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NATIONAL DAM INSPECTION PROGRAM. TROUT LAKE DAM (NDI ID NUMBER --ETC(U)
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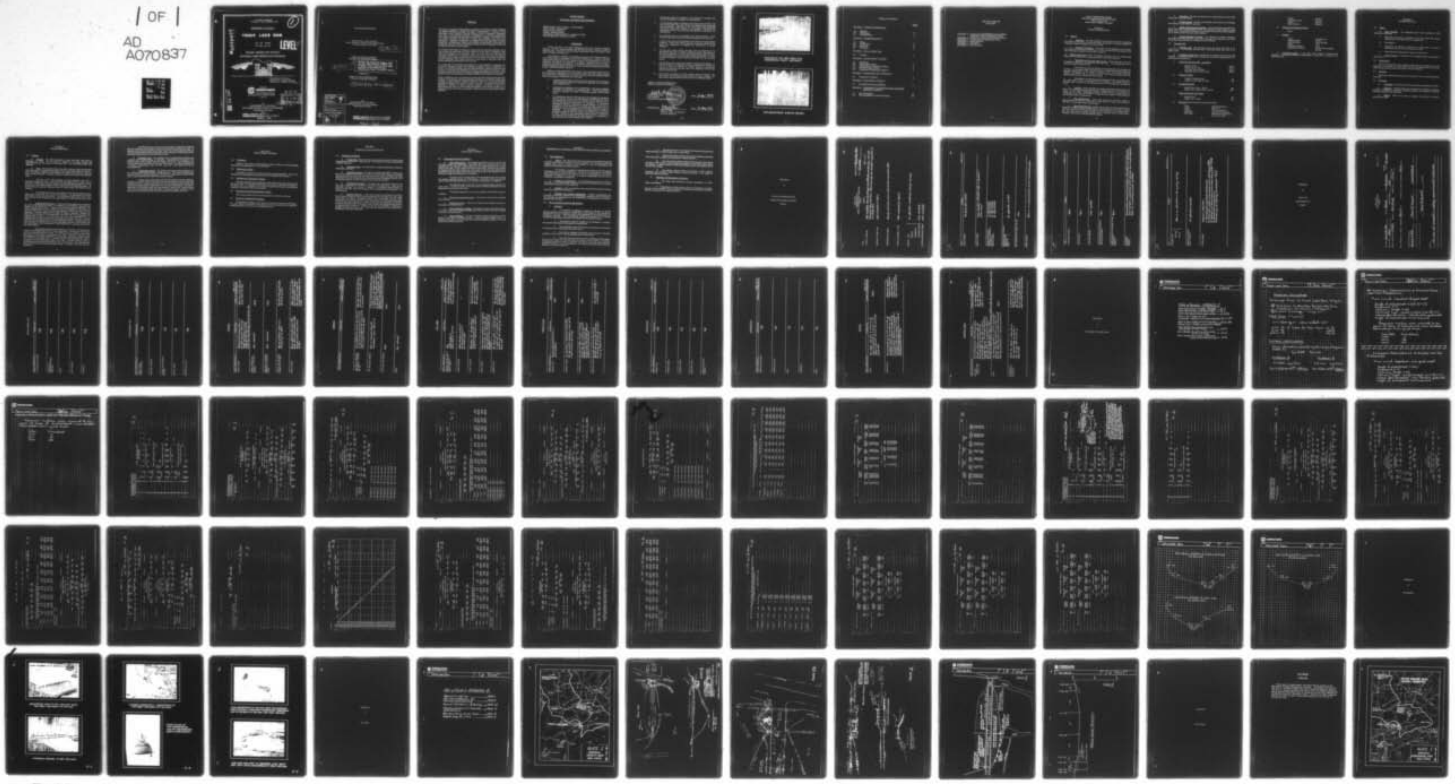

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DELAWARE RIVER BASIN
APPENZELL CREEK, LUZERNE COUNTY
MONROE

PENNSYLVANIA

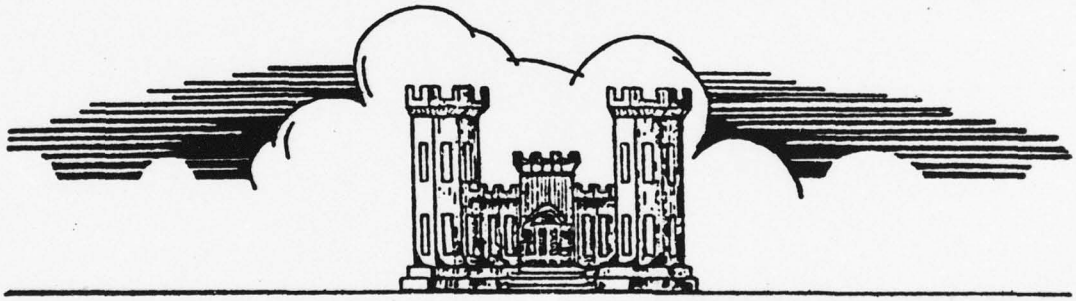
TROUT LAKE DAM

NDI - PA 00769
PA DER 45 - 43

LEVEL II

AD A070837

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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Prepared By
O'BRIEN & GERE
Justin & Courtney Division
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FOR
DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT CORPS OF ENGINEERS
BALTIMORE, MARYLAND
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MARCH 1979

DELAWARE RIVER BASIN

Name of Dam: Trout Lake Dam
County and State: Monroe County, Pennsylvania
Inventory Number: PA 00769

(11) May 79

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

(12) 82 p.

(6) National Dam Inspection Program. Trout Lake Dam (NDI ID Number PA-00769, DER ID Number 45-43), Delaware River Basin, Appenzell Creek, Monroe County, Pennsylvania. Phase I Inspection Report.

Prepared by:

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

(15) DACW 31-79-C-0010

For:
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, MD 21203

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected, and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Trout Lake Dam ID # PA 00769
State Located: Pennsylvania
County Located: Monroe
Stream: Appenzell Creek
Coordinates: Latitude 40° 00.1' Longitude 75° 20.8'
Date of Inspection: December 14, 1978

ASSESSMENT

Trout Lake Dam is an earth embankment dam with a concrete overflow spillway. The dam is approximately 390 feet long and has a maximum height of about 24 feet. The dam is located along Pennsylvania Route 715, about 1 mile south of Reeders, Pennsylvania.

The spillway is capable of discharging 25 percent of the Probable Maximum Flood (PMF) without overtopping of the earth embankment. Failure of the dam would significantly increase the hazard to loss of life downstream of the dam. Therefore, the spillway is classified as "seriously inadequate", and the dam is classified as "unsafe (non-emergency)". The spillway capacity should be increased. Further detailed hydrologic and hydraulic studies should be performed prior to the design of additional spillway capacity.

Based on visual observations and review of the information obtained from the Pennsylvania Department of Environmental Resources, Dam Safety Section, Trout Lake Dam is considered to be in poor condition. Several conditions require further investigation, maintenance or monitoring:

1. Longitudinal depressions extend across the upstream face of the dam. These depressions should be monitored to determine if any differential movement occurs.

2. Immediately downstream of the embankment is an area of seepage, saturated silty deposits, and standing water. This area should be monitored regularly for signs of increased seepage and/or turbid water.

3. The depressions along the upstream face, the seepage and discolored water at the toe of the earth embankment, and undulations of all of the embankment surfaces may be indicative of the migration of fine material through the embankment or foundation. A subsurface investigation should be initiated at several sections of the dam to include, but not be limited to, soil borings for determination of the composition and in situ properties of the embankment and foundation materials. The investigation should be supervised by a licensed professional engineer with experience in the design and construction of dams. Results of the investigation should be used to establish if the materials are satisfactory for the embankment as designed and constructed; and to detect possible fines migration.

4. Piezometers should be installed in the boreholes to evaluate pore pressure development throughout the embankment.

5. The downstream slope is overgrown with a heavy cover of trees. The roots of the large trees may increase the seepage potential through the embankment. Uprooting of the trees could cause substantial volumes of embankment material to be displaced. Therefore, the trees should be cut to root level and removed from the surface of the embankment.

6. The upstream face is not provided with slope protection. Slope protection should be provided to prevent damage from wave action.

7. Portions of the top of the embankment were found to be below design elevation. Areas below design elevation should have additional fill placed and compacted to regrade the embankment to design elevation.

8. The low level outlet conduit and gate valve are silted-in at the downstream end, and no means of upstream control was evident at the time of inspection. The valve and outlet should be cleared of silt, and the adequacy of the outlet system should be assessed. A means of positive upstream control should be provided for the low level outlet.

9. The conditions of the site show evidence of lack of maintenance. A program of periodic maintenance should be established to include, but not be limited to, keeping the slopes cleared of deleterious vegetation, exercising the gate valve and inspecting the dam for structural deficiencies.

10. There was no evidence of a flood warning system at this site. The dam should be monitored during periods of heavy rainfall, and downstream residents alerted in the event of an impending failure.

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

Will M. Heiser

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
WILL M. HEISER
ENGINEER
No. 6926E

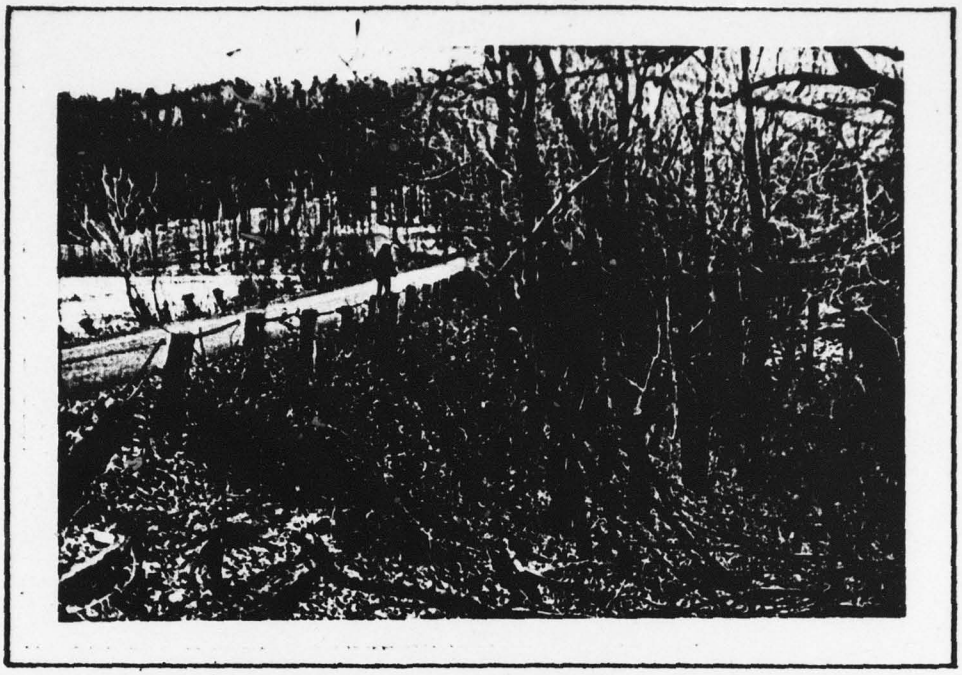
Will M. Heiser, P.E.
Vice President
Pennsylvania Registration #006926-E

Date: 16 Apr. 1979

APPROVED BY _____

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

Date: 14 May 1979



OVERVIEW OF THE DAM FROM THE DOWNSTREAM RIGHT ABUTMENT

THE DOWNSTREAM SLOPE OF THE DAM

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(Continued)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
TROUT LAKE DAM
INVENTORY NUMBER - PA 00769

SECTION 1
PROJECT INFORMATION

1.1 General

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

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic conditions at Trout Lake Dam and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description (From information obtained from the Pennsylvania Department of Environmental Resources (DER), Dam Safety Section.)

a. Description of Dam and Appurtenances. Trout Lake Dam is an earth embankment structure approximately 390 feet long. The embankment has a maximum height of about 24 feet.

A 35-foot long overflow spillway is located along the left abutment of the dam. A clear-span bridge is constructed over the spillway, with the steel beam supports approximately 4 feet above the spillway crest. The spillway discharge channel is provided with a masonry training wall along the right bank for approximately 50 feet downstream of the bridge.

According to the drawings made available, the dam is provided with a low level outlet conduit of unknown size and material. The outlet conduit is provided with a control at the downstream toe of the embankment (see Section 3.1.c).

b. Location. Trout Lake Dam is located along Pennsylvania Route 715 about 1 mile south of Reeders, Pennsylvania, on Appenzell Creek. The dam site is shown on the USGS Quadrangle entitled "Mount Pocono, Pennsylvania" at coordinates N 41° 00.1', W 75° 20.8'. A regional location plan of Trout Lake Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. Trout Lake Dam has a maximum height of approximately 24 feet and a maximum storage volume of about 1,117 acre-feet. The dam is in the intermediate size category.

d. Hazard Classification. Several homes and a church are located along Appenzell Creek at the town of Appenzell, 1 mile downstream of the dam. Failure of Trout Lake Dam would probably cause Gruber Lake Dam ($\frac{1}{2}$ mile downstream) to fail and would cause property damage and the probable loss of human lives. Therefore, the dam is in the high hazard category.

e. Ownership. The dam is owned by Mr. M. David Karpe, 103 East 125th Street, New York, NY 10035.

f. Purpose of Dam. The dam was originally constructed for ice pondage. The reservoir is now used for recreation.

g. Design and Construction History. (From information obtained from DER.) The dam was constructed in 1900. No information made available is dated before 1926. The spillway and bridge of the original structure have been replaced, but no details of the work were made available.

h. Normal Operating Procedure. The reservoir is normally maintained at the spillway crest elevation. Inflow occurring when the reservoir is at or above the spillway crest elevation is discharged over the spillway.

1.3 Pertinent Data

a. Drainage Area. The drainage area to the Trout Lake Dam is 3.7 square miles. The sub-basin drainage area to Mountain Spring Lake Dam is 2.5 square miles.

b. Discharge at Dam Site. No high pool or discharge records were made available. The spillway capacity to the design top of the dam is approximately 790 cubic feet per second (cfs).

c. Elevation (feet above MSL - estimated)

Spillway Crest	943.0
Design Top of Dam	947.0
Low Spot (top of dam)	946.8
Drainage Pipe Invert (outlet)	923.0

d. Reservoir (miles)

Length of Normal Pool	.95
Length of Pool (top of dam)	.98

e. Storage (acre-feet)

Normal Pool (Elev. 943.0)	700
Design Top of Dam (Elev. 947.0)	1117

f. Reservoir Surface Area (acres)

Normal Pool	96
Design Top of Dam	113

g. Dam Data (From information provided by DER)

Type -	Earth Embankment
Length -	390 feet ±
Height -	24 feet (maximum)
Top Width -	approximately 20 feet
Side Slopes -	both slopes variable from 1 H:IV to 2.5 H:IV

Zoning -	unknown
Impervious Core -	unknown
Cutoff -	unknown
Grout Curtain -	unknown

h. Diversion and Regulating Tunnel

None

i. Spillway

Type -	concrete weir
Length of Weir -	35 feet
Crest Elevation -	943.0 feet MSL
Gates -	none
Upstream Channel -	none
Downstream Channel -	25-foot wide riprapped channel

j. Regulating Outlets. A low level outlet conduit of undetermined diameter is constructed through the embankment. A gate valve is located at the downstream toe.

SECTION 2
ENGINEERING DATA

2.1 Design

a. Data Available. The engineering data made available by DER includes the following:

1. Plans and Sections for rebuilding of the dam, dated 1927 (never implemented - see Plates 2 and 3 of Appendix E).

2. Photographs

3. Application for Permit to Draw Dam or Other Body of Water in Accordance with the Act of December 15, 1959.

4. Miscellaneous correspondence, inspection reports, etc.

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

2.2 Construction

The only information made available concerning the construction of Trout Lake Dam is a comment in a letter dated July 28, 1926, stating that the dam was built 26 years previous, under the direction of Frank G. Wolfe.

2.3 Operation

No formal operating procedures were included in the information obtained from DER.

2.4 Evaluation

a. Availability. All information made available was obtained from DER.

b. Adequacy. Although design and construction information is minimal, a Phase I evaluation is considered reasonable based on the revealing conditions observed during the field inspection.

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

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Trout Lake Dam took place on December 14, 1978. At the time of inspection, the water surface was approximately one inch above the spillway crest. No underwater areas were inspected.

b. Dam. The upstream face of the dam is heavily covered with bushes and small trees. The slope of the upstream face varies from about 2.5 H:1V to 1 H:1V. Undulating longitudinal depressions were observed all along the upstream face and top of the dam. A sparse covering of cobbles was noted on the upstream slope.

The top of the dam supports a paved macadam road with a pronounced centerline crown. The top of the dam appears to be rounded rather than flat. Wooden post and cable barriers are located along both edges of the top of the dam. The barriers appear to have settled toward the adjoining slopes. At several locations along the upstream face, the barrier posts have fallen into the reservoir.

The downstream face of the embankment is heavily overgrown with trees up to 50 feet high and 18 inches in diameter. The embankment is covered with bushes, leaves and dead timber. The downstream slope varies from 1 H:1V near the top of the embankment to approximately 2.5 H:1V near the toe of the slope.

c. Appurtenant Structures. A small wood frame gatehouse is located at the toe of the downstream slope. The building is surrounded by saturated silty deposits and discolored water. A gate valve is located inside the gatehouse. The valve is partially buried in silt, as shown on Page 2 of Appendix D. The crown of a cast iron pipe buried in silt is located approximately 10 feet downstream of the gatehouse. The pipe appeared to be about 18 inches in diameter. Seepage was observed along the toe of the embankment to the right side of the gatehouse. The seepage area extends 5 to 10 feet from the toe of the embankment and is characterized by a band of saturated, discolored soil parallel to the toe. The flow along the toe was estimated to be 2 to 4 gallons per minute. Downstream of the toe is an area of standing water covering about 800 square feet. Approximately 50 feet downstream of the embankment is the confluence of a tributary stream with the outlet channel.

The spillway adjoins the left abutment of the dam. The spillway is a 35-foot wide bridged opening with concrete abutments. The bridge is a clear-span structure supported by steel I-beams. The opening from the spillway crest to the low chord of the bridge was measured as 4 feet. Based on a review of old photographs and the visual inspection, it appears that the present spillway surface is a concrete cap placed over an existing masonry, broad-crested weir with a concrete lip at the downstream edge of the weir. Concrete training walls are constructed along the sloping downstream face of the spillway. The walls constrict the width from 35 feet to approximately 25 feet. The weir is shown on Page 1 of Appendix D.

The field survey of the top of the dam (Plate 5, Appendix E) revealed that the underside of the bridge is above the low spot on the top of the dam. A masonry wall is constructed along the right bank of the spillway discharge channel. The wall extends about 50 feet downstream of the spillway and directs flow in the discharge channel away from the downstream slope.

d. Reservoir Area. The drainage area is predominantly meadow and woodland with a small number of residences. Approximately two-thirds of the drainage basin drains through Mountain Spring Lake Dam. This structure is an earth embankment about 600 feet long and 10 feet high. The dam is provided with a masonry, broad-crested weir 28 feet wide and 3 feet below the top of the embankment.

e. Downstream Channel. The spillway discharge channel appears to be an excavated earth channel with a cobblestone bed. The channel overbanks are heavily overgrown with trees and brush. The channel is obstructed by several fallen trees. These trees would not affect the spillway capacity.

Gruber Lake, located about 400 feet downstream of Trout Lake Dam, is about $\frac{1}{2}$ mile long. Gruber Lake Dam is an earth embankment about 15 feet high and 300 feet long. The dam is provided with a 45-foot masonry, broad-crested weir constructed approximately 3 feet below the top of the embankment. The town of Appenzell is located about 3000 feet downstream of Gruber Lake. Several homes and a church are located along the banks of Appenzell Creek. Failure of Trout Lake Dam would cause significant property damage and probable loss of life.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedures

Based on the review of information provided by DER, no formal operating procedures are established for Trout Lake Dam.

4.2 Maintenance of Dam

Attempts to contact the owner of the dam were unsuccessful. There is no evidence that maintenance procedures have been established for this dam.

4.3 Maintenance of Operating Facilities

The only operating facility associated with the dam is the gate valve for the low level outlet. The operating handle was not in place at the time of inspection. The owner was not available at the time of inspection; therefore, the operating condition of the outlet could not be assessed.

4.4 Description of any Warning System in Effect

There is no evidence that any warning system is in effect at this site.

4.5 Evaluation of Operational Adequacy

The operating condition of the gate valve should be assessed immediately. The dam should be monitored during periods of heavy rainfall, and downstream residents alerted in the event of an impending failure.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Trout Lake Dam has a drainage area of 3.7 square miles and impounds a reservoir of 700 acre-feet. The spillway is a 35-foot wide concrete overflow structure.

b. Experience Data. No information is available pertaining to maximum discharges at this site.

c. Visual Observations. The Spillway Design Flood (SDF) for this site is given as a range from one-half of the PMF to the full PMF. Based on the height and storage of Trout Lake Dam, the high potential for failure of Gruber Lake Dam following a failure of Trout Lake Dam, and the potential for damage and loss of life at the hazard center, the SDF was determined to be the full PMF.

d. Overtopping Potential. The peak inflow and outflow rates for the SDF were determined to be 7950 cfs and 7740 cfs respectively. Based on the hydrologic analyses, the spillway is capable of discharging approximately 25 percent of the PMF without overtopping of the embankment (see Appendix C for computations).

e. Spillway Adequacy. A dam break analysis was computed to evaluate the increased "hazard to loss of life downstream from the dam from that which would exist just before overtopping failure" (ETL 1110-2-234, 10 May 1978). According to the analysis, failure of the Trout Lake Dam would increase the depth of flow at the hazard area from 7.9 feet to 12.7 feet for 50 percent of the PMF. The peak discharge at the hazard area would increase from approximately 3400 cfs to approximately 14,600 cfs. Failure of the dam is considered to significantly increase the hazard to loss of life. Therefore, the spillway of Trout Lake Dam is classified as "seriously inadequate."

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The undulating surfaces of the top of the dam and both slopes, the longitudinal depressions along the upstream face of the embankment, the displaced barrier posts, and the measured variations in slope could be the result of poor compaction during construction. Based on the presence of seepage along the downstream toe, and an area of saturated silty deposits and discolored water, the above noted items could also be due to the migration of fine material through the embankment or foundation.

The heavy cover of large trees on the downstream slope may increase the seepage potential through the embankment. Uprooting of the trees by high winds could cause substantial volumes of embankment material to be displaced.

The upstream slope of the dam is not protected against erosion from wave action. The lack of slope protection could be partially responsible for the depressions along the upstream face.

The spillway appeared to be in good condition and showed no signs of instability.

b. Design and Construction Data. There are no construction and design data available.

c. Operating Records. There is no evidence that operating records are maintained for this structure.

d. Post Construction Changes. The spillway has been reconstructed, but no records were made available describing the extent of this or any other changes to the dam or appurtenances.

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 conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS AND PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Safety. The visual observations and review of available information indicate that the Trout Lake Dam is in poor condition. The many deficiencies and problem areas noted in Section 6.1.a evidence a lack of maintenance and potentially hazardous structural conditions.

The spillway is capable of discharging 25 percent of the PMF without overtopping of the earth embankment. Failure of the structure by overtopping would significantly increase the hazard to loss of life downstream of the dam. Therefore, the spillway is classified as "seriously inadequate:, and the dam is classified as "unsafe(non-emergency)".

b. Adequacy of Information. The information received from DER is inadequate for relating possible design and construction deficiencies to the problem areas observed during the visual inspection.

c. Urgency. Further investigations and recommended remedial measures should be implemented immediately.

d. Necessity for Further Investigation. Further investigations are necessary at this site. Results of the investigation should be used to establish if the materials are satisfactory for the embankment as constructed; and to detect possible fines migration.

7.2 Recommendations and Remedial Measures

a. Facilities

1. A subsurface investigation should be initiated at several selected sections of the dam to include, but not be limited to, soil borings for determination of the composition and in situ properties of the embankment and foundation materials. The investigation should be supervised by a licensed professional engineer experienced in the design and construction of dams.

2. Piezometers should be installed in the boreholes to evaluate pore pressure development throughout the embankment.

3. The depressions along the upstream face should be monitored to determine if any differential movement occurs.

4. The areas of seepage and standing water should be monitored regularly for any signs of increased seepage and/or turbid water.

5. The trees and brush growing on the embankment slopes should be cut to root level and removed from the surface of the structure. A further investigation should be made to determine the extent of the root systems before remedial measures can be recommended. The downstream slope should then be seeded with suitable vegetation.

6. The upstream face of the embankment should be provided with slope protection to inhibit erosion due to wave action.

7. Areas below design elevation should have additional fill placed and compacted to regrade the embankment to design elevation.

8. The mud and silt should be cleared from the gate valve and the low level outlet conduit, and the operational adequacy of the outlet system should be assessed. A means of positive closure should be provided at the upstream end of the low level conduit.

9. The spillway capacity should be increased. Further detailed hydrologic and hydraulic studies should be performed prior to the design of additional spillway facilities.

b. Operation and Maintenance Procedures.

1. The outlet gate should be operated periodically to insure proper maintenance.

2. A downstream warning system should be developed, and during periods of heavy rainfall, the dam should be monitored and downstream residents alerted in the event of an impending failure.

APPENDIX

A

Check List Engineering Data

Design, Construction, Operation

Phase I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Trout Lake Dam

ID # PA 00769

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available. The only drawings in the DER files are two from 1927 for "Rebuilding Trout Lake Dam." These drawings are included in Appendix E as Plates 2 & 3.
REGIONAL VICINITY MAP	Refer to Appendix E, Plate 1
CONSTRUCTION HISTORY	The only information known is that the dam was built in 1900.
TYPICAL SECTIONS OF DAM	Refer to Appendix E, Plate 2
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 data available
GEOLOGY REPORTS	None provided in DER 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	None
MODIFICATIONS	None
HIGH POOL RECORDS	None available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None
MAINTENANCE OPERATION RECORDS	Correspondence through the years (from DER files) gives information about sporadic maintenance work that was done on the structure. There are no operating records available.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	There is no information on the existing spillway.
OPERATING EQUIPMENT PLANS & DETAILS	No information available
MISCELLANEOUS	Material in DER files: 1. Dam inspection reports through the years 2. Photographs related to the structure from 1927 through 1964 3. "Application for Permit to Draw Dam or Other Body of Water" (1968) 4. Miscellaneous correspondence 5. Two drawings for "Rebuilding Trout Lake Dam" (1927)

APPENDIX

B

Check List

Visual Inspection

Phase I

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Trout Lake Dam County Monroe State Pennsylvania National ID # PA 00769

Type of Dam Earth Hazard Category High

Date(s) Inspection 12/14/78 Weather Cold, cloudy Temperature 20°-25° F

Pool Elevation at Time of Inspection 943.0± M.S.L. Tailwater at Time of Inspection 921.0± M.S.L.

Inspection Personnel:

George C. Elias David B. Campbell Leonard R. Beck

David B. Campbell Recorder

Remarks:

We were not successful in contacting anyone associated with the dam.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N/A	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N/A	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	N/A	

CONCRETE/MASONRY DAMS

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

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Could not tell because there is so much brush and litter on the slopes and there is a hard surfaced road along the top of the dam. Many large trees on downstr. dam slope.	Clear the brush, litter, and trees from the dam.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed	None
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The top of the dam varies by a maximum of 2.2 feet.	The low portion of the dam should be built up.
RIPRAP FAILURES	It is difficult to tell what is left of the riprap on the upstream slope because of the heavy brush & litter.	Clear the brush and litter from the upstream. Repair the riprap as needed to provide protection from wave action.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	It is difficult to assess the situation at the junction of the embankment and abutment, spillway and dam because of the heavy brush and litter on the slopes.	Clear the brush and litter from the slopes so the situation can be appraised.
ANY NOTICEABLE SEEPAGE	There is seepage along the downstream right abutment.	A boring program should be initiated to determine the composition and in situ properties of the embankment and foundation. Piezometers should be installed in the bore holes to evaluate pore pressure development throughout the embankment.
STAFF GAGE AND RECORDER	None	None
DRAINS	None observed	None

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	N/A Outlet conduit is either steel or cast iron.	Drawdown impoundment so that entire reservoir drain system can be examined
INTAKE STRUCTURE	Intake structure could not be observed because it was under water.	"
OUTLET STRUCTURE	Drain pipe at the downstream end of the reservoir drain system conduit is half buried in sediment.	Sediment should be removed from pool immediately downstream of the dam.
OUTLET CHANNEL	Flows through woods for about 100 yds. where it joins the channel for the spillway discharge. The headwaters of Gruber Lake are within 100 feet of this junction.	"
EMERGENCY GATE	The sluice valve is half buried in sediment. It is located about 15' upstream of the outlet of the reservoir drain pipe.	The sluice valve should be examined and repaired as needed. The sediment should be removed from around the sluice valve.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete appeared to be in good condition.	None
APPROACH CHANNEL	The approach is only about 30 feet long. The only possible obstruction would be the bridge built over the spillway.	None
DISCHARGE CHANNEL	The channel flows through a heavily wooded area for a distance of about 500 feet to the headwaters of Gruber Lake. The average channel gradient is about 5 percent.	None
BRIDGE AND PIERS	The bridge built over the spillway restricts the opening for flow over the spillway to an area of 35 feet wide by 4 feet vertical.	The spillway probably is undersized.

GATED SPILLWAY

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

INSTRUMENTATION

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

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes vary from a maximum of about 15 percent to a minimum of abaut 2 percent around the perimeter of the lake.	None
SEDIMENTATION	The perimeter of the lake consists of timbered regions and pastures with several summer cottages located along the south shore. The amount of additional sediment in the impoundment will be dependent on the extent of future residental development around the lake.	Sediment control measures should be implemented for future construction along the lake shores.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The discharge from the spillway flows through a heavily wooded region for about 500 feet to the headwaters of Gruber Lake. Gruber Lake is about one half mile long. The channel downstream of Gruber Lake is in meadows for about 3000 feet before following a route through timbered regions. Bridge ≈700' downstr. of Gruber Lake has opening ≈ 24' wide x 6' high	An estimated "n" value for the downstream reaches except for Gruber Lake is 0.05
SLOPES	The channel gradient is about 4 percent between the Trout Lake Dam spillway and Gruber Lake. From Gruber Lake to Appenzell the channel gradient is about 0.8 percent	None
APPROXIMATE NO. OF HOMES AND POPULATION	there are about a dozen homes and approximately 60 people in the 3 miles downstream of Trout Lake.	A formal warning system should be developed and implemented. Procedures for evacuating people within the potential flood area should be implemented.

APPENDIX

C

Hydrologic & Hydraulic Data

O'BRIEN & GERE
ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Trout Lake Dam			3/22/79	

Table of Contents APPENDIX C

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
TROUT LAKE DAM	1	DBC	4/9/79	

HYDROLOGY CALCULATIONS

Drainage Area to Trout Lake Dam - 3.7 sq. mi.

(A) Sub-basin to Mountain Spring Lake Dam (upstream structure) - 2.5 sq. mi.
(B) Local drainage - 1.2 sq. mi.

PMP DATA (Zone 1)

6 hr - 200 sq. mi. index rainfall = 22"

6 hr	% of index for this basin	"	"	"	= 111 %
12 hr	% "	"	"	"	124 %
24 hr	% "	"	"	"	133 %

SNYDER COEFFICIENTS

(From information provided by the Corps of Engineers - ZONE 1)

$C_p = 0.45$ $C_t = 1.23$

Subbasin A

$L = 2.8$ mi $L_{ca} = 1.5$ mi

$t_p = 1.23(2.8 \times 1.5)^{.3} = \underline{1.89 \text{ hrs}}$

Subbasin B

$L = 2.1$ mi. $L_{ca} = 0.7$ mi.

$t_p = 1.23(2.1 \times 0.7)^{.3} = \underline{1.38 \text{ hrs}}$

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
TROUT LAKE DAM	2A	DBC	4/9/79	

⇒ HYDROLOGIC CHARACTERISTICS OF MOUNTAIN SPRING LAKE DAM & RESERVOIR.

From visual inspection & quad sheet:

length of embankment ≈ 600' (C = 3.1)
freeboard ≈ 3'
spillway length ≈ 28'
spillway type - broad-crested weir (C = 3.1)
normal pool elevation - 1046' MSL (from quad sheet)
height of embankment ≈ 11' (maximum)

Reservoir surface area assumed to be zero at base of embankment, area-elevation information from quad sheet.

Elev (MSL)	Area (acres)
1038	0
1046	78
1060	190

HYDROLOGIC CHARACTERISTICS OF GRUBER LAKE DAM & RESERVOIR.

From visual inspection and quad sheet:

length of embankment ≈ 300'
freeboard ≈ 3'
spillway length ≈ 45'
spillway type - broad-crested weir (C = 3.1)
normal pool elevation - 921' MSL (from quad sheet)
height of embankment ≈ 10' (maximum)

O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
TROUT LAKE DAM	13	DBC	4/10/79	

Hydrologic Characteristics of Gruber Lake Dam & Reservoir (cont.)

Reservoir surface area assumed to be zero at base of embankment, area-elevation information from quad sheet.

Elev	Area (acres)
914	0
921	15
940	28

Sh 2

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION 25 SEP 78
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```
    1  A1                          NATIONAL DAM INSPECTION PROGRAM
    2  A2                                TROUT LAKE DAM
    3  A3                                PMF HYDROGRAPH
    4  B    150       0      30       0       0       0       0       0      -4       0
    5  B1     5
    6  J      1       9       1
    7  J1   .05     .10     .15     .20     .25     .30     .50     .75     1.0
    8  K      0 MT SP-I                                                 1
    9  K1                          RUNOFF TO MOUNTAIN SPRING LAKE
   10  M      1       1     2.5                   3.7                             1
   11  P      0      22     111     124     133
   12  T                                                         1.0    0.05
   13  W   1.89    0.45
   14  X   -1.5    -.05       2
   15  K      1 MT SP-O                                                 1
   16  K1                          ROUTING THROUGH MOUNTAIN SPRING LAKE
   17  Y                                       1       1
   18  Y1     1                                                 -1046
   19  $A     0      78     190
   20  $E  1038    1046    1060
   21  $S  1046      28     3.1     1.5
   22  $D  1049     3.1     1.5     600
   23  K      1 ROUT DS                                                 1
   24  K1                          ROUTING DOWNSTREAM TO TROUT LAKE
   25  Y                                       1       1
   26  Y1     1                                                        -1
   27  Y6   .08     .05     .08     943     960    5800    .018
   28  Y7     0     980     100     960     675     946     678     943     693     943
   29  Y7  -696     946     861     960    1111     980
   30  K      0 TROUT-I
   31  K1                          RUNOFF TO TROUT LAKE
   32  M      1       1     1.2                   3.7                             1
   33  P      0      23     113     123     132
   34  T                                                         1.0    0.05
   35  W   1.38    0.45
   36  X   -1.5    -.05       2
   37  K      2 COMBINE
   38  K1                          COMBINING RUNOFF AND STREAM INFLOWS
   39  K      1 TROUT-O                                                 1
   40  K1                          ROUTING THROUGH TROUT LAKE
   41  Y                                       1       1
   42  Y1     1                                                  -943
   43  $A   1.4      96     176
   44  $E   924     943     960
   45  $S   943      35     3.3     1.5
   46  $D   947     3.1     1.5     250
   47  K     99
```

Sh 3

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  25 SEP 78
**********

 RUN  DATE= 04/11/79.
      TIME= 08.34.16.

                    NATIONAL DAM INSPECTION PROGRAM
                          TROUT LAKE DAM
                          PMF HYDROGRAPH

                          JOB SPECIFICATION
      NQ     NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     150       0       30        0       0        0        0        0       -4        0
                          JOPER      NWT    LROPT    TRACE
                              5        0        0        0

                    MULTI-PLAN ANALYSES TO BE PERFORMED
                          NPLAN= 1 NRTIO= 5 LRTIO= 1
          RTIOS=    .05      .10      .15      .20      .25      .30      .50      .75     1.00

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

                          SUB-AREA RUNOFF COMPUTATION

                    RUNOFF TO MOUNTAIN SPRING LAKE

                ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
              T SP-I        0        0        0        0        0        1        0        0

                          HYDROGRAPH DATA
      IHYDG     IUHG    TAREA     SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
          1        1     2.50     0.00     3.70     0.00    0.000        0        1        0

                          PRECIP DATA
              SPFE      PMS       R6      R12      R24      R48      R72      R96
              0.00    22.00   111.00   124.00   133.00     0.00     0.00     0.00
 TRSPC COMPUTED BY THE PROGRAM IS  .800

                          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
                      TP=  1.89    CP=  .45    NTA=  0

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

 UNIT HYDROGRAPH 34 END-OF-PERIOD ORDINATES, LAG=  1.90 HOURS, CP=  .45  VOL= 1.00
    45.     105.     302.     275.     358.     303.     257.     217.     184.     156.
   132.     112.      95.      80.      68.      58.      49.      41.      35.      30.
    25.      21.      18.      15.      13.      11.       9.       8.       7.       6.
     5.       4.       3.       3.
```

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0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	23.41	21.56	1.85	71676.
										(595.)	(548.)	(47.)	(2029.64)

HYDROGRAPH ROUTING

ROUTING THROUGH MOUNTAIN SPRING LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
T SP-O	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	-1046.	0

SURFACE AREA=	0.	78.	190.
CAPACITY=	0.	208.	2027.
ELEVATION=	1038.	1046.	1060.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1046.0	28.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1049.0	3.1	1.5	600.

PEAK OUTFLOW IS 94. AT TIME 22.00 HOURS

PEAK OUTFLOW IS 220. AT TIME 21.50 HOURS

PEAK OUTFLOW IS 358. AT TIME 21.00 HOURS

PEAK OUTFLOW IS 588. AT TIME 20.50 HOURS

PEAK OUTFLOW IS 969. AT TIME 19.50 HOURS

PEAK OUTFLOW IS 1302. AT TIME 19.00 HOURS

PEAK OUTFLOW IS 2449. AT TIME 18.50 HOURS

PEAK OUTFLOW IS 3721. AT TIME 18.00 HOURS

PEAK OUTFLOW IS 4994. AT TIME 18.00 HOURS

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HYDROGRAPH ROUTING

ROUTING DOWNSTREAM TO TROUT LAKE

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
OUT DS	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	-1.	0

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NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0500	.0800	943.0	960.0	5800.	.01800

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 980.00 100.00 960.00 675.00 946.00 678.00 943.00 693.00 943.00
696.00 946.00 861.00 960.00 1111.00 980.00

STORAGE	0.00	1.89	4.00	6.32	9.99	18.95	33.55	53.78	79.65	111.15
	148.29	191.06	239.46	293.50	353.17	418.48	489.42	566.00	648.21	736.05
OUTFLOW	0.00	49.46	157.23	311.33	537.26	917.20	1530.91	2447.49	3727.58	5426.56
	7596.08	10284.92	13539.54	17404.51	21922.77	27135.86	33084.07	39806.60	47341.67	55726.59
STAGE	943.00	943.89	944.79	945.68	946.58	947.47	948.37	949.26	950.16	951.05
	951.95	952.84	953.74	954.63	955.53	956.42	957.32	958.21	959.11	960.00
FLOW	0.00	49.46	157.23	311.33	537.26	917.20	1530.91	2447.49	3727.58	5426.56
	7596.08	10284.92	13539.54	17404.51	21922.77	27135.86	33084.07	39806.60	47341.67	55726.59

MAXIMUM STAGE IS 944.3

MAXIMUM STAGE IS 945.2

MAXIMUM STAGE IS 945.9

MAXIMUM STAGE IS 946.7

MAXIMUM STAGE IS 947.5

MAXIMUM STAGE IS 948.0

MAXIMUM STAGE IS 949.2

MAXIMUM STAGE IS 950.1

MAXIMUM STAGE IS 950.8

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

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO TROUT LAKE

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
ROUT-I		0	0	0	0	0	0	0	0

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HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.20	0.00	3.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.00	113.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

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

TP= 1.38 CP= .45 NTA= 0

RECESSION DATA

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

UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 1.39 HOURS, CP= .45 VOL= 1.00

48.	163.	241.	226.	179.	142.	113.	90.	71.	57.
45.	36.	28.	22.	18.	14.	11.	9.	7.	6.
4.	4.	3.	2.	2.					

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.29	22.44	1.84	36288.
										(617.)	(570.)	(47.)	(1027.56)

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

COMBINE HYDROGRAPHS

COMBINING RUNOFF AND STREAM INFLOWS

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

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

HYDROGRAPH ROUTING

ROUTING THROUGH TROUT LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
ROUT-O	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	-943.	0

SURFACE AREA=	1.	96.	176.
CAPACITY=	0.	690.	2968.
ELEVATION=	924.	943.	960.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
943.0	35.0	3.3	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
947.0	3.1	1.5	250.

PEAK OUTFLOW IS 86. AT TIME 26.00 HOURS

PEAK OUTFLOW IS 219. AT TIME 24.50 HOURS

PEAK OUTFLOW IS 371. AT TIME 23.50 HOURS

PEAK OUTFLOW IS 550. AT TIME 22.50 HOURS

PEAK OUTFLOW IS 805. AT TIME 22.00 HOURS

PEAK OUTFLOW IS 1172. AT TIME 21.50 HOURS

PEAK OUTFLOW IS 3094. AT TIME 19.50 HOURS

PEAK OUTFLOW IS 5257. AT TIME 19.00 HOURS

PEAK OUTFLOW IS 7232. AT TIME 19.00 HOURS

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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 .05	RATIO 2 .10	RATIO 3 .15	RATIO 4 .20	RATIO 5 .25	RATIO 6 .30	RATIO 7 .50	RATIO 8 .75	RATIO 9 1.00
HYDROGRAPH AT	T SP-I	2.50	1	253.	506.	759.	1012.	1265.	1519.	2531.	3796.	5062.
		(6.47)	(	7.17)(	14.33)(	21.50)(	28.67)(	35.83)(	43.00)(	71.67)(	107.50)(	143.34)
ROUTED TO	T SP-O	2.50	1	94.	220.	358.	588.	969.	1302.	2449.	3721.	4994.
		(6.47)	(	2.65)(	6.24)(	10.13)(	16.66)(	27.45)(	36.86)(	69.34)(	105.38)(	141.41)
ROUTED TO	OUT DS	2.50	1	93.	220.	357.	578.	951.	1282.	2415.	3715.	4975.
		(6.47)	(	2.65)(	6.23)(	10.12)(	16.37)(	26.94)(	36.30)(	68.40)(	105.19)(	140.88)
HYDROGRAPH AT	ROUT-I	1.20	1	153.	306.	459.	613.	766.	919.	1532.	2297.	3063.
		(3.11)	(	4.34)(	8.67)(	13.01)(	17.35)(	21.68)(	26.02)(	43.37)(	65.05)(	86.74)
2 COMBINED	OMBINE	3.70	1	182.	395.	625.	859.	1356.	1870.	3689.	5690.	7662.
		(9.58)	(	5.14)(	11.19)(	17.71)(	24.33)(	38.41)(	52.95)(	104.45)(	161.13)(	216.95)
ROUTED TO	ROUT-O	3.70	1	86.	219.	371.	550.	805.	1172.	3094.	5257.	7232.
		(9.58)	(	2.43)(	6.19)(	10.50)(	15.59)(	22.79)(	33.19)(	87.62)(	148.87)(	204.79)

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1046.00	1046.00	1049.00
STORAGE	208.	208.	471.
OUTFLOW	0.	0.	451.

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
.05	1047.05	0.00	294.	94.	0.00	22.00	0.00
.10	1047.86	0.00	364.	220.	0.00	21.50	0.00
.15	1048.57	0.00	430.	358.	0.00	21.00	0.00
.20	1049.15	.15	486.	588.	3.00	20.50	0.00
.25	1049.38	.38	509.	969.	5.00	19.50	0.00
.30	1049.53	.53	524.	1302.	6.00	19.00	0.00
.50	1049.97	.97	569.	2449.	9.50	18.50	0.00
.75	1050.35	1.35	610.	3721.	11.50	18.00	0.00
1.00	1050.70	1.70	648.	4994.	13.00	18.00	0.00

PLAN 1 STATION OUTFLOWS

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.05	93.	944.3	22.00
.10	220.	945.2	21.50
.15	357.	945.9	21.50
.20	578.	946.7	21.00
.25	951.	947.5	20.00
.30	1282.	948.0	19.50
.50	2415.	949.2	18.50
.75	3715.	950.1	18.50
1.00	4975.	950.8	18.50

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

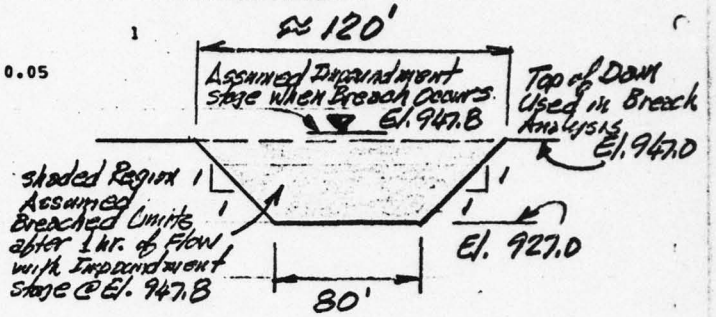
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	943.00	943.00	947.00
STORAGE	690.	690.	1107.
OUTFLOW	0.	0.	924.

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
.05	943.82	0.00	771.	86.	0.00	26.00	0.00
.10	944.53	0.00	842.	219.	0.00	24.50	0.00
.15	945.18	0.00	909.	371.	0.00	23.50	0.00
.20	945.83	0.00	978.	550.	0.00	22.50	0.00
.25	946.65	0.00	1068.	[illegible]5.	0.00	22.00	0.00
.30	947.31	.31	1143.	1[illegible].	3.50	21.50	0.00
.50	948.60	1.60	1293.	3094.	7.50	19.50	0.00
.75	949.62	2.62	1418.	5257.	10.00	19.00	0.00
1.00	950.42	3.42	1518.	7232.	11.50	19.00	0.00

0.5 PMF with Breach of Dam Sh 11

```
FLOOD HYDROGRAPH PACKAGE (MEC-1)
DAM SAFETY VERSION     JULY 1978
LAST MODIFICATION  25 SEP 78
```

```
  1          A1                    NATIONAL DAM INSPECTION PROGRAM
  2          A2                         TROUT LAKE DAM
  3          A3                          PMF HYDROGRAPH
  4          B    150       0      30       0       0       0       0       0      -4       0
  5          B1     5
  6          J      2       1       1
  7          J1    .5
  8          K      0 MT-SP-I                                                    1
  9          K1                   RUNOFF TO MOUNTAIN SPRING LAKE
 10          M      1       1     2.5             3.7                                    1
 11          P      0      22     111     124     133
 12          T                                                  1.0    0.05
 13          W   1.89    0.45
 14          X   -1.5    -.05       2
 15          K      1 MT SP-O                                                    1
 16          K1                   ROUTING THROUGH MOUNTAIN SPRING LAKE
 17          Y                                  1       1
 18          Y1     1                                                   -1046
 19          SA     0      78     190
 20          SE  1038    1046    1060
 21          SS  1046      28     3.1     1.5
 22          SD  1049     3.1     1.5     600
 23          K      1 ROUT DS                                                    1
 24          K1                   ROUTING DOWNSTREAM TO TROUT LAKE
 25          Y                                  1       1
 26          Y1     1                                                      -1
 27          Y6   .08     .05     .08     943     960    5800    .018
 28          Y7     0     980     100     960     675     946     678     943     693     943
 29          Y7   696     946     861     960    1111     980
 30          K      0 TROUT-I
 31          K1                   RUNOFF TO TROUT LAKE
 32          M      1       1     1.2             3.7                                    1
 33          P      0      23     113     123     132
 34          T                                                  1.0    0.05
 35          W   1.28    0.45
 36          X   -1.5    -.05       2
 37          K      2 COMBINE
 38          K1                   COMBINING RUNOFF AND STREAM INFLOWS
 39          K      1 TROUT-O                                                    1
 40          K1                   ROUTING THROUGH TROUT LAKE
 41          Y                                  1       1
 42          Y1     1                                                    -943
 43          SA   1.4      96     176
 44          SE   924     943     960
 45          SS   943      35     3.3     1.5
 46          SD   947     3.1     1.5     250
 47          SW    80       1     927       1     943   -1000
 48          SB    80       1     927       1     943   947.8
 49          K      1 GRUB.-I                                                    1
 50          K1                   ROUTING DOWNSTREAM TO GRUBERS LAKE
```



The portion of the dam assumed to be breached is based on the geometry of the site. The depth of flow over the top of the dam at which failure is initiated and the elapsed time to complete failure are based on the general appearance and age of the structure. Consideration was given to the parameters used in the C.O.E. publication "Basic Concepts of Dam Breaks and Development of Dam Break Hydrographs."

0.5 PMF WITH DAM BREAK

Sh 12

```
Y                                 1        1
Y1      1                                                 -1
Y6    .08      .05      .08     921      940      400    .04
Y7      0      960      110     940      300      924    303      921      328      921
Y7    331      924      431     940      740      960
K       1 GRUB.-0                                          1
K1                           ROUTING THROUGH GRUBERS LAKE
Y                                 1        1
Y1      1                                               -921
$A      0       15       28
$E    914      921      940
$S    921       45      3.1     1.5
$D    924      3.1      1.5     300
K       1 DMGCENT                                          1
K1                        ROUTING DOWNSTREAM TO DAMAGE CENTER
Y                                 1        1
Y1      1                                                 -1
Y6    .08      .05      .08     904      925     2400   .005
Y7      0      940      250     920      675      907    678      904      698      904
Y7    701      907     1100     920     1200      940
K      99
```

0.5 PMF WITH DAM BREAK Sh 13

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
 LAST MODIFICATION  25 SEP 78
**********************************

RUN DATE= 04/11/79.
     TIME= 08.45.40.

                    NATIONAL DAM INSPECTION PROGRAM
                          TROUT LAKE DAM
                          PMF HYDROGRAPH

                          JOB SPECIFICATION
      NO     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
     150       0      30       0       0       0       0       0      -4       0
                          JOPER     NWT   LROPT   TRACE
                              5       0       0       0

                    MULTI-PLAN ANALYSES TO BE PERFORMED
                        NPLAN= 2 NRTIO= 1 LRTIO= 1
          RTIOS=    .50

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

                        SUB-AREA RUNOFF COMPUTATION

                    RUNOFF TO MOUNTAIN SPRING LAKE

                    ISTAQ   ICOMP   IECON   ITAPE   JPLT    JPRT   INAME  ISTAGE  IAUTO
                    T SP-I      0       0       0      0       0       1       0      0

                          HYDROGRAPH DATA
     IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
         1       1    2.50    0.00    3.70    0.00   0.000       0       1       0

                          PRECIP DATA
              SPFE     PMS      R6     R12     R24     R48     R72     R96
              0.00   22.00  111.00  124.00  133.00    0.00    0.00    0.00
 TRSPC COMPUTED BY THE PROGRAM IS  .800

                          LOSS DATA
     LRUPT   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
                    TP=  1.89   CP=  .45   NTA=  0

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

     UNIT HYDROGRAPH 34 END-OF-PERIOD ORDINATES, LAG=  1.90 HOURS, CP=  .45  VOL= 1.00
    45.   165.   302.   375.   358.   303.   257.   217.   184.   156.
   132.   112.    95.    80.    68.    58.    49.    41.    35.    30.
    25.    21.    18.    15.    13.    11.     9.     8.     7.     6.
     5.     4.     3.     3.
```

0.5 PMF WITH DAM BREAK

Sh 14

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	23.41	21.56	1.85	71676.
										(595.)	(548.)	(47.)	(2029.64)

HYDROGRAPH ROUTING

ROUTING THROUGH MOUNTAIN SPRING LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
T SP-O	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME 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	-1046.	0

SURFACE AREA=	0.	78.	190.
CAPACITY=	0.	208.	2027.
ELEVATION=	1038.	1046.	1060.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1046.0	28.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1049.0	3.1	1.5	600.

PEAK OUTFLOW IS 2449. AT TIME 18.50 HOURS

PEAK OUTFLOW IS 2449. AT TIME 18.50 HOURS

HYDROGRAPH ROUTING

ROUTING DOWNSTREAM TO TROUT LAKE

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

ALL PLANS HAVE SAME 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	-1.	0

NORMAL DEPTH CHANNEL ROUTING

0.5 PMF WITH DAM BREAK Sh 15

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0500	.0800	943.0	960.0	5800.	.01800

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 980.00 100.00 960.00 675.00 946.00 678.00 943.00 693.00 943.00
696.00 946.00 861.00 960.00 1111.00 980.00

STORAGE	0.00	1.89	4.00	6.32	9.99	18.95	33.55	53.78	79.65	111.15
	148.29	191.06	239.46	293.50	353.17	418.48	489.42	566.00	648.21	736.05
OUTFLOW	0.00	49.46	157.23	311.33	537.26	917.20	1530.91	2447.49	3727.58	5426.56
	7596.08	10284.92	13539.54	17404.51	21922.77	27135.86	33084.07	39806.60	47341.67	55726.59
STAGE	943.00	943.89	944.79	945.68	946.58	947.47	948.37	949.26	950.16	951.05
	951.95	952.84	953.74	954.63	955.53	956.42	957.32	958.21	959.11	960.00
FLOW	0.00	49.46	157.23	311.33	537.26	917.20	1530.91	2447.49	3727.58	5426.56
	7596.08	10284.92	13539.54	17404.51	21922.77	27135.86	33084.07	39806.60	47341.67	55726.59

MAXIMUM STAGE IS 949.2

MAXIMUM STAGE IS 949.2

SUB-AREA RUNOFF COMPUTATION

RUNOFF TO TROUT LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
ROUT-I	0	0	0	0	0	0	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.20	0.00	0.70	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.00	113.00	123.00	132.00	0.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

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

TP= 1.38 CP= .45 NTA= 0

RECESSION DATA

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

0.5 PMF WITH DAM BREAK Sh. 16

UNIT HYDROGRAPH 25 END-OF-PERIOD ORDINATES, LAG= 1.39 HOURS, CP= .45 VOL= 1.00

48.	183.	241.	226.	179.	142.	113.	90.	71.	57.	
45.	36.	28.	22.	18.	14.	11.	9.	7.	6.	
4.	4.	3.	2.	2.						

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.29	22.44	1.84	36288.
										(617.)	(570.)	(47.)	(1027.56)

COMBINE HYDROGRAPHS

COMBINING RUNOFF AND STREAM INFLOWS

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

HYDROGRAPH ROUTING

ROUTING THROUGH TROUT LAKE

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
ROUT-O		-1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME 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	-943.	0

SURFACE AREA=	1.	96.	176.
CAPACITY=	0.	690.	2968.
ELEVATION=	924.	943.	960.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
943.0	35.0	3.3	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
947.0	3.1	1.5	250.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
90.	1.00	927.00	1.00	943.00	1000.00

PEAK OUTFLOW IS 3094. AT TIME 10.50 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
80.	1.00	927.00	1.00	943.00	947.80

BEGIN DAM FAILURE AT 18.50 HOURS

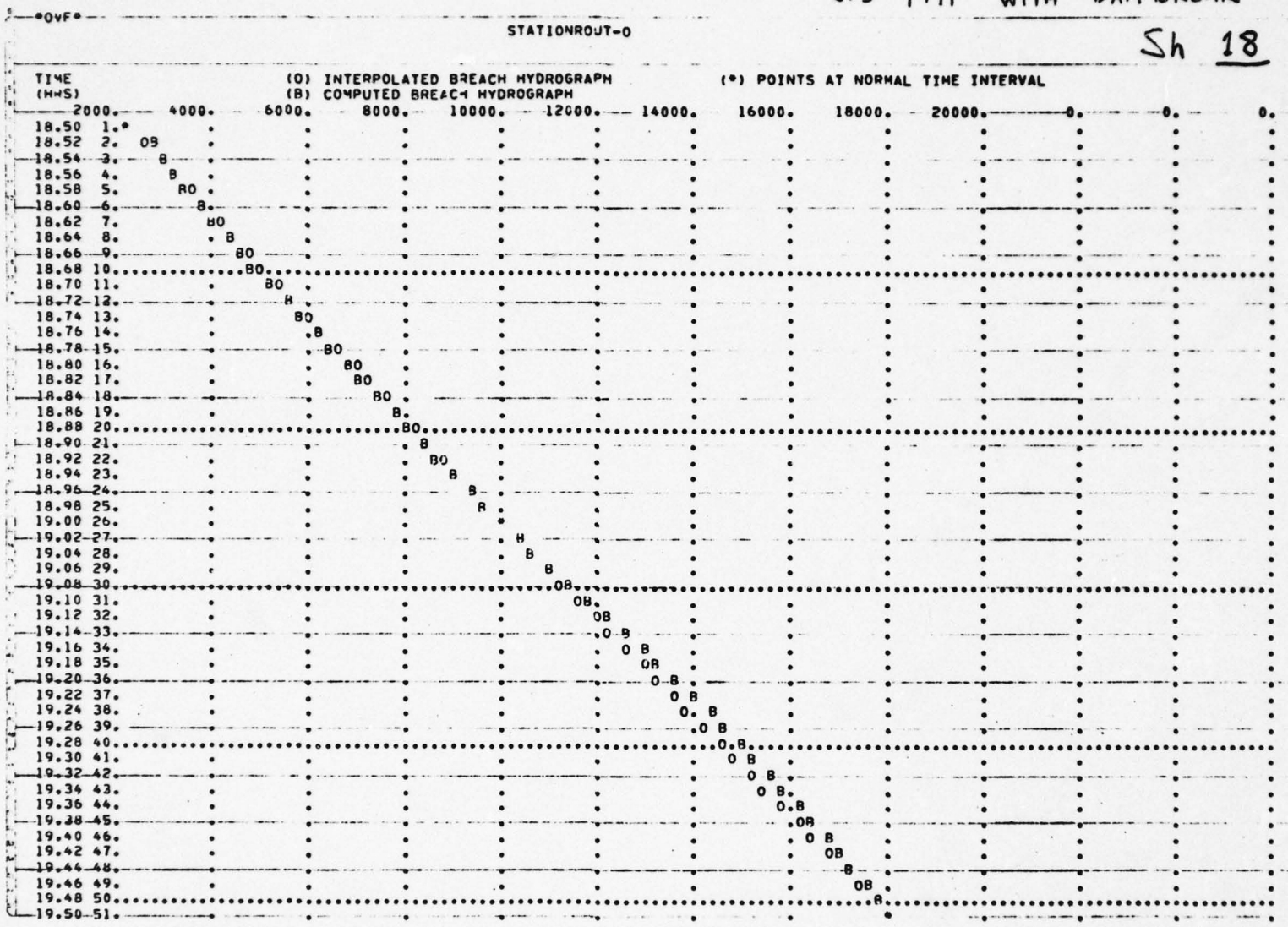
PEAK OUTFLOW IS 18080. AT TIME 19.50 HOURS

0.5 PMF WITH DAM BREAK

Sh 17

0.5 PMF WITH DAM BREAK

Sh 18



0.5 PMF WITH DAM BREAK

Sh 19

•OVNO•

HYDROGRAPH ROUTING

ROUTING DOWNSTREAM TO GRUBERS LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
RUB.-I	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME 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	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0500	.0800	921.0	940.0	400.	.04000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

	0.00	960.00	110.00	940.00	300.00	924.00	303.00	921.00	328.00	921.00
	331.00	924.00	431.00	940.00	740.00	960.00				
STORAGE	0.00	.24	.50	.77	1.14	1.67	2.37	3.24	4.28	5.48
	6.84	8.37	10.07	11.94	13.97	16.17	18.54	21.07	23.77	26.63
OUTFLOW	0.00	148.10	469.41	924.29	1581.35	2456.80	3597.45	5042.65	6828.15	8987.36
	11551.93	14552.14	18017.13	21975.05	26453.23	31478.23	37075.99	43271.79	50090.42	57556.14
STAGE	921.00	922.00	923.00	924.00	925.00	926.00	927.00	928.00	929.00	930.00
	931.00	932.00	933.00	934.00	935.00	936.00	937.00	938.00	939.00	940.00
FLOW	0.00	148.10	469.41	924.29	1581.35	2456.80	3597.45	5042.65	6828.15	8987.36
	11551.93	14552.14	18017.13	21975.05	26453.23	31478.23	37075.99	43271.79	50090.42	57556.14

MAXIMUM STAGE IS 926.6

MAXIMUM STAGE IS 933.0

HYDROGRAPH ROUTING

ROUTING THROUGH GRUBERS LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO

RUB.-0	1	0	0	0	0	1	0	0	

0.5 PMF WITH DAM BREAK

Sh 20

ALL PLANS HAVE SAME 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	-921.	0	

SURFACE AREA=	0.	15.	28.
CAPACITY=	0.	35.	437.
ELEVATION=	914.	921.	940.

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
921.0	45.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
924.0	3.1	1.5	300.

PEAK OUTFLOW IS 3073. AT TIME 19.50 HOURS

PEAK OUTFLOW IS 17391. AT TIME 19.50 HOURS

****

HYDROGRAPH ROUTING

ROUTING DOWNSTREAM TO DAMAGE CENTER

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
MGCENT	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME 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	-1.	0	

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0500	.0800	904.0	925.0	2400.	.00500

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	940.00	250.00	920.00	675.00	907.00	678.00	904.00	698.00	904.00
701.00	907.00	1100.00	920.00	1200.00	940.00				

0.5 PMF WITH DAM BREAK Sh. 21

STORAGE	0.00	1.29	2.71	4.43	9.36	18.56	32.03	49.77	71.77	98.03
	128.56	163.36	202.43	245.76	293.36	344.80	397.76	451.91	507.23	563.73
OUTFLOW	0.00	49.44	157.04	317.50	603.02	1110.67	1922.59	3109.05	4733.58	6855.02
	9528.75	12807.38	16741.25	21378.77	26766.72	33469.92	41422.85	50127.20	59570.58	69743.83
STAGE	904.00	905.11	906.21	907.32	908.42	909.53	910.63	911.74	912.84	913.95
	915.05	916.16	917.26	918.37	919.47	920.58	921.68	922.79	923.89	925.00
FLOW	0.00	49.44	157.04	317.50	603.02	1110.67	1922.59	3109.05	4733.58	6855.02
	9528.75	12807.38	16741.25	21378.77	26766.72	33469.92	41422.85	50127.20	59570.58	69743.83

MAXIMUM STAGE IS 911.7

MAXIMUM STAGE IS 916.7

0.5 PMF WITH DAM BREAK

Sh 22

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 .50
HYDROGRAPH AT	T SP-1	2.50 (6.47)	1	2531. (71.67)
			2	2531. (71.67)
ROUTED TO	T SP-O	2.50 (6.47)	1	2449. (69.34)
			2	2449. (69.34)
ROUTED TO	OUT DS	2.50 (6.47)	1	2415. (68.40)
			2	2415. (68.40)
HYDROGRAPH AT	ROUT-I	1.20 (3.11)	1	1532. (43.37)
			2	1532. (43.37)
2 COMBINED	OMBINE	3.70 (9.58)	1	3689. (104.45)
			2	3689. (104.45)
ROUTED TO	ROUT-O	3.70 (9.58)	1	3094. (87.62)
			2	18080. (511.98)
ROUTED TO	RUB.-I	3.70 (9.58)	1	3091. (87.52)
			2	18071. (511.70)
ROUTED TO	RUB.-O	3.70 (9.58)	1	3073. (87.01)
			2	17391. (492.44)
ROUTED TO	MGCENT	3.70 (9.58)	1	3079. (87.19)
			2	14832. (419.99)

0.5 PMF WITH DAM BREAK

Sh 23

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1046.00	1046.00	1049.00
STORAGE	208.	208.	471.
OUTFLOW	0.	0.	451.

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
.50	1049.97	.97	569.	2449.	9.50	18.50	0.00

PLAN 2

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1046.00	1046.00	1049.00
STORAGE	208.	208.	471.
OUTFLOW	0.	0.	451.

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
.50	1049.97	.97	569.	2449.	9.50	18.50	0.00

PLAN 1 STATION OUT DS

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	2415.	949.2	18.50

PLAN 2 STATION OUT DS

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	2415.	949.2	18.50

0.5 PMF WITH DAM BREAK

Sh 24

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	943.00	943.00	947.00
STORAGE	690.	690.	1107.
OUTFLOW	0.	0.	924.

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
.50	948.60	1.60	1293.	3094.	7.50	19.50	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	943.00	943.00	947.00
STORAGE	690.	690.	1107.
OUTFLOW	0.	0.	924.

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
.50	948.16	1.16	1240.	18080.	1.54	19.50	18.50

PLAN 1 STATION RUB.-I

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	3091.	926.6	19.50

PLAN 2 STATION RUB.-I

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	18071.	933.0	19.50

0.5 PMF WITH DAM BREAK

Sh 25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN -1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	921.00	921.00	924.00
STORAGE	35.	35.	83.
OUTFLOW	0.	0.	725.

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
.50	925.52	1.52	109.	3073.	10.50	19.50	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	921.00	921.00	924.00
STORAGE	35.	35.	83.
OUTFLOW	0.	0.	725.

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
.50	929.99	5.99	195.	17391.	7.50	19.50	0.00

PLAN 1 STATION MGCENT

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	3079.	911.7	20.00

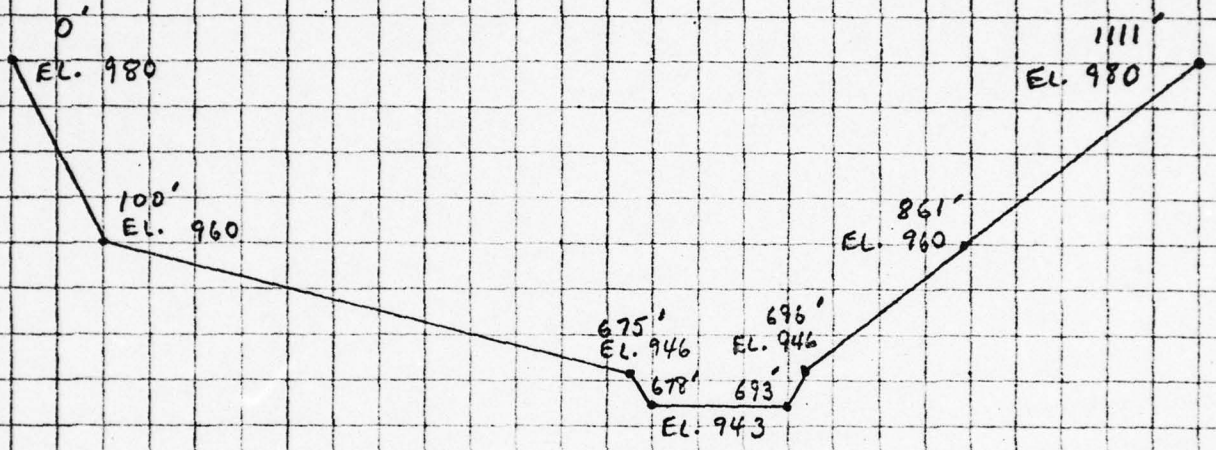
PLAN 2 STATION MGCENT

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	14832.	916.7	19.50

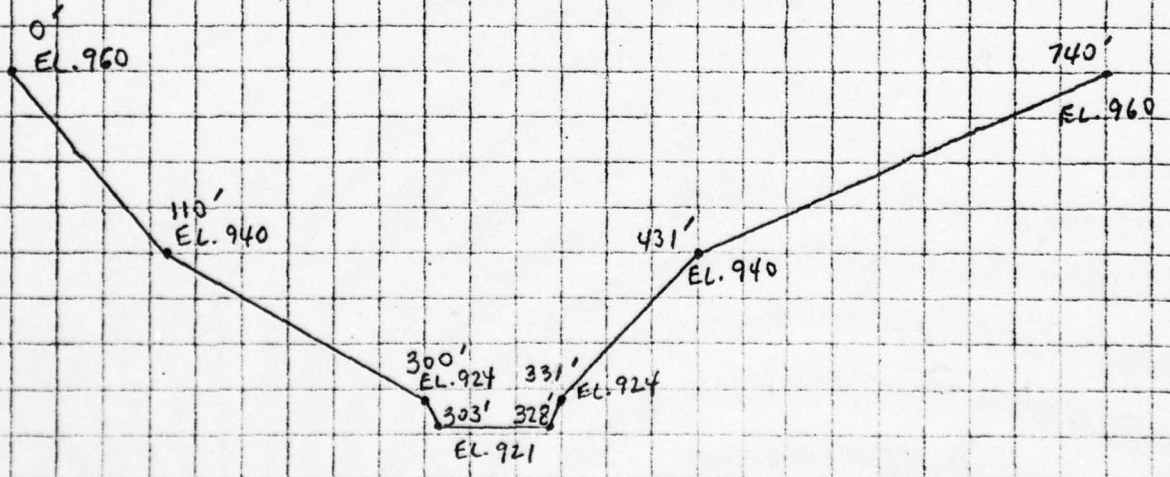
O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
Trout Lake Dam	26			

CROSS-SECTION DOWNSTREAM OF MOUNTAIN SPRING LAKE
(AT TROUT LAKE)



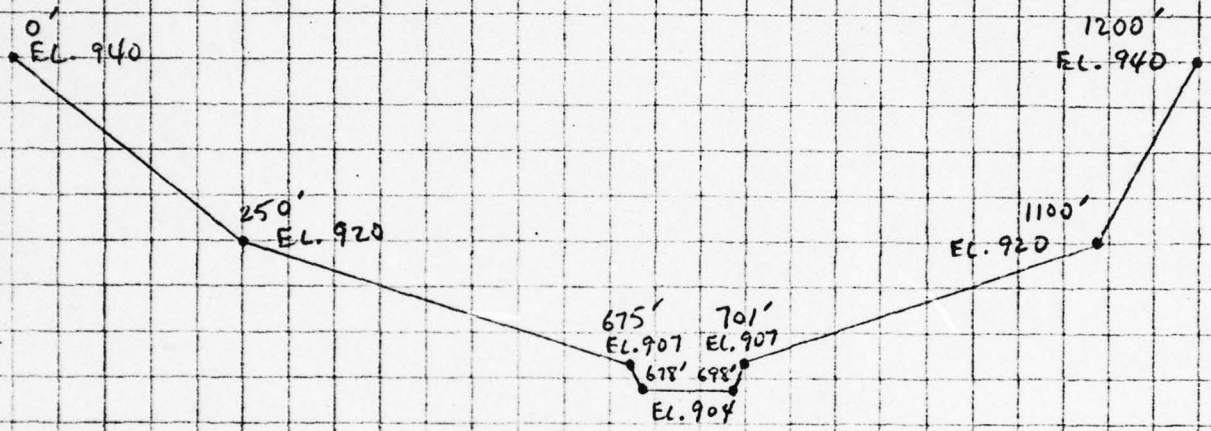
CROSS-SECTION DOWNSTREAM OF TROUT LAKE
(AT GRUBERS LAKE)



O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO.
Trout Lake Dam	27			

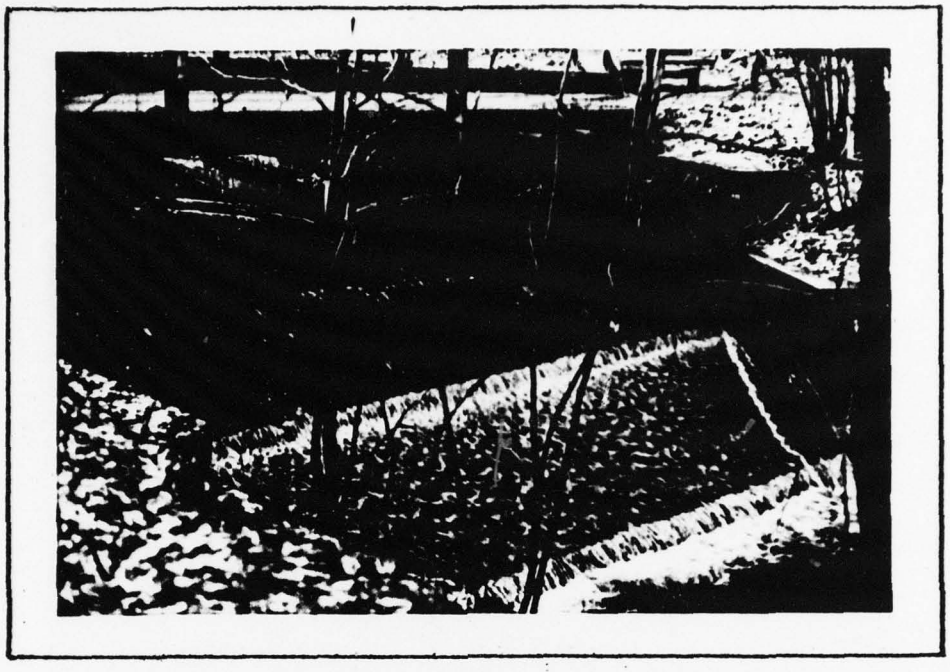
CROSS-SECTION DOWNSTREAM OF GRUBERS LAKE
(AT DAMAGE CENTER)



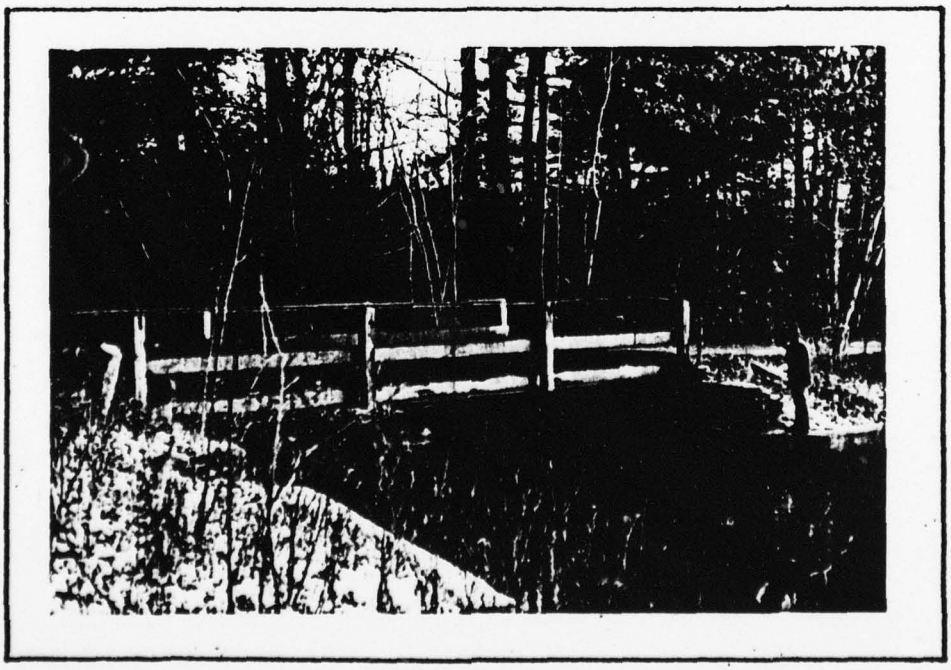
APPENDIX

D

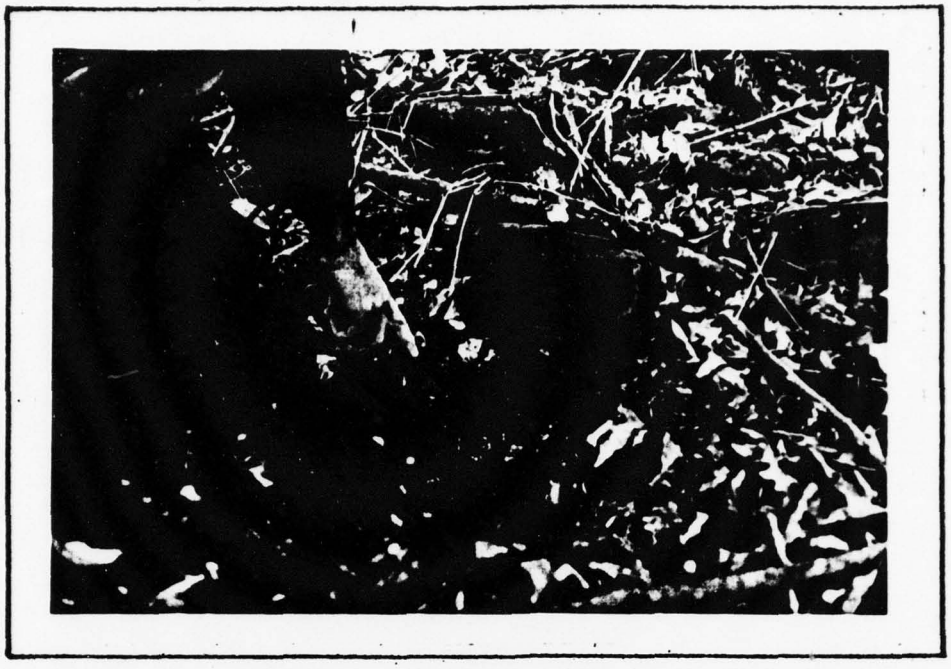
Photographs



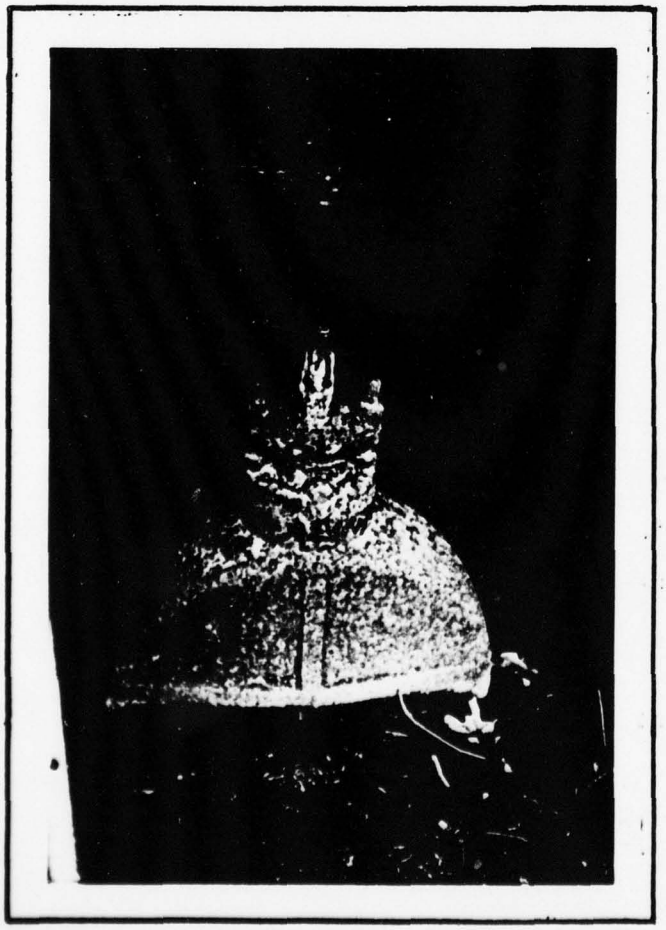
DOWNSTREAM VIEW OF THE SPILLWAY NEAR THE RIGHT ABUTMENT OF THE DAM



APPROACH CHANNEL TO THE SPILLWAY



SEEPAGE IMMEDIATELY DOWNSTREAM OF THE RIGHT ABUTMENT OF THE DAM



SLUICE VALVE ON THE DOWNSTREAM END OF THE RESERVOIR DRAIN SYSTEM CONDUIT

FLOW DOWNSTREAM OF THE DAM FROM THE RESERVOIR DRAIN SYSTEM, A TRIBUTARY IMMEDIATELY DOWNSTREAM AND TO THE RIGHT OF THE DAM, AND FROM SEEPAGE

DAM AND SPILLWAY OF GRUBERS LAKE ABOUT ONE HALF MILE DOWNSTREAM OF TROUT LAKE DAM

APPENDIX

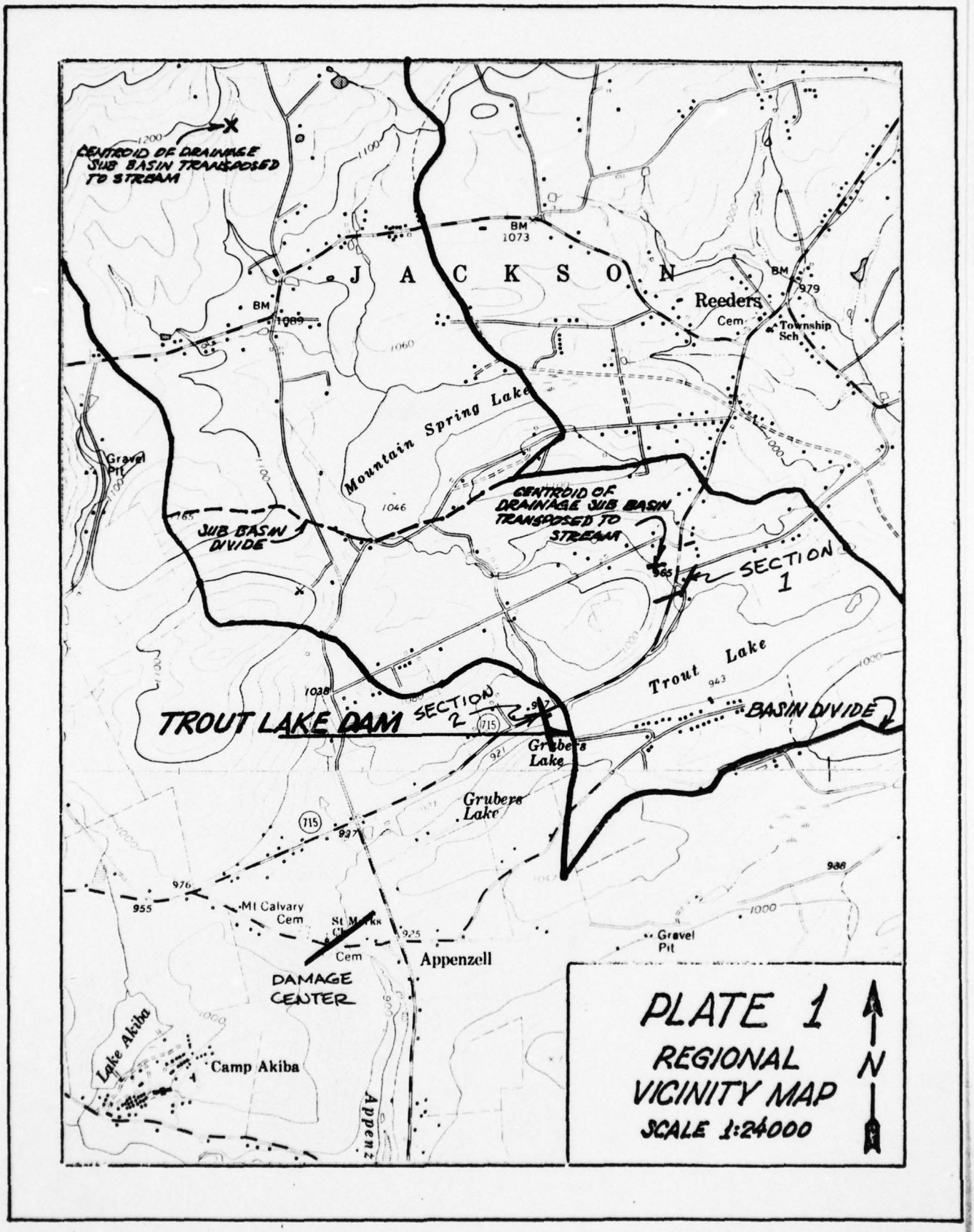
E

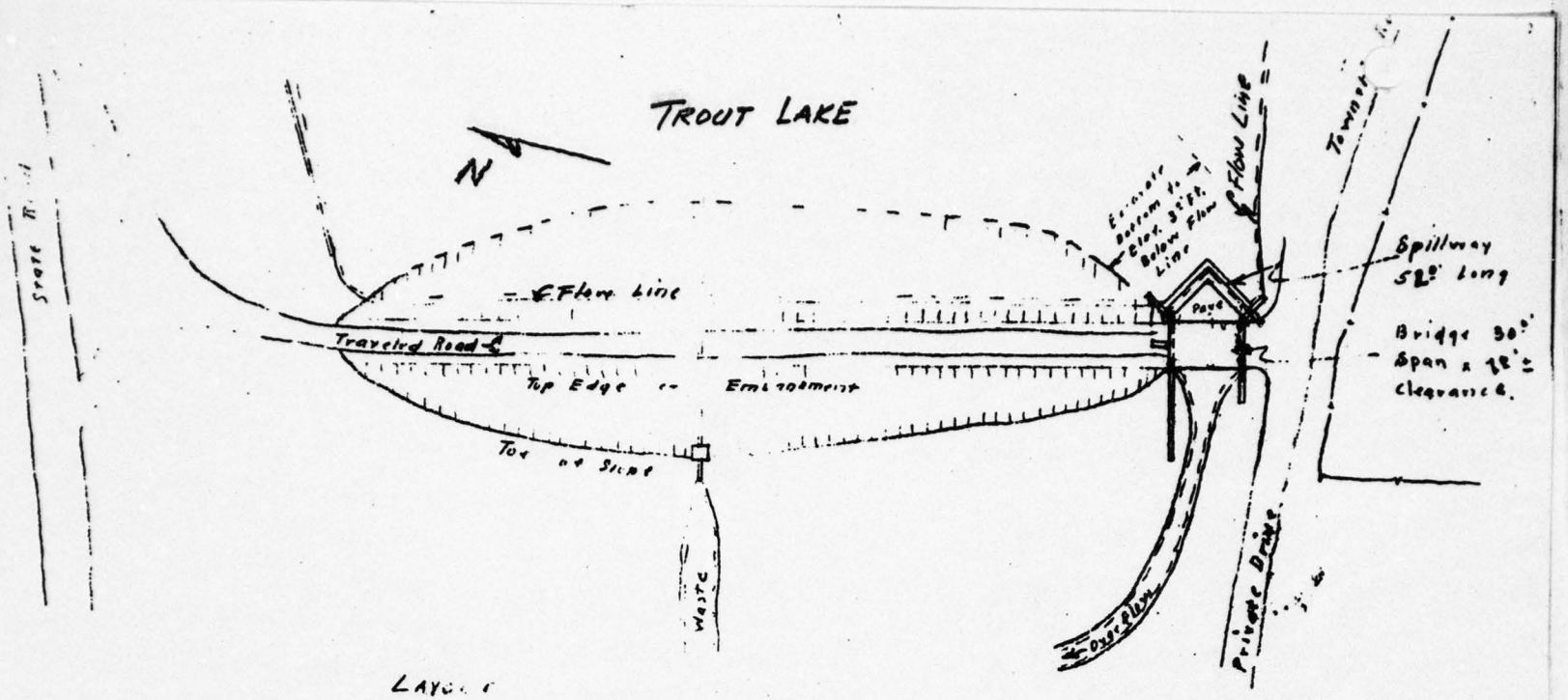
Drawings

O'BRIEN & GERE
ENGINEERS, INC.

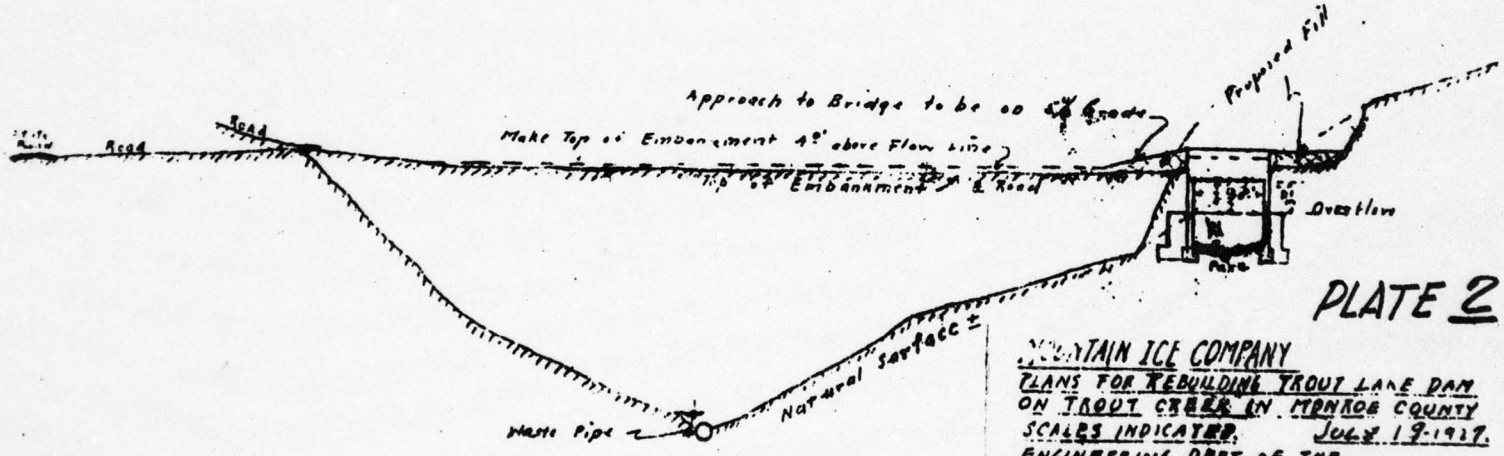
SUBJECT	SHEET	BY	DATE	JOB NO
Trout Lake Dam			3/22/79	

Table of Content APPENDIX E


CENTROID OF DRAINAGE SUB BASIN TRANSPOSED TO STREAM
JACKSON
BM 1073
BM 1089
BM 979
Reeders
Cem
Township Sch
Mountain Spring Lake
Gravel Pit
SUB BASIN DIVIDE
CENTROID OF DRAINAGE SUB BASIN TRANSPOSED TO STREAM
SECTION 1
Trout Lake
TROUT LAKE DAM
SECTION 2
BASIN DIVIDE
Gruber's Lake
Grubers Lake
715
Mt Calvary Cem
St Marks Cem
Appenzell
DAMAGE CENTER
Gravel Pit
Lake Akiba
Camp Akiba
PLATE 1
REGIONAL VICINITY MAP
SCALE 1:24000
N



LAYOUT
Scale 1"=50'



DOWNSTREAM ELEVATION
Scales Vert. 1"=10'
Hor. 1"=60'

PLATE 2

MOUNTAIN ICE COMPANY
PLANS FOR REBUILDING TROUT LAKE DAM
ON TROUT CREEK IN MONROE COUNTY
SCALES INDICATED. JULY 19-1927.
ENGINEERING DEPT OF THE
SCRANTON GAS & WATER CO.- SCRANTON PA.
Fr. Bk. 126.

Ch. Engr. Scranton Gas & Water Co.

Revised 1-28-27 J.W.S.

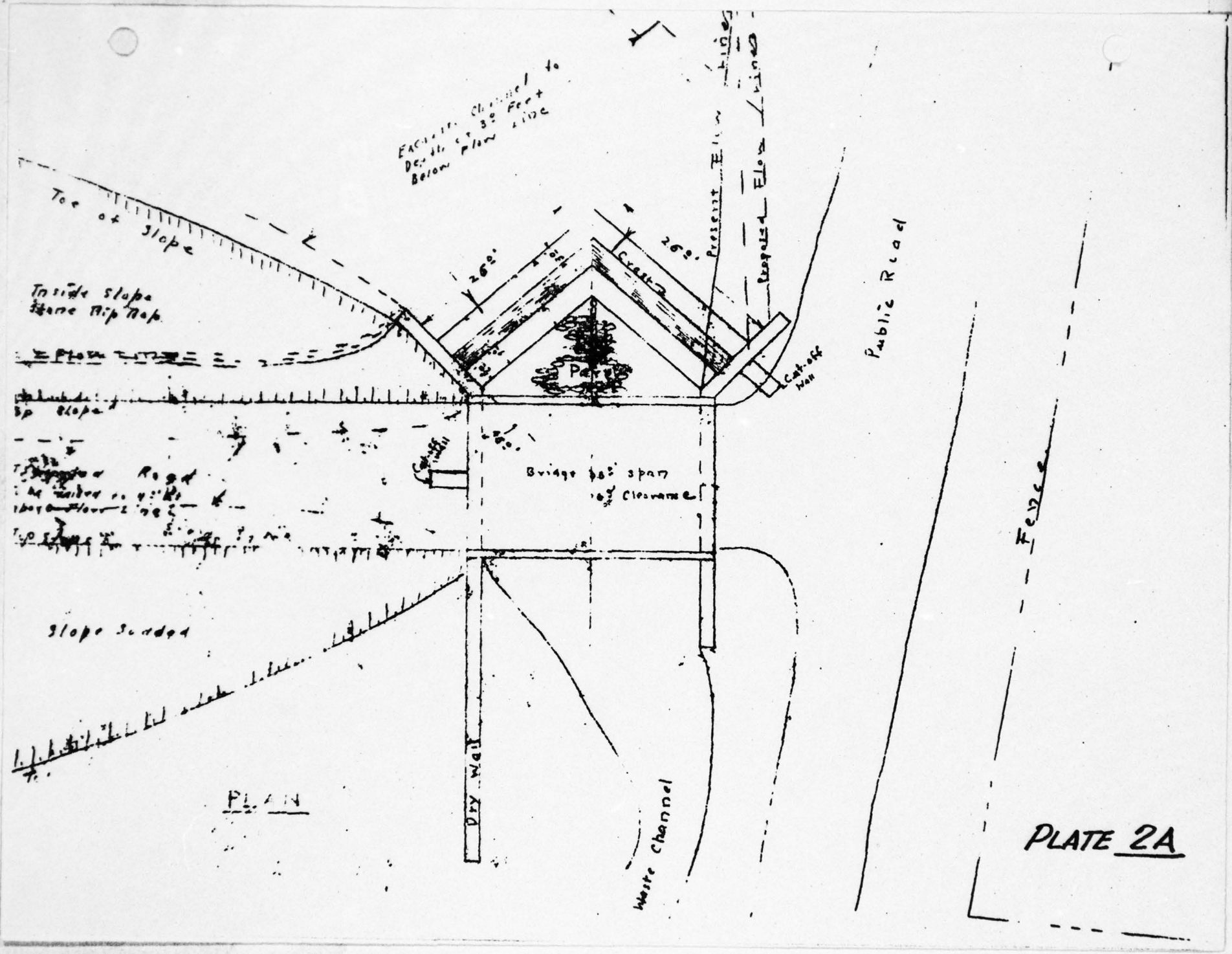
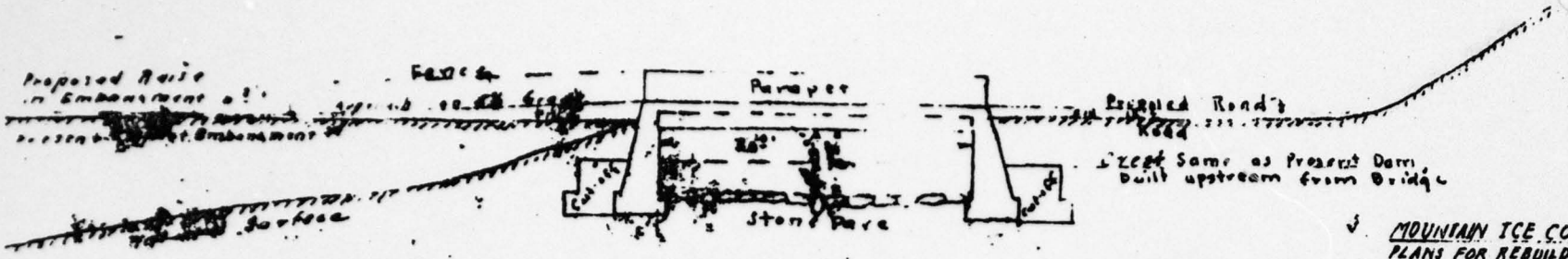

Toe of Slope
Inside Slope
Stone Rip Rap
26'
26'
Crest
Present Flow Lines
Proposed Flow Lines
Cut-off Wall
Public Road
Fence
Bridge 150' span
for Clearance
Slope Sodded
Dry Wall
Waste Channel
PLAN

PLATE 2A

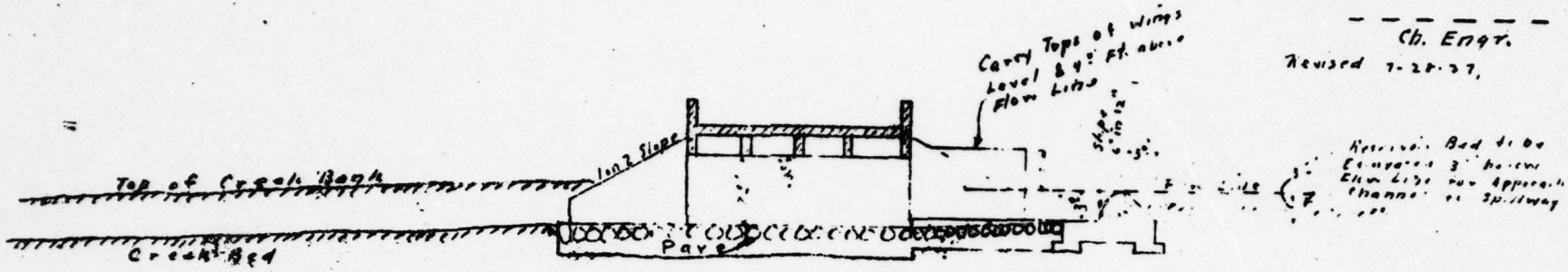


DOWNSTREAM ELEVATION

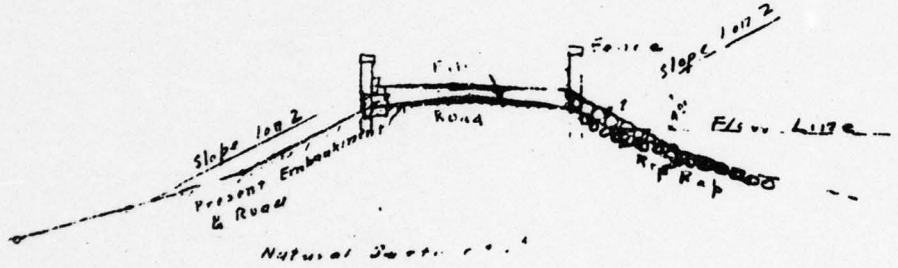
MOUNTAIN ICE COMPANY
PLANS FOR REBUILDING TROUT LAKE DAM IN JACKSON TWP.-MONRE CO

ENGR. DEPT. OF THE SCRANTON GAS & WATER CO.- SCRANTON-PA
Scale 1"=10' July 19-1927

Ch. Engr.
Revised 7-28-27.



SECTION THRU SPILLWAY & BRIDGE



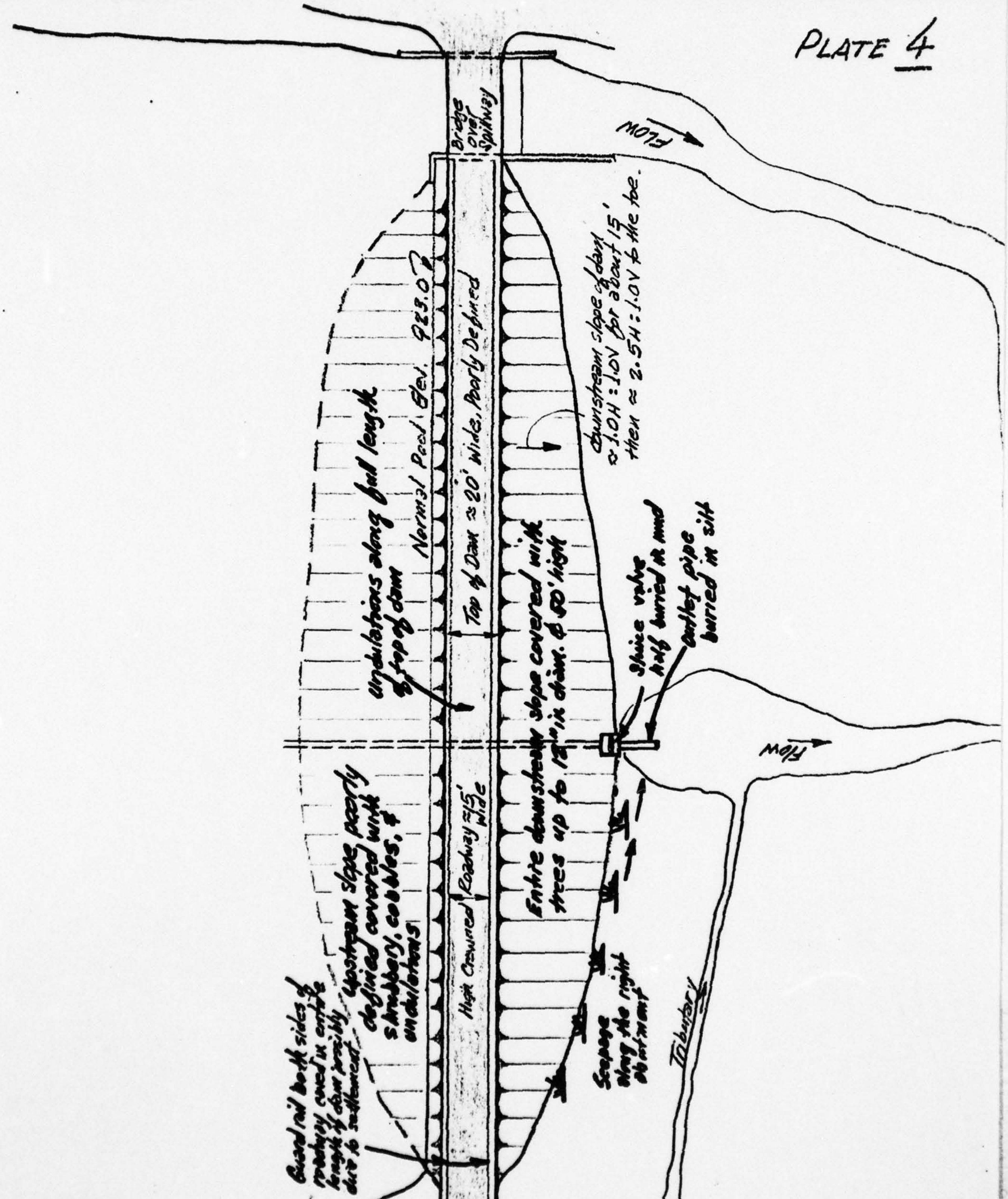
TYPICAL CROSS SECTION
THROUGH EMBANKMENT.
Scale 1" = 10'

PLATE 3

O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Trout Lake Dam		JB	3/20/79	

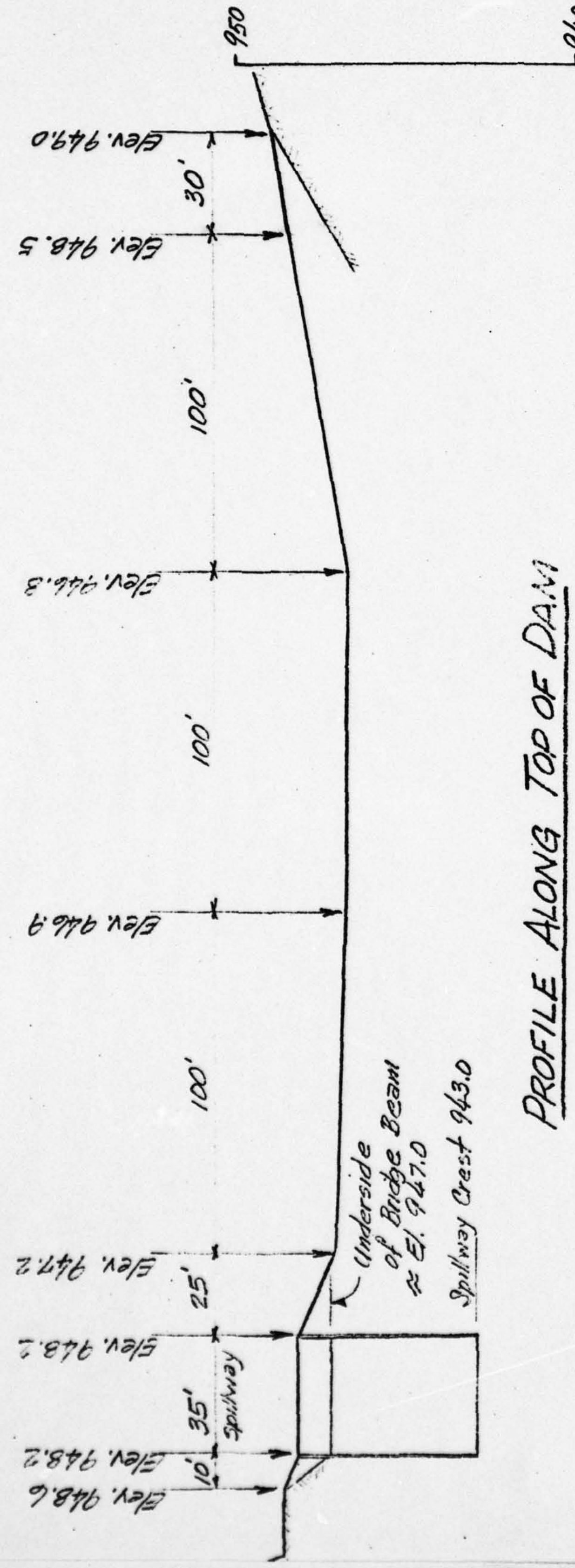
PLATE 4



O'BRIEN & GERE ENGINEERS, INC.

SUBJECT	SHEET	BY	DATE	JOB NO
Trout Lake Dam		[illegible]	3/21/79	

PLATE 5



APPENDIX

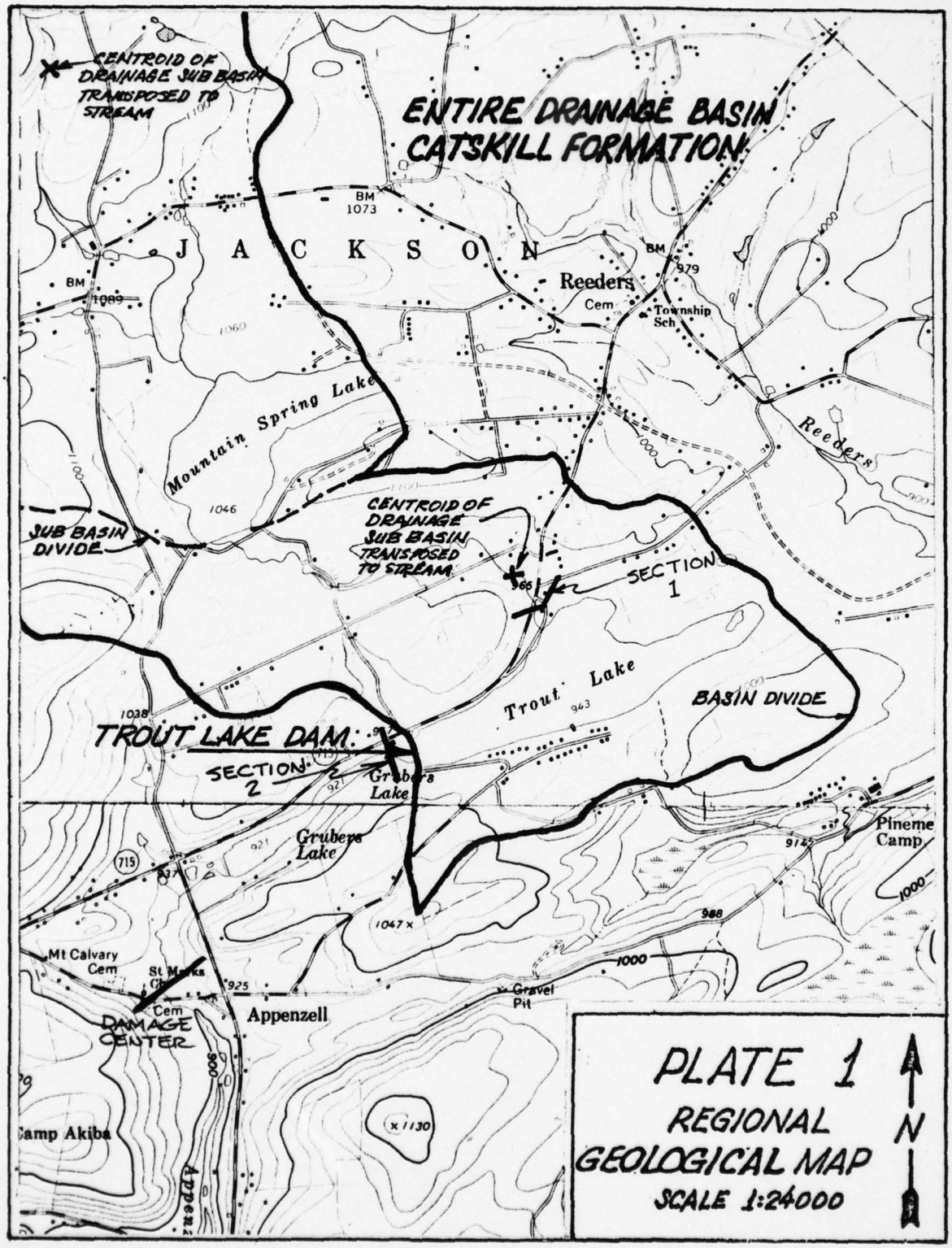
F

Site Geology

SITE GEOLOGY

Trout Lake

Trout Lake is located within the Pocono Plateau Section of the Appalachian Plateaus physiographic province. The geologic structure at the site is relatively simple with thick Pleistocene deposits, consisting of till, outwash and other rock debris units of Wisconsin glaciation, overlying nearly horizontal beds of non-marine red and gray sediments of the Devonian Catskill continental groups. No faults or major structural defects are known to exist in the buried bedrock in the vicinity of the dam and lake.


CENTROID OF DRAINAGE SUB BASIN TRANSPOSED TO STREAM
ENTIRE DRAINAGE BASIN CATSKILL FORMATION
BM 1073
J A C K S O N
BM 1089
BM 979
Reeders
Cem
Township Sch
Mountain Spring Lake
Reeders
SUB BASIN DIVIDE
CENTROID OF DRAINAGE SUB BASIN TRANSPOSED TO STREAM
SECTION 1
Trout Lake
BASIN DIVIDE
TROUT LAKE DAM
SECTION 2
Gruber's Lake
Gruber's Lake
Pineme Camp
715
Mt Calvary Cem
St Marks Ch
Cem
Appenzell
DAMAGE CENTER
Gravel Pit
Camp Akiba
PLATE 1
REGIONAL GEOLOGICAL MAP
SCALE 1:24000
N