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OHIO RIVER BASIN

HARMON CREEK, WASHINGTON COUNTY

PENNSYLVANIA

DINSMORE STORAGE No. 2 DAM

NDI No. PA 00497

PennDER No. 63-20

LEVEL II

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MICHAEL BAKER, JR., INC.

DACW31-80-C-0025

prepared for

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.

Consulting Engineers

4301 Dutch Ridge Road

Beaver, Pennsylvania 15009

March 1980

OHIO RIVER BASIN

DINSMORE STORAGE No. 2 DAM
WASHINGTON COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI No. PA 00497
PennDER No. 63-20

(6) PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM.

Dinsmore Storage No. 2 Dam.
NDI Number PA-00497, PennDER
Number 63-20. Ohio River Basin,
Harmon Creek, Washington County
Commonwealth of Pennsylvania,

Prepared for: DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

Prepared by: MICHAEL BAKER, JR., INC.
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DACW31-80-C-0032

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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 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 available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

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 and safety 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 a dam depends on numerous and constantly changing internal and external conditions, and is 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.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Dinsmore Storage No. 2 Dam, Washington County, Pennsylvania
NDI No. PA 00497, PennDER No. 63-20
Harmon Creek
Inspected 7 December 1979

ASSESSMENT OF GENERAL CONDITIONS

Dinsmore Storage No. 2 Dam is classified as a "High" hazard - "Small" size dam. The dam and reservoir, owned by the Smith Township Municipal Authority, are used for water supply. The overall condition of the dam was assessed to be fair except for the spillway capacity and the blockage in the spillway.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass approximately 14 percent of the Probable Maximum Flood (PMF) before overtopping will occur. A spillway design flood (SDF) in the range of the 1/2 Probable Maximum Flood (1/2 PMF) to the PMF is required for Dinsmore Storage No. 2 Dam. The 1/2 PMF was chosen as the SDF. Because the duration and depth of overtopping under the 1/2 PMF (9.50 hours and 1.90 feet, respectively) exceeds the limiting criteria for failure of the dam (4 hours and 1.0 foot), it was determined that dam failure is likely under 1/2 PMF conditions. Further analyses indicated that the downstream damages would increase significantly as a result of failure of the dam. The spillway is therefore considered "seriously inadequate." The owner should immediately initiate an engineering study to further evaluate the spillway capacity and to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

In summary, Dinsmore Storage No. 2 Dam is classified as being in an "Unsafe" - "Non-emergency" condition because of the results of the hydraulic/hydrologic evaluations.

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 through 4 below should be designed or completed under the guidance of a qualified professional engineer experienced in the design of earth dams and appurtenant structures.

1) The material blocking the spillway should be removed immediately by the owner. Any cuts made

into the hillside should be designed and supervised by the owner's engineer.

2) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

3) The "as built" condition of the spillway should be determined and recorded on engineering drawings. It would also be advantageous to obtain detailed information on the intakes and outlet works and record this information.

4) The ability to use the water supply system for rapid drawdown of the reservoir should be evaluated. If the system cannot be used for this purpose, then an alternative drawdown system should be developed and instructions given to the appropriate operating personnel.

5) Repair the exposed areas of the concrete core wall (where repairs have not yet been completed).

6) Provide upstream closure for the intake pipe passing through the embankment.

7) Repair the undermined areas in the spillway channel.

8) Repair the section of the right spillway training wall where it is cracked and deteriorated.

9) Remove the remaining sections of the concrete weir in the spillway.

10) Place riprap on areas of minor erosion at the upstream crest of the slope.

11) Relocate the fuel tank to a suitable location away from the dam.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. The seepage noted in this inspection report should be examined in all future inspections and the condition recorded.

Submitted by:

MICHAEL BAKER, JR., INC.

John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 27 March 1980

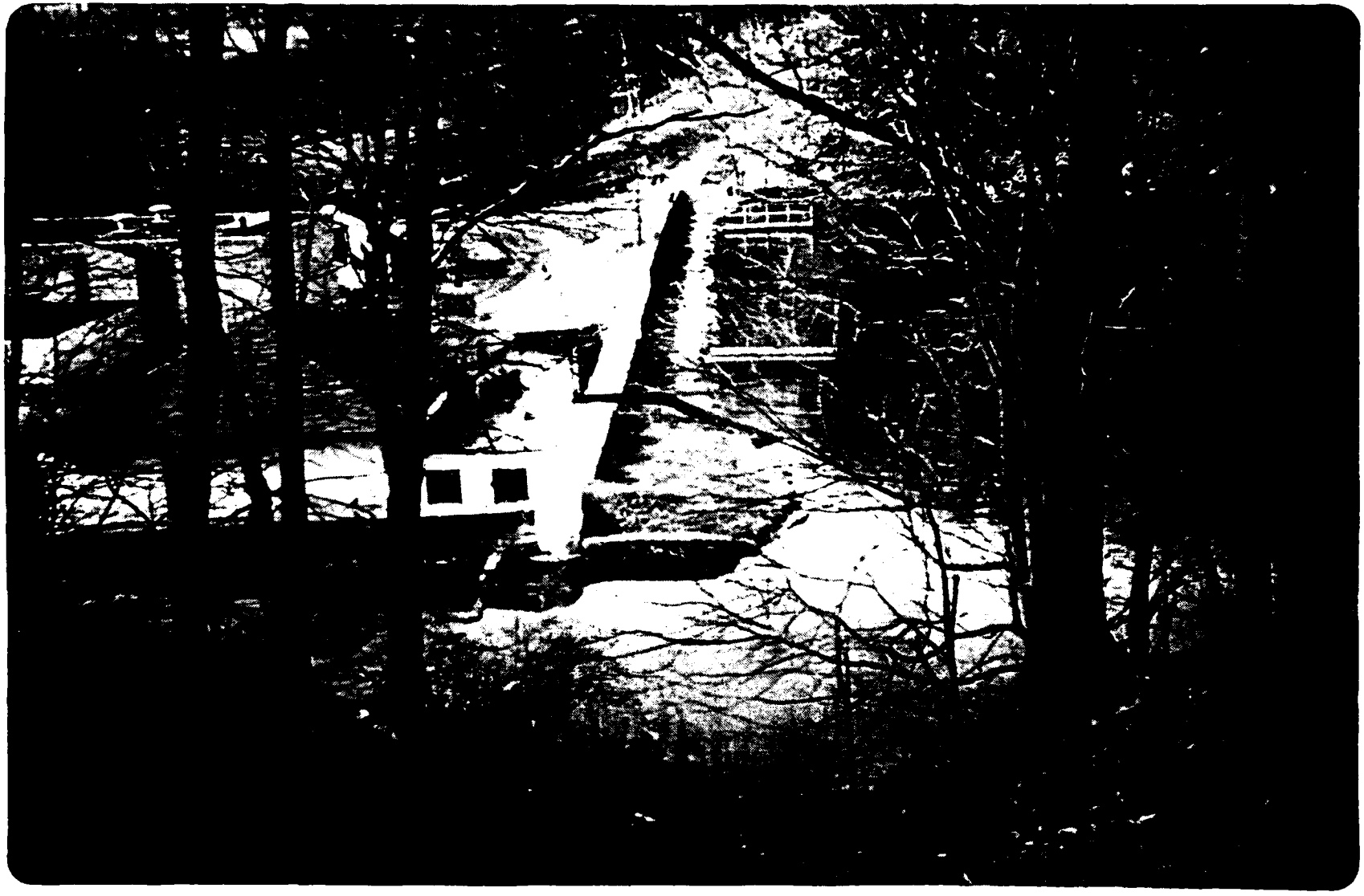
Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date: 29 April 1980

DINSMORE STORAGE No. 2 DAM



OVERALL VIEW OF DAM

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
DINSMORE STORAGE No. 2 DAM
NDI No. 00497, PennDER 63-20

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances - Dinsmore Storage No. 2 Dam was originally constructed as an 11 foot high concrete dam. At a later time the crest of the dam was raised to 26.6 feet by building an embankment behind the concrete dam. A concrete core wall was installed along the centerline of the dam. This core wall was socketed 3 feet into the rock underlying the dam. The upstream slope is 2H:1V (Horizontal to Vertical) from Elevation 990.7 feet Mean Sea Level (M.S.L.) to Elevation 999.7 feet M.S.L. and was riprapped from the top of the old concrete dam to the upstream bench. The bench is 8.5 feet wide; just behind the bench is the concrete core wall which is 2.5 feet above the bench and 1.5 feet wide at the top. The core wall flares out to 3 feet in width at the bottom of the wall. Downstream of the concrete core wall is a 3 foot wide bench which is at the same elevation as the top of the concrete core wall. The downstream slope is 2H:1V and grass covered. At the filtration plant, the core wall was increased in thickness to act as a retaining wall for the upstream portion of the embankment. No portion of the downstream embankment was placed behind the core wall at this location.

The spillway is located at the left abutment of the dam. The spillway is an open channel designed to have a 60 foot crest length (perpendicular to flow); however, because of blockage material, the spillway has an effective width of only 36 feet.

The channel bottom is concrete-lined near the crest changing to rock paving further downstream. The channel narrows from 36 feet at the crest to 22 feet at the discharge end.

The original outlet works are abandoned and non-functional. Two 12 inch cast-iron pipes serve as intakes for the water supply system. One pipe is fed by gravity, the other pipe is laid on the crest of the dam and is used as a syphon.

b. Location - Dinsmore Storage No. 2 Dam is located approximately 2 miles west of Burgettstown, Pennsylvania on Harmon Creek. The coordinates of the dam are N 40° 23.0' and W 80° 26.0'. The dam and reservoir can be located on USGS 7.5 minute topographic quadrangle, Burgettstown, Pennsylvania.

c. Size Classification - The maximum height of the dam is 26.6 feet. The reservoir volume to the top of the dam at Elevation 1001.6 feet M.S.L. is 133.0 acre-feet. Therefore, the dam is in the "Small" size category.

d. Hazard Classification - Because of residential structures located immediately downstream from the dam and because of the water supply filter plant and pump house located at the toe of the dam, loss of life is likely in the event of a dam failure. Therefore, the dam is classified in the "High" hazard category.

e. Ownership - The dam and reservoir are owned by the Smith Township Municipal Authority, Box 387, Burgettstown, Pennsylvania 15021. Mr. John McKee is the current Manager.

f. Purpose of Dam - The dam and reservoir are used for water supply.

g. Design and Construction History - The original concrete dam is estimated to have been built sometime prior to 1909. The design drawing in the PennDER file is dated 4 October 1909 (revised 24 January 1910) and is labeled as designed by the Pittsburg Buffalo Company, Pittsburg, PA. However, only the details of the intake and outlet works are shown on the drawing. In 1917 an addition to the concrete dam was designed by Baton and Elliott, Civil and Mining Engineers, First National Bank Building, Pittsburg, PA. (See Plate 3, dated July 1917, last revision 24 August 1918). The actual

dates of construction and contractors for both the original concrete dam and the addition to the dam are not known.

h. Normal Operational Procedures - The spillway is uncontrolled and the reservoir is normally at the spillway crest Elevation 997.7 feet M.S.L. except during periods of low rainfall and high water consumption. The water filtration building is at the toe of the dam and the embankment and spillway is occasionally checked by the personnel.

1.3 PERTINENT DATA

a. Drainage Area (square miles) -	3.78
b. Discharge at Dam Site (c.f.s.) -	
Maximum Known Flood -	760
Ungated Spillway Capacity (Top of Dam El. 1001.6 ft.) -	994
c. Elevation* (feet above M.S.L.) -	
Design Top of Dam -	1002.2
Minimum Top of Dam -	1001.6
Spillway Crest -	997.7
Streambed at Toe of Dam -	975±
Maximum Tailwater of Record -	Unknown
d. Reservoir (feet) -	
Length of Maximum Pool -	2500
Length of Normal Pool -	1800
e. Storage (acre-feet) -	
Top of Dam (El. 1001.6 ft.) -	133
Normal Pool (El. 997.7 ft.) -	79
f. Reservoir Surface (acres) -	
Top of Dam (El. 1001.6 ft.) -	18.0
Spillway Crest (El. 997.7 ft.) -	10.4

*Referenced to spillway Elevation 997.7 feet M.S.L. on Design Plans.

g. Dam -

Type -		Diaphragm earthfill
Length (feet) -		410
Maximum Height (feet) -	Design -	27.2
	Field -	26.6
Top Width (feet) -		
Design El. 1002.2 ft. -		4.5
Design El. 999.7 ft. -		8.5
Side Slopes - Upstream (El. 999.7 ft. to El. 990.7 ft.) -		2H:1V
Downstream -		2H:1V
Zoning -		None

Impervious Core - An existing concrete dam was used as a retaining wall for the upstream prism of the embankment during the raising of the dam circa 1917 (see Plate 3). A concrete core wall was constructed in the centerline of the new embankment dam.

Cut-off - The concrete core wall along the centerline of the dam is shown on the drawings as socketed 3 feet into underlying rock.

Grout Curtain -	None
Drains -	None

h. Diversion and Regulating Tunnel - None

i. Spillway -

Type -		Open channel
Crest Length Perpendicular to Flow (feet) -	Design -	60
	Field -	36
Gates -		None

Upstream Channel - Concrete-lined, formed by left training wall and left abutment.

Chute Channel - Rectangular shaped, concrete near the crest changing to rock paving. The channel narrows and curves toward the dam as it proceeds downstream.

Downstream Channel - Natural streambed

j. Regulating Outlets - The original outlet works are abandoned and non-functional. Two water intakes could possibly serve to drawdown the reservoir if necessary.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The review of information for this dam included the design plan file from the Pennsylvania Department of Environmental Resources' (PennDER) File No. 63-20. The correspondence file for this dam was not available. Contained in the design plan file were:

1) "Details - Intake - Dam - Francis Mine" dated 4 October 1909 (revised 24 January 1910) prepared by the Pittsburg Buffalo Company, Pittsburg, Pennsylvania.

2) "New Dam for Dinsmore Reservoir" dated July 1917 (last revision 24 August 1918) prepared for Langeloth Townsite Co., Langeloth, PA, prepared by Baton & Elliott, Civil and Mining Engineers, First National Bank Building, Pittsburg, PA. (See Plate 3.)

3) "Spillway - New Dam at Dinsmore, PA," dated July 1917 (last revision 22 August 1917). (See Plate 4.)

4) "Plan of Reservoir," dated July 1917. (See Plate 5.)

5) Miscellaneous superceded drawings from the period of 26 August 1916 to 24 August 1918.

2.2 CONSTRUCTION

No information concerning the actual construction period, methods, and design departures is available. The most reasonable estimate of the construction period for the addition to the dam is 1918. Although the design drawing detailing information concerning the outlet works (intake) of the prior existing concrete dam was dated 1909, it is estimated that the dam was constructed sometime prior to that date.

2.3 OPERATION

The operation of Dinsmore Storage No. 2 Dam is the responsibility of the Smith Township Municipal Authority. No formal operation procedures or records are presently maintained. However, records of rainfall and reservoir level are recorded.

2.4 EVALUATION

a. Availability - The limited information reviewed is readily available in PennDER's File No. 63-20.

b. Adequacy - The information available is adequate for a Phase I Inspection of the dam. However, it would be advantageous for the owner to obtain detailed information on the intakes and outlet works and record the information on engineering drawings. Also, the "as built" condition of the spillway structure should be obtained and recorded on engineering drawings.

c. Validity - The intake and outlet works shown on Plate 3 of this report are no longer functional or used. The current water intakes are located upstream of the water supply plant and consist of two 12 inch (estimated) cast-iron intake pipes (one by gravity and one by syphon).

The "as built" condition of the spillway is estimated to be different than the design plans; however, verification of this is difficult because of the material present on the left side of the crest of the spillway. No additional departure from the design plans of the observable portions of the dam could be identified.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General - The visual inspection of Dinsmore Storage No. 2 Dam was performed on 7 December 1979. No unusual weather conditions existed at the time of inspection. The pool level at the time of inspection was at Elevation 997.95 feet M.S.L. and approximately 0.2 foot of water was flowing over the spillway. The dam and its appurtenances are considered to be in fair overall condition. Noteworthy deficiencies observed during the inspection are described in the following paragraphs. The visual inspection check list, field sketch, top of dam profile, and typical cross-section are given in Appendix A.

b. Dam - Seepage was observed flowing from the right downstream toe of the dam. The quantity of seepage was estimated to be less than one gallon per minute (g.p.m.) and migration of fines was not observed. A portion of the exposed areas of the concrete core wall has been repaired; however, the remaining portions not repaired are spalled. The remainder of the spalled areas should be repaired. A minor amount of erosion has occurred along the upstream crest of the embankment. This erosion is superficial in nature and can be retarded by the placement of riprap at these locations. A fuel storage tank has been placed on the downstream slope embankment. It is not known what type of fuel is in the tank, but if it is explosive in nature this tank should be relocated.

c. Appurtenant Structures - The crest of the spillway is partially obstructed by slough material from the left abutment hillside. It is estimated that a portion of this material has been washed into the spillway by a drainage swale which discharges into the spillway at this location. It was also observed that the length (perpendicular to flow) of the spillway crest is probably not 60 feet as designed. The exact "as built" spillway crest length could not be determined because of the material blocking the left side of the spillway. A portion of the spillway channel paving has started to become undermined (see field sketch for location). A portion of the right spillway training wall is cracked and deteriorated. Portions of an old concrete weir were present on the spillway crest. These pieces of old weir should be removed.

The original outlet works for the dam is abandoned and non-functional. According to the owner's representative, bales of straw were thrown into the intake to plug the structure. (It is assumed that the sluice gate had become locked open.) The 30 inch outlet pipe was reportedly filled with grout subsequently. The 6 inch valve (the plans indicate a 12 inch cast-iron pipe) at the downstream end of the other outlet pipe has not been operated in over 10 years. The two 12 inch cast-iron pipes currently used for the water supply system could probably provide for emergency drawdown of the reservoir through the filtration plant; however, it is not known as to how far they would be able to drawdown the reservoir.

d. Reservoir Area - Soundings taken in the reservoir indicate that the area upstream of the old concrete dam has become silted in. Additionally, it was observed that a portion of the upstream end of the reservoir has also accumulated some sedimentation. A dam and reservoir (known locally as Star Lake) are located at the headwaters of Harmon Creek; however, because the property was heavily posted with no trespassing signs, no attempt was made to visually examine the dam. (The Soil Conservation Service (SCS) is currently designing a dam (SCS No. PA481) to be constructed upstream from Dinsmore Storage No. 2 Dam.

e. Downstream Channel - A house, the filtration and water supply building, and associated storage facilities are located immediately downstream from the dam. A bridge for the access road is located 300 feet downstream. This bridge was inundated with 2 feet of water during an August 1979 heavy rainfall. An additional three structures are located downstream within the floodplain before Harmon Creek passes beneath a township road. It should be further noted that several SCS structures have recently (1970's) been constructed on tributaries of Harmon Creek to protect areas of Colliers, West Virginia from flooding.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal written procedures in the event of impending failure of the dam. Because the pump and filter building is located at the downstream toe, the downstream face will usually receive a quick visual inspection every day, but no formal written procedure for the inspection of the dam has been prepared by the owner.

4.2 MAINTENANCE OF DAM

The Smith Township Water Authority is responsible for maintenance of the dam. At the present time, the maintenance of the dam is considered fair. It is recommended that formal maintenance procedures be developed and implemented.

4.3 MAINTENANCE OF OPERATING FACILITIES

The Smith Township Water Authority is responsible for maintenance of the operating facilities. Although maintenance of these facilities has been performed at various times in the past, no formal schedule or record of the maintenance is presently in use. It is recommended that operation and preventive maintenance schedules be developed and implemented.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

At the present time, there is no warning system or evacuation plan in the event of a dam failure.

4.5 EVALUATION OF OPERATIONAL ADEQUACY

Maintenance of the operating facilities are considered fair for the function that they serve. Formal emergency procedures should be developed.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data - None of the original hydrologic or hydraulic design calculations are available for Dinsmore Storage No. 2 Dam.

b. Experience Data - According to owners of the dam, a storm occurring in August 1979 resulted in a flow through the spillway which rose to within 1 foot of the top of the spillway training wall. This corresponds to a maximum discharge of 760 c.f.s. No other information concerning the effects of significant floods on the dam is available.

c. Visual Observation - A large amount of material has slid and washed down the left abutment, burying a section of the left spillway training wall and blocking a portion of the spillway. There is no evidence to suggest that high flows would remove significant amounts of this material, indicating that this blockage will affect the performance of the spillway during flood events.

The spillway, in its current condition, is 36 feet wide. Because the left spillway training wall is buried, the original dimensions of the spillway could not be obtained during the field inspection. However, it is unlikely that the spillway crest is 60 feet wide as stated in the design plans for the dam. For the spillway to be this size, it would have to extend another 24 feet into the hillside, as shown in Photos 7 and 8. Other discrepancies between the actual and design spillway dimensions indicate that the spillway was not constructed according to the design plans.

Scattered remnants of an old broad-crested weir are present in the spillway. As these remnants are very limited in extent, they should not significantly influence flow through the spillway.

There is also a low area at Station 1+45 on the dam crest which is approximately 0.6 foot below the average crest elevation.

d. Overtopping Potential - Dinsmore Storage No. 2 Dam is a "Small" size - "High" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of 1/2 Probable Maximum Flood (1/2 PMF)

to the Probable Maximum Flood (PMF). Due to the small size of the impoundment, the 1/2 PMF was chosen as the SDF.

The hydraulic capacity of the dam, reservoir, and spillway was assessed by utilizing the U.S. Army Corps of Engineers Flood Hydrograph Package, HEC-1 DB. The hydrologic characteristics of the basin, specifically, the Snyder's unit hydrograph parameters, were obtained from a regionalized analysis conducted by the Baltimore District of the U.S. Army Corps of Engineers.

Because the size of the spillway without the obstruction is unknown, only the present spillway capacity was analyzed. This revealed that during the SDF, the dam would be overtopped for a duration of 9.50 hours by a maximum depth of 1.90 feet.

The spillway is capable of passing only 14 percent of the PMF before overtopping occurs.

e. Spillway Adequacy - As outlined in the above analyses, the spillway cannot pass the SDF before overtopping occurs. The next criteria for determining spillway adequacy requires an estimate of whether the dam will fail during the 1/2 PMF. The following conditions, as well as the overall state of the dam, were used as the limiting criteria which are likely to cause failure of the dam.

1) Depth of overtopping of 1.0 foot or greater.

2) Duration of overtopping in excess of 4 hours.

Both of these criteria are exceeded during the 1/2 PMF, indicating the dam is likely to fail. To assess the impact of the dam's failure on the damage centers downstream, the 1/2 PMF was routed through the dam for failure and non-failure cases. This analysis indicated that there would be a very large increase in flow magnitude and depth from the non-failure to the failure case. It is likely that there would be a significant increase in downstream damages accompanying this increase in flow which would place this spillway in the "seriously inadequate" category.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations - The seepage noted in paragraph 3.1.b is considered minor but should be examined in all future inspections and the condition recorded. No signs of distress, in association with the seepage or at other locations on the embankment, were observed. No signs of distress or major cracking was observed for the retaining wall section of the concrete core wall. None of the deficiencies noted in Section 3 for the appurtenant structures adversely affects the continued structural stability of these facilities. It is recommended, for the protection of the individuals removing the material from the left side of the spillway, that any cuts made into the hillside be designed and inspected by a professional engineer experienced in earth and rock slope stability.

b. Design and Construction Data - Calculations of structural stability were not available for review. No information concerning the dam foundation materials or conditions was available. The dam apparently has had a history of satisfactory performance of the structural stability although no written information is available. Should future inspections observe signs of distress which would affect the structural stability, detailed evaluations and corrective measures may become necessary.

c. Operating Records - Historically (August 1979), the dam withstood the reservoir level within one foot (approximate Elevation 1001.2 feet M.S.L.) of the design top of dam elevation without any structural damage. No other information is available.

d. Post-Construction Changes - No known changes adversely affecting the structural stability of the dam have been performed.

e. Seismic Stability - The dam is located in Seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is not warranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety - Dinsmore Storage No. 2 Dam is a "High" hazard - "Small" size dam and should have a hydraulic capacity in the range of the 1/2 PMF to PMF. Because of the small size of the impoundment, the 1/2 PMF was chosen as the SDF. As presented in Section 5, the spillway and reservoir were determined to have a capacity of only 14 percent of the PMF before overtopping of the dam will occur. During the 1/2 PMF, the depth and duration of overtopping are 1.90 feet and 9.50 hours, respectively. These exceed the limiting criteria of 1.0 foot or greater of overtopping and duration in excess of 4 hours estimated for this dam. Therefore, it was concluded that failure of the dam is likely to occur during or prior to the 1/2 PMF event. Further, the 1/2 PMF was routed downstream for failure and non-failure cases and it was determined that failure would significantly increase the damages downstream. The spillway is therefore classified as "seriously inadequate" and the dam is classified as being in an "Unsafe" - "Non-emergency" condition.

Except for the results of the spillway capacity analyses and the partial blockage of the spillway channel, the overall condition of the dam at the time of inspection was considered fair. It should be pointed out that even if the material on the spillway crest is removed, the capacity of the spillway may not meet the necessary criteria.

The current condition of the outlet works and the elevation of the intake pipes leaves a question as to whether drawdown of the reservoir, if necessary, could be accomplished by the current system. It is recommended that the system be evaluated for this purpose and if drawdown cannot be accomplished then written instructions and procedures on the use of siphons for drawdown should be prepared.

The condition of the seepage observed during the inspection is not critical to the structural stability at this time. Future inspections should visually examine this area and record the condition.

b. Adequacy of Information - The information and the observations made during the visual inspection are considered sufficient for this Phase I Inspection

Report. However, it would be advantageous for the owner to obtain detailed information on the intakes and outlet works and the "as built" condition of the spillway. This information should be recorded on engineering drawings for future reference.

c. Urgency - The owner should initiate without delay the further investigation as discussed in paragraph 7.1.d.

d. Necessity for Additional Data/Evaluation - The hydraulic/hydrologic analyses performed for this dam has indicated the need for additional spillway capacity. It is recommended that the owner of Dinsmore Storage No. 2 Dam immediately initiate an engineering study to further evaluate the spillway capacity and to develop recommendations for reducing the overtopping potential of the dam. This study should result in the implementation of the necessary remedial measures. As a part of this study, the "as built" condition of the spillway should be determined and used appropriately in the analyses.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection and review of information revealed certain items of work which should be performed without delay by the owner. Items 1 through 4 below should be designed or completed under the guidance of a qualified professional engineer experienced in the design of earth dams and appurtenant structures.

1) The material blocking the spillway should be removed immediately by the owner. Any cuts made into the hillside should be designed and supervised by the owner's engineer.

2) The owner should immediately initiate an engineering study to further evaluate the spillway capacity in order to develop recommendations for remedial measures to reduce the overtopping potential of the dam.

3) The "as built" condition of the spillway should be determined and recorded on engineering drawings. It would also be advantageous to obtain detailed information on the intakes and outlet works and record this information.

4) The ability to use the water supply system for rapid drawdown of the reservoir should be evaluated. If the system cannot be used for

this purpose, then an alternative drawdown system should be developed and instructions given to the appropriate operating personnel.

5) Repair the exposed areas of the concrete core wall (where repairs have not yet been completed).

6) Provide upstream closure for the intake pipe passing through the embankment.

7) Repair the undermined areas in the spillway channel.

8) Repair the section of the right spillway training wall where it is cracked and deteriorated.

9) Remove the remaining sections of the concrete weir in the spillway.

10) Place riprap on areas of minor erosion at the upstream crest of the slope.

11) Relocate the fuel tank to a suitable location away from the dam.

In addition, the following operational measures are recommended to be undertaken by the owner:

1) Develop a detailed emergency operation and warning system.

2) During periods of unusually heavy rain, provide around-the-clock surveillance of the dam.

3) When warning of a storm of major proportions is given by the National Weather Service, the owner should activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. The seepage noted in this inspection report should be examined in all future inspections and the condition recorded.

APPENDIX A

VISUAL INSPECTION CHECK LIST, FIELD SKETCH, TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION

Check List
Visual Inspection
Phase 1

Name of Dam Dinsmore Storage No. 2 Dam County Washington State PA Coordinates Lat. N 40°23.0'

NDI # PA 00497
PennDER # 63-20

Long. W 80°26.0'

Date of Inspection 7 December 1979 Weather Cool, sunny Temperature 35-40° F.

Pool Elevation at Time of Inspection 997.95* ft. M.S.L. Tailwater at Time of Inspection 976.73* ft. M.S.L.

*Referered to spillway Elevation 997.7 M.S.L. on Design Plans.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Ulinski
David J. Greenwood
Jeffrey S. Maze

Field Review (6 February 1980)

John A. Dziubek
James G. Ulinski

Owner's Representatives:

Mr. John McKee - Manager
Smith Township

James G. Ulinski Recorder

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE		
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS		
DRAINS		
WATER PASSAGES		
FOUNDATION		

CONCRETE/MASONRY DAMS - Not Applicable

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES		
STRUCTURAL CRACKING		
VERTICAL AND HORIZONTAL ALIGNMENT		
MONOLITH JOINTS		
CONSTRUCTION JOINTS		

EMBANKMENT

Name of Dam DINSMORE STORAGE No. 2 DAM
NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Two areas of minor erosion have occurred at the normal pool level on the upstream crest. The left abutment is sloughing and eroding into the spillway crest.	Repair erosion by adding some riprap. Remove material from spillway crest and cutback or stabilize abutment slope.

EMBANKMENT

Name of Dam DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The horizontal alignment is acceptable. The top of the concrete core wall is slightly (0.6 ft. maximum) irregular due to different depths of weathering and spalling of the concrete.	The concrete core wall that is exposed should be repaired.
RIPRAP FAILURES	Minor erosion along upstream crest mentioned under "Sloughing or Erosion of Embankment and Abutment Slopes."	

EMBANKMENT

Name of Dam DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problems were observed other than the previously mentioned material sloughing onto the spillway crest from left abutment.	
ANY NOTICEABLE SEEPAGE	Minor seepages (Q < 1 g.p.m.) coming from toe of embankment near the right downstream end (see Field Sketch).	This area should be visually examined in future inspections and the condition recorded.
STAFF GAGE AND RECORDER	None	
DRAINS	None	

OUTLET WORKS

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet could not be observed.	
INTAKE STRUCTURE	There is a 12 in. syphon water intake to the pump and filter building. Additionally, there is a 12 in. intake located under the left walkway into the reservoir. No valves were located in the reservoir during the visual inspection. The original intake structure has been abandoned and is non-functional.	Provide upstream closure for the pipe through the embankment. (See Field Sketch for locations.)
OUTLET STRUCTURE	None	
OUTLET CHANNEL	None	
EMERGENCY GATE	The original outlet works consisted of a 30 in. diameter outlet pipe which was permanently closed sometime between 1931 and 1969. A 6 in. diameter outlet pipe with a gate valve is located on the downstream end, but it has not been operated in the past 10 yrs. The reservoir can presently be drawn down by utilizing the intake piping to the treatment plant.	

UNGATED SPILLWAY

Name of Dam: DINSMORE STORAGE No. 2 DAM
NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	An old concrete broad crested weir partially blocks a portion of the spillway.	This old weir should be removed.
APPROACH CHANNEL	Slough material blocks the left side of the spillway and covers part of the training wall. This slide could severely restrict flow in the spillway.	Remove slough material and regrade hillside. Rebuild left training wall if necessary.
DISCHARGE CHANNEL	Repairs were made to the left training wall on the downstream slope in 1960. These repairs consisted of placing concrete (gunite) along the base of the wall to keep water away from the training wall. Some minor undermining of the channel paving is occurring. (See Field Sketch for approximate location.) The right training wall of the spillway is cracked and deteriorated at the location shown on the Field Sketch.	Repair undermined area. Repair training wall where necessary.
BRIDGE AND PIERS	A small bridge is located at the bottom of the spillway. The bottom of the bridge is approximately 4 ft. above the spillway.	The bridge appears to offer no constriction to flow in the discharge channel.

GATED SPILLWAY - Not Applicable

Name of Dam: DINSMORE STORAGE No. 2 DAM
NDI # PA 00497

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

INSTRUMENTATION - None

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS		
OBSERVATION WELLS		
WEIRS		
PIEZOMETERS		
OTHER		

RESERVOIR

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

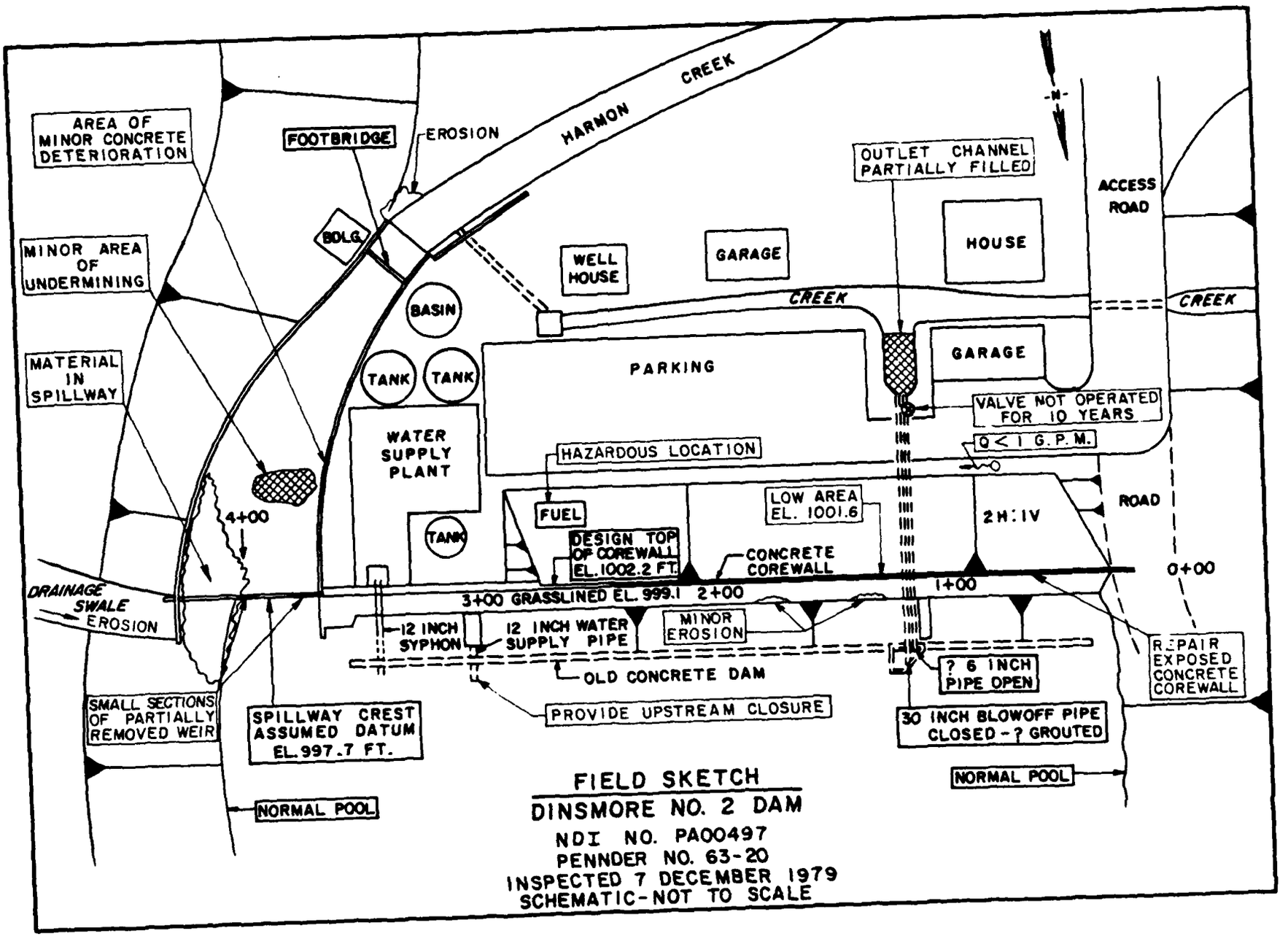
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slopes are moderate to steep and one covered with woods and grass. Part of the watershed consists of strip-mined areas. A dam and reservoir are located at the headwaters of Harmon Creek. Known locally as Star Lake, no NDI number or PennDER number could be identified for this dam. It is estimated that it would meet the 50 ac.-ft. or 25 ft. height criteria for the National Dam Inspection Program. In addition, it is our understanding that the SCS is designing a dam (SCS No. PA 481) to be constructed upstream from Dinsmore Storage No. 2 Dam.	
SEDIMENTATION	The upper end of reservoir appears to be partially filled with sedimentation in addition to the area behind the old concrete dam.	

DOWNSTREAM CHANNEL

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	One small access road bridge is located approximately 300 ft. downstream of the dam.	This bridge has been submerged by floodwaters during recent floods.
SLOPES	Slopes are gentle to moderate with woods and fields along the downstream channel.	
APPROXIMATE NO. OF HOMES AND POPULATION	One home, several storage buildings, and the Smith Township Water Authorities' filter and pump building are located almost immediately downstream from the dam. An additional 2 to 3 homes are located in the floodplain of the downstream channel.	



FIELD SKETCH

DINSMORE NO. 2 DAM

NDI NO. PA00497

PENNDER NO. 63-20

INSPECTED 7 DECEMBER 1979

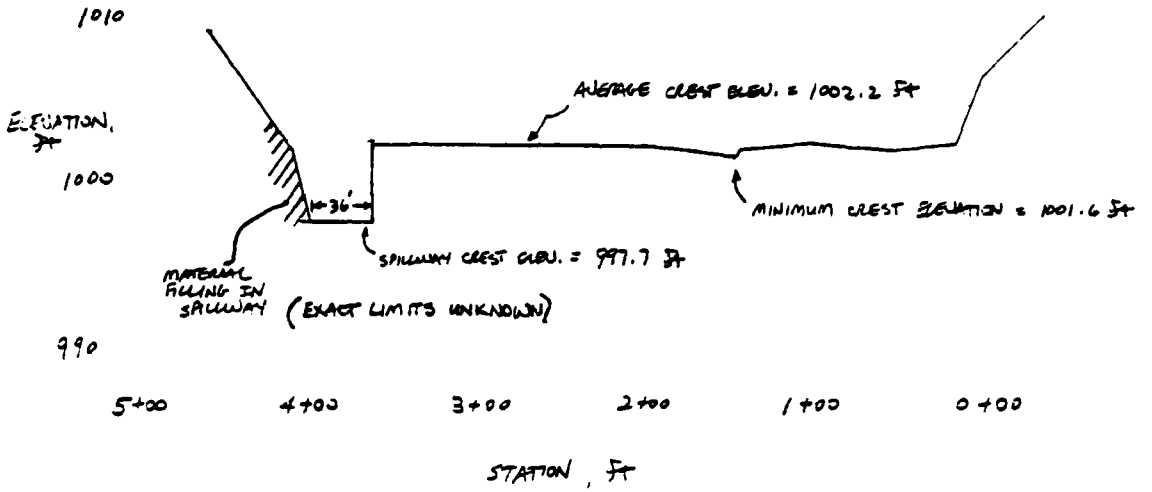
SCHEMATIC-NOT TO SCALE

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS
18 February 1980
Box 280
Beaver, Pa. 15009

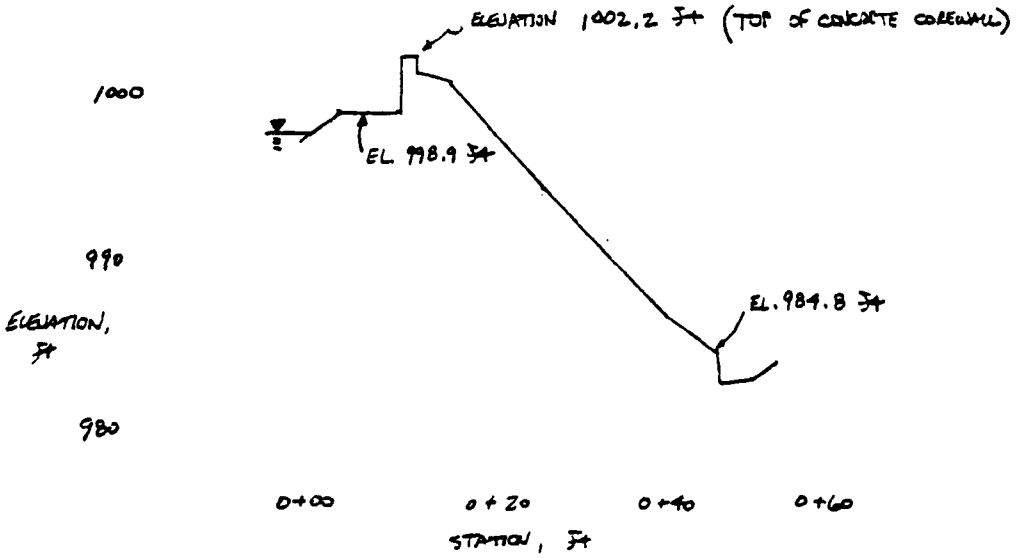
DINSMORE STORAGE No. 2 DAM
TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

Date of Inspection - 7 December 1979

TOP OF DAM PROFILE



CROSS SECTION AT STATION 2+00



APPENDIX B

ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: DINSMORE STORAGE No. 2 DAM
NDI # PA 00497

ITEM	REMARKS
PLAN OF DAM	See Plate 3 of this report.
REGIONAL VICINITY MAP	See Location Plan (Plate 1) of this report. The USGS 7.5 minute topographic quadrangles, Avella and Burgettstown, Pennsylvania were used to prepare the Location Plan.
CONSTRUCTION HISTORY	Original concrete dam - data unknown. Raising of the dam by modifying to diaphragm earthfill dam was probably constructed in 1918. Details of the intake for the concrete dam was placed on drawings by the Pittsburg Buffalo Company in 1909. Design of the raising of the dam was performed by Baton and Elliott, Civil and Mining Engineers, Pittsburg, PA in 1917.
TYPICAL SECTIONS OF DAM	See Plate 3 for design. See Appendix A for field inspection cross-section.
HYDROLOGIC/HYDRAULIC DATA	None available
OUTLETS - PLAN and - DETAILS	Details of abandoned outlets on Plate 3. See Field Sketch for approximate location of intake pipes for water supply.
- CONSTRAINTS	No information available
- DISCHARGE RATINGS	None available
RAINFALL/RESERVOIR RECORDS	Records are tabulated daily and kept at the plant.

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

ITEM	REMARKS
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available; see Appendix F for regional geology.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No information available
POST-CONSTRUCTION SURVEYS OF DAM	No information available
BORROW SOURCES	No information available

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICATIONS	The only modifications known is the abandonment of the outlet works by dumping straw bales into the intake and subsequent grouting of the 30 in. outlet pipe. Some repairs (gunite) have been performed to portions of the spillway training walls (circa 1960). Also, over the past two years approximately one half of the exposed portions of the concrete core wall has been repaired. Two new 12 in. C.I.P. water intakes were installed at sometime after original construction.
HIGH POOL RECORDS	No record of high pool is kept. Owners personnel noted that the spillway was flowing to within one ft. of the top during unusually heavy rainfall in August 1979.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	No information available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	No information available
MAINTENANCE OPERATION RECORDS	No records of maintenance are kept.

Name of Dam: DINSMORE STORAGE No. 2 DAM

NDI # PA 00497

ITEM	REMARKS
SPILLWAY PLAN	See Plate 3 for design; it is questionable as to whether it represents the "as built" conditions.
SECTIONS and DETAILS	See Plate 4 for design; it may not represent the "as built" conditions.
OPERATING EQUIPMENT PLANS & DETAILS	Abandoned facilities are noted on Plate 3; no information available on current intakes.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 3.78 sq.mi. (Primarily forests with some strip-mined areas)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 997.7 ft. (79.0 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1001.6 ft. (133.0 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1001.6 ft. (minimum elevation)

SPILLWAY:

a. Crest Elevation 997.7 ft.
b. Type Concrete open channel
c. Width of Crest Parallel to Flow Approximately 55 ft.
d. Length of Crest Perpendicular to Flow 36 ft. (bottom width)
e. Location Spillover Left abutment
f. Number and Type of Gates None

OUTLET WORKS:[1] Treatment Plant Intake Piping Is Used Currently

a. Type 12 in. C.I.P.
b. Location Under left walkway
c. Entrance Inverts El. 975± ft. (this El. is unconfirmed)
d. Exit Inverts Unknown
e. Emergency Drawdown Facilities Reservoir can be drained through 2 service lines used by the plant

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE No records available

[1]Original outlet works consisting of a 30 in. C.I.P. with sluice gate and a 12 in. C.I.P. with 6 in. valve at downstream end are abandoned.

APPENDIX C

PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Dam from Left Hillside Above Dam

Photograph Location Plan

Photo 1 - View of the Upstream Crest of the Dam from the Right Abutment

Photo 2 - View of the Downstream Slope of the Dam from the Right Abutment

Photo 3 - View of the Upstream Crest of the Dam from the Junction of the Spillway and the Embankment

Photo 4 - View Looking Upstream at the Downstream Slope of the Embankment

Photo 5 - View Looking Downstream at the Entrance to the Spillway

Photo 6 - View Looking at the Right Side of the Crest of the Spillway

Photo 7 - View Looking at the Left Side of the Crest of the Spillway (Note material accumulated in spillway from hillside)

Photo 8 - View Looking Upstream at the Crest of the Spillway

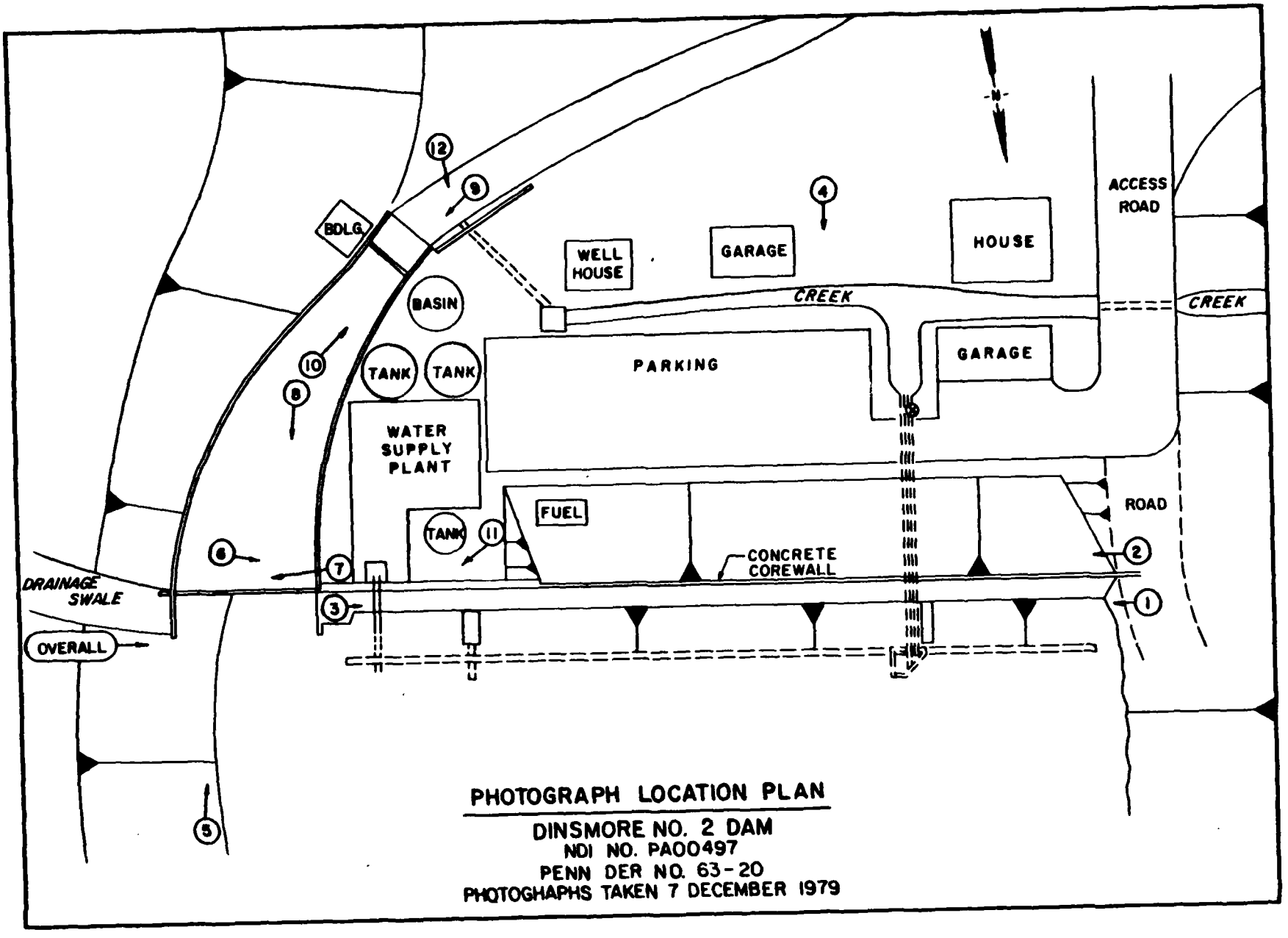
Photo 9 - View Looking Upstream at the Discharge Channel of the Spillway

Photo 10 - View Looking Downstream at the Discharge Channel of the Spillway

Photo 11 - View Looking at Core Wall (Retaining Wall) Immediately Upstream from the Water Filtration Plant

Photo 12 - View Looking Upstream at the Water Filtration Plant and the Wall Along the Right Side of the Stilling Basin

Note: Photographs were taken on 7 December 1979.



PHOTOGRAPH LOCATION PLAN

DINSMORE NO. 2 DAM
NDI NO. PA00497
PENN DER NO. 63-20
PHOTOGHAPHS TAKEN 7 DECEMBER 1979

DINSMORE STORAGE No. 2 DAM

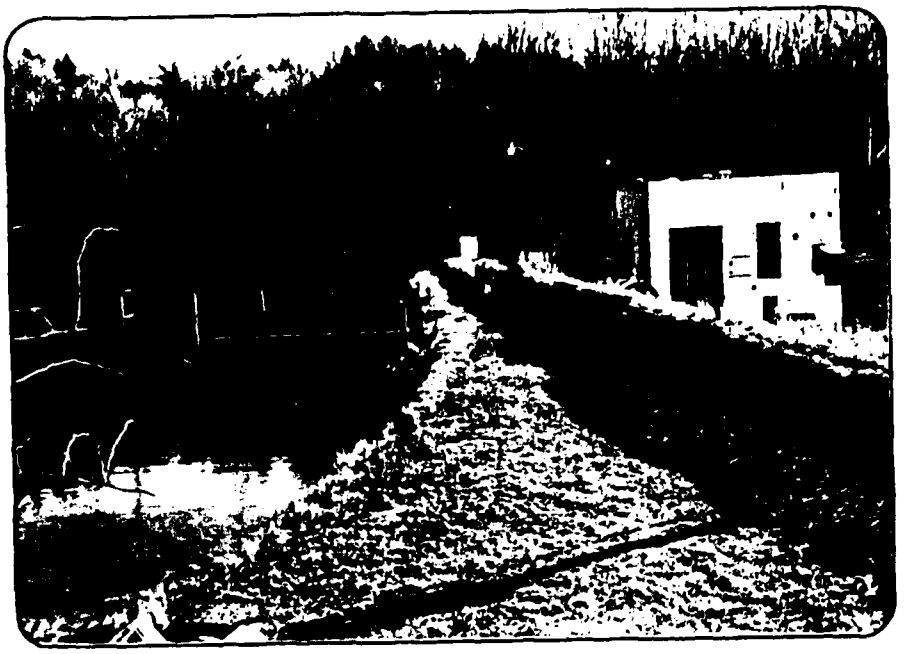


PHOTO 1. View of the Upstream Crest of the Dam from the Right Abutment

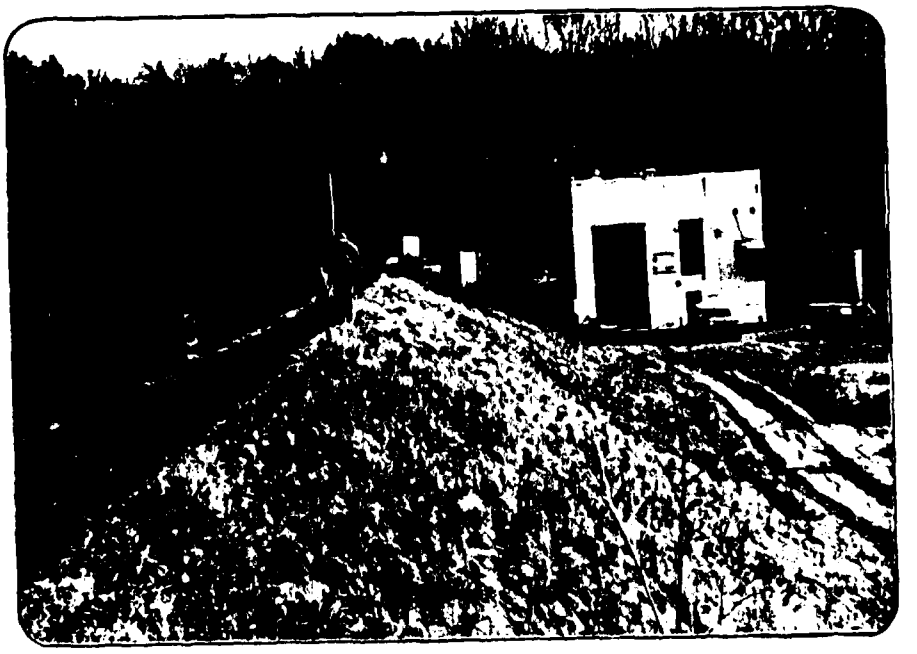


PHOTO 2. View of the Downstream Slope of the Dam from the Right Abutment

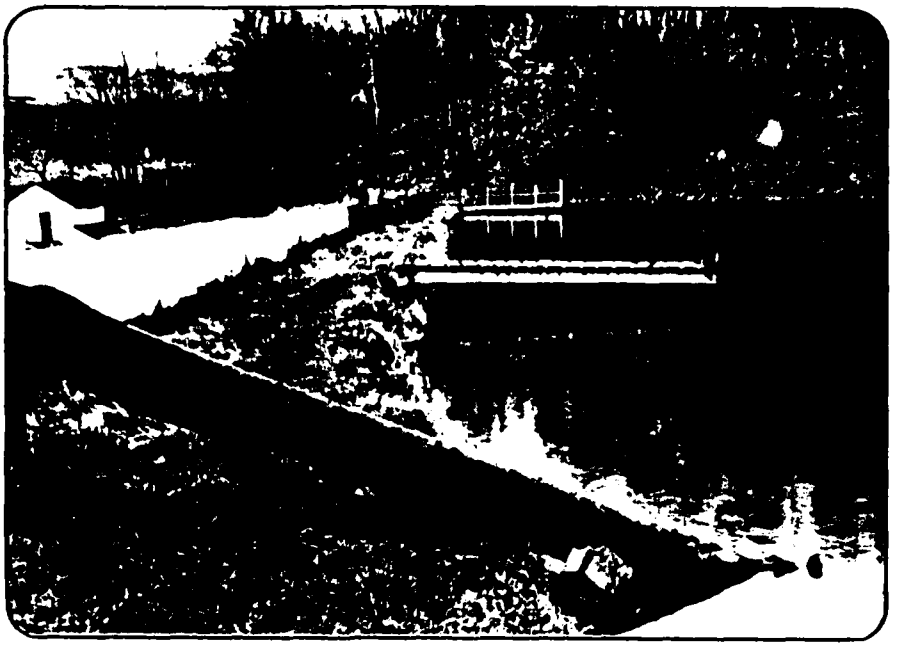


PHOTO 3. View of the Upstream Crest of the Dam from the Junction of the Spillway and the Embankment

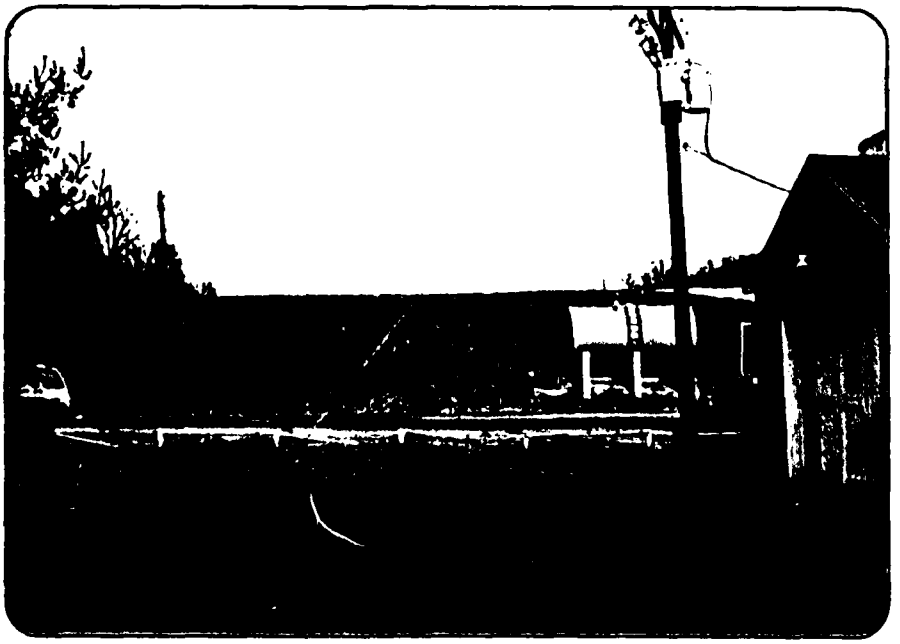


PHOTO 4. View Looking Upstream at the Downstream Slope of the Embankment

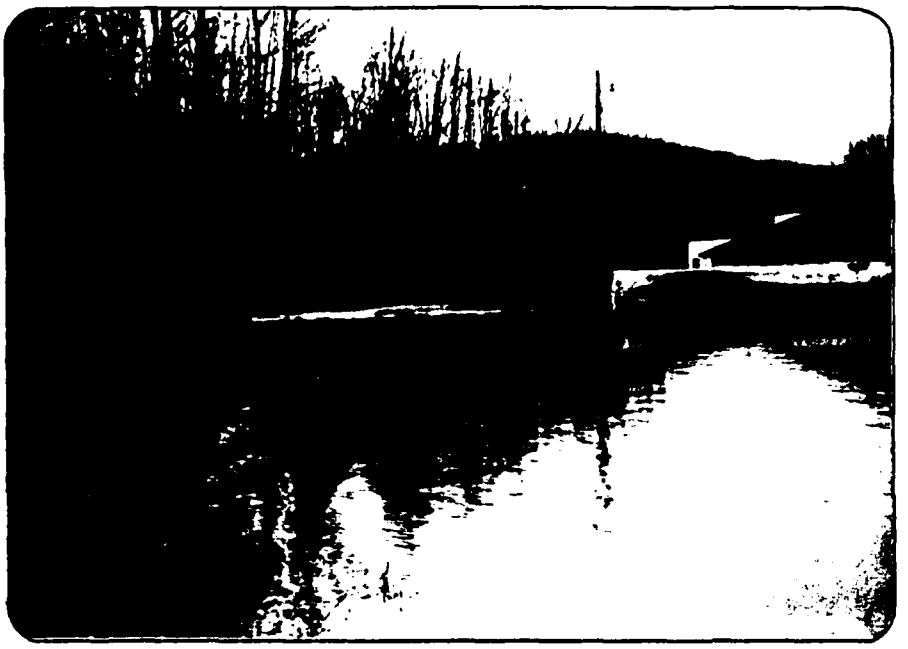


PHOTO 5. View Looking Downstream at the Entrance to the Spillway

PHOTO 6. View Looking at the Right Side of the Crest of the Spillway

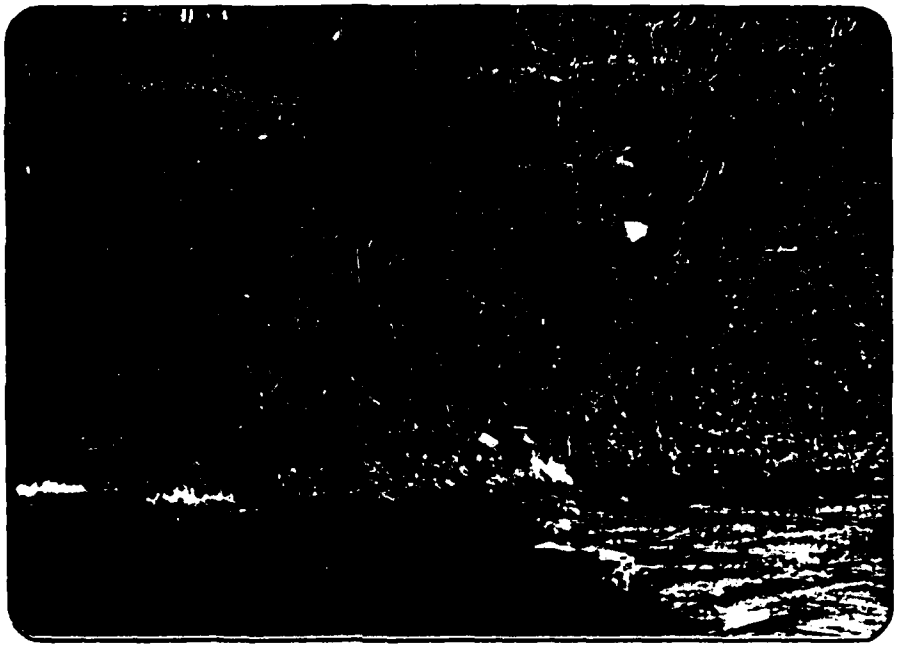


PHOTO 7. View Looking at the Left Side of the Crest of the Spillway

PHOTO 8. View Looking Upstream at the Crest of the Spillway

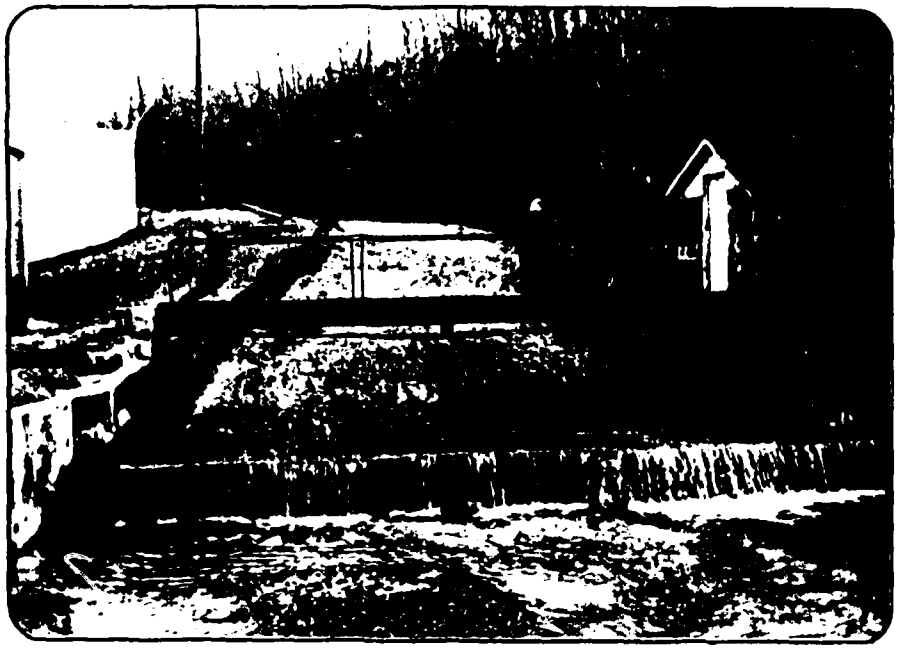


PHOTO 9. View Looking Upstream at the Discharge Channel of the Spillway

PHOTO 10. View Looking Downstream at the Discharge Channel of the Spillway

PHOTO 11. View Looking at Core Wall (Retaining Wall) Immediately Upstream from the Water Filtration Plant

PHOTO 12. View Looking Upstream at the Water Filtration Plant and the Wall Along the Right Side of the Stilling Basin

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject DINSMORE STORAGE NO. 2 DAM S.O. No. _____
APPENDIX D - HYDROLOGIC AND Sheet No. _____ of _____
HYDRAULIC COMPUTATIONS Drawing No. _____
Computed by _____ Checked by _____ Date _____

SUBJECT	PAGE
PREFACE	i
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
DAM CREST PROFILE AND CROSS SECTION	4
SPILLWAY PROFILE AND DISCHARGE RATING	5
SPILLWAY CAPACITY ANALYSIS AND FAILURE ASSUMPTIONS	6
HEC-1 SPILLWAY CAPACITY ANALYSIS	7
HEC-1 DOWNSTREAM ROUTINGS	12

PREFACE

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: DINSMORE STORAGE No. 2 DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 24.1 INCHES/24 HOURS(1)

STATION	1	2	3	4	5
Station Description	DINSMORE STORAGE No. 2 DAM				
Drainage Area (square miles)	3.78				
Cumulative Drainage Area (square miles)	3.78				
Adjustment of PMF for Drainage Area (%)(2)	Zone 7				
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)	3.75				
L_{ca} (miles) (5)	1.89				
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	3.06				
Spillway Data					
Crest Length (ft)	36				
Freeboard (ft)	3.90				
Discharge Coefficient	(Discharge rating curve developed				
Exponent	on sheet 5 of 17)				

(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.

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject DINSMORE STORAGE NO. 2 DAM — S.O. No.
HYDRAULIC DATA — Sheet No. 2 of 17
Drawing No.
Computed by WDL — Checked by WLS — Date 2-18-80

STORAGE CALCULATIONS :

AREA VS. ELEVATION DATA : (MEASURED FROM QUADS)

ELEVATION (Ft)	AREA (ACRES)
997.7	10.41
1000.0	15.00
1020	52.09

NOTE: NORMAL POOL ASSUMED TO BE AT ELEVATION OF CONTROL SECTION IN SPILLWAY CREST (997.7 Ft)

NORMAL POOL STORAGE :

$$\text{STORAGE VOLUME} = V_{NP} = \frac{h}{3}\left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$$

h = ESTIMATED AVERAGE DEPTH = 8.0 Ft

A_1 = AREA OF NORMAL POOL = 10.41 Ac.

A_2 = AREA OF RESERVOIR BOTTOM = 9.35 Ac (ESTIMATED FROM RESERVOIR SIDE SLOPES AND DEPTH)

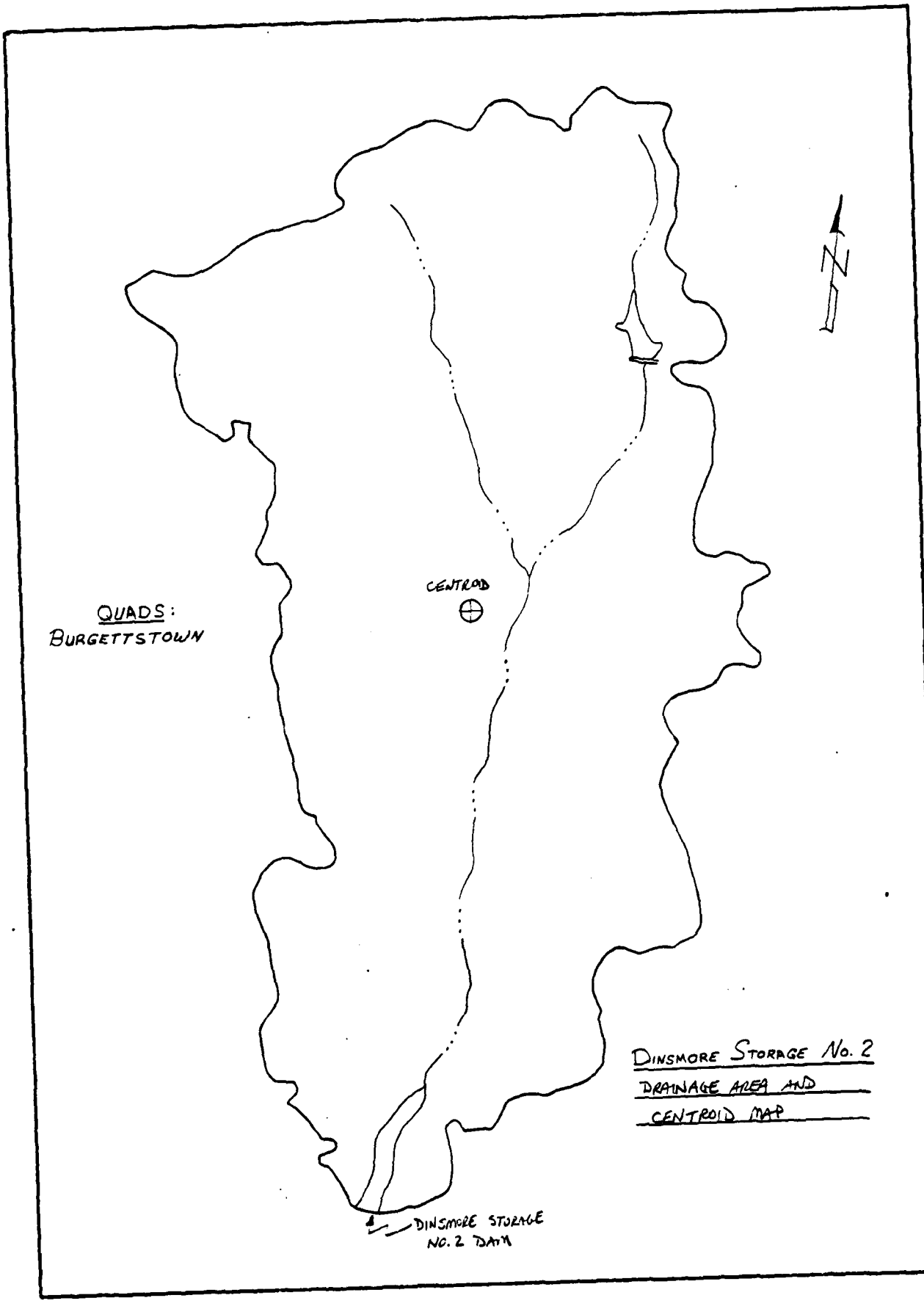
$$V_{NP} = \frac{8}{3}\left(10.41 + 9.35 + \sqrt{(10.41)(9.35)}\right)$$

$$V_{NP} = 79.0 \text{ Ac-Ft}$$

TOP OF DAM STORAGE :

$$V = 79.0 \text{ Ac-Ft} + 54.0 \text{ Ac-Ft}$$

$$V = 133.0 \text{ Ac-Ft}$$

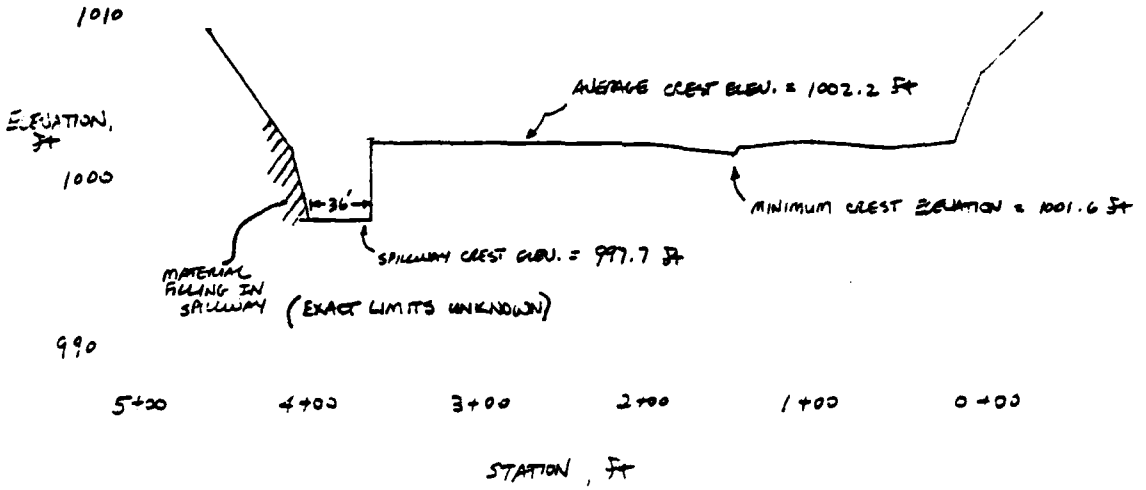

N
CENTROID
QUADS:
BURGETTSTOWN
DINSMORE STORAGE
NO. 2 DAM
DINSMORE STORAGE NO. 2
DRAINAGE AREA AND
CENTROID MAP

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

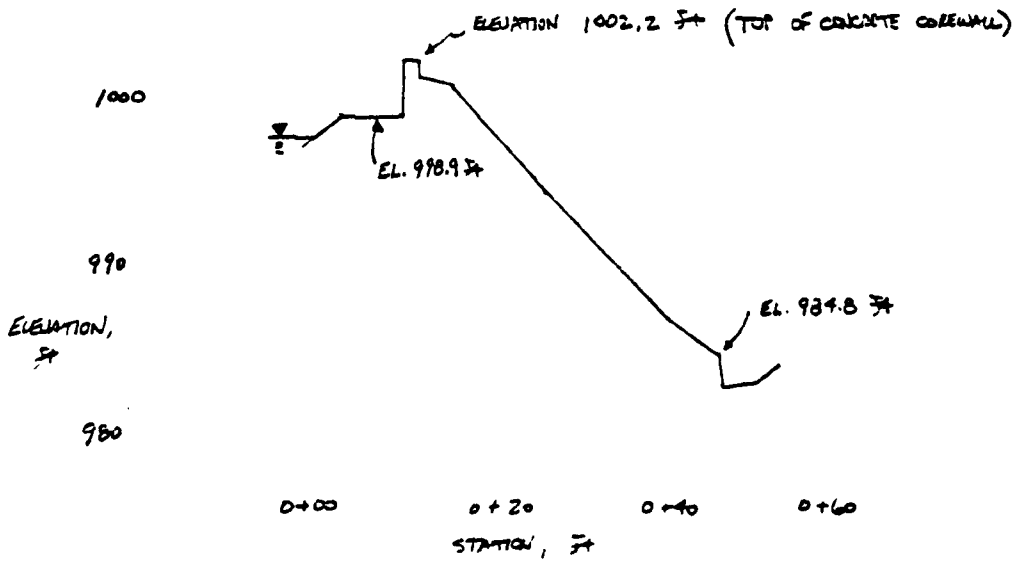
Box 280
Beaver, Pa. 15009

Subject DINSMORE STORAGE NO. 2 S.O. No.
TOP OF DAM PROFILE AND Sheet No. 4 of 17
CROSS SECTION Drawing No.
Computed by JSM Checked by WDL Date 2-13-80

TOP OF DAM PROFILE



CROSS SECTION AT STATION 2+00

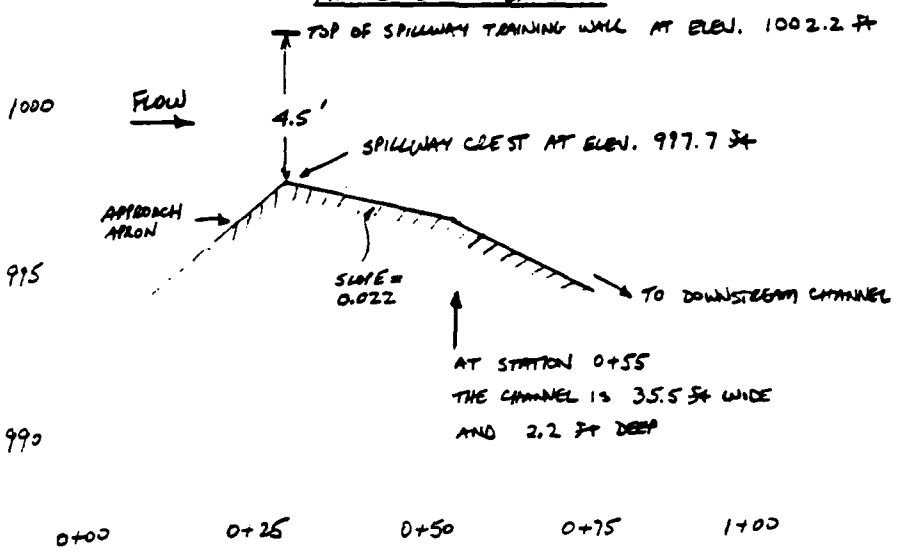


MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject DINSMORE STORAGE NO. 2 DAM S.O. No.
SPILLWAY DISCHARGE RATING Sheet No. 5 of 17
Drawing No.
Computed by WLL Checked by LAD Date 2-26-80

PROFILE DOWN SPILLWAY



DEVELOP RATING CURVE BASED UPON CRITICAL FLOW OVER SPILLWAY:

$V = \sqrt{gD}$ (CHOW, OPEN CHANNEL HYDRAULICS, P. 43)

$g = 32.2$ ft/sec^2

D = MEAN HYDRAULIC DEPTH = $\frac{\text{FLOW AREA}}{\text{FREE SURFACE TOP WIDTH}} = \frac{A}{T}$

V = MEAN FLOW VELOCITY

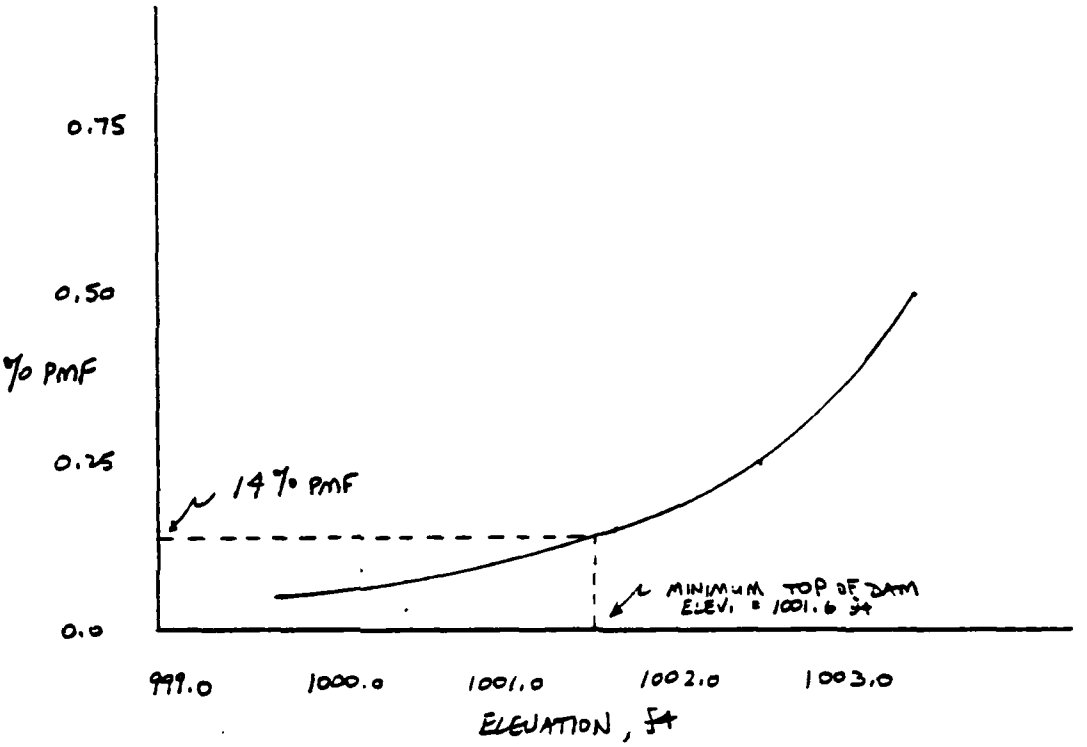
$Q = VA$

ELEVATION, ft	FLOW DEPTH, ft.	AREA, ft^2	TOPWIDTH, ft	A/T	V, ft/sec	Q, cfs	$V^2/2g$	EGL
997.7	0	0	0	0	0	0		997.7
998.0	0.3	10.95	37.0	0.30	3.11	34.03	0.15	998.15
998.5	0.8	29.70	38.0	0.78	5.01	148.84	0.39	998.89
999.0	1.3	49.20	40.0	1.23	6.29	309.63	0.61	999.61
1000.0	2.3	90.20	42.0	2.15	8.23	750.51	1.05	1001.05
1002.2	4.5	189.20	48.0	3.94	11.26	2131.07	1.97	1004.17

MICHAEL BAKER, JR., INC.
THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject DINSMORE STORAGE No. 2 DAM S.O. No.
SPILLWAY CAPACITY ANALYSIS Sheet No. 6 of 17
AND FAILURE ASSUMPTIONS Drawing No.
Computed by WDL Checked by Date 3/3/80



FAILURE ASSUMPTIONS:

1. FAILURE TAKES PLACE AS THE DEPTH OF OVERTOPPING NEARS ITS MAXIMUM.
2. THE DAM FAILS ALONG ITS ENTIRE CREST LENGTH (MINUS THE SPILLWAY).
3. BECAUSE THE CONCRETE CORE WALL IS NOT BUTTRESSED, FAILURE WILL OCCUR WHEN ENOUGH OF THE SUPPORTING DOWNSTREAM FACE IS WASHED OUT - FAILURE WILL THEN OCCUR RAPIDLY (0.1 HRS DURATION).
4. FAILURE DEPTH WILL BE TO SOME POINT BETWEEN THE TOP OF THE WALL ON THE UPSTREAM FACE AND THE TOP OF THE EARTH CREST OF THE DAM (ELEV. 993.8 ft IS ASSUMED)

SPILLWAY CAPACITY ANALYSIS

```
**********
FLUID HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  26 FEB 79
 MBJ UPDATE         04 JUN 79
**********
     1              A1       NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
     2              A2       HYDROLOGIC AND HYDRAULIC ANALYSES OF WINSMORE STORAGE  2 DAM
     3              A3       UNIT GRAPH BY SNYDERS METHOD
     4              B     300       0      30       0       0       0       0       0      -4       0
     5              B1      5
     6              J       1       4       1
     7              J1  0.50    0.25    0.15    0.05
     8              K       0       1                                                       1
     9              K1      RUNOFF HYDROGRAPH  2 DAM
    10              M       1       1    3.78
    11              P                                                                                 1
    12              T                                                                 1.0    0.05
    13              N    3.06    0.57
    14              X    -1.5   -0.05    2.0
    15              K                                                                       1
    16              K1      ROUTING FOR WINSMORE STORAGE  2 DAM
    17              Y                                                       1
    18              Y1      1                                                       -997.7      -1
    19              Y4  997.7  998.15  998.89  999.61 1001.05 1004.17
    20              Y5      0   34.03  148.84  309.63  750.51 2131.07
    21              BA                                                      1
    22              BB  997.7   997.7   998.5   1000.
    23              BS  997.7
    24              SD1001.6    3.08     1.5   375.0
    25              SL      0     10.     34.     84.    131.    181.    268.    348.    355.    388.
    26              SV1001.6  1001.7  1001.9  1002.0  1002.1  1002.2  1002.3  1002.4  1004.0  1006.0
    27              ZZ
```

4 of 7 sheets

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
  MAJ UPDATE         04 JUN 79
**********

RUN  DATE 03/21/80
     TIME    15.20
```

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
HYDROLOGIC AND HYDRAULIC ANALYSES OF WINSMORE STORAGE 2 DAM
UNIT GRAPH BY SNYDER'S METHOD

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	30	0	0	0	0	0	-4	0

JOPER	NMIT	IROPT	IRACE
			0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 4 LRTIO= 1
RTIOS= 0.50 0.25 0.15 0.05

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

INTYP	ITAB	TAREA	SNAP	TRDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
	1	2.28	0.00	2.28	0.0	0.0	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
						0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.100

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.03	0.0	0.0

UNIT HYDROGRAPH DATA
TP= 3.06 CP=0.57 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 39 END-OF-PERIOD ORDINATES, LAG= 3.07 HOURS, CP= 0.57 VOL= 1.00

27.	99.	187.	285.	386.	488.	588.	678.	759.	828.
264.	226.	194.	167.	143.	123.	105	90.	78.	67.
57.	49.	42.	36.	31.	27.	23.	20.	17.	14.
12.	11.	9.	8.	7.	6.	5.	4.	4.	

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
													680.31
													624.31
													61.31
													3472.81

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING FOR DINSMORE STORAGE 2 DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

IPMP	LSTR
0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	-999.	-1

STAGE [illegible] 1004.17

FLOW	0.0	34.03	148.84	309.63	750.51	2131.07
SURFACE AREA=	9.	10.	15.	52.		
CAPACITY=	[illegible]					
ELEVATION=	990.	998.	1000.	1020.		

	CREL	SPMID	COOM	EXPM	ELEVL	COOL	CAREA	EXPL		
								0.0		

TOPEL	COQD	EXPD	DAMWID
1001.6	3.1	1.5	375.

NOTE: A DAMWID VALUE OF 375 FT. IS USED FOR THE OVERTOPPING ANALYSIS. THIS IS THE LENGTH OF DAM CREST SUBJECT TO ACTIVE OVERTOPPING

CREST LENGTH AT OR BELOW ELEVATION	[illegible]	[illegible]	[illegible]	[illegible]	1002.0	1002.1	1002.2	1002.3	1002.4	1003.0	1000.0
					181.	1002	268.	355.	368.		

PEAK OUTFLOW IS 3567. AT TIME 43.00 HOURS

PEAK OUTFLOW IS [illegible] AT TIME 43.00 HOURS

PEAK OUTFLOW IS 1043. AT TIME 43.50 HOURS

PEAK OUTFLOW IS [illegible] AT TIME 43.50 HOURS

********** ********** ********** ********** **********

SHEET 9 of 17

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	RATIO 1	RATIO 2	RATIO 3	RATIO 4
				RATIOS APPLIED TO FLOWS			
				0.50	0.25	0.15	0.05
HYDROGRAPH AT	1	3.78	1	3562.	1781.	1069.	356.
		(9.79)		(100.89)(	50.49)(	30.26)(	10.09)
ROUTED TO	2	3.78	1	3562.	1782.	1063.	344.
		(9.79)		(101.02)(	50.45)(	29.54)(	9.74)

SHEET 4 OF 17

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	997.70	997.70	1001.60
STORAGE	79.	79.	134.
OUTFLOW	0.	0.	994.

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
0.50	1001.50	1.90	169.	1507.	8.50	43.00	0.0
0.25	1000.39	0.90	131.	1782.	5.50	43.00	0.0
0.19	1001.71	0.11	138.	1043.	1.50	43.50	0.0
0.08	999.72	0.0	104.	366.	0.0	43.50	0.0

SHEET 1 OF 17

COMPARISON OF FAILURE AND NON-FAILURE CASES

PLAN 1 = FAILURE
PLAN 2 = NON-FAILURE

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION  JULY 1978
 LAST MODIFICATION  26 FEB 79
 NBJ UPDATE         04 JUN 79
**********
    1          A1       NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
    2          A2       HYDROLOGIC AND HYDRAULIC ANALYSES OF DINSMORE STORAGE  2 DAM
    3          A3       UNIT GRAPH BY SNYDERS METHOD
    4          B    500       0       5       0       0       0       0       0      -4       0
    5          B1     5
    6          J      2       1       1
    7          J1   0.50
    8          K      0       1                                               1
    9          K1       ROUTING HYDROGRAPH TO DAM
   10          M      1       1    3.78                                                       1
   11          P                 24.1    101.    120.    130.    140.
   12          T                                                       1.0     0.05
   13          W    3.06    0.57
   14          X    -1.5   -0.05     2.0
   15
   16          K1       ROUTING FOR DINSMORE STORAGE  2 DAM
   17          Y                                       1       1
   18          Y1     1                                                -997.7      -1
   19          Y4  997.7  998.15  998.89  999.61 1001.05 1004.17
   20          Y5     0   34.03  148.84  309.63  750.51 2131.07
   21          Y6   997.   998.   999.  1000.  1001.  1002.
   22          $E 997.7   998.5  1000.0 1020.0
   23          $$ 997.7
   24          $D1001.6     3.08     1.5   375.0
   25          $L     0      10.      34.      84.     131.     181.     268.     348.     355.     388.
   26          $V1001.6  1001.7   1001.9   1002.0   1002.1   1002.2   1002.3   1002.4   1003.0   1006.0
   27          $$
   28          $$   350       2    993.4     0.1    997.7   1000.0
   29          K      1       3                                               1
   30          K1       ROUTE TO SECTION 1000 FEET DOWNSTREAM OF DAM
   31          Y                                       1       1
   32          Y1     1                                                       0
   33          Y6   997.   998.   999.  1000.  1001.  1002.
   34          Y7     0   1000      40     980      80     977      80     973     120     973
   35          Y7   120    977     280     980     400    1000
   36          K     99
```

SHEET 12 OF 17

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION -1 JULY 1978
LAST MODIFICATION 26 FEB 79
MBJ UPDATE 04 JUN 79
****

RUN DATE 03/10/80
TIME 14.18

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
HYDROLOGIC AND HYDRAULIC ANALYSES OF DINSMORE STORAGE 2 DAM

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
500	0	5	0	0	0	0	0	-4	0
			JOPER	NMT	LROPT	TRACE			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 2 NRTIO= 1 LRTIU= 1

RTIOS= 0.50

SUB-AREA RUNOFF COMPUTATION

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

IRUN	IPMP	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	8.78	0.0	3.78	0.0	0.0	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	20.00	22.00	24.00	0.0	0.0	0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.0	0.0	1.00	0.0	0.0	1.00	1.00	0.05	0.0	0.0

UNIT HYDROGRAPH DATA
TP= 3.06 CP=0.57 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 3.09 HOURS, CP= 0.57 VOL= 0.86

2.	8.	16.	27.	39.	52.	66.	80.	96.	112.
129.	147.	165.	183.	202.	221.	241.	261.	281.	301.
321.	339.	357.	373.	388.	402.	414.	426.	436.	445.
453.	461.	465.	469.	471.	472.	471.	469.	464.	459.

Note: Unit hydrograph volume is slightly less than 1.0 due to computer program limitations for a rainfall duration of 5 min. However the 5 min duration is necessary for downstream routing during future conditions

SHEET 13 OF 17

443.	432.	421.	411.	401.	391.	382.	372.	363.	354.
346.	337.	329.	321.	313.	305.	298.	290.	283.	276.
270.	263.	257.	250.	244.	238.	232.	227.	221.	216.
210.	205.	200.	195.	191.	186.	181.	177.	173.	168.
164.	160.	156.	152.	149.	145.	142.	138.	135.	131.
128.	125.	122.	119.	116.	113.	110.	108.	105.	103.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.99	24.57	2.42	5959869.
										686.11	624.31	61.7816875.991	

********** ********** ********** ********** **********

ROUTING FOR DINSMORE STORAGE 2 DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ALL FLOWS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.0	0.0	1	1	0	0		0

					0.0	0.0	0.0	STORA -998.	SPRAT -1

STAGE	997.70	998.15	998.89	999.81	1001.05	1004.17
FLOW	0.0	34.03	148.84	309.63	750.51	2131.07

SURFACE AREA=	0.	10.	41.	88.
CAPACITY=	0.	79.	108.	741.
ELEVATION=	990.	998.	1000.	1020.

	CAREA	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
	997.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

	TOPEL	COQD	EXPD	DAMWID					
CREST LENGTH	0.	10.	34.	86.	131.	181.	268.	348.	355.	388.
AT OR BELOW ELEVATION	1001.6	1001.7	1001.9	1002.0	1002.1	1002.2	1002.3	1002.4	1003.0	1006.0

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	HSEL	FAILEL
350.	2.00	993.80	0.10	997.70	1003.40

BEGIN DAM FAILURE AT 42.08 HOURS

PEAK OUTFLOW IS [illegible]

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	HSEL	FAILEL
350.	2.00	993.80	0.10	997.70	1090.00

SHEET 4 of 17

PEAK OUTFLOW IS 3514. AT TIME 42.67 HOURS

HYDROGRAPH ROUTING

ROUTE TO SECTION 1000 FEET DOWNSTREAM OF DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
[illegible]	[illegible]	[illegible]	[illegible]	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.0	0.0	0.0	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0600	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.0 1000.00 40.00 980.00 80.00 977.00 80.00 973.00 120.00 973.00

STORAGE	0.0	1.30	[illegible]	3.97	7.30	13.89	21.93	30.35	39.13	48.28
	57.81	67.70	77.97	88.60	99.61	110.99	122.74	134.86	147.35	160.21
OUTFLOW	0.0	198.00	602.26	1146.52	2011.99	3526.82	6032.47	9264.70	13168.73	17715.60
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	97240.63
STAGE	973.00	974.42	975.84	977.26	978.68	980.10	981.53	982.95	984.37	985.79
	987.21	988.63	990.05	991.47	992.89	994.31	995.73	997.16	998.58	1000.00
FLOW	0.0	198.00	602.26	1146.52	2011.99	3526.82	6032.47	9264.70	13168.73	17715.60
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	97240.63

MAXIMUM STAGE IS 981.4

MAXIMUM STAGE IS 980.1

SHEET 15 of 17

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 0.50
HYDROGRAPH AT	1	3.78	1	3519.
		(9.79)	(	99.65)(
			2	3519.
			(	99.65)(
ROUTED TO	2	3.78	1	14981.
	(	9.79)	(	424.22)(
			(	99.48)(
ROUTED TO	3	3.78	1	10466.
	(	9.79)	(	296.38)(
			2	3512.

SHEET 16 OF 17

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	997.70	997.70	1001.60
STORAGE	79.	79.	134.
OUTFLOW	0.	0.	994.

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
0.50	1003.41	1.81	167.	15493.	3.15	42.18	42.08

PLAN 2

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	997.70	997.70	1001.60
STORAGE	79.	79.	134.
OUTFLOW	0.	0.	994.

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
0.50	1001.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	42.[illegible]	[illegible]

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	10946.	983.6	42.25

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3512.	980.1	42.75

SHEET 1 OF 1

APPENDIX E

PLATES

CONTENTS

Plate 1 - Location Plan

Plate 2 - Watershed Map

Plate 3 - Plan, Profile, and Section of Dam (and Outlet Works Details)

Plate 4 - Sections and Profile of Spillway

Plate 5 - Plan of Reservoir

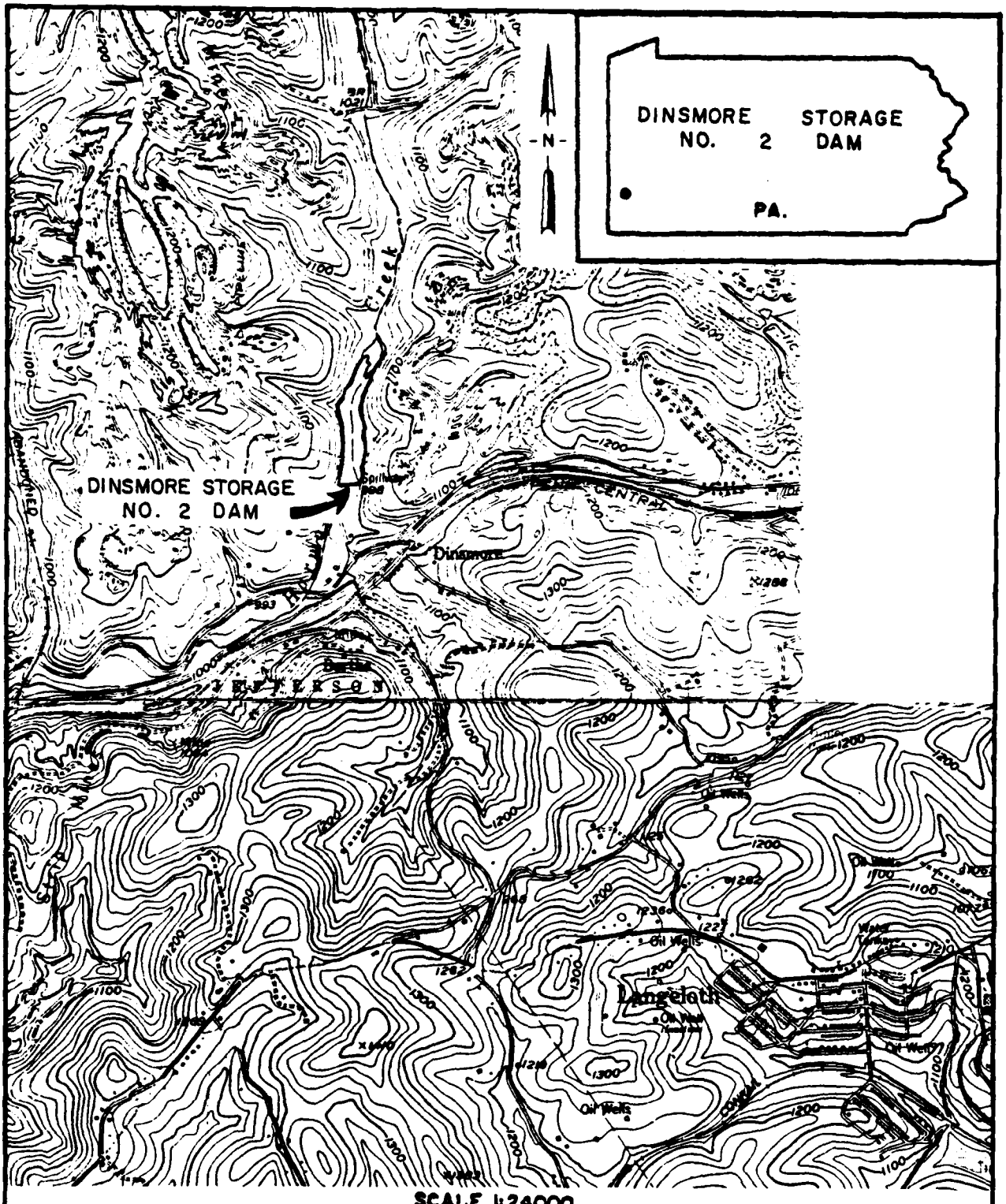


PLATE 1 LOCATION PLAN
DINSMORE STORAGE NO. 2 DAM

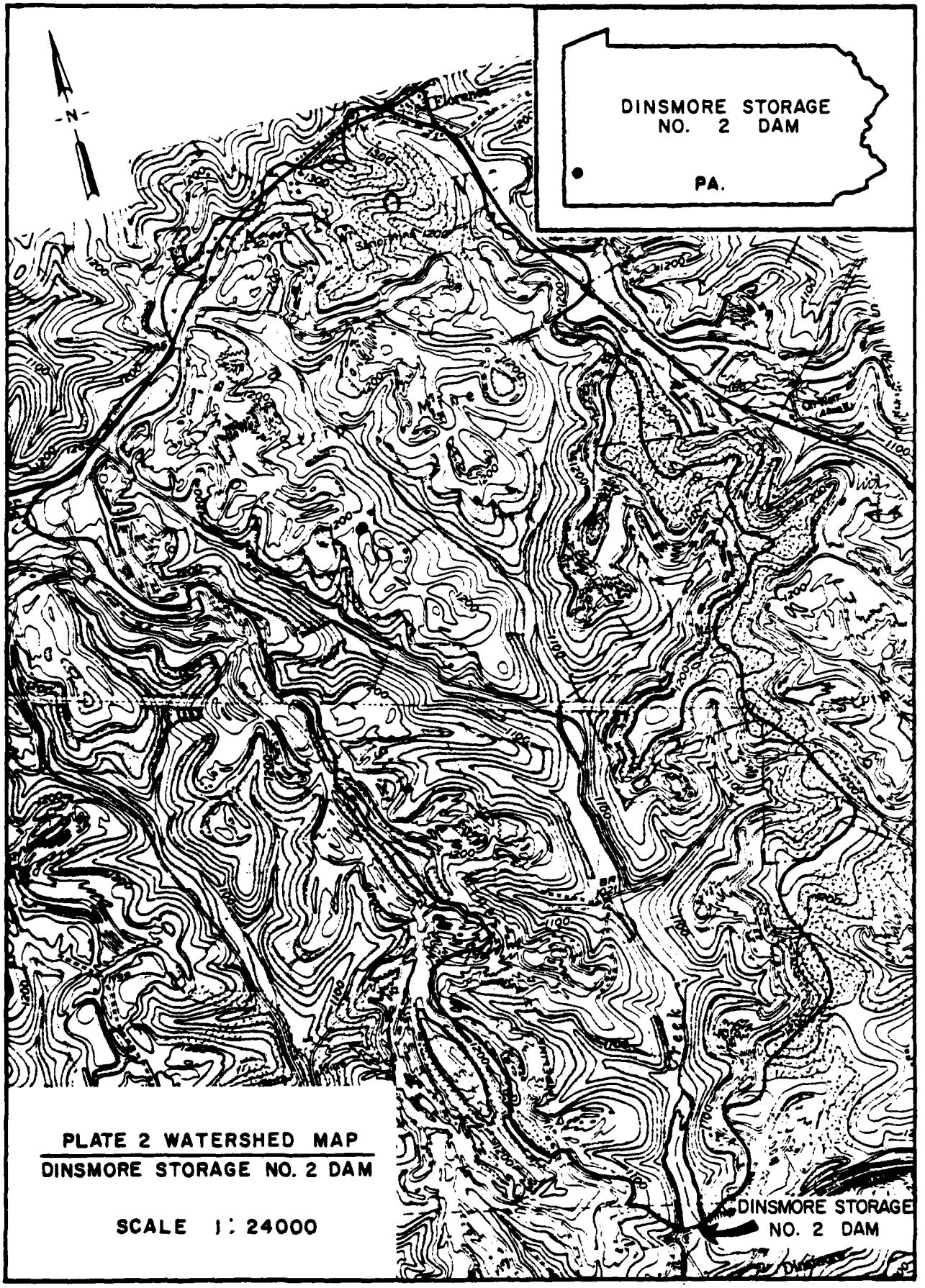
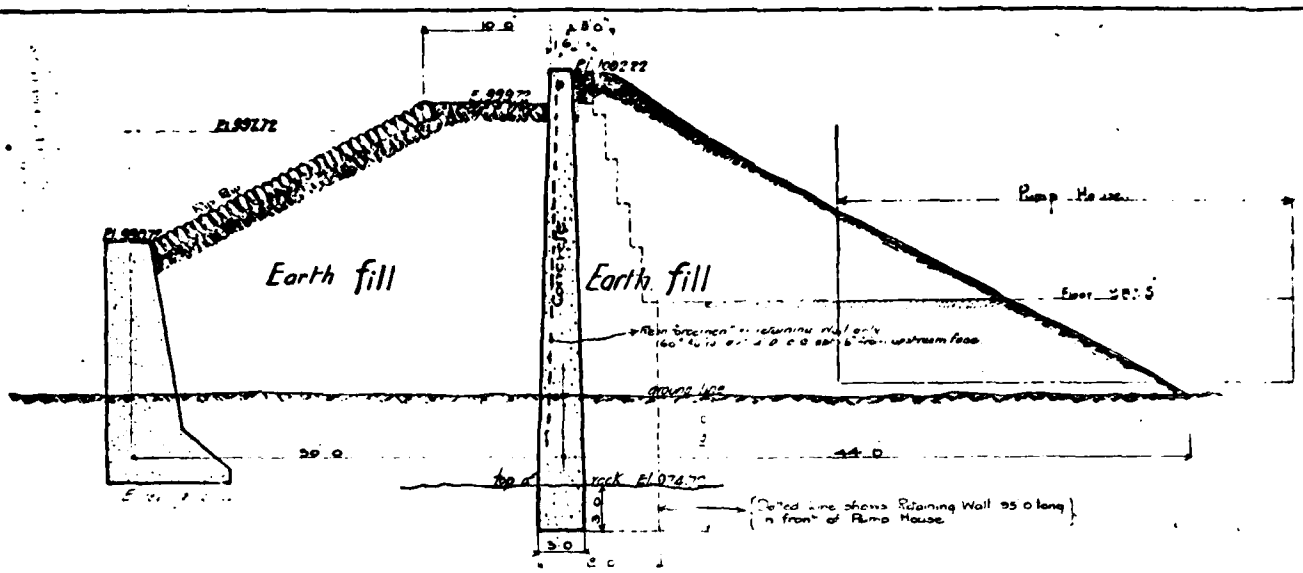
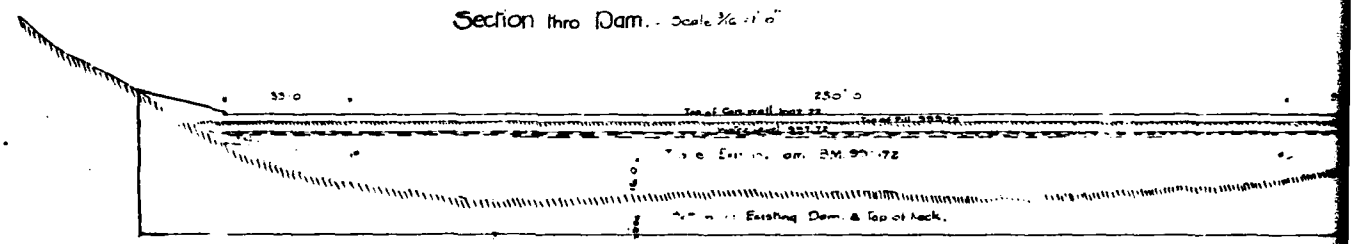


PLATE 2 WATERSHED MAP
DINSMORE STORAGE NO. 2 DAM

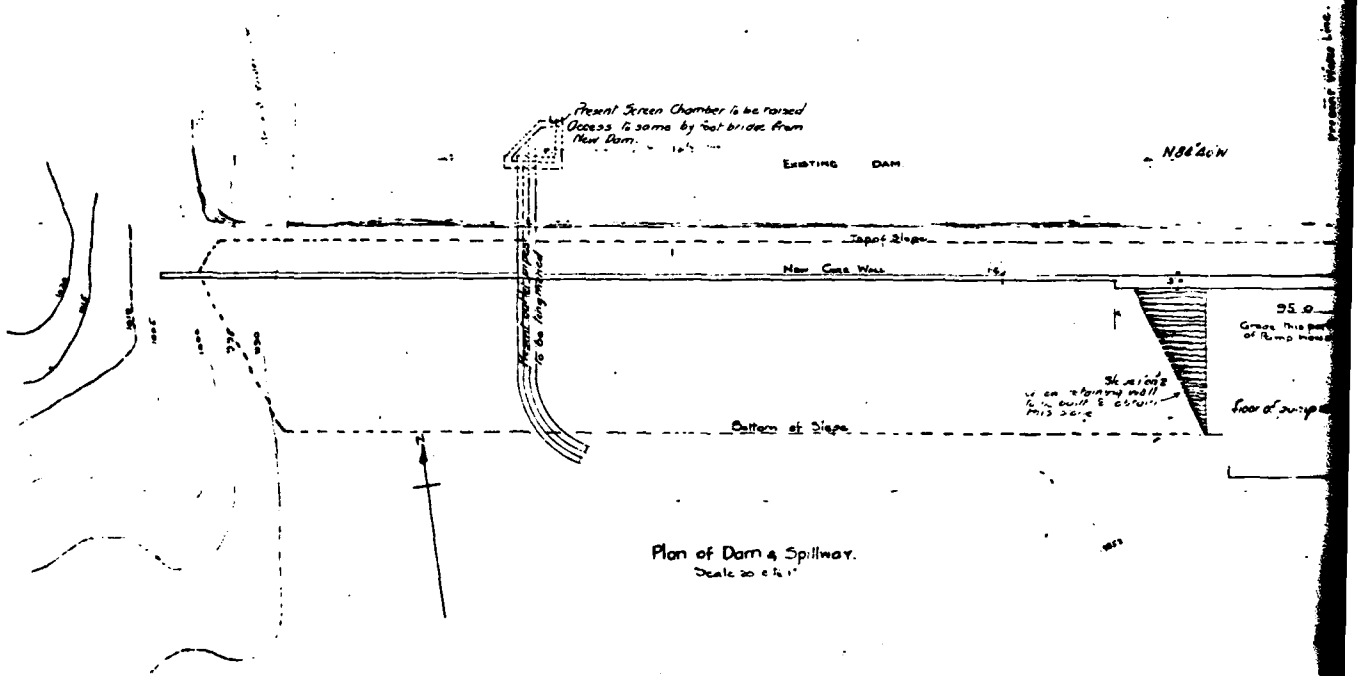
SCALE 1: 24000



Section thro Dam. - Scale 3/16 = 1'-0"



Elevation of Dam



Plan of Dam & Spillway.
Scale 30 ft = 1"

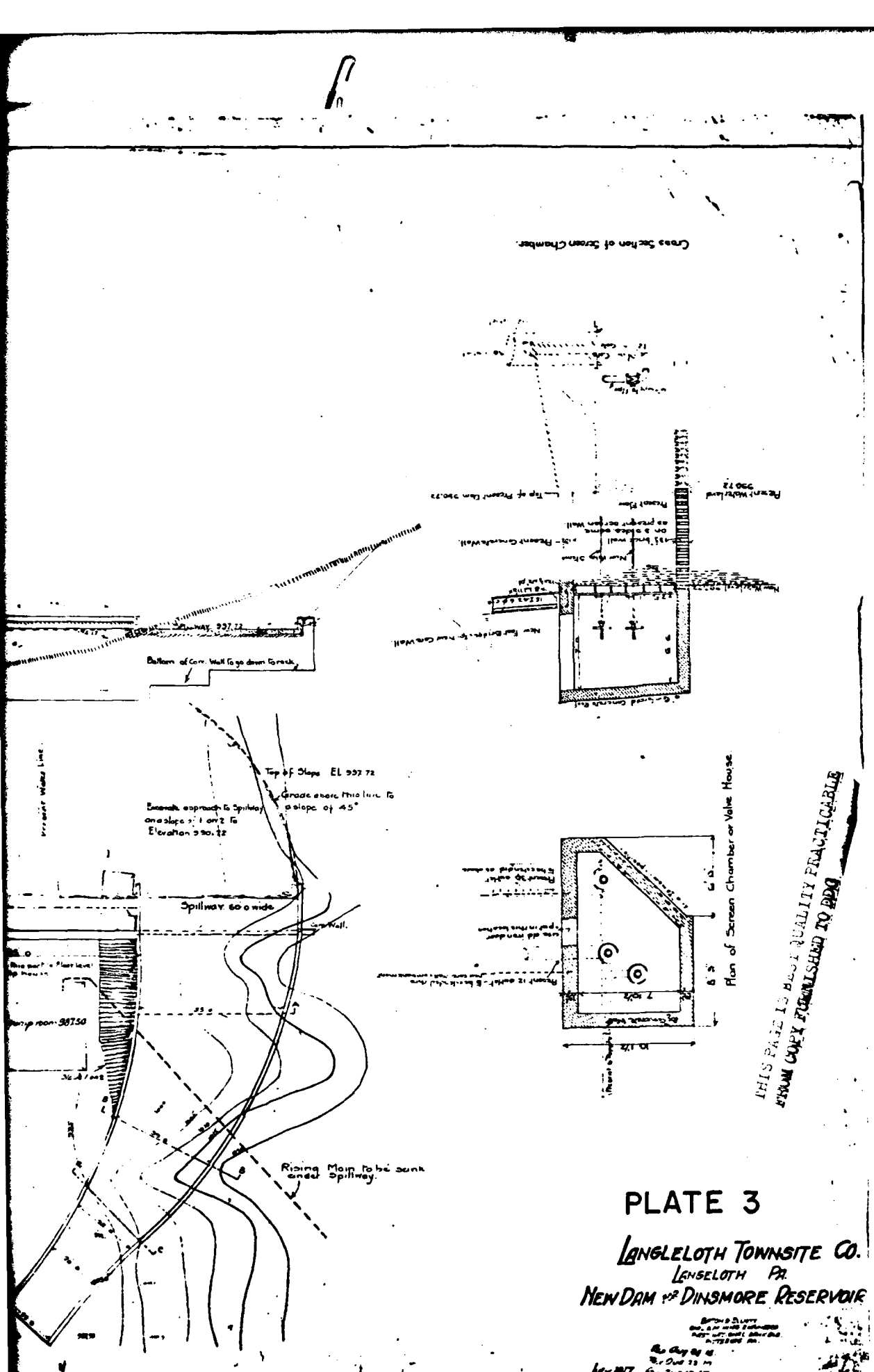


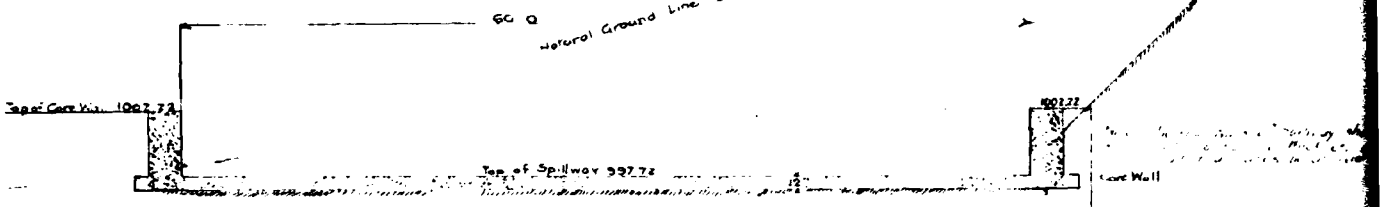
PLATE 3

LANGLELOTH TOWNSITE CO.

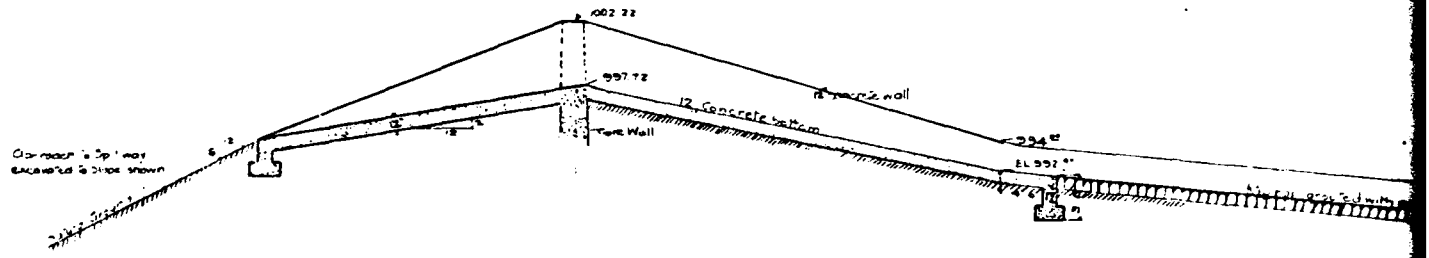
LENSELOTH PA.

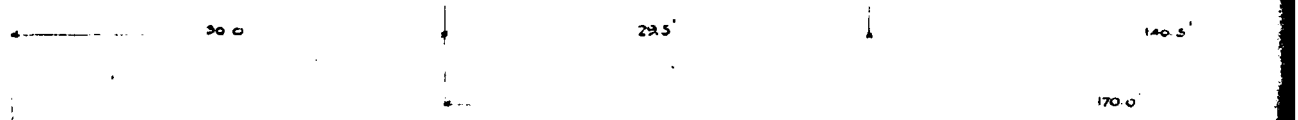
NEW DAM for DINSMORE RESERVOIR

JULY 1917



Cross Section at Top of Spillway





Longitudinal Section thro Cen Line of Spillway

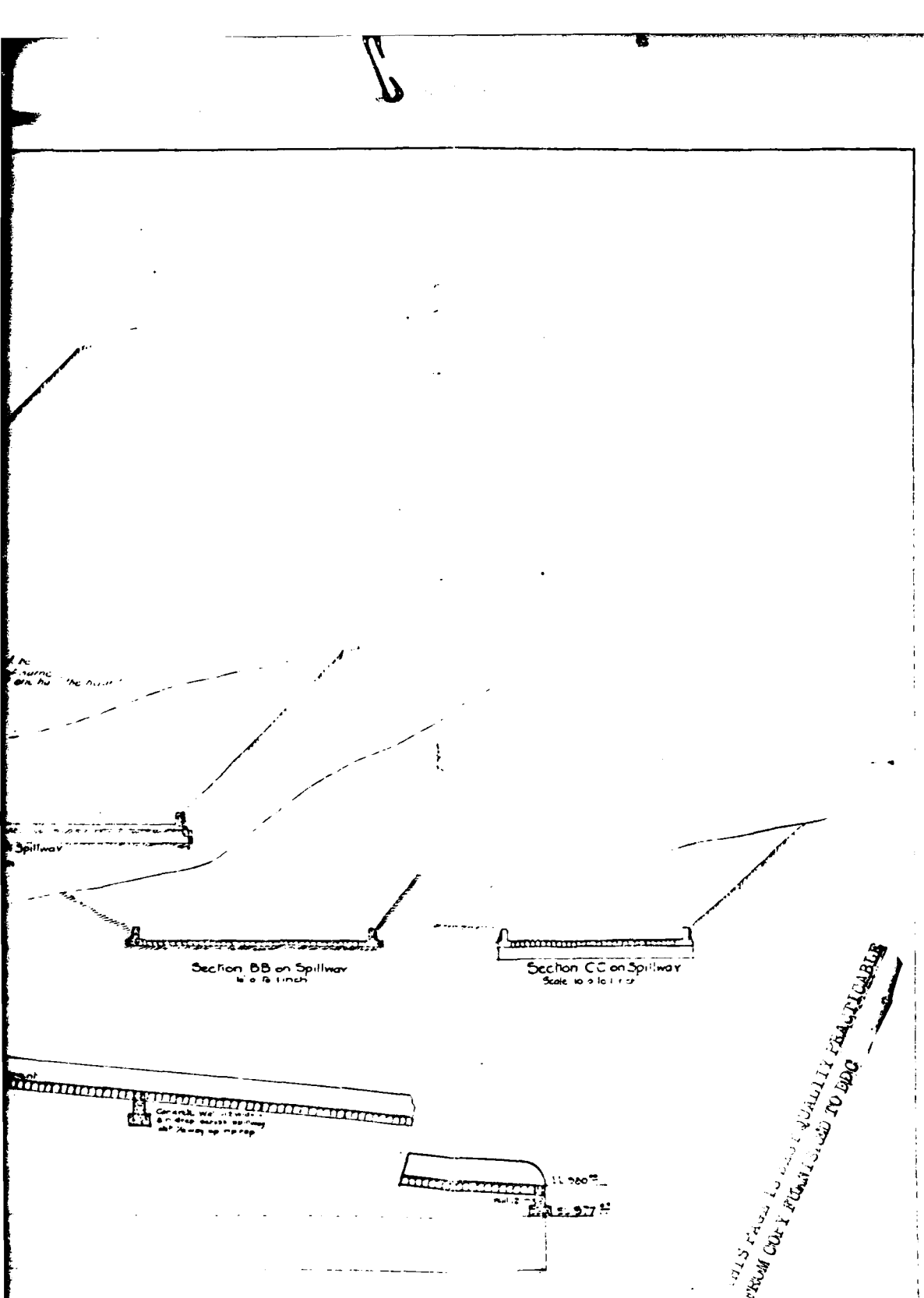


PLATE 4

LANGLELOTH TOWNSITE CO.

LANGELOTH PA

SPILLWAY-NEW DAM at DINSMORE PA.

JULY 1917

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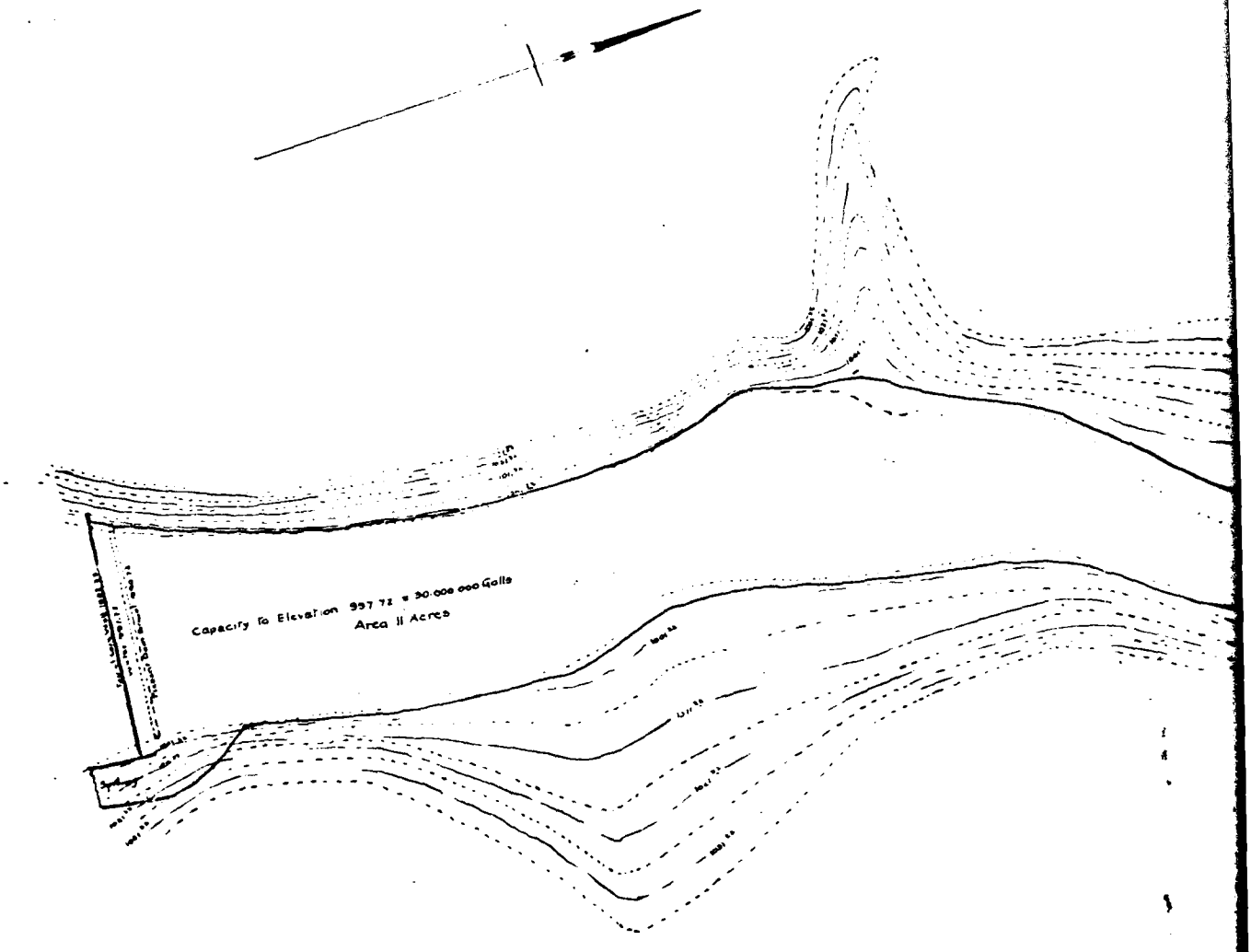
Capacity to Elevation 997.72 = 30,000,000 Gals
Area 11 Acres

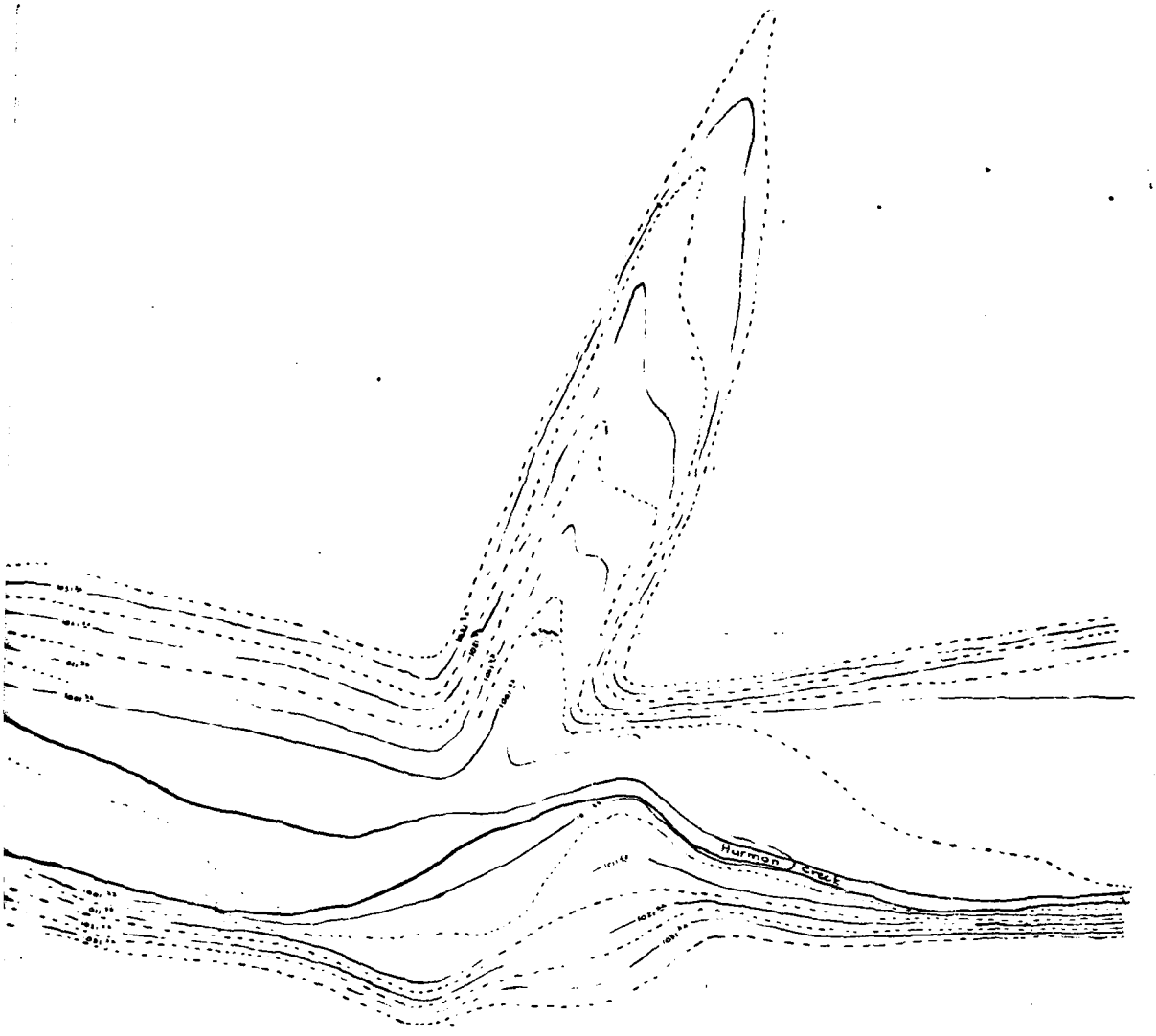

PLATE 5

LANGLELOTH TOWNSITE CO.

LANGELOTH PA.

PLAN OF RESERVOIR

JULY 1917

1 of 2

APPENDIX F

REGIONAL GEOLOGY

DINSMORE STORAGE No. 2 DAM
NDI No. PA 00497, PennDER No. 63-20

REGIONAL GEOLOGY

Dinsmore Storage No. 2 Dam is located on Harmon Creek in an unglaciated area of the Appalachian Plateaus Physiographic Province. Bedrock units below the dam are members of the Casselman Formation, Conemaugh Group, Pennsylvanian System. Bedrock in this formation is typically cyclic sequences of sandstone, shale, red beds and thin limestone, and coal. The bedrock units are typically dipping 60 to 80 feet per mile to the southeast.

The Pittsburgh coal has been extensively mined in the area; however, the Pittsburgh coal is not present at the dam site because of erosion. The Pittsburgh coal has been strip-mined in the watershed areas above the dam.

GEOLOGIC MAP
Dinsmore Storage No. 2 Dam
NDI No. PA 00497, Washington County

Reproduced from
Greater Pittsburgh Region Geologic Map,
Compiled by W. R. Wagner and others, 1975

Scale One Inch Equals Approximately Two Miles
See Legend, Next Page

GEOLOGY MAP LEGEND

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	PPw	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.
CONEMAUGH	Casselman	Pcc	Cyclic sequence of sandstone, shale, red beds and thin limestone and coal.
CONEMAUGH	Ames		
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	Pa	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	Vanport	Pa	
POTTSVILLE		Pp	Sandstone and shale; contains some conglomerate and locally mineable coal.
Mauch Chunk		Mmc	Red and green shale with some sandstone; contains Wymps Gap and Loyalhanna limestones.
Pocono		Mp	Sandstone and shale with Burgoon sandstone at top.


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