

AD-A104 665

ARMY ENGINEER DISTRICT ST LOUIS MO
NATIONAL DAM SAFETY PROGRAM, ANDERSON LAKE DAM (MO 30410), MISS--ETC(U)
DEC 78 A L JOHNSON

F/6 13/13

UNCLASSIFIED

NL

1 of 1
ADA
DAGR

END
DATE
FILMED
10-81
DTIC

AD A104665

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A104665	
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Anderson Lake Dam (MO 30410) Jefferson County, Missouri		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Corps of Engineers, St. Louis District		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		8. CONTRACT OR GRANT NUMBER(s) N/A
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) National Dam Safety Program, Anderson Lake Dam (MO 30410), Mississippi- Kaskaskia-St. Louis Basin, Jefferson County, Missouri, Phase I		12. REPORT DATE December 1978
16. DISTRIBUTION Inspection Report. Approved for release; distribution unlimited.		13. NUMBER OF PAGES Approximately 45
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		15. SECURITY CLASS. (of this report) UNCLASSIFIED DECLASSIFICATION/DOWNGRADING SCHEDULE
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety, Lake, Dam Inspection, Private Dams		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.		

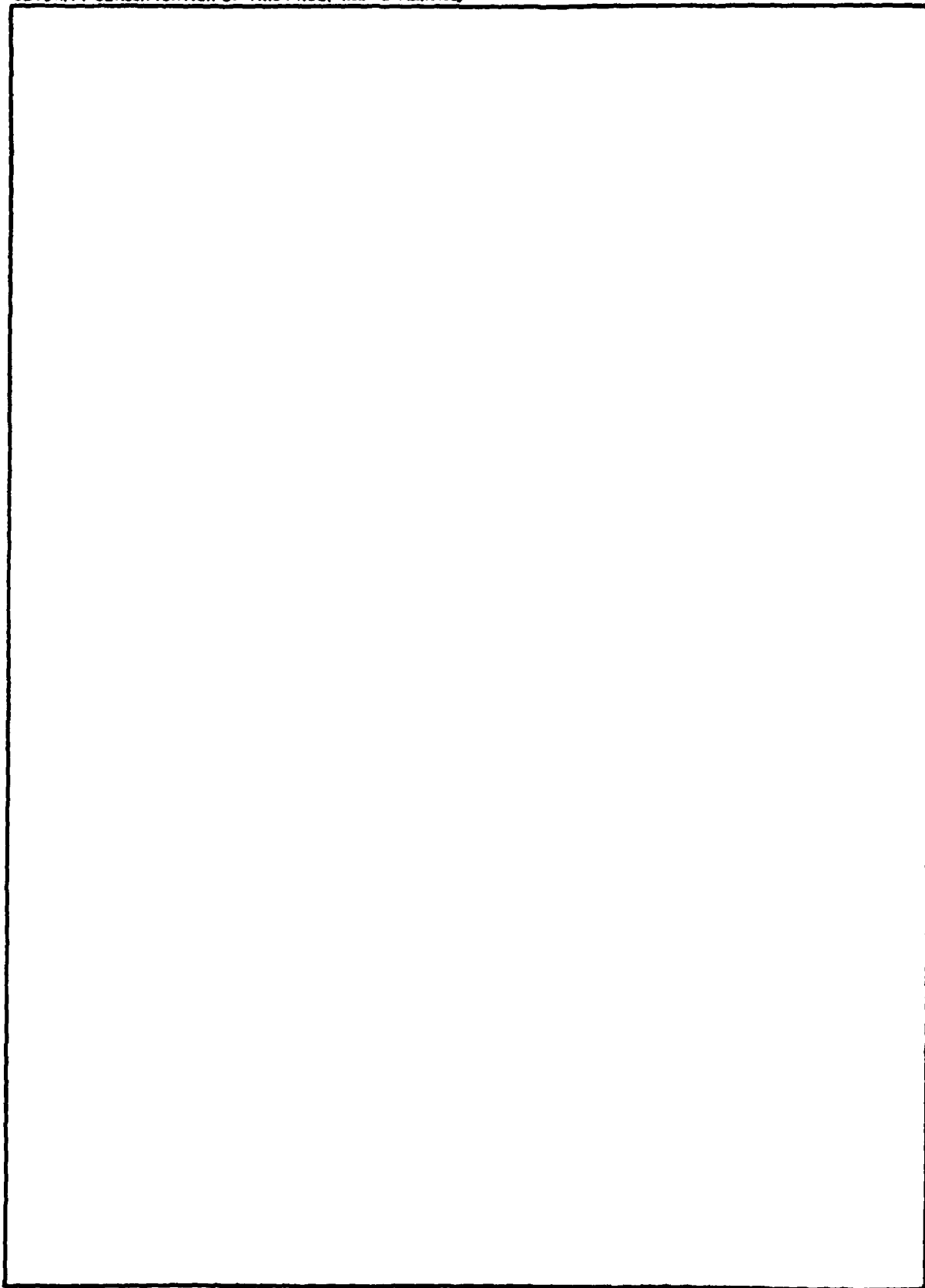
DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)



SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

RESPONSIBILITY. The controlling DoD office will be responsible for completion of the Report Documentation Page, DD Form 1473, in all technical reports prepared by or for DoD organizations.

CLASSIFICATION. Since this Report Documentation Page, DD Form 1473, is used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by the appropriate symbol.

COMPLETION GUIDE

General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave Blocks 2 and 3 blank.

Block 1. Report Number. Enter the unique alphanumeric report number shown on the cover.

Block 2. Government Accession No. Leave Blank. This space is for use by the Defense Documentation Center.

Block 3. Recipient's Catalog Number. Leave blank. This space is for the use of the report recipient to assist in future retrieval of the document.

Block 4. Title and Subtitle. Enter the title in all capital letters exactly as it appears on the publication. Titles should be unclassified whenever possible. Write out the English equivalent for Greek letters and mathematical symbols in the title (see "Abstracting Scientific and Technical Reports of Defense-sponsored RDT/E," AD-667 000). If the report has a subtitle, this subtitle should follow the main title, be separated by a comma or semicolon if appropriate, and be initially capitalized. If a publication has a title in a foreign language, translate the title into English and follow the English translation with the title in the original language. Make every effort to simplify the title before publication.

Block 5. Type of Report and Period Covered. Indicate here whether report is interim, final, etc., and, if applicable, inclusive dates of period covered, such as the life of a contract covered in a final contractor report.

Block 6. Performing Organization Report Number. Only numbers other than the official report number shown in Block 1, such as series numbers for in-house reports or a contractor/grantee number assigned by him, will be placed in this space. If no such numbers are used, leave this space blank.

Block 7. Author(s). Include corresponding information from the report cover. Give the name(s) of the author(s) in conventional order (for example, John R. Doe or, if author prefers, J. Robert Doe). In addition, list the affiliation of an author if it differs from that of the performing organization.

Block 8. Contract or Grant Number(s). For a contractor or grantee report, enter the complete contract or grant number(s) under which the work reported was accomplished. Leave blank in in-house reports.

Block 9. Performing Organization Name and Address. For in-house reports enter the name and address, including office symbol, of the performing activity. For contractor or grantee reports enter the name and address of the contractor or grantee who prepared the report and identify the appropriate corporate division, school, laboratory, etc., of the author. List city, state, and ZIP Code.

Block 10. Program Element, Project, Task Area, and Work Unit Numbers. Enter here the number code from the applicable Department of Defense form, such as the DD Form 1498, "Research and Technology Work Unit Summary" or the DD Form 1634, "Research and Development Planning Summary," which identifies the program element, project, task area, and work unit or equivalent under which the work was authorized.

Block 11. Controlling Office Name and Address. Enter the full, official name and address, including office symbol, of the controlling office. (Equates to funding/sponsoring agency. For definition see DoD Directive 5200.20, "Distribution Statements on Technical Documents.")

Block 12. Report Date. Enter here the day, month, and year or month and year as shown on the cover.

Block 13. Number of Pages. Enter the total number of pages.

Block 14. Monitoring Agency Name and Address (if different from Controlling Office). For use when the controlling or funding office does not directly administer a project, contract, or grant, but delegates the administrative responsibility to another organization.

Blocks 15 & 15a. Security Classification of the Report: Declassification/Downgrading Schedule of the Report. Enter in 15 the highest classification of the report. If appropriate, enter in 15a the declassification/downgrading schedule of the report, using the abbreviations for declassification/downgrading schedules listed in paragraph 4-207 of DoD 5200.1-R.

Block 16. Distribution Statement of the Report. Insert here the applicable distribution statement of the report from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 17. Distribution Statement (of the abstract entered in Block 20, if different from the distribution statement of the report). Insert here the applicable distribution statement of the abstract from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 18. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . . translation of (or by) . . . Presented at conference of . . . To be published in . . .

Block 19. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging, conforming to standard terminology. The DoD "Thesaurus of Engineering and Scientific Terms" (TEST), AD-672 000, can be helpful.

Block 20. Abstract. The abstract should be a brief (not to exceed 200 words) factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified and the abstract to an unclassified report should consist of publicly-releasable information. If the report contains a significant bibliography or literature survey, mention it here. For information on preparing abstracts see "Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E," AD-667 000.

ANDERSON LAKE DAM
JEFFERSON COUNTY, MISSOURI

MISSOURI INVENTORY NO. 30410

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	

PREPARED BY: ST. LOUIS DISTRICT CORPS OF ENGINEERS
FOR: GOVERNOR OF MISSOURI

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam: Anderson Lake Dam
State Located: Missouri
County Located: Jefferson County
Stream: No Name
Date of Inspection: 7 September 1978

Anderson Lake Dam was inspected by an interdisciplinary team of engineers from the St. Louis District, U. S. Army Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property. The inspection and assessment were made using the "Recommended Guidelines for Safety Inspection of Dams" developed by the Chief of Engineers, U.S. Army, Washington, DC, with the help of several Federal and state agencies, professional engineering organizations and private engineers.

Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten the life and property of approximately four families downstream of the dam and cause appreciable damage to one farm complex, one improved road and two unimproved roads, all within a three-mile damage reach of the lake.

For its size and hazard category, this dam is required by the guidelines to pass from one-half PMF to PMF. However, considering the high-hazard potential to life (four residences) and property downstream of the dam, the PMF is considered the appropriate spillway design flood. Since the spillway for the dam is not capable of passing a minimum of one-half (50 percent) of the PMF without overtopping the dam and causing failure, the spillway is considered seriously inadequate. The spillway is capable of passing 20 percent of the PMF without overtopping the dam.

Other deficiencies visually observed by the inspection team were a thick cover of trees and brush on both sides of the embankment slopes, lack of erosion protection from runoff on the downstream face of the left abutment, lack of erosion protection along the spillway channel and the upstream face of the embankments, and the exit channel flows along the toe of the embankment. Another

deficiency which should be corrected was the lack of seepage and stability analyses comparable to the requirements of the guidelines. However, none of these deficiencies present a serious threat to the dam's stability.

It is recommended that the owner take action to correct or control the deficiencies described. A detailed report discussing each of these deficiencies was prepared and submitted herewith.

Sar. Lynne E. Puetz P.E.
LYNNE E. PUETZ
Hydraulic Engineer
St. Louis District
Corps of Engineers

Joseph L. Schwenk
JOE SCHWENK
Soils Engineer
St. Louis District
Corps of Engineers

Michael J. Klosterman
MICHAEL J. KLOSTERMAN
Geologist
St. Louis District
Corps of Engineers

SUBMITTED BY: *Arthur L. Johnson* 20 Dec 78
for Chief, Engineering Division Date

APPROVED BY: *Leon E. Mills* 20 Dec 78
Colonel, CE, District Engineer Date

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
ANDERSON LAKE DAM - ID NO. 30410

TABLE OF CONTENTS

<u>Paragraph No.</u>	<u>Title</u>	<u>Page No.</u>
SECTION 1 - PROJECT INFORMATION		
1.1	General	1
1.2	Description of Project	1
1.3	Pertinent Data	2
SECTION 2 - ENGINEERING DATA		
2.1	Design	5
2.2	Construction	5
2.3	Operation	5
2.4	Evaluation	5
SECTION 3 - VISUAL INSPECTION		
3.1	Findings	6
3.2	Evaluation	7
SECTION 4 - OPERATIONAL PROCEDURES		
4.1	Procedures	8
4.2	Maintenance of Dam	8
4.3	Maintenance of Operating Facilities	8
4.4	Description of Any Warning System in Effect	8
4.5	Evaluation	8
SECTION 5 - HYDRAULIC/HYDROLOGIC		
5.1	Evaluation of Features	9
SECTION 6 - STRUCTURAL STABILITY		
6.1	Evaluation of Structural Stability	10
SECTION 7 - ASSESSMENT/REMEDIAL MEASURES		
7.1	Dam Assessment	11
7.2	Remedial Measures	11
APPENDIX		
A	Hydrologic Computations	

TABLE OF CONTENTS (Continued)

LIST OF PLATES

<u>Plate No.</u>	<u>Title</u>
1	Location Map
2	Vicinity Topograph
3	Plan
4	Dam Profile and Cross Section

LIST OF PHOTOGRAPHS

<u>Photo No.</u>	<u>Title</u>
1	Upstream View of Lake
2	Downstream Face of Dam
3	Downstream Face of Dam and Spillway
4	Upstream Face of Right Abutment and Spillway
5	Downstream View of Spillway
6	Upstream View of Spillway
7	Seepage Near Right Abutment, Downstream Face of Embankment
8	Exit Channel Running Along Toe of Dam



AMERICAN NATIONAL

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
ANDERSON LAKE DAM - ID NO. 30410

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection of the Anderson Lake Dam be made.

b. Purpose of Inspection. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria. Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams." These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances.

(1) The dam is an earth structure built in a narrow valley. The topography adjacent to the valley is rolling to steep. The earth embankment is composed of brown silty clay. Topography in the vicinity of the dam is shown on PLATE 2.

(2) The spillway, located on the right abutment, was cut in sedimentary rock. There are no outlet works or other structures controlling releases from the lake except for the spillway.

(3) Pertinent physical data are given in paragraph 1.3 below.

b. Location: The dam is located in the southwestern portion of Jefferson County, Missouri, as shown on PLATE 1. The lake formed by the dam is located in the SW 1/4 of Section 7 of T40N, R4E of the Fletcher, Missouri Quadrangle Sheet.

c. Size Classification: Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1c above. Based on these criteria, this dam and impoundment is in the small size category.

d. Hazard Classification: Guidelines for determining hazard classification are presented in the same guidelines as referenced in paragraph 1.2c, above. Based on referenced guidelines, this dam is in the High Hazard Classification

e. Ownership. This dam is owned by Mr. Hugh Anderson.

f. Purpose of Dam. The dam forms a 5.2-acre recreational lake.

g. Design and Construction History. It was reported that the dam was built in 1958 by the previous owner. Plans for the construction of the dam were prepared but the present owner was unable to locate the design plans. The location of the previous owner is not known.

h. Normal Operating Procedure. No operating records exist. Outflow passes over an uncontrolled spillway.

1.3 PERTINENT DATA

a. Drainage Area - 93 acres

b. Discharge at Damsite: Not known

Maximum known flood at damsite - 1 foot depth over spillway reported

Spillway capacity at maximum pool elevation - 350 cfs

c. Elevation (feet Above m.s.l. from assumed benchmark of 700 ft. m.s.l.):

(1) Top of dam - 699.2

(2) Flood control pool - 699.2

- (3) Recreation pool - 696.8
- (4) Streambed - 673+
- (6) Maximum tailwater - Not known

d. Reservoir:

Length of maximum pool - Approximately 1,200 feet

Length of recreation pool - Approximately 900 feet

e. Storage (Acre-feet):

Recreation pool - 57

Flood Control pool - 68

Design surcharge - 0

Top of dam - 68

f. Reservoir Surface Area (Acres):

Top of dam - 5.2

Maximum pool - 5.2

Flood control pool - 5.2

Recreation pool - 4.7

Spillway crest - 4.7

g. Dam.

Type - Earth fill.

Length - 335 feet.

Height - 26+ feet

Top width - 10 feet.

Side Slopes - Varies, typically 1 vertical on 1.5 horizontal downstream; upstream side slope could not be determined. A typical section is shown on PLATE 4.

Zoning - Unknown.

Impervious Core - Unknown.

Cutoff - Unknown.

Grout curtain - Unknown.

h. Diversion and Regulating Tunnel: None.

i. Spillway.

(1) Type - Earth/rock channel

(2) Length of weir - Not applicable

(3) Crest elevation - 696.8

j. Regulating Outlets. None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN.

No design data were found to be readily available.

2.2 CONSTRUCTION.

The dam was built in 1958 by the previous owner. Plans for the construction of the dam were prepared but the present owner was unable to locate the design plans. The location of the previous owner is not known.

2.3 OPERATION.

The maximum reservoir loading on the dam is not known. All releases are through an uncontrolled spillway

2.4 EVALUATION.

a. Availability. No design or construction data were available.

b. Adequacy. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dam" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for the appropriate loading conditions and made a matter of record.

c. Validity. No valid engineering design data of construction data were available.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of the dam, outlet spillway and exit channel was made on 7 September 1978 by Corps of Engineers, St. Louis District personnel. The owner, Mr. Anderson, accompanied the inspection team. Very little information was available concerning construction of the dam.

b. Project Geology.

(1) The Anderson Lake Dam and drainage area is underlain by the Ordovician Jefferson City formation. Bedrock exposed in the spillway is light brown to cream, fine grained, thinly bedded dolomite with a moderately spalled surface. The bedding is essentially horizontal. The rock surface was slightly jointed by a set of short, closely spaced, relatively tight NW-SE trending joints. The bedrock exposed in the spillway was the only rock outcrop found in the entire drainage area, the remainder being covered by thin, cherty Jefferson City-Cotter residuum.

(2) The dam is located approximately 3 miles northeast of the northern edge of the Valle Mines - Vineland fault zone. The last major movement along this fault zone has been described as being post-Ordovician (440 million years before present), and it is not considered to be active. No evidence of faulting or other tectonic activity was observed in the area of the dam.

(3) No evidence of karst or other solution activity was found in the drainage area. On the right abutment, a small amount of water was observed seeping from the rock-embankment interface at the downstream edge of the spillway near the toe of the dam. On the left abutment, a small springhouse was located approximately 50 feet downstream of the toe of the dam; however, no artesian flow was apparent.

c. Dam.

(1) The dam is an earth embankment composed of brown silty clay. The dam is heavily vegetated and has scattered trees 3 inches in diameter and less growing on the downstream slope. The upstream slope is covered with willow trees that are less than 3 inches in diameter. These root systems constitute a potential seepage hazard. The crown has thick grass cover and is occasionally mowed. No detrimental settlement, cracking or sinkholes were observed in or near the earth embankment.

(2) No animal burrows were noted in the embankment. However, the thick vegetation provides animal habitat which increases the likelihood of animal burrows.

(3) No riprap exists on the upstream slope of the dam. However very little erosion has taken place on the upstream slope due to wave action.

(4) The downstream slope varies, typically 1 vertical on 1.5 horizontal. The upstream slope could not be determined.

(5) Marshy areas with standing water were observed approximately 25 feet downstream of the toe of the dam. A spring was observed seeping from the rock outcrop located at the right abutment of the dam.

(6) Surface drainage from the left side of the lake has caused minor erosion near the left abutment and dam embankment. Gullies were observed to be 8 inches deep. Erosion of the downstream slope of the dam is very minimal, if any.

d. Appurtenant Structures. The only appurtenant structure was the spillway which discharges over a series of rock falls to reach the original channel. No obstructions were observed in the spillway area and growth of vegetation is very minimal.

e. Reservoir Area. No pertinent problems were noted in any of the reservoir area.

f. Downstream Channels. The downstream channel has a marshy area with brush and trees growing along the downstream channel.

3.2 EVALUATION.

None of the conditions observed on the dam pose a serious threat to its stability. Maintenance of the downstream and upstream slope should be performed to discourage animal burrowing and to eliminate tree-root systems both of which could lead to seepage problems.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES.

There are no controlled outlet works for this dam; therefore, no regulating procedures exist. The pool is controlled by rainfall, runoff, evaporation, and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM.

Based on the amount of brush and size of trees on the upstream and downstream slopes, it has been several years since the vegetation has been cut.

4.3 MAINTENANCE OF OPERATING FACILITIES.

No operating facilities exist.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT.

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION.

If the uncontrolled vegetation on the slopes are allowed to continue, potential problems may develop.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES.

a. Design Data: No design data were made available to the inspection team. All releases are nonregulated.

b. Experience Data: All of the pertinent data furnished in this report were derived from U. S. Geological Survey 7½ Minute Quadrangle Sheets or from measurements and surveys made during this inspection.

c. Visual Observations:

(1) A spring was observed seeping from the rock outcrop located at the right abutment of the dam.

(2) Trees and brush are growing on the dam embankment.

d. Overtopping Potential:

(1) The spillway is too small to pass the minimum required flood of one-half of the Probable Maximum Flood (PMF) without overtopping. The PMF is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The spillway is capable of passing 20 percent of the PMF without overtopping. Routing 50 percent of the PMF through the reservoir indicated the dam will be overtopped by a flow of 900 cfs at a depth of .7 foot for approximately 45 minutes. The PMF would result in an overtopping flow of 2,100 cfs, a depth of 1.3 feet for a duration of five hours.

(2) The effects from rupture of the dam could extend approximately three miles downstream of the dam. There are three houses and one mobile home immediately downstream of the dam in addition to a group of farm buildings, one improved road crossing and two unimproved crossings within three miles of the dam. Should failure of the dam occur, these buildings could be severely damaged and the lives of any inhabitants lost.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY.

a. Visual Observations. Visual observations of conditions which adversely affect the structural stability of this dam are discussed in Section 3.

b. Design and Construction Data. No design or construction data relating to the structural stability of the dam were found available. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency. These seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

c. Operating Records. No appurtenant structures requiring operation exist at this dam.

d. Post Construction Changes. No post construction changes were reported.

e. Seismic Stability. The dam is located in seismic zone 2, for which the recommended guidelines assign a "moderate" damage probability. Since detailed information on the properties of the materials in the embankment is not available, an accurate seismic evaluation cannot be made. The clayey materials used in the embankment minimize the likelihood of failure due to an earthquake.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT.

a. Safety. Several items are deficient which should be corrected. No erosion protection exists on the upstream slope of the dam. Erosion protection should be provided in the area of downstream slope of the left abutment. Exit channels are not sufficiently protected against erosion. Trees and bushes on the embankments provide a potential seepage hazard and animal habitat.

b. Adequacy of Information. The statements and recommendations in this report are based on visual observations and verbal discussions. Seepage and stability analyses are not on record as prescribed in the recommended guidelines.

c. Urgency. It is recommended that the remedial measures listed in Section 7.2 be accomplished in the near future.

d. Need for Phase II. No Phase II inspection is recommended. Action should begin on the remedial actions discussed in this report.

7.2 REMEDIAL MEASURES.

The following remedial measures are recommended:

a. Remove trees and cut-bushes on the upstream and downstream slopes and reestablish with grass cover. Holes created by the removal of trees should be suitably backfilled.

b. Fill any animal burrows found during clearing.

c. Spillway size and/or height of dam should be increased to pass the probable maximum flood without overtopping the dam.

d. Provide erosion protection from surface runoff at the left abutment and downstream slope.

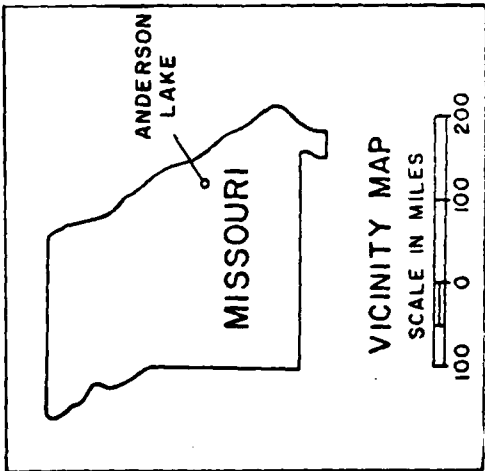
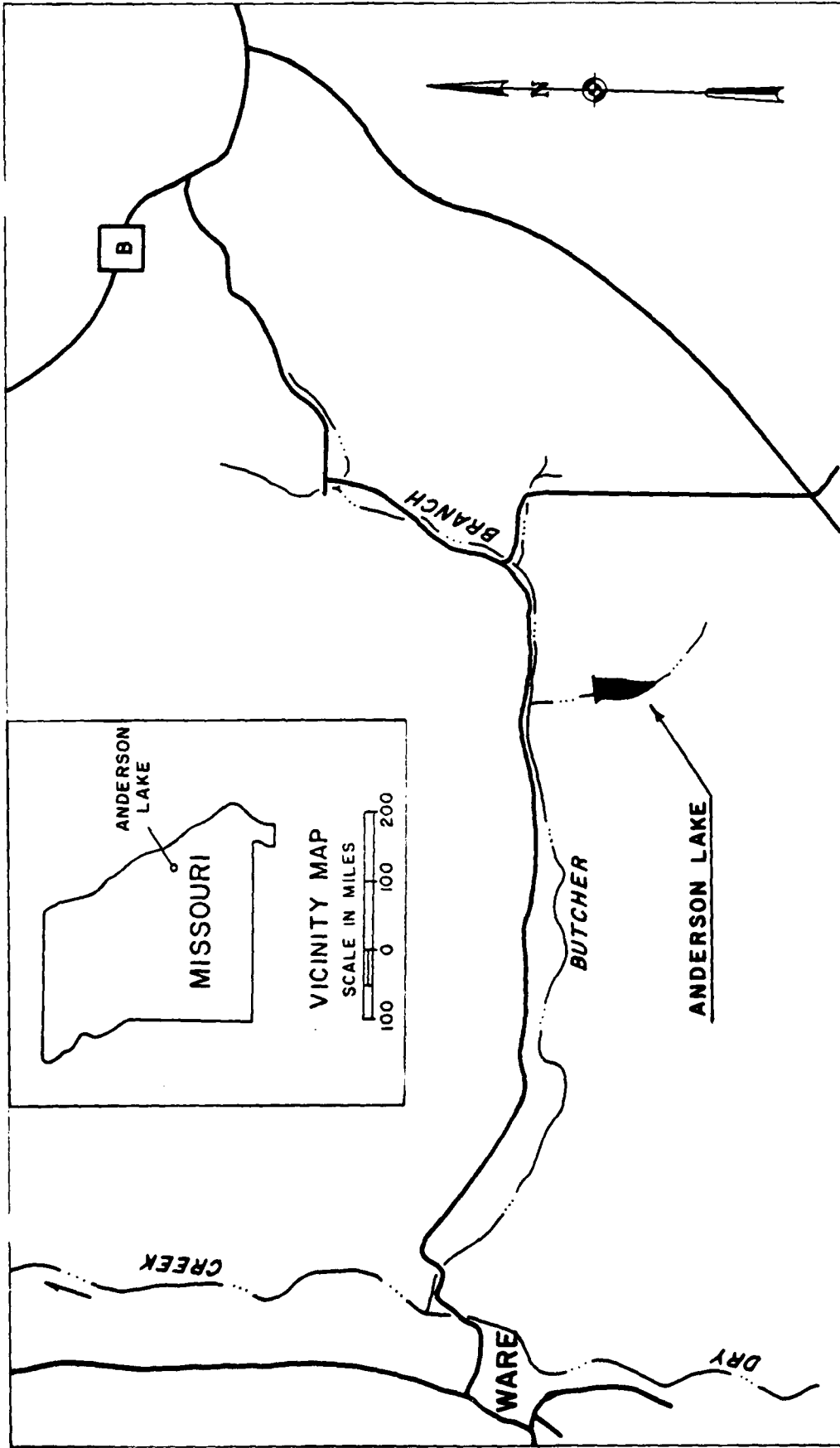
e. Realine the exit channel to direct flow from the toe of the embankment.

f. A stability and seepage analysis of the dam should be performed by a professional engineer experienced in the design and construction of dams.

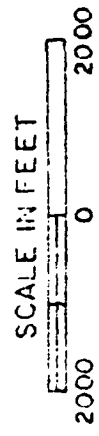
APPENDIX A
HYDROLOGIC COMPUTATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

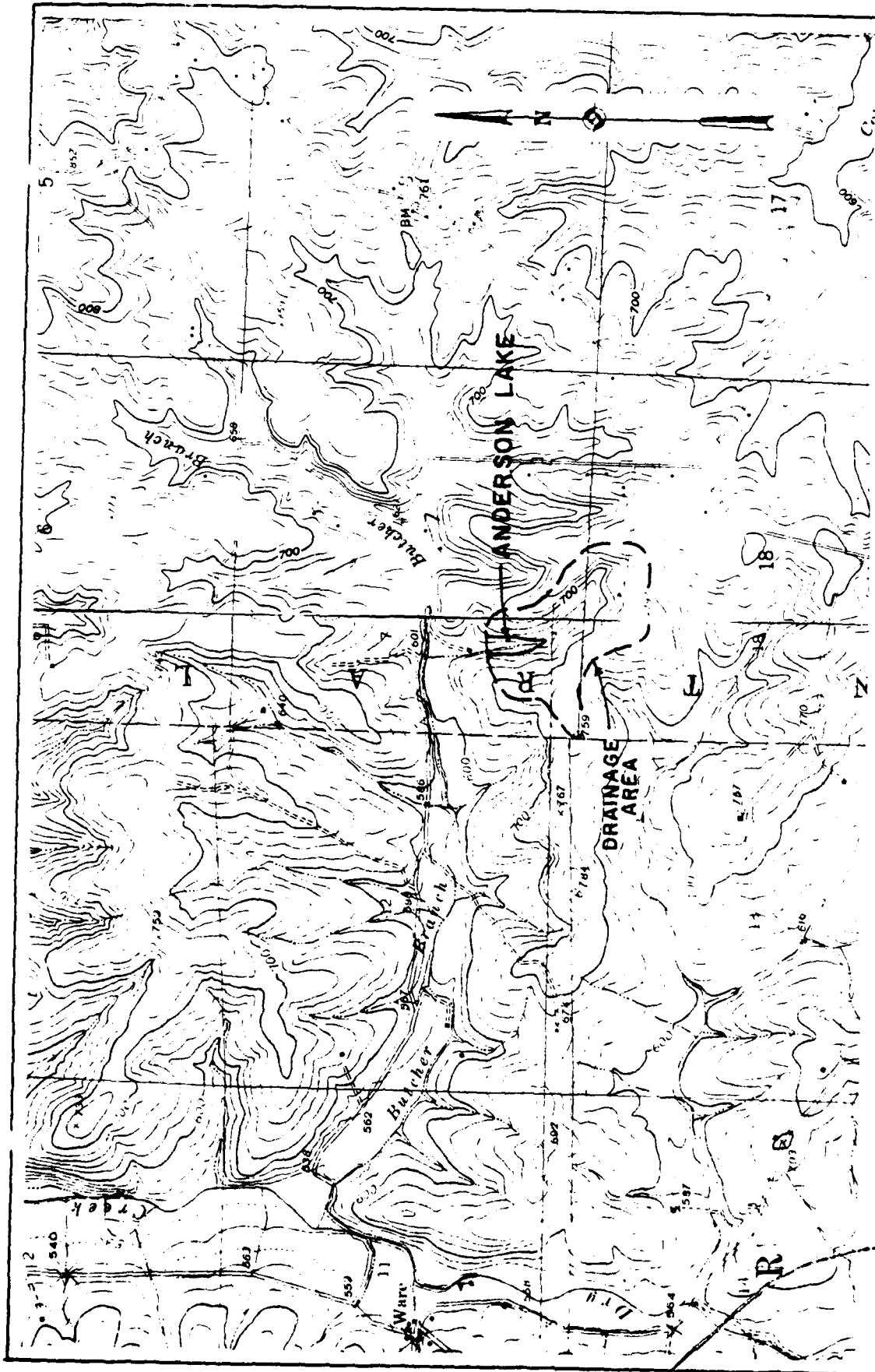
1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33." Reduction factors have not been applied. A 24-hour storm duration is assumed with the total rainfall depth distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use, and antecedent moisture conditions.
2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the spillway, and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-storage capacity curve. The hydraulic capacity of the outlet works, spillway, and top of dam are defined by elevation-discharge curves.
3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.
4. The above analysis has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed in the attached computer printout. Definitions of these variables are contained in the "User's Manual" for the computer program.



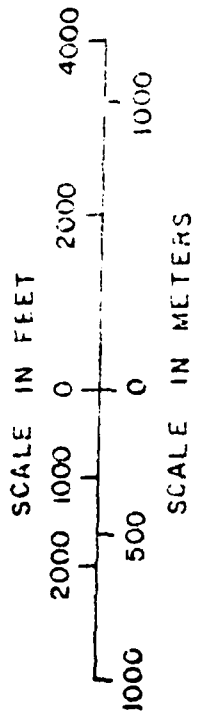
LOCATION MAP

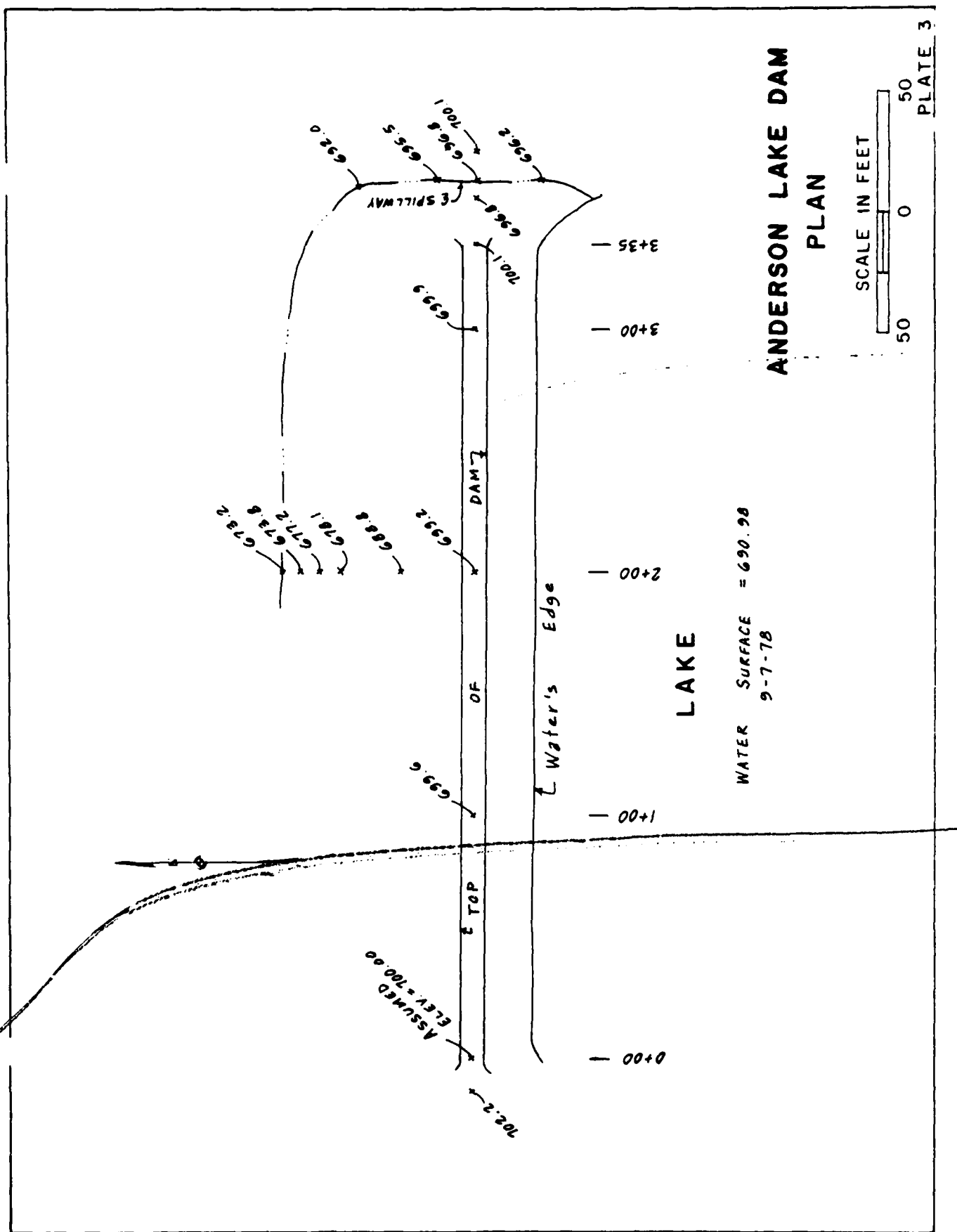


JEFFERSON COUNTY



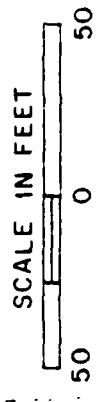
ANDERSON LAKE
VICINITY TOPOGRAPHY
PLATE 2

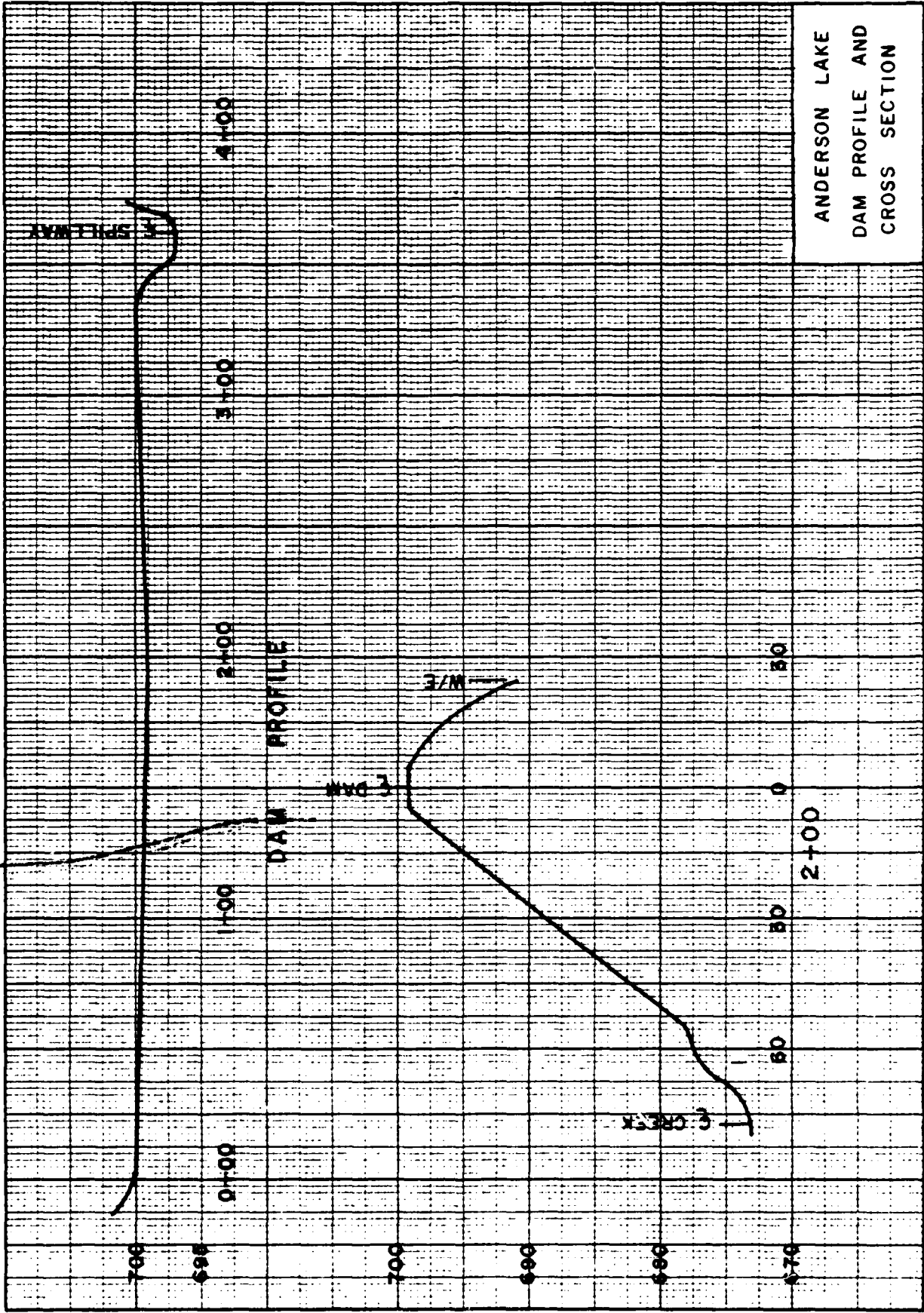




ANDERSON LAKE DAM PLAN

WATER SURFACE = 690.98
9-7-78





ANDERSON LAKE
DAM PROFILE AND
CROSS SECTION

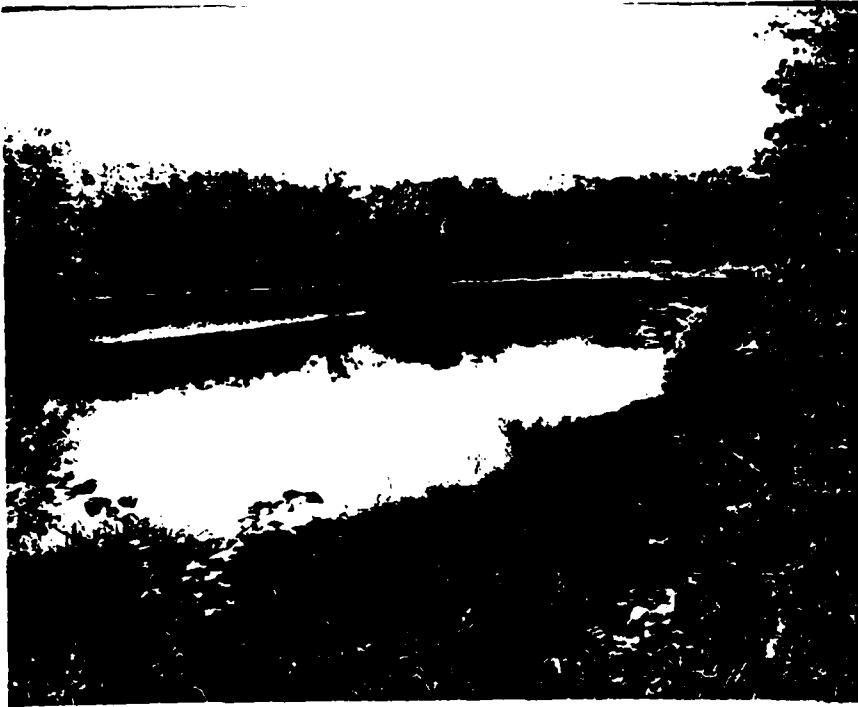


PHOTO 1: UPSTREAM VIEW OF LAKE



PHOTO 2: DOWNSTREAM VIEW FROM DAM



PHOTO 3: DOWNSTREAM FACE OF DAM AND SPILLWAY



PHOTO 4: UPSTREAM FACE OF RIGHT ABUTMENT AND SPILLWAY



PHOTO 5: DOWNSTREAM VIEW OF SPILLWAY



PHOTO 6: UPSTREAM VIEW OF SPILLWAY



PHOTO 7: MESSAGE NEAR SLANT ABUTMENT, DOWNSTREAM FROM SLANT ABUTMENT



PHOTO 8: MESSAGE NEAR SLANT ABUTMENT, DOWNSTREAM FROM SLANT ABUTMENT