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NATIONAL DAM SAFETY PROGRAM, BLAIR LAKE DAM (NJ00774), DELAWARE--ETC(U)
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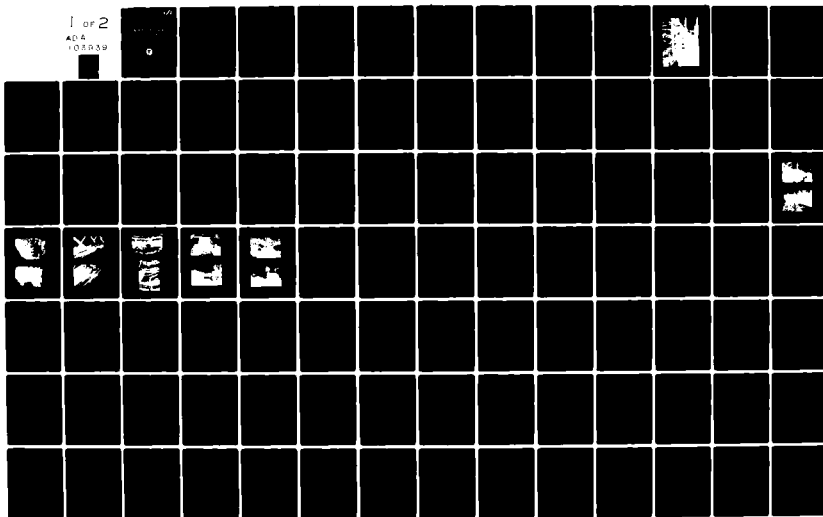
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DELAWARE RIVER BASIN
BLAIR CREEK, WARREN COUNTY
NEW JERSEY

BLAIR LAKE DAM NJ 00774

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY

Philadelphia District
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Philadelphia, Pennsylvania

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AUGUST 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		



DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

31 AUG 1981

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Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Blair Lake Dam in Warren County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Blair Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The spillway is considered seriously inadequate since a flow equivalent to 5 percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval

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Honorable Brendan T. Byrne

of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee installation of a properly sized low-level outlet and gate.

(2) Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.

(3) Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.

(4) Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.

(5) Design and oversee repair or replacement to the service bridge trusses and wood deck.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

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Honorable Brendan T. Byrne

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

Incl

As stated

Copies furnished:

Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CNO29
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
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BLAIR LAKE DAM (NJ00774)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 22 April 1981 by Anderson-Nichols & Co., Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Blair Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The spillway is considered seriously inadequate since a flow equivalent to 5 percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee installation of a properly sized low-level outlet and gate.

(2) Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.

(3) Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.

(4) Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.

(5) Design and oversee repair or replacement to the service bridge trusses and wood deck.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

APPROVED:



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE:

31 Aug 81

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Blair Lake
Identification No.:	Fed ID No. NJ00774
State Located:	New Jersey
County Located:	Warren
Stream:	Blair Creek
River Basin:	Delaware
Date of Inspection	April 22, 1981

ASSESSMENT OF GENERAL CONDITIONS

Blair Lake Dam is a 78-year old dam with an ashlar masonry spillway with earthen and bedrock abutments, is 100 feet long and 18.3 feet high, and is in fair condition. It is small in size and has a high hazard classification. Large trees are growing on the abutments and some of their roots have been instrumental, in part, in causing undermining of the bedrocks on the downstream side of the right abutment. Some seepage was observed through the stone masonry of the spillway below the water line near the right and left sides of the spillway. Erosion has exposed tree roots on the right abutment upstream and the left abutment also shows signs of erosion. In 1960 to seal seepage areas, large amounts of clay and lake-bottom sediments were placed in various locations, including along the upstream spillway toe and the left abutment. The service bridge would be a cause for concern should the dam be overtopped. The bridge, whose low chord elevation at the abutments is slightly below that of top of dam, is rusted and corroded. The dam has no low-level outlet as it was built with a mill race to a downstream millbuilding. The old mill race has been filled and the intake gate at the mill appeared to be inoperable.

The spillway is 41 feet long and 4 feet wide. Overtopping or breaching of Blair Lake Dam would cause excessive property damage to the library and Main Street Bridge and probably would result in damage to 4 or 5 houses 300 feet downstream of the Main Street Bridge as well as the loss of 10 to 20 lives. Therefore the dam is classified high hazard.

The spillway is capable of passing 984 cfs at the top of dam or about 4.6 percent of the 21,554 cfs peak inflow from the Probable Maximum Flood (PMF), which is the selected spillway design flood (SDF). The PMF would overtop the dam by 11 feet for up to 15 1/2 hours. The spillway is not capable of passing 50 percent of the 1/2 PMF (10, 777 cfs inflow) without

overtopping (7.6 feet) which would cause failure. (Failure would probably occur with one to two feet of overtopping.) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. The stage would increase from 7.1 feet to 9.8 feet in about 25 minutes upon failure with one foot of overtopping. Therefore, the spillway is considered to be seriously inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and inspection of dams, to accomplish the following tasks in the near future: investigate the seriously inadequate spillway capacity and implement remedial measures indicated; design and oversee installation of a properly sized low level outlet and gate; Design and oversee procedures for the removal of trees and root systems from immediately downstream of the dam; evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks; design and oversee procedures for elimination of the seepage through the stone masonry in the spillway; and design and oversee repair or replacement to the service bridge trusses and wood deck.

It is further recommended that the owner undertake the following as a part of operating and maintenance procedures starting soon: develop an emergency action plan which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam. In the near future: develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

ANDERSON-NICHOLS & COMPANY, INC.



Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848



April 22, 1981

OVERVIEW PHOTO
OFF 2100 100

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. 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 continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test 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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BLAIR LAKE DAM FED ID NO. NJ00774 NJ NO. 21-11

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
BLAIR LAKE DAM
FED ID NO. #NJ00774

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Blair Lake Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 December 1980 under Basic Contract No. FPM-39 and Contract No. A01093 dated 10 October 1979. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc.

b. Purpose: The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Blair Lake Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this study were used to determine any need for emergency measures and to conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Blair Lake Dam is an ashlar stone masonry dam tied to earthen and rock abutments 100 feet long with a hydraulic and structural height of 18.3 feet. The masonry spillway is 41 feet long with a topwidth of 4 feet. On the left (east) side of the spillway is a 39-foot earthen abutment and on the right (west) side is a 20 foot bedrock and earth abutment; both abutments are 4 feet higher than the spillway. The upstream and downstream slopes of the dam are tree-covered and of varying slope. On the right (west) side of the right abutment, extending approximately 200 feet downstream, is the east bank of an old mill race (diversion channel), which provided water power for a flour mill. The mill is no longer operating and the mill gate is assumed inoperable. The mill race has been filled to prevent flow to the mill building.

b. Location. Blair Lake Dam is located on Blair Creek in Blairstown Township, Warren County, New Jersey. The dam is at 40° 59.0' north latitude 74° 57.6' west longitude on the Blairstown Quadrangle. A location map has been included as Figure 2. The site may be reached by driving on Main Street northward from U.S. Route 94.

c. Size Classification. Blair Lake Dam is classified as being small in size on the basis of storage at the dam crest of 60 acre-feet, which is less than 1000 acre-feet but more than 50 acre-feet, and on the basis of its height of 18.3 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. The potential is present for excessive economic damage to the mill building (now the Catherine Dickson Hofman Public Library), Main Street Bridge, and 4 to 8 houses within 400 to 800 feet downstream of the dam. These structures are built along the rock-wall, lined channel of Blair Brook. With the potential loss of 12 to 20 lives in event of overtopping and/or breach, Blair Lake Dam is classified High Hazard.

e. Ownership. The dam is owned by the Blair Academy, Mr. J. Ernest Rea, Treasurer of Blairstown Academy, Blairstown, N.J. 07825 can be contacted for information at the above address or by calling (201) 362-6121.

f. Purpose. Blair Lake Dam was built to provide water power to a flour mill downstream. It is presently used for recreation.

g. Design and Construction History. Memoirs of Blair, a privately printed document published in 1939 indicates that the dam was built in 1902-03 to provide water power for the flour mill downstream. The memoirs were written by John C. Sharpe, who supervised the reconstruction. Mr. Rea, Treasurer of Blairstown Academy, said that the upstream side of the dam was sealed by Lawrence McConachy Construction Co. in 1960 with 1,500 cubic yards of clay and lake-bottom sediments along the spillway and the left embankment. The old headrace had a concrete cut-off placed in it and backfilled to its present height (See Appendix 2).

h. Normal Operational Procedure. No operational procedures were found for the dam.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from the Geologic Map of New Jersey (Kummel and Johnson, 1912) and the Glacial Drift of New Jersey (Salisbury, Kummel, Peet and Whitson, 1902) indicates soils within the immediate site consist of stratified drift which may be comprised of sand and gravel plains, deltas, eskers, kames, and terraces.

Bedrock (massive limestone) was observed in large outcrops at the right side of the downstream channel during inspection. The previously mentioned geologic map indicates that bedrock in this area consists of massive to thin bedded limestone of Cambrian to Ordovician age.

1.3 Pertinent Data

a. Drainage Area

10.85 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown.

Total ungated spillway capacity at maximum pool
(top of dam) elevation - 984

c. Elevation (ft. above NGVD)

Top of dam - 359.0

Maximum pool test flood (PMF) - 370

Recreation pool (at time of inspection) - 355

Spillway crest - 355

Streambed at centerline of principal spillway - 340.7

Maximum tailwater (estimated) - 346.5

d. Reservoir (Length in feet)

Maximum pool - 2000 (estimated)

Spillway crest - 700

e. Storage (acre-feet)

Spillway crest - 24

Top of dam - 60

Test flood - (PMF) - 236

f. Reservoir Surface (acres)

Top of dam - 12 (estimated)

Spillway crest - 4.3

g. Dam

Type - Ashlar masonry with earth and bedrock abutments

Length - 100 feet

Height - 18.3 feet (hydraulic)

- 18.3 feet (structural)

Top width - 4-foot spillway; varies up to 15 feet on
earthen abutments

Side slopes - upstream vertical; downstream 1H:3V

(slopes apply to spillway and masonry portion
only) slopes on earthen abutment vary.

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - Broad crested, Ashlar masonry

Length of weir - 41 feet

Crest elevation - 355 feet NGVD

Low level outlet - none present

U/S channel - Blair Lake and Blair Creek

D/S channel - Blair Creek

SECTION 2 ENGINEERING DATA

2.1 Design

No hydraulic, hydrologic, or other design engineering data were disclosed.

2.2 Construction

As noted above in Section 1.2.g., Memoirs of Blair indicate that the dam was built in 1902-03 under supervision of Dr. John C. Sharpe and paid for by D.C. Blair, son of John I. Blair, founder of Blairstown, N.J. at a cost of \$15,000. The upstream side of the spillway and left embankment were sealed with 1,500 cubic yards of clay and lake-bottom sediments in about 1960 by Lawrence McConachy Construction Company. Owner's representative stated that a concrete cut-off was placed in the mill's headrace before backfilling to preclude flowing water through the mill. Dampness was causing mildew in the library.

2.3 Operation

No data pertaining to the operation of the dam were found.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files, and contact with community officials revealed a limited amount of information.

b. Adequacy. The information retrieved is inadequate to evaluate; however, the visual inspection is deemed adequate to complete this Phase I Inspection Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. The left abutment is eroded. Undermining of some of the large rock outcrops of limestone downstream of the right abutment of the dam has occurred. Trees are growing upstream of the dam at the right and downstream of the dam at both abutments. Evidence of seepage through the masonry joints was noted on both right and left sides of the downstream face of the spillway below the waterline.

b. Appurtenant Structure. Service bridge: major corrosion of the bottom chord joint gusset plates has substantially reduced the effectiveness of the bridge truss. The wood deck planking is weathered with several planks observed to be deteriorated.

c. Reservoir Area. The watershed above the lake is gently to moderately sloping, wooded, and is partially urbanized. Some open fields exist along the right side of the reservoir. Slopes on the shore appear to be stable. No evidence of significant sedimentation was observed in the reservoir. However, sediment at the upstream face of the dam reaches nearly to the crest of the spillway. This is the result of the action taken about 1960 to place clay and lake-bottom sediments at the upstream toe of the spillway and left abutment to seal the leaks in the dam.

d. Downstream Channel. Some erosion and displacement of the vertical masonry block walls along the right and left side of the channels downstream of the dam has occurred. Trees are growing on the left bank of the channel downstream of the spillway. One large tree is leaning into the channel approximately 100 ft downstream of the dam.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were disclosed.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found, but from its condition, it is apparent that maintenance is needed to prevent serious deterioration of the structure.

4.3 Maintenance of Operating Facility

No formal maintenance procedures for the operating facilities were found.

4.4 Warning System

No description of any warning system was disclosed.

4.5 Evaluation of Operational Adequacy

Because of the lack of operation and maintenance procedures, the remedial measures described in Section 7.2 should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no hydrologic or hydraulic data were revealed an evaluation could not be performed.

b. Experience Data. No experience data were found.

c. Visual Observation. The spillway appears to be in good condition. At the left spillway abutment downstream, the bedrock is seriously undermined in part, caused by tree roots that have spread along the joint planes. The dam now has no low-level outlet; the old mill race has been blocked off and the gate in the mill building is closed and presumed to be inoperable. Because the low chord of the bridge is just below top of dam, the condition of the bridge is important in the event of overtopping. The poor structural condition of the trusses, caused by corrosion, makes the bridge a liability to the integrity of the dam if it should collapse.

d. Blair Lake Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines, for dams classified as High Hazard and small in size. The PMF was determined by application of the SCS dimensionless unit hydrograph to a 24-hour probable maximum precipitation of 22.2 inches. Hydrologic computations are given in Appendix 3. The routed PMF peak discharge for the subject drainage area is 21,554 cfs.

The minimum elevation of the dam allows 2.9 feet of depth above the spillway, before overtopping occurs. Under this head the total spillway capacity is 984 cfs, which is less than the selected SDF inflow (approximately 4.6 percent).

Flood routing calculations indicate that Blair Lake Dam will be overtopped for 15.5 hours to a maximum depth of 11 feet under PMF conditions. It is estimated that the spillway can pass about 4.6 percent of the peak PMF inflow without overtopping the dam.

Bank full condition downstream, which occurs at incipient overtopping, is about 5 to 6 feet. If the dam were to fail at overtopping, a significant increase (3.6 feet) in downstream flood stage would occur at the damage center. Failure with a stage one foot above the dam crest is likely, and would increase the downstream stage by 2.7 feet, causing an increase

to the hazard of loss of life in Blairstown. Since the one-half PMF would overtop the dam by 7.6 feet, more than needed to cause failure, the spillway capacity is seriously inadequate.

e. Drawdown Capability. Since the mill headrace was filled, no drawdown capability has existed at Blair lake Dam.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability. Trees growing immediately upstream of the dam may cause seepage if their root systems penetrate and dislodge the masonry blocks in the dam. Several large blocks of bedrock which have been displaced on the right abutment downstream of the dam may cause stability problems at the right abutment.

Based on visual inspection alone, it is not possible to determine the character of the dam foundation or the interior of the cross section. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure, sliding or overturning.

6.2 Design and Construction Data. No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records. No operating records pertinent to the structural stability of the dam were available.

6.4 Post-Construction Changes. No record of post-construction changes was available; however, Mr. Rea indicated that in about 1960, a total of 1,500 cubic yards of clay and lake-bottom sediments was placed along the upstream toe of the spillway and left embankment.

6.5 Seismic Stability. This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of unstable slopes. However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Blair Lake Dam is 78 years old and is in fair condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2.a and 7.2.b should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should retain a professional engineer qualified in the design and construction of dams to accomplish the following in the near future:

1. Investigate the seriously inadequate spillway capacity and design, and implement remedial measures indicated.
2. Design and oversee installation of properly sized low-level outlet and gate.
3. Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.
4. Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.
5. Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.
6. Design and oversee repair or replacement to the service bridge trusses and wood deck.
7. Consider the provision of a low level outlet.

b. Alternatives. None recommended.

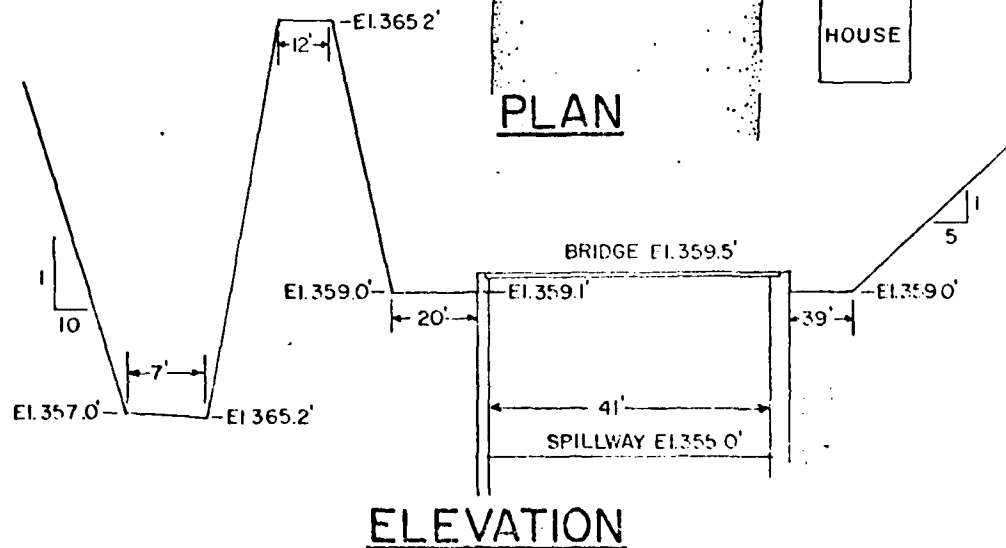
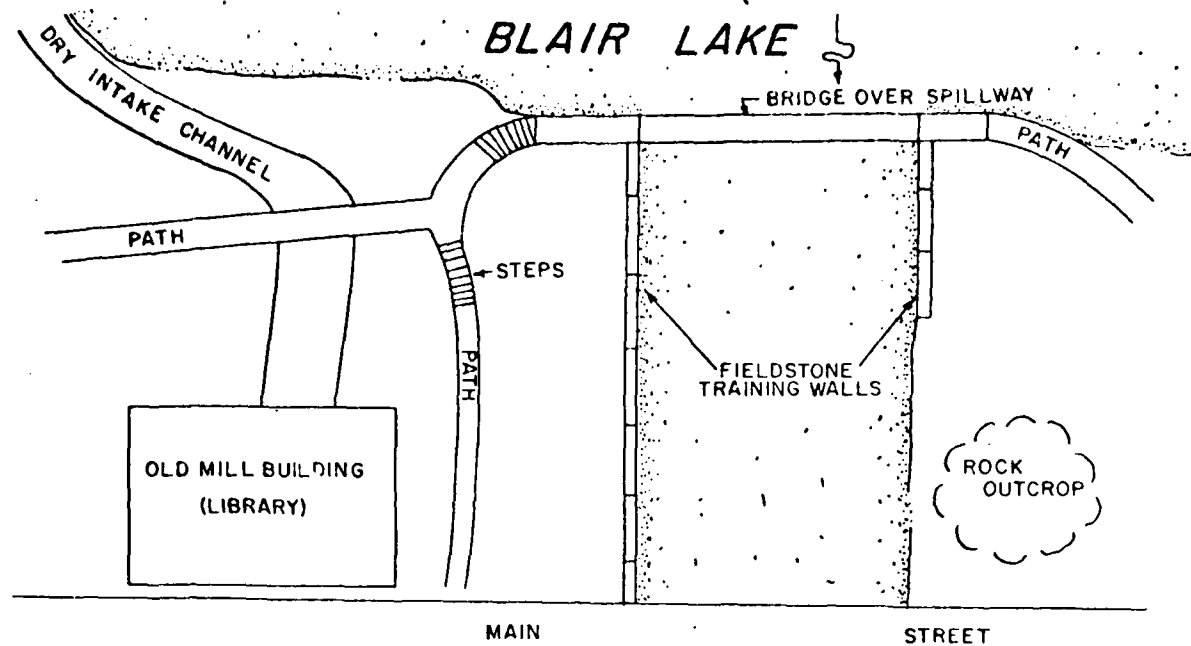
c. Operating and Maintenance Procedures

The owner should accomplish the following items soon:

Develop an emergency action plan which outlines actions taken by the owner to minimize downstream effects of an emergency at the dam.

The owner should do the following in the near future:

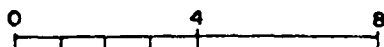
Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.



Anderson-Nichols & Co., Inc.		U.S. ARMY ENGINEER DISTRICT OFFICE	
BOSTON MASSACHUSETTS		CORPS OF ENGINEERS	
		PHILADELPHIA, PA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
BLAIR LAKE DAM			
BLAIR CREEK		NEW JERSEY	
		SCALE NOT TO SCALE	
		DATE JUNE 1961	



SCALE IN MILES



MAP BASED ON STATE OF NEW JERSEY
OFFICIAL MAP & GUIDE.

Anderson-Nichols & Co., Inc.		U.S. ARMY ENGINEER DIST. PHILADELPHIA	
BOSTON		CORPS OF ENGINEERS	
MASSACHUSETTS		PHILADELPHIA, PA.	
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
BLAIR LAKE DAM			
LOCATION MAP			
BLAIR CREEK		NEW JERSEY	
		SCALE: 1" = 4 Miles Approx.	
		DATE: JUNE 1961	

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

BLAIR LAKE DAM

Check List
Visual Inspection
Phase 1

Name Dam Blair Lake Dam County Warren State NJ00774 Coordinators MJDEP
 Date(s) Inspection 2-18-81 4-27-81 Weather Fair, mild Temperature 45°
 Pool Elevation at Time of Inspection 355.2' NGVD Tailwater at Time of Inspection 342' NGVD

Inspection Personnel:

<u>W. Guinan</u>	<u>F.D.Deane</u>
<u>S. Gilman</u>	<u>K. Stuart</u>
<u>R. Murdock</u>	<u></u>

R. Murdock/F.D.Deane Recorder

Mr. J. Ernest Rea, Treasurer of Blairstown Academy,
dam owners, accompanied the inspection team.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Water flowing over spillway - unable to inspect for seepage.	Inspect during no flow condition over spillway.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Some rock blocks have been displaced on right abutment in vicinity of downstream face of dam. Erosion adjacent to toe of dam on left side.	Restore and/or replace blocks of rock and repair erosion.
DRAINS	Not visible	
WATER PASSAGES	Not visible	
FOUNDATION	Appears to be bedrock on right side of dam. Not visible on left side of dam.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
STONE MASONRY WEIR	Numerous horizontal cracks noted in top walkway. Concrete cap visible on both sides of bridge, but not visible on central section. 4 ft. wide mortared cut stone cap; covered with algae, but appears to be in good condition. No indication of vertical or horizontal movement. Small amount of mortar missing on d/s joints. Some seepage is apparent on both sides near top of weir.	
APPROACH CHANNEL	Clear and unobstructed.	
DISCHARGE CHANNEL	Clear wide and unobstructed. Bound by dry cut stone walls approx. 5 ft.- 7 ft. high which train steam to bridge approx. 90 yards d/s. (Main Street of Blairstown). D/s training walls missing on both sides for approx. 15 ft. d/s of dam.	
BRIDGE AND PIERS OVER SPILLWAY	Bridge is set on mortared cut stone spillway abutments; no piers. It is constructed of steel channels bolted together w/channel cross members & a wooden plank deck which is worn but solid. Railings also along approaches to bridge. Moderate weathered wood plank deck. Wrought iron gusset plates badly corroded. Wrought iron is pitted. One section of railing	Investigate impact of corrosion and make repairs.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	NA	
INTAKE STRUCTURE	NA	
OUTLET PIPE	None observed	
OUTLET CHANNEL	NA	
EMERGENCY GATE	None observed	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SLOPES

Gradual to moderately sloped, some wooded areas, open grassed area.

SEDIMENTATION

Appears to be appreciable sedimentation below the reservoir surface in front of the dam.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Clear, unobstructed, training walls, steep valley on left d/s bank and Library on right would confine flow.	
SLOPES	Steep.	
APPROXIMATE NO. OF HOMES AND POPULATION	Up to 8 homes and businesses. Population affected 20 - high hazard. Blairstown business district affected by breach of dam. Flow would divert around railing of Main St. bridge and former mill (now Town Library)	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found
REGIONAL VICINITY MAP	Prepared for this report.
CONSTRUCTION HISTORY	Memoirs of Blair indicate the dam was built between 1902-03. Upstream side was sealed with 1,500 cubic yards of clay and earth along the spillway and the left embankment in 1960.
TYPICAL SECTIONS OF DAM	None found
HYDROLOGIC/HYDRAULIC DATA	None found
OUTLETS - PLAN	
- DETAILS	
- CONSTRAINTS	None found
- DISCHARGE RATINGS	
RAINFALL/RESERVOIR RECORDS	None found

ITEM	REMARKS
DESIGN REPORTS	None found
GEOLOGY REPORTS	None found
DESIGN COMPUTATIONS	
HYDROLOGY & HYDRAULICS	
DAM STABILITY	None found
SEEPAGE STUDIES	
1-8	
MATERIALS INVESTIGATIONS	
BORING RECORDS	
LABORATORY	None found
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	None found
BORROW SOURCES	Unknown

ITEM:	REMARKS
MONITORING SYSTEMS	None found
MODIFICATIONS	<u>Memoirs of Blair</u> see "CONSTRUCTION HISTORY"
HIGH POOL RECORDS	None found
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None found
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None found
MAINTENANCE OPERATION RECORDS	None found

ITEMS	REMARKS
SPILLWAY PLAN	
SECTIONS	None found
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None found

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 10.85 square miles, moderate slope,
wooded.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 355' NGVD (24 acre-
feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) Not applicable

ELEVATION MAXIMUM TEST FLOOD POOL: 370' NGVD

ELEVATION TOP DAM: 359.0' NGVD

SPILLWAY CREST: Uncontrolled masonry

a. Elevation 355' NGVD

b. Type Broad crested

c. Width 4 feet

d. Length 41 feet

e. Location Spillover Right center of dam

f. Number and Type of Gates None

OUTLET WORKS: None

HYDROMETEOROLOGICAL GAGES: None

MAXIMUM NON-DAMAGING DISCHARGE: 984 cfs

APPENDIX 2

PHOTOGRAPHS

BLAIR LAKE DAM



April 22, 1961

View looking at right upstream dam and spillway abutment; upsloping berm is left bank of old mill race. Note erosion and growth of large trees with roots exposed adjacent to dam.



February 18, 1961

View looking in downstream direction along axis of old mill race; roof of old mill building (now a public library) is just above arched bridge.



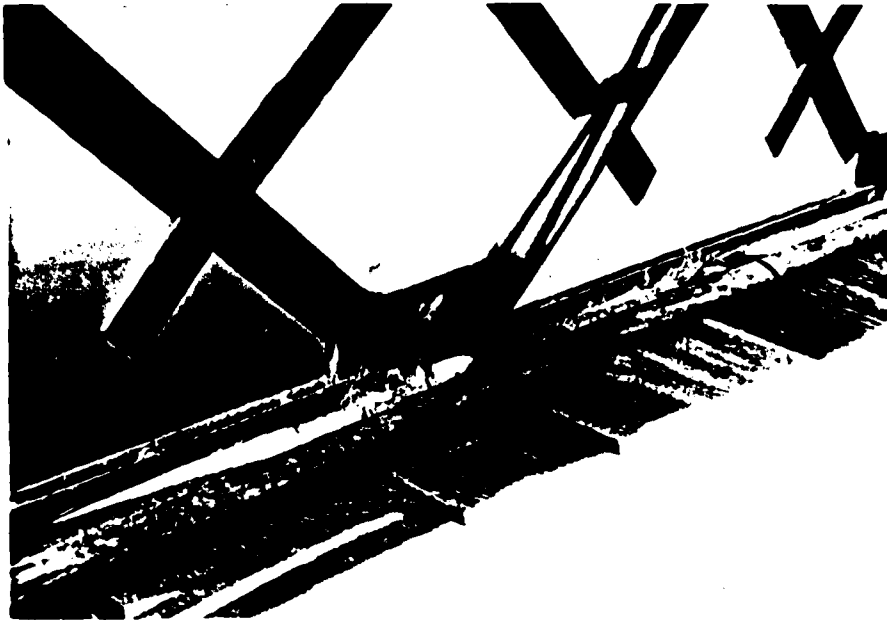
April 22, 1981

View of downstream left spillway abutment contact; note trees up to 14-inch diameter on slope, erosion, debris, and portions of lined downstream channel wall missing.



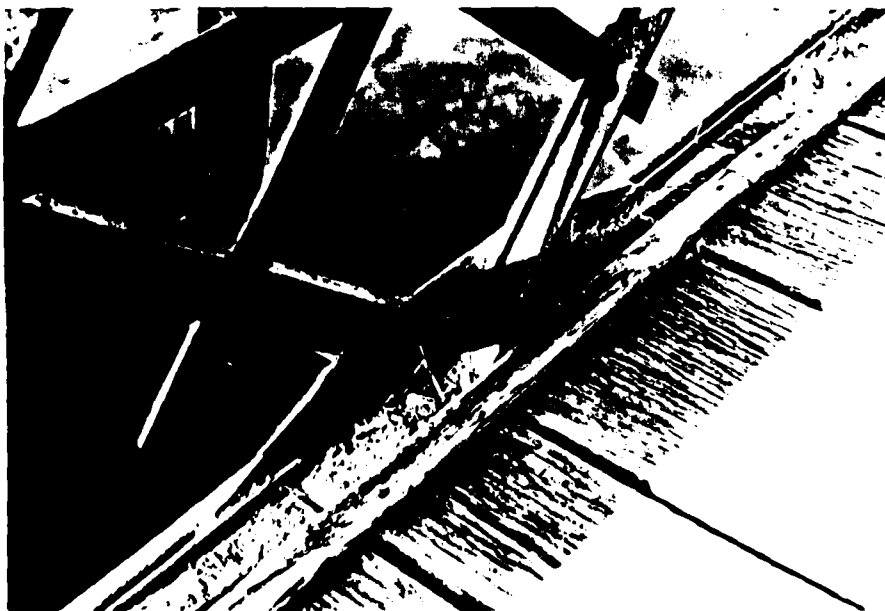
April 22, 1981

View of exposed bedrock contact at right spillway abutment.



April 22, 1981

Gusset plates rusted through on bridge over spillway.



April 22, 1981

Rust eaten gussets on upstream truss; note that rust is eating into truss angle bars.



April 24

View of erosion to right downstream channel wall near spillway; rule could be extended 2 feet into opening.



April 27, 1961

Erosion typical of many locations along lined downstream channel at top of bank.



February 18, 1981

View of intake at head of old mill race at mill building
on Main Street 200 feet downstream of dam.



April 22, 1981

View looking upstream across reservoir at inlet from Blair
Creek; note that flow must turn nearly a right angle to
pass over spillway.



April 22, 1981

View looking at downstream channel from right bank at dam;
note Main Street Bridge.

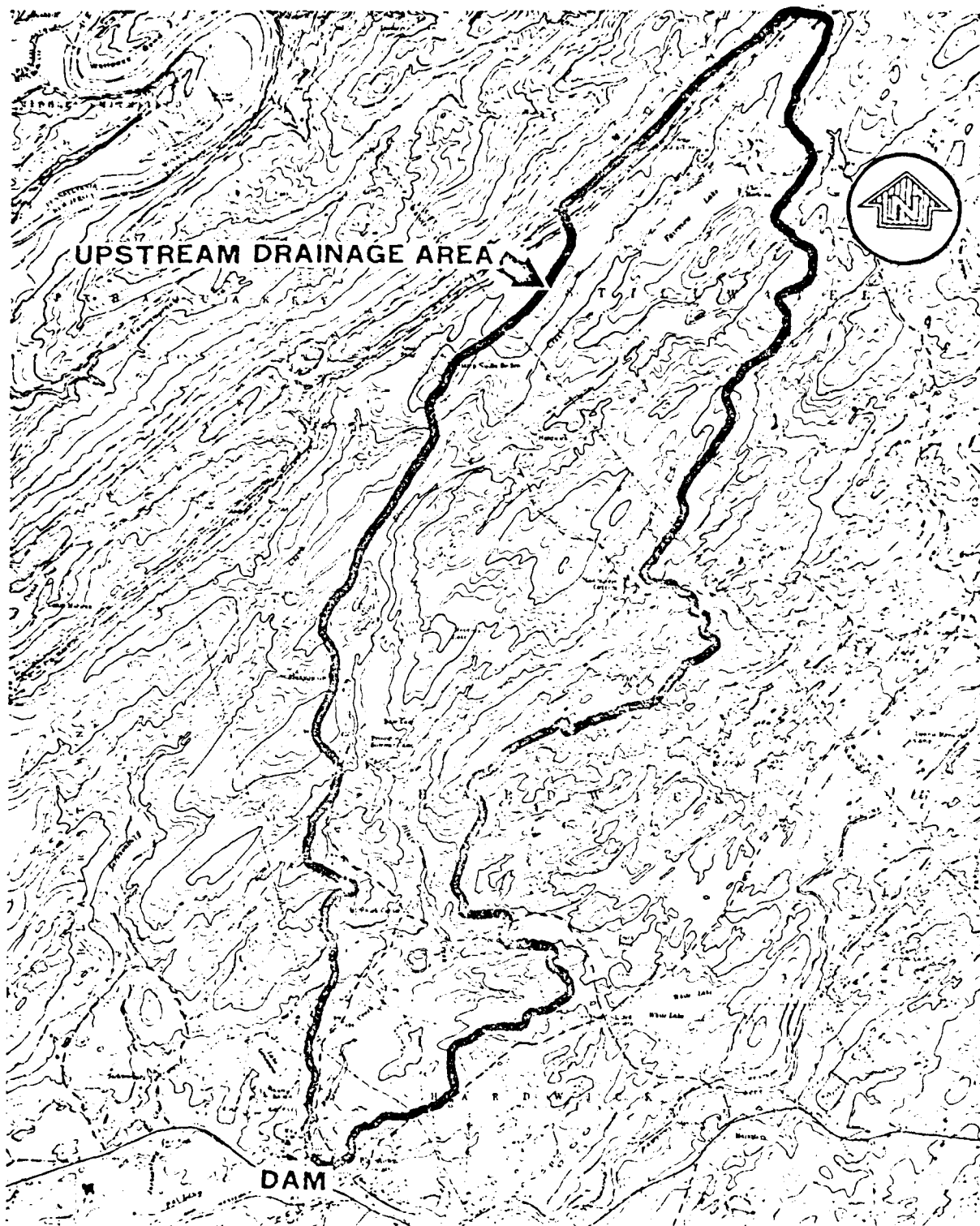


April 22, 1981

View looking downstream from downstream side of Main Street
Bridge.

APPENDIX 3
HYDROLOGIC COMPUTATIONS

BLAIR LAKE DAM



**NATIONAL PROGRAM OF INSPECTION OF
NON-FED. DAMS**

**BLAIR LAKE DAM
BLAIRSTOWN TOWNSHIP, NEW JERSEY**

REGIONAL VICINITY MAP

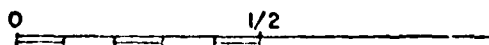
JUNE 1981

**DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA**

Anderson-Nichols & Company, Inc.

BOSTON, MA

SCALE IN MILES



**MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE
SHEETS. BLAIRSTOWN, N.J. 1954, REVISED 1971,
AND FLATBROCKVILLE, N.J., PA. 1954, REVISED 1971.**

JOB NO.

SQUARES
1/4 IN. SCALE

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

INFLOW HYDROGRAPH

The inflow hydrograph for Blair Lake will be routed outflow from Bass Lake + Local inflow downstream of Bass Lake by SCS method.

Bass Lake has already been run using these data:

DA = 5.959 mi.

Lag = 3.3 hr.

precip = 22.2 inches

Use 112%, 123%, 133%, 142% for ratio of 6, 12, 24, and 48-hour storms to 12-hour

Loss data: initial loss = 1.00 inches; loss rate of 0.15 in/hr

200 30-minute time steps

Starting el. = 100.1

Stage	Discharge (cfs)	Storage
100.1	0	0
101.1	63	15.2
102.1	355	32.6 *
103.1	796	49.9 *
104.1	1511	67.3 *
105.1	2422	84.6 *
106.1	3,639	102 *
107.1	5,137	119 *
108.1	6,921	137 *
109.1	8,777	154

* - Linear interpolation

Breaches from Bass Lake to Blair Lake.

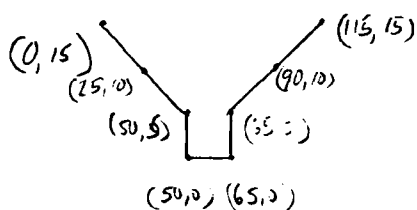
Reach 1 = 1630 feet Slope = $\frac{185}{1630} = 0.11$

JOB NO.

SQUARES
1/4 IN. SCALE

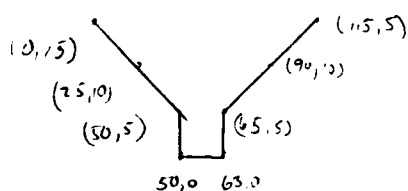
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

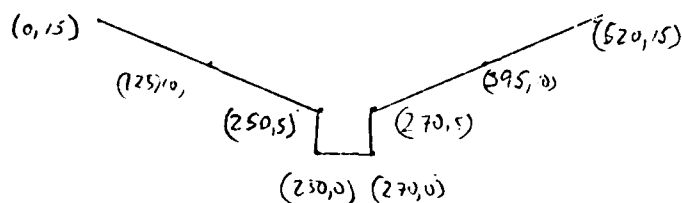
Typical cross section.


 $n = 0.05$ channel
 0.10 overbanks

Reach 2 = 6,000 feet. Slope = $\frac{140}{6,000} = 0.023$

typical cross section:


 $n = 0.05$ channel
 0.10 overbanks

Reach 3 = 10,800 feet, Slope = $\frac{85}{10,800} = 0.008$

 $n = 0.05$ channel
 0.10 overbanks
Local inflow to Blair LakeArea = 5.0 mi²

Use loss and storm characteristics same as Bass Lake.

JOB NO.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALETIME OF CONCENTRATION① Texaco Highway Method

Overland: length = 3,600 feet

Slope = $\frac{400}{3600} = 0.111 = 11.1\%$

for woods, velocity = 3 fps

Time = $\frac{3600}{3} = 1,200 \text{ sec} = 0.33 \text{ hours}$

channel - Through tributary reach + reaches 2 and 3

Trib. reach: length = 8,000 ft, slope = 2.0% $\rightarrow V = 1 \text{ fps} \rightarrow \frac{8,000}{1} \text{ sec} = 8,000 \text{ sec}$ Reach 2 - length = 6,000 ft., slope = 2.3%, $V = 1 \text{ fps}$ $\rightarrow \text{time} = \frac{6,000}{1} \text{ sec} = 1.67 \text{ hr.}$ Reach 3 - length = 10,800 ft, slope = 0.8%, $V = 1 \text{ fps}$ $\rightarrow \text{time} = \frac{10,800}{1} \text{ sec} = 3 \text{ hours}$ Total $T_c = 3 + 1.67 + 2.22 + 0.33 = 7.22 \text{ hrs.}$ ② Soil and Water Conservation

$$L = 0.6 T_c = \frac{L^{0.8} (S+1)^{1.67}}{7000 Y^{0.5}}$$

$$\rightarrow T_c = \frac{L^{0.8} (S+1)^{1.67}}{(0.6)(7000)(Y^{0.5})}$$

$$L = 10,800 + 6,000 + 8,000 + 3,600 = 28,400$$

$$Y = S_{0.01} = \frac{7100 - 355}{28,400} = 0.026 = 2.6\%$$

C.N. = 70 for good to very good woods or soil groups

$$= \frac{100}{70} - 10 = 1.29$$

$$T_c = \frac{28,400^{0.8} (5.26)^{1.67}}{0.6 (7000) (1.29)^{0.5}} = 6.78 \text{ hrs.}$$

JOB NO.

QUARES
1/4 IN. SCALE

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

(3) Weston, or SCS T.R. #55

Overland: slope = 11.1%, $V = 0.85$ fps (from T.R. #55 graph). Length = 3,600 ft
 Time = $\frac{3600}{0.85} = 4235 \text{ sec} = 1.18 \text{ hrs.}$

channel: Tributary reach - $\frac{1}{2}$ ft deep in 10 foot channel. Use Manning's formula, $n = 0.05$, $R = \frac{5}{11} = 0.45$

$$V = \frac{1.49}{0.05} (0.45)^{2/3} (0.02)^{1/2} = 2.5 \text{ fps}$$

$$\text{Time} = \frac{8,000}{2.5} = 3,200 \text{ sec} = 0.89 \text{ hrs.}$$

Reach 2 - 1 ft in 15 foot channel, $n = 0.05$, $R = \frac{15}{16} = 0.94$

$$V = \frac{1.49}{0.05} (0.94)^{2/3} (0.023)^{1/2} = 4.2 \text{ fps}$$

$$\text{Time} = \frac{6,000}{4.2} = 1429 \text{ sec} = 0.40 \text{ hrs}$$

Reach 3 - 1 ft. in a 20 ft. channel, $n = 0.05$, $R = \frac{20}{21} = 0.95$

$$V = \frac{1.49}{0.05} (0.91)^{2/3} (0.008)^{1/2} = 2.5 \text{ fps}$$

$$\text{Time} = \frac{10,800}{2.5} = 4,320 \text{ sec} = 1.20 \text{ hrs.}$$

$$\text{Total time} = 1.2 + 0.4 + 0.89 + 1.18 = 3.67 \text{ hrs.}$$

(1) us by

Overland $T_c = 0.83 \left(\frac{N L}{1.487} \right)^{0.467}$ $N = 0.7$, $L = 3,600$, $S = 0.111$

$$T_c = 0.83 \left(\frac{0.70 \cdot 3600}{1.487} \right)^{0.467} = 53.8 \text{ min} = 0.90 \text{ hrs}$$

channel See Manning's work for SCS T.R. #55 method

$$\text{Total} = 0.90 + 0.89 + 0.02 + 1.2 = 3.39 \text{ hrs.}$$

$$\text{Avg. } T_c = \frac{(4.22 + 6.78 + 3.67 + 3.39)}{4} = 5.27 \text{ hrs. } \log = 0.612 = 3.166$$

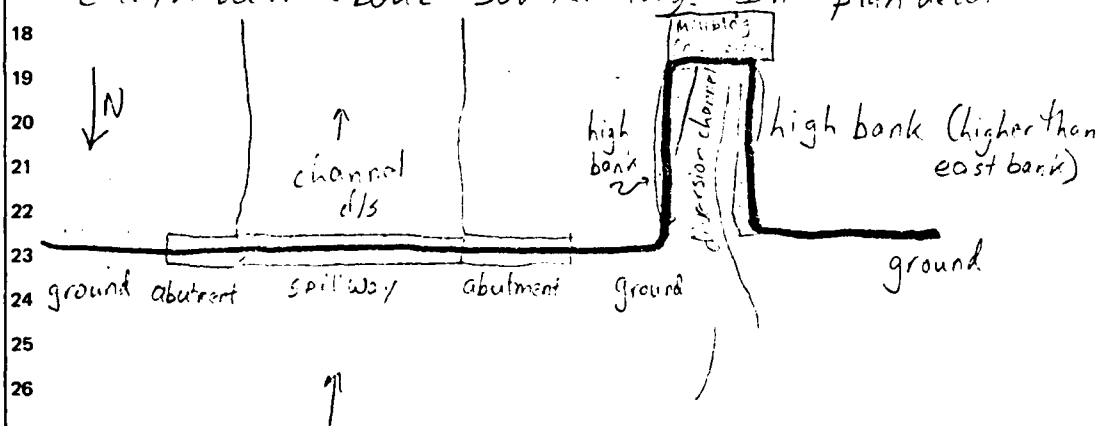
JOB NO.

SQUARES
1/4 IN. SCALE

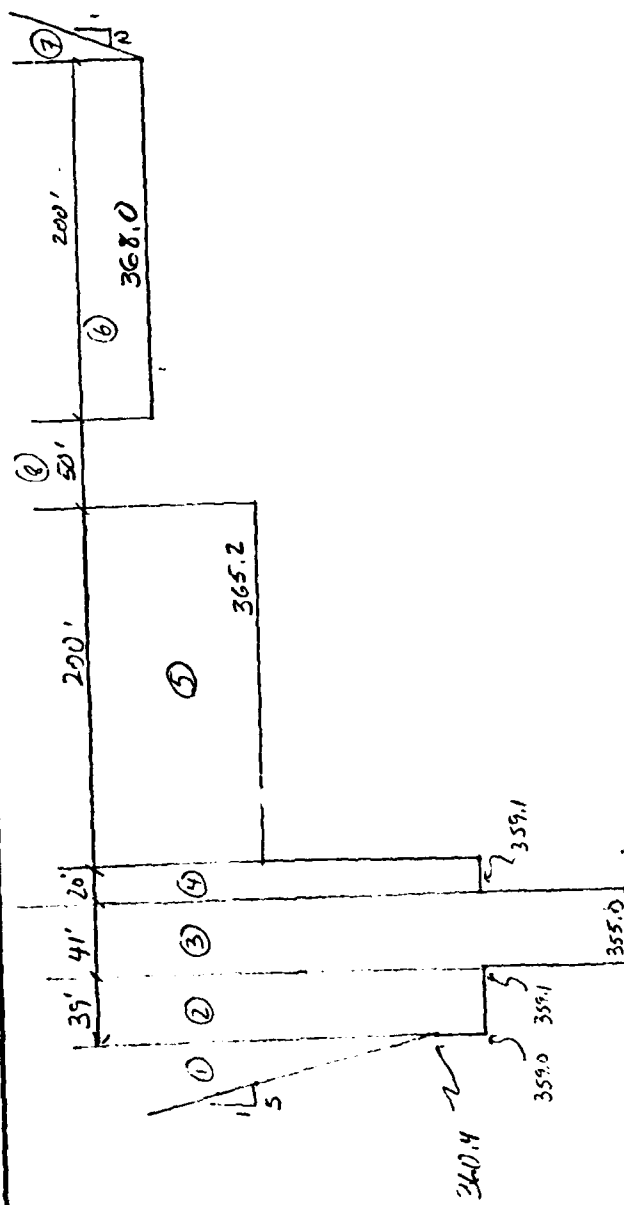
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Stage-Discharge Curve

The hydraulic profile of Blair Dam is shown on page 6. The diversion channel to the right of the spillway is blocked by a closed (and apparently inoperable) gate at the mill building and high channel banks. If the water rises above 365.2, it will begin to flow over the east bank of the diversion channel into Blair Creek downstream of the dam. This serves as an earth weir about 300 feet long. In plan view:



control extends as the black line, which is the line shown as the hydraulic profile



- ① left side slope
- ② top of dam - left abutment
- ③ spillway
- ④ top of dam - right abutment
- ⑤ diversion channel - east bank
- ⑥ diversion channel - west bank
- ⑦ right side slope
- ⑧ mill building

crest length of dam = 100 ft.

ANDERSON - NICHOLS

VERNON	BOSTON	CONCORD
HYDRAULIC PROFILE - BLAIR LAKE DAM		
DATE 6/19/81	SCALE: 1" = 100' H 1" = 5' V	JOB NO. 56,723-019
		SHEET NO. 60513

JOB NO.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALEStage vs. Discharge

See profile on p.6. We will assume the spillway bridge has negligible effect on discharge.

Spillway: section (3) $Q = 3.0 L_3 H_3^{3/2}$
 $= 3.0 (41) (E - 355.0)^{3/2}$

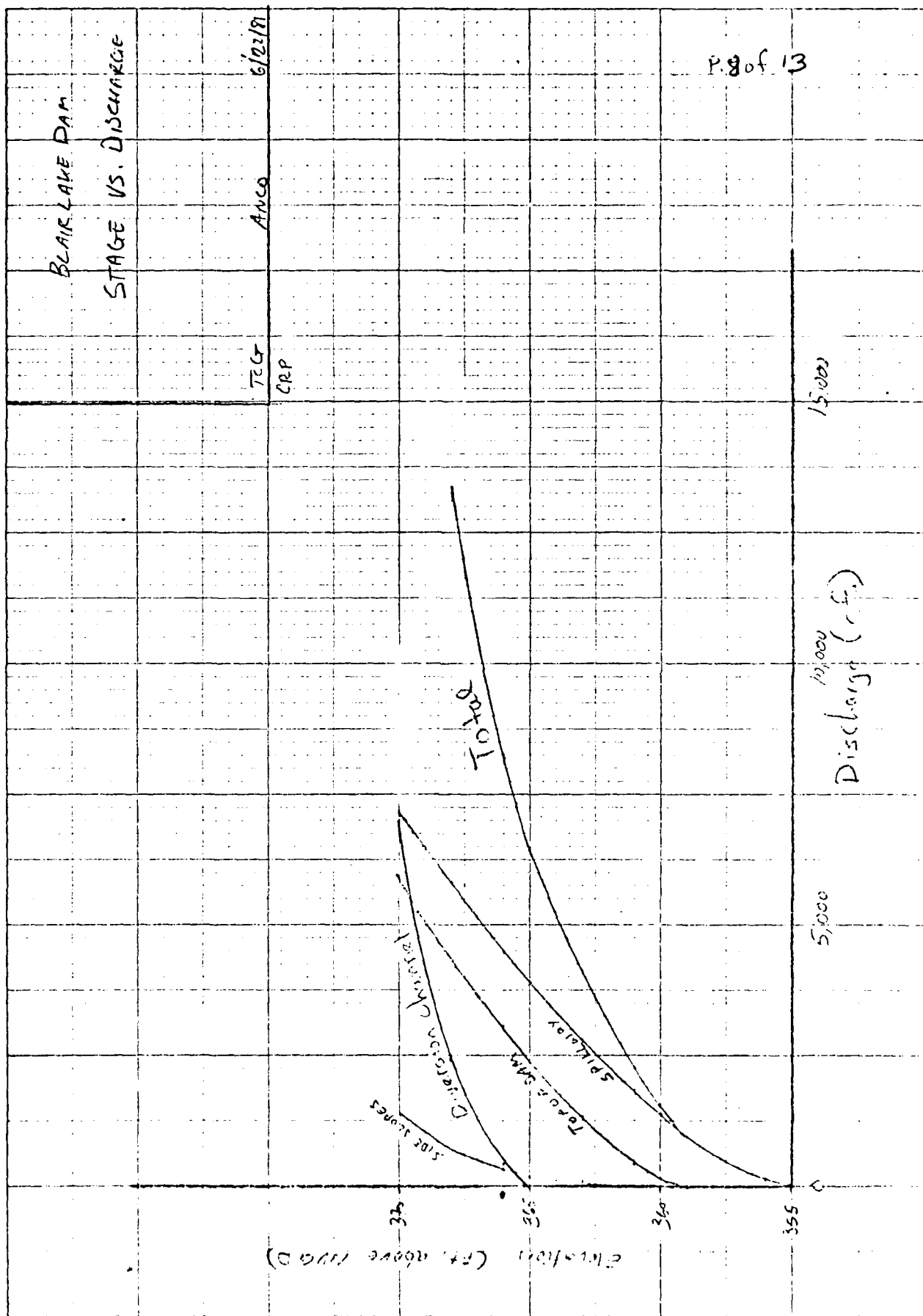
Top of Dam: [sections (2) and (4)] $Q = 2.8 L_2 H_2^{3/2} + 2.8 L_4 H_4^{3/2}$
 $= 2.8 (39) (E - 359.05)^{3/2} + 2.8 (20) (E - 359.1)^{3/2}$

Assume Avg. El. of section (2) = $\frac{359.1 + 359}{2} = 359.05$

Old Diversion Channel: [sections (5) and (6)] $Q = 2.6 L_5 H_5^{3/2} + 2.6 L_6 H_6^{3/2}$
 $= 2.6 (200) (E - 365.2)^{3/2} + 2.6 (200) (E - 365.2)^{3/2}$

Side Slopes: [sections (7) and (8)] $Q = 2.6 L_7 H_7^{3/2} + 2.6 L_8 H_8^{3/2}$
 $= 2.6 (5(E - 360.4))^{3/2} + 2.6 (10(E - 365))^{3/2}$

ELEVATION (ft. above NGVD)	DESCRIPTION	HEAD ABOVE SPILLWAY (ft.)	Q Spillway (CFS)	Q Top of Dam (CFS)	Q Div. Chan. (CFS)	Q Side Slopes (CFS)	Q TOTAL (CFS)
355	spillway crest	0	0	0	0	0	0
356	-	1	123	0	0	0	123
357	-	2	348	0	0	0	348
358	-	3	639	0	0	0	639
359	top of dam	4	984	0	0	0	984
360	-	5	1,375	149	0	0	1,524
361	-	6	1,808	444	0	1	2,253
363	-	8	2,783	1,289	0	50	4,122
365	-	10	3,890	2,387	0	209	6,486
365.2	diversion channel west bank	10.2	4,007	2,509	0	232	6,748
366	-	11	4,487	3,016	372	341	8,216
368	diversion channel east bank	13	5,765	4,411	2,437	732	13,345
370	-	15	7,146	5,972	6,939	1,364	21,421



JOB NO.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALE

Stage vs. Storage

Area at pond surface = 4.3 acres (at 355' msl)

" " elev. 360 = 14.3

" " elev. 380 = 31.6

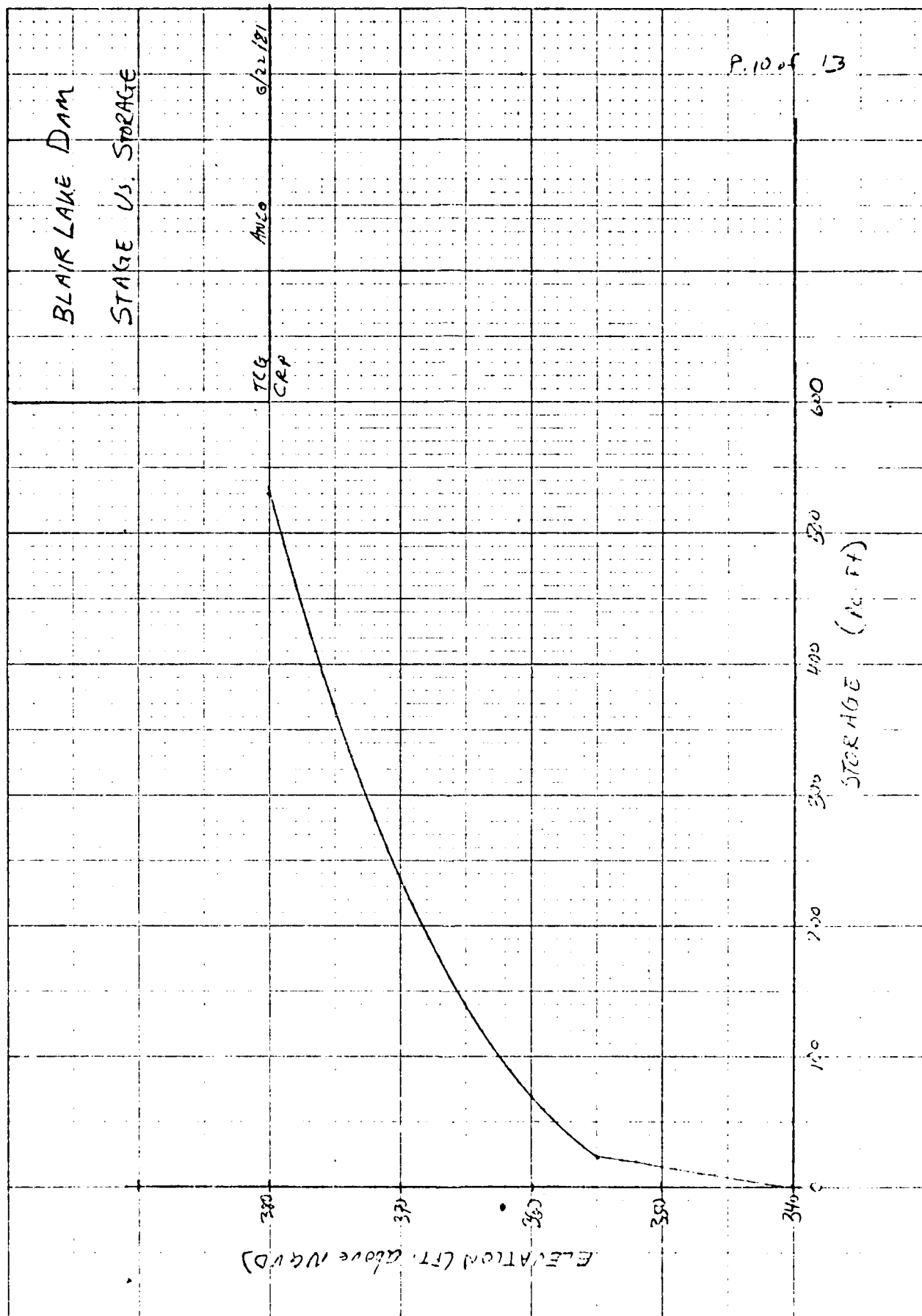
} estimated from
156.5 Q.u.

Storage = 0 at 340.7, bottom of reservoir

Storage = 24 acre-feet at spillway crest

Elevation (ft. above M.S.L.)	Surface Area (Acres)	Average S.A. (Acres)	Incremental Storage (Acre-feet)	Cumulative Storage (Acre-feet)
355	4.3			24
360	14.3	9.3	46.5	70.5
380	31.6	22.95	459	529.5

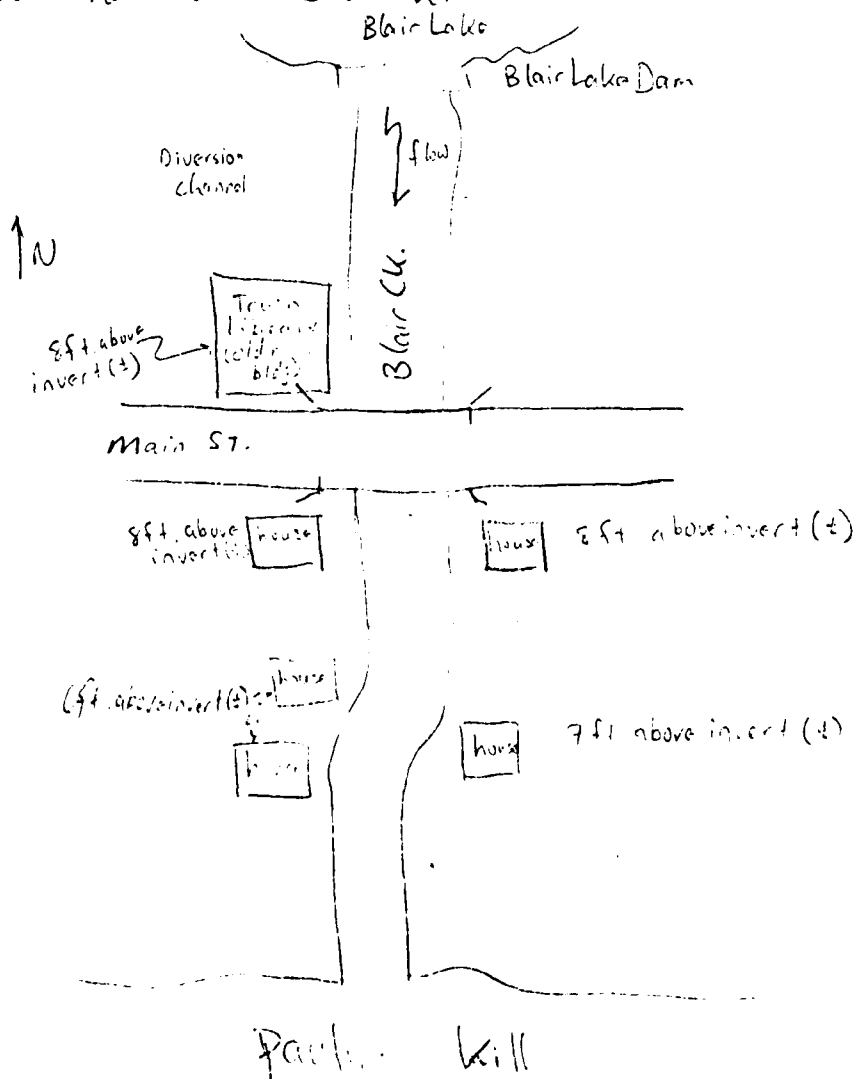
Stage vs. Storage plotted on p. 10



JOB NO.

QUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALEDownstream Analysis

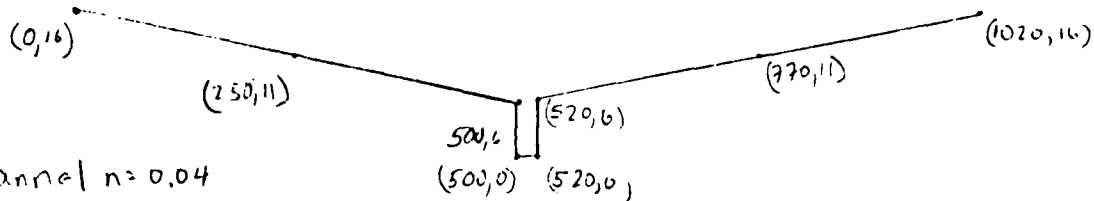
Downstream of Blair Lake Dam, Blair Creek runs 240 feet through Blairstown to the Pauline Kill. The creek is crossed by Main Street bridge about 300 feet below the bridge. There are two houses and the Town Library at the bridge, about 8 feet above the stream invert. Downstream of Main Street, there are 3-4 houses about 6-8 feet above the invert. Sketch:



JOB NO.

QUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALE

The cross section in this reach:

channel $n = 0.04$ overbank $n = 0.10$

slope = 0.011

length = 840'

SERIOUSLY INADEQUATE SPILLWAY

1. Dam is high hazard

2. A stage one foot over the dam crest would probably cause failure of the 39-foot long, lift, earth abutment and for the masonry spillway. Assume a 30 foot width (bottom width) failure gap with 0.35 H:1 V side slopes, and a 1/2 hour time to develop breach.

- Flow before failure at damage section	16.5 ft
- Stage " " " "	7.1 ft
- Peak flow after " " " "	4,357 cfs
- Peak stage " " " "	9.8 ft

Increase of 2.7 feet in 25 minutes would cause a significant increase to the hazard of loss of life.

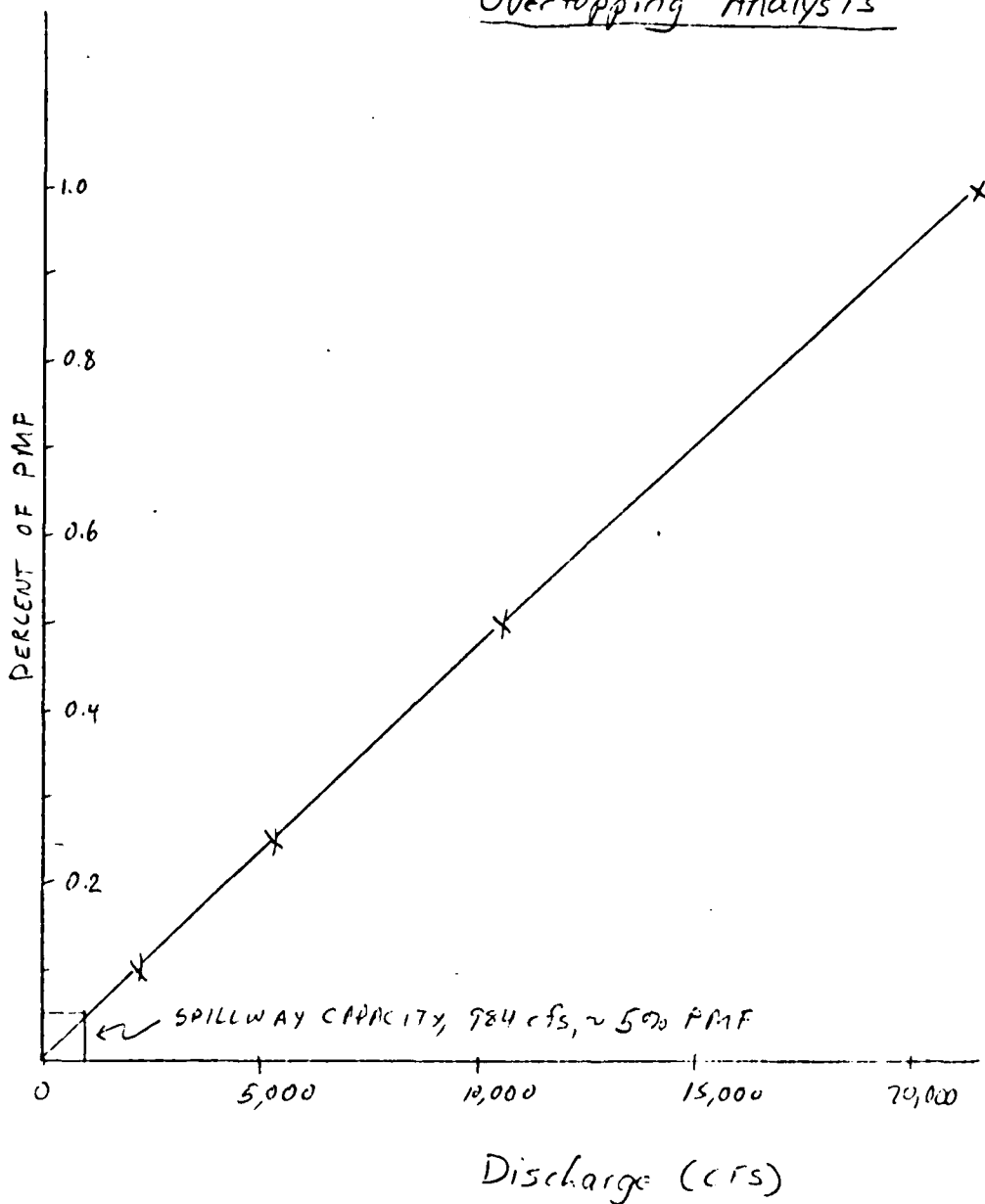
3. 1/2 PMF overtops the dam by 7.6 feet, and would cause failure.

The spillway is seriously inadequate.

JOB NO.

QUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
 /4 IN. SCALE

Overtopping Analysis



APPENDIX 4

HEC-1 OUTPUT

BLAIR LAKE DAM

HFC-1 INPUT

ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

BLAIR LAKE DAM OVERTOPPING ANALYSIS TOM GUICH ANCH
NEW JERSEY DAM NO. 774 - WARREN COUNTY - WATERSTOWN TOWNSHIP
0.1 0.25 0.5 1.0 MULTIPLY BY PMF FROM 24-HOUR PMF

FLUM 1.0 0.5 0.25 0.1

AL BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT
INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

5.90 0 1 NO 112 173 133 142
11.8 0.0
22.2 0.15
3.3

ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM BASS LK REP

ELFV 100.1 49.9 67.3 84.6 102. 119. 137. 154.
15.2 102.1 103.1 105.1 107.1 108.1 109.1
101.1 102.1 103.1 104.1 105.1 106.1 107.1
100.1 101.1 102.1 103.1 104.1 105.1 106.1 107.1 108.1 109.1

ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1

STOR -1 1630. 0.11 65.1 90. 115.
0.1 0.05 49.9 50. 0. 65. 10. 15.
25. 10.

ROUTE HYDROGRAPH THROUGH REACH 2

STOK -1 6000. 0.023 65.1 90. 115.
0.1 0.05 49.9 50. 0. 65. 10. 15.
25. 10.

ROUTE HYDROGRAPH THROUGH REACH 3

STOR -1 10800. 0.008 270.1 395. 520.
0.1 0.05 249.9 250. 0. 270. 10. 15.
125. 10.

DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE

15. 15. NO 112 173 133 142
22.2 0.15
3.16

L

1 1
2 2
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32 32
33 33
34 34
35 35
36 36
37 37
38 38
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41 41
42 42
43 43
44 44
45 45

HFC-1 INPUT

LIR.	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10	COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO BLAIR LAKE
46	47	47
47	48	48
48	49	49
49	50	50
50	51	51
51	52	52
52	53	53
53	54	54
54	55	55
55	56	56

KK	47	48	49	50	51	52	53	54	55	56
HC	2	1	0	0	0	0	0	0	0	0
KS	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
SO	0	0	0	0	0	0	0	0	0	0
SV	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7
SE	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7	340.7
SS	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.
ST	359.	359.	359.	359.	359.	359.	359.	359.	359.	359.
ZZ	59.	59.	59.	59.	59.	59.	59.	59.	59.	59.

ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE

4122.	9748.	13345.	21421.
353.	305.2	368.	370.
109.	142.	193.	235.
363.	365.2	368.	370.

 FLOOD HYDROGRAPH PACKAGE (HIC-1)
 FEBRUARY 1981
 RCH DATE 08/12/81 TIM 15.55.07

 U.S. ARMY CORPS OF ENGINEERS
 THE HYDROLOGIC ENGINEERING CENTER
 609 SECOND STREET
 DAVIS, CALIFORNIA 95616
 (916) 440-3285 LR (RTS) 448-3285

BLAIR LAKE DAM OVERTOPPING ANALYSIS TOM GOOCH ANCO
 NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
 0.1, 0.25, 0.5, 1.0 MULTIPLES OF PMF FROM 24-HOUR PMF

5 IO OUTPUT CONTROL VARIABLES PRINT CONTROL
 IPLOT 3 PLOT CONTROL
 USCAL 0 HYDROGRAPH PLOT SCALE
 YES PRINT DIAGNOSTIC MESSAGES

IT HYDROGRAPH TIME DATA 30 MINUTES IN COMPUTATION INTERVAL
 DATE 1 0000 STARTING DATE
 TIME 0000 STARTING TIME
 NO 200 NUMBER OF HYDROGRAPH ORDINATES
 NDATE 5 0330 ENDING DATE
 NTIME 0330 ENDING TIME
 COMPUTATION INTERVAL 0.50 HOURS
 TOTAL TIME BASE 99.50 HOURS

ENGLISH UNITS
 DRAINAGE AREA DEPTH SQUARE MILES
 PRECIPITATION INCHES
 LENGTH ELEVATION FEET
 FLOW CUBIC FEET PER SECOND
 STORAGE VOLUME ACRES-Feet
 SURFACE AREA ACRES
 TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION 1 NUMBER OF PLANS
 PLAN 1

JR MULTI-RATIO OPTION 0.25 0.10
 RATIOS OF RUNOFF 1.00 0.50

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

 7 AK A1

 BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT

9 IO OUTPUT CONTROL VARIABLES PRINT CONTROL
 IPLOT 3 PLOT CONTROL
 USCAL 0 HYDROGRAPH PLOT SCALE

10 DA SURBASIN CHARACTERISTICS 5.90 SURBASIN AREA
 14.4A
 11 DF BASE FLOW CHARACTERISTICS INITIAL FLOW
 START 11.00 BEGIN RISE FLOW RECESION
 CROSN 0.0 RECESION CONSTANT
 RTOR 1.0000

SURBASIN RUNOFF DATA

INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

PRECIPITATION DATA

12 PM
 PRIORABLE MAXIMUM STORM INDEX PRECIPITATION
 PMS 22.20
 TRSPC 0.80 TRANSPUSITION COEFFICIENT
 TRSDA 5.99 TRANSPUSITION AREA
 TRSHU 4.3 USE SHD DISTRIBUTION

PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME
 0-HR 12-HR 24-HR 48-HR 72-HR 96-HR
 112.0 123.0 133.0 142.0 0.0 0.0

13 LU
 UNIFORM LOSS RATE 1.00 INITIAL LOSS
 STRIL 0.15 UNIFORM LOSS RATE
 KTIMP 0.0 PERCENT IMPERVIOUS AREA

14 UD
 SCS DIMENSIONLESS UNITGRAPH
 LLAG 3.30 LAG

 35 END-OF-PEAK 100 ORDINATES
 662. 783. 802.
 192. 119. 60.
 19. 15. 12.
 1. 7.
 782. 709. 619.
 96. 77. 60.
 10. 8. 7.

PEAK FLOW
 (CFS)
 12000.
 TIME
 (HR)
 43.00

MAXIMUM AVERAGE FLOW
 24-HR 72-HR 99.50-HR
 3211. 1090. 792.
 (INCHES) 20.611 20.696
 (AC-FT) 6486. 6512.

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A1
 FOR PLAN 1. RATIO = 1.00

PEAK FLOW
 (CFS)
 12000.
 TIME
 (HR)
 43.00

MAXIMUM AVERAGE FLOW
 24-HR 72-HR 99.50-HR
 3211. 1090. 792.
 (INCHES) 20.611 20.696
 (AC-FT) 6486. 6512.

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A1
 FOR PLAN 1. RATIO = 0.50

PEAK FLOW
 (CFS)
 6000.
 TIME
 (HR)
 43.00

MAXIMUM AVERAGE FLOW
 24-HR 72-HR 99.50-HR
 1606. 545. 396.
 (INCHES) 10.121 10.348
 (AC-FT) 3185. 3256.

CUMULATIVE AREA = 5.90 SQ MI

***	***	***	***	***
PEAK FLOW (CFS) 3006.	TIME (HR) 43.00	HYDROGRAPH AT STATION FOR PLAN 1. RATIO = 0.25	A1	99.50-HR 198. 5.174 1628.
			MAXIMUM AVERAGE FLOW	
			24-HR	72-HR
			803.	272.
			5.061	5.153
			1592.	1621.
			CUMULATIVE AREA =	5.90 SQ MI

CUMULATIVE AREA = 5.90 50 MI

***	***	***	***
PEAK FLOW (FIS) 11.00.	TIME (HR) 43.00	HYDROGRAPH AT STATION FOR GLEN I. RATIO = 0.10 AI	MAXIMUM AVERAGE FLUM 72-HR. 109. 2.061 649.
			99.50-HR 79. 2.070 651.

	(AC-F)	(AC-HF)
1950	637.	2,024
1953	1,459.	1,453

[illegible]

A2 # ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM DASS LK REP
#

15 AK

```

16 KO      OUTPUT CONTROL VARIABLES
           IPRT      3      PRINT CONTROL
           IPLOT     0      PLOT CONTROL
           ISCAL     0      HYDROGRAPH PLOT SCALE

```

OUTPUT CONTROL VARIABLES	PRINT CONTROL
IPRINT	3
IPLOT	0
GSCAL	0.
	PRINT CONTROL
	PLCT CONTROL
	HYDROGRAPH PL

HYDROGRAPH ROUTING DATA

17 RS	STORAGE EQUATING RS15 1115 RSVC X	1 ELVY 100.10 G.0	1 NUMBER OF SUBREACHES TYPICAL CONDITION INITIAL CONDITION DURING R AND D COEFFICIENT
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50
51	51	51	51
52	52	52	52
53	53	53	53
54	54	54	54
55	55	55	55
56	56	56	56
57	57	57	57
58	58	58	58
59	59	59	59
60	60	60	60
61	61	61	61
62	62	62	62
63	63	63	63
64	64	64	64
65	65	65	65
66	66	66	66
67	67	67	67
68	68	68	68
69	69	69	69
70	70	70	70
71	71	71	71
72	72	72	72
73	73	73	73
74	74	74	74
75	75	75	75
76	76	76	76
77	77	77	77
78	78	78	78
79	79	79	79
80	80	80	80
81	81	81	81
82	82	82	82
83	83	83	83
84	84	84	84
85	85	85	85
86	86	86	86
87	87	87	87
88	88	88	88
89	89	89	89
90	90	90	90
91	91	91	91
92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100

NUMBER OF SUBREACHES
TYPE OF INITIAL CONDITION
INITIAL CONDITION
DURING R AND D COEFFICIENT

18 SV	STORAGE	0.0	15.2	32.6	49.9	67.3	84.6	102.0	119.0	137.0	154.0
19 SE	ELEVATION	100.10	101.10	102.10	103.10	104.10	105.10	106.10	107.10	108.10	109.10
20 SE	DISCHARGE	0.	63.	355.	796.	1511.	2422.	3639.	5137.	6921.	8777.
21 SE	ELEVATION	100.10	101.10	102.10	103.10	104.10	105.10	106.10	107.10	108.10	109.10

	COMPUTED STORAGE-DUTYFLOW CURVE				
	32.60	49.90	67.30	84.60	
STORAGE	0.0	15.20			
DUTYFLOW	0.0	65.00	355.00	706.00	1511.00
				2422.00	3639.00
					5137.00
					6921.00
					8777.00
					102.00
					119.00
					137.00
					156.00

CUTFLPW	0.0	65.00	355.00	796.00	1511.00	2422.00	3639.00	5137.00	6921.00	8777.00
---------	-----	-------	--------	--------	---------	---------	---------	---------	---------	---------

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1511.70 8777.
USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

HYDROGRAPH AT STATION A2
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS) 11582.	TIME (HR) 43.00	6-HR 9224. (INCHES) 14.536 (AC-FT) 4574.	MAXIMUM AVERAGE FLOW 24-HR 3208. 20.219 6362.	72-HR 1090. 20.611 6486.	99.50-HR 792. 20.687 6509.
PEAK STORAGE (AC-FT) 183.	TIME (HR) 43.00	6-HR 158.	MAXIMUM AVERAGE STORAGE 24-HR 78. 30.	72-HR 72-HR 23.	99.50-HR 23.
PEAK STAGE (FEET) 110.83	TIME (HR) 43.00	6-HR 109.33	MAXIMUM AVERAGE STAGE 24-HR 104.70 101.92	72-HR 101.92	99.50-HR 101.47

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A2
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS) 5987.	TIME (HR) 43.00	6-HR 4613. (INCHES) 7.270 (AC-FT) 2267.	MAXIMUM AVERAGE FLOW 24-HR 1602. 10.097 3177.	72-HR 545. 10.311 3258.	99.50-HR 398. 10.323 3258.
PEAK STORAGE (AC-FT) 128.	TIME (HR) 43.00	6-HR 112.	MAXIMUM AVERAGE STORAGE 24-HR 55. 21.	72-HR 21.	99.50-HR 16.
PEAK STAGE (FEET) 107.58	TIME (HR) 43.00	6-HR 106.75	MAXIMUM AVERAGE STAGE 24-HR 103.40 101.38	72-HR 101.38	99.50-HR 101.05

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A2
FOR PLAN 1, RATIO = 0.25

PEAK FLOW (CFS) 2987.	TIME (HR) 43.00	6-HR 2305. (INCHES) 3.532 (AC-FT) 1143.	MAXIMUM AVERAGE FLOW 24-HR 800. 5.042 1556.	72-HR 273. 5.155 1622.	99.50-HR 178. 5.177 1629.
PEAK STORAGE (AC-FT) 93.	TIME (HR) 43.00	6-HR 61.	MAXIMUM AVERAGE STORAGE 24-HR 40. 15.	72-HR 15.	99.50-HR 11.
PEAK STAGE (FEET) 105.56	TIME (HR) 43.00	6-HR 104.91	MAXIMUM AVERAGE STAGE 24-HR 102.49 100.99	72-HR 100.99	99.50-HR 100.76

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A2
FOR PLAN 1. RATIO = 0.10

PEAK FLOW (CFS) 1185.	TIME (HR) 43.50	6-HR 915. (INCHES) 1.442 (AC-FT) 454.	MAXIMUM AVERAGE FLOW 24-HR 319. 72-HR 109. 2.013 633.	99.50-HR 79. 7.071 652.
PEAK STORAGE (AC-FT) 59.	TIME (HR) 43.50	6-HR 52.	MAXIMUM AVERAGE STORAGE 24-HR 25. 72-HR 9.	99.50-HR 7.
PEAK STAGE (FEET) 103.24	TIME (HR) 43.50	6-HR 103.22	MAXIMUM AVERAGE STAGE 24-HR 101.62 72-HR 100.65	99.50-HR 100.50

CUMULATIVE AREA = 5.90 50 MI

*** **

ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1

22 AK *****
* A3 *

23 KO OUTPUT CONTROL VARIABLES PRINT CONTROL
IFPRINT 3 PLOT CONTROL
IFLOT 0 PLOT CONTROL
USCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

24 RS STORAGE ROUTING
MSTDS 1 NUMBER OF SUBREACHES
MSTYP 0 TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
0.0 WORKING R AND D COEFFICIENT

25 RC NORMAL DEPTH CHANNEL ROUTING
ANCH 0.100 LEFT OVERBANK N-VALUE
ANCH 0.050 MAIN CHANNEL N-VALUE
ANCH 0.100 RIGHT OVERBANK N-VALUE
PLNTH 1030. REACH LENGTH
SEL 0.1100 ENERGY SLOPE
ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

27 RX CROSS-SECTION DATA
ELEVATION 15.00 LEFT OVERBANK ---
DISTANCE 0.0 25.00 49.90 50.00 50.00 65.10 65.00 90.00 90.00 10.00 10.00 15.00 115.00
MAIN CHANNEL ---

STORAGE 0.0 0.44 0.09 1.33 2.23 2.68 3.18 3.90 4.65
 6.03 7.45 9.10 10.98 13.10 15.44 20.84 23.89 27.17

OUTFLOW 0.0 23.69 280.42 522.29 802.82 1112.24 1444.16 1846.67 2338.21 2920.77
 3611.68 4426.11 5377.95 6479.98 7744.44 9183.40 10808.17 12628.64 14658.39 16904.67

ELEVATION 0.0 0.79 1.58 2.37 3.16 3.95 4.74 5.53 6.32 7.11
 7.89 8.68 9.47 10.26 11.05 11.84 12.63 13.42 14.21 15.00

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN
 USE SHORTEST TIME INTERVAL OR LONGER REACH LENGTH

HYDROGRAPH AT STATION A3
 FOR PLAN 1: RATIO = 1.00

PEAK FLOW 11.94 CFS
 TIME 43.00
 (CFS) 9228
 (INCHES) 14.542
 (AC-FT) 4576

PEAK STORAGE 20.219
 TIME 43.00
 (AC-FT) 6352

PEAK STAGE 2.02
 TIME 43.00
 (FEET) 11.74

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A3
 FOR PLAN 1: RATIO = 0.50

PEAK FLOW 10.311 CFS
 TIME 43.00
 (CFS) 4615
 (INCHES) 7.272
 (AC-FT) 2288

PEAK STORAGE 10.311
 TIME 43.00
 (AC-FT) 3177

PEAK STAGE 1.39
 TIME 43.00
 (FEET) 8.74

CUMULATIVE AREA = 5.90 SQ MI

CROSS-SECTION DATA

33 KY 32 KX	LEFT OVERBANK		MAIN CHANNEL		RIGHT OVERBANK	
	ELEVATION	DISTANCE	ELEVATION	DISTANCE	ELEVATION	DISTANCE
	15.00	0.0	5.00	0.0	5.00	0.0
	0.0	0.0	50.00	50.00	98.00	115.00
			49.90	65.00	65.10	115.00

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	1.63	3.27	4.91	6.55	8.20	9.85	11.49	14.34	17.85
22.21	27.42	33.49	40.42	48.20	56.85	65.35	76.71	87.92	100.00

OUTFLOW

OUTFLOW	1651.49	2023.90	2459.15	2963.07	3541.20	4199.24	4942.19	5775.09	6702.76	7729.90	8844.42	10069.18	11335.56	12729.90	14211.11	15730.00

ELEVATION

ELEVATION	0.0	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11	7.90	8.69	9.48	10.27	11.06	11.85

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 43. TO 7730.

PEAK STAGE (F-FT) 13.57
 TIME (HR) 43.00
 6-HR 12.18
 MAXIMUM AVERAGE STAGE 72-HR 7.14
 99.50-HR 1.58

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A4
 FOR PLAN 1. RATIO = 0.25

PEAK FLOW (CFS) 2976.
 TIME (HR) 43.50
 (INCHES) 3.623
 (AC-FT) 1142.
 MAXIMUM AVERAGE FLOW 72-HR 273.
 24-HR 806.
 5.041 5.155
 1566. 1622.
 99.50-HR 198.
 5.176 1629.

PEAK STORAGE (AC-FT) 41.
 TIME (HR) 43.50
 6-HR 31.
 MAXIMUM AVERAGE STORAGE 72-HR 4.
 24-HR 12.
 99.50-HR 3.

PEAK STAGE (F-FT) 10.28
 TIME (HR) 43.50
 6-HR 9.10
 MAXIMUM AVERAGE STAGE 72-HR 1.47
 24-HR 4.09
 99.50-HR 1.58

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A4
 FOR PLAN 1. RATIO = 0.10

PEAK FLOW (CFS) 1188.
 TIME (HR) 43.50
 (INCHES) 1.439
 (AC-FT) 453.
 MAXIMUM AVERAGE FLOW 72-HR 109.
 24-HR 319.
 2.013 2.063
 633. 649.
 99.50-HR 79.
 2.071 652.

PEAK STORAGE (AC-FT) 16.
 TIME (HR) 43.50
 6-HR 13.
 MAXIMUM AVERAGE STORAGE 72-HR 2.
 24-HR 5.
 99.50-HR 1.

PEAK STAGE (F-FT) 6.27
 TIME (HR) 43.50
 6-HR 5.68
 MAXIMUM AVERAGE STAGE 72-HR 0.85
 24-HR 2.42
 99.50-HR 0.62

CUMULATIVE AREA = 5.90 SQ MI

*** **

 34 KK 45 *

 ROUTE HYDROGRAPH THROUGH REACH 3

35 KO OUTPUT CONTROL VARIABLES PRINT CONTROL
 INPUT 3 PLUT CONTROL
 IPLOT 0 HYDROGRAPH PLOT SCALE
 OSCAL 0

HYDROGRAPH ROUTING DATA
 STORAGE ROUTING
 STYPE 1
 RSTYP 0
 RSTALC 0
 1 NUMBER OF SUBREACHES
 STOR TYPE OF INITIAL CONDITION
 -1.00 INITIAL CONDITION
 0.0 WORKING R AND D COEFFICIENT

37 KC NORMAL DEPTH CHANNEL ROUTING
 ANL 0.100 LEFT OVERBANK N-VALUE
 ANCH 0.050 MAIN CHANNEL N-VALUE
 ANR 0.100 RIGHT OVERBANK N-VALUE
 RLTH 10000.
 REACH LENGTH
 SLOPE 0.0050
 SEL 0.0
 ELEV. MAX. ELEV. FOR STORAGE/OUTFLTH CALCULATION
 FLMAX 0.0

CROSS-SECTION DATA
 --- LEFT OVERTANK --- MAIN CHANNEL --- RIGHT OVERTANK ---
 ELEVATION 15.00 10.00 5.00 0.0 5.00 270.00 270.10 5.00 10.00 15.00
 DISTANCE 0.0 125.00 249.90 250.00 270.00 270.10 395.00 520.00

 STORAGE 0.0 3.92 7.54 11.77 15.11 23.60 29.27 42.23 62.91
 91.31 127.43 171.28 222.84 282.13 349.14 506.35 598.54 694.46
 OUTFLOW 0.0 34.22 103.77 195.46 303.34 423.78 554.29 712.91 930.29
 1644.62 2188.98 2885.67 3753.43 4809.95 6072.16 7556.25 9277.75 11251.71 1232.43
 ELEVATION 0.0 0.79 1.58 2.37 3.16 4.74 5.53 6.37 7.11
 7.89 8.68 9.47 10.26 11.05 11.84 12.63 13.42 14.21 15.00

HYDROGRAPH AT STATION A5
 FOR PLAN 1. RATIO = 1.00

PEAK FLOW (CFS) 11547. TIME (HR) 44.00
 (INCHES) 9073. MAXIMUM AVERAGE FLOW 99.50-HR 17.05
 (AC-FT) 14294. 6-HR 3707. 24-HR 1090. 72-HR 20.681 6509.

PEAK STORAGE (AC-FT) 612. TIME (HR) 44.00
 6-HR 494. MAXIMUM AVERAGE STORAGE 99.50-HR 44.
 24-HR 176. 72-HR 61.

PEAK STAGE (FT) 14.33. TIME (HR) 44.00
 6-HR 13.25. MAXIMUM AVERAGE STAGE 99.50-HR 2.17
 24-HR 7.50 72-HR 2.91

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A5
 FOR PLAN 1. RATIO = 0.50

PEAK FLOW (CFS) 5751. TIME (HR) 44.00
 (INCHES) 4496. MAXIMUM AVERAGE FLOW 99.50-HR 395.
 (AC-FT) 7085. 6-HR 1601. 24-HR 545. 72-HR 10.350 3257.

PEAK STORAGE (AC-FT) 332. TIME (HR) 44.00
 6-HR 263. MAXIMUM AVERAGE STORAGE 99.50-HR 23.
 24-HR 92. 72-HR 32.

PEAK STAGE (FT) 11.64. TIME (HR) 44.00
 6-HR 10.75. MAXIMUM AVERAGE STAGE 99.50-HR 1.60
 24-HR 5.71 72-HR 2.16

CUMULATIVE AREA = 5.90 SQ MI

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***
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***
HYDROGRAPH AT STATION AS
FOR PLAN 1, RATIO = 0.25
***
***
***
PEAK FLOW
(CFS)
2034.
TIME
(HR)
44.00
(CFS)
(INCHES)
(AC-FT)
99.50-HR
198.
5.175
1629.
MAXIMUM AVERAGE FLOW
24-HR
799.
5.037
1565.
72-HR
273.
5.155
1622.
PEAK STORAGE
(AC-FT)
167.
TIME
(HR)
44.00
MAXIMUM AVERAGE STORAGE
24-HR
45.
16.
72-HR
11.
99.50-HR
11.
PEAK STAGE
(FT)
9.41
TIME
(HR)
44.00
MAXIMUM AVERAGE STAGE
24-HR
4.25
1.56
72-HR
1.15
99.50-HR
1.15
CUMULATIVE AREA = 5.90 SQ MI
***

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***
***
***
HYDROGRAPH AT STATION AS
FOR PLAN 1, RATIO = 0.10
***
***
***
PEAK FLOW
(CFS)
1125.
TIME
(HR)
44.00
(CFS)
(INCHES)
(AC-FT)
99.50-HR
79.
2.071
652.
MAXIMUM AVERAGE FLOW
24-HR
319.
2.010
632.
72-HR
109.
2.062
649.
PEAK STORAGE
(AC-FT)
56.
TIME
(HR)
44.00
MAXIMUM AVERAGE STORAGE
24-HR
16.
6.
72-HR
4.
99.50-HR
4.
PEAK STAGE
(FT)
6.23
TIME
(HR)
44.00
MAXIMUM AVERAGE STAGE
24-HR
2.69
0.96
72-HR
0.70
99.50-HR
0.70
CUMULATIVE AREA = 5.90 SQ MI
***

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DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE

SUBBASIN RUNOFF DATA

```

40 AK
*****
SUBBASIN CHARACTERISTICS
TABLE
5.00 SUBBASIN AREA
41 LA
42 LF
BASE FLOW CHARACTERISTICS
STORY
15.00 INITIAL FLOW
15.00 BEGIN BASE FLOW RECESSION
RTION 1.00000 RECESSION CONSTANT

```

PRECIPITATION DATA

PRIMARY MAXIMUM STORM
 PMS 22.20
 TRSFC 9.00
 TRSUA 5.00
 S-C NO USE SMO DISTRIBUTION

PERCENT OF INDX PRECIPITATION OCCURRING IN GIVEN TIME
 6-HR 12-HR 24-HR 48-HR 72-HR 96-HR
 112.0 123.0 133.0 142.0 0.0 0.0

UNIFORM LOSS RATE 1.00 INITIAL LOSS RATE
 STRIL 0.15 UNIFORM LOSS RATE
 C-SIL 0.0 PERCENT IMPERVIOUS AREA
 K-TMP

SCS DIMENSIONLESS UNIT HYDROGRAPH
 LLAG 3.16 LAG

UNIT HYDROGRAPH
 34 END-OF-PERIOD ORDINATES
 607. 693. 707.
 147. 116. 91.
 13. 10. 8.

671. 598.
 72. 56.
 7. 6.

506.
 44.
 4.

PEAK FLOW (CFS) 10401.
 TIME (HR) 43.00
 (CFS) 130. 265. 450. 99.50-HR
 (INCHES) 296. 7950. 2728. 675.
 (AC-FT) 27. 14.783 20.288 20.851
 2. 3942. 5410. 5526.
 3. 1. 0. 5560.

CUMULATIVE AREA = 5.00 SQ MI

*** *** ***

HYDROGRAPH AT STATION A6
 FOR PLAN 1. RATIO = 1.00

PEAK FLOW (CFS) 10401.
 TIME (HR) 43.00
 (CFS) 130. 265. 450. 99.50-HR
 (INCHES) 296. 7950. 2728. 675.
 (AC-FT) 27. 14.783 20.288 20.851
 2. 3942. 5410. 5526.

CUMULATIVE AREA = 5.00 SQ MI

*** *** ***

HYDROGRAPH AT STATION A6
 FOR PLAN 1. RATIO = 0.50

PEAK FLOW (CFS) 5200.
 TIME (HR) 43.00
 (CFS) 130. 265. 450. 99.50-HR
 (INCHES) 296. 7950. 2728. 675.
 (AC-FT) 27. 14.783 20.288 20.851
 2. 3942. 5410. 5526.

CUMULATIVE AREA = 5.00 SQ MI

*** *** ***

[illegible]

♦♦♦	♦♦♦	♦♦♦	♦♦♦
PEAK FLOW (CFS) 2085.	TIME (HR) 43.50	HYDROGRAPH AT STATION FOR PLAN 1. RATIO = 0.10	A7
		MAXIMUM AVERAGE FLOW	
		6-HR	99.50 HR
		168.4	147
	(CEJ)	58.9	2027
	{INC-EG}	182.3	2077
	{AC-FI}	116.1	1209.
		CUMULATIVE AREA =	10.90 SQ MI

ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE

HYDROGRAPH ROUTING DATA

STORAGE ROUTING	1	NUMBER OF SURREACHES
STIPS	STOK	TYPE OF INITIAL CONDITION
STYP	24.00	INITIAL CONDITION
RSVRIC	U.O	WORKING R AND D COEFFICIENT
RSVRIC X		

52 5V	STORAGE	0.0	24.0	30.0	40.0	60.0	80.0	109.0	142.0	193.0	235.0
53 5C	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00
50 5C	DISCHARGE	0.	0.	123.	348.	984.	2253.	4122.	6746.	13345.	21421.
51 5E	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00

SPILLWAY	CREL	SPILLWAY CREST ELEVATION
SPILLWAY	41.00	SPILLWAY WIDTH
CUSH	3.00	WEIR COEFFICIENT
EXP	1.50	EXPONENT OF HEAD

55 ST	TOP OF DAM	ELEVATION AT TOP OF DAM
TELL	359.00	
DAMID	59.00	
CGCD	0.0	WEIR COEFFICIENT
EXPD	1.50	EXPOSURE OF HEAD

 STORAGE 0.0 24.00 30.00 40.00 60.00 80.00 109.00 142.00 193.00 235.00
 CUMULATIVE STORAGE-OUTFLOW CURVE
 OUTFLOW 0.0 0.0 123.00 348.00 984.00 2253.00 4122.00 6748.00 13345.00 21421.00

HYDROGRAPH AT STATION AB
 FOR PLAN 1, RATIO = 1.00

PEAK CUMULATIVE IS 21554. AT TIME 43.50 HOURS

PEAK FLOW (CFS) 21554. TIME (HR) 43.50
 (INCHES) 167.00
 (AC-FT) 8321.00
 MAXIMUM AVERAGE FLOW 72-HR 2019.00
 24-HR 5928.00
 6-HR 1670.00
 99.50-HR 1467.00
 11759.00
 20.562
 20.756
 17066.00
 MAXIMUM AVERAGE STORAGE 72-HR 54.00
 24-HR 104.00
 6-HR 210.00
 99.50-HR 46.00
 PEAK STAGE (FT) 43.50
 (INCHES) 370.00
 (AC-FT) 370.00
 MAXIMUM AVERAGE STAGE 72-HR 357.73
 24-HR 362.20
 6-HR 368.74
 99.50-HR 357.02
 CUMULATIVE AREA = 10.90 SQ MI

HYDROGRAPH AT STATION AB
 FOR PLAN 1, RATIO = 0.50

PEAK CUMULATIVE IS 10652. AT TIME 43.50 HOURS

PEAK FLOW (CFS) 10652. TIME (HR) 43.50
 (INCHES) 83.13
 (AC-FT) 4122.00
 MAXIMUM AVERAGE FLOW 72-HR 1039.00
 24-HR 2361.00
 6-HR 831.30
 99.50-HR 734.00
 10.101
 10.333
 6007.00
 6036.00
 MAXIMUM AVERAGE STORAGE 72-HR 44.00
 24-HR 80.00
 6-HR 153.00
 99.50-HR 39.00
 PEAK STAGE (FT) 43.50
 (INCHES) 365.73
 (AC-FT) 365.73
 MAXIMUM AVERAGE STAGE 72-HR 356.95
 24-HR 360.29
 6-HR 365.73
 99.50-HR 356.43
 CUMULATIVE AREA = 10.90 SQ MI

HYDROGRAPH AT STATION AB
FOR PLAN 1. RATIO = 0.25

PEAK OUTFLOW IS 5226. AT TIME 43.50 HOURS

PEAK FLOW (CFS) 5126.	TIME (HR) 43.50	MAXIMUM AVERAGE FLOW 24-HR 1477. 72-HR 505. 99.50-HR 307.	99.50-HR 5.191 3019.
(CFS) (INCHES) (AC-FT)	6-HR 4135. 3.528 2051.	24-HR 5.041 2931.	

PEAK STORAGE (AC-FT) 123.	TIME (HR) 43.50	MAXIMUM AVERAGE STORAGE 24-HR 60. 72-HR 37. 99.50-HR 33.	99.50-HR 33.
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PEAK STAGE (FEET) 305.53	TIME (HR) 43.50	MAXIMUM AVERAGE STAGE 24-HR 358.72 72-HR 356.34 99.50-HR 355.98	99.50-HR 355.98
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CUMULATIVE AREA = 10.90 SQ MI

HYDROGRAPH AT STATION AB
FOR PLAN 1. RATIO = 0.10

PEAK OUTFLOW IS 2074. AT TIME 43.50 HOURS

PEAK FLOW (CFS) 2074.	TIME (HR) 43.50	MAXIMUM AVERAGE FLOW 24-HR 569. 72-HR 202. 99.50-HR 147.	99.50-HR 2.077 1207.
(CFS) (INCHES) (AC-FT)	6-HR 1604. 1.419 825.	24-HR 2.010 1169.	

PEAK STORAGE (AC-FT) 77.	TIME (HR) 43.50	MAXIMUM AVERAGE STORAGE 24-HR 43. 72-HR 31. 99.50-HR 29.	99.50-HR 29.
--------------------------------	-----------------------	--	-----------------

PEAK STAGE (FEET) 300.72	TIME (HR) 43.50	MAXIMUM AVERAGE STAGE 24-HR 357.22 72-HR 355.78 99.50-HR 355.57	99.50-HR 355.57
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CUMULATIVE AREA = 10.90 SQ MI

PEAK FLOW AND STAGE (END-OF-BEYOND) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CURVIC PER SECOND, AREA IN SQUARE HILLS
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS			
				RATIO 1 1.00	RATIO 2 0.50	RATIO 3 0.25	RATIO 4 0.10
HYDROGRAPH AT	A1	5.90	1	12000. 43.00	6000. 43.00	3000. 43.00	1200. 43.00
				11982. 43.00	5987. 43.00	2987. 43.00	1185. 43.50
ROUTED TO	A2	5.90	1	** PEAK STAGES IN FEET **			
				110.83 43.00	107.58 43.00	105.55 43.00	103.64 43.50
ROUTED TO	A3	5.90	1	11980. 43.00	5989. 43.00	2984. 43.00	1186. 43.50
				** PEAK STAGES IN FEET **			
				13.14 43.00	9.91 43.00	7.18 43.00	4.12 43.50
ROUTED TO	A4	5.90	1	11910. 43.00	5952. 43.00	2976. 43.50	1188. 43.50
				** PEAK STAGES IN FEET **			
				18.21 43.00	13.57 43.00	10.28 43.50	6.67 43.50
ROUTED TO	A5	5.90	1	11597. 44.00	5751. 44.00	2834. 44.00	1125. 44.00
				** PEAK STAGES IN FEET **			
				14.33 44.00	11.64 44.00	9.41 44.00	6.83 44.00
HYDROGRAPH AT	A6	5.00	1	10401. 43.00	5200. 43.00	2600. 43.00	1040. 43.00
				21537. 43.50	10659. 43.50	5246. 43.50	2085. 43.50
2 COMBINED AT	A7	10.90	1	21554. 43.50	10652. 43.50	5226. 43.50	2074. 43.50
				** PEAK STAGES IN FEET **			
				370.03 43.50	366.86 43.50	361.93 43.50	360.72 43.50
ROUTED TO	A8	10.90	1				

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 48

PLAN 1

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TOP OF DAM MAX HOURS	TIME OF FAILURE HOURS
1.00	370.03	11.03	236.	21564.	15.50	43.50	0.0
0.50	356.85	7.86	175.	10662.	12.50	43.50	0.0
0.25	343.93	4.93	123.	5218.	10.00	43.50	0.0
0.10	340.72	1.72	77.	2074.	6.00	43.50	0.0

*** NORMAL END OF JOB ***

 * U.S. ARMY CORPS OF ENGINEERS
 * THE HYDROLOGIC ENGINEERING CENTER
 * 600 SECOND STREET
 * DAVIS, CALIFORNIA 95616
 * (916) 440-3285 CR (FIS) 448-3285
 * *****

BLAIR LAKE DAM NO. 774 - HARPEN COUNTY - TOM GLOCH AND
 NEW JERSEY DAM NO. 774 - HARPEN COUNTY - ELAIRSTOWN TOWNSHIP

OUTPUT CONTROL VARIABLES
 PRINT CONTROL
 PRINT CONTROL
 HYDROGRAPH PLOT SCALE
 PRINT DIAGNOSTIC MESSAGES

HYDROGRAPH TIME DATA
 MINUTES IN COMPUTATION INTERVAL
 STARTING TIME
 ENDING TIME
 COMPUTATION INTERVAL 0.02 HOURS
 TOTAL TIME BASE 0.98 HOURS

ENGLISH UNIT CHARACTERISTICS
 AREA SQUARE MILES
 DEPTH FEET
 LENGTH FEET
 VOLUME CUBIC FEET
 TEMPERATURE DEGREES FAHRENHEIT

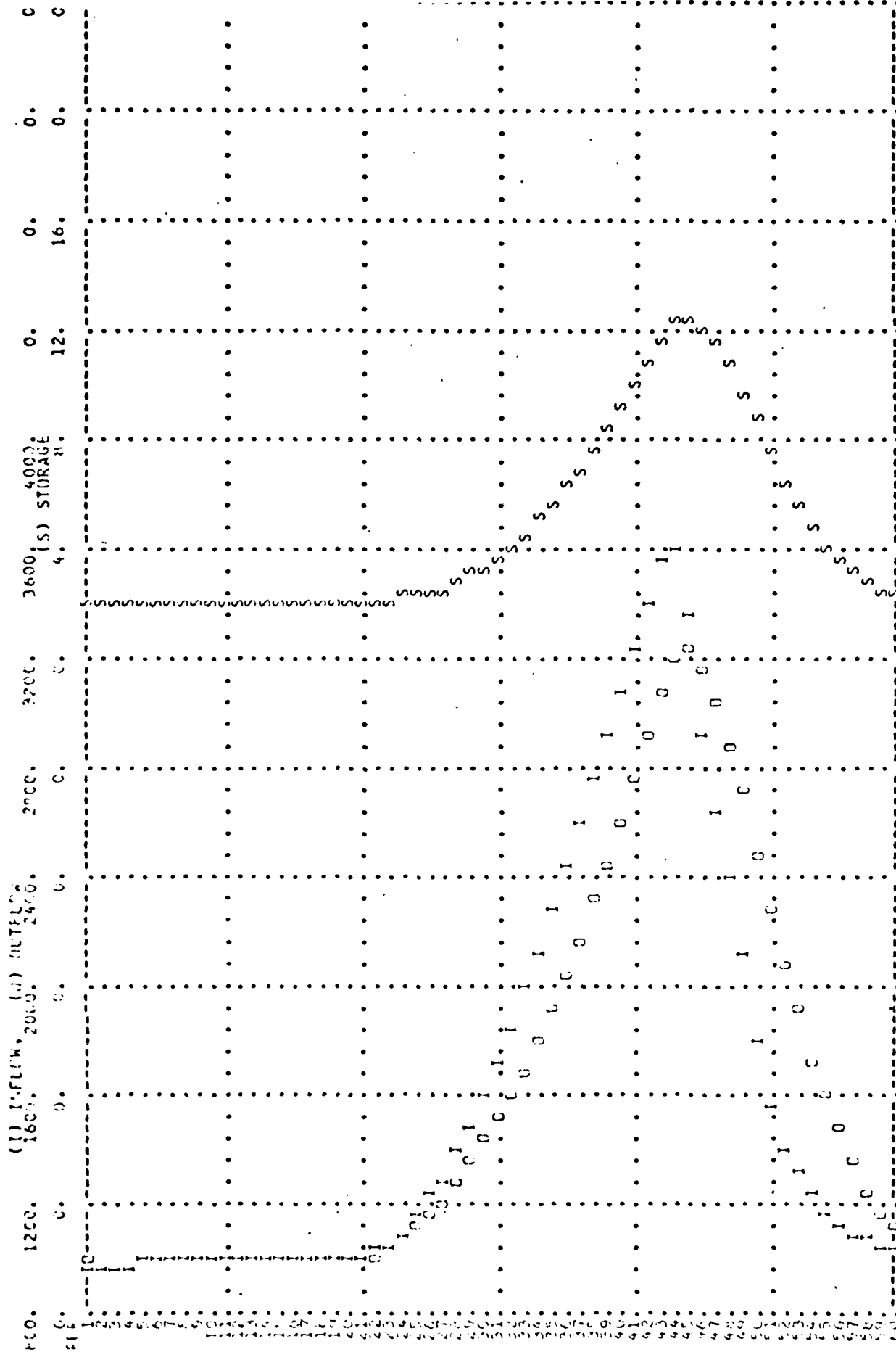
INPUT INFLUX HYDROGRAPH

SUBBASIN RUNOFF DATA
 SUBBASIN CHARACTERISTICS
 AREA 0.0 SUBBASIN AREA

HYDROGRAPH AT STATION A1

STAGE	STORAGE	OUTFLOW	ORD	HRNN	DA MON	STAGE	STORAGE	OUTFLOW	ORD	HRNN	DA MON	STAGE	STORAGE	OUTFLOW	ORD	HRNN	DA MON
5	1	97	1	0	1	5	1	97	1	0	1	5	1	97	1	0	1
4	2	14	2	1	2	4	2	14	2	1	2	4	2	14	2	1	2
3	3	40	3	2	3	3	3	40	3	2	3	3	3	40	3	2	3
2	4	70	4	3	4	2	4	70	4	3	4	2	4	70	4	3	4
1	5	120	5	4	5	3	5	120	5	4	5	3	5	120	5	4	5
0	6	160	6	5	6	4	6	160	6	5	6	4	6	160	6	5	6
0	7	200	7	6	7	5	7	200	7	6	7	5	7	200	7	6	7
0	8	240	8	7	8	6	8	240	8	7	8	6	8	240	8	7	8
0	9	280	9	8	9	7	9	280	9	8	9	7	9	280	9	8	9
0	10	320	10	9	10	8	10	320	10	9	10	8	10	320	10	9	10
0	11	360	11	10	11	9	11	360	11	10	11	9	11	360	11	10	11
0	12	400	12	11	12	10	12	400	12	11	12	10	12	400	12	11	12
0	13	440	13	12	13	11	13	440	13	12	13	11	13	440	13	12	13
0	14	480	14	13	14	12	14	480	14	13	14	12	14	480	14	13	14
0	15	520	15	14	15	13	15	520	15	14	15	13	15	520	15	14	15
0	16	560	16	15	16	14	16	560	16	15	16	14	16	560	16	15	16
0	17	600	17	16	17	15	17	600	17	16	17	15	17	600	17	16	17
0	18	640	18	17	18	16	18	640	18	17	18	16	18	640	18	17	18
0	19	680	19	18	19	17	19	680	19	18	19	17	19	680	19	18	19
0	20	720	20	19	20	18	20	720	20	19	20	18	20	720	20	19	20
0	21	760	21	20	21	19	21	760	21	20	21	19	21	760	21	20	21
0	22	800	22	21	22	20	22	800	22	21	22	20	22	800	22	21	22
0	23	840	23	22	23	21	23	840	23	22	23	21	23	840	23	22	23
0	24	880	24	23	24	22	24	880	24	23	24	22	24	880	24	23	24
0	25	920	25	24	25	23	25	920	25	24	25	23	25	920	25	24	25
0	26	960	26	25	26	24	26	960	26	25	26	24	26	960	26	25	26
0	27	1000	27	26	27	25	27	1000	27	26	27</						

STATION AS



SURGE SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 2-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	990.	0.07	989.	989.	989.	0.0		
ROUTED TO	A2	3632.	0.72	1626.	1626.	1626.	0.0	359.00	0.30
ROUTED TO	A3	3237.	0.73	1623.	1623.	1623.	0.0	9.03	0.73

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1

RATIO OF PIF	1.00	MAXIMUM RESERVOIR W.S. FLEV	359.00	MAXIMUM DEPTH OVER DAM	0.00	MAXIMUM STORAGE AC-FT	60.	MAXIMUM OUTFLOW CFE	3632.	DURATION OVER TOP HOURS	0.03	TIME OF MAX OUTFLOW HOURS	0.72	TIME OF FAILURE HOURS	0.28
		ELEVATION STORAGE OUTFLOW	359.99 60. 980.	INITIAL VALUE	359.99 60. 980.	SPILLWAY CRFST	359.00 24. 5719.	TOP OF DAM	359.00 60. 9371.						

*** NORMAL END OF JOB ***

10.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

47 67 17 COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO SLAIR LAKE

24 ROUTE INFLOW HYDROGRAPH THROUGH SLAIR LAKE

48	24	34	348	989	2253	4122	6749	13345	21421
49	25	35	357	359	361	363	365.2	365	365
50	26	36	36	40	40	109	142	193	235
51	27	37	357	359	361	363	365.2	368	370
52	28	38	36	36	36	36	36	36	36

FLOOD HYDROGRAPH DATA (HFC-1)

10' DATE 06/29/91 TIME 17.02.00

BASS LAKE DAM
NEW JERSEY DAM NO. 774 - WARREN COUNTY - FLAIRSTOWN TOWNSHIP
0.1, 0.25, 0.5, 1.0 MULTIPLES OF PWF FROM 24-HOUR PWF

5 10 OUTPUT CONTROL VARIABLES
PRINT CONTROL
PLOT CONTROL
HYDROGRAPH PLOT SCALE
YES PRINT DIAGNOSTIC MESSAGES

11 HYDROGRAPH TIME DATA
MINUTES IN COMPUTATION INTERVAL
STARTING TIME
ENDING TIME
HYDROGRAPH ORDINATES

COMPUTATION INTERVAL 0.50 HOURS
TOTAL TIME 99.50 HOURS

ENGLISH UNITS
DRAINAGE AREA SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH ELEVATION FEET
STORAGE VOLUME CUBIC FEET PER SECOND
SURFACE AREA ACRES
TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PERIOD OPTION 1 NUMBER OF PLANS

JK MULTI-PERIOD OPTION
RATIOS OF RUNOFF
1.00

7 7K BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT

INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

9 9C OUTPUT CONTROL VARIABLES
PRINT CONTROL
PLOT CONTROL
SCALE 0.0 HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

10 1A SUBBASIN CHARACTERISTICS
AREA 10.40 - SUBBASIN AREA

U.S. ARMY CORPS OF ENGINEERS
THE HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 440-3285 LC (FIS) 448-3285

11 04 BASE FLOW CORRECTED INITIAL FLOW
 11.000 - REGION EAST FLOW RECESSIO
 11.0000 RECESSIO CONSTANT

PRECIPITATION DATA
 12 PM PROPORTION MAXIMUM STATION
 11.20 INDEX PRECIPITATION
 11.20 REAR POSITION COEFFICIENT
 11.20 REAR POSITION AREA
 11.20 USE SMO DISTRIBUTION

PERCENTAGE OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME
 112.0 123.0 133.0 142.0 0.0
 112.0 123.0 133.0 142.0 0.0

13 LU UNIFORM LOSS RATE
 1.00 INITIAL LOSS
 0.16 UNIFORM LOSS RATE
 0.0 PERCENT IMPERVIOUS AREA

14 00 SCS DIMENSIONLESS UNITOGRAPH
 5.90 LAC

 UNIT HYDROGRAPH
 35 END-OF-PERIOD ORDINATES
 47: 136: 278: 474: 762: 709: 619:
 48: 177: 354: 528: 792: 77: 60:
 49: 36: 72: 108: 162: 10: 67:
 50: 1: 1: 1: 1: 1: 1:

 HYDROGRAPH AT STATION = 0.0 A1
 FOR PLAN 1, RATIO = 1.00
 MAXIMUM AVERAGE FLOW
 59.50-HR 72-HR
 1000 1000
 20.611 20.611
 6486 6486
 CUMULATIVE AREA = 5.90 SQ MI

 HYDROGRAPH AT STATION = 1.00 A1
 FOR PLAN 1, RATIO = 1.00
 MAXIMUM AVERAGE FLOW
 59.50-HR 72-HR
 1000 1000
 20.611 20.611
 6486 6486
 CUMULATIVE AREA = 5.90 SQ MI

 HYDROGRAPH AT STATION = 1.00 A1
 FOR PLAN 1, RATIO = 1.00
 MAXIMUM AVERAGE FLOW
 59.50-HR 72-HR
 1000 1000
 20.611 20.611
 6486 6486
 CUMULATIVE AREA = 5.90 SQ MI

 HYDROGRAPH AT STATION = 1.00 A1
 FOR PLAN 1, RATIO = 1.00
 MAXIMUM AVERAGE FLOW
 59.50-HR 72-HR
 1000 1000
 20.611 20.611
 6486 6486
 CUMULATIVE AREA = 5.90 SQ MI

[illegible]

AD-A103 939

NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/6 13/13
NATIONAL DAM SAFETY PROGRAM, BLAIR LAKE DAM (NJ00774), DELAWARE--ETC(U)
AUG 81 W A GUINAN

DACW61-79-C-0011

UNCLASSIFIED

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10-81

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ROUTE OUTFLOW HYDROGRAPH FROM MASS LAKE THROUGH REACH 1

OUTPUT CONTROL VARIABLES POINT CONTROL
 SCALE 1
 HYDROGRAPH PLOT SCALE

HYDROGRAPH PLOTTING DATA

STORAGE PLOTTING
 TYPE 1
 STOP TYPE OF SURPEACHES
 -1.00 INITIAL CONDITION
 0.00 WEEPING AND D COEFFICIENT

NORMAL DEPTH CHANNEL ROUTING
 ANCH 0.100 LEFT OVERBANK N-VALUE
 ANCH 0.100 MAIN CHANNEL N-VALUE
 ANCH 0.100 RIGHT OVERBANK N-VALUE
 FLTH 1000 REACH LENGTH
 SLO 0.1100 ENERGY SLOPE
 FLTH 1000 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

--- LEFT OVERBANK --- + --- MAIN CHANNEL --- + --- RIGHT OVERBANK ---
 ELEVATION 15.00 25.00 49.90 50.00 65.10 90.00 10.00 15.00
 DISTANCE 0.0 25.00 49.90 50.00 65.10 90.00 10.00 15.00

STORAGE	0.0	0.44	0.89	1.33	1.77	2.23	2.63	3.12	3.90	4.95
OUTFLOW	0.0	42.69	380.42	522.22	802.82	1113.24	1444.19	1846.67	2338.21	2920.77
ELEVATION	0.0	42.69	5377.95	6479.52	7744.44	9183.24	10808.19	12629.64	14658.39	16904.27
	0.0	0.79	0.79	1.54	3.16	5.95	9.74	13.42	16.32	19.11
	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

WARNING *** USE SPLIT PULS ROUTING WILL BE UNRELIABLY UNSTABLE FOR OUTFLOWS BETWEEN 0.10 16905.

HYDROGRAPH AT STATION 1.00

TIME 43.00
 (FEET) 11.00
 (INCHES) 14.562
 (AC-FT) 4576

TIME 43.00
 (FEET) 11.00
 (INCHES) 14.562
 (AC-FT) 4576

TIME 43.00
 (FEET) 11.00
 (INCHES) 14.562
 (AC-FT) 4576

CUMULATIVE AREA = 5.90 SQ MI

41	STORAGE (C-F)	TIME (HR)	MAXIMUM AVERAGE STORAGE 24-HR	99.50-HR
	(12)	44.00	176.	44.
42	STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 24-HR	99.50-HR
	(14.33)	44.00	7.50	2.17

CUMULATIVE AREA = 5.90 SQ MI

40 RK --- 46 --- DEVELOPMENTAL-INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE

SUPBASIN RUNOFF DATA

41	FA	SUPBASIN CHARACTERISTICS	2.00	SUPBASIN AREA
		AREA		
42	EF	BASE FLOW CHARACTERISTICS		
		INITIAL FLOW	1.00	
		10.00		
		10.00		
		1.00000		
		RECESSION CONSTANT		

PRECIPITATION DATA

43	PM	PRECIPITATION		
		MAXIMUM SIGN	22.20	
		INDEX PRECIPITATION		
		COEFFICIENT	0.20	
		TRANSPPOSITION AREA	5.00	
		TRANSPPOSITION		
		USE 500 DISTRIBUTION		
		PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME		
		6-HR	12.0	133.0
		12-HR	12.0	142.0
		24-HR	12.0	142.0
		48-HR	12.0	142.0
		72-HR	12.0	142.0
		96-HR	12.0	142.0
		120-HR	12.0	142.0

44	LU	UNIFORM LOSS RATE	1.00	INITIAL LOSS RATE
		LOSS RATE	0.15	PERCENT IMPERVIOUS AREA
45	UD	SCS DIMENSIONLESS UNITGRAPH	3.16	LAG

UNIT HYDROGRAPH

34	END-OF-PERIOD COORDINATES		
	607	693	707
	147	116	91
	13	116	8
	450	177	0
	265	232	1
	130	27	3
	44	386	506
	386	506	44
	506	44	4

HYDROGRAPH AT STATION 27 SUM OF 2 HYDROGRAPHS PLAN 1, CALIB = 1.00

CA	PLN	HR:MIN	ORD	FLOW	DA	MON	HIGH	UKD	FLOW	DA	MON	HIGH	ORD	FLOW
1	1	00:00	1	15	0	0	0	101	2442	4	0	0	151	27
1	1	00:00	2	15	0	0	0	103	1996	4	0	0	152	27
1	1	00:00	3	15	0	0	0	105	1624	4	0	0	153	27
1	1	00:00	4	15	0	0	0	106	1321	4	0	0	154	27
1	1	00:00	5	15	0	0	0	107	1063	4	0	0	155	27
1	1	00:00	6	15	0	0	0	108	819	4	0	0	156	27
1	1	00:00	7	15	0	0	0	109	610	4	0	0	157	27
1	1	00:00	8	15	0	0	0	110	442	4	0	0	158	27
1	1	00:00	9	15	0	0	0	111	341	4	0	0	159	27
1	1	00:00	10	15	0	0	0	112	279	4	0	0	160	27
1	1	00:00	11	15	0	0	0	113	227	4	0	0	161	27
1	1	00:00	12	15	0	0	0	114	183	4	0	0	162	27
1	1	00:00	13	15	0	0	0	115	145	4	0	0	163	27
1	1	00:00	14	15	0	0	0	116	119	4	0	0	164	27
1	1	00:00	15	15	0	0	0	117	85	4	0	0	165	27
1	1	00:00	16	15	0	0	0	118	75	4	0	0	166	27
1	1	00:00	17	15	0	0	0	119	68	4	0	0	167	27
1	1	00:00	18	15	0	0	0	120	58	4	0	0	168	27
1	1	00:00	19	15	0	0	0	121	50	4	0	0	169	27
1	1	00:00	20	15	0	0	0	122	46	4	0	0	170	27
1	1	00:00	21	15	0	0	0	123	42	4	0	0	171	27
1	1	00:00	22	15	0	0	0	124	40	4	0	0	172	27
1	1	00:00	23	15	0	0	0	125	38	4	0	0	173	27
1	1	00:00	24	15	0	0	0	126	36	4	0	0	174	27
1	1	00:00	25	15	0	0	0	127	35	4	0	0	175	27
1	1	00:00	26	15	0	0	0	128	34	4	0	0	176	27
1	1	00:00	27	15	0	0	0	129	33	4	0	0	177	27
1	1	00:00	28	15	0	0	0	130	32	4	0	0	178	27
1	1	00:00	29	15	0	0	0	131	31	4	0	0	179	27
1	1	00:00	30	15	0	0	0	132	30	4	0	0	180	27
1	1	00:00	31	15	0	0	0	133	29	4	0	0	181	27
1	1	00:00	32	15	0	0	0	134	28	4	0	0	182	27
1	1	00:00	33	15	0	0	0	135	28	4	0	0	183	27
1	1	00:00	34	15	0	0	0	136	28	4	0	0	184	27
1	1	00:00	35	15	0	0	0	137	28	4	0	0	185	27
1	1	00:00	36	15	0	0	0	138	28	4	0	0	186	27
1	1	00:00	37	15	0	0	0	139	28	4	0	0	187	27
1	1	00:00	38	15	0	0	0	140	28	4	0	0	188	27
1	1	00:00	39	15	0	0	0	141	28	4	0	0	189	27
1	1	00:00	40	15	0	0	0	142	28	4	0	0	190	27
1	1	00:00	41	15	0	0	0	143	28	4	0	0	191	27
1	1	00:00	42	15	0	0	0	144	28	4	0	0	192	27
1	1	00:00	43	15	0	0	0	145	28	4	0	0	193	27
1	1	00:00	44	15	0	0	0	146	28	4	0	0	194	27
1	1	00:00	45	15	0	0	0	147	28	4	0	0	195	27
1	1	00:00	46	15	0	0	0	148	28	4	0	0	196	27
1	1	00:00	47	15	0	0	0	149	28	4	0	0	197	27
1	1	00:00	48	15	0	0	0	150	28	4	0	0	198	27
1	1	00:00	49	15	0	0	0	151	28	4	0	0	199	27
1	1	00:00	50	15	0	0	0	152	28	4	0	0	200	27

PEAK FLOW (CFS) 2157
 TIME (HRS) 43.50
 MAXIMUM AVERAGE FLOW 72-HR 1463
 24-HR 2019
 6-HR 5430
 (CFS) 1463
 (CFS) 2019
 (CFS) 5430
 (CFS) 11761
 CUMULATIVE AREA 10.90 SQ MI

99.50-HR 1463
 20.759 12068
 12068

[illegible]

ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE

HYDROGRAPHIC SURVEY DATA

5411100-300 0015

1. NUMBER OF SUBREACHES
TYPE OF INITIAL CONDITION
24.00 INITIAL CURVATURE
24.00 BENDING AND-D COEFFICIENT

	0.0	24.0	30.0	40.0	60.0	80.0	109.0	142.0	193.0	225.0
52 SV	STAGE									
53 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	366.00	370.00
54 SC	DISCHARGE	0	0	123	344	984	2253	4122	6746	21421
51 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	366.00	370.00

SPILLWAY	FL	355.00	SPILLWAY CREST ELEVATION
COEFF	1.00	355.00	SPILLWAY WIDTH
COEFF	1.00	355.00	WEIR COEFFICIENT
EXP	1.00	355.00	EXPONENT OF HEAD

55-57	TOP OF DAM	350.00	ELEVATION AT TOP OF DAM
	TOP OF	350.00	
	BASE OF	350.00	
	COEFFICIENT	0.0	
	EXPANSION OF HEAD	1.00	

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COMPUTED STORAGE-OUTFLOW CURVE										
STORAGE	0.0	24.00	30.00	40.00	60.00	100.00	142.00	193.00	235.00	
OUTFLOW	0.0	0.0	123.00	348.00	984.00	2253.00	4122.00	6748.00	13345.00	21421.00

HYDROGRAPH AT STATION = 1.00
PLAN 1, 1.00

DA	MON	HRM	CRD	STAGE	STORAGE	CUTFLOW	DA	MON	HRM	CRD	STAGE	STORAGE	CUTFLOW	STAGE
1	0000	1	0	355.0	27.0	0	3	0000	1	0	355.0	25.0	35.0	
1	0000	1	0	355.1	24.4	0	3	0000	1	0	357.0	30.6	31.0	
1	0000	1	0	355.1	23.4	0	3	0000	1	0	357.0	44.2	31.0	
1	0000	1	0	355.1	23.7	0	3	0000	1	0	357.0	44.6	31.0	
1	0000	1	0	355.1	23.0	0	3	0000	1	0	358.3	52.7	31.0	
1	0000	1	0	355.1	23.0	0	3	0000	1	0	358.6	52.7	31.0	
1	0000	1	0	355.1	23.0	0	3	0000	1	0	358.6	50.0	31.0	

AN OUTFLOW IS 21:54. AT TIME 43.50 HOURS

IN FLOW
(CFS)
2115.1

TIME
(HR)
43.50

MAXIMUM AVERAGE FLOW
24-HR
1477.0
72-HR
2019.0
90.50-HR
1477.0
2019.0
12000.0

IN STORAGE
(AC-FT)
232.0

TIME
(HR)
43.50

MAXIMUM AVERAGE STORAGE
24-HR
106.0
72-HR
64.0
90.50-HR
66.0

OUT FLOW
(CFS)
170.03

TIME
(HR)
43.50

MAXIMUM AVERAGE STAGE
24-HR
362.20
72-HR
357.73
90.50-HR
357.02

CUMULATIVE AREA = 10.90 SQ MI

PEAK FLOW AND STAGE (SUMMER PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE FEET
 TIME TO PEAK IN HOURS

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO	1
HYDROGRAPH AT	A1	5.90	1	12000	43.00
ROUTED TO	A2	5.90	1	11242	43.50
			** PEAK STAGES IN FEET **		
			1	110.83	43.00
ROUTED TO	A3	5.90	1	11000	43.00
			** PEAK STAGES IN FEET **		
			1	10.16	43.00
ROUTED TO	A4	5.90	1	11010	43.00
			** PEAK STAGES IN FEET **		
			1	10.21	43.00
ROUTED TO	A5	5.90	1	11507	44.00
			** PEAK STAGES IN FEET **		
			1	14.33	44.00
HYDROGRAPH AT	A6	5.00	1	10401	43.00
2 COMBINED AT	A7	10.90	1	21537	43.50
ROUTED TO	A8	10.90	1	21554	43.50
			** PEAK STAGES IN FEET **		
			1	370.23	43.50

SUMMARY OF DAM INTERFERING/WEIR ANALYSIS FOR STATION AS

PLAN 1

RATIO OF PHE	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
1.00	370.03	11.03	236.	21554.	15.50	43.50	0.0

ELEVATION
STATION
OUTFLOW

INITIAL VALUE
365.00
24.
0.

SPILLWAY CRIST
255.00
24.
0.

TOP OF DAM
359.00
60.
964.

→ NORMAL END OF JUC ***

APPENDIX 5

REFERENCES

BLAIR LAKE DAM

APPENDIX 5
REFERENCES

BLAIR LAKE DAM

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