

NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM, N.J. NO NAME DAM NUMBER 51 (NJ0082--ETC(U)
MAR 81 K P YU DACW61-79-C-0011

DAEN/NAP-53842/NJ00823-81/ NL

106

END
DATE
FILMED
8-8-81
DTIC

AD A701451

HUDSON RIVER BASIN
TRIBUTARY OF RUSSIA BROOK.
MORRIS COUNTY
NEW JERSEY

1
35

LEVEL

N.J. NO NAME
DAM NO. 51
NJ 00823

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DTIC
ELECTE
JUL 16 1981
F



APPROVED FOR PUBLIC RELEASE
DISTRIBUTION UNLIMITED.

DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

REPT. NO: DAEN/NAP-53842/NJ00823-81/03

MARCH 1981

81 7 14 114

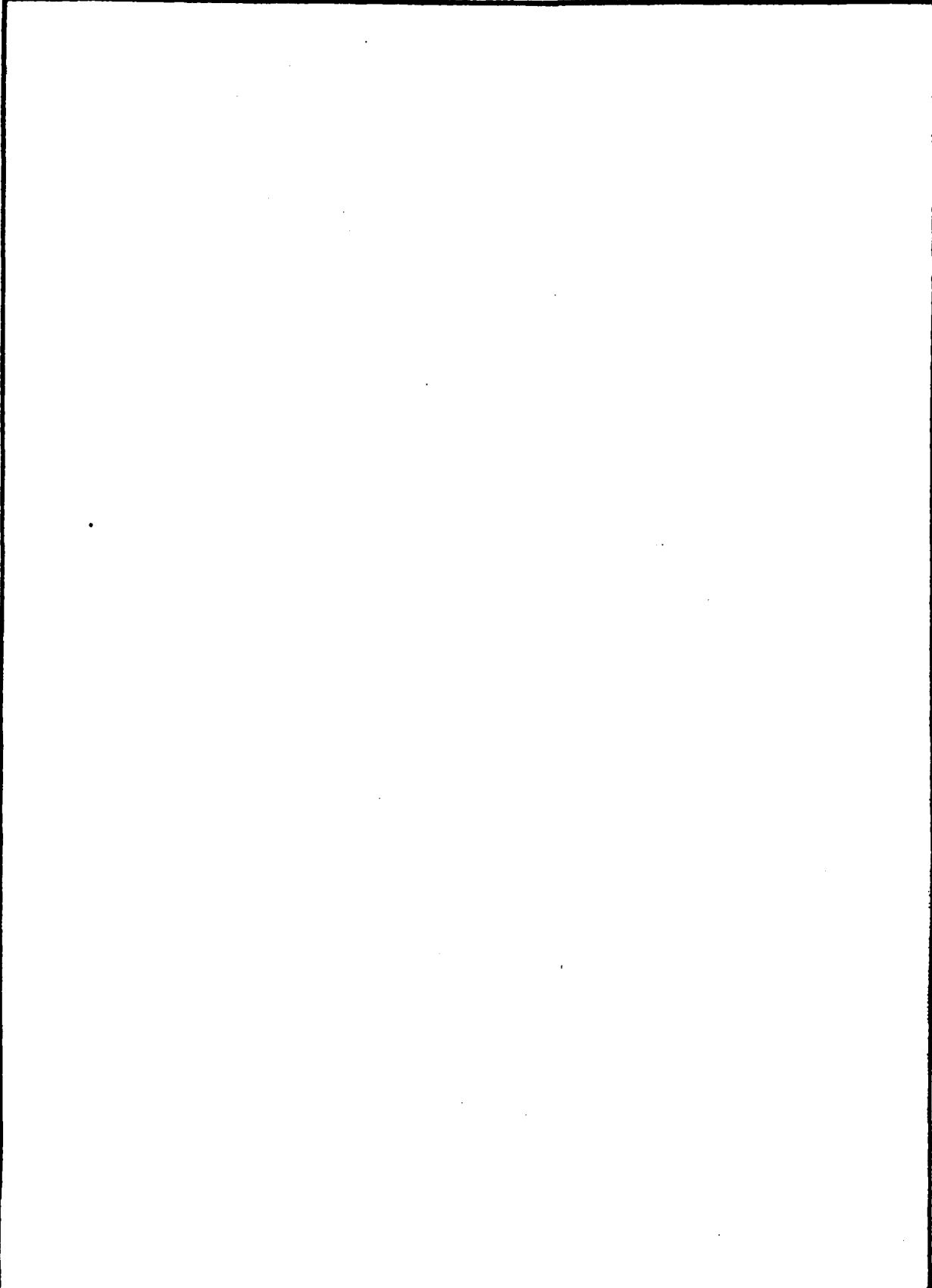
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

National Dam Safety Program.
N.J. No Name Dam Number 51 (NJ00823),
Hudson River Basin, Tributary of Rus-
sia Brook, Morris County, New Jersey.
Phase I Inspection Report.
BEFORE COMPLETING FORM

REPORT DOCUMENTATION PAGE

1. REPORT NUMBER DAEN/NAP-53842/NJ00823-81/03		2. GOVT ACCESSION NO. AD-101451		3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program N.J. No Name Dam No. 51, NJ00823 Morris County, New Jersey				5. TYPE OF REPORT & PERIOD COVERED FINAL	
7. AUTHOR(s) Yu, K. Peter				8. CONTRACT OR GRANT NUMBER(s) DACW61-79-C-0011	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Langan Engineering Associates 299 Market St. Saddle Brook, NJ 07662				10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 1247E1	
11. CONTROLLING OFFICE NAME AND ADDRESS NJ Department of Environmental Protection Division of Water Resources P.O. Box CN029 Trenton, NJ 08625				12. REPORT DATE March, 1981	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, PA 19106				13. NUMBER OF PAGES 65	
				15. SECURITY CLASS. (of this report) Unclassified	
				15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.					
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)					
18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.					
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams National Dam Safety Program Embankments N.J. No Name Dam No. 51, New Jersey Visual Inspection Spillways Structural Analysis Seepage					
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.					

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)



SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

DISCLAIMER NOTICE

**THIS DOCUMENT IS BEST QUALITY
PRACTICABLE. THE COPY FURNISHED
TO DTIC CONTAINED A SIGNIFICANT
NUMBER OF PAGES WHICH DO NOT
REPRODUCE LEGIBLY.**



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

IN REPLY REFER TO
NAPEN-N

22 JUN 1981

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

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for N.J. No Name No. 51 Dam in Morris 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, N.J. No Name Dam No. 51, a high hazard potential structure, is judged to be in poor overall condition. The spillway is considered seriously inadequate since a flow equivalent to nine percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. 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 three months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

NAPEN-N

• Honorable Brendan T. Byrne

b. The following remedial measures should be initiated within three months from the date of approval of this report:

(1) Perform additional investigation to determine the seepage conditions through and beneath the dam. Provide toe filter or other appropriate means to properly accommodate seepage and to strengthen the downstream toe condition.

(2) Determine the operating condition and draw down capacity of the low level outlets. Relocate and repair the valves as appropriate and increase the draw down capability if necessary.

c. The following remedial measures should be initiated within six months from the date of approval of this report:

(1) Perform additional investigation to determine the engineering properties of the dam and foundation, whether or not conventional safety margins exist under more severe stress conditions than those observed during the inspection, and to determine what modifications may be required to achieve such safety margins.

(2) Repair the deteriorated concrete of the retaining wall and the spillway structure.

d. The following remedial actions should be initiated within one year from the date of approval of this report:

(1) Properly remove all trees from the dam embankment and provide adequate filter coverage on the downstream face to prevent any future piping which may occur as a result of possible root decay.

(2) Completely plug animal burrows in the downstream face of the dam and provide protection against future animal burrowing into the embankment.

(3) Repair dislodged or eroded riprap along the upstream embankment.

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.

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 you be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



JAMES G. TON
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

Accession For	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	100

N.J. NO NAME DAM NO. 51 (NJ00823)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 12 September, 2 and 6 October and 1 December 1980 by Langan Engineering Associates, 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.

N.J. No Name Dam No. 51, a high hazard potential structure, is judged to be in poor overall condition. The spillway is considered seriously inadequate since a flow equivalent to nine percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. 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 three months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. The following remedial measures should be initiated within three months from the date of approval of this report:

(1) Perform additional investigation to determine the seepage conditions through and beneath the dam. Provide toe filter or other appropriate means to properly accommodate seepage and to strengthen the downstream toe condition.

(2) Determine the operating condition and draw down capacity of the low level outlets. Relocate and repair the valves as appropriate and increase the draw down capability if necessary.

c. The following remedial measures should be initiated within six months from the date of approval of this report:

(1) Perform additional investigation to determine the engineering properties of the dam and foundation, whether or not conventional safety margins exist under more severe stress conditions than those observed during the inspection, and to determine what modifications may be required to achieve such safety margins.

(2) Repair the deteriorated concrete of the retaining wall and the spillway structure.

d. The following remedial actions should be initiated within one year from the date of approval of this report:

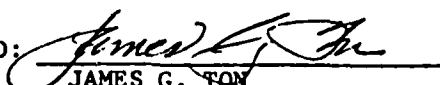
(1) Properly remove all trees from the dam embankment and provide adequate filter coverage on the downstream face to prevent any future piping which may occur as a result of possible root decay.

(2) Completely plug animal burrows in the downstream face of the dam and provide protection against future animal burrowing into the embankment.

(3) Repair dislodged or eroded riprap along the upstream embankment.

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.

APPROVED:


JAMES G. TON

Colonel, Corps of Engineers
Commander and District Engineer

DATE:

17 June 1981



IN REPLY REFER TO
NAPEN-N

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

15 JUL 1981

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

Dear Governor Byrne:

This is in reference to our ongoing National Program for Inspection of Non-Federal Dams within the State of New Jersey. N.J. No Name No. 51 Dam (Federal I.D. No. NJ00803), a high hazard potential structure, has recently been inspected. The dam is owned by the Paulist Fathers, and is located on a tributary of Russia Brook in Jefferson Township, Morris County.

Using Corps of Engineers screening criteria, it has been determined that the dam's spillway is seriously inadequate because a flow equivalent to twelve percent of the Probable Maximum Flood would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise, or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard potential to loss of life downstream from the dam. As a result of this UNSAFE determination, it is recommended that the dam's owners take the following measures within 30 days of the date of this letter:

a. Engage the services of a qualified professional consultant to more accurately determine the spillway adequacy by using more detailed and sophisticated hydrologic and hydraulic analyses, and to recommend any remedial measures required to prevent overtopping of the dam.

NAPEN-N

Honorable Brendan T. Byrne

b. In the interim, a detailed emergency operation plan and downstream warning system should be promptly developed. Also, around the clock surveillance should be provided during periods of unusually heavy precipitation.

A final report on this Phase I Inspection will be forwarded to you within two months.

Sincerely,



JAMES G. TON
Colonel, Corps of Engineers
Commander and District Engineer

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

UNSAFE DAM

NATIONAL PROGRAM OF INSPECTION OF DAMS

a. NAME: N.J. No. Name Dam No. 51 b. ID NO.: NJ00823 c. LOCATION State: New Jersey, County: Morris.
 d. HEIGHT: 26 feet e. MAXIMUM IMPOUNDMENT CAPACITY: 280 ac. ft.
 f. TYPE: Earth Embankment with concrete core wall. g. OWNER: Paulist Fathers
 h. DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS:
 i. URGENCY CATEGORY: High Hazard, UNSAFE, Non-Emergency.
 j. EMERGENCY ACTIONS TAKEN: Gov. notified of this condition by District Engineer's letter of
 k. REMEDIAL ACTIONS TAKEN: N.J.D.E.P. will notify dam's owner upon receipt of our letter.
 l. REMARKS: Final report, to be issued within six weeks, will have WHITE cover.

m. NAME: N.J. No. Name Dam No. 51 n. ID NO.: NJ00823 o. LOCATION State: New Jersey, County: Morris.
 p. HEIGHT: 26 feet q. MAXIMUM IMPOUNDMENT CAPACITY: 280 ac. ft.
 r. TYPE: Earth Embankment with concrete core wall. s. OWNER: Paulist Fathers
 t. DATE GOVERNOR NOTIFIED OF UNSAFE CONDITIONS:
 u. URGENCY CATEGORY: High Hazard, UNSAFE, Non-Emergency.
 v. EMERGENCY ACTIONS TAKEN: Gov. notified of this condition by District Engineer's letter of
 w. REMEDIAL ACTIONS TAKEN: N.J.D.E.P. will notify dam's owner upon receipt of our letter.
 x. REMARKS: Final report, to be issued within six weeks, will have WHITE cover.

T.B. HEVERIN, Coordinator
 Dam Inspection Program
 U.S.A.E.D., Philadelphia

1

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	NJ NO NAME 51
ID NUMBER:	FED ID No NJ 00823
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	MORRIS COUNTY
STREAM:	TRIBUTARY OF RUSSIA BROOK
RIVER BASIN:	PASSAIC
DATE OF INSPECTION:	SEPTEMBER, OCTOBER & DECEMBER 1980

ASSESSMENT OF GENERAL CONDITIONS

No Name 51 Dam, classified as having high hazard potential, is in poor overall condition. There is soft ground and seepage existing at the foundation level in the the valve control pit which is located at about the middle of the dam approximately half way down the downstream embankment. The concrete walls which retain the embankment behind and around the valve pit are in extremely deteriorated condition. There is water flowing from the downstream toe of the dam. The ground along the downstream toe of the dam is spongy with occasional seepage of water. The downstream embankment is vegetated with trees and brush. Occasional animal burrow holes were observed. The upstream embankment riprap has become dislodged in areas. The concrete spillway structure is in a deteriorated condition with numerous large cracks and extensive spalling. The operating condition of the low level outlets is unknown. There is no available information on the design, construction, and operation of the dam, consequently there is uncertainty as to the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is "seriously inadequate". We estimate the dam can adequately pass only 8% of the PMF. The spillway adequacy should be determined using more precise and sophisticated methods and procedures.

The following are recommended to be done very soon:

Perform additional investigation to determine the seepage conditions through and beneath the dam. Provide toe filter or other appropriate means to properly accomodate seepage and to strengthen downstream toe conditions. Determine the operating condition and drawdown capacity of the low level outlets. Relocate and repair the valves as appropriate and increase the

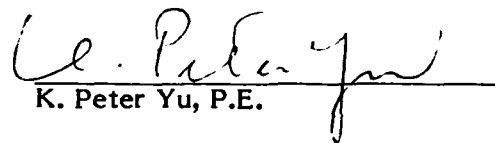
drawdown capability if necessary. The spillway of the dam is "seriously inadequate" as defined in the Corps of Engineers ETL 1110-2-234. The need for and type of mitigating measures should be determined, around-the-clock surveillance during periods of unusually heavy precipitation provided and a warning system established.

The following are recommended to be done soon:

Perform additional investigation to determine the engineering properties of the dam and foundation, whether or not conventional safety margins exist under more severe stress conditions than those observed during our inspection, and what modifications may be required to achieve such safety margins. Repair the deteriorated concrete of the retaining wall and the spillway structure. Develop written operational procedures and periodic maintenance plan for the dam and appurtenances.

The following are recommended to be done in the near future:

Properly remove all trees from the dam embankment and provide adequate filter coverage on the downstream face to prevent any future piping which may occur as a result of possible root decay. Completely plug animal burrows in the downstream face of the dam and provide protection against future animal burrowing into the embankment. Repair dislodged or eroded riprap along the upstream embankment.

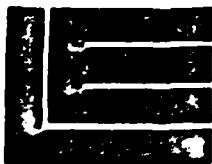

K. Peter Yu, P.E.



OVERALL VIEW
NO NAME 51 DAM
2 October 1980

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:	NJ NO NAME 51
ID NUMBER:	FED ID No NJ 00823
STATE LOCATED:	NEW JERSEY
COUNTY LOCATED:	MORRIS COUNTY
STREAM:	TRIBUTARY OF RUSSIA BROOK
RIVER BASIN:	PASSAIC
DATE OF INSPECTION:	SEPTEMBER, OCTOBER & DECEMBER 1980



LANGAN ENGINEERING ASSOCIATES, INC.

Consulting Civil Engineers
990 CLIFTON AVENUE
CLIFTON, NEW JERSEY
201-472-9366

CONTENTS
NATIONAL DAM SAFETY REPORT
NJ NO NAME 51 FED ID NO NJ 00823

	<u>PAGE</u>
PREFACE	
SECTION 1 PROJECT INFORMATION	
1.1 General	1
1.2 <u>Project Description</u>	1
1.3 <u>Pertinent Data</u>	2
SECTION 2 ENGINEERING DATA	4
SECTION 3 VISUAL INSPECTION	4
SECTION 4 OPERATIONAL PROCEDURES	5
SECTION 5 HYDRAULIC/HYDROLOGIC	5
SECTION 6 STRUCTURAL STABILITY	6
SECTION 7 ASSESSMENT, RECOMMENDATIONS/ REMEDIAL MEASURES	
7.1 <u>Dam Assessment</u>	6
7.2 <u>Recommendations/Remedial Measures</u>	7
FIGURES	
1. Regional Vicinity Map	
2. Plan & Section thru Dam	
3. Spillway Details - Plan of Outlet Structure	
APPENDICES	
1. Hydrologic and Hydraulic Data Visual Inspection Check List	
2. Photographs	
3. Hydrologic Computations	
4. References	

PREFACE

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

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

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aide 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.

SECTION 1 PROJECT INFORMATION

1.1 General

Authority to perform the Phase I Safety Inspection of No Name 51 Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 August 1980. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the US Army Engineer District, Philadelphia.

The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to safety of No Name 51 Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations and analyses are necessary and warranted. The assessment is made using screening criteria established in Recommended Guidelines for Safety Inspection of Dams prepared by the Department of Army, Office of the Chief of Engineers. It is not the purpose of the inspection report to imply that a dam meeting or failing to meet the screening criteria is, per se, certainly adequate or inadequate.

1.2 Project Description

a. Description of Dam and Appurtenances

No Name 51 Dam is an earthfill dam. The age of the dam is not known other than its construction predates 1924. The dam has a concrete notch over-fall spillway and appears to have a concrete core wall. It is approx 320 ft long and 26 ft high. The dam has a crest width which varies from 15 to 20 ft. The upstream and downstream embankment slopes are approx 2H:1V. The spillway weir length is 20 ft and is located close to the north abutment of the dam. The top of the spillway weir is 2.2 ft below the lowest point on the crest of the dam. A wooden foot bridge crosses the spillway. The bottom of the bridge is approximately 2.2 ft above the top of the spillway crest. There are two valve control stems in a pit formed on 3 sides by retaining walls located on the downstream face at about the middle of the dam. Essential features of the dam are given in Figures 2 & 3.

b. Location

No Name 51 Dam is located on the east end of the lake located about 3/4 mile west of Russia Road in Jefferson Township, Morris County, New Jersey. It is at north latitude 41°02.2' and west longitude 74° 32.8'. A regional vicinity map is given in Figure 1.

c. Size Classification

No Name 51 Dam is classified as being "Small" on the basis of its maximum reservoir storage volume of 280 ac-ft, which is more than 50 ac-ft, but less than 1000 ac-ft. It is also classified as "Small" on the basis of its total height of 26 ft, which is less than 40 ft. Accordingly the dam is classified as "Small" in size.

d. Hazard Classification

In the National Inventory of Dams, No Name 51 Dam has been classified as having "High Hazard Potential" on the basis that failure of the dam would cause excessive property damage to residences downstream and could potentially cause more than a few deaths. Visual Inspection of the downstream area shows that a failure of the dam would discharge impounded water down a fairly steep slope and potentially cause excessive property damage and loss of life to a developed flood plain approximately 3500 ft downstream of the dam. Accordingly it is proposed to keep the Hazard Classification as "High".

e. Ownership

No Name 51 lake and dam are owned by the Paulist Fathers, Mission Society of Saint Paul the Apostle, 86 Dromose Road, Scarsdale, New York 10853 as reported by the Jefferson Township Tax Assessor's Office.

f. Purpose of Dam

The purpose of the dam and lake is recreation.

g. Design and Construction History

No information is available concerning the design and construction of the dam. According to Rev. James Moran of the Paulist Fathers, the dam existed when the Paulist Fathers purchased the property in 1924 from a private hunting club.

h. Normal Operational Procedures

There is no information available concerning operational procedures for the dam.

1.3 Pertinent Data

a.	<u>Drainage Areas</u>	0.84 sq mi
b.	<u>Discharge at Dam site</u>	
	Maximum known flood at dam site	unknown
	Total spillway capacity at max. pool elevation	194 cfs
c.	<u>Elevation (Reference to an arbitrary datum of El 100.00 at the top of a concrete pedestal located as shown on Fig. 2)</u>	
	Top Dam elevation	100.15 (low point)

	Recreation pool	97.64 (Assumes spillway crest)
	Spillway crest	97.64
	Streambed at centerline of dam	75±
	Maximum tail water	unknown - dry at time of inspection
d.	<u>Reservoir</u>	
	Length of maximum pool	approx 1200 ft
	Length of recreation pool	approx 1000 ft
e.	<u>Storage (acre-feet)</u>	
	Recreation pool	245 ac-ft (Assumes spillway crest)
	Top of dam	280 ac-ft
f.	<u>Reservoir Surface (acres)</u>	
	Top dam	14.5
	Recreation pool	13.8 (Assumes spillway crest)
	Spillway crest	13.8
g.	<u>Dam</u>	
	Type	Earth Fill
	Length	Approx 320 ft
	Height	Approx 26 ft
	Top Width	Varies between 15 to 20 ft
	Side Slopes	2H:1V
	Zoning	unknown
	Impervious Core	Appears to be concrete core wall
	Cut off	unknown
	Grout curtain	unknown

h. Spillway

Type	Broad crested concrete weir
Length of weir	20 ft
Crest elevation	97.64 ft. (3' notch at center of spillway) 97.89 ft (remaining section of spillway)
Gates	None
U/S Channel	Concrete wing walls perpendicular to spillway weir, stone lined apron.
D/S Channel	11 ft vertical drop from weir crest to concrete stilling basin.

i. Regulating Outlets

2 valve stems in pit
located approx middle
of dam at downstream
toe. Outlet pipes and
valves not visible.
Operating condition
unknown.

NOTE: Elevations refer to Arbitrary Datum.

SECTION 2 ENGINEERING DATA

There is no information available concerning the design, construction or operation of No Name 51 Dam.

SECTION 3 VISUAL INSPECTION

No Name 51 Dam is in poor overall condition. There are 2 valve control stems in a pit located about the middle of the dam approximately halfway down the downstream embankment. No outlet pipes were located. The valve control pit is at toe elevation and is formed on 3 sides by vertical concrete retaining walls with maximum height of 11 ft. The ground surface in the pit is wet muck and will not support the weight of a man. Water is seeping from the ground in this area. Large cracks were observed on the retaining walls; large pieces of concrete were found missing and were dislodged; and portions of the downstream walls overturned. The operating condition of the outlet work is unknown.

Water is flowing from the toe of the dam approximately 15 feet north of the north side of the valve control pit. The flow carries no visible material and appears to have been flowing for some time. The ground surface along the majority of the downstream toe is spongy and occasional seepage of water can be seen.

The downstream embankment of the dam is vegetated with trees and brush. Occasional animal burrow holes were found. The crest of the dam varies from 15 to 20 feet in width and is grass covered. The top of a concrete core wall is exposed in areas along the north side of the dam. The riprap along the upstream face of the dam extends below the present water surface and has become dislodged in areas.

The concrete spillway structure located on the north end of the dam is in a deteriorated condition. The concrete has numerous large cracks and extensive spalling.

SECTION 4 OPERATIONAL PROCEDURES

There are no operational procedures for this dam. Maintenance of the dam is limited to grass cutting of the dam crest and associated landscape care. There appears to have been no recent maintenance of the spillway structure, low level outlet pipes and control valves, or the dam proper. No warning system was apparent.

SECTION 5 HYDRAULIC/HYDROLOGIC

Conversations with residents of the Paulist Fathers Seminary indicate that they have not seen any dam overtopping in recent years.

The hydraulic/hydrologic evaluation is based on a Spillway Design Flood (SDF) equal to the Probable Maximum Flood chosen in accordance with the evaluation guidelines for dams classified as high hazard and small in size. Hydrologic design data for this dam was not available for this dam. The PMF has been determined by developing a synthetic hydrograph based on the probable maximum precipitation of 22.0 inches (200 sq. mi - 24 hour). The Corps of Engineers has recommended the use of the SCS triangular unit hydrograph with the curvilinear transformation. Hydrologic computations are presented in Appendix 3. The PMF peak inflow determined for the subject watershed is 3243 cfs.

The capacity of the spillway at maximum pool elevation (100.15) is 194.0 cfs which is significantly less than the SDF. Flood routing for the 1/2 PMF and PMF indicate the dam will overtop by 1.19 ft and 2.16 ft respectively. We estimate the dam can adequately pass only 8% of the PMF. Based on our knowledge of the dam as an earthfill embankment and our knowledge of the degree of overtopping potential, it is our opinion that overtopping by the 1/2 PMF would likely cause failure.

The downstream potential damage center is located approximately 3500 ft from the dam. Based on the U. S. G. S. topographic map, the downstream channel between the dam and the potential damage center is narrow and steep. Preliminary analysis indicates a significant rise in the flood elevation immediately upstream of the damage center will occur immediately after dam breach. Therefore, it is our opinion that dam failure from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. Accordingly, the spillway capacity of No Name 51 Dam is considered to be "seriously inadequate" as defined in the Corps of Engineers ETL 1110-2-234.

Visual inspection revealed that 2 valve control stems existed at the downstream toe of the dam, however, no outlet pipes could be located. The operating condition of the outlet work is unknown. Therefore, the drawdown capability of the dam cannot be evaluated.

SECTION 6 STRUCTURAL STABILITY

No information is available concerning design and construction of the dam or of the engineering properties of the dam and foundation materials. No operating records have been kept. It is not known whether any post construction changes have been made. No recent changes are known to the present owners.

Visual observations revealed soft mucky ground conditions at the base of the valve control pit which is located on the downstream face of the embankment. The ground in the pit would not support the weight of a man. The retaining wall is in a very deteriorated condition with large cracks, missing concrete and overturned sections. Water is flowing from the toe of the dam approximately 15 ft north of the valve pit. These deficiencies are considered detrimental to the stability of the dam.

Due to the unavailability of information concerning the design, construction procedures and engineering properties of materials in the dam and foundation, analysis of the stability of the dam cannot be made without gross assumptions.

The dam is located in Seismic Zone I of the Seismic Zone Map of the Contiguous States. The degree of stability of the dam and appurtenances under static loading are uncertain with respect to conventional safety margins and may be unstable under earthquake loading. The stability of the dam should be further investigated.

SECTION 7 ASSESSMENT, RECOMMENDATION/REMEDIAL MEASURES

7.1 Dam Assessment

No Name 51 Dam is in poor overall condition. There is soft ground and seepage existing at the foundation level in the valve control pit which is located at about the middle of the dam approximately half way down the downstream embankment. The concrete walls which retain the embankment behind and around the valve pit are in extremely deteriorated condition. There is water flowing from the downstream toe of the dam. The ground along the downstream toe of the dam is spongy with occasional seepage of water. The downstream embankment is vegetated with trees and brush. Occasional animal burrow holes

were observed. The upstream embankment riprap has become dislodged in areas. The concrete spillway structure is in a deteriorated condition with numerous large cracks and extensive spalling. The operating condition of the low level outlets is unknown.

There is no available information on the design, construction, and operation of the dam, consequently there is uncertainty as to the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is "seriously inadequate". We estimate the dam can adequately pass only 8% of the PMF. The spillway adequacy should be determined using more precise and sophisticated methods and procedures.

7.2 Recommendations/Remedial Measures

The following are recommended to be done very soon:

1. Perform additional investigation to determine the seepage conditions through and beneath the dam. Provide toe filter or other appropriate means to properly accommodate seepage and to strengthen downstream toe condition.
2. Determine the operating condition and drawdown capacity of the low level outlets. Relocate and repair the valves as appropriate and increase the drawdown capability if necessary.
3. The spillway of the dam is "seriously inadequate" as defined in the Corps of Engineers ETL 1110-2-234. The need for and type of mitigating measures should be determined, around-the-clock surveillance during periods of unusually heavy precipitation provided and a warning system established.

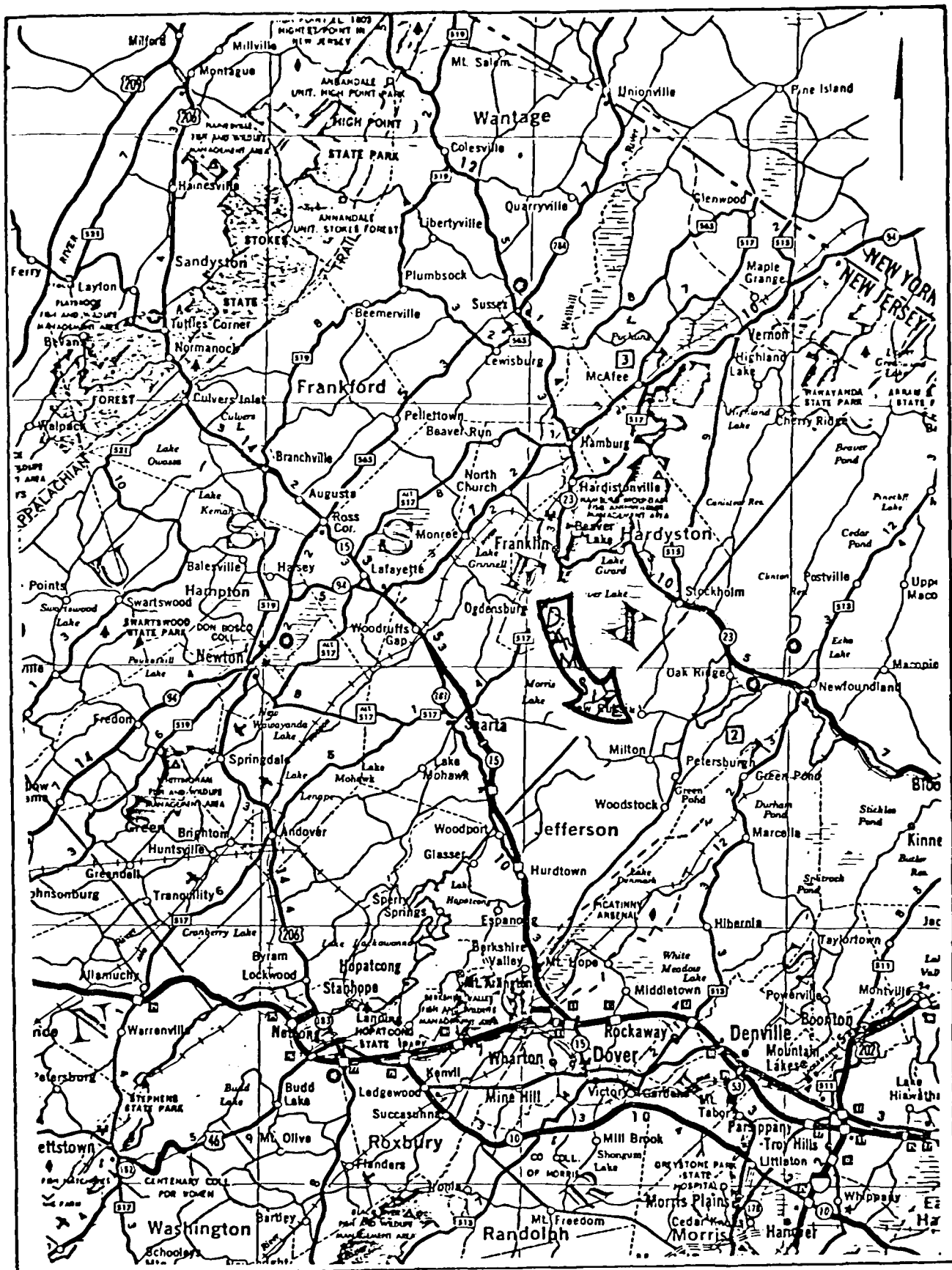
The following are recommended to be done soon:

1. Perform additional investigation to determine the engineering properties of the dam and foundation, whether or not conventional safety margins exist under more severe stress conditions than those observed during our inspection, and what modifications may be required to achieve such safety margins.
2. Repair the deteriorated concrete of the retaining wall and the spillway structure.
3. Develop written operational procedures and periodic maintenance plan for the dam and appurtenances.

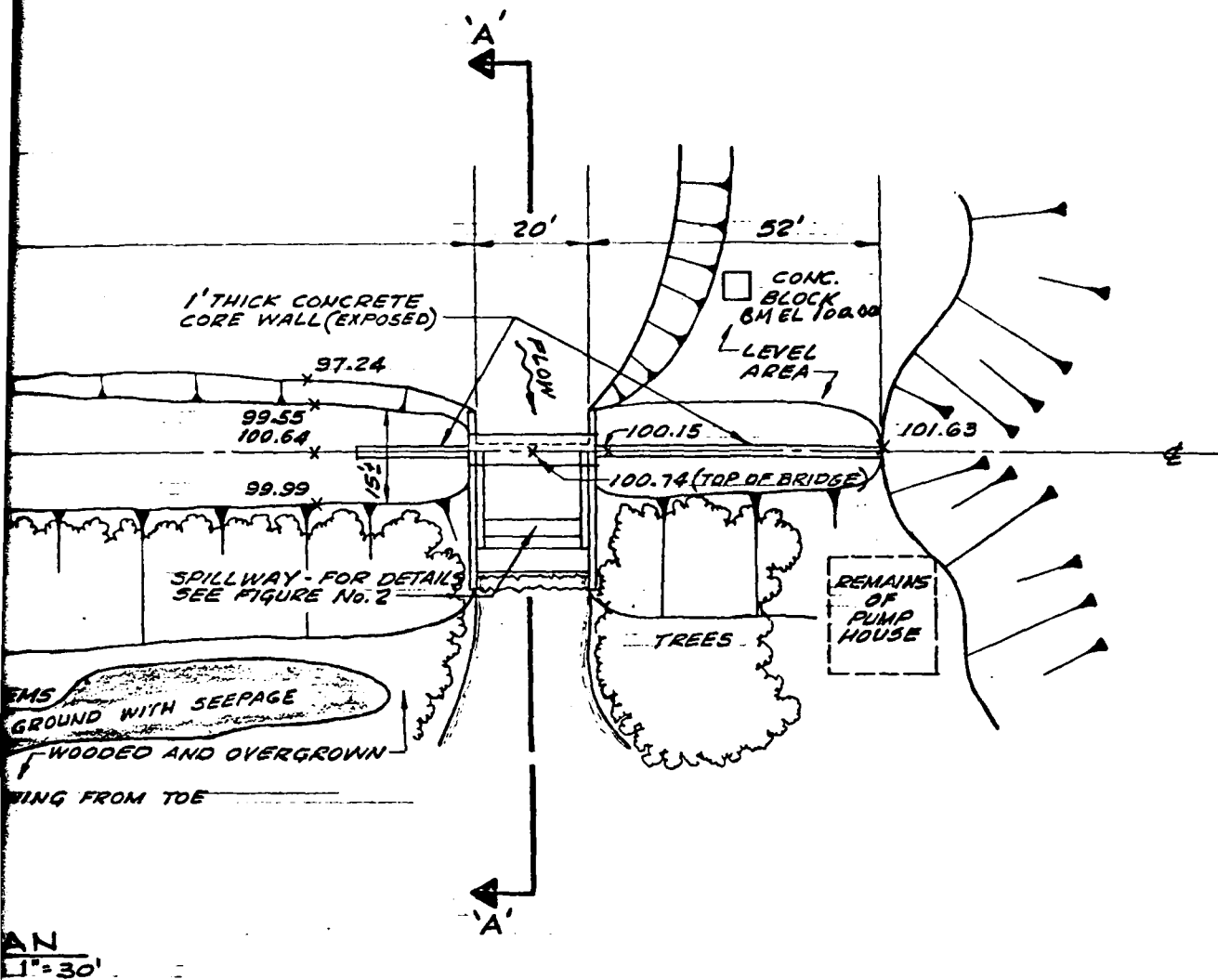
The following are recommended to be done in the near future:

1. Properly remove all trees from the dam embankment and provide adequate filter coverage on the downstream face to prevent any future piping which may occur as a result of possible root decay.
2. Completely plug animal burrows in the downstream face of the dam and provide protection against future animal burrowing into the embankment.
3. Repair dislodged or eroded riprap along the upstream embankment.

FIGURES



BY _____ DATE _____ REGIONAL VICINITY MAP JOB NO. 80145
 CKD _____ DATE _____ NO NAME 51
 FIGURE 1 Scale: 1" = 2 miles



ALL DATA OBTAINED FROM FIELD SURVEY
ON 9-12-80 BY L.E.A., INC. NO
REFERENCE TO M.S.L. IS AVAILABLE.
A REFERENCE ELEVATION OF 100.00
WAS ASSUMED AS THE TOP OF A
CONCRETE PEDESTAL

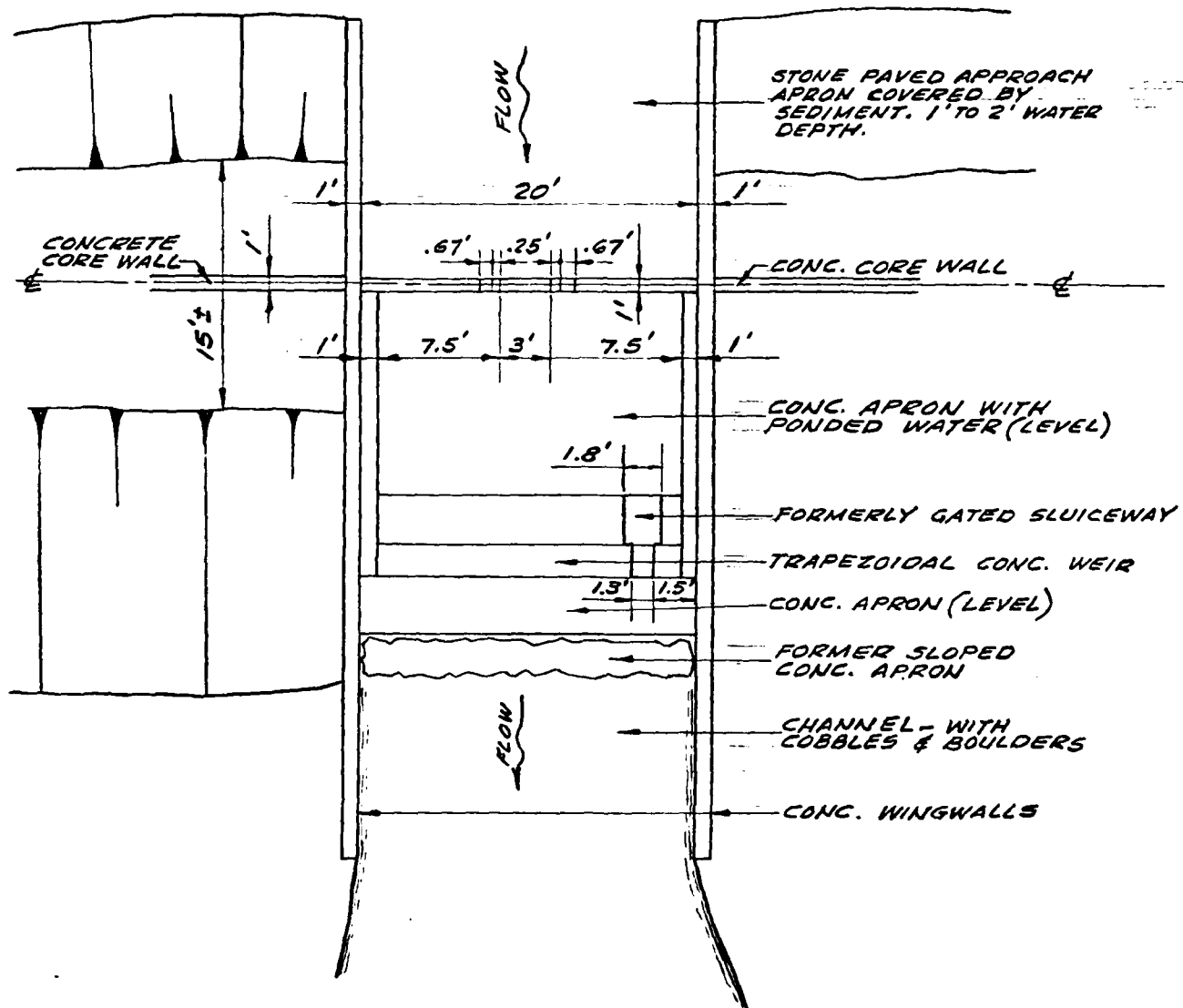
PLAN AND SECTION THRU DAM NO NAME 51

JEFFERSON TWP MORRIS COUNTY, N.J.

LANGAN ENGINEERING ASSOCIATES, INC.

990 CLIFTON AVENUE CLIFTON, N.J. 07013

DRN. BY: R.D.	SCALE: AS SHOWN	JOB No. 80145
CK'D. BY: V.U.	DATE: 9-16-80	FIG. No. 2

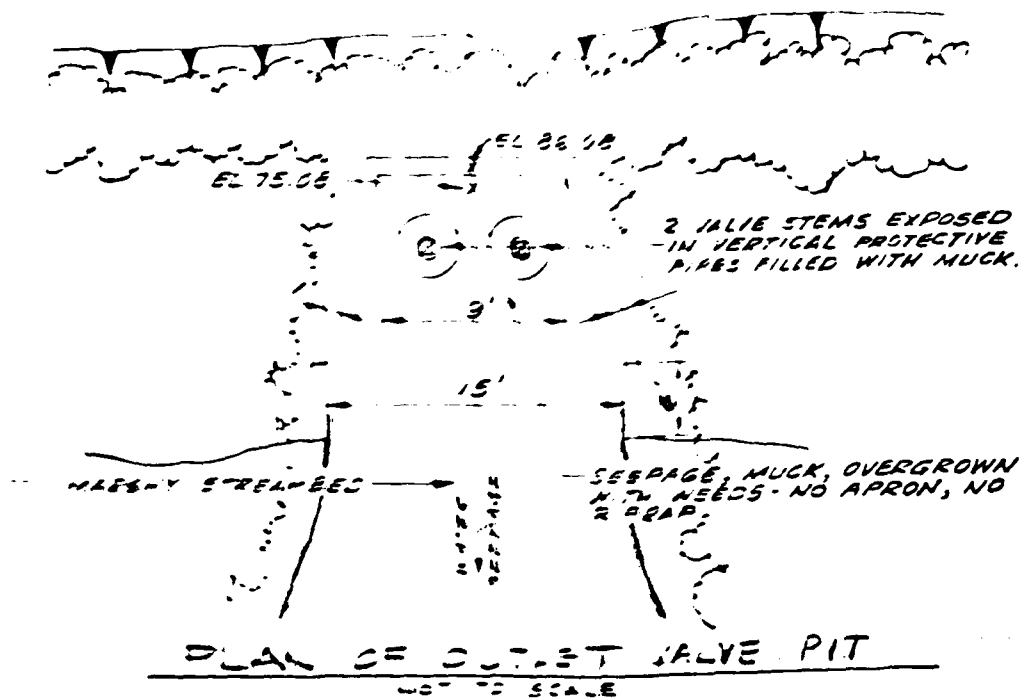
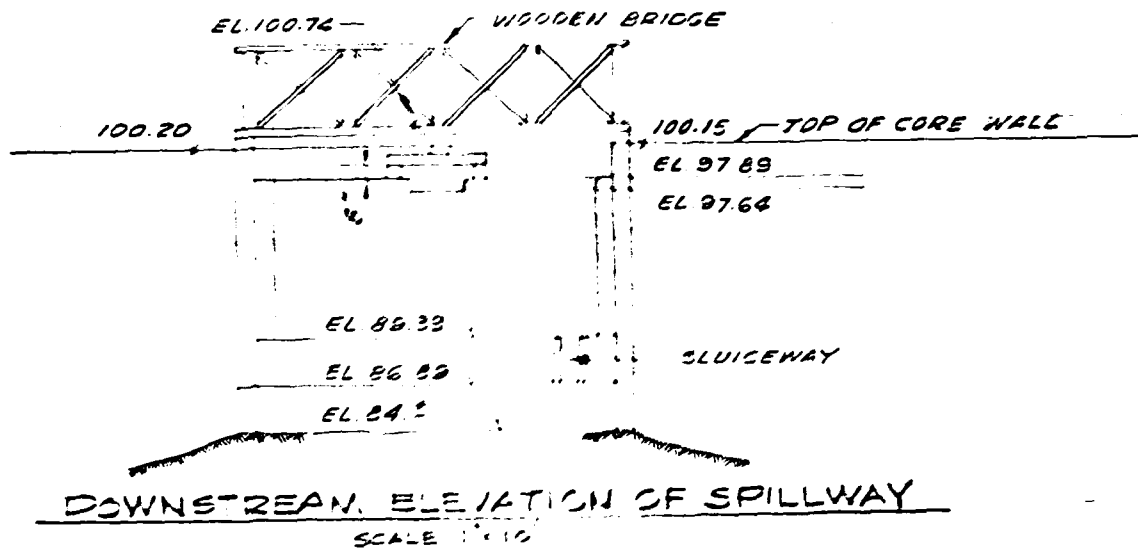


PLAN OF SPILLWAY

SCALE: 1"=10'

NOTES:

1. ALL SUR NO AWA OF TOP



ALL DATA OBTAINED FROM FIELD
SURVEY ON 9-16-80 BY L. E. A. NO
NO REFERENCE TO N.S. 11.5
AVAILABLE - A REFERENCE ELEV
ON 100.00 WAS ASSUMED AS THE
TOP OF A CONCRETE PEDESTAL.

<u>SPILLWAY DETAILS</u>		
<u>PLAN OF OUTLET STRUCTURE</u>		
NO NAME 51 MORRIS COUNTY, N.J.		
LANGAN ENGINEERING ASSOCIATES, INC.		
590 CLIFTON AVENUE CLIFTON, N.J. 07013		
DATE BY	SCALE AS SHOWN	JOB No. 80145
DATE BY	DATE 9-16-80	FIG. No. 3

APPENDIX 1
HYDROLOGIC AND HYDRAULIC DATA
VISUAL INSPECTION CHECK LIST

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: .84 sq mi., wooded

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 97.64 (245 ac ft)

ELEVATION TOP OF DAM (STORAGE CAPACITY): 100.15 (280 ac ft)

ELEVATION MAXIMUM POOL: 100.15 (Assumed to be top of dam)

ELEVATION TOP DAM: 100.15

CREST: Spillway

- a. Elevation 97.64
- b. Type Broad crested weir with 3' notch
- c. Width 1 ft
- d. Length Overall 20'
- e. Location Spillover approx 60± ft South of North abutment
- f. Number and Type of Gates None

OUTLET WORKS: Not Visible except top of control stems

- a. Type Unknown
- b. Location Approx middle of south embankment
- c. Entrance inverts unknown
- d. Exit inverts unknown
- e. Emergency draindown facilities None observed

HYBROMETEOROLOGICAL GAGES: None

- a. Type _____
- b. Location _____
- c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE: 194 (@ 100.15) cfs

NOTE: Elevations Refer to Arbitrary Datum of 100.00 at the top of a concrete pedestal located as shown in Fig. 2.

Check List
Visual Inspection
Phase 1

Name Dam No Name 51 County Sussex State N. J. Coordinators NJ DEP

Date(s) Inspection See Below Weather Overcast (9/12/80) Temperature Mid 70's (9/12/80)

Arbitrary
Datum

Pool Elevation at Time of Inspection 97.24 ~~M.S.L.~~ Tailwater at Time of Inspection Dry M.S.L.

Inspection Personnel:

R. Greene (LEA) <u>9/12/80, 10/2/80</u>	<u>John Moyle (DEP) 10/2/80</u>	<u>Brian Mulvenna (C of E) 10/2/80</u>
<u>10/6/80</u>		
V. Urban (LEA) <u>9/12/80</u>	<u>Bruce Uibel (C of E) 10/2/80</u>	<u>Dennis J. Leary (LEA) 10/6/80</u>
		<u>12/1/80</u>
P. Yu (LEA) <u>12/1/80</u>		

R. W. Greene Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE OBSERVED.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	OPENING IN SOIL AT TOE APPROX 3 FT LONG WITH WATER FLOWING ABOUT 15 FT NORTH OF LOW LEVEL OUTLET CHANNEL. AT OUTLET VALVE CONTROL, MID DAM DOWNSTREAM TOE, WET SOFT MUCKY GROUND WITH SEEPAGE.	FURTHER INVESTIGATE CONDITION. USE FILTER COVERAGE AND STRENGTHEN DOWNSTREAM TOE CONDITION AS APPROPRIATE.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	MINOR SLOUGHING OF DOWNSTREAM EMBANKMENT IN VARIOUS AREAS. AT OUTLET VALVE CONTROL AREA, MID DAM, DOWNSTREAM TOE, RETAINING WALL CRUMBLING. LARGE PIECES OF CONCRETE BROKEN OUT AND SECTIONS OF WALL OVERTURNED.	REPAIR RETAINING WALL. STRENGTHEN DOWNSTREAM TOE.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	ROUGHLY NORTH TO SOUTH ALIGNMENT FAIRLY STRAIGHT CREST GRASS COVERED. TOP OF CONCRETE CORE WALL BIVIBLE IN AREAS. OCCASIONAL CRACKS VISIBLE IN TOP OF CORE WALL CONCRETE.	
RIPRAP FAILURES	UPSTREAM FACE, RIPRAP IN FAIR CONDITION. OCCASIONAL PIECES HAVE BECOME DISLODGED AND FALLEN INTO POND.	REPLACE DISLODGED RIPRAP.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
	DOWNSTREAM EMBANKMENT THICKLY COVERED WITH BRUSH & SMALL DIAMETER TREES (LESS THAN 6" DIA IN GENERAL). OCCASIONAL ANIMAL BURROW HOLES.	GROUND SPONGY AT TOE OF DAM. REMOVE TREES AND PLUG ANIMAL HOLES. PROVIDE FILTER COVERAGE ON DOWNSTREAM FACE TO PREVENT PIPING.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	NO APPARENT DEFICIENCY OBSERVED.	
ANY NOTICEABLE SEEPAGE	NONE FROM EMBANKMENTS. SEEPAGE FROM SOIL AROUND OUTLET CONTROLS AT DOWNSTREAM TOE OF EMBANKMENT AND ALONG TOE NORTH OF OUTLET CONTROLS. WATER FLOWING FROM TOE APPROX 15 FT NORTH OF OUTLET CONTROLS.	FURTHER INVESTIGATE SEEPAGE CONDITION. PROVIDE FILTER COVERAGE.
STAFF GAGE AND RECORDER	NONE OBSERVED	
DRAINS	NONE OBSERVED.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	1 FT WIDE SURFACE OF CONCRETE SPALLED	REPAIR CONCRETE.
APPROACH CHANNEL	ROCK LINED, LITTLE GRASS GROWING. UNOBSTRUCTED	
DISCHARGE CHANNEL	APPROX 11 FT VERTICLE DROP, INTO STILLING BASIN. CONCRETE HEAVILY SPALLED WITH PIECES OF CON- CRETE MISSING, LARGE CRACKS UP TO APPROX 1/4" WIDE, SLIGHT SEEPAGE OF WATER FROM DOWNSTREAM SPILLWAY FACE AND FROM BASE OF SPILLWAY.	REPAIR SPILLWAY STRUCTURE.
BRIDGE AND PIERS	WOODEN FOOT BRIDGE ACROSS TOP OF SPILLWAY, APPROX 2 FT ABOVE SPILLWAY CREST,	

OUTLET WORKS 2 UNKNOWN DIA PIPES W/SLUICE GATES

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	RETAINING WALL AROUND TWO VALVE STEMS HAS LARGE CRACKS. PIECES OF CONCRETE MISSING, PARTS OF WALL OVERTURNED. SOFT MUCKY GROUND WITH SEEPAGE AT BASE OF RETAINING WALL.	REPAIR RETAINING WALL. INVESTIGATE SEEPAGE CONDITION. RELOCATE AND REPAIR VALVE, AND STRENGTHEN DOWNSTREAM TOE AREA AS APPROPRIATE.
INTAKE STRUCTURE	NOT VISIBLE	
OUTLET STRUCTURE	OUTLET PIPES NOT VISIBLE	
OUTLET CHANNEL	SOFT GROUND STREAM BOTTOM. SEEPAGE FROM GROUND.	
EMERGENCY GATE	NONE OBSERVED	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	TREE COVERED APPROX 4H:1V MANY ROCK OUTCROPS.	
SEDIMENTATION	VERY LITTLE OBSERVED.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	BOULDER LINED STREAMBED. OCCASIONAL DEAD FALLEN TREES AND BRANCHES IN STREAMBED.	REMOVE FALLEN TREES & BRANCHES.
SLOPES	FAIRLY STEEP, TREE COVERED. DOWNSTREAM, FAIRLY RAPID DROP OF GROUND ELEVATION.	
APPROXIMATE NO. OF HOMES AND POPULATION	NONE VISIBLE IMMEDIATELY DOWNSTREAM. APPROX 3500 FT DOWNSTREAM ARE APPROX 12 HOUSES IN FLOOD PLAIN.	

APPENDIX 2
PHOTOGRAPHS



South wall, west wall.
6 October 1980

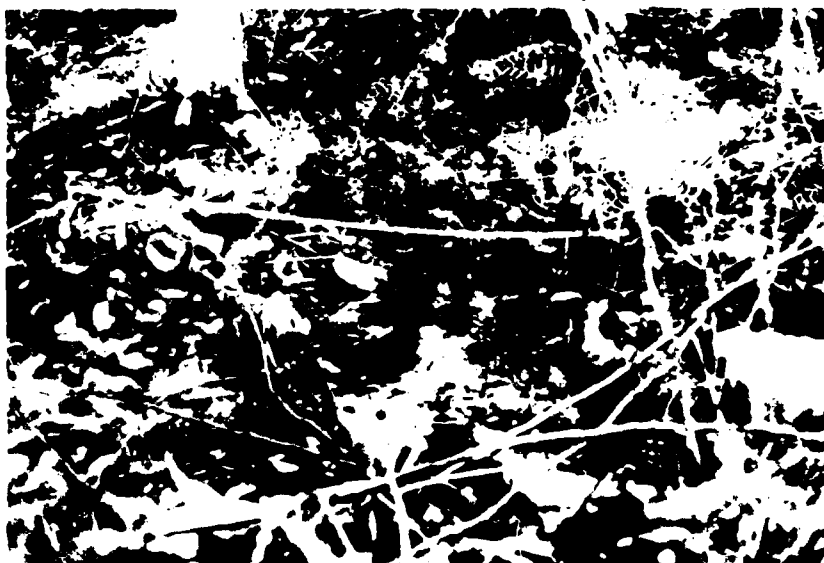


West wall, north wall.
6 October 1980



Retaining wall, north wall.

6 October 1980



Water flow at toe of dam.

6 October 1980



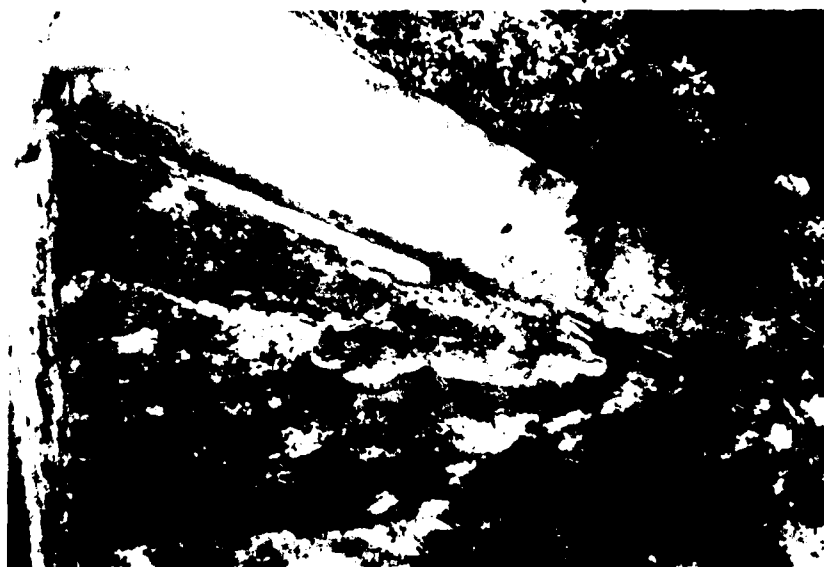
Seepage at toe of dam.

6 October 1980



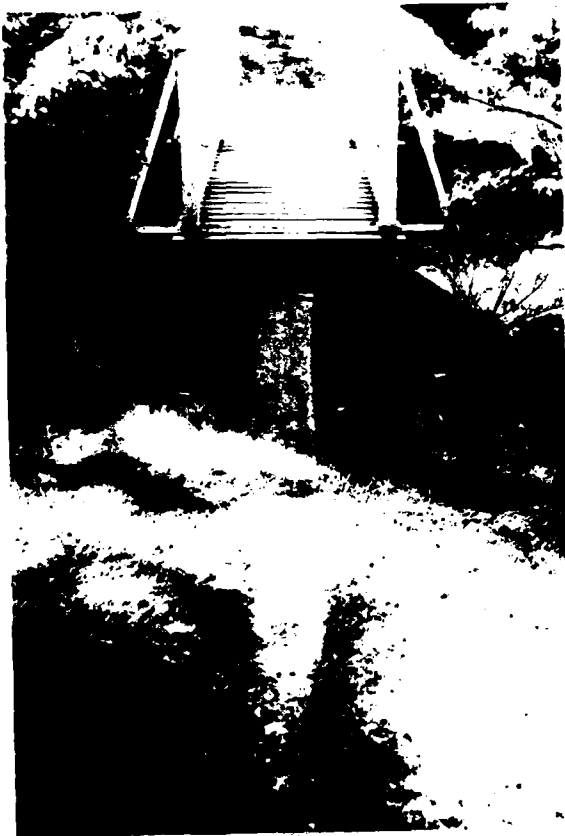
Downstream face of spillway.

6 October 1980



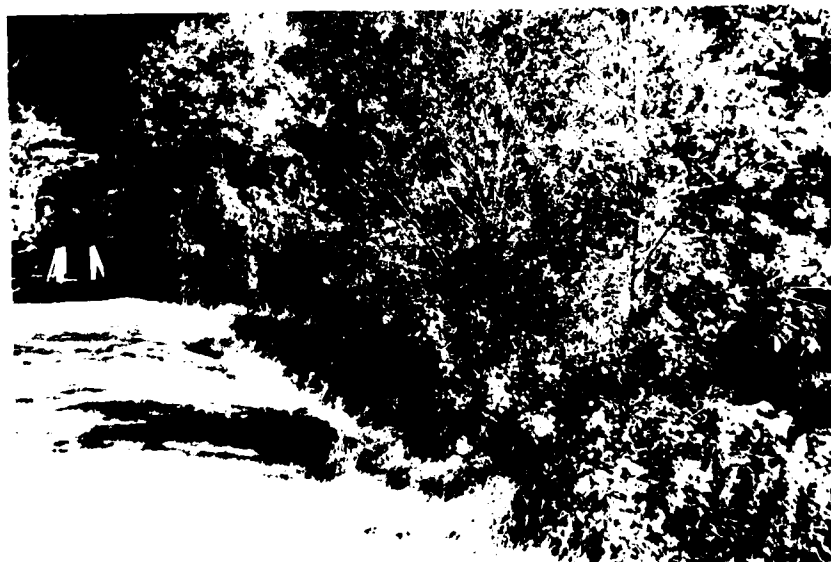
Downstream spillway, north wing wall.

6 October 1980



Exposed top of concrete core wall on north and south sides of spillway.

6 October 1980



Crest of dam looking north. Thick vegetation on downstream embankment.

6 October 1980

NO NAME 51 DAM



Animal burrow on downstream
embankment.

6 October 1980



Upstream face of dam looking
north.

6 October 1980

HYDROLOGICAL COMPUTATIONSN.J. NoNAME 51A. Location: Morris County, N.J., Russia BrookB. Drainage area: 0.84 sq.mi (535 acres)C. Lake area: 13.77 acD. Classification: Size - small

Hazard - High

E. Spillway Design Flood: PMFF. PMP

1. Dam located in Zone 1 (near zone 6 boundary)

PMP = 22.0 inches (for 200 sq mi, 24 hr,
"all season envelope")*2. PMF must be adjusted by a factor of 80% **
to account for the basin size being under
10 sq. mi.

% Factor for ≤ 10 sq. mi			
Duration	Zone 1	Zone 6	Avg
0-6	111	113	112
0-12	123	123	123
0-24	133	132	132
0-48	142	142	142

* HMR #33

** from pg 48 "Design of Small Dams"

BY YH

DATE

9/23/80NoNAME 51 DAM

JOB NO.

8015CKD PJ

DATE

May 81# 00823

SHEET NO.

1

OF

G. UNIT HYDROGRAPH

Corps of Engineers has indicated that the SCS triangular unit hydrograph with curvilinear transformation be used for analysis

Drainage area = 535 ac (a)

average slope = 2.75 % (Y)

1) hydraulic length (L)

from drainage map

$$L = 7000 \text{ ft}$$

soil group C, * wood or forest land $CN = 74^{**}$

$$S = \frac{1000}{CN} - 10 = 3.51$$

Lag time (L)

$$L = \frac{L^{.8} (S+1)^{.7}}{1900 (Y)^{.5}}$$

$$L = \frac{(1191.46)(2.87)}{(1900)(1.658)}$$

$$L = 1.09 \text{ hr.}$$

$$T_c = \frac{L}{.6} = 1.81 \text{ hours}$$

* County Soil Survey - Sussex NJ (SCS)

** Table 2-2, SCS TR-55

BY Vu DATE 9/23/80 No Name 51

JOB NO. 80195

CKD Pg DATE MAY 81

SHEET NO. 2 OF 2

2). Estimate T_c from velocity and watercourse lengths

$$\text{length} = 7000 \text{ ft}$$

$$\text{avg. slope} = 2.75\%$$

$$\text{Avg. velocity} : 1.5 \text{ f/s. (SCS. TR-55 Fig. 3-1 to woodland to stream)}$$

$$t_c = \frac{7000 \text{ ft}}{1.5 \text{ f/s.}} = 1.30 \text{ hr.}$$

$$L_{eq} = 0.6 t_c = 0.78 \text{ hr.}$$

$$\text{Use } L = \frac{1.09 + 0.78}{2} = 0.94 \text{ hr.}$$

BY Dry DATE MAY 81

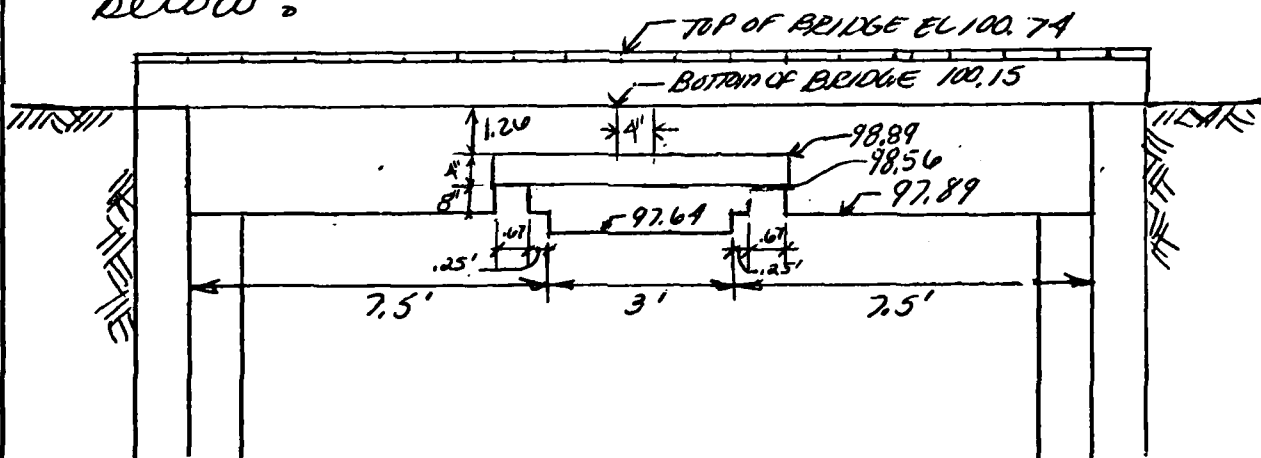
JOB NO. _____

CKD RWG DATE MAY 27, 81

SHEET NO. _____ OF _____

SPILLWAY CAPACITY

The visible portion of the spillway indicates that the structure is a notched broadcrested weir. It has a crest width of 1' and is 20 ft in length. At the centerline of the spillway is a 3 ft long 3" deep notch. The configuration of the weir and elevations are as shown below:



Approximately 12 ft downstream on the concrete apron exists a trapezoidal broadcrested weir with its crest at elevation 89.39. The weir has a sluiceway cut into it which appears to have been controlled by a 2' x 1.8' gate. It is presently deteriorated. For this analysis it will not be considered.

BY Vu DATE 9/25/80JOB NO. 80115CKD RWG DATE MAY 81

As Name 51

SHEET NO. 4 OF

For the purpose of analysis the ~~top~~ top of the dam will be at elev 100.15 which is the elevation of the top of core wall. The core wall is exposed near the spillway. The dam (exclusive of spillway) is 298 ft long with top width varying from 15 to 18 ft $\pm$.

Weir flow will be calculated using $Q = CLH^{3/2}$ where values of C will be taken from table 5-3 (Handbook of Hydraulics)

Orifice flow will be calculated using $Q = CA\sqrt{2gH}$ with the coefficient c for square edge entrances (from Small Dams table 33) shall be 0.85.

BY Vh DATE Walter

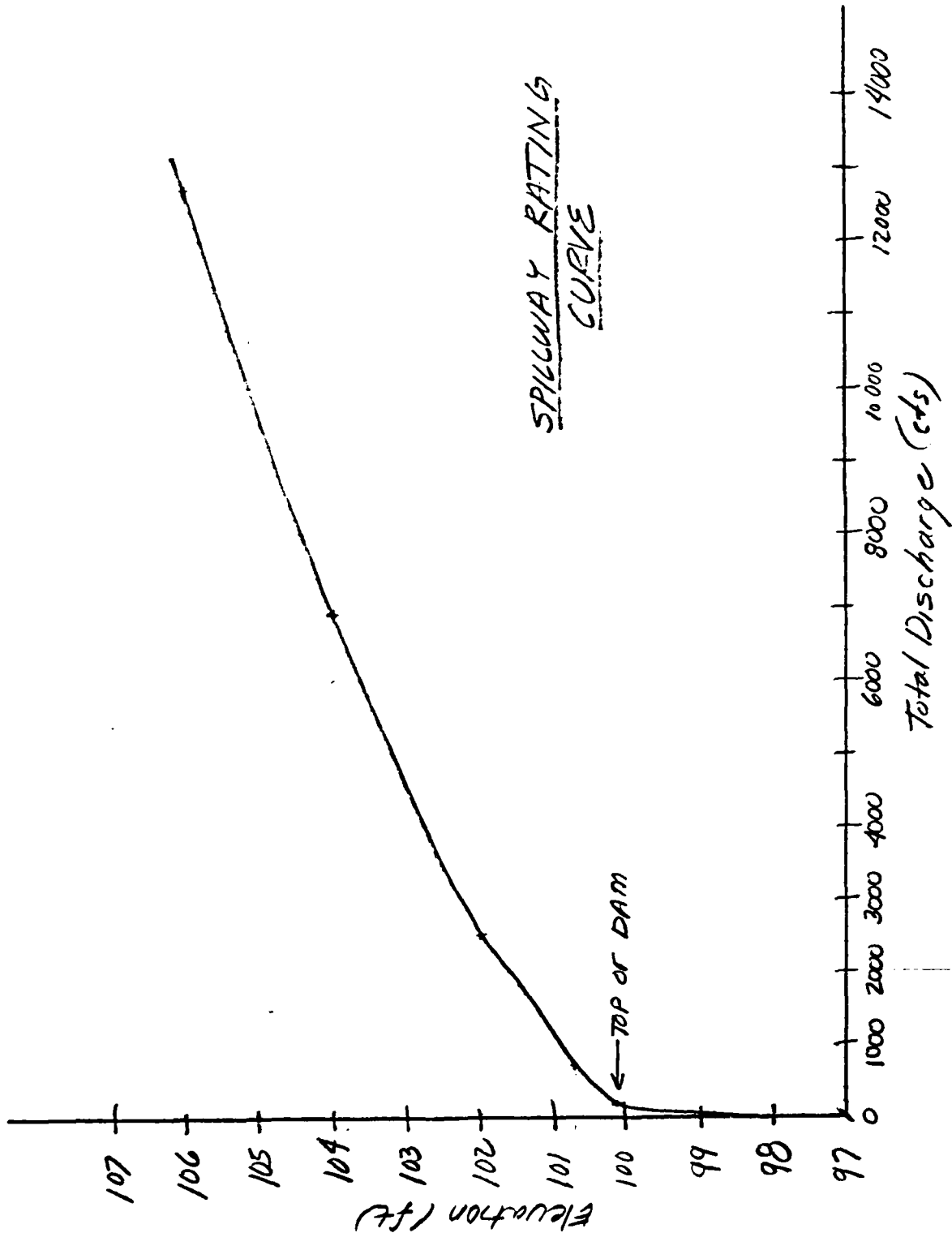
JOB NO.

CKD by DATE

SHEET NO. 5 OF

ELEV. (ft)	Notch (97.64) L=3' W=1'			Weir-1 (97.89) L=13.66' W=1'			Orifice-1 A=3.095 ft ²			Weir-2 (97.89) L=13.16' W=1'			Weir-3 (98.89) L=3.5' W=4'			Orifice-2 A=38.36 ft ²			Embankment L=298' W=15'			Bridge (100.74) L=22' W=4'			ΣQ
	H	C	Q	H	C	Q	H	C	Q	H	C	Q	H	C	Q	H	C	Q	H	C	Q	H	C	Q	
97.64	0	-	0																						0
97.80	.16	2.69	.5																						.5
97.89	.25	2.69	1.0	0	-	0																			1.0
98.00	.36	2.71	1.8	.11	2.69	1.3																			3.1
98.56	.92	2.91	7.7	.67	2.78	20.8	0	-	0	0	-	0													28.5
98.75							.69	.85	16.9	.86	2.89	30.3													47.2
98.89							.78	"	18.6	1.0	2.98	39.2	0	-	0										57.8
99.00							.89	"	19.9	1.11	3.04	46.8	.11	2.80	.4										67.1
99.50							1.39	"	24.9	1.61	3.28	88.2	.61	3.09	5.2										118.3
100.00							1.89	"	29.0	2.11	3.30	133.1	1.11	3.32	13.6										175.7
100.15							2.04	"	30.1	2.26	3.30	147.5	1.26	3.32	16.4	0	-	0	-	0	-	0			194.0
100.74							2.63	"	34.2							1.61	.85	332	.59	2.70	3646	0	-	0	730.8
102.00							3.89	"	41.6							287	"	443.5	185	2.63	1972	1.26	2.66	82.8	2539.7
104.00							5.89	"	51.2							487	"	577.4	3.85	2.63	5921	3.26	2.74	359.8	6904.4
106.00							7.89	"	59.3							687	"	635.8	5.85	2.63	11081	5.26	3.2	849.3	12683.4

SPILLWAY CAPACITY COMPUTATION



BY VM DATE 9-23-80 Ab/Name 51

JOB NO. 80145

CKD Dry DATE MAY 81

SHEET NO. 7 OF

Storage Capacity

Assume a linear distribution for the area of the lake with elevation. Start at a zero storage at the crest of the spillway.

Area of Lake = 13.77 ac

Length of equivalent square = 774.48 ft

Take average side slope: 1 V : 4 H

∴ for every foot of water above the crest of the spillway the length of the equivalent square increases by: $2 \times 4 \times 1 = 8 \text{ ft}$

Elevation (ft)	H (ft)	Length of Equiv. Square (ft)	Area of Lake (acres)
97.69	0	774.48	13.77
98.00	.36	777.36	13.87
99.00	1.36	785.36	14.16
100.00	2.36	793.36	14.45
100.15	2.51	794.56	14.49
101.0	3.36	801.36	14.74
102.0	4.36	809.36	15.04
104.0	6.36	825.36	15.64
106.0	8.36	841.36	16.25

Storage Capacity vs. elevation is calculated by HEC 1

BY VH DATE 9/23/80 No Name SI JOB NO. 80195
 CKD py DATE MAY 81 SHEET NO. 8 OF

SUMMARY OF HYDROGRAPH AND FLOOD ROUTING

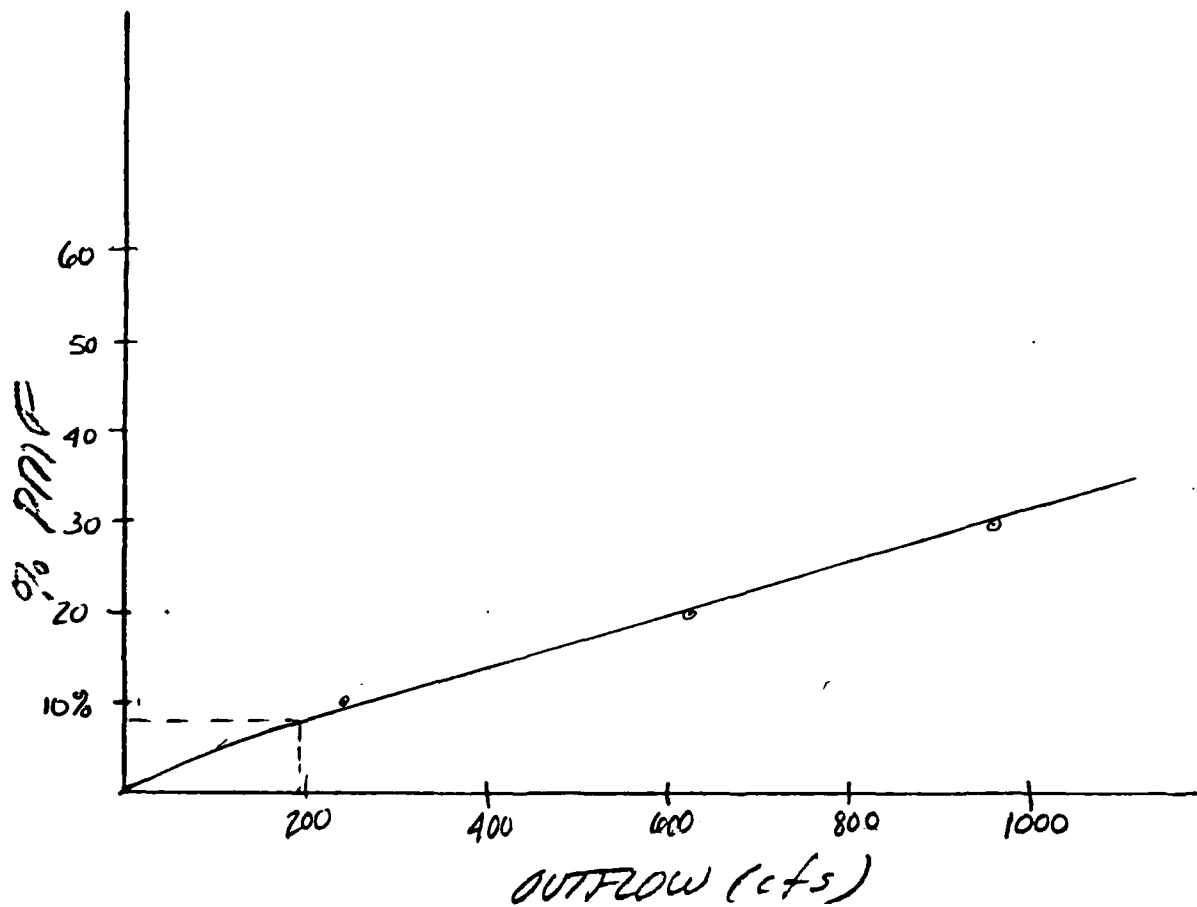
- 1) Hydrograph & routing calculated using HEC-1.
- 2) PMF for No Name 51
is 3243 cfs (routed to 3209 cfs).
- 3) Routing of PMF indicates that the dam will overtop by 2.16 ft.
- 4) Routing of $\frac{1}{2}$ PMF indicates that the dam will overtop by 1.19 ft.

BY rn DATE 9/23/80 HEC-1 Summary
CKD rn DATE MAY 81 No Name 51

JOB NO. 80145
SHEET NO. 9 OF

OVERTOPPING POTENTIAL

- 1) VARIOUS % of PMF have been routed using HEC-1
- 2) Plot peak outflow vs. % PMF



- 3) Dam overtops at elevation 100.15 with $Q = 194$ cfs $\therefore$ dam can pass approx. 8 % of the PMF

BY <u>ML</u>	DATE <u>9-23-80</u>	<u>151 PM 51</u>	JOB NO. <u>80175</u>
CKD <u>RWC</u>	DATE <u>MAY 81</u>	<u>overkeeping</u>	SHEET NO. <u>10</u> OF <u> </u>

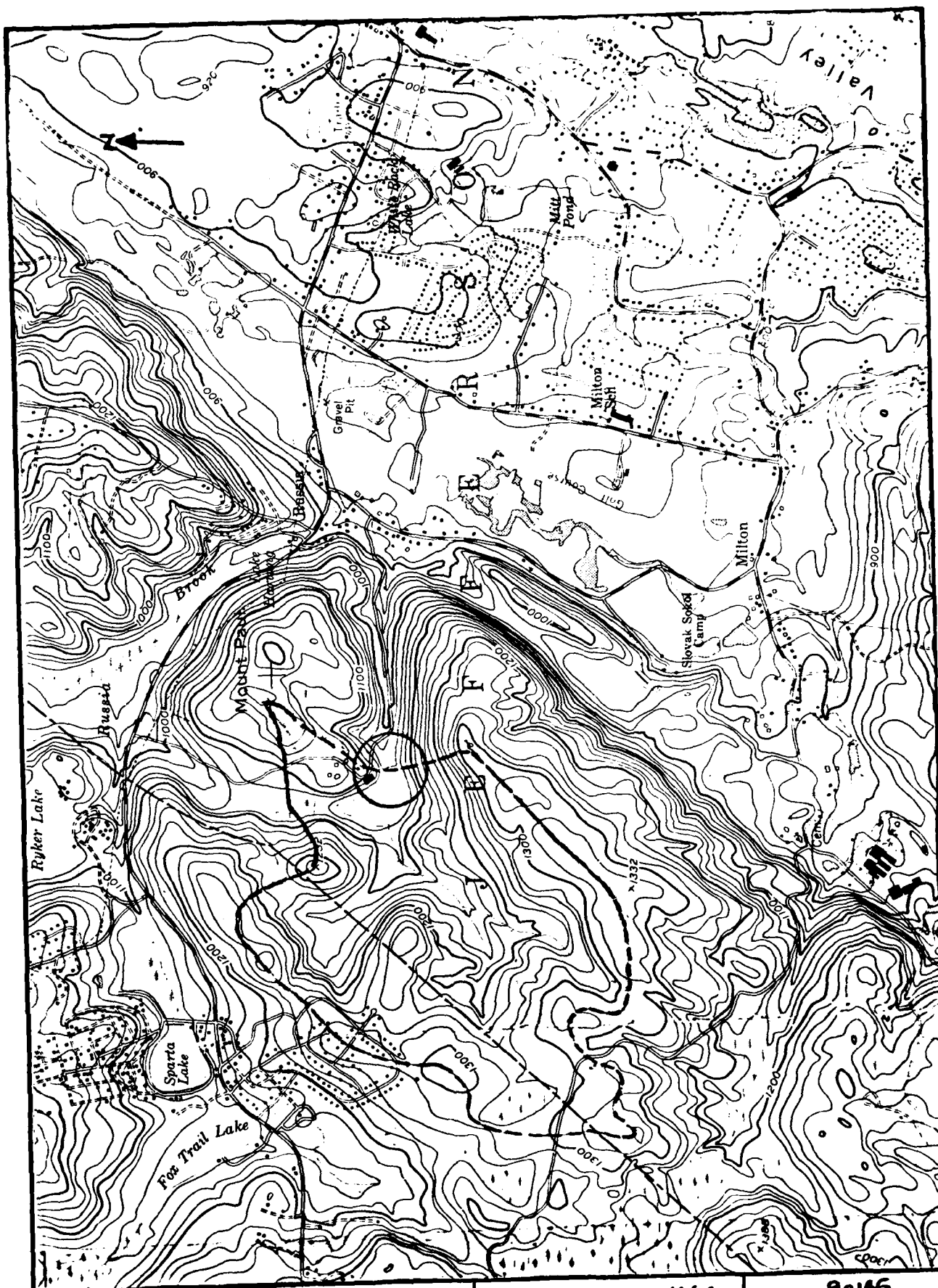
Lake Storage Capacity

Using the method of equivalent square and
a lake area of 13.77ac at normal pool (at 97.64),
a side slope of 1V:4H,
the lake storage capacity is estimated as follow:

water elev (ft)	length of equiv. sq (ft)	Area (ac)	ΔH (ft)	Increment Volume	Volume (ac-ft)
97.64	774.48	13.77			
95	753.36	13.03	2.64	35.38	244.62
90	713.36	11.68	5	61.78	209.24
85	673.36	10.40	5	55.20	147.46
80	633.36	9.21	5	49.03	92.26
75	593.36	8.08	5	43.23	43.23

$\therefore$ Normal Pool Total Volume = 245 ac

BY Dry DATE MAY 81 JOB NO. 80165
CKD RWG DATE MAY 27 81 SHEET NO. 11 OF



DRAINAGE BASIN	MAP SOURCE <u>USGS</u>	PROJ NO <u>80145</u>
NONAME SI DAM	FRANKLIN SCALE: 1"=200'	SHEET _____ OF _____

LANGAN ENGINEERING ASSOCIATES, INC.

HEC-1 OUTPUTS

NO NAME 51

NJ51001 15150 MAY 20, '81

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

1 A1 NJ NUNAMES1 (00823)
2 A2 INFLOW HYDROGRAPHY AND ROUTING
3 A3 N.J. DAM INSPECTION
4 B 290 0 10 0 0 0 0 0 0 0
5 B1 3
6 K 0 1
7 K1 COMPUTE HYDROGRAPH
8 K 1 2 0.84 .80
9 P 0 22.0 112 123 132 142
10 T
11 W2 0.94
12 X -2 1
13 K 1 2
14 K1 ROUTING COMPUTATIONS
15 Y
16 Y1 1
17 Y4 97.64 97.80 97.89 98.00 98.56 98.75 98.89 99.00 99.50 100.00
18 Y4100.15 100.74 102.00 104.00 106.00
19 Y5 0 1.0 3.1 28.5 47.2 57.8 67.1 118.3 175.7
20 Y5 194.0 730.8 2539.7 4904.4 12683.4
21 SA 13.77 13.87 14.16 14.45 14.49 14.74 15.04 15.64 16.25
22 SE 97.64 98.00 99.00 100.00 100.15 101.00 102.00 104.00 106.00
23 SS 97.64
24 SB100.15
25 K 99

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
ROUTE HYDROGRAPH TO 2
END OF NETWORK

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

RUN DATE# 81/05/20.
TIME# 15.39.46.

NJ NUNAMES1 (00823)
INFLOW HYDROGRAPHY AND ROUTING
N.J. DAM INSPECTION

NO	MHR	MMIN	IDAY	JOB SPECIFICATION				IPLT	IPRY	NSTAN
				IHR	LMIN	MTRC	TRACE			
290	0	10	0	0	0	0	0	0	0	0
			JOPEK	NMT	LKUP	TRACE				
			3	0	0	0				

SUB-AREA RUNOFF COMPUTATION

COMPUTE HYDROGRAPH

ISTAQ 1 ICOMP 0 IECON 0 IJTAPE 0 JPLY 0 JPKY 0 INAME 1 ISTAGE 0 IAUTO 0

HYDROGRAPH DATA

INHYDG 1 IUNG 2 TAREA .84 SHAP 0.00 TRSDA .84 TRSPC 0.0000 NATJO 0 ISNOW 0 ISAME 0 LOCAL 0

PRECIP DATA

SPFE PMS 22.00 R6 112.00 K12 123.00 R24 132.00 K48 142.00 R72 0.00 R96 0.00

LOSS DATA

LROPT 0 STKR DLTKR RTIOL 1.00 ERAIN 0.00 STKRS RTIOL 1.00 STRIL CNSTL .15 ALSMX 0.00 RTIMP 0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAB= .94

RECESSION DATA

STRTQ= -2.00 NRCSN= 0.00 RTIUR= 1.00

UNIT HYDROGRAPH 30 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= .94 VOL= 1.00
 29. 88. 179. 294. 372. 396. 383. 340. 283. 211.
 157. 120. 94. 73. 55. 42. 32. 25. 19. 15.
 11. 9. 7. 5. 4. 3. 2. 2. 1. 0.

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.00	0.00	.00	1.02	.20	146	.02	0.00	.02	.02	2.
1.01	.20	2	.00	0.00	.00	1.02	.30	147	.02	0.00	.02	.02	2.
1.01	.30	3	.00	0.00	.00	1.02	.40	148	.02	0.00	.02	.02	2.
1.01	.40	4	.00	0.00	.00	1.02	.50	149	.02	0.00	.02	.02	2.
1.01	.50	5	.00	0.00	.00	1.02	1.00	150	.02	0.00	.02	.02	2.
1.01	1.00	6	.00	0.00	.00	1.02	1.10	151	.02	0.00	.02	.02	2.
1.01	1.10	7	.00	0.00	.00	1.02	1.20	152	.02	0.00	.02	.02	2.
1.01	1.20	8	.00	0.00	.00	1.02	1.30	153	.02	0.00	.02	.02	2.
1.01	1.30	9	.00	0.00	.00	1.02	1.40	154	.02	0.00	.02	.02	2.
1.01	1.40	10	.00	0.00	.00	1.02	1.50	155	.02	0.00	.02	.02	2.
1.01	1.50	11	.00	0.00	.00	1.02	2.00	156	.02	0.00	.02	.02	2.
1.01	2.00	12	.00	0.00	.00	1.02	2.10	157	.02	0.00	.02	.02	2.
1.01	2.10	13	.00	0.00	.00	1.02	2.20	158	.02	0.00	.02	.02	2.
1.01	2.20	14	.00	0.00	.00	1.02	2.30	159	.02	0.00	.02	.02	2.
1.01	2.30	15	.00	0.00	.00	1.02	2.40	160	.02	0.00	.02	.02	2.
1.01	2.40	16	.00	0.00	.00	1.02	2.50	161	.02	0.00	.02	.02	2.
1.01	2.50	17	.00	0.00	.00	1.02	3.00	162	.02	0.00	.02	.02	2.
1.01	3.00	18	.00	0.00	.00	1.02	3.10	163	.02	0.00	.02	.02	2.
1.01	3.10	19	.00	0.00	.00	1.02	3.20	164	.02	0.00	.02	.02	2.
1.01	3.20	20	.00	0.00	.00	1.02	3.30	165	.02	0.00	.02	.02	2.
1.01	3.30	21	.00	0.00	.00	1.02	3.40	166	.02	0.00	.02	.02	2.
1.01	3.40	22	.00	0.00	.00	1.02	3.50	167	.02	0.00	.02	.02	2.
1.01	3.50	23	.00	0.00	.00	1.02	4.00	168	.02	0.00	.02	.02	2.
1.01	4.00	24	.00	0.00	.00	1.02	4.10	169	.02	0.00	.02	.02	2.
1.01	4.10	25	.00	0.00	.00	1.02	4.20	170	.02	0.00	.02	.02	2.
1.01	4.20	26	.00	0.00	.00	1.02	4.30	171	.02	0.00	.02	.02	2.
1.01	4.30	27	.00	0.00	.00	1.02	4.40	172	.02	0.00	.02	.02	2.
1.01	4.40	28	.00	0.00	.00	1.02	4.50	173	.02	0.00	.02	.02	2.
1.01	4.50	29	.00	0.00	.00	1.02	5.00	174	.02	0.00	.02	.02	2.
1.01	5.00	30	.00	0.00	.00	1.02	5.10	175	.02	0.00	.02	.02	2.
1.01	5.10	31	.00	0.00	.00	1.02	5.20	176	.02	0.00	.02	.02	2.
1.01	5.20	32	.00	0.00	.00	1.02	5.30	177	.02	0.00	.02	.02	2.
1.01	5.30	33	.00	0.00	.00	1.02	5.40	178	.02	0.00	.02	.02	2.

[illegible]

1.01	18.30	77	.03	.01	.03	.03	77	1.02	18.30	245	.46	.73	.03	2974.
1.01	18.40	100	.03	.01	.03	.03	102	1.02	16.50	245	.46	.43	.03	2974.
1.01	18.50	101	.03	.01	.03	.03	98	1.02	17.00	246	.46	.43	.03	2704.
1.01	19.00	102	.03	.01	.03	.03	89	1.02	17.10	247	.36	.34	.03	2396.
1.01	19.10	103	.03	.00	.03	.03	77	1.02	17.20	248	.36	.34	.03	2145.
1.01	19.20	104	.03	.00	.03	.03	65	1.02	17.30	249	.36	.34	.03	1952.
1.01	19.30	105	.03	.00	.03	.03	54	1.02	17.40	250	.36	.34	.03	1796.
1.01	19.40	106	.03	.00	.03	.03	48	1.02	17.50	251	.36	.34	.03	1659.
1.01	19.50	107	.03	.00	.03	.03	41	1.02	18.00	252	.36	.34	.03	1540.
1.01	20.00	108	.03	.00	.03	.03	35	1.02	18.10	253	.03	.00	.03	1432.
1.01	20.10	109	.03	.00	.00	.00	29	1.02	18.20	254	.03	.00	.03	1323.
1.01	20.20	110	.00	.00	.00	.00	24	1.02	18.30	255	.03	.00	.03	1200.
1.01	20.30	111	.00	.00	.00	.00	20	1.02	18.40	256	.03	.00	.03	1053.
1.01	20.40	112	.00	.00	.00	.00	17	1.02	18.50	257	.03	.00	.03	893.
1.01	20.50	113	.00	.00	.00	.00	14	1.02	19.00	258	.03	.00	.03	732.
1.01	20.60	114	.00	.00	.00	.00	11	1.02	19.10	259	.03	.00	.03	582.
1.01	20.70	115	.00	.00	.00	.00	9	1.02	19.20	260	.03	.00	.03	452.
1.01	20.80	116	.00	.00	.00	.00	8	1.02	19.30	261	.03	.00	.03	345.
1.01	20.90	117	.00	.00	.00	.00	6	1.02	19.40	262	.03	.00	.03	265.
1.01	21.00	118	.00	.00	.00	.00	5	1.02	19.50	263	.03	.00	.03	205.
1.01	21.10	119	.00	.00	.00	.00	4	1.02	20.00	264	.03	.00	.03	159.
1.01	21.20	120	.00	.00	.00	.00	4	1.02	20.10	265	.03	.00	.03	122.
1.01	21.30	121	.00	.00	.00	.00	3	1.02	20.20	266	.03	.00	.03	93.
1.01	21.40	122	.00	.00	.00	.00	3	1.02	20.30	267	.03	.00	.03	71.
1.01	21.50	123	.00	.00	.00	.00	2	1.02	20.40	268	.03	.00	.03	54.
1.01	21.60	124	.00	.00	.00	.00	2	1.02	20.50	269	.03	.00	.03	43.
1.01	21.70	125	.00	.00	.00	.00	2	1.02	21.00	270	.03	.00	.03	34.
1.01	21.80	126	.00	.00	.00	.00	2	1.02	21.10	271	.03	.00	.03	27.
1.01	21.90	127	.00	.00	.00	.00	2	1.02	21.20	272	.03	.00	.03	22.
1.01	22.00	128	.00	.00	.00	.00	2	1.02	21.30	273	.03	.00	.03	18.
1.01	22.10	129	.00	.00	.00	.00	2	1.02	21.40	274	.03	.00	.03	15.
1.01	22.20	130	.00	.00	.00	.00	2	1.02	21.50	275	.03	.00	.03	12.
1.01	22.30	131	.00	.00	.00	.00	2	1.02	22.00	276	.03	.00	.03	11.
1.01	22.40	132	.00	.00	.00	.00	2	1.02	22.10	277	.03	.00	.03	9.
1.01	22.50	133	.00	.00	.00	.00	2	1.02	22.20	278	.03	.00	.03	8.
1.01	22.60	134	.00	.00	.00	.00	2	1.02	22.30	279	.03	.00	.03	7.
1.01	22.70	135	.00	.00	.00	.00	2	1.02	22.40	280	.03	.00	.03	7.
1.01	22.80	136	.00	.00	.00	.00	2	1.02	22.50	281	.03	.00	.03	6.
1.01	22.90	137	.00	.00	.00	.00	2	1.02	23.00	282	.03	.00	.03	6.
1.01	23.00	138	.00	.00	.00	.00	2	1.02	23.10	283	.03	.00	.03	6.
1.01	23.10	139	.00	.00	.00	.00	2	1.02	23.20	284	.03	.00	.03	6.
1.01	23.20	140	.00	.00	.00	.00	2	1.02	23.30	285	.03	.00	.03	6.
1.01	23.30	141	.00	.00	.00	.00	2	1.02	23.40	286	.03	.00	.03	6.
1.01	23.40	142	.00	.00	.00	.00	2	1.02	23.50	287	.03	.00	.03	6.
1.01	23.50	143	.00	.00	.00	.00	2	1.03	0.00	288	.03	.00	.03	6.
1.02	0.00	144	.00	.00	.00	.00	2	1.03	.10	289	0.00	0.00	0.00	6.
1.02	.10	145	.02	.00	.02	.02	2	1.03	.20	290	0.00	0.00	0.00	6.

SUM 24.99 20.22 4.77 66231.
(635.)(514.)(121.)(1875.45)

PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
3243.	1610.	451.	228.	66183.
92.	46.	13.	6.	1874.
	17.83	19.97	20.36	20.36
	452.85	507.12	517.12	517.12
	798.	894.	912.	912.
	985.	1103.	1124.	1124.

HYDROGRAPH UNITING

ROUTING COMPUTATIONS

STAGE	97.64	100.15	0.00	194.00	14.	5.	98.	CREL	SPWID	COGW	EXPW	ELEV	COOL	CAREA	EXPL	STAGE	99.50	118.30
FLOW	97.80	100.74	0.00	730.80	14.	5.	98.	97.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.00	99.50	118.30
SURFACE AREA	97.89	102.00	0.00	2539.70	14.	5.	98.	97.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.00	99.50	118.30
CAPACITY	97.89	102.00	0.00	2539.70	14.	5.	98.	97.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.00	99.50	118.30
ELEVATION	97.89	102.00	0.00	2539.70	14.	5.	98.	97.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.00	99.50	118.30

DAM DATA
TOPEL 100.2
COUD 0.0
EXPW 0.0
ELEV 0.0
COOL 0.0
CAREA 0.0
EXPL 0.0

END-OF-PERIOD HYDROGRAPH URDINATES

MO.DA	WK.MN	PERIOD	HOURS	INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.10	1	.17	2.	0.	0.	97.6
1.01	.20	2	.33	2.	0.	0.	97.6
1.01	.30	3	.50	2.	0.	0.	97.6
1.01	.40	4	.67	2.	0.	0.	97.6
1.01	.50	5	.83	2.	0.	0.	97.6
1.01	1.00	6	1.00	2.	0.	0.	97.6
1.01	1.10	7	1.17	2.	0.	0.	97.7
1.01	1.20	8	1.33	2.	0.	0.	97.7
1.01	1.30	9	1.50	2.	0.	0.	97.7
1.01	1.40	10	1.67	2.	0.	0.	97.7
1.01	1.50	11	1.83	2.	0.	0.	97.7
1.01	2.00	12	2.00	2.	0.	0.	97.7
1.01	2.10	13	2.17	2.	0.	0.	97.7
1.01	2.20	14	2.33	2.	0.	0.	97.7
1.01	2.30	15	2.50	2.	0.	0.	97.7
1.01	2.40	16	2.67	2.	0.	0.	97.7
1.01	2.50	17	2.83	2.	0.	0.	97.7
1.01	3.00	18	3.00	2.	0.	0.	97.7
1.01	3.10	19	3.17	2.	0.	0.	97.7
1.01	3.20	20	3.33	2.	0.	0.	97.7
1.01	3.30	21	3.50	2.	0.	0.	97.7
1.01	3.40	22	3.67	2.	0.	0.	97.7
1.01	3.50	23	3.83	2.	0.	1.	97.7
1.01	4.00	24	4.00	2.	0.	1.	97.7
1.01	4.10	25	4.17	2.	0.	1.	97.7
1.01	4.20	26	4.33	2.	0.	1.	97.7
1.01	4.30	27	4.50	2.	0.	1.	97.7
1.01	4.40	28	4.67	2.	0.	1.	97.7
1.01	4.50	29	4.83	2.	0.	1.	97.7
1.01	5.00	30	5.00	2.	0.	1.	97.7
1.01	5.10	31	5.17	2.	0.	1.	97.7
1.01	5.20	32	5.33	2.	0.	1.	97.7

1.01	5.30	33	5.30	2.	0.	1.	97.7
1.01	5.40	34	5.47	2.	0.	1.	97.7
1.01	5.50	35	5.83	2.	0.	1.	97.7
1.01	6.00	36	6.00	2.	0.	1.	97.7
1.01	6.10	37	6.17	2.	0.	1.	97.7
1.01	6.20	38	6.33	2.	0.	1.	97.7
1.01	6.30	39	6.50	2.	0.	1.	97.7
1.01	6.40	40	6.67	2.	0.	1.	97.7
1.01	6.50	41	6.83	2.	0.	1.	97.7
1.01	7.00	42	7.00	2.	0.	1.	97.7
1.01	7.10	43	7.17	2.	0.	1.	97.7
1.01	7.20	44	7.33	2.	0.	1.	97.7
1.01	7.30	45	7.50	2.	0.	1.	97.7
1.01	7.40	46	7.67	2.	0.	1.	97.7
1.01	7.50	47	7.83	2.	0.	1.	97.7
1.01	8.00	48	8.00	2.	0.	1.	97.7
1.01	8.10	49	8.17	2.	0.	1.	97.7
1.01	8.20	50	8.33	2.	0.	1.	97.7
1.01	8.30	51	8.50	2.	0.	1.	97.7
1.01	8.40	52	8.67	2.	0.	1.	97.7
1.01	8.50	53	8.83	2.	0.	1.	97.7
1.01	9.00	54	9.00	2.	0.	1.	97.7
1.01	9.10	55	9.17	2.	0.	1.	97.7
1.01	9.20	56	9.33	2.	0.	1.	97.7
1.01	9.30	57	9.50	2.	0.	1.	97.7
1.01	9.40	58	9.67	2.	0.	1.	97.7
1.01	9.50	59	9.83	2.	0.	1.	97.7
1.01	10.00	60	10.00	2.	0.	1.	97.7
1.01	10.10	61	10.17	2.	0.	1.	97.7
1.01	10.20	62	10.33	2.	0.	1.	97.7
1.01	10.30	63	10.50	2.	0.	1.	97.7
1.01	10.40	64	10.67	2.	0.	1.	97.7
1.01	10.50	65	10.83	2.	0.	1.	97.7
1.01	11.00	66	11.00	2.	0.	1.	97.7
1.01	11.10	67	11.17	2.	0.	1.	97.7
1.01	11.20	68	11.33	2.	0.	1.	97.7
1.01	11.30	69	11.50	2.	0.	1.	97.7
1.01	11.40	70	11.67	2.	0.	1.	97.7
1.01	11.50	71	11.83	2.	0.	1.	97.7
1.01	12.00	72	12.00	2.	0.	1.	97.7
1.01	12.10	73	12.17	2.	0.	2.	97.7
1.01	12.20	74	12.33	2.	0.	2.	97.8
1.01	12.30	75	12.50	2.	0.	2.	97.8
1.01	12.40	76	12.67	2.	0.	2.	97.8
1.01	12.50	77	12.83	2.	0.	2.	97.8
1.01	13.00	78	13.00	2.	0.	2.	97.8
1.01	13.10	79	13.17	2.	0.	2.	97.8
1.01	13.20	80	13.33	2.	0.	2.	97.8
1.01	13.30	81	13.50	2.	0.	2.	97.8
1.01	13.40	82	13.67	2.	0.	2.	97.8
1.01	13.50	83	13.83	2.	0.	2.	97.8
1.01	14.00	84	14.00	2.	0.	2.	97.8
1.01	14.10	85	14.17	2.	0.	2.	97.8
1.01	14.20	86	14.33	2.	0.	2.	97.8
1.01	14.30	87	14.50	2.	0.	2.	97.8
1.01	14.40	88	14.67	2.	0.	2.	97.8
1.01	14.50	89	14.83	2.	0.	2.	97.8
1.01	15.00	90	15.00	2.	0.	2.	97.8
1.01	15.10	91	15.17	2.	0.	2.	97.8
1.01	15.20	92	15.33	2.	0.	2.	97.8
1.01	15.30	93	15.50	2.	0.	2.	97.8
1.01	15.40	94	15.67	7.	0.	2.	97.8
1.01	15.50	95	15.83	19.	0.	2.	97.8
1.01	16.00	96	16.00	34.	1.	2.	97.8
1.01	16.10	97	16.17	44.	1.	3.	97.9
1.01	16.20	98	16.33	NA.	2.	4.	97.9

1.01	16.30	77	16.30	77.	5.	78.0
1.01	16.40	100	16.47	102.	9.	78.1
1.01	16.50	101	16.83	98.	8.	78.2
1.01	17.00	102	17.00	89.	9.	78.3
1.01	17.10	103	17.17	77.	10.	78.4
1.01	17.20	104	17.33	65.	11.	78.4
1.01	17.30	105	17.50	56.	11.	78.4
1.01	17.40	106	17.67	48.	12.	78.5
1.01	17.50	107	17.83	41.	12.	78.5
1.01	18.00	108	18.00	35.	12.	78.5
1.01	18.10	109	18.17	29.	12.	78.5
1.01	18.20	110	18.33	24.	12.	78.5
1.01	18.30	111	18.50	20.	12.	78.5
1.01	18.40	112	18.67	17.	12.	78.5
1.01	18.50	113	18.83	14.	12.	78.5
1.01	19.00	114	19.00	11.	12.	78.5
1.01	19.10	115	19.17	9.	11.	78.5
1.01	19.20	116	19.33	8.	11.	78.4
1.01	19.30	117	19.50	6.	11.	78.4
1.01	19.40	118	19.67	5.	11.	78.4
1.01	19.50	119	19.83	4.	11.	78.4
1.01	20.00	120	20.00	4.	10.	78.4
1.01	20.10	121	20.17	3.	10.	78.4
1.01	20.20	122	20.33	3.	10.	78.3
1.01	20.30	123	20.50	2.	10.	78.3
1.01	20.40	124	20.67	2.	9.	78.3
1.01	20.50	125	20.83	2.	9.	78.3
1.01	21.00	126	21.00	2.	9.	78.3
1.01	21.10	127	21.17	2.	9.	78.3
1.01	21.20	128	21.33	2.	9.	78.3
1.01	21.30	129	21.50	2.	8.	78.2
1.01	21.40	130	21.67	2.	8.	78.2
1.01	21.50	131	21.83	2.	8.	78.2
1.01	22.00	132	22.00	2.	8.	78.2
1.01	22.10	133	22.17	2.	8.	78.2
1.01	22.20	134	22.33	2.	8.	78.2
1.01	22.30	135	22.50	2.	8.	78.2
1.01	22.40	136	22.67	2.	7.	78.2
1.01	22.50	137	22.83	2.	7.	78.2
1.01	23.00	138	23.00	2.	7.	78.2
1.01	23.10	139	23.17	2.	7.	78.1
1.01	23.20	140	23.33	2.	7.	78.1
1.01	23.30	141	23.50	2.	7.	78.1
1.01	23.40	142	23.67	2.	7.	78.1
1.01	23.50	143	23.83	2.	7.	78.1
1.02	0.00	144	24.00	2.	6.	78.1
1.02	.10	145	24.17	2.	6.	78.1
1.02	.20	146	24.33	2.	6.	78.1
1.02	.30	147	24.50	2.	6.	78.1
1.02	.40	148	24.67	2.	6.	78.1
1.02	.50	149	24.83	2.	6.	78.1
1.02	1.00	150	25.00	2.	6.	78.1
1.02	1.10	151	25.17	2.	6.	78.1
1.02	1.20	152	25.33	2.	6.	78.1
1.02	1.30	153	25.50	2.	6.	78.1
1.02	1.40	154	25.67	2.	6.	78.1
1.02	1.50	155	25.83	2.	6.	78.1
1.02	2.00	156	26.00	2.	6.	78.1
1.02	2.10	157	26.17	2.	5.	78.0
1.02	2.20	158	26.33	2.	5.	78.0
1.02	2.30	159	26.50	2.	5.	78.0
1.02	2.40	160	26.67	2.	5.	78.0
1.02	2.50	161	26.83	2.	5.	78.0
1.02	3.00	162	27.00	2.	5.	78.0
1.02	3.10	163	27.17	2.	4.	78.0
1.02	3.20	164	27.33	2.	4.	78.0

1.02	3.40	166	27.67	4.	7.	5.	98.0
1.02	3.50	167	27.83	2.	4.	5.	98.0
1.02	4.00	168	28.00	2.	4.	5.	98.0
1.02	4.10	169	28.17	2.	4.	5.	98.0
1.02	4.20	170	28.33	2.	4.	5.	98.0
1.02	4.30	171	28.50	2.	4.	5.	98.0
1.02	4.40	172	28.67	2.	4.	5.	98.0
1.02	4.50	173	28.83	2.	3.	5.	98.0
1.02	5.00	174	29.00	2.	3.	5.	98.0
1.02	5.10	175	29.17	2.	3.	5.	98.0
1.02	5.20	176	29.33	2.	3.	5.	98.0
1.02	5.30	177	29.50	2.	3.	5.	98.0
1.02	5.40	178	29.67	2.	3.	5.	98.0
1.02	5.50	179	29.83	2.	3.	5.	98.0
1.02	6.00	180	30.00	2.	3.	5.	98.0
1.02	6.10	181	30.17	3.	3.	5.	98.0
1.02	6.20	182	30.33	5.	3.	5.	98.0
1.02	6.30	183	30.50	10.	3.	5.	98.0
1.02	6.40	184	30.67	19.	4.	5.	98.0
1.02	6.50	185	30.83	29.	5.	5.	98.0
1.02	7.00	186	31.00	41.	6.	6.	98.1
1.02	7.10	187	31.17	52.	8.	6.	98.1
1.02	7.20	188	31.33	62.	10.	7.	98.1
1.02	7.30	189	31.50	70.	12.	8.	98.2
1.02	7.40	190	31.67	76.	15.	9.	98.3
1.02	7.50	191	31.83	80.	18.	9.	98.3
1.02	8.00	192	32.00	84.	20.	10.	98.4
1.02	8.10	193	32.17	86.	23.	11.	98.4
1.02	8.20	194	32.33	89.	26.	12.	98.5
1.02	8.30	195	32.50	90.	29.	13.	98.6
1.02	8.40	196	32.67	91.	35.	14.	98.6
1.02	8.50	197	32.83	92.	40.	14.	98.7
1.02	9.00	198	33.00	93.	45.	15.	98.7
1.02	9.10	199	33.17	94.	49.	16.	98.8
1.02	9.20	200	33.33	94.	52.	16.	98.8
1.02	9.30	201	33.50	94.	55.	17.	98.9
1.02	9.40	202	33.67	95.	58.	17.	98.9
1.02	9.50	203	33.83	95.	61.	18.	98.9
1.02	10.00	204	34.00	95.	64.	18.	99.0
1.02	10.10	205	34.17	95.	66.	19.	99.0
1.02	10.20	206	34.33	95.	69.	19.	99.0
1.02	10.30	207	34.50	95.	71.	20.	99.0
1.02	10.40	208	34.67	95.	73.	20.	99.1
1.02	10.50	209	34.83	95.	75.	20.	99.1
1.02	11.00	210	35.00	95.	77.	20.	99.1
1.02	11.10	211	35.17	95.	79.	21.	99.1
1.02	11.20	212	35.33	95.	81.	21.	99.1
1.02	11.30	213	35.50	95.	82.	21.	99.1
1.02	11.40	214	35.67	95.	83.	21.	99.2
1.02	11.50	215	35.83	95.	84.	21.	99.2
1.02	12.00	216	36.00	95.	85.	22.	99.2
1.02	12.10	217	36.17	103.	87.	22.	99.2
1.02	12.20	218	36.33	127.	89.	22.	99.2
1.02	12.30	219	36.50	177.	95.	23.	99.3
1.02	12.40	220	36.67	257.	107.	24.	99.4
1.02	12.50	221	36.83	360.	127.	27.	99.6
1.02	13.00	222	37.00	468.	157.	31.	99.8
1.02	13.10	223	37.17	576.	202.	36.	100.2
1.02	13.20	224	37.33	675.	202.	40.	100.4
1.02	13.30	225	37.50	764.	415.	42.	100.6
1.02	13.40	226	37.67	842.	727.	44.	100.7
1.02	13.50	227	37.83	909.	845.	45.	100.8
1.02	14.00	228	38.00	968.	920.	46.	100.9
1.02	14.10	229	38.17	1022.	900.	47.	100.9
1.02	14.20	230	38.33	1075.	1014.	47.	101.0

INCHES
 MM
 AC-FT
 THOUS CU M

17.75	19.82	20.08	20.08
450.78	503.51	509.92	509.92
795.	888.	899.	899.
980.	1095.	1109.	1109.

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND) AREA IN SQUARE MILES(SQUARE KILOMETERS)

	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT 1	3243.	1610.	451.	228.	.84
(91.84)(	45.59)(	12.76)(	6.46)(	2.18)	
ROUTED TO 2	3209.	1603.	448.	225.	.84
(90.86)(	45.38)(	12.67)(	6.37)(	2.18)	

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION STORAGE	97.64	97.64	100.15
OUTFLOW	0.	0.	35.
	0.	0.	194.

	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
RATIO OF PHF	0.00	102.31	67.	3209.	40.67	0.00

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

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

1	2
BRUNOFF HYDROGRAPH AT	
ROUTE HYDROGRAPH TO	
END OF NETWORK	

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAN SAFETY VERSION JULY 1978

LAST MODIFICATION 24 FEB 79

RUN DATE# 01/05/20.
TIME# 15.50.15.

NJ NUNAMES1 (00823)
INFLDW HYDROGRAPHY AND ROUTING
H.J. DAM INSPECTION

ND	NHR	NMIN	IDAY	JOB SPECIFICATION					IPLT	XPRT	NSTAN
990	0	10	0	INR	IMIN	METRC		0	0	4	0
			JOPER	NWT	LRUPT	TRACE					
			S	0	0	0		0			

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

[illegible]

SUB-AREA KIMOFF COMPUTATION

COMPUTE HYDROGRAPH

IBTAN	ICOMP	IECON	ITAPE	JPLY	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INVT00	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	YSNOW	YSAME	LOCAL
1	2	.84	0.00	.84	.80	0.000	0	0	0

```
PRECIP DATA      K6      K24
R12
```

LROPT	0	HTKR	0.00	DLTKR	0.00	NTIUL	1.00	ERAIN	0.00	STRKS	0.00	NYIDK	1.00	HTKYL	1.00	CHNLT	.15	ALSMX	0.00	NTIMP	0.00
LDOS DATA																					

THE UNIVERSITY OF CHICAGO

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

OPERATION	STATION	AREA	PLAN	RATIO	RATIOS APPLIED TO FLOWS				
					RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5
					.10	.20	.30	.40	.50
HYDROGRAPH AT	1	.84	1	324.	649.	973.	1297.	1622.	
	(	2.18)	(	9.18)	(18.37)	(27.55)	(36.74)	(45.92)	(
ROUTED TO	2	.84	1	240.	625.	958.	1278.	1597.	
	(	2.18)	(	6.80)	(17.69)	(27.11)	(36.18)	(45.21)	(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1				INITIAL VALUE	SPILLWAY CREST	TOP OF DAM		
				97.64	97.64	100.15		
				0.	0.	35.		
				0.	0.	194.		
RATIO OF PHF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS		
.10	100.20	.05	36.	240.	.83	41.17	0.00	
.20	100.62	.47	42.	625.	3.17	40.67	0.00	
.30	100.90	.75	46.	958.	4.50	40.67	0.00	
.40	101.12	.97	50.	1278.	5.33	40.67	0.00	
.50	101.34	1.19	53.	1597.	5.67	40.67	0.00	

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

APPENDIX 4
REFERENCES

REFERENCES

1. Brater, Ernest F. and Kings, Horace W. Handbook of Hydraulics, 5th Edition, Mc-Graw-Hill Book Company 1963.
2. Sauls, G. A., Additional Hydrology and Hydraulics Guidance, 12 September 1978.
3. United States Army Corps of Engineers, Flood Hydrograph Package (HEC-I), Davis, Calif., September 1978.
4. United States Army Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams, Washington, D.C.
5. United States Department of Agriculture, Soil Conservation Service, A Method for Estimating Volume and Rate of Runoff in Small Watersheds, SCS-TP-149, Revised April 1973.
6. United States Department of Agriculture, Soil Conservation Service, Soil Survey of Sussex and Morris County, August 1975.
7. United States Department of Agriculture, Soil Conservation Service, Somerset, N. J. Urban Hydrology for Small Watersheds, Technical Release No 55, January 1975.
8. United States Department of Commerce Weather Bureau, April 1956, Hydrometeorological Report #33, Washington, D. C.
9. United States Department of Interior, Bureau of Reclamation, Design of Small Dams, Second Edition 1973, Revised print 1977.