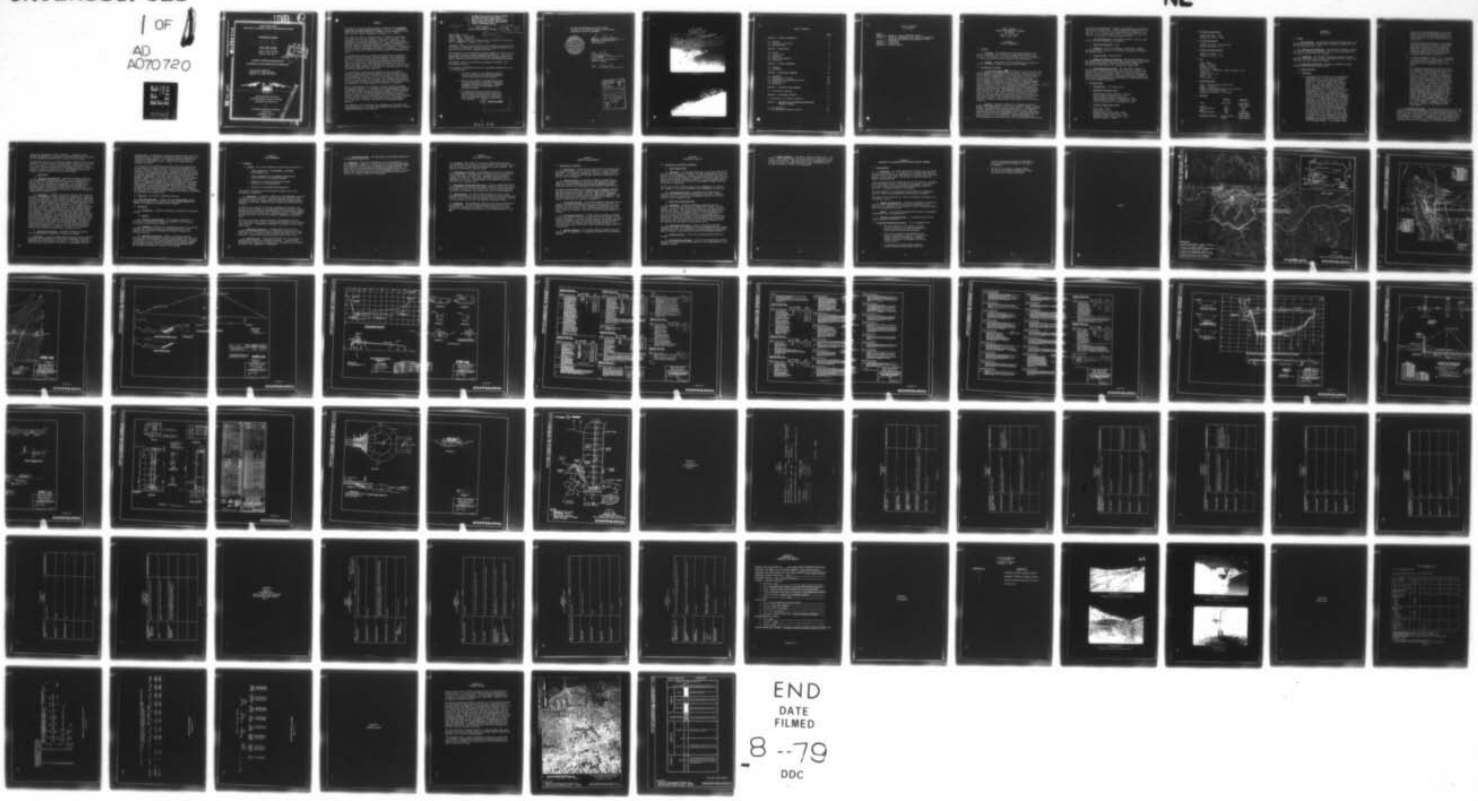
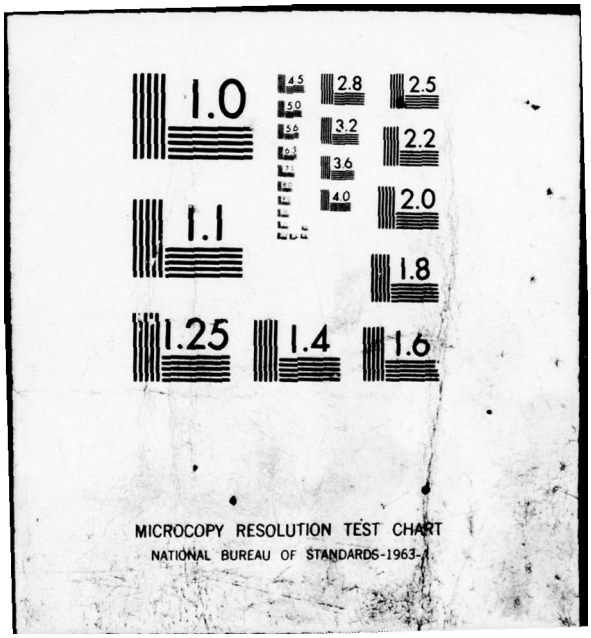
AD-A070 720 D'APPOLONIA CONSULTING ENGINEERS INC PITTSBURGH PA F/G 13/2
NATIONAL DAM INSPECTION PROGRAM. PA-479 DAM (NDI ID NUMBER PA-5--ETC(U)
MAR 79 DACW31-79-C-0014

UNCLASSIFIED NL

1 OF 1
AD A070720



END
DATE FILMED
8-79
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

LEVEL II

OHIO RIVER BASIN
TRIBUTARY OF HARMON CREEK, WASHINGTON COUNTY

PENNSYLVANIA

See page ii.

PA-479 DAM

NDI I.D. NO: PA-509
DER I.D. NO: 63-71

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Distribution Unlimited
Approved for Public Release
Contract No. DACW31-79-C-0014

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

D'APPOLONIA CONSULTING ENGINEERS
10 DUFF ROAD
PITTSBURGH, PA. 15235

MARCH 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

(6) National Dam Inspection Program. PA-479 Dam (NDI ID Number PA-509, DER ID Number 63-71), Ohio River Basin, Harmon Creek, Washington County, Pennsylvania. Phase I Inspection Report.

[CONT'D FROM P. i]

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

(11) Mar 79

(12) 75 p.

NAME OF DAM: PA-479
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Washington
STREAM: Unnamed tributary of Harmon Creek, a tributary of Ohio River
DATE OF INSPECTION: December 5 and 21, 1978

ASSESSMENT: Based on the evaluation of the conditions as they existed on the dates of inspection and as revealed by visual observations, the condition of PA-479 dam is assessed to be good.

The hillside west of the emergency spillway channel was found to be wet and irregular, showing signs of potential instability. It is recommended that this area be closely examined and necessary remedial work done to assure that future slides do not block the emergency spillway.

The spillway capacity is classified as adequate according to the recommended criteria.

The following recommendations should be implemented immediately or on a continuing basis:

1. The slope adjacent to the emergency spillway should be stabilized to prevent development of a slide which would block the spillway.

2. The wet area located on the downstream slope should be periodically observed to document if a seepage condition is developing. Necessary remedial work should be performed if such conditions develop.

3. An around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of an emergency.

(15) DACW31-79-C-0014

411 001

4. The dam and appurtenant structures should continue to be inspected regularly and necessary maintenance should be performed.

Lawrence D. Andersen, P.E.
Vice President

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

DATE: 22 Apr 79

Accession For	
NTIS GRA&I	☑
DDC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or special

PA-479 DAM
NDI I.D. NO. PA-509
DECEMBER 5, 1978

Upstream Face

Downstream Face

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
PA-479 DAM
NDI I.D. NO. PA-509
DER I.D. NO. 63-71

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. The PA-479 dam is one of the 14 flood control projects in the Harmon Creek watershed. The dam consists of an earth embankment approximately 650 feet long with a maximum height of 63 feet from the downstream toe and a crest width of 14 feet. The flood discharge facilities for the dam consist of a drop inlet primary spillway located near the left abutment (looking downstream) and an emergency spillway, also located on the left abutment. The primary spillway is a drop inlet structure consisting of a two-stage reinforced concrete riser, a 24-inch-diameter reinforced concrete conduit, terminating at a plunge pool near the left abutment at the downstream toe of the dam. The emergency spillway is a trapezoidal earth channel with a base width of 50 feet excavated into the left abutment. The reservoir outlet facilities for the dam consist of a 15-inch steel pipe extending from the upstream toe of the dam to the drop inlet structure. Flow through the reservoir outlet is controlled by a manually operated sluice gate located in the drop inlet structure.

[CONT'D ON P. ii]

b. Location. The dam is located on an unnamed tributary of Harmon Creek, approximately one mile west of Hanlin Station in Hanover Township, Washington County, Pennsylvania (Plate 1). Downstream from the dam, the stream flows approximately 1000 feet north, under the Penn-Central Railroad, and joins Harmon Creek. The first development below the dam is located approximately one mile downstream from the dam and consists of three farmhouses. Harmon Creek crosses the West Virginia/Pennsylvania state line two miles downstream from the dam.

In this reach, approximately 15 homes are considered to be within the flood plain of Harmon Creek. Further downstream, Harmon Creek flows near the town of Collier and joins the Ohio River at Weirton, West Virginia. It is estimated that failure of the dam would cause large loss of life and property damage along Harmon Creek.

c. Size Classification. Intermediate (based on 63-foot height and 343 acre-feet maximum storage capacity).

d. Hazard Classification. High.

e. Ownership. County of Washington, Pennsylvania (address: Mr. Joseph Geicek, Administrative Assistant, Courthouse, Washington, Pennsylvania 15301).

f. Purpose of Dam. Flood control.

g. Design and Construction History. The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service, during 1967. The dam was constructed by Windy Hill Construction Company of Burgettstown, Pennsylvania, with completion in August 1969.

h. Normal Operating Procedure. The reservoir is normally maintained at Elevation 902.8, the crest level of an orifice on the upstream face of the drop inlet structure. The crest level of the primary spillway is at Elevation 913.5. The crest of the emergency spillway is at Elevation 922.7. Depending on the rate of inflow, the flood would be discharged through the orifice in combination with the primary and emergency spillways.

1.3 Pertinent Data

a. Drainage Area - 1.15 square miles

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site - Unknown
Outlet conduit at maximum pool - 58
Gated spillway capacity at maximum pool - N/A
Ungated spillway capacity at maximum pool - 8037
Total spillway capacity at maximum pool - 8095

c. Elevation (USGS Datum) (feet)

Top of dam - 934.2
Maximum pool - 934.2
Upstream invert outlet works - 885.0
Downstream invert outlet works - 879.2
Streambed at center line of dam - 877±
Maximum tailwater - Unknown

d. Reservoir Length (feet)

Normal pool level - 500
Maximum pool level - 1000+

e. Storage (acre-feet)

Normal pool level - 26 (estimated)
Maximum pool level - 343

f. Reservoir Surface (acres)

Normal pool level - 4
Maximum pool level - 18.5

g. Dam

Type - Earth
Length - 650 feet
Height - 63 feet
Top width - 14 feet
Side slopes - Downstream: 2H:1V; Upstream: 3H:1V
Zoning - No
Impervious core - No
Cutoff - Yes
Grout curtain - No

h. Regulating Outlet

Type - 15-inch reservoir outlet pipe
Length - 50+ feet
Closure - Sluice gate at drop inlet structure
Access - Drop inlet structure
Regulating facilities - Sluice gate

i. Spillway

	Primary	Emergency
Type -	Drop inlet	Trapezoidal earth channel
Length -	N/A	50 feet
Crest elevation -	913.5	922.7
Gates -	None	None
Upstream channel -	Lake	Trapezoidal earth channel
Downstream channel -	24-inch outlet conduit	Trapezoidal earth channel

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available information was provided by the Pennsylvania Department of Environmental Resources (PennDER) and the Soil Conservation Service (SCS).

(1) Hydrology and Hydraulics. The available information consists of principal freeboard and emergency spillway inflow hydrographs and the results of associated flood routings.

(2) Embankment. The available information consists of design drawings, geology and soils reports, laboratory soil test results, and the results of slope stability analyses.

(3) Appurtenant Structures. Available information includes design drawings and design calculations.

b. Design Features

(1) Embankment

a. As designed, the dam (Plate 2) is a homogeneous embankment with a central cutoff trench and a trench drain beneath the downstream slope (Plate 3). The cutoff trench, with a bottom width of 17 feet, was extended 5 to 10 feet below original ground along the valley floor. On the abutments, the width of the cutoff trench was reduced to 12 feet and the depth was approximately 5 feet. A 4-foot-wide, 10- to 15-foot trench filled with granular material located beneath the downstream slope constitutes the internal drainage system for the embankment (Plate 4). The trench drain starts at a level approximately 30 feet below the dam crest level and 40 feet downstream from the center line of the dam near the right abutment and terminates at a filter blanket near the discharge end of the outlet pipe at an elevation approximately 55 feet below the dam crest and 64 feet downstream from the center line of the dam. Over the lower half of its length, the trench drain is equipped with a 12-inch-diameter perforated drainpipe. On the left abutment, the internal drainage system consists of a minimum 2-foot-thick drainage blanket. This drainage blanket

starts at a level approximately 30 feet below the dam crest and 40 feet downstream from the center line of the dam and terminates at the drainage blanket near the downstream end of the outlet pipe.

Two principal borrow materials for the embankment were classified as follows: clayey sands containing 15 percent gravel and 50 percent fines with a liquid limit of 35 percent and plasticity index of 18, and silty clays containing 83 percent fines with liquid limit of 40 percent and plasticity index of 22.

b. The dam was designed to have a 3 to 1 (horizontal to vertical) slope on the upstream face with an 8-foot-wide bench at elevation 903.3. The downstream face was designed to have a 2 to 1 slope.

c. The subsurface investigation conducted for the dam consisted of numerous borings and test pits. The locations of these borings are shown in Plate 2. Selected boring logs are illustrated in Plates 5, 6 and 7. The typical subsurface profile (Plate 8) consists of up to 5 feet of medium to stiff sandy clayey silts on the valley slopes and about 10 to 30 feet of alluvium in the valley bottom. The alluvium is classified as medium dense to dense clayey gravels and clayey sands containing 33 to 56 percent gravel. The bedrock at the dam site consists of thin-bedded Birmingham Shale on the abutments and Pittsburgh Red Bed Shale underlying the valley bottom. The shales were separated by 2- to 3-foot-thick layers of Ames Limestone. The permeability of the bedrock varied between 0.1 foot per day and 8.6 feet per day (4×10^{-5} to 3×10^{-3} ft/sec). In general, the higher permeability rates were encountered in the valley bottom.

(2) Appurtenant Structures. The appurtenant structures of the dam consist of a drop inlet primary spillway and an emergency spillway. The primary spillway structures consist of a single-stage reinforced concrete riser and a 24-inch-diameter reinforced concrete conduit through the embankment, terminating at a plunge pool at the downstream toe of the dam (Plates 9, 10 and 11). A 15-inch-diameter steel pipe from the upstream toe of the dam discharging into the drop inlet structure

constitutes the reservoir outlet facilities. The outlet conduit through the embankment is supported on concrete bedding and is equipped with six reinforced concrete cutoff collars 25 feet on center.

The emergency spillway is a trapezoidal channel excavated into the left abutment. The bottom width of the trapezoidal channel is 50 feet with 2 to 1 side slopes. A 30-foot level section of the channel bottom constitutes the control section of the emergency spillway. The control section is located at Elevation 922.7. The embankment side of the emergency spillway channel is protected with riprap.

c. Design Data

(1) Hydrology and Hydraulics. Available information indicates that the emergency spillway was designed to pass a hydrograph with a peak of 8612 cfs, corresponding to 25.8 inches of precipitation in 6 hours, without overtopping the embankment. This hydrograph was apparently routed through the reservoir starting at normal pool (Elevation 902.8) and producing a maximum pool at Elevation 934.2 with a peak emergency spillway outflow of 8037 cfs. The top of the dam was established at Elevation 934.2.

(2) Embankment. Available information indicates that laboratory tests for the embankment design consisted of classification, compaction, and shear strength tests. Shear strength parameters for the embankment material were obtained from consolidated-undrained triaxial shear tests conducted on samples compacted to 95 percent of maximum Standard Proctor dry density. Total stress strength parameters of two samples were reported. Internal friction angles were 15.5 and 17 degrees and cohesion 500 and 875 psf. It was reported that a slope stability analysis was conducted utilizing modified Swedish circle and modified sliding block analyses. The stability of the downstream slope under steady-state seepage and stability of the upstream slope under rapid drawdown conditions was considered. For steady-state seepage analysis, the pool level was taken at Elevation 922.7, the emergency spillway crest level. The analysis considered a phreatic line from emergency spillway elevation to the trench drain beneath the downstream slope. The minimum computed factor of safety was 1.48 for the downstream slope under a steady-state seepage condition and 1.77 for the upstream slope under rapid drawdown conditions. A stability analysis for the emergency spillway cut indicated a minimum factor of safety of 1.15.

(3) Appurtenant Structures. Available information indicates that the appurtenant structures were standard SCS designs.

2.2 Construction. As-built drawings and construction progress reports prepared by the Commonwealth of Pennsylvania, Department of Environmental Resources were available for review. To the extent that can be determined, the construction of the dam was in conformance with SCS

specifications. No significant construction changes were noted in the embankment design. The dam was constructed under the supervision of an SCS field representative. It is reported that the earthwork was monitored by field density tests. However, the results were not available for review.

It is reported that both during construction and after completion of the dam several landslides occurred on the hillside adjacent to the emergency spillway. The first slide occurred in June 1969 during the excavation of the emergency spillway. Approximately 2000 cubic yards of material was removed from the hillside and the slopes were regraded. The dam was completed in July 1969. The second slide occurred in September 1969; however, the slide did not progress into the emergency spillway channel. In the spring of 1970, additional slides were observed blocking approximately half of the emergency spillway channel. Again, the material was removed and the slopes regraded. A detailed investigation of the condition was undertaken during 1970, including an additional subsurface investigation. The detailed investigation concluded that the permanent solution would be too costly. Therefore, the slide area was to be periodically monitored and necessary maintenance be undertaken as the slides occur.

2.3 Operation. No records of operation are kept.

2.4 Other Investigations. A report entitled, Harmon Creek, PA-479 Slide, dated April 2, 1971, presents the detailed investigation conducted on the emergency spillway stability problem.

2.5 Evaluation

a. Availability. Available information was obtained from SCS and PennDER.

b. Adequacy

(1) Hydrology and Hydraulics. The available information is considered to be adequate to assess the conformity of the design to the current spillway design criteria.

(2) Embankment. Review of the geotechnical aspects of the design indicates that the design generally followed currently accepted practices for subsurface investigation, laboratory testing, and stability analyses.

(3) Appurtenant Structures. Review of the design drawings indicated that the appurtenant structures were designed and constructed in conformance with currently accepted engineering practices. However, concern exists as to the continued stability of the hillside adjacent the emergency spillway, since post-construction engineering studies did not provide a permanent solution to this problem.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of PA-479 dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Visual examination of the emergency spillway and visual portions of the primary spillway.

3. Observation of factors affecting the runoff potential of the drainage basin.

4. Evaluation of downstream hazard potential.

The specific observations are illustrated in Plate 12 and in the photographs in Appendix C.

b. Embankment. In general, inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the dam is considered to be good. Only one wet area was observed on the downstream slope near the left abutment immediately above the outlet works plunge pool. No perceivable seepage was associated with this wet area. The slope adjacent to the emergency spillway was found to be wet and irregular, suggesting a progressing slide.

The top of the dam was surveyed relative to the emergency spillway crest elevation and was found to be within one-half foot of the cambered crest elevation. Irregularities appeared to be caused by truck tracks on the crest.

c. Appurtenant Structures. The appurtenant structures were examined for deterioration or signs of distress and obstructions that would limit flow. In general, the structures were found to be in good condition. No significant deficiencies were noted at this time.

d. Reservoir Area. A map review indicates that the watershed is predominantly covered with reclaimed strip mines. A review of the regional geology (Appendix E) indicates that the slopes of the reservoir are likely to be susceptible to landslides.

e. Downstream Channel. The description of downstream conditions is included in Section 1.2b.

3.2 Evaluation. The dam is considered to be in good condition. The most significant condition at the dam site is the potential instability of the emergency spillway cut, as demonstrated by past problems. This area should be closely examined and necessary remedial work done to assure that future slides do not block the emergency spillway. The wet spot on the downstream slope should also be periodically observed to document if a seepage condition is developing.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. The reservoir is normally maintained at the crest level of the orifice on the drop inlet structure. The reservoir outlet pipe can be used to draw down the permanent pool when required. The reservoir outlet gate is normally closed.

4.2 Maintenance of the Dam. The maintenance of the dam is considered to be satisfactory. The downstream and upstream faces of the dam are covered with grass and crown vetch. Washington County personnel reported that there is no full-time dam tender responsible for the maintenance of the dam. The maintenance is performed by outside contractors on an as-needed basis.

4.3 Maintenance of Operating Facilities. The only operational feature is the reservoir outlet pipe sluice gate operated by a hoist located on the primary spillway drop inlet structure. Since the drop inlet structure was not accessible, this facility could not be closely examined.

4.4 Warning System. No formal warning system exists for the dam. Telephone communication facilities are available via homes approximately one mile east of the dam near the community of Hanlin Station. The site is not considered to be readily accessible during major storms.

4.5 Evaluation. The maintenance condition of the dam is considered to be satisfactory. The dam and appurtenances should continue to be periodically inspected with emphasis on the wet areas on the slope adjacent to the emergency spillway and on the downstream slope of the dam.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. PA-479 dam has a watershed of 1.15 square miles and impounds a reservoir with a surface area of 4.3 acres at normal pool level. The emergency spillway of the dam is located on the left abutment. The capacity of the emergency spillway is reported to be 8037 cfs with no freeboard.

b. Experience Data. As previously stated, the PA-479 dam is classified as an intermediate size dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass full PMF.

The PMF inflow hydrograph for the reservoir was determined using the Dam Safety Version of the HEC-1 computer program, developed by the Hydrolgoic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer input are presented in Appendix D. The PMF inflow hydrograph was found to have a peak flow of 3081 cfs. The computer outputs are also included in Appendix D.

c. Visual Observations. As observed during the inspection and as reported from previous investigations, the potential exists for the emergency spillway to be blocked (completely or partially) by a slope failure above the spillway. Such a failure would be more likely to occur during heavy rainfall conditions requiring discharge through the spillway.

d. Overtopping Potential. The PMF inflow hydrograph was routed through the reservoir, and it was found that the dam can pass the PMF without overtopping. To obtain an upper bound on the maximum pool level during the passage of PMF, the spillway discharge rating was conservatively based on a rectangular cross section, with the base of the rectangle taken equal to the base of the trapezoidal emergency spillway cross section.

e. Spillway Adequacy. The spillway capacity (greater than 100 percent PMF) is classified to be adequate according to the recommended criteria.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the stability of the embankment. However, it should be noted that since the dam is a flood control facility, it impounds a relatively small reservoir under normal operating conditions relative to its full storage capacity. Therefore, the dam was not subjected to its maximum loading conditions on the date of inspection.

The wet area on the downstream slope is not considered to be significant relative to the overall stability of the embankment at this time.

(2) Appurtenant Structures. Performance of the appurtenant structures is considered to be satisfactory at this time. However, a potential exists for blockage of the emergency spillway with sliding material from the adjacent slope.

b. Design and Construction Data

(1) Embankment. *Available information* indicates that the stability of the dam was analyzed for steady-state seepage and rapid drawdown conditions using the modified Swedish circle slope stability analysis procedures. The minimum factor of safety was reported to be 1.77 for the steady-state seepage stability of the downstream slope and 1.48 for the rapid drawdown condition of the upstream slope. Strength parameters were obtained from consolidated-undrained triaxial shear tests. Construction progress reports indicate that the dam was constructed under the supervision of an SCS field representative and the earthwork was monitored by field density tests.

(2) Appurtenant Structures. Review of the design drawings indicates that there are no apparent structural deficiencies that would significantly affect the performance of the appurtenant structures other than the potential slope stability problem in the emergency spillway.

c. Operating Records. There are no operating records kept for the dam.

d. Post-Construction Changes. The only post-construction activity reported at the dam site was the excavation of the slide adjacent to the emergency spillway.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam is considered to be adequate. Therefore, based on the recommended criteria for the evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that the PA-479 dam is in good condition. No conditions were observed that would significantly affect the overall performance of the structure at this time. However, as previously noted, the dam was not inspected under its maximum loading condition.

A wet area observed at the downstream face of the dam is not considered to be significant relative to the overall performance of the dam at this time. However, this area should be periodically observed to determine if a seepage condition is developing.

The slope adjacent to the emergency spillway should be stabilized to prevent a slide from developing which would block the spillway.

The capacity of the spillway was found to be adequate according to the recommended criteria.

b. Adequacy of Information. Available information in conjunction with the visual observations and the previous experience of the inspectors are considered to be sufficient to make a reasonable assessment of the condition of the dam.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Data. No additional data are considered required at this time.

7.2 Recommendations/Remedial Measures. It is recommended that:

1. The slope adjacent to the emergency spillway should be stabilized to prevent development of a slide which would block the spillway.

2. The wet area located on the downstream slope should be periodically observed to document if a seepage condition is developing. Necessary remedial work should be performed if such conditions develop.

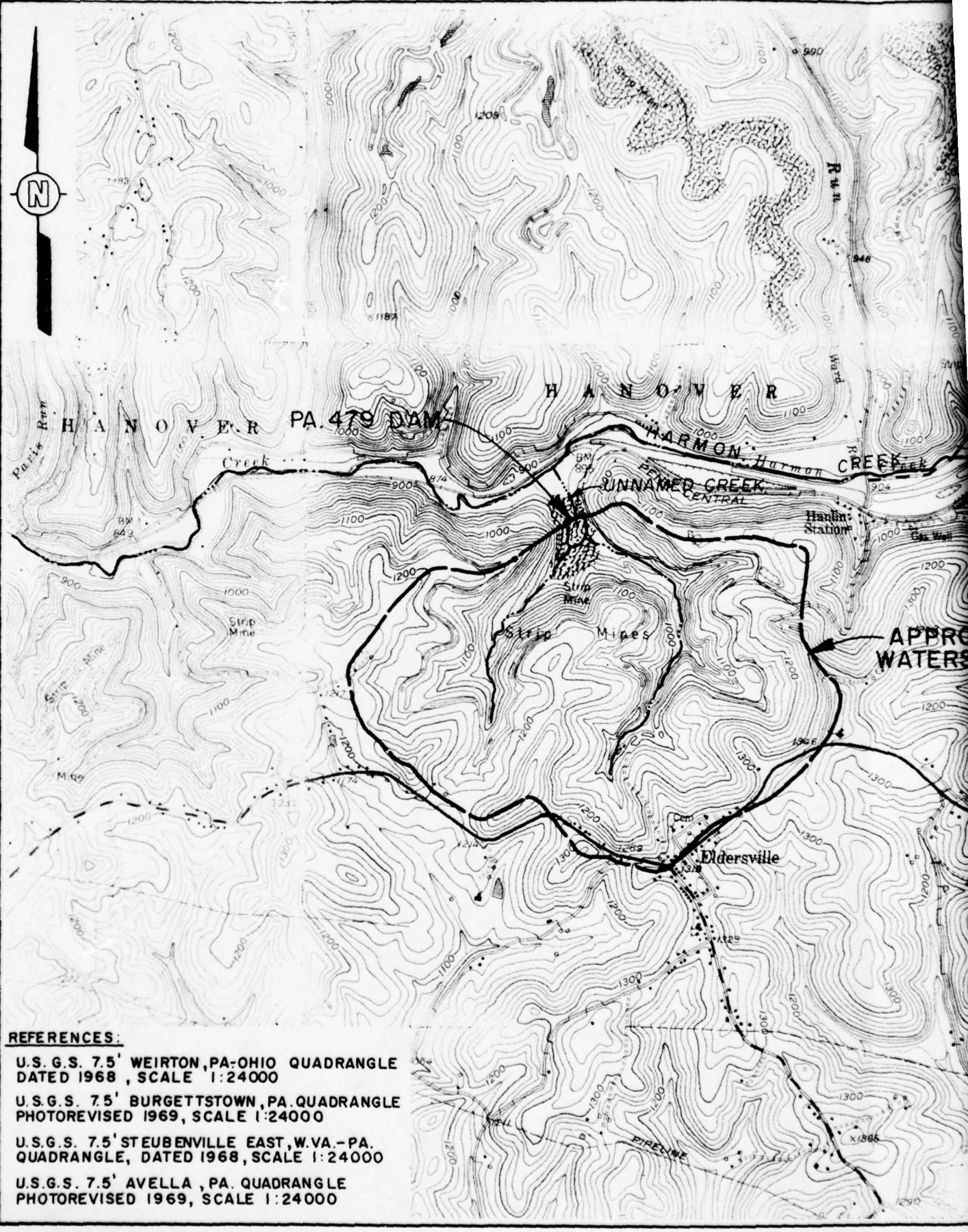
3. An around-the-clock surveillance should be provided during unusually heavy runoff and

a formal warning system should be developed to alert the downstream residents in the event of an emergency.

4. The dam and appurtenant structures should continue to be inspected regularly and necessary maintenance should be performed.

PLATES

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
ACS 1-3-79	BE	JMD	78-367-B52



REFERENCES:

U.S. G.S. 7.5' WEIRTON, PA-OHIO QUADRANGLE DATED 1968, SCALE 1:24000

U.S.G.S. 7.5' BURGETTSTOWN, PA. QUADRANGLE PHOTOREVISED 1969, SCALE 1:24000

U.S.G.S. 7.5' STEUBENVILLE EAST, W.VA.-PA. QUADRANGLE, DATED 1968, SCALE 1:24000

U.S.G.S. 7.5' AVELLA, PA. QUADRANGLE PHOTOREVISED 1969, SCALE 1:24000

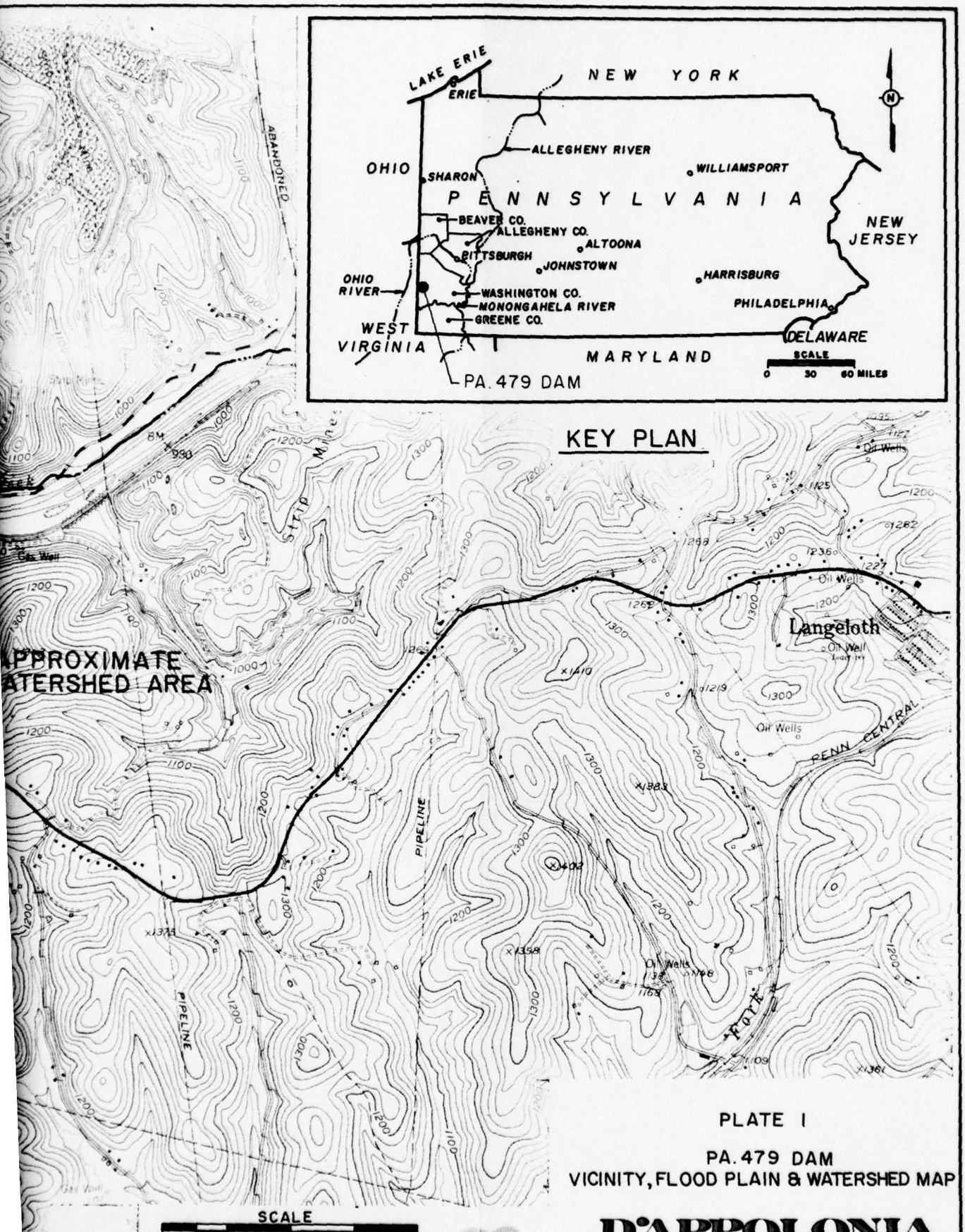
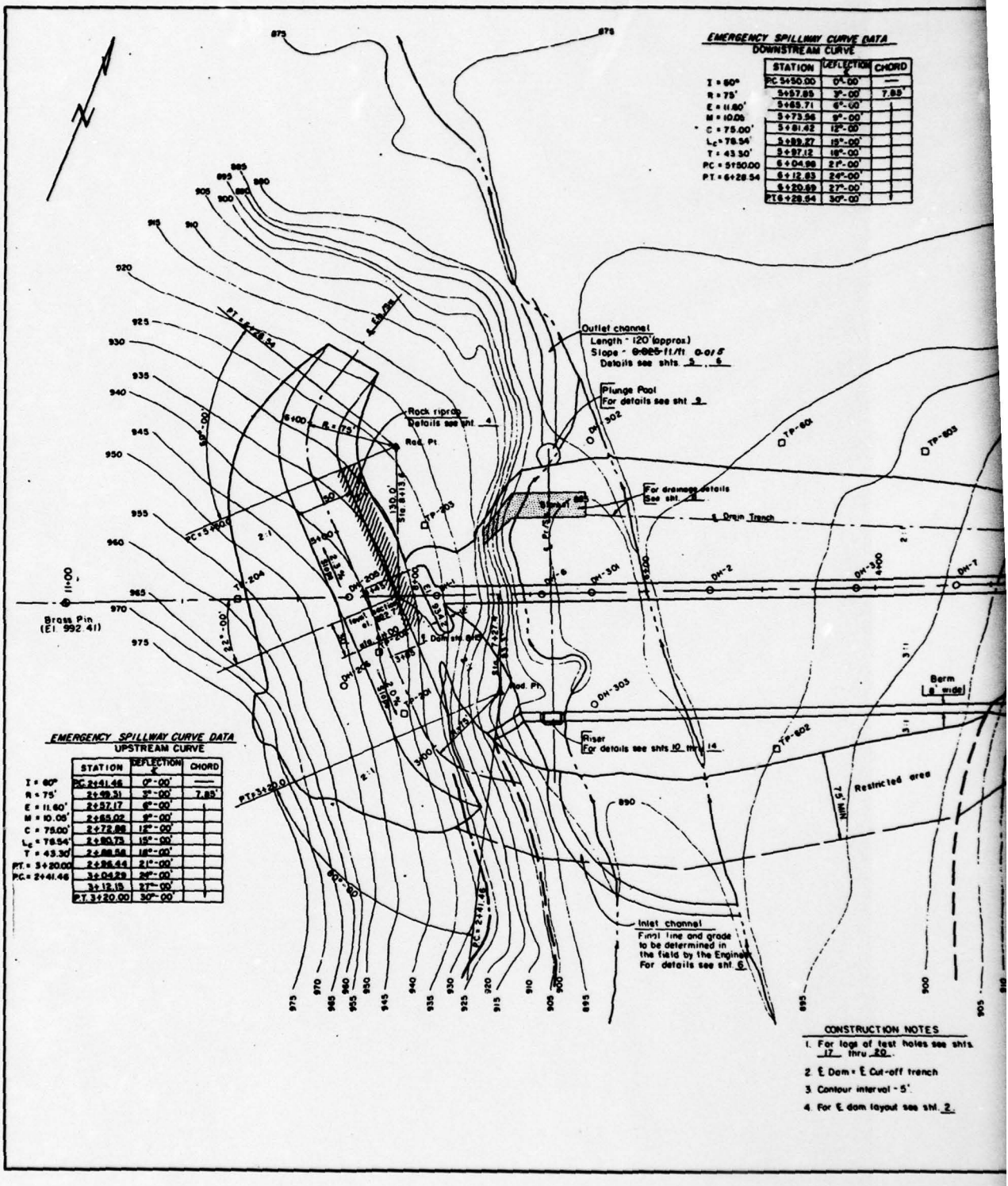


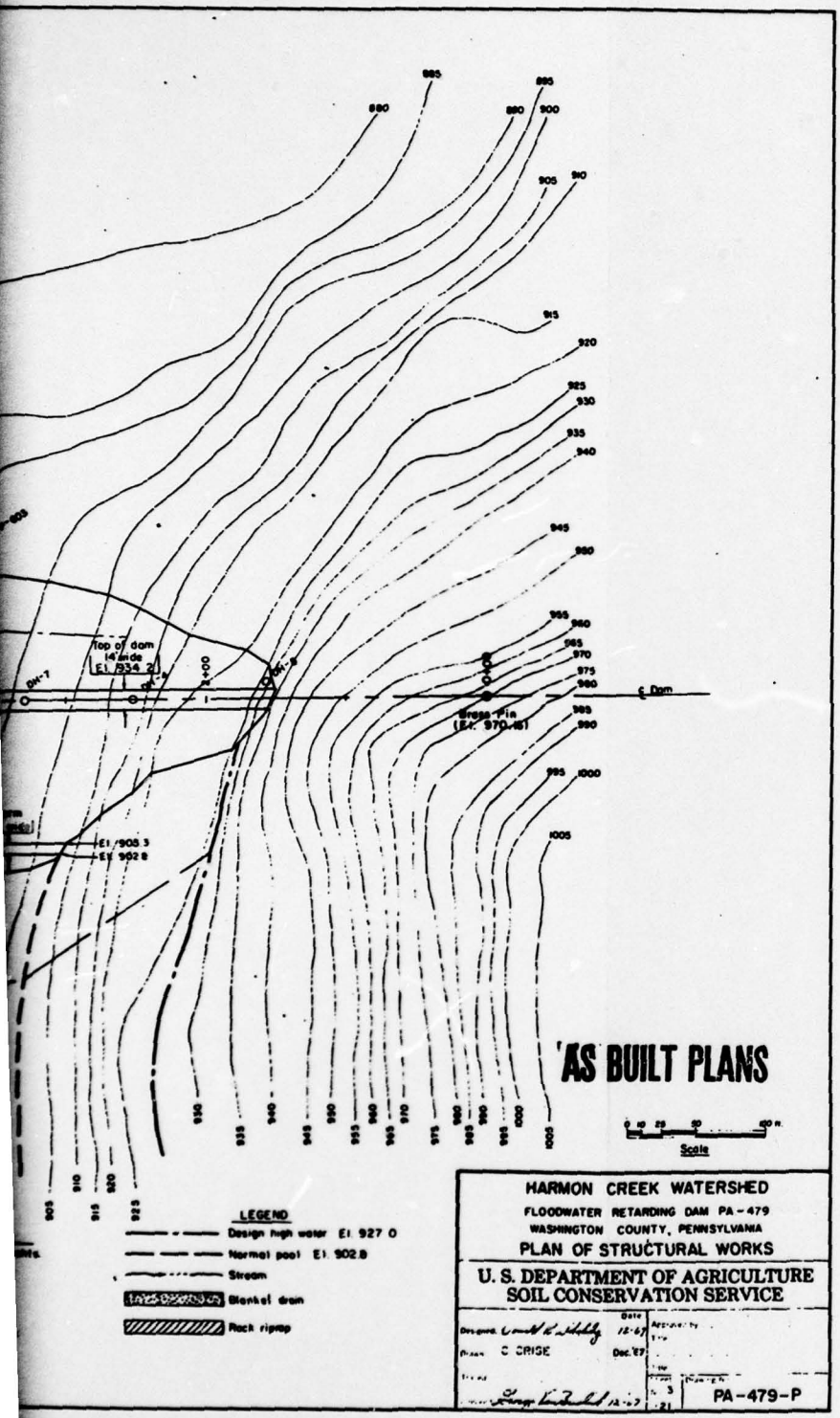
PLATE 1

PA. 479 DAM
VICINITY, FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	RE	4/1/77	DRAWING NUMBER 78-367-B53
	1-4-79	APPROVED BY	JHP	3.1.79	





'AS BUILT PLANS

Scale

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-479
WASHINGTON COUNTY, PENNSYLVANIA
PLAN OF STRUCTURAL WORKS

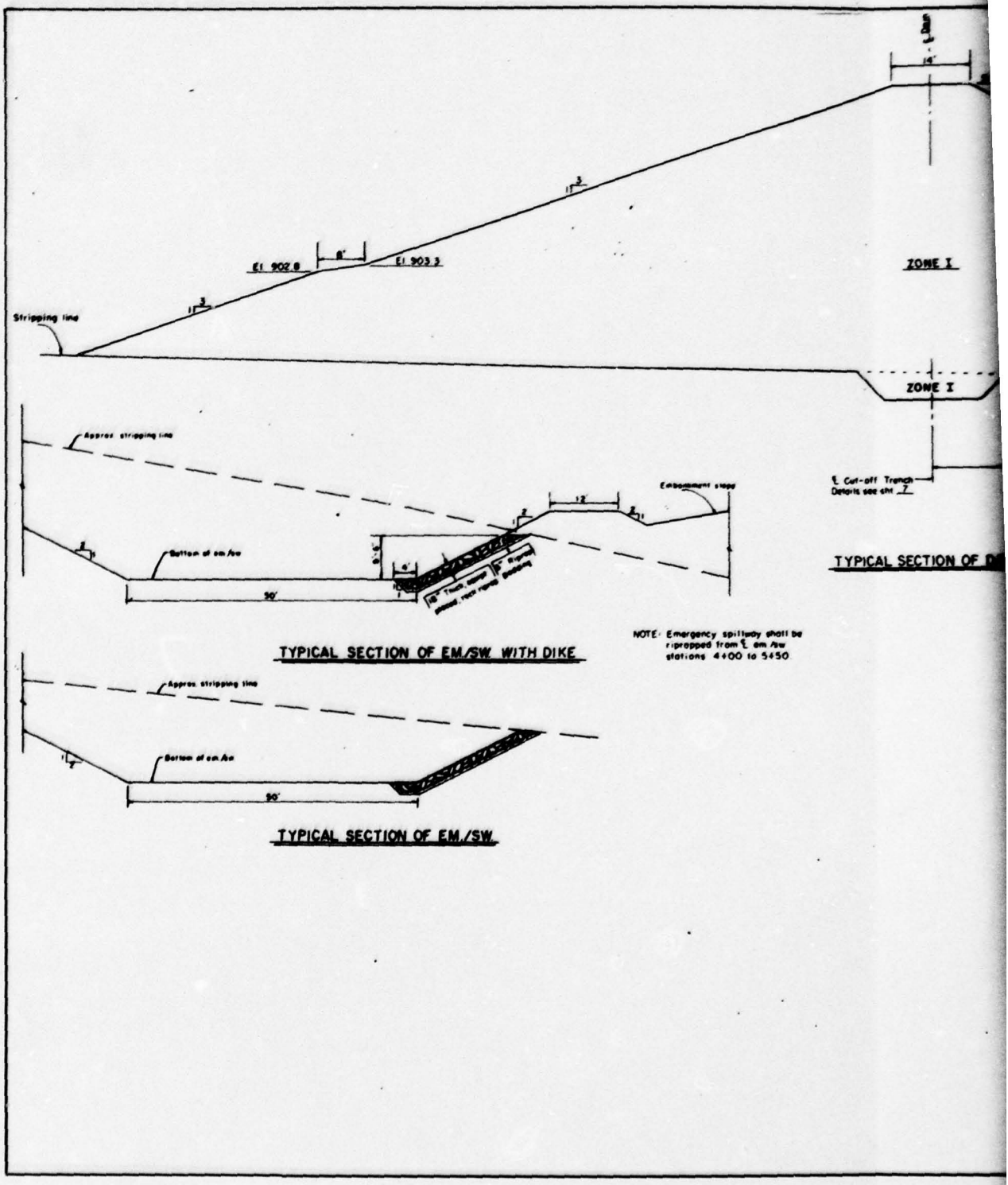
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

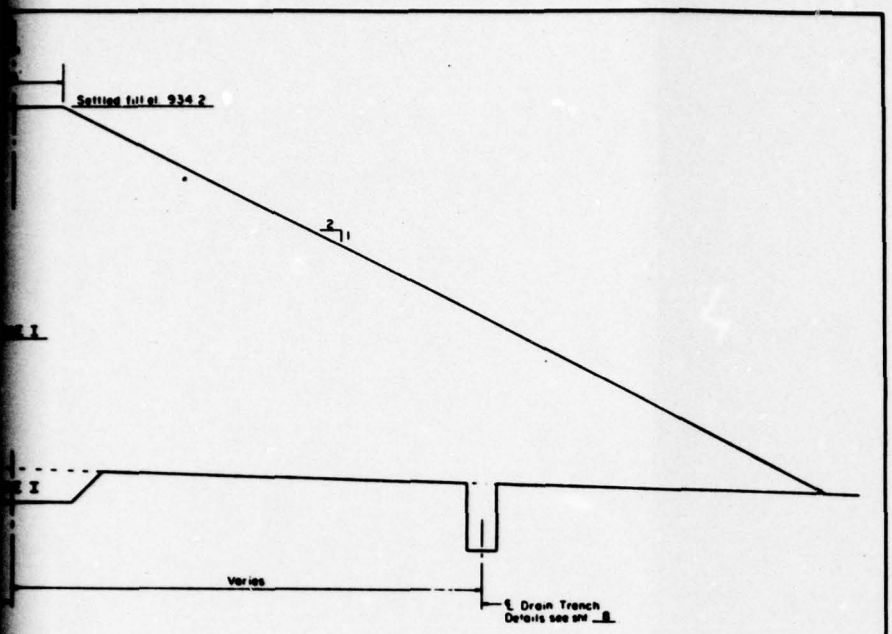
Designed [illegible] 12-67
Drawn C. DRISE Dec. '67
Traced [illegible] 12-67
Sheet No. 3 of 21
PA-479-P

PLATE 2

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	BE	8/1/79	DRAWING NUMBER 78-367-B54
	1-4-79	APPROVED BY	JMD	3.1.79	





ION OF DAM

CONSTRUCTION NOTES

1 Constructed slopes are
2.91 : 1 upstream
1.94 : 1 downstream

2 For constructed fill elevations see sht 7

ZONE	MATERIAL	MAX [1] ROCK SIZE	MAX. LIFT THICKNESS [2]	REQUIRED [3] WATER CONTENT	COMPACTION [4] CLASS	COMPACTION [4] DEFINITION
I	Material as represented by TP 102.1, depth 4-5.5' classified as CL; by TP 118.1, depth 1.5-3' classified as CL.	6"	9"	Optimum +4 % 0 %	A	95% Max. dens.†, by A.S.T.M. D698 Method 'A'

[1] For fill adjacent to structures, max rock size = 3"
[2] Maximum permissible lift thickness before compaction
[3] Water content of fill matrix at time of compaction
[4] For typical compaction curves, see sht 21

AS BUILT PLANS

0 2 5 10 20
SCALE in FEET

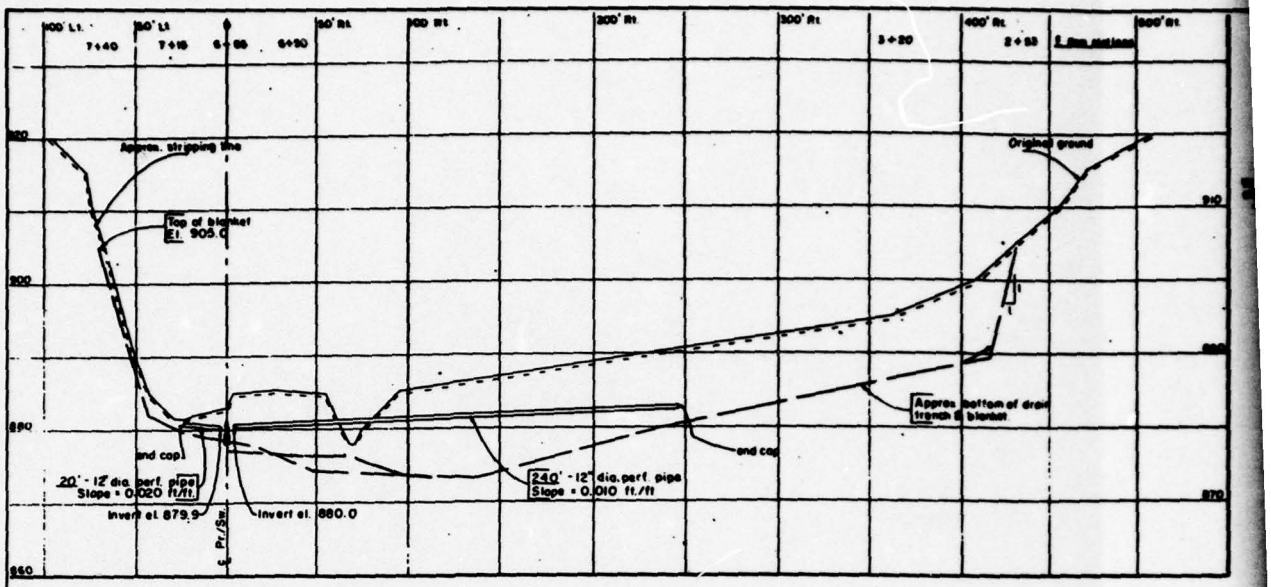
HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-479
WASHINGTON COUNTY, PENNSYLVANIA
FILL PLACEMENT
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PA-479-P

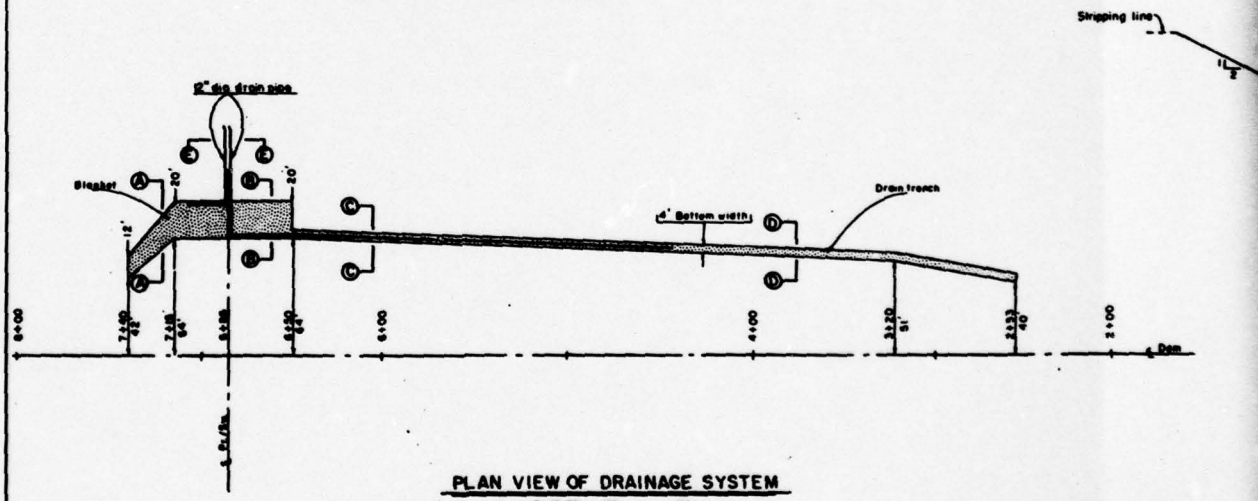
PLATE 3

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	BC	3/1/79	DRAWING NUMBER	78-367-B55
	1-4-79	APPROVED BY	JMP	3.1.79		



PROFILE ALONG ℄ DRAIN TRENCH & UPSTREAM EDGE OF BLANKET



PLAN VIEW OF DRAINAGE SYSTEM

0 10 20 40 80

SCALE in FEET

CONSTRUCTION NOTE

All drain pipe shall be 12" dia., class I, shape I, type D, 16 gage (material spec. 1110)

QUANTITY SUMMARY

2	12' sections of 12" dia. perf. pipe
30	10' sections of 12" dia. perf. pipe
2	10' sections of 12" dia. non-perf pipe
2	90° elbows (1'x 1-1/2')
2	End caps
2	Small animal guards details see sht 16
349'	Total

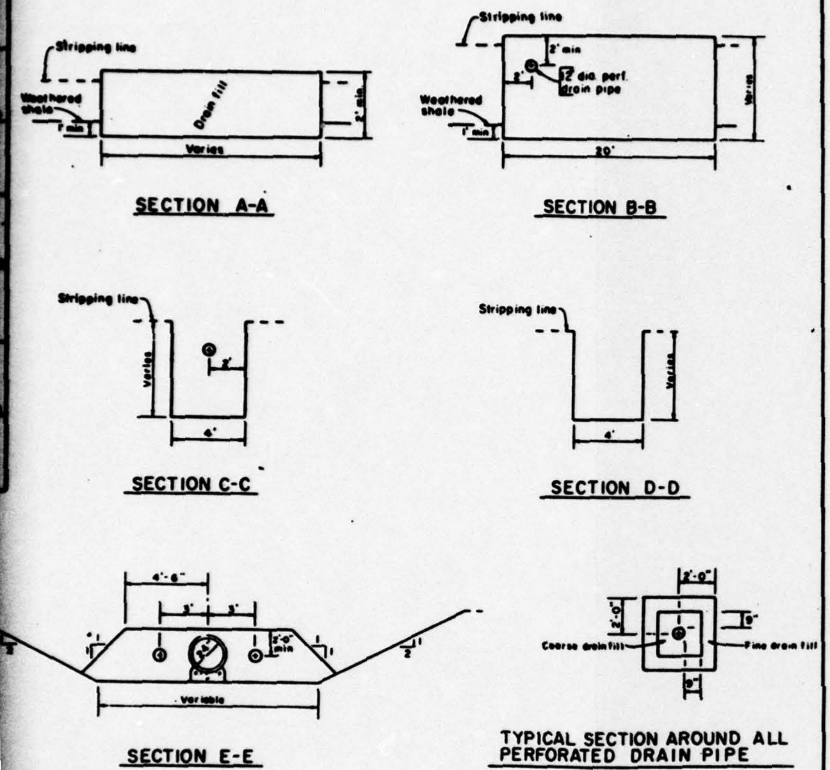
GRADATION LIMITS FOR DRAIN FILL

FINE DRAIN FILL

Sieve No.	% Passing (based on dry weight)
1/2"	100
3/8"	96 - 100
no. 4	82 - 100
no. 8	64 - 94
no. 16	42 - 82
no. 30	22 - 62
no. 50	6 - 38
no. 100	0 - 17
no. 200	< 5

COARSE DRAIN FILL

Sieve No.	% Passing (based on dry weight)
3"	100
1-1/2"	87 - 100
1"	63 - 100
1/2"	24 - 72
3/8"	12 - 53
no. 4	0 - 19
no. 8	< 8



SECTIONS NOT TO SCALE

AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA - 479
WASHINGTON COUNTY, PENNSYLVANIA

DRAINAGE DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

C. CRISE 10-67

PA-479-P

PLATE 4

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	BE	3/1/77	DRAWING NUMBER	78-367-B56
	1-4-79	APPROVED BY	JMP	3.1.79		

BH 1, ELEV. 911.3, 1+90, Centerline
Logged by: R. C. Hirnisey 6/16/66
Drilling Equipment: Sprague & Henwood 30C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type	SAMPLES From Ft.	To Ft.	% Rec.
0.0	0.4	Forest litter, roots, etc.		2-3-4-7	SpT	1	Jar	0.0	2.0	100
0.4	7.0	Clay, sand with gravel, cobbles, brn to red-brn, moist, average composition, 10% sandstone, cobbles (3-8"), 10% gravel, 30% sand, fines are plastic, from 0.5 to 2.0' gravel up to 25%, gravel and sand nondurable, some coal particles noted	CL	18-18-13-10	"	2	"	2.0	4.0	10
				9-12-15-17	"	3	"	4.0	6.0	50
				24-18-22	"	4	"	6.0	7.5	45
				27-36-64	"	5	"	7.5	9.0	50
					Tri.			9.0	9.5	0
				40-56-74	"	6	Jar	9.5	11.0	100
					Tri.			11.0	11.3	0
					NQ1			11.5	15.0	80
7.0	8.7	Sand, gravel with clay and cobbles, brn, moist, 25% gravel, 30% sand, 15% small cobbles, fines are plastic, coarse particles are nondurable.	SC		"			15.0	18.0	70
					"			18.0	23.0	60
					"			23.0	28.0	55
					"			28.0	29.5	20
					"			29.5	33.0	40
8.7	27.0	Clay, shale, grn-gry and dk. gry to black 18.0-21.0', from 8.7 to 18.0 shale laminated and readily breaks down to CL with 10% gravel, 30% sand, from 18.0 to 18.6 shale thin bedded, very soft, easily broken and molded with fingers, below 18.6 core can be scratched with fingers, core highly broken in sections with numerous gravel and sand size particles, contains clay strata, core contains vertical fractures, some from staining, shale limy below 25.0', black shaley coal 18.5-18.9'			"			33.0	38.0	95
					"			38.0	39.7	60
					"			39.7	41.5	65
					"			41.5	46.0	75
					"			46.0	51.0	95
					"			51.0	55.0	95
27.0	33.0	Shale, lt. to med. gry, very limy, core highly broken with numerous clay strata noted up to 0.1' thick, core can be barely scratched with fingernail, core recovery very poor this section.								
33.0	54.0	Siltstone, gry, can be scratched with fingernail, core fits fairly well together 33.0-38.0' and 50.0-54.0', remainder of core contains highly broken zones with gravel size pieces, core up to 0.3' long, core readily breaks along smooth horizontal thin bedding planes, highly fractured in zones with some calcite fracture filling below 47.7', some clay strata noted along core, strata up to 0.1' thick, core limy in zones and becomes more limy with depth.								
54.1	55.0	Limestone (Ames), lt. gry, fossiliferous, can be scratched with knife.								
55.0		Bottom of hole - wet hole. WL (5/2/66) 16.9' WL (5/7/66) 17.5' WL (5/9/66) 15.2'								

BH 2, ELEV. 885.7, 1+45, Centerline
Logged by: R. C. Hirnisey 6/6/66
Drilling Equipment: Sprague & Henwood 40C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type	SAMPLES From Ft.	To Ft.	% Rec.
0.0	0.5	Forest litter, roots, etc.		1-4-8	SpT	1	Jar	0.0	1.5	85
0.5	1.5	Gravel, sand with clay, brn, moist, approx. 15% small cobbles, 35% gravel, 20% sand, 30% plastic fines.	GC	5-8-10	"	2	"	1.5	3.0	95
				6-10-17	"	3	"	3.0	4.5	100
				18-20-22	"	4	"	4.5	6.0	100
				5-7-10	"	5	"	6.0	7.5	70
1.5	2.7	Clay, sand, brn, moist, trace of gravel, 20% sand, fines are plastic, contains some highly weathered particles.	CL	20-12-11	"	6	"	7.5	9.0	80
				5-12-10	"	7	"	9.0	10.5	85
				10-15-96	"	8	"	10.5	12.0	85
					NQ1			12.0	15.0	20*
2.7	5.4	Sand, gravel with clay and cobbles, brn, moist, approx. 10% cobbles (3-8"), 25% gravel, 30% sand, 35% plastic fines, coarse particles are fairly well-graded, platy and subround, grades into CL.	SC	22-36-38	SpT	9	Jar	15.0	16.5	85
				30-36-43	"	10	"	16.5	18.0	85
				15-38-38	"	11	"	18.0	19.5	80
				20-22-25	"	12	"	19.5	21.0	80
				26-30-38	"	13	"	21.0	22.5	85
				17-22-35	"	14	"	22.5	24.0	85
				26-31-38	"	15	"	24.0	25.5	90
5.4	7.5	Clay, sand with gravel, brn, moist, 10% gravel, 25% sand, fines are plastic.	CL	17-22-27	"	16	"	25.5	27.0	85
				30-30-45	"	17	"	27.0	28.5	85
				25-100	"	18	"	28.5	29.5	100
7.5	23.5	Sand, clay with gravel and cobbles, brn to gru-gry, moist to wet, average composition, approx. 10% small cobbles, 20% gravel, 25% sand, 30% plastic fines, coarse particles are fairly well-graded, sandstone and shale, platy and subround, limy from approx. 9.0', contains some highly weathered coal particles, grades into CL below.	SC		NQ1			29.5	34.5	48
					"			34.5	38.0	45
					"			38.0	41.0	70
					"			41.0	45.0	80
23.5	28.5	Clay, sand with gravel, brn, wet, some of cobbles, 15% gravel, 25% sand, 35% plastic fines, limy.	CL							
28.5	48.0	Clay, shale, red-brn to gru-gry, wet, first foot highly weathered to CL with 30% sand and moderately plastic fines, very limy to 41.0' and limy in sections to bottom of hole, rock easily scratched with knife, contains clay strata conglomerate with sand and gravel size inclusions, core shows pitting from weak areas, core highly fractured, occasional gravel size pieces to 40.0', cored pieces up to 0.4' long, contains vertical fractures.								
48.0		Bottom of hole - wet hole. WL (5/5/66) 7.0' WL (5/6/66) 7.2'								

*Sample recovered with spoon

BH 3, ELEV. 892.7, 0+17, Centerline
Logged by: R. C. Hirnisey 5/6/66
Drilling Equipment: Sprague & Henwood 30C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type
0.0	0.5	Forest litter, roots, etc.		1-5-5	SpT	1	Jar
0.5	33.0	Sand, gravel with clay & cobbles, brn; gry-grn & brn below 12.0', moist & wet from 13.0', average composition, trace to 10% small cobbles, 20% gravel, 35% sand, fines are plastic, limy below 11.5', coarse particles are platy to subround, sandstone & shale, durable to nondurable, particles are fairly well-graded, contains some highly weathered coal particles, contains some thin lenses of CL with 20% sand, grades into CL below	SC	4-7-5-5	"	2	"
				5-7-5	"	3	"
				3-4-5	"	4	"
				5-6-5	"	5	"
				5-5-7	"	6	"
				5-6-8-8	"	7	"
				4-7-5-5	"	8	"
				11-16-23	"	9	"
				21-23-27-31	"	10	"
				33-36-52-54	"		
					Tri.		
				8-13-18-18	SpT	11	"
				16-17-20-21	"	12	"
				7-70-26-15	"	13	"
				15-16-17-22	"	14	"
				15-17-17-21	"	15	"
				14-21-27-15	"	16	"
33.0	35.7	Clay, sand with gravel, brn, wet, trace of cobbles, 15% gravel, 25% sand, 55% plastic fines, limy.	CL	14-15-16-19	"	17	"
				16-19-32-32	"	18	"
				16-21-21-22	"	19	"
				32-90	"	20	"
35.7	37.2	Clay, sandy, gry to red-brn wet, 20% fine sand, fines are plastic, limy, highly weathered bedrock.			NQ1		
37.2	45.5	Clay, shale, red-brn & grn-gry, wet, can be scratched with fingernail (some sections easily scratched), limy, conglomerate with sand and gravel size inclusions, thin clay strata, vertical fractures, core pieces up to 0.5' long with broken zones along core with sand and gravel pieces, slicken sides noted at 41.4', 10° dip to horizontal, planes of weakness in the rock noted in both horizontal and vertical directions.					
45.5		Bottom of hole - wet hole WL (5/8/66) 13.7 WL (5/9/66) 13.7'					

BH 3A, ELEV. 892.7, 0+27, Centerline

0.0	10.0	Earth boring			Tri.	0.0	10.0
10.0	12.5	Attempted denison sample, no recovery					
12.5	15.0	Attempted denison sample, hole caved from 9.0', no recovery					
15.0		Bottom of hole - wet hole					

BH 4, ELEV. 907.3, 2+51, Centerline
Logged by: R. C. Hirnisey 5/8/66
Drilling Equipment: Sprague & Henwood 40C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type
0.0	0.4	Forest litter, roots, etc.		4-6-12	SpT	1	Jar
0.4	4.5	Clay, sand with gravel, red-brn, to gry-brn, 10% fine gravel, 25% sand fines are plastic, coarse particles are platy and nondurable, some thin coal beds noted 3.0-4.5'.	CL	5-6-10	"	2	"
				17-20-22	"	3	"
				5-11-16	"	4	"
				8-10-18	"	5	"
				10-17-27	"	6	"
				50-70-122	"	7	"
					NQ1		
4.5	13.2	Clay, sandy, gru-gry, moist to wet at 20% sand, fines are moderately plastic, some bedding apparent, highly weathered shale, limy, cored from 10.5'.	CL		"		
13.2	24.0±	Clay, shale, gru-gry to 20.0', sad. gry to 24.0', can be easily scratched with fingernail, limy along some seams, cored pieces up to 0.3' long, core is highly broken with numerous zones, contains vertical fractures and thin clay strata, some fractures noted.					
24.0±	26.0±	Limestone, lt. gry, limy, fossiliferous, easily scratched with fingernail, cored pieces up to 0.2' long, core highly broken with clay seams.					
26.0±	34.0	Clay, shale, gry to gru-gry, can be scratched with fingernail, cored pieces up to 0.4' long, highly broken zones along core with gravel and sand size pieces, contains some clay strata, contains some vertical fractures, some fractures obtaining noted along some fractures and bedding planes, core readily breaks along thin bedding planes, limy, core appears to be less weathered bottom of hole					
34.0		Bottom of hole - wet hole. WL (5/12/66) 10.5' WL (5/13/66) 16.8' WL (5/20/66) 14.9'					

BH 5, ELEV. 928.2, 1+55, 10' D.S.
Logged by: R. C. Hirnisey 5/12/66
Drilling Equipment: Sprague & Henwood 40C

Hole Depth From	To	Description of Materials	Type Bit Used	From Ft.	To Ft.
		Approx. 3.0' of red clay shale removed in digging set up for drill rig.			
0.0	14.5	Clay, shale, red-gry to 10.5', gru-gry with some red brn 10.5 to 13.5', can be barely scratched with fingernail, very highly broken to 5.5', with highly broken zones along remainder of this section, hole caving through this section, cored pieces up to 0.6' long, thin bedded, approx. 0.03' thick, core readily breaks along the smooth horizontal bedding planes, some clay strata, some vertical fractures and iron staining noted.	Rec.	0.0	1.5
			"	1.5	3.0
			"	3.0	4.5
			NQ1	4.5	9.5
			"	9.5	10.5
			"	10.5	14.5
			"	14.5	24.5
			"	24.5	29.5
			"	29.5	34.5
				34.5	39.5
				39.5	44.5

Continued

SAMPLES		
From Ft.	To Ft.	% Rec.
0.0	1.5	55
1.5	3.0	70
3.0	4.5	65
4.5	6.0	80
6.0	7.5	35
7.5	9.5	50
9.5	11.5	95
11.5	13.0	65
13.0	15.0	55
15.0	17.0	50
17.0	18.0	0
18.0	20.0	55
20.0	22.0	65
22.0	24.0	55
24.0	26.0	60
26.0	28.0	55
28.0	30.0	55
30.0	32.0	15
32.0	34.0	35
34.0	36.0	40
36.0	37.0	80
37.0	40.5	75
40.5	45.5	90

...ate containing
...ures, cored
...d gravel size
...s of weakness

GC

SAMPLES		
From Ft.	To Ft.	% Rec.
0.0	1.5	95
1.5	3.0	80
3.0	4.5	60
4.5	6.0	80
6.0	7.5	60
7.5	9.0	75
9.0	10.5	95
10.5	13.5	45
13.5	15.0	80
15.0	20.0	75
20.0	25.0	60
25.0	28.0	100
28.0	31.0	90
31.0	34.0	90

...erous gravel
...e iron staining

...with fingernail,

...ed pieces
...nd size
..., iron
...ly broken
... bottom 2.0'

To Ft.	% Rec.
1.5	15
3.0	55
4.5	60
4.5	100
..5	95
..5	80
..5	75
..5	80
..5	85
..5	95

DH 5 Cont'd

Hole Depth From	To	Description of Materials	Type Bit Used	From Ft.	To Ft.	% Rec.
14.5	22.5	Clay shale, gry to grn-gry, easily scratched with fingernail, cored pieces up to 0.5' long, below 17.0' core very highly broken with some broken zones 1?.5-1?.0', thin bedded. Some vertical fractures, iron staining noted along bedding planes.	NX?	39.5	4?.5	50
			"	4?.5	47.5	?0
			"	47.5	50.5	100
			"	50.5	55.5	?0
			"	55.5	60.5	5
22.5	26.5	Shale-coal, black, easily scratched with fingernail, highly weathered and broken, clay seams, limy from 25.0', some iron staining.				
26.5	58.0	Clay shale, gry to grn-gry, red-brn 35.0-36.5', can be scratched with fingernail, core very highly broken with clay strata to 2?.0' and in zones 36.5 to 45.5'. Below 45.5 core shows some broken zones with some clay strata, especially from ??.?-5?.1', 5?.1-55.0', and 5?.?-5?.?'. and it appears to be less weathered. Core pieces 55.5-58.0' 0.05 to 0.5' long with one piece 1.5' long, rock is thin bedded approx. 0.02' thick, vertical fractures present, iron staining noted to 40.0', some calcite fracture filling, core is limy 26.5-45.0 and 46.5-58.0 limy in zones, planes of weakness appear in core horizontally along bedding planes and vertical along small fractures.				
58.0	59.5	Limestone, lt. gry, fossiliferous, very limy, can be scratched with knife, trace of coal at 5?.5' with clay strata.				
59.5	60.5	Clay-shale, med. gry, can be barely scratched with fingernail, clay strata at top, limy, thin bedded-0.025' thick.				
60.5		Bottom of hole - wet hole WL (?/20/66) ?.0'				

DH 6, ELEV. 8??.6, 6+8?.5, Centerline
Logged by: ?. G. Hirnisey ?/1?/66
Drilling Equipment: Sprague & Henwood ?0C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	SAMPLES No.	Type	From Ft.	To Ft.	% Rec.
0.0	0.5	Forest litter, roots, etc.		1-1-1-1	Spl	1	Car	0.0	2.0	15
0.5	2.0	Clay, sandy, brn, moist, trace of gravel, 20 sand, fines are moderately plastic, grades into GC below.		1-?-?-11?	"	2	"	2.0	?.0	55
					Ice.			?.?	?.?	6?
					NXT			5.?	10.0	?
					"			10.0	15.0	7?
2.0	3.5	Gravel, sand with clay, brn, wet, trace of cobbles, ?0 gravel, 25 sand, ?0 plastic fines, coarse particles are subround and fairly well-graded sandstone.			"			15.0	20.0	??
					"			20.0	25.0	100
3.5	10.2	Shale, clay, med. to dk. gry, can be scratched with fingers (some easily scratched), some zones are limy. Core highly broken with clay strata. Pieces up to 0.25' long, core contains vertical fractures with iron staining.								
10.2	12.0±	Limestone, (Ames Formation), lt. gry, can be scratched with knife, cored pieces up to 0.5' long, fossiliferous.								
12.0±	25.0	Clay-shale, gry to grn-gry, red-gry from 1?.8 to 21.8', can be barely scratched with knife, limy, contains clay strata, some vertical fractures, no iron staining noted this section, cored pieces up to 0.7' long, some broken zones along core to 22.8', below 22.8' core fits fairly well together.								
25.0		Bottom of hole - wet hole WL (/21/66) 1.5'								

DH 7, ELEV. 896.?, 3+30, Centerline
Logged by: R. G. Hirnisey ?/20/66
Drilling Equipment: Sprague & Henwood

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	Type Bit Used	From Ft.	To Ft.	% Rec.
0.0	5.0	Estimated to be similar to DH #?,0.? to ?.5', clay, sand with gravel, red-brn, 10% gravel, 25% sand, 65% plastic fines	CL	Tri.	?.?	12.5	
				Sp?	12.5	1?.?	?0
				Tri.	14.?	?1.?	
5.0	23.0	Estimated to be similar to SC in DH #2, 7.5 to 23.5' and DH #3, 0.5 to 13.0', sand, clay with gravel, moist and wet, brn, 20% gravel, 35% sand, 10% cobbles and 35 plastic fines, SPT sample 12.5 to 1?.? confirms estimate.	SC	NX?	?0.?	?2.?	5?
				"	?2.?	47.?	?
				"	?7.?	?2.?	?

Continued

See note, sht 21

HARMON CREEK WATERSHED

FLOODWATER RETARDING DAM PA-479

WASHINGTON COUNTY, PENNSYLVANIA

LOGS OF DRILL HOLES AND TEST PITS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed ...R. Hirnisey...	Date ?-67	Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. 17 of 21	Drawing No. PA-479-P

PLATE 5

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY		3/1/83	DRAWING
	1-4-79	APPROVED BY	JMD	3.1.83	NUMBER 78-367-B57

DH 7 Cont'd

21.0	40.0	Highly weathered bedrock, clay with sand and gravel, gry, wet. Thin black coal-shale noted in wash water at 25.0'.
40.0	46.0	Clay shale, grn-gry, very highly weathered, easily scratched with fingernail, limy, clay strata, very poor recovery.
46.0	42.0	Clay stone, med. gry, some red-gry, 41.3 to 42.0', can be scratched with knife, cored pieces up to 0.7' long, below 38.6' core fits fairly well together with some broken and clayey zones, some iron staining to 37.5', some clay strata.
42.0		Bottom of hole - wet hole WL (7/22/66) 17.6'

DH 701, ELEV. 845.7, 6+45, Centerline
Logged by: R. G. Hirmisey 8/30/66
Drilling Equipment: Sprague & Henwood 40C

Hole From	Hole To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type	SAMPLES From Ft.	To Ft.	Rec.
0.0	0.4	Forest litter, roots, etc.		3-5-10	Spr	1	Jar	0.0	1.5	65
0.4	3.1	Clay, sand with gravel, brn, moist, average composition, 15% gravel, 20% sand, fines are plastic, trace of small cobbles, 5 percent of gravel ranges from trace to 25%, coarse particles are moderately durable with some nondurable.	CL	3-6-9	"	2	"	1.5	3.0	65
				5-6-12	"	3	"	3.0	4.5	85
				2-3-5	"	4	"	4.5	6.0	60
				3-4-9	"	5	"	6.0	7.5	80
				3-4-6	"	6	"	7.5	9.0	25
				6-100	"	7	"	9.0	10.0	80
					NX			10.0	11.0	70
3.1	9.9	Sand, gravel with clay, grn, wet, 30% gravel, 35% sand, fines are plastic, coarse particles are fairly well graded and moderately durable.	SC		"			11.0	14.0	100
					"			14.0	17.8	40
					"			17.8	21.0	85
					"			21.0	26.0	100
					"			26.0	30.5	90
9.9	14.0	Limestone (Ames Formation), lt. gry, can be scratched with knife, fossiliferous. Contains clay and coal seams, core is highly broken to 11.0', pieces up to 0.9' long, clay strata up to 0.2' long.			"			30.5	38.5	100
14.0	38.5	Clay shale, lt. to med. gry, 14.0-19.5' and 22.3-25.8', red-brn to grn-gry remainder of core, limy, conglomerate with sand and gravel size inclusions, core contained clay strata and highly broken zones, below 38.5' core fits fairly well together, slicken sides noted at 26.0' dipping 50% from horizontal, cored pieces up to 0.5' long, core can be easily scratched with knife.								
38.5		Bottom of hole - wet hole AL (9/2/66) 5.5' WL (9/7/66) 2.6'								

DH 702, ELEV. 881.3, 6+45, 130' U.S.
Logged by: R. G. Hirmisey 9/1/66
Drilling Equipment: Sprague & Henwood 40C

Hole From	Hole To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type	SAMPLES From Ft.	To Ft.	Rec.
0.0	0.3	Forest litter, roots		2-3-4	Spr	1	Jar	0.0	1.5	55
0.3	3.4	Gravel, sand with clay and cobbles, brn, moist to wet, approx. 15% cobbles, 35% gravel, 25% sand, 25% plastic fines, coarse particles are thin and platy.	GC	4-5-9	"	2	"	1.5	3.0	80
				5-3-2	"	3	"	3.0	4.5	100
				12-20-90	"	4	"	4.5	6.0	100
					NX			6.0	8.0	70
3.4	5.4	Clay, gravel with sand, brn, wet, 20% gravel, 20% sand, fines are plastic, coarse particles are thin and platy.	CL							
5.4	9.0	Limestone, from 5.4 to 6.0' highly weathered to CL with trace of fine gravel and 20% sand, fines are plastic, from 6.0 to 8.0' limestone, lt. gry, limy, can be scratched with fingernail, cored pieces up to 0.15' long with numerous gravel size pieces.								
9.0		Bottom of hole - wet hole WL (9/7/66) 2.5'								

DH 703, ELEV. 887.7, 6+45, 95' U.S.
Logged by: R. G. Hirmisey 9/2/66
Drilling Equipment: Sprague & Henwood 40C

Hole From	Hole To	Description of Materials	Unif. Soil Class Symb.	STANDARD PENETRATION Blows Per 6"	Type Bit Used	No.	Type	SAMPLES From Ft.	To Ft.	Rec.
0.0	0.5	Forest litter, roots, etc.		1-2-2	Spr	1	Jar	0.0	1.5	55
0.5	2.5	Clay, sand, brn to gry, moist to wet, trace of gravel, 20% fine sand, fines are plastic.	CL	4-2-3	"	2	"	1.5	3.0	45
				5-7-10	"	3	"	3.0	4.5	80
				5-7-100	"	4	"	4.5	6.0	100
2.5	4.8	Sand, gravel with clay and cobbles, brn, wet, 10% cobbles, 25% gravel, 35% sand, 30% plastic fines.	SC		NX			6.0	8.0	55
4.8	6.0	Clay, sand with gravel, brn to gry, wet, 10% gravel, 25% sand, fines are plastic, coarse particles are shale.	CL							
6.0	8.0	Shale, gry to grn-gry, wet, can be scratched with fingernail, core pieces up to 0.025' long with numerous gravel size pieces, contains flat smooth bedding planes, bedrock appears to be firm at 7.95', limy.								
8.0		Bottom of pit - wet WL (9/7/66) 2.2'								

TP 801, ELEV. 884.5, 4+80, 125' U.S.

0.0	0.4	Topsoil, roots, etc.
0.4	2.5	Clay, sand with gravel, red-brn, moist, 10% fine gravel, 15% sand, fines are plastic.
2.5	5.0	Gravel, sand with clay, red-brn, moist, wet from approx. 3.5', very slight seepage evident, trace of cobbles, 35% gravel, 20% sand, 40% plastic fines, coarse particles are thin and platy sandstone particles, moderately durable, sandstone can be scratched with knife, This material graded into SC below
5.0	9.5	Sand, gravel with clay, red-brn, wet, slight seepage noted from this horizon, fines noted grading from 40 to 30% 5.0 to 6.0' fines are plastic, trace of sandstone cobbles, 25% gravel, 40% sand, coarse particles thin and platy sandstone and shale, gravel particles are fine to med. with some large, particles are nondurable with some moderately durable.
9.5		Bottom of pit - wet AL (7/19/66) 9.5' WL (7/25/66) 8.0'

SAMPLES No.	Type	From Ft.	To Ft.	Rec.
1	M. Bag			
2	S. Bag			
3	M. Bag			

TP 802, ELEV. 890.5, 4+90, 115' U.S.

0.0	0.5	Topsoil, roots, etc. with some forest litter.
0.5	8.0	Gravel, sand with clay and cobbles, red-brn, moist 0.5 to 5.5', trace of cobbles, 45% gravel, 20% sand, fines are plastic coarse particles are thin and platy moderately durable sandstone with some nondurable shale, 5.5 to 8.0' wet, with lenses of platy cobbles, cobbles about 15% thick. Lenses 0.1' thick of CL containing 85% plastic fines noted between and this material grades into SC proportions at 8.0'.
8.0	10.5	Sand, clay with gravel, red-brn, wet, slow seepage noted in this horiz. Trace of sandstone cobbles (3-8"), 25% gravel, 40% sand, 30% plastic fines gravel particles fine to med. with some large coarse particles thin and platy nondurable shale and sandstone.
10.5		Bottom of pit - Wet

TP 803, ELEV. 891.1, 3+55, 115' U.S.

0.0	0.5	Topsoil, forest litter, roots, etc.
0.5	3.0	Clay, sand with gravel, brn, slightly moist, 10% gravel, 15% sand, fines are plastic.
3.0	6.5	Gravel, clay with sand, red-brn, moist, trace of small cobbles, 35% gravel, 20% sand, 40% plastic fines, coarse particles are moderately durable thin and platy sandstone with some shale, cobbles in thin lenses.
6.5	10.5	Sand, clay with gravel, red-brn, moist, appears to be wet below 8.0', trace of platy cobbles, 20% gravel, 20% sand, 45% plastic fines, coarse thin and platy, nondurable with some moderately durable, gravel is fine to med. with some large, no seepage noted into pit.
10.5		Bottom of pit - wet?

SAMPLES No.	Type	From Ft.	To Ft.	Rec.
1	2 L Bags			

TP 101, ELEV. 937.1, 1+80, 700' U.S.

0.0	0.5	Heavy brush litter, roots with some small blocky boulders, sandstone
0.5	5.5	Clay, sand with gravel, brn, moist, 25 sand, 20 gravel, 55 plastic fines, (average composition). Coarse particles are platy and in random orientation, particles are nondurable shale with some sandstone (highly weathered)
5.5	6.4	Clay, sandy, red, moist, 15 fine sand, fines are plastic
6.4	10.5	Shale, highly weathered, excavates as platy gravel size pieces, shale is thin bedded and ranges from grn-gry to red, particles are nondurable, readily breaks along cleavage and bedding planes.
10.5		Bottom of pit - dry

TP 102, ELEV. 920.6, 1+80, 700' U.S.

0.0	0.5	Topsoil, forest litter, roots, etc.
0.5	12.0	Clay, sand with gravel, brn, moist, 20% gravel, 15% sand, fines are plastic, coarse particles are platy and nondurable shale with some sandstone, trace of small cobbles, micaceous sandstone, material contains some coal particles.
12.0		Bottom of pit - Dry

SAMPLES No.	Type	From Ft.	To Ft.	Rec.
1	2 L Bags			

** TP 103, ELEV. 955.5, 0-20, 700' U.S.

0.0	0.5	Forest litter, roots with a few small sandstone boulders.
0.5	11.0	Clay, gravel with sand, brn with some red 3 to 6', moist, average composition 20% gravel, 15% sand, fines are plastic, coarse particles are thin and platy nondurable shale with some sandstone, trace of small cobbles and boulders, sandstone is moderately durable, cobbles found in thin lenses, test pit, material contains some coal particles.
11.0		Bottom of pit - dry AL (7/22/66) 10.5'

** TP 104, ELEV. 981.0, 0-20, 500' U.S.

0.0	0.5	Topsoil, roots, etc., some small boulders noted.
0.5	6.0	Clay, gravel with sand, brn to red, moist, trace of small sandstone cobbles, 20% gravel, 15% sand, fines are plastic, coarse particles are thin and platy shale with some sandstone, coarse particles are nondurable, easily crushed and broken with fingernail, material contains some coal particles.
6.0	7.5	Gravel, sand with clay, red to gry to yellow, wet from 7.0', highly weathered shale bedrock containing 30 plastic fines, shale particles are thin and platy, easily broken with fingernail, nondurable.
7.5	12.5	Gravel with sand, red to gry, wet, highly weathered shale bedrock, shale readily along bedding and cleavage planes, particles are nondurable, easily scratched with fingernail.
12.5		Bottom of pit - wet AL (7/22/66) 8.0'

** NOTE: TEST PITS ARE 50' TO RIGHT OF E DAM STR 0+00

From	To	
1.0	2.5	
2.5	5.0	
6.0	9.5	

ance ... GC
...es are
...shale, from
...this horizon.
...n cobbles,
...orizon. SC
...ble fines,
...m and

From Ft.	To Ft.	% Rec.
6.5	10.0	

...me
...tic CL
...ble
...ighly
CL
...ale is GP
...le,

From Ft.	To Ft.	% Rec.
1.0	2.5	

...composition, CL
...and
...and small
...ses within

...cobbles, CL
...and platy
...scratched

...weathered GC
...s and

...shale breaks GP
...easily

TP 105, ELEV. 936.8, 0-20, 1100' U.S.

From	To	Description	Class.[4]
0.0	1.0	Forest litter, roots with cinder GM and GP fill	
1.0	11.0	Clay, gravel with sand, cobbles and boulders, red-brn to yellow-brn, moist, appears to be wet below 8.0', boulder, sandstone, highly weathered noted from 1.0 to 5.5', average composition, 10 small boulders, trace of small sandstone cobbles, 20 gravel, 10 sand, fines are plastic, one lens of SC containing "C fines noted along test pit, some coal particles found in this material.	CL
11.0		Bottom of pit - dry WL (7/22/66) dry	

TP 106, ELEV. 900.1, 3+80, 300' U.S.

From	To	Description	Class.
0.0	0.5	Topsoil with some forest litter, roots, etc.	
0.5	4.5	Gravel, sand with clay, red-brn, slightly moist 0.5 to 4.0, moist from 4.0, average composition, trace of cobbles, ?% gravel, 20 sand, fines are plastic, coarse particles thin and platy sandstone with some shale, fine and sand portion of material increases to CL proportions at 4.5', some coal particles within material.	C
4.5	10.5	Clay, sand with gravel, red-brn, moist, appears to be wet from 7.0', no seepage into pit, trace of small cobbles, 15 fine to med. gravel, 30 sand, fines are plastic, coarse particles are thin and platy and nondurable.	CL
10.5		Bottom of pit - wet? WL (7/22/66) dry	

TP 107, ELEV. 903.?, 3+80, 500' U.S.

From	To	Description	Class.
0.0	0.5	Topsoil, roots with some forest litter.	
0.5	10.0	Clay, gravel, sand with cobbles and boulders, red-brn, slightly moist to 3.0', moist 3.0 to 6.5', wet 6.5 to bottom of hole, average composition for entire hole, trace of boulders, 10% cobbles, 25% gravel, 15% sand, fines are plastic, below 8.0' pit contained 10 small boulders and 15 small cobbles-sandstone, with lenses of CL with 85% fines and SC	CL
10.0		Bottom of hole - wet WL (7/22/66) 7.5'	

TP 108, ELEV. 910.7, 5+80, 700' U.S.

From	To	Description	Class.
0.0	0.5	Forest litter, roots, etc.	
0.5	5.0	Clay, gravel and sand, red, brn, slightly moist to 3.5', moist below 3.5' average composition, 1?% gravel, 15% sand. Fines are plastic, gravel is fine to med.	CL
5.0	11.0	Clay, sand and gravel with cobbles, red-brn with some black, moist, appears to be wet below 8.0', trace of sandstone cobbles, cobbles are thin and platy, 25 sand, 20% gravel, fines are plastic. Below 8.0' fines decrease to 45% (SC proportions) and gravel is fine to med. Some 0.5' lenses of CL with organic inclusions are found below 8.0', cobbles are found in thin lenses, coarse particles are moderately durable with some nondurable, no seepage noted in test pit.	CL
11.0		Bottom of pit - dry	

TP 109, ELEV. ?56.2, 5+80, ?00' U.S.

From	To	Description	Class.
0.0	0.3	Forest litter	
0.3	10.0	Shale, highly weathered, olive to red-brn, readily breaks along bedding and joint and cleavage plane into fine to med. gravel size pieces, trace of clay present, shale is easily scratched with fingernail and pieces are nondurable.	GF
10.0		Bottom of pit - dry	

TP 110, ELEV. 924.2, 3+80, 900' U.S.

From	To	Description	Class.
0.0	0.5	Topsoil, roots, etc.	
0.5	10.0	Clay, sand with gravel, brn to red-brn and yellow-brn; blue-gry ?.0-10.0', moist, thin lense of platy shale cobbles at 6.0', a few small cobbles noted within material, average matrix, 10% gravel, 15% sand, fines are plastic, coarse particles are nondurable, soil is limy from ?.0 to 6.0'.	CL
10.0		Bottom of pit - dry	

TP 111, ELEV. ?26.?, 1+90, 1100' U.S.

From	To	Description	Class.
0.0	0.5	Forest litter, roots, etc.	
0.5	2.5	Clay, gravel with sand, brn, slightly moist, 15 gravel, 1?% sand, fines are plastic.	CL
2.5	5.5	Gravel, sand with clay, red-brn to yellow-brn, moist, trace of small cobbles, 30% gravel, 20% sand, 45 plastic fines, coarse particles are thin and platy and angular, random orientation, particles are sandstone, nondurable.	GC
5.5	8.0	Clay, gravel with sand, red-brn to yellow-brn, moist, 1?% gravel, 15 sand, fines are plastic, coarse particles are sandstone and shale, large blocky sandstone boulder 6.0-6.5', coarse particles are nondurable.	CL
8.0		Bottom of hole - wet WL (7/22/66) 7.2'	

TP 112, ELEV. 1011.6, 5+80, 1100' U.S.

From	To	Description	Class.
0.0	0.5	Forest litter, roots, etc.	
0.5	5.0	Clay with gravel and sand, red and yellow-brn, moist, 10 nondurable sand, 15% gravel, fines are plastic, highly weathered bedrock.	CL
5.0	10.5	Silt with gravel and sand, red and yellow-brn with some lt. gry, limy, highly weathered siltstone bedrock with about 75 low plastic fines, coarse particles appear in thin beds through material.	?
10.5		Bottom of pit - dry	

See note, sht 21

[4] Unified classification by laboratory analysis

HARMON CREEK WATERSHED

FLOODWATER RETARDING DAM PA-479

WASHINGTON COUNTY, PENNSYLVANIA

LOGS OF DRILL HOLES AND TEST PITS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed R. Hennessy ... Date 1-67	Approved by ...	
Drawn ...	Title ...	
Traced ...	Title ...	
Checked ...	Sheet 18 of 21	Drawing No. PA-479-P

PLATE 6

D'APPOLONIA

38

DRAWN BY	ACS	CHECKED BY	BE	3/13	DRAWING NUMBER	78-367-B58
	1-4-79	APPROVED BY	JMP	2.1.79		

TP 111, ELEV. 977.5, 7+80, 1100' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	2.5	Clay, gravel with sand, brn, slightly moist, 20% gravel, 15% sand, fines are plastic, coarse particles are thin and platy sandstone.	CL
2.5	6.0	Clay with gravel and sand, red-brn, with yellow and gry mottling, 10% gravel, 10% sand, fines are plastic, coarse particles are nondurable siltstone, highly weathered siltstone bedrock?	CL
6.0	8.5	Clay with gravel and sand, red-brn with yellow and gry mottling, 20% fine gravel, 25% sand, fines are plastic, coarse particles are nondurable siltstone particles, highly weathered siltstone bedrock?	CL
8.5		Bottom of pit - dry	

TP 114, ELEV. 984.2, 7+80, 700' U.S.

0.0	0.8	Swamp muck, roots, etc. - wet	
0.8	5.5	Gravel, clay with sand and cobbles and boulders, brn, wet, 10% small boulders, 15% cobbles (1-6"), 35% gravel, 20% sand, 10% plastic fines, coarse particles are thin and platy, angular, sandstone, moderately durable to durable.	GC
5.5		Bottom of pit - wet hole - Swamp conditions noted immediately upstream from test pit, between small streams	

TP 115, ELEV. 894.2, 5+80, 800' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	5.0	Silt, gravel with sand, brn, slightly moist to 3.5', moist from 3.5 to 5.0', 20% gravel, 15% sand, fines are nonplastic	ML
5.0	9.5	Gravel, sand with clay, cobbles and boulders, brn, wet below 6.0', moderate seepage into pit, 10% small boulders, 15% small cobbles, 30% gravel, 20% sand, 20% plastic fines, coarse particles are thin and platy, moderately durable with some durable, gravel and sand size pieces show evidence of rounding, some coal particles are present.	GC
9.5		Bottom of pit - wet hole. WL (7/22/66) 5.0'	

TP 116, ELEV. 897.3, 5+80, 500' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	2.5	Silt, gravel with sand, brn, moist, 20% gravel, 15% sand, fines are nonplastic, coarse particles are platy and moderately durable.	ML
2.5	8.5	Gravel, clay with sand and cobbles, brn, wet below 3.0', trace of small boulders, 15% cobbles (1/2 over 6"), 10% gravel, 20% sand, 30% fines, coarse particles are thin and platy sandstone, moderately durable, some rounding evident on gravel and sand size particles, moderate seepage into pit. Some black organic deposits were found around some boulders and cobbles, some coal particles are present.	GC
8.5		Bottom of pit - wet hole. WL (7/22/66) 4.0'	

TP 117, ELEV. 910.6, 7+80, 700' U.S.

				SAMPLES			
				No.	Type	From Ft.	To Ft.	Rec.
0.0	0.5	Forest litter, roots, etc.						
0.5	9.5	Gravel, sand with clay, cobbles, red-brn, slightly moist to 2.0', moist from 2.0' to bottom of pit, trace of boulders, 10% cobbles (1/2 over 6"), 30% gravel, 20% sand, 35% plastic fines, material variable along pit, the above is an average composition, cobbles and boulders are found in thin lenses, coarse particles are thin and platy sandstone moderately durable with some durable. Some black organic deposits were found around some cobbles and boulders. Some coal present.	GC	1	Bags	0.5	9.5	
9.5		Bottom of pit - dry hole.						

TP 118, ELEV. 907.2, 7+80, 500' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	6.0	Clay with gravel and sand, red-brn with some yellow mottling, moist, 10% gravel, 15% sand, fines are plastic, coarse particles are platy, thin, and nondurable shale with some sandstone.	CL
6.0	9.5	Gravel, cobbles with sand, boulders and clay, red-brn, wet below 6.5', moderate seepage into pit, approx. 10% boulders, 30% cobbles (1/2 over 6") 25% gravel, 15% sand, 20% plastic fines, coarse particles are sandstone, platy, moderately durable with some durable.	GC
9.5		Bottom of pit - wet hole. WL (7/22/66) 3.5'	

Sample - 1 L bag from 1.5 to 3.0'

TP 119, ELEV. 935.5, 7+80, 300' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	6.8	Clay with gravel and sand, red-brn with yellow mottling, moist, 15% gravel, 15% sand, fines are plastic, coarse particles are nondurable shale, easily scratched with fingernail, a few sandstone cobbles noted.	CL
6.8	10.0	Siltstone, grn-gry to red-brn, moist, barely scratched with fingernail, moderately durable, bedrock highly weathered and excavates as gravel size pieces, breaking along bedding and joint planes.	CP
10.0		Bottom of pit - dry hole.	

TP 120, ELEV. 920.0, 9+80, 700' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	10.0	Clay gravel with sand and cobbles, red-brn with some yellow and black mottling moist, compact, trace of boulders, 10% cobbles (1/2 over 6"), cobbles and boulders, durable sandstone, 15% gravel, 10% sand, fines are plastic, coarse particles are sandstone and siltstone, cobbles occur in lenses within material.	CL
10.0		Bottom of pit - dry hole.	

TP 121, ELEV. 1016.6, 9+80, 300' U.S.

0.0	0.4	Forest litter, roots, etc.	
0.4	2.0	Clay with sand, red-brn, slightly moist, trace of gravel, 15% sand, fines are plastic.	CL
2.0	6.0	Siltstone, silt to very fine grained sand size particles, moderately durable particles, grn-gry, moist, excavates as gravel with small cobbles and sand containing some thin clay seams, can be barely scratched with fingernail.	CP
6.0		Bottom of pit - dry hole.	

TP 122, ELEV. 967.9, 11+80, 1100' U.S.

0.0	0.5	Forest litter.	
0.5	5.5	Clay, gravel with sand, brn, slightly moist, 30% gravel, 15% sand, plastic, coarse particles are platy sandstone, moderately durable, small cobbles in material and some coal noted.	
5.5	9.0	Clay, sand, red-brn, moist, trace of gravel, 15% fine sand, fines are coarse particles are nondurable.	
9.0		Bottom of pit - dry hole.	

TP 123, ELEV. 998.9, 7+80, 1100' U.S.

0.0	0.4	Topsoil, roots, etc.	
0.4	7.5	Clay, sandy; red-brn to 7.0', grn-gry below 7.0', moist, trace of gr 20% fine sand, fines are plastic, coarse particles are nondurable, gl fines are plastic, lisy below 5.5'.	
7.5		Bottom of pit - dry hole.	

TP 124, ELEV. 936.1, 7+80, 900' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	6.0	Clay, sand with gravel, red-brn to yellow, moist, average composition 25% fine to med. gravel, 20% sand, fines are plastic, coarse particles nondurable siltstone, coarse particles increase 2.0 to 6.0'.	
6.0	7.5	Clay, sandy, dk. red-brn, wet below 6.5', trace of gravel, 20% sand, are plastic, coarse particles are nondurable, very slight seepage	
7.5	10.0	Siltstone, bedrock, brn to grn-gry, wet, 7.5 to 8.5' excavates as GC with 15% plastic fines and 35% sand, from 8.5 to 10.0' material excavates with 5 plastic fines. Coarse particles are nondurable, easily scratched and broken with fingernail.	
10.0		Bottom of pit - wet hole. Hole appears dry, little or no seepage	

TP 125, ELEV. 921.0, 9+80, 900' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	9.5	Gravel, clay with sand, brn, slightly moist, 30% gravel, 25% sand, 45% plastic fines, coarse particles are platy, moderate to nondurable. Some coal particles.	
3.5	9.5	Clay, gravel with sand, red-brn, moist, 15% gravel, 20% sand, fines are plastic, coarse particles are nondurable, contains thin beds of sandstone small cobble size pieces. Sandstone is moderately durable.	
9.5		Bottom of pit - dry hole.	

TP 126, ELEV. 922.8, 11+80, 700' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	10.0	Sand, gravel, clay with cobbles, brn, wet below 3.4', moderate seepage pit, trace of large boulders, 15% cobbles (1/2 over 6"), 25% gravel, sand, 25% plastic fines, coarse particles are shale and sandstone, thin platy and in random orientation, particles are moderate to nondurable.	
10.0		Bottom of pit - wet hole, pit collapsing.	

TP 201, ELEV. 937.0, 9+10, 100' U.S.

0.0	0.5	Forest litter, roots, some cobbles.	
0.5	6.0	Clay with gravel and sand, red-brn with some yellow and gry mottling, moist, 15% gravel, 10% sand, fines are plastic, coarse particles are silt stone, nondurable, easily scratched with fingers, material is compact.	
6.0	9.0	Siltstone, olive with some yellow and gry, moist, scratched with fingernail nondurable to moderately durable, readily breaks along bedding and cleavage planes to gravel and sand size particles.	
9.0		Bottom of pit - dry hole.	

TP 202, ELEV. 940.8, 8+30, 50' U.S.

0.0	0.5	Forest litter, roots, etc.	
0.5	9.5	Clay with gravel and sand, red-brn with some yellow mottling to 7.0', red-brn from 7.0-9.5', moist, a few sandstone cobbles noted, 20% gravel, sand, fines are plastic, from 7.0-9.5' gravel decreases to 10%. Coarse particles are platy, nondurable shale with some sandstone, material is c	
9.5		Bottom of pit - dry hole.	

TP 203, ELEV. 925.7, 7+70, 60' U.S.

				SAMPLES			
				No.	Type	From Ft.	To Ft.
0.0	0.5	Forest litter, roots, etc.					
0.5	5.5	Clay with sand and gravel, red-brn with some yellow and brn mottling, moist, 10% gravel, 10% sand, fines are plastic, coarse particles are nondurable siltstone, material is compact, a few small sandstone cobbles noted to 1.0', material graded into recognizable siltstone bedrock at 5.5'	CL				
5.5	10.0	Siltstone, olive, moist, bedrock highly weathered and breaks readily into nondurable sand and gravel size pieces, from 5.5 to 8.5' siltstone breaks down to SC material with about 20 plastic fines. From 8.0 to 10.0' material excavates as CP. Bedrock breaks readily along thin bedding planes and cleavage planes. SC material contains up to 60% sand and grades into CP.	SC/CP	1	3 L Bags	5.5	
10.0		Bottom of pit - wet hole.					

TP 204, ELEV. 958.7, 9+50, CONTINUED

0.0	0.5	Forest litter, roots, etc.	
0.5	9.5	Clay, gravel with sand, red-brn with some yellow, moist, average composition 15% gravel, 10% sand, fines are plastic, coarse particles are nondurable siltstone, thin bed of sandstone cobble size pieces at 5.5'. Percent of coarse particles increase with depth of pit from a trace of gravel to 20% gravel 8.0-9.5'.	
9.5		Bottom of pit - dry	

DH 205, ELEV. 941.0, 0+55, Centerline
Logged by: R. G. Hirnisey 9/1/66
Drilling Equipment: Sprague & Henwood [illegible]C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	Standard Penetration: Blows Per 6"	Type Bit Used	No.	Type	Sample From Ft.	To Ft.	Rec.
0.0	0.4	Forest litter, roots, etc.		[illegible]-7-7-7	Sp	1		0.0	2.0	[illegible]
0.4	2.0	Clay, sand, brn, moist, trace	CL	13-16-16-13	"	2		2.0	4.0	60
		of cobbles, trace of gravel,		12-13-11-	"	3		4.0	6.0	100
		20 sand, fines are plastic,		[illegible]-7-[illegible]-11	"	4		6.0	8.0	50
		coarse particles are nondurable		12-1[illegible]-[illegible]-[illegible]	"	5		8.0	10.0	[illegible]
2.0	6.5	Clay, sand with gravel, brn	CL		Tri.			10.0	11.2	0
		to red-brn, moist, 15 gravel,		31-7[illegible]	Sp	6		10.2	11.2	70
		25 sand, fines are plastic,			Tri.			11.2	12.0	0
		contains approx. 10 small cobbles,			NX			12.0	1[illegible]	25
		coarse particles are nondurable			"			1[illegible]	16.5	
6.5	9.0	Clay, sand with gravel, red-brn, moist, 20 gravel, 20 sand, fines are plastic, coarse particles are thin and platy and nondurable	CL		"			16.5	21.5	100
					"			21.[illegible]	26.0	[illegible]
9.0	13.5	Sand, clay with gravel, brn and red-brn below 10.[illegible]', 25 gravel, 35 sand, fines are plastic, contains from a trace to 10 cobbles, contains some highly weathered coal particles. Coarse particles are moderate and nondurable	SC							
13.5	26.0	Clay, shale, red-gry to gry, thin bedded, cored pieces .05 to 0.1' long, core breaks readily along smooth horizontal bedding planes, core fit fairly well together with some broken zones, some vertical fractures noted with some iron staining, very thin clay strata noted. Clay noted 0.1' thick at 25.0'. Core can be scratched with fingernail (core easily scratched from 24.3 to 25.3').								
26.0		Bottom of hole - wet hole WL ([illegible]/[illegible]/66) 18.5' WL ([illegible]/1[illegible]/66) 20.0'								

DH 206, ELEV. 940.3, 0+60, 75' U.S.
Logged by: R. G. Hirnisey 9/2/66
Drilling Equipment: Sprague & Henwood [illegible]C

Hole Depth From	To	Description of Materials	Unif. Soil Class Symb.	Standard Penetration: Blows Per 6"	Type Bit Used	No.	Type	Sample From Ft.	To Ft.	Rec.
0.0	0.5	Forest litter, roots, etc.		[illegible]-6-6-6	SpT	1	Jar	0.0	2.0	85
0.5	2.0	Clay, sand with gravel, brn,	CL	[illegible]-18-18-18	"	2	"	2.0	[illegible].0	55
		moist, 10 fine gravel, 20		8-8-1[illegible]-1[illegible]	"	3	"	[illegible].0	6.0	70
		sand, fines are plastic.		10-1[illegible]-1[illegible]-21	"	[illegible]	"	6.0	8.0	50
2.0	[illegible].5	Clay, gravel with sand, brn	CL	8-10-1[illegible]-16	"	5	"	8.0	10.0	60
		to red-brn, moist, 10 small		10-10-12-1[illegible]	"	6	"	10.0	12.[illegible]	25
		cobbles, 15 gravel, 25 sand,			Tri.			12.0	12.[illegible]	0
		fines are plastic, cobbles are		11-17-70	SpT	7	Jar	12.5	1[illegible].0	65
		moderately durable and gravel			NX			1[illegible].0	1[illegible].5	0
		is nondurable shale.			"			15.5	1[illegible].0	100
[illegible].5	10.0	Clay, sand with gravel, red-	CL		"			18.0	23.0	[illegible]
		brn with some yellow and gry,			"			23.0	28.0	[illegible]5
		appears to be laminated below			"			28.0	32.0	100
		5.5', 15 gravel, 20 sand, fines are plastic, some strata of CL with trace of gravel and 15 sand, contains trace of cobbles, composition variable according to degree of weathering of different shale units.								
10.0	15.[illegible]	Clay, sand with gravel, brn, to yellow-brn, moist, 10 gravel, 25 sand, fines are plastic, coarse particles are nondurable shale.	CL							
15.[illegible]	32.0	Shale-clayey, red-brn to 25.1' and med. gry to 32.0', easily scratched with fingernail, easily broken along smooth flat bedding planes, contains vertical fractures. Two pronounced planes of weakness, bedding planes and vertical fractures. Shale is thin bedded, beds 0.03' thick, cored pieces up to 0.2' long. Core highly broken to 20.0' with numerous gravel size pieces, some broken ones noted to bottom of hole. Some iron staining noted. Contains some thin clay strata.								
32.0		Bottom of hole - wet hole. WL (9/7/66) 26.5' WL (9/[illegible]/66) 26.3' WL ([illegible]/1[illegible]/66) 2[illegible].1'								

DH 206A, ELEV. 946.3, 0+60, 80' U.S.

Hole Depth From	To	Description of Materials		Type Bit Used	From Ft.	To Ft.	% Rec.
0.0	8.0	Earth boring		Tri.	0.0	8.0	0
8.0	10.5	Denison sample - 2 ft. sampler, top of bottom 0.2[illegible]' discarded	*ML	D	8.0	10.5	100
10.5	13.0	Denison sample - 2 ft. sampler, top of bottom 0.2[illegible]' discarded	*CL	D	10.5	13.0	100
13.0		Bottom of hole - dry hole.					

See note, sht 21

*Unified classification by laboratory analysis

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-479
WASHINGTON COUNTY, PENNSYLVANIA
LOGS OF DRILL HOLES AND TEST PITS

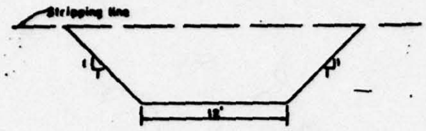
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed R. Hirnisey	Date 1-67	Approved by	
Drawn		Title	
Traced		Sheet No. 19 of 21	Drawing No. PA-479-P

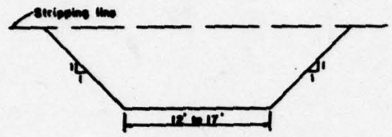
PLATE 7

D'APPOLONIA

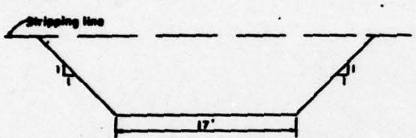
DRAWN BY	1-4-79	ACS	CHECKED BY	BE	3/1/79	APPROVED BY	JHD	3.1.79	DRAWING NUMBER	78-367-B59



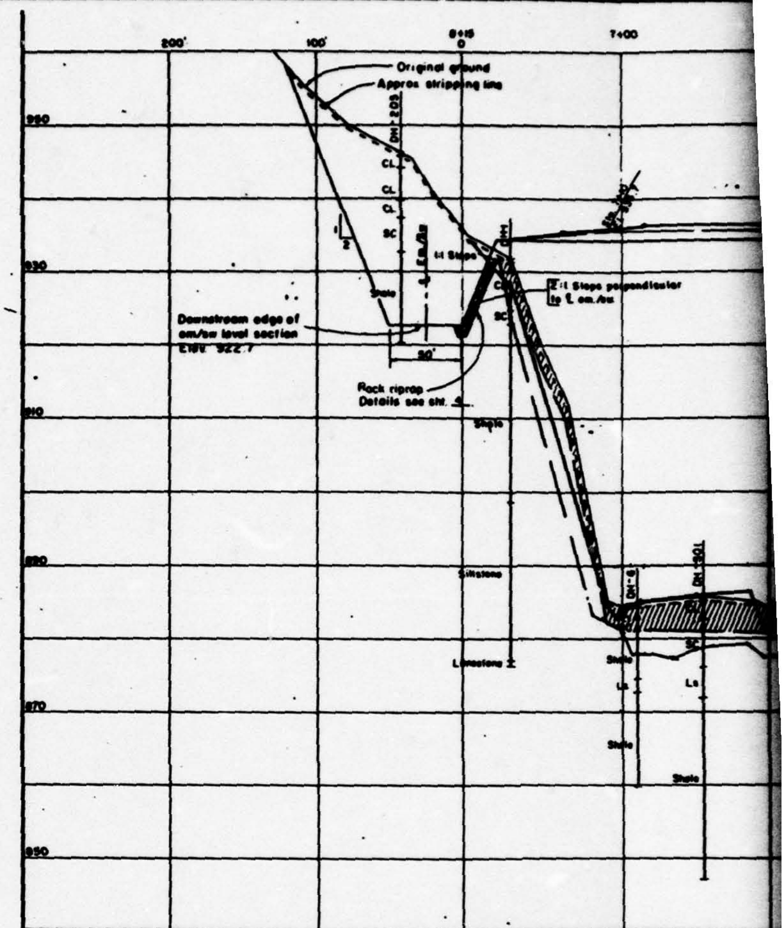
TYPICAL BETWEEN ℄ DAM STATIONS
1+46 TO 2+80 & 7+22 TO 7+88



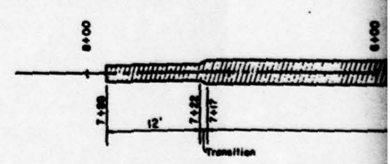
TRANSITION SECTION
TYPICAL BETWEEN ℄ DAM STATIONS
2+80 TO 2+85 & 7+17 TO 7+22

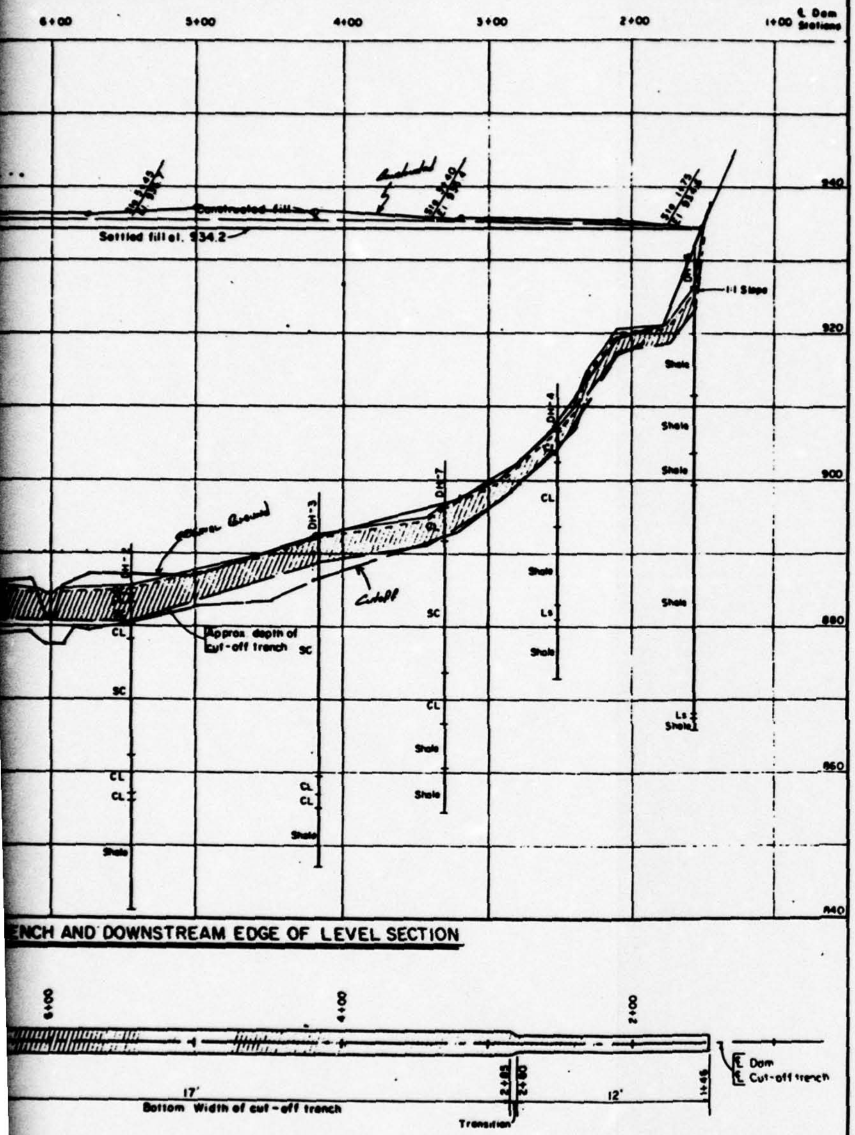


TYPICAL BETWEEN ℄ DAM STATIONS
2+85 TO 7+17



PROFILE ALONG ℄ CUT-OFF TRENCH





PLAN VIEW

0 10 25 50 100
SCALE in FEET

CONSTRUCTION NOTES

1. For logs of test holes see shts. 17 thru 20
2. ℄ Dam = ℄ Cut-off trench

AS BUILT PLANS

HARMON CREEK WATERSHED

FLOODWATER RETARDING DAM PA-479

WASHINGTON COUNTY, PENNSYLVANIA

CUT-OFF TRENCH DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

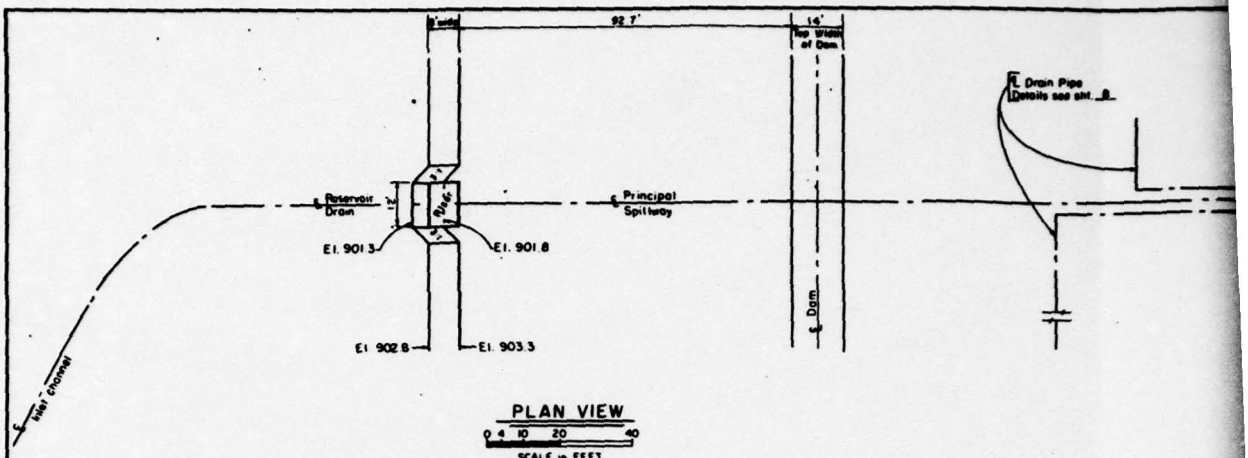
Designed	[signature]	11-67
Drawn	C. CRISE	11-67
	[signature]	12-67

PA-479-P

PLATE 8

D'APPOLONIA

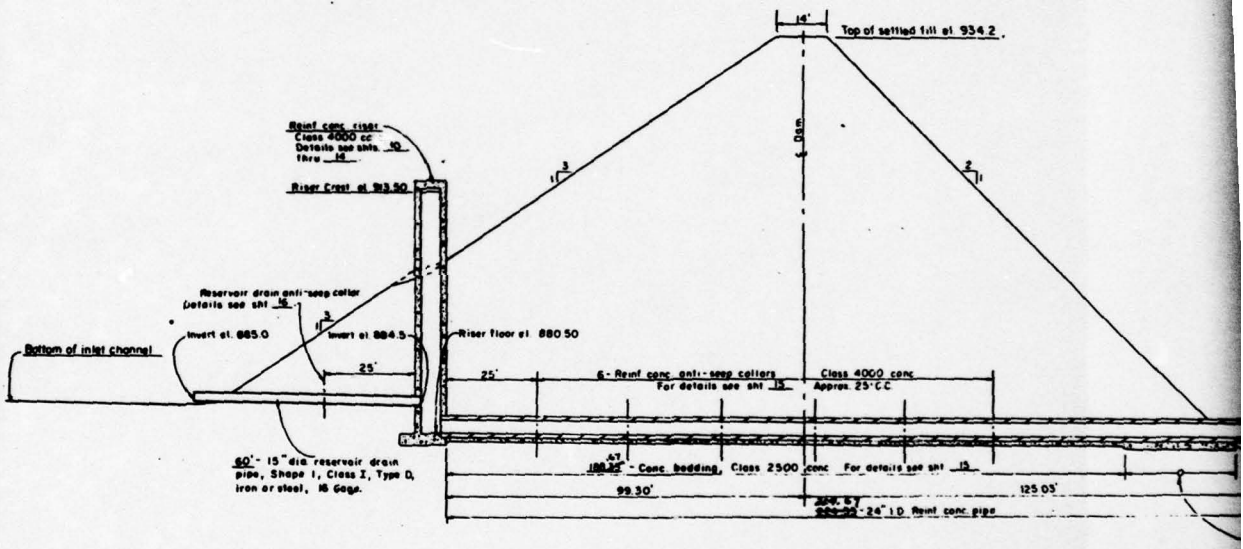
DRAWN BY	ACS	CHECKED BY	BE	3/1/79	DRAWING NUMBER	78-367-B60
	1-4-79	APPROVED BY	JMP	3.1.79		



PLAN VIEW

0 4 10 20 40

SCALE in FEET



PROFILE ALONG ℄ PRINCIPAL SPILLWAY

0 2 5 10 20 0 4 10 20 40

VERTICAL SCALES in FEET HORIZONTAL

AS BUILT

24" I.D PIPE JOINT DATA

JOINT	DIST FROM RISER WALL	INVERT EL
A	0	880.50
B	20.03	880.38
C	40.06	880.27
D	60.09	880.16
E	80.12	880.04
F	100.15	879.92
G	104.18	879.89
H	124.21	879.78
I	144.24	879.66
J	164.27	879.55
K	184.30	879.43
L	204.33	879.32
M	224.67	879.20

AS BUILT

COLLAR DATA FOR 24" I.D PIPE

COLLAR	DIST FROM RISER WALL	INVERT EL
1	24.5	880.36
2	48.0	880.22
3	71.5	880.08
4	95.9	879.94
5	118.4	879.81
6	141.9	879.68

24" I.D Reinforced concrete pressure pipe spillway conduit.

224' - Straight sections

1 - Spigot ring wall fitting (for 15" wall)

Maximum Pressure Head = 43'. Minimum Pressure Head = 0

Load = 48,120 lbs per lin ft, based on O.D. of 2.67'

Min. 3 edge bearing strength for
0.01" Crack non-prestressed pipe = 25,200 lbs. per lin. ft
0.001" Crack prestressed pipe = 18,950 lbs per lin. ft.

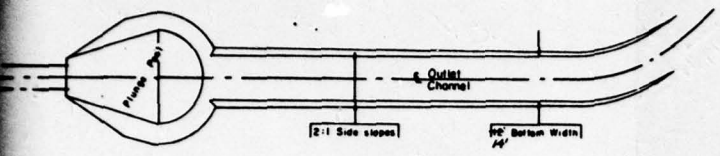
224.33' Total

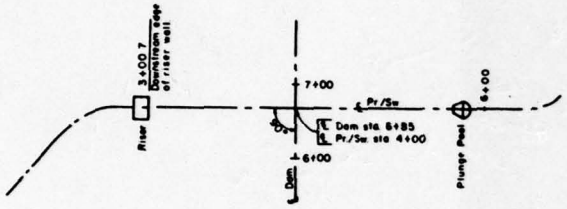
CONSTRUCTION

1 Outlet end of pipe to no metal is exposed.

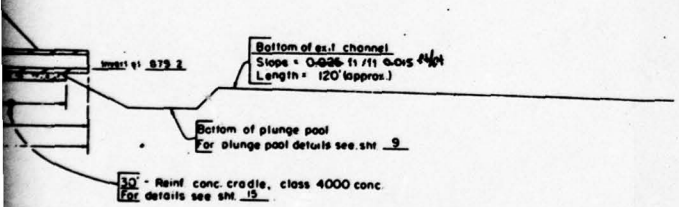
2 Pipe layout data will the engineer

1





LAYOUT OF PRINCIPAL SPILLWAY
NOT TO SCALE



TRUCTION DETAILS

of pipe to be finished so that
deposed

data will be furnished by

AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA - 479
WASHINGTON COUNTY, PENNSYLVANIA
PRINCIPAL SPILLWAY
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Edward P. Kelly 10-67
C CRISE 10-67

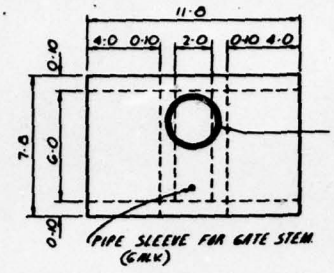
PA-479-P

PLATE 9

D'APPOLONIA

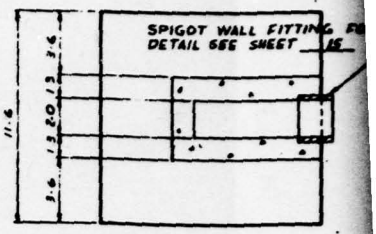
DRAWN BY	ACS	CHECKED BY	BE	3/1/79	DRAWING
	1-4-79	APPROVED BY	JWP	3.1.79	NUMBER

78-367-B61

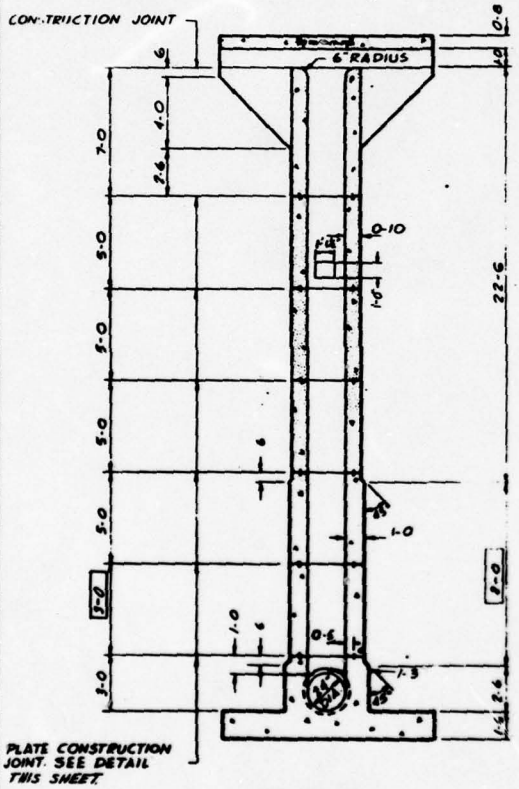


FOR DETAIL OF TRASH RACK ANGLES AND GRATING SEE SHEET 14

TOP PLAN



SECTION A-A



SECTION B-B

1/4" x 6" Steel Plate Continuous Thru Constr. Joint.
Splices Shall Be Either
1. Butt Welded
2. Lapped 3" And Bolted
3. Lapped 3" And Fillet Welded

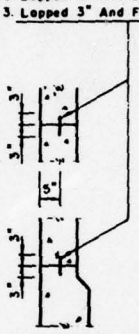
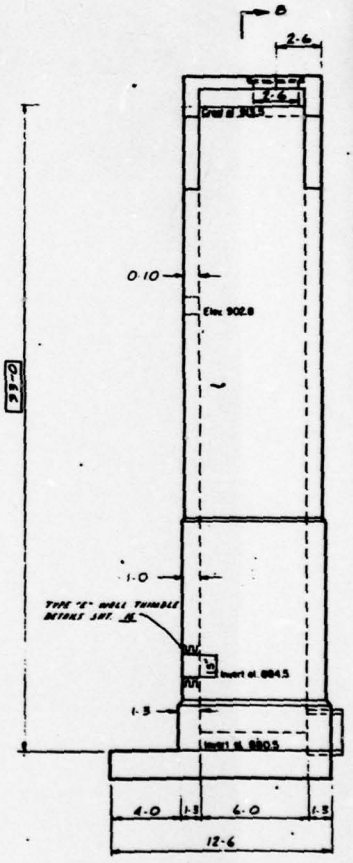


PLATE CONSTR. JOINT

CONSTR. JOINT



SIDEWALL ELEVATION

0 2 4 6
SCALE IN FEET

NOTE: For Construction Details see sht 13

STEE

STEEL SCHEDULE

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
B1	5	12	11-0	1		-	132-0
B2	6	5	11-0	1	-	-	55-0
B3	6	12	12-0	1	-		144-0
B4	7	11	7-3	1	-	-	79-9
B5	6	24	6-7	21	3-0	3-7	158-0
B6	6	12	12-0	1	-	-	144-0
B7	6	15	11-0	1	-	-	165-0
B8	6	2	4-9	1	-	-	9-6
B9	5	5	4-6	21	1-0	3-6	22-6
B10	5	3	6-7	21	1-0	5-7	19-9
B11	5	16	6-7	21	1-0	5-7	105-4
B12	5	2	4-6	21	1-0	3-6	9-0
B13	5	8	6-8	1	-	-	53-4
B14	5	4	3-0	1	-	-	12-0
B15	5	10	7-10	21	2-11	4-11	78-4
B16	5	4	5-9	21	0-10	4-11	23-0
B17	5	4	5-7	21	0-8	4-11	22-4
B18	5	2	6-5	21	1-6	4-11	12-10
B19	6	4	7-8	21	2-10	4-10	30-8
B20	6	24	4-0	1	-	-	96-0
B21	5	5	3-8	1	-	-	18-4
B22	5	2	3-8	1	-	-	7-4
B23	5	2	2-5	1	-	-	4-10
B24	5	2	2-7	1	-	-	5-2
R1	5	12	9-7	1	-	-	115-0
R2	5	4	9-7	1	-	-	[illegible]
R3	5	16	7-6	1	-	-	120-0
R4	5	8	7-6	1	-	-	60-0
R5	5	12	6-8	1	-	-	80-0
R6	5	6	2-8	1	-	-	16-0
R7	6	[illegible]	7-8	21	2-10	4-10	[illegible]-0
R8	5	16	6-8	1	-	-	106-8
R9	5	10	2-8	1	-	-	26-8
R10	5	36	7-4	21	2-8	4-8	264-0
R11	5	16	3-8	1	-	-	58-8
R12	5	8	3-8	1	-	-	29-4
R13	5	4	7-0	21	2-6	4-6	28-0
R14	5	10	11-7	1	-	-	115-10
R15	5	4	11-7	1	-	-	46-4
R16	5	12	11-7	1	-	-	139-0
R17	5	6	11-7	1	-	-	69-6
R18	5	16	6-8	1	-	-	106-8
R19	5	8	2-8	1	-	-	21-4
R20	5	40	7-0	21	2-6	4-6	280-0
R21	5	10	6-8	1	-	-	66-8
R22	5	8	2-8	1	-	-	21-4
R23	5	32	7-0	21	2-6	4-6	224-0
R24	5	10	6-7	1	-	-	65-10
R25	5	4	6-7	1	-	-	26-4
R26	5	12	6-7	1	-	-	79-0
R27	5	6	6-7	1	-	-	39-6
R28	5	8	6-8	1	-	-	53-4
R29	5	8	2-8	1	-	-	21-4
R30	5	20	7-0	21	2-6	4-6	140-0
R-31	5	8	1-10	1			14-8
R-32	5	8	2-4	1			18-8

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	TOTAL LENGTH
T1	5	10	6 6		-	-	65·0
T2	5	6	8·3	1	-	-	49·6
T3	5	10	6·9		-	-	67·6
T4	5	6	8·3		-	-	49·6
T5	5	12	6·8	1	-	-	80·0
T6	5	4	2·8		-	-	10·8
T7	5	2	3·8		-	-	7·4
T8	5	2	6·2	1	-	-	12·4
T9	5	2	8·8		-	-	17·4
T10	5	2	11·2	1	-	-	22·4
T11	5	24	7·0	21	2·6	4·6	168·0
T12	5	4	4·8	1	-	-	8·8
T13	5	4	3·5	1	-	-	13·8
T14	5	4	2·2	1	-	-	8·8
T15	5	4	7·3	19	1·8	5·7	29·0
T16	5	2	3·8	1	-	-	7·4
T17	5	2	6·2	1	-	-	12·4
T18	5	2	8·8	1	-	-	17·4
T19	5	2	11·2	1	-	-	22·4
T20	5	4	4·8	1	-	-	8·8
T21	5	4	3·5	1	-	-	13·8
T22	5	4	2·2	1	-	-	8·8
T23	5	4	7·3	19	1·8	5·7	29·0
T24	5	2	11·2	1	-	-	22·4
T25	4	12	6·8	1	-	-	80·0
T26	4	2	3·2	1	-	-	6·4
T27	4	6	11·2	1	-	-	67·0
T28	4	4	4·3	1	-	-	17·0
T29	5	20	5·11	21	1·5	4·6	118·4
T30	5	2	4·10	21	1·5	3·5	9·8
T31	5	2	2·3	21	1·5	0·10	4·6
T32	5	2	11·2	1	-	-	22·4
T33	4	6	11·2	1	-	-	67·0
T34	4	4	4·3	1	-	-	17·0

QUANTITIES

STEEL

# 4 BARS	254-4	170	LBS.
# 5 BARS	5944-5	4114	LBS.
# 6 BARS	986-2 [illegible]	1481 [illegible]	LBS.
# 7 BARS	79-9	163	LBS.
		[illegible]	LBS.

[illegible] CU. YDS.

AS BUILT PLANS

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-479
WASHINGTON COUNTY, PENNSYLVANIA
RISER STRUCTURAL DETAILS

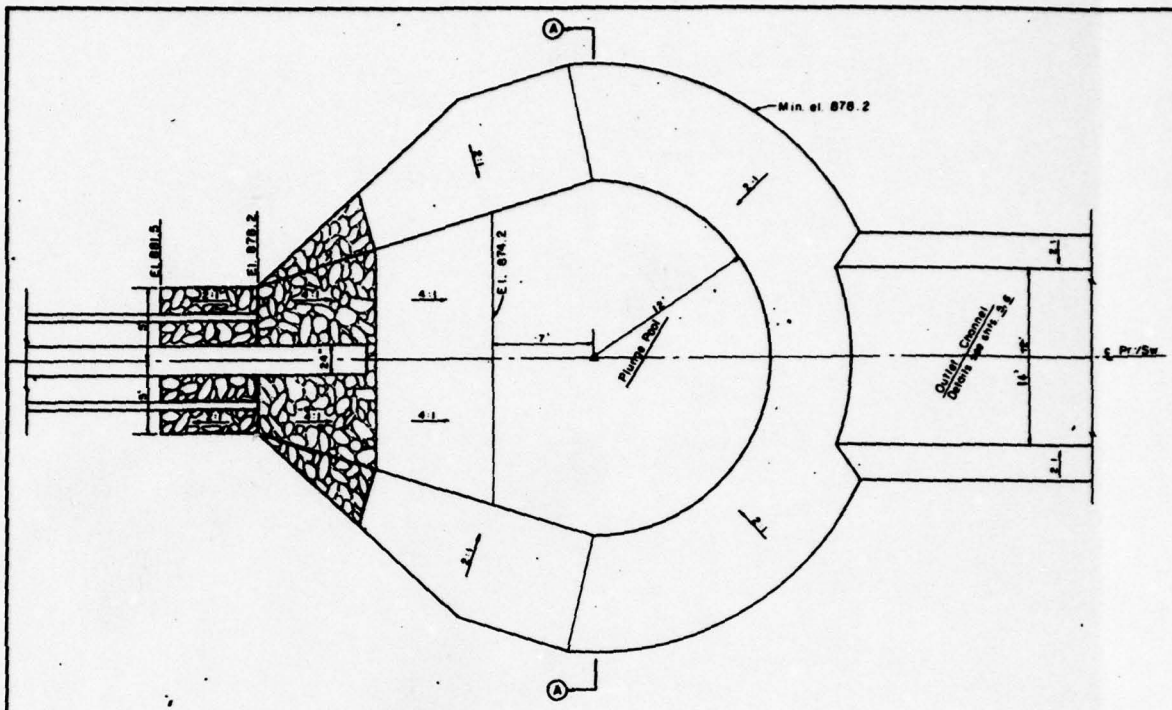
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed [signature] Date 11/67
Drawn
Traced
Checked [signature]
Approved by
Title
Sheet 10 of 21
Drawing No. PA-479-[illegible]

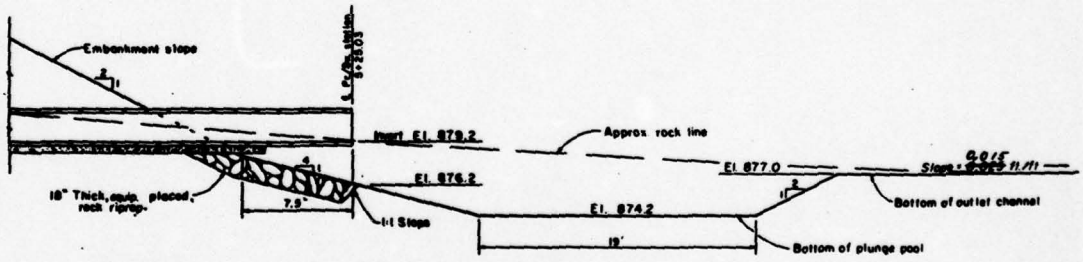
PLATE 10

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	DE	3/1/79	DRAWING NUMBER	78-367-B62
	1-4-79	APPROVED BY	JHD	3.1.79		



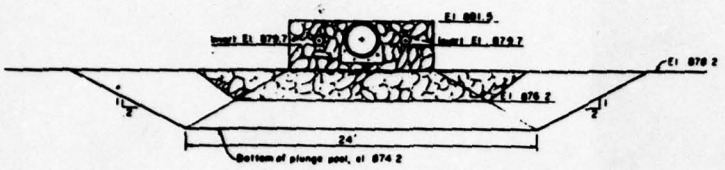
PLAN VIEW



PROFILE ALONG ℄ PLUNGE POOL

CONSTRUCTION NOTES

1. Minimum top of plunge pool = el. 878.2 . Fill with zone I material as required to obtain min. elevation.
2. Grade area in vicinity of plunge pool and exit channel to obtain free drainage.



SECTION A-A

AS BUILT

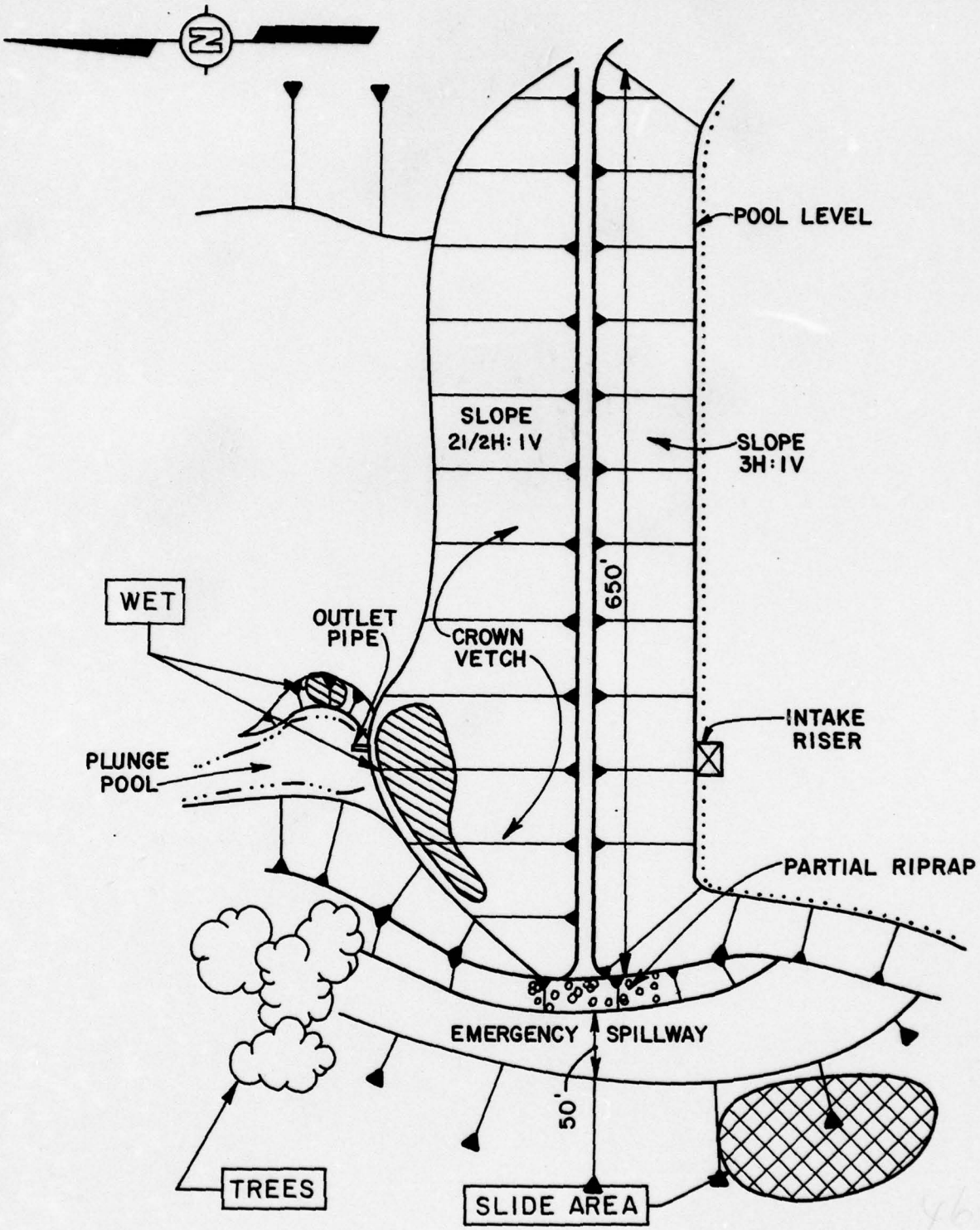
0 1 3 5 10
SCALE in FEET

HARMON CREEK WATERSHED
FLOODWATER RETARDING DAM PA-479
WASHINGTON COUNTY, PENNSYLVANIA
PLUNGE POOL DETAILS
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
... 11-67
C CRISE 11-67
PA-479-P

PLATE II

D'APPOLONIA

DRAWN BY	MBM	CHECKED BY	BE	3/1/79	DRAWING NUMBER 78-367-A8
	1-3-79	APPROVED BY	JHP	3.1.79	



NOTES:

1. EMERGENCY SPILLWAY FREEBOARD: 5.1 FT.
2. POOL LEVEL DATE OF INSPECTION: 30.3 FT. BELOW CREST OF DAM

PLATE 12

PA.479 DAM
GENERAL PLAN
FIELD INSPECTION NOTES
FIELD INSPECTION DATE: DEC. 5, 1978

D'APPOLONIA

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM PA-479 COUNTY Washington STATE Pennsylvania ID# NDI I.D. NO. PA-509
DER I.D. NO. 63-71

TYPE OF DAM Earth HAZARD CATEGORY High

DATE(S) INSPECTION December 5, 1978 WEATHER Sunny TEMPERATURE 40s

POOL ELEVATION AT TIME OF INSPECTION 903.8 M.S.L. TAILWATER AT TIME OF INSPECTION 876.5 M.S.L.

INSPECTION PERSONNEL:	REVIEW INSPECTION PERSONNEL: (December 21, 1978)
Bilgin Erel	L. D. Andersen
Wah-Tak Chan	J. H. Poellot
	Bilgin Erel

Bilgin Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Crest elevation is within 1/2 foot of the as-built crest elevation relative to the spillway crest elevation.	The irregularities appeared to be from truck tracks.
RIPRAP FAILURES	No riprap on the dam.	

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	One wet area on the downstream slope near the left abutment above the outlet works.	The wet area should be periodically observed to document if a seepage condition is developing.
STAFF GAGE AND RECORDER	None.	
DRAINS	Drainage blanket drainpipes are located adjacent to the outlet pipe. There is no flow in the drainpipes.	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The visible portions of the outlet works are in good condition.	
INTAKE STRUCTURE	In good condition.	
OUTLET STRUCTURE	Minor scour in the plunge pool beneath the outlet pipe.	Maintenance should be performed if scour conditions worsen.
OUTLET CHANNEL	No significant obstructions.	
EMERGENCY GATE	Reservoir drainpipe gate hoist is located on the drop inlet structure. Not accessible for inspection.	The operational condition of the reservoir drainpipe gate should be periodically evaluated.

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	There is no concrete overflow structure in the emergency spillway.	
APPROACH CHANNEL	Trapezoidal earth channel. The slope adjacent to the emergency spillway is wet and irregular, indicating potential slope instability.	The slopes adjacent to the emergency spillway should be stabilized to prevent development of a slide which would block the spillway.
DISCHARGE CHANNEL	Trapezoidal earth channel (see remarks above).	See remarks above.
BRIDGE AND PIERS	None.	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A.	
APPROACH CHANNEL	N/A.	
DISCHARGE CHANNEL	N/A.	
BRIDGE PIERS	N/A.	
GATES AND OPERATION EQUIPMENT	N/A.	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None found.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	Toe drainpipes discharging into the plunge pool. No flow in the drainpipes.	

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Steep to moderate.	
SEDIMENTATION	Unknown.	
UPSTREAM RESERVOIRS	None.	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No apparent obstructions immediately downstream from the dam.	
SLOPES	No apparent instability (immediately downstream from the dam).	
APPROXIMATE NUMBER OF HOMES AND POPULATION	There are three homes approximately one mile downstream and 20 homes approximately two miles downstream. Population: Approximately 125 (initial impact area).	

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM PA-479

ID# NDI I.D. NO. PA-509
DER I.D. NO. 63-71

ITEM	REMARKS
AS-BUILT DRAWINGS	The drawings are available in state and Soil Conservation Service files.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service. It was constructed by Windy Hill Construction Company of Burgettstown, Pennsylvania, with completion in July 1969.
TYPICAL SECTIONS OF DAM	See Plate 3.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plates 9, 10, and 11.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not available.
DESIGN REPORTS	Soil Conservation Service internal memo dated April 3, 1967.
GEOLOGY REPORTS	Detailed Geologic Investigation of Dam Sites, SCS Form 376 (undated).
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Hydrology, hydraulics, geotechnical, and structural calculations are available in SCS files.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Included in design and geology reports (see Plate 8 for typical subsurface profile and Plates 5, 6, and 7 for boring logs).

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Described in engineer's report.
MONITORING SYSTEMS	None.
MODIFICATIONS	None reported.
HIGH POOL RECORDS	Not recorded.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	An SCS report entitled, Harmon Creek, PA-479 Slide, dated April 2, 1971.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Landslides on the slope adjacent to the emergency spillway (see Section 2.2 of the report).
MAINTENANCE OPERATION RECORDS	Not available.
SPILLWAY PLAN SECTIONS DETAILS	Primary spillway: See Plates 9, 10, and 11. Emergency spillway: See Plates 2 and 3.
OPERATING EQUIPMENT PLANS AND DETAILS	Available in SCS files.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 1.15 square miles (reclaimed strip mines)

ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 902.8 (5± acre-feet)

ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: 922.7 (166 acre-feet)

ELEVATION; MAXIMUM DESIGN POOL: 934.2

ELEVATION; TOP DAM: 935.7 (top of overfill)

SPILLWAY: (Emergency Spillway)

a. Elevation 922.7

b. Type Trapezoidal open channel (critical depth overflow section)

c. Width 50 feet (base width perpendicular to flow direction)

d. Length 250± feet (from crest to the end of the trapezoidal section)

e. Location Spillover Adjacent to emergency spillway

f. Number and Type of Gates None

OUTLET WORKS:

a. Type 24-inch reinforced concrete conduit

b. Location Near left abutment

c. Entrance Inverts El. 880.5

d. Exit Inverts El. 879.2

e. Emergency Draindown Facilities 15-inch reservoir drainpipe

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

MAXIMUM NONDAMAGING DISCHARGE: Emergency spillway discharge capacity (80,000+ cfs)

APPENDIX C

PHOTOGRAPHS

LIST OF PHOTOGRAPHS
PA-479 DAM
NDI I.D. NO. PA-509
DECEMBER 5, 1978

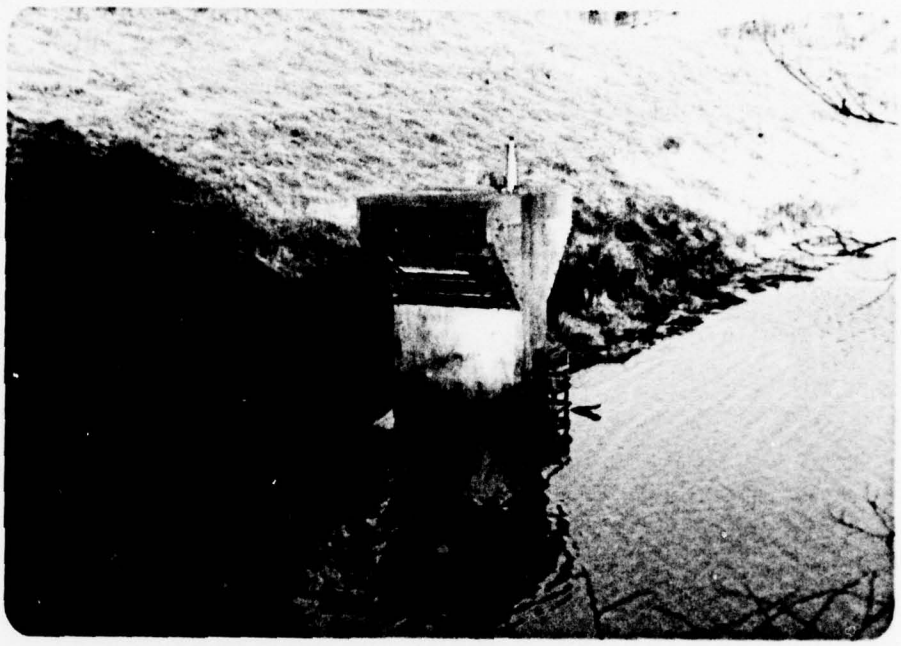
PHOTOGRAPH NO.	DESCRIPTION
1	Emergency spillway approach channel.
2	Emergency spillway discharge channel.
3	Primary spillway drop inlet structure.
4	Outlet pipe.

Photograph No. 1

Emergency spillway approach channel.

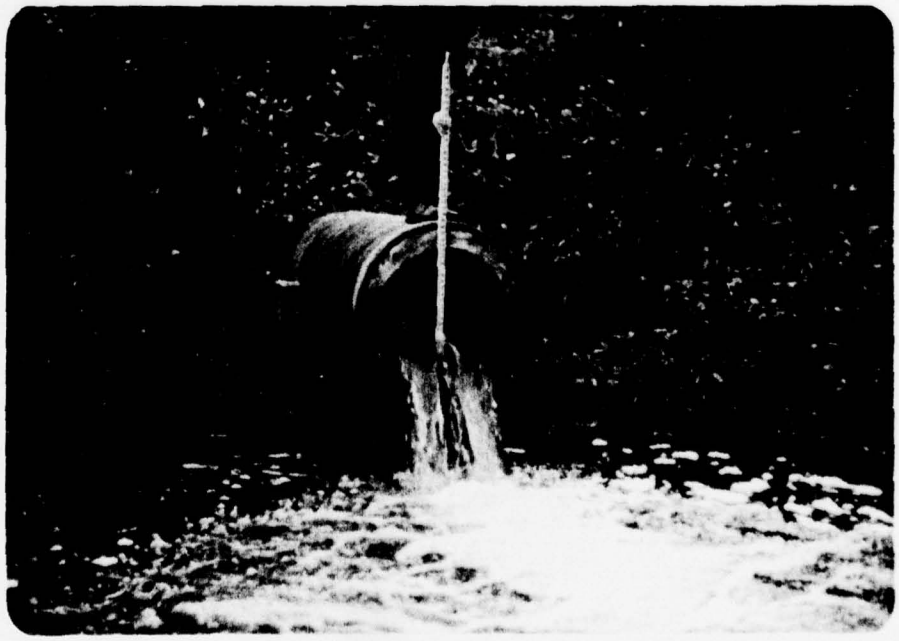
Photograph No. 2

Emergency spillway discharge channel.



Photograph No. 3

Primary spillway drop inlet structure.



Photograph No. 4

Outlet pipe.

APPENDIX D

CALCULATIONS

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: PA-479 (NDI I.D. PA-469)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.2 INCHES/24 HOURS[1]

STATION	1	2	3	4	5
Station Description	Reservoir	Dam			
Drainage Area (square miles)	1.15	0			
Cumulative Drainage Area (square miles)	1.15	1.15			
Adjustment of PMF for Drainage Area (%)[2]					
6 Hours	102	-			
12 Hours	120	-			
24 Hours	130	-			
48 Hours	140	-			
72 Hours	-	-			
Snyder Hydrograph Parameters					
Zone[3]	28B	-			
C_p/C_t[4]	0.57/1.7	-			
L (miles)[5]	1.3	-			
L_{ca} (miles)[5]	0.6	-			
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	1.6	-			
Spillway Data					
Crest Length (ft)	-	50			
Freeboard (ft)	-	11.5			
Discharge Coefficient	-	3.1			
Exponent	-	1.5			

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  11 JAN 79
**********
    1                A1       SNYDER UNIT HYDROGRAPH,FLOOD ROUTING   DAM OVERTOPPING ANALYSES
    2                A2       PA.479 DAM,WASHINGTON COUNTY,NDI-ID.PA469       PROJECT NO 78-367-08
    3                A3       FOR 30%,40%,50%,60%,70%,80%,90%,AND 100% PMF
    4                B     300        0       10        0        0        0        0        0       -4        0
    5                B1      5
    6                J       1        P        1
    7                J1   0.30     0.40     0.50     0.60     0.70     0.80     0.90     1.00
    8                K       0        1                                          1
    9                K1       CALCULATION OF INFLOW HYDROGRAPH TO PA.479 DAM,NDI-ID.PA469
   10                M       1        1     1.15                1.15                                1
   11                P                24.2      102      120      130      140
   12                T                                                          1.0      .05             0.003
   13                W     1.4     0.57
   14                X    -1.6    -0.05      2.0
   15                Y       1        2                                          1
   16                K1       ROUTING FLOW THROUGH PA.479 DAME NDI-ID.PA469
   17                Y                                         1        1
   18                Y1      1                                                  26.4
   19                Y5   24.4      200.0    420.0
   20                Y6  902.8      924.0    935.0
   21                Y8  922.7       50.0      3.1      1.5
   22                Y6  934.2        5.1      1.5    550.0
   23                E       99
```

COMPUTER INPUT OVERTOPPING ANALYSIS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS							
				RATIO 1 .30	RATIO 2 .40	RATIO 3 .50	RATIO 4 .60	RATIO 5 .70	RATIO 6 .80	RATIO 7 .90	RATIO 8 1.00
HYDROGRAPH AT	1	1.15	1	924.	1233.	1541.	1849.	2157.	2465.	2773.	3081.
	(	2.98)	(	26.18)(	34.90)(	43.63)(	52.35)(	61.08)(	69.80)(	78.53)(	87.25)(
ROUTED TO	2	1.15	1	801.	1124.	1435.	1736.	2036.	2335.	2634.	2935.
	(	2.98)	(	22.68)(	31.97)(	40.64)(	49.16)(	57.64)(	66.12)(	74.59)(	83.11)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	912.80	922.70	934.20
STORAGE	26.	189.	404.
OUTFLOW	0.	0.	6045.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	925.69	0.00	234.	801.	0.00	42.00	0.00
.60	926.44	0.00	249.	1129.	0.00	41.83	0.00
.70	927.11	0.00	262.	1435.	0.00	41.67	0.00
.75	927.71	0.00	274.	1736.	0.00	41.67	0.00
.80	928.27	0.00	285.	2036.	0.00	41.67	0.00
.90	928.80	0.00	296.	2335.	0.00	41.67	0.00
1.00	929.31	0.00	306.	2634.	0.00	41.67	0.00
1.00	929.80	0.00	316.	2935.	0.00	41.50	0.00

OVERTOPPING ANALYSIS SUMMARY

APPENDIX E

REGIONAL GEOLOGY

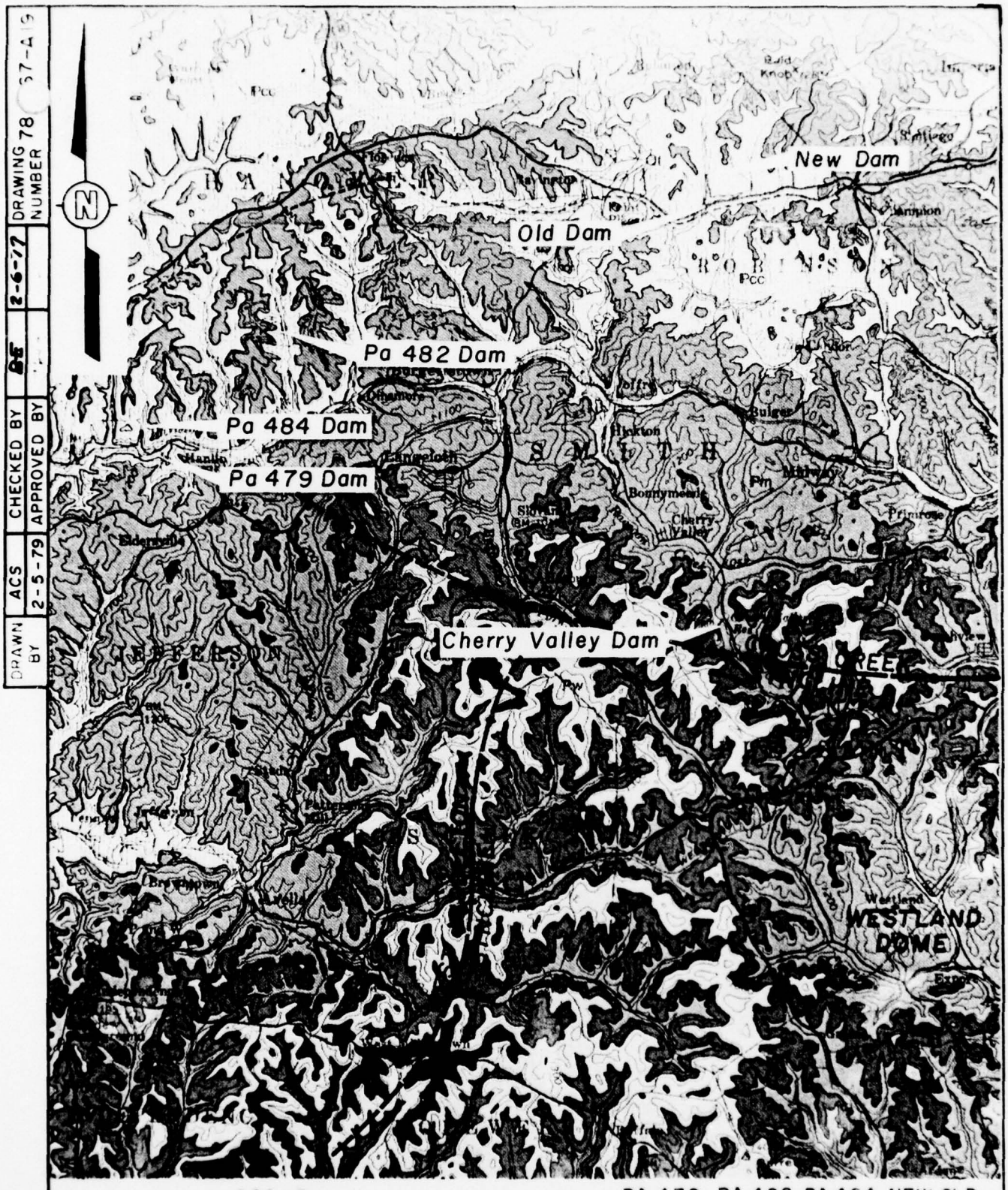
APPENDIX E
REGIONAL GEOLOGY

Pennsylvania Dam 479 is located between the Aunt Clara Dome and the Gillespie Dome. The strata strike northeast and dip approximately 70 feet per mile to the northwest. The stratigraphic column consists of members of the Upper Conemaugh Group, with shale, siltstone, and sandstone the primary rock type.

The lowest stratigraphic member of interest is the Pittsburgh red beds, a thick sequence of reddish claystone and shale. Above the red bed material is the Ames Limestone, a thin gray marine limestone which acts as a marker bed. The Ames Limestone crops at the surface or may be up to 15 feet below the surface in the vicinity of the dam. The Ames Limestone is usually highly jointed, and these joints may be open or filled with clay. These joints are usually interconnected with a possibility of piping along the fractures. Above the Ames are 22 feet of green-gray siltstone, 10 feet of calcareous shale, and 3 to 4 feet of a carbonaceous shale, which is equivalent to the Duquesne coal seam. Above the black shale is the Birmingham Shale, approximately 35 feet thick and consisting of a reddish claystone and shale, and then the Morgantown Sandstone. The Pittsburgh coal seam occurs approximately 215 feet above the Duquesne coal seam.

The only coal seam of economic interest is the Pittsburgh seam, which has been strip mined and deep mined on the ridges south of the dam and reservoir by the Superior Mining Company.

The Birmingham Shale is easily eroded and is known to be slide prone in the region. Approximately 20 percent of the surrounding area is covered by slide deposits and several recent as well as older slides have occurred near the dam.



DRAWN BY	ACS	CHECKED BY	BF	DRAWING NUMBER 78 57-A 19
	2-5-79	APPROVED BY		2-6-77

SCALE

0 1 2 3 4 5 miles

PA 479, PA 482, PA 484, NEW, OLD AND CHERRY VALLEY DAMS

GEOLOGY MAP

REFERENCE

GREATER PITTSBURGH REGION GEOLOGIC MAP
COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
AND J.A. HARPER, DATED 1975, SCALE 1:125000

DAPPOLONIA

DRAWN BY	ACS	2-5-79	DRAWING NUMBER 78-17-A22
CHECKED BY	BE	2-5-79	
APPROVED BY	[illegible]	2-5-79	

GROUP	FORMATION		DESCRIPTION
	Alluvium	Qt	Sand, gravel, clay.
	Terrace deposits		Sand, clay, gravel on terraces above present rivers; includes Carmichaels Formation.
DUNKARD	Greene		Cyclic sequences of sandstone, shale, red beds, thin limestones and coals.
DUNKARD	Washington	Pw	Cyclic sequences of sandstone, shale, limestone, and coal; contains Washington coal bed at base.
DUNKARD	Waynesburg		Cyclic sequences of sandstone, shale, limestone and coal; contains Waynesburg coal bed at base.
MONONGAHELA		Pm	Cyclic sequences of shale, limestone, sandstone and coal; contains Pittsburgh coal bed at base.
P; CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
P; CONEMAUGH	Ames		
P; CONEMAUGH	Glenshaw	Pcg	Cyclic sequences of sandstone, shale, red beds and thin limestone and coal; several fossiliferous limestone; Ames limestone bed at top.
ALLEGHENY	Vanport		Cyclic sequences of shale, sandstone, limestone, and coal; contains Brookville coal at base and Upper Freeport coal at top; within group are the commercial Vanport limestone and Kittanning and Clarion coals.
ALLEGHENY		Pa	

GEOLOGY MAP LEGEND

REFERENCE:

GREATER PITTSBURGH REGION GEOLOGIC MAP
COMPILED BY W.R. WAGNER, J.L. CRAFT, L. HEYMAN
AND J.A. HARPER, DATED 1975, SCALE 1:125 000