce neutralization costs but increase the plant design flow.

## 3.3 IRWIN-COAL RUN TREATMENT FACILITY

There are few locations within an hydraulically acceptable radius of the Irwin discharge capable of accommodating a neutralization-oxidation treatment facility sized for the Irwin discharge alone. At best, a facility can be situated immediately adjacent to the discharge. This requires (1) demolition of the glass plant beneath which the discharge flows and (2) provisions for Tinker's Run, i.e., its relocation around the facility or a culvert beneath and integral with the plant. However, until the space requirements can be finalized, the use of the land adjacent to the discharge cannot be taken for granted. Although this assumption is based on using a neutralization-oxidation process, an alternate method of treatment may be implemented that entails less space but perhaps higher operating costs. These are final design considerations. Therefore, premised on the neutralization method, the need to transmit the Irwin discharge to a remote site for treatment is the basis for this discussion.

The Coal Run watercourse, carrying the Coal Run discharge, enters Brush Creek approximately 1200 feet upstream from the mouth of Tinker's Run. Compared to the Irwin discharge, the average AMD pollution load from Coal Run is minute, its daily flow about one-twelfth. The Coal Run watercourse quite obviously contains domestic sewage. Presently, under construction, however, is the Western Westmoreland Municipal Authority Brush Creek sewage treatment facility and collection system. An interceptor along Coal Run from Brush Creek north to the North Huntingdon-Penn Township line near Paintertown was recently completed. The treatment facility, located near Larimer, is expected to be operational at the close of calendar year 1977. Unofficial estimates indicate that about 80 to 90% of the sewage in Coal Run originates in North Irwin, which will be picked up by the Coal Run line. The area from Paintertown north unofficially accounts for the remaining input of sewage. A separate sewage facility is tentatively planned by Penn Township which will accommodate this sewage, however, no target dates are available.

With the domestic sewage removed, only acid mine drainage from two sources will pollute Coal Run: the Coal Run discharge and a group of several seepage-type discharges originating from the North Side mine that enter the water course just prior to the culvert. These are located along the abandoned Coal Run Railroad grade that parallels the west bank of the water course. See Plate 34. Following the natural hydrologic cycle, these discharges are greatest in the early spring, lowest during late summer, and at times nonexistent. If efforts are made to abate the Coal Run discharge these minor sources can feasibly be included in the collection scheme. Coal Run should then be a pollution-free water course.

Notwithstanding the unusual location of the Coal Run discharge, the local topography prohibits nearby construction of a treatment facility. Combined with the similar situation regarding the Irwin discharge, the recommended abatement scheme has been developed from a "worst case" perspective; that both discharges be conveyed to a common site for treatment, as located on Plate 34. This approach is preferred as an indicator of the potential cost ceiling, although the facility could finally be located adjacent to the Irwin discharge.

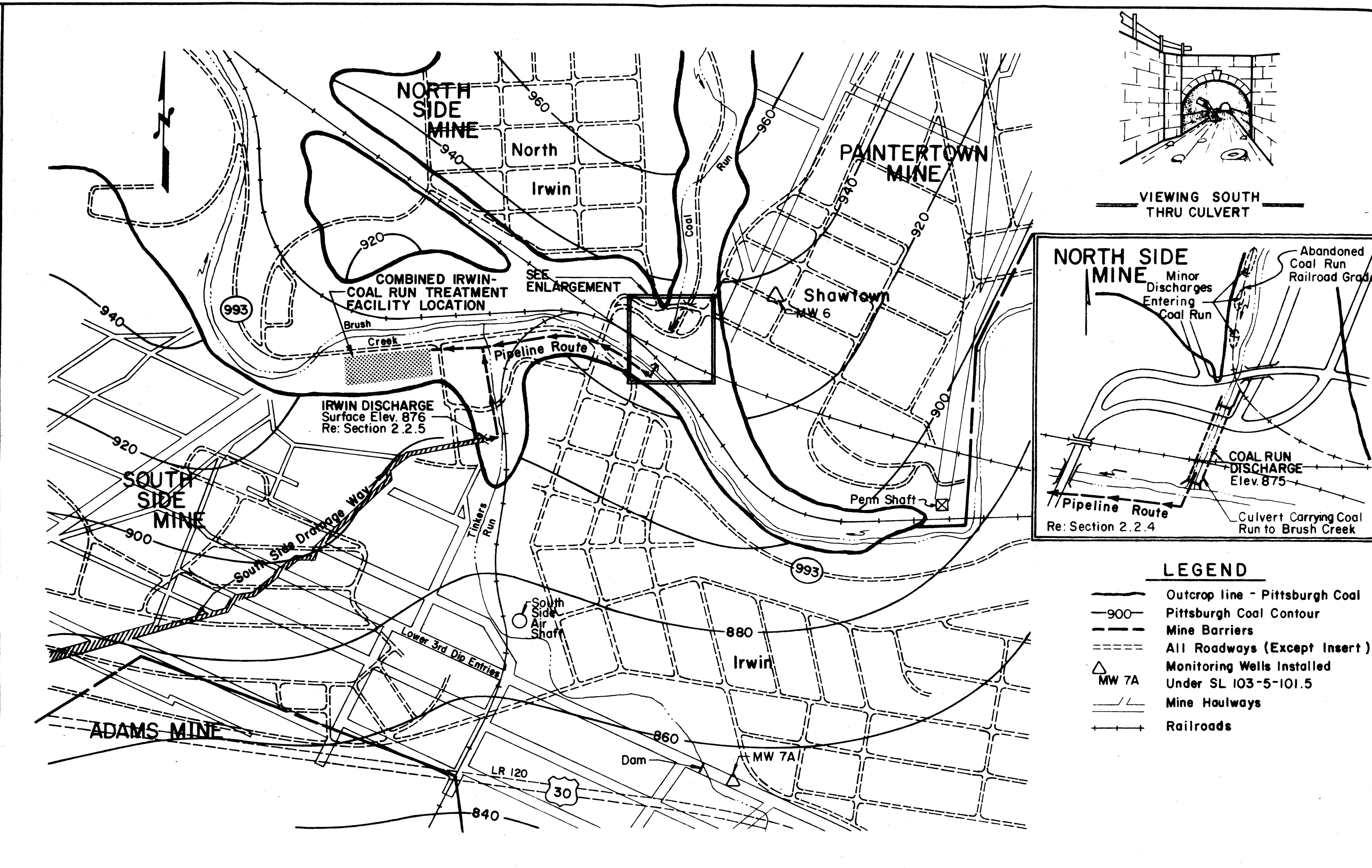
Gravity flow of the Coal Run discharge to the treatment facility downstream is impractical, thus a pressurized system is needed, and if a capital investment of this nature is made then continuous flow of the AMD must be insured. Therefore, approximately two percent of the estimated total construction cost for a combined Irwin-Coal Run treatment facility is allocated for exploratory excavation. Since uninterrupted flow from the two existing twelve inch (12") pipes cannot be guaranteed, the exploratory work would allow the exact nature of the discharge to be determined, then properly modified to insure reliable, continuous flow.

The cost and time to perform the exploratory excavation may be kept to a minimum by doing some preliminary research. It appears that the two pipes were not constructed integrally with the culvert but installed at some later date. This part of the railroad and the culvert were built around 1899 according to a plaque on an overpass carrying the railroad over Main Street just downstream of Coal Run. Exactly when and by whom the pipes were installed, if not by the rail company, should be on file with Penn Central (Conrail) since they would have had to grant permission if done by an outside source. Construction drawings would presumably show the true pipe alignment and grade. Pending the outcome of this research, a more thorough scheme and schedule for exploring the Coal Run discharge in detail could be planned.

Most likely the excavation would be initiated within the immediate vicinity of the culvert. This would also facilitate simultaneous exploratory work along the Coal Run railroad grade to determine what is necessary to abate these few small discharges. It may be simplest to collect the discharges in a "french drain" along the grade to convey it along with the Coal Run discharge to the treatment site.

The proposed site of the treatment facility is shown on Plate 34. The Irwin and Coal Run discharges are pumped to the site via 900 feet of 30" and 1500 feet of 12" pipe respectively.

The acreage requirements include an 80 acre-feet equalization lagoon sized to store 72 hours of flow in excess of the plant design capacity of 18.2 MGD. Plant design flow is estimated at 150% of average flow. The combined average flow of the Irwin and Coal Run discharges equals 12.13 MGD, thus design equals 18.2 MGD. The neutralization-oxidation process described previously is used. Maximum expected flow would be approximately 26.6 MGD, equal to the sum of the observed maximum flow for Irwin (23.63 MGD) and Coal Run (3.0 MGD). A cost summary follows which includes the Coal Run exploration work and conveyance systems for both discharges.

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| PS CONTRACT NO. | OPERATION SCARLIFT PROJECT No. SL 103-5 | · COMMONWEALTH OF PENNSYLVANIA · DEPARTMENT OF ENVIRONMENTAL RESOURCES | DRAWN B.M.C.<br>CHECKED R.C.O.<br>SCALE 1" = 600' | IRWIN SYNCLINE BASIN MINE DRAINAGE POLLUTION ABATEMENT PROJECT<br>IRWIN - COAL RUN ABATEMENT DETAILS | PLATE 34<br>DRAWING NO. |

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COST ESTIMATE SUMMARY

IRWIN-COAL RUN TREATMENT FACILITY

| | | |
|---|---|---|
| Site Preparation | | $1,913,200 |
| Operations Building | | 37,800 |
| Mechanical | | 1,149,300 |
| Electrical | | 332,700 |
| Exploratory Excavation | | 95,000 |
| | Sub-Total | $3,528,000 |
| Contingencies@ 10% | | 352,800 |
| | Sub-Total | $3,880,800 |
| Engineering @ 8% | | 310,500 |
| | Total | $4,191,300 |
| | | Say 4.2 million |

## 3.4 MARCHAND DISCHARGE ABATEMENT

A treatment facility can easily be accommodated at this location. Surrounding the artesian discharge, a sump would be constructed from which the raw AMD would be pumped through the neutralization plant or overflow into an adjacent equilization lagoon. Plant design flow is 1900 GPM, equal to the average flow. In this case, the discharge is artesian and very seldom exceeded 3.0 MGD. Rather than design for 150% times the average, design flow equals the average flow and any excess can be stored in the equalization lagoon. See Plate 35.

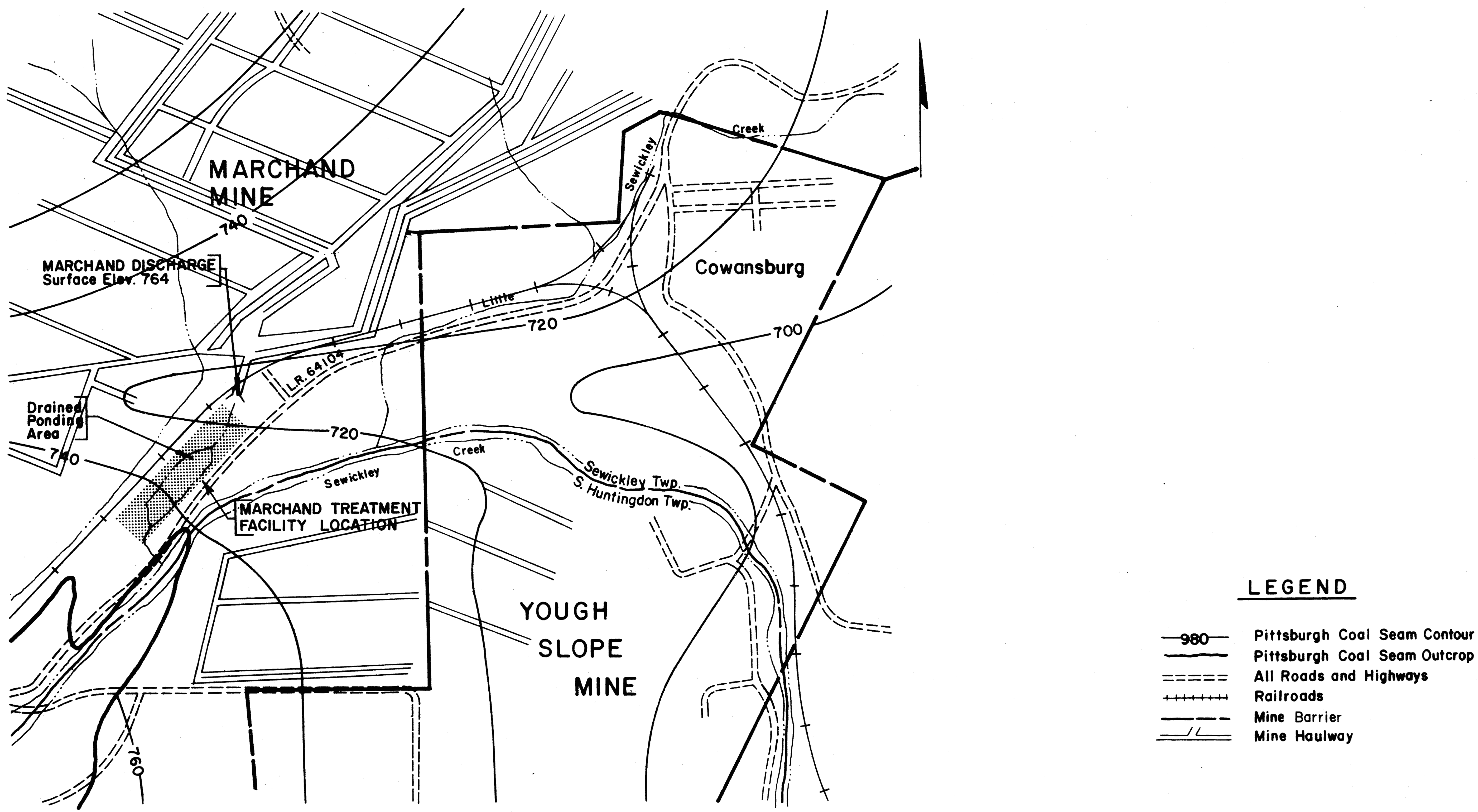
COST ESTIMATE SUMMARY
MARCHAND DISCHARGE TREATMENT FACILITY

| | | | |
|---|---|---|---|
| Operations Building | | $ 25,000 | |
| Mechanical | | 390,000 | |
| Electrical | | 125,000 | |
| Site Preparation | | 450,000 | |
| | Sub-Total | $990,000 | |
| Contingencies @ 10% | | 99,000 | |
| | Sub-Total | $1,089,000 | |
| Engineering @ 8% | | 87,000 | Say 1.2 million |
| | Total | $1,176,000 | |

The only factor that might inflate the cost, albeit minimally, is the subsurface conditions. The artesian condition suggests that uplift forces may have to be considered in the foundation analysis of the various structures.

### 3.4.1 Redstone Coal Outcrop Discharges

The nature of these discharges was described at the end of Section 2.3.1. The recommended abatement scheme herein cannot practically incorporate any feasible abatement measures to eliminate this source of acid mine drainage to Little Sewickley Creek. Abatement of the Marchand discharge will improve the quality of Sewickley Creek enough such that the Redstone AMD becomes insignificant in this watershed.




PS CONTRACT NO.

OPERATION SCARLIFT
PROJECT No. SL 103-5

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

DRAWN B.M.C.
CHECKED R.C.O.
SCALE 1" = 600'

IRWIN SYNCLINE BASIN MINE DRAINAGE
POLLUTION ABATEMENT PROJECT
MARCHAND
ABATEMENT SCHEME DETAILS

PLATE 35
DRAWING NO.

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## 3.5 GUFFEY STATION DISCHARGES

It is doubtful that a treatment facility can be constructed in the immediate vicinity of these discharges. The surrounding hillsides are quite steep. The valley floors are narrow and are occupied by the roadway and paralleling streams. At the mouth of Guffey Hollow Run, there appears to be sufficient open space to build a treatment plant, however, constructing a hydraulically suitable facility might require re-routing this tributary or building a culvert beneath the plant. Flood control considerations will also have to be taken into account.

It is assumed that a facility at a remote site will be the final solution based on the "worst case" argument advanced for the Coal Run-Irwin project. A possible site is shown on Plate 36. Plant design flow (5.4 MGD) is estimated at 150% of average flow (3.6 MGD).

Although chemical analyses indicate that the average net acid load is alkaline, it is periodically acidic and must therefore be treated accordingly. The full neutralization-oxidation process is employed. If the combined discharge net acid load was consistently alkaline, then aeration and settling processes would suffice and the neutralization stage could be omitted.

Depending on final analysis of the hydraulics Upper Guffey may be collected via a wet-well pump arrangement or by gravity flow, but because the origin of the Lower Guffey discharge is nebulous, it should be more thoroughly investigated. Exploratory excavation of Lower Guffey is recommended before entering the design stage of a combined treatment-collection system.

COST ESTIMATE SUMMARY
UPPER AND LOWER GUFFEY STATION DISCHARGES COMBINED

| | | |
|---|---|---|
| Operations Building | | $30,800 |
| Electrical | | 163,800 |
| Mechanical | | 554,700 |
| Site Preparation | | 549,500 |
| Exploratory Excavation | | 50,000 |
| | Sub-total | $1,348,800 |
| Contingencies @ 10% | | 134,880 |
| | Sub-total | $1,483,680 |
| Engineering @ 8% | | 118,690 |
| | Total | $1,602,370 |

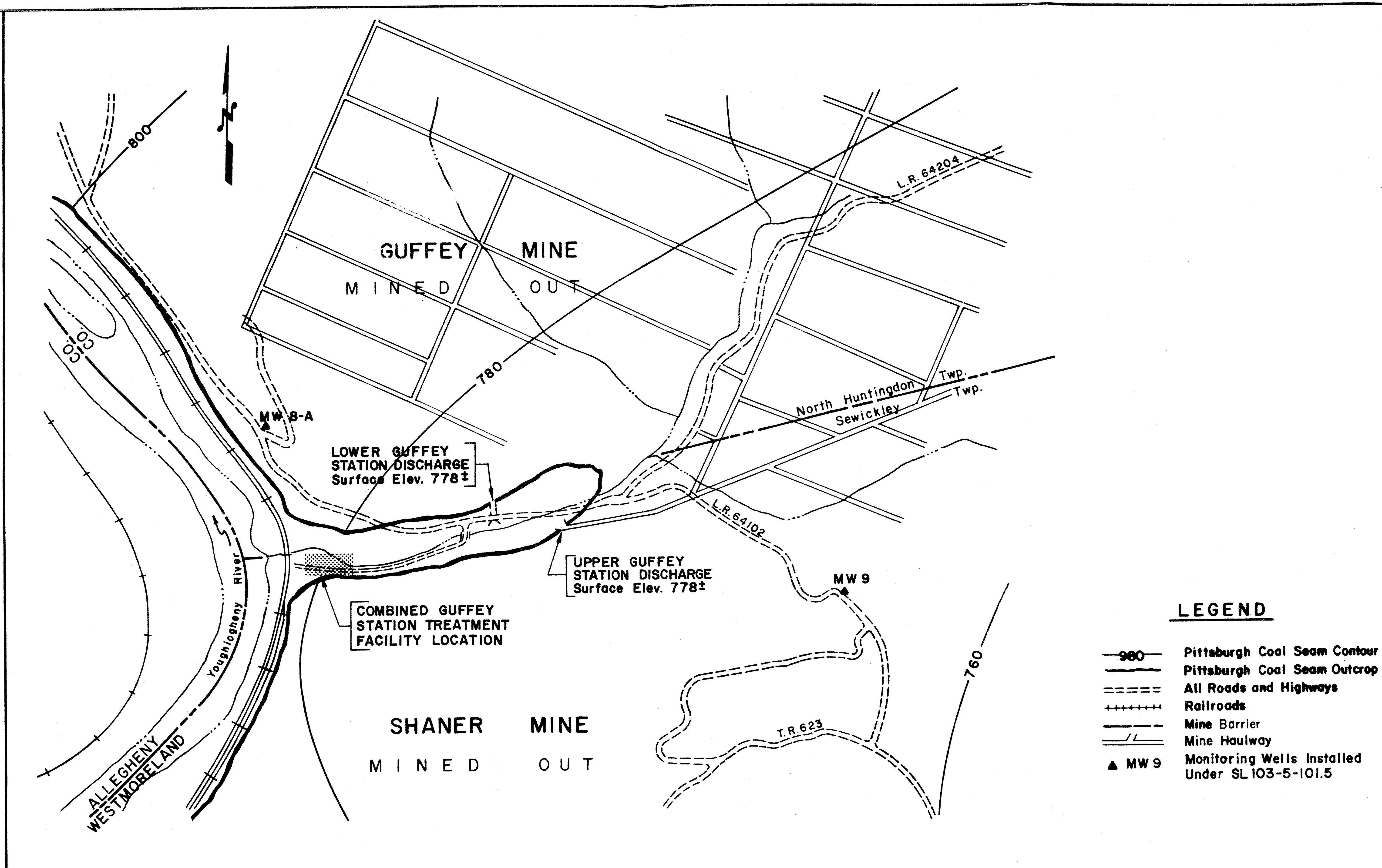
Say 1.6 Million

### 3.6 LONG TERM BASIN ACTIVITY

It should be observed that the recommended abatement plan for dealing with the major discharges in the lower two thirds of the basin may or may not be implemented before the Banning No. 4 mine is abandoned. In either case, what will be the effect? Since the various treatment facilities are geared to treating the AMD as it exits the mine, as opposed to pumping from the mine at an accelerated rate, the impact of the abatement plan on the subsurface hydrology and the Banning mine should be nil.

Similar to the role of the Hutchison mine prior to its abandonment, the Banning No. 4 barrier pillars adjacent to the Hutchison, Osborne and Yough Slope mines are forced to contain the hydrostatic pressure exerted by the pool. Banning must also contend with inflow from the exhausted portions of the Port Royal No. 1 and No. 2 mines to the south, southwest and west. The water elevations in these areas represent a continuation of the piezometric surface north of Banning as discussed in Section 2.4.3, the only variation being the pumping action centered at Banning which creates a local well-like drawdown of the pool. Referring to the Composite Map, the left flank of the Irwin basin ascends westerly as part of the east flank of the Belle Vernon, or Brownsville Anticline. At sites surrounding Banning, the pool elevations read: Yough Slope constant at 765', Buddtown at 732', Fitzhenry at 635', Port Royal at 644' and Smithton at 702'. Going south along the syncline axis, these elevations reflect the shallow geologic plunge of the basin. Thus it is estimated that when Banning is abandoned, it will flood to an elevation of 775'±, i.e., coincident with the surrounding piezometric surface. The southernmost tip of the pool should stabilize within the 700' - 725'± range. Since the total pool will remain essentially unchanged even as it is joined by Banning, the chemical composition of the nearby discharges should remain constant. The flow at Marchand might increase but it is not expected to be more than 20%. Sufficient capacity would be available at a Marchand treatment facility for wet weather flows. As a last resort more equalization lagoons could be added.

Lastly, no additional AMD discharges are expected to occur when Banning floods, because the pool will be confined within the outcrop if it levels off at 775'±. The few areas where the pool might approach the outcrop is where the outcrop is presently intersected by the Yough River and Jacobs Creek. Sufficient reserve has assuredly been left to avoid inflow via the outcrop from these waterways.

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| PS CONTRACT NO. | OPERATION SCARLIFT PROJECT No. SL 103-5 | · COMMONWEALTH OF PENNSYLVANIA · DEPARTMENT OF ENVIRONMENTAL RESOURCES | DRAWN B.M.C.<br>CHECKED R.C.O.<br>SCALE 1" = 600' | IRWIN SYNCLINE BASIN MINE DRAINAGE POLLUTION ABATEMENT PROJECT<br>UPPER & LOWER GUFFEY ABATEMENT SCHEME DETAILS | PLATE 36<br>DRAWING NO. |

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