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NATIONAL DAM SAFETY PROGRAM, PIEDMONT GERIATRIC HOSPITAL DAM (I--ETC(U)

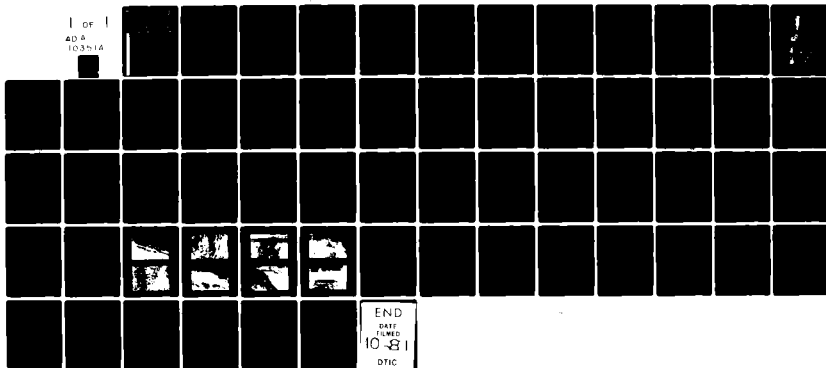
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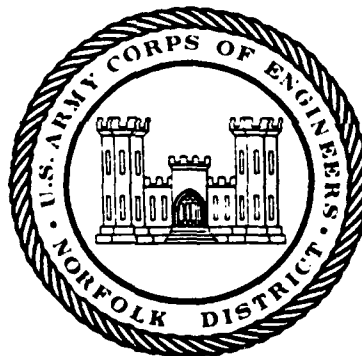
AD A103514

Name of Dam: Piedmont Geriatric Hospital Dam

Location: Nottoway County, Commonwealth of Virginia

Inventory Number: VA 13520

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



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NORFOLK DISTRICT CORPS OF ENGINEERS

803 FRONT STREET
NORFOLK, VIRGINIA 23510

PREPARED BY
MICHAEL BAKER, JR., INC.
BEAVER, PENNSYLVANIA 15009

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER		2. GOVT ACCESSION NO.	
		AD-A103514	
3. RECIPIENT'S CATALOG NUMBER		5. TYPE OF REPORT & PERIOD COVERED	
		Final	
4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program		6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s) Michael Baker, Jr., Inc. Beaver, Penn 15009		8. CONTRACT OR GRANT NUMBER(s) DACW 65-80-D-0032	
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineering District 803 Front Street Norfolk, Virginia 23510		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 12541	
11. CONTROLLING OFFICE NAME AND ADDRESS National Dam Safety Program. Piedmont Geriatric Hospital Dam (Inventory Number VA-13520), James River Basin, Nottoway County, Commonwealth of Virgin- ia. Phase I Inspection Report.		12. REPORT DATE February 1981	
14. MON (co)		13. NUMBER OF PAGES	
		15. SECURITY CLASS. (of this report) Unclassified	
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams - VA National Dam Safety Program Phase I Dam Safety Dam Inspection			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)			

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 indentify 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.

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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: PIEDMONT GERIATRIC HOSPITAL DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Piedmont Geriatric Hospital Dam
State: Commonwealth of Virginia
County: Nottoway
USGS 7.5 Minute Quadrangle: Crewe West, Virginia
Stream: Unnamed Tributary on Lazaretto Creek
Date of Inspection: 12 November 1980

BRIEF ASSESSMENT OF DAM

Piedmont Geriatric Hospital Dam is an earthfill embankment approximately 19.5 feet high¹ and 500 feet long. The principal spillway consists of a 6 inch diameter cast iron pipe acting as a fixed crest riser connected to a 6 inch cast iron conduit that extends through the embankment. The emergency spillway consists of one 18 inch diameter concrete pipe on the left side of the embankment. The embankment is considered to be in fair condition. The appurtenant structures are generally in poor condition. The dam is located approximately one mile east of Burkeville, Virginia. The dam is owned by the Piedmont Geriatric Hospital, Burkeville, Virginia, and is used for recreation. Piedmont Geriatric Hospital Dam is a "small" size - "significant" hazard dam as defined by the Recommended Guidelines for Safety Inspection of Dams. Visual inspection and office analyses of the dam revealed several minor deficiencies requiring further attention. A stability check is not required.

Using the Corps of Engineers' screening criteria for the initial review of spillway adequacy, the 100-year flood was selected as the spillway design flood (SDF). The spillway is capable of passing up to 25 percent of the SDF or 6 percent of the PMF without overtopping the crest of the dam. Overtopping during the SDF is not considered detrimental to the embankment.

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.

¹Measured from downstream toe to low point of embankment crest.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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A regular program of inspections of the dam and appurtenant structures should be instituted. 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. A formal warning system and emergency action plan should be developed and implemented as soon as possible.

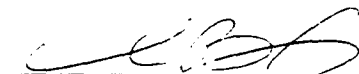
The following repair items should be completed as part of the general maintenance of the dam.

- 1) Remove all trees and brush.
- 2) Remove the root systems of trees with a trunk diameter greater than 3 inches, then fill, compact, and seed the area.
- 3) Remove obstructions from the principal spillway or replace the spillway.
- 4) Install a trash rack on the crest of the riser of the principal spillway to prevent future blockage.
- 5) Repair the erosion on the upstream embankment and extend riprap on the upstream embankment to the crest of the dam.
- 6) Backfill and seed the small cut on the right side of the downstream embankment.
- 7) Backfill the eroded existing emergency spillway discharge channel, compact and seed the fill.
- 8) Install a staff gage to monitor reservoir levels above normal pool.
- 9) The owner should expeditiously consider restoring the emergency spillway to its original condition by removing the 18 inch concrete pipe and the earth used to fill the former spillway channel, then reseed the channel since the reduced waterway capacity has the potential for increasing the probability of overtopping flows.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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MICHAEL BAKER, JR., INC.



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



SUBMITTED:

Original signed by
JAMES A. WALSH

James A. Walsh, P.E.
Chief, Design Branch

RECOMMENDED:

Original signed by
JACK G. STARR

Jack G. Starr, P.E.
Chief, Engineering

APPROVED:

Original signed by:
Douglas L. Haller

Douglas L. Haller
Colonel, Corps of Engineers
District Engineer

Date:

MAR 4 1981

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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OVERALL VIEW OF DAM

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM ID# 13520

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: Piedmont Geriatric Hospital Dam is an earthfill embankment approximately 19.5 feet high¹ and 500 feet long. Most of the upstream embankment has an approximate slope of 3H:1V (Horizontal to Vertical). The top part of the upstream embankment has a slope of 1.3H:1V. The downstream embankment has a slope of 1.7H:1V for the upper 7 feet; the lower section of the downstream embankment is not as adverse, with some sections as flat as 4.8H:1V. The crest of the dam is about 14.4 feet wide; a dirt road runs along the crest. There is no information available on any possible zoning of the embankment. A good riprap cover extends from the normal pool elevation a few feet up the embankment, on the upstream side.

¹Measured from downstream embankment toe to low point of embankment crest.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

The principal spillway consists of a 6 inch diameter cast iron pipe acting as a fixed crest riser connected to a 6 inch cast iron conduit that extends through the embankment and exits 40 feet beyond the toe of the dam into a heavily wooded area. The principal spillway is reportedly clogged with stones and inoperable at the present time.

The emergency spillway consists of one 18 inch diameter concrete pipe on the left side² of the dam. This concrete pipe was recently placed in a former grassed emergency spillway channel, then the channel was filled with earth to near the crest level of the dam. The approach channel is unvegetated due to the recent placement of the concrete pipe. Flow from the existing emergency spillway has cut a 5 foot deep ditch just beyond the left downstream toe of the dam.

An emergency gate for draining the reservoir is located immediately upstream of the principal spillway intake structure. This emergency control is assumed to be ineffective due to the reported blockage of the outlet works.

- 1.2.2 Location: Piedmont Geriatric Hospital Dam is located on an unnamed tributary of Lazaretto Creek, approximately one mile east of Burkeville in Nottoway County, Virginia. A Location Plan is included in this report in Appendix I.
- 1.2.3 Size Classification: The maximum height of the dam is 19.5 feet; the reservoir storage capacity at the crest of the dam (elevation 488.0 T.B.M.³) is 53 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: A sewage disposal plant is located about one quarter mile

²Facing downstream.

³All elevations are referenced to a Temporary Bench Mark (T.B.M.) and are approximately Mean Sea Level.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

downstream of the dam. In the event of dam failure by overtopping, the plant would probably be damaged. Approximately 1600 feet downstream is U.S. Route 460. In the event of dam failure by overtopping, the westbound lanes of the highway, which are 15 feet lower than the eastbound lanes, would probably become obstructed, but serious damage to the road itself would probably not occur. Although loss of human life is not highly probable, economic loss due to the damage of the sewage treatment plant, and disruption of the normal traffic flow in the area, are likely in the event of dam failure. The Piedmont Geriatric Hospital 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 the Piedmont Geriatric Hospital, Burkeville, Virginia 23922. The current Director of the hospital is Mr. William R. Pierce.
- 1.2.6 Purpose of Dam: The dam is used for recreational purposes.
- 1.2.7 Design and Construction History: During the summer of 1980, an 18 inch diameter concrete pipe was placed in the former grassed emergency spillway channel, then the channel was filled with earth to near the crest level of the dam. This work was done by the hospital's maintenance personnel. No other information on the design and construction history was available.
- 1.2.8 Normal Operational Procedures: The normal operating level is about three feet from the top of the dam, elevation 485.0 feet T.B.M. No formal operating procedures are followed for this structure.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

1.3 Pertinent Data

1.3.1 Drainage Area: The drainage area tributary to the dam is 0.11 square miles.

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

Emergency Spillway (present condition):

Pool level at top of dam . . . 10 c.f.s.

Emergency Spillway (if restored to original condition)

Pool level at top of dam . . 500 c.f.s.

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

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation (feet T.B.M.)	Area (acres)	Reservoir		Length (feet)
			Acre-	Capacity	
			feet	Watershed (inches)	
Top of dam (minimum)	488.0	7.2	53	9.0	1380
Emergency spillway	485.6	6.2	37	6.3	1225
Streambed at downstream toe of dam	468.5	-	-	-	-

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

SECTION 2 - ENGINEERING DATA

- 2.1 Design: Design plans, specifications, and boring logs were not available for use in preparing this report.
- 2.2 Construction: Construction records, as-built plans, and inspection logs were not available for review.
- 2.3 Evaluation: No stability analyses or hydrologic and hydraulic data were available for review. 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 upon field observations, discussions with the owner's representatives and office analyses.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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SECTION 3 - VISUAL INSPECTION

3.1 Findings

3.1.1 General: The field inspection of Piedmont Geriatric Hospital Dam was conducted on 12 November 1980. The weather was cold and clear. Precipitation had not been experienced for close to a week previous to the inspection. The reservoir level, at elevation 484.8 ft. T.B.M., was 0.2 feet below the crest of the principal spillway riser. Water was not flowing through the principal spillway because of the low water level. The dam was found to be in fair condition while the principal and emergency spillways were found to be in poor condition.

The deficiencies noted during the field inspection are described in the following paragraphs. The complete field compiled descriptions are included in Appendix III. A field sketch depicting existing conditions is included as Plate 1 in Appendix I.

3.1.2 Dam: The upstream embankment slope of the dam was generally found to be in fair condition. A good riprap cover extended a few feet up the embankment above the water level. The top two feet of the upstream embankment, extending to the top of the dam, were not riprapped for erosion protection. As a result, erosion of the upper few feet has occurred in a few places, leaving small vertical scarps which are subject to further erosion (Photo 7). A few small trees are growing on the upstream embankment.

The downstream embankment slope of the dam was found to be vegetated with dense ground cover and brush. In addition, numerous large evergreen trees and a few deciduous trees are growing on the embankment (Photo 8). Signs of slumping or erosion were not observed, even though the majority of the slope is very steep. However, a small cut into the downstream embankment near the right abutment has been excavated along the junction with the right abutment.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

The junction areas of the abutments with the upstream and downstream embankments are generally not eroded and they are well covered with vegetation. However, the junction of the left abutment with the downstream embankment may be subject to erosion in the near future from discharges through the existing emergency spillway (Photo 6).

A wide, grass covered channel along the left end of the dam previously comprised the emergency spillway. Recently, an 18 inch diameter concrete pipe was laid in sections in the channel and covered with fill to form the present emergency spillway (Photos 4 and 5). The fill extends across the entire channel of the previous emergency spillway and is just slightly lower in elevation than the crest of the dam. The old emergency spillway discharge channel flowed well downstream of the dam before emptying into the receiving stream. A narrow and deep (5 feet) erosion channel in natural soils presently extends from the discharge of the 18 inch outlet all the way into the receiving stream, very close to the toe of the left half of the downstream embankment. Insufficient riprap to subdue erosion is present in the area of the outlet for the existing emergency spillway.

3.1.3 Appurtenant Structures: The inlet of the principal spillway consists of a vertical, open-ended, 6 inch diameter cast iron pipe. No trash rack was provided (Photo 1). The owner's representative reports that this inlet is largely obstructed with rocks that were thrown into the inlet in the past. An emergency valve or gate control is located immediately upstream of the principal spillway inlet. This drain discharges into the principal spillway inlet, and is not operational because the inlet is obstructed with rocks. The outlet of the principal spillway is piped approximately 40 feet downstream of the toe of the embankment before being discharged (Photos 2 and 3).

3.1.4 Reservoir Area: No adverse reservoir conditions were observed during the field inspection. The land around the reservoir is

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

gently sloping and covered with grass and brush. There is no evidence of erosion.

3.1.5 Downstream Channel: The discharge area for the principal and emergency spillways is heavily wooded, but wide and generally unobstructed. Riprap was not provided around the outlet of the principal spillway; however, erosion is minor and the flows experienced must be small.

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

3.2 Evaluation: In general, the dam was found to be in fair condition; however, the principal and emergency spillways were found to be in poor condition. All trees and brush growing on the dam should be removed. Trees with a trunk diameter of three inches or less should be cut at ground level; all trees with a trunk diameter greater than 3 inches should have their root systems removed. The cavities from the tree roots and the small cut on the right side of the downstream embankment should be backfilled and seeded. On the upstream side of the embankment, the erosion should be repaired and riprap should be extended to the crest of the dam. The 18 inch emergency spillway concrete pipe and the related earth fill should be removed. The emergency spillway should be restored to the original grass covered channel. The existing eroded discharge channel should be backfilled and seeded. The principal spillway should be cleaned out or replaced. A trash rack should be installed on the principal spillway riser to prevent future blockages. A staff gage should be installed to monitor reservoir levels above normal pool.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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SECTION 4 - OPERATIONAL PROCEDURES

- 4.1 Procedures: Operation of the dam is an automatic function controlled by the principal spillway and the emergency spillway. At the present time, the principal spillway is reportedly obstructed with stones and does not operate at its full potential. Water enters the principal spillway at elevation 485 feet T.B.M. When inflow is sufficient, the reservoir level rises above 485.55 feet T.B.M. and discharges through the emergency spillway. There is an emergency valve, which discharges into the principal 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: The emergency valve is the only operating facility at the dam. Maintenance is the responsibility of the owner.
- 4.4 Warning System: At the present time, there is no warning system or emergency action plan in operation.
- 4.5 Evaluation: Maintenance of the dam in the past has been inadequate. 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 corrected annually. A warning system and emergency action plan should be developed and implemented as soon as possible.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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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 Information: No rainfall, stream gage, or reservoir stage records are maintained for this dam.
- 5.3 Flood Experience: No records were available. The dam has reportedly never been overtopped.
- 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_c 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 National Oceanic and 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 loss rate of 0.05 inches per hour were used for the PMF and the 1/2 PMF.
- 5.5 Reservoir Regulation: 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 at 485.0 feet T.B.M.

Outlet discharge capacity was computed by hand; reservoir area was planimetered from the Crewe West, Virginia, 7.5 minute USGS quadrangle. Storage capacity was computed by the HEC-1 DB program. Outlet discharge capacity curves were computed to elevations above the crest of the dam. All flood routings were begun with the reservoir at normal pool, elevation 485.0 feet T.B.M., and it was assumed the principal spillway was totally obstructed.

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

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal	Hydrographs		
		100-Year flood	1/2 PMF	PMF ¹
Peak flow, c.f.s.				
Inflow	1	263	700	1400
Outflow	1	57	652	1355
Peak elev., ft. T.B.M.	485.8	487.98	489.07	489.61
Non-overflow section ² (elev. 487.2 ft. T.B.M.)				
Depth of flow, ft.	-	0.8	1.9	2.4
Average velocity, f.p.s.		4.1	6.3	7.2
Total duration of over- topping, hrs.	-	5.8	15.8	19.3
Tailwater elev., ft. T.B.M.	467.3	-	-	-

¹The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region.

²Velocity estimates were based on critical depth at control section.

5.7 Reservoir Emptying Potential: An emergency gate to drain the reservoir was originally installed in the dam. This gate uses the conduit of the principal spillway and is controlled by a shut-off valve located near the crest riser of the principal spillway. This gate may not be operable because of the reported obstruction of the principal spillway. If the spillway is unobstructed and can operate properly, and neglecting inflow, the reservoir can be drawn down from normal pool in approximately 10 days. This is equivalent to an approximate drawdown rate of 0.6 feet per day, based on the hydraulic height measured from normal pool divided by the time to dewater the reservoir.

5.8 Evaluation: Piedmont Geriatric Hospital 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. The 100-year flood was routed through the reservoir and found to overtop the dam by a maximum depth of 0.8 feet and an average critical velocity of 4.1 feet per second

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

(f.p.s.). Total duration of dam overtopping would be approximately 5.8 hours. The spillway is capable of passing up to 25 percent of the SDF or 6 percent of the PMF without overtopping the crest of the dam.

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

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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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 located in the Piedmont physiographic province of Virginia. The topography of the Piedmont generally consists of rolling hills and gentle slopes with relief less than 150 feet. Granite of uncertain age is indicated on the Geologic Map of Virginia as underlying the dam. Bedrock outcrops were not observed in the vicinity of the dam during the field inspection. It is not known how the dam was keyed into the foundation and abutments. Relatively thick residual soils may be expected beneath the dam. The Piedmont is reported to contain widespread, thick (50-150 feet) residual soils. Brown sandy silt with a trace of clay was determined to be the local soil type during the visual inspection (ML group soil-Unified Classification System).

6.2 Embankment

6.2.1 Materials: Documented information describing the nature of the embankment materials or any zoning within the embankment was not available for this inspection. The outer embankment materials were noted to be similar to local soils described above.

6.2.2 Stability: Design plans and the results of a previous stability analysis, if any, were not available for use during this evaluation. The embankment is assumed to be a generally homogeneous type. The dam is 19.5 feet high with a crest width of 14.4 feet. The upstream embankment generally slopes 3H:1V. The upper few feet of the upstream embankment has been locally steepened by erosion to approximately 1.3H:1V. The upper 7 feet of the downstream embankment slopes 1.7H:1V. The lower segment of the downstream embankment is flatter, one section being as flat as 4.8H:1V.

An emergency gate was provided to drain the impoundment as necessary; however, the gate may not be operable. The principal spillway is obstructed with stones, according to the owner's representative. However, assuming

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

that the drawdown system could be operable, the dam would be subjected to a rapid drawdown rate of 0.6 feet per day which exceeds the critical rate of 0.5 feet per day for earth dams.

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 dam constructed of CL or ML type soils, with a stable foundation, should be 3.5H:1V if the dam is subject to rapid drawdown. The recommended downstream slope is 2.5H:1V. A crest width of 13.7 feet is recommended, considering the height of the dam. Based on these guidelines, the existing upstream slope and crest width are satisfactory. The downstream slope is overly steep.

Signs of instability in the dam such as slumping, tension cracks, or unusual alignment along the crest were not observed during the visual inspection. The upper few feet of the upstream embankment have been eroded by runoff and wave action resulting in a few very steep scarps.

6.2.3 Seismic Stability: The dam is located in Seismic Zone 2 which presents no hazard from earthquakes according to the Recommended Guidelines for 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 conventional safety margins exist.

6.3 Evaluation: The results of a previous stability analysis were not available for comparison as part of this evaluation of Piedmont Geriatric Hospital Dam. The embankment design is generally satisfactory compared to guidelines by the Bureau of Reclamation, with the exception that the upper part of the downstream embankment is overly steep and the upstream embankment is slightly inadequate. The downstream embankment is very well vegetated with no signs of instability. The erosion of the upper few feet of the upstream embankment should be corrected to ensure continued stability and prevent small slumps along the upstream crest. A stability analysis is not required.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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 0.8 feet with an average critical velocity of 4.1 f.p.s. Total duration of the overtopping would be 5.8 hours. The velocity of the overtopping flow, 4.1 f.p.s., does not exceed 6.0 f.p.s., the effective eroding velocity for a vegetated earth embankment. The depth, duration and rate of overtopping flows are not considered detrimental to the embankment. Presently, most of the embankment is heavily vegetated, with the exception of the area near the emergency spillway where the former spillway channel has recently been filled with bare earth. This area is also the low point of the dam. Because of these two conditions, during overtopping, the flood would probably rapidly erode the new fill in the emergency spillway area down to the original spillway channel.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

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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 is considered to be in fair condition. The appurtenant structures are generally in poor condition. Maintenance of the dam is considered inadequate. A stability check is not 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 Piedmont Geriatric Hospital Dam. The spillway is capable of passing up to 25 percent of the SDF or 6 percent of the PMF without overtopping the crest of the dam. Overtopping during the SDF is not considered detrimental to the embankment.

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.

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

- 7.2 Recommended Remedial Measures: A regular program of inspections of the dam and appurtenant structures should be instituted. 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.

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be completed as part of the general maintenance of the dam:

- 1) Remove all trees and brush.
- 2) Remove the root systems of trees with a trunk diameter greater than 3 inches, then fill, compact, and seed the area.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

- 3) Remove obstructions from the principal spillway or replace the spillway.
- 4) Install a trash rack on the crest riser of the principal spillway to prevent future blockage.
- 5) Repair the erosion on the upstream embankment and extend riprap to the crest of the dam.
- 6) Backfill and seed the small cut on the right side of the downstream embankment.
- 7) Backfill the eroded existing emergency spillway discharge channel, compact and seed the fill.
- 8) Install a staff gage to monitor reservoir levels above normal pool.
- 9) The owner should expeditiously consider restoring the emergency spillway to its original condition by removing the 18 inch concrete pipe and the earth used to fill the former spillway channel, then reseed the channel since the reduced waterway capacity has the potential for increasing the probability of overtopping flow.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

APPENDIX I

PLATES

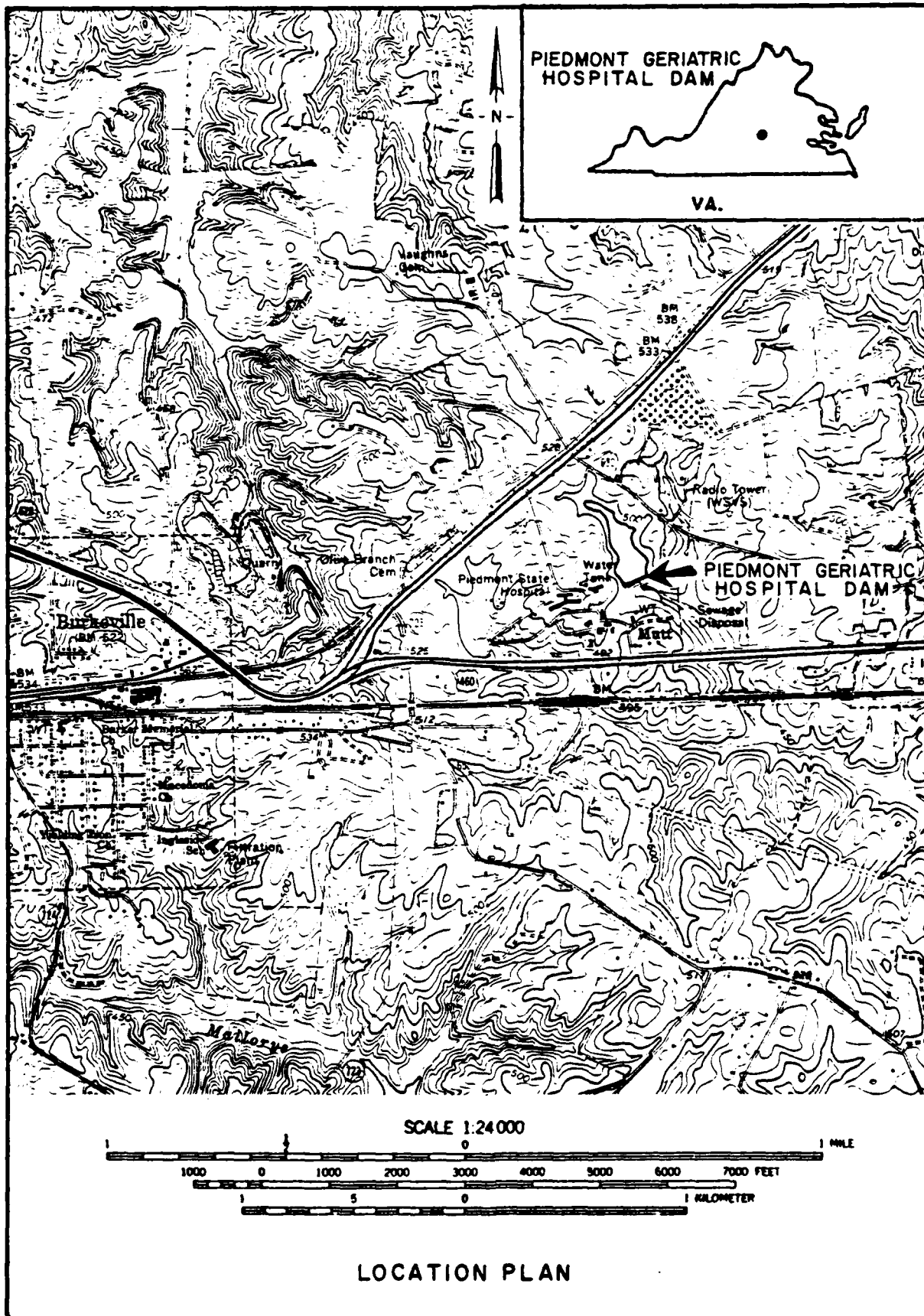
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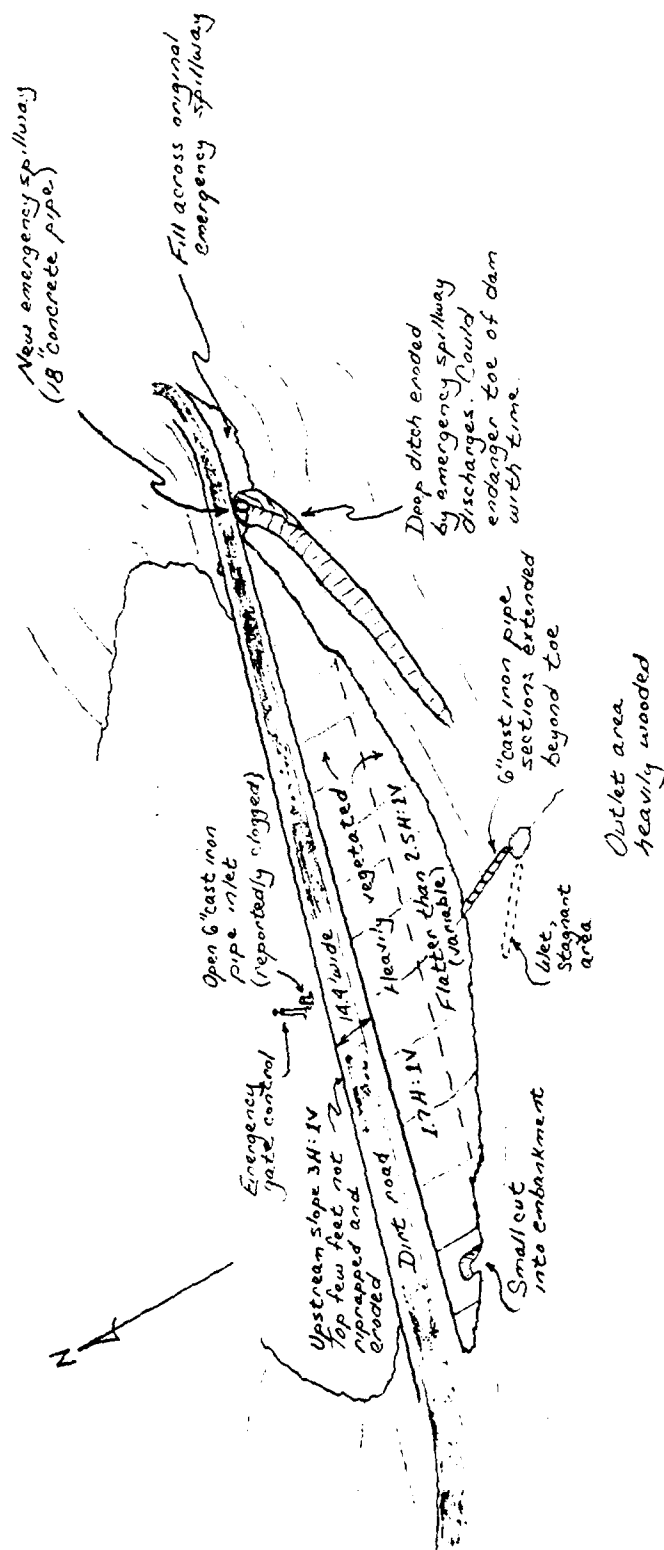
Location Plan

Plate 1: Field Sketch

Plate 2: Top of Dam Profile and Typical Dam Cross Section

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM





-Not to Scale-

FIELD SKETCH PIEDMONT GERIATRIC HOSPITAL DAM, VIRGINIA

Michael Baker, Jr., Inc.
12 November 1980

DWH 11-80

PLATE 1

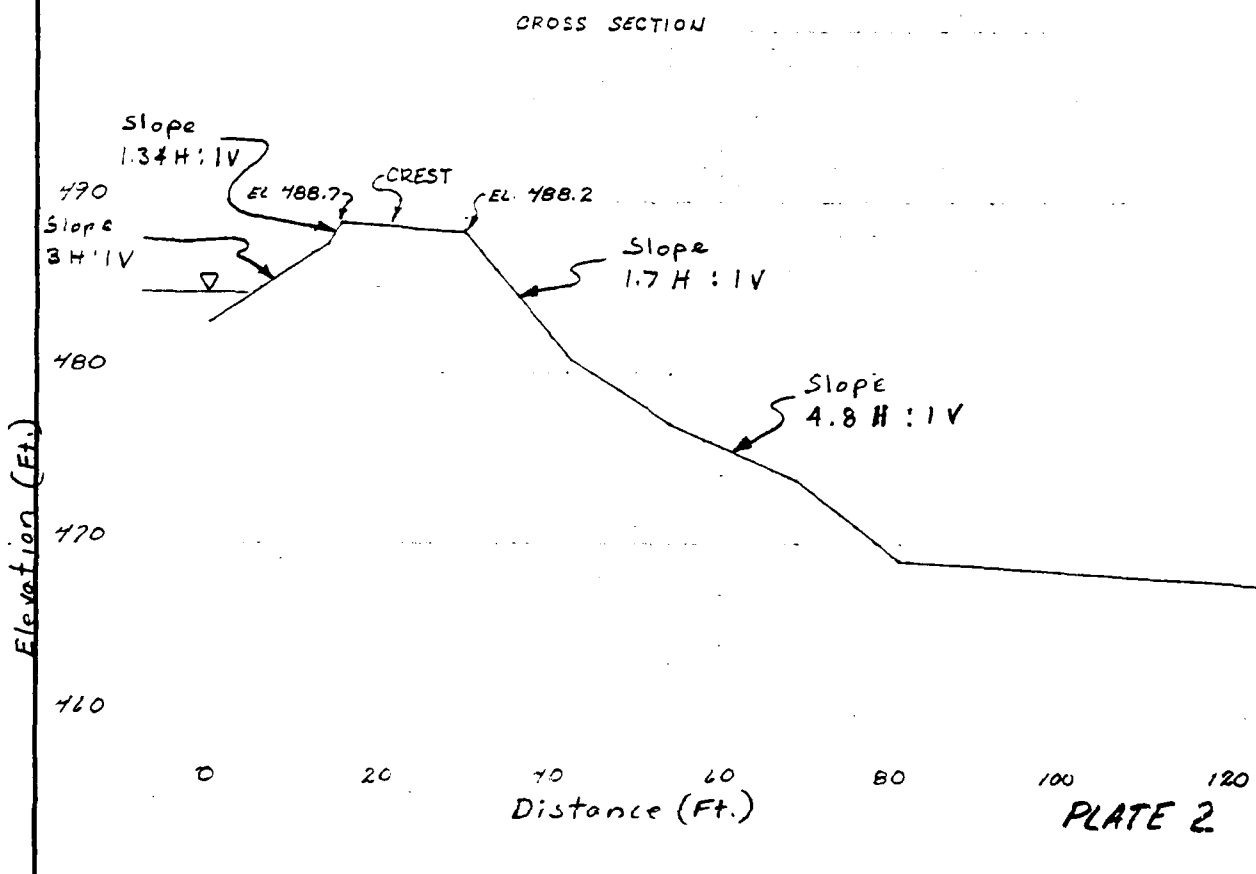
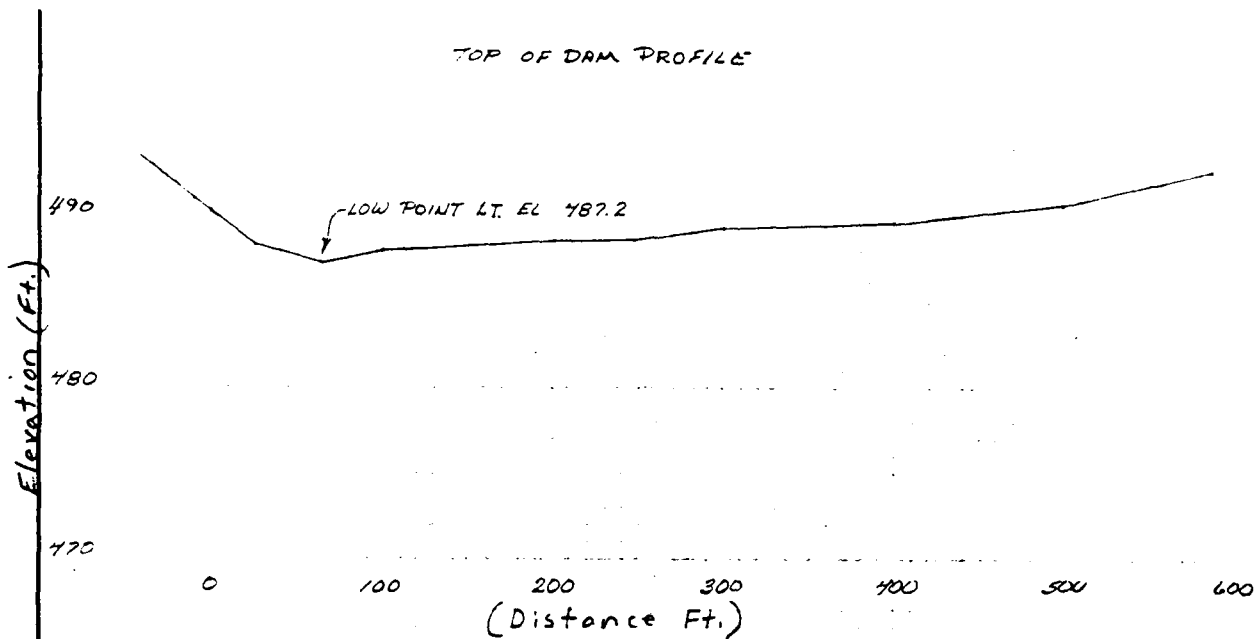


PLATE 2

APPENDIX II

PHOTOGRAPHS

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- Photo 1: Principal Spillway Inlet, Emergency Gate Control
- Photo 2: Principal Spillway Outlet Piped Beyond Toe
- Photo 3: Principal Spillway Outlet, Wooded Discharge Area
- Photo 4: New Emergency Spillway Inlet, Fill Across Original Channel
- Photo 5: New Emergency Spillway Outlet
- Photo 6: Channel Eroded by New Emergency Spillway Discharges
- Photo 7: Upstream Embankment, Riprap, Oversteepened Top of Embankment
- Photo 8: Downstream Embankment, Heavy Vegetation

Note: Photographs were taken on 12 November 1980.

NAME OF DAM: PIEDMONT GERIATRIC HOSPITAL DAM

PIEDMONT GERIATRIC HOSPITAL DAM

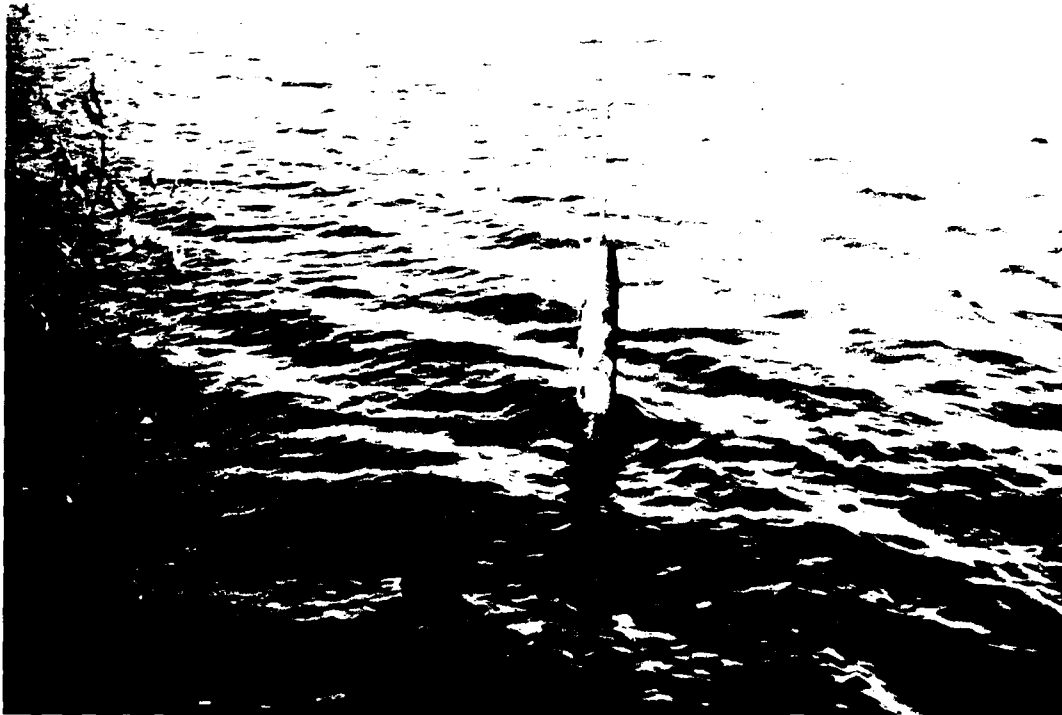


PHOTO 1. Principal Spillway Inlet, Emergency Gate Control



PHOTO 2. Principal Spillway Outlet Piped Beyond Toe

PIEDMONT GERIATRIC HOSPITAL DAM



PHOTO 3. Principal Spillway Outlet, Wooded Discharge Area



PHOTO 4. New Emergency Spillway Inlet, Fill Across Original Channel

PIEDMONT GERIATRIC HOSPITAL DAM



PHOTO 5. New Emergency Spillway Outlet

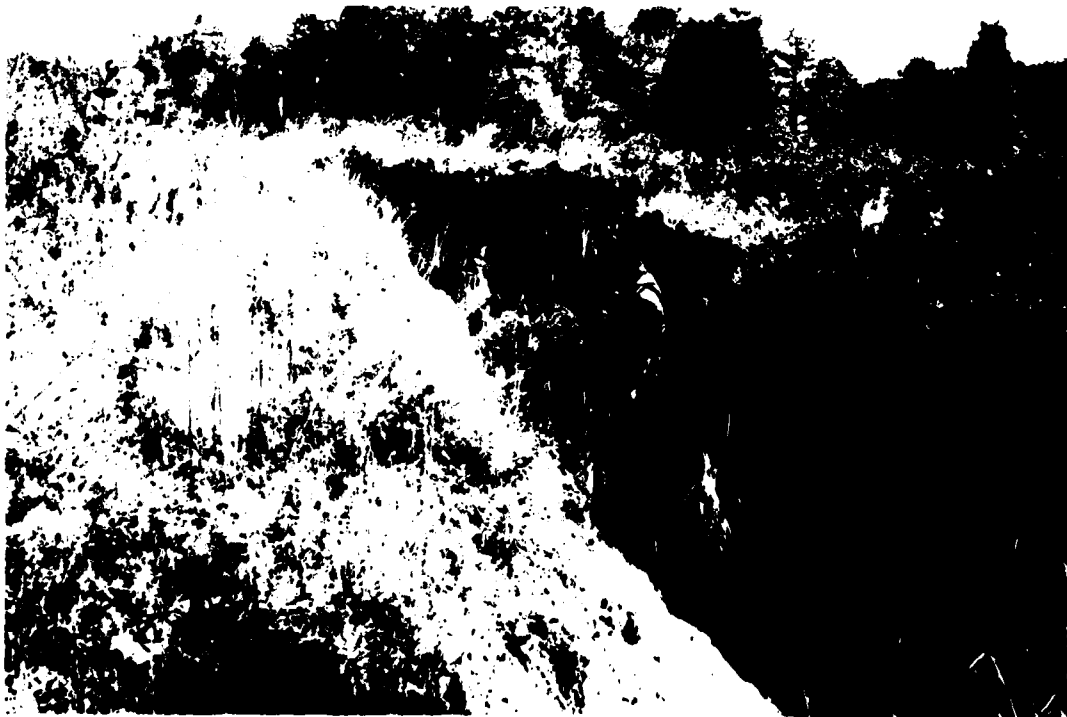


PHOTO 6. Channel Eroded by New Emergency Spillway Discharges

PIEDMONT GERIATRIC HOSPITAL DAM



PHOTO 7. Upstream Embankment, Riprap, Oversteepened Top of Embankment



PHOTO 8. Downstream Embankment, Heavy Vegetation

APPENDIX III
VISUAL INSPECTION CHECK LIST

Check List
Visual Inspection
Phase 1

Name of Dam Piedmont Geriatric County Nottoway State Virginia Coordinates Lat. 3711.6
Hospital Dam Long. 7810.3

Date of Inspection 12 November 1980 Weather Clear Temperature 40° F.

Pool Elevation at Time of Inspection 484.8 ft. T.B.M.* Tallwater at Time of Inspection 467.3 ft. T.B.M.*

*All elevations are referenced to a Temporary Bench Mark (T.B.M.) and are approximately Mean Sea Level.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Jeff Quay
Earl Lim
Dave Hupe

Owner's Representatives:

Mr. Weishaar

Virginia State Water Control Board:

Leon Musselwhite

Dave Hupe Recorder

EMBANKMENT

Name of Dam PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	The upstream face of the embankment is in fair condition. A few near-vertical erosion scarps have formed on the top section of the embankment. A few small trees are present on the upstream embankment. The downstream embankment is heavily vegetated with dense ground cover and brush. Numerous large evergreen trees grow on the embankment. No signs of instability or erosion were observed. The downstream embankment is very steep. A small cut has been recently taken out of the embankment near the right end.	The erosion scarps should be backfilled. All trees should be removed. Trees with a trunk diameter of less than 3 in. should be cut at ground level. All trees with a trunk diameter greater than 3 in. should have their root systems removed and the holes backfilled, compacted and seeded. The cut should also be backfilled and seeded.

EMBANKMENT

Name of Dam PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The embankment is 4 ft. higher at the right abutment than at the left. Horizontal alignment of the crest is satisfactory.	
RIPRAP FAILURES	The upstream embankment is riprapped, with the exception of approximately the top 2 ft. This riprap is in good condition. The normal water level is reportedly at or above the level of the riprap.	The riprap should be extended to the crest of the dam.
EMBANKMENT MATERIALS	The embankment is composed of sandy silt with a trace of clay.	

EMBANKMENT

Name of Dam PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The junctions of the embankment and abutments and the spillway and dam are generally in good condition. The junction of the downstream embankment with the left abutment could be affected if erosion from the emergency spillway discharge channel progresses.	Refer to "Discharge Channel".
ANY NOTICEABLE SEEPAGE	One wet area was observed just right of the spillway outlet. This is believed to be the result of poor drainage due to runoff from the right downstream abutment and the embankment	This wet area should not affect the stability of the dam. No remedial measures are required.
STAFF GAGE AND RECORDER	None observed	A staff gage should be installed to monitor reservoir levels above normal pool.
DRAINS	No drains were located during the field inspection.	

OUTLET WORKS

Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	N/A - The outlet conduit is a 6 in. diameter cast iron pipe.	
INTAKE STRUCTURE	The intake consists of a vertical, open ended, 6 in. diameter cast iron pipe acting as a riser. No trash screen was provided. The intake was almost completely blocked several years ago by rocks.	The intake should be cleaned out if possible or the principal spillway should be reconstructed.
	The water level in the pond was below the inlet at the time of inspection.	
OUTLET STRUCTURE	The outlet is piped along the ground, well beyond the toe on the dam. The pipe discharges into a broad flat area with many trees. Riprap is not provided, but no significant erosion has occurred. A small amount of water was dripping from the pipe at the time of the inspection.	
OUTLET CHANNEL	The outlet channel is heavily wooded. There are no major obstructions in the outlet channel.	

OUTLET WORKS

Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EMERGENCY GATE	The emergency gate is located immediately upstream of the principal spillway intake structure. The emergency gate is assumed to be ineffective, due to the reported blocking of the principal spillway intake structure.	Refer to "Intake Structure".

UNGATED SPILLWAY

Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTION	A grassed emergency spillway channel existed previously. Recently an 18 in. diameter concrete pipe was placed in the center of the spillway and the grassed channel was filled to near the level of the dam crest so vehicles could travel over the emergency spillway.	This 18 in. pipe is inadequate in size, especially considering that the principal spillway is reportedly blocked with stones. The emergency spillway should be restored to its original condition.
APPROACH CHANNEL	The approach channel is unvegetated, due to the recent placement of the concrete pipe.	A good cover of grass should be established.
DISCHARGE CHANNEL	The original discharge channel that directed flow away from the downstream embankment has been cut short. Flow from the concrete pipe has cut a 5 ft. deep channel just beyond the left toe of the dam. The channel is cut in the natural soils below the dam.	The eroded channel should be backfilled and seeded. See "Control Section" recommendations.
BRIDGE AND PIERS	None present	

INSTRUMENTATION
Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION

MONUMENTATION/SURVEYS No permanent markers were found.

OBSERVATION WELLS None

WEIRS None

PIEZOMETERS None

OTHER

RESERVOIR

Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The slopes are very gentle and covered with grass and brush. There is no evidence of erosion.	
SEDIMENTATION	The extent of sedimentation was not directly observed, but is not expected to be significant. According to the owner's engineer, the reservoir is 16 ft. deep at its deepest point.	

DOWNSTREAM CHANNEL

Name of Dam: PIEDMONT GERIATRIC HOSPITAL DAM

VISUAL EXAMINATION OF		REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	OBSERVATIONS	
	The downstream channel is narrow, but there are no significant obstructions between the dam and Route 460, 1600 ft. downstream of the dam.	
SLOPES	The downstream channel has a slope of approximately 1.8%. The overbanks are covered with dense trees and brush.	
APPROXIMATE NO. OF HOMES AND POPULATION	No houses downstream.	

APPENDIX IV
GENERAL REFERENCES

GENERAL REFERENCES

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