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| 990 Clifton Ave. | |
| Clifton, N.J. 07013 | |
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NAPEN-N

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

Honorable Brendan T. Byrne Governor of New Jersey Trenton, New Jersey 08621 15 JUN 1981



Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for N.J. No Name No. 53 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 No. 53 Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 72 percent of the Probable Maximum Flood would cause the dam to be overtopped. 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 should be initiated.

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

(1) Remove all debris and vegetated growth in the flume and the discharge channel.

(2) Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

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

APPROVED FOR PUBLIC RELEASE; DISTAILUTION UNLIMITED. NAPEN-N Honorable Brandan T. Byrne

(1) Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against inture animal burrowing into the embankments.

(2) Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.

(3) Repair and provide proper protection against further erosion along the east side of the secondary dike.

(4) Repair the crest and slope of the dike in the area near the spillway.

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 and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.

(2) Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of the inspection.

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 should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within three 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 Congresswoman Fenwick of the Fifth 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,

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l Incl As stated 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 CNO29 Trenton, NJ 08625

N.J. NU NAME NO. 53 DAM (NJUU809)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 26 and 29 August and 11 and 12 November 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 No. 53 Dam, a high hazard potential structure, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 72 percent of the Probable Maximum Flood would cause the dam to be overtopped. 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 should be initiated.

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

(1) Remove all debris and vegetated growth in the flume and the discharge channel.

(2) Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

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

(1) Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments.

(2) Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.

(3) Repair and provide proper protection against further erosion along the east side of the secondary dike.

(4) Repair the crest and slope of the dike in the area near the spillway.

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 and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay. (2) Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of the inspection.

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 should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within three months from the date of approval of this report.

APPROVED: Junea

Colonel, Corps of Engineers Commander and District Engineer

DATE: NJune 1981

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

| NAME OF DAM: | NJ NO NAME 53 |
|---------------------|--------------------------------|
| ID NUMBER: | FED ID No NJ 00809 |
| STATE LOCATED: | NEW JERSEY |
| COUNTY LOCATED: | MORRIS |
| STREAM: | TRIBUTARY OF WHIPPANY RIVER |
| RIVER BASIN: | PASSAIC |
| DATE OF INSPECTION: | AUGUST & NOVEMBER 1980 |
| | |

ASSESSMENT OF GENERAL CONDITIONS

No Name 53 Dam, classified as having high hazard potential, is in fair overall condition. No evidence of seepage in the downstream embankment and no evidence of unusual movement of the embankment was observed during our inspection. However, certain deficiencies do exist in the dam and reservoir area. Brush and trees have overgrown on the lower portion of the downstream slope. Animal burrows exist in both the dam and the dike embankments. Erosion has occurred along the unprotected east side of the dike due to the existence of the stream along its toe. The surface of the dike is uneven with significant erosion occurring near the dike and spillway junction. The discharge flume structure is in a deteriorated condition and occasional obstructions exist along its channel. The discharge channel appears to have been used as a dump. The operating condition of the emergency low level outlet is uncertain and the access to the control is unsafe. There is virtually no available information on the design, construction, and operation of the dam. Additional investigation is necessary to adequately evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is inadequate for the PMF. We estimate the dam can adequately pass about 71% of the PMF.

The following are recomended to be done very soon:

Remove all debris and vegetated growth in the flume and the discharge channel. Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

The following are recommended to be done soon:

Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments. Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure. Establish a warning system. Repair and provide proper protection against further erosion along the east side of the secondary dike. Repair the crest and slope of the dike in area near the spillway. The following are recommended to be done in the near future:

Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay. Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of our inspection. The spillway capacity is estimated to be inadequate for the PMF. The SDF and the actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. If necessary, steps should be taken to increase the spillway capacity or to keep the normal pool at a lower elevation so that sufficient storage is available for the SDF.

Cl. Piterful K. Peter Yu, P.E.



29 August J4R0

NJ NO NAME 53 DAM

OVERALL VIEW

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

NAME OF DAM:

ID NUMBER:

STATE LOCATED:

COUNTY LOCATED:

STREAM:

RIVER BASIN:

DATE OF INSPECTION:

NJ NO NAME 53

FED ID No NJ 00809

NEW JERSEY

MORRIS

TRIBUTARY OF WHIPPANY RIVER

PASSAIC

AUGUST & NOVEMBER 1980



LANGAN ENGINEERING ASSOCIATES, INC.

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

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NATIONAL DAM SAFETY REPORT

NJ NO NAME 53 FED ID NO NJ 00809

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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 N.J. No Name 53 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 N.J. No Name 53 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 53 Dam is a 55-year old 350-ft long earthfill dam with a crest width of approximately 15 ft. It was reported to be 50 ft high but was field checked to be about 35 ft high. A wide berm measuring 20 ft to 70 ft exists on the downstream slope about 9 to 10 ft below the crest. The upstream slope is riprapped to within 1 ft of the crest and is approximately 3H:1V. The downstream slope is variable, typically 2H:1V above the berm and varies from about 3H:1V to 1H:1V below the berm. A concrete core wall reportedly exists in the dam.

An earth dike oriented perpendicular to the axis of the dam forms the eastern boundary of the reservoir locally known as Jockey Hollow Reservoir. The dike is about 700 ft long and 10 to 15 ft wide at the top. It is 3 to 4 ft above the channel bottom of a brook flowing along the east side of the dike. The west slope of the dike is typically 3H:1V and the east slope is about 1H:1V. The height of the dike is between 1 and 8 feet above the spillway flashboard tops at the north and south ends respectively.

A concrete spillway, 15 ft wide, connects the dam embankment and the earth dike. Discharge at the spillway is controlled by 2 l/2-in thick wood flashboards placed to 4 ft above the spillway crest. There is a 4 ft wide concrete walkway about 4 l/2 ft above the crest of the spillway. It is supported by the concrete spillway side walls. There is a concrete flume immediately below the spillway which conveys the discharge from the reservoir and the brook to a stream bed downstream of the dam.

The impounded water of Jockey Hollow Reservoir is transmitted by means of gravity flow from Clyde Potts Reservoir which is located about 9 miles to the northwest. The water enters Jockey Hollow Reservoir by means of 3 aerators located at the upstream end. A pump station is located near the southwest corner of the reservoir. This pump station is reportedly not used in relation to the reservoir but is used to divert portions of the influent water to two elevated storage tanks in the vicinity.

The capacity of the reservoir is reported to be about 23 million gallons (70 acre-ft) and is used as a municipal water supply. The water is distributed by means of gravity flow through a valved 12-inch effluent pipe located underneath the dam embankment. The control valve is located in a pit near the downstream toe of the lower embankment. A chlorination house is located about 60 ft downstream of the valve pit. Average normal daily consumption rate is reported to be 0.7 million gallons but increases to as much as 1.2 to 1.4 million gallons per day in the summer months.

An emergency low level outlet consisting of one 12-inch-dia valved pipe is reportedly located to the east of the effluent pipe. Its control valve is located at the bottom of an enclosed shaft at the north edge of the downstream berm. A 12 inch metal stand-pipe exists at about the midpoint of the upper dam embankment on the upstream side. This pipe was originally installed as an observation pipe to indicate any backwater into the reservoir from the water supply system. The pipe is reported to be nonfunctional.

The essential features of the dam are given in Figures 2 and 3.

b. Location

No Name 53 Dam is located at the north end of the reservoir which is situated approximately 1/2 mile southwesterly of Morristown on Western Avenue in Morris Township, Morris County, New Jersey. It is at north latitude 40° 47.3' and west long tude 74° 29.9'. A regional vicinity map is given in Figure 1.

c. Size Classification

No Name 53 dam is classified as being "small" on the basis of its maximum reservoir storage volume of 73 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 maximum height of 35 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 53 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 cause more than a few deaths. Visual inspection of the downstream area shows that failure of the dam would potentially cause excessive property damage and loss of life to a heavily populated area approximately -3000 ft downstream of the dam. Accordingly, it is proposed to keep the Hazard Classification as "High". e. Ownership

The dam and reservoir are owned by the Southeast Morris County Municipal Utilities Authority, 101 Western Avenue, Morristown, N. J. 07960.

f. Purpose of Dam

The present purpose of the dam is to impound water for use as municipal water supply for Morristown, N. J.

We were informed by the Municipal Utilities Authority personnel that the reservoir service will soon be replaced by two 3-million gallon tanks currently under construction. No future plan for the present reservoir has yet been established.

g. Design and construction history

A brief description on the features and history of the dam and reservoir is on file in the office of the Southeast Morris County Municipal Utilities Authority. However, no detailed design and construction history records are available.

Exhibit P-7 "Detailed Inventory and Original Cost of Property in Plan as of Dec. 31, 1971", available from the above office, describes that the reservoir was formed by an earth and concrete core wall dam and an earth dike to impound water transmitted from Clyde Potts Reservoir. The reservoir formed has a capacity of 23 million gallons with a water surface area of 4 acres. The Exhibit also indicates that a smaller distribution reservoir was constructed at the site about 1880 and was used until reconstruction work of the present dam and dike was begun in 1925 and completed in 1926.

h. Normal Operational Procedures

The normal operational procedures are limited to daily visual inspection of the reservoir and appurtenances. Routine operations consist primarily of regulating the water level in the reservoir and monitoring flow pressures of the piping system in the pump station.

1.3. Pertinent Data

a. Drainage Areas

6.5 Acres (0.01 sq mi)

b. Discharge at Damsite

Maximum known flood at damsite

Unknown

Total spillway capacity at max. pool elevation

22 cfs (Flashborad in place)

c. <u>Elevation</u> (ft)

i

| | Note: Data obtained from field measurement using El 503.13 at the crest of the spillway | |
|----|--|--|
| | Top Dam | El 508.02 (low point) |
| | Maximum pool-design surcharge | E1 508.02 (Assumed to be top of dam) |
| | Normal Pool | Ei 507.3 (Top of flash- boards) |
| | Top of flashboards over spillway crest | El 507.3 |
| | Spillway crest | El 503.13 |
| | Streambed at centerline of dam | Approx El 473 |
| | Maximum tailwater | Unknown. No water discharged from reservoir at time of inspection |
| d. | Reservoir | |
| | Length of maximum pool | Approx 705 ft |
| | Length of normal pool | Approx 700 ft |
| e. | Storage (acre-feet) | |
| | Normal | 70 Ac-ft |
| | Top of dam | 73 Ac-ft |
| f. | Reservoir Surface (acres) | |
| | Top dam | 4.06 Ac |
| | Maximum pool | 4.06 Ac (Assumed top of dam) |
| - | Normal pool (Top of flashboards) | 4 Ac |
| g٠ | Dam | |
| | Туре | Earthfill |
| | Length | 350 ft |
| | Height | 35 ft |
| | Top Width | 15 ft typical |

Side Slopes

Zoning

Impervious Core

Cutoff

Grout curtain

h. Spillway

Туре

Length of weir

Crest elevation

Gates

U/S Channel

D/S channel

i. Regulating Outlets

D/S Approx 2H:1V U/S Approx 3H:1V

Unknown

Concrete core wall reported to exist

Unknown

Unknown

Overfall; flashboard over crest of concrete weir

15 ft

El 507.3 (Top of flashboard) El 503.13 (Crest of concrete weir)

None

Concrete wing walls

Concrete discharge flume

Reported to exist: One 12-in effluent pipe for water supply. Valve in pit at downstream toe. One 12-in emergency low level outlet pipe. Valve at bottom of shaft on north edge of

downstream berm. Outlet not located.

SECTION 2 ENGINEERING DATA

There is no engineering data available concerning the design construction or operation of No Name 53 dam.

SECTION 3 VISUAL INSPECTION

No Name 53 dam is in fair overall condition. The main dam embankment on the north side and the dike on the east side of the impoundment form a reservoir which has virtually no upstream drainage area. On-site inspections were made in August and November 1980. The visual inspection check list and selected photographs are included in Appendices 1 and 2, respectively.

The portion of the dam embankment above the downstream berm is covered with grass and brush and appears in fair condition. Animal burrows in the embankment were found. The downstream embankment below the berm has slopes varying from approximately 3H:1V to 1H:1V and is vegetated with trees and brush. The upstream embankment is riprapped to within 1 ft of the crest.

The extent of the riprap below the water surface is not certain.

The earth dike along the east side of the reservoir is vegetated with brush and grass and appears in poor condition. The crest surface is uneven and significant erosion has occurred in the area near the junction of the dike and the spillway. An animal burrow was found on the crest of the dike. The stream channel which flows along the east toe of the dike is about 3 to 4 ft below the crest. There is no toe or slope protection along the east side of the dike and significant erosion has occured. The west slope of the dike is riprapped to near the normal pool level.

Cracks and spalled concrete were observed on the spillway structure. The channel floor of the discharge flume structure has deteriorated. The concrete channel linings have disintegrated in some places and trees and brush grow out of the channel floor. The discharge flume and channel are obstructed by much debris including sand, scattered boulders, piles of asphalt, and metal pipes. The channel appears to be have been used as a dump.

All reservoir slopes are riprapped to about normal pool level. Moderate siltation was observed upstream of the spillway.

SECTION 4 OPERATIONAL PROCEDURES

Operational procedures are reported to include daily visual inspection of the reservoir and appurtenances. Routine operations consist primarily of regulating the water level in the reservoir and monitoring flow pressures of the piping system in the pump station. The normal pool is maintained at or just below the top of the flashboards (el 507.3).

Maintenance of the dam is limited to grass cutting and landscaping care. Repairs on appurtenances are made as determined to be necessary.

No warning system for the dam and reservoir is known to exist.

SECTION 5 HYDRAULIC/HYDROLOGIC

No Name 53 dam and reservoir have virtually no upstream drainage area. The catchment area involves the reservoir surface and a relatively small strip of ground around it. However, due to the limited available freeboard (0.72 ft) above the normal pool, the reservoir has insufficient storage capacity for the Probable Maximum Precipitation (PMP). Therefore, a reservoir routing was performed.

The hydraulic/hydrologic evaluation is based on a Spillway Design Flood (SDF) equal to the full Probable Maximum Flood (PMF) chosen in accordance with the recommended guidelines for a dam classified as high hazard and small in size. Hydrologic design data for this dam was not available. The PMF has been determined by the PMP of 22.3 inches (200 sq. mi. - 24 hour). The PMP was directly converted to an inflow hydrograph and a routing was performed. Hydrologic computations are presented in Appendix 3. The PMF peak inflow determined for the subject watershed is 50 cfs.

The capacity of the spillway at pool elevation equal to the low point of the dam embankment (El 508.02) is 22 cfs which is less than the SDF. Flood routing indicates the dam will overtop by approximately 0.06 ft for the PMF and is inadequate. We estimate the dam can adequately pass about 71% of the PMF.

The drawdown facilities include the 12-inch dia water supply effluent pipe, which is continuously operating, and the 12-inch dia emergency low level outlet.

The operational condition of the emergency outlet is not certain. Drawdown of the reservoir has been evaluated assuming that both pipes are in operating condition and the flashboard of the spillway is in place to keep a normal pool at el 507.3. Our calculations indicate that the lake level could be lowered 5 ft in about 1 1/2 days and 10 ft in about 2 1/2 days.

SECTION 6 STRUCTURAL STABILITY

Our visual observations indicate no evidence of immediate instability of the embankments exist under normal operating conditions. However, the downstream slope of the main dam appears to be steep in some areas but no evidence of unusual movement or seepage was observed. The existence of the reported concrete core wall has not been physically verified and its vertical and longitudinal extent is unknown. The alignment of the dike along the east side of the reservoir indicates an unsatisfactory condition. There is erosion occuring along the entire unprotected east slope of the dike where a stream flows.

No engineering data concerning the design and construction of the dam or the engineering properties of the dam and foundation materials is available. There is also no knowledge on any post construction changes. No operating records other than water level elevations have been kept.

Due to lack of engineering information, analysis of the degree of stability of the dam cannot be made without gross assumptions as to the engineering properties of the dam and foundation materials.

The dam is located in Seismic Zone I of the Seismic Zone Map of the Contiguous States. Due to the steep downstream slope and the poor condition of the discharge flume structure, the dam embankment and the spillway structure may be unstable under earthquake loading and such conditions should be further evaluated.

SECTION 7 ASSESSMENT, RECOMMENDATION/REMEDIAL MEASURES

7.1 Dam Assessment

No Name 53 Dam is in fair overall condition. No evidence of seepage in the downstream embankment and no evidence of unusual movement of the embankment was observed during our inspection. However, certain deficiencies do exist in the dam and reservoir area.

Brush and trees have overgrown on the lower portion of the downstream slope. Animal burrows exist in both the dam and the dike embankment. Erosion has occurred along the unprotected east side of the dike due to the existence of the stream along its toe. The surface of the dike is uneven with significant erosion occurring near the dike and spillway junction.

The discharge flume structure is in a deteriorated condition and occasional obstructions exist along its channel. The discharge channel appears to have been used as a dump. The operating condition of the emergency low level outlet is uncertain and the access to the control is unsafe.

There is virtually no available information on the design, construction, and operation of the dam. Additional investigation is necessary to adequately evaluate the future performance of the dam.

The spillway capacity as determined by the Corps of Engineers Screening criteria is inadequate for the PMF. We estimate the dam can adequately pass about 71% of the PMF.

7.2 Recommendations/Remedial Measures

The following are recomended to be done very soon:

- 1. Remove all debris and vegetated growth in the flume and the discharge channel.
- 2. Determine the operating condition of the emergency low level outlet, repair if necessary, and provide safe access to the control.

The following are recommended to be done soon:

- 1. Completely plug animal burrows in the downstream face of the dam and the crest of the secondary dike, and provide protection against future animal burrowing into the embankments.
- 2. Repair the deteriorated concrete floor slab of the discharge flume and spalled and cracked portions of the spillway structure.
- 3. Establish a warning system.
- 4. Repair and provide proper protection against further erosion along the east side of the secondary dike.
- 5. Repair the crest and slope of the dike in area near the spillway.

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

- 1. Properly remove all trees from the dam and provide adequate filter coverage on the downstream face to prevent any piping which may occur as a result of future root decay.
- 2. Perform additional investigation to determine the engineering properties of the dam and foundation materials. Perform analysis to evaluate the degree of stability of the dam under stress conditions more severe than those observed at the time of our inspection.
- 3. The spillway capacity is estimated to be inadequate for the PMF. The SDF and the actual capacity of the spillway should be determined using more precise and sophisticated methods and procedures. If necessary, steps should be taken to increase the spillway capacity or to keep the normal pool at a lower elevation so that sufficient storage is available for the SDF.

FIGURES

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APPENDIX 1

HYDROLOGIC AND HYDRAULIC DATA

VISUAL INSPECTION CHECK LIST

CHECK LIST HYDROLOGIC AND HYDRAULIC DATA ENGINEERING DATA

| DRAINAGE AREA CHARACTERISTICS:6.5 Ac. Grassed high ground and slopes around reservoir |
|--|
| ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 507.3 (70 Ac-ft) |
| ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N/A |
| RLEVATION MAXIMUM DESIGN POOL: 508.02 (Assumed top of dam) |
| ELEVATION TOP DAM: 508.02 |
| CREST:Flashboard over spillway weir |
| a. Elevation 507.3 (Top of flashboards) |
| b. Type Overfall - 2% inch flashboards |
| |
| a. Length Between dam and auxiliary dike (NE corner of reservoir) |
| f. Number and Trace of a server daily different of the server of the ser |
| 1. Number and Type of Gates |
| OUTLET WORKS:Effluent pipe for water supply |
| a. Type <u>12 inch diameter pipe</u> |
| b. Location Near centerline of dam underneath embankment |
| c. Entrance inverts Unknown |
| d. Exit inverts |
| e. Emergency draindown facilities <u>One 12-inch blow-oir reported to exist</u> |
| HYDROMETEOROLOGICAL GAGES: None |
| a. Type |
| b. Location |
| c. Records |
| |

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| | m No Name No. 53 County Morris State New Jersey Coordinators NJ DEP |) Inspection See Below huather Warm & Hazy Temperature Mid 70's (8/29/80) | <pre>levation at Time of Inspection 506.2* M.S.L. Tailwater at Time of Inspection No water discharge from *Elevation obtained from field measurements using a BM El. 503.13 at the crest of the spillway (Spillway controlled by flashboards about 4.17 ft high) tion Personnel: 8/29/80, 11/6/80, 11/12/80 R. Greene 11/12/80</pre> | ban 8/26/80, 8/29/80 D. Leary 11/12/80 dd 8/26/80 | Peter Yu Recorder | |
|----|---|---|--|--|-------------------|--|
| (. | Name Da | Date(s) | Pool El Inspec | M. La | | |

| | EMBA NKME NT | |
|--|---|---|
| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
| SURFACE CRACKS | NONE OBSERVED. | |
| URUSUAL RIOVENENT OR CRACKING AT OR BEYOND THE TOE | NONE OBSERVED. | |
| SLOUGHING OR EROSION OF ENDANCHENT AND ABUTHENT SLOPES | EROSION AT EAST HALF OF EMBANKMENT DOWNSTREAM SLOPE AND CREST OF SECONDARY DIKE NEAR SPILLWAY. EROSION ALSO ALONG TOE OF DIKE DUE TO STREAM FLOW. | EROSION AT CREST OF SECONDARY DIKE NEAR SPILLWAY SHOULD BE PROPERLY FILLED. CHANNEL AND BANK PROTECTION SHOULD BE PROVIDED ALONG BROOK AT DOWNSTREAM TOE OF DIKE. |
| VERTICAL AND NORIZONTAL ALINENENT OF THE CREST | SECONDARY DIKE: PORTION NEAR SPILLWAY IS WINDING AND HAS UNLEVEL CREST. | |
| RIFRAF FAILURES | NONE OBSERVED. | |

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| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|---|--|
| ANIMAL BURROW | ANIMAL BURROWS (ONE MEASURES 34" DEEP & 6 IN DIA) EXIST 50' TO 100' FROM SPILLWAY ON UPPER DOWNSTREAM SLOPE OF MAIN EMBANKMENT. ANIMAL BURROW 1 1/2' DIA AT CREST OF SECONDARY DIKE ABOUT 350 FT FROM SFILLWAY. | ANIMAL BURROWS SHOULD BE FILLED. |
| JUNCTION OF ENDANGENT AND ABUTNENT, SPILLWAY AND DAN | SIGNIFICANT EROSION AT JUNCTION OF SPILLWAY AND SECONDARY DIKE. | ERODED AREA SHOULD BE PROPERLY FILLED. |
| ANY NOTICEABLE SEEPAGE | NONE OBSERVED. | |
| STAFF CAGE AND RECORDER | NONE OBSERVED. | |
| DRAINS | NONE OBSERVED. | |
| • | | |

| | UNGATED SPILLWAY | وی میکنون دارد. من با این مالی میکنون این این با این مالی میکنون این این مالی میکنون این مالی میکنون با م |
|-----------------------|--|---|
| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
| CONCRETE WEIR | 2 1/2" - FLASH BOARDS PLACED OVER CONCRETE WEIR. NO FLOW OVER FLASH BOARD EXCEPT SEEPAGE BETWEEN BOARDS AND CONCRETE WEIR. SILTATION AND LEAVES COVER UPSTREAM PORTION AND CANNOT BE INSPECTED. | |
| APPROACH CHANNEL | APPEARED SATISFACTORY. | |
| DISCHARGE CHANNEL | OBSTRUCTION SUCH AS SAND AND SCATTERED BOULDERS, ASPHALT AND PIPES. CONCRETE LINING OF DISCHARGE CHANNEL BADLY DETERIORATED. | OBSTRUCTIONS SHOULD BE CLEARED AND CHANNEL LINING REPAIRED. |
| BRIDCE AND PIERS | 4' WIDE CONCRETE WALKWAY OVER SPILLWAY. HAIR LINE TO 1/2 inch CRACKS NEAR ABUTMENT. | REPAIR CRACKS. |
| OTHERS . | SPALLING OF CONCRETE ON BOTH UPSTREAM WING WALLS. | |

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| | RESERVOIR | |
|-----------------------|---|----------------------------|
| VISUAL EXAMINATION OF | OBSERVATIONS | REPARKS OR RECOMIENDATIONS |
| Siores | RIPRAP OBSERVED NEAR WATER SURFACE IN MOST AREAS. SLOPES GRASSED ABOVE RIPRAP. | |
| SEDIPENTATION | MODERATE SILTATION NEAR SPILLWAY. | |
| | | |
| | | |
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| | DOWNSTRFAM CILANNEL | |
|---|--|-----------------------------------|
| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECONCENDATIONS |
| CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) | SAND, SCATTERED GRAVEL, COBBLES, METAL FIPE, WOOD, BROKEN CONCRETE LININGS, AND SMALL FILE OF ASPHALT IN CHANNEL. UP TO 1/4-IN CRACKS ON EAST CHANNEL RETAINING WALL, SLIGHT BULGE. | REMOVE DEBRIS. REPAIR CHANNEL. |
| SLOPES | MODERATELY STEEP. | |
| APPROXIMATE NO. OF HONES AND POPULATION | NO HOMES IMMEDIATELY DOWNSTREAM. HEAVILY POPULATED ABOUT 3000 FT DOWNSTREAM. | |
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APPENDIX 2

PHOTOGRAPHS

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Upper dam embankment and berm looking west.

6 November 1980



Upper dam embankment and berm looking east.

6 November 1980

NJ NO NAME 53 DAM



Animal burrow in face of downstream embankment above the berm.

and the second second

29 August 1980

Debris covered pit for effluent pipe control. Note entrance shaft for emergency low level outlet control located in upper left corner of photograph. 6 November 1980

Concrete walkway over spillway, 29 August 1980 upstream side.

Spillway controlled by flashboards. 29 August 1980 Note sedimentation and boulders along discharge flume.

Deteriorated concrete slab of 29 August 1980 discharge flume.

Dike along east side of reservoir looking north. Brook flows along east side of dike to spillway discharge flume.

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11 November 1980

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Reservoir looking downstream. 6 November 1980

NJ NO NAME 53 DAM

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APPENDIX 3

HYDROLOGICAL COMPUTATIONS

HYDIZOLOGIC COMPUTATIONS N.J. NO NAME 53 DAM A. Location : Morris County, N.J. B. Drainage area : 6.5 Acros (0.01 sg.mi.) C. Area of Lake = 4 Acres D. Classification : Size - small (height <40') Hazard - high E. Spillway Design Flood - PMF chosen in accordance with COEStecommended guideline. F. PMP 1. Dan is located in Zone 6 (close to boundary of Zono 1) PMP = 22.3 inches (2005q mi - 24 hos, "all season envelope, HME # 33) 2. PMP mut be adjusted for basin size % Factor (for losg mi) ReductionFactor Duration Zone 6 Zone Use 6-6 112 111 112 0-12 0.80 123 123 123 133 0-24 132 133 * page 48 "Design of Small Dam 3: Adjusted PMP Incremental Total Duration this Adj. Factor PMP, inches PMP, inches 1.12×0.8=0.90 0-6 20-1 20.1 1.23×0.8=0.98 21.9 1.8 0-12 0-24 1.33 × 0.8 = 1.06 23-6 1.7 BY PT DATE 41/80 NO Nome 53 JOB NO. 80145 CKD RWG DATE STON SHEET NO. _ OF _

4. Distribution of maximum 6-hour by the stradard EM-1110-2-1411 method

| Duration (hos) | % 6-h. PMP. | Dist. PMP (: cole) |
|----------------|-------------|--------------------|
| I | 10 | 2.01 |
| 2 | 12 | 2.41 |
| 3 | 15 | 3.02 |
| 4 | 38 | 7.64 |
| 5 | 14 | 2.81 |
| 6 | 11 | 2.21 |

| 5. Rank the four | 6-heur incriment | J PMP |
|------------------|------------------|-------|
| 6thr increment | Incremental PUP. | Rank |
| jst | 20.1 | 1 |
| 2nd | 1-8 | 2 |
| zrd | 1-0 (assemed) | 3 |
| 4 - | 0.7 (acsumed) | 4 |

| 6. Arrange the four 6 - hr in | crements ranked 1, 2, 3 and 4 |
|-------------------------------|----------------------------------|
| in the order 4, 2, 1, 3 | (EC1110-2-163 revised 5 Nov. 74) |

| 7. 24-lur dis | tribution as follows | | |
|-------------------|---------------------------|-----|----|
| Duration, | his Dist. Phi P (indus) | | |
| 0-6 | 0.7 | | |
| 6-12 | 1-8 | | |
| 12-13 | 2.01 | | |
| 13-14 | 2-41 | | |
| 14-15 | 3.05 | | |
| 15-16 | 7.64 | | |
| 16-17 | 2.51 | | |
| 17-18 | 2.21 | | |
| 18-74 | 1- 0 | | |
| BY PM DATE 5/81 N | lo Name 53 Dam JOB NO. BC | 145 | |
| CKORWG DATE 5/81 | SHEET NO | 2 | OF |

| Grown engineering associates, INC. Gr. Computation of inflow hydrography $Q = \left(\frac{P \cdot A}{t} \times 1 \cdot o\right) c fs \text{where } P \text{ is precipitation in indes} \\ A = catchment area in Ac. \\ t = time in hours \\ Duration, hr. \qquad Q, c fs \\ o - 6 \qquad o.77 \\ 6 - 12 \qquad 1.97 \\ 12 - 13 \qquad 13 - 20 \\ 13 - 14 \qquad 15 - 82 \\ 14 - 15 \qquad 19 - 83 \\ 15 - 16 \qquad 50.16 \\ \end{array}$ |
|---|
| (F. Computation of inflow hydrography $ \begin{aligned} \mathcal{A} = \left(\frac{P \cdot A}{t} \times 1 \cdot o\right)_{cfs} & \text{where } P \text{ is precipitation in indes} \\ A = catchment area in Ac. \\ t = time in Acours \end{aligned} $ $ \begin{aligned} Duration, hr. & Q, cfs \\ o-6 & o.77 \\ 6-12 & 1.97 \\ 12-13 & 13-20 \\ 13-14 & 15-82 \\ 14-15 & 19-83 \\ 15-16 & 50.16 \end{aligned} $ |
| $Q = \left(\frac{P \cdot A}{t} \times 1 \cdot o\right) cfs \text{where } P \text{ is precipitation in indes} \\ A = catchment area in Ac. \\ t = time in hours \\ Duration, hr. Q, cfs \\ o-6 & o.77 \\ 6-12 & 1.97 \\ 12-13 & 13-20 \\ 13-14 & 15-82 \\ 14-15 & 19-83 \\ 15-84 & 50.16 \\ \end{array}$ |
| $D=\left(\frac{1-1}{t} \times 1 \cdot 0\right) cfs$ $A = catchment area in Ac. t = time in hours Duration, hr. \qquad Q, cfs 0-6 \qquad 0.77 6-12 \qquad 1.97 12-13 \qquad 13-20 13-14 \qquad 15-82 14-15 \qquad 19.83 15-16 \qquad 50.16$ |
| H = Catchment area in Ac. t = time in hours Duration, hr. 0-6 0-77 6-12 12-13 13-14 15-82 14-15 19-83 15-16 50-16 |
| t = time in hours $Duration, hr. Q, cfs$ $0-6 0.77$ $6-12 1.97$ $12-13 13-20$ $13-14 15-82$ $14-15 19-83$ $15-16 50.16$ |
| Duration, hr. Q, cfs 0-6 0.77 6-12 1.97 12-13 13-20 13-14 15-82 14-15 19-83 15-16 50.16 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| 6-12 1.97 12-13 13-20 13-14 15-82 14-15 19-83 15-16 59.16 |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$ |
| 13-14 $15-8214-15$ $19-8315-16$ 59.16 |
| 14-15 19-83 |
| 15-16 50.16 |
| |
| 16-17 18.45 |
| 17-18 1451 |
| 18-24 1.09 |
| Input inflow bydrograph to HEC-1 DB |
| |
| USE 15 min 14Terval |
| Plot of inflow hydrigraph is shown on next page. |
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| BY 12 DATE 5/81 No Nam 53 DAM JOB NO. 80145 |
| CKD WG DATE 5/8/ SHEET NO. 3 OF |

LANGAN ENGINEERING ASSOCIATES, INC. SPILLWAY CAPACITY 350 350 1512 1508.3 159.15 el 508.02 (100 pt.) Anxilian Dike Main Daw Eubankment use 4:17 503.13 Y-15-Concrete Waltury K-15-1 508.02 VIII 501.7 5.7.3 2 flash back Dan Enbantment Anyo/jary Dike Typical Profile Typical Profile Spillway At spillway section, when pool surface is below bottom of concrete walkway (21 507.7), discharge over flashboards is weir flow. Take spillway section as a broad-crested weir. Choose C from Table 5-3 of Handbook of Hydraulics by King & Brater (5th Ed.). Take C=3.32 When prol surface is above el sogial, discharge includes orifice flow between bottom of walkway and top of flashboard and weir flow over walkway and dam. Assume average C= 0.62 for orifice flow and use values of C from Table 5-3 y King & Brater Dam and dike sections are similar to weir of trapezoidal section. Use ave. C = 2.80 (Table 5-9 on page 5-46 y King & Brater) BY Py DATE 1/13/80 No NAME 53 DAM JOB NO. 80145 CKD RWG DATE 5/81 SHEET NO .. __ OF

| ANGA | NE | ENGI | NEEF | RING A | SSOC | IATES, | INC. | | | | |
|-----------|----------------|----------|----------------|--------|-----------------|----------|--------|---------|---------|---------|---|
| | Total Q, (cfs) | -0+0-4 | | 0 | 13 | 22 | 172 | 1698 | 6252 | 16822 | |
| -7C | ey nec | Q.4 | (1) | | | | 0 | 63 6-53 | 2771.86 | 2840 | 3 |
| 4 | 20000 | Ŧ | (ft) | | | | 0 | Stio | 3 | 4 | 4 all |
| 24:0 | raw | Q. | (042) | | | ٥ | 02.541 | 1024.43 | 3373.87 | 8677.44 | 9.85 1 H |
| Mit | high | X | (ft) | | | 0 | 0.28 | 1.03 | 3.28 | 4.28 | t = zhich |
| | | Q<(243) | = Q 40 + Q 5 W | 0 | 12.60 | 21.53 | 26.70 | 37.16 | 105.92 | 304.13 | 2232211 980HX 980HX 980HX |
| | | 3 | a. (cfs) | | 12.60 | i | 1 | 0 | 55.97 | 13.040 | 5×0.41 = +1/2 = 5 + 1/2 = |
| | | 「日の | 0 | | 3.32 | | | | 2.67 | さい | 62×1 * 350 * 350 |
| 1.1.1 | Nav Nav | Wei | HEO | ٥ | 0°4 | 220 | | 0 | 521 | 3.25 | 1 = 0. 15 c 5 c 2 80 = 2.80 |
| | s pi | fice How | Q. (cfs) | | 13.35 | 21.53 | 26.70 | 37-16 | 56.94 | 63.32 | cAJ29H cLHX= cLHX= cLHX= cLHX= f walku |
| | | 1.20 | H(ft) | ١ | 6.2 | 0.52 | 0,8 | 1.55 | 2.3 | 4 2 | |
| | | Elev. | (+t) | 507.3 | 507.7* | 508.02 | 508.3 | Sofos | 510.3 | 512-3 | * * 8 8 8 8 8 F |
| BY CKD | P 2 | 200 | | | 1/13/fr 5/81 | <u> </u> | la Na | (m.e. | 53 1 |)cm | JOB NO. 80/45 |

Reservoir Storage Capacity Assume a linear distribution for the area of the lake with devation. Start at a zero storage at the crest of the spillway (flashboard) Area of lake = 4 Ac. Length of equivalent square = 417 ft. Take average side slope above normal pool = 1V:2.5H . for every foot of water above the crest of spillway the length of the equivalent square increases by = 1,2.5,2= 5 ft Elev. Elev. H Length of (ft) (ft) Equivalent Square (ft) Arca of Lake (Acro) 417 507.3 0 4 508.02 0.72 420.6 4.06 509.3 2 427 4.19 512.3 5 442 4.48 Storage capacity vs. elevation to be calculated by HEC-1. DB BY P DATE 1/13/80 NO Name 53 Dam JOBNO. BO145 CKD RUG DATE 5/01 SHEET NO._____ OF.

SUMMARY OF HYDROGRAPH AND FLOOD ROUTING 1. Inflow hydrograph was input and routing calculated by HEC-1DB 2. PMF for No Name 53 is 50 cfs. 3. Routing indicates dam will overtop by approximelaly 0.06ft for PMF and will not overtup for 12 PMF UVERTOPPING POTENTIAL 1. Various % of PMF have been routed using HEC-1DB 2. Plot peak outflow US. % PMF 90 % PMF 80 at el. 508.02 70 40 50 20 50 10 Outflow, efs 3. Dam overtops at cl 508.02 with Q= 22 cfs : dan can pass approximately 71% of the PMF _ DATE 11/13/80 NO NAME 53 DAM JOB NO. 80145 CKD RWG DATE 5/81 SHEET NO. ____ OF

DEAWDOWN ANALYSIS 1. artlet structures a. The 12"-dia effluent pipe feeding to wate supply system b. The reported existence of the 12"-dia emergency blow-off pipe underneath the dam. (assumed operable) 2. Drawdown capacity a. 12"- dia effuant pipe normal daily consumption rate : 700,000 gallous (2.15 Ac-fr). b. 12"-dia blow-off -Pipe located underneath dawn; elevation and length unknown. Estimate daily discharge rate by assuming Length = 200 ft Average water head = 20 ft $Q = A \int \frac{2gH}{1+k_{m}+k_{pL}}$ Using $A = \frac{\pi}{4}x^{2} = 0.785 \text{ ft}^{2}$ Km = Ka+Kg = 0.9 Using n= 0.02, Kp=0.0741 (Rof: NEH Section 5, ES-42) Q = 0.785 1 64.4 × 20 1 -- 0.9+0.074 + 200 = 6.89 cfs = 13.7 Ac-ft/day Total drawdown capacity = (2.15+13.7)Ac-H/day = 15.85 Ac-ft/day Say 15 Ac-ft/ 3. Virtually no drainage area :. no inflow BY Dyc DATE 1/14/Fo No Nome 53 Dam JOB NO. 80145 CKD. RWG DATE 5/81 SHEET NO. 10 OF

Assuming a linear distribution for the lake area with 4 devation, and using the equivalent square method A.= 4 Ac p el 503.7 (Normel Pool) for h=5' $A_2 = 3.44 \text{ Ac}$. $Lapacity = \frac{4+3.44}{2} \times 5 = 18.6 \text{ Ac-ft}$: time required = 18.6 = 1.24 say 1/2 days. : the reservoir can be lowered 5 ft from top of flashboard in about 1/2 day. for h = 10' $A_2 = 2.93 Ac$ Copacity = 4+2.93 × 10 = 34.6 Ac-ft i-time required = 34.6 = 2.3 say 2/2 days - the reservoir can be lowered to get from top of flashboard in about 3/2 days Note: Drowdown capacity for the 1st aft can be greatly increased by reheating the flash board. JOB NO. 8010.1-BY DATE /14/80 NO Name 53 Dam SHEET NO. _____ OF. CKD TWG DATE 5/81

HEC-1 OUTPUT NO NAME 53 DAM

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NJ ND NAME 53 (100809) Inflow hydrography and rilling N.J. dam inspection

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PEAK OUTFLOW IS

SUMMARY OF DAM SAFETY ANALYSIS

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MYDROORAPH ROUTING

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PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

18."12 ANN 20140

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APPENDIX 4

REFERENCES

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REFERENCES

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