AD-A103 756 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. ROCK ISLAND LAKE DAM (NJ 00819) WA--ETC(U)
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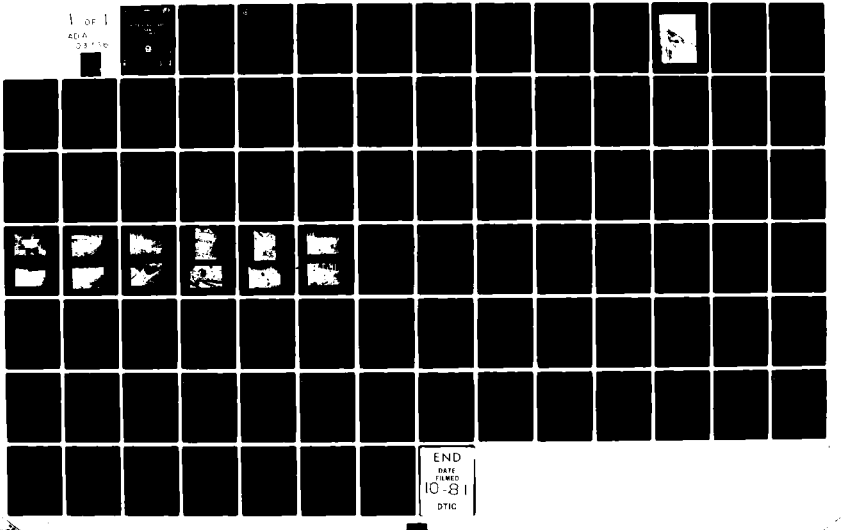

LEVEL II

WALLKILL RIVER BASIN
ROCK ISLAND LAKE, SUSSEX COUNTY
NEW JERSEY

ROCK ISLAND LAKE DAM NJ 00819

PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

AUGUST 1981

REPT. NO: DAEN/NAP-53842/NJ00819-81/08

xb

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DAEN/NAP/53842/NJ00819-81/08	2. GOVT ACCESSION NO.: AD-A103 756
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Phase I Inspection Report National Dam Safety Program Rock Island Dam, NJ00819 Sussex County, N.J.	5. TYPE OF REPORT & PERIOD COVERED: FINAL
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Guinan, Warren, P.E.	8. CONTRACT OR GRANT NUMBER(s): DACW61-79-C-0011
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Anderson-Nichols 150 Causeway St. Boston, Massachusetts	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: NJ Department of Environmental Protection Division of Water Resources P.O. Box CN029 Trenton, NJ 08625	12. REPORT DATE: August, 1981
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16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

National Dam Safety Program. Rock Island Lake Dam (NJ 00819) Wallkill River Basin, Rock Island Lake, Sussex County, New Jersey. Phase I Inspection Report.

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program	Seepage
Embankments	Rocks Island Dam, N.J.	
Visual Inspection	Spillways	
Structural Analysis	Ersoions	

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. → page

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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 1931

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Rock Island Lake Dam in Sussex 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, Rock Island Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 25 percent of the Spillway Design Flood (SDF) would cause the dam to be overtopped. 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:

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

(1) Evaluate the leakage into the spillway discharge pipe and design and oversee corrective measures as required.

(2) Design and oversee the procedure for the removal of brush, debris and trees from the downstream slope and for a distance of 25 feet from the downstream toe of the dam or to the property line whichever is the lesser distance.

(3) Design and oversee repairs for the eroded areas on the upstream slope of the dam and specify erosion protection for the upstream slope.

(4) Investigate the cause of the seepage and wet, soft areas at and downstream of the downstream toe of the dam and design remedial measures as required.

c. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) Begin a program of periodically checking the condition of the dam and monitoring the seepage and wet areas along and downstream of the downstream toe of the dam.

(2) Point the stone masonry headwall containing the spillway discharge pipes.

(3) Establish permanent cover along the crest after filling ruts with suitable material.

(4) Clear inlet box of debris.

d. Within one year from the date of approval of this report the owner should clear trees and brush on either side of the discharge channel for a distance of 100 feet from the toe of the dam or the property line whichever is the lesser.

e. The owner of the dam 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.

f. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months 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.

NAPEN-N

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

1 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 CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

ROCK ISLAND LAKE DAM (NJ00819)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 23 April 1981 by Anderson-Nichols and 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.

Rock Island Lake Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 25 percent of the Spillway Design Flood (SDF) would cause the dam to be overtopped. 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:

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

(1) Evaluate the leakage into the spillway discharge pipe and design and oversee corrective measures as required.

(2) Design and oversee the procedure for the removal of brush, debris and trees from the downstream slope and for a distance of 25 feet from the downstream toe of the dam or to the property line whichever is the lesser distance.

(3) Design and oversee repairs for the eroded areas on the upstream slope of the dam and specify erosion protection for the upstream slope.

(4) Investigate the cause of the seepage and wet, soft areas at and downstream of the downstream toe of the dam and design remedial measures as required.

c. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) Begin a program of periodically checking the condition of the dam and monitoring the seepage and wet areas along and downstream of the downstream toe of the dam.

(2) Point the stone masonry headwall containing the spillway discharge pipes.

(3) Establish permanent cover along the crest after filling ruts with suitable material.

(4) Clear inlet box of debris.

d. Within one year from the date of approval of this report the owner should clear trees and brush on either side of the discharge channel for a distance of 100 feet from the toe of the dam or the property line whichever is the lesser.

e. The owner of the dam 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.

f. An emergency action plan should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Roger Baldwin

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:	Rock Island Lake
Identification No.:	Fed ID No. NJ00819
State Located:	New Jersey
County Located:	Sussex
Stream:	Wallkill River Tributary
River Basin:	Wallkill
Date of Inspection	April 23, 1981

ASSESSMENT OF GENERAL CONDITIONS

Rock Island Lake Dam is probably at least 50 years old and is in poor condition. It is a small dam, 500 feet long, 19.1 feet in height, and was initially rated as high hazard but downgraded to a significant hazard classification as a result of this inspection. Sixty percent of the downstream area at the toe is wet and seepage, noted by orange colored flocs, shows that water is passing though and under the dam. The three 12-inch concrete spillway pipe system is connected to a 20-inch RCP with a 24-inch RCP outlet that discharges beyond the toe of the dam. An 8-inch blowoff pipe also discharges through the 24-inch RCP. The downstream slope is covered with debris and dump materials. Brush and large trees are growing on the downstream face and at the toe. Erosion gullies have developed on the upstream slope and erosion has left patches of rip rap on the upstream slope. A small discharge of whitish foul-smelling effluent is coming from the 24-inch RCP spillway outlet. The spillway is capable of passing 24 percent of the Spillway Design Flood inflow hydrograph, which is one-half the Probable Maximum Flood, without overtopping. Therefore, the spillway is considered inadequate.

The owner should engage a professional engineer qualified in the design and construction of dams to accomplish the following in the near future: Investigate the adequacy of the spillway capacity and design and oversee remedial measures as needed; evaluate the leakage into the spillway discharge pipe; design and oversee the procedure for the removal of brush, debris, and trees from the downstream slope for a distance of 25 feet from the downstream toe of the dam or to the property line, whichever is less; design and oversee repairs for the eroded areas on the upstream slope of the dam and specify erosion protection for the upstream slope; and investigate the seepage and wet, soft areas at and downstream of the downstream toe of the dam and design remedial measures as required.

It is further recommended that the owner accomplish the following tasks as part of operation and maintenance procedures. Starting soon: Begin a program of periodically checking the condition of the dam and monitoring the seepage and wet areas along and downstream of the downstream toe of the dam; point stone masonry headwall containing the spillway discharge pipes; establish permanent cover along the crest after filling ruts with suitable material; clear inlet box of debris; and develop an emergency plan which outlines actions to be taken by the owner to minimize 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, and clear trees and brush on either side of the discharge channel for a distance of 100 feet from the toe of the dam or to the property line whichever is the lesser.

ANDERSON-NICHOLS & COMPANY, INC.

Warren A. Guinan

Warren A. Guinan, P.E.
Project Manager
New Jersey 16848

February 17, 1981

OVERVIEW PHOTO

ROCK ISLAND LAKE DAM

CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY REPORT

ROCK ISLAND LAKE DAM FED ID NO. NJ00819

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.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
ROCK ISLAND LAKE POND DAM
FED ID NO. #NJ00819

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Rock Island 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 Rock Island Lake Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this study are 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. Rock Island Lake Dam is a 500 foot long earth embankment dam with a hydraulic height of 18.1 feet and a structural height of 19.1 feet. The spillway is a concrete weir leading to three 12-inch concrete pipes, located at the left center of the dam, and connecting to a 20-inch RCP with a 24-inch reinforced concrete pipe outlet that discharges downstream of the toe of the dam. An 8-inch blow-off pipe also discharges through the 24-inch RCP. The dam's crest width ranges from 30 to 100 feet. The crest of the dam is bare and rutted because it serves as an access road to homes on the right (north) side of the lake. The dam's upstream face has a 3H:1V slope with small erosion gullies at and above the water line. The downstream embankment has a 2H:1V slope and is covered with extensive debris, including large boulders, brush, tree stumps, and trash. The downstream toe is wet and soft, with a high concentration of orange colored flocs.

b. Location. The dam is located on a tributary to the Wallkill River in Sparta Township, Sussex County, New Jersey. The dam is at 41° 02.5' north latitude and 74° 35.2' west longitude on the Franklin, N.J. Quandrangle. The dam may be reached by exiting from Interstate 80 on Route 15 north to Sparta, exiting right on Route 517 north at the center of Sparta, turning right immediately on Route 620 (Glen Road). Rock Island Dam is a left turn approximately 0.5 mile after Glen Road branches left from Milton Road. A location map has been included as Figure 3.

c. Size Classification. Rock Island Lake Dam is classified as being small in size on the basis of storage at the dam crest of 61 acre-feet, which is less than 1000 acre-feet but more than 50 acre-feet, and on the basis of its structural height of 19.1 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Visual inspection of the downstream area shows that the failure of Rock Island Dam would cause the surface of the small pond about 200 feet downstream to rise about 5-1/2 feet. Two houses and a shed or garage are located downstream of the small pond. The porch, and presumably the first floor, elevation of the lower of the two houses, about 4 occupants, is about 5 feet above the present pond surface. Although damage to the lower house may be appreciable, few, if any, lives would be lost. Therefore, the dam is considered significant hazard.

e. Ownership. The dam is co-owned by Mr. Carl Aherns and Mr. Franz Montane. Information may be obtained by writing Mr. Aherns at Galen Road, Sparta, New Jersey.

f. Purpose. Mr. Aherns said that the dam was built to provide road access and to create a lake.

g. Design and Construction History. No information regarding the original plan or design of the dam was available.

h. Normal Operational Procedure. No operational procedures were disclosed 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 Geology of Franklin and part of Hamburg Quadrangles, New Jersey (Buddington and Baker, 1961) and Glacial Drift Map of New Jersey (Salisbury, Kummel, Peet and Whitson, 1902) indicates soils within the immediate site consist of glacial till over bedrock.

Bedrock was observed in one outcrop adjacent to the downstream toe of the dam during the site visit. The previously mentioned map indicates that bedrock in the area consists of medium granitoid gneiss of Precambrian age.

1.3 Pertinent Data

a. Drainage Area

0.09 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown

Total ungated spillway capacity at maximum pool elevation (at top of dam) - 9

c. Elevation (ft. above NGVD)

Top of dam - 1251.1

Test flood (1/2 PMF) - 1251.9

Recreation pool (at time of inspection) - 1250

Spillway crest - 1250

Streambed in channel near the toe of the dam - 1233.0

Maximum tailwater - (estimated) - 1237.0

d. Reservoir (length in feet)

Length of maximum pool - 1000 (estimated)

Spillway crest - 900

e. Storage (acre-feet)

Spillway crest - 50

Test Flood (1/2 PMF) - 69

Top of dam - 61

f. Reservoir Surface (acres)

Top of dam - 11 (estimated)

Spillway crest - 10

g. Dam

Type - earth

Length - 500 feet

Height - 18.1 feet (hydraulic)

- 19.1 feet (structural)

Top width - ranges from 30 to 100 feet

Side slopes - upstream 3H:1V, downstream 2H:1V

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - Three 12-inch concrete pipes set in a stone masonry headwall connected to a 20-inch RCP and discharging through a 24-inch RCP

Length of weir - 3 feet

Crest elevation - 1250 feet NGVD

Low level outlet - one 8-inch diameter blowoff pipe (see 1.2 i below)

U/S Channel - Rock Island Lake

D/S Channel - tributary to Wallkill River

i. Regulating Outlets

Type - one 8-inch diameter blow off pipe connected to 24-inch RCP spillway outlet pipe.

Length (estimated) - 60 feet

Access - along crest of dam to valve box on upstream side to the right of the spillway.

SECTION 2
ENGINEERING DATA

2.1 Design

No hydraulic, hydrologic, or other engineering data were disclosed. However a property map, showing some dimensions of the dam, was made available by Mr. Carl Aherns, a co-owner.

2.2 Construction

No recorded data concerning construction of the Rock Island Lake Dam were found.

2.3 Operation

No written operational data were found.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files revealed no information.

b. Adequacy. Data obtained in the visual inspection are deemed adequate to complete this Phase 1 Inspection Report

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. The downstream slope and downstream toe of the dam are covered with extensive debris, including large boulders, brush, tree stumps, leaves and a considerable amount of trash which makes it impossible to inspect the downstream slope adequately. It appeared during the site visit that dumping of debris over the crest had taken place over a considerable period of time. The area at the downstream toe is wet and soft for approximately sixty percent of the length of the dam. Several seeps were observed discharging water which had a pronounced chemical odor and a high concentration of orange colored flocs with no evidence of suspended fines. Near the center of the dam, the 24-inch-diameter reinforced concrete pipe (RCP) outlet, connected to the three 12-inch concrete spillway pipes, was discharging water with a strong chemical odor which flowed in the channel bypassing a small pond downstream from the dam. A large wet and soft area was observed approximately 50 feet downstream from the dam. This area was opposite the three 12-inch-diameter concrete pipes which are located on the upstream slope.

Trees are growing in the area at the downstream toe of the dam. Brush and small trees are growing on the upstream slope. Erosion has left sporadic patches of riprap on the upstream face and developed erosion gullies at and above the waterline.

The crest is bare and rutted because of vehicular traffic; the crest serves as access road to several houses on the right (north) side of the dam.

b. Appurtenant Structures. The inlet box leading to the three 12-inch-diameter concrete pipes is clogged with leaves and debris. The concrete of the structure is surface eroded and the mortar in the stone-masonry headwall is missing or cracked. The outlet for these pipes is a 24-inch RCP, located near the downstream toe.

c. Reservoir Area. The watershed above the lake is gently to moderately sloping and wooded. Several homes were noted around the perimeter of the reservoir. Slopes on the shore of the lake appear stable. No appreciable sedimentation was observed.

d. Downstream Channel. Erosion has occurred on the right and left banks of the channel immediately downstream from the 24-inch-diameter RCP. Approximately 150 feet downstream from the pipe, the stream flows adjacent to and around the toe of the slope of the dike which contains a downstream pond. Trees are growing on the banks of the channel downstream of the 24-inch RCP.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were revealed.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were discovered.

4.4 Warning System

No description of any warning system was found.

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 described.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no original hydrologic/hydraulic design data were revealed, an evaluation of such data could not be performed.

b. Experience Data. No experience data were found.

c. Visual Inspection. The inlet box for the spillway pipes contain debris and sediment. The downstream outlet is a 24-inch RCP. At that time, this pipe was discharging a small quantity of whitish-colored, foul-smelling effluent. This may be caused by infiltration through the pipe joints of leachate from dumped material on the downstream face of the dam.

d. Rock Island Lake Dam Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to one-half the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines, for dams classified as significant hazard and small in size. The PMF was determined by application of a 24-hour Probable Maximum Precipitation of 22.2 inches to the SCS dimensionless unit hydrograph. Hydrologic computations are given in Appendix 3. The routed half-PMF peak discharge for the subject drainage area is 288 cfs.

Water will rise to a depth of 1.1 foot above the spillway crest before overtopping the low point on the dam embankment crest. Under this head the spillway capacity is 9 cfs, which is less than the selected SDF.

Flood routing calculatiions indicate that Rock Island Lake Dam will be overtopped for 6.8 hours to a maximum depth of 0.8 feet under half-PMF conditions. It is estimated that the spillway can pass 24 percent of the half-PMF inflow hydrograph without overtopping the dam. Thus, the spillway is considered inadequate.

e. Draw-down Capacity. If the low level outlet currently in place is fully operable and free of siltation, it is estimated that the pond can be drained in approximately 15 days, assuming no significant inflow. This time period is considered marginal for draining the reservoir under emergency conditions, but adequate, considering the small drainage area.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability The presence of boulders, brush, leaves, and extensive debris on the downstream slope makes it impossible to make an adequate inspection of the embankment.

The soft, wet area and seepage at the downstream toe of the dam is indicative of seepage either through or under the dam which, if not properly controlled, could lead to failure of the dam by piping or sloughing of the downstream slope.

The trees growing at the downstream toe of the embankment and in the area downstream of the toe may blow over and pull out their roots or they may die with the result that their roots rot. In either case, serious seepage and erosion problems could result.

Erosion gullies which are developing on the crest and upstream face of the dam are susceptible to erosion by rainfall or by overtopping of the dam or wave action on the upstream face, and erosion could, in turn, lead to breaching of the dam.

Parts of the crest of the dam which are bare of vegetation would be suseptible to erosion if the dam were overtopped, which might, in turn, lead to breaching of the dam.

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.

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. Rock Island Lake Dam is estimated to be at least 50 years old and is in poor 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 Recommendation/Remedial Measures

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

(1) Investigate the adequacy of the spillway capacity and design and oversee remedial measures as needed.

(2) Evaluate the leakage into the spillway discharge pipe and design and oversee corrective measures as required.

(3) Design and oversee the procedure for the removal of brush, debris and trees from the downstream slope and for a distance of 25 feet from the downstream toe of the dam or to the property line whichever is the lesser distance.

(4) Design and oversee repairs for the eroded areas on the upstream slope of the dam and specify erosion protection for the upstream slope.

(5) Investigate the cause of the seepage and wet, soft areas at and downstream of the downstream toe of the dam and design remedial measures as required.

b. Alternatives: None, however, if the dam and reservoir are considered non-essential, the dam could be breached and a bridge over the stream could be provided to replace the embankment.

c. Operating and Maintenance Procedures. The owner should accomplish the following in the time periods specified.

Starting soon:

(1) Begin a program of periodically checking the condition of the dam and monitoring the seepage and wet areas along and downstream of the downstream toe of the dam.

(2) Point the stone masonry headwall containing the spillway discharge pipes.

(3) Establish permanent cover along the crest after filling ruts with suitable material.

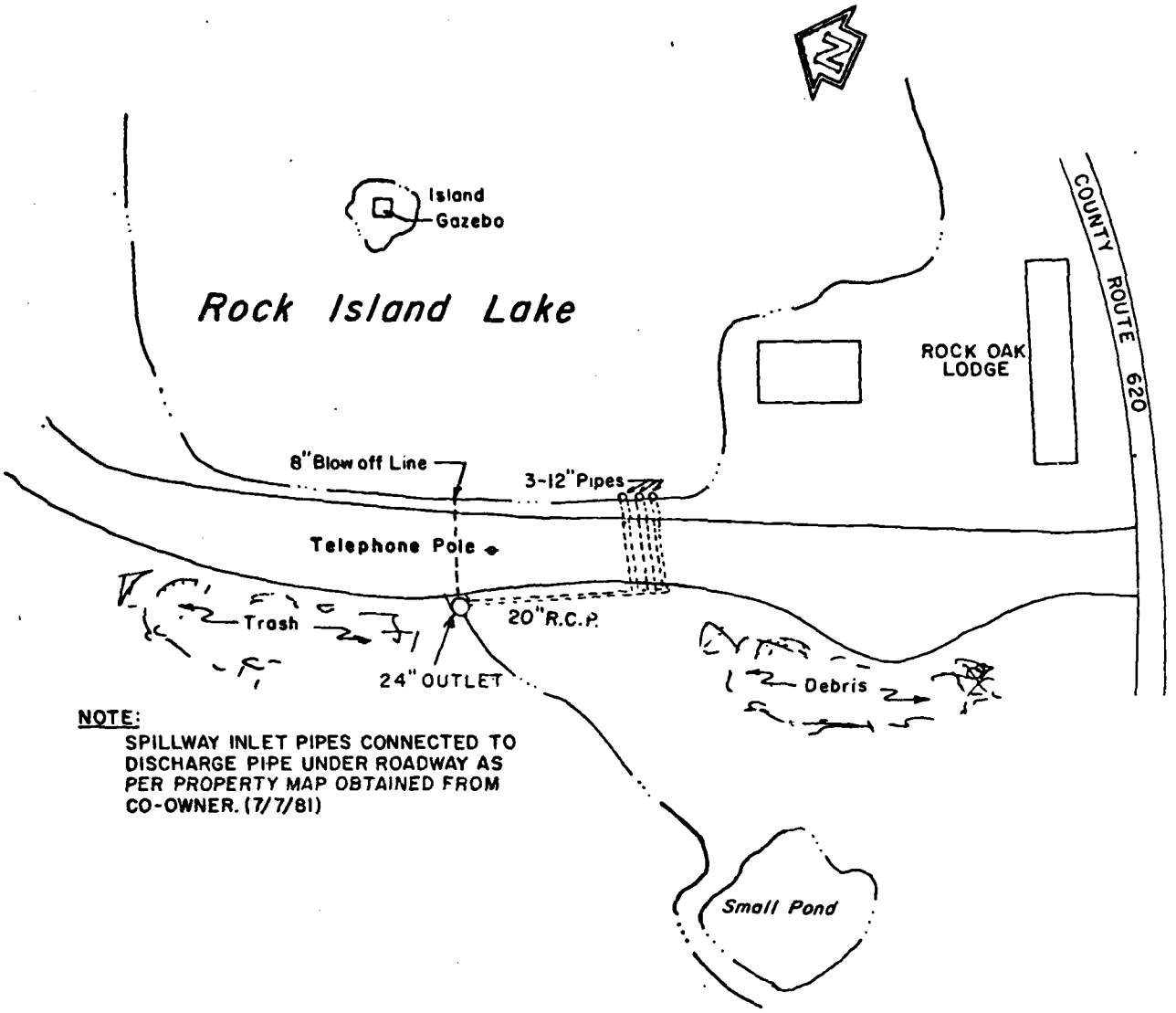
(4) Clear inlet box of debris.

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

In the near future:

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

(2) Clear trees and brush on either side of the discharge channel for a distance of 100 feet from the toe of the dam or the property line whichever is the lesser.



NOTE:
SPILLWAY INLET PIPES CONNECTED TO DISCHARGE PIPE UNDER ROADWAY AS PER PROPERTY MAP OBTAINED FROM CO-OWNER. (7/7/81)

Anderson-Nichols & Co, Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

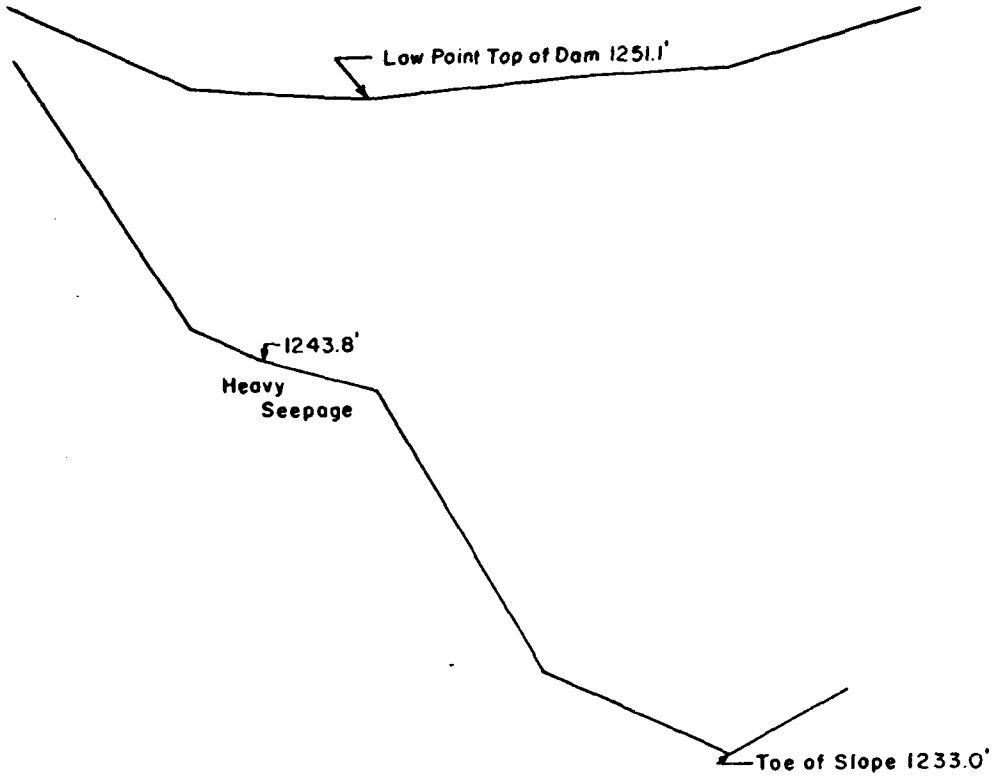
ROCK ISLAND LAKE DAM PLAN

ROCK ISLAND LAKE NEW JERSEY

SCALE NOT TO SCALE

DATE JUNE 1981

FIGURE-1



Anderson-Nichols & Co, Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROCK ISLAND LAKE DAM ELEVATION

ROCK ISLAND LAKE NEW JERSEY

SCALE	NOT TO SCALE
DATE	JUNE 1981

FIGURE-2

Anderson-Nichols & Co., Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST. PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROCK ISLAND LAKE DAM LOCATION MAP

ROCK ISLAND LAKE NEW JERSEY

SCALE: 1" = 4 Miles Approx.

DATE: JUNE 1981

SCALE IN MILES

0 4 8

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

FIGURE-3

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

ROCK ISLAND LAKE

Check List
Visual Inspection
Phase 1

Name Dam Rock Island Lake Dam County Sussex State NJ(00819) Coordinators NJDEP

Date(s) Inspection 2/17/81, 4/23/81 Weather Cool & Overcast, Rain, Overcast Temperature 45°, 55°

Pool Elevation at Time of Inspection 1250' NGVD Tailwater at Time of Inspection 1233' NGVD

Inspection Personnel:

W. Guinan	F.D.Deane
S. Gilman	K.Stuart
R. Murdock	

R. Murdock/K.Stuart Recorder

Owner not present

UNGATED SPILLWAY OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	3-foot wide concrete weir in poor condition leads to three 12-inch concrete pipes	Locate and clean outlet or replace spillway
APPROACH CHANNEL	Unobstructed on right side. Building foundation runs perpendicular to spillway at left abutment for approx. 25 feet	
DISCHARGE CHANNEL	Outlet at center of dam - 24-inch reinforced concrete pipe. Discharging liquid smelling of chemicals. Maybe infiltrating through joints. Ground and rocks around discharge end are discolored and malodorous.	Investigate source of discharge.
BRIDGE AND PIERS OVER SPILLWAY	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Unable to observe toe, covered by leaves and debris.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Erosion along crest, upstream and downstream slopes. Trees and brush on upstream slopes, trees up to 16-inch diameter along toe.	Clear trees and brush.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal - Okay Vertical - Slight undulation in elevation along crest	
RIPRAP FAILURES	Riprap appears to be missing above water level. Some riprap noted on slope below water surface.	Provide erosion protection.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	None	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Some erosion evident on upstream slope adjacent to spillway intake.	
ANY NOTICEABLE SEEPAGE	Ground wet and soggy along majority of toe. Visible seepage at toe near outlet pipe. Standing water along toe near right abutment.	
STAFF GAGE AND RECORDER	N/A	
DRAINS	None found	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Poor flowline meanders through woods.	
SLOPES	Moderately steep. Wooded.	
APPROXIMATE NO. OF HOMES AND POPULATION	One home approx. 6 feet above pond 150 yards d/s. Estimate 4 persons.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gradual to moderately sloped, wooded, some structures present adjacent to reservoir.	
SEDIMENTATION	No appreciable sedimentation observed.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found
REGIONAL VICINITY MAP	Prepared for this report
CONSTRUCTION HISTORY	None found
TYPICAL SECTIONS OF DAM	None found
HYDROLOGIC/HYDRAULIC DATA	None found
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	None found
RAINFALL/RESERVOIR RECORDS	None found

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

ITEM	REMARKS
MONITORING SYSTEMS	None found
MODIFICATIONS	None found
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: 0.09 square miles, moderate slope, wooded

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1250' NGVD (50 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) Not applicable

ELEVATION MAXIMUM TEST FLOOD POOL: 1251.9' NGVD

ELEVATION TOP DAM: 1251.1' NGVD (61 acre-feet)

SPILLWAY CREST: Pipes broad-crested, concrete box with one-foot stoplog notch.

a. Elevation 1250' NGVD

b. Type Stone masonry headwall with three 12-inch concrete pipes connected to a 20-inch RCP discharging through a 24-inch RCP

c. Width Three foot apron with training walls

d. Length 3 feet

e. Location Spillover near center of dam

f. Number and Type of Gates None

OUTLET WORKS: Blow-off pipe

a. Type One 8-inch pipe

b. Location Right of spillway

c. Entrance Invert Estimated at 1240.0' NGVD

d. Exit Invert 1236.6' NGVD

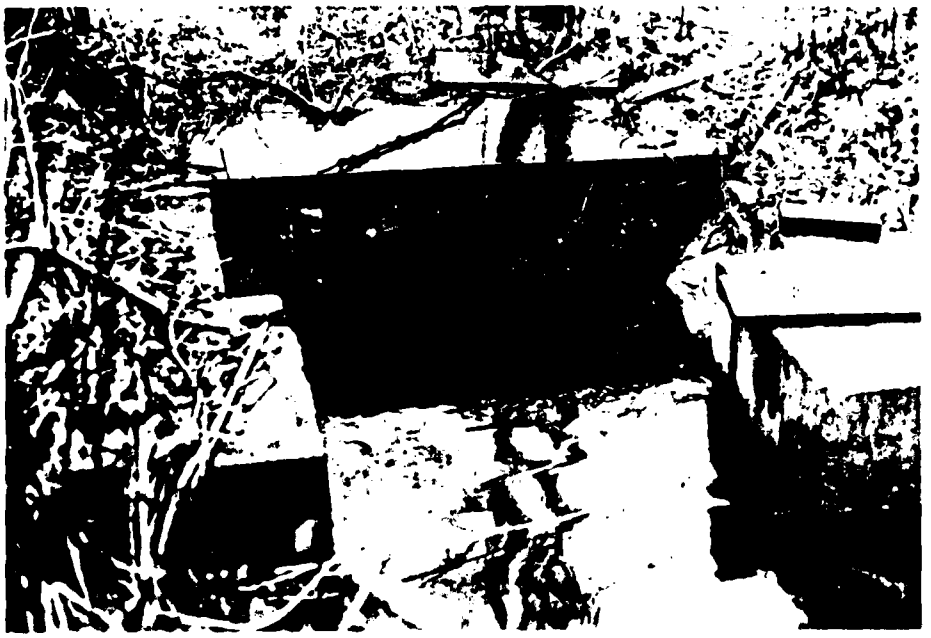
HYDROMETEOROLOGICAL GAGES: None

MAXIMUM NON-DAMAGING DISCHARGE: 9 cfs

APPENDIX 2

PHOTOGRAPHS

ROCK ISLAND LAKE



April 23, 1981

Spillway Intake

April 23, 1981

Crest of dam from left abutment

April 23, 1981

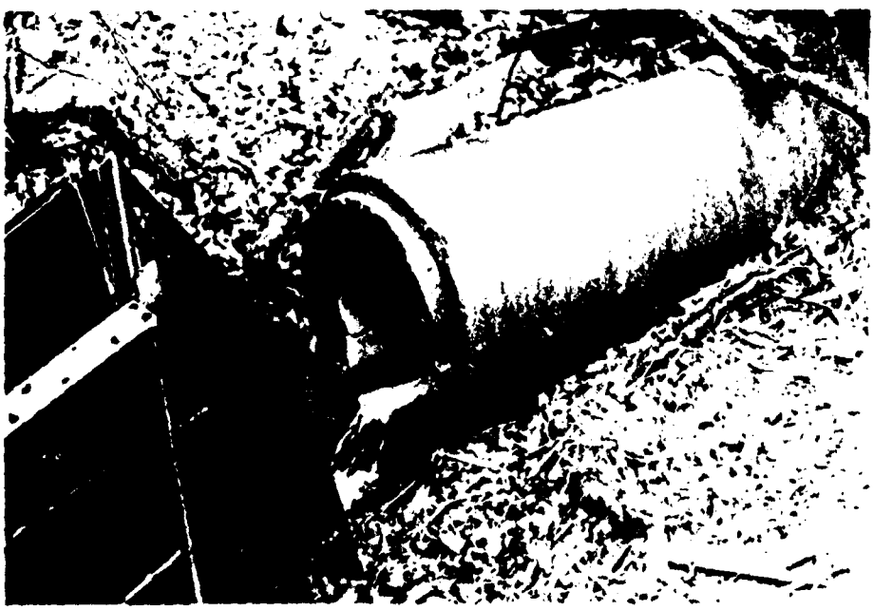
Upstream face, some riprap visible

April 23, 1981

Large wet area downstream of dam

April 23, 1981

Looking along toe toward 24-inch RCP spillway outlet pipe



April 23, 1981

Close-up view of 24-inch RCP spillway outlet pipe

April 23, 1981

Erosion in crest of dam directly above seep at toe of slope

April 23, 1981

Close-up of seep

April 23, 1981

Wet area at toe of slope, orange flocs, no visible sedimentation or flow, leaves and brush obscure toe

April 23, 1981

View of extensive debris along downstream slope

April 23, 1981

Spillway pipe retreat channel

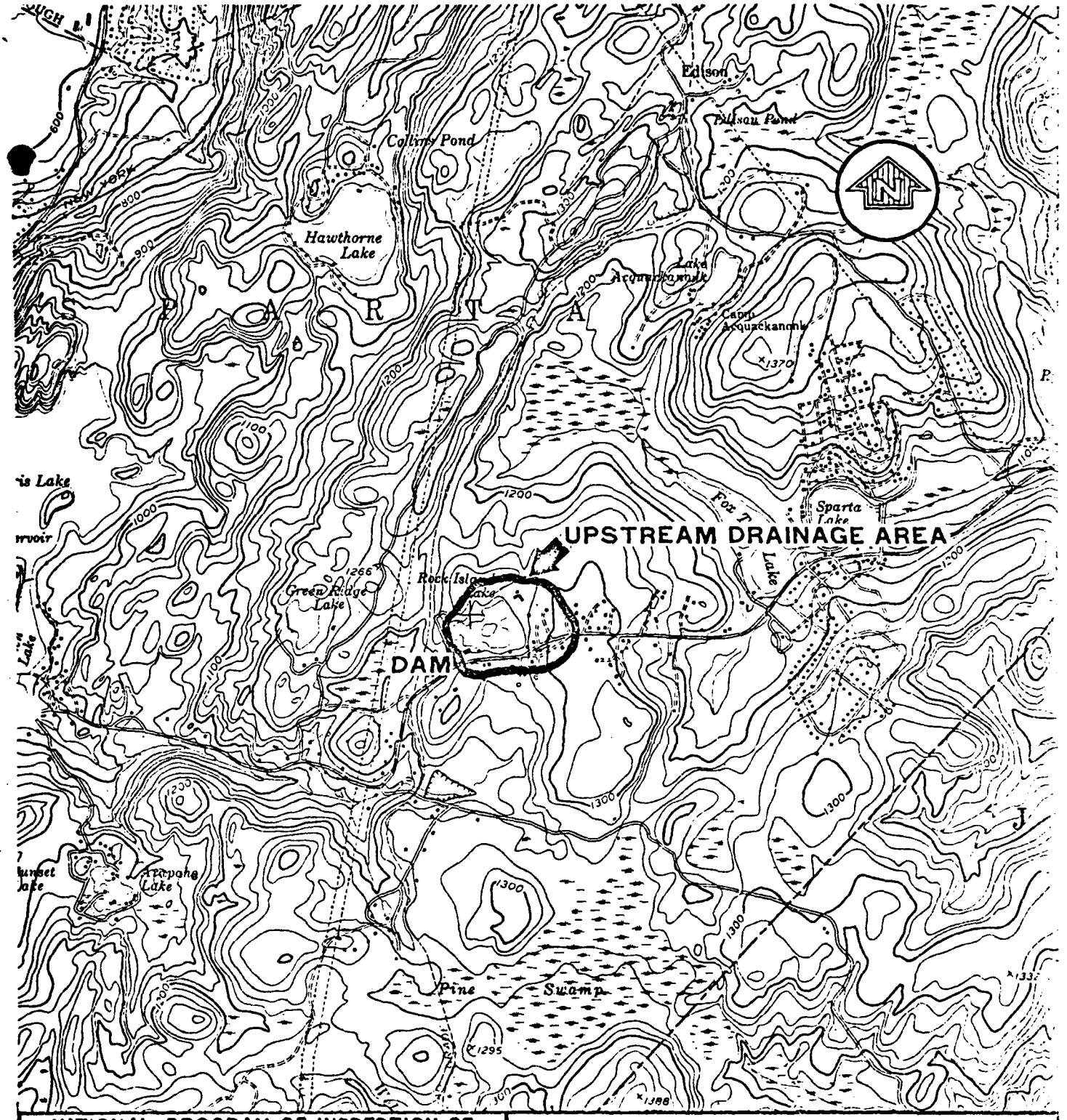
April 23, 1981

Discharge channel looking downstream

APPENDIX 3

HYDROLOGIC COMPUTATIONS

ROCK ISLAND LAKE



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

ROCK ISLAND LAKE DAM
SPARTA TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEET FRANKLIN, N.J. 1954. REVISED 1971.

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

Anderson-Nichols & Company, Inc. BOSTON, MA.

Anderson-Nichols & Company, Inc.

Subject Cook Island Dam

Sheet No. 1 of 14

Date

Computed

Checked

JOB NO.

Determine Time of Concentration

Method #1 Texas Highway method

Overland Flow

Reach length = 1000 ft

slope = $\frac{1310 - 1250}{1,000} = 0.06 = 6.0\%$

From TABLE "Woodlands"

Vel. Velocity = 2.0 fps

$1000 \div 2.0 \text{ fps} = 500 \text{ sec} = 8.3 \text{ min} = .14 \text{ hr}$

Channel Flow

no channel

Method #2 Soil & Water conservation

$L = 0.6\, T_c \qquad L = \frac{l^{0.8}(s+1)^{1.67}}{9000\, y^{0.5}} \qquad s = \frac{1000}{CN} - 10$

Take CN = 70 for woods $\qquad s = \frac{1000}{70} - 10 = 4.3$

$l = 1000 + 0 = 1000$ ft.

$y = \frac{1310 - 1250}{1000} = 0.06 = 6.0\%$

$L = \frac{(1,000)^{0.8}(4.3+1)^{1.67}}{9000\ (6)^{.5}} = .18$ hours

$T_c = \frac{.18}{.6} = 0.30$ hours

SQUARES 1/4 IN. SCALE

Method #3 SCS TR#55

Overland

length = 1,000 ft
head = 60 ft
slope = 0.06 = 6.0%

from Figure 3-1 page 3-2
V = .60 fps

$T_c = \frac{L}{V} = \frac{1.000}{0.6} = 1,667$ sec = 27.8 min = .46 hrs

Method #4 Kirby method

Overland flow

$$T_c = 0.83 \left(\frac{Nl}{\sqrt{s}}\right)^{0.467}$$

N = 0.6
s = 0.06
l = 1,000

$$T_c = 0.83 \left(\frac{(.6)(1000)}{\sqrt{.06}}\right)^{.467} = 31.75 \text{ min} = .53 \text{ hrs}$$

average T_c from 4 methods

$$\frac{.14 \text{ hr} + .30 \text{ hr} + .46 \text{ hr} + .53 \text{ hr}}{4} = .36 \text{ hrs}$$

Lag: $T_L = 0.6 \times .36 = .22$ hrs

SQUARES 1/4 IN. SCALE

Stage Versus Discharge

Hydraulic profile on page 4. Numbers in circles (①, ②, etc.) refer to section numbers from page 4.

Spillway - 3-12" pipes, inverts at 1250.0.

$$Q = C A \sqrt{2g} \sqrt{H}$$

$C = 0.61$

$A = 3\left(\frac{\pi}{4}\right) = 2.36\ ft^2$

$\sqrt{H} = \sqrt{E - 1250.5}$

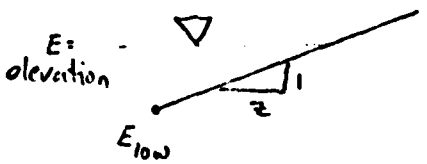
$$Q = 0.61(2.36)\sqrt{64.4}\left(E-1250.5\right)^{\frac{1}{2}} = 11.55\left(E-1250.5\right)^{\frac{1}{2}}$$

Top of dam (sections 2, 3, 4, 5, & 6)

Discharge will be calculated at 1238.0, 1250.0, 1251.1, 1251.2, 1251.4, 1251.6, 1251.8, 1252.0, 1252.5, 1253.0. C = 2.7 for dam crest, Z = Z H:1V

Z	Description
45.5	Section ② is a 100-ft. sloping weir, avg. ht. 1252.4, ends at 1251.3 &
500	Section ③ is a 100-foot sloping weir, avg. ht. 1251.2, ends at 1251.1 & 1251.3.
166.7	Section ④ is a 100-foot sloping weir, avg. ht. 1251.4, ends at 1251.1 & 1251.7
250	Section ⑤ is a 100-foot sloping weir, avg. ht. 1251.9, ends at 1251.7 and 1252.1
62.5	Section ⑥ is a 100-foot sloping weir, avg. ht. 1252.9, ends at 1252.1 and 1253.7

For a partially submerged sloping weir:

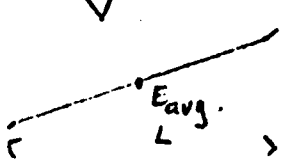


$$Q = C L_{submerged} H_{ave}^{3/2}$$

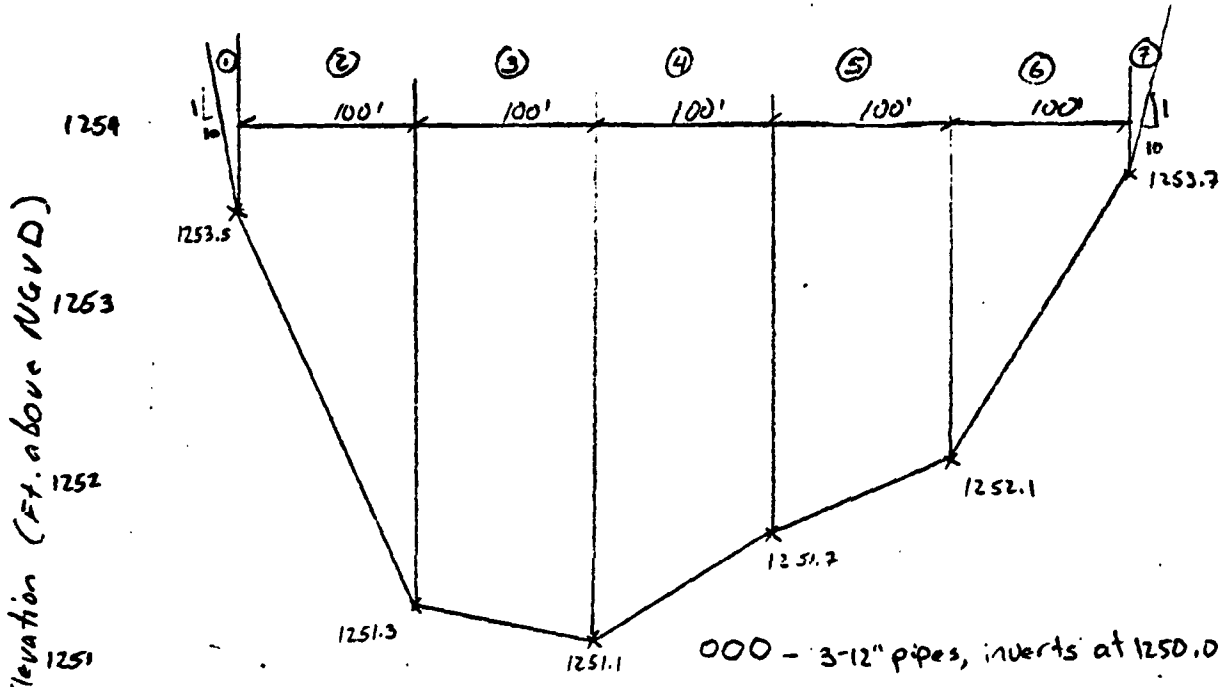
$$L_{submerged} = Z(E - E_{low})$$

$$H_{ave} = \frac{0 + (E - E_{low})}{2} = 0.5(E - E_{low})$$

fully submerged sloping weir: $Q = C(Z)(E-E_{low})^2\left(0.5(E-E_{low})\right)^{3/2}$



$$Q = C L H_{ave}^{3/2} = C L (E - E_{avg})^{3/2}$$



000 - 3-12" pipes, inverts at 1250.0

⊗ - 1-24" pipe, d/s invert at 12366.

ANDERSON-NICHOLS

VERNON BOSTON CONCORD

Rock Island Lake
Hydraulic Profile

DATE	SCALE: 1" = 1'V 1" = 100'H	JOB NO.	SHEET NO.
6/30/81			P. 40 of 14

Anderson-Nichols & Company, Inc. Subject Rock Island Sheet No. 5 of 14
Date 6/30/81
Computed [illegible]
Checked [illegible]
JOB NO.

for E: 1238.0, 1250.0, 1251.1 : Q = 0.0

for E: 1251.2 : $Q = 2.7(500)(E-1251.1)^{(3)}(0.5(E-1251.1))^{3/2}$

$+ 2.7(166.7)(E-1251.1)^{(4)}(0.5(E-1251.1))^{3/2}$

for E: 1251.4, 1251.6 : $Q = 2.7(45.5)(E-1251.3)^{(2)}(0.5(E-1251.3))^{3/2}$

$+ 2.7(100)(E-1251.2)^{(3)\,3/2} + 2.7(166.7)(E-1251.1)(0.5(E-1251.1))^{(4)\,3/2}$

for E: 1251.8, 1252.0 : $Q = 2.7(45.5)(E-1251.3)^{(2)}(0.5(E-1251.3))^{3/2} + 2.7(100)^{(3)}(E-1251.2)^{3}$

$+ 2.7(100)(E-1251.4)^{(4)\,3/2} + 2.7(250)(E-1251.7)(0.5(E-1251.7))^{(5)\,3}$

for E = 1252.5, 1253.0 : $Q = 2.7(45.5)(E-1251.3)^{(2)}(0.5(E-1251.3))^{3/2} + 2.7(100)^{(3)}(E-1251.2)^{3}$

$+ 2.7(100)(E-1251.4)^{(4)\,3/2} + 2.7(100)(E-1251.9)^{(5)\,3/2}$

$+ 2.7(62.5)(E-1252.1)^{(6)}(0.5(E-1252.1))^{3/2}$

Side Slopes (sections ① and ⑦)

for 1238.0 - 1253.0 : Q = 0

Anderson-Nichols & Company, Inc.

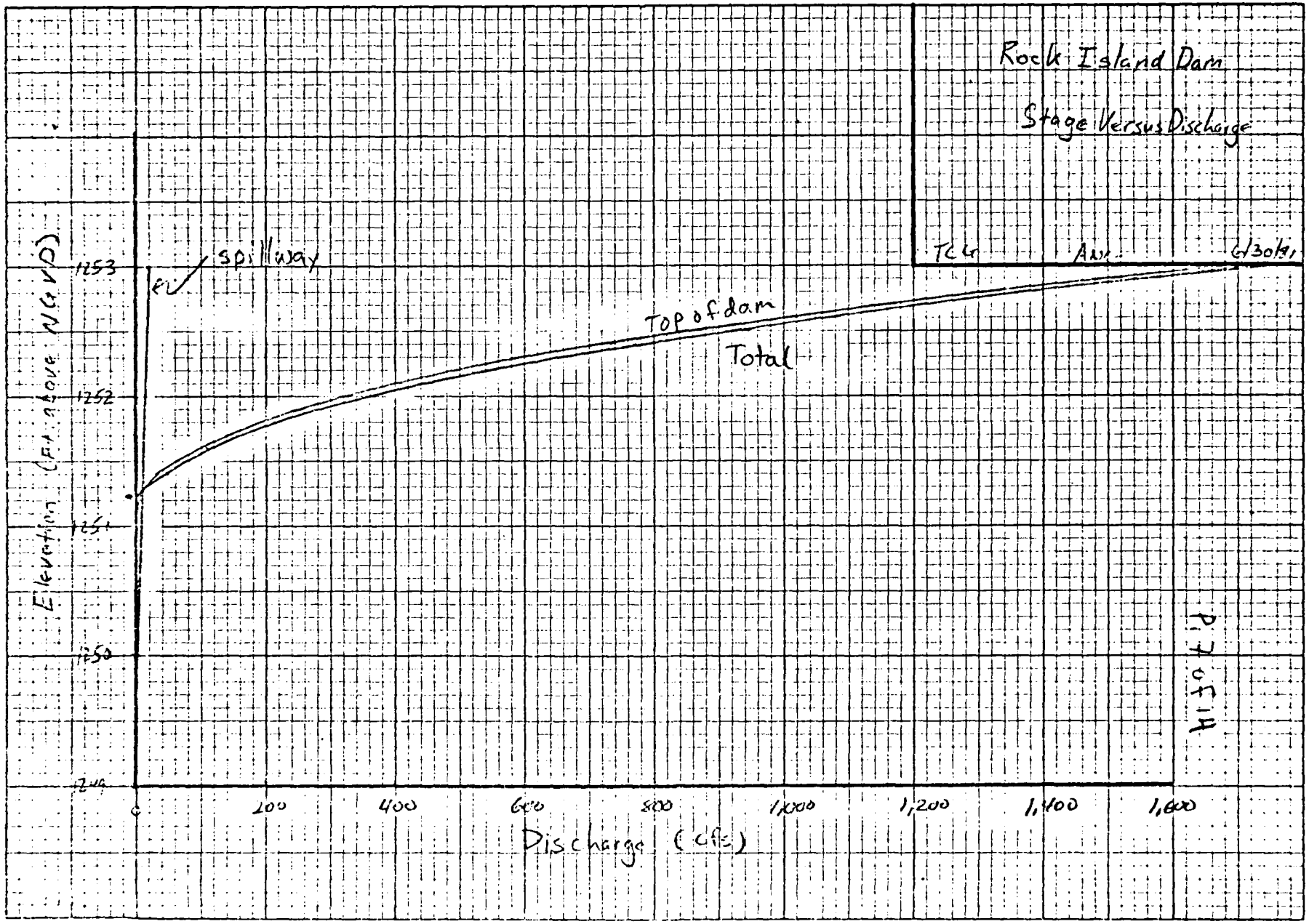
Subject Rock Island

Sheet No. 6 of 14
Date 6/30/81
Computed [illegible]
Checked [illegible]

JOB NO.

SQUARES 1/4 IN. SCALE

Elevation (Ft. above NGVD)	Description	Q spillway (cFS)	Q top of dam (CFS)	Q sideslopes (CFS)	Q Total (CFS)
1238.0	approx. pond low pt.	0	0	0	0
1240.0		0	0	0	0
1250.0	spillway crest	0	0	0	0
1251.1	top of Dam	8.9	0	0	8.9
1251.2		9.7	2	0	11.7
1251.4		11	32	0	43
1251.6		12	98	0	110
1251.8		13	202	0	215
1252.0		14	348	0	362
1252.5		16	912	0	928
1253.0		18	1,716	0	1,734



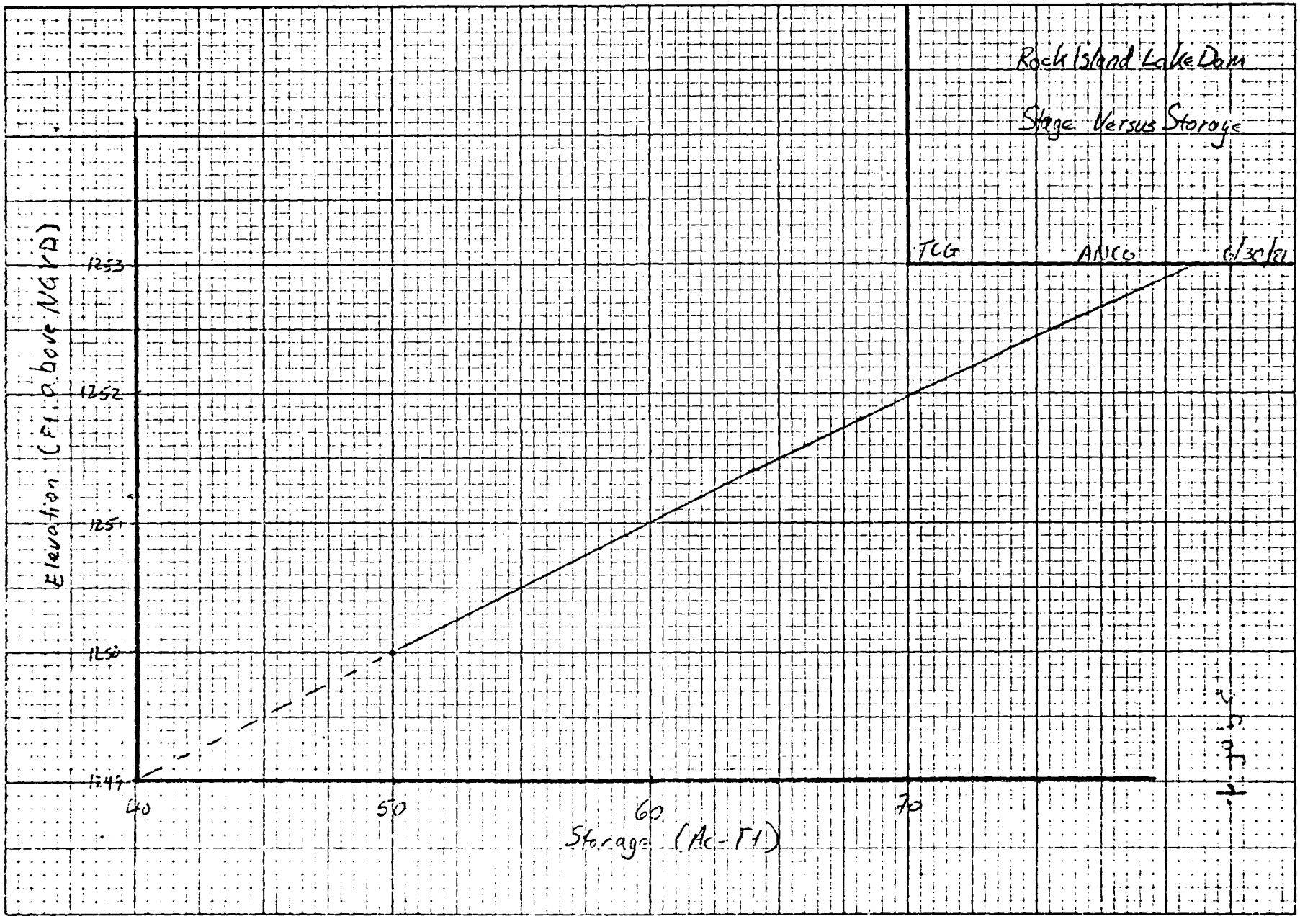
SQUARES 1/4 IN. SCALE

Stage Versus Storage

Surface Area at normal pool (1250.0) = 10 acres
Surface Area at elevation 1260 = 15.8 acres

Assume a linear increase in surface area with elevation. Assume storage = 0.0 at 1238.0, 50 ac-ft. at 1250 (average depth = 5 feet).

Elevation (Ft. above NGVD)	Surface Area (Acres)	Avg. S. A. (Acres)	Incremental Storage (Ac-Ft)	Cumulative Storage (Ac-Ft)
1238.0	-			0
		-	-	
1250.0	10			50
		10.03	11.0	
1251.1	10.06			61
		10.09	1.0	
1251.2	10.12			62
		10.175	2.0	
1251.4	10.23			64
		10.29	2.1	
1251.6	10.35			66.1
		10.405	2.1	
1251.8	10.46			68.2
		10.52	2.1	
1252.0	10.58			70.3
		10.725	5.4	
1252.5	10.87			75.7
		10.985	5.5	
1253.0	11.10			81.2



Anderson-Nichols & Company, Inc.

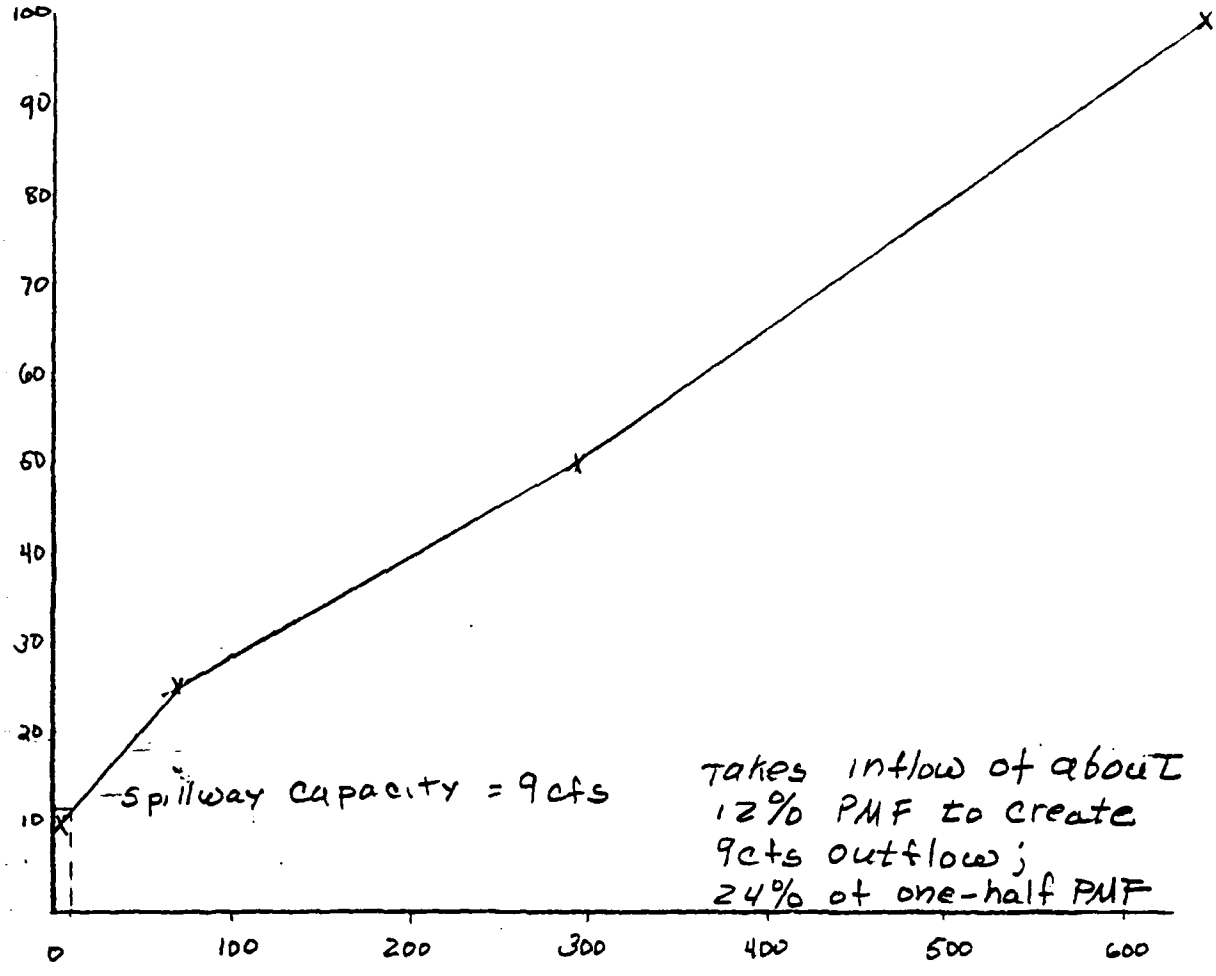
Subject Rock Island

Sheet No. 10 of 14
Date 6/30/81
Computed TCG
Checked CRD

JOB NO.

SQUARES 1/4 IN. SCALE

Overtopping Analysis



Breach Analysis

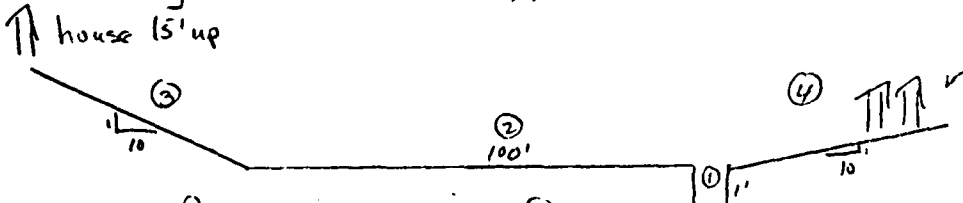
Assume breach width of 100'

Time to develop of 0.25 hour

Straight walls on breach

Bottom elevation of 1238' NGVD

The damage center is a pond about 500 feet downstream, with 3 houses around it, 2 about 5 feet above the pond and one about 15 feet up. The stream below Rock Island Dam actually routes around the pond to the north, beside the two lower houses. The following cross section approximates the control at the dam:



$$Q = \overset{①}{3.0(5)}(H)^{3/2} + \overset{②}{2.7(100)}(H-1)^{3/2}\,5' + 2(2.7)(10)\overset{③}{(H-1)}\overset{④}{(0.5(H-1))}^{3/2}$$

For storage, Assume 2 acre-ft at spill way crest, and loose surface area → $S = 2 + H(\text{Ac Ft}/\text{ft})$. Assume constant surface area as pond rises (effect of pond storage on Q negligible anyway)

H (ft above s/w)	Q (CFS)	Storage (Ac-Ft)
0	0	2
1	15	3
2	332	4
3	950	5
4	1,821	6
5	2,939	7
6	4,306	8
7	5,930	9
8	7,815	10

A HEC-1 shows that dam breach upon overtopping would have the following impact:

	Flow	Stage
Before failure	9 cfs	0.6'
After failure	3,532 cfs	5.43'

This would cause about 0.4 feet of flooding at the two houses. Thus, the dam is considered to be Significant Hazard, since there is little threat of loss of life.

Determination of "C" for low level outlet

D = diameter = 8 inches

n = 0.015 for RCP (K+B 6-15)

A_p = area of pipe opening = 0.35

L_p = length of pipe = 60 feet

K_f = friction loss through pipe

$$K_f = \frac{5087 n^2}{D^{4/3}} = \frac{5087 (.015)^2}{(8)^{4/3}} = .072$$

K_l = entrance loss to pipe = 0.8 (K+B 6-18)

C_p = coefficient of discharge

$$C_p = A_p \sqrt{\frac{2g}{1 + K_l + K_f L_p}} = .35 \sqrt{\frac{64.4}{1 + .8 + (.051)(60)}} = 1.14$$

$$C = C_p / A_p / \sqrt{2g}$$

$$= 1.14 / .35 / \sqrt{64.4} = 0.40$$

Anderson-Nichols & Company, Inc.

Subject Rock Island Dam

Sheet No. ____ of ____
Date 8/6/81
Computed CLP
Checked RES

JOB NO.

Drawdown by low level Outlet

Assume: ① no significant inflow
② one 8" pipe
③ invert estimated at 1240.' NGVD
④ $Q_p = C_p H^{\frac{1}{2}} = 1.14 H^{\frac{1}{2}}$
⑤ Acre-ft/day = 1.9835 × Q ave
⑥ Days = Δ storage / Acre-ft/day

Elev (NGVD)	Storage (acre-ft)	ΔS	H (ft)	Q (cfs)	Ave Q (cfs)	Acre-ft day	Days
1250	60		9.7	3.6			
		10			3.4	6.7	1.5
1248	40		7.7	3.2			
		10			2.95	5.9	1.7
1246	30		5.7	2.7			
		10			2.45	4.9	2.0
1244	20		3.7	2.2			
		10			1.85	3.7	2.7
1242	10		1.7	1.5			
		10			.75	1.5	6.7
1240.3	0		0				

14.6 day

APPENDIX 4

HEC 1 OUTPUT

ROCK ISLAND LAKE

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   1          ID    ROCK ISLAND LAKE DAM   OVERTOPPING ANALYSIS   TOM GOUCH   ANCO
   2          ID    NEW JERSEY DAM NO. 819 - SUSSEX COUNTY - SPARTA TOWNSHIP
   3          ID    DETAILED RUN OF TEST FLOOD WITH 0.5 PMF FROM 24-HOUR PMP
   4          IT       5                 0     300
   5          IO       2         1
   6          JR    FLOW      0.5

   7          KK      A1  DEVELOP INFLOW HYDROGRAPH TO ROCK ISLAND LAKE DAM
   8          KM        INFLOW FROM SCS UNIT GRAPH COMPUTATIONS
   9          BA    0.09         0
  10          BF    0.27      0.27         1
  11          PM    22.2                          NO     113     123     132
  12          LU       1       0.1
  13          UD    0.22

  14          KK      A2  ROUTE INFLOW HYDROGRAPH THROUGH ROCK ISLAND LAKE
  15          RS       1    STOR      50.
  16          SV      0.      50.      61.      62.      64.    66.1    68.2    70.3    75.7    81.2
  17          SE   1238.    1250.  1251.1   1251.2   1251.4  1251.6  1251.8  1252.   1252.5  1253.
  18          SQ      0.       0.      8.9     11.7     43.     110.    215.    362.    928.   1734.
  19          SE   1238.    1250.  1251.1   1251.2   1251.4  1251.6  1251.8  1252.   1252.5  1253.
  20          SS   1250.0     3.0      3.0      1.5
  21          ST   1251.1   500.       0.0      1.5
  22          ZZ
```

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**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*         FEBRUARY 1981                      *
*                                            *
*                                            *
*  RUN DATE07/02/81      TIME16.38.33        *
*                                            *
**********************************************
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   THE HYDROLOGIC ENGINEERING CENTER  *
*        609 SECOND STREET             *
*      DAVIS, CALIFORNIA 95616         *
*   (916) 440-3285 OR (FTS) 448-3285   *
*                                      *
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                        ROCK ISLAND LAKE DAM   OVERTOPPING ANALYSIS   TOM GOOCH   ANCO
                        NEW JERSEY DAM NO. 819 - SUSSEX COUNTY - SPARTA TOWNSHIP
                        DETAILED RUN OF TEST FLOOD WITH 0.5 PMF FROM 24-HOUR PMP

  5 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          1  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
                      QMSG         YES PRINT DIAGNOSTIC MESSAGES

    IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
                       NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2   0  ENDING DATE
                     NDTIME      0055  ENDING TIME

                  COMPUTATION INTERVAL     0.08 HOURS
                      TOTAL TIME BASE     24.92 HOURS

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

    JP          MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                    RATIOS OF RUNOFF
                  0.50

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

            ***************
            *             *
  7 KK      *      A1     *      DEVELOP INFLOW HYDROGRAPH TO ROCK ISLAND LAKE DAM
            *             *
            ***************
                          INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

          SUBBASIN RUNOFF DATA

  9 BA          SUBBASIN CHARACTERISTICS
                     TAREA          0.09  SUBBASIN AREA

 10 BF          BASE FLOW CHARACTERISTICS
                     STRTQ          0.27  INITIAL FLOW
                     QRCSN          0.27  BEGIN BASE FLOW RECESSION
                     RTIOR      1.000000  RECESSION CONSTANT
```

PRECIPITATION DATA

11 PM — — PROBABLE MAXIMUM STORM

PMS	22.20	INDEX PRECIPITATION
TPSPC	0.60	TRANSPOSITION COEFFICIENT
TPSDA	0.09	TRANSPOSITION AREA
SWD	NO	USE SWD DISTRIBUTION

PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME

6-HR	12-HR	24-HR	48-HR	72-HR	96-HR
113.0	123.0	132.0	0.0	0.0	0.0

12 LU UNIFORM LOSS RATE

STRTL	1.00	INITIAL LOSS
CNSTL	0.10	UNIFORM LOSS RATE
RTIMP	0.0	PERCENT IMPERVIOUS AREA

13 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	0.22	LAG

***

UNIT HYDROGRAPH
15 END-OF-PERIOD ORDINATES

35. 120. 166. 146. 95. 54. 33. 20. 12. 7. 4. 2. 2. 1. 0.

HYDROGRAPH AT STATION A1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	0.0	0.0	0.0	0.	1		1230	151	0.17	0.01	0.16	100.
1		0005	2	0.01	0.01	0.00	0.	1		1235	152	0.17	0.01	0.16	104.
1		0010	3	0.01	0.01	0.00	0.	1		1240	153	0.17	0.01	0.16	107.
1		0015	4	0.01	0.01	0.00	0.	1		1245	154	0.17	0.01	0.16	109.
1		0020	5	0.01	0.01	0.00	0.	1		1250	155	0.17	0.01	0.16	110.
1		0025	6	0.01	0.01	0.00	0.	1		1255	156	0.17	0.01	0.16	110.
1		0030	7	0.01	0.01	0.00	0.	1		1300	157	0.17	0.01	0.16	111.
1		0035	8	0.01	0.01	0.00	0.	1		1305	158	0.20	0.01	0.19	112.
1		0040	9	0.01	0.01	0.00	0.	1		1310	159	0.20	0.01	0.19	116.
1		0045	10	0.01	0.01	0.00	0.	1		1315	160	0.20	0.01	0.19	122.
1		0050	11	0.01	0.01	0.00	0.	1		1320	161	0.20	0.01	0.19	127.
1		0055	12	0.01	0.01	0.00	0.	1		1325	162	0.20	0.01	0.19	130.
1		0100	13	0.01	0.01	0.00	0.	1		1330	163	0.20	0.01	0.19	132.
1		0105	14	0.01	0.01	0.00	0.	1		1335	164	0.20	0.01	0.19	133.
1		0110	15	0.01	0.01	0.00	0.	1		1340	165	0.20	0.01	0.19	133.
1		0115	16	0.01	0.01	0.00	0.	1		1345	166	0.20	0.01	0.19	134.
1		0120	17	0.01	0.01	0.00	0.	1		1350	167	0.20	0.01	0.19	134.
1		0125	18	0.01	0.01	0.00	0.	1		1355	168	0.20	0.01	0.19	134.
1		0130	19	0.01	0.01	0.00	0.	1		1400	169	0.20	0.01	0.19	134.
1		0135	20	0.01	0.01	0.00	0.	1		1405	170	0.25	0.01	0.24	136.
1		0140	21	0.01	0.01	0.00	0.	1		1410	171	0.25	0.01	0.24	142.
1		0145	22	0.01	0.01	0.00	0.	1		1415	172	0.25	0.01	0.24	150.
1		0150	23	0.01	0.01	0.00	0.	1		1420	173	0.25	0.01	0.24	156.
1		0155	24	0.01	0.01	0.00	0.	1		1425	174	0.25	0.01	0.24	163.
1		0200	25	0.01	0.01	0.00	0.	1		1430	175	0.25	0.01	0.24	165.
1		0205	26	0.01	0.01	0.00	0.	1		1435	176	0.25	0.01	0.24	167.
1		0210	27	0.01	0.01	0.00	0.	1		1440	177	0.25	0.01	0.24	168.

1	0215	28	0.01	0.01	0.00	0.	*	1	1445	178	0.25	0.01	0.24	168.
1	0220	29	0.01	0.01	0.00	0.	*	1	1450	179	0.25	0.01	0.24	169.
1	0225	30	0.01	0.01	0.00	0.	*	1	1455	180	0.25	0.01	0.24	169.
1	0230	31	0.01	0.01	0.00	0.	*	1	1500	181	0.25	0.01	0.24	169.
1	0235	32	0.01	0.01	0.00	0.	*	1	1505	182	0.23	0.01	0.22	168.
1	0240	33	0.01	0.01	0.00	0.	*	1	1510	183	0.31	0.01	0.30	169.
1	0245	34	0.01	0.01	0.00	0.	*	1	1515	184	0.38	0.01	0.37	177.
1	0250	35	0.01	0.01	0.00	0.	*	1	1520	185	0.46	0.01	0.45	196.
1	0255	36	0.01	0.01	0.00	0.	*	1	1525	186	0.69	0.01	0.68	237.
1	0300	37	0.01	0.01	0.00	0.	*	1	1530	187	1.30	0.01	1.29	316.
1	0305	38	0.01	0.01	0.00	0.	*	1	1535	188	1.91	0.01	1.90	470.
1	0310	39	0.01	0.01	0.00	0.	*	1	1540	189	0.84	0.01	0.83	654.
1	0315	40	0.01	0.01	0.00	0.	*	1	1545	190	0.61	0.01	0.60	738.
1	0320	41	0.01	0.01	0.00	0.	*	1	1550	191	0.38	0.01	0.37	689.
1	0325	42	0.01	0.01	0.00	0.	*	1	1555	192	0.31	0.01	0.30	566.
1	0330	43	0.01	0.01	0.00	0.	*	1	1600	193	0.23	0.01	0.22	441.
1	0335	44	0.01	0.01	0.00	0.	*	1	1605	194	0.23	0.01	0.23	342.
1	0340	45	0.01	0.01	0.00	0.	*	1	1610	195	0.23	0.01	0.23	271.
1	0345	46	0.01	0.01	0.00	0.	*	1	1615	196	0.23	0.01	0.23	225.
1	0350	47	0.01	0.01	0.00	0.	*	1	1620	197	0.23	0.01	0.23	196.
1	0355	48	0.01	0.01	0.00	0.	*	1	1625	198	0.23	0.01	0.23	182.
1	0400	49	0.01	0.01	0.00	0.	*	1	1630	199	0.23	0.01	0.23	172.
1	0405	50	0.01	0.01	0.00	0.	*	1	1635	200	0.23	0.01	0.23	166.
1	0410	51	0.01	0.01	0.00	0.	*	1	1640	201	0.23	0.01	0.23	162.
1	0415	52	0.01	0.01	0.00	0.	*	1	1645	202	0.23	0.01	0.23	160.
1	0420	53	0.01	0.01	0.00	0.	*	1	1650	203	0.23	0.01	0.23	159.
1	0425	54	0.01	0.01	0.00	0.	*	1	1655	204	0.23	0.01	0.23	156.
1	0430	55	0.01	0.01	0.00	0.	*	1	1700	205	0.23	0.01	0.23	156.
1	0435	56	0.01	0.01	0.00	0.	*	1	1705	206	0.18	0.01	0.18	156.
1	0440	57	0.01	0.01	0.00	0.	*	1	1710	207	0.18	0.01	0.18	150.
1	0445	58	0.01	0.01	0.00	0.	*	1	1715	208	0.18	0.01	0.18	142.
1	0450	59	0.01	0.01	0.00	0.	*	1	1720	209	0.18	0.01	0.18	134.
1	0455	60	0.01	0.01	0.00	0.	*	1	1725	210	0.18	0.01	0.18	129.
1	0500	61	0.01	0.01	0.00	0.	*	1	1730	211	0.18	0.01	0.18	127.
1	0505	62	0.01	0.01	0.00	0.	*	1	1735	212	0.18	0.01	0.18	125.
1	0510	63	0.01	0.01	0.00	0.	*	1	1740	213	0.18	0.01	0.18	124.
1	0515	64	0.01	0.01	0.00	0.	*	1	1745	214	0.18	0.01	0.18	123.
1	0520	65	0.01	0.01	0.00	0.	*	1	1750	215	0.18	0.01	0.18	123.
1	0525	66	0.01	0.01	0.00	0.	*	1	1755	216	0.18	0.01	0.18	123.
1	0530	67	0.01	0.01	0.00	0.	*	1	1800	217	0.18	0.01	0.18	123.
1	0535	68	0.01	0.01	0.00	0.	*	1	1805	218	0.01	0.01	0.00	117.
1	0540	69	0.01	0.01	0.00	0.	*	1	1810	219	0.01	0.01	0.00	96.
1	0545	70	0.01	0.01	0.00	0.	*	1	1815	220	0.01	0.01	0.00	68.
1	0550	71	0.01	0.01	0.00	0.	*	1	1820	221	0.01	0.01	0.00	43.
1	0555	72	0.01	0.01	0.00	0.	*	1	1825	222	0.01	0.01	0.00	27.
1	0600	73	0.01	0.01	0.00	0.	*	1	1830	223	0.01	0.01	0.00	17.
1	0605	74	0.02	0.02	0.00	0.	*	1	1835	224	0.01	0.01	0.00	12.
1	0610	75	0.02	0.02	0.00	0.	*	1	1840	225	0.01	0.01	0.00	9.
1	0615	76	0.02	0.02	0.00	0.	*	1	1845	226	0.01	0.01	0.00	7.
1	0620	77	0.02	0.02	0.00	0.	*	1	1850	227	0.01	0.01	0.00	5.
1	0625	78	0.02	0.02	0.00	0.	*	1	1855	228	0.01	0.01	0.00	5.
1	0630	79	0.02	0.02	0.00	0.	*	1	1900	229	0.01	0.01	0.00	4.
1	0635	80	0.02	0.02	0.00	0.	*	1	1905	230	0.01	0.01	0.00	4.
1	0640	81	0.02	0.02	0.00	0.	*	1	1910	231	0.01	0.01	0.00	4.
1	0645	82	0.02	0.02	0.00	0.	*	1	1915	232	0.01	0.01	0.00	4.
1	0650	83	0.02	0.02	0.00	0.	*	1	1920	233	0.01	0.01	0.00	4.
1	0655	84	0.02	0.02	0.00	0.	*	1	1925	234	0.01	0.01	0.00	4.
1	0700	85	0.02	0.02	0.00	0.	*	1	1930	235	0.01	0.01	0.00	4.
1	0705	86	0.02	0.02	0.00	0.	*	1	1935	236	0.01	0.01	0.00	4.
1	0710	87	0.02	0.02	0.00	0.	*	1	1940	237	0.01	0.01	0.00	4.
1	0715	88	0.02	0.01	0.01	0.	*	1	1945	238	0.01	0.01	0.00	4.
1	0720	89	0.02	0.01	0.02	2.	*	1	1950	239	0.01	0.01	0.00	4.
1	0725	90	0.02	0.01	0.02	4.	*	1	1955	240	0.01	0.01	0.00	4.
1	0730	91	0.02	0.01	0.02	6.	*	1	2000	241	0.01	0.01	0.00	4.
1	0735	92	0.02	0.01	0.02	8.	*	1	2005	242	0.01	0.01	0.00	4.
1	0740	93	0.02	0.01	0.02	10.	*	1	2010	243	0.01	0.01	0.00	4.
1	0745	94	0.02	0.01	0.02	11.	*	1	2015	244	0.01	0.01	0.00	4.
1	0750	95	0.02	0.01	0.02	11.	*	1	2020	245	0.01	0.01	0.00	4.
1	0755	96	0.02	0.01	0.02	11.	*	1	2025	246	0.01	0.01	0.00	4.
1	0800	97	0.02	0.01	0.02	11.	*	1	2030	247	0.01	0.01	0.00	4.
1	0805	98	0.02	0.01	0.02	12.	*	1	2035	248	0.01	0.01	0.00	4.
1	0810	99	0.02	0.01	0.02	12.	*	1	2040	249	0.01	0.01	0.00	4.
1	0815	100	0.02	0.01	0.02	12.	*	1	2045	250	0.01	0.01	0.00	4.

1	0820	101	0.02	0.01	0.02	12.	*	1	2050	251	0.01	0.01	0.00	4.
1	0825	102	0.02	0.01	0.02	12.	*	1	2055	252	0.01	0.01	0.00	4.
1	0830	103	0.02	0.01	0.02	12.	*	1	2100	253	0.01	0.01	0.00	4.
1	0835	104	0.02	0.01	0.02	12.	*	1	2105	254	0.01	0.01	0.00	4.
1	0840	105	0.02	0.01	0.02	12.	*	1	2110	255	0.01	0.01	0.00	4.
1	0845	106	0.02	0.01	0.02	12.	*	1	2115	256	0.01	0.01	0.00	4.
1	0850	107	0.02	0.01	0.02	12.	*	1	2120	257	0.01	0.01	0.00	4.
1	0855	108	0.02	0.01	0.02	12.	*	1	2125	258	0.01	0.01	0.00	4.
1	0900	109	0.02	0.01	0.02	12.	*	1	2130	259	0.01	0.01	0.00	4.
1	0905	110	0.02	0.01	0.02	12.	*	1	2135	260	0.01	0.01	0.00	4.
1	0910	111	0.02	0.01	0.02	12.	*	1	2140	261	0.01	0.01	0.00	4.
1	0915	112	0.02	0.01	0.02	12.	*	1	2145	262	0.01	0.01	0.00	4.
1	0920	113	0.02	0.01	0.02	12.	*	1	2150	263	0.01	0.01	0.00	4.
1	0925	114	0.02	0.01	0.02	12.	*	1	2155	264	0.01	0.01	0.00	4.
1	0930	115	0.02	0.01	0.02	12.	*	1	2200	265	0.01	0.01	0.00	4.
1	0935	116	0.02	0.01	0.02	12.	*	1	2205	266	0.01	0.01	0.00	4.
1	0940	117	0.02	0.01	0.02	12.	*	1	2210	267	0.01	0.01	0.00	4.
1	0945	118	0.02	0.01	0.02	12.	*	1	2215	268	0.01	0.01	0.00	4.
1	0950	119	0.02	0.01	0.02	12.	*	1	2220	269	0.01	0.01	0.00	4.
1	0955	120	0.02	0.01	0.02	12.	*	1	2225	270	0.01	0.01	0.00	4.
1	1000	121	0.02	0.01	0.02	12.	*	1	2230	271	0.01	0.01	0.00	4.
1	1005	122	0.02	0.01	0.02	12.	*	1	2235	272	0.01	0.01	0.00	4.
1	1010	123	0.02	0.01	0.02	12.	*	1	2240	273	0.01	0.01	0.00	4.
1	1015	124	0.02	0.01	0.02	12.	*	1	2245	274	0.01	0.01	0.00	4.
1	1020	125	0.02	0.01	0.02	12.	*	1	2250	275	0.01	0.01	0.00	4.
1	1025	126	0.02	0.01	0.02	12.	*	1	2255	276	0.01	0.01	0.00	4.
1	1030	127	0.02	0.01	0.02	12.	*	1	2300	277	0.01	0.01	0.00	4.
1	1035	128	0.02	0.01	0.02	12.	*	1	2305	278	0.01	0.01	0.00	4.
1	1040	129	0.02	0.01	0.02	12.	*	1	2310	279	0.01	0.01	0.00	4.
1	1045	130	0.02	0.01	0.02	12.	*	1	2315	280	0.01	0.01	0.00	4.
1	1050	131	0.02	0.01	0.02	12.	*	1	2320	281	0.01	0.01	0.00	4.
1	1055	132	0.02	0.01	0.02	12.	*	1	2325	282	0.01	0.01	0.00	4.
1	1100	133	0.02	0.01	0.02	12.	*	1	2330	283	0.01	0.01	0.00	4.
1	1105	134	0.02	0.01	0.02	12.	*	1	2335	284	0.01	0.01	0.00	4.
1	1110	135	0.02	0.01	0.02	12.	*	1	2340	285	0.01	0.01	0.00	4.
1	1115	136	0.02	0.01	0.02	12.	*	1	2345	286	0.01	0.01	0.00	4.
1	1120	137	0.02	0.01	0.02	12.	*	1	2350	287	0.01	0.01	0.00	4.
1	1125	138	0.02	0.01	0.02	12.	*	1	2355	288	0.01	0.01	0.00	4.
1	1130	139	0.02	0.01	0.02	12.	*	2	0000	289	0.0	0.0	0.0	4.
1	1135	140	0.02	0.01	0.02	12.	*	2	0005	290	0.0	0.0	0.0	3.
1	1140	141	0.02	0.01	0.02	12.	*	2	0010	291	0.0	0.0	0.0	2.
1	1145	142	0.02	0.01	0.02	12.	*	2	0015	292	0.0	0.0	0.0	1.
1	1150	143	0.02	0.01	0.02	12.	*	2	0020	293	0.0	0.0	0.0	1.
1	1155	144	0.02	0.01	0.02	12.	*	2	0025	294	0.0	0.0	0.0	1.
1	1200	145	0.02	0.01	0.02	12.	*	2	0030	295	0.0	0.0	0.0	1.
1	1205	146	0.17	0.01	0.16	17.	*	2	0035	296	0.0	0.0	0.0	0.
1	1210	147	0.17	0.01	0.16	34.	*	2	0040	297	0.0	0.0	0.0	0.
1	1215	148	0.17	0.01	0.16	57.	*	2	0045	298	0.0	0.0	0.0	0.
1	1220	149	0.17	0.01	0.16	78.	*	2	0050	299	0.0	0.0	0.0	0.
1	1225	150	0.17	0.01	0.16	92.	*	2	0055	300	0.0	0.0	0.0	0.
							*			SUM	23.43	2.67	20.76	

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
738.	15.75	(CFS)	106.	51.	49.	49.
		(INCHES)	19.299	20.871	20.875	20.875
		(AC-FT)	92.	100.	100.	100.

CUMULATIVE AREA = 0.09 SQ MI

HYDROGRAPH AT STATION A1
PLAN 1, RATIO = 0.50

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	0.	1		0615	76	0.	1		1230	151	50.	1		1845	226	3.
1		0005	2	0.	1		0620	77	0.	1		1235	152	52.	1		1850	227	3.
1		0010	3	0.	1		0625	78	0.	1		1240	153	54.	1		1855	228	3.
1		0015	4	0.	1		0630	79	0.	1		1245	154	54.	1		1900	229	2.
1		0020	5	0.	1		0635	80	0.	1		1250	155	55.	1		1905	230	2.
1		0025	6	0.	1		0640	81	0.	1		1255	156	55.	1		1910	231	2.
1		0030	7	0.	1		0645	82	0.	1		1300	157	55.	1		1915	232	2.
1		0035	8	0.	1		0650	83	0.	1		1305	158	56.	1		1920	233	2.
1		0040	9	0.	1		0655	84	0.	1		1310	159	58.	1		1925	234	2.
1		0045	10	0.	1		0700	85	0.	1		1315	160	61.	1		1930	235	2.
1		0050	11	0.	1		0705	86	0.	1		1320	161	63.	1		1935	236	2.
1		0055	12	0.	1		0710	87	0.	1		1325	162	65.	1		1940	237	2.
1		0100	13	0.	1		0715	88	0.	1		1330	163	66.	1		1945	238	2.
1		0105	14	0.	1		0720	89	1.	1		1335	164	66.	1		1950	239	2.
1		0110	15	0.	1		0725	90	2.	1		1340	165	67.	1		1955	240	2.
1		0115	16	0.	1		0730	91	3.	1		1345	166	67.	1		2000	241	2.
1		0120	17	0.	1		0735	92	4.	1		1350	167	67.	1		2005	242	2.
1		0125	18	0.	1		0740	93	5.	1		1355	168	67.	1		2010	243	2.
1		0130	19	0.	1		0745	94	5.	1		1400	169	67.	1		2015	244	2.
1		0135	20	0.	1		0750	95	5.	1		1405	170	68.	1		2020	245	2.
1		0140	21	0.	1		0755	96	6.	1		1410	171	71.	1		2025	246	2.
1		0145	22	0.	1		0800	97	6.	1		1415	172	75.	1		2030	247	2.
1		0150	23	0.	1		0805	98	6.	1		1420	173	79.	1		2035	248	2.
1		0155	24	0.	1		0810	99	6.	1		1425	174	81.	1		2040	249	2.
1		0200	25	0.	1		0815	100	6.	1		1430	175	83.	1		2045	250	2.
1		0205	26	0.	1		0820	101	6.	1		1435	176	83.	1		2050	251	2.
1		0210	27	0.	1		0825	102	6.	1		1440	177	84.	1		2055	252	2.
1		0215	28	0.	1		0830	103	6.	1		1445	178	84.	1		2100	253	2.
1		0220	29	0.	1		0835	104	6.	1		1450	179	84.	1		2105	254	2.
1		0225	30	0.	1		0840	105	6.	1		1455	180	85.	1		2110	255	2.
1		0230	31	0.	1		0845	106	6.	1		1500	181	85.	1		2115	256	2.
1		0235	32	0.	1		0850	107	6.	1		1505	182	84.	1		2120	257	2.
1		0240	33	0.	1		0855	108	6.	1		1510	183	84.	1		2125	258	2.
1		0245	34	0.	1		0900	109	6.	1		1515	184	88.	1		2130	259	2.
1		0250	35	0.	1		0905	110	6.	1		1520	185	99.	1		2135	260	2.
1		0255	36	0.	1		0910	111	6.	1		1525	186	118.	1		2140	261	2.
1		0300	37	0.	1		0915	112	6.	1		1530	187	158.	1		2145	262	2.
1		0305	38	0.	1		0920	113	6.	1		1535	188	235.	1		2150	263	2.
1		0310	39	0.	1		0925	114	6.	1		1540	189	327.	1		2155	264	2.
1		0315	40	0.	1		0930	115	6.	1		1545	190	369.	1		2200	265	2.
1		0320	41	0.	1		0935	116	6.	1		1550	191	345.	1		2205	266	2.
1		0325	42	0.	1		0940	117	6.	1		1555	192	283.	1		2210	267	2.
1		0330	43	0.	1		0945	118	6.	1		1600	193	221.	1		2215	268	2.
1		0335	44	0.	1		0950	119	6.	1		1605	194	171.	1		2220	269	2.
1		0340	45	0.	1		0955	120	6.	1		1610	195	135.	1		2225	270	2.
1		0345	46	0.	1		1000	121	6.	1		1615	196	113.	1		2230	271	2.
1		0350	47	0.	1		1005	122	6.	1		1620	197	99.	1		2235	272	2.
1		0355	48	0.	1		1010	123	6.	1		1625	198	91.	1		2240	273	2.
1		0400	49	0.	1		1015	124	6.	1		1630	199	86.	1		2245	274	2.
1		0405	50	0.	1		1020	125	6.	1		1635	200	83.	1		2250	275	2.
1		0410	51	0.	1		1025	126	6.	1		1640	201	81.	1		2255	276	2.
1		0415	52	0.	1		1030	127	6.	1		1645	202	80.	1		2300	277	2.
1		0420	53	0.	1		1035	128	6.	1		1650	203	79.	1		2305	278	2.
1		0425	54	0.	1		1040	129	6.	1		1655	204	79.	1		2310	279	2.
1		0430	55	0.	1		1045	130	6.	1		1700	205	79.	1		2315	280	2.
1		0435	56	0.	1		1050	131	6.	1		1705	206	78.	1		2320	281	2.
1		0440	57	0.	1		1055	132	6.	1		1710	207	75.	1		2325	282	2.
1		0445	58	0.	1		1100	133	6.	1		1715	208	71.	1		2330	283	2.
1		0450	59	0.	1		1105	134	6.	1		1720	209	67.	1		2335	284	2.
1		0455	60	0.	1		1110	135	6.	1		1725	210	65.	1		2340	285	2.
1		0500	61	0.	1		1115	136	6.	1		1730	211	63.	1		2345	286	2.
1		0505	62	0.	1		1120	137	6.	1		1735	212	63.	1		2350	287	2.

1	0510	63	0.	*	1	1125	138	6.	*	1	1740	213	62.	*	1	2355	288	2.
1	0515	64	0.	*	1	1130	139	6.	*	1	1745	214	62.	*	2	0000	289	2.
1	0520	65	0.	*	1	1135	140	6.	*	1	1750	215	62.	*	2	0005	290	1.
1	0525	66	0.	*	1	1140	141	6.	*	1	1755	216	61.	*	2	0010	291	1.
1	0530	67	0.	*	1	1145	142	6.	*	1	1800	217	61.	*	2	0015	292	1.
1	0535	68	0.	*	1	1150	143	6.	*	1	1805	218	58.	*	2	0020	293	0.
1	0540	69	0.	*	1	1155	144	6.	*	1	1810	219	48.	*	2	0025	294	0.
1	0545	70	0.	*	1	1200	145	6.	*	1	1815	220	34.	*	2	0030	295	0.
1	0550	71	0.	*	1	1205	146	8.	*	1	1820	221	21.	*	2	0035	296	0.
1	0555	72	0.	*	1	1210	147	17.	*	1	1825	222	13.	*	2	0040	297	0.
1	0600	73	0.	*	1	1215	148	29.	*	1	1830	223	9.	*	2	0045	298	0.
1	0605	74	0.	*	1	1220	149	39.	*	1	1835	224	6.	*	2	0050	299	0.
1	0610	75	0.	*	1	1225	150	46.	*	1	1840	225	4.	*	2	0055	300	0.

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PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
369.	15.75	(CFS)	93.	25.	24.	24.
		(INCHES)	9.624	10.435	10.438	10.438
		(AC-FT)	46.	50.	50.	50.

CUMULATIVE AREA = 0.09 SQ MI

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14 KK      ***************
           *             *
           *      A2     *     ROUTE INFLOW HYDROGRAPH THROUGH ROCK ISLAND LAKE
           *             *
           ***************

           HYDROGRAPH ROUTING DATA

15 RS      STORAGE ROUTING
                NSTPS       1  NUMBER OF SUBREACHES
                 ITYP    STOR  TYPE OF INITIAL CONDITION
               RSVRIC   50.00  INITIAL CONDITION
                    X     0.0  WORKING R AND D COEFFICIENT

16 SV        STORAGE      0.0      50.0      61.0      62.0      64.0      66.1      68.2      70.3      75.7      81.2

17 SE      ELEVATION  1238.00   1250.00   1251.10   1251.20   1251.40   1251.60   1251.80   1252.00   1252.50   1253.00

18 SQ      DISCHARGE       0.        0.        9.       12.       43.      110.      215.      362.      928.     1734.

19 SE      ELEVATION  1238.00   1250.00   1251.10   1251.20   1251.40   1251.60   1251.80   1252.00   1252.50   1253.00

20 SS      SPILLWAY
              CREL    1250.00  SPILLWAY CREST ELEVATION
             SPWID       3.00  SPILLWAY WIDTH
              COSW       3.00  WEIR COEFFICIENT
              EXPW       1.50  EXPONENT OF HEAD

21 ST      TOP OF DAM
             TOPEL    1251.10  ELEVATION AT TOP OF DAM
             DAMWID    500.00  DAM WIDTH
              COSD       0.0   WEIR COEFFICIENT
              EXPD       1.50  EXPONENT OF HEAD
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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	50.00	61.00	62.00	64.00	66.10	68.20	70.30	75.70	81.20
OUTFLOW	0.0	0.0	8.90	11.70	43.00	110.00	215.00	362.00	928.00	1734.00

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HYDROGRAPH AT STATION A2
PLAN 1, RATIO = 0.50

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	0.	50.0	1250.0	1		0820	101	0.	50.4	1250.0	1		1640	201	106.	66.0	1251.6
1		0005	2	0.	50.0	1250.0	1		0825	102	0.	50.4	1250.0	1		1645	202	101.	65.8	1251.6
1		0010	3	0.	50.0	1250.0	1		0830	103	0.	50.4	1250.0	1		1650	203	97.	65.7	1251.6
1		0015	4	0.	50.0	1250.0	1		0835	104	0.	50.5	1250.0	1		1655	204	93.	65.6	1251.6
1		0020	5	0.	50.0	1250.0	1		0840	105	0.	50.5	1250.1	1		1700	205	90.	65.5	1251.5
1		0025	6	0.	50.0	1250.0	1		0845	106	0.	50.6	1250.1	1		1705	206	88.	65.4	1251.5
1		0030	7	0.	50.0	1250.0	1		0850	107	0.	50.6	1250.1	1		1710	207	86.	65.3	1251.5
1		0035	8	0.	50.0	1250.0	1		0855	108	1.	50.6	1250.1	1		1715	208	83.	65.3	1251.5
1		0040	9	0.	50.0	1250.0	1		0900	109	1.	50.7	1250.1	1		1720	209	80.	65.2	1251.5
1		0045	10	0.	50.0	1250.0	1		0905	110	1.	50.7	1250.1	1		1725	210	77.	65.1	1251.5
1		0050	11	0.	50.0	1250.0	1		0910	111	1.	50.7	1250.1	1		1730	211	75.	65.0	1251.5
1		0055	12	0.	50.0	1250.0	1		0915	112	1.	50.8	1250.1	1		1735	212	72.	64.9	1251.5
1		0100	13	0.	50.0	1250.0	1		0920	113	1.	50.8	1250.1	1		1740	213	70.	64.9	1251.5
1		0105	14	0.	50.0	1250.0	1		0925	114	1.	50.8	1250.1	1		1745	214	69.	64.8	1251.5
1		0110	15	0.	50.0	1250.0	1		0930	115	1.	50.9	1250.1	1		1750	215	67.	64.8	1251.5
1		0115	16	0.	50.0	1250.0	1		0935	116	1.	50.9	1250.1	1		1755	216	66.	64.7	1251.5
1		0120	17	0.	50.0	1250.0	1		0940	117	1.	50.9	1250.1	1		1800	217	65.	64.7	1251.5
1		0125	18	0.	50.0	1250.0	1		0945	118	1.	51.0	1250.1	1		1805	218	64.	64.7	1251.5
1		0130	19	0.	50.0	1250.0	1		0950	119	1.	51.0	1250.1	1		1810	219	62.	64.6	1251.5
1		0135	20	0.	50.0	1250.0	1		0955	120	1.	51.0	1250.1	1		1815	220	58.	64.5	1251.4
1		0140	21	0.	50.0	1250.0	1		1000	121	1.	51.1	1250.1	1		1820	221	52.	64.3	1251.4
1		0145	22	0.	50.0	1250.0	1		1005	122	1.	51.1	1250.1	1		1825	222	45.	64.1	1251.4
1		0150	23	0.	50.0	1250.0	1		1010	123	1.	51.1	1250.1	1		1830	223	41.	63.8	1251.4
1		0155	24	0.	50.0	1250.0	1		1015	124	1.	51.2	1250.1	1		1835	224	37.	63.6	1251.4
1		0200	25	0.	50.0	1250.0	1		1020	125	1.	51.2	1250.1	1		1840	225	34.	63.4	1251.3
1		0205	26	0.	50.0	1250.0	1		1025	126	1.	51.2	1250.1	1		1845	226	31.	63.2	1251.3
1		0210	27	0.	50.0	1250.0	1		1030	127	1.	51.3	1250.1	1		1850	227	28.	63.0	1251.3
1		0215	28	0.	50.0	1250.0	1		1035	128	1.	51.3	1250.1	1		1855	228	25.	62.9	1251.3
1		0220	29	0.	50.0	1250.0	1		1040	129	1.	51.3	1250.1	1		1900	229	23.	62.7	1251.3
1		0225	30	0.	50.0	1250.0	1		1045	130	1.	51.4	1250.1	1		1905	230	21.	62.6	1251.3
1		0230	31	0.	50.0	1250.0	1		1050	131	1.	51.4	1250.1	1		1910	231	19.	62.5	1251.2
1		0235	32	0.	50.0	1250.0	1		1055	132	1.	51.4	1250.1	1		1915	232	17.	62.3	1251.2
1		0240	33	0.	50.0	1250.0	1		1100	133	1.	51.5	1250.1	1		1920	233	16.	62.2	1251.2
1		0245	34	0.	50.0	1250.0	1		1105	134	1.	51.5	1250.1	1		1925	234	14.	62.2	1251.2
1		0250	35	0.	50.0	1250.0	1		1110	135	1.	51.5	1250.2	1		1930	235	13.	62.1	1251.2
1		0255	36	0.	50.0	1250.0	1		1115	136	1.	51.5	1250.2	1		1935	236	12.	62.0	1251.2
1		0300	37	0.	50.0	1250.0	1		1120	137	1.	51.6	1250.2	1		1940	237	12.	61.9	1251.2
1		0305	38	0.	50.0	1250.0	1		1125	138	1.	51.6	1250.2	1		1945	238	11.	61.9	1251.2
1		0310	39	0.	50.0	1250.0	1		1130	139	1.	51.6	1250.2	1		1950	239	11.	61.8	1251.2
1		0315	40	0.	50.0	1250.0	1		1135	140	1.	51.7	1250.2	1		1955	240	11.	61.7	1251.2
1		0320	41	0.	50.0	1250.0	1		1140	141	1.	51.7	1250.2	1		2000	241	11.	61.7	1251.2
1		0325	42	0.	50.0	1250.0	1		1145	142	1.	51.7	1250.2	1		2005	242	11.	61.6	1251.2
1		0330	43	0.	50.0	1250.0	1		1150	143	1.	51.7	1250.2	1		2010	243	10.	61.6	1251.2
1		0335	44	0.	50.0	1250.0	1		1155	144	1.	51.8	1250.2	1		2015	244	10.	61.5	1251.1
1		0340	45	0.	50.0	1250.0	1		1200	145	1.	51.8	1250.2	1		2020	245	10.	61.4	1251.1
1		0345	46	0.	50.0	1250.0	1		1205	146	1.	51.8	1250.2	1		2025	246	10.	61.4	1251.1
1		0350	47	0.	50.0	1250.0	1		1210	147	2.	51.9	1250.2	1		2030	247	10.	61.3	1251.1
1		0355	48	0.	50.0	1250.0	1		1215	148	2.	52.1	1250.2	1		2035	248	10.	61.3	1251.1
1		0400	49	0.	50.0	1250.0	1		1220	149	2.	52.3	1250.2	1		2040	249	10.	61.2	1251.1
1		0405	50	0.	50.0	1250.0	1		1225	150	2.	52.6	1250.3	1		2045	250	9.	61.2	1251.1
1		0410	51	0.	50.0	1250.0	1		1230	151	2.	52.9	1250.3	1		2050	251	9.	61.1	1251.1
1		0415	52	0.	50.0	1250.0	1		1235	152	2.	53.2	1250.3	1		2055	252	9.	61.1	1251.1

1	0420	53		0.	50.0	1250.0	*	1	1240	153		3.	53.5	1250.4	*	1	2100	253		9.	61.0	1251.1
1	0425	54		0.	50.0	1250.0	*	1	1245	154		3.	53.9	1250.4	*	1	2105	254		9.	61.0	1251.1
1	0430	55		0.	50.0	1250.0	*	1	1250	155		3.	54.3	1250.4	*	1	2110	255		9.	60.9	1251.1
1	0435	56		0.	50.0	1250.0	*	1	1255	156		4.	54.6	1250.5	*	1	2115	256		9.	60.9	1251.1
1	0440	57		0.	50.0	1250.0	*	1	1300	157		4.	55.0	1250.5	*	1	2120	257		9.	60.8	1251.1
1	0445	58		0.	50.0	1250.0	*	1	1305	158		4.	55.3	1250.5	*	1	2125	258		9.	60.8	1251.1
1	0450	59		0.	50.0	1250.0	*	1	1310	159		5.	55.7	1250.6	*	1	2130	259		9.	60.7	1251.1
1	0455	60		0.	50.0	1250.0	*	1	1315	160		5.	56.0	1250.6	*	1	2135	260		9.	60.7	1251.1
1	0500	61		0.	50.0	1250.0	*	1	1320	161		5.	56.4	1250.6	*	1	2140	261		9.	60.7	1251.1
1	0505	62		0.	50.0	1250.0	*	1	1325	162		6.	56.8	1250.7	*	1	2145	262		9.	60.6	1251.1
1	0510	63		0.	50.0	1250.0	*	1	1330	163		6.	57.3	1250.7	*	1	2150	263		9.	60.6	1251.1
1	0515	64		0.	50.0	1250.0	*	1	1335	164		6.	57.7	1250.8	*	1	2155	264		9.	60.5	1251.1
1	0520	65		0.	50.0	1250.0	*	1	1340	165		7.	58.1	1250.8	*	1	2200	265		8.	60.5	1251.0
1	0525	66		0.	50.0	1250.0	*	1	1345	166		7.	58.5	1250.8	*	1	2205	266		8.	60.4	1251.0
1	0530	67		0.	50.0	1250.0	*	1	1350	167		7.	58.9	1250.9	*	1	2210	267		8.	60.4	1251.0
1	0535	68		0.	50.0	1250.0	*	1	1355	168		8.	59.3	1250.9	*	1	2215	268		8.	60.4	1251.0
1	0540	69		0.	50.0	1250.0	*	1	1400	169		8.	59.7	1251.0	*	1	2220	269		8.	60.3	1251.0
1	0545	70		0.	50.0	1250.0	*	1	1405	170		9.	60.1	1251.0	*	1	2225	270		8.	60.3	1251.0
1	0550	71		0.	50.0	1250.0	*	1	1410	171		9.	60.5	1251.1	*	1	2230	271		8.	60.2	1251.0
1	0555	72		0.	50.0	1250.0	*	1	1415	172		9.	61.0	1251.1	*	1	2235	272		8.	60.2	1251.0
1	0600	73		0.	50.0	1250.0	*	1	1420	173		10.	61.4	1251.1	*	1	2240	273		8.	60.1	1251.0
1	0605	74		0.	50.0	1250.0	*	1	1425	174		11.	61.9	1251.2	*	1	2245	274		8.	60.1	1251.0
1	0610	75		0.	50.0	1250.0	*	1	1430	175		16.	62.4	1251.2	*	1	2250	275		8.	60.1	1251.0
1	0615	76		0.	50.0	1250.0	*	1	1435	176		24.	62.8	1251.3	*	1	2255	276		8.	60.0	1251.0
1	0620	77		0.	50.0	1250.0	*	1	1440	177		30.	63.2	1251.3	*	1	2300	277		8.	60.0	1251.0
1	0625	78		0.	50.0	1250.0	*	1	1445	178		36.	63.5	1251.4	*	1	2305	278		8.	59.9	1251.0
1	0630	79		0.	50.0	1250.0	*	1	1450	179		41.	63.9	1251.4	*	1	2310	279		8.	59.9	1251.0
1	0635	80		0.	50.0	1250.0	*	1	1455	180		47.	64.1	1251.4	*	1	2315	280		8.	59.9	1251.0
1	0640	81		0.	50.0	1250.0	*	1	1500	181		55.	64.4	1251.4	*	1	2320	281		8.	59.8	1251.0
1	0645	82		0.	50.0	1250.0	*	1	1505	182		60.	64.5	1251.5	*	1	2325	282		8.	59.8	1251.0
1	0650	83		0.	50.0	1250.0	*	1	1510	183		65.	64.7	1251.5	*	1	2330	283		8.	59.7	1251.0
1	0655	84		0.	50.0	1250.0	*	1	1515	184		69.	64.8	1251.5	*	1	2335	284		8.	59.7	1251.0
1	0700	85		0.	50.0	1250.0	*	1	1520	185		74.	65.0	1251.5	*	1	2340	285		8.	59.6	1251.0
1	0705	86		0.	50.0	1250.0	*	1	1525	186		81.	65.2	1251.5	*	1	2345	286		8.	59.6	1251.0
1	0710	87		0.	50.0	1250.0	*	1	1530	187		92.	65.5	1251.5	*	1	2350	287		8.	59.6	1251.0
1	0715	88		0.	50.0	1250.0	*	1	1535	188		114.	66.2	1251.6	*	1	2355	288		8.	59.5	1251.0
1	0720	89		0.	50.0	1250.0	*	1	1540	189		163.	67.2	1251.7	*	2	0000	289		8.	59.5	1250.9
1	0725	90		0.	50.0	1250.0	*	1	1545	190		218.	68.2	1251.8	*	2	0005	290		8.	59.4	1250.9
1	0730	91		0.	50.0	1250.0	*	1	1550	191		272.	69.0	1251.9	*	2	0010	291		8.	59.4	1250.9
1	0735	92		0.	50.1	1250.0	*	1	1555	192		288.	69.2	1251.9	*	2	0015	292		8.	59.4	1250.9
1	0740	93		0.	50.1	1250.0	*	1	1600	193		274.	69.0	1251.9	*	2	0020	293		8.	59.3	1250.9
1	0745	94		0.	50.1	1250.0	*	1	1605	194		244.	68.6	1251.8	*	2	0025	294		7.	59.3	1250.9
1	0750	95		0.	50.1	1250.0	*	1	1610	195		210.	68.1	1251.8	*	2	0030	295		7.	59.2	1250.9
1	0755	96		0.	50.2	1250.0	*	1	1615	196		185.	67.6	1251.7	*	2	0035	296		7.	59.2	1250.9
1	0800	97		0.	50.2	1250.0	*	1	1620	197		162.	67.1	1251.7	*	2	0040	297		7.	59.1	1250.9
1	0805	98		0.	50.3	1250.0	*	1	1625	198		142.	66.7	1251.7	*	2	0045	298		7.	59.1	1250.9
1	0810	99		0.	50.3	1250.0	*	1	1630	199		125.	66.4	1251.6	*	2	0050	299		7.	59.0	1250.9
1	0815	100		0.	50.3	1250.0	*	1	1635	200		114.	66.2	1251.6	*	2	0055	300		7.	59.0	1250.9

AK OUTFLOW IS 288. AT TIME 15.92 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	24.92-HR
288.	15.92	(CFS)	74.	21.	20.	20.
		(INCHES)	7.618	8.526	8.526	8.526
		(AC-FT)	37.	41.	41.	41.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	24.92-HR
69.	15.92	64.	56.	56.	56.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	24.92-HR
1251.90	15.92	1251.34	1250.61	1250.58	1250.58

CUMULATIVE AREA = 0.09 SQ MI

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

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO FLOWS RATIO 1 0.50
HYDROGRAPH AT	A1	0.09	1	FLOW	369.
				TIME	15.75
ROUTED TO	A2	0.09	1	FLOW	288.
				TIME	15.92
			** PEAK STAGES IN FEET **		
			1	STAGE	1251.90
				TIME	15.92

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1250.00	1250.00	1251.10
STORAGE	50.	50.	61.
OUTFLOW	0.	0.	9.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1251.90	0.80	69.	288.	6.75	15.92	0.0

*** NORMAL END OF JOB ***

```
LINE          IC.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1         IC    ROCK ISLAND LAKE DAM   OVERTOPPING ANALYSIS   TOM GOOCH   ANCO
    2         IC    NEW JERSEY DAM NO. 819 - SUSSEX COUNTY - SPARTA TOWNSHIP
    3         ID    0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP
    4         IT          5                C       300
    5         IC          3                0
    6         JR    FLOW      0.1      0.25       0.5       1.0

    7         KK      A1  DEVELOP INFLOW HYDROGRAPH TO ROCK ISLAND LAKE DAM
    8         KM      INFLOW FROM SCS UNIT GRAPH COMPUTATIONS
    9         BA    0.09               0
   10         BF    0.27      0.27                 1
   11         PM    22.2                                 NO      113      123      132
   12         LU          1       0.1
   13         LD    0.22

   14         KK      A2  ROUTE INFLOW HYDROGRAPH THROUGH ROCK ISLAND LAKE
   15         RS          1       STOR              0.
   16         SV         0.      50.      61.      62.      64.      66.1     68.2     70.3     75.7     81.2
   17         SE       1238.    1250.    1251.1   1251.2   1251.4   1251.6   1251.8   1252.    1252.5   1253.
   18         SQ          0.       0.       6.5     11.7     43.      110.     215.     362.     928.     1734.
   19         SE       1238.    1250.    1251.1   1251.2   1251.4   1251.6   1251.8   1252.    1252.5   1253.
   20         RS    1250.0      -3.0              2.0       1.5
   21         RT    1251.1     500.      0.0      1.5
   22         ZZ
```

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

OPERATION	STATION	AREA	PLAN		RATIO 1	RATIOS APPLIED TO FLOWS RATIO 2	RATIO 3	RATIO 4
					0.10	0.25	0.50	1.00
HYDROGRAPH AT	A1	0.09	1	FLOW	74.	184.	369.	738.
				TIME	15.75	15.75	15.75	15.75
ROUTED TO	A2	0.09	1	FLOW	6.	68.	288.	640.
				TIME	16.25	16.17	15.92	15.83
			** PEAK STAGES IN FEET **					
			1	STAGE	1250.79	1251.48	1251.90	1252.25
				TIME	16.25	16.17	15.92	15.83

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1250.00	1250.00	1261.10
STORAGE	50.	50.	61.
OUTFLOW	0.	0.	9.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.10	1250.79	0.0	58.	6.	0.0	18.25	0.0
0.25	1251.48	0.38	65.	68.	4.75	16.17	0.0
0.50	1251.90	0.80	69.	208.	6.75	15.62	0.0
1.00	1252.25	1.15	73.	640.	8.75	15.83	0.0

*** NORMAL END OF JOB ***

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1         ID    ROCK ISLAND LAKE DAM     BREACH ANALYSIS       TOM GOOCH   ANCO
    2         ID    NEW JERSEY DAM NO. 819 - SUSSEX COUNTY - SPARTA TOWNSHIP
    3         IT       1          0    100
    4         IO       2       1
    5         KK      A1  INFLOW HYDROGRAPH FOR ROCK ISLAND LAKE
    6         QI     8.8     8.8     8.8     8.8     50.     50.
    7         KK      A2  ROUTE INFLOW HYDROGRAPH THROUGH ROCK ISLAND LAKE
    8         KO       2       2
    9         RS       1   FLOW      8.8
   10         SV      0.     50.     61.     62.     64.   66.1   68.2   70.3   75.7   81.2
   11         SE    1238.  1250.  1251.1  1251.2  1251.4 1251.6 1251.8  1252.  1252.5  1253.
   12         SQ      0.      0.     8.9    11.7     43.    110.    215.    362.    928.  1734.
   13         SE    1238.  1250.  1251.1  1251.2  1251.4 1251.6 1251.8  1252.  1252.5  1253.
   14         SS  1250.0     3.0     3.0     1.5
   15         ST  1251.1     500.    0.0     1.5
   16         SD    1238.    100.     0.     .25  1251.1
   17         KK      A3  ROUTE OUTFLOW TO DAMAGE-CENTER
   18         KO       2       2
   19         RS       1   FLOW      8.8
   20         SV      2.      3.      4.      5.      6.      7.      8.      9.     10.
   21         SE      0.      1.      2.      3.      4.      5.      6.      7.      8.
   22         SQ      0.     15.    332.    950.   1821.   2939.   4306.   5930.   7815.
   23         SE      0.      1.      2.      3.      4.      5.      6.      7.      8.
   24         ZZ
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FLOOD HYDROGRAPH PACKAGE (HEC-1)
FEBRUARY 1981

RUN DATE07/07/81      TIME17.06.58
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U.S. ARMY CORPS OF ENGINEERS
THE HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 440-3285 OR (FTS) 448-3285

ROCK ISLAND LAKE DAM BREACH ANALYSIS TOM GOOCH ANCO
NEW JERSEY DAM NO. 819 - SUSSEX COUNTY - SPARTA TOWNSHIP

```
4 IO          OUTPUT CONTROL VARIABLES
                 IPRNT        2  PRINT CONTROL
                 IPLOT        1  PLOT CONTROL
                 QSCAL        0. HYDROGRAPH PLOT SCALE
                  CMSG      YES  PRINT DIAGNOSTIC MESSAGES

  IT          HYDROGRAPH TIME DATA
                  NMIN        1  MINUTES IN COMPUTATION INTERVAL
                 IDATE      1  0  STARTING DATE
                 ITIME         0000  STARTING TIME
                    NQ          100  NUMBER OF HYDROGRAPH ORDINATES
                NQDATE      1  0  ENDING DATE
                NQTIME         0139  ENDING TIME

              COMPUTATION INTERVAL     0.02 HOURS
                  TOTAL TIME BASE      1.65 HOURS

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

> *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

5 KK          A1          INFLOW HYDROGRAPH FOR ROCK ISLAND LAKE

          SUBBASIN RUNOFF DATA

0 BA          SUBBASIN CHARACTERISTICS
                 TAREA        0.0   SUBBASIN AREA

                                                  ***

                          HYDROGRAPH AT STATION       A1
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DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	9.	1		0025	26	50.	1		0050	51	50.	1		0115	76	50.
1		0001	2	9.	1		0026	27	50.	1		0051	52	50.	1		0116	77	50.
1		0002	3	9.	1		0027	28	50.	1		0052	53	50.	1		0117	78	50.
1		0003	4	9.	1		0028	29	50.	1		0053	54	50.	1		0118	79	50.
1		0004	5	50.	1		0029	30	50.	1		0054	55	50.	1		0119	80	50.
1		0005	6	50.	1		0030	31	50.	1		0055	56	50.	1		0120	81	50.
1		0006	7	50.	1		0031	32	50.	1		0056	57	50.	1		0121	82	50.
1		0007	8	50.	1		0032	33	50.	1		0057	58	50.	1		0122	83	50.
1		0008	9	50.	1		0033	34	50.	1		0058	59	50.	1		0123	84	50.
1		0009	10	50.	1		0034	35	50.	1		0059	60	50.	1		0124	85	50.
1		0010	11	50.	1		0035	36	50.	1		0100	61	50.	1		0125	86	50.
1		0011	12	50.	1		0036	37	50.	1		0101	62	50.	1		0126	87	50.
1		0012	13	50.	1		0037	38	50.	1		0102	63	50.	1		0127	88	50.
1		0013	14	50.	1		0038	39	50.	1		0103	64	50.	1		0128	89	50.
1		0014	15	50.	1		0039	40	50.	1		0104	65	50.	1		0129	90	50.
1		0015	16	50.	1		0040	41	50.	1		0105	66	50.	1		0130	91	50.
1		0016	17	50.	1		0041	42	50.	1		0106	67	50.	1		0131	92	50.
1		0017	18	50.	1		0042	43	50.	1		0107	68	50.	1		0132	93	50.
1		0018	19	50.	1		0043	44	50.	1		0108	69	50.	1		0133	94	50.
1		0019	20	50.	1		0044	45	50.	1		0109	70	50.	1		0134	95	50.
1		0020	21	50.	1		0045	46	50.	1		0110	71	50.	1		0135	96	50.
1		0021	22	50.	1		0046	47	50.	1		0111	72	50.	1		0136	97	50.
1		0022	23	50.	1		0047	48	50.	1		0112	73	50.	1		0137	98	50.
1		0023	24	50.	1		0048	49	50.	1		0113	74	50.	1		0138	99	50.
1		0024	25	50.	1		0049	50	50.	1		0114	75	50.	1		0139	100	50.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	1.65-HR
50.	0.07	(CFS)	49.	49.	49.	49.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	7.	7.	7.	7.

CUMULATIVE AREA = 0.0 SQ MI

* ***

7 KK A2 ROUTE INFLOW HYDROGRAPH THROUGH ROCK ISLAND LAKE

8 KO OUTPUT CONTROL VARIABLES
IPRNT 2 PRINT CONTROL
IPLOT 2 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

9 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP FLOW TYPE OF INITIAL CONDITION
RSVRIC 8.80 INITIAL CONDITION
X 0.0 WORKING R AND D COEFFICIENT

10 SV	STORAGE	0.0	50.0	61.0	62.0	64.0	66.1	68.2	70.3	75.7	81.2
11 SE	ELEVATION	1238.00	1250.00	1251.10	1251.20	1251.40	1251.60	1251.80	1252.00	1252.50	1253.00
12 SQ	DISCHARGE	0.	0.	9.	12.	43.	110.	215.	362.	928.	1734.
13 SE	ELEVATION	1238.00	1250.00	1251.10	1251.20	1251.40	1251.60	1251.80	1252.00	1252.50	1253.00

14 SS	SPILLWAY		
	CREL	1250.00	SPILLWAY CREST ELEVATION
	SPWID	3.00	SPILLWAY WIDTH
	COSW	3.00	WEIR COEFFICIENT
	EXPW	1.50	EXPONENT OF HEAD
15 ST	TOP OF DAM		
	TOPEL	1251.10	ELEVATION AT TOP OF DAM
	DAMWID	500.00	DAM WIDTH
	COSD	0.0	WEIR COEFFICIENT
	EXPD	1.50	EXPONENT OF HEAD
16 SB	BREACH DATA		
	ELBM	1238.00	ELEVATION AT BOTTOM OF BREACH
	BRWID	100.00	WIDTH OF BREACH BOTTOM
	Z	0.0	BREACH SIDE SLOPE
	TFAIL	0.25	TIME FOR BREACH TO DEVELOP
	FAILEL	1251.10	W.S. ELEVATION TO TRIGGER FAILURE

***

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	50.00	61.00	62.00	64.00	66.10	68.20	70.30	75.70	81.20
OUTFLOW	0.0	0.0	8.90	11.70	43.00	110.00	215.00	362.00	928.00	1734.00

BEGIN DAM FAILURE AT 0.10 HOURS

HYDROGRAPH AT STATION A2

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	9.	60.9	1251.1	1		0034	35	264.	3.8	1238.9	1		0108	69	56.	1.3	1238.3
1		0001	2	9.	60.9	1251.1	1		0035	36	235.	3.5	1238.8	1		0110	71	55.	1.3	1238.3
1		0002	3	9.	60.9	1251.1	1		0036	37	211.	3.2	1238.8	1		0110	71	55.	1.3	1238.3
1		0003	4	9.	60.9	1251.1	1		0037	38	191.	3.0	1238.7	1		0111	72	54.	1.3	1238.3
1		0004	5	9.	60.9	1251.1	1		0038	39	174.	2.8	1238.7	1		0112	73	54.	1.3	1238.3
1		0005	6	9.	61.0	1251.1	1		0039	40	160.	2.7	1238.6	1		0113	74	53.	1.3	1238.3
1		0006	7	9.	61.0	1251.1	1		0040	41	147.	2.5	1238.6	1		0114	75	53.	1.3	1238.3
1		0007	8	26.	61.1	1251.1	1		0041	42	136.	2.4	1238.6	1		0115	76	53.	1.3	1238.3
1		0008	9	104.	61.0	1251.1	1		0042	43	127.	2.3	1238.6	1		0116	77	52.	1.3	1238.3
1		0009	10	268.	60.9	1251.1	1		0043	44	118.	2.2	1238.5	1		0117	78	52.	1.3	1238.3
1		0010	11	531.	60.4	1251.0	1		0044	45	111.	2.1	1238.5	1		0118	79	52.	1.3	1238.3
1		0011	12	896.	59.5	1250.9	1		0045	46	105.	2.0	1238.5	1		0119	80	52.	1.3	1238.3
1		0012	13	1359.	58.0	1250.8	1		0046	47	99.	2.0	1238.5	1		0120	81	52.	1.3	1238.3
1		0013	14	1907.	55.8	1250.6	1		0047	48	94.	1.9	1238.5	1		0121	82	51.	1.3	1238.3
1		0014	15	2521.	52.1	1250.3	1		0048	49	90.	1.8	1238.4	1		0122	83	51.	1.3	1238.3
1		0015	16	3080.	49.0	1249.8	1		0049	50	86.	1.8	1238.4	1		0123	84	51.	1.3	1238.3
1		0016	17	3292.	44.7	1248.7	1		0050	51	83.	1.7	1238.4	1		0124	85	51.	1.3	1238.3
1		0017	18	3432.	40.1	1247.6	1		0051	52	79.	1.7	1238.4	1		0125	86	51.	1.3	1238.3
1		0018	19	3510.	35.4	1246.5	1		0052	53	77.	1.6	1238.4	1		0126	87	50.	1.2	1238.3
1		0019	20	3537.	30.6	1245.3	1		0053	54	74.	1.6	1238.4	1		0127	88	50.	1.2	1238.3
1		0020	21	3528.	25.8	1244.2	1		0054	55	72.	1.6	1238.4	1		0128	89	50.	1.2	1238.3
1		0021	22	3494.	21.0	1243.0	1		0055	56	70.	1.6	1238.4	1		0129	90	50.	1.2	1238.3
1		0022	23	2537.	17.0	1242.1	1		0056	57	68.	1.5	1238.4	1		0130	91	50.	1.2	1238.3
1		0023	24	1903.	14.0	1241.4	1		0057	58	66.	1.5	1238.4	1		0131	92	50.	1.2	1238.3
1		0024	25	1466.	11.8	1240.9	1		0058	59	65.	1.5	1238.4	1		0132	93	50.	1.2	1238.3
1		0025	26	1156.	10.1	1240.4	1		0059	60	64.	1.5	1238.3	1		0133	94	50.	1.2	1238.3
1		0026	27	929.	8.7	1240.1	1		0100	61	62.	1.4	1238.3	1		0134	95	50.	1.2	1238.3
1		0027	28	760.	7.6	1239.8	1		0101	62	61.	1.4	1238.3	1		0135	96	50.	1.2	1238.3
1		0028	29	631.	6.7	1239.6	1		0102	63	60.	1.4	1238.3	1		0136	97	50.	1.2	1238.3
1		0029	30	529.	6.0	1239.4	1		0103	64	59.	1.4	1238.3	1		0137	98	50.	1.2	1238.3
1		0030	31	447.	5.4	1239.3	1		0104	65	58.	1.4	1238.3	1		0138	99	50.	1.2	1238.3
1		0031	32	381.	4.9	1239.1	1		0105	66	57.	1.4	1238.3	1		0139	100	50.	1.2	1238.3
1		0032	33	327.	4.5	1239.0	1		0106	67	57.	1.4	1238.3	1		0140	101	50.	1.2	1238.3
1		0033	34	283.	4.1	1238.9	1		0107	68	56.	1.3	1238.3	1		0141	102	50.	1.2	1238.3

1						*	1							*	1											
1	0028	29	631.	6.7	1239.6	*	1	0102	63	60.	1.4	1238.3	*	1	0135	96	50.	1.2	1238.3							
1	0029	30	531.	6.0	1239.4	*	1	0103	64	59.	1.4	1238.3	*	1	0136	97	50.	1.2	1238.3							
1	0030	31	453.	5.4	1239.3	*	1	0104	65	58.	1.4	1238.3	*	1	0137	98	50.	1.2	1238.3							
1	0031	32	390.	4.9	1239.2	*	1	0105	66	58.	1.4	1238.3	*	1	0138	99	50.	1.2	1238.3							
1	0032	33	339.	4.4	1239.1	*	1	0106	67	57.	1.3	1238.3	*	1	0139	100	50.	1.2	1238.3							
1	0033	34	298.	4.1	1239.0	*	1	0107	68	56.	1.3	1238.3	*													
						*							*													

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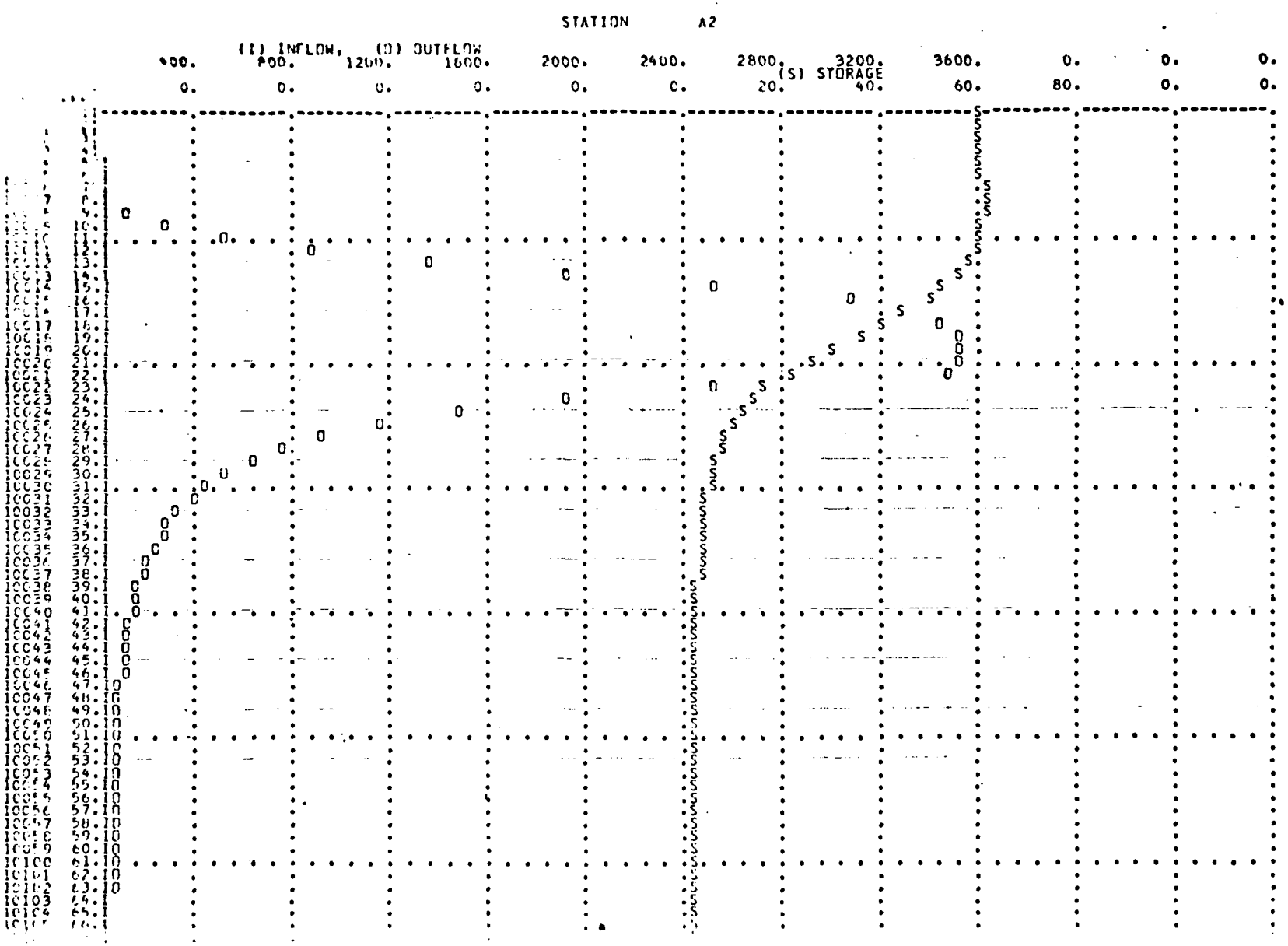
AK OUTFLOW IS 3537. AT TIME 0.32 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	1.65-HR
3537.	0.32	(CFS)	486.	486.	486.	486.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	66.	66.	66.	66.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	1.65-HR
61.	0.12	13.	13.	13.	13.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	1.65-HR
1251.11	0.12	1240.98	1240.98	1240.98	1240.98

CUMULATIVE AREA = 0.0 SQ MI


STATION A2
(I) INFLOW, (O) OUTFLOW
(S) STORAGE
400. 800. 1200. 1600. 2000. 2400. 2800. 3200. 3600.
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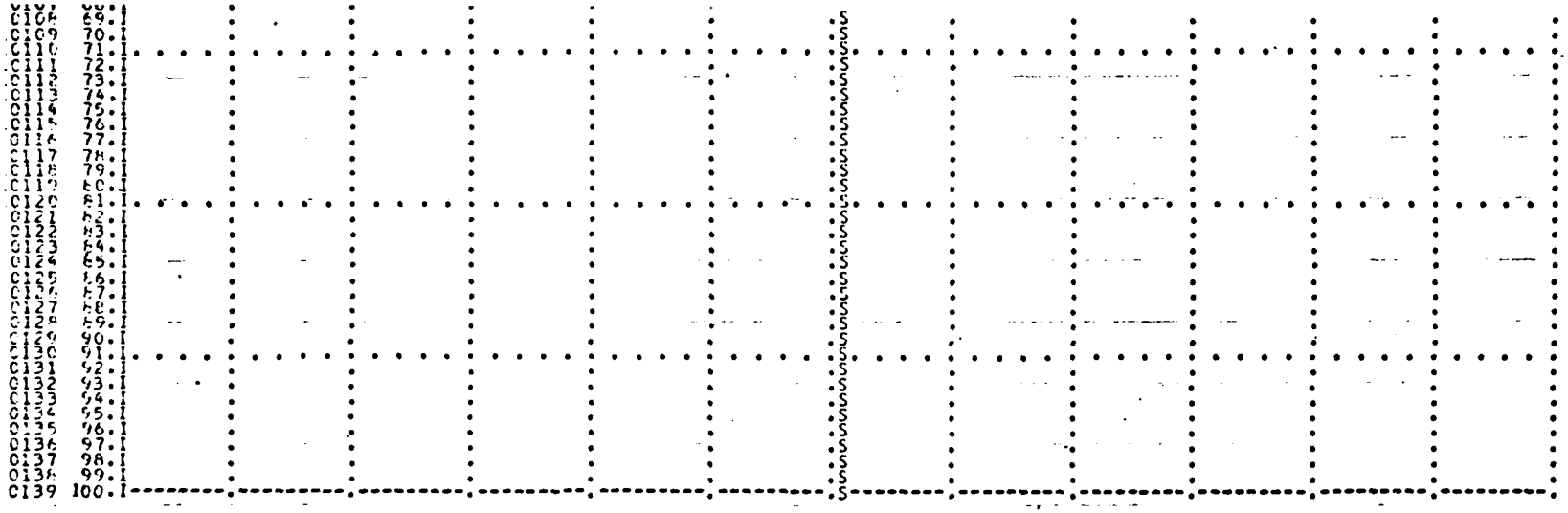
0. 0. 0.
0. 0. 0.



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

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          *             *
 17 KK    *      A3     *      ROUTE OUTFLOW TO DAMAGE CENTER
          *             *
          ***************

 18 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          2  PRINT CONTROL
                     IPLOT          2  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 19 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       FLOW  TYPE OF INITIAL CONDITION
                    RSVRIC        8.80  INITIAL CONDITION
                         X        0.0  WORKING R AND D COEFFICIENT

 20 SV            STORAGE        2.0       3.0       4.0       5.0       6.0       7.0       8.0       9.0      10.0
 21 SE          ELEVATION        0.0       1.00      2.00      3.00      4.00      5.00      6.00      7.00      8.00
 22 SQ          DISCHARGE          0.       15.      332.      950.     1821.     2939.     4306.     5930.     7815.
 23 SE          ELEVATION        0.0       1.00      2.00      3.00      4.00      5.00      6.00      7.00      8.00
                                                                  ***

                                        COMPUTED STORAGE-OUTFLOW CURVE
               STORAGE        2.00      3.00      4.00      5.00      6.00      7.00      8.00      9.00     10.00
               OUTFLOW         0.0      15.00     332.00    950.00   1821.00   2939.00   4306.00   5930.00   7815.00

** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN     4306. TO     7815.
              USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

PEAK FLOW     TIME                                  MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                    6-HR          24-HR          72-HR        1.65-HR
 3532.        0.33          (CFS)      482.           482.           482.         482.
                        (INCHES)     0.000          0.000          0.000        0.000
                          (AC-FT)      66.            66.            66.          66.

PEAK STORAGE  TIME                                  MAXIMUM AVERAGE STORAGE
(AC-FT)       (HR)                    6-HR          24-HR          72-HR        1.65-HR
    7.        0.33                     4.             4.             4.           4.

PEAK STAGE    TIME                                  MAXIMUM AVERAGE STAGE
  (FEET)      (HR)                    6-HR          24-HR          72-HR        1.65-HR
    5.43      0.33                    1.76           1.76           1.76         1.76

                        CUMULATIVE AREA =    0.0  SQ MI
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RUNOFF 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 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	50.	0.07	49.	49.	49.	0.0		
ROUTED TO	A2	3537.	0.32	486.	486.	486.	0.0	1251.11	0.12
ROUTED TO	A3	3532.	0.33	482.	482.	482.	0.0	5.43	0.33

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1251.09	1250.00	1251.10
STORAGE	61.	50.	61.
OUTFLOW	9.	12803.	14613.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1251.11	0.01	61.	3537.	0.06	0.32	0.10

* NORMAL END OF JOB ***

APPENDIX 5

REFERENCES

ROCK ISLAND LAKE

APPENDIX 5
REFERENCES

ROCK ISLAND LAKE DAM

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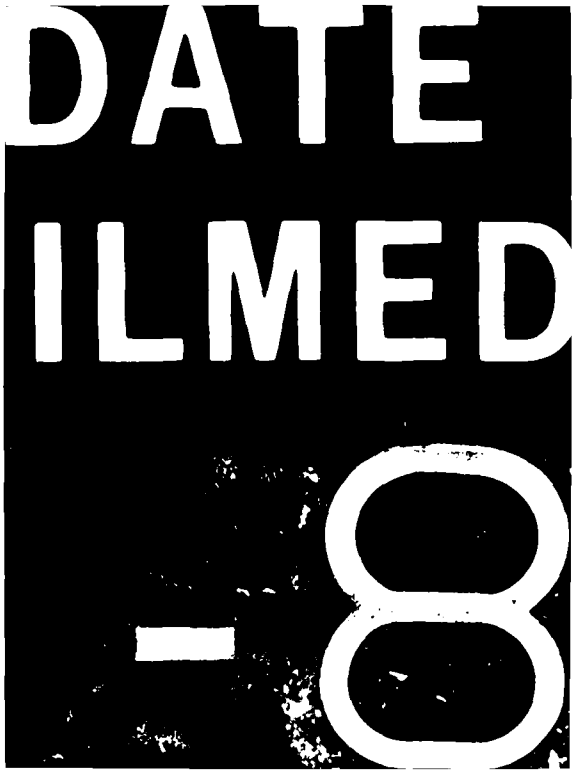
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