





SUSQUEHANNA RIVER BASIN

UNNAMED TRIBUTARY OF SHADIGEE CREEK, WAYNE COUNTY

PENNSYLVANIA

AD A1 01204

BEAVER POND DAM

NDI No. PA 00133 PennDER No. 64-19 Dam Owner: Marguerite Card

PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM



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



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April 1981

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SUSQUEHANNA RIVER BASIN

BEAVER POND DAM WAYNE COUNTY, COMMONWEALTH OF PENNSYLVANIA NDI No. PA 00133 PennDER No. 64-19 National Dam Inspection Program. Beaver Pond Dam (NDI Number PA-ØØ133, PennDER Number 64-19), Susquehanna River Basin, Unnamed Tributary of Shadigee Creek, Wayne County, Pennsylvania.

> PHASE I INSPECTION REPORT. NATIONAL DAM INSPECTION PROGRAM

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1) Apr 87

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

Prepared by:

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MICHAEL BAKER, JR., INC. Consulting Engineers 4301 Dutch Ridge Road Beaver, Pennsylvania 15009 (2) Contract DACW 31-81-C-00//



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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.

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PHASE I REPORT NATIONAL DAM INSPECTION PROGRAM

Beaver Pond Dam, Wayne County, Pennsylvania NDI No. PA 00133, PennDER No. 64-19 Unnamed Tributary of Shadigee Creek Inspected 28 October 1980

ASSESSMENT OF GENERAL CONDITIONS

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Beaver Pond Dam is owned by Marguerite Card and is classified as a "Significant" hazard - "Small" size dam. The dam was found to be in poor overall condition at the time of inspection.

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 not pass the 100-year flood without overtopping the dam. A spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF) is required for Beaver Pond Dam. Because the dam is on the low end of the "Small" size category in terms of storage capacity and height, the 100-year flood was chosen as the SDF. During the 10C-year flood, the dam is overtopped by a maximum depth of 3.27 feet for a total duration of 8.67 hours. The spillway is therefore considered "Inadequate." It is recommended that the owner immediately develop recommendations for remedial measures to reduce the overtopping potential of the dam.

Several items of remedial work should be immediately initiated by the owner. Item 1 below should be completed under the guidance of a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

- 1) Develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.
- 2) Repair the timber cribbing on the right side of the dam.
- 3) Remove the debris and brush on the spillway.
- 4) Fill the rodent holes on the right side of the dam.

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BEAVER POND DAM

- 5) Cut the brush on the dam and for 10 feet below the toe of the dam.
- 6) Provide means to draw down reservoir during an emergency.

In addition, the following operational measures are recom- "mended to be undertaken by the owner:

- 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, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown of the reservoir should become necessary. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

OHN A

MICHAEL BAKER, JR., INC.

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

Date: 24 April 1981

Approved by:

DEPARTMENT OF THE ARMY BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK

Colonel, Corps of Engineers District Engineer

Date: 11 MA 8/



Overall View of Dam from Downstream Right Abutment

BEAVER POND DAM

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PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM BEAVER POND DAM NDI No. PA 00133, PennDER No. 64-19

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. <u>Authority</u> 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. <u>Purpose of Inspection</u> 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. <u>Description of Dam and Appurtenances</u> - Beaver Pond Dam is a dry masonry dam with earthfill. It has a height of 15 feet and a crest length of 110 feet. The embankment has a crest width of approximately 5 feet and an upstream side slope of 5H:1V (Horizontal to Vertical). The downstream face of the embankment is "stepped" down in two relatively large steps. The top step drops down about 2.5 feet from the dam crest, followed by a fairly level area for 6 feet, then a step of about 5 feet drops down to the toe of the dam. The embankment consists of a large amount of rock rubble and slate with earthfill placed on the crest.

The spillway, located in the center section of the embankment, has a slate broad-crested weir. The spillway crest is 2.9 feet below the minimum crest of the dam and has drylaid stone training walls extending to the crest of the dam. The spillway has a length of 49.5 feet perpendicular to the direction of flow and a width of 10 feet. The discharge channel for the spillway steps down to the toe of the dam in three slate and rock rubble covered steps.

There are no outlet works in the dam.

- b. Location Beaver Pond Dam is located on an unnamed tributary of the Shadigee Creek in Preston Township, Wayne County, Pennsylvania. It is approximately 3 miles east-southeast of Starrucca. The coordinates of the dam are N 41° 53.3' and W 75° 25.1'. The dam can be found on the USGS 7.5 minute topographic quadrangle, Starrucca, Pennsylvania.
- c. <u>Size Classification</u> The height of the dam is 15 feet. Storage at the top of the dam at Elevation 1620.9 feet Mean Sea Level (ft. M.S.L.) is 274 acre-feet. The dam is therefore in the "Small" size category.

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- d. <u>Hazard Classification</u> If the dam should fail, economic damage is likely to result to two township road crossings located 4000 and 5000 feet downstream. A residential structure, which is approximately 5 to 10 feet above the streambed and is located 7000 feet downstream from the dam, may also suffer economic damage but loss of life is believed to be unlikely. Therefore, the dam is considered to be in the "Significant" hazard classification.
- e. <u>Ownership</u> The dam is owned by Marguerite Card, Banta Road, P.O. Box 49, Corbettsville, NY 13749.
- f. <u>Purpose of the Dam</u> The reservoir is used for recreational purposes.
- g. Design and Construction History A 1917 report by the Water Supply Commission (one of PennDER's predecessors) reported that the dam was breached down to the original natural lake level by the owner 8 years earlier (1909). In 1930 a permit was granted to Leo L. Card to reconstruct the dam. Extensions of time were granted for reconstruction through 1935. No notice of completion was in the PennDER file; therefore, the date of completion is unknown. The dam was not reconstructed according to the sketches provided by Mr. Card to the Water and Power Resources Board (one of PennDER's predecessors).
- h. <u>Normal Operational Procedures</u> The spillway is uncontrolled and the pool is normally at the spillway crest, Elevation 1618.0 ft. M.S.L.

1.3 PERTINENT DATA

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a.	Drainage Area (square miles) -	5.4
b.	Discharge at Dam Site (c.f.s.) -	
	Maximum Flood - Spillway Capacity at Maximum Pool	Unknown
	(El. 1620.9 ft. M.S.L.) -	58 5
c.	Elevation* (feet above Mean Sea Level [ft. M	<u>.s.l.])</u> -
	Design Top of Dam - Minimum Top of Dam - Maximum Design Pool - Spillway Crest - Streambed at Toe of Dam - Maximum Tailwater of Record -	Unknown 1620.9 Unknown 1618.0 1605.8 Unknown
d.	<u>Reservoir (feet)</u> -	
	Length of Maximum Pool (El. 1620.9 ft. M.S.L.) - Length of Normal Pool	2900
	(El. 1618.0 ft. M.S.L.) -	2700
e.	<u>Storage (acre-feet)</u> -	
	Top of Dam (El. 1620.9 ft. M.S.L.) - Normal Pool (El. 1618.0 ft. M.S.L.) -	274 176
f.	<u>Reservoir Surface (acres)</u> -	
	Top of Dam (El. 1620.9 ft. M.S.L.) - Normal Pool (El. 1618.0 ft. M.S.L.) -	38 28

*All elevations referenced to the spillway crest, Elevation 1618.0 ft. M.S.L., estimated from the USGS 7.5 minute topographic quadrangle, Starrucca, Pennsylvania.

g. Dam -Type - Dry masonry dam with earthfill Total Length including spillway (feet) -110 Maximum Height (feet) - Design -Unknown Field -15 Top Width (feet) -5 Side Slopes - Upstream -5H:1V Downstream -Stepped Vertical Face Zoning -None Impervious Core -None Cutoff -None Drains -None h. Diversion and Regulating Tunnel -None i. Spillway -Type - Slate broad-crested weir Location - Center of dam Width of Crest Parallel to Flow (feet) -10 Length of Crest Perpendicular to Flow (feet) -49.5 1618.0 Crest Elevation (ft. M.S.L.) -Gates -None Downstream Channel - Moderately sloping, natural rock-lined streambed; an abandoned rock foundation is located 200 feet downstream on the right side of the channel.

j. <u>Outlet Works</u> -

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None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Information reviewed for preparation of this report consisted of File No. 64-19 of the Pennsylvania Department of Environmental Resources (PennDER). This included:

- 1) An information sheet on the dam, dated 1914.
- 2) An application to the Commonwealth of Pennsylvania, Water and Power Resources Board, from Leo L. Card, owner of the dam, dated 10 February 1930, to repair the stone dam.
- 3) Various correspondence between Leo Card and the Water and Power Resources Board regarding clarifications and revisions to the original permit application.
- 4) The permit issued by the Water and Power Resources Board allowing the reconstruction of the dam (dated 9 June 1930).
- 5) The requests for an extension of the expiration date of the building permit and the granting of those extensions by the Water and Power Resources Board.
- 6) Inspection reports, photographs and correspondence by PennDER personnel, including the last recorded inspection on 8 November 1978.

2.2 CONSTRUCTION

A 1917 report by the Water Supply Commission (one of PennDER's predecessors) reported that the dam was breached down to the original natural lake level by the owner 8 years earlier (1909). In 1930 a permit was granted to Leo L. Card to reconstruct the dam. Extensions of time were granted for reconstruction through 1935. No notice of completion was in the PennDER file; therefore, the date of completion is unknown. The dam was not reconstructed according to the sketches provided by Mr. Card to the Water and Power Resources Board (one of PennDER's predecessors).

2.3 OPERATION

No formal records are available for operation of the dam and reservoir. The spillway is uncontrolled and the owner reported that the reservoir does not fluctuate very much from the spillway crest level.

2.4 EVALUATION

- a. <u>Availability</u> The information reviewed is readily available from PennDER's File No. 64-19.
- b. <u>Adequacy</u> The information available combined with the visual inspection measurements and observations is adequate for a Phase I Inspection of this dam.
- c. <u>Validity</u> There is no reason at the present time to doubt the validity of the available engineering data.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

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- a. <u>General</u> The dam was found to be in poor overall condition at the time of inspection on 28 October 1980. No unusual weather conditions were experienced during the visual inspection. Noteworthy deficiencies observed during the visual inspection of the dam are described briefly in the following paragraphs. The complete visual inspection check list, field sketch, top of dam profile, and typical cross-section are presented in Appendix A.
- b. Dam The timber cribbing on the left half of the dam has rotted considerably. It is recommended that this cribbing be repaired. Rodent holes were observed on the right half of the dam where the dam is covered with a thin layer of soil. Thick brush is growing on the left side of the dam and below the downstream toe of both sides of the dam.
- c. <u>Appurtemant Structures</u> The spillway consists of pieces of slate laid horizontally to form a cap. There was debris and brush partially blocking the right side of the spillway.
- d. Reservoir Area - The reservoir slopes are moderate to fairly steep with a good cover of vegetation. Some localized quarrying for slate is being conducted along the left hillside of the reservoir. There are 5 ponds upstream from Beaver Pond Dam on three tributary streams. The northern stream contains Island Lake (PennDER ID No. 64-NL 20), a natural lake, which empties into an unnamed pond 6700 feet to the north-northeast of Beaver Pond Dam. The eastern branch contains another unnamed pond 5600 feet due east of Beaver Pond Dam. This pond was dry at the time of inspection. These three ponds can be found on the USGS 7.5 minute topographic quadrangle, Starrucca, Pennsylvania. Two additional unnamed ponds are shown on the USGS 7.5 minute topographic quadrangle, Orson, Pennsylvania, approximately 8500 feet southeast of Beaver Pond Dam. The lower of these two could not be located in the field and the upper one is considered insignificant to Beaver Pond Dam.

e. <u>Downstream Channel</u> - Two township road crossings are located 4000 and 5000 feet downstream. A residential structure is located 7000 feet downstream. These could suffer economic damage in the event of a dam failure.

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SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal written instructions for lowering the reservoir or evacuating the downstream area in case of an impending emergency. It is recommended that formal emergency procedures be adopted.

4.2 MAINTENANCE OF DAM

There are no formal records of maintenance or formal procedures for evaluating the necessity of maintenance for the structure. It is recommended that formal inspection procedures be developed.

4.3 MAINTENANCE OF OPERATING FACILITIES

There are no operating facilities installed at the dam. An emergency drawdown plan should be developed.

4.4 DESCRIPTION OF ANY WARNING SYSTEM

There is no warning system in the event of dam failure. It is recommended that an emergency warning system be developed.

4.5 EVALUATION OF OPERATIONAL ADEQUACY

The current operational features are adequate for the purpose they serve. However, it is recommended that a formal maintenance and operations manual be prepared for the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

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- a. <u>Design Data</u> No hydrologic or hydraulic design calculations are available for Beaver Pond Dam.
- <u>Experience Data</u> No information concerning the effects of significant floods on the dam is available.
- c. <u>Visual Observations</u> During the visual inspection, no problems were observed which would indicate that the dam and appurtenant facilities could not perform satisfactorily during a flood event.

There are five ponds upstream from Beaver Pond Dam on three tributary streams. The northern stream contains Island Lake (PennDER ID No. 64-NL 20), a natural lake with an outlet channel which is 5 feet wide and 3 feet deep. Island Lake empties into an unnamed pond 900 feet downstream. This pond is approximately 6700 feet to the northnortheast of Beaver Pond Dam. The pond is formed by an earth and rockfill dam 60 feet long and 4 feet high. The spillway for this dam consists of a small rock channel 4 feet wide and 0.5 foot deep.

The eastern branch contains another unnamed pond 5600 feet due east of Beaver Pond Dam. This pond was dry at the time of the inspection.

Two additional unnamed ponds are shown on the USGS 7.5 minute topographic quadrangle, Orson, PA. These are located approximately 8500 feet southeast of Beaver Pond Dam. The lower of these two could not be located in the field and the upper one is considered to be insignificant to Beaver Pond Dam.

d. <u>Overtopping Potential</u> - Beaver Pond Dam is a "Small" size - "Significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 Probable Maximum Flood (1/2 PMF). Because the dam is on the low end of the "Small" size category in terms of storage capacity and height, the 100-year flood was chosen as the SDF.

The hydrologic characteristics of the watershed, 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. 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.

In the hydrologic and hydraulic analysis performed for this inspection report, the total drainage area tributary to Beaver Pond Dam was divided into two parts. The first part is the area north of Beaver Pond Dam which is controlled by the small dam located 6700 feet upstream from Beaver Pond Dam. The second part is the area which is cirectly tributary to Beaver Pond Dam. A runoff hydrograph was developed for the drainage area to the dam north of Beaver Pond Dam, routed through this dam, and down to Beaver Pond. This hydrograph was then combined with the runoff hydrograph developed for the area surrounding Beaver Pond and routed through Beaver Pond Dam.

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Material from "The Hydrologic Study - Tropical Storm Agnes" prepared by the Corps of Engineers in New York City, was used to calculate the peak flows for the 100-year flood. A detailed description of how these flows were calculated is presented in Appendix D.

Analysis of Beaver Pond Dam shows that the dam will be overtopped during the 100-year flood by a maximum depth of 3.27 feet for a total duration of 8.67 hours.

e. <u>Spillway Adequacy</u> - As outlined in the above analysis, the spillway will not pass the SDF without overtopping the dam; therefore, the spillway is considered "Inadequate."

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. <u>Visual Observations</u> There were no structural inadequacies noted during the visual inspection that cause concern for the structural stability of the dam.
- b. Design and Construction Data - No design or construction data were available for review. Generally, for this type of dam, if the ratio of the width of the stonewall portion of the dam is greater than 0.5 times the height of the dam (0.5)w/h), then stability of the dam due to overturning or sliding is not a problem. (Reference: "Evaluation and Repair of Stonewall-earth Dams," by Kent A. Healy, Proceedings of "Safety of Small Dams" conference, New England College, Henniker, New Hampshire, August 4-9, 1974, pp. 149-178). The w/h ratio for this dam is estimated at 0.75 and the downstream face is stepped. Because the w/h ratio is greater than 0.5 and because no signs of instability were observed during the visual inspection, further assessments of the structural stability are not considered necessary.
- c. <u>Operating Records</u> No operating records are available. Nothing in the procedures described by the owner's representative indicates concern for the structural stability of the dam.
- d. <u>Post-Construction Changes</u> No changes adversely affecting the structural stability of the dam have been performed.
- e. <u>Seismic Stability</u> 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.

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SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

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- Safety Beaver Pond Dam was found to be in poor а. overall condition at the time of inspection. Beaver Pond Dam is a "Significant" hazard - "Small" size dam requiring a spillway capacity in the range of the 100-year flood to the 1/2 PMF. Because the dam is on the low end of the "Small" size category in terms of height and storage, the 100-year flood was chosen as the SDF. As presented in Section 5, the spillway and reservoir are not capable of passing the 100-year flood without overtopping the dam. During the 100-year flood, the dam is overtopped by a maximum depth of 3.27 feet for a total duration of 8.67 hours. Therefore. the spillway is considered "Inadequate."
- b. <u>Adequacy of Information</u> The information available and the observations made during the visual inspection are considered sufficient for a Phase I Inspection Report.
- c. <u>Urgency</u> The owner should immediately initiate the further evaluation discussed in paragraph 7.1.d.
- d. <u>Necessity for Additional Data/Evaluation</u> The hydraulic/hydrologic analysis performed in connection with this Phase I Inspection Report has indicated the need for additional spillway capacity. It is recommended that the owner, under the guidance of a professional engineer, develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. Item 1 below should be completed under the guidance of a qualified professional engineer experienced in the design of hydraulic structures for dams. These include:

1) Develop remedial measures to ensure that the dam will not be overtopped by the 100-year flood.

- 2) Repair the timber cribbing on the left side of the dam.
- 3) Remove the debris and brush on the spillway.
- 4) Fill the rodent holes on the right side of the dam.
- 5) Cut the brush on the dam and for 10 feet below the toe of the dam.
- 6) Provide means to draw down reservoir during an emergency.

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

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- Develop a detailed emergency operation and warning system.
- 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, activate the emergency operation and warning system.

It is further recommended that formal inspection, maintenance, and operation procedures and records be developed and implemented. An emergency drawdown plan should be developed in case an emergency drawdown of the reservoir should become necessary. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

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

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Check List Visual Inspection Phase 1	Λ-1
ame of Dam Beaver Pond Dam County Wayne State PA IDI # PA 00133 ennDER # 64-19	Coordinates Lat. N 41°53.3' Long.W 75°25.1'
ate of Inspection 28 October 1980 Weather Overcast	Temperature 40° F.
<pre>ool Blevation at Time of Inspection I618.24 *All elevations referenced to spillway crest elevation 1618.0 7.5 minute topographic quadrangle, Starrucca, Pennsylvania.</pre>	at Time of Inspection 1608.80 ft. M.S.L. assumed from USGS
nspection Personnel: Michael Baker, Jr., Inc.:	<u>Owner's Representatives:</u>
James G. Ulinski Wayne D. Lasch Jeffrey S. Maze	Marguerite Card
James G. Ulinski	Recorder

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	SWY ANSONRY DAMS	
Name of Dam: BEAVER PC NDI # PA 00133	DND DAM	
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
LEAKAGE	Small amount of leakage is entering the rockfill in the openings between pieces of slate in the spillway and exiting at the toe of the dam. This is not considered to represent a serious problem for the dam.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Good condition	
VEGETATION	There is brush growing on the dam and below the toe.	Cut the brush on the dam and for 10 ft. below the toe of the dam.
DRAINS	None observed	
WATER PASSAGES	Not Applicable	
FOUNDATION	No problems observed.	
RODENT HOLES	Several rodent holes were observed on the right side of the dam.	Fill the rodent holes.

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MASONRY DAMS

Name of Dam: BEAVER POND DAM

NDI # PA 00133 VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	The timber cribbing for the left side of the dam is deteriorating.	Repair this portion of the dam.
STRUCTURAL CRACKING	Not Applicable	
VERTICAL AND HORIZONTAL ALIGNMENT	Good condition	
SINIOL ETLLONOM	Not Applicable	

CONSTRUCTION JOINTS

Not Applicable

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EMBANKMENT - Not Applicable

Name of Dam BEAVER POND DAM

NDI # PA 00133

VISUAL EXAMINATION OF

OBSERVATIONS

SURFACE CRACKS

UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES •••••

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Λ-4

REMARKS OR RECOMMENDATIONS

EMBANKMENT - Not Applicable

Name of Dam BEAVER POND DAM NDI # PA 00133

REMARKS OR RECOMMENDATIONS	
OBSERVATIONS	
ISUAL EXAMINATION OF	

VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST

RIPRAP FAILURES

A-5

REMARKS OR RECOMMENDATIONS **A-6** EMBANKMENT - Not Applicable OBSERVATIONS Name of Dam BEAVER POND DAM STAFF GAGE AND RECORDER JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM ANY NOTICEABLE SEEPAGE VISUAL EXAMINATION OF NDI # PA 00133

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DRAINS

cable	REMARKS OR RECOMMENDATIONS						
OUTLET WORKS - Not Applic	OBSERVATIONS						
Name of Dam: BEAVER POND DAM	VISUAL EXAMINATION OF	CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	INTAKE STRUCTURE	OUTLET STRUCTURE	OUTLET CHANNEL	EMERGENCY GATE	

	UNGATED SPILLWAY	Λ-8
Name of Dam: BEAN NDI # PA 00133	VER POND DAM	
VISUAL EXAMINATION	I OF OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The spillway crest consists of horizontally laid pieces of slate approximately 1 to 2 in. thick and variable in size in plan view. No problem observed.	
APPROACH CHANNEL	Small amount of debris and brush is partially blocking the spillway.	Remove debris and brush.
DISCHARGE CHANNEL	Good condition	
BRIDGE AND PIERS	None observed	
		-

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A-9 M	OBSERVATIONS REMARKS OR RECOMMENDATIONS					
Name of Dam: BEAVER POND DA NDI # PA 00133	VISUAL EXAMINATION OF CONCRETE SILL	APPROACH CHANNEL	DISCHARGE CHANNEL	BRIDGE AND PIERS	GATES AND OPERATION EQUIPMENT	

C

			A-10
Name of Dam: BEAVER POND NDI # PA 00133	DAM	INSTRUMENTATION	
VISUAL EXAMINATION		OBSERVATIONS REMARKS OR RE	COMMENDATIONS
MONUMENTATION/SURVEYS	None		
OBSERVATION WELLS	None		
WEIRS	None		
P I E Z OMET E R S	None		
OTIBR	None .		

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	RESERVOIR	A-11
Name of Dam: BEAVER NDI # PA 00133	POND DAM	
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate (5°-15°) to fairly steep (15°-45°) slopes with good growth of ground cover and woods. Some localized quarrying for slate is occurring along the left hillside of the reservoir.	
SEDIMENTATION	Small amount of sediment in upstream reservoir area.	
UPSTREAM DAMS	A natural lake, Island Lake (PennDER ID No. 64-NL 20) is located upstream (in series) of an unnamed reservoir. This unnamed reservoir is located 6700 ft. upstream of Beaver Pond Dam to the north and slightly east. Another unnamed pond is located 5600 ft. due east of Beaver Pond but was dry at the time of inspection. Two additional ponds (in series) are located south of Beaver Pond. The downstream pond appears on the quadrangle map but could not be located in the field. The upper pond was observed, but is not con- sidered to have an effect on Beaver Pond Dam.	

OBSERVATIONS	REMARKS OR RECOMMENDATIONS
Two small bridges over township roads 4000 and 5000 ft. downstream of dam.	
Mild to moderately sloping with good growth of ground cover and woods.	
Two township road crossings are located 4000 and 5000 ft. downstream. A residential structure is located 7000 ft. downstream of the dam.	·
	Wild to moderately sloping with good growth of ground cover and woods. Invo township road crossings are located 4000 and 5000 ft. downstream. A residential structure is located 7000 ft. downstream of the dam.

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TYPICAL

MICHAEL BAKER, JR., INC.

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STATION (FEET.

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ELEVATION = 1618.2

APPENDIX B

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ENGINEERING DATA CHECK LIST

Name of Dam: BEAVER POND DAM NDI # PA 00133 ENGINEERING DATA CHECK LIST

<pre>MEMMANS DAM No information available this report.</pre>	See the Field Sketch inclu
I. VICTNITY MAD A USCS 7.5 minute tonogr	hic quadrangle of Starrucca

A 1917 report by the Water Supply Commission (one of PennDER's predeceswas used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1). CONSTRUCTION HISTORY

dam was not reconstructed according to the sketches provided by Mr. Card lake level by the owner 8 years (1909) earlier. In 1930 a permit was granted to Leo L. Card to reconstruct the dam. Extensions of time were granted for reconstruction through 1935. No notice of completion was in the PennDER file, therefore, the date of completion is unknown. The to the Water and Power Resources Board (one of PennDER's predecessors). sors) reported that the dam was breached down to the original natural

See typical cross section of the dam from the field inspection given as Plate 4 of this report. No information available. TYPICAL SECTIONS OF DAM

No information available HYDRAULIC DATA HYDROLOGIC/

OUTLETS - PLAN

There are no outlets in the dam.

DETAILS

CONSTRAINTS

DISCHARGE

RATINGS 1

RAINFALL/RESERVOIR RECORDS

No records are kept.

B-1

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Name of Dam: <u>BEAVER POND DAM</u> NDI # PA 00133		G0
ITEM	REMARKS	
DESIGN REPORTS	None available	
GEOLOGY REPORTS	No geology reports are available. Regional Geology.	See Appendix F for the
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not performed	
MATERIALS INVESTIGATIONS	Not performed	

BORING RECORDS LABORATORY FIELD

FOST-CONSTRUCTION SURVEYS OF DAM

Not performed

BORROW SOURCES

No information available.

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DAM	
POND	
BEAVER	
Dam:	•
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Name	

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-woH Plans were submitted and a permit was granted for Leo L. Card Inspections were performed by PennDER personnel and its pra-decessors on 8 November 1978, 20 April 1965, 15 May 1917 and in 1914. These reports are available in the PennDER file. to reconstruct and make alterations to the dam in 1930. ever, these plans were never fully implemented. None reported in the information available. No information available. None observed REMARKS PRIOR ACCIDENTS OR FAILURE OF DAM POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS MONITORING SYSTEMS **HIGH POOL RECORDS** NDI # PA 00133 MODIFICATIONS DESCRIPTION REPORTS ITEM

MAINTENANCE OPERATION RECORDS

No formal records of maintenance are kept.

B-3

DAM	
POND	
BEAVER	
Dam:	
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Name	

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NDI # PA 00133

No information available. REMARKS SECTIONS, and DETAILS SPILLWAY PLAN, ITEM

OPERATING EQUIPMENT PLANS & DETAILS

None

B-4

CHECK LIST HYDROLOGIC AND HYDRAULIC DATA ENGINEERING DATA

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DRAINAGE AREA CHARACTERISTICS: 5.4 sq. mi., moderate to steep
slopes, mostly wooded
ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1618.0 ft. M.S.L.
(176.0 acft.)
ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1620.9 ft. M.S.L.
(274 acft.)
ELEVATION MAXIMUM DESIGN POOL: Unknown
ELEVATION TOP DAM: 1620.9 ft. M.S.L. (minimum top of dam elevation)
SPILLWAY: <u>Rectangular channel with slate cap</u>
a. Crest Elevation <u>1618.0 ft. M.S.L.</u> b. Type <u>Slate broad crested weir</u> c. Width of Crest Parallel to Flow <u>10 ft.</u>
d. Length of Crest Perpendicular to Flow 49.5 ft.
e. Location Spillover Center of dam f. Number and Type of Gates None
OUTLET WORKS: None
a. Type
C. Entrance Inverts
d. Exit Inverts
e. Emergency Drawdown Facilities
HYDROMETEOROLOGICAL GAGES: None
a. Type
b. Location
c. Records
MAXIMUM NON-DAMAGING DISCHARGE UNKNOWN

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APPENDIX C

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PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

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DETAILED PHOTOGRAPH DESCRIPTIONS

Overall View of Daw - Overall View of Dam from Downstream Right Abutment

Photograph Location Plan

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Photo 1 - View of Dam from Upstream Shoreline
Photo 2 - View of Dam from Downstream Channel
Photo 3 - View Across Dam Towards Right Abutment
Photo 4 - View Across Dam Towards Left Abutment
Photo 5 - View of Crest of Dam from Left Abutment
Photo 6 - Downstream View of Spillway
Photo 7 - Downstream View of Right Half of Dam
Photo 8 - Downstream View of Left Half of Dam

Note: Photographs were taken on 28 October 1980.





PHOTO 1. View of Dam from Upstream Shoreline

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PHOTO 2. View of Dam from Downstream Channel



PHOTO 3. View Across Dam Towards Right Abutment

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PHOTO 4. View Across Dam Towards Left Abutment



PHOTO 5. View of Crest of Dam from Left Abutment

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PHOTO 7. Downstream View of Right Half of Dam



PHOTO 8. Downstream View of Left Half of Dam

APPENDIX D

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HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.	Subject BEAVER POND DAM S.O. No.
THE BAKER ENGINEERS	APPENDIX D- HYDROLOGIC AND Sheet No of
D.,	HYDRAULIC CALCULATIONS Drowing No.
Beaver, Pa. 15009	Computed by Checked by Date

SUBJECT

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Preface	i
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
Tor of DRM PROFILE AND CROSS SECTION	4
SPILLWRY DISCHARGE RATING	5
100 - YEAR STORM DISTRIBUTION	6
100-YEAR DISCHARGE CALCULATIONS	7
HEC-1 CAPACITY ANALYSIS	10

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.

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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

100-YEAR STORM = 6.4 INCHES/24 HOURS⁽¹⁾

NAME OF DAM: BEAVER POND DAM

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STATION	1	2	3	4	5
Station Description	UNNAMED DAM LOCATED 900 ft. DOWNSTREAM FROM ISLAND LAKE	BEAVER POND DAM			
Drainage Area (squ are miles)) 1.64	3.75			
Cumulative Drainage Area (square miles)	1.64	5.39			
Adjustment of PMF for Drainage Ares (2)	100-YEAR STORM	100-YEAR STORM			
6 Nours 12 Hours 24 Nours 48 Nours 72 Nours	DISTRIBUTION ON SHEET 6	DISTRIBUTION ON SHEET 6			
Snyder Hydrograph Parameters	· · · · · · · · · · · · · · · · · · ·	- <u></u>			
Zone (2)	11 A	11 A			
c_/c_ ⁽³⁾	0.62/1.50	0.62/1.50			
L (miles) (4)	1.00	3.37			
L _{ca} (miles) ⁽⁴⁾	.62	1.17			
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	1.30	2.26			
Spillway Data Crest Length (ft) Freeboard (ft) Discharge Coefficient Exponent	56 0 3.08 1.5	42 3.1 SPILLWAY DISCHARGE RATING DEVELOPED ON SHEET 5			

(1) Technical Paper No. 40, Cooperative Studies Section, U.S. Weather Bureau, Washington, D.C., 1961.

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

(3) Snyder's Coefficients.

(4) L = Length of longest water course from outlet to basin divide.
 L L = Length of water course from outlet to point opposite the centroid of drainage area.

MICHAEL BAKER, JR., INC.	Subject <u>BEAVER</u> POND DAM HYDRAULIC DATA	_ S.O. No Sheet No2 of8
Box 280 Beaver, Pa. 15009	Computed byChecked byLDL	Drowing No Date/2 - 2 - 8 O

STORAGE CALCULATIONS

AREA VS. ELEVATION DATA (MERSURED FROM QUAD.)

ELEVATION (Fr.)	SURFACE AREA (ACRES)
1618.2	28.47
1620	36.73
1640	58.77

NORMAL POOL STORAGE STORAGE VOLUME = VNF = 1/3 (A, +A2 + VA, A2) h = ESTIMATED AVERAGE DEPTH 6.8FT. A, = SURFALE AREA OF NORMAL POOL = 28.47 Ac. A: SURFACE AREA OF RESERVOIR BOTTOM = 23.62 AC. (ESTIMATED FROM AVERAGE DEPTH FIND RESERVOIR SIDE SLOPES) NORMAL POOL STORAGE = VN, = (28.47 + 23.62 + VEB.47 (23.62)) VNF = 176.85 Ac- FT.

TOP OF DAM STORAGE

274 AC. - FT. (FROM HEC-I ANALYSIS)

DRAINAGE AREA

UPSTREAM DAIT	1.64	59. Mi.
BEAVER POND	3.75	5q. Mi.
TOTAL DRAINAGE AREA	5.39	59. Mi.





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· · · · · ·	CLOB RDT	TING CL	IRVE BR.	SED L	UPON CA	DIFICAL FLO	ow Or	FR SPILLWAY
VEVA	$V = \sqrt{9} D$) (CHO MEAN	W, <u>OPEN</u> HYDRAULI	<u>CHAN</u> 'C DE	INEL HY PTH = E FR	DRAULICS LOW AREA	P. 43,)
	$V = \sqrt{9} D$ $D =$ $g =$ $V =$) MERN 32.2 MERN	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW VI	<u>CHRN</u> CDE ELOCI	INEL HY PTH = E FR	DRAULICS LOW AREA EE SURFACE	P. 43,)
	$V = \sqrt{9} D$ $P = V = V = V = V = V = V = V = V = V = $	(CHO MEAN 32.2 MEAN	W, <u>OPEN</u> HYDRRULI FT/SEC ² FLOW VI	<u>CHRN</u> C DE Eloci	INEL HY PTH = E FR	DRAULICS LOW AREA EE SURFACE	P. 43, Tep Wi)
SPILLWAY ELEV. FT.	$V = \sqrt{9} D$ $P =$ $g =$ $V =$ $Q = VR$ FLOW DEPTH, FT.	CHO MEAN 32.2 MEAN RREA FT.	W, OPEN HYDRRULI FT/SEC FLOW VI TOP WIDTH, FT.	CHAN C DE ELOCI	INEL HY PTH = E FRI TY	DRAULICS, LOW AREA EE SURFACE Q, CFS	P. 43, Top Wi	RESERVOIRSURFACE, FT.
SPILLWAY ELEV. FT. 1618.0	$V = \sqrt{g} D$ $D = \frac{1}{\sqrt{g}} D$ $Q = \sqrt{g} \frac{1}{\sqrt{g}} V = \frac{1}{\sqrt{g}} \frac{1}{\sqrt{g}} V$ $V = \sqrt{g} \frac{1}{\sqrt{g}} \frac{1}{\sqrt$	Сно МЕЯМ 32.2 / МЕЯМ ЯЕАМ ЯКЕА FT.	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW VI TOP WIDTH, FT.	CHRA CDE ELOCI	INEL HY PTH = E FR TY V, FT/SEC	DRAULICS <u>LOW AREA</u> EE SURFACE Q, CFS O	P. 43, Ter Win V/29	RESERVOIRSULFACE, Fr.1418.0
SPILLWAY ELEV. FT. 1618.0 1618.5	$V = \sqrt{9} D$ $P = \frac{9}{\sqrt{9}}$ $V = \sqrt{9} V = \frac{9}{\sqrt{9}}$ $F = \sqrt{7}$ $F = \sqrt{7}$ $F = \sqrt{7}$ $F = \sqrt{7}$	(CHO MEAN 32.2 MEAN REA Fr. 0 10,5	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW VI TOP WIDTH, FT. O 42.0	<u>CHAN</u> CDE ELOCI A/T 0 0,25	INEL HY PTH = E FRI TY V, Fr/SEC 0 2.94	DRAULICS, <u>LOW AREA</u> EE SURFACE Q, CFS 0 29.79	P. 43, Top Win V/29 0 0,13	RESERVOIRSURFACE, FT.1418.01418.63
SPILLWAY ELEV. FT. 1618.0 1618.8	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $Q = \sqrt{7}$ $V = \sqrt{9} D$ $V = \sqrt{7}$	(CHO MEAN 32.2 MEAN RREA FT. 0 10.5 23.7	W, OPEN HYDRAULI FT/SEC FLOW VI TOP WIDTH, FT. 0 42.0 44.0	<u>CHRN</u> IC DE ELOCI	INEL HY PTH • E FR TY V, FT/SEC 0 2.84 4.17	DRAULICS <u>LOW AREA</u> EE SURFACE Q, CFS 0 29.79 98.83	P. 43, Ter Will V/29 0 0,13 0,27	RESERVOIRSURFACE, FT.1618.01619.07
VEV SPILLWAY ELEV. FT. 1618.0 1618.5 1618.8 1619.0	$V = \sqrt{9} D$ $D = \sqrt{9} D$ $Q = \sqrt{4}$ F_{LOW} $F_{PEPTH, FT.}$ O 0.5 0.8 1.0	(CHO MEAN 32.2 MEAN RREA FT. 0 10.5 23.7 32.6	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW VI TOP WIDTH, FT. 0 42.0 44.0 44.5	<u>CHRA</u> IC DE ELOCI 0,25 0,54 0,73	INEL HY PTH • E FR TY V, FT/SEC 0 2.84 4.17 4.85	DRAULICS, <u>LOW AREA</u> FE SURFACE Q, CFS 0 29.79 98.83 158.05	P. 43, Tep Win V/29 0,13 0,27 0,37	$\frac{R}{T} = \frac{R}{T}$ $\frac{RESERVOIR}{SURFACE, FF}$ $\frac{1418.0}{1619.63}$ $\frac{1619.37}{1619.37}$
JEVEV SPJLLWRY ELEV. FT. IG 18.0 1618.5 1618.8 1619.5 1619.5	$V = \sqrt{9} D$ $P =$ $9 =$ $V =$ $Q = V A$ $Flow$ $PEPTH, FT.$ 0 0.5 0.8 1.0 1.5 0	(CHO MEAN 32.2 MEAN RREA FT. 0 10.5 23.7 32.6 55.87	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW VI TOP WIDTH, FT. 0 92.0 44.0 44.5 46.5	<u>CHAN</u> IC DE ELOCI. 0.25 0.54 0.73 1.20	INEL HY PTH • E FR. TY V, FT/SEC 0 2.84 4.17 4.85 6.22 7.20	DRAULICS -LOW AREA EE SURFACE 9, CFS 0 29.79 98.83 158.05 347.17 	P. 43, Top Will V/29 0,13 0,27 0.37 0.60	RESERVOIRSURFACE, FT.1418.01619.071619.371620.10
DEV SPILLWRY ELEV. FT. 1618.0 1618.5 1618.8 1619.0 1619.5 1620.0	$V = \sqrt{g} D$ $p =$ $q =$ $V =$ $Q = VA$ $PEPTH, FT.$ O 0.5 0.8 1.0 1.5 2.0 $-$	(CHO MEAN 32.2 MEAN REA FT. 0 10.5 23.7 32.6 55.87 79.35	W, <u>OPEN</u> <i>NYDRRULI</i> <i>FT/SEC</i> <i>FLOW VI</i> <i>TOP WIDTH</i> <i>FT</i> . <i>O</i> <i>92.0</i> <i>44.0</i> <i>44.5</i> <i>46.5</i> <i>47.0</i> <i>7.0</i>	<u>CHRA</u> IC DE ELOCI ELOCI 0,25 0,54 0,73 1.20 1.69	INEL HY PTH = E FR TY V, Fr/SFC 0 2.84 4.17 4.85 6.22 7.38	DRAULICS <u>ECOW AREA</u> EE SURFACE	P. 43, Ter Will V/29 0,13 0,27 0.37 0.60 0.85	RESERVOIRSURFACE, FT. 1418.0 1618.63 1619.37 1620.10 1620.85 167.57
JEVEV SPILLWAY ELEV. FT. 1618.0 1618.5 1618.8 1619.0 1619.5 1619.5 1620.0 1620.5 1.310	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $V =$	(CHO MEAN 32.2 MEAN RREA FT 0 10.5 23.7 32.6 55.87 79.35 103.35 12210	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW V. TOP WIDTH, FT. O 42.0 44.0 44.5 46.5 47.0 48.0 48.0 48.0	CHRA IC DE ELOCI ELOCI 0,25 0,25 0,73 1.20 1.69 2.15	INEL HY PTH • E FR TY V; Fr/sec 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13	DRAULICS, <u>LOW ALEA</u> EE SURFACE	P. 43, Top Will V/29 0,13 0,27 0,37 0,60 0,85 1.07 1.20	RESERVOIRSURFACE, FT. 1418.0 1418.0 1418.63 1619.37 1620.10 1620.85 1621.57 17.7
DEV SPILLWAY ELEV. FT. IG 18.0 IG 18.5 IG 18.8 IG 19.0 IG 19.0 IG 19.5 IG 20.0 IG 20.0 IG 20.5 IG 21.0 IG 21.0	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $V =$	(CHO MEAN 32.2 MEAN RREA FT. 0 10.5 23.7 32.6 55.87 79.35 103.35 128.10 .32 25	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW V. TOP WIDTH, FT. 0 92.0 44.0 14.5 46.5 47.0 48.0 49.5 19.5 19.5	<u>CHRA</u> IC DE ELOCI. B/T 0.25 0.54 0.73 1.20 1.69 2.15 2.59 2.69	INEL HY PTH • E FR TY V, FT/SEC 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13 2.31	DRAULICS 	P. 43, Top Will V/29 0,13 0,27 0,37 0,85 1.07 1.29	RESERVOIRSURFACE, FT. 1418.0 1619.63 1619.37 1620.10 1620.85 1621.57 1622.29
DEV SPILLWRY ELEV. FT. 1618.0 1618.5 1618.8 1619.5 1620.0 1620.5 1620.5 1621.0 1621.1	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $Q = \sqrt{4}$ $V = \sqrt{9} D$ $Q = \sqrt{4}$ $Q = \sqrt{4}$ $D = \sqrt{4}$ $D = \sqrt{4}$ $Q = \sqrt{4}$	(CHO MEAN 32.2 MEAN	W, <u>OPEN</u> NYDRRULI FT/SEC ⁻ FLOW V. TOP WIDTH, FT. 0 92.0 44.0 44.5 46.5 47.0 48.0 49.5 47.5 47.5 47.5 47.5	<u>CHRA</u> IC DE ELOCI ELOCI 0,25 0,54 0,73 1.20 1.69 2.15 2.59 2.69	INEL HY PTH = E FR TY V, Frysec 0 2.84 4.17 4.85 6.22 7.38 6.32 9.13 9.31	DRAULICS <u>ECON AREA</u> EE SURFACE Q, CFS Q 29,79 98.83 158.05 347.17 585.35 859.92 1,169.84 1,238.28 159.20	P. 43, Top Will V/29 0 0,13 0,27 0,37 0,37 0,60 0,85 1.07 1.29 1.35 .59	RESERVOIRSURFACE, FT. 1418.0 1618.63 1619.37 1620.10 1620.85 1621.57 1622.29 1622.45 1622.9
SPILLWAY ELEV. FT. 1618.0 1618.5 1618.8 1619.0 1619.5 1620.0 1620.5 1621.0 1621.1 1621.5	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $Q = \sqrt{4}$ $P = \sqrt{4}$	(CHO MEAN 32.2 MEAN 71EAN 71EAN 71EAN 71EAN 71.5 75.87 79.35 103.35 128.10 133.05 157.80 192.55	W, <u>OPEN</u> <i>HYDRRULI</i> <i>FT/SEC</i> <i>FLOW</i> <i>V</i> <i>TOP</i> <i>WIDTH</i> , <i>FT</i> . <i>O</i> <i>92.0</i> <i>44.0</i> <i>44.5</i> <i>46.5</i> <i>47.0</i> <i>48.0</i> <i>49.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>49.5</i> <i>40.5</i> <i>45.5</i> <i>45.5</i> <i>45.5</i> <i>45</i>	<u>CHRA</u> IC DE ELOCI 0,25 0,54 0,73 1.20 1.69 2.15 2.59 2.69 3.19 3.19	INEL HY PTH • E FR TY V, Fr/SEC 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13 9.31 10.13 10.00	DRAULICS <u>LOW AREA</u> EF SURFACE	P. 43, Top Win Top Win V/29 0 0,13 0,27 0,37 0,37 0,60 0,85 1.07 1.29 1.35 1.59 1.84	RESERVOIRSURFACE, FT. 1418.0 1418.0 1418.0 1619.37 1620.10 1620.85 1621.57 1622.29 1622.45 1623.09 1623.09 1623.09
SPILLWAY ELEV. FT. IG 18.0 IG 18.5 IG 18.8 IG 19.5 IG 20.0 IG 20.5 IG 21.0 IG 21.1 IG 21.5 IG 22.0	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $V = \sqrt{9} P$ $P = \sqrt{10} P$ $P = \sqrt{10} P$ $V = \sqrt{10} P$	(CHO MEAN 32.2 MEAN 7EAN 7EAN 70.5 23.7 32.6 55.87 79.35 103.35 128.10 133.05 157.80 182.55 207.30	W, <u>OPEN</u> HYDRRULI FT/SEC ⁻ FLOW V. TOP WIDTH, FT. 0 92.0 44.0 44.5 46.5 47.0 48.0 49.5 49.5 49.5 49.5 49.5 49.5 49.5	CHRAN CDE ELOCI 0.25 0.54 0.73 1.20 1.69 2.15 2.59 2.69 3.19 3.69 4.19	INEL HY PTH • E FR TY V, FT/SEC 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13 9.31 10.13 10.90 11.62	DRAULICS -2000 ALEA EE SUNFACE Q, CFS 0 29,79 98.83 158.05 347.17 585.35 859.92 1,169.84 1,238.28 1,599.30 1,989.86 24.07.88	P. 43, Top Will VZg O 0, 13 0, 27 0, 37 0, 27 0, 37 0, 60 0, 85 1, 07 1, 29 1, 35 1, 59 1, 84 2, 10	RESERVOIR SURFACE, FT. 1418.0 1619.63 1619.37 1620.10 1620.85 1621.57 1622.29 1622.45 1623.84 1623.84 1624.60
DEV SPILLWAY ELEV. FT. IG18.0 IG18.0 IG18.5 IG18.8 IG19.0 IG19.5 IG20.0 IG20.5 IG20.0 IG21.5 IG21.5 IG21.5 IG22.0 IG22.5	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $V =$	(CHO MEAN 32.2 MEAN 715AN 715AN 710,5 23,7 32,6 55.87 79.35 103.35 128.10 133.05 157.80 182.55 207,30 237.05	W, <u>OPEN</u> NYDRRULI FT/SEC ⁻ FLOW V. TOP WIDTH, FT. 0 92.0 44.0 44.5 46.5 47.0 48.0 49.5 49.5 49.5 49.5 49.5 49.5 49.5 49.5 49.5 49.5 49.5	CHRA CDE ELOCI R/T 0 0,25 0,54 0,73 1.20 1.69 2.15 2.59 2.69 3.19 3.69 4.19 4.49	INEL HY PTH • E FR TY V, Fr/SEC 0 2.84 4.17 4.85 6.22 7.38 6.32 9.13 9.31 10.13 10.90 11.62 12.29	DRAULICS <u>ECON AREA</u> EE SURFACE Q, CFS Q 29,79 98.83 158.05 347.17 585.35 859.92 1,169.84 1,238.28 1,579.30 1,989.86 2,407.88 1,951.55	P. 43, Top Will V/29 O 0,13 0,27 0,37 0,37 0,60 0,85 1.07 1.29 1.35 1.59 1.84 2,10 2,35	RESERVOIRSURFACE, FT. 1418.0 1618.63 1619.37 1620.10 1620.85 1621.57 1622.29 1622.29 1622.45 1623.84 1623.84 1624.60 1625.35
SPILLWAY ELEV. FT. 1618.0 1618.5 1618.8 1619.0 1619.5 1620.0 1620.5 1621.0 1621.1 1621.5 1622.0 1622.5 1623.0	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $Q = \sqrt{4}$ $P = \sqrt{4}$ $P = \sqrt{4}$ $Q = \sqrt{4}$ $Q = \sqrt{4}$ $Q = \sqrt{4}$	(CHO MEAN 32.2 MEAN 71EAN 71EAN 71EAN 71EAN 72.6 55.87 79.35 103.35 128.10 133.05 157.80 182.55 207.30 232.05	W, <u>OPEN</u> HYDRRULI FT/SEC ^T FLOW V. TOP WIDTH, FT. 0 42.0 44.5 46.5 47.0 44.5 46.5 47.0 48.0 49.5 49.5 49.5 49.5 49.5 49.5 49.5	<u>CHRA</u> IC DE ELOCI 0,25 0,54 0,73 1.20 1.69 2.15 2.59 2.69 3.19 3.69 4.19 4.69	INEL HY PTH • E FR TY V, Fr/sec 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13 9.31 10.13 10.90 11.62 12.29	DRAULICS 	P. 43, Top Win Top Win V/29 0, 13 0, 27 0, 13 0, 27 0, 37 0, 60 0, 85 1, 07 1, 29 1, 35 1, 59 1, 84 2, 10 2, 35	RESERVOIRSURFACE, FT. 1418.0 1418.0 1418.0 1418.63 1619.37 1620.10 1620.85 1621.57 1622.29 1622.45 1623.84 1623.84 1624.60 1625.35
DEVA SPILLWAY ELEV. FT. 1618.0 1618.5 1618.8 1619.0 1620.0 1620.0 1620.5 1621.0 1621.5 1621.5 1622.0 1622.5 1623.0	$V = \sqrt{9} D$ $P = \sqrt{9} D$ $P = \sqrt{9} P$ $V = \sqrt{9} P$ $V = \sqrt{9} P$ $V = \sqrt{9} P$ $V = \sqrt{9} P$ $P = \sqrt{7} P$ $P = \sqrt{9} P$ $P = \sqrt{7} P$ $P = \sqrt{7} P$ $P = \sqrt{9} P$ $P = \sqrt{7} P$ $P =$	(CHO MEAN 32.2 MEAN 715AN 715AN 710,5 23,7 32,6 55.87 79.35 128.10 133.05 157.80 182.55 207,30 232.05	W, <u>OPEN</u> <i>HYDRRULI</i> <i>FT/SEC</i> <i>FLOW</i> V. <i>TOP WIDTH</i> , <i>FT.</i> <i>O</i> <i>42.0</i> <i>44.0</i> <i>44.5</i> <i>44.5</i> <i>44.5</i> <i>44.5</i> <i>44.5</i> <i>44.5</i> <i>47.0</i> <i>48.0</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i> <i>47.5</i>	CHRA IC DE ELOCI 0,25 0,54 0,73 1.20 1.69 2.15 2.59 2.69 3.19 3.69 4.19 4.67	INEL HY PTH • E FR TY V, FT/SEC 0 2.84 4.17 4.85 6.22 7.38 8.32 9.13 9.31 10.13 10.90 11.62 12.29	DRAULICS -2000 ALEA EE SUNFACE Q, CFS 0 29,79 98.83 158.05 347.17 585.35 859.92 1,169.84 1,238.28 1,579.30 1,989.86 2,407.88 3,851.65	P. 43, Tep Will V/29 O 0,13 0,27 0,37 0,60 0,85 1.07 1.29 1.35 1.59 1.84 2,10 2,35	RESERVOIRSURFACE, FT. 1618.0 1619.07 1619.37 1620.10 1620.85 1621.57 1622.29 1622.45 1623.09 1623.84 1624.60 1625.35

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Box 280 Beaver, Pa. 15009	Computed by <u>GWT</u> Checked by <u>WDL</u>	Drawing No Date _//- 26 8.0
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THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FRON " THE HYDROLOGIC STUDY - TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY. DRAINAGE AREA - 3.75 SQ. Mi. () COMPUTE THE MERN LOGARITHM. LOG (9) = C + 0.75 LOGA LOG (Qm) = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS A = DRAINAGE AREA, SQ. Mi. = 3.75 SQ. Mi. Cm = MAP COEFFICIENT FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 = 2.18 LOG (Qm) = 2,18 + 0.75 (LOG 3.75) = 2.6105 (2) COMPUTE STANDARD DEVIATION 5 = Cs - 0.05 (LOGA) S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PERKS. Cs = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = 0.347 A = DRAINAGE AREA, Sq. Mi. = 3.75 Sq. Mi. 5: 0.347 - 0.05 (LOG 3.75) . 0.3183 SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.20 \Im

(a) $Log(Q_{100}) = Log(Q_{10}) + K(P,g) S$ K(P,g) = STANDARD DEVIATE FOR R GIVEN EXCEEDENCE FREQUENCY PERCENTAGE (P) AND SKEW coefficient(g) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY" $Log(Q_{100}) = 2.6/05 + 2.480(0.3183)$ $Q_{100} = 2.511... CFS$

> USING ZERO LOSS RATES, A PEAK FLOW OF 2717 C.F.S WAS OBTRINED IN THE HEC-I ANALYSIS IF THE SNYDER'S UNIT HYDROGRAPH PARAFTETERS ORIGINALLY PERIVED FOR THIS BASIN WERE USER. THIS VALUE IS WITHIN & PERCENT OF THE PREVIOUSLY COMPUTED VALUE OF 2511. C.F.S. AND IS WITHIN THE IO PERCENT LIMIT SUGGESTED BY CORPS GUIDELINES.

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Subject BEAVER POND DAM S.O. No. MICHAEL BAKER, JR., INC. 100 - YEAR DISCHARGE CALCULATIONSheet No. 9 of 18 THE BAKER ENGINEERS TOTAL DRAINAGE AREA ___ Drawing No. ___ Box 280 Computed by GUT Checked by WAL - Date 4/15/81 Beaver, Pa. 15009 THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY - TROPICAL STORM AGNES " PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY. DRRINAGE AREA - 5.39 Sq. Mi. COMPUTE THE MEAN LOGARITHM \bigcirc LOG (Q_) = C_ + 0.75 LOGR LOG (Q_) = MERN LOGARITHM OF ANNUAL FLOOD PEAKS A . DRAINAGE AREA, Sq. Mi. C. = MAP COEFFICIENTS FOR MERN LOG OF ANNUAL PERKS FROM FIG. 21 $LOG (Q_m) = 2.18 + 0.75 (LOG 5.39)$ = Z.7287 2 COMPUTE STANDARD DEVIATION S = C5 - 0.05 (LOG A) . S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS. C. MAP COEFFICIENT FOR STANDARD DEVIRTION FROM FIG. 22 = 0,347 A = DRAINAGE AREA, 59. Mi., = 5.39 5 = 0.347 - 0.05 (LOG 5.39) = 0.3104 3 SELECT SKEW COEFFICIENT FROM FIG. 23 = 0,20 **(4)** LOG (9,00) = LOG (9_) + K(P,g) 5 K (P, g) = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTRGE (P) AND SKEW COEFFICIENT (9) FROM EXHIBIT 39 OF BEARD'S "STRTISTICAL METHODS IN HYDROLOGY " LOG (qioo) = 2,7287 + 2,48 (.3104) 9,00 = 3150 CFS A PEAK TN FLOW TO BEAVER ROND DAM OF 3699 CFS WAS OBTAINED TO THE HEL-I DB ANALYSIS, THIS IS C WITHIN 15% OF THE CALCULATED 100 - YEAR FLOW OF 3150 cfs. THIS LEVEL OF ACCURACY HAS BEEN JUDGED TO BE ACCEPTABLE BY THE BALTIMORE DISTRUCT, LORDS OF EAKINEERS, FOR THES PHASE I

INSTECTION REPORT ANALYSIS.

	NIL 40	10/ 11	0 - Yea	FLOOD	ROUTIN	,					
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••••••••••         •••••••••         •••••••••         •••••••••           SUB-AREA RWNOFF ECMPUTATION         SUB-AREA RWNOFF ECMPUTATION         ••••••••••         ••••••••••           RJYDFF HYDROGRAPH TO BEAVER POND         ISTAGE         JATI         JATI         JATI           IFMD6         IJ46         TAREA         SUND         JATI         JATI         JATI           IFMD6         IJ46         TAREA         SUND         TASOC         ATIU         ISNUE         LAUTO           IFMD6         IJ46         IAREA         SUND         TASOC         ATIU         ISNUE         LAUTO           IFMD6         IJ40         SUND         ISNUE         ISNUE         ISNUE         LAUTO         ISNUE	I STAGE I	13 1735.	Ś								
RJ10FF HT34064APH TO BEAVER POND         ISTAGE 1200         ISTAGE 14010         ISTAGE 14010         ISTAGE 14010         IFMOG 1.00         IFMOG 1.00         ISTAGE 14010         IFMOG 1.00         IFMOG 0.00		*****	-	115 SUI	B-AREA RUNDF	F COMPUFATIO	***	*			
ISTAQ       ICON       IECON       IAPE       JULI       JPRI       IMME       ISTAGE       LAUTO         IHMOG       LJHG       LAREA       SMAP       RASIS       RASIS       RASIS       RASIS       LAUTO       LAUTO </td <td></td> <td></td> <td>RJNDFF HYD</td> <td>ROGRAPH TO BI</td> <td>EAVER POND</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			RJNDFF HYD	ROGRAPH TO BI	EAVER POND						
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LROPT     514X3     DUT(A     R110L     ERAIN     51RKS     R110K     S1RKS     R110K     S1RKS     R110K     S1RKS     R110K     S1RK     R110K     S1RK     R110K     S1RK     R110K     S1RK     R110K     S1RK     R110K     S1RK     R110K     S1RT     Colo     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0		O AH I	1 9HC1 90	TAREA SI 3.75 0.	HYDRUGRA NAP TRSDA •0 3.75	PH DATA TRSPC RA 0.0	11.0 ISNON 0 0	ISAME LU 0	CAL 0		
UNIT HYDRGGRAPH DATA     DATA       1P= 2.26     CP=0.62     NIA= 3       5TATQ= -1.50     RECESSION DATA       35     UNIT HYDLLARPH 39     EUO-DE-PERIDD DRDIMTES. LAG=     2.26     40.05     RTIDR= 2.00       35     1131.     2.59.     00.5     RTIDR= 2.00     689.       36     1131.     2.59.     011.     640.     102.       38     75.     06.     251.     101.     104.       38.     70.     39.     101.     104.     102.       38.     7.     0.     7.     0.     21.       18.     13.     11.     10.     8.     7.     0.       18.     13.     13.     11.     10.     8.     7.     5.       18.     13.     11.     10.     8.     7.     5.     21.       18.     13.     11.     10.     8.     7.     5.     21.       18.     13.     11.     10.     8.     7.     5.     21.       19.     14.     10.     8.     7.     5.     21.       19.     13.     10.     8.     7.     5.     21.       19.     14.     10.     8.		LRCPT S	174K4 DLT 0.0	48 8110L	LOSS ERALN STR 0.0	DATA KS RT10K 0 1.00	STRTL CNS 0.0	1L ALSHX	RI 1MP 0.0		
RECESSION DATA         STRTQ= -1.50         STRTQ= -1.50         STRTQ= -1.50         JWIT H/03435AAPH 39 EVO-DE-PERIDD ORDIMATES. LAG=         35.         JWIT H/03435AAPH 39 EVO-DE-PERIDD ORDIMATES. LAG=         35.         JWIT H/03435AAPH 39 EVO-DE-PERIDD ORDIMATES. LAG=         JSS.         JSS         JSS         JSS         JSS          JSS <t< td=""><td></td><td></td><td></td><td>•d1</td><td>UNIT HYDRO</td><td>GRAPH DATA =0.62 NIA</td><td>C =</td><td></td><td></td><td></td><td></td></t<>				•d1	UNIT HYDRO	GRAPH DATA =0.62 NIA	C =				
UNIT HFURLARMENT 39 END-OF-PERTOD ORDINATES. LAG. 2.26 JOURS. CP. 0.62 VOL. 1.00 35. 1131. 259. 401. 236. 611. 647. 571. 489. 418. 151. 105. 201. 224. 191. 164. 123. 102. 38. 75. 64. 251. 224. 191. 164. 123. 224. 224. 18. 15. 04. 251. 100. 80. 7. 61. 224. 224. 224. 224. 224. 224. 224. 22				STRTQ= -1	.50 RECESSI	0N DATA 0.05	RTIOR= 2.00				
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PEUK FLAM AUS STIAUGE (END OF REATION) SUMMAR FOR MULTIPLE FLAM-AUTO COMMONIC CUMULATING           MERATION         STATION         ATEA TIN SQUARE FULCES TRANSCONDUCTATION           MODI PEDION         STATION         ATEA TIN TIN SQUARE FULCES TRANSCONDUCTATION           MODI PEDION         STATION         ATEA TIN TIN TIN TIN TIN TIN TIN TIN TIN TIN	UNDALC CUMPUTAT	
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PEGK RLW AND STARGE (END OF PERIOD) SUMMAR FOLLES TOUNDETENS)           Image: Second Classes         AREA ND STARGE (END OF PERIOD) SUMMAR FULCE TERS SECONDIC GENOMIC CLASSES           Image: Startury         STATUDY         STATUDY         STATUDY         STATUDY           Image: Startury         STATUDY         STATUDY         STATUDY         STATUDY         STATUDY           Image: Startury         Image: Startury         Image: Startury         Image: Startury         Startury           Image: Startury         Image: Startury         Image: Startury         Image: Startury         Startury           Image: Startury         Image: Startury         Image: Startury         Image: Startury         Startury           Image: Startury         Image: Startury         Image: Startury         Image: Startury         Startury           Image: Startury <t< td=""><td></td><td></td></t<>		
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SUMMARY OF DAM SAFELY ANALYSIS

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## APPENDIX E

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## PLATES

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Plate 4 - Top of Dam Profile and Typical Cross-Section from Visual Inspection







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## APPENDIX F

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REGIONAL GEOLOGY

## Beaver Pond Dam NDI No. PA 00133, PennDER No. 64-19

## REGIONAL GEOLOGY

Beaver Pond Dam is located in the Glaciated Low Plateaus section of the Appalachian Plateaus physiographic province. Drainage is to the west via Starrucca Creek and average relief in the area is 300 feet. The area has been glaciated at least three times and is presently covered with Wisconsin Stage glacial deposits. According to the Soil Conservation Service's Soil Survey for Wayne County, the surface soils in the vicinity of the dam consist primarily of silt loams on the valley floor and very stoney, silt loams on the valley walls. All soils are of the Volusia series and Oquaga-Lordstown association, respectively. No test borings were available for review, thus, the thickness of the overburden is difficult to ascertain.

Geologic references indicate that the bedrock in the vicinity of the dam consists of members of the Catskill Formation in the Susquehanna Group. The Catskill is composed of bay and delta front, red and gray shales and sandstones of Upper Devonian age. The Formation may also include widely scattered, thin coal seams and scattered fish remains. The strata in the vicinity of the dam remain essentially horizontal after the Appalachian uplift.

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