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NATIONAL DAM SAFETY PROGRAM. SCOTTS MILLPOND DAM (INVENTORY NUM--ETC(U)
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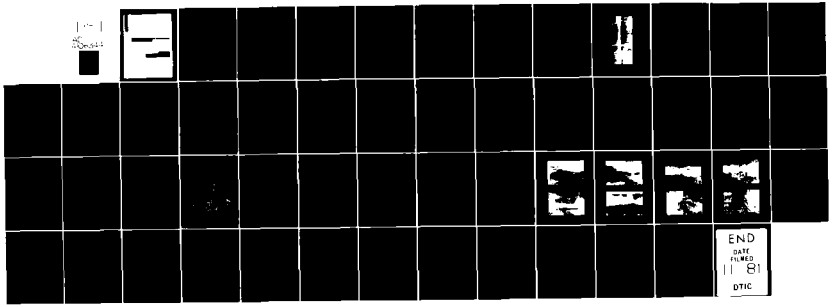

Scotts Millpond Dam (Inventory Number VA 05706 Rappahannock River Basin.
Essex County, Commonwealth of Virginia.
Phase I Inspection Report.

(9) Final rept.,

(15) DACW65-80-D-0032

(10) James A Walsh II

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. 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.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

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 the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

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

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NAME OF DAM: SCOTTS MILLPOND DAM

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Scotts Millpond Dam
State: Commonwealth of Virginia
County: Essex
USGS 7.5 Minute Quadrangle: Mount Landing, Virginia
Stream: Hoskins Creek
Date of Inspection: 14 November 1980

BRIEF ASSESSMENT OF DAM

Scotts Millpond Dam consists of two earthfill embankments located on the left[1] and right sides of a natural knoll. The left embankment is approximately 12 feet high[2] and 400 feet long. The right embankment is approximately 10 feet high and 440 feet long. The right embankment is curved with the concave side of the curve facing the reservoir. The principal spillway consists of an open rectangular channel, a concrete bottom and concrete and brick sides, excavated through the natural knoll between the two embankments. The principal spillway is 30 feet wide by about 4 feet deep. The emergency spillway consists of an irregular channel excavated into the existing ground at the left abutment of the dam. The dam, located on Hoskins Creek, is used for recreation by the owner, Mr. Louis Marx, Jr. Scotts Millpond Dam is a "small" size - "significant" hazard structure as defined by the Recommended Guidelines for Safety Inspection of Dams. Visual inspection of the dam revealed several major deficiencies requiring further attention.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the spillway design flood (SDF). It has been determined that the dam would be overtopped by the SDF by a maximum depth of 1.2 feet with an average critical velocity of 5.1 feet per second (f.p.s.). Duration of overtopping would be approximately 40 hours. The spillway is capable of passing up to 27 percent of the SDF or 4 percent of the PMF.

The depth, duration, and rate of overtopping flows are considered detrimental to the right embankment and there is a high probability the embankment would fail if the SDF would occur. The spillway is adjudged as inadequate. The

[1]Facing downstream.
[2]Measured from the downstream embankment toe to the embankment crest. The area downstream of the dam is very swampy and there is no well-defined natural channel.

spillway is not adjudged as seriously inadequate since dam failure from overtopping would not significantly increase the hazard to loss of life downstream from the dam over that which would exist just before overtopping failure.

The dam and appurtenant structures are generally in poor to fair overall condition. Maintenance of the dam is considered inadequate. According to guidelines by the Bureau of Reclamation, the slopes of the left and right embankments are overly steep. The crest width of the left embankment is satisfactory, but the crest width of the right embankment is too narrow. The downstream slope of the right embankment is considered to be unstable, due to its overly steep, eroded condition, slumping, and related surface cracks on the crest. A stability check is required.

There is no flood warning system or emergency action plan currently in operation.

It is recommended that, within two months of the date of notification of the Governor of the Commonwealth of Virginia, the owner engage the services of a professional engineering consultant to perform a stability check of the dam. Due to irregularities in crest elevation and past evidence of overtopping, a detailed hydrologic/hydraulic study should be performed to evaluate spillway capacity.

Within six months of the notification of the Governor, the consultant's report of appropriate remedial measures should have been completed and the owner should have an agreement with the Commonwealth of Virginia for a reasonable time frame in which all remedial measures will be complete.

A flood warning system and emergency action plan should be promptly developed and put into operation. It is recommended that a formal emergency procedure be prepared, prominently displayed, and furnished to all operating personnel. This should include:

1) How to operate the dam in an emergency.

2) Who to notify, including public officials, in case evacuation from the downstream area is necessary.

3) Procedures to evaluate inflow during periods of emergency operation.

Regular inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

NAME OF DAM: SCOTTS MILLPOND DAM

The following repair items should be accomplished as soon as possible:

1) Scarify, fill, compact, grade, and seed the surface cracks and areas of slumping on the right embankment crest.

2) Remove all trees from the embankments.

3) Remove the root systems of all trees with a trunk diameter greater than 3 inches.

4) Fill, compact, grade, and seed all areas of erosion and cavities left after removal of trees.

5) Establish and maintain a good grass cover over the entire dam.

6) Remove the debris from the principal spillway channel.

7) Remove all brush and trees and establish a good grass cover over the entire emergency spillway.

8) Install a staff gage to monitor reservoir levels above normal pool.

Consideration should also be given to excavating the emergency spillway in order to level the spillway and form well-defined side slopes, and to removing the sediment from the left side of the emergency spillway discharge channel.

MICHAEL BAKER, JR., INC.

Michael Baker, III, P.E.
Chairman of the Board and
Chief Executive Officer

COMMONWEALTH OF VIRGINIA
MICHAEL BAKER III
NO. 3176

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Colonel, Corps of Engineers
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Date: AUG 18 1981

NAME OF DAM: SCOTTS MILLPOND DAM

OVERALL VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: SCOTTS MILLPOND DAM ID# VA 05706

SECTION 1 PROJECT INFORMATION

1.1 General

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams. The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: Scotts Millpond Dam consists of two earthfill embankments located on the left and right[1] sides of a natural knoll (Plate 1). The left embankment is approximately 12 feet high[2] and 400 feet long with variable upstream and downstream slopes of about 1.1-1.3H:1V and 1.0-1.2H:1V (Horizontal to Vertical), respectively. The crest width of the left embankment varies from about 17 feet to 19 feet. The right embankment is approximately 10 feet high and 440 feet long with variable upstream and downstream slopes of about 1.2H:1V and as steep as 0.3H:1V, respectively. The crest width of the right embankment varies from about 9 feet to 11 feet. The crest of the left embankment has a minimum elevation of

[1]Facing downstream.
[2]Measured from the downstream embankment toe to the embankment crest.

94.3 feet Temporary Bench Mark (T.B.M.)[1] and the crest of the right embankment has a minimum elevation of 93.6 feet T.B.M.

The principal spillway consists of an open rectangular channel, with a concrete bottom and concrete and brick sides, excavated through the natural knoll located between the left and right embankments. The spillway is 30 feet wide by about 4 feet deep. A low flow, broad crested concrete weir, with a vertical upstream face at the edge of the reservoir, is located at the entrance to the channel.

The emergency spillway consists of an irregular channel excavated into the existing ground at the left abutment of the dam. The spillway is approximately 60 feet wide and the minimum elevation at the control section is 96.2 feet T.B.M.

There are no facilities for dewatering the reservoir.

1.2.2 Location: Scotts Millpond Dam is located on Hoskins Creek in Essex County, Virginia. A Location Plan is included with this report in Appendix I.

1.2.3 Size Classification: The height of the dam is 12 feet and the reservoir storage capacity at the crest of the dam (elevation 93.6 feet T.B.M.) is 237 acre-feet. Therefore, the dam is in the "small" size category as defined by the Recommended Guidelines for Safety Inspection of Dams.

1.2.4 Hazard Classification: There is a home and outbuilding located on the natural knoll between the left and right embankments of the dam. Virginia State Route 614 crosses Hoskins Creek approximately 0.9 miles downstream of the dam. Although loss of human life is not highly probable, economic loss is likely in the event of dam failure or flood flows

[1]All elevations are referenced to a Temporary Bench Mark (T.B.M.) located on the left top of the concrete weir for the principal spillway (Elevation 91.0 feet).

overtopping the dam. Scotts Millpond Dam is therefore considered in the "significant" hazard category as defined by the Recommended Guidelines for Safety Inspection of Dams. The hazard classification used to categorize dams is a function of location only and is not related to its stability or probability of failure.

1.2.5 Ownership: The dam is owned by Mr. Louis Marx, Jr., 645 Madison Avenue, New York, NY 10022.

1.2.6 Purpose of Dam: The dam was originally constructed to provide water power for a mill but is now used for recreational purposes.

1.2.7 Design and Construction History: According to the "Inventory of United States Dams" (Reference 11, Appendix IV), the dam was originally built in 1900. No other information on design and construction history was available.

1.2.8 Normal Operational Procedures: The reservoir is normally operated at the crest of the principal spillway, elevation 91.0 feet T.B.M. No formal operating procedures are followed for this structure.

1.3 Pertinent Data

1.3.1 Drainage Area: The drainage area of Hoskins Creek to the dam is 19.80 square miles.

1.3.2 Discharge at Dam Site: The maximum discharge from the reservoir is unknown.

Principal Spillway
Pool level at top of dam . . . . 398 c.f.s.

Emergency Spillway
Pool level at top of dam . . . . 34 c.f.s.

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

NAME OF DAM: SCOTTS MILLPOND DAM

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation (feet)	Reservoir Capacity Area (acres)	Reservoir Capacity Acre-feet	Reservoir Capacity Watershed (inches)	Length (feet)
Top of left embankment	94.3	53.0	242	0.24	4800
Top of right embankment	93.6	45.8	205	0.20	4400
Emergency spillway crest	92.6	39.6	163	0.16	3900
Principal spillway crest	91.0	29.4	108	0.11	2500
Streambed at at toe*	78.6	-	-	-	-

*This is the elevation of the bottom of the plunge pool for the principal spillway, which was excavated through a natural knoll between the left and right embankments. The difference in elevation between the minimum top of dam and the bottom of the plunge pool is 15.0 feet, but the left and right embankments are 12 and 10 feet high, respectively.

SECTION 2 - ENGINEERING DATA

2.1 Design: No design plans, specifications, and boring logs were available for use in preparing this report. No stability analyses or hydrologic and hydraulic data were available for review.

2.2 Construction: No construction records, as-built plans and inspection logs were available for review.

2.3 Evaluation: No construction records or as-built plans were available to adequately assess the condition of the dam. All evaluations and assessments in this report were based on field observations and office analyses.

SECTION [illegible] - VISUAL OBSERVATION

[illegible] Findings

[illegible] General. The field inspection was conducted on [illegible] November [illegible]. At the time of the inspection the pool elevation was [illegible] feet NGVD. The weather was mild with temperatures in the [illegible]s degrees Fahrenheit. The ground surface at the embankment and abutments was generally dry. The dam and appurtenant structures were found to be in poor to fair overall condition. Deficiencies found during the inspection will require remedial treatment. The following are brief summaries of deficiencies found during the inspection. A field sketch of conditions found during the inspection is presented on Plate [illegible] in Appendix I. The complete visual inspection check list is presented in Appendix III. No record of any previous inspections was found.

[illegible] The dam was described in Section [illegible] and was found to be in generally poor to fair condition. The downstream face of the right embankment is very steep, nearly vertical. [illegible] surface cracks related to [illegible] and erosion are present in the [illegible] of the right embankment of the dam. The dam appears to have been overtopped in this area. The downstream face of the left embankment is slightly to moderately eroded in a few places. The downstream face of the entire dam is heavily covered with trees. The crest and upstream face of the dam are generally well vegetated and show few signs of erosion.

The right embankment crest is an average of [illegible] lower than the left embankment crest. In addition, there are a few low spots in the left embankment crest. The right embankment is curved with the concave side of the curve facing the reservoir. The junction of the left and right embankments with the abutments is in satisfactory condition. No seepage was observed. However, a large part of the downstream toe of the dam was very swampy due to the topography of the area and any seepage would have been obscured.

NAME OF DAM: [illegible]TTS MILL POND DAM

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by the swampy conditions. No drains or riprap were observed.

3.1.3 Appurtenant Structures: The principal spillway, as described in Section 1.2.1, is in good condition with no spalling or cracking in the concrete bottom and concrete and brick sides. There is a footbridge that crosses the spillway that has 4 concrete piers. The footbridge is in good condition.

The emergency spillway, as described in Section 1.2.1, is in poor condition. The approach channel is very wide, however, it is heavily vegetated at the edge of the reservoir near normal pool level. The spillway is very irregular and is sparsely vegetated with small trees and brush and has exposed soil and claystone on the left side and bottom. The discharge channel is unvegetated. Minor sedimentation has occurred on the left side of the channel due to erosion of the left abutment.

3.1.4 Reservoir Area: The reservoir slopes are moderately steep and are heavily wooded with no signs of erosion.

3.1.5 Downstream Channel: The channel downstream of the dam is a broad flat swampy area heavily overgrown with vegetation. The slopes of the channel and surrounding area are flat and heavily wooded. A home and outbuilding are located on the natural knoll between the left and right embankments of the dam. Virginia State Route 614 crosses Hoskins Creek approximately 0.9 miles downstream of the dam.

3.1.6 Instrumentation: There is no instrumentation at the dam site.

3.1.7 Evaluation: In general, the dam and appurtenant structures are in poor to fair overall condition. The surface cracks and areas of slumping on the right embankment crest and downstream slope should be scarified, filled, compacted, graded and seeded. The right embankment downstream slope should be uniformly filled

NAME OF DAM: SCOTTS MILLPOND DAM

to a minimum slope of 2.5H:1V, graded, compacted, and seeded. All trees on the embankment should be removed. All trees with a trunk diameter greater than 3 inches should also have their root systems removed. All areas of erosion and cavities left after removal of trees should be filled, graded, compacted, and seeded. A good grass cover should be established over the entire dam and mowed regularly. The debris should be removed from the principal spillway channel. All brush and trees should be removed and a good grass cover should be established over the entire emergency spillway. A staff gage should be installed to monitor reservoir levels above normal pool.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures: Operation of the dam is an automatic function controlled by the principal and emergency spillways. Water entering the reservoir flows into the principal spillway at elevation 91.0 feet T.B.M. When inflow is sufficient, the reservoir level rises above elevation 92.6 feet T.B.M. and discharges through the emergency spillway.

4.2 Maintenance of Dam: Maintenance of the dam is the responsibility of the owner. An inspection or maintenance schedule has not been instituted.

4.3 Maintenance of Operating Facilities: There are no operating facilities at the pond.

4.4 Warning System: At the present time, there is no warning system or emergency action plan in operation.

4.5 Evaluation: Past maintenance of the dam has been inadequate. Regular inspections of the dam and appurtenant structures should be made and documented. A check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be corrected annually. A warning system and emergency action plan should be developed and put into operation.

SECTION 5 - HYDRAULIC/HYDROLOGIC DATA

5.1 Design: No hydraulic or hydrologic design data were available for use in preparing this report.

5.2 Hydrologic Records: There is a stream gage located approximately 2.6 miles upstream of the dam on Hoskins Creek. Available records from this gage were used to estimate the 100-year peak discharge at the dam. This discharge was used for comparison with the 100-year flood developed in this report. No rainfall records are maintained for this dam.

5.3 Flood Experience: No records were available.

5.4 Flood Potential: The Probable Maximum Flood (PMF), 1/2 Probable Maximum Flood (1/2 PMF), and the 100-year flood were developed and routed through the reservoir by use of the HEC-1 DB computer program (Reference 9, Appendix IV) and appropriate unit hydrograph, precipitation, and storage-outflow data. Clark's T and R coefficients for the local drainage areas were estimated from basin characteristics. The rainfall applied to the unit hydrograph was taken from publications by the U.S. Weather Bureau and the National Atmospheric Administration (References 16 and 17, Appendix IV). Rainfall losses for the 100-year flood were estimated at an initial loss of 1.5 inches and a constant loss rate of 0.15 inches per hour thereafter. An initial loss of 1.0 inch and a constant loss rate of 0.05 inches per hour were used for the PMF and 1/2 PMF.

5.5 Reservoir Regulations: Pertinent dam and reservoir data are shown in Table 1.1, paragraph 1.3.3.

Regulation of flow from the reservoir is automatic. Normal flows are maintained by the crest of the principal spillway with an elevation of 91.0 feet T.B.M.

Outlet discharge capacity was computed by hand; reservoir area was planimetered from the Cauthornville, Virginia and Mount Landing, Virginia, 7.5 minute USGS quadrangles; and storage capacity was computed by the HEC-1 DB program. Outlet discharge capacity and storage capacity curves were computed to elevations above the crest of the dam. All flood routings were begun with the reservoir level at normal pool. Flow through the principal spillway was included in the routings.

NAME OF DAM: SCOTTS MILLPOND DAM

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance are shown in the following table:

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal[1]	Hydrographs 100-Year flood	1/2 PMF	PMF[2]
Peak flow, c.f.s.				
Inflow	5	2617	9014	18,029
Outflow	5	2614	9014	18,029
Peak elev., ft. T.B.M.	91.2	94.8	96.0	97.1
Emergency spillway[3] (elev. 92.6 ft. T.B.M.)				
Depth of flow, ft.	-	2.2	3.4	4.5
Average velocity, f.p.s.	-	6.9	8.5	9.8
Duration of flow, hrs.	-	48.0	71.0	74.5
Non-overflow section[3] (elev. 93.6 ft. T.B.M.)				
Depth of flow, ft.	-	1.2	2.4	3.5
Average velocity, f.p.s.	-	5.1	7.2	75.1
Total duration of over-topping, hrs.	-	40	66	70
Tailwater elev., ft. T.B.M.	81.1	-	-	-

[1]Conditions at time of inspection.
[2]The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meterologic and hydrologic conditions that are reasonably possible in a region.
[3]Velocity estimates were based on critical depth at control section.

5.7 Reservoir Emptying Potential: There are no facilities for draining the reservoir.

5.8 Evaluation: Scotts Millpond Dam is a "small" size - "significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range between the 100-year flood and the 1/2 PMF. Due to the risk involved, the 100-year flood has been selected as the SDF. The 100-year flood was routed through the reservoir and found to overtop the dam by a maximum depth of 1.2 feet with an average critical velocity of 5.1 feet per second (f.p.s.). Total duration of dam overtopping would be 40 hours. The spillway is capable of passing

up to 27 percent of the SDF or 4 percent of the PMF without overtopping the dam.

Conclusions pertain to present-day conditions and the effect of future development on the hydrology has not been considered.

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: No previous information describing local subsurface conditions was available for the visual inspection or subsequent analyses. The dam is situated in the Coastal Plan physiographic province of Virginia. The topography consists of low hills with steep side slopes and relief of between 100 to 200 feet. The Calvert formation, Teritary age, is shown on the State Geologic Map as comprising the foundation materials. The St. Mary's formation, also Tertiary age, is indicated as forming the adjacent hillsides or abutments. Both formations are described as consisting of unconsolidated clay and sand and the St. Mary's clays may be fossiliferous. Weathered, highly fossiliferous claystone was exposed in the cut through the left abutment for the emergency spillway at the time of the visual inspection. This material can be assumed to represent the St. Mary's fossiliferous clays.

6.2 Embankments

6.2.1 Materials: Documented information describing the nature of the embankment materials or any zoning within the embankments was not available for this analysis. The outer embankment materials were noted during the visual inspection as being silty find sand (ML group soil - Unified Classification System). The embankments are assumed to be generally homogeneous.

6.2.2 Stability: Design plans and the results of previous stability analyses, if any, were not available for use during this evaluation. The left embankment is approximately 12 feet high (measured from the minimum crest elevation to the lowest downstream toe) with a minimum crest width of 17 feet. The upstream slope of the left embankment is variable, but is approximately 1.2H:1V. The downstream slope is also variable, but is approximately 1.1H:1V. The right embankment is approximately 10 feet high (measured as described above) with a minimum crest width of 9 feet. The upstream slope of the right embankment is about 1.2H:1V, but variable. Much of the downstream slope has been significantly eroded such that the

slope is as steep as 0.3H:1V. No facilities are available to drain the reservoir.

According to guidelines outlined in Design of Small Dams by the U.S. Department of the Interior, Bureau of Reclamation, the upstream slope of a small, homogeneous embankment constructed of CL or ML type soils on a stable foundation should be 3H:1V, provided the dam is not subject to rapid drawdown. The recommended downstream slope is 2.5H:1V. A crest width of 12 feet is recommended for both the left and right embankments considering their heights. According to these guidelines, the slopes of the embankments are overly steep. The crest width of the left embankment is acceptable. The crest width of the right embankment is unacceptable.

Signs of instability in the left embankment such as slumping, tension cracks, or unusual alignment along the crest were not observed during the visual inspection. The upstream slope of the right embankment showed no signs of instability. However, the downstream slope of the right embankment is seriously eroded and near vertical erosion scarps are numerous. This condition appears to be a result of suspected overtopping of the right embankment. The erosion and oversteepening has caused slumps that extend from the crest nearly to the toe of the downstream embankment. Tension cracks were apparent locally on the downstream side of the crest of the right embankment (far right end), indicating probable additional slumping during wet periods.

6.2.3 Seismic Stability: The dam is located in Seismic Zone 1 which presents no hazard from earthquakes according to the Recommended Guidelines for the Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This determination is contingent on the requirements that static stability conditions are satisfactory and convential safety margins exist.

6.3 Evaluation: The results of previous stability analyses were not available for review as part of this evaluation of Scotts Millpond Dam. According to guidelines by the

Bureau of Reclamation, the slopes of the embankments are overly steep. The crest width of the left embankment is satisfactory, but the crest width of the right embankment is too narrow locally. The downstream slope of the right embankment is considered to be unstable due to its overly steep, eroded condition and the slumping observed during the visual inspection of the dam. A qualified geotechnical engineering firm should be retained to perform a stability check of the dam.

Also, as described in Section 5 of this report, the dam would be overtopped by the SDF. The SDF would overtop the dam by a maximum depth of 1.2 feet, with an average critical velocity of 5.1 f.p.s.; total duration of overtopping would be 40 hours. Taking into account the present poor condition of the embankment and the duration and velocity of overtopping flows, overtopping would be detrimental to the embankment.

SECTION 7 - ASSESSMENT REMEDIAL MEASURES

7.1 Dam Assessment: There were no engineering data available for use in preparing this report. Deficiencies discovered during the field inspection and office analyses will require remedial treatment. The dam and appurtenant structures are generally in poor to fair overall condition. Maintenance of the dam is considered inadequate. A stability check is required.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the SDF for the "small" size - "significant" hazard classification of Scotts Millpond Dam. It has been determined that the dam would be overtopped by the SDF by a maximum depth of 1.2 feet with an average critical velocity of 5.1 f.p.s. Duration of overtopping would be approximately 40.0 hours. The spillway is capable of passing up to 27 percent of the SDF or 4 percent of the PMF.

The depth, duration, and rate of overtopping flows are considered detrimental to the right embankment and there is a high probability the embankment would fail if the SDF would occur. The spillway is adjudged as inadequate. The spillway is not adjudged as seriously inadequate since dam failure from overtopping would not significantly increase the hazard to loss of life downstream from the dam over that which would exist just before overtopping failure.

According to guidelines by the Bureau of Reclamation, the slopes of the left and right embankments are overly steep. The crest width of the left embankment is satisfactory, but the crest width of the right embankment is too narrow. The downstream slope of the right embankment is considered to be unstable due to its overly steep, eroded condition, slumping, and the related surface cracks on the crest.

There is no flood warning system or emergency action plan currently in operation.

7.2 Recommended Remedial Measures: It is recommended that, within two months of the date of notification of the Governor of the Commonwealth of Virginia, the owner engage the services of a professional engineering consultant to perform a stability check of the dam. Due to irregularities in crest elevation and past

evidence of overtopping, a detailed hydrologic/hydraulic study should be performed to evaluate spillway capacity.

Within six months of the notification of the Governor, the consultant's report of appropriate remedial measures should have been completed and the owner should have an agreement with the Commonwealth of Virginia for a reasonable time frame in which all remedial measures will be complete.

A flood warning system and emergency action plan should be promptly developed and put into operation. It is recommended that a formal emergency procedure be prepared, prominently displayed, and furnished to all operating personnel. This should include:

1) How to operate the dam in an emergency.

2) Who to notify, including public officials, in case evacuation from the downstream area is necessary.

3) Procedures to evaluate inflow during periods of emergency operation.

Regular inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

The following repair items should be accomplished as soon as possible:

1) Scarify, fill, compact, grade, and seed the surface cracks and areas of slumping on the right embankment crest.

2) Remove all trees from the embankments.

3) Remove the root systems of all trees with a trunk diameter greater than 3 inches.

4) Fill, compact, grade, and seed all areas of erosion and cavities left after removal of trees.

5) Establish and maintain a good grass cover over the entire dam.

NAME OF DAM: SCOTTS MILLPOND DAM

6) Remove the debris from the principal spillway channel.

7) Remove all brush and trees and establish a good grass cover over the entire emergency spillway.

8) Install a staff gage to monitor reservoir levels above normal pool.

Consideration should also be given to excavating the emergency spillway in order to level the spillway and form well-defined side slopes, and to removing the sediment from the left side of the emergency spillway discharge channel.

NAME OF DAM: SCOTTS MILLPOND DAM

APPENDIX I

PLATES

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Location Plan

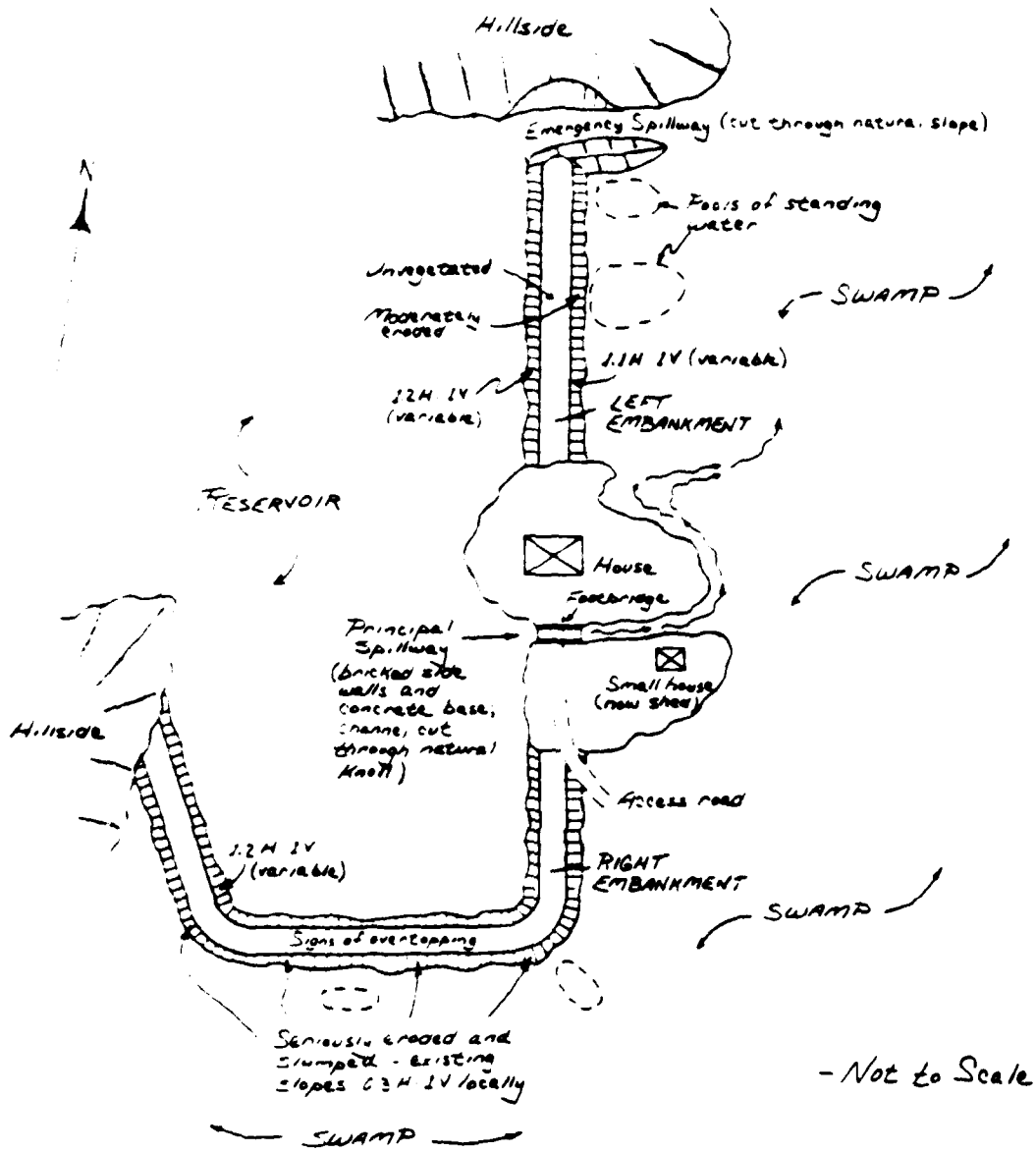
Plate 1 Field Sketch

Plate 2 Top of Dam Profile

Plate 3 Typical Dam Cross Section

NAME OF DAM: SCOTTS MILLPOND DAM

LOCATION PLAN



DWN 11-80

FIELD SKETCH

SCOTTS MILL POND DAM, VIRGINIA

Michael Baker, Jr., Inc.

14 November 1980

PLATE 1

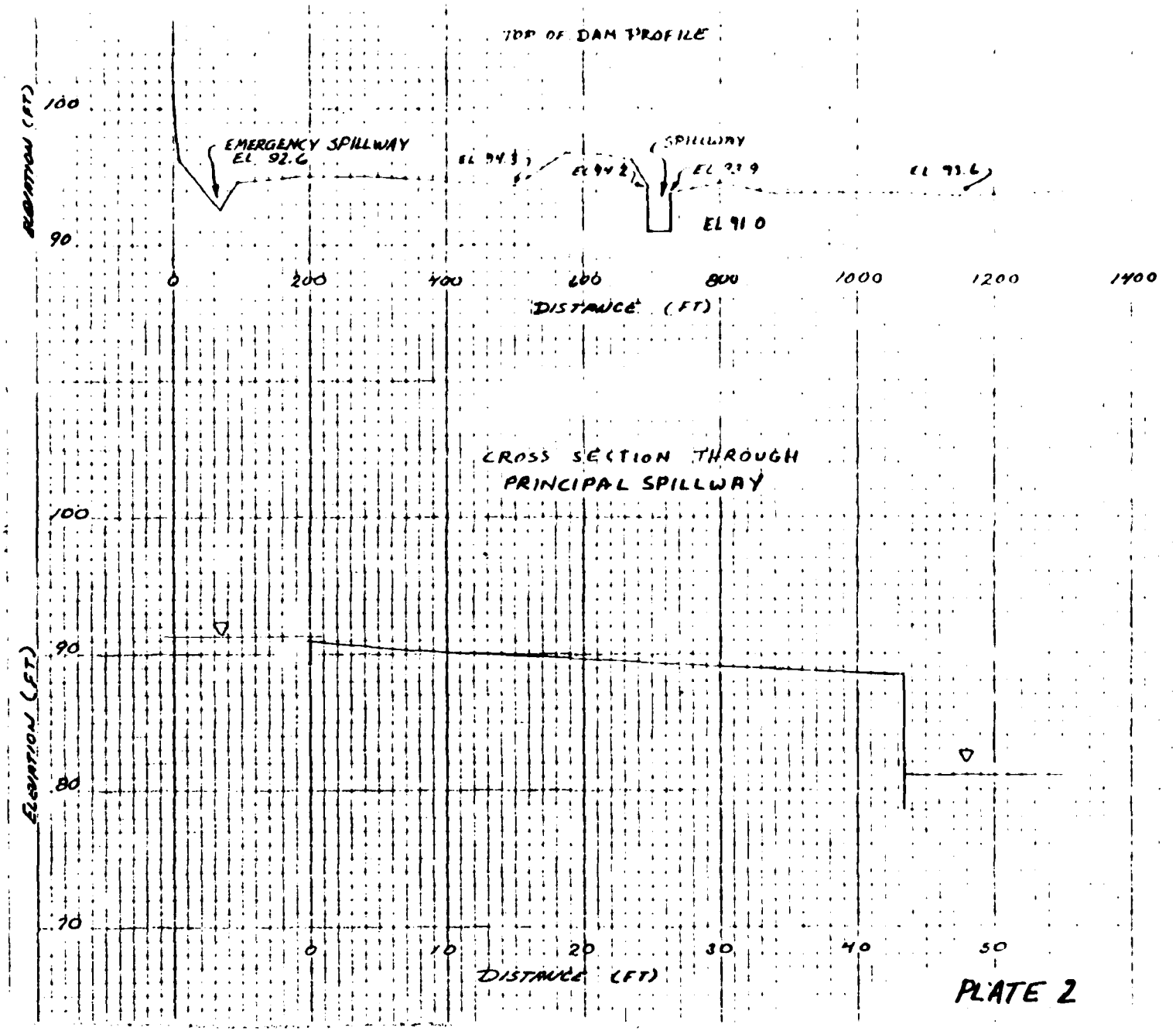
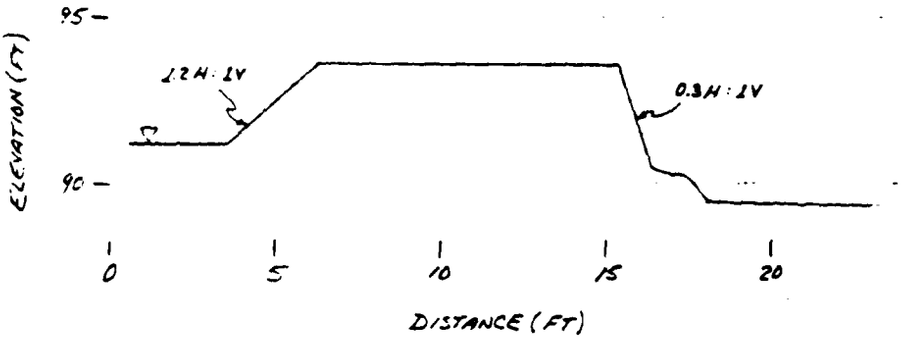

TOP OF DAM PROFILE
ELEVATION (FT)
100
90
EMERGENCY SPILLWAY
EL 92.6
EL 91.0
0
200
400
600
800
1000
1200
1400
DISTANCE (FT)
CROSS SECTION THROUGH
PRINCIPAL SPILLWAY
100
90
80
70
0
10
20
30
40
50
DISTANCE (FT)

PLATE 2

CROSS SECTION STA 11+50
(RIGHT EMBANKMENT)



CROSS SECTION STA. 3+00
(LEFT EMBANKMENT)

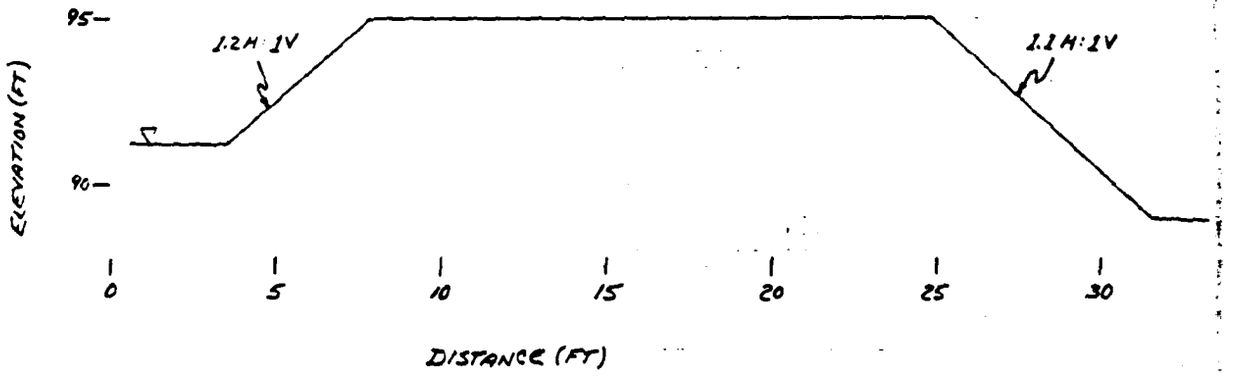


PLATE 3

APPENDIX II

PHOTOGRAPHS

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Photo 1: Principal Spillway Inlet, Right Embankment in Background

Photo 2: Principal Spillway Outlet

Photo 3: Emergency Spillway Discharge Channel

Photo 4: Emergency Spillway Approach Channel, Junction with Left Embankment

Photo 5: Natural Knoll, Left Embankment, Principal Spillway to Right of House

Photo 6: Left Embankment

Photo 7: Right Upstream Embankment

Photo 8: Erosion on Right Downstream Embankment

Note: Photographs were taken on 14 November 1980.

NAME OF DAM: SCOTTS MILLPOND DAM

SCOTTS MILLPOND DAM

PHOTO 1. Principal Spillway Inlet, Right Embankment in Background

PHOTO 2. Principal Spillway Outlet

PHOTO 3. Emergency Spillway Discharge Channel

PHOTO 4. Emergency Spillway Approach Channel, Junction with Left Embankment

PHOTO 5. Natural Knoll, Left Embankment, Principal Spillway to Right of House

PHOTO 6. Left Embankment

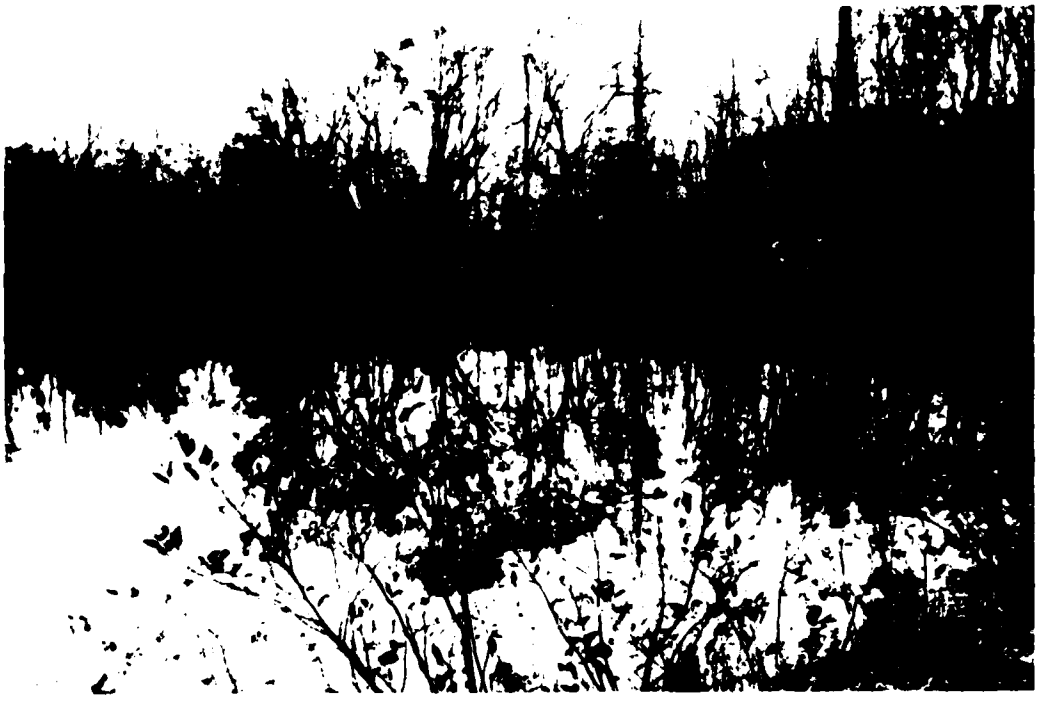

PHOTO 7. Right Upstream Embankment

PHOTO 8. Erosion on Right Downstream Embankment

APPENDIX III

VISUAL INSPECTION CHECK LIST

Check List
Visual Inspection
Phase 1

Name of Dam Scotts Millpond Dam County Essex State Virginia Coordinates Lat. 3755.6 Long. 7654.6

Date of Inspection 14 November 1980 Weather Partly cloudy Temperature 65° F.

Pool Elevation at Time of Inspection 91.2 ft. T.B.M.* Tailwater at Time of Inspection 81.1 ft. T.B.M.*

*All elevations are referenced to a Temporary Bench Mark (T.B.M.) located on the left top of the concrete weir for the principal spillway (elevation 91.0 feet).

Inspection Personnel:

Michael Baker, Jr., Inc.:

Jeff Quay
Dave Hupe

Virginia State Water Control Board:

Leon Musselwhite

Owner's Representatives:

None present

Dave Hupe Recorder

EMBANKMENT

Name of Dam SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Surface cracks, related to minor slumping and erosion on the right downstream embankment, are present on the crest of the right embankment. The dam appears to have been overtopped in this area. Oversteepening of the slope, due to overtopping and erosion, is probably the cause of the surface cracks and slumping.	The surface cracks and areas of slumping should be scarified, filled, compacted, graded and seeded.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	The dam consists of two embankments located on the left and right sides of a natural knoll. The right downstream face of the dam is seriously eroded and is too steep (near vertical in places due to the erosion), resulting in minor slumps. The right crest and upstream face are well vegetated and show few signs of erosion. The left downstream face of the dam is slightly to moderately eroded in a few places. The left crest and (Continued on next page)	All trees should be cut at ground level over the entire embankment. All trees with a trunk diameter greater than 3 in. should also have their root systems removed. All areas of erosion and cavities left after removal of trees should be filled, graded, compacted, and seeded. The right downstream slope should be filled to a minimum slope of of 2.5H:1V, graded, compacted (Continued on next page)

EMBANKMENT

Name of Dam SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES (Continued)	upstream face are generally well vegetated and not eroded. The downstream face of the entire dam is heavily covered with trees.	and seeded. A good grass cover should be established over the entire dam and mowed regularly.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The right embankment crest is an average of about 1 ft. lower than the left crest of the embankment. There are a few low spots on the left embankment crest. The right embankment is curved, with the concave side of the curve facing the reservoir.	The right embankment should be filled to the maximum elevation of the left embankment crest and compacted, graded and seeded. The low areas of the left embankment should be filled to the maximum elevation of the left embankment and compacted, graded, and seeded.
RIPRAP FAILURES	No riprap was observed on the dam.	
EMBANKMENT MATERIALS	The embankment is constructed of silty fine sand.	

EMBANKMENT

Name of Dam SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The junctions of the left and right embankments with the abutments are in satisfactory condition.	
ANY NOTICEABLE SEEPAGE	No seepage areas were observed.	A large part of the downstream toe of the dam was very swampy, due to the topography of the area. Seepage, if any, could have been obscured by the swampy conditions.
STAFF GAGE AND RECORDER	None observed	A staff gage should be installed to monitor reservoir levels above normal pool.
DRAINS	None observed	

OUTLET WORKS

Name of Dam: SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The principal spillway consists of a rectangular concrete open channel, with concrete and brick sides, excavated into the natural knoll between the left and right embankments. The concrete and brick are in good condition with no cracks or spalling.	
INTAKE STRUCTURE	The inlet to the spillway is a low flow concrete weir with a vertical upstream face at the edge of the reservoir and a slight curve on the downstream face.	The weir is completely submerged by moderate and high flows.
OUTLET STRUCTURE	The spillway outlet is a concrete channel with concrete and brick sides. There is a footbridge over the channel with four concrete piers in the channel. The concrete and brick are in good condition, but there is some minor debris along the channel sides.	The debris should be removed from the channel.
OUTLET CHANNEL	Water passing through the principal spillway drops about 10 ft. from the concrete channel to an excavated channel with an apparent rock bottom. The outlet channel is wide and unobstructed.	
EMERGENCY GATE	None	

UNGATED SPILLWAY

Name of Dam: SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMERGENCY SPILLWAY	The emergency spillway consists of an irregular channel excavated into the existing ground at the left abutment. Sandy soils and claystone are exposed in the bottom and sides of the channel, respectively. Scattered brush and small trees are present.	Additional excavation should be performed to level the spillway and form well-defined side slopes. All brush and small trees should be cut at ground level. A good ground cover of grass should be established.
APPROACH CHANNEL	The approach channel is very wide, however, it is heavily vegetated at the edge of the reservoir near normal pool level.	All brush and trees should be cut at ground level. A good ground cover of grass should be established.
DISCHARGE CHANNEL	The discharge channel is unvegetated. Sandy soils are exposed. Sedimentation has occurred on the left side of the channel due to erosion on the left abutment. The discharge channel exits into woods and swamp.	Sediment should be removed from the left side of the channel. A good ground cover of grass should be established.
BRIDGE AND PIERS	None	
CONCRETE WEIR	None	

INSTRUMENTATION

Name of Dam: SCOTTS MILLPOND DAM

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER		

RESERVOIR

Name of Dam: SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes are moderately steep and heavily wooded. There are no signs of erosion.	
SEDIMENTATION	The extent of sedimentation was not directly observed, but considering the condition of the area around the reservoir, it should not be significant.	

DOWNSTREAM CHANNEL

Name of Dam: SCOTTS MILLPOND DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The channel downstream of the dam is a broad, flat swampy area heavily overgrown with vegetation.	
SLOPES	The slopes of the channel and surrounding areas are very flat and heavily wooded.	
APPROXIMATE NO. OF HOMES AND POPULATION	The home and outbuilding located on the natural knoll between the left and right embankments of the dam could suffer economic damage from flood flows overtopping the dam, as could Virginia State Route 614, which crosses Hoskins Creek approximately 0.9 miles downstream of the dam.	

APPENDIX IV

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GENERAL REFERENCES

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