

NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NEWBURG MILL DAM (NJ 00779) DELAWA--ETC(U)
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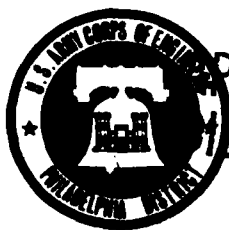
DELAWARE RIVER BASIN
MUSCONETCONG RIVER
WARREN COUNTY
NEW JERSEY

AD A103761

NEWBURG MILL DAM

NJ 00779

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

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ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report. → page 1		



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31 AUG 1981

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

Dear Governor Byrne:

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

Based on visual inspection, available records, calculations and past operational performance, Newburg Mill Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 6 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is the One Hundred Year Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy and/or the dam's stability under overtopping should be initiated.

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

- (1) Oversee repair of the erosion on the left abutment.
- (2) Design and specify repairs for reconstruction of the collapsed and deteriorated sections of the spillway training wall along the left side of the dam.

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Honorable Brendan T. Byrne

(3) Design and specify remedial measures required to repair the vertical crack in the principal spillway face about 12 feet from the left end.

(4) Design and specify repairs to the eroded and deteriorated downstream face of the principal spillway.

(5) Design and specify repairs to the gated section of the dam.

(6) Design and specify repairs for reconstruction of the deteriorated section of the dam to the right of the gated spillway.

(7) Remove trees and roots in the area near the end of the former raceway structure.

c. Within three months from the date of approval of this report the owner should start a program of checking the condition of the dam periodically.

d. Within one year from the date of approval of this report the owner should clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the property line whichever is the lesser distance.

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

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

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

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

NAPEN-N.

Honorable Brendan T. Byrne

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

Sincerely,



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl

As stated

Copies furnished:

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

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

NEWBURG MILL DAM (NJ00779)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

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

Newburg Mill Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's spillway is considered inadequate because a flow equivalent to 6 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is the One Hundred Year Flood). To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy and/or the dam's stability under overtopping should be initiated.

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

(1) Oversee repair of the erosion on the left abutment.

(2) Design and specify repairs for reconstruction of the collapsed and deteriorated sections of the spillway training wall along the left side of the dam.

(3) Design and specify remedial measures required to repair the vertical crack in the principal spillway face about 12 feet from the left end.

(4) Design and specify repairs to the eroded and deteriorated downstream face of the principal spillway.

(5) Design and specify repairs to the gated section of the dam.

(6) Design and specify repairs for reconstruction of the deteriorated section of the dam to the right of the gated spillway.

(7) Remove trees and roots in the area near the end of the former raceway structure.

c. Within three months from the date of approval of this report the owner should start a program of checking the condition of the dam periodically.

d. Within one year from the date of approval of this report the owner should clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the property line whichever is the lesser distance.

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

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

APPROVED:



ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE:

31 Aug 81

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Newburg Mill Dam
Identification No.:	Fed ID No. NJ00779
State Located:	New Jersey
County Located:	Warren
Stream:	Musconetcong River
River Basin:	Delaware
Date of Inspection:	April 22, 1981

ASSESSMENT OF GENERAL CONDITIONS

Newburg Mill Dam is probably over 100 years old and is in poor condition. The dam is small in size and is classified as a significant hazard. The dam is a run of the river, concrete gravity dam, 313 feet long and has a structural height of 11.9 feet. It is composed of the following parts from left (east) to right (west): a 190-foot training wall dike that serves as an emergency spillway; a 74-foot long ogee principal spillway, and 49 feet of various gate, walls, and weir sections.

Serious erosion has occurred at the left abutment and the training wall dike appears to be breached and the breach filled with logs and debris. The wall is undermined and leaking along its entire length. The principal spillway has a vertical crack about 12 feet from the left end and the concrete face of the spillway is deteriorated and eroded. The lift mechanisms for the gated section in the dam and in the headrace are missing. The wooden gates are deteriorated and the steel headframes are rusted and corroded. The downstream face of the concrete overflow weir is deteriorated, spalled away and leaking. The filler wall between the old gate house slab and right wall of the headrace is cracked and leaking. The gate stems are missing in the gate house, the gates are leaking badly, and the trash racks are rusted and corroded. Debris in the form of dead trees and brush are in the downstream channels below both emergency and principal spillways. The spillway is capable of passing 218 cfs at top of dam which is 5.9% of the 100-year spillway design flood of 3,668 cfs. Thus the spillway is inadequate.

The owner should engage a professional engineer qualified in the design and construction of dams to accomplish the following soon: design and oversee measures to increase the spillway capacity and/or ensure the stability of the dam under overtopping, repair erosion at left abutment; design and specify repairs for reconstruction of the collapsed and deteriorated sections of the spillway training wall along the left side of the dam; design and specify remedial measures required to repair the vertical crack in the principal spillway face about 12 feet from

the left end; design and specify repairs to the eroded and deteriorated downstream face of the principal spillway; remove trees and their roots in the area near the end of the former raceway structure; design and specify repairs to the gated section of the dam; and design and specify repairs for reconstruction of the deteriorated section of the dam (overflow weir) to the right of the gated spillway.

It is further recommended that the owner undertake the following as a part of operating and maintenance procedures beginning soon: start a program of periodically checking the condition of the dam; and develop an emergency action plan which outlines actions taken by the owner to minimize downstream effects of an emergency at the dam. In the near future: develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, and clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the property line, whichever is the lesser distance.

ANDERSON-NICHOLS & COMPANY, INC.

Warren A. Guinan

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



February 16, 1961

OVERVIEW PHOTO
HEMBURG MTL. CAMP

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

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

CONTENTS

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY REPORT

NEWBURG MILL DAM FED ID NO. NJ00779

SECTION		<u>Page</u>
SECTION 1	PROJECT INFORMATION	
	1.1 <u>General</u>	
	1.2 <u>Project Description</u>	
	1.3 <u>Pertinent Data</u>	
SECTION 2	ENGINEERING DATA	
	2.1 <u>Design</u>	
	2.2 <u>Construction</u>	
	2.3 <u>Operation</u>	
	2.4 <u>Evaluation</u>	
SECTION 3	VISUAL INSPECTION	
SECTION 4	OPERATIONAL PROCEDURES	
	4.1 <u>Procedures</u>	
	4.2 <u>Maintenance of Dam</u>	
	4.3 <u>Maintenance of Operating Facilities</u>	
	4.4 <u>Warning System</u>	
	4.5 <u>Evaluation of Operational Adequacy</u>	
SECTION 5	HYDRAULIC/HYDROLOGIC	
SECTION 6	STRUCTURAL STABILITY	
SECTION 7	ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES	
	7.1 <u>Assessment</u>	
	7.2 <u>Recommendations/Remedial Measures</u>	
FIGURES	1. Essential Project Features	
	2. Location	
APPENDICES	1. Check List Visual Inspection	
	2. Photographs	
	3. Hydrologic Computations	
	4. References	

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
NEWBURG MILL DAM
FED ID NO. #NJ00779
SECTION 1
PROJECT INFORMATION

1.1 General

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

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

1.2 Project Description

a. Description of Dam and Appurtenances. Newburg Mill Dam is a run-of-the-river, concrete gravity dam 11.9 feet high and 313 feet long with a 2-foot wide spillway crest. The upstream and downstream embankments have slopes of 4H:1V and 1H:2V, respectively. The principal spillway is 74 feet long, with an ogee shaped, free overflow concrete weir. A concrete dike training wall 190 feet long forms the left side of the dam and helps direct river flow to the principal spillway. This dike serves as an emergency spillway. The right side of the dam is formed by the foundation remains of a building structure containing intake gates, a canal and a gate structure. Three gates each 30 inches wide are located just to the right of the principal spillway. The upstream reservoir pool is within the banks of the Musconetcong River.

b. Location. The dam is located in Warren County, New Jersey on the Musconetcong River at 40° 48.9' north latitude and 74° 50.0' west longitude on the Hackettstown Quadrangle. The dam may be reached by driving south on State Route 57 from Hackettstown to Newburg Road and thence southeast 400 feet to the damsite. A location map has been included as Figure 2.

c. Size Classification. Newburg Mill Dam is classified as being small in size on the basis of its structural height of 11.9 feet which is greater than 6 feet but less than 40 feet and storage at the high point on the dam crest of 55 acre feet, which is less than 1000 acre feet but greater than 50 acre feet, in accordance with criteria given in the Recommended Guidelines for Saftety Inspection of Dams.

d. Hazard Classification. The Musconetcong River flows under Newburg Road about 300 feet below the dam. There is one home on the right bank of the downstream channel within 350 feet below the dam. Damage to this single inhabited house and the bridge in the event of dam failure may be appreciable, and there is the potential for loss of a few lives. Therefore, the dam is considered a significant hazard.

e. Ownership. The dam is owned by the First National State Bank of New Jersey, Route 10, Succasunna, New Jersey 07876, telephone (201) 584-6700.

f. Purpose. Newburg Mill Dam was originally built to supply water power for a mill. Presently, it is not being used for any identifiabile purpose.

g. Design and Construction History. No design or construction data pertinent to Newburg Mill Dam are available.

h. Normal Operational Procedure. No operational procedures pertinent to Newburg Mill Dam are available.

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

Bedrock was observed in a large outcrop on the left side of the downstream channel during inspection of the dam. The previously mentioned map indicates that bedrock in this area consists of massive to thin bedded limestone of Cambrian to Ordovician age.

1.3 Pertinent Data

a. Drainage Area

86 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown; flood of record at U.S.G.S. gage 01456000 was 2170 cfs on August 19, 1955. The gage is located upstream of Newburg Mill Dam on the Musconetcong and has a drainage area of 70 square miles.

Total ungated spillway capacity at maximum pool elevation - of 483.8 - 218 cfs

c. Elevation (ft. above NGVD)

Top of dam - 483.8 - low point (left abutment)
 - 486.2 - high point (right abutment)

Test Flood (100-year flood) - 485.8

Recreation pool (at time of inspection) - 483.6

Spillway crest - 483.5 principal spillway
 - 483.8 emergency spillway (training wall dike)

Streambed at centerline of spillway - 474.3

Maximum tailwater - (F.l.S. 500-year flood) - 485.5

d. Reservoir (feet)

Length of maximum pool (at 483.8' NGVD) - 2500
(estimated)

Spillway crest - 2400 (estimated)

e. Storage (acre-feet)

Spillway crest - 14.5

Test flood (100-year) - 35.0

Top of dam - (483.8' NGVD) - 16.0
 (486.2' NGVD) - 55.0

f. Reservoir Surface (acres)

Top of dam (483.8' NGVD) - 10.2 (estimated)
 (486.2' NGVD) - 20 (estimated)

Spillway crest - 10.0 (estimated)

g. Dam

Type - concrete gravity

Length - 313 feet

Height - 9.5 feet (hydraulic)

- 11.9 feet (structural)

Top width (spillway) - 2.0 feet

Side slopes - upstream 4H:1V, downstream 1H:2V

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - concrete ogee

Length of weir - 74 feet

Crest elevation - 483.5' NGVD

U/S Channel - Musconetcong River

D/S Channel - Musconetcong River

i. Regulating Outlets

Type - Three 30 inch gates, invert elevation 477.0' NGVD

Length - 7.6' (total)

Access - Along crest of dam, no lifting mechanism present

SECTION 2
ENGINEERING DATA

2.1 Design

No original plans, hydraulic, hydrologic, or other engineering data for Newburg Mill Dam were found.

2.2 Construction

No data concerning the original construction of Newburg Mill Dam were available.

2.3 Operation

No engineering operational data were available.

2.4 Evaluation

- a. Availability. A search of the New Jersey Department of Environmental Protection files and contact with a representative of the owner of the dam revealed no information.
- b. Adequacy. Data obtained in the visual inspection are deemed adequate to complete this Phase I Inspection Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. Serious erosion has occurred at the left abutment as well as undermining and collapse of portions of the dike training wall (emergency spillway) on the left side of the dam. Most of the concrete principal spillway crest was underwater at the time of the inspection. Water is leaking underneath and through the deteriorated filler wall portions of the dam between the gated spillway and the vertical concrete walls of the former raceway structure. The concrete in this portion of the dam has undergone extensive deterioration which has resulted in a sand and gravel consistency which can be easily excavated. The old raceway training walls are undermined along the entire length of their outside faces by water flowing from the gates and principal spillway.

The downstream face of the principal spillway is badly eroded and deteriorated. A major vertical crack was observed approximately 12 ft. from left end. The crack appears to have been eroded to a depth of approximately 6 inches.

b. Appurtenant Structures

- (1) Left Training Wall (Emergency Spillway). The low concrete wall is badly cracked and spalled, with a section approximately 15 feet long that is breached. Water is flowing through and under the wall. There are numerous through wall cracks and indication that movement between sections of up to 3 inches has occurred.
- (2) Gated Section. All visible portions of the concrete portion of the gated facility are badly spalled and eroded. The wooden gates are badly weathered and leak in many places. The steel framework is badly corroded at the waterline.
- (3) Outlet Works. The concrete sections of the outlet works are badly spalled and eroded at junctions and at construction joints. All metal works are badly corroded. The existing wooden gates visible on the downstream face at the right abutment structure are deteriorated and leaking badly. The gate stems are missing.

- (4) Headrace. A 10.7-foot wide headrace with a set of 3 gates is contained between concrete walls 1.25 feet wide. Only the head frames of the gates were visible. They are badly rusted. If gates are present they are in a closed position at about 2/3 of the length of the headrace downstream of the dam. The concrete walls are surface spalled with some cracks and minor leakage.
- (5) Filler Walls. Two short concrete walls connect the gate house to the right headrace wall (4 feet) and the gated structure to the left headrace wall (10 feet) respectively. Both walls have spalled concrete on their sloping faces and are leaking as noted above.

c. Reservoir Area. The watershed above the lake is gently sloping, slightly wooded and contains numerous open fields. Slopes on the shore appear to be stable. Evidence of significant sedimentation, namely a low-lying swampy area just upstream from the spillway crest was observed.

d. Downstream Channel. Erosion has occurred on the left and right banks of the channel downstream from the spillway for a distance of approximately 100 to 200 feet. A small wooded island exists in the middle of the discharge channel approximately 50 feet downstream from the principal spillway crest. Trees are growing on the banks of the channel downstream of the spillway.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were revealed.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities were discovered.

4.4 Warning System

No description of any warning system was found.

4.5 Evaluation of Operational Adequacy

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

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no data were revealed, an evaluation could not be performed.

b. Experience Data. No experience data were found indicating stages or flow at the dam. The flood of record at U.S.G.S. gage 01456000, on the Musconetcong River near Hackettstown, is 2,170 cfs. The drainage area at the gage is 70 square miles, compared to 86 square miles at the dam.

c. Visual Observation. The principal spillway for Newburg Mill Dam consists of a 74-foot long, free overflow, ogee shaped, concrete weir. Upstream and downstream sides slopes are 4H:1V and 1H:2V, respectively. Seepage was observed through several joints along with significant erosion and deterioration of the concrete surfaces.

A concrete and masonry dike-training wall 190 feet long forms the left side of the dam and acts as an emergency spillway. Sections of the dike are breached. Severe leakage was occurring at the time of inspection at many locations along the downstream side of the entire length of the wall.

The regulating outlet consists of three 30-inch gates, isolated just to the right of the spillway. The concrete in this section is in fair condition with limited surface erosion. The downstream face of the gates is badly weathered with significant leakage. The steel head frame for the gates is badly corroded.

An old mill foundation and intake form the right side of the dam. The concrete is badly spalled and eroded. The walls of the intake structure are cracked, spalled and eroded at junctions and construction joints. The existing wooden outlet gates are deteriorated, leaking badly, and the gate stems are missing. The trash racks are badly rusted. The concrete walls forming the headrace are spalled, cracked, and have minor leaking near the reservoir. The gated headframe in the race is corroded and inoperable.

d. Newburg Mill Dam Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to the 100-year flood in accordance with the range of test floods given in the evaluation guidelines, for dams classified as significant hazard. The 100-year flood was taken from the Flood Insurance

Study for the Township of Washington, Morris County, New Jersey. In that study, the 100-year flood was determined from a Log-Pearson Type III distribution of stream gage records at Bloomsbury and Hackettstown, New Jersey, and at the outlet to Lake Hopatcong.

The 100-year discharge for the subject watershed is 3,668 cfs. The spillway can pass only 218 cfs, 6% of the test flood, without overtopping and is thus considered inadequate.

From the visual inspection Newburg Mill Dam was considered a potential significant or high hazard. The Newburg Road Bridge and a single home are located downstream of the dam 300 and 350 feet, respectively. Damage to this house and overtopping of this bridge may increase under dam failure conditions, but the potential for loss of life is not considered great. The hazard was therefore downgraded to significant.

e. Drawdown Capability. During average or low flow conditions the Newburg Mill Dam impoundment could be lowered to elevation 477.0 feet NGVD in less than a day by raising the three gates. This gated area can easily pass the average flow. The drawdown to 477.0 feet would remove about 1.5 feet of silt accumulated behind the dam as shown in the Washington Township, Morris County, Flood Insurance Study.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability. The erosion at the left abutment and the collapse and deterioration of the left spillway training wall (emergency spillway) on the left side of the dam, if allowed to continue, could result in the eventual breaching of the dam. Seepage and deterioration of the concrete to the right of the gated spillway and along the foundation of the former raceway structure could contribute to future stability problems for these structures, if allowed to continue.

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

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

6.4 Post-Construction Changes. No record of post-construction changes is available. However, the patch work of mortar, rubble, and concrete on the training wall shows that some effort to maintain integrity was performed in the past.

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

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. Newburg Mill Dam is estimated to be over 100 years old and is in poor condition.
- b. Adequacy of Information. The information available is such that the assessment of the dam must be based entirely on the results of the visual inspection.
- c. Urgency. The recommendations made in 7.2.a and 7.2.b should be implemented by the owner as prescribed.
- d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendation/Remedial Measures

a. Recommendations

The owner should engage a professional engineer qualified in the design and construction of dams to do the following beginning soon:

- (1) Determine, design, and oversee repairs needed to increase the spillway capacity of the dam and/or ensure its stability under overtopping.
- (2) Oversee repair of the erosion on the left abutment.
- (3) Design and specify repairs for reconstruction of the collapsed and deteriorated sections of the spillway training wall along the left side of the dam.
- (4) Design and specify remedial measures required to repair the vertical crack in the principal spillway face about 12 feet from the left end.
- (5) Design and specify repairs to the eroded and deteriorated downstream face of the principal spillway.
- (6) Design and specify repairs to the gated section of the dam.

(7) Design and specify repairs for reconstruction of the deteriorated section of the dam to the right of the gated spillway.

(8) Remove trees and their roots in the area near the end of the former raceway structure.

b. Alternatives. As an alternative to the above recommendations, the dam could be breached under proper supervision and compliance with all state of New Jersey regulation regarding breaching of dams.

c. Operating and Maintenance Procedures

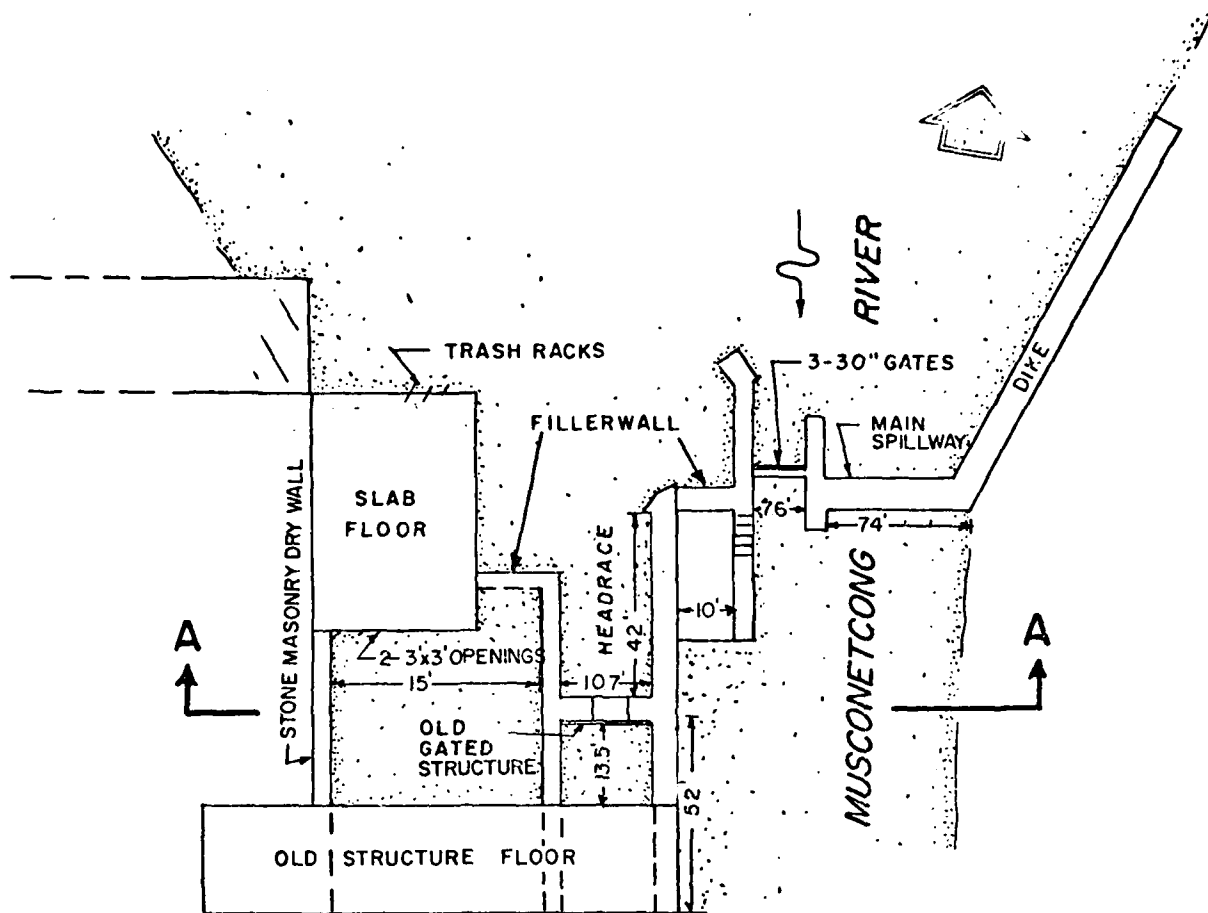
The owner should accomplish the following in the time periods specified.

Starting soon:

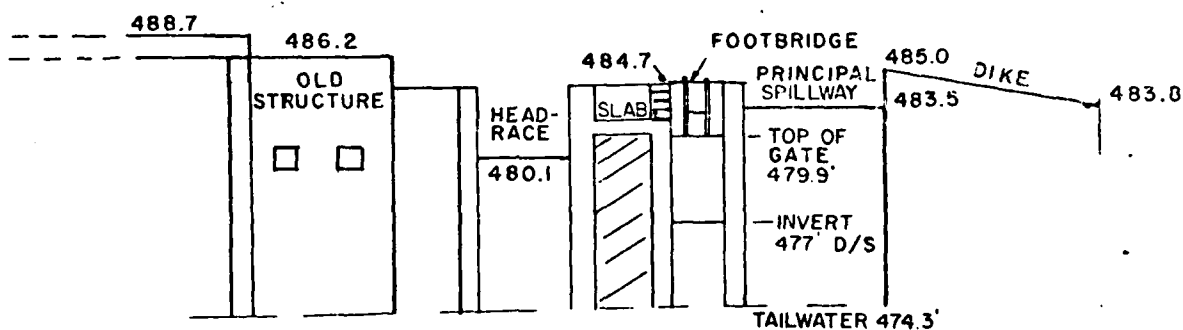
- (1) Start a program of checking the condition of the dam periodically.
- (2) Develop an emergency action plan which outlines actions to be taken by the owner to minimize downstream effects of an emergency at the dam.

In the near future:

- (1) Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.
- (2) Clear trees and brush from the discharge channel and from a zone 15 feet wide on either side of the discharge channel for a distance of 100 feet downstream from the toe of the dam or to the property line whichever is the lesser distance.



PLAN



ELEVATION

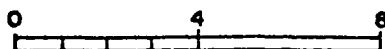
AA

Anderson-Nichols & Co., Inc.		U.S. ARMY ENGINEER DIST PHILADELPHIA	
BOSTON		CORPS OF ENGINEERS	
MASSACHUSETTS		PHILADELPHIA, PA	
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS			
NEWBURG MILL DAM			
MUSCONETCONG RIVER		NEW JERSEY	
		SCALE NOT TO SCALE	
		DATE: JUNE 1981	

FIGURE-1



SCALE IN MILES



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

Anderson-Nichols & Co., Inc.

BOSTON

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CORPS OF ENGINEERS
PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

NEWBURG MILL DAM LOCATION MAP

MUSCONETCONG RIVER

NEW JERSEY

SCALE: 1" = 4 Miles Approx.

DATE: JUNE 1981

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

NEWBURG MILL DAM

Check List
Visual Inspection
Phase 1

Name Dam Newberg Mill County Warren State NJ (00779) Coordinators NJDEP
 Date(s) Inspection 2/16/81 4/21/81 Weather' Overcast Clear - Cold Temperature 42° 38°
 Pool Elevation at Time of Inspection 486.0' NGVD Tailwater at Time of Inspection 474.3' NGVD

Inspection Personnel:

<u>W. Guinan</u>	<u>J. Stone</u>
<u>S. Gilman</u>	
<u>R. Murdock</u>	

R. Murdock/S. Gilman Recorder

Owner was not present during inspection

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Seepage observed through several of joints of spillway and adjoining mill structure.	Seal leaking joints and cracks
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Significant deterioration of adjoining dike.	Emergency spillway needs complete rehabilitation.
DRAINS	None observed	
WATER PASSAGES	Water passage through adjoining mill structure.	Repair gates and seals
FOUNDATION	No information	

CONCRETE/MASONRY DAMS

MAIN DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	The downstream face is badly eroded and deteriorated. Eroded to 6 inches $\pm$ exposing coarse aggregate and rubble. Ends of dam at abutments are eroded and spalled.	Major repair required
STRUCTURAL CRACKING	One major vertical crack observed. Approximately 12 feet from left end crack eroded to a depth of 6 inches $\pm$.	Major repair required
VERTICAL AND HORIZONTAL ALIGNMENT	No indication of movement. Sloped concrete cap is missing from right end.	Replace concrete cap
MONOLITH JOINTS	None visible	
CONSTRUCTION JOINTS	None visible	

UNGATED SPILLWAY

MAIN DAM

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

CONCRETE WEIR

The sloped downstream face is eroded and deteriorated to depths of 6 inches. Coarse aggregate and cables exposed.

Repair under the supervision of a qualified registered professional engineer.

APPROACH CHANNEL

Under water

1-4

DISCHARGE CHANNEL

Trees, brush, small island in the middle covered with trees.

BRIDGE AND PIERS OVER SPILLWAY

UNGATED SPILLWAY

Training Wall on Left Side (Emergency Spillway)

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

CONCRETE WEIR -

Combination concrete and mortared masonry

The weir has a very irregular crest and varies in cross section. There is one major breach 15 feet + long near left end that is plugged with debris. Also one section has a major leak from undermining. There are numerous major thru wall cracks in weir. Horizontal and vertical movement (3 inches of cracked section of mortared masonry observed.)

Major repair required

APPROACH CHANNEL

Not applicable

DISCHARGE CHANNEL

Not applicable

BRIDGE AND PIERS OVER SPILLWAY

Not applicable

OUTLET WORKS

Intake Channel to Mill

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Many areas are badly spalled and eroded - several leaks noted on d/s face	
INTAKE STRUCTURE	Walls cracked and spalled, and eroded at junction and at construction joint. Metal work at abandoned trash racks is badly corroded.	Repair walls and metal work
OUTLET PIPE	Existing wooden gate visible on d/s of right abutment structure is leaking badly and is deteriorated	Replace gate
OUTLET CHANNEL		
EMERGENCY GATE	See above	

GATED SPILLWAY
Stop Log Section

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not visible	
APPROACH CHANNEL	Visible portions of intake training walls are badly spalled and eroded exposing large cobbles.	Major reconstruction required
DISCHARGE CHANNEL	Sides of channel walls adjacent to stop logs are badly eroded and spalled exposing large cobbles	Major reconstruction required
BRIDGE AND PIERS	Fair - deterioration limited to surface erosion	
GATES AND OPERATION EQUIPMENT	D/s face of stop logs is badly weathered and shows many leaks. Steel upright stop log supports are badly corroded - almost completely rusted apart at the waterline.	Major reconstruction required

RESERVOIR

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SLOPES

Gentle slope, partially wooded, open fields.

SEDIMENTATION

Significant sedimentation in reservoir, small island of weeds in center upstream of spillway.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Erosion on left and right banks downstream of spillway for 100-200 feet; a small wooded island is located in the middle of the discharge channel about 50 feet downstream; trees are growing on the banks of the downstream channel	Cut trees and brush on the island and 15 feet on either side of the channel for a distance of 100 feet downstream of the channel

SLOPES

gentle

APPROXIMATE NO. OF HOMES AND POPULATION

One at 6 feet above w/s at south side of bridge 150 feet downstream

Significant hazard

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

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

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

ITEM	REMARKS
MONITORING SYSTEMS	None found
MODIFICATIONS	None found
HIGH POOL RECORDS	None found
1-12	
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None found
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None found
MAINTENANCE OPERATION RECORDS	None found

ITEMS	REMARKS
-------	---------

SPILLWAY PLAN

SECTIONS
DETAILS

None found

OPERATING EQUIPMENT
PLANS & DETAILS

None found

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 86 square miles, moderate relief

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 483.5' NGVD

14.5 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) 483.8' NGVD

(16 acre-feet)

ELEVATION MAXIMUM DESIGN POOL: (Test Flood) 485.8' NGVD

ELEVATION TOP DAM: 483.8' NGVD

SPILLWAY CREST: Free overflow concrete spillway

a. Elevation 483.5' NGVD

b. Type concrete, ogee shape

c. Width 2 feet

d. Length 74 feet

e. Location Spillover Center of dam

f. Number and Type of Gates None

OUTLET WORKS: Gates

a. Type 3 30-inch gates

b. Location right of principal spillway

c. Entrance Inverts 477' NGVD

d. Exit Inverts 477' NGVD

HYDROMETEOROLOGICAL GAGES: One - USGS #4560

a. Type continuous stage-discharge recording - Musconetcong R.

b. Location upstream of Saxton's Falls Dam, 5.5 miles upstream
of Newburg Mill Dam

c. Records August 19, 1923 to present

MAXIMUM NON-DAMAGING DISCHARGE: 218 cfs (estimated)

APPENDIX 2

PHOTOGRAPHS

NEWBURG MILL DAM



April 21, 1981

View looking at downstream face of dam from left bank. Note deteriorated condition at left (east) spillway abutment.



April 21, 1981

View of a stoplog structure



April 21, 1981

General appearance of dike - part masonry, concrete, concrete capping, and debris. Flow of water from under and through dike along most of its length.



April 21, 1981

Erosion of slope protection on adjoining training wall.



April 21, 1981

Looking back along dike toward abutment. Water at right side of photo is underflow from pond at left.



April 21, 1981

Looking down at u/s side of stoplog section. Note spalled concrete.



April 21, 1981

Gate headframes in headrace. Note deterioration of walls.
Mill foundation in background.



April 21, 1981

Gate portals



April 21, 1981

Downstream channel of Musconetcong River from bridge
about 200 feet downstream of dam.



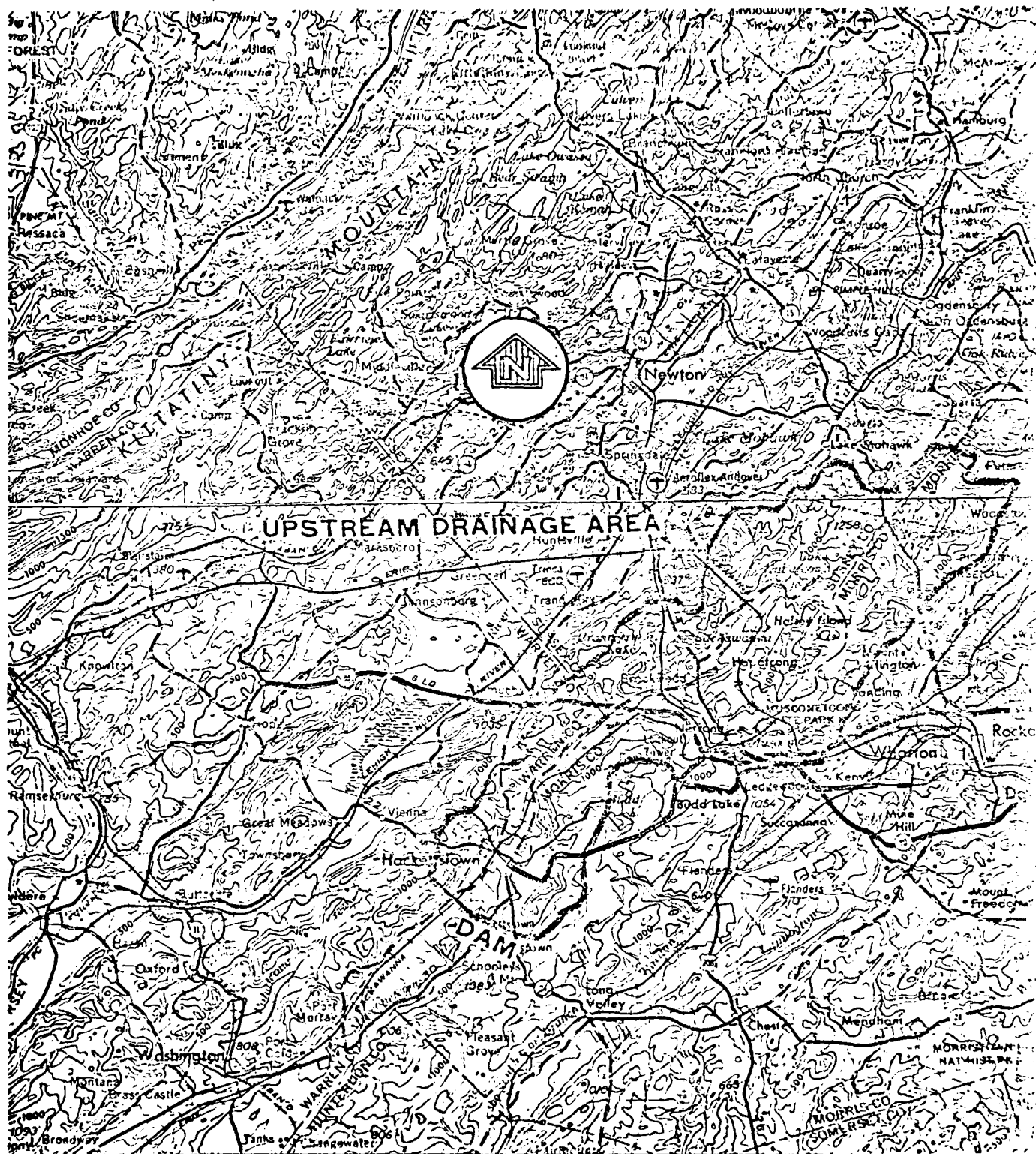
April 21, 1981

Looking u/s across reservoir

APPENDIX 3

HYDROLOGIC COMPUTATIONS

NEWBURG MILL DAM



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

**NEWBURG MILL DAM
WASHINGTON TOWNSHIP, NEW JERSEY
REGIONAL VICINITY MAP**

JUNE 1981

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

Anderson-Nipels & Company, Inc.

BOSTON, MA

SCALE IN MILES

0 10 20

MAP BASED ON U.S.G.S. 1:250,000 SERIES SHEET
NK 18-B SCRANTON, PA., N.Y., N.J. 1962, REVISED
1976, AND NK 18-II NEWARK, N.J., PA., N.Y. 1944,
REVISED 1969.

JOB NO. _____

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

$$D/s \text{ Toe Dam} = 474.3$$

$$\text{High point top of dam} = 486.2$$

$$\text{Low point top of dam} = 483.8$$

$$\text{Hydraulic Ht.} = 483.8 - 474.3 = 9.5'$$

$$\text{Structural Ht.} = 486.2 - 474.3 = 11.9'$$

$$\text{Storage at } 483.8' = 16.0 \text{ (p. 7)}$$

$$\text{Storage at } 486.2' = 55.0 \text{ (p. 7)}$$

Significant Hazard $\rightarrow$ 100 year flood to $1/2$ PMF Test flow
Use 100-year (little threat to life).

JOB NO.

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

- SPILLWAY EATING CURVEFROM BACKWATER COMPUTATIONS - WASHINGTON
TWIN NJ-FISELEV (NGVD)Q (CFS)

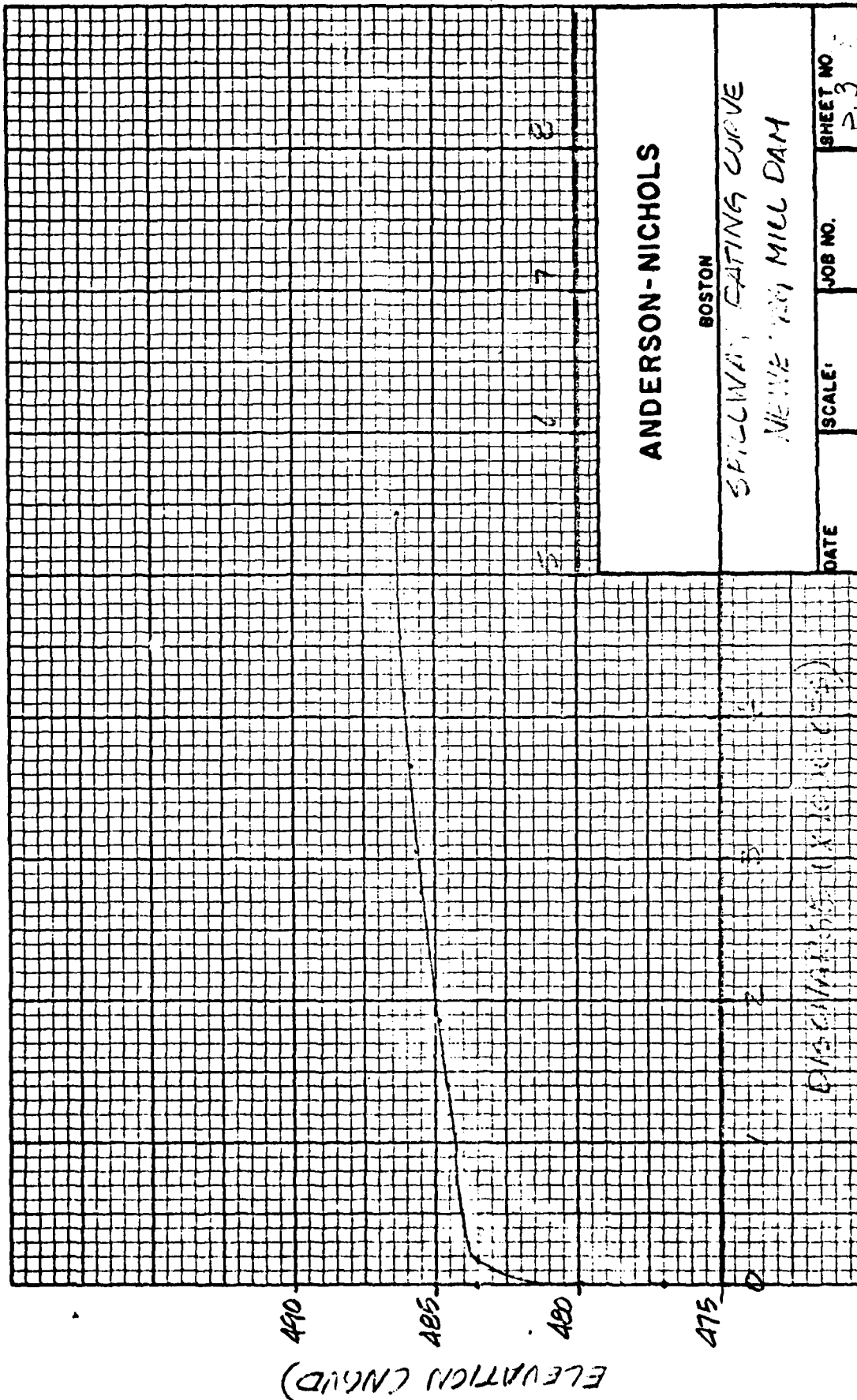
479.9 (+)	0
484.9	1863
485.6	3049
485.8	3668
486.5	5426

$$483.5, \text{ s/w crest. } Q = 3.0(7.5)(483.5 - 479.9)$$

$$= \text{gate flow} = 154 \text{ cfs.}$$

$$Q_{\text{top of dam}} (483.8) = 3.0(7.5)(483.8 - 479.9)^{3/2}$$

$$+ 3.7(74)(0.3)^{3/2} = 218$$



JOB NO.

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

See p. 5, FIS profile for dam.

Storage below 480 = Area x Avg. width.

$$\text{Area} = 540 \left(\frac{1}{2} (3.0 + 3.5) \right) + \frac{1}{2} (3.5) (1200) = 3,555 \text{ ft}^2$$

$$\text{say avg. width at mid-depth} = 50' \rightarrow \frac{3,555(50)}{43,560} = 4.08 \text{ ac-ft}$$

$$\text{surface area} = (540 + 1200)(60') = 2.40 \text{ ac. (60' width at 480)}$$

Storage 480 to 484

$$\text{Area} = 4(920) + \frac{1}{2}(4)(1600) = 6,880 \text{ sq ft}$$

$$\text{Avg. width 480 to 484} = 75' \rightarrow \frac{6,880(75)}{43,560} = 11.85 \text{ ac-ft}$$

$$\text{Surface area} = \text{Len. (width at 484)} = \frac{(2520)(75)}{43,560} = 5.21 \text{ ac}$$

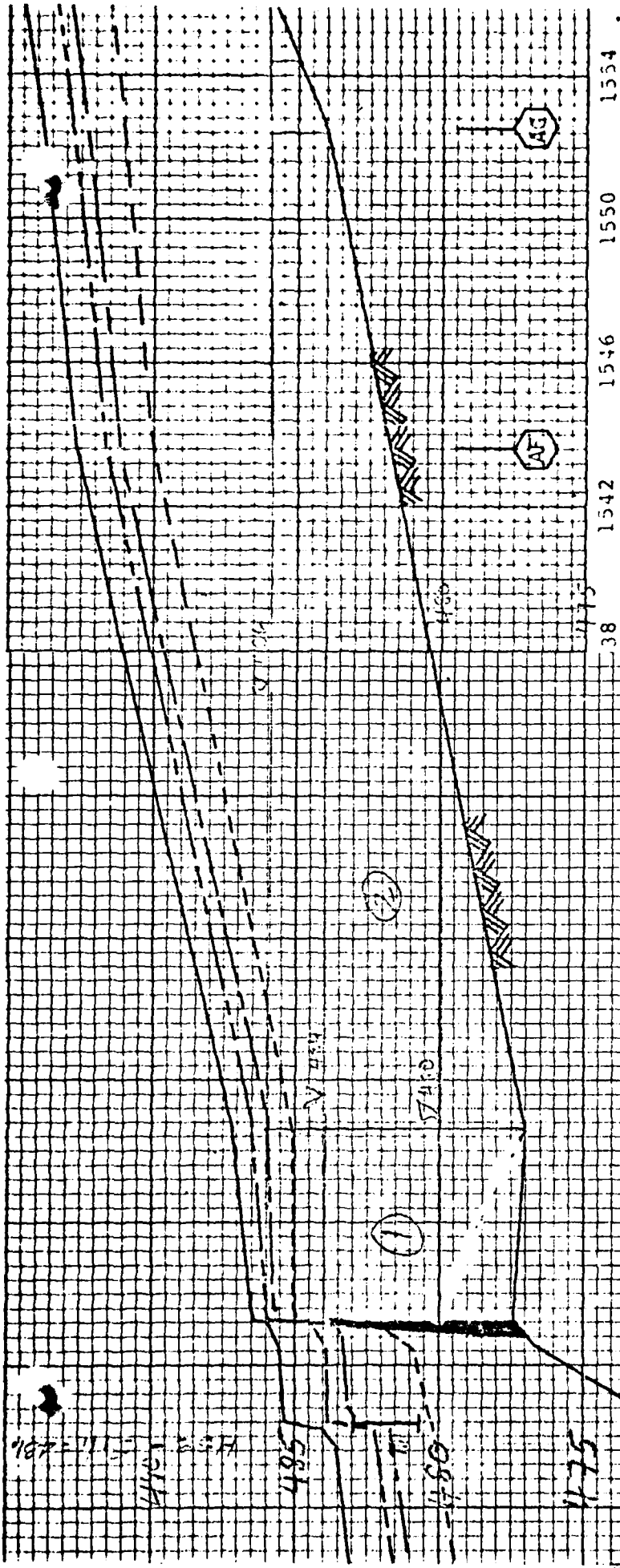
Storage 484 to 486

$$\text{Area} = 2(3320) + \frac{1}{2}(2)(400) = 7040 \text{ sq ft}$$

$$\text{Avg width 484 to 486} = 200' \rightarrow \text{Volume} = \frac{7,040(200)}{43,560} = 32.3 \text{ ac}$$

$$\text{Surface area} = \text{length (width at 486)}$$

$$= \frac{3720(220)}{43,560} = 18.8 \text{ ac}$$



LEGEND

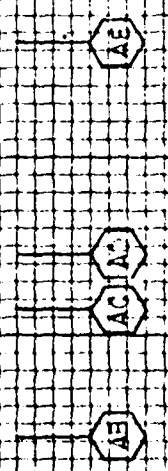
- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

ANDERSON-NICHOLS

INNON BOSTON CONCORD
460 Newburg Mills Dam

F. I. S. RESULTS

E	SCALE: 1"=5' JOB NO.	SHEET NO.
	114211	P. 5 of



RESERVOIR SURFACE (ACRES)

0 5 10 15 20 25

490

485

480

475

RESERVOIR SURFACE
VS. ELEVATION

STORAGE VS ELEVATION

Top of Dam, 483.8' NGVD
16 ac-ft

0 10 20 30 40

STORAGE (AC-FT)

ANDERSON-NICHOLS

VERNON	BOSTON	CONCORD
RESERVOIR SURFACE & STORAGE ELEVATION CURVES		
NEWBURG MILL DAM		
SM		
DATE	SCALE	JOB NO.
7/16/91		
		SHEET NO.
		22

JOB NO.

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

DESCRIP.	ELEV. (NGVD)	SURFACE* AREA (AC)	STORAGE (AC-Ft)	
			"Δ"*	Total
u/s inv.	477.0	—	—	0
	480.	2.40	4.4	4.4
	484.	5.2	11.	16.3
	486.	18.8	32.3	48.6

DESCRIP	ELEV.	STORAGE (Ac-Ft) [†]
	477	0
Top gate	477.9	0.8
	480.	4.4
Principal spillway	483.5	14.5
Low point top of dam	483.8	16.0
high point top of dam	486.2	55.0 (estimated)

* From calculations on page 4.

† From graph, p 6

JOB NO.

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

The test flood is the 100-year flood. From the F.I.S., the test flood flow would be 3,668 cfs, which would result in a stage of 485.8 ft. above NGVD.

At this stage the storage would be about 35 acre-feet. For the drainage area of 86 square miles, this represents 0.006 inches of rain. Thus, the effect of storage on peak flow would be negligible.

APPENDIX 4

REFERENCES

NEWBURG MILL DAM

APPENDIX 4
REFERENCES

NEWBURG MILL DAM

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