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NATIONAL DAM SAFETY PROGRAM. COUNTRY LAKES DAM NUMBER 1 (NJ-000--ETC(U)
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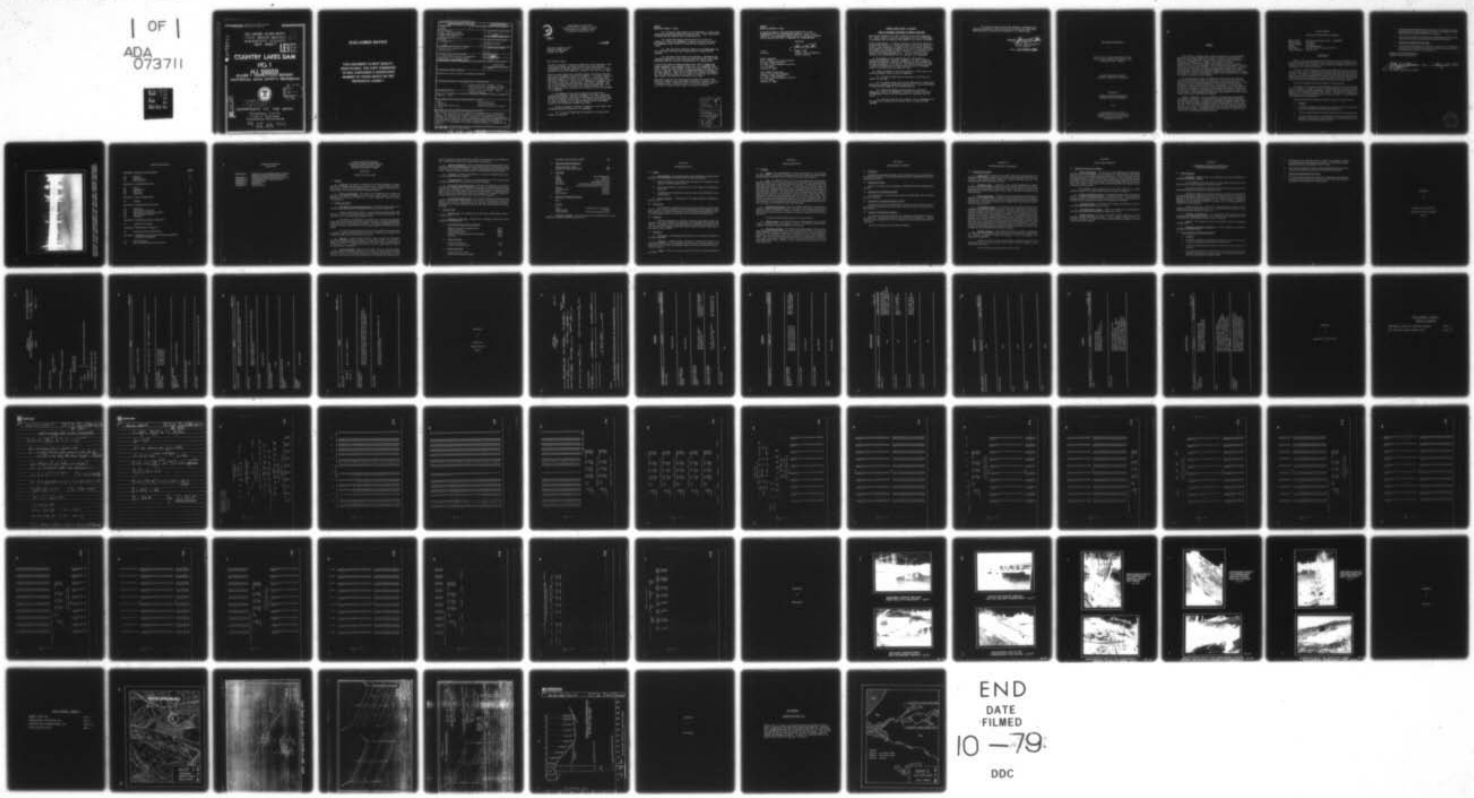

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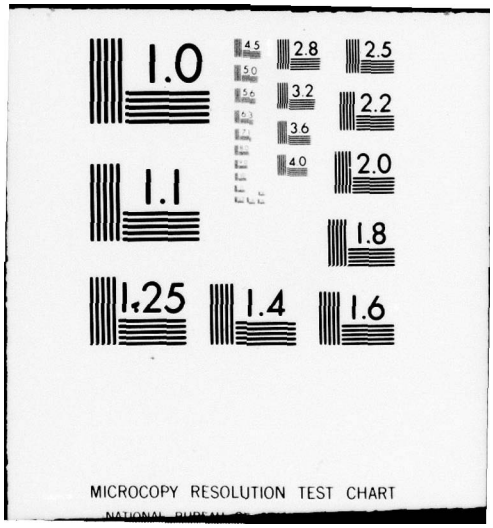
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DELAWARE RIVER BASIN
POLE BRIDGE BRANCH.
BURLINGTON COUNTY
NEW JERSEY

LEVEL II

COUNTRY LAKES DAM
NO. 1
NJ 00050

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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

June, 1979

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

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11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, Pennsylvania 19106	12. REPORT DATE: (11) Jun[illegible]79
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Approved for public release; distribution unlimited.

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

(6) National Dam Safety Program. Country Lakes Dam Number 1 (NJ-00050), Delaware River Basin, Pole Bridge Branch, Burlington 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
Spillways
County Lakes Dam #1, N.J.
Safety
Visual Inspection
Structural Analysis
National Dam Safety Act Report

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.

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

IN REPLY REFER TO
NAPEN-D

29 AUG 1979

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Country Lakes No. 1 Dam in Burlington 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, Country Lakes Dam No. 1, 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 spillway is considered inadequate since 59% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one-half the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway 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. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1) A service bridge should be provided to facilitate the removal of stop logs.

(2) In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be backfilled and compacted with suitable material.

(3) Areas below design elevation should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

(4) Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

(5) The owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

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 Edwin B. Forsythe of the Sixth 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-D
Honorable Brendan T. Byrne

An important aspect of the Dam Safety 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,

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

Copies furnished:
Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

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

COUNTRY LAKES DAM NO. 1 (NJ00050)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 12 April 1979 by O'Brien & Gere Engineers, Inc., under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public law 92-367.

Country Lakes Dam No. 1, 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 spillway is considered inadequate since 59% of the Spillway Design Flood -SDF- would overtop the dam. (The SDF, in this instance, is one-half the Probable Maximum Flood.) To insure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The adequacy of the spillway 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. Any remedial measures necessary to insure the adequacy of the spillway and to prevent overtopping should be initiated within calendar year 1980.

b. Within six months of the date of approval of this report the following remedial actions should be completed:

(1) A service bridge should be provided to facilitate the removal of stop logs.

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(3) Areas below design elevation should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

(4) Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

(5) The owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 27 August 1979

DELAWARE RIVER BASIN

Name of Dam: Country Lakes Number 1 Dam
County & State: Burlington County, New Jersey
Inventory Number: NJ 00050

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared by:

O'BRIEN & GERE ENGINEERS, INC
JUSTIN & COURTNEY DIVISION

For

DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, PA 19106

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 reasonably 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 REPORT

NATIONAL DAM INVENTORY PROGRAM

Name of Dam:	Country Lakes Number 1 Dam ID #NJ00050
State Located:	New Jersey
County Located:	Burlington
Stream:	Pole Bridge Branch
Coordinates:	Latitude 39^{o} 56.9', Longitude 74^{o} 32.5'
Date of Inspection:	April 12, 1979

ASSESSMENT

Based on the visual observations made during the field investigation, information made available by New Jersey DEP and conversations with the Owner's representative, Country Lakes Number 1 Dam (owned by Friendship Lakes, Inc.) is considered to be in overall fair condition.

The dam is an earth embankment approximately 580 feet long with a maximum height of about 13 feet. A 28-foot wide paved road is constructed along the crest of the dam. The spillway is constructed of concrete piers with stop logs spanning horizontally between vertical grooves in adjacent piers. It is located approximately 10 feet upstream of the bridge for the road along the top of the dam. The 64.0 acre normal pool is used for recreation by members of the Country Lakes development.

The dam is considered to be in the "Significant" hazard category.

Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 58 percent Spillway Design Flood (SDF) without overtopping the earth embankment. The SDF chosen for use on this site is 50 percent of the Probable Maximum Flood (PMF). The spillway is classified as "Inadequate" but not "Seriously Inadequate" because the dam is an "Intermediate" size, "Significant" hazard Structure.

Several deficiencies noted require remedial measures or maintenance soon.

a. Facilities.

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.

2. A service bridge should be provided to facilitate the removal of stop logs.

3. In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be backfilled and compacted with suitable material.

4. Areas below design elevations should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

b. Operation and Maintenance Procedures

1. The Owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

O'BRIEN & GERE ENGINEERS, INC.
JUSTIN & COURTNEY DIVISION

John J. Williams Date: 1 August 1979

John J. Williams, P.E
Vice President
New Jersey Registration No. #24916

OVERVIEW OF THE EMBANKMENT AND SPILLWAY LOOKING UPSTREAM
COUNTRY LAKES DAM NUMBER ONE, BURLINGTON COUNTY, NEW JERSEY

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(Continued)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
COUNTRY LAKES NUMBER 1 DAM
INVENTORY NUMBER - NJ00050

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with contract #DACW 61-78-C-0052 between O'Brien & Gere Engineers, Inc., Justin & Courtney Division and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of the Country Lakes Number 1 Dam and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description

a. Description of Dam and Appurtenances. (From information obtained from the New Jersey Department of Environmental Protection (DEP), Trenton, NJ)

Country Lakes Number 1 Dam is an earth embankment approximately 580 feet long. A 28 foot wide paved roadway is located on the crest of the dam. The embankment has a maximum height of about 13 feet.

The spillway is constructed of concrete piers with stop logs spanning horizontally between vertical grooves in adjacent piers, and is located approximately 10 feet upstream of the bridge for the roadway. The spillway discharges through the two-span concrete bridge which has a total opening length of 50 feet and 7.5-foot height.

The concrete bridge abutments are connected upstream and downstream to masonry retaining walls that have been built to protect the upstream and downstream slopes of the embankment from erosion.

b. Location. Country Lakes Number 1 Dam is located in Pemberton Township, Burlington County, New Jersey, on Pole Bridge Branch. The dam site is shown on the USGS Quadrangle entitled "Brown Mills, New Jersey", at coordinates N 39^{o} 56.9', W 74^{o} 32.5'. A regional location plan of Country Lakes Number 1 Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. Country Lakes Number 1 Dam has a maximum height of approximately 13 feet which places it in the "Small" size dam category for height because it is less than 40 feet high. The dam has a maximum storage volume of 1,176 acre-feet which places it in the "Intermediate" size dam category for storage because

it has a maximum storage greater than 1,000 acre-feet and less than 50,000 acre-feet. Therefore, the dam is in the "Intermediate" size category.

d. Hazard Classification. There are approximately 24 homes downstream of the dam which would possibly experience damage from water 1 to 2 feet deep in their first floors with a failure of the dam. There is little chance there would be any loss of life. Therefore, the dam should be placed in the "Significant" hazard category.

e. Ownership. Country Lakes Number 1 is owned by Friendship Lakes, Inc., P.O. Box #18, Brown Mills, NJ 08015.

f. Purpose of Dam. The dam was constructed as part of the Country Lakes real estate development. The reservoir is used for recreation.

g. Design and Construction History. The dam was originally constructed in 1953 without a legal permit. However, on September 13, 1955, based on drawings made by John G. Reutter from a survey of the existing structure, a legal permit was issued by the State Water Policy Commission of New Jersey. A drawing entitled "Plan of Spillway Constructed at Country Lakes situated in Township of Pemberton, County of Burlington, New Jersey" is enclosed as Plate 2, Appendix E.

h. Normal Operating Procedure. The reservoir is normally maintained at the spillway crest elevation. Inflow which occurs when the reservoir level is above the spillway crest elevation is discharged over the spillway. According to the Owner's representative, Mr. Steven Albano, the stop logs are removed during periods of heavy discharge.

1.3 Pertinent Data

a. Drainage Area. The drainage area to the Country Lakes Number 1 Dam is 16 square miles.

b. Discharge at Dam Site. No high pool or discharge records were made available for this inspection.

c. Elevation (feet above MSL - estimated).

Spillway crest (at the inspection time)	78.70
Design Top of Dam	86.00
Low Spot (top of dam)	82.30
Spillway slab invert downstream of stop logs	75.40
Tailwater	±72.0

d. Reservoir (miles)

Length of Normal Pool	0.95
Length of Pool (top of dam)	1.9

e. Storage (acre-feet)

Normal Pool (Elev. 78.70)	78.0
Design Top of Dam (Elev. 86.00)	1,176

Low Spot Top of Dam (Elev. 82.30)	548

f. Reservoir Surface Area (acres)

Normal Pool (Elev. 78.70)	64.0
Design Top of Dam (Elev. 86.00)	460

g. Dam Data

Type	Earth Embankment
Length	580 feet+
Height	13 feet (maximum)
Top Width	Approximately 28 feet
Side Slopes	Both upstream and downstream slopes vary from approximatley 1H:1V to 3H:1V
Zoning	Unknown
Impervious Core	Unknown
Cutoff	Unknown
Grout Curtain	Unknown

h. Diversion and Regulating Tunnel

None

i. Spillway

Type	Concrete piers with stop logs
Length of Weir	50 feet
Crest Elevation	78.70 (at the inspection time)

j. Regulating Facilities. The stop logs are removed during periods of heavy discharge or in order to lower the reservoir level.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. The engineering data made available by the New Jersey Department of Environmental Protection (DEP) includes the following.

1. Plan and sections of the original dam prepared by J.G. Reutter, dated January 19, 1955 and April 12, 1955.

2. Plans and sections for reconstruction of the bridge and embankment, dated 1974.

3. Miscellaneous correspondence, inspection reports, etc.,between the state and the Owner.

b. Design Features. A description of the design features is discussed in Section 1.2.a.

2.2 Construction

No information is available concerning the construction of Country Lakes Number 1 Dam. However, based on the field investigation, the dam appears to have been constructed in general conformance with the reconstruction drawings of 1974. The spillway appears to be in conformance with the "As-built" drawings of 1955.

2.3 Operation

Operation procedures are limited to removing stop logs to reduce the reservoir water surface elevation during periods of heavy rainfall or to draw down the reservoir. According to the Owner's representative, residents in the vicinity of the dam are personally contacted by the Dam Tender when the reservoir water level is rising during a heavy rainfall.

2.4 Evaluation

a. Availability. The engineering data utilized in this report is provided by the New Jersey DEP.

b. Adequacy. Although design information is minimal and there is no construction information, the conditions observed during the field inspection and discussions with the Owner's representative appear to provide an adequate basis for a Phase I evaluation.

c. Validity. There is no reason to question the validity of the data obtained from DEP.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Country Lakes Number 1 Dam took place on April 12,1979. At the time of inspection, the water surface was approximately two inches above the spillway crest. No underwater areas were inspected.

b. Dam. The upstream face of the dam has a sparse cover of vegetation. Beyond the extent of the retaining wall along the upstream face, inadequate slope protection is provided by some pieces of broken concrete. The upstream slope of the dam varies from about 3H:1V to 1H:1V. Erosion along the upstream slope has undermined the retaining wall in several areas. A 28-foot wide road is located on the top of the dam. Along the crest of the dam, depressions of the road are evident in the longitudinal direction. The visible portion of the downstream slope consists of sandy material and most of it has virtually no slope protection. Several deep erosion channels are evident on the downstream slope due to the surface runoff. Some erosion has also occurred behind the retaining wall of the downstream slope. The downstream slope of the embankment adjacent to the bridge is approximately 1H:1V. The remainder of the downstream slope varies from approximately 3H:1V near the toe of the slope to 1H:1V near the top of the embankment.

c. Appurtenant Structures. The water surface elevation of the reservoir is varied by means of the stop logs which are removed by hand during periods of heavy rainfall or when the reservoir is drained. According to the Owner's representative, Steven Albano, about four days are required to drain the reservoir from the normal pool level.

The spillway and the bridge appear to be in good condition.

d. Reservoir Area. The reservoir slopes are relatively flat varying between 2 and 10 percent with limited vegetative cover. No significant slope stability problems are apparent along the periphery of the reservoir.

e. Downstream Channel. The spillway discharges through a twin-span concrete bridge into a reservoir formed by a dam (Country Lakes Number 2 Dam) located about 2,800 feet downstream of Country Lakes Number 1 Dam. The slopes along the periphery of the downstream reservoir are relatively flat with limited vegetative cover. There are twenty four homes within the area that would possibly be flooded in the event of a dam failure. Therefore, failure of Country Lakes Number 1 Dam could cause appreciable property damage. However, there is little likelihood there would be any loss of life.

SECTION 4

OPERATIONAL FEATURES

4.1 Procedures

Operational procedures have been covered in Section 1.2.h. According to the Owner's representative, no formal operating procedures are established for Country Lakes Number 1 Dam.

4.2 Maintenance of Dam

There is no evidence that maintenance procedures have been established for this dam.

4.3 Maintenance of Operating Facilities

The maintenance of the stop logs consists of keeping them free of floating debris and sediment.

4.4 Description of any Warning System in Effect

According to the Owner's representative, residents in the vicinity of the dam are contacted personally by the Dam Tender when the reservoir is rising during a heavy rainfall.

4.5 Evaluation of Operational Adequacy

The spillway and stop logs appeared to be adequately maintained at the time of the inspection. The stop logs were not removed during the inspection. It appears however, that considerable time may be required for the removal process when the need arises.

The dam is accessible under all weather conditions.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Country Lakes Number 1 Dam has a drainage area of 16 square miles and impounds a reservoir of 78 acre-feet at the spillway crest elevation of 78.70. The spillway facility consists of a 50-foot long stop log weir. The available depth in the weir section is 7.5 feet.

b. Experience Data. According to the Owner's representative, Steven Albano, no records of reservoir level or rainfall are kept for this dam. Also according to the Owner's representative, it takes about 4 days to draw the reservoir down. The flashboards are pulled during periods of heavy runoff. The dam is monitored during heavy rainfalls.

c. Visual Observations. The bridge and the concrete portion of the spillway appeared to be in good condition. However, if a large flood occurs, the full spillway capacity may be difficult to attain due to the laborous process involved in removing the stop logs. This operation would also be impeded due to the lack of a service bridge over spillway piers.

d. Overtopping Potential. The Spillway Design Flood (SDF) for this "Intermediate" size, significant hazard structure is given as a range from one-half of the Probable Maximum Flood (PMF) to the PMF. The SDF selected for use is 0.5 PMF. The SDF hydrograph was routed through the reservoir with the starting water surface elevation at the crest of the spillway, Elev. 78.70. The maximum water surface elevation in the reservoir resulting from the SDF routing would be 4.4 feet above the spillway crest elevation of 78.70, and 0.8 feet above the low point of the top of the dam, Elev. 82.3. The low point of the dam crest was determined by a survey of the dam crest profile during the field investigation (See Sheet 5, Appendix E). The SDF routing has a peak inflow of 2175 cfs and a peak outflow of 2155 cfs. The spillway is capable of discharging 58 percent of the SDF without overtopping of the dam. Refer to Appendix C for computations and computer printouts.

e. Spillway Adequacy. Even though the spillway is capable of discharging only 58 percent of the SDF (0.5 PMF), the spillway is considered as "Inadequate" but not "Seriously Inadequate" because the structure is an "Intermediate" size, "Significant" hazard dam.

Failure of the dam would cause flooding in approximately 24 homes downstream of the dam on the shores of Country Lakes Number 2 to depths of 1 to 2 feet in their first floors.

There is little chance there would be any loss of life.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. On the date of the inspection, the embankment appeared to be in fair condition. The depression of the road adjacent to the bridge may be due to poor compaction during construction. Both the upstream and the downstream slopes do not have adequate slope protection. The downstream slope has no protection and is subject to an intensive erosive process from surface runoff. There are a number of areas where surface runoff has deeply eroded the downstream slope. The variation of the slopes of the embankment appears to be largely a result of erosion by surface runoff.

The spillway system, including the weir, floor slab, and the bridge abutments appear to be in good condition and show no signs of instability.

b. Design and Construction Data. The spillway appears to be in conformance with the "As-Built" drawings prepared by J.G. Reutter in 1955. There are limited drawings available for the earth embankment portion of the dam. No information on stability analysis, seepage computations, or soil properties is available.

c. Operating Records. According to the Owner's representative, there are no official operating records kept for this dam.

d. Post-Construction Changes. There is no record of any modificatiions made after the bridge and embankment reconstruction in 1974.

e. Seismic Stability. The dam is located in Seismic Risk Zone 1 of the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected earthquake loading, if it is safe under static loading condition.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on the visual inspection the earth embankment is considered to be in fair condition.

The depressions of the road adjacent to the bridge along the top of the dam may be due to poor compaction during construction.

The erosion channels and depressions along the downstream face of the embankment appear to be the result of surface runoff.

As stated in Section 5.1.d, the SDF selected is 50 percent of the PMF for this "Intermediate" size, "Significant" hazard dam. Examination of the results of the hydrologic and hydraulic analyses indicate that the spillway is capable of passing 58 percent of the SDF without overtopping the dam. The spillway is classified as "Inadequate but not "Seriously Inadequate" because the dam is an "Intermediate" size "Significant" hazard structure.

Failure of the dam would affect approximately 24 homes with the possibility of causing damage from water 1 to 2 feet deep in their first floors. There is little change there would be any loss of life.

b. Adequacy of Information. The information made available by DEP, conversation with the Owner's representative and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in section 7.2 should be initiated soon.

d. Necessity for Further Investigation. Further hydrologic and hydraulic investigations should be made.

7.2 Recommendations and Remedial Measures

a. Facilities .

1. A detailed hydrologic and hydraulic study should be made and the need and type of mitigating measures should be determined.

2. A service bridge should be provided to facilitate to the removal of the stop logs.

3. In several areas erosion of the embankment is taking place behind the upstream and downstream retaining walls. These areas should be back-filled and compacted with suitable material.

4. Areas below design elevations should be filled and compacted to restore the embankment to design elevations and slopes. The embankment slopes should be protected with vegetative cover or riprap.

5. Trees and brush should be removed from the embankment and the areas where trees have been removed should be backfilled and regraded.

b. Operation and Maintenance Procedures

1. The Owner should develop and implement a maintenance and inspection checklist to insure that the stop logs and all other items associated with the structure are maintained on a regular basis.

APPENDIX

A

Check List Engineering Data

Design, Construction, Operation

Phase I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Country Lakes #1 Dam

ID # N.J. 0050

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available
REGIONAL VICINITY MAP	Refer to Appendix E, Plate 1
CONSTRUCTION HISTORY	No information available
TYPICAL SECTIONS OF DAM	Not available for existing structure
OUTLETS - PLAN	No information available for existing structure
DETAILS	
CONSTRAINTS	
DISCHARGE RATINGS	None available
RAINFALL/RESERVOIR RECORDS	None available

ITEM	REMARKS
DESIGN REPORTS	No design reports available
GEOLOGY REPORTS	None provided in DEP files. Refer to Appendix F of this report.
DESIGN COMPUTATIONS	No data available
HYDROLOGY & HYDRAULICS	No data available
DAM STABILITY	No data available
SEEPAGE STUDIES	No data available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	No information available
POST-CONSTRUCTION SURVEYS OF DAM	None
BORROW SOURCES	There is no record of where borrow material came from.

ITEM	REMARKS
MONITORING SYSTEMS	According to the Owner's representative an informal warning (by phone) system is in effect during periods of heavy rainfall.
MODIFICATIONS	There is no record of any modifications after the bridge and embankment reconstruction.
HIGH POOL RECORDS	None available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	None available

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	Refer to Plate 1, Appendix D
OPERATING EQUIPMENT PLANS & DETAILS	There are no available plans and details for the stop logs which are inserted and/or removed from the slots in the piers of the spillway to regulate the stage in the impoundment.
MISCELLANEOUS	Miscellaneous correspondence, inspection reports, etc. are all available in DEP files

APPENDIX

B

Check List

Visual Inspection

Phase I

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Country Lakes NR. 1 Dam County Burlington State New Jersey National ID # NJ 00050

Type of Dam Earth Hazard Category Significant

Date(s) Inspection 4/12/79 Weather Clear Temperature 60°F

Pool Elevation at Time of Inspection 78.9 ± M.S.L. Tailwater at Time of Inspection 72 ± M.S.L.

Inspection Personnel:

Mr. Lee DeHeer
Mr. Stefan Manea
Mr. David B. Campbell

Mr. David B. Campbell Recorder

Remarks:

Mr. Steve Albano, president of Friendship Lakes, Inc. was present at the time of the inspection.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Several erosion channels were observed on the downstream slope	The downstream embankment slope should be repaired & vegetated
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The top of the dam varies by a maximum of 3.7 feet	The low portions of the dam should be built up.
RIPRAP FAILURES	N/A	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Some slight undermining was observed at the junction of embankment and upstream and downstream retaining walls.	These areas should be backfilled and compacted with suitable material
ANY NOTICEABLE SEEPAGE	None Observed	
STAFF GAGE AND RECORDER	None Observed	
DRAINS	None Observed	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	N/A	Concrete piers with stop logs spanning horizontally between vertical groves in adjacent piers. They appeared to be in good condition.
APPROACH CHANNEL	N/A	There is no approach channel to the stop log weir.
DISCHARGE CHANNEL	N/A	Country Lakes #2 is about 50 feet downstream of country Lakes #1
BRIDGE AND PIERS	N/A	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Slopes are relatively flat around the entire perimeter of the reservior varying between 2 and 10 percent.	
SEDIMENTATION	There does not appear to be any excessive accumulation of sediment in the reservior. Because of the flat gradient around the entire perimeter of the reservior there is little sediment accumulation even though there is poor vegetative cover around the entire reservoir.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The spillway discharges through its outlet (Bridge) into a lake created by a Dam (Country Lakes #2) located about 800 feet downstream.	
SLOPES	There is no downstream channel. The discharge over the spillway of Country Lakes Dam No. 1 flows directly into the Country Lakes Dam No. 2 impoundment. The slopes along the perimeter of Country Lakes #2 impoundment are relatively flat (2 to 10 %) and fairly well vegetated.	
APPROXIMATE NO. OF HOMES AND POPULATION	There are about 24 homes downstream of the dam which lie within the area that would be affected by a flood resulting from a dam failure. There would probably be appreciable flood damage to the houses, but little chance for loss of life.	

APPENDIX

C

Hydrologic & Hydraulic Data

TABLE OF CONTENTS - APPENDIX C

HYDRAULICS & HYDROLOGY

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
COUNTRY LAKES #1	1	SM VB	4/20/79 5/5/79	1800-005-112

INPUT VALUES FOR CLARK HYDROGRAPH

$$T_c + R = 21 \left(\frac{DA}{S}\right)^{.22} S_t^{.33} \times \left(1 + 0.3I\right)^{-0.28}$$

DA = drainage area in square miles

S = average channel slope measured from the 10% and 85% points along the stream length – ft/mile

S_t = storage (% of lakes and swamps)

I = % impervious surface within the drainage area.

$$I = 0.117\, D^{0.792 - 0.039 \log D}$$ (USGS Special Rpt #38)

D = basin population density in persons per square mile

$$R/(T_c + R) = 0.60$$ (from Phila. C.O.E)

DA = 16.0 Square Miles

L = 56,000 ft

0.1L = 5600 ft (EL. = 79.00)

0.15L = 8400 ft (EL. = 140.00)

L' = 56000 – (8400 + 5600) = 42000 ft ≈ 8 miles

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
Country Lakes #1	2	SMG VB	4/20/79 6/5/79	1800-005-112

$$S = \frac{\Delta H}{L} = \frac{140-79}{8.0} \approx 7.6 \text{ ft./Mile}$$

$$S_t \approx 27\%$$

$D = 40$ persons per Square Mile

$$I = 0.117 \times 40^{0.792 - 0.039 \log 40} = 1.73$$

$$T_c + R = 21\left(\frac{16}{7.6}\right)^{0.22} 27^{0.33}\left(1 + 0.3 \times 1.73\right)^{-0.28} \approx 66$$

$$R / T_c + R = 0.6$$

$$R = 0.6\left(T_c + R\right) = 0.6 \times 66 = \underline{\underline{39.6}}$$

$$T_c + 39.6 = 66$$

$$T_c = 26.4 \qquad \text{Say } \underline{\underline{T_c = 26.5}}$$

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

RUN DATE= 07/12/79.
TIME= 13.41.31.

NATIONAL DAM INSPECTION PROGRAM
COUNTRY LAKE NR.1
PMF HYDROGRAPH

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	3	0	0	0	0	0	0	3	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 6 LRTIO= 1

RTIOS= .10 .20 .28 .30 .40 .50

****

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO COUNTRY LAKE NR.1

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

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	16.00	0.00	16.00	0.00	0.000	0	1	0

PRECIP DATA

	SPFE	PMS	R6	R12	R24	R48	R72	R96
	0.00	23.50	107.00	117.00	126.00	138.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .816

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 26.50 R= 39.60 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 75 END-OF-PERIOD ORDINATES, LAG= 24.96 HOURS, CP= .45 VOL= 1.00

7.	25.	52.	83.	117.	147.	171.	185.	189.	180.
167.	155.	143.	133.	123.	114.	106.	98.	91.	84.
78.	72.	67.	62.	58.	53.	50.	46.	43.	40.
37.	34.	31.	29.	27.	25.	23.	22.	20.	19.
17.	16.	15.	14.	13.	12.	11.	10.	9.	9.

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

O						END-OF-PERIOD FLOW							
MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	3.00	1	.03	0.00	.03	22.	1.19	21.00	151	0.00	0.00	0.00	0.
1.01	6.00	2	.03	0.00	.03	21.	1.20	0.00	152	0.00	0.00	0.00	0.
1.01	9.00	3	.09	0.00	.09	19.	1.20	3.00	153	0.00	0.00	0.00	0.
1.01	12.00	4	.09	0.00	.09	18.	1.20	6.00	154	0.00	0.00	0.00	0.
1.01	15.00	5	.64	0.00	.64	17.	1.20	9.00	155	0.00	0.00	0.00	0.
1.01	18.00	6	1.31	1.06	.24	23.	1.20	12.00	156	0.00	0.00	0.00	0.
1.01	21.00	7	.05	0.00	.05	42.	1.20	15.00	157	0.00	0.00	0.00	0.
1.02	0.00	8	.05	0.00	.05	69.	1.20	18.00	158	0.00	0.00	0.00	0.
1.02	3.00	9	.35	.20	.15	103.	1.20	21.00	159	0.00	0.00	0.00	0.
1.02	6.00	10	.35	.20	.15	143.	1.21	0.00	160	0.00	0.00	0.00	0.
1.02	9.00	11	.96	.81	.15	189.	1.21	3.00	161	0.00	0.00	0.00	0.
1.02	12.00	12	.96	.81	.15	244.	1.21	6.00	162	0.00	0.00	0.00	0.
1.02	15.00	13	6.77	6.62	.15	353.	1.21	9.00	163	0.00	0.00	0.00	0.
1.02	18.00	14	13.75	13.60	.15	631.	1.21	12.00	164	0.00	0.00	0.00	0.
1.02	21.00	15	.52	.37	.15	1115.	1.21	15.00	165	0.00	0.00	0.00	0.
1.03	0.00	16	.52	.37	.15	1736.	1.21	18.00	166	0.00	0.00	0.00	0.
1.03	3.00	17	0.00	0.00	0.00	2433.	1.21	21.00	167	0.00	0.00	0.00	0.
1.03	6.00	18	0.00	0.00	0.00	3131.	1.22	0.00	168	0.00	0.00	0.00	0.
1.03	9.00	19	0.00	0.00	0.00	3724.	1.22	3.00	169	0.00	0.00	0.00	0.
1.03	12.00	20	0.00	0.00	0.00	4140.	1.22	6.00	170	0.00	0.00	0.00	0.
1.03	15.00	21	0.00	0.00	0.00	4349.	1.22	9.00	171	0.00	0.00	0.00	0.
1.03	18.00	22	0.00	0.00	0.00	4316.	1.22	12.00	172	0.00	0.00	0.00	0.
1.03	21.00	23	0.00	0.00	0.00	4087.	1.22	15.00	173	0.00	0.00	0.00	0.
1.04	0.00	24	0.00	0.00	0.00	3747.	1.22	18.00	174	0.00	0.00	0.00	0.
1.04	3.00	25	0.00	0.00	0.00	3522.	1.22	21.00	175	0.00	0.00	0.00	0.
1.04	6.00	26	0.00	0.00	0.00	3265.	1.23	0.00	176	0.00	0.00	0.00	0.
1.04	9.00	27	0.00	0.00	0.00	3027.	1.23	3.00	177	0.00	0.00	0.00	0.
1.04	12.00	28	0.00	0.00	0.00	2806.	1.23	6.00	178	0.00	0.00	0.00	0.
1.04	15.00	29	0.00	0.00	0.00	2601.	1.23	9.00	179	0.00	0.00	0.00	0.
1.04	18.00	30	0.00	0.00	0.00	2411.	1.23	12.00	180	0.00	0.00	0.00	0.
1.04	21.00	31	0.00	0.00	0.00	2235.	1.23	15.00	181	0.00	0.00	0.00	0.
1.05	0.00	32	0.00	0.00	0.00	2072.	1.23	18.00	182	0.00	0.00	0.00	0.
1.05	3.00	33	0.00	0.00	0.00	1921.	1.23	21.00	183	0.00	0.00	0.00	0.
1.05	6.00	34	0.00	0.00	0.00	1781.	1.24	0.00	184	0.00	0.00	0.00	0.
1.05	9.00	35	0.00	0.00	0.00	1651.	1.24	3.00	185	0.00	0.00	0.00	0.
1.05	12.00	36	0.00	0.00	0.00	1530.	1.24	6.00	186	0.00	0.00	0.00	0.
1.05	15.00	37	0.00	0.00	0.00	1418.	1.24	9.00	187	0.00	0.00	0.00	0.
1.05	18.00	38	0.00	0.00	0.00	1315.	1.24	12.00	188	0.00	0.00	0.00	0.
1.05	21.00	39	0.00	0.00	0.00	1219.	1.24	15.00	189	0.00	0.00	0.00	0.
1.06	0.00	40	0.00	0.00	0.00	1130.	1.24	18.00	190	0.00	0.00	0.00	0.
1.06	3.00	41	0.00	0.00	0.00	1048.	1.24	21.00	191	0.00	0.00	0.00	0.
1.06	6.00	42	0.00	0.00	0.00	971.	1.25	0.00	192	0.00	0.00	0.00	0.
1.06	9.00	43	0.00	0.00	0.00	900.	1.25	3.00	193	0.00	0.00	0.00	0.
1.06	12.00	44	0.00	0.00	0.00	835.	1.25	6.00	194	0.00	0.00	0.00	0.
1.06	15.00	45	0.00	0.00	0.00	774.	1.25	9.00	195	0.00	0.00	0.00	0.
1.06	18.00	46	0.00	0.00	0.00	717.	1.25	12.00	196	0.00	0.00	0.00	0.
1.06	21.00	47	0.00	0.00	0.00	665.	1.25	15.00	197	0.00	0.00	0.00	0.
1.07	0.00	48	0.00	0.00	0.00	616.	1.25	18.00	198	0.00	0.00	0.00	0.
1.07	3.00	49	0.00	0.00	0.00	571.	1.25	21.00	199	0.00	0.00	0.00	0.
1.07	6.00	50	0.00	0.00	0.00	530.	1.26	0.00	200	0.00	0.00	0.00	0.
1.07	9.00	51	0.00	0.00	0.00	491.	1.26	3.00	201	0.00	0.00	0.00	0.
1.07	12.00	52	0.00	0.00	0.00	455.	1.26	6.00	202	0.00	0.00	0.00	0.
1.07	15.00	53	0.00	0.00	0.00	422.	1.26	9.00	203	0.00	0.00	0.00	0.
1.07	18.00	54	0.00	0.00	0.00	391.	1.26	12.00	204	0.00	0.00	0.00	0.

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1.07	21.00	55	0.00	0.00	0.00	383.	1.26	15.00	205	0.00	0.00	0.00	0.
1.08	0.00	56	0.00	0.00	0.00	336.	1.26	18.00	206	0.00	0.00	0.00	0.
1.08	3.00	57	0.00	0.00	0.00	312.	1.26	21.00	207	0.00	0.00	0.00	0.
1.08	6.00	58	0.00	0.00	0.00	289.	1.27	0.00	208	0.00	0.00	0.00	0.
1.08	9.00	59	0.00	0.00	0.00	268.	1.27	3.00	209	0.00	0.00	0.00	0.
1.08	12.00	60	0.00	0.00	0.00	248.	1.27	6.00	210	0.00	0.00	0.00	0.
1.08	15.00	61	0.00	0.00	0.00	230.	1.27	9.00	211	0.00	0.00	0.00	0.
1.08	18.00	62	0.00	0.00	0.00	214.	1.27	12.00	212	0.00	0.00	0.00	0.
1.08	21.00	63	0.00	0.00	0.00	200.	1.27	15.00	213	0.00	0.00	0.00	0.
1.09	0.00	64	0.00	0.00	0.00	186.	1.27	18.00	214	0.00	0.00	0.00	0.
1.09	3.00	65	0.00	0.00	0.00	174.	1.27	21.00	215	0.00	0.00	0.00	0.
1.09	6.00	66	0.00	0.00	0.00	162.	1.28	0.00	216	0.00	0.00	0.00	0.
1.09	9.00	67	0.00	0.00	0.00	151.	1.28	3.00	217	0.00	0.00	0.00	0.
1.09	12.00	68	0.00	0.00	0.00	141.	1.28	6.00	218	0.00	0.00	0.00	0.
1.09	15.00	69	0.00	0.00	0.00	132.	1.28	9.00	219	0.00	0.00	0.00	0.
1.09	18.00	70	0.00	0.00	0.00	123.	1.28	12.00	220	0.00	0.00	0.00	0.
1.09	21.00	71	0.00	0.00	0.00	115.	1.28	15.00	221	0.00	0.00	0.00	0.
1.10	0.00	72	0.00	0.00	0.00	107.	1.28	18.00	222	0.00	0.00	0.00	0.
1.10	3.00	73	0.00	0.00	0.00	100.	1.28	21.00	223	0.00	0.00	0.00	0.
1.10	6.00	74	0.00	0.00	0.00	93.	1.29	0.00	224	0.00	0.00	0.00	0.
1.10	9.00	75	0.00	0.00	0.00	87.	1.29	3.00	225	0.00	0.00	0.00	0.
1.10	12.00	76	0.00	0.00	0.00	81.	1.29	6.00	226	0.00	0.00	0.00	0.
1.10	15.00	77	0.00	0.00	0.00	76.	1.29	9.00	227	0.00	0.00	0.00	0.
1.10	18.00	78	0.00	0.00	0.00	71.	1.29	12.00	228	0.00	0.00	0.00	0.
1.10	21.00	79	0.00	0.00	0.00	66.	1.29	15.00	229	0.00	0.00	0.00	0.
1.11	0.00	80	0.00	0.00	0.00	61.	1.29	18.00	230	0.00	0.00	0.00	0.
1.11	3.00	81	0.00	0.00	0.00	57.	1.29	21.00	231	0.00	0.00	0.00	0.
1.11	6.00	82	0.00	0.00	0.00	53.	1.30	0.00	232	0.00	0.00	0.00	0.
1.11	9.00	83	0.00	0.00	0.00	50.	1.30	3.00	233	0.00	0.00	0.00	0.
1.11	12.00	84	0.00	0.00	0.00	47.	1.30	6.00	234	0.00	0.00	0.00	0.
1.11	15.00	85	0.00	0.00	0.00	43.	1.30	9.00	235	0.00	0.00	0.00	0.
1.11	18.00	86	0.00	0.00	0.00	41.	1.30	12.00	236	0.00	0.00	0.00	0.
1.11	21.00	87	0.00	0.00	0.00	38.	1.30	15.00	237	0.00	0.00	0.00	0.
1.12	0.00	88	0.00	0.00	0.00	35.	1.30	18.00	238	0.00	0.00	0.00	0.
1.12	3.00	89	0.00	0.00	0.00	33.	1.30	21.00	239	0.00	0.00	0.00	0.
1.12	6.00	90	0.00	0.00	0.00	31.	1.31	0.00	240	0.00	0.00	0.00	0.
1.12	9.00	91	0.00	0.00	0.00	29.	1.31	3.00	241	0.00	0.00	0.00	0.
1.12	12.00	92	0.00	0.00	0.00	27.	1.31	6.00	242	0.00	0.00	0.00	0.
1.12	15.00	93	0.00	0.00	0.00	25.	1.31	9.00	243	0.00	0.00	0.00	0.
1.12	18.00	94	0.00	0.00	0.00	23.	1.31	12.00	244	0.00	0.00	0.00	0.
1.12	21.00	95	0.00	0.00	0.00	22.	1.31	15.00	245	0.00	0.00	0.00	0.
1.13	0.00	96	0.00	0.00	0.00	20.	1.31	18.00	246	0.00	0.00	0.00	0.
1.13	3.00	97	0.00	0.00	0.00	19.	1.31	21.00	247	0.00	0.00	0.00	0.
1.13	6.00	98	0.00	0.00	0.00	18.	2.01	0.00	248	0.00	0.00	0.00	0.
1.13	9.00	99	0.00	0.00	0.00	16.	2.01	3.00	249	0.00	0.00	0.00	0.
1.13	12.00	100	0.00	0.00	0.00	15.	2.01	6.00	250	0.00	0.00	0.00	0.
1.13	15.00	101	0.00	0.00	0.00	14.	2.01	9.00	251	0.00	0.00	0.00	0.
1.13	18.00	102	0.00	0.00	0.00	13.	2.01	12.00	252	0.00	0.00	0.00	0.
1.13	21.00	103	0.00	0.00	0.00	12.	2.01	15.00	253	0.00	0.00	0.00	0.
1.14	0.00	104	0.00	0.00	0.00	12.	2.01	18.00	254	0.00	0.00	0.00	0.
1.14	3.00	105	0.00	0.00	0.00	11.	2.01	21.00	255	0.00	0.00	0.00	0.
1.14	6.00	106	0.00	0.00	0.00	10.	2.02	0.00	256	0.00	0.00	0.00	0.
1.14	9.00	107	0.00	0.00	0.00	9.	2.02	3.00	257	0.00	0.00	0.00	0.
1.14	12.00	108	0.00	0.00	0.00	9.	2.02	6.00	258	0.00	0.00	0.00	0.
1.14	15.00	109	0.00	0.00	0.00	8.	2.02	9.00	259	0.00	0.00	0.00	0.
1.14	18.00	110	0.00	0.00	0.00	8.	2.02	12.00	260	0.00	0.00	0.00	0.
1.14	21.00	111	0.00	0.00	0.00	7.	2.02	15.00	261	0.00	0.00	0.00	0.
1.15	0.00	112	0.00	0.00	0.00	7.	2.02	18.00	262	0.00	0.00	0.00	0.
1.15	3.00	113	0.00	0.00	0.00	6.	2.02	21.00	263	0.00	0.00	0.00	0.
1.15	6.00	114	0.00	0.00	0.00	6.	2.03	0.00	264	0.00	0.00	0.00	0.
1.15	9.00	115	0.00	0.00	0.00	5.	2.03	3.00	265	0.00	0.00	0.00	0.
1.15	12.00	116	0.00	0.00	0.00	5.	2.03	6.00	266	0.00	0.00	0.00	0.

Sh 5

1.15	15.00	117	0.00	0.00	0.00	5.	2.03	9.00	267	0.00	0.00	0.00	0.
1.15	18.00	118	0.00	0.00	0.00	4.	2.03	12.00	268	0.00	0.00	0.00	0.
1.15	21.00	119	0.00	0.00	0.00	4.	2.03	15.00	269	0.00	0.00	0.00	0.
1.16	0.00	120	0.00	0.00	0.00	4.	2.03	18.00	270	0.00	0.00	0.00	0.
1.16	3.00	121	0.00	0.00	0.00	4.	2.03	21.00	271	0.00	0.00	0.00	0.
1.16	6.00	122	0.00	0.00	0.00	3.	2.04	0.00	272	0.00	0.00	0.00	0.
1.16	9.00	123	0.00	0.00	0.00	3.	2.04	3.00	273	0.00	0.00	0.00	0.
1.16	12.00	124	0.00	0.00	0.00	3.	2.04	6.00	274	0.00	0.00	0.00	0.
1.16	15.00	125	0.00	0.00	0.00	3.	2.04	9.00	275	0.00	0.00	0.00	0.
1.16	18.00	126	0.00	0.00	0.00	3.	2.04	12.00	276	0.00	0.00	0.00	0.
1.16	21.00	127	0.00	0.00	0.00	2.	2.04	15.00	277	0.00	0.00	0.00	0.
1.17	0.00	128	0.00	0.00	0.00	2.	2.04	18.00	278	0.00	0.00	0.00	0.
1.17	3.00	129	0.00	0.00	0.00	2.	2.04	21.00	279	0.00	0.00	0.00	0.
1.17	6.00	130	0.00	0.00	0.00	2.	2.05	0.00	280	0.00	0.00	0.00	0.
1.17	9.00	131	0.00	0.00	0.00	2.	2.05	3.00	281	0.00	0.00	0.00	0.
1.17	12.00	132	0.00	0.00	0.00	2.	2.05	6.00	282	0.00	0.00	0.00	0.
1.17	15.00	133	0.00	0.00	0.00	2.	2.05	9.00	283	0.00	0.00	0.00	0.
1.17	18.00	134	0.00	0.00	0.00	1.	2.05	12.00	284	0.00	0.00	0.00	0.
1.17	21.00	135	0.00	0.00	0.00	1.	2.05	15.00	285	0.00	0.00	0.00	0.
1.18	0.00	136	0.00	0.00	0.00	1.	2.05	18.00	286	0.00	0.00	0.00	0.
1.18	3.00	137	0.00	0.00	0.00	1.	2.05	21.00	287	0.00	0.00	0.00	0.
1.18	6.00	138	0.00	0.00	0.00	1.	2.06	0.00	288	0.00	0.00	0.00	0.
1.18	9.00	139	0.00	0.00	0.00	1.	2.06	3.00	289	0.00	0.00	0.00	0.
1.18	12.00	140	0.00	0.00	0.00	1.	2.06	6.00	290	0.00	0.00	0.00	0.
1.18	15.00	141	0.00	0.00	0.00	1.	2.06	9.00	291	0.00	0.00	0.00	0.
1.18	18.00	142	0.00	0.00	0.00	1.	2.06	12.00	292	0.00	0.00	0.00	0.
1.18	21.00	143	0.00	0.00	0.00	1.	2.06	15.00	293	0.00	0.00	0.00	0.
1.19	0.00	144	0.00	0.00	0.00	1.	2.06	18.00	294	0.00	0.00	0.00	0.
1.19	3.00	145	0.00	0.00	0.00	1.	2.06	21.00	295	0.00	0.00	0.00	0.
1.19	6.00	146	0.00	0.00	0.00	1.	2.07	0.00	296	0.00	0.00	0.00	0.
1.19	9.00	147	0.00	0.00	0.00	1.	2.07	3.00	297	0.00	0.00	0.00	0.
1.19	12.00	148	0.00	0.00	0.00	1.	2.07	6.00	298	0.00	0.00	0.00	0.
1.19	15.00	149	0.00	0.00	0.00	1.	2.07	9.00	299	0.00	0.00	0.00	0.
1.19	18.00	150	0.00	0.00	0.00	0.	2.07	12.00	300	0.00	0.00	0.00	0.
									SUM	26.46	24.02	2.44	83248.
										(672.)	(610.)	(62.)	(2357.32)

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	4349.	1032.	347.	277.	83240.
CMS	123.	29.	10.	8.	2357.
INCHES		24.00	24.20	24.20	24.20
MM		609.63	614.62	614.62	614.62
AC-FT		20470.	20638.	20638.	20638.
THOUS CU M		25250.	25457.	25457.	25457.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 1

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	435.	103.	35.	28.	8324.
CMS	12.	3.	1.	1.	236.
INCHES		2.40	2.42	2.42	2.42
MM		60.96	61.46	61.46	61.46
AC-FT		2047.	2064.	2064.	2064.
THOUS CU M		2525.	2546.	2546.	2546.

Sh 6

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 2

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	870.	206.	64.	55.	16644.
CMS	25.	6.	2.	2.	471.
INCHES		4.80	4.84	4.84	4.84
MM		121.93	122.92	122.92	122.92
AC-FT		4044.	4128.	4128.	4128.
THOUS CU M		5050.	5091.	5091.	5091.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 3

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1214.	249.	97.	78.	23307.
CMS	34.	8.	3.	2.	660.
INCHES		6.72	6.78	6.78	6.78
MM		170.70	172.09	172.09	172.09
AC-FT		5732.	5779.	5779.	5779.
THOUS CU M		7070.	7128.	7128.	7128.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1305.	310.	104.	83.	24972.
CMS	37.	9.	3.	2.	707.
INCHES		7.20	7.26	7.26	7.26
MM		182.89	184.39	184.39	184.39
AC-FT		6141.	6191.	6191.	6191.
THOUS CU M		7575.	7637.	7637.	7637.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 5

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1740.	413.	139.	111.	33296.
CMS	49.	12.	4.	3.	943.
INCHES		9.60	9.68	9.68	9.68
MM		243.85	245.85	245.85	245.85
AC-FT		8188.	8255.	8255.	8255.
THOUS CU M		10100.	10183.	10183.	10183.

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 6

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	2175.	516.	173.	139.	41620.
CMS	62.	15.	5.	4.	1179.
INCHES		12.00	12.10	12.10	12.10
MM		304.81	307.31	307.31	307.31
AC-FT		10235.	10319.	10319.	10319.
THOUS CU M		12625.	12728.	12728.	12728.

Sh 7

HYDROGRAPH ROUTING

ROUTING THROUGH COUNTRY LAKE NR.1

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

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-79.	0

SURFACE AREA=	0.	54.	740.
CAPACITY=	0.	78.	4153.
ELEVATION=	75.	79.	90.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
79.7	50.0	3.4	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
82.3	3.1	1.5	250.

STATION OUTFLO, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

6.	5.	5.	4.	4.	3.	3.	4.	5.	7.
9.	13.	19.	30.	54.	94.	149.	214.	279.	337.
31.	408.	414.	404.	385.	362.	338.	314.	292.	271.
51.	233.	216.	201.	186.	173.	160.	149.	138.	128.
19.	110.	102.	95.	88.	82.	76.	71.	66.	61.
57.	53.	49.	46.	43.	40.	37.	34.	32.	30.
28.	26.	24.	22.	21.	19.	18.	17.	16.	15.
14.	13.	12.	11.	11.	10.	9.	9.	8.	8.
7.	7.	6.	6.	6.	5.	5.	5.	4.	4.
4.	4.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

86.	85.	84.	84.	83.	83.	83.	83.	84.	86.
88.	90.	94.	100.	111.	128.	150.	174.	198.	219.
235.	245.	247.	243.	236.	228.	219.	211.	202.	195.
168.	161.	175.	169.	164.	158.	154.	149.	145.	142.
138.	135.	131.	129.	126.	123.	121.	119.	117.	115.
113.	111.	109.	108.	106.	105.	103.	102.	101.	100.
99.	98.	97.	96.	95.	94.	93.	93.	92.	91.
91.	90.	90.	89.	89.	88.	88.	87.	87.	87.
85.	86.	86.	85.	85.	85.	84.	84.	84.	84.
84.	83.	83.	83.	83.	83.	82.	82.	82.	82.
82.	82.	81.	81.	81.	81.	81.	81.	81.	81.
81.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

STAGE

78.8	78.8	78.8	78.8	78.7	78.7	78.7	78.7	78.8	78.8
78.8	78.9	78.9	79.0	79.1	79.3	79.6	79.8	80.1	80.2
80.4	80.5	80.5	80.5	80.4	80.3	80.3	80.2	80.1	80.0
80.0	79.9	79.8	79.8	79.7	79.7	79.6	79.6	79.5	79.5
79.5	79.4	79.4	79.3	79.3	79.3	79.3	79.2	79.2	79.2
79.2	79.1	79.1	79.1	79.1	79.0	79.0	79.0	79.0	79.0
79.0	79.0	78.9	78.9	78.9	78.9	78.9	78.9	78.9	78.9
78.9	78.9	78.9	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

Sh 9

78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 414. AT TIME 69.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	414.	103.	35.	28.	8368.
CMS	12.	3.	1.	1.	237.
INCHES		2.40	2.43	2.43	2.43
MM		61.00	61.79	61.79	61.79
AC-FT		2048.	2075.	2075.	2075.
THOUS CU M		2527.	2559.	2559.	2559.

STATION OUTFLO, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

7.	6.	6.	5.	5.	5.	5.	7.	10.	14.
21.	29.	42.	66.	117.	200.	310.	435.	560.	672.
758.	810.	824.	807.	771.	727.	679.	632.	587.	544.
505.	468.	433.	401.	372.	345.	319.	296.	274.	254.
236.	219.	203.	188.	174.	162.	150.	139.	129.	120.
111.	103.	96.	89.	83.	77.	72.	67.	62.	58.
54.	50.	46.	43.	40.	38.	35.	33.	31.	29.
27.	25.	24.	22.	21.	19.	18.	17.	16.	15.
14.	13.	12.	11.	11.	10.	9.	9.	8.	8.
7.	7.	6.	6.	6.	5.	5.	5.	4.	4.
4.	4.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

86.	86.	85.	85.	84.	84.	85.	86.	88.	91.
95.	100.	106.	117.	137.	169.	209.	255.	301.	343.
377.	397.	403.	396.	382.	364.	346.	328.	311.	295.
280.	267.	254.	242.	231.	222.	212.	204.	196.	189.
182.	176.	170.	164.	159.	154.	150.	146.	142.	138.
135.	132.	129.	126.	124.	121.	119.	117.	115.	113.
111.	109.	108.	106.	105.	104.	103.	101.	100.	99.
98.	97.	97.	96.	95.	94.	93.	93.	92.	91.
91.	90.	90.	89.	89.	88.	88.	87.	87.	87.

Sh 10

86.	86.	86.	85.	85.	85.	84.	84.	84.	84.
84.	83.	83.	83.	83.	83.	82.	82.	82.	82.
82.	82.	81.	81.	81.	81.	81.	81.	81.	81.
81.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

STAGE

78.8	78.9	78.8	78.8	78.9	78.8	78.8	78.8	78.8	78.9
78.9	79.0	79.1	79.2	79.4	79.8	80.2	80.5	80.9	81.2
81.4	81.5	81.5	81.5	81.4	81.3	81.2	81.1	81.0	80.8
80.7	80.6	80.5	80.4	80.4	80.3	80.2	80.1	80.0	80.0
79.9	79.9	79.8	79.7	79.7	79.6	79.6	79.5	79.5	79.5
79.4	79.4	79.4	79.3	79.3	79.3	79.2	79.2	79.2	79.2
79.1	79.1	79.1	79.1	79.1	79.0	79.0	79.0	79.0	79.0
79.0	79.0	78.9	78.9	78.9	78.9	78.9	78.9	78.9	78.9
78.9	78.9	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.9	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 824. AT TIME 69.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	824.	206.	70.	56.	16693.
CMS	23.	6.	2.	2.	473.
INCHES		4.80	4.85	4.85	4.85
MM		121.92	123.26	123.26	123.26

AC-FT	4094.	4139.	4139.	4139.
THOUS CU M	5050.	5105.	5105.	5105.

STATION OUTFLO, PLAN 1, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

8.	7.	7.	6.	6.	6.	7.	9.	14.	21.
31.	43.	60.	96.	168.	285.	436.	607.	779.	931.
1050.	1124.	1148.	1128.	1081.	1021.	956.	891.	827.	767.
711.	655.	609.	564.	523.	484.	448.	415.	385.	356.
330.	305.	284.	263.	244.	226.	210.	194.	180.	167.
155.	144.	134.	124.	115.	107.	99.	92.	85.	80.
74.	69.	64.	60.	56.	52.	49.	46.	43.	40.
37.	35.	33.	31.	29.	27.	25.	23.	22.	21.
19.	18.	17.	16.	15.	14.	13.	12.	11.	11.
10.	9.	9.	8.	8.	7.	7.	6.	6.	6.
5.	5.	5.	4.	4.	4.	4.	3.	3.	3.
3.	3.	2.	2.	2.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

87.	86.	86.	86.	85.	85.	86.	88.	91.	95.
100.	106.	114.	129.	157.	200.	255.	319.	385.	446.
495.	526.	536.	528.	508.	483.	456.	429.	404.	380.
358.	338.	320.	303.	287.	273.	259.	247.	236.	226.
216.	207.	199.	192.	185.	178.	172.	167.	161.	157.
152.	148.	144.	140.	137.	133.	130.	127.	125.	122.
120.	118.	116.	114.	112.	110.	109.	107.	106.	105.
104.	102.	101.	100.	99.	98.	97.	96.	96.	95.
94.	93.	93.	92.	91.	91.	90.	90.	89.	89.
88.	88.	87.	87.	87.	86.	86.	86.	85.	85.
85.	84.	84.	84.	84.	83.	83.	83.	83.	83.
82.	82.	82.	82.	82.	82.	82.	81.	81.	81.
81.	81.	81.	81.	81.	81.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.

Sh 12

79.	79.	79.	79.	79.	79.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

STAGE

78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.9	78.9
79.0	79.1	79.2	79.4	79.7	80.1	80.5	81.0	81.4	81.8
82.0	82.2	82.2	82.2	82.1	82.0	81.8	81.7	81.5	81.4
81.3	81.1	81.0	80.9	80.8	80.7	80.6	80.5	80.4	80.3
80.2	80.1	80.1	80.0	79.9	79.9	79.8	79.8	79.7	79.7
79.5	79.5	79.5	79.5	79.4	79.4	79.4	79.3	79.3	79.3
79.2	79.2	79.2	79.2	79.1	79.1	79.1	79.1	79.1	79.1
79.0	79.0	79.0	79.0	79.0	79.0	78.9	78.9	78.9	78.9
78.9	78.9	78.9	78.9	78.9	78.9	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 1148. AT TIME 69.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1148.	289.	97.	78.	23354.
CMS	33.	8.	3.	2.	661.
INCHES		6.72	6.79	6.79	6.79
MM		170.67	172.44	172.44	172.44
AC-FT		5731.	5790.	5790.	5790.
THOUS CU M		7069.	7142.	7142.	7142.

Sh 13

STATION OUTFLO, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

8.	7.	7.	7.	6.	6.	7.	10.	15.	23.
33.	46.	65.	103.	181.	306.	468.	650.	833.	995.
1123.	1209.	1242.	1204.	1151.	1091.	1024.	955.	887.	823.
763.	706.	654.	605.	560.	519.	481.	445.	412.	382.
354.	328.	304.	282.	261.	242.	225.	208.	193.	179.
166.	154.	143.	133.	123.	114.	106.	98.	91.	85.
79.	74.	69.	64.	60.	56.	52.	49.	46.	43.
40.	37.	35.	33.	31.	29.	27.	25.	23.	22.
21.	19.	18.	17.	16.	15.	14.	13.	12.	11.
11.	10.	9.	9.	8.	8.	7.	7.	6.	6.
6.	5.	5.	5.	4.	4.	4.	4.	3.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

87.	86.	86.	86.	86.	86.	86.	88.	92.	96.
101.	108.	116.	132.	162.	207.	267.	335.	406.	472.
525.	558.	567.	557.	537.	512.	484.	455.	428.	402.
379.	357.	337.	318.	301.	286.	271.	258.	246.	235.
225.	215.	207.	199.	191.	184.	178.	172.	166.	161.
156.	152.	147.	143.	140.	136.	133.	130.	127.	125.
122.	120.	118.	116.	114.	112.	110.	109.	107.	106.
105.	103.	102.	101.	100.	99.	98.	97.	96.	96.
95.	94.	93.	93.	92.	91.	91.	90.	90.	89.
89.	88.	88.	87.	87.	87.	86.	86.	86.	85.
85.	85.	84.	84.	84.	84.	83.	83.	83.	83.
83.	82.	82.	82.	82.	82.	82.	82.	81.	81.
81.	81.	81.	81.	81.	81.	81.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

Sh 14

STAGE

78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.9	78.9
79.0	79.1	79.2	79.4	79.7	80.1	80.6	81.1	81.6	81.9
82.2	82.4	82.4	82.3	82.2	82.1	82.0	81.8	81.7	81.5
81.4	81.3	81.1	81.0	80.9	80.8	80.7	80.6	80.5	80.4
80.3	80.2	80.1	80.1	80.0	79.9	79.9	79.8	79.8	79.7
79.7	79.6	79.6	79.5	79.5	79.4	79.4	79.4	79.3	79.3
79.3	79.2	79.2	79.2	79.2	79.1	79.1	79.1	79.1	79.1
79.1	79.0	79.0	79.0	79.0	79.0	79.0	78.9	78.9	78.9
78.9	78.9	78.9	78.9	78.9	78.9	78.9	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 1242. AT TIME 69.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1242.	310.	104.	83.	25020.
CMS	35.	9.	3.	2.	708.
INCHES		7.20	7.27	7.27	7.27
MM		182.86	184.74	184.74	184.74
AC-FT		6140.	6203.	6203.	6203.
THOUS CU M		7574.	7652.	7652.	7652.

STATION OUTFLO, PLAN 1, RATIO 5

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

8.	8.	8.	8.	8.	8.	9.	13.	21.	31.
46.	63.	89.	141.	245.	410.	622.	859.	1096.	1376.
1629.	1715.	1687.	1597.	1491.	1388.	1294.	1209.	1145.	1080.
1011.	942.	874.	811.	751.	695.	644.	596.	552.	511.
473.	438.	406.	376.	348.	323.	299.	277.	257.	238.
221.	205.	190.	176.	164.	152.	141.	131.	121.	113.
105.	97.	90.	84.	79.	74.	69.	64.	60.	56.
53.	49.	46.	43.	40.	38.	35.	33.	31.	29.
27.	25.	24.	22.	21.	19.	18.	17.	16.	15.
14.	13.	12.	11.	11.	10.	9.	9.	8.	8.
7.	7.	6.	6.	6.	5.	5.	5.	4.	4.
4.	4.	3.	3.	3.	3.	3.	2.	2.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

Sh 15

1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
				STORAGE					
87.	87.	87.	87.	87.	87.	88.	90.	95.	101.
107.	115.	126.	146.	185.	245.	324.	417.	514.	598.
646.	661.	656.	640.	620.	600.	580.	559.	535.	507.
479.	450.	423.	397.	374.	352.	333.	314.	298.	283.
269.	256.	244.	233.	223.	214.	205.	197.	190.	183.
176.	171.	165.	160.	155.	151.	147.	143.	139.	136.
132.	129.	127.	124.	122.	120.	118.	116.	114.	112.
111.	109.	108.	106.	105.	104.	102.	101.	100.	99.
98.	97.	97.	96.	95.	94.	93.	93.	92.	91.
91.	90.	90.	89.	89.	88.	88.	87.	87.	87.
86.	86.	86.	85.	85.	85.	84.	84.	84.	84.
84.	83.	83.	83.	83.	83.	82.	82.	82.	82.
82.	82.	81.	81.	81.	81.	81.	81.	81.	81.
81.	80.	80.	80.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
				STAGE					
78.8	78.6	78.8	78.6	78.8	78.8	78.8	78.9	78.9	79.0
79.1	79.2	79.3	79.6	79.9	80.5	81.0	81.6	82.1	82.5
82.7	82.8	82.8	82.7	82.6	82.5	82.4	82.4	82.2	82.1
82.0	81.8	81.6	81.5	81.4	81.2	81.1	81.0	80.9	80.8
80.5	80.5	80.5	80.4	80.3	80.2	80.1	80.1	80.0	79.9
79.9	79.8	79.7	79.7	79.6	79.6	79.6	79.5	79.5	79.4
79.4	79.4	79.3	79.3	79.3	79.2	79.2	79.2	79.2	79.1
79.1	79.1	79.1	79.1	79.1	79.0	79.0	79.0	79.0	79.0
79.0	79.0	78.9	78.9	78.9	78.9	78.9	78.9	78.9	78.9
78.9	78.9	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

Sh 16

78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 1715. AT TIME 66.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	1715.	413.	139.	111.	33346.
CMS	49.	12.	4.	3.	944.
INCHES		9.60	9.69	9.69	9.69
MM		243.80	246.22	246.22	246.22
AC-FT		8186.	8268.	8268.	8268.
THOUS CU M		10098.	10198.	10198.	10198.

STATION OUTFLOW, PLAN 1, RATIO 6

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

9.	9.	10.	10.	9.	10.	11.	17.	26.	40.
58.	61.	113.	178.	309.	513.	773.	1062.	1453.	1873.
2088.	2155.	2109.	1989.	1853.	1722.	1599.	1487.	1383.	1289.
1205.	1142.	1077.	1007.	938.	871.	807.	748.	692.	641.
593.	549.	509.	471.	436.	404.	374.	347.	322.	298.
276.	256.	237.	220.	204.	189.	176.	163.	151.	140.
130.	121.	112.	105.	98.	92.	86.	80.	75.	70.
65.	61.	57.	53.	50.	47.	44.	41.	38.	36.
33.	31.	29.	27.	26.	24.	22.	21.	20.	18.
17.	16.	15.	14.	13.	12.	12.	11.	10.	10.
9.	8.	8.	7.	7.	7.	6.	6.	5.	5.
5.	4.	4.	4.	4.	3.	3.	3.	3.	3.
3.	2.	2.	2.	2.	2.	2.	2.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Sh 17

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STORAGE

87.	88.	88.	88.	88.	88.	89.	93.	98.	105.
113.	123.	136.	161.	208.	283.	382.	500.	613.	688.
723.	734.	727.	707.	685.	662.	641.	620.	599.	578.
557.	533.	506.	477.	448.	421.	396.	373.	351.	332.
314.	297.	282.	268.	255.	243.	232.	222.	213.	205.
197.	189.	182.	176.	170.	165.	160.	155.	150.	146.
142.	139.	136.	132.	130.	127.	125.	122.	120.	118.
116.	114.	113.	111.	109.	108.	107.	105.	104.	103.
102.	101.	99.	99.	98.	97.	96.	95.	94.	94.
93.	92.	92.	91.	90.	90.	89.	89.	88.	88.
88.	87.	87.	86.	86.	86.	85.	85.	85.	85.
84.	84.	84.	84.	83.	83.	83.	83.	83.	82.
82.	82.	82.	82.	82.	81.	81.	81.	81.	81.
81.	81.	81.	81.	80.	80.	80.	80.	80.	80.
80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	79.	79.	79.	79.	79.	79.
79.	79.	79.	79.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.
78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

STAGE

78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.9	79.0	79.1
79.2	79.3	79.4	79.7	80.2	80.8	81.4	82.1	82.6	82.9
83.1	83.1	83.1	83.0	82.9	82.8	82.7	82.6	82.5	82.4
82.3	82.2	82.1	81.9	81.8	81.6	81.5	81.4	81.2	81.1
81.0	80.9	80.7	80.6	80.5	80.5	80.4	80.3	80.2	80.1
80.1	80.0	79.9	79.9	79.8	79.7	79.7	79.6	79.6	79.5
79.5	79.5	79.4	79.4	79.4	79.3	79.3	79.3	79.2	79.2
79.2	79.2	79.2	79.1	79.1	79.1	79.1	79.1	79.0	79.0
79.0	79.0	79.0	79.0	79.0	78.9	78.9	78.9	78.9	78.9
78.9	78.9	78.9	78.9	78.9	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8	78.8
78.8	78.8	78.8	78.8	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

Sh 18

78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7
78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7

PEAK OUTFLOW IS 2155. AT TIME 65.00 HOURS

	PEAK	10-DAY	30-DAY	90-DAY	TOTAL VOLUME
CFS	2155.	516.	174.	139.	41671.
CMS	61.	15.	5.	4.	1180.
INCHES		12.00	12.11	12.11	12.11
MM		304.73	307.58	307.69	307.69
AC-FT		10232.	10332.	10332.	10332.
THOUS CU M		12622.	12744.	12744.	12744.

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

84 19

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .28	RATIO 4 .30	RATIO 5 .40	RATIO 6 .50
HYDROGRAPH AT	INFLOW	16.00	1	435.	870.	1218.	1305.	1740.	2175.
		(41.44)		(12.32)(	24.63)(	34.48)(	36.95)(	49.26)(	61.58)(
ROUTED TO	OUTFLO	16.00	1	414.	824.	1148.	1242.	1715.	2155.
		(41.44)		(11.72)(	23.34)(	32.51)(	35.16)(	48.56)(	61.03)(

Sh 20

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	78.80	78.67	82.30
STORAGE	87.	78.	548.
OUTFLOW	8.	0.	1176.

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
.10	80.44	0.00	647.	414.	0.00	69.00	0.00
.20	81.53	0.00	803.	824.	0.00	69.00	0.00
.25	82.24	0.00	936.	1148.	0.00	69.00	0.00
.30	82.39	.09	967.	1242.	9.00	69.00	0.00
.40	82.81	.51	661.	1715.	27.00	66.00	0.00
.50	83.11	.81	734.	2155.	39.00	66.00	0.00

Sh 21

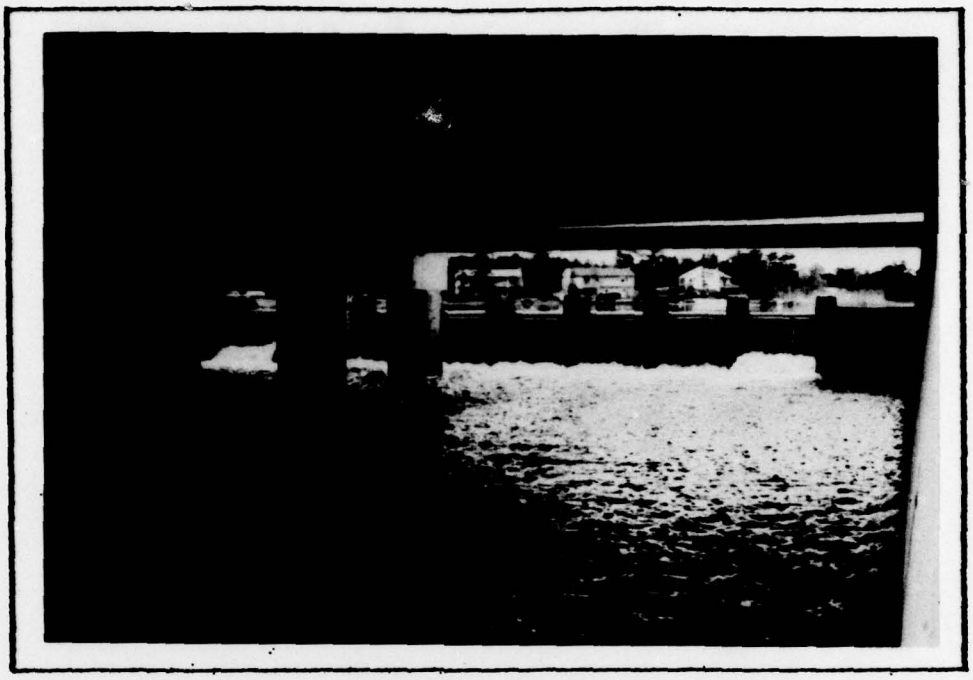
APPENDIX

D

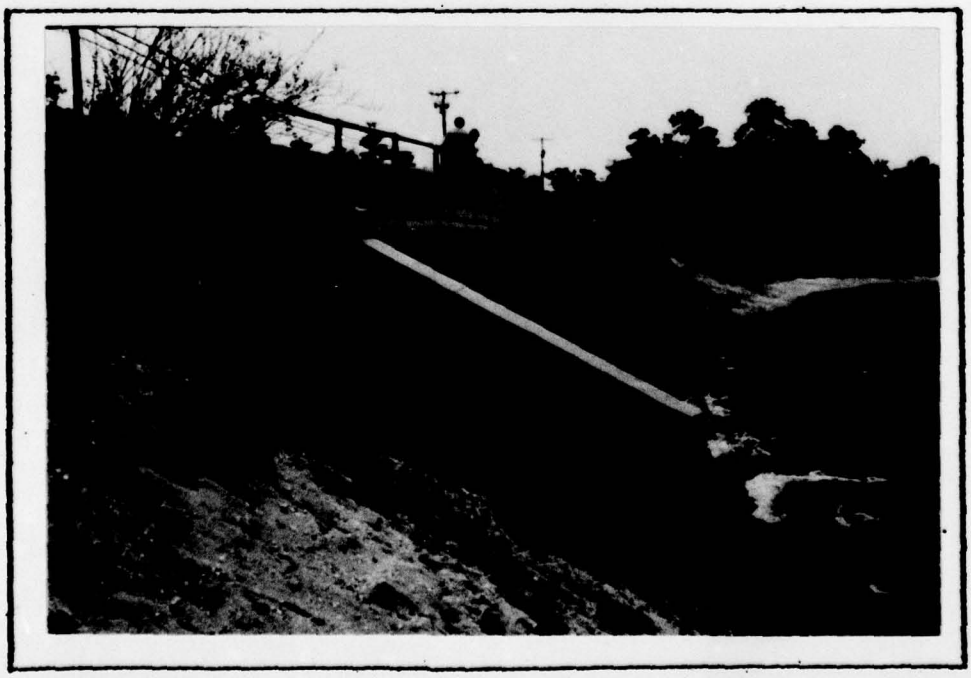
Photographs

UPSTREAM FACE OF THE DAM
FROM THE LEFT ABUTMENT 4/12/79

SPILLWAY STOPLOG PIERS
AND THE BRIDGE OPENING 4/12/79



VIEW OF THE BRIDGE OPENING
AND THE SPILLWAY STOPLOG PIERS 4/12/79



DOWNSTREAM FACE OF THE
EMBANKMENT AND BRIDGE 4/12/79

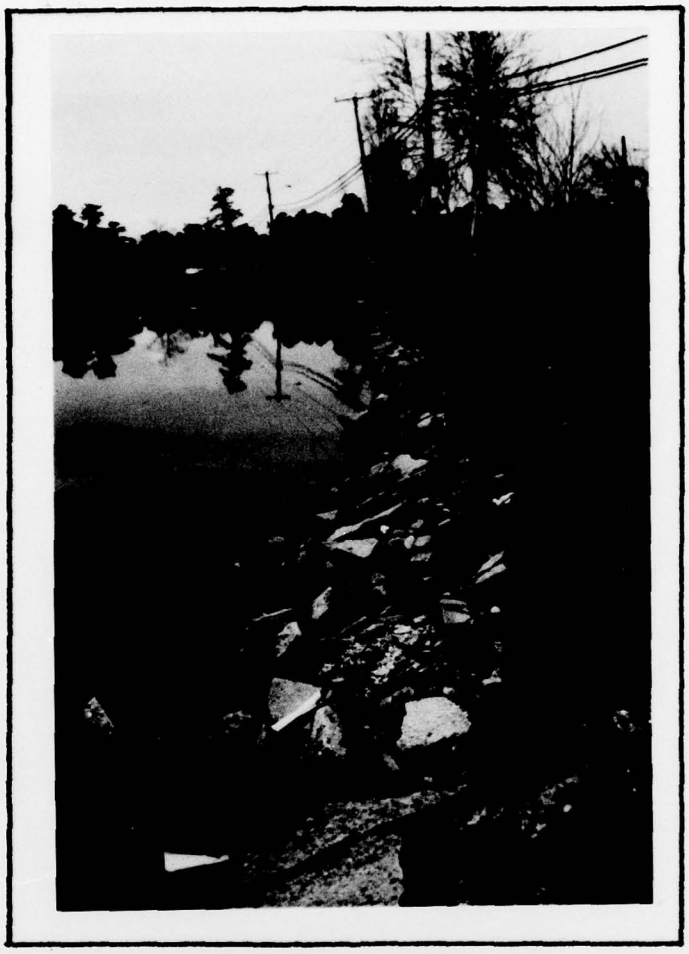
DOWNSTREAM FACE OF THE EMBANKMENT SHOWING DEBRIS AND TREES
4/12/79

DOWNSTREAM FACE OF THE EMBANKMENT SHOWING EXTENSIVE DEBRIS 4/12/79

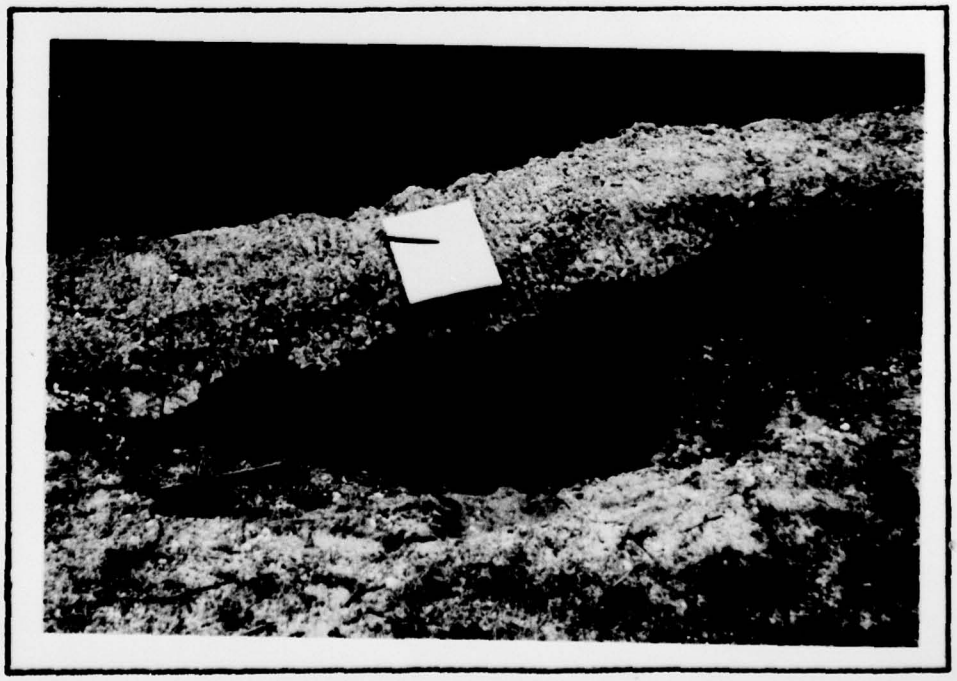
DOWNSTREAM FACE OF THE EMBANKMENT SHOWING EROSION AND LACK OF COVER
4/12/79

4/12/79

DOWNSTREAM FACE OF THE EMBANKMENT SHOWING EROSION AND MATERIALS INCLUDED IN THE EMBANKMENT



UPSTREAM FACE OF THE DAM FROM THE RIGHT ABUTMENT
4/12/79



UNDERMINING OF THE BLOCK WALL ALONG THE UPSTREAM EMBANKMENT SLOPE 4/12/79

APPENDIX

E

Drawings

TABLE OF CONTENTS - APPENDIX E

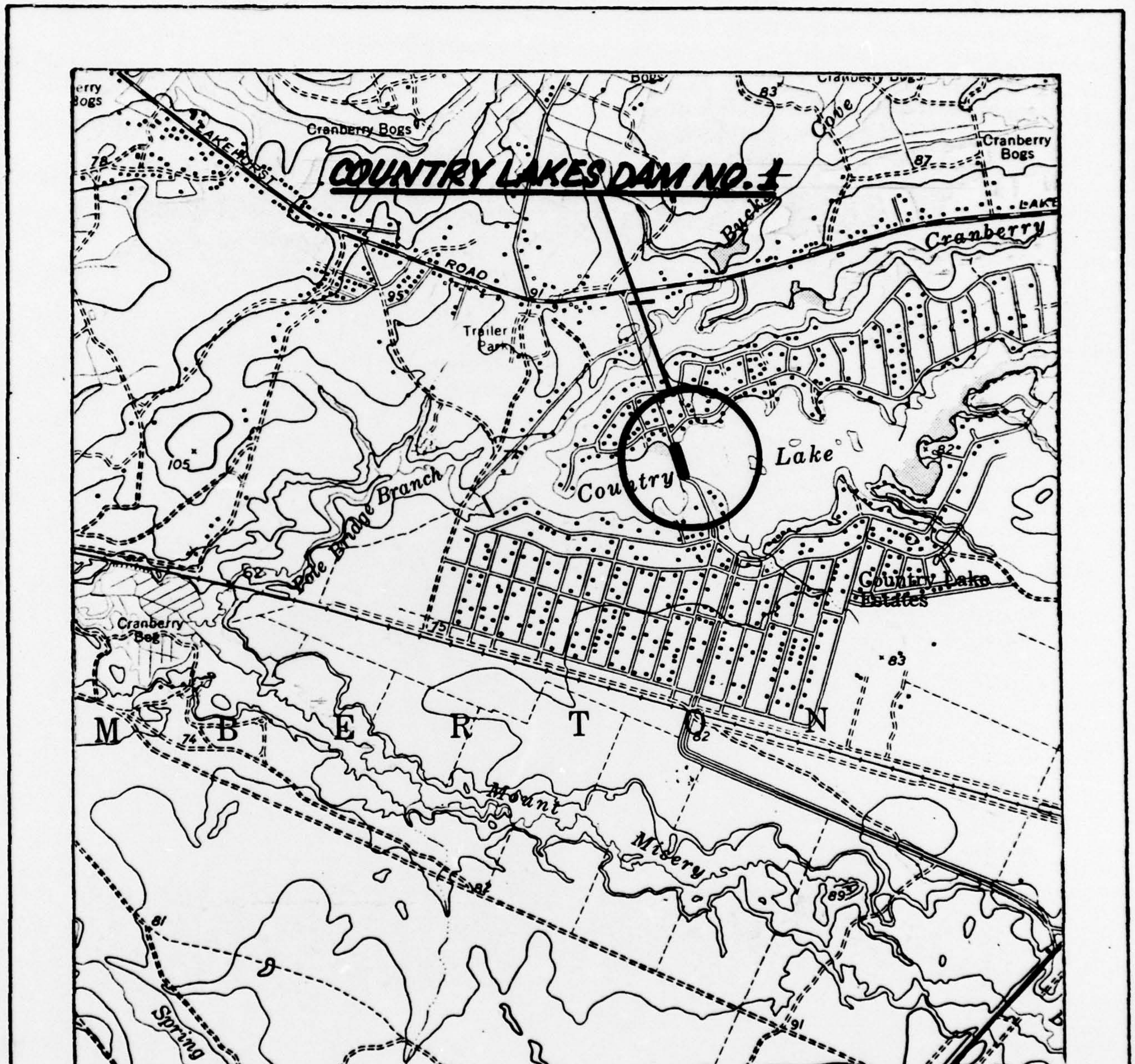
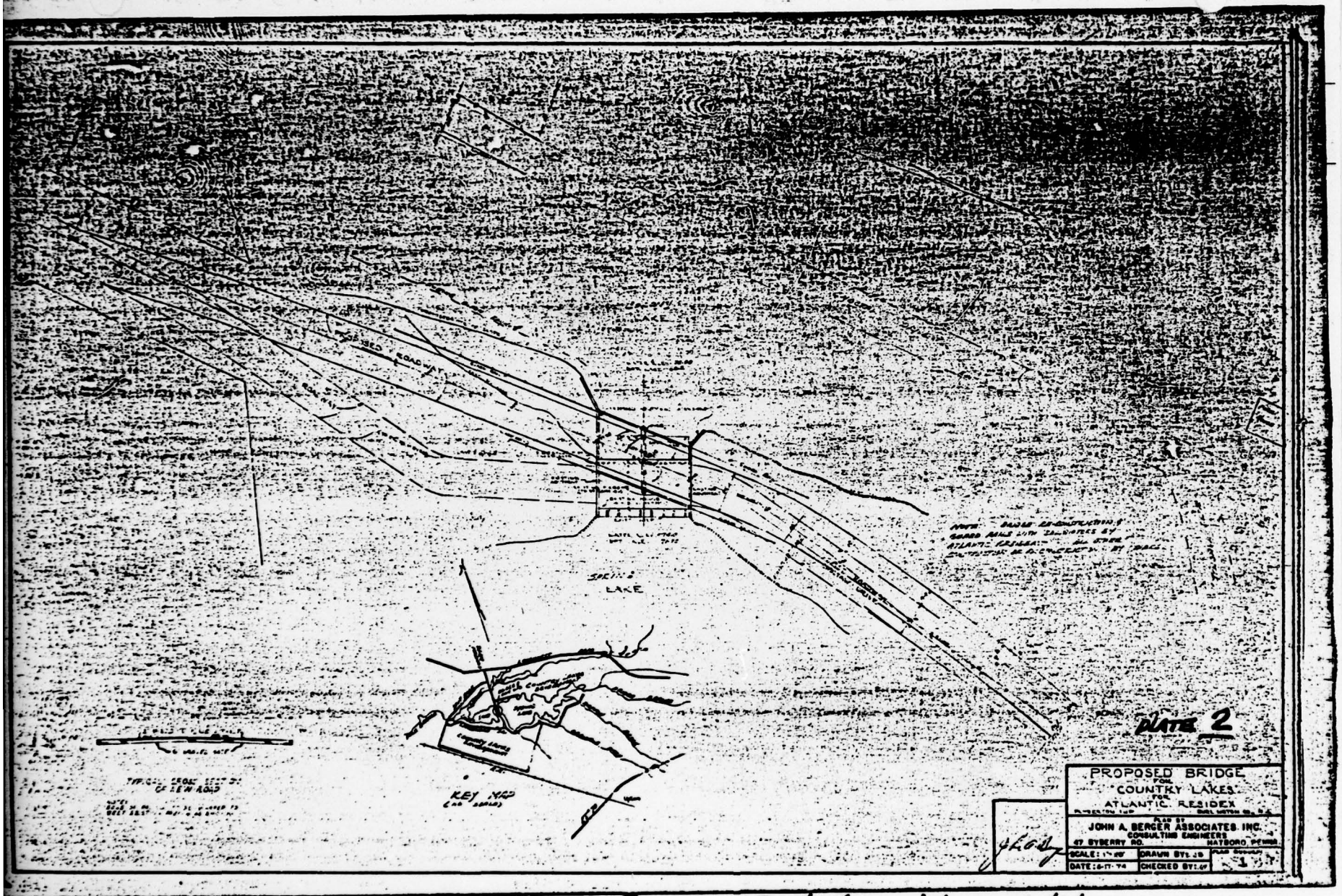
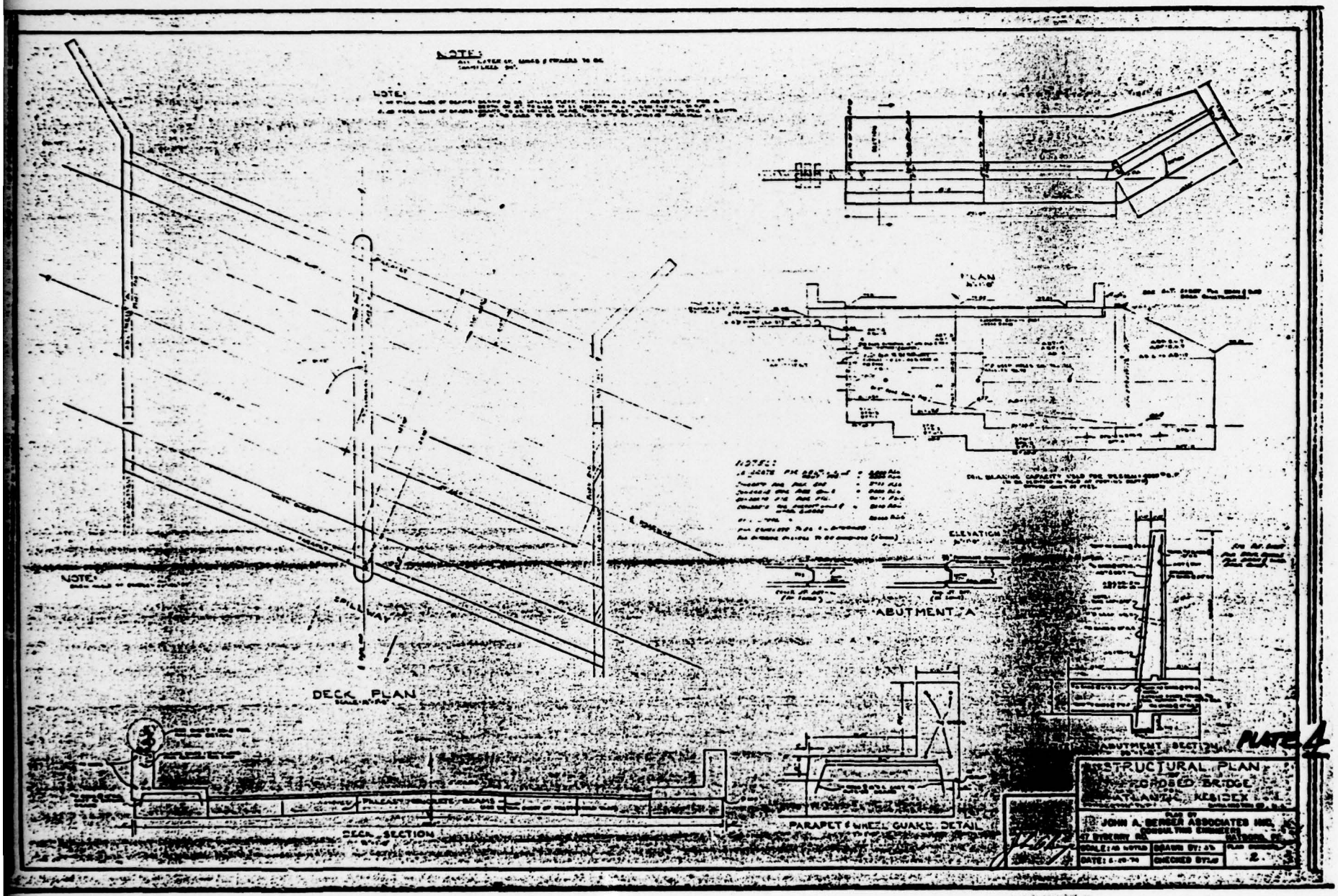


PLATE 1
REGIONAL VICINITY MAP
SCALE 1:24000
N



NOTE: Refer to Appendix D. page D-1 for spillway details.

PLATE 3
DECK FRAMING PLAN
ABUTMENT B PLAN
DECK PLAN
ABUTMENT A PLAN


NOTE:
NOTE:
NOTE:
PLAN
ELEVATION
ABUTMENT A
DECK PLAN
DECK SECTION
PARAPET & WHEEL GUARD DETAIL
ABUTMENT SECTION
PLATE 4
STRUCTURAL PLAN
PROPOSED BRIDGE
ATLANTIC RESIDEX
JOHN A. BERGER ASSOCIATES INC.
CONSULTING ENGINEERS
SCALE: AS NOTED
DRAWN BY: AS
DATE: 5-10-74
CHECKED BY: AS
2

O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Country Lakes Dam #1	5		7/23/79	1800-005-12

APPENDIX

F

Site Geology

SITE GEOLOGY

COUNTRY LAKES DAM 1 & 3

Country Lake is located in the Coastal Plain physiographic province which is composed of unconsolidated sedimentary deposits. These beds form a wedge-shaped mass that is exposed at the Fall Line and thickens in a southeasterly direction towards the Atlantic Ocean. The surficial deposits at the dam site consist of a series of tertiary sands comprising the Cahansey formation. No faults or structural defects are noted in the vicinity of the dam or reservoir.

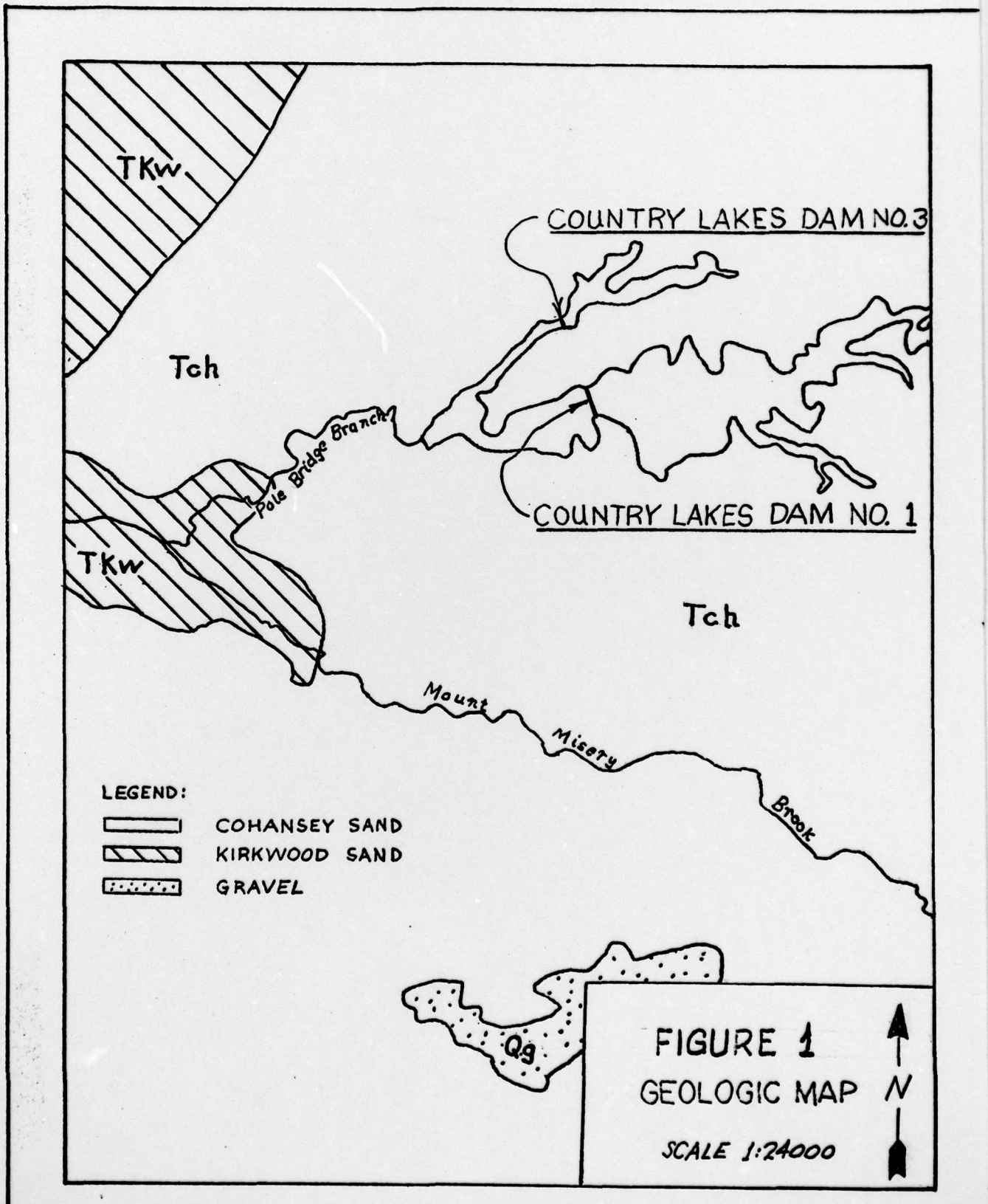


FIGURE 1
GEOLOGIC MAP
SCALE 1:24000