CONNECTICUT RIVER BASIN
CONWAY, MASSACHUSETTS

CONWAY ELECTRIC DAM
MA 00463

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MARCH 1981

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

Conway Electric Dam is about 265 ft. long with a maximum height of about 77 ft. The dam appears to be in poor condition. The dam is placed in the intermediate size category and has a hazard potential if significant. The owner should implement various operations and maintenance procedures.
Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

Inclosed is a copy of the Conway Electric Dam (MA-00463) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Commonwealth of Massachusetts, Department of Environmental Management, 100 Cambridge Street, Boston, MA 02114.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely,

C.E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer
CONWAY ELECTRIC DAM
MA 00463

SOUTH RIVER BASIN
CONWAY, MASSACHUSETTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification Number: MA 00463
Name of Dam: Conway Electric Dam
Town: Conway
County and State: Franklin County, Massachusetts
Stream: South River
Date of Inspection: Dec. 2, 1980

BRIEF ASSESSMENT

Conway Electric Dam is approximately 265 feet long with a maximum height of about 77 feet. The dam consists of a 110-foot long overflow section which is a rock filled timber crib covered with concrete and a non-overflow section consisting of a concrete and masonry wall plus an earth embankment. The abutments and the base of the dam appear to be founded on bedrock. The original dam was a rock filled timber crib about 55 feet high and 90 feet long built in 1898. The dam was enlarged to the extent described above around 1910. From 1898 to 1921 the dam impounded water for hydroelectric power generation for the Conway Electric Street Railway Company. Since 1921, the area in the vicinity of the dam has been used for recreation.

A 4-foot square timber sluiceway, located at the center of the base of the overflow section, has not been functional since 1921 when it was plugged with concrete by Conway Electric Street Railway Company when they abandoned the site.

The stone masonry headworks and the 5-foot diameter boiler plate penstock to the original powerhouse, which are located about 150 feet north of the dam, are in poor condition. The headworks and penstock have also been abandoned and all that remains of the powerhouse is the stone foundation.

The dam appears to be in poor condition. However, the spillway discharge condition at the time of the inspection prohibited a thorough inspection of the overflow portion of the dam. The non-overflow portion of the dam appears to be in fair condition. Some minor cracking is evident in the masonry and concrete wall. The earth embankment has an irregular top width, steep side slope (varies 1H:1V), varying crest elevation and many large trees (up to 24-inch trunks and 50 feet high) growing both on the slopes and the crest. Seepage (5 gpm) was noted along the north side of the spillway.

Conway Electric Dam has a maximum height of about 77 feet which places it in the "Intermediate" size category. The initial potential hazard area is considered to be the Stillwater Bridge over the Deerfield River approximately 2.5 miles downstream of Conway Electric Dam. Although the bridge deck would be about 26 feet above the flow caused by a breach of the dam, appreciable damage could occur to the bridge supports; however, no loss of life is probable.
Due to the above considerations, Conway Electric Dam is classified in the "Significant" hazard potential category. The recommended test flood for an "Intermediate" size, "Significant" hazard dam ranges from one-half of the Probable Maximum Flood (PMF) to the full PMF. Due to the potential for appreciable property damage, the selected test flood is one-half of the PMF.

The test flood peak inflow to Conway Electric Dam is 26,800 cfs. The routed test flood outflow of 26,800 cfs overtops the spillway crest by 16 feet and the top of the dam (concrete abutment at north end of overflow section) by nine feet. The spillway system is capable of discharging 6,650 cfs prior to overtopping of the embankment, which is approximately 25 percent of the routed test flood outflow.

Within one year of receipt of this Phase I Inspection Report, the Owner (Commonwealth of Massachusetts, Department of Environmental Management) should retain the services of a qualified, registered professional engineer experienced in the design and construction of dams for the following purposes: 1) inspect the dam during a low or no flow condition and recommend measures to be taken to insure the future integrity of the dam; 2) design and direct the installation of a reservoir drawdown system; 3) perform detailed hydrologic and hydraulic analyses to assess the need for increasing the project discharge capacity and to evaluate the ability of the structure to withstand overtopping; 4) investigate the source and nature of the seepage observed along the north side of the spillway; and 5) direct the removal of all trees and their root systems from the embankment portion of the dam including a 20-foot wide strip beyond the downstream toe of the embankment and direct the backfilling of any remaining voids with suitable thoroughly compacted material.

In addition, the Owner should implement the following operational and maintenance procedures: 1) remove brush from the earth embankment portion of the dam; 2) establish and maintain vegetative cover on the embankment portion of the dam; 3) institute a program of annual technical inspection of the dam; 4) establish and implement a regular maintenance program of the dam; 5) develop a downstream warning system.

As an alternative to the above recommendations and remedial measures, the lake could be drained and the dam removed.

O'BRIEN & GERE ENGINEERS, INC.

John J. Williams, P.E.
Vice President
Massachusetts Registration No. 30208 (CIVIL)
This Phase I Inspection Report on Conway Electric Dam (MA-00463) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR. MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNET M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division
PREFACE

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

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through 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. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. 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.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.
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SECTION 6
EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

During the inspection, the Ogee spillway overflow portion of the dam was submerged, thus observations and an appraisal of the structural condition of the Ogee surface were somewhat limited. The crest of the overflow section appears to be in poor condition with many areas of missing concrete (refer to photograph 4, page C-2). The downstream face of the Ogee Spillway, where visible, appears to be spalled and eroded in horizontal lines (Refer to the overview photograph and photograph 3, page C-2). The masonry and concrete non-overflow wall north of the overflow section appears to be in fair condition with some minor cracking near the south end of the wall. The earth embankment north of the wall has an irregular top width, steep side slopes (varies 1:1), varying crest elevation and many large trees (up to 24-inch diameter trunks and 50 feet high) growing both on the slopes and the crest. Seepage (5 gpm) was noted along the north side of the spillway in the region where the spillway ties into the bedrock abutment. These conditions are discussed in greater detail in Section 3.

6.2 Design and Construction Data

Prints of the original plans and specifications from 1897 for Conway Electric Dam were provided by Mr. John R. Moseley, Clerk of the Courts, Franklin County, Greenfield, Massachusetts. No actual design data or construction information is available relative to the original design and construction in 1897 and 1898.

6.3 Post Construction Changes

About 1910 concrete was placed over the existing structure and the crest of the overflow section was raised about 15 feet. A concrete and masonry wall approximately 55 feet long was built north of the overflow section. North of the wall an earth embankment about 100 feet long was built which blended into the north abutment. No other known modifications have been made to the structure.

6.4 Seismic Stabilities

Conway Electric Dam is located in Seismic Zone 2 on the "Seismic Zone Map of Contiguous States." A dam is located in Seismic Zone 2 need not be evaluated for seismic stability, according to the Recommended Guidelines for Phase I Dam Inspections.
vertical side slopes developing within one hour. The failure was assumed to occur with the reservoir surface at the crest of the overflow portion of the dam, Elev. 298. The resulting breach discharge was routed to the initial damage center which is considered to be the Stillwater Bridge over the Deerfield River about 2.5 miles downstream of the Conway Electric Dam. The approximate channel cross-section at this point is shown on page D-5.

The failure analysis indicates that a breaching of the dam with the reservoir surface at the crest of the overflow portion of the dam Elev. 298, would result in discharge in the Deerfield River about 26 feet below the deck of the Stillwater Bridge with a flow of 2570 cfs. Just before the assumed failure of the dam, no discharge would be passed through the dam because the stage of the water in the impoundment would be at the crest of the overflow portion of the dam. Appreciable damage could occur to the bridge supports, but no loss of life would be expected.
SECTION 5
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The total drainage area for Conway Electric Dam is approximately 26.1 square miles consisting primarily of forested mountainous terrain. The towns of Ashfield and Conway are the only population centers within the drainage area. The topography ranges from roughly El. 1800 at the farthest upstream point in the watershed to approximately El. 300 at the reservoir. Ashfield Pond is the only other impoundment in the drainage area.

5.2 Design Data

Neither hydraulic nor hydrologic design data is available for Conway Electric Dam.

5.3 Experience Data

According to the Owner's representative, no rainfall or reservoir level records are known to exist for this site.

5.4 Test Flood Analysis

The recommended test flood range for an "Intermediate" size, "Significant" hazard dam is from one-half of the Probable Maximum Flood (PMF) to the full PMF. Based on the potential for appreciable damage to the supports of the Stillwater Bridge 2.5 miles downstream of the dam, the selected test flood is one-half of the PMF. Hydrologic and hydraulic calculations were performed with the assistance of the HEC-1-DB computer program. The flood hydrographs were constructed from the Snyder unit hydrographs using average coefficients, an initial infiltration of zero and a constant loss rate of 0.05 inches per hour. The Hop Brook adjustment factor was used to reduce the Probable Maximum Precipitation based on the size of the drainage area. Stage vs. discharge and stage vs. storage relationships were developed for Conway Electric Dam. The relationships were utilized by the program to route the test flood through the dam. The reservoir water surface was assumed to be at the spillway crest elevation at the beginning of the storm event.

The peak inflow and outflow rates for the test flood at Conway Electric Dam were computed to be 26,800 cfs. The peak outflow corresponds to a stage of 16 feet above the spillway crest or 9 feet above the top of the dam elevation. The spillway discharge capacity with the reservoir surface at the top of dam El. 305 is 6,650 cfs which is approximately 25 percent of the routed test flood outflow.

5.5 Dam Failure Analysis

A failure of the overflow portion of the dam was simulated by use of the HEC-1-DB computer program assuming a 36-foot wide by 70-foot deep breach with

1Corps of Engineers, Engineer Circular No. 1110-2-27, Aug. '66.
SECTION 4
OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. According to the Owner's representative, no operating procedures exist for Conway Electric Dam because of the absence of a drawdown system.

b. Description of Any Warning System in Effect. According to the Owner's representative, no warning system exists which could be used to alert downstream property owners of an impending dam failure.

4.2 Maintenance Procedures

a. General. According to the Owner's representative, maintenance is not performed on a regular basis on the Conway Electric Dam.

b. Operating Facilities. Because no operating facilities exist on the site, no maintenance can be performed.

4.3 Evaluation

A regular maintenance program and warning system should be developed and implemented for Conway Electric Dam.
d. Reservoir Area. The reservoir is almost entirely filled with sediment. The maximum depth of water in the impoundment is estimated to be about 5 feet in the immediate vicinity of the Ogee spillway section. The freeboard between the spillway crest and the top of the concrete and masonry wall north of the spillway is roughly 7 feet. The reservoir side slopes on the periphery of the reservoir are densely forested and vary from about 20 to 100 percent.

e. Downstream Channel. South River flows through a narrow, twisting, densely forested, boulder strewn gorge between Conway Electric Dam and the Deerfield River approximately 3,500 feet downstream. The invert of South River drops about 70 feet in this distance. About 11 miles downstream of the dam the Deerfield River discharges into the Connecticut River.

3.2 Evaluation

The dam appears to be in poor condition; however, the Ogee spillway overflow portion of the dam could not be closely inspected because of the amount of discharge at the time of inspection. An inspection should be made of this portion of the dam during low or no flow conditions. All trees on the non-overflow northern portion of the dam should be removed. Some means of drawing the reservoir down should be provided. The seepage observed along the north side of the Ogee spillway should be investigated.
SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Conway Electric Dam was performed on December 2, 1980. At the time of the inspection, the reservoir water surface was approximately 3 inches above the spillway crest elevation. No underwater areas, other than what could be seen from above the water surface, were inspected.

The observations and comments of the field inspection team are in the checklist which is Appendix A of this report.

b. Dam. During the inspection, the overflow section of the dam was submerged, thus observations of the Ogee spillway surface were somewhat limited. The crest of the overflow section appears to be in poor condition with many areas of missing concrete (Refer to Photograph 4, page C-2). Even with the limited visibility of the downstream face, the Ogee spillway appears to be spalled and eroded. The deterioration appears to have occurred in horizontal lines (refer to the overview photograph and photograph 3, page C-2).

The masonry and concrete non-overflow wall north of the overflow section appears to be in fair condition with some minor cracking near the south end of the wall. None of the cracks appear to be more than 0.05 of an inch wide. The north end of the wall ties into an earth embankment which has an irregular top width, steep side slopes (varies 1H:1V) varying crest elevation and many large trees (up to 24-inch trunks and 50 feet high) growing on both the slopes and the crest.

The south abutment and the base of the Ogee spillway section appear to tie into bedrock. The north side of the spillway also appears to tie into bedrock; however, seepage (5 gpm) with iron oxide discoloration was noted in this area.

c. Appurtenant Structures. A 4-foot square timber sluiceway through the base of the spillway reportedly has been blocked off with concrete since the site was abandoned in 1921 by the Conway Electric Company. No evidence of a control system for the sluiceway could be found except for an estimated 8-inch diameter steel pipe filled with concrete projecting about 6 inches above the crest of the spillway located in the region where the sluiceway reportedly passes through the base of the dam. This possibly could have been a conduit for a valve control stem.

The stone masonry headworks for the penstock to the power plant, which are in disrepair, are located approximately 150 feet north of the Ogee spillway section of the dam. The reservoir in this area is almost entirely filled with sediment.

The penstock terminates about 20 feet upstream of the remains of the powerhouse which is located about 300 feet downstream of the axis of the dam. The exposed portion of the penstock exhibits considerable corrosion. A small amount of leakage (less than 1 gpm) was observed discharging from the penstock. The only part of the powerhouse which remains is the stone foundation.
SECTION 2
ENGINEERING DATA

2.1 Design

Prints of the original plans and specifications from 1897 for Conway Electric Dam were provided by Mr. John R. Moseley, Clerk of the Courts, County of Franklin, Greenfield, Massachusetts. No information is available relative to the modifications made to the dam about 1910.

2.2 Construction

No information with respect to the original construction in 1898 or the modifications of 1910 is available.

2.3 Operation

According to the Owner's representative, no operational data is available for this site.

2.4 Evaluation

a. Availability. Information with regard to Conway Electric Dam was provided by the Commonwealth of Massachusetts Department of Environmental Quality Engineering, Division of Waterway and the Department of Environmental Management (the Owner). Mr. John R. Moseley, Clerk of the Courts, County of Franklin, Greenfield, Massachusetts provided prints of the original 1897 plans and specifications plus added historical information.

b. Adequacy. Information obtained during the field investigation, from conversations with the Owner's representative and from the sources discussed in paragraph 2.4.a, is considered adequate for a Phase I assessment of the dam.

c. Validity. The information provided by the sources discussed in paragraphs 2.4.a and 2.4.b, appears to be valid.
3. Height 77 feet
4. Top Width 2 to 4 feet overflow portion
10 to 30 feet non-overflow portion
5. Side Slopes
   Overflow portion:
   Upstream vertical
   Downstream approximately 0.3:1
   Non-overflow portions:
   Upstream and downstream slopes vary 1:1

6. Zoning Unknown
7. Impervious Core Unknown
8. Cutoff Unknown
9. Grout Curtain Unknown

h. Diversion and Regulating Tunnel. Penstock to powerhouse in poor condition and non-functional.

i. Spillway.
   1. Type Concrete Ogee in disrepair
   2. Length 110 feet
   3. Crest Elevation 298
   4. Gates None
   5. Upstream Channel None
   6. Downstream Channel South River

j. Regulating Outlets.
   1. Invert Elevation 225 feet
   2. Size 4-foot square
   3. Description Sluiceway through base of spillway section
   4. Control Mechanism Unknown
      Inoperable since 1921
8. Total Project Discharge at Top of Dam. The total project discharge at top of dam El. 305 is 6,650 cfs.

9. Total Project Discharge at Test Flood Elevation. The total project discharge at test flood El. 314 is 26,800 cfs.

c. Elevation, (NGVD)

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<tr>
<td>1. Streambed at Toe of Dam</td>
<td>+228</td>
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<td>2. Bottom of Cutoff</td>
<td>Unknown</td>
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<td>3. Maximum Tailwater</td>
<td>Unknown</td>
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<td>4. Normal Pool</td>
<td>+298</td>
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<td>5. Full Flood Control Pool</td>
<td>N/A</td>
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<td>6. Spillway Crest (Ungated)</td>
<td>+298</td>
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<td>7. Design Surcharge (Original Design)</td>
<td>Unknown</td>
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<td>8. Top of Dam (North Abutment)</td>
<td>+305</td>
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<td>9. Test Flood Surcharge</td>
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</tr>
<tr>
<td>2. Flood Control Pool</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Spillway Crest Pool</td>
<td>+900</td>
</tr>
<tr>
<td>4. Top of Dam</td>
<td>+3,700</td>
</tr>
<tr>
<td>5. Test Flood Pool</td>
<td>+4,000</td>
</tr>
</tbody>
</table>

e. Storage, (Acre-feet)

<table>
<thead>
<tr>
<th>Storage</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Normal Pool</td>
<td>8</td>
</tr>
<tr>
<td>2. Flood Control Pool</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Spillway Crest Pool</td>
<td>8</td>
</tr>
<tr>
<td>4. Top of Dam (North Abutment)</td>
<td>118</td>
</tr>
<tr>
<td>5. Test Flood Pool</td>
<td>295</td>
</tr>
</tbody>
</table>

f. Reservoir Surface, (Acres)

<table>
<thead>
<tr>
<th>Surface</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Normal Pool</td>
<td>5</td>
</tr>
<tr>
<td>2. Flood Control Pool</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Spillway Crest Pool</td>
<td>5</td>
</tr>
<tr>
<td>4. Top of Dam</td>
<td>18</td>
</tr>
<tr>
<td>5. Test Flood Pool</td>
<td>22</td>
</tr>
</tbody>
</table>

g. Dam.

<table>
<thead>
<tr>
<th>Type</th>
<th>Overflow portion: rock filled timber crib covered with concrete; non-overflow portion: concrete and masonry wall plus earth embankment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Length</td>
<td>+110-foot overflow portion +155-foot non-overflow portion Total length +265 Feet</td>
</tr>
</tbody>
</table>
h. Design and Construction History. The original dam was designed in 1897 to provide a reservoir for power generation for the Conway Electric Street Railway Company (CESRC). The Franklin County Commissioners approved the plans and specifications submitted by Emery Brown and others of the CESRC for the building of the dam in Conway on October 19, 1897. The dam was a rock filled timber crib structure with plank facing when originally built in 1898. It was about 55 feet high, 90 feet long at the crest and had a 4-foot square timber sluiceway at its base. Flow to the sluiceway was controlled by a timber seating head gate.

The stone masonry headworks for the powerhouse penstock were built about 150 feet north of the dam. The powerhouse was built approximately 200 feet downstream of the dam.

Around 1910, concrete was placed over the existing structure and the crest of the overflow section was raised about 15 feet. A concrete and masonry wall approximately 55 long was built north of the now 110-foot long spillway. The wall, which extends 7 feet above the spillway crest, was tied into an earth embankment roughly 100 feet long which in turn was blended into the north abutment.

In 1921 CESRC abandoned the site. Reportedly at this time the sluiceway was blocked with concrete. Since 1921 the structure has been allowed to slowly fall into disrepair.

i. Normal Operating Procedures. According to the Owner's representative, Mr. Roger Ward, there are no operating procedures associated with this site.

1.3 Pertinent Data

a. Drainage Area. The area draining to the Conway Electric Dam encompasses 26.1 square miles to the west, southwest of the dam. Hydrologically there are no significant impoundments located upstream of the dam.

b. Discharge at Damsite.

1. Outlet Works. No outlet works exist on this site.

2. Maximum Known Flood. According to the Owner's representative, no known discharge records for the site exist.

3. Ungated Spillway Capacity at Top of Dam. The ungated spillway capacity at top of dam El. 305 is 6,650 cfs.

4. Ungated Spillway Capacity at Test Flood Elevation. The ungated spillway capacity at test flood El. 314 is 22,500 cfs.

5. Gated Spillway Capacity at Normal Pool Elevations. Not applicable.


7. Total Spillway Capacity at Test Flood Elevation. The total spillway capacity at test flood El. 314 is 22,500 cfs.
b. **Description of Dam and Appurtenances.** The spillway portion of Conway Electric Dam is a concrete section built over a timber crib. The length of the spillway weir is about 110 feet and the overall height of the structure including a 7-foot masonry and concrete wall extending above the spillway on the north side of the spillway is approximately 77 feet. The wall, about 55 feet long, ties into an earth embankment roughly 100 feet long with side slopes averaging about 1:1, which in turn blends into the north abutment. The earth embankment crest varies from 7 feet above the spillway crest to about 17 feet above the spillway at the north abutment. The spillway on the south ties into a steep bedrock abutment.

The spillway is a severely damaged Ogee section (refer to pictures 3 and 4 in Appendix C). A 4-foot square, timber sluiceway is located at the base of the spillway and reportedly had a timber seating head gate.

About 150 feet north of the spillway are stone masonry headworks for the penstock to the power plant abandoned in 1921. All that remains of the powerhouse is the stone foundation.

c. **Size Classification.** Conway Electric Dam has a maximum height of about 77 feet which places it in the "Intermediate" size classification. The maximum storage capacity of 188 acre-feet is less than the 1,000 acre-foot upper limit for "Small" size dams. Because of its height, Conway Electric Dam is classified in the "Intermediate" size category.

d. **Hazard Classification.** The initial potential hazard area is considered to be the Stillwater Bridge over the Deerfield River approximately 2.5 miles downstream of Conway Electric Dam. Although the bridge deck would be about 26 feet above the flow caused by breach of the dam, appreciable damage could occur to the bridge supports. A secondary potential hazard area is a cluster of houses about 4 miles downstream from the dam in the vicinity of the Deerfield River. The door sill at the lowest house is roughly 8 feet above the Deerfield River channel banks. The failure analysis indicates that a breach of the dam would result in a depth of flow one foot below the channel banks. Therefore, no loss of life would be expected.

Due to the above considerations, Conway Electric Dam is classified in the "Significant" hazard potential category.

e. **Ownership.** The dam has been owned by the Commonwealth of Massachusetts, Department of Environmental Management, 100 Cambridge Street, Boston, MA 02114 since 1966. Telephone (413) 549-1461 (Amherst Office).

f. **Operator.** Owner.

g. **Purpose of Dam.** The dam was originally constructed in 1898 to impound a water supply for hydroelectric power. The powerhouse was abandoned in 1921 and since then the area has been used for recreation. Most of the reservoir is now filled with silt. The possibility exists that the dam may be used again in the future in a hydroelectric power project. Refer to pages B-20 and B-21.
1.1 General

a. Authority. The National Dam Inspection Act (Public Law 92-367) was passed by Congress on August 8, 1972. Under this Act, the Secretary of the Army was authorized to initiate, through the Corps of Engineers, the National Program for Inspection of Dams throughout the United States. Responsibility for supervising inspection of dams in the New England Region has been assigned to the New England Division of the Army Corps of Engineers.

O'Brien & Gere Engineers, Inc. has been retained by the New England Division to inspect and report on selected non-federal dams in the Commonwealth of Massachusetts. Authorization and Notice to Proceed were issued to O'Brien & Gere by a letter dated November 12, 1980 and signed by Col. William E. Hodgson, Jr. Contract No. DACW 33-81-C-0016 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection. The purpose of inspecting and evaluating non-federal dams is to:

1. Identify conditions which threaten public safety and make the Owner aware of any deficiencies so that he may correct them in a timely manner.

2. Encourage and prepare the State to initiate an effective dam safety program for non-federal dams as soon as possible.

3. Update, verify and complete the National Inventory of Dams.

1.2 Description of Project. (Information with regard to the Conway Electric Dam was provided by the Commonwealth of Massachusetts, Department of Environmental Management and the Clerk of the Courts, County of Franklin, Greenfield, Massachusetts).

a. Location. Conway Electric Dam is located on South River in the Town of Conway, Massachusetts. A portion of the USGS Quadrangle Map entitled "Shelburne Falls, Massachusetts" has been included as Figure 1 on page vi of this report to illustrate the location. USGS reference coordinates for this dam are N42°32.3', W72°40.1'.

Water flowing over the spillway at Conway Electric Dam is conveyed easterly via South River approximately 3,500 feet to the Deerfield River. About 2.5 miles downstream of Conway Electric Dam, the Deerfield River flows under the Stillwater Bridge which would be the initial flood impact site. A secondary potential hazard area would be a cluster of houses in the vicinity of the Deerfield River approximately 4 miles downstream of the dam. The Deerfield River discharges into the Connecticut River about 11 miles downstream of the dam.
SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Based upon the visual inspection of December 2, 1980, Conway Electric Dam appears to be in poor condition. Even with the limited visibility of the Ogee spillway overflow portion of the dam, evidence of severe spalling and erosion is apparent. The masonry and concrete non-overflow wall north of the overflow section appears to be in fair condition with some minor cracking near the south end of the wall. The earth embankment north of the wall is in poor condition with many large trees, varying crest elevation, steep side slopes and irregular top width. Seepage (5 gpm) is evident along the north side of the spillway. Structural deficiencies are further discussed in Sections 3 and 6. The lack of a drawdown system is discussed in Section 3. The spillway, in addition to being in poor condition, is hydraulically inadequate.

b. Adequacy of Information. Information obtained during the field investigation, from conversations with the Owner's representative and from the sources discussed in paragraph 2.4.a, is considered adequate for a Phase I assessment of the dam.

c. Urgency. The recommendations and remedial measures described in Sections 7.2 and 7.3 should be implemented within one year of receipt of this Phase I Inspection Report.

7.2 Recommendations

It is recommended that the Owner retain the services of a qualified, registered professional engineer experienced in the design and construction of dams for the following purposes:

1. Inspect the dam during a low or no flow condition and recommend measures to be taken to insure the future integrity of the dam.

2. Design and direct the installation of a reservoir drawdown system.

3. Perform detailed hydrologic and hydraulic analyses to assess the need for increasing the project discharge capacity and to evaluate the ability of the structure to withstand overtopping.

4. Investigate the source and nature of the seepage observed along the north side of the spillway.

5. Direct the removal of all trees and their root systems from the embankment portion of the dam including a 20-foot wide strip beyond the downstream toe of the embankment and direct the backfilling of any remaining voids with suitable, thoroughly compacted material.
7.3 Remedial Measures

   a. Operation and Maintenance Procedures. The Owner should also implement
      the following operation and maintenance procedures:

      1. Remove brush from the earth embankment portion of the dam.

      2. Establish and maintain vegetative cover on the embankment portion of
         the dam.

      3. Institute a program of annual technical inspection of the dam.

      4. Establish and implement a regular maintenance program of the dam.

      5. Develop a downstream warning system.

7.4 Alternatives

   As an alternative to the above recommendations and remedial measures, the
   lake could be drained and the dam removed.
APPENDIX A

INSPECTION CHECKLIST
VISUAL INSPECTION CHECK LIST

INSPECTION TEAM ORGANIZATION

Project: Conway Electric Dam

National I.D.#: MA 00463

Location: Conway, Massachusetts

Type of Dam: Rock Filled Crib with Plank Facing Covered with Concrete

Inspection Date(s): December 2, 1980

Weather: Cool, Heavily Overcast \( \approx 50^\circ F \)

Pool Elevation: \( \pm 298 \) MSL

Inspection Team

Lee DeHeer
Leonard Beck
Steven Snider
Alan Hanscom
Denis Mehu

O'Brien & Gere
O'Brien & Gere
O'Brien & Gere
O'Brien & Gere
Bryant & Associates

Managing Engineer
Structures
Foundations & Materials
Structures
Hydrology/Hydraulics

Owner's Representative

Mr. Carroll Holmes, Regional Supervisor, Dept. of Environmental Management, Commonwealth of Massachusetts

Mr. Roger Word, Maintenance Supervisor, Dept. of Environmental Management, Commonwealth of Massachusetts
## VISUAL INSPECTION CHECK LIST

**Project:** Conway Electric Dam  
**National I.D. #:** MA 00463  
**Date(s):** Dec 2, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAM EMBANKMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Crest Elevation</td>
<td>305 @ Spillway to 315 @ Left Abutment</td>
</tr>
<tr>
<td>Current Pool Elevation</td>
<td>298.2</td>
</tr>
<tr>
<td>Maximum Impoundment to Date</td>
<td>Unknown</td>
</tr>
<tr>
<td>Surface Cracks</td>
<td>None Observed</td>
</tr>
<tr>
<td>Pavement Condition</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Movement or Settlement of Crest</td>
<td>None Observed</td>
</tr>
<tr>
<td>Lateral Movement</td>
<td>None Observed</td>
</tr>
<tr>
<td>Vertical Alignment</td>
<td>Varies @ least 10' ft with EL. 305 @ the spillway to EL. 315 at left abutment</td>
</tr>
<tr>
<td>Horizontal Alignment</td>
<td>Appears satisfactory</td>
</tr>
<tr>
<td>Condition at Abutment and at Concrete Structures</td>
<td>Some seepage (590m) through left abutment on oxide stone</td>
</tr>
<tr>
<td>Indications of Movements of Structural Items on Slopes</td>
<td>None observed</td>
</tr>
<tr>
<td>Trespassing on Slopes</td>
<td>Paths are not in evidence on the slopes</td>
</tr>
<tr>
<td>Vegetation on Slopes</td>
<td>Heavy tree cover</td>
</tr>
<tr>
<td>Sloughing or Erosion of Slopes or Abutments</td>
<td>None observed</td>
</tr>
<tr>
<td>Rock Slope Protection - Riprap Failures</td>
<td>None</td>
</tr>
</tbody>
</table>
### Visual Inspection Check List

**Project:** Conway Electric Dam  
**National I.D. #:** MA 00463  
**Date(s):** Dec 2, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAM EMBANKMENT (Con't)</td>
<td></td>
</tr>
<tr>
<td>Unusual Movement or Cracking at or near Toes</td>
<td>None Observed</td>
</tr>
</tbody>
</table>
| Unusual Embankment or Downstream Seepage | 2.5 gpm through left abutment  
Iron oxide stains |
| Piping or Boils | None observed |
| Foundation Drainage Features | None known to exist |
| Toe Drains | None known to exist |
| Instrumentation System | None known to exist |
## VISUAL INSPECTION CHECK LIST

**Project:**  

**National I.D. #:** MA 00463  

**Date(s):** Dec 6, 1980

### AREA EVALUATED

<table>
<thead>
<tr>
<th>CONCRETE/MASONRY DAM</th>
<th>CONDITIONS</th>
</tr>
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<tbody>
<tr>
<td>Crest Elevation</td>
<td>≈ 296</td>
</tr>
<tr>
<td>Current Pool Elevation</td>
<td>≈ 296.2</td>
</tr>
<tr>
<td>Maximum Impoundment to Date</td>
<td>Unknown</td>
</tr>
<tr>
<td>Any Noticeable Seepage</td>
<td></td>
</tr>
<tr>
<td>Conditions of Abutments</td>
<td></td>
</tr>
<tr>
<td>Drains</td>
<td></td>
</tr>
<tr>
<td>Water Passages</td>
<td></td>
</tr>
<tr>
<td>Foundation</td>
<td></td>
</tr>
<tr>
<td>Masonry/Concrete Surface Cracks</td>
<td></td>
</tr>
<tr>
<td>Structural Cracking</td>
<td></td>
</tr>
<tr>
<td>Vertical and Horizontal Alignment</td>
<td></td>
</tr>
<tr>
<td>Monolith Joints</td>
<td></td>
</tr>
<tr>
<td>Construction Joints</td>
<td></td>
</tr>
<tr>
<td>Upstream Embankment</td>
<td></td>
</tr>
<tr>
<td>Instrumentation System</td>
<td></td>
</tr>
<tr>
<td>Inspection Galleries</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- There was seepage noted on pgs. A-2 & A-3.
- The sluice way outlet was observed at the base of the masonry dam at approx. mid pt.
- Any noticeable seepage noted above. No drains were observed.
- Right abutment appears to be firm, bedrock.
- Left abutment; some weathering of rock with seepage noted above.
- No obvious cracks were observed.
- The concrete surface of the dam is severely cracked & spoiled.
- The above mentioned cracks may extend to the arid dam inside the structure since 1970. Refer to pictures & Appendix C.
- Very poor because of displaced concrete. Refer to above mentioned pictures.
- None observed. According to 1977 drawings, there is no upstream embankment.
- None observed; none known to exist.
### VISUAL INSPECTION CHECK LIST

**Project:** Conway Electric Dam

**National I.D. #:** MA 00463

**Date(s):** Dec 2, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</strong></td>
<td></td>
</tr>
<tr>
<td>a. Approach Channel</td>
<td><strong>NONE EXISTS</strong></td>
</tr>
<tr>
<td>General Condition</td>
<td></td>
</tr>
<tr>
<td>Loose Rock Overhanging Channel</td>
<td></td>
</tr>
<tr>
<td>Trees Overhanging Channel</td>
<td></td>
</tr>
<tr>
<td>Floor of Approach Channel</td>
<td></td>
</tr>
<tr>
<td>b. Weir and Training Walls</td>
<td></td>
</tr>
<tr>
<td>General Condition of Concrete</td>
<td><strong>Very poor, extensive cracking &amp; spalling</strong></td>
</tr>
<tr>
<td>Rust or Staining</td>
<td><strong>None observed, probably no reinforcing in concrete</strong></td>
</tr>
<tr>
<td>Spalling</td>
<td><strong>Extensive, large sections of the spillway crest gone.</strong></td>
</tr>
<tr>
<td>Any Visible Reinforcing</td>
<td><strong>No</strong></td>
</tr>
<tr>
<td>Any Seepage or Efflorescence</td>
<td><strong>Could not be determined under flowing water</strong></td>
</tr>
<tr>
<td>Drain Holes</td>
<td><strong>Nicer observed</strong></td>
</tr>
<tr>
<td>c. Discharge Channel</td>
<td></td>
</tr>
<tr>
<td>General Condition</td>
<td><strong>Barker filled, refer to picture 9, Appendix C.</strong></td>
</tr>
</tbody>
</table>
## VISUAL INSPECTION CHECK LIST

**Project:** Conway Electric Dam  
**National I.D. #:** MA 00463  
**Date(s):** Dec 2, 1980

<table>
<thead>
<tr>
<th>AREA EVALUATED</th>
<th>CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS (Con't)</strong></td>
<td></td>
</tr>
<tr>
<td>Loose Rock Overhanging Channel</td>
<td>A limited amount</td>
</tr>
<tr>
<td>Trees Overhanging Channel</td>
<td>Many</td>
</tr>
<tr>
<td>Floor of Channel</td>
<td>Filled with boulders up to 10' in size. Gradient ≈ 5%</td>
</tr>
<tr>
<td>Other Obstructions</td>
<td>None observed</td>
</tr>
</tbody>
</table>
APPENDIX B

ENGINEERING DATA
## Table of Contents

<table>
<thead>
<tr>
<th>Document Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Map, 1964</td>
<td>B-1</td>
</tr>
<tr>
<td>Original Drawings, 1897</td>
<td>B-2 to B-4</td>
</tr>
<tr>
<td>Plan View of Dam Area, 1973</td>
<td>B-5</td>
</tr>
<tr>
<td>Section Through Center of Ogee Spillway at Sluiceway</td>
<td>B-6</td>
</tr>
<tr>
<td>Petition for Permission to Build Dam, Oct. 1897</td>
<td>B-7</td>
</tr>
<tr>
<td>Approval of County Commissioners to Build Dam, Oct. 1897</td>
<td>B-8</td>
</tr>
<tr>
<td>Inspection Report, June 1968</td>
<td>B-9</td>
</tr>
<tr>
<td>Inspection Report, July 1973</td>
<td>B-10 to B-13</td>
</tr>
<tr>
<td>Inspection Report, December 1973</td>
<td>B-14</td>
</tr>
<tr>
<td>Inspection Report, June 1977</td>
<td>B-15 to B-19</td>
</tr>
<tr>
<td>Newspaper Article &quot;Conway Dam Study Proposed&quot;, 12/4/80</td>
<td>B-20</td>
</tr>
<tr>
<td>Newspaper Article &quot;Conway Hydro Could Mean Big Bucks&quot;, 12/17/80</td>
<td>B-21</td>
</tr>
</tbody>
</table>
Sketch Showing arrangement of logs in dam

Typical Section Through Dam

ORIGINAL DRAWING FROM 1897
6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

Main spillway-conc. crest over flow spillway 116" x 7' 1"

No. 1 Location and Type: with open dropwall 65' H.

Controls Yes, Type: of spillway-usable now

Automatic , Manual X , Operative Yes , No X

Comments: Concrete crest badly spalled.

No. 2 Location and Type: Center bottom of dropwall-4' x 4' sluiceway.

Controls Unk , Type: No controls visible.

Automatic , Manual Unk , Operative Yes , No X

Comments: See inspection report of July 30, 1973

No. 3 Location and Type: for 5' diam. penstock.

Controls Yes , Type: Old wood slidegate quides showing above water line

Automatic , Manual X , Operative Yes , No X

Comments: 6" x 8" wood timbers rotten-considerable seepage and leaks noted in old penstock flume.

Drawdown present Yes X , No , Operative Yes , No X


7. DAM UPSTREAM FACE: Slope Vertical , Depth Water at Dam 2' to 12'

Material: Turf , Brush & Trees , Rock Fill , Masonry X , Wood

Other______


Comments: Minor spalling of concrete-pond area mostly silted in water depth

quite shallow 30' to 40' upstream from dam.

8. DAM DOWNSTREAM FACE: Slope Open dropwall

Material: Turf , Brush & Trees , Rock Fill , Masonry X , Wood

Other______


Comments: Severe spalling of lip of spillway-spalling noted on face of dropwall

seepage flows noted in ledge fissures in abutments.
INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:
   City/Town: Conway
   County: Franklin
   Dam No.: 2-5-68-1
   Name of Dam: Conway Electric Dam
   Mass. Rect.
   Topo Sheet No.: 10 C
   Coordinates: N 563,000, E 285,300
   Inspected by: Harold T. Shumway, On June 14, 1977. Last Inspection 8-22-75

2. OWNER/S: As of June 14, 1977
   per: Assessors, Reg. of Deeds, Prev. Insp., X, Per. Contact
   Comm. of Mass.
   1. Dept. of Environmental Management, 100 Cambridge St., Boston, Mass.
      Name
      St. & No.
      City/Town
      State
      Tel. No.
   2.
   3.

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.
   Mr. Kenneth Dubuque
   Regional Forest Parks Supervisor, Amherst Nursery, P.O.Box 484, Amherst, Mass.
   Name
   St. & No.
   City/Town
   State
   Tel. No.

4. DATA:
   No. of Pictures Taken: None
   Sketches: See description of Dam.
   Plans, Where 1897 sketch on file in County Commissioners office
   Approved Oct. 19, 1897.

5. DEGREE OF HAZARD: (if dam should fail completely)*
   1. Minor
   2. Moderate
   3. Severe
   4. Disastrous
   Comments: Damage would be mostly silting of Deerfield River bed.
   *This rating may change as land use changes (future development).
June 30, 1977

Commonwealth of Massachusetts
Dept. of Environmental Management
100 Cambridge St.
Boston, Mass.

FS: Insp. Dam #2-6-68-1
Conway Electric Dam
Conway

Dear Sir:

On June 14, 1977, an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Comm. of Mass., Dept. Env. Management. If this information is incorrect, will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is conditionally safe. The following conditions were noted that require attention:

There is no visible evidence of any repairs having been made to this dam since last inspection of 8-22-75, and structure is continuing to slowly deteriorate. Leaks through old flume pipe developed and seepage and small leaks noted on downstream side of dam appears somewhat more pronounced.

We call these conditions to your attention before they become serious and more expensive to correct. With any correspondence please include the number of the dam as indicated above.

Yours truly yours,

[Signature]

John J. Hannon, P.E.
Chief Engineer

cc: Kenneth Dubuque
Francis J. Hoey, D.H.E.
H. Shumway, D.D.R.E.
TO:        Bruce S. Gullion, Director
FROM:  Kenneth M. Dubuque, Regional Supervisor
SUBJECT:  INSPECTION DAMS. REGION #4
DATE:    December 21, 1973

Conway Electric Dam, Conway

Dam structure in question, Inspector doesn't know whether it is log crib covered with cement or solid cement. Sluiceway not operable.

Penstock condition in question, condition of intake gate uncertain.

Should be thoroughly investigated by qualified Reg. Engineer with a great deal of experience and knowledge on this subject.
REMARKS AND RECOMMENDATIONS: (Continued)

only conditionally safe.

There is a 4' x 4' square sluiceway through the base of the spillway. A swimmer was able to look into this and reported some water leaking through the sluiceway. No controls were located but there is a six or eight inch steel pipe filled with cement projecting about 10 inches above the crest of spillway. A representative of the Department of Natural Resources told me that just before the dam was abandoned the Conway Electric Company poured concrete to block the sluiceway.

Attachment to Description of Dam

Note Number 1.

In the Franklin County Commissioners Office there is a sketch of a timber crib dam, attached to a petition of the Conway Electric Company, to build a dam at Conway Station on the South River. The Commissioners approved this petition at their meeting of October 19, 1897. This sketch is for a log crib dam, 90 feet long and 55.5 feet high.

No record of later alteration was found but hearsay indicates that around 1910 a masonry structure was built.

RCS/ad
OVERALL CONDITION:

1. Safe
2. Minor repairs needed
3. Conditionally safe - major repairs needed
4. Unsafe
5. Reservoir impoundment no longer exists (explain)

Recommend removal from inspection list.

REMARKS AND RECOMMENDATIONS: (Fully Explain)

This old spillway dam has been neglected for many years. There are no operating gates, the only outlet being the main 110' wide Ogee spillway. As near as can be determined the original log crib dam was built in 1897 to provide power for a trolley line and about 1910 the present masonry dam was built apparently over the older log crib dam.

The southerly end of the Ogee spillway is founded on ledge and at the northerly end ledge outcroppings are visible three quarters of the height of the dam. There is a 4' wide masonry wall 53' long from the end of the spillway's abutment, backed by an earth fill 10 to 20 feet wide. Several trees were growing on the pond side of this wall. Below the dam on the northerly side, there were several leaks or springs flowing from cracks in the ledge.

About 150 feet north of the spillway end are the stone masonry headworks for the old penstock. It was impossible to determine the existing or condition of the intake gate. The 5' diameter boiler plate penstock could be seen on the other side of the narrow ridge extending to the end of the dam. Some water was leaking out but it did not seem to be under any pressure and the penstock lower end at the old power house ruin was open.

The Ogee spillway was about 65' high and the downstream face was deeply spalled and eroded. This deterioration seemed to have occurred in regular horizontal lines and in areas it appeared that logs from the old log crib dam were exposed. It was impractical to view this surface close up and because of the water flowing over the surface a good view was impossible. It does appear that a concrete veneer over the old log face has fallen away and that a close inspection of the face is necessary before a final evaluation can be made. It is possible that if the logs are now exposed that frost and ice action could dislodge them and cause the dam to fail. For this reason the dam has been rated unsafe.

(Continued)
**Classification of Dam by Material:**

- Earth
- Conc. Masonry [X]
- Stone Masonry
- Timber
- Rockfill
- Other

**See Note No. 1.**

**3.**

**Dam Type:**
- Gravity [X]
- Straight [X]
- Curved, Arched
- Other
- Overflow [X]
- Non-overflow

**A.** Description of present land usage downstream of dam:

- 100% rural; ___% urban

**B.** Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure? Yes [X] No ______ About 1/2 mile gorge to Deerfield River.

**C.** Character Downstream Valley:
- Narrow [X]
- Wide
- Developed
- Rural 100%
- Urban

**10.**

Risk to life and property in event of complete failure.

- No. of people: None
- No. of homes: None
- No. of businesses: None
- No. of industries: None
- No. of utilities: None
- Railroads: None
- Other dams: None

**Possible damage** to property on Deerfield River.

**11.**

See Attached Notes.

Attach Sketch of dam to this form showing section and plan on 8½" x 11" sheet.

Attachments
- Locus Plan
- Sketches

RCS/vk/sd
DESCRIPTION OF DAM

DISTRICT II.

Submitted by Russell C. Salls, P. E. Dam No. 2-6-68-1

Date July 30, 1973

Town Conway

Name of Dam Conway Electric Dam

1. Location: Topo Sheet No. 10C

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

Located on South River about one-half mile from its mouth at the Deerfield River and about 300 feet south of Conway Station Road about a mile easterly from Bardwell Road

2. Year built 1897

Year/s of subsequent repairs Unknown

3. Purpose of Dam: Water Supply Recreational

Flood Control Irrigation Other Originally power source for trolley line

4. Drainage Area: 21½ sq. mi. 146 acres.

Type: City, Bus. & Ind. Dense Res. Suburban Rural, Farm 20%

Wood & Scrub Land 80% Slope: Steep 40% Med. 40% Slight 20%

5. Normal Ponding Area: 17 Acres; Ave. Depth 25½ ft.

Impoundment: 138½ Million gals.; 425 acre ft.

Silted in: Yes No Approx. Amount Storage Area

Pond over 99% silted in actual impoundment now about one million gallons.

6. No. and type of dwellings located adjacent to pond or reservoir None

i.e. summer homes etc.

7. Dimensions of Dam: Length 110' Max. Height 6½'

Freeboard 7'

Slopes: Upstream Face Vertical

Downstream Face Ogee Curve

Width across top Ogee spillway - approximately 2' flat on crest.
June 3, 1965.

Mr. Bruce Gullion  
Director of Forests & Parks  
100 Cambridge St.  
Boston, Mass.

' Dear Mr. Gullion:

Subject: Dams and Reservoirs under control of Department of Natural Resources

South River-Conway. 2 acres. Average depth 5'. Concrete structure. 100' spillway, no flash boards. 5' gate for complete drain. Draw down not necessary. Maintained by C.C. Annear and A. Badlow. Apparent condition, good with exception of gate which has not been freed for many years. This should be repaired for cleaning of impoundment which is filled with silt.

From Commonwealth of Massachusetts, Dept of Environmental Management files.
Franklin, petitioners for the approval of dam across South River, in Conway.

The petition in this case was presented to the Board of County Commissioners at their meeting, held at Greenfield, within and for said County, on the eighteenth day of September A.D. 1899, by adjournment from the first Tuesday of September A.D. 1899.

And said petitioners caused a sufficient recognizance to be given to said County, in the sum of two hundred dollars to pay all costs and expenses which might arise by reason of said petition and the proceedings had thereon in case the same should not prevail, and said petition is in words following, to wit:

"Conway, Mass. Sept. 4" 1899.

To the Hon. Board of County Commissioners:

Gentlemen: We, the undersigned, desiring to build a dam across South River near Conway Station, respectfully petition your Honorable Board to take such action regarding it as the law requires.

S. Brown and others.

And thereupon said petition was continued to the meeting of said Board, held at Greenfield, within and for said County, on the nineteenth day of October A.D. 1899, by adjournment from the first Tuesday of September A.D. 1899.

And at said meeting, it was voted: That the plans and specifications submitted by Emery Brown and others for the building of a dam in Conway, be approved.

APPROVAL OF COUNTY COMM. TO BUILD DAM
Conway, Mass., Sept. 4, 1897

To the Hon. Board of County Commissioners:

Gentlemen:

We, the undersigned, desiring to build a dam across South River near Conway Station, respectfully petition your Honorable Board to take such action regarding it as the case may require.

E. Persons
W. John B. Ladley
W. J. Delabar
A. P. S. L. M.
6" or 8" pipe filled with concrete projecting about 1 foot above crest directly over sluiceway.

2" pipe sockets for stoplogs 1' on center.

Face of spillway eroded or spalled deeply. Depressions arranged horizontally could be that concrete surface has broken away exposing old log cribbing.

4' x 4' sluiceway at least 20' under dam to gate of UG water leaking into sluiceway around barrier.

Section through center of ogee spillway @ sluiceway.
9. **EMERGENCY SPILLWAY:**

- Available: No
- Needed: No

- Height Above Normal Water: ___________ Ft.
- Width: ___________ Ft.
- Height: ___________ Ft.
- Material: ___________

**Condition:**
1. Good
2. Minor Repairs
3. Major Repairs
4. Urgent Repairs

**Comments:** Spillway appears to be adequate.

---

10. **WATER LEVEL AT TIME OF INSPECTION:**

- ___________ X 
- ___________ Below

- Top Dam
- P.L. Principal Spillway
- Other

- Normal Freeboard: 7 ___________ Ft.

---

11. **SUMMARY OF DEFICIENCIES NOTED:**

- Brush growth on earthen embankment on northerly end of dam.
- Growth (Trees and Brush) on Embankment
- Animal Burrows and Washouts: None found
- Damage to Slopes or Top of Dam: Concrete spalling on crest of spillway.
- Cracked or Damaged Masonry: Spalled concrete noted over entire structure.
- Evidence of Seepage: Red oxide stains noted at toe of dam in ledge seams
- Evidence of Piping: None found
- Leaks: Flows noted in ledge fissures.
- Erosion: Minor erosion of northerly bank below dam noted.
- Trash and/or Debris Impeding Flow: None found.
- Clogged or Blocked Spillway: None found.
- Other: Small leaks noted in bottom of flume pipe at sharp bend of flume.
OVERALL CONDITION:

1. Safe

2. Minor repairs needed

3. Conditionally safe - major repairs needed X

4. Unsafe

5. Reservoir impoundment no longer exists (explain)

Recommend removal from inspection list

REMARKS AND RECOMMENDATIONS: (Fully Explain)

There is no visible evidence of any repairs having been made to this dam since last inspection of 8-22-75 and structure is continuing to slowly deteriorate. Leaks through old flume pipe developed and seepage and small leaks noted on downstream side of dam appear somewhat more pronounced. Damage from complete failure of the dam would appear to be mostly from released silt stored behind the dam.
Conway dam study proposed

By TOM MEYERSTemporary Recorder Staff

CONWAY — Hoping to excite residents about the potential use of the old Conway Power Station Dam, the Conway Town Energy Committee is trying to generate as much interest in a proposed hydroelectric project in town as the dam could generate electricity.

The abandoned dam on the South River has the largest generating potential and highest available head — vertical distance from top of dam to bottom — of any untapped site in Franklin County. It could conceivably generate half of Conway’s energy needs.

To bring the project closer to reality, the energy committee has requested town residents appropriate $750 toward a $22,000 feasibility study of the project at a special town meeting. The meeting is Monday at 8 p.m. at town hall.

In preparation for that vote the energy committee conducted an informational session Monday for 15 citizens interested in the project. Although town finances are already tight, the energy committee is asking voters to consider the expenditure as an “investment in Conway’s energy future.” If the dam, abandoned in 1921, is redeveloped, James Manwell, energy committee member, told the group Conway could become the first small town “to do anything vaguely like this.”

Lisa Limonte, energy committee chairwoman, said the preliminary study shows “it would make sense to redevelop the dam.” The town would lease the site from the owner, the state Department of Environmental Management, and the electricity would be sold to Massachusetts Electric Co.

Ms. Limonte said the dam could generate between $80,000 and $100,000 revenue for the town. The town must sell the electricity to the utility unless there is a change in legislation allowing the town to use the power generated at the dam directly.

Manwell estimated the renovation of the dam would cost $1 million. He said the top surface of the dam — worn from water pouring over it — appears to be the portion which would need the most work. Other tentative costs include the 500- to 600-kilowatt turbine, $250,000; redoing the access road off Conway Station Road, $60,000; and dredging sludge from the old reservoir, $60,000.

Ms. Limonte said the feasibility study would provide a more detailed estimate of the costs and funding sources. The study would also assess the impact the dam would have on the town and the environment.

Believing the town should play a major role in the development of the dam, the energy committee submitted an application to the state Energy Office for a grant to fund the feasibility study. The grant provides 50 per-
Conway Hydro Could Mean Big Bucks

During World War I, the hydroelectric dam at Conway Station powered an electric railway through the town of Conway. By 1921, the dam was abandoned as other sources of power production became more economic. But the 65-foot dam on the South River remains intact, the largest such undeveloped dam in the county—but perhaps not for much longer. Even today, if rebuilt, the dam could produce enough power to meet one-half of Conway's electricity needs.

Last week a special town meeting voted $750 towards a $22,000 feasibility study of the dam. This was a vote of confidence for a group of alternative energy advocates who have dreamed of redeveloping the dam for years. They plan to combine the $750 in town money with donated skills valued at $10,285 to come up with the local match for the $11,000 in state funds. The state Executive Office of Energy Resources has $1 million to allocate for hydro-development, and the funds are expected to be awarded by the first of the year.

Jim Manwell, a Conway native and an engineer, has been doing research on the dam for the past several years. Nearly two years ago, the town formed an energy committee and this group agreed one of its projects would be to investigate the dam. Manwell worked with Lisa Limont, chairwoman of the energy committee, to write the grant proposal for the state, which included estimates of the total development costs ($500,000 to $1 million) and a pre-feasibility assessment. Bob Van Gelder and Duane Marcus, graduate students in regional planning and landscape architecture, worked on the environmental impact statement. Barbara Schneider of Whately did legal research on water rights. Even the Department of Environmental Management, which owns the dam site, agreed to the study with the apparent intention of allowing the development if it's feasible.

Limont told the Advocate the dam seems in good shape, but one of the main purposes of the study will be to hire structural engineers to make sure the dam is safe. From the top of the dam to the powerhouse below is a drop of 100 feet, and Limont estimated the repaired dam could produce 2,600,000 kilowatt hours of power per year. The power would have to be sold back to Northeast Utilities at a rate yet to be determined.

There are no turbines at Conway Station now and the penstock (the pipe to the power house) will have to be replaced if the project is to be feasible.
APPENDIX C

PHOTOGRAPHS
APPENDIX C
SELECTED PHOTOGRAPHS OF THE PROJECT

Site plan showing location and direction in which each photo was taken.

PHOTOGRAPHS

No.

1. Silt filled impoundment with penstock entrance on the left and the left abutment of the dam on the right. (12/2/80) 1
2. Partially ruined penstock entrance left of the dam. (12/2/80) 1
3. Crest of spillway viewed from the left abutment. (12/2/80) 2
4. Crest of spillway showing deterioration of the Ogee surface. (12/2/80) 2
5. Downstream overview showing the irregular surface of the downstream face of the dam. (12/2/80) 3
6. The downstream right abutment of the dam. (12/2/80) 3
7. The downstream left abutment of the dam showing areas of seepage. (12/2/80) 4
8. Close-up of one of the seepage areas in the downstream left abutment of the dam. (12/2/80) 4
9. Typical river conditions downstream of the dam. (12/2/80) 5
10. Outlet of the abandoned penstock on the left abutment of the dam. (12/2/80) 5
11. Ruins of powerhouse approximately 100 yds. of the dam. (12/2/80) 6
1. SILT FILLED IMPOUNDMENT WITH PENSTOCK ENTRANCE ON THE LEFT AND THE LEFT ABUTMENT OF THE DAM ON THE RIGHT. (12/2/80)

2. PARTIALLY RUINED PENSTOCK ENTRANCE LEFT OF THE DAM. (12/2/80)
3. CREST OF SPILLWAY VIEWED FROM THE LEFT ABUTMENT. (12/2/80).

4. CREST OF SPILLWAY SHOWING DETERIORATION OF THE OGEE SURFACE. (12/2/80)
5. DOWNSTREAM OVERVIEW SHOWING THE IRREGULAR SURFACE OF THE DOWNSTREAM FACE OF THE DAM. (12/2/80)

6. THE DOWNSTREAM RIGHT ABUTMENT OF THE DAM. (12/2/80)
7. THE DOWNSTREAM LEFT ABUTMENT OF THE DAM SHOWING AREAS OF SEEPAGE. (12/2/80)

8. CLOSE-UP OF ONE OF THE SEEPAGE AREAS IN THE DOWNSTREAM LEFT ABUTMENT. (12/2/80)
9. TYPICAL RIVER CONDITIONS DOWNSTREAM OF THE DAM. (12/2/80)

10. OUTLET OF THE ABANDONED PENSTOCK ON THE LEFT ABUTMENT OF THE DAM. (12/2/80)
11. REMAINS OF POWERHOUSE APPROXIMATELY 100 YARDS DOWNSTREAM OF THE DAM. (12/2/80)
APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS
NORMAL DEPTH CHANNEL ROUTING

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HYDROGRAPH ROUTING

CONWAY ELECTRIC DAM BREACH ROUTING TO HAZARD

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D-13
HYDRAULIC ANALYSES OF CONWAY ELECTRIC DAM
NATIONAL DAM SAFETY PROGRAM
NEW ENGLAND DIVISION - CORPS OF ENGINEERS

JOB SPECIFICATION

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MULTI-PLAN ANALYSES TO BE PERFORMED

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Hydrograph Routing

ROUTED OUTFLOW FROM CONWAY ELECTRIC DAM

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BEGIN DAM FAILURE AT 0.00 HOURS

PEAK OUTFLOW IS 310.00 AT TIME 27 HOURS

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**PREVIEWS OF SEQUENCE OF STREAM NETWORK CALCULATIONS**

ROUTE HYDROGRAPH TO DAM 0
ROUTE HYDROGRAPH TO REACH 1
ROUTE HYDROGRAPH TO REACH 2
ROUTE HYDROGRAPH TO REACH 3
ROUTE HYDROGRAPH TO END OF NETWORK

D-11
### Flows in Cubic Feet per Second (Cubic Meters per Second)

**Area in Square Miles (Square Kilometers)**

<table>
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<th>Operation</th>
<th>Critical</th>
<th>Area</th>
<th>Plan</th>
<th>Ratio 1</th>
<th>Ratio 2</th>
<th>Ratio 3</th>
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### Summary of Flow Safety Analysis

**Plan 1**

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<th>Maximum Reservoir Elev.</th>
<th>Maximum Depth Over Dam</th>
<th>Maximum Storage Acf-ft</th>
<th>Maximum Outflow Acf-ft</th>
<th>Duration Over Top</th>
<th>Time of Failure Hours</th>
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_D-10_
## HYDROLOGIC ANALYSIS OF CONWAY ELECTRIC DAM
### NATIONAL DAM SAFETY PROGRAM
#### NEW ENGLAND DIVISION - CORPS OF ENGINEERS

### JOB SPECIFICATION
- **10th MIN IMIN DAT** - **10th IMIN MFTCO** IFLT IPRT ISTAR
- **JOPER** IWT LSCF TRACE

### MULTI-PLAN ANALYSIS TO BE PERFORMED
- **NPLAN** 2 **RATIO** 2 **LPLAN** 1
- **STICST** .08 .09 .10 .15 .20 .30 .40 .50 1.00

### SUB-AREA RUNOFF COMPUTATION
### INFLOW TO CONWAY RESERVOIR
- **ISTAS** ICOM IECN ITAFE JFLT UPRT IRAVE ISTAR IAUTO
- **CONWAY**

### HYDROGRAPH DATA
- **INHYD** IUNIT TARP TARP TARP TARP TARP TARP TARP TARP
- **RATIO** ISNOW ISNOW LOCAL

### PRECIP DATA
- **SPFE** CKS RCN RCN RCN RCN RCN RCN RCN
- **TRPC**

### LOSS DATA
- **LCON** STRA CILFA RTIQP**

### UNIT HYDROGRAPH DATA
- **TD** 2.00 CP .60 IMA 0

### RECEPTION DATA
- **COCONE** -.10 RIVOR = 2.00

### UNIT HYDROGRAPH 47 END-OF-PERIOD ORDINATES
- **LACE** 2.01 HOURS CP .61 VOLT 1.09
- **214** 219 224 229 234 239 244 249 254
- **427** 432 437 442 447 452 457 462 467
- **115** 120 125 130 135 140 145 150 155

### END-OF-PERIOD FLOW
- **MO.1A** MO.1A PERIOD RAIN EXCES LOSS COMP C
- **MO.2A** MO.2A PERIOD RAIN EXCES LOSS COMP C

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**D-8**
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PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
RUNOFF HYROGRAPH AT
ROUTE HYROGRAPH TO
END OF NETWORK

D-7
SECTION THREE  (DOWNSTREAM VIEW)

$\text{LENGTH: 4300' }$

$\text{CHANNEL SLOPE: 0.0014'/'}$
BREACH CONFIGURATION:

\[ \text{Breach Width} = \frac{(70+110) \times 0.40}{2} = 36 \text{ ft.} \]

SECTION 1 - Confluence South & Deerfield Rivers

Channel Slope = 0.019
\[ L \approx 3,500 \text{ ft.} \]

SECTION 2 - HAZARD - Stillwater Bridge

Bridge Deck \( \approx 450' \) long.

Channel Slope = 0.0021' / ft
\[ L \approx 10,000 \text{ ft.} \]
Stage-Storage & Stage-Discharge Curves

Storage (Mio. Ac. Ft.)

Discharge (Mio. cfs)

Reservoir Surface Elevation - NAVD

Top of Dam
PMP DATA:

From H%#33-34/hr., 200 sq. mi. Index Rainfall is 20 inches.

Distribution:

- 6 hr. % = 100
- 12 hr. % = 104
- 24 hr. % = 122

STAGE-DISCHARGE COMPUTATIONS:

Spillway: \( Q_s = CLH^{3/2} \) \( c = 3.2 \) \( L = 110 \text{ feet} \)

Dam: \( Q_d = CLH^{1.5} \) \( c = 2.8 \) \( L = 55 \text{ feet} \)

(Left abutment wall)

STAGE-DISCHARGE TABULATION

<table>
<thead>
<tr>
<th>ELEVATION</th>
<th>SPILLWAY</th>
<th></th>
<th>DAM</th>
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<td>Head</td>
<td>Discharge</td>
<td>Head</td>
<td>Discharge</td>
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<td>0</td>
<td>0</td>
<td>-</td>
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<tr>
<td>300</td>
<td>2</td>
<td>996</td>
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</tr>
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<td>302</td>
<td>4</td>
<td>2816</td>
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<td>5173</td>
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<td>306</td>
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<td>7965</td>
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<tr>
<td>308</td>
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<td>11,131</td>
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<td>800</td>
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<tr>
<td>310</td>
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<td>14,632</td>
<td>5</td>
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</tr>
<tr>
<td>315</td>
<td>17</td>
<td>24,673</td>
<td>10</td>
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</table>
HYDROLOGIC & HYDRAULIC COMPUTATIONS

Drainage Area - 26.1 sq. mi.

Reservoir Area -

Elevation 228 - 0 Toe of Dam
Elevation 293 - 0 Existing Res. Bottom
Spillway Crest (Elev. 298) - 5 Acres
Elevation 300 - 17 Acres
Elevation 310 - 20 Acres

Snyder Hydrograph Coefficients:

\[ C_t = 2.0 \quad C_p = 0.6 \]
\[ L = 13 \text{ miles} \quad L_{oa} = 8 \text{ miles} \]
\[ T_p = C_t \left( \frac{L}{L_{oa}} \right)^3 \]
\[ = 2.0 \left( \frac{13}{8} \right)^3 \]
\[ = 8.0 \text{ hours} \]
## Table of Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
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<tbody>
<tr>
<td>Figure 1, Regional Vicinity Map Showing Flood Impact Area</td>
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<tr>
<td>Drainage Area, Reservoir Area, Snyder Hydrograph Coefficients</td>
<td>D-2</td>
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<td>PMP Data, Stage-Discharge Computations, Stage-Discharge Tabulation</td>
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<td>Stage-Storage and Stage Discharge Curves</td>
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<tr>
<td>Breach Configuration, Section 1, Section 2, Section 3</td>
<td>D-5</td>
</tr>
<tr>
<td>HEC-1 Dam Safety Version, Non-Breach Computer Output</td>
<td>D-7 through D-10</td>
</tr>
<tr>
<td>HEC-1 Dam Safety Version, Breach Computer Output</td>
<td>D-11 through D-15</td>
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### Pea Flow and Storage (End of Period) Summary for Multiple Plan-Rail: Economic Computations

FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)

AREA IN SQUARE MILES (SQUARE KILOMETERS)

<table>
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<th>Station</th>
<th>Area</th>
<th>Plan</th>
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<td>(0.00)</td>
<td></td>
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<td>(84.90)</td>
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### Summary of Can Safety Analysis

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<tr>
<th>PLAN 1</th>
<th>Elevation</th>
<th>Initial Value</th>
<th>Spillway Crest</th>
<th>TPD of Dam</th>
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<tbody>
<tr>
<td></td>
<td>Storagel</td>
<td>290.00</td>
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<table>
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<th>Ratio of Reservoir Elevation</th>
<th>Maximum Depth</th>
<th>Maximum Storage</th>
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<th>Maximum Duration</th>
<th>Time of Failure</th>
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### PLAN 1 STATION REACH1

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### PLAN 1 STATION REACH2

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### PLAN 1 STATION REACH3

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<td>Flow</td>
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## INVENTORY OF DAMS IN THE UNITED STATES

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<th>LONGITUDE</th>
<th>REPORT DATE</th>
<th>OWNED BY</th>
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### POPULAR NAME
CONWAY ELECTRIC RESERVOIR

### REGION BASKET
01 SOUTH RIVER

### RIVER OR STREAM
DEERFIELD

### CITY - TOWN - VILLAGE

### DIST ON FED R PRV/FED
500

### TYPE OF DAM
PO

### YEAR COMPLETED
1998

### PURPOSES
H

### STRUCTURE HEIGHT
77

### HYDRAULIC HEIGHT
77

### INFLOWING CAPACITIES
118

### POPULATION
5

### OWNER
UNKNOWN

### ENGINEERING BY
UNKNOWN

### CONSTRUCTION BY
UNKNOWN

### REGULATORY AGENCY
NONE

### DESIGN
NONE

### CONSTRUCTION
NONE

### OPERATION
NONE

### MAINTENANCE
NONE

### INSPECTION BY
UNKNOWN / GENE ENGINEERS

### INSPECTION DATE
02/12/80

### AUTHORITY FOR INSPECTION
PL 97-367

### REMARKS

---

### DIST ON FED R PRV/FED
500

### DESCRIPTION
Since 1981, rebuilt 1990, 21-TIMBER CREEK

### SPILLWAY
TYPE: MS

### MAXIMUM DISCHARGE
110 6660

### VOLUME OF DAM
55000

### POWER CAPACITY
NONE

### NAVIGATION LOCKS
NONE

### OWNER
UNKNOWN

### ENGINEERING BY
UNKNOWN

### CONSTRUCTION BY
NONE

### REGULATORY AGENCY
NONE

### DESIGN
NONE

### CONSTRUCTION
NONE

### OPERATION
NONE

### MAINTENANCE
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UNKNOWN

### CONSTRUCTION BY
NONE

### REGULATORY AGENCY
NONE

### DESIGN
NONE

### CONSTRUCTION
NONE

### OPERATION
NONE

### MAINTENANCE
NONE

### INSPECTION BY
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02/12/80

### AUTHORITY FOR INSPECTION
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### REMARKS
END
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7-85
DTIC