

UNCLASSIFIED

UNCLASSIFIED

DACW43-79-C-0075
NL

1 of 2
20
4/26/06

417646

AD A106862

(1)

MISSISSIPPI-KASKASKIA-ST. LOUIS BASIN

BUSCH WILDLIFE AREA LAKE NO. 35 DAM
ST. CHARLES COUNTY, MISSOURI
MO. 10092

PHASE I INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



United States Army
Corps of Engineers
*Serving the Army
Serving the Nation*

St. Louis District

DISTRICT
ENGINEER
NOV 5 1979
A

~~THIS DOCUMENT IS UNCLASSIFIED~~
COPY 1
SIGNATURE
REMARKS

PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

This document has been approved
for release to the public
DATE 11/11/02 BY 811102038

NOVEMBER 1979

81 11 02 038

ONE FILE COPY

DISCLAIMER NOTICE

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

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. <i>AD-A106</i>	3. RECIPIENT'S CATALOG NUMBER <i>862</i>
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Busch Wildlife Area Lake No. 35 Dam (MO 10092) St. Charles County, Missouri		5. TYPE OF REPORT & PERIOD COVERED Final Report
6. AUTHOR(s) Consoer, Townsend and Associates, Ltd.		7. PERFORMING ORG. REPORT NUMBER
8. 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		9. CONTRACT OR GRANT NUMBER(s) <i>15</i> DACW43-79-C-0075
10. 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		11. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
12. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) <i>19-113</i>		13. REPORT DATE November 1979
		14. NUMBER OF PAGES Approximately 135
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		16. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of this Report) Approved for release; distribution unlimited. <i>10 Walter G. Williams</i>		
18. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) <i>6</i> National Dam Safety Program, Busch Wildlife Area Lake Number 35 Dam (MO 10092), Mississippi - Kaskaskia - St. Louis Basin, St. Charles County, Missouri. National Phase I Inspection <i>Report</i>		
19. SUPPLEMENTARY NOTES		
20. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety, Lake, Dam Inspection, Private Dams		
21. 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.		

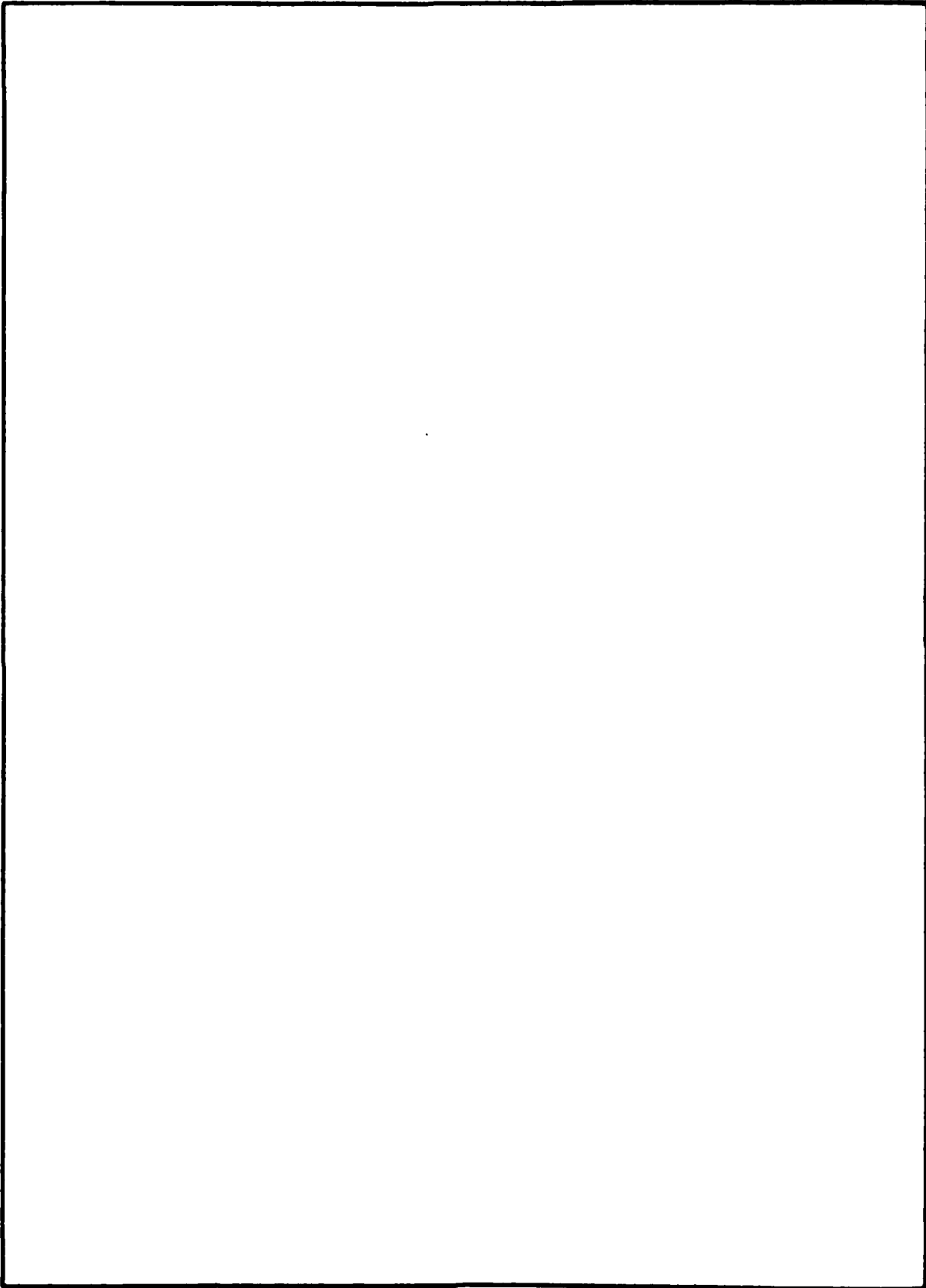
DD FORM 1 JAN 73 1473

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

Block 1. General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave 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 6200.1-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.



DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: Busch Wildlife Area Lake No. 35 Dam (Mo. 10092) Phase I
Inspection Report

This report presents the results of field inspection and evaluation of the Busch Wildlife Area Lake No. 35 Dam (Mo. 10092).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

- 1) Spillway will not pass 50 percent of the Probable Maximum Flood
- 2) Overtopping could result in dam failure
- 3) Dam failure significantly increases the hazard to loss of life downstream

SIGNED

SUBMITTED BY:

Chief, Engineering Division

26 DEC 1979

Date

SIGNED

APPROVED BY:

Colonel, CE, District Engineer

28 DEC 1979

Date

MISSOURI INVENTORY NO. 10092

NOVEMBER 1979

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Busch Wildlife Area Lake No. 35 Dam,
Missouri Inv. No. 10092
State Located: Missouri
County Located: St. Charles
Stream: Schote Creek
Date of Inspection: June 15, 1979

Assessment of General Condition

Busch Wildlife Area Lake No. 35 Dam was inspected by the engineering firms of Consoer, Townsend and Associates LTD., and Engineering Consultants, Inc. (A Joint Venture) of St. Louis, Missouri using the "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed by the Chief of Engineers, U.S. Army, Washington, D.C., with the help of Federal and State agencies, professional engineering organizations, and private engineers. The resulting guidelines are considered to represent a consensus of the engineering profession.

The overall structural condition of the dam appears to be good. The dam does not exhibit signs of structural instability, except for possibly the longitudinal and transverse cracks observed on the crest of the upstream berm which should be investigated. The dam appears adequately maintained.

Based on the criteria in the guidelines, the dam is in the high hazard potential classification, which means that loss of life and appreciable property loss could occur in the event of failure of the dam. The estimated damage zone extends about 1 1/2 miles downstream of the dam. Within the damage zone are seven trailers and a bridge under U.S. Highway 40 which may be subjected to flooding, with possible damage and/or destruction, and possible loss of life. The Busch Wildlife Area Lake No. 35 Dam is in the intermediate size classification since its storage capacity is more than 1,000 acre-feet, but less than 50,000 acre-feet.

Our inspection and evaluation indicates that the spillway of Busch Wildlife Area Lake No. 35 Dam does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. Busch Wildlife Area Lake No. 35 Dam being an intermediate size dam, with a high hazard potential, is required by the guidelines to pass the Probable Maximum Flood without overtopping. It was determined that the reservoir/spillway system can accommodate 31 percent of the Probable Maximum Flood without overtopping the dam. Our evaluation indicates that the reservoir/spillway system will accommodate the 100-year flood without overtopping.

The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The 100-year flood is defined as a flood having a one percent chance of being equalled or exceeded during any given year.

Other deficiencies noted by the inspection team were: longitudinal and transverse cracks observed on the crest of the upstream berm; severe erosion of the upstream berm; obstruction of the spillway weir; erosion of the side slopes of the spillway

discharge channel; the low level drain did not appear to be in working condition; the seepage observed in the spillway discharge channel; the trees and debris in the downstream channel; a lack of periodic inspection by a qualified engineer and a lack of a maintenance schedule. The absence of seepage and stability analyses on record is also a deficiency.

It is recommended that the owner take action to correct or control the deficiencies described above.

Walter G. Shifrin, P.E.



Overview of Busch Wildlife Area Lake No. 35 Dam

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

BUSCH WILDLIFE AREA LAKE NO. 35 DAM, I.D. NO. 10092

TABLE OF CONTENTS

<u>Sect. No.</u>	<u>Title</u>	<u>Page</u>
SECTION 1	PROJECT INFORMATION	1
	1.1 General	1
	1.2 Description of Project	3
	1.3 Pertinent Data	8
SECTION 2	ENGINEERING DATA	11
	2.1 Design	11
	2.2 Construction	11
	2.3 Operation	11
	2.4 Evaluation	11
SECTION 3	VISUAL INSPECTION	13
	3.1 Findings	13
	3.2 Evaluation	17

TABLE OF CONTENTS

(Continued)

<u>Sect. No.</u>	<u>Title</u>	<u>Page</u>
SECTION 4	OPERATION PROCEDURES	19
	4.1 Procedures	19
	4.2 Maintenance of Dam	19
	4.3 Maintenance of Operating Facilities	19
	4.4 Description of Any Warning System in Effect	20
	4.5 Evaluation	20
SECTION 5	HYDRAULIC/HYDROLOGIC	21
	5.1 Evaluation of Features	21
SECTION 6	STRUCTURAL STABILITY	25
	6.1 Evaluation of Structural Stability	25
SECTION 7	ASSESSMENT/REMEDIAL MEASURES	28
	7.1 Dam Assessment	28
	7.2 Remedial Measures	31

TABLE OF CONTENTS

(Continued)

LIST OF PLATES

	<u>Plate No.</u>
LOCATION MAP	1
PLAN AND ELEVATION OF DAM	2
DESIGN DRAWINGS.	3-18
GEOLOGIC MAP	19
SEISMIC ZONE MAP	20

APPENDICES

APPENDIX A	-	PHOTOGRAPHS
APPENDIX B	-	HYDROLOGIC COMPUTATIONS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Busch Wildlife Area Lake No. 35 Dam, Missouri Inv. No. 10092

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

The Dam Inspection Act, Public Law 92-367 of August, 1972, authorizes the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspections. Inspection for the Busch Wildlife Area Lake No. 35 Dam was carried out under Contract DACW 43-79-C-0075 between the Department of the Army, St. Louis District, Corps of Engineers, and the engineering firms of Consoer, Townsend & Associates Ltd., and Engineering Consultants, Inc. (A Joint Venture), of St. Louis, Missouri.

b. Purpose of Inspection

The visual inspection of the Busch Wildlife Area Lake No. 35 Dam was made on June 15, 1979. The purpose of the inspection was to make a general assessment as to the structural integrity and operational adequacy of the dam embankment and its appurtenant structures.

c. Scope of Report

This report summarizes available pertinent data relating to the project; presents a summary of visual observations made during the field inspection; presents an assessment of hydrologic and hydraulic conditions at the site; presents an assessment as to the structural adequacy of the various project features; and assesses the general condition of the dam with respect to safety.

Subsurface investigations, laboratory testing, and detailed analyses were not within the scope of this study. The conclusions drawn herein, therefore, are based on the presence of, or absence of, obvious signs of distress. No warranty as to the absolute safety of the project features is implied by the conclusions presented in this report.

It should be noted that reference in this report to left or right abutments is as viewed looking downstream. Where left abutment or left side of the dam is used in this report, this also refers to northwest abutment or side, and right to the southeast abutment or side.

d. 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", Appendix D. 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 the Project

a. Description of Dam and Appurtenances

The dam consists of a homogenous earthfill embankment between an earth abutment on the left side and a rock abutment on the right side. The crest is 14 feet wide and 930 feet long as shown on available drawings. The crest elevation is 563.5 feet above MSL. The maximum height of the embankment is 35 feet.

The upstream slope was constructed with either a 1V to 3H or a 1V to 2.5H slope from the crest to elevation 558.0 according to the available drawings. From field measurements, the slope was found to be 1V to 3.75H. At elevation 558.0, a 20-foot wide berm was constructed. From elevation 558.0 to the streambed elevation, the slope is either 1V to 3H or 1V to 2.5H according to the available drawings. The upstream slope has riprap protection on it below elevation 558.0 which was not shown on the design drawings. The riprap ranges in size from 2 inches to 24 inches.

The downstream slope is constructed with a 1V to 2.5H slope from the crest to elevation 540.0. At elevation 540.0, a 20-foot wide berm is constructed. From elevation 540.0 to the original ground, the slope is 1V to 2.5H.

The dam is located near the southern edge of the Dissected Till Plains Section of the Central Lowlands Province (Fenneman, N.M., "Physiographic of Eastern United States", 1946). In the area of the dam site, overlaying the glacial till, is a considerable amount of loess. However, much of the surficial material in the vicinity of the dam has been eroded. The area is characterized by gently rolling hills.

Regionally, the rocks are dipping gently about 40 feet per mile to the northeast off of the Ozark Uplift to the south. The rocks in the area range in age from Ordovician to Mississippian.

According to the design drawings, the spillway weir, the spillway channels and the right abutment are founded on bedrock. Approximately the right one third of the dam is founded on the bedrock and the rest of dam is founded on the surficial material overlaying the bedrock, according to the design drawings.

A cutoff trench, with side slopes of 1H to 1V, and a base width of 10 feet, was excavated parallel to the dam axis across the entire dam according to the available drawings. From near the right abutment toward the left abutment for approximately 135 feet, the trench was excavated to or into the rock foundation.

There is only one spillway for the Busch Wildlife Area Lake No. 35 Reservoir. The spillway is cut into the right abutment. The spillway consists of a straight drop concrete rectangular weir with a crest length of 50 feet. From the crest of the weir, there is a 3.5 foot vertical drop to a 3.5 foot wide concrete apron which abuts the rock in the discharge channel. The elevation of the crest of the weir is 557 feet above MSL. The spillway channels consist of an approach channel and a discharge channel. The approach channel, which has a 50-foot wide bottom and is approximately 100 feet in length, is excavated to rock. The side slopes of the approach channels are 1V to 3H. The discharge channel has a 50-foot wide bottom and is approximately 270 feet in length and is excavated into the rock. The side slopes of the discharge channel vary from near vertical to 1V to 3H.

A low level outlet drain pipe was provided for the reservoir. The intake is at elevation 536.0 and the discharge is at elevation 531.0 according to the available drawings. The pipe is a 12-inch inside diameter C.I.P. located approximately 335 feet from the right abutment. The outlet is controlled by a gate valve which is located 40 feet upstream from the outlet of the pipe.

b. Location

Busch Wildlife Area Lake No. 35 Dam is located on Schote Creek which flows northeasterly from the dam for approximately 2.5 miles into Dardenne Creek, St. Charles County, Missouri (Plate 1). The nearest downstream community is a trailer park which is approximately 0.7 miles downstream of the dam. The dam and reservoir are shown on the Weldon Springs Quadrangle Sheet (7.5 minute series) in Township 46 North, Range 2 East (Plate 1, Appendix B). The dam was located by the U.S. Survey No. 1669 as being 10,930 feet northwest and 53 feet southwest from the southwest corner of Section 30, Township 46 North, Range 3 East.

c. Size Classification

According to the "Recommended Guidelines for Safety Inspection of Dams", by the U.S. Department of the Army, Office of the Chief Engineer, the dam is classified in the dam size category as being "Small" since its height is less than 40 feet. The dam is classified as "Intermediate" in dam size category because its storage is more than 1,000 acre-feet but less than 50,000 acre-feet. The overall size classification is governed by the larger of the two determinations, and the classification is, accordingly, "Intermediate" in size.

d. Hazard Classification

The dam has been classified as having "High" hazard potential in the National Inventory of Dams, on the basis that in the event of failure of the dam or its appurtenances, excessive damage could occur to downstream property, together with the possibility of the loss of life. Our findings concur with the classification. The estimated damage zone extends about 1 1/2 miles downstream of the dam. Within about 0.7 miles downstream from the dam are seven trailers and a bridge under U.S. Highway 40.

e. Ownership

Busch Wildlife Area Lake No. 35 Dam is owned by the Missouri Department of Conservation Commission. The mailing address is Missouri Department of Conservation Commission, c/o Mr. Leroy Heman, Box 180, Jefferson City, Missouri 65102.

f. Purpose of Dam

The purpose of the dam is to impound water for recreational use.

g. Design and Construction History

Busch Wildlife Area Lake No. 35 Dam was designed in May, 1962 by the Missouri Conservation Commission located in Jefferson City, Missouri. According to Mr. Calsady of Busch Wildlife Area, the dam was built in the latter part of 1962 and early part of 1963 by a local contractor named Bernow McMememy. Efforts to locate or contact the contractor were futile.

h. Normal Operational Procedures

Normal procedure for Busch Wildlife Area Lake No. 35 Dam is to allow the reservoir to remain as full as possible with the water level being controlled by rainfall, runoff, evaporation, seepage and the elevation of the spillway crest.

1.3

Pertinent Data

a. Drainage Area (square miles):

3.29

b. Discharge at Damsite

Estimated experienced maximum flood (cfs):

NA

Estimated ungated spillway capacity with
reservoir at top of dam elevation (cfs):

2751

c. Elevation (Feet above MSL)

Top of dam:

563.5

Spillway crest:

557.0 (assumed)

Normal Pool:

557.0

Maximum Pool (PMF):

566.7

d. Reservoir

Length of pool with water surface
at top of dam elevation:

4800

e. **Storage (Acre-Feet)**

Top of dam:

1658

Spillway crest:

1001

Normal Pool:

1001

Maximum Pool (PMF):

2119

f. Reservoir Surface (Acres)

Top of dam:

121

Spillway crest:

85

Normal Pool:

85

Maximum Pool (PMF):

146 +

g. Dam

Type:	Earthfill
Length:	930 feet
Structural Height:	35 feet
Hydraulic Height:	35 feet
Top width:	14.0 feet
Side slopes:	
Downstream	1V to 2.5H
Upstream	1V to 3.75H
Zoning:	Homogeneous
Impervious core:	NA
Cutoff:	Cutoff trench with 10-foot bottom width and 1V to 1H side slopes.
Grout curtain:	Unknown

h. Diversion and Regulating Tunnel None

i. Spillway

Type:	Straight Drop Rectangular Weir, Uncontrolled
Length of weir:	50 feet
Crest Elevation (feet above MSL):	557 feet

j. Regulating Outlets

Type:	12-inch C.I.P. Low Level Drain Pipe
Length:	224 feet (According to Plans)
Closure:	Gate valve, 40 feet upstream of the downstream end.
Maximum Capacity:	Unknown

SECTION 2 : ENGINEERING DATA

2.1 Design

Design drawings are available for the dam from the Missouri Conservation Commission in Jefferson City, Missouri and are included as part of this report. The drawings were prepared in May of 1962 by the Missouri Conservation Commission. No specifications, engineering computations or soil data for this project were available.

2.2 Construction

No data is available concerning the construction of the dam and appurtenant structures, other than the construction history given in Section 1.2g.

2.3 Operation

No operation records are available for the Busch Wildlife Area Lake No. 35 Dam.

2.4 Evaluation

a. Availability

The availability of engineering data is poor and consists only of the design drawings mentioned in Section 2.1, State Geological Maps and U.S.G.S. Quadrangle Sheets. No information on subsurface investigations or soil testing was

available. No information on design hydrology or hydraulic design was available, nor were seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams", which is considered a deficiency.

b. Adequacy

The conclusions presented in this report are based on field measurements, the available engineering data, past performance and present condition of the dam. The data available is adequate to evaluate the hydraulic and hydrologic capabilities of the dam. 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 and made a matter of record.

c. Validity

Only a set of design drawings was available for review. From field measurements, the dam appears to have been constructed according to the available drawings, except for the discrepancies described in Section 1.2a. Busch Wildlife Area Lake No. 35 Dam was originally Busch Area Lake No. 41 according to the design drawings provided by the Missouri Conservation Commission.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

A visual inspection of the Busch Wildlife Area Lake No. 35 Dam was made on June 15, 1979. The following persons were present during the inspection:

<u>Name</u>	<u>Affiliation</u>	<u>Disciplines</u>
David J. Kerkes	Engineering Consultants, Inc.	Soils
Peter Howard	Engineering Consultants, Inc.	Geology
Mark R. Haynes	Engineering Consultants, Inc.	Civil, Structural and Mechanical
Kenneth L. Bullard	Engineering Consultants, Inc.	Hydraulics and Hydrology
Kevin Blume	Consoer, Townsend & Assoc., Ltd.	Civil and Structural

Specific observations are discussed below.

b. Dam

The crest of the dam is protected against surface erosion by a well maintained cover of grass. There was no evidence of significant settlement or cracking on the crest. No significant deviations in horizontal or vertical alignment were apparent. There was no evidence of the dam ever being overtopped.

The upstream slope from the crest to the berm was protected from surface erosion by a well maintained cover of grass. No depressions or settlements were apparent on the slope. The upstream edge of the crest of the berm was severely eroded due to wave action. The slope below the berm was protected by riprap. The riprap appeared to have been added after initial construction because of the damage to the crest of the berm due to wave action. No provisions for riprap protection appeared on the design drawings.

Continuous longitudinal and transverse cracks along most of the crest of the upstream berm were observed. The cracks were up to approximately 1 inch wide and up to approximately 12 inches in depth.

The downstream slope of the embankment and the downstream berm were protected from surface erosion by a well maintained cover of grass. No depressions, bulges or settlements were apparent on the downstream slope. No seepage was apparent along the toe of the slope. Materials removed immediately below the vegetation cover on the embankment appeared to be a clayey silt.

No signs of rodent activity in either the embankment or the abutments were apparent.

At the dam site, bedrock was exposed along the edge of the reservoir upstream of the right abutment and in the spillway channels. The rock is a gray, dense, cherty, bedded limestone. The limestone is part of the Burlington-Keokuk limestone formation (Geologic Map of Missouri, 1979). No dip could be measured in the beds in the vicinity of the dam.

c. Appurtenant Structures

(1) Spillways

The concrete rectangular weir structure is in good condition. No spalling or cracking of the concrete was observed. A tree was growing just upstream of the weir. The tree appeared to be collecting debris and may cause any flow over the weir to erode the backfill from behind the structure.

The approach channel to the weir was heavily covered with grass and was not obstructed. Several exposures of limestone bedrock were observed in the channel. No indication of instability in the slopes was apparent.

The discharge channel was excavated into the limestone bedrock. The channel was not obstructed. Seepage was observed in several areas of the channel approximately 75 feet to 200 feet downstream of the weir. The seepage appears to be flowing in the bedding planes of the limestone and the total flow of the seeps is estimated to be less than 1 gpm. The side slopes of the channel were eroded just downstream of the weir. The slopes beyond the eroded area appear to be stable.

(2) Outlet Works

The outlet of the 12-inch diameter C.I.P. low level drain was observed. No seepage through or around the pipe was apparent. The inlet to the pipe was not located. The gate valve housing was located, however, the valve control could not be seen due to the debris on top of it.

d. Reservoir Area

The water surface elevation was approximately 554 feet above MSL on the day of the inspection.

The reservoir rim is gently sloped and no indications of instability or severe erosion were readily apparent. The slopes above the reservoir on the south and the east sides were heavily wooded and on the north and the west sides were grassy. No houses were built around the reservoir rim.

e. Downstream Channel

The downstream channel of the spillway is a well-defined, open channel. The channel was obstructed by several trees and large piles of rock. Approximately 200 feet downstream of the end of the discharge channel, the channel flows through a concrete box culvert. The culvert has two barrels which are approximately 20 feet high by 10 feet wide. U.S. Highway 40 travels over this box culvert.

3.2 Evaluation

The visual inspection did not reveal any items which are sufficiently significant to indicate a need for immediate remedial action.

The following deficiencies were observed which could affect the safety of the dam or which will require maintenance within a reasonable period of time.

1. The erosion of the upstream berm crest above the riprap protection, if allowed to continue, could jeopardize the structural stability of the embankment.
2. The tree just upstream of the weir poses an obstruction to the normal operation of the spillway and thus jeopardizes the safety of the dam.
3. The erosion of the backfill upstream of the weir could jeopardize the structural stability of the weir.
4. The erosion of the side slopes of the discharge channel just downstream of the weir, if allowed to continue, could jeopardize the structural stability of the weir.
5. The seepage observed in the discharge channel could pose a danger to the safety of the dam.
6. The obstructions in the downstream channel of the spillway will reduce the hydraulic efficiency of the channel.

7. It is unknown whether the cracks observed on the crest of the upstream berm are indicative of shrinkage, slope movement or foundation settlement. The observed cracks should be further investigated to insure that they are not symptomatic of distress in the slope or foundation.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

Busch Wildlife Area Lake No. 35 Dam is used primarily for recreational use. It is part of the August A. Busch Memorial Wildlife Area which is a state owned and operated park. The only operating facility is a 12-inch diameter low level lake drain. The water level in the lake is allowed to remain as full as possible, and is controlled by rainfall, runoff, evaporation and the elevation of the spillway crest.

4.2 Maintenance of Dam

The dam is maintained by personnel employed by Busch Wildlife Area. The downstream and upstream slopes of the embankment are kept mowed and free of trees and brush. There appears to have been no major repairs to the dam itself since its original construction except for possibly the riprap protection placed on the upstream slope which did not appear on the original design drawings.

4.3 Maintenance of Operating Facilities

The only facility located at the damsite which requires any operation is the 12-inch diameter low level lake drain. The control, a gate valve, is located 40 feet upstream from the downstream end of the drain. The gate valve was inaccessible at the time of the inspection due to debris covering it.

4.4 Description of Any Warning System in Effect

The inspection team is not aware of any existing warning system in effect.

4.5 Evaluation

The maintenance at Busch Wildlife Area Lake No. 35 Dam appears to be adequate, however, the remedial measures as described in Section 7 should be undertaken.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design

Busch Wildlife Area Lake No. 35 Dam has a watershed of 2,107 acres. Two upstream dams are located above Busch Wildlife Area Lake No. 35 Dam. A drainage map showing the watershed area and the location of the three dams is presented as Plate 1 in Appendix B. The watershed areas of Upstream Dams #1, and #2 are 228 and 809 acres, respectively. The reservoirs of the Upstream Dam #1 and Upstream Dam #2 drain into Busch Wildlife Area Lake No. 35 Dam. The watershed area between Busch Wildlife Area No. 35 Dam and Upstream Dams #1 and #2 is 1,070 acres. Busch Wildlife Area Lake No. 35 Dam is located on Schote Creek. The dam is about 2.25 miles upstream from the confluence of the Schote Creek and Dardenne Creek.

Evaluation of the hydraulic and hydrologic features of Busch Wildlife Area Lake No. 35 Dam was based on criteria set forth in the Corps of Engineers' "Recommended Guidelines for Safety Inspection of Dams", and additional guidance provided by the St. Louis District of the Corps of Engineers. The Probable Maximum Flood (PMF) was calculated from the Probable Maximum Precipitation (PMP) using the methods outlined in the U.S. Weather Bureau Publication, Hydrometeorological Report No. 33. The probable maximum storm duration was set at 24 hours, and storm rainfall distribution was based on criteria given in EM 1110-2-1411 (Standard Project Storm). The SCS method was used for deriving the unit hydrographs,

utilizing the Corps of Engineers' computer program HEC-1 (Dam Safety Version). Three unit hydrographs, one for each of the three dams were derived. The parameters of the unit hydrographs are presented in Appendix B. The SCS method was used for determining the loss rate. The hydrologic soil group of the watershed was determined by use of the published soil maps. The hydrologic soil group of the watershed and the SCS curve number are also presented in Appendix B. The curve number, unit hydrograph parameters, and the PMP rainfall were directly input to the HEC-1 (Dam Safety Version) computer program to obtain the PMF hydrographs. The computed peak discharges of the PMF for Upstream Dams #1 and #2, and Busch Wildlife Area Lake No. 35 Dam are 3,021, 9,772 and 12,119 cfs, respectively. The computed peak discharges for one-half of the PMF for the three dams are one-half of the PMF values.

Both the PMF and one-half of the PMF inflow hydrographs at the upstream dams were routed through the upstream reservoirs by the Modified Puls Method, also utilizing the HEC-1 (Dam Safety Version) computer program. The peak outflow discharges for the PMF and one-half of the PMF at Upstream Dam #1 are 2,866 and 1,424 cfs, respectively. The peak outflow discharges for the PMF and one-half the PMF at Upstream Dam #2 are 8,609 and 3,886 cfs, respectively. The outflow hydrographs at Upstream Dams #1 and #2 were combined with the inflow hydrograph for Busch Wildlife Area Lake No. 35 Dam. The combined inflow discharges for the PMF and one-half of the PMF for Busch Wildlife Area Lake No. 35 Dam are 23,318 cfs and 11,072 cfs, respectively. The combined hydrographs for both the PMF and one-half of the PMF, were routed through Busch Wildlife Area Lake No. 35 Dam. The peak outflow discharges for the PMF and one-half of the PMF at Busch Wildlife Area Lake No. 35 Dam are 20,402 and 7,935 cfs, respectively. Both the PMF and one-half of the PMF when routed through the Busch

Wildlife Area Lake No. 35 Dam reservoir resulted in overtopping of the dam.

The stage-outflow relation for the spillway was prepared from field notes and sketches prepared during the field inspection, and some limited design drawings. The reservoir stage-capacity data were based on the U.S.G.S. Weldon Spring, Missouri Quadrangle topographic map (7.5 minute series). The spillway and overtop rating curve and the reservoir capacity curve for Busch Wildlife Area Lake No. 35 Dam are presented as Plates 2 & 3, respectively in Appendix B.

From the standpoint of dam safety, the hydrologic design of a dam aims at avoiding overtopping. Overtopping is especially dangerous for an earth dam because the downrush of waters over the crest can erode the dam embankment and release all the stored water suddenly into the downstream floodplain. The safe hydrologic design of a dam requires a spillway discharge capability, in combination with an embankment crest height that can handle a very large and exceedingly rare flood without overtopping.

The Corps of Engineers designs its dams to safely pass the Probable Maximum Flood that is estimated could be generated from the upstream watershed. This is the generally accepted criterion for major dams throughout the world, and is the standard for dam safety where overtopping would pose any threat to human life. According to the Corps criteria, the hydrologic requirement for safety for this dam is the capability to pass the Probable Maximum Flood without overtopping.

b. Experience Data

It is believed that no records of reservoir stage or spillway discharge are maintained for this site.

c. Visual Observations

Observations made of the spillway during the visual inspection are discussed in Section 3.1c(1) and evaluated in Section 3.2.

d. Overtopping Potential

As indicated in Section 5.1a, both the Probable Maximum Flood and one-half of the Probable Maximum Flood, when routed through the reservoir, result in overtopping of the dam. The peak outflow discharges for the PMF and one-half of the PMF are 20,402 cfs and 7,935 cfs, respectively. The PMF overtopped the dam crest by 3.20 feet and one-half of the PMF overtopped the dam crest by 1.36 feet. The total duration of embankment overflow is 5.50 hours during the PMF, and 2.92 hours during one-half of the PMF. The spillway and the reservoir of Busch Wildlife Area Lake No. 35 Dam is capable of accommodating a flood equal to approximately 31 percent of the PMF just before overtopping the dam. The spillway/reservoir system of Busch Wildlife Area Lake No. 35 Dam will accommodate the 100-year flood without overtopping.

The failure of the dam could cause extensive damage to the property downstream of the dam and possible loss of life. The estimated damage zone extends about 1 1/2 miles downstream of the dam. Within the damage zone are seven trailers and a bridge under U.S. Highway 40.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

Extensive longitudinal and transverse cracks were observed on the crest of the upstream berm. Many cracks were continuous over large areas. The maximum width was about 1 inch with measured depths to 12 inches. There were no other signs of settlement or distress observed on the embankment or foundation during the visual inspection.

The severe erosion of the upstream berm due to wave action was not serious enough to constitute an unsafe condition at this time. The erosion of the upstream berm was above the riprap protection, which made it appear that the riprap protection was placed on the upstream slope after the erosion occurred.

The spillway weir did not show any structural instability at this time. Nevertheless, the tree and the erosion of the backfill just upstream of the weir and the erosion of the side slopes of the discharge channel just downstream of the weir may pose a danger to the structural stability of the weir in the future.

The low level lake drain did not show any sign of structural instability. Nevertheless, the gate valve should be operated to determine if it is operable and verify that drain is not clogged. If the drain does not function, necessary repairs should be made in case the reservoir has to be lowered for any reason.

The seepage through the limestone in the discharge channel does not pose a danger to the stability of the dam in its present condition. Nevertheless, the seepage should be monitored because there is possibility that the seepage channels could be enlarged by solution.

The limestone bedrock is a competent and satisfactory foundation for the dam, the spillway weir and the spillway channels.

b. Design and Construction Data

No design computations were uncovered during the report preparation phase. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available. No embankment or foundation soil parameters are available for carrying out a conventional stability analysis on the embankment. No construction data or specifications relating to the degree of embankment compaction are available for use in a stability analysis.

c. Operating Records

No operating records are available relating to the stability of the dam or appurtenant structures. The water level on the day of inspection was 3 feet below the crest of spillway weir and it is assumed that the reservoir remains close to full at all times. The low level lake drain should be operated as described in Section 6.1a.

d. Post Construction Changes

No post construction changes exist which will affect the structural stability of the dam, except for possibly the riprap protection placed on the upstream slope which did not appear on the original design drawings.

e. Seismic Stability

The dam is located in Seismic Zone 2, as defined in "Recommended Guidelines for Safety Inspection of Dams" as prepared by the Corps of Engineers, and therefore, does not require a seismic stability analysis.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment

The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed 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.

It should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is also 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 an unsafe condition could be detected.

a. Safety

The spillway capacity of Busch Wildlife Area Lake No. 35 Dam was found to be "Seriously Inadequate". The spillway/reservoir system will accommodate only 31 percent of the PMF without overtopping the dam. The spillway and the reservoir will accommodate the 100-year flood without overtopping.

If loess indeed constitutes a portion of the foundation as the geology of the area indicates, it is quite possible that the cracking is a result of settlement in the foundation. An increase in the water content of the loess as the reservoir filled could induce considerable post construction settlement since wetting has a radical affect on the consolidation properties of loess. Therefore, without further investigation, it is not possible to determine whether the cracks are due to settlement, shrinkage, or are symptomatic of distress in the slope.

The severe erosion of the upstream berm above the riprap protection due to wave action should be repaired and protected within a reasonable period of time. The dam embankment appears to be in good structural condition, except for possibly the cracking as described above. No seepage and stability analyses were available for review.

The tree and the erosion of the backfill just upstream of the weir and the erosion of the side slopes of the discharge channel just downstream of weir pose a potential danger to the safety of the dam and an obstruction to the normal operation of the spillway. These conditions should be repaired and protected within a reasonable period of time.

The seepage observed in the discharge channel of the spillway does not pose a danger to the safety of the dam in its present condition. However, the seepage should be monitored for any changes in quantity, location or color and any changes reported.

The trees and debris in the downstream channel of the spillway should be removed. The channel should be kept clean of trees and debris.

b. Adequacy of Information

The conclusions presented in this report are based on field measurements, the available engineering data, past performance and present condition of the dam. Information on the design hydrology, hydraulic design, and the operation and maintenance of the dam as well as seepage and stability analyses were not available.

c. Urgency

A program should be developed as soon as possible to monitor at regular intervals the deficiencies described in this report. The remedial measures recommended in Paragraph 7.2 should be accomplished in the near future. The item recommended in Paragraph 7.2a should be pursued on a high priority basis.

d. Necessity for Phase II Inspection

Based on results of the Phase I inspection, and if the remedial measures recommended in Paragraph 7.2 are undertaken as soon as possible, a Phase II inspection is not felt to be necessary.

7.2 Remedial Measures

The following remedial measures should be performed under the guidance of an engineer experienced in the design and construction of earth dams.

a. Alternatives:

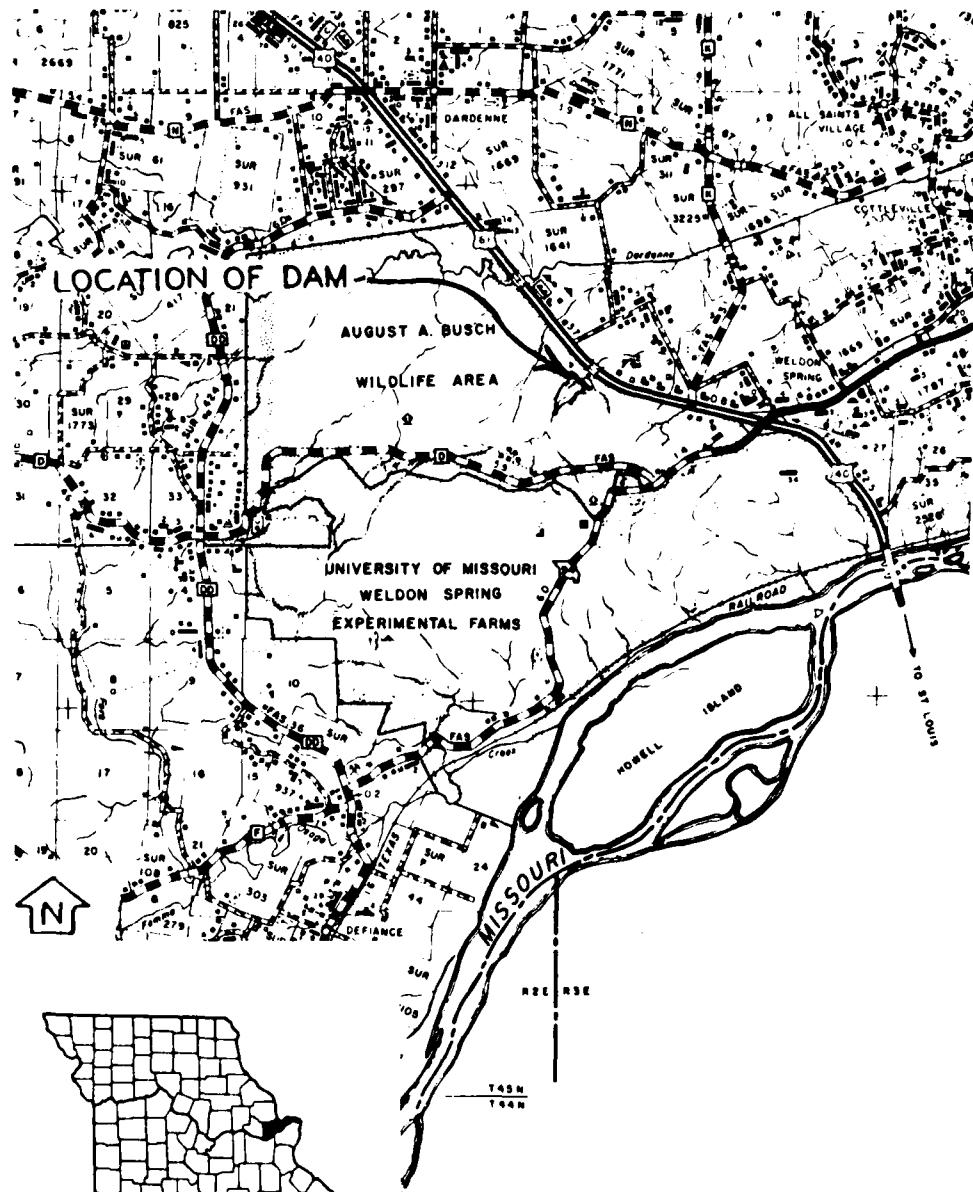
Spillway capacity and/or height of the dam should be increased to accommodate the PMF without overtopping the dam. The overtopping depth during the occurrence of the PMF, stated elsewhere in this report is not the required or recommended increase in height of the dam.

b. O & M Procedures:

1. The observed cracking should be further investigated to insure that it is not symptomatic of distress in the slope. Large cracks should be trenched and properly backfilled.
2. Repair erosion due to wave action on the upstream slope and protect the slope from further damages.
3. Remove the tree and repair the erosion just upstream of the spillway weir.
4. Repair the erosion of the side slopes of the discharge channel just downstream of the spillway weir.
5. Remove the obstructions in the downstream channel of the spillway.

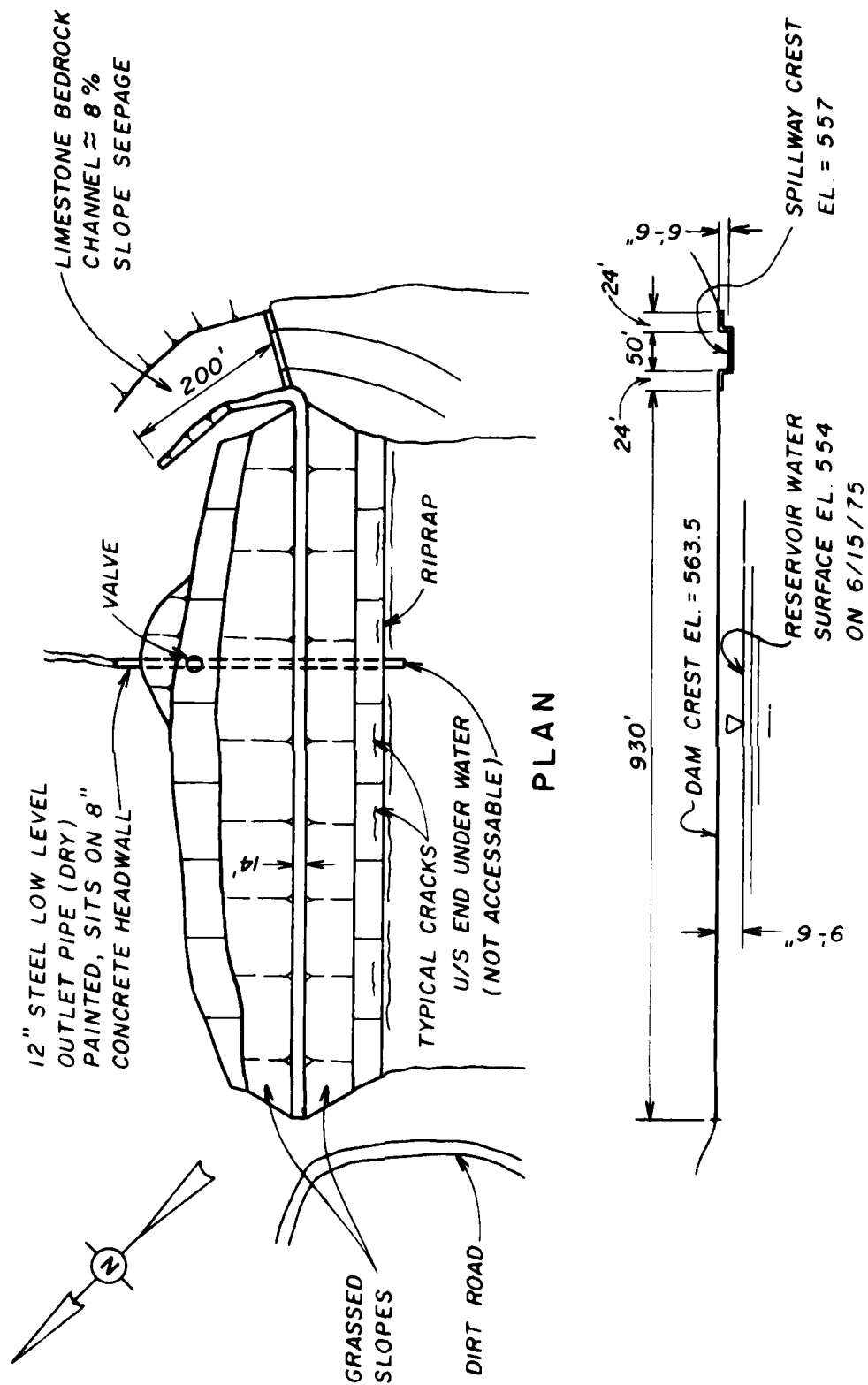
6. Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of earthen dams.
7. Monitor the seepage in the discharge channel for any changes in quantity, location or color and report any changes.
8. The owner should initiate the following programs:
 - (a) Periodic inspection of the dam by a professional engineer experienced in the design and construction of earthen dams.
 - (b) Set up a maintenance schedule and log all visits to the dam for operation, repairs and maintenance.

PLATES



ST. CHARLES COUNTY

LOCATION MAP - BUSCH WILDLIFE AREA LAKE # 35 DAM



SCALE
1" = 200' (HORIZONTAL)
VERTICAL (NOT TO SCALE)

BUSH WILDLIFE AREA LAKE NO. 35 DAM (MO. 10092)
PLAN & ELEVATION

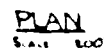
AUGUST A. BUSCH MEMORIAL
ST. CHARLES COUNTY, MO.
PLANS FOR CONSTRUCTION OF

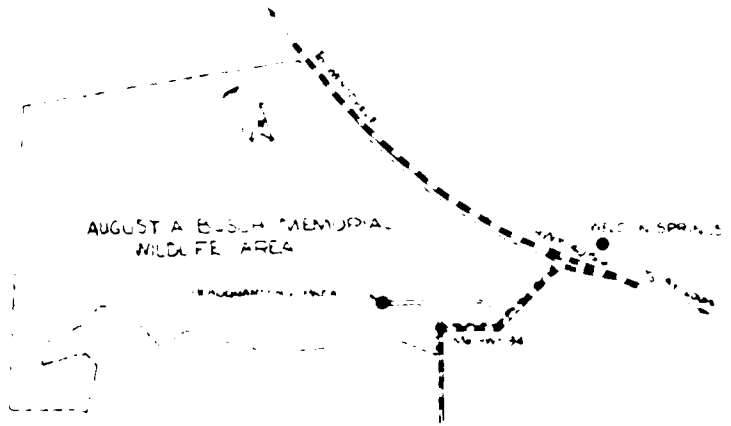
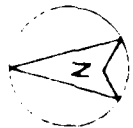
MEMORIAL WILDLIFE AREA.

LES COUNTY, MISSOURI

CTION OF LAKES ~~41 AND 51~~ 35
(New designated as 35)

MICROFILMED





VICINITY MAP

INDEX

LAKE NO. 41

- SHEET NO. 1 GENERAL PLAN LAKE 41
- 2 DAM - PLAN & PROFILE
- 3 SPILLWAY - PLAN & PROFILE
- 4 LAKE DRAIN - PLAN & PROFILE
- 5 SPILLWAY - WEIR WALL
- 6 TYPICAL SECTIONS, GENERAL NOTES & QUANTITIES
- 7 SPILLWAY - CROSS SECTIONS
- 8-16 DAM - CROSS SECTIONS

LAKE NO. 51

- SHEET NO. 17 GENERAL PLAN LAKE 51
- 18 DAM - PLAN & PROFILE
- 19 SPILLWAY - PLAN & PROFILE
- 20 SPILLWAY - LUNGEON BOX, PIPE SUPPORT & CONCRETE DIAGRAMS
- 21 TYPICAL SECTIONS, GENERAL NOTES & QUANTITIES
- 22-27 DAM - CROSS SECTIONS

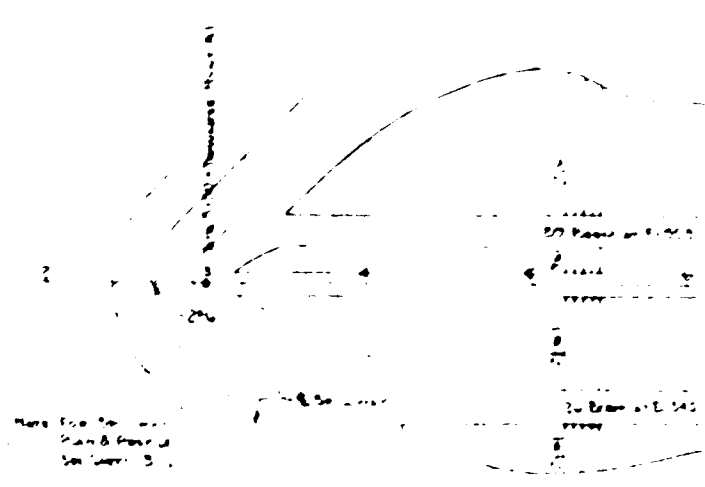
NOTE: B.M. NAIL IN WEST END OF
24 WHITE OAK TREE, APPROX.
500 SOUTH STR. 5' 10" DIA.

TIMBER

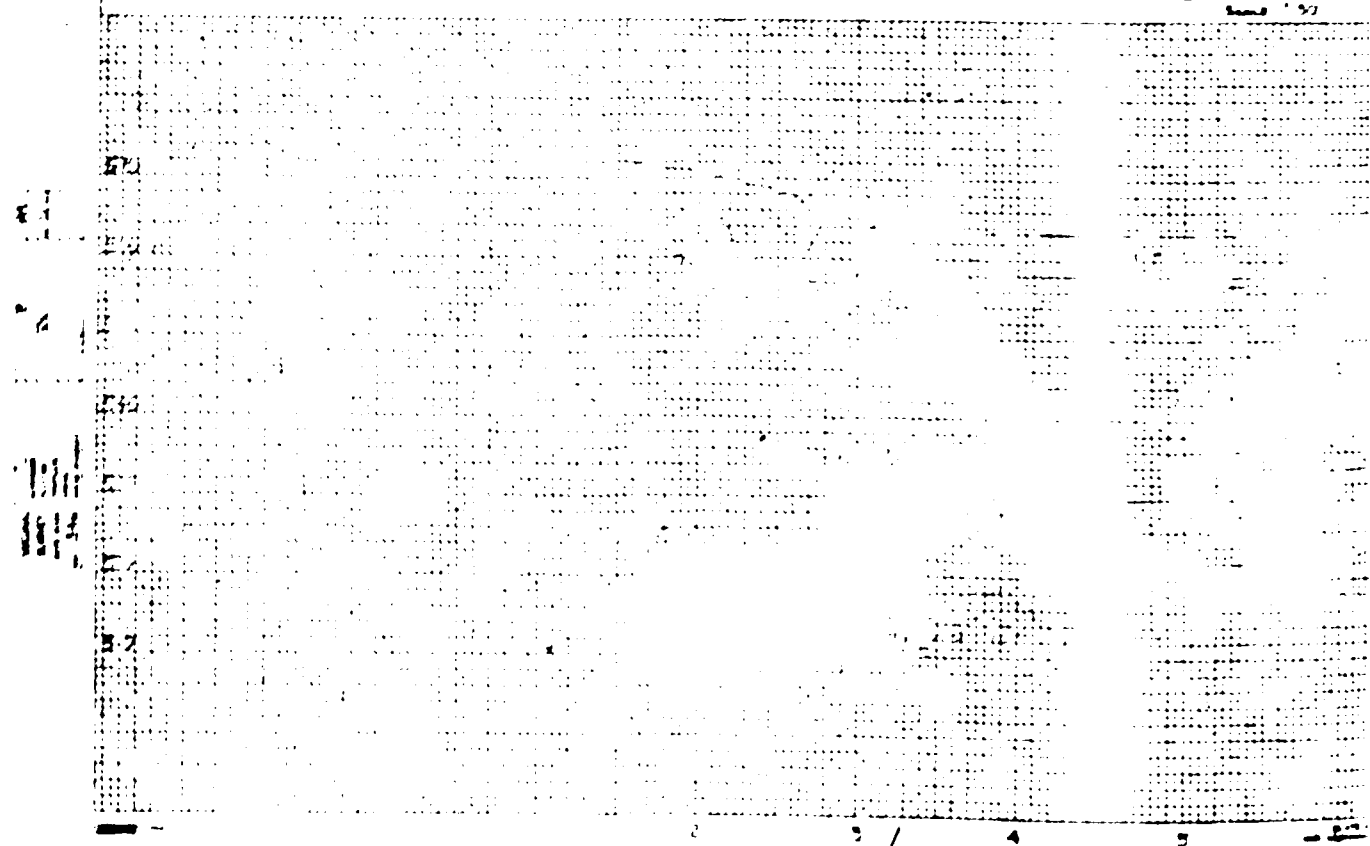
DESIGNED BY J. G. CEM	MISSOURI CONSERVATION COMMISSION	
DETAILED BY J. G. CEM	GENERAL PLAN LAKE # 25	
CHECKED BY J. G. CEM	APPROVED	SHEET 1 OF 27
	DATE MAY 52	JOB NO. 52-52

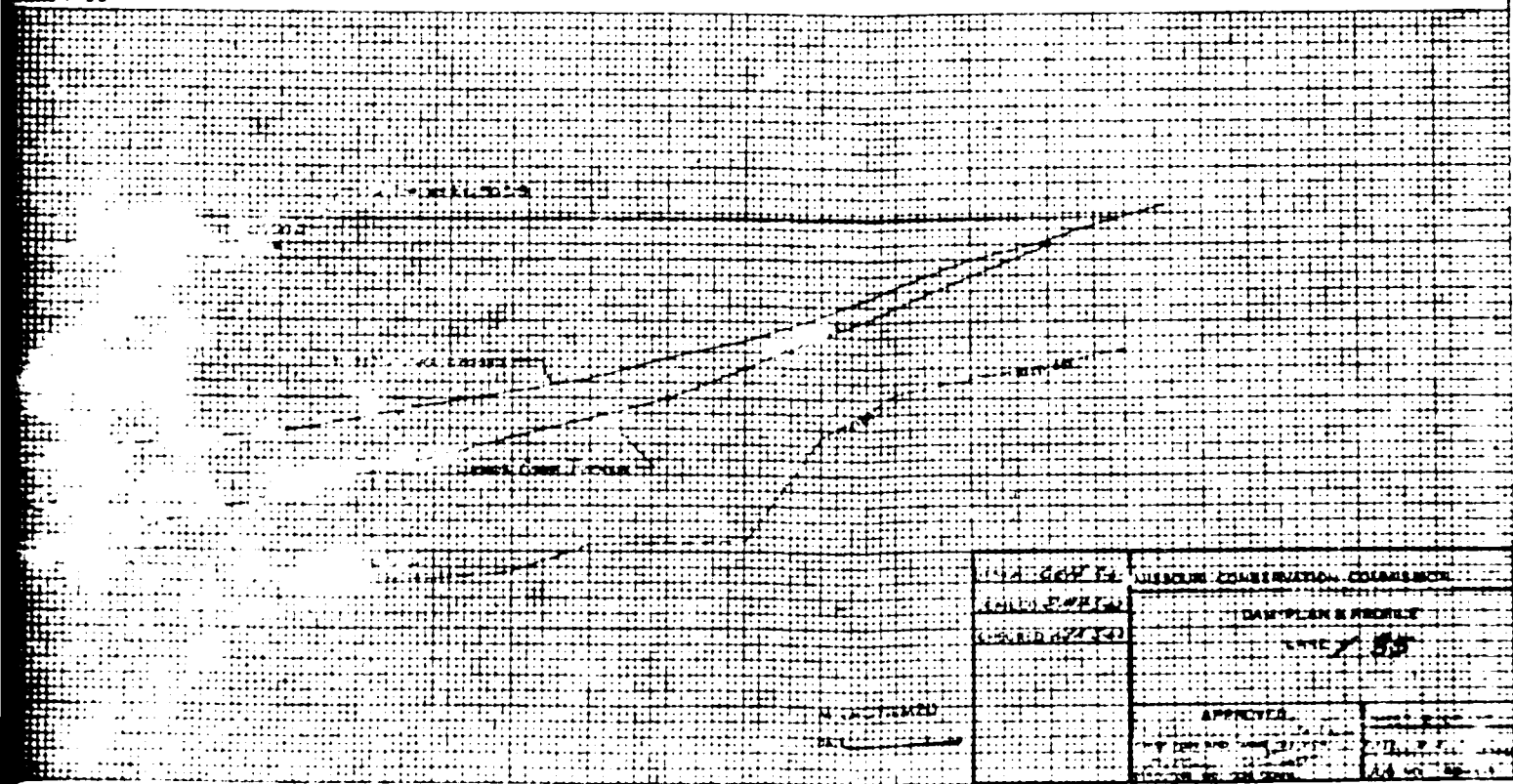
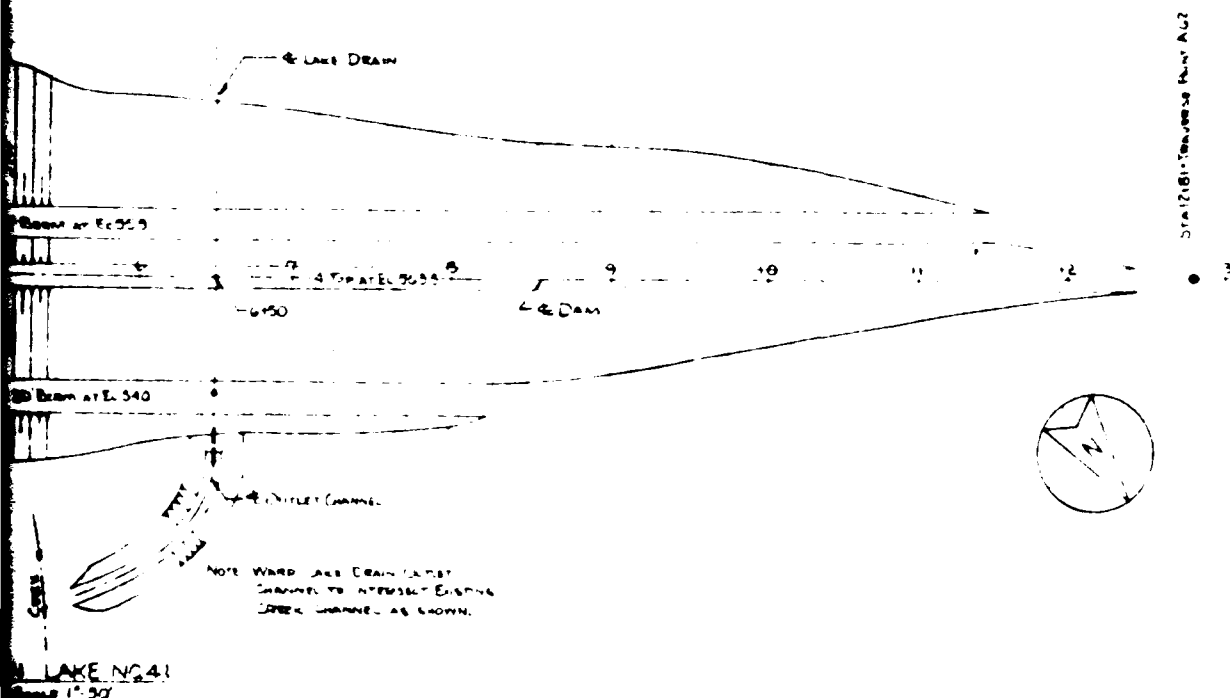
5

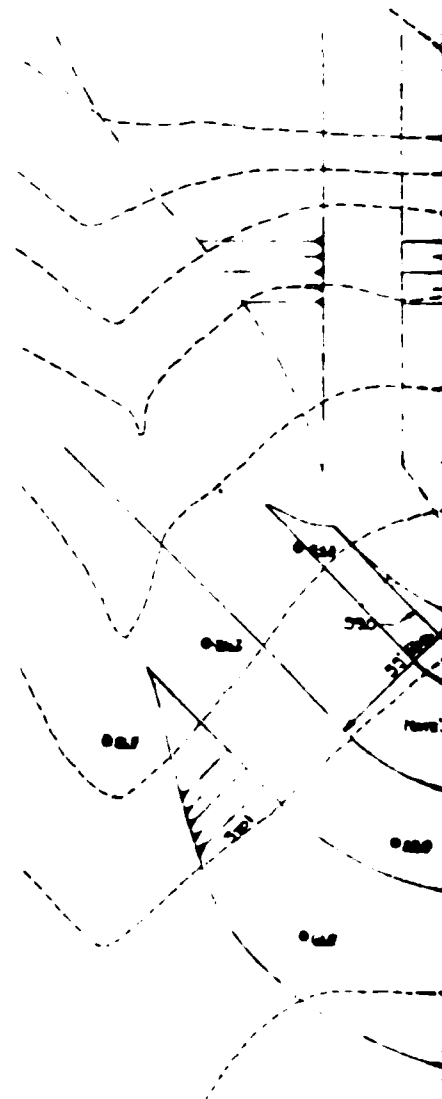
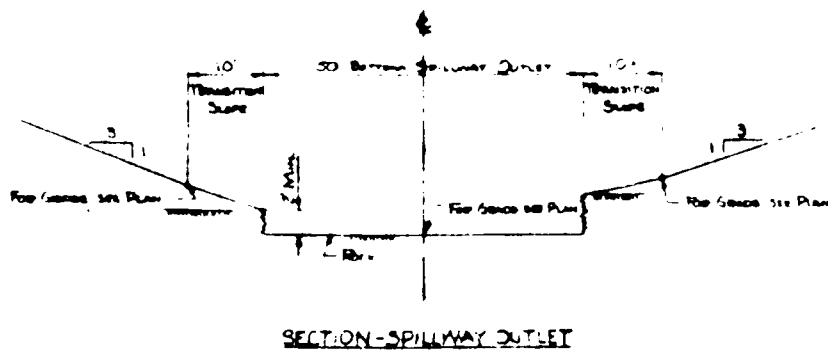
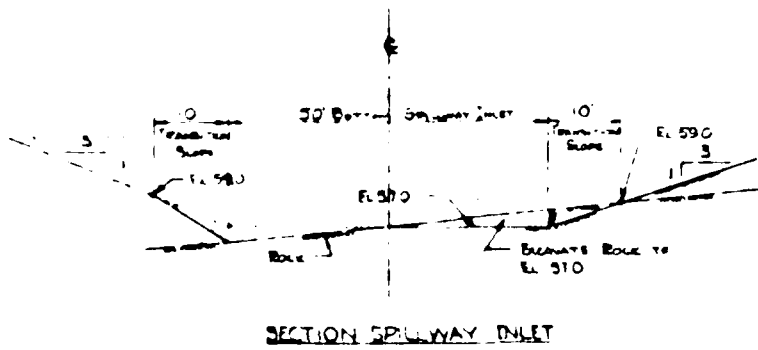
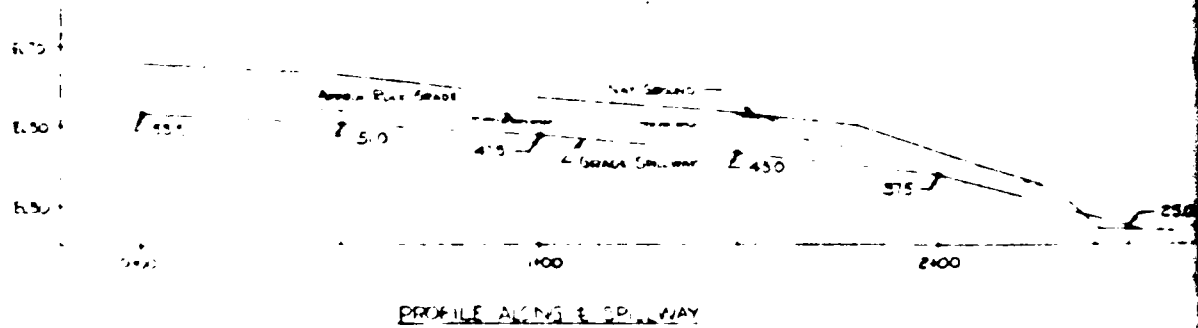
1111
1111



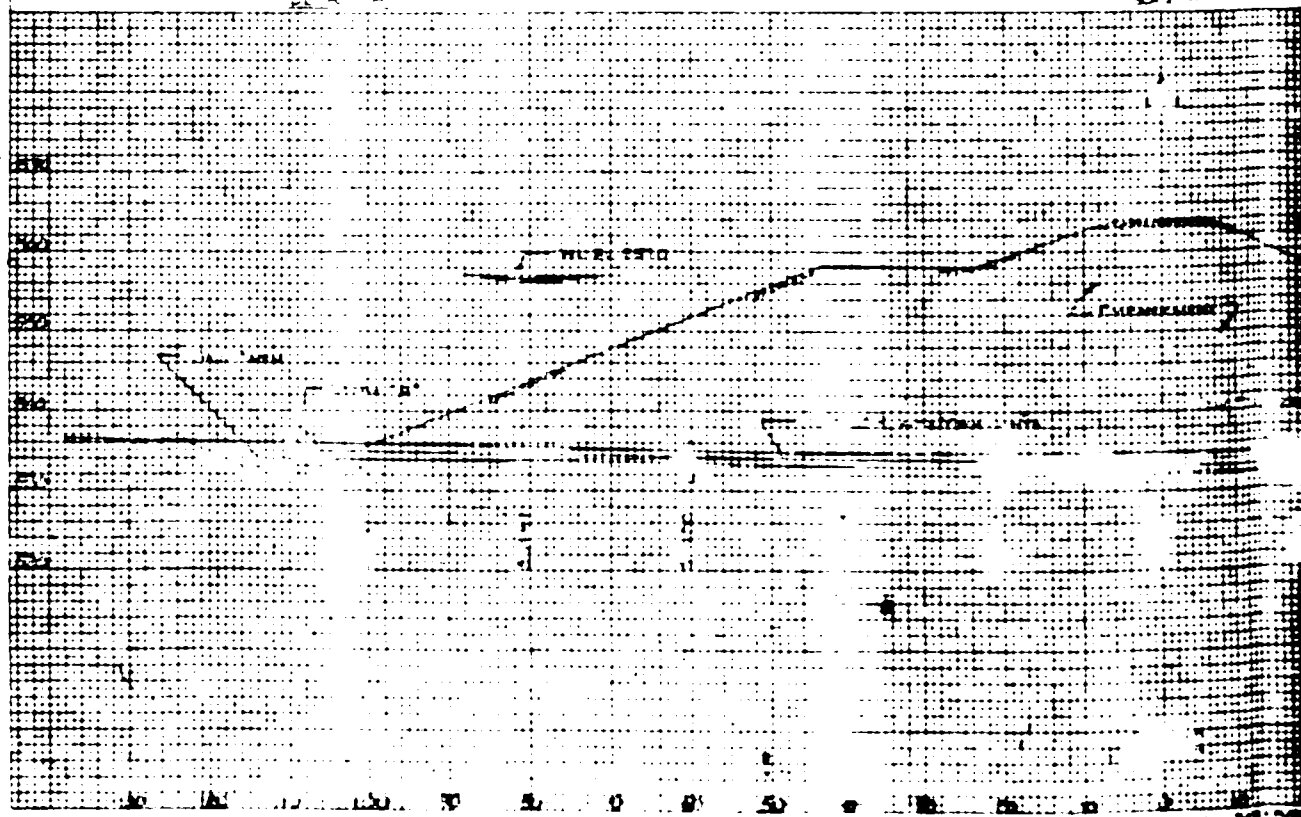
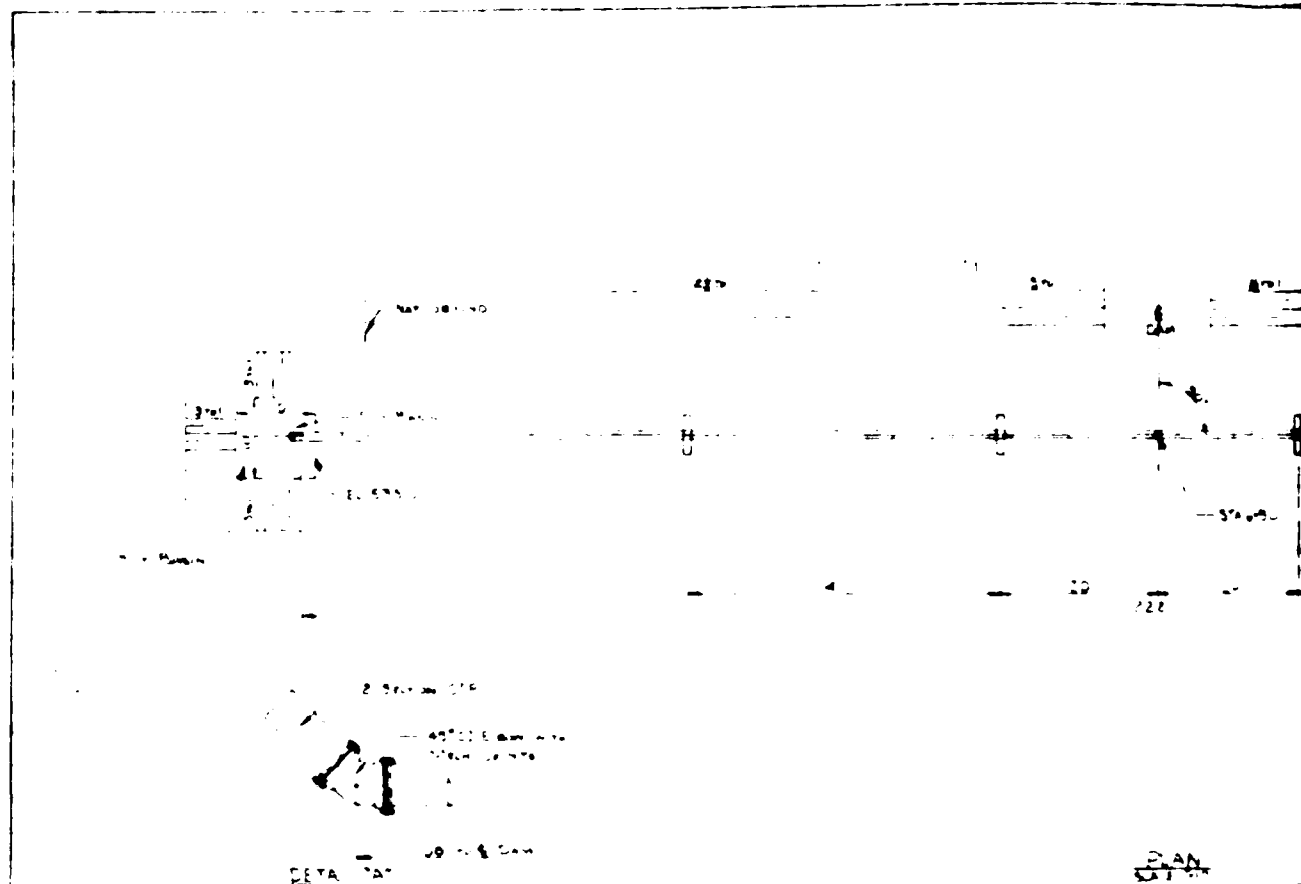
PLAN NO. 124
Scale 1/2"







DESIGN 3-62 CEM	MISSOURI CONSERVATION COMMISSION	
DETAILED 3-62 CEM	SPILLWAY PLAN & PROFILE	
CHECKED 3-62 CEM	LAKE # 35	
	APPROVED <i>[Signature]</i> CHIEF CIVIL AND WASTE DIVISION	SHEET 3 OF 27 DATE MAY 82 JOB NO. 68-103



42

2000

CONFIDENTIAL

• 4 7 5 2 1

* * *

[illegible]

44. *Chrysomelidae* (continued)

James Earl Ray, born May 19, 1928, was born in Jackson, Mississippi.

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

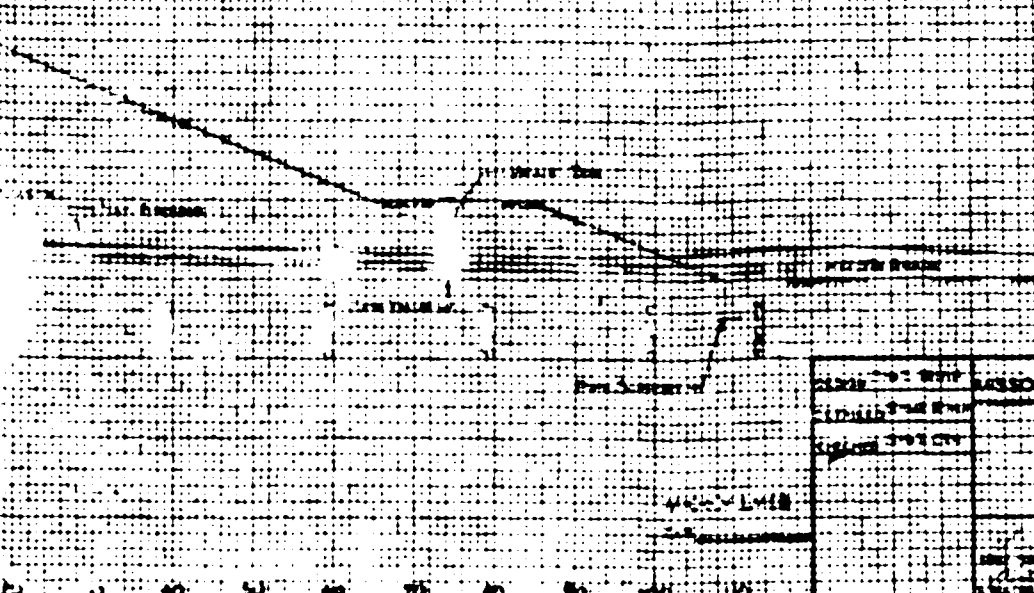
On 27 February 1992, the following information was received from the U.S. Coast Guard:

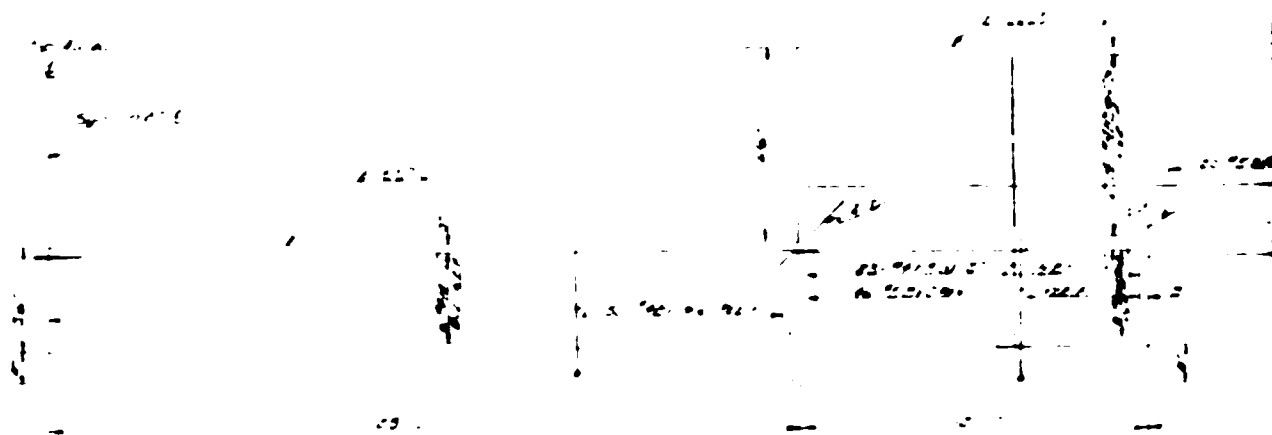
... ..

THE UNIVERSITY OF CHICAGO

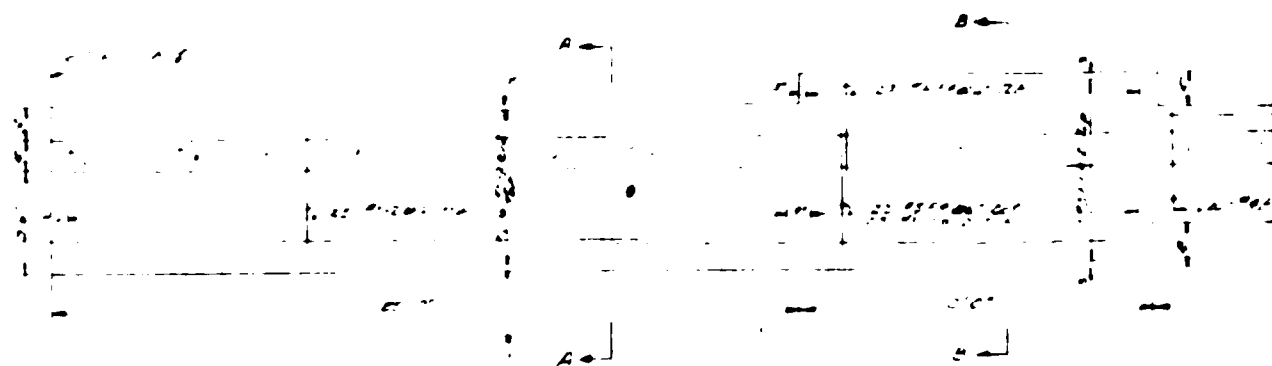
4. The second part of the contract

2. 2014 JANUARY 21

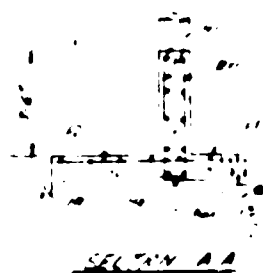
[illegible]



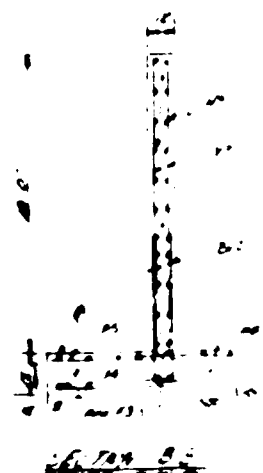
SECTION AA
Scale: 1/4" = 1'-0"



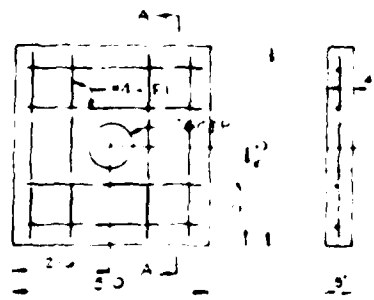
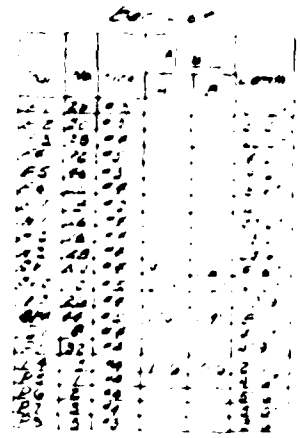
SECTION BB
Scale: 1/4" = 1'-0"



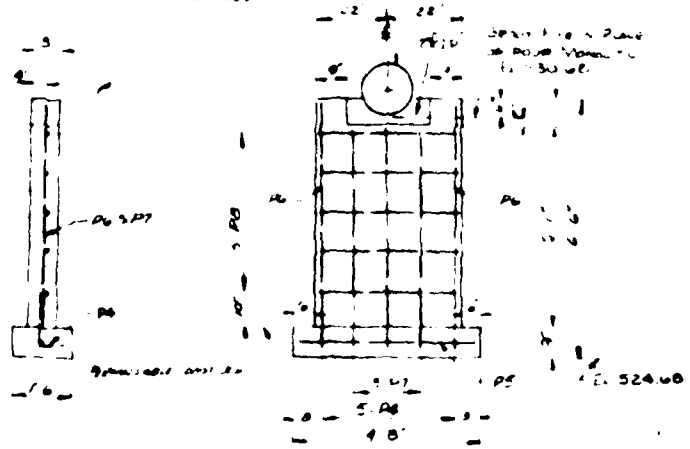
SECTION CC
Scale: 1/4" = 1'-0"



SECTION DD
Scale: 1/4" = 1'-0"

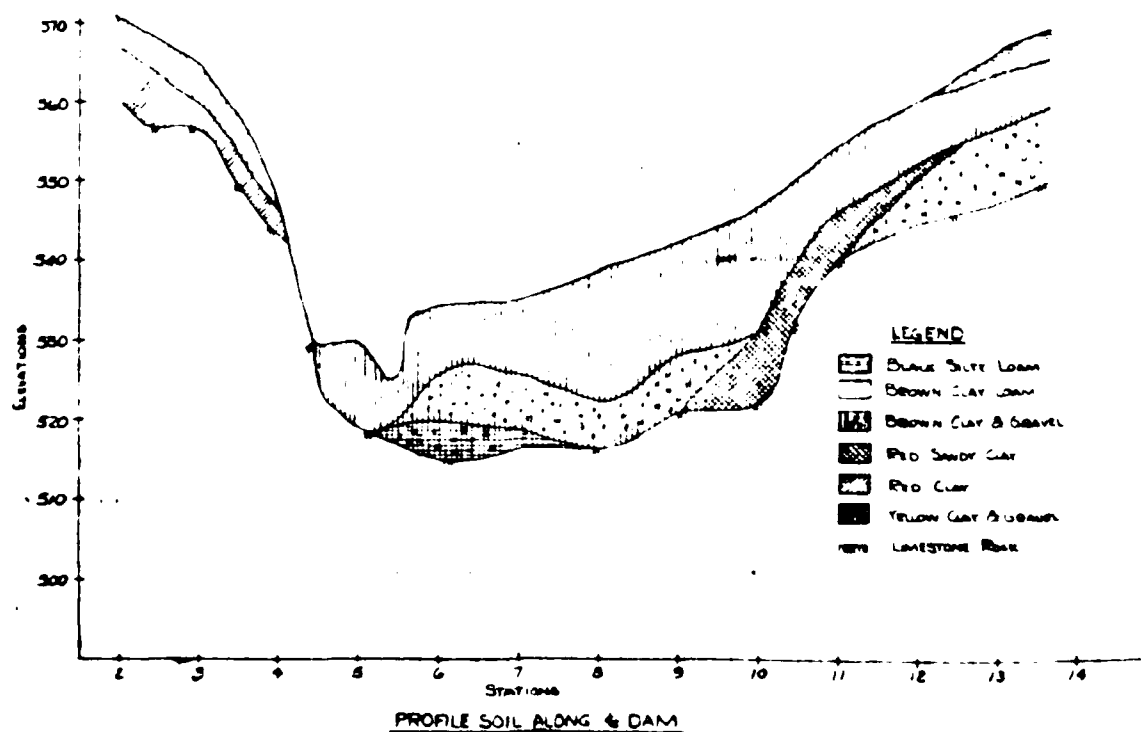
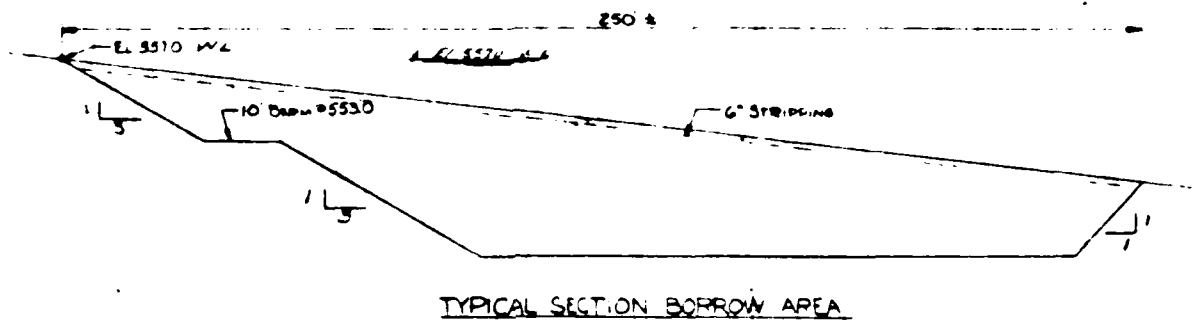
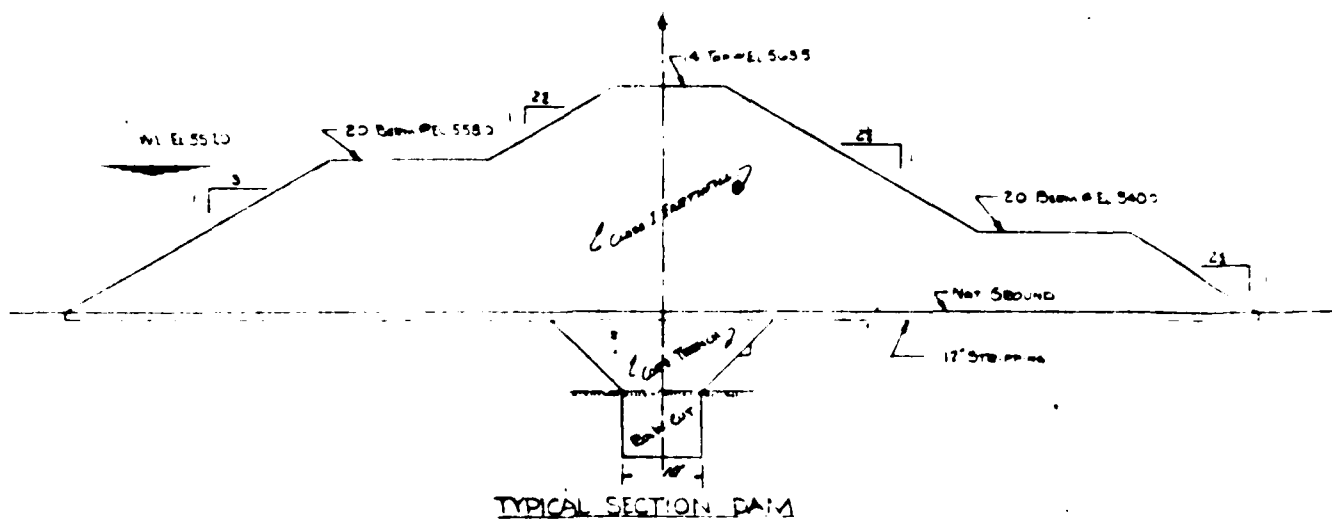


NOTE: A. 1. 1/2" DIA. 4" L. 1/2" DIA. 4" L. 1/2" DIA. 4" L.
 DETAIL CONCRETE DAMPERS SECTION A-A



DETAILS PIPE SUPPORT

DESIGN	MISSOURI CONSERVATION COMMISSION	
DETAILED	SPILLWAY-WEIR WALL	
CHECKED	LAKE # 35	
APPROVED	DATE MAY 82	SHEET 2 OF 27
ENGINEER AND GAGE DIVISION	108 NO. 48-102	



GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE MISSOURI CONSERVATION COMMISSION DESIGN MANUAL, EDITION 1967, AND THE MISSOURI CONSERVATION COMMISSION DESIGN MANUAL, EDITION 1967, AND THE MISSOURI CONSERVATION COMMISSION DESIGN MANUAL, EDITION 1967.

2. THE DESIGNER SHALL BE RESPONSIBLE FOR THE DESIGN OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

3. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

4. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

5. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

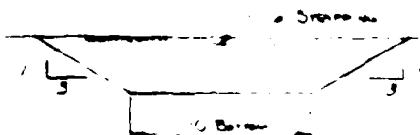
6. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

7. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

8. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

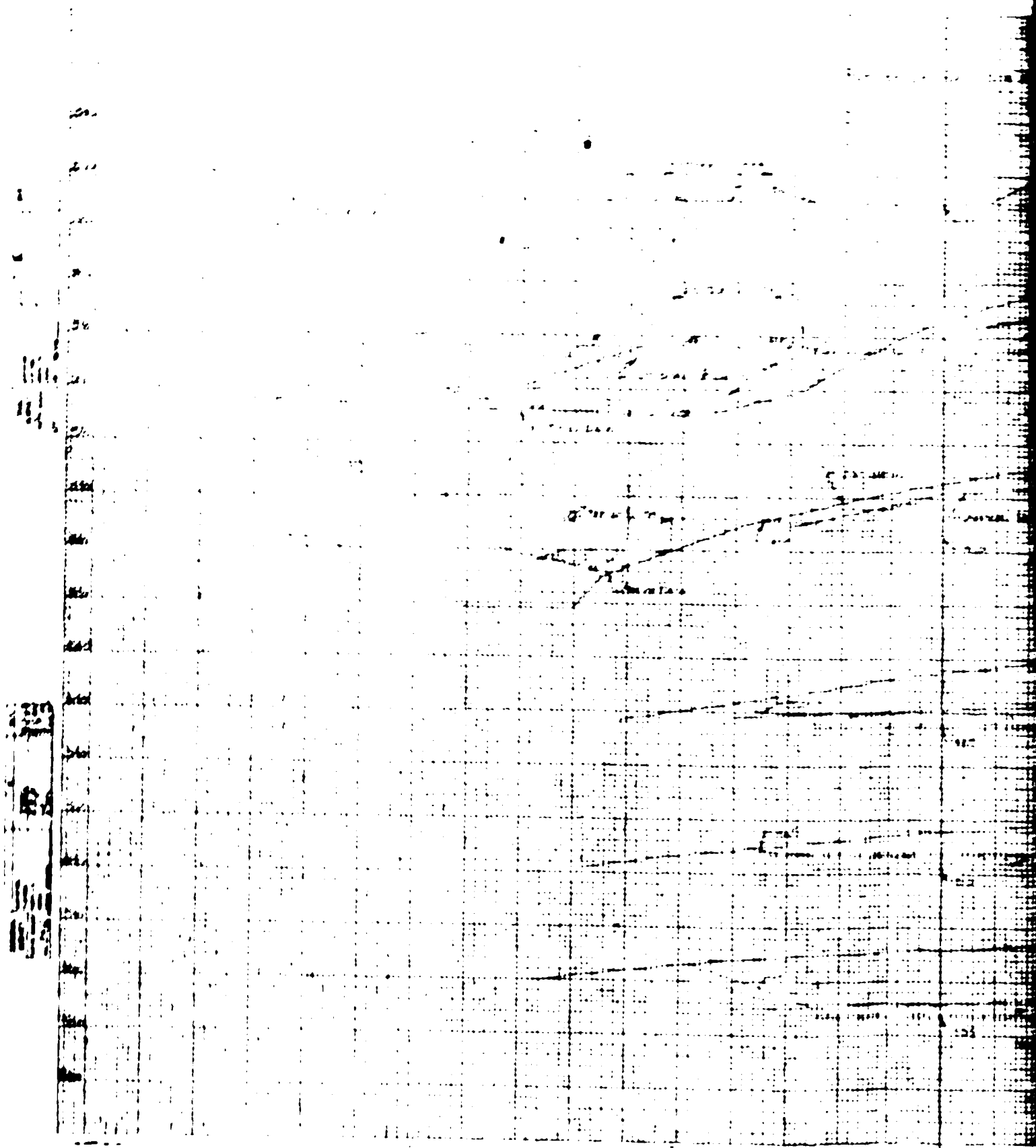
9. THE MISSOURI CONSERVATION COMMISSION SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE PROJECT AND FOR THE ACCURACY OF THE INFORMATION PROVIDED HEREON.

QUANTITIES		
EARTHWORK CLASS 1	5,550	Cu Yds
ROCK EXCAVATION	225	Cu Yds
CLASS "A" CONCRETE	49	Cu Yds
METAL REINFORCING	3,720	Lbs
FERTILIZING & SEEDING	3	Acres
SEEDING	3	Acres
LAKE DRAIN	224	Lin Ft
GATE VALVE	1	EA

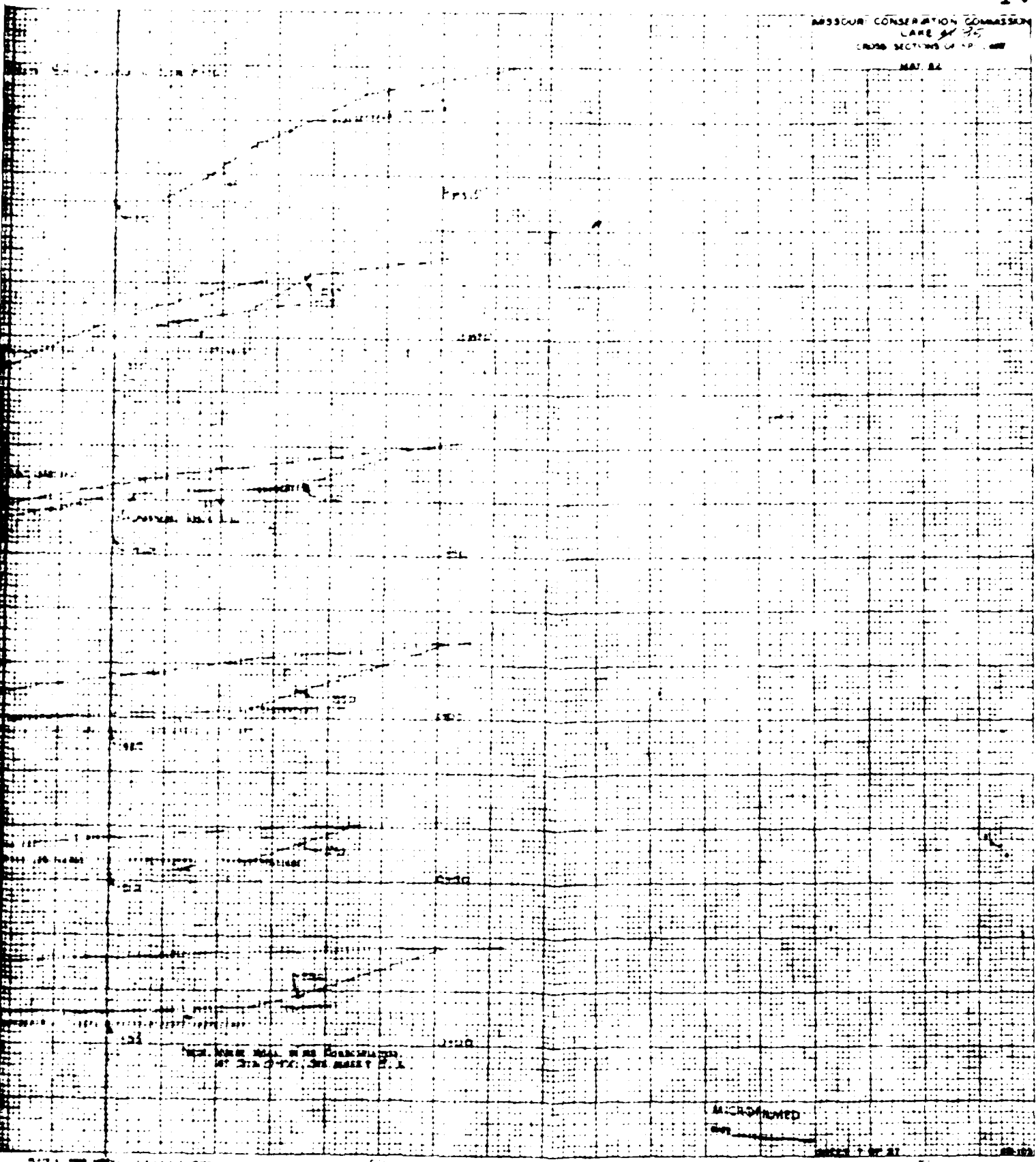


TYPICAL SECTION OUTLET CHANNEL
FOR LAKE DRAIN

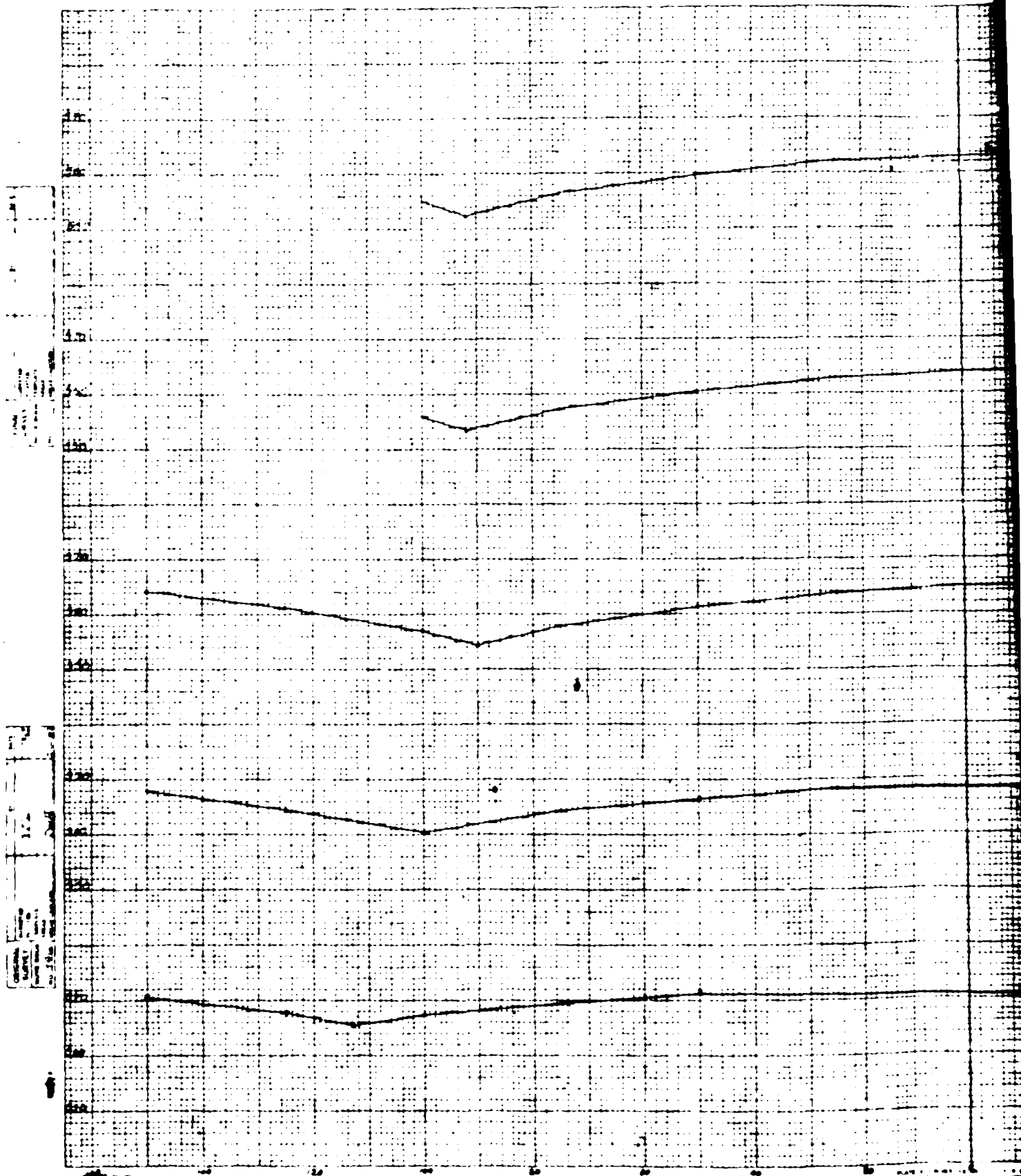
DESIGNED BY	MISSOURI CONSERVATION COMMISSION
DRAWN BY	
CHECKED BY	
TYPICAL SECTIONS & NOTES LAKE # 36	
APPROVED	SHEET 8 OF 87
DATE	MAY 68
BY	FOR MR. M. A.



MISSOURI CONSERVATION COMMISSION
LAKE OF THE OZARKS
CROSS SECTIONS OF LAKE
MAY 22



MICROFILMED



MISSOURI CONSERVATION COMMISSION
LAKE # 35
CROSS-SECTIONS OF DAM
MAY 82

3-15

3-09

3-00

2-50

2-00

MICROFILMED

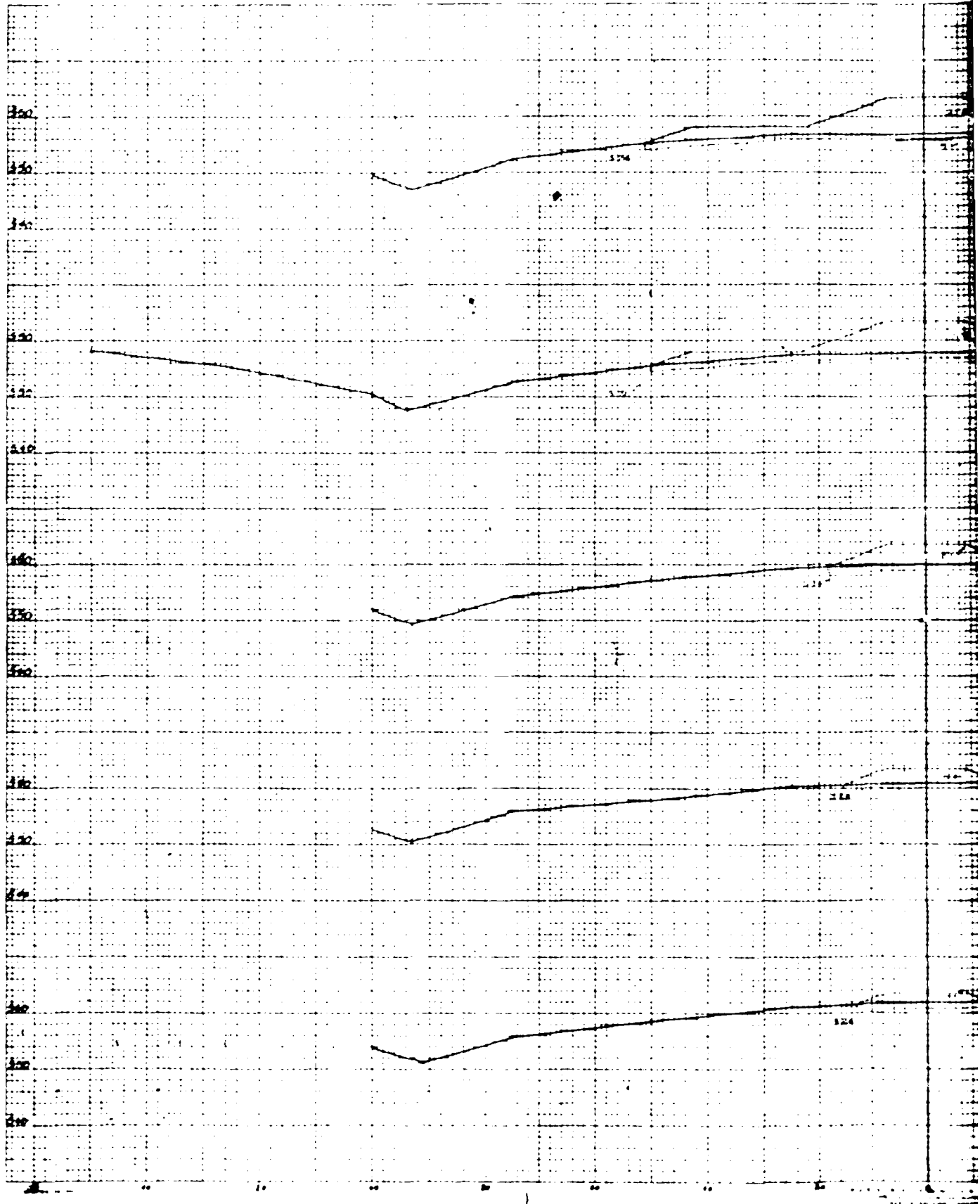
DATE

MAY 82

FINAL
WELL POINT
ELEVATION
DATE

WELL
NO. 1

WELL
NO. 2



MISSOURI CONSERVATION COMMISSION
LAKE # 345
CROSS-SECTIONS OF DAM
MAY 62

3-55

3-50

3-38

3-31

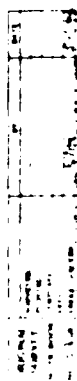
3-25

MICROFILMED

DATE

MAY 62

00-01



MISSOURI CONSERVATION COMMISSION
LAKE # 35
CROSS-SECTIONS OF DAM
MAY 82

12-28

12-30

12-32

12-22

12-30

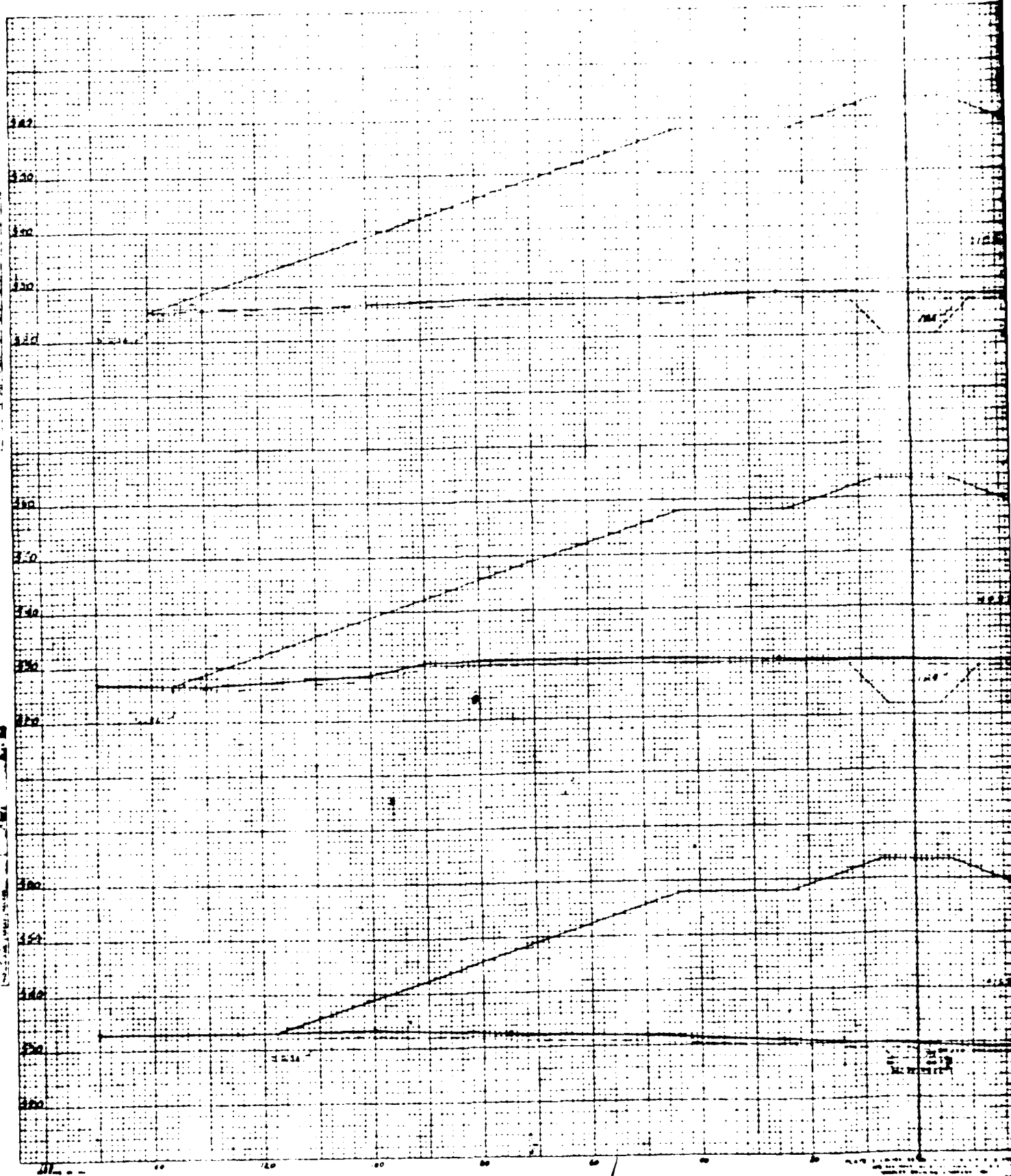
11-85

ACROFILMED

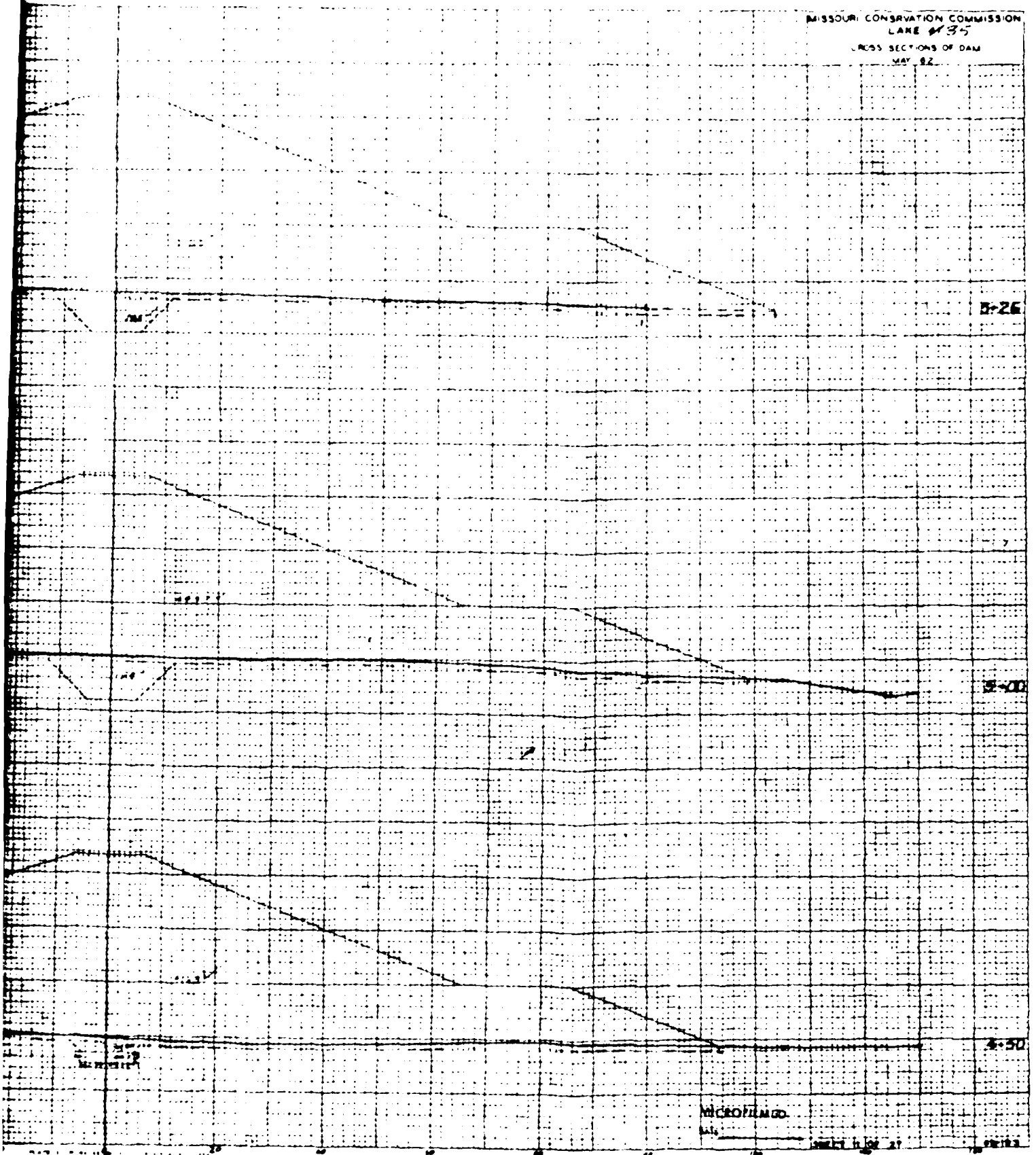
1981 09 27

FINAL	DATE	TIME
START	TIME	TIME
STOP	TIME	TIME

FINAL	DATE	TIME
START	TIME	TIME
STOP	TIME	TIME

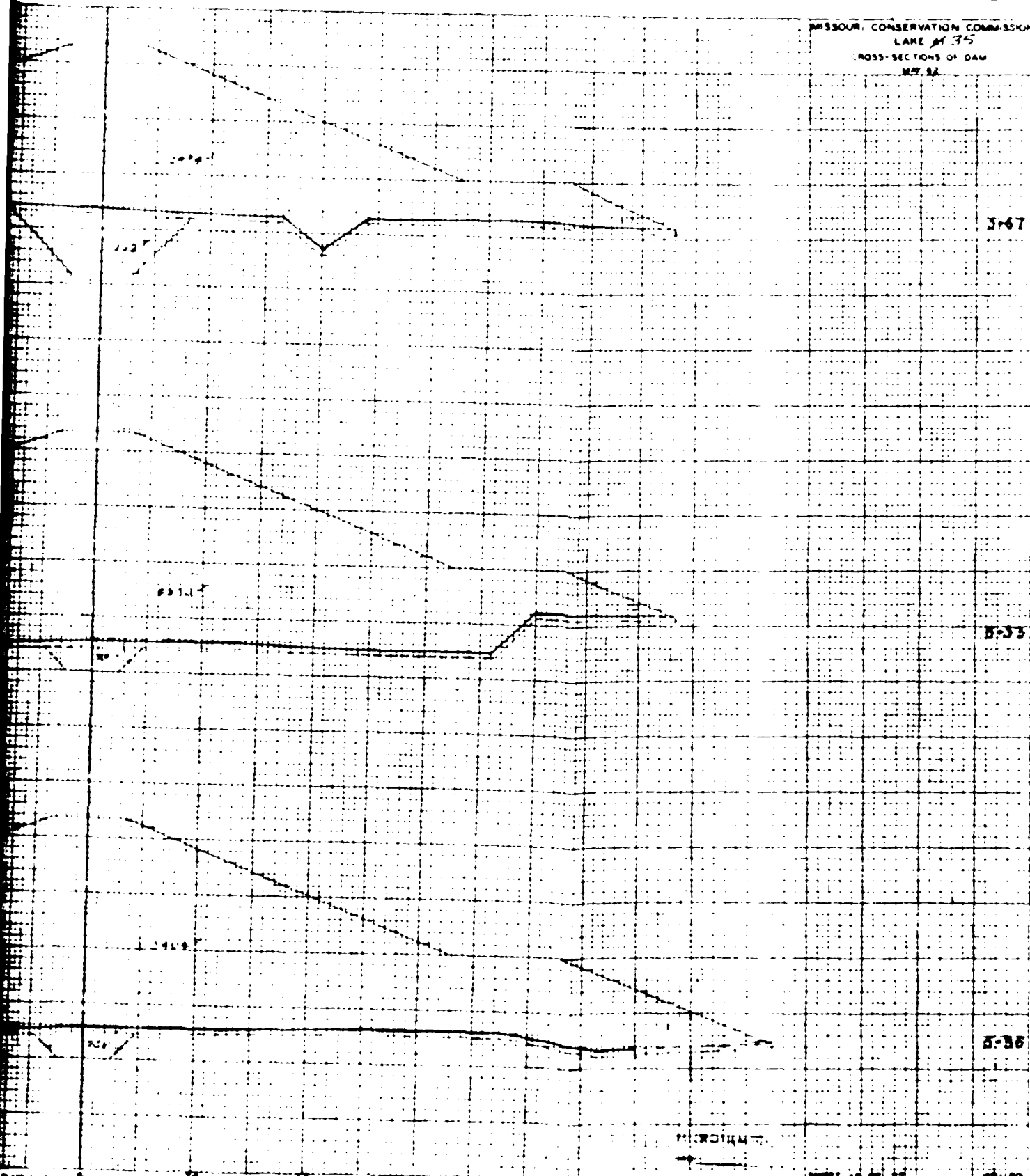


MISSOURI CONSERVATION COMMISSION
LAKE #35
CROSS SECTIONS OF DAM
MAY 82

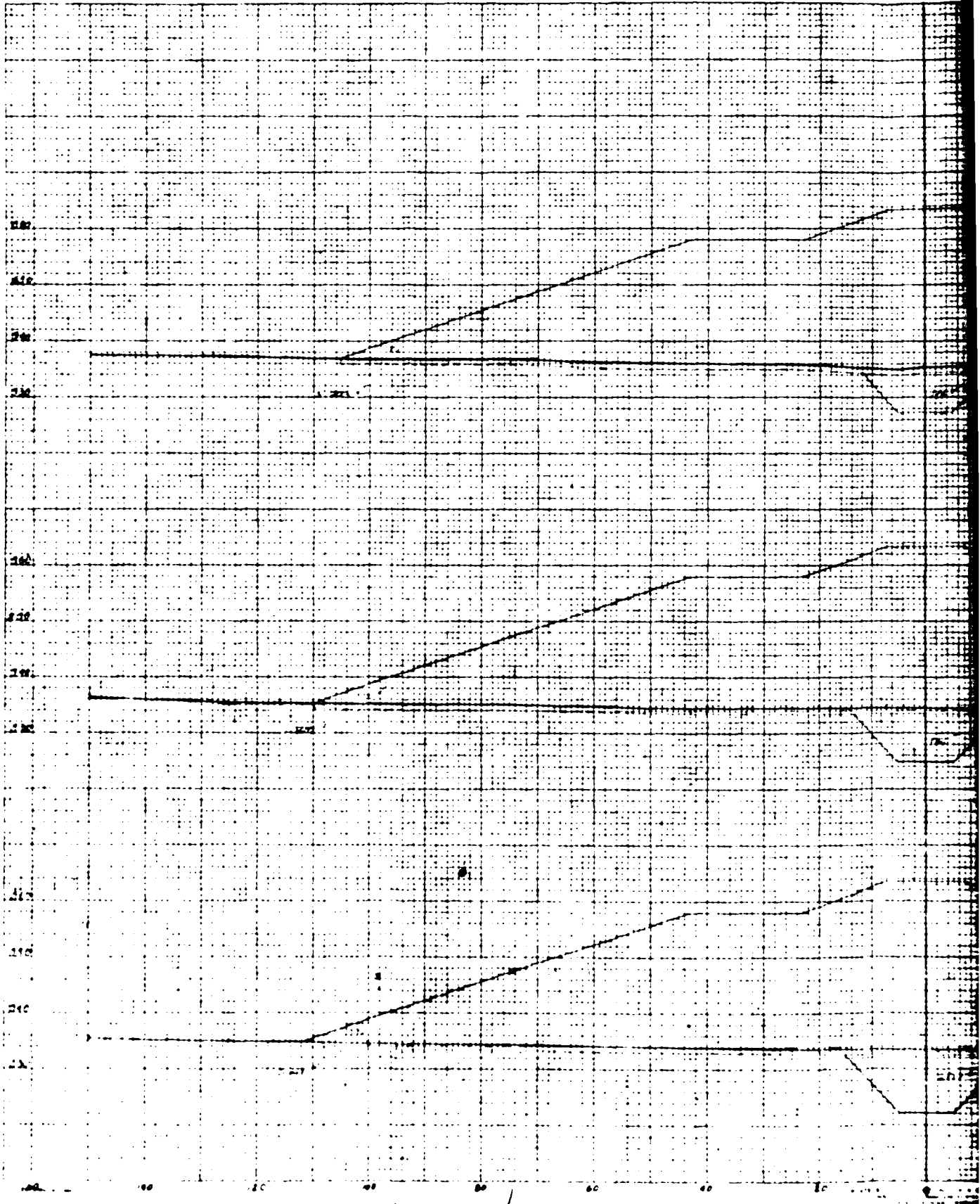




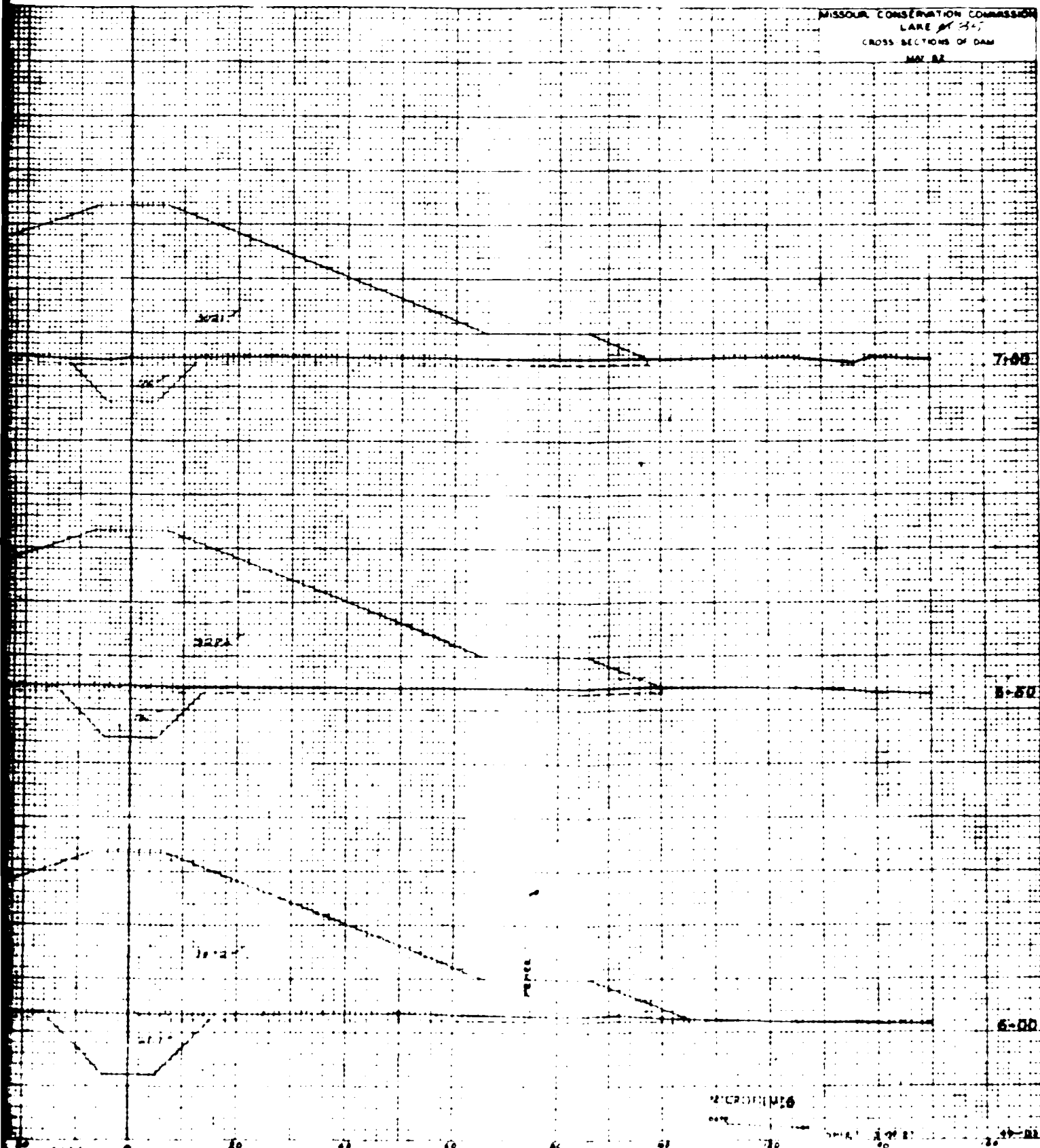
MISSOURI CONSERVATION COMMISSION
LAKE # 345
CROSS-SECTIONS OF DAM
MAY 22



NORTH



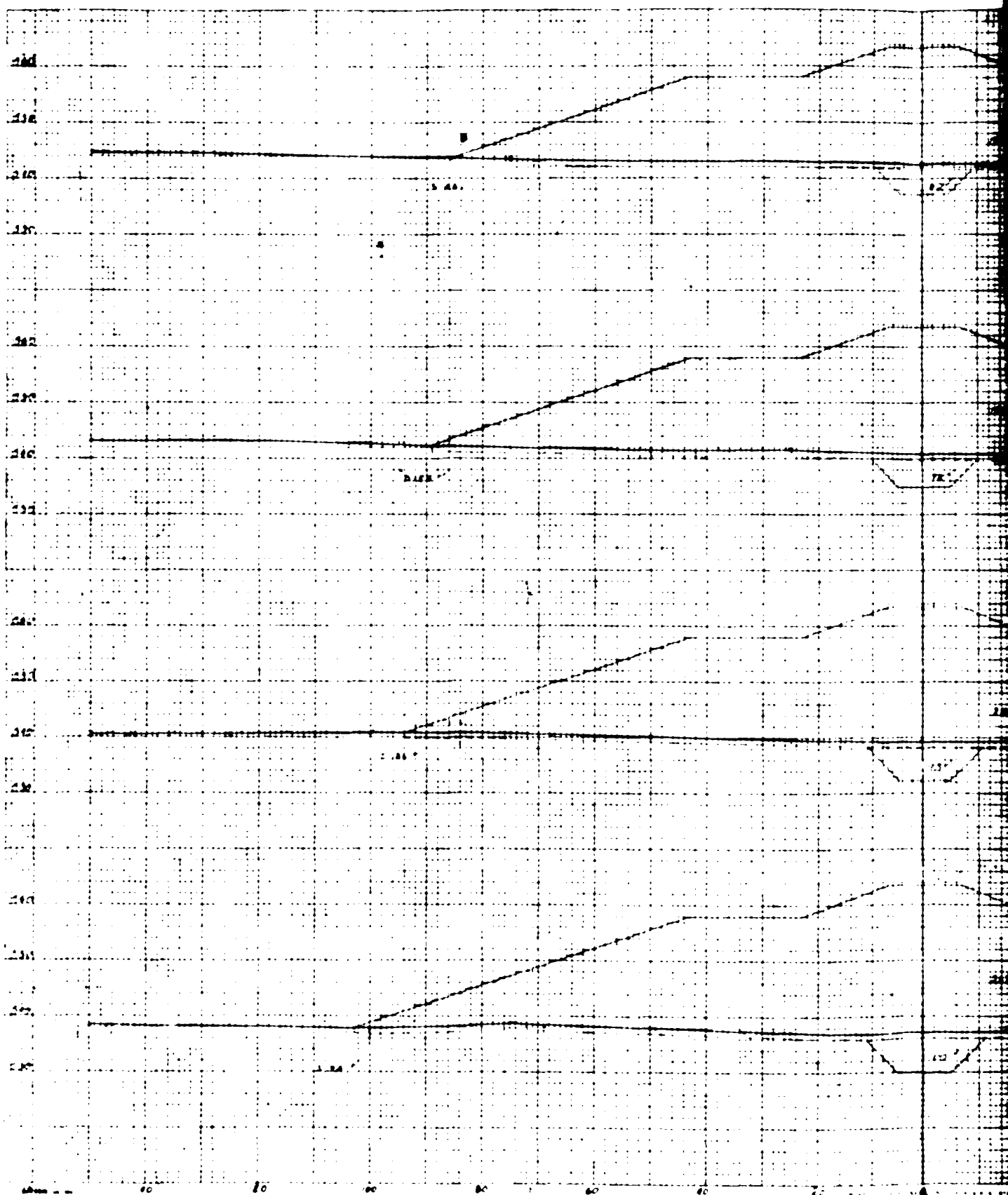
MISSOURI CONSERVATION COMMISSION
LAKE # 3-5
CROSS SECTIONS OF DAM
MAY 82



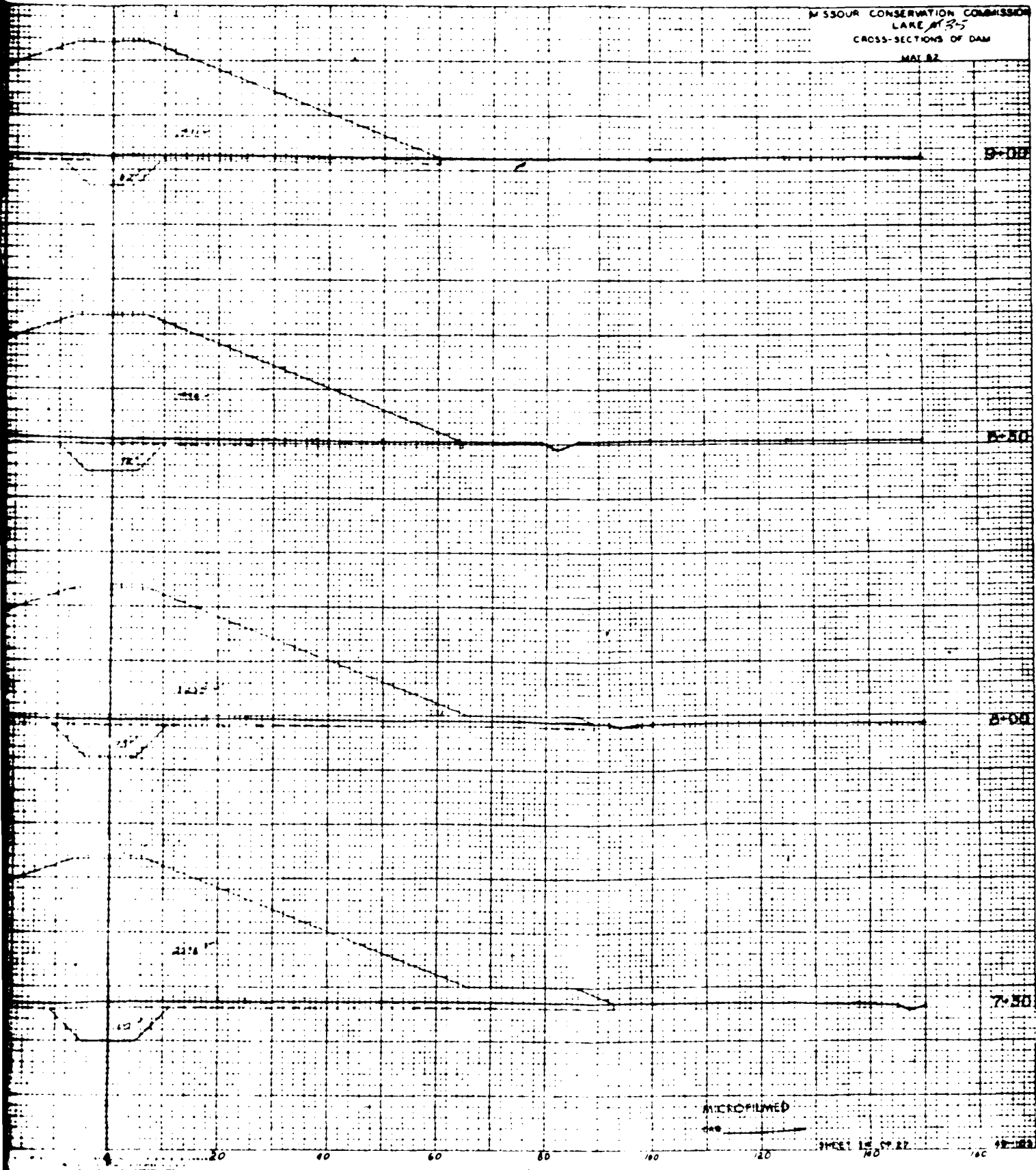
MISSOURI 16

DATE 1-10-82

BY 1-10-82

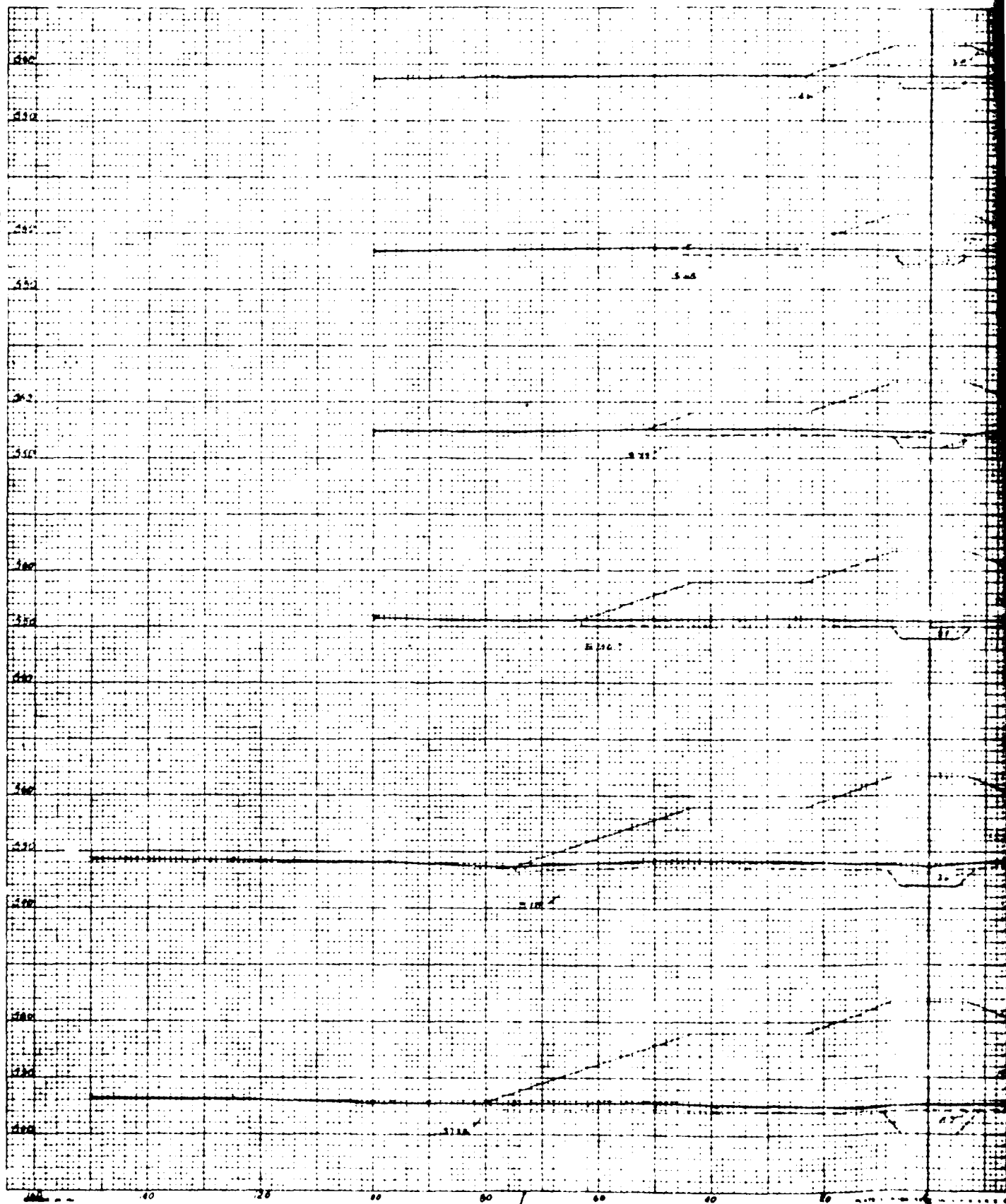


MISSOURI CONSERVATION COMMISSION
LAKE #3-5
CROSS-SECTIONS OF DAM
MAY 82



DATE	TIME	LOCATION	WIND	TEMP	MOON	SEA	WAVE	SWELL	STATE	REMARKS

DATE	TIME	LOCATION	WIND	TEMP	MOON	SEA	WAVE	SWELL	STATE	REMARKS



MISSOURI CONSERVATION COMMISSION
LAKE # 305
CROSS SECTIONS OF DAM

MAY 82

11-50

11-35

11-00

10-50

10-00

9-50

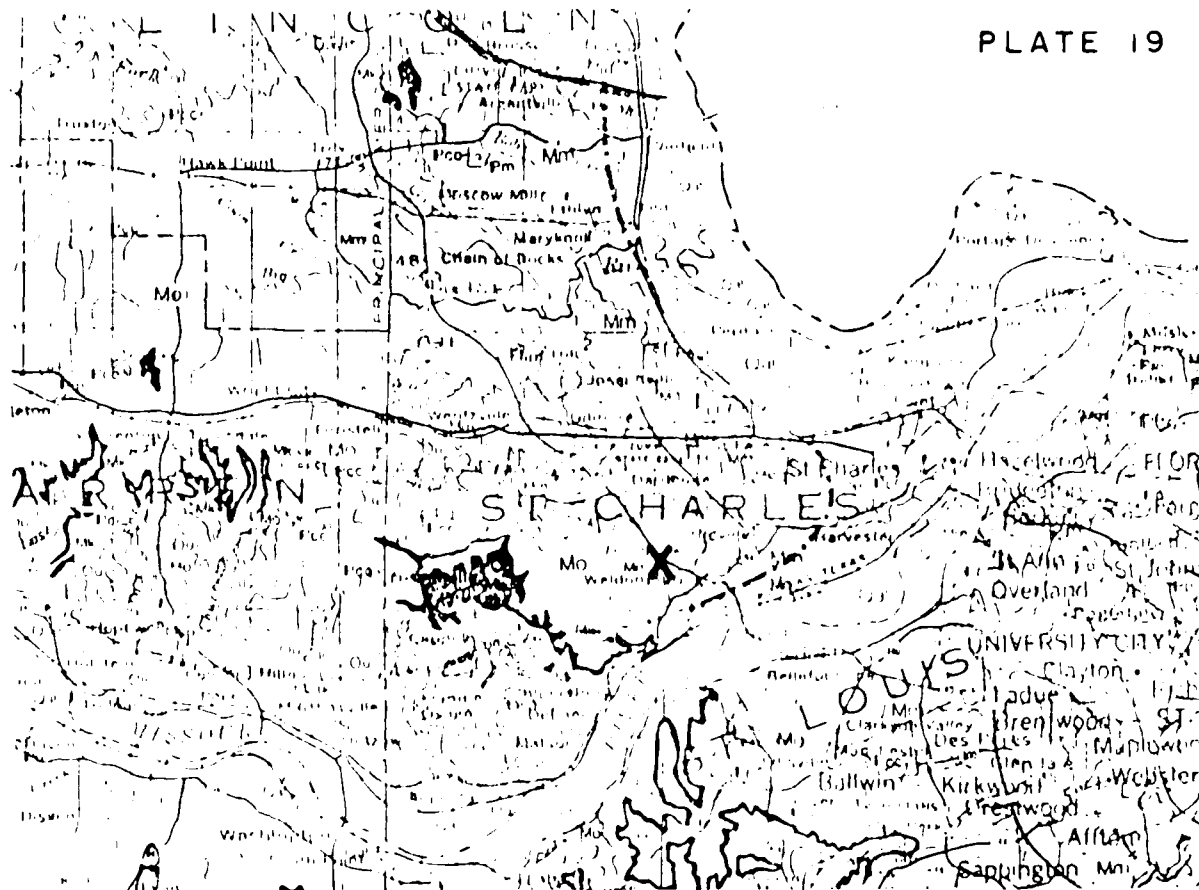
ENCLOSURE

DATE

FILED IN 305

NO. 100

2



QUATERNARY - Qol - ALLUVIAN

PENNSYLVANIAN - Pcc - CABINESS SUBGROUP

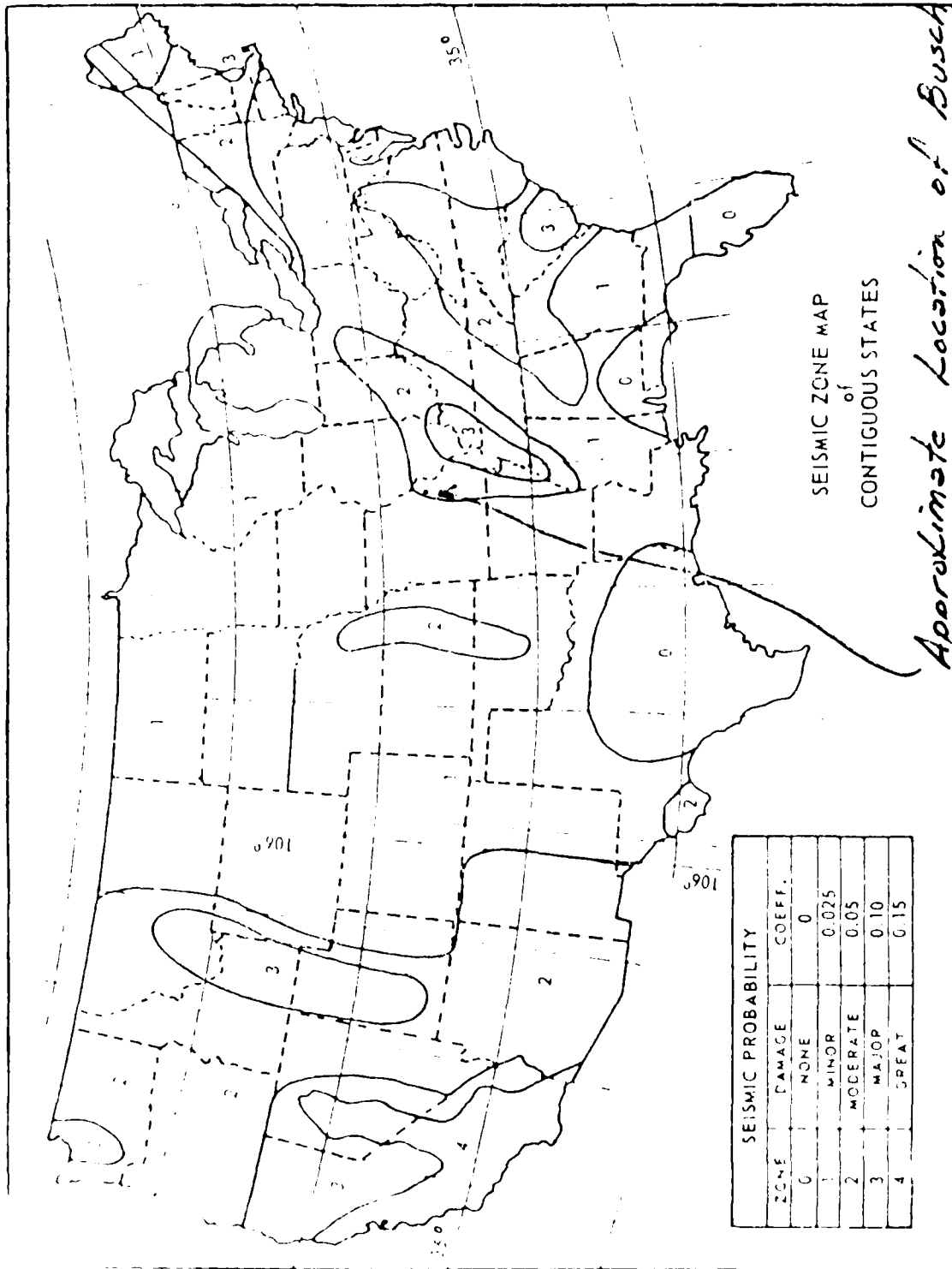
MISSISSIPPIAN

- | | | |
|---|----|--|
| { | Mm | STE. GENEVIEVE FORMATION
ST. LOUIS LIMESTONE
SALEM FORMATION
WARSAW FORMATION |
| | Mo | KEOKUK LIMESTONE
BURLINGTON LIMESTONE
FERN GLEN FORMATION |

X - LOCATION OF DAM, MO. 10092

REFERENCE:
 GEOLOGIC MAP OF MISSOURI
 MISSOURI GEOLOGIC SURVEY
 a) 1961 b) 1979

GEOLOGIC MAP
 OF
 ST. CHARLES COUNTY
 AND
 ADJACENT AREA



Approximate Location of Busch Wildlife Area Lake #35 Dam.

APPENDIX A

PHOTOGRAPHS TAKEN DURING INSPECTION

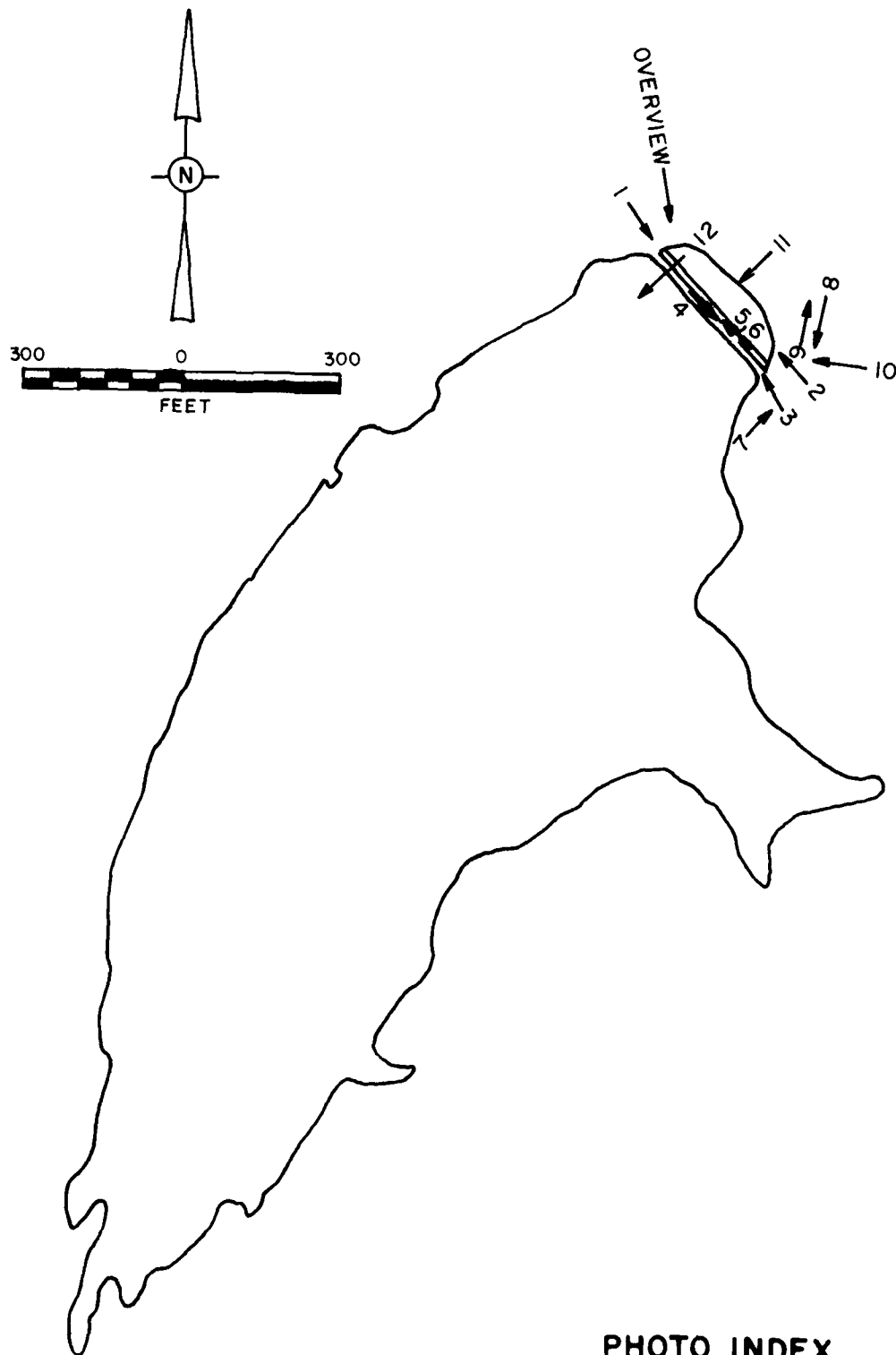


PHOTO INDEX
FOR
BUSCH WILDLIFE AREA LAKE NO. 35 DAM

Busch Wildlife Area Lake No. 35 Dam

- | | | |
|-----------|---|---|
| Photo 1. | - | View of the crest of the embankment. |
| Photo 2. | - | View of the downstream embankment slope. |
| Photo 3. | - | View of the upstream embankment slope and berm. |
| Photo 4. | - | View of the erosion on the upstream embankment slope. |
| Photo 5. | - | View of the cracking on the upstream berm. |
| Photo 6. | - | View of the cracking on the upstream berm. |
| Photo 7. | - | View of the approach channel to the spillway. Note concrete weir in background. |
| Photo 8. | - | View of the discharge channel of the spillway and the weir. |
| Photo 9. | - | View of the discharge channel of the spillway. |
| Photo 10. | - | View of the erosion in the discharge channel. |
| Photo 11. | - | View of the outlet to the low level drain. |
| Photo 12. | - | View of the reservoir rim. |

Busch Wildlife Area Lake No. 35 Dam



Photo 1



Photo 2

Busch Wildlife Area Lake No. 35 Dam



Photo 3



Photo 4



Photo A



Busch Wildlife Area Lake No. 35 Dam



Photo 7



Photo 8

Bush Wildlife Area Lake No. 35 Dam



Photo 9



Photo 10



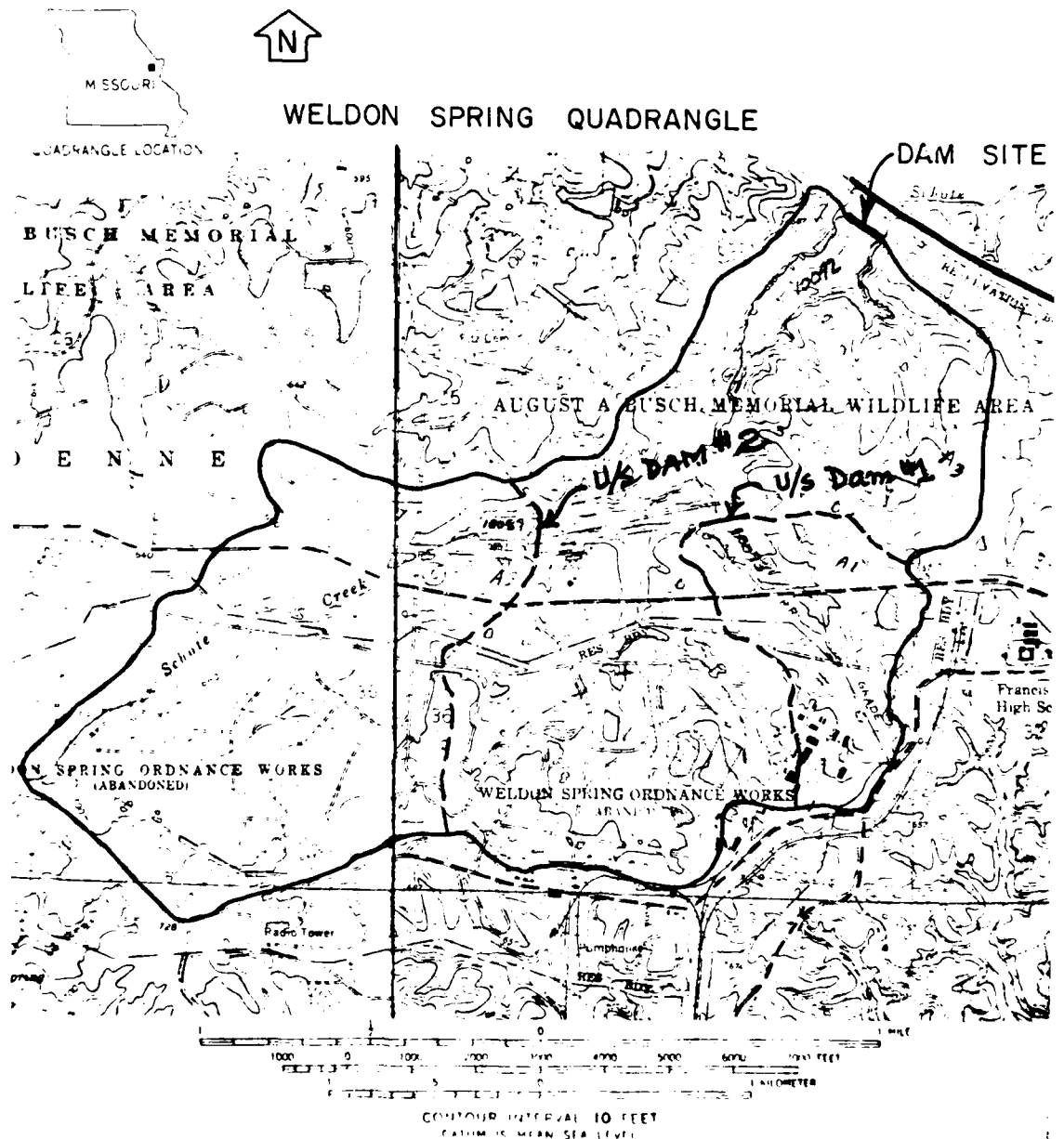
Photo 11



Photo 12

APPENDIX B

HYDROLOGIC COMPUTATIONS



BUSCH WILDLIFE AREA LAKE DAM (MO 10092)
DRAINAGE BASIN

Dam Safety Inspection - Missouri

Pusch Wildlife Area Lake No. 35 Dam - #10092

Spillway and Overtop Rating Curve

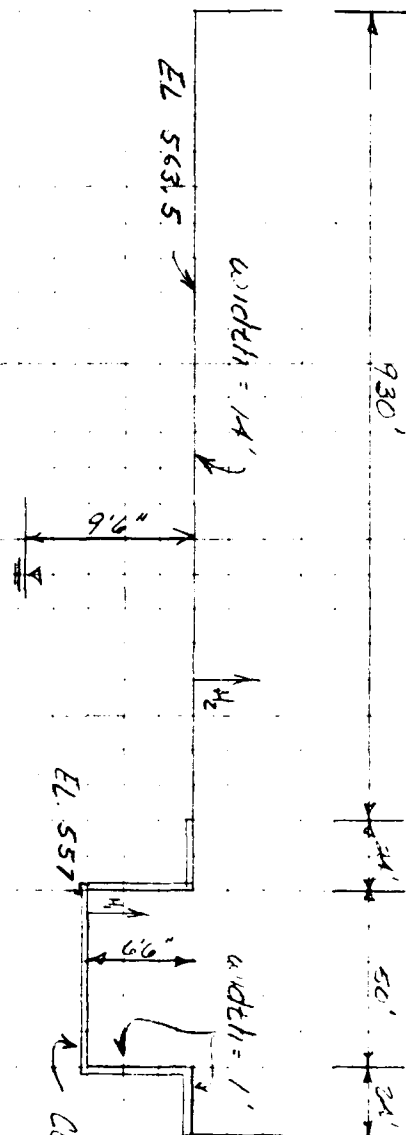
SHEET NO. OF

JOB NO. 1240

BY dly DATE 6/21/9

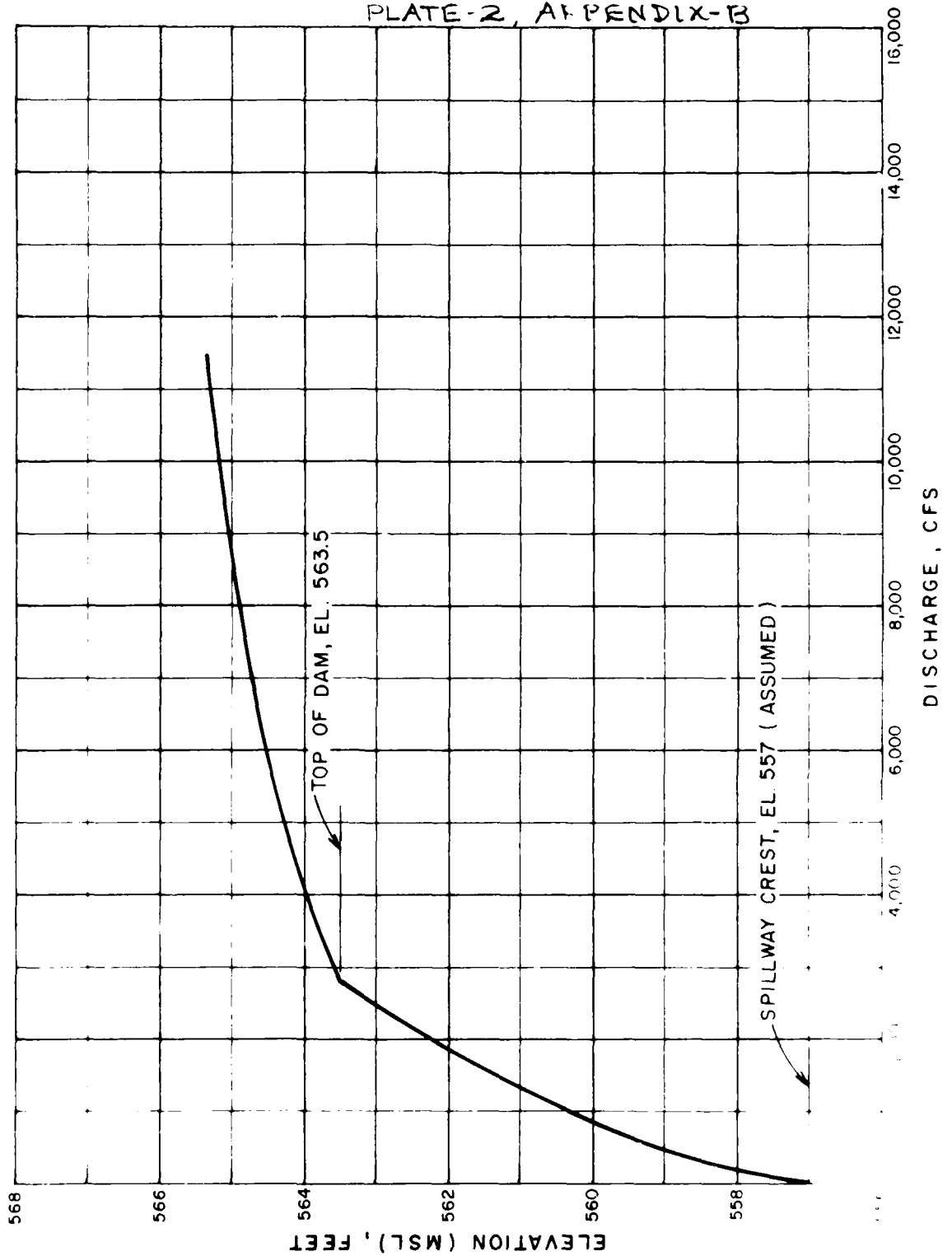
KLB 6-22-

Reservoir Surface Elevation	C ₁	L ₁	H ₁	G ₁ (C ₁ H ₁ ^{3/2})	L ₂	L ₂	H ₂	Q ₂ (C ₂ H ₂ ^{3/2})	L ₃	L ₃	H ₃	Q ₃ (C ₃ H ₃ ^{3/2})	G _T (C ₁ + C ₂ + G ₃)
557	-	50	0	0	-	48	0	0	-	930	0	0	0
558	2.98		10	1.49	-				-				1.49
560	3.32		3.0	8.63	-				-				8.63
562			5.0	18.56	-				-				18.56
563.5			6.5	27.51	-				-				27.51
564			7.0	30.14	2.73		0.5	4.0	2.70		0.5	8.8	40.6
565			8.0	37.56	3.24		1.5	25.6	2.64		1.5	45.0	55.2
566			9.0	44.82	3.81		2.5	42.8	2.63		2.5	94.6	147.8
568			11.0	40.56	3.32		4.5	15.21	2.63		4.5	232.46	309.25



L₁ = 50'
L₂ = 34.31' = 48'
L₃ = 930'

PLATE-2, APPENDIX-B



BUSCH WILDLIFE AREA LAKE NO 35 DAM M
SPILLWAY & OVERTOP RATING CURVE

AD-A106 862

PRC CONSOER TOWNSEND INC ST LOUIS MO

F/G 13/13

NATIONAL DAM SAFETY PROGRAM. BUSCH WILDLIFE AREA LAKE NUMBER 35--ETC(U)

NOV 79 W G SHIFRIN.

DACW43-79-C-0075

NL

UNCLASSIFIED

21-2

14

210000



END

DATE

FORMED

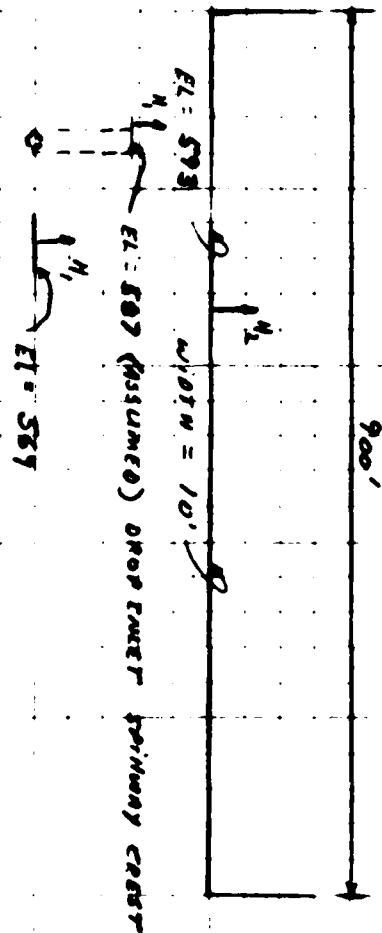
(2-81)

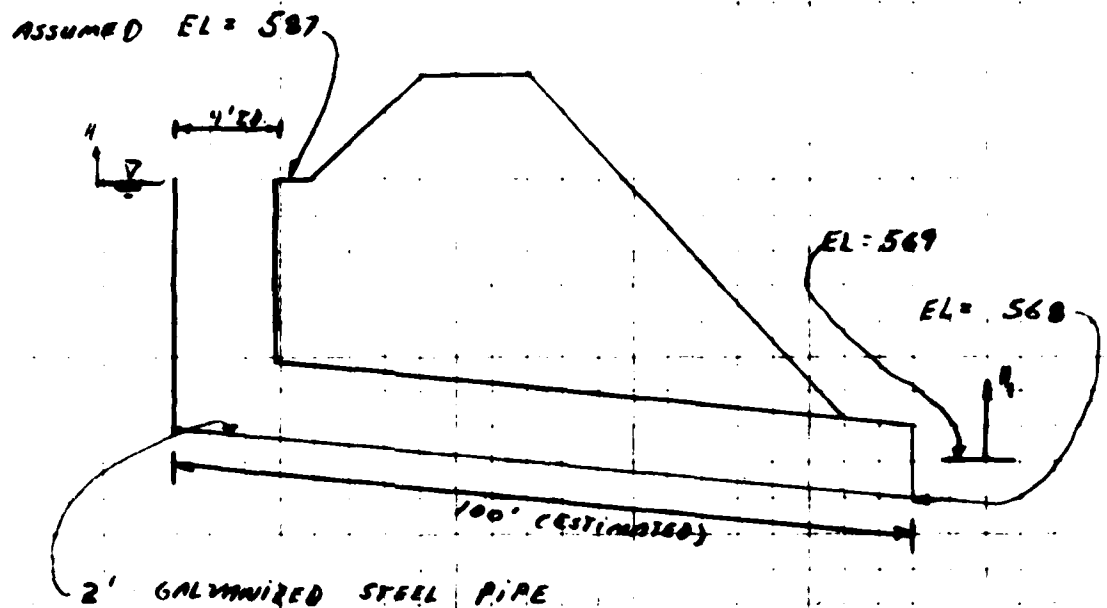
DTIC

DAM SAFETY INSPECTION - MISSOURI
 U/S DAM #1 (10093) TO BUSCH LAKE DAM #35
 SPILLWAY AND OVERTOP RATING CURVE

SHEET NO. 1 OF
 JOB NO. 1240-001
 BY HLB DATE 6-21-7

RESERVOIR WATER SURFACE ELEV.	H ₁	Multiple Spillway Q ₁ (CFS)	C ₂	L ₂	H ₂	Q ₂ (CFS)	Q _T = Q ₁ + Q ₂
587	1.8	-	-	-	-	-	0
585	20	62	-	-	-	-	62
591	22	65	-	-	-	-	65
593	24	68	-	-	-	-	68
595	26	71	2.64	100	1	6720	6791
596	27	72	2.64	100	3	12346	12418





ASSUME NO TAIL WATER EFFECTS.

AT WL = 589, H = 2

a) WEIR FLOW

$$Q = CLH^{3/2} = 3.03 \times (\pi \times 4) \times 2^{3/2} = 108 \text{ cfs.}$$

b) PRESSURE FLOW

$$\text{ASSUME } E = 0.017 \rightarrow S_f = 0.00825 \rightarrow f = 0.036 \text{ \& } K_e = 0.$$

$$H_f = (1.0 + K_e + f \frac{L}{D}) \frac{V^2}{2g}$$

$$H_f = (1.0 + 0.5 + 0.036 \frac{100}{2}) \frac{V^2}{2g}$$

$$H_f = 3.30 \frac{V^2}{2g}, \Rightarrow V = 9.42 \sqrt{H_f}$$

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 3 OF
U/S DAM #1 (BUSCH 36) TO BUSCH LAKE DAM #35 JOB NO. 1290
PRINCIPLE SPILLWAY RATING CURVE BY HLB DATE 6-21-71
MAB

$$Q = A \cdot V = \pi \frac{D^2}{4} \times 4.42 \sqrt{H_f}$$

$$Q = 13.90 \sqrt{H_f}$$

$$H_f = 689 - 669 = 20$$

$$Q = 13.90 \sqrt{20} = \underline{62} \text{ CFS}$$

∴ AT ELEV 589 PRESSURE FLOW
CONTROLS AND $Q = \underline{62} \text{ CFS}$

ALSO FOR ALL ELEVATIONS ABOVE 589

PRESSURE FLOW WILL CONTROL AND

THE EQUATION $Q = 13.90 \sqrt{H_f}$

WILL BE USED.

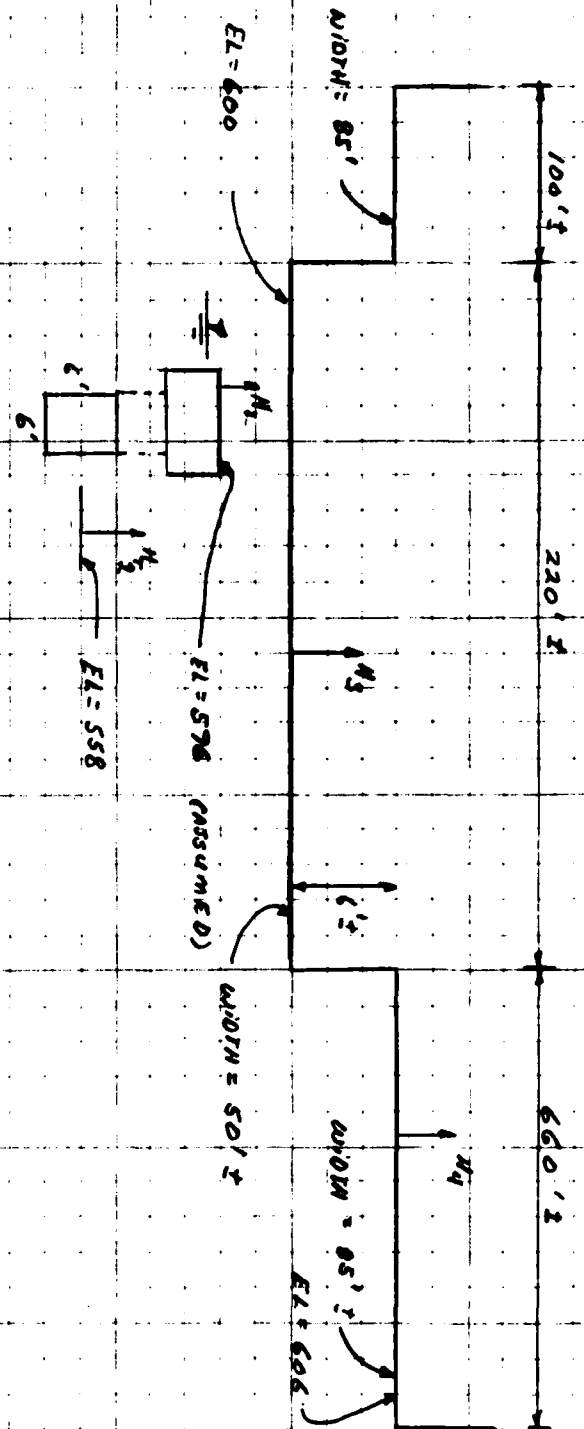
DAM SAFETY INSPECTION - MISSOURI

SHEET NO. _____ OF _____

U/S DAM #2 (BUSCH 10089 LAKE) TO BUSCH LAKE #85 DAM JOB NO. 1240-001

SPILLWAY AND OVERTOP RATING CURVE.

BY HLB DATE 6-22-7
VJNAS



RESERVOIR WATER SURFACE (ELEV.)	H ₂	DROP INLET SPILLWAY DISCHARGE Q ₁ = 200.8 ft ³ /s	Q ₃	L ₃	H ₃	Q ₃ = C ₃ H ₃ ^{3/2}	L ₄	L ₄	H ₄	Q ₄ = C ₄ H ₄ ^{3/2}	Q _T = Q ₂ + Q ₃ + Q ₄
596	38	—	—	—	—	—	—	—	—	—	0
598	40	653 *	—	—	—	—	—	—	—	—	653
600	42	1301	—	—	—	—	—	—	—	—	1301
602	44	1337	263	220	2	1637	—	—	—	—	2969
604	46	1362	2.83	220	4	4629	—	—	—	—	5991
606	48	1391	2.63	226	6	8504	—	—	0	—	9895
607	1	1406	2.63	220	7	10,115	2.63	760	1	1799	14121
# WEIR FLOW CONTROLS											

DAM SAFETY INSPECTION - MISSOURI

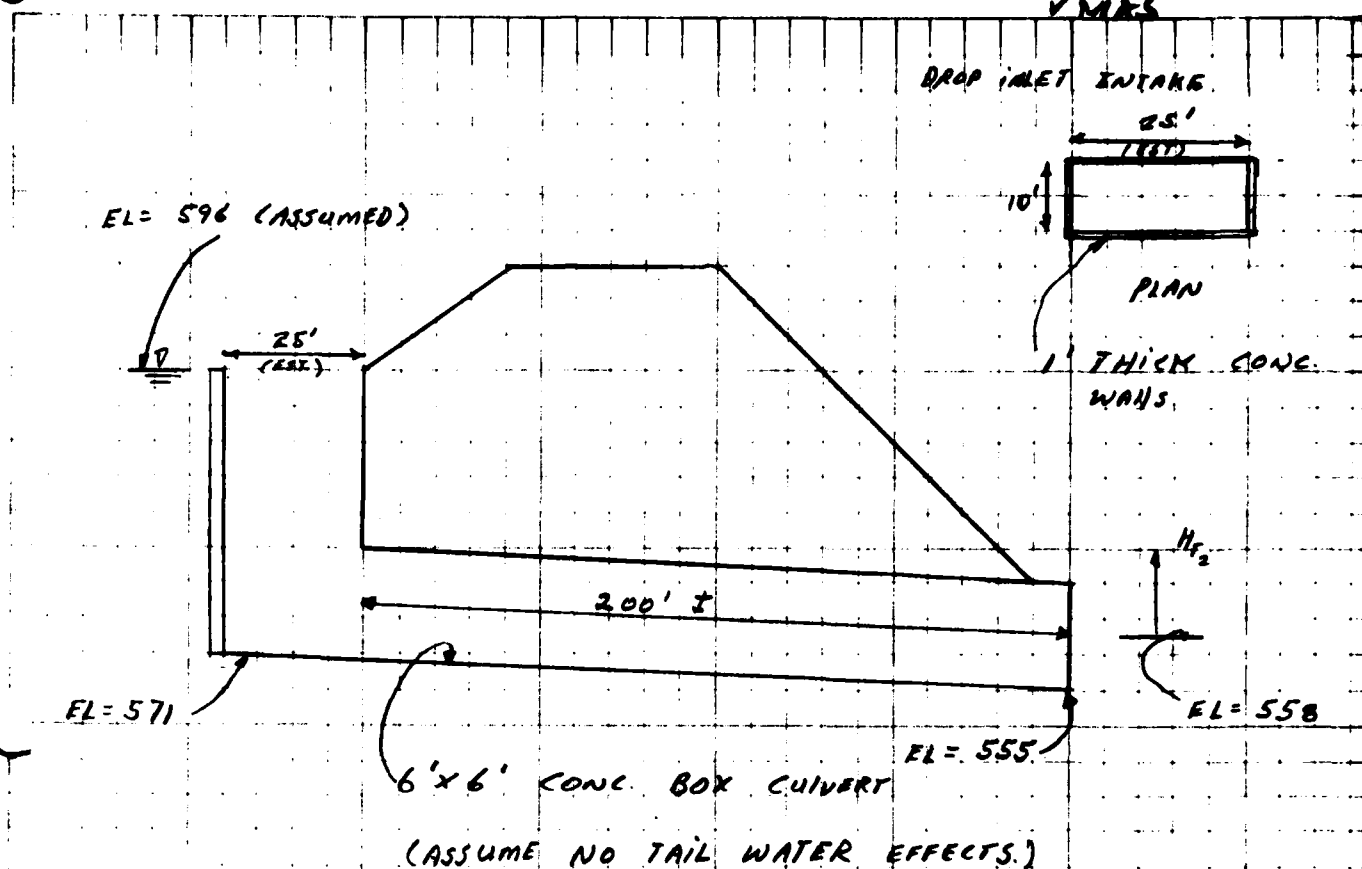
SHEET NO. 2 OF

U/S DAM #2 (BUSCH ANN. MEM. LAKE) TO BUSCH LAKE #85 DAM JOB NO. 1740-001

SPILLWAY RATING CURVE

BY HLB DATE 6-23

V.M.S.

a) WEIR FLOW ASSUME $C = 3.30$

$$Q = CLH^{3/2}$$

$$L = (25 + 10) \times 2 = 70'$$

$$H = 598 - 596 = 2'$$

$$Q = 3.3 \times 70 \times 2^{3/2} = 653 \text{ CFS.}$$

b) PRESSURE FLOW

$$\text{ASSUME } m = 0.012 \Rightarrow f = 0.017 \quad K_e = 0.5$$

$$H_{T2} = \left(1.0 + 0.5 + f \frac{L}{D} \right) \frac{V^2}{2g}$$

$$H_{T2} = (1.0 + 0.5 + 0.017 \frac{200.8}{4R}) \frac{V^2}{2g}$$

$$R = \frac{A}{P} = \frac{6 \times 6}{4 \times 6} = 1.5$$

$$H_{T2} = (1.0 + 0.5 + 0.017 \frac{200.8}{4 \times 1.5}) \frac{V^2}{2g}$$

$$H_{T2} = 2.07 \frac{V^2}{2g}, \Rightarrow V = 5.58 \sqrt{H_{T2}}$$

$$Q_2 = A_2 V = (6 \times 6) \times 5.58 \sqrt{H_{T2}} = 200.8 \sqrt{H_{T2}}$$

$$H_{T2} = 598 - 558 = 40'$$

$$Q_2 = 200.8 \sqrt{40} = 1279 \text{ CFS} < 653 \text{ CFS}$$

∴ AT ELEV = 598 WEIR FLOW CONTROLS
 AND $Q_2 = 653 \text{ CFS}$.

At W.L. = 600

a) Weir flow: $Q = 3.3 \times 70 \times 4^{3/2} = 1848 \text{ cfs}$.

b) Pressure flow:

$$Q = 200.8 \sqrt{42} = 1301 \text{ cfs}$$

Pressure flow controls:

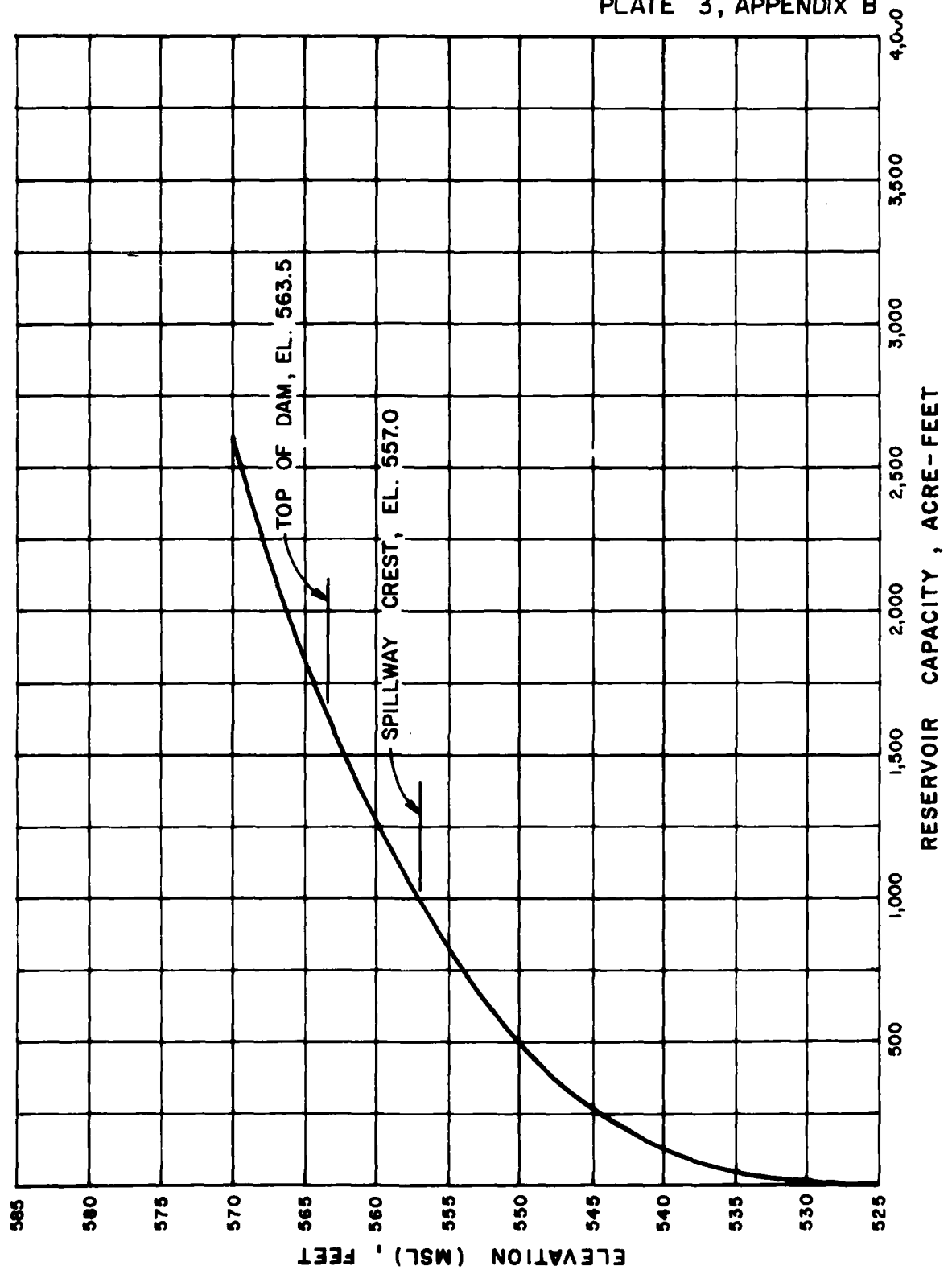
Thus $Q = 1301 \text{ cfs}$.

Use $Q = 200.8 \sqrt{H_{T2}}$ for water levels above 600.

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 1 OF
BUSCH WILDLIFE AREA NO 35 LAKE DAM JOB NO. 1240-001
RESERVOIR AREA CAPACITY BY NLB DATE 6-26-78

BUSCH WILDLIFE AREA NO 35 LAKE DAM
RESERVOIR AREA CAPACITY

ELEV. M. S. L. (FE.)	RESERVOIR SURFACE AREA (ACRES)	INCREMENTAL VOLUME (AC-FT)	TOTAL VOLUME (AC-FT)	REMARKS
525	0	—	0	ASSUMED STREAM BED ELEV. ON U.S. SIDE OF DAM
540	25	125.0	125.0	AREA MEASURED ON U.S.G.S. MAP
550	55	390.3	515.0	AREA MEASURED ON U.S.G.S. MAP
557	85	486.2	1001.0	RAILWAY CREST EL. (FROM PLANS)
560	98	274.3	1275.0	AREA MEASURED ON U.S.G.S. MAP
563.5	121	382.5	1658.0	TOP OF DAM EL.
570	169	938.2	2596.0	AREA MEASURED ON U.S.G.S. MAP



BUSCH WILDLIFE AREA NO. 35 LAKE DAM (MO. 10092)
RESERVOIR CAPACITY CURVE

DAM SAFETY INSPECTION - MISSOURI
U/S DAM #1 (10093) TO BUSCH #35 LAKE DAM
RESERVOIR AREA CAPACITY

SHEET NO. 1 OF
 JOB NO. 1240-001-1
 BY HLB DATE 6-27-79

U/S DAM 10093 TO BUSCH #35 LAKE DAM

RESERVOIR AREA CAPACITY

ELEV. M. S. L. (FT)	RESERVOIR SURFACE AREA (ACRES.)	INCREMENTAL VOLUME (AC-FT)	TOTAL VOLUME (AC-FT)	REMARKS
568	0	-	0	EST. STREAM INVERT ELEVATION AT CENTER OF DAM
580	5	20	20	
587	15	67	87	ASSUMED W.S. ELEV. ON U.S.G.S. MAP.
				ASSUMED DROP INLET SPINWAY CREST ELEV.
593	23	113	200	TOP OF DAM ELEV. (ESTIMATED)
600	31	188	388	
610	65	470	858	

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 1 OF
 U/S DAM (10089) TO BUSCH #35 LAKE DAM JOB NO. 1242-001
 #2 RESERVOIR AREA CAPACITY BY KLB DATE 6-27-79

U/S DAM 10089 TO BUSCH #35 LAKE DAM
RESERVOIR AREA CAPACITY

ELEV. M.S.L. (FT.)	RESERVOIR SURFACE AREA (ACRES)	INCREMENTAL VOLUME (AC-FT)	TOTAL VOLUME (AC-FT)	REMARKS.
580	0	-	0	EST. STREAM CENTER LINE ELEV. AT BOTTOM OF DAM
596	13	69	69	ASSUMED U.S. ELEV. ON U.S.G.S. MAP. ASSUMED DROP INLET SPILLWAY CREST ELEV.
600	22	69	138	EMERGENCY SPILLWAY CREST ELEV. (EST.)
606	39	181	319	TOP OF DAM ELEV. (EST.)
610	56	189	508	

DAM SAFETY INSPECTION - MISSOURI
BUSCH WILDLIFE AREA #35 LAKE DAM (10092)
UNIT HYDROGRAPH PARAMETERS

SHEET NO. 1 OF
 JOB NO. 1240-001
 BY HLB DATE 6-28-7

1. DRAINAGE AREA, $A = 1070 \text{ AC} = 1.67 \text{ SQ. MI.}$
2. LENGTH OF STREAM $= L = 4.5'' \times 2000' = 9000' = 1.70 \text{ MI.}$
3. ELEVATION AT DRAINAGE DIVIDE ALONG THE LONGEST STREAM $= H_1 = 685$

4. RESERVOIR ELEVATION AT SPILLWAY CREST $= H_2 = 557$

5. DIFFERENCE IN ELEVATION $= \Delta H = 685 - 557 = 128 \text{ FT.}$

6. AVERAGE SLOPE OF STREAM $= \frac{\Delta H}{L} = \frac{128}{9000} = 1.42\%$

7. TIME OF CONCENTRATION:

a) BY KIRPICH FORMULA:

$$T_c = \left(\frac{11.9 \times L^3}{\Delta H} \right)^{0.385} = \left(\frac{11.9 \times 1.70^3}{128} \right)^{0.385}$$

$$T_c = 0.74 \text{ HR.}$$

b) BY VELOCITY ESTIMATE: AVG VEL $= 2 \text{ FPS.}$

$$T_c = \frac{L}{V} = \frac{9000}{2 \times 3600} = 1.25 \text{ HR.}$$

USE $T_c = 0.8 \text{ HR.}$

8. LAG TIME $= 0.6 \times T_c = 0.6 \times 0.8 = 0.48 \text{ HR.}$

9. UNIT DURATION, $D \leq \frac{L_t}{3} = \frac{0.48}{3} = 0.16 > 0.083$

USE $D = 0.083 \text{ HR.} = 5 \text{ MIN.}$

10. TIME TO PEAK, $T_p = \frac{D}{2} + L_t = \frac{0.083}{2} + 0.48$
 $T_p = 0.52 \text{ HR.}$

11. PEAK DISCHARGE, $q_p = \frac{484 \times A}{T_p} = \frac{484 \times (1.67)}{0.52}$

$$q_p = 1554 \text{ CFS}$$

DAM SAFETY INSPECTION - MISSOURI

SHEET NO. 1 OF

U/S DAM 10093 TO BUSCH WILDLIFE AREA LAKE #35 (10092) JOB NO. 1240-001

UNIT OF HYDROGRAPH PARAMETERS

BY HLB

DATE 6-28-71

1. DRAINAGE AREA, $A = 228 \text{ AC} = 0.36 \text{ SQ. MI.}$

2. LENGTH OF STREAM, $L = 2.8 \times 12000' = 5600' = 1.06 \text{ MI}$

3. ELEVATION AT DRAINAGE DIVIDE ALONG THE
LONGEST STREAM $= H_1 = 642$

4. RESERVOIR ELEVATION AT SPIRWAY CREST $= H_2 = 587$

5. DIFFERENCE IN ELEVATION, $\Delta H = 55 \text{ FT}$

6. AVERAGE SLOPE OF STREAM $= \frac{\Delta H}{L} = \frac{55}{5600} = 0.98\%$

7. TIME OF CONCENTRATION:

a) BY KIRPICH FORMULA:

$$T_c = \left(\frac{11.9 \times L^3}{\Delta H} \right)^{0.385} = \left(\frac{11.9 \times 1.06^3}{55} \right)^{0.385}$$

$$T_c = 0.59 \text{ HR}$$

b) BY VELOCITY ESTIMATE: AVG VEL = 2 FPS

$$T_c = \frac{L}{V} = \frac{5600}{2 \times 3600} = 0.78 \text{ HR}$$

$$\text{USE } T_c = 0.6 \text{ HR}$$

8. LAG TIME $= 0.6 \times T_c = 0.6 \times 0.6 = 0.36 \text{ HR}$

9. UNIT DURATION, $D = \frac{L_t}{3} = \frac{0.6}{3} = 0.2 \approx 0.083$

$$\text{USE } D = 0.083 \text{ HR} = 5 \text{ MIN.}$$

10. TIME TO PEAK, $T_p = \frac{D}{2} + L_t = \frac{0.083}{2} + 0.36 = 0.40 \text{ HR}$

11. PEAK DISCHARGE, $q_p = \frac{484 \cdot A}{T_p} = \frac{484 \times (0.36)}{0.40}$

$$q_p = \underline{436} \text{ CFS}$$

DAM SAFETY INSPECTION - MISSOURI

SHEET NO. 1 OF

4/5 DAM #10089 TO BUSCH WILDLIFE AREA LAKE #35 (10092) JOB NO. 1790-001

UNIT HYDROGRAPH PARAMETERS

BY HLB DATE 6-28-79

1. DRAINAGE AREA, $A = 809 \text{ AC} = 1.26 \text{ SQ. MI.}$
2. LENGTH OF STREAM, $L = 4" \times 2000' = 8000' = 1.52 \text{ MI.}$
3. ELEVATION AT DRAINAGE DIVIDE ALONG THE LONGEST STREAM $= H_1 = 708$
4. RESERVOIR ELEVATION AT SPILLWAY CREST $= H_2 = 596$
5. DIFFERENCE IN ELEVATION, $\Delta H = 112 \text{ FT.}$
6. AVERAGE SLOPE OF STREAM $= \frac{\Delta H}{L} = \frac{112}{8000} = 1.4\%$
7. TIME OF CONCENTRATION:

a) BY KIRPICH FORMULA:

$$T_c = \left(\frac{11.9 \times L^3}{\Delta H} \right)^{0.385} = \left(\frac{11.9 \times 1.52^3}{112} \right)^{0.385}$$

$$T_c = 0.68 \text{ HR.}$$

b) BY VELOCITY ESTIMATE: AVG VEL = 2 FPS.

$$T_c = \frac{L}{V} = \frac{8000}{2 \times 3600} = 1.11 \text{ HR}$$

USE $T_c = 0.7 \text{ HR.}$

$$8. \text{ LAG TIME} = 0.6 \times T_c = 0.6 \times 0.7 = 0.42 \text{ HR}$$

$$9. \text{ UNIT DURATION, } D \leq \frac{L}{3} = 0.14 > 0.083$$

USE $D = 0.083 \text{ HR} = 5 \text{ MIN.}$

$$10. \text{ TIME TO PEAK, } T_p = \frac{D}{2} + L_t = \frac{0.083}{2} + 0.42 = 0.46 \text{ HR}$$

$$11. \text{ PEAK DISCHARGE, } q_p = \frac{484 \times A}{T_p}$$

$$q_p = \frac{484 \times (1.26)}{0.46}, \quad q_p = 1326 \text{ CFS}$$

BUSCH WILDLIFE AREA LAKE #35 DAM (10092) AND U/S DAMS.

DETERMINATION OF PMP

1. DETERMINE DRAINAGE AREA OF THE BASIN

D.A. = 2107 ACRES TOTAL

2. DETERMINE PMP INDEX RAINFALL (200 SQ. MI. & 24 HRS DURATION)

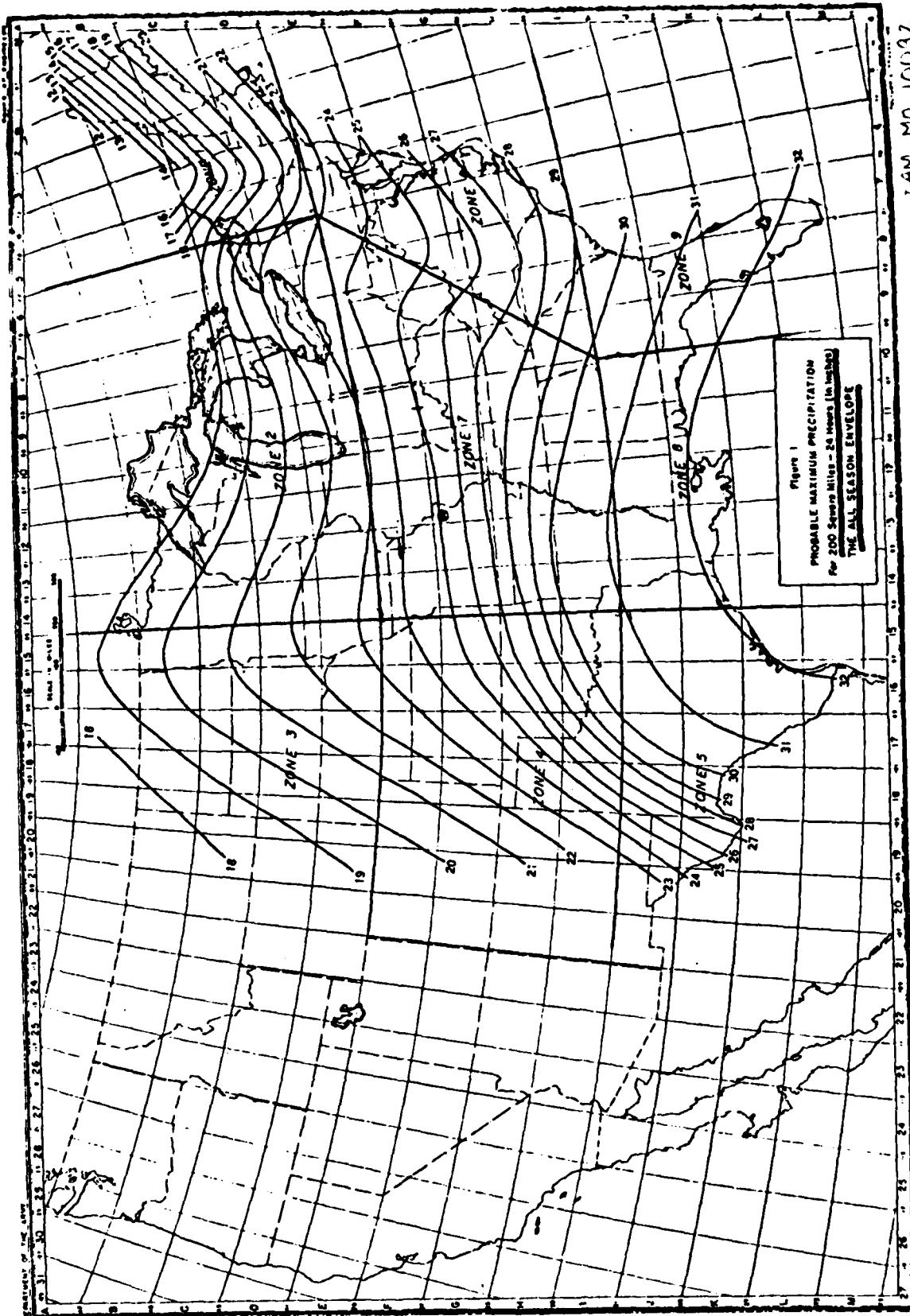
LOCATION OF CENTROID OF BASIN

LONG. = $90^{\circ}44'14''$ LAT. = $38^{\circ}42'04''$ PMP. = 25.1"

3. DETERMINE BASIN RAINFALL IN TERMS OF PERCENTAGE
OF PMP INDEX RAINFALL FOR VARIOUS DURATIONS:

LOCATION LONG. = $90^{\circ}44'14''$ LAT. = $38^{\circ}42'04''$
⇒ ZONE 7

DURATION (HOURS)	PERCENT OF INDEX RAINFALL	TOTAL RAINFALL	RAINFALL INCREMENTS	DURATION OF INCREMENTS
6	100	25.1	25.1	6
12	120	30.1	5.0	6
24	130	32.6	2.5	12



LAM MO 10092

LOCATION OF CENTROID

OF WATERSHED:

AT 30° 42' 04" LONG 90° 44' 14"

PMP FOR 200 SQ. MI. +
24 HRS DURATION = 25.1"

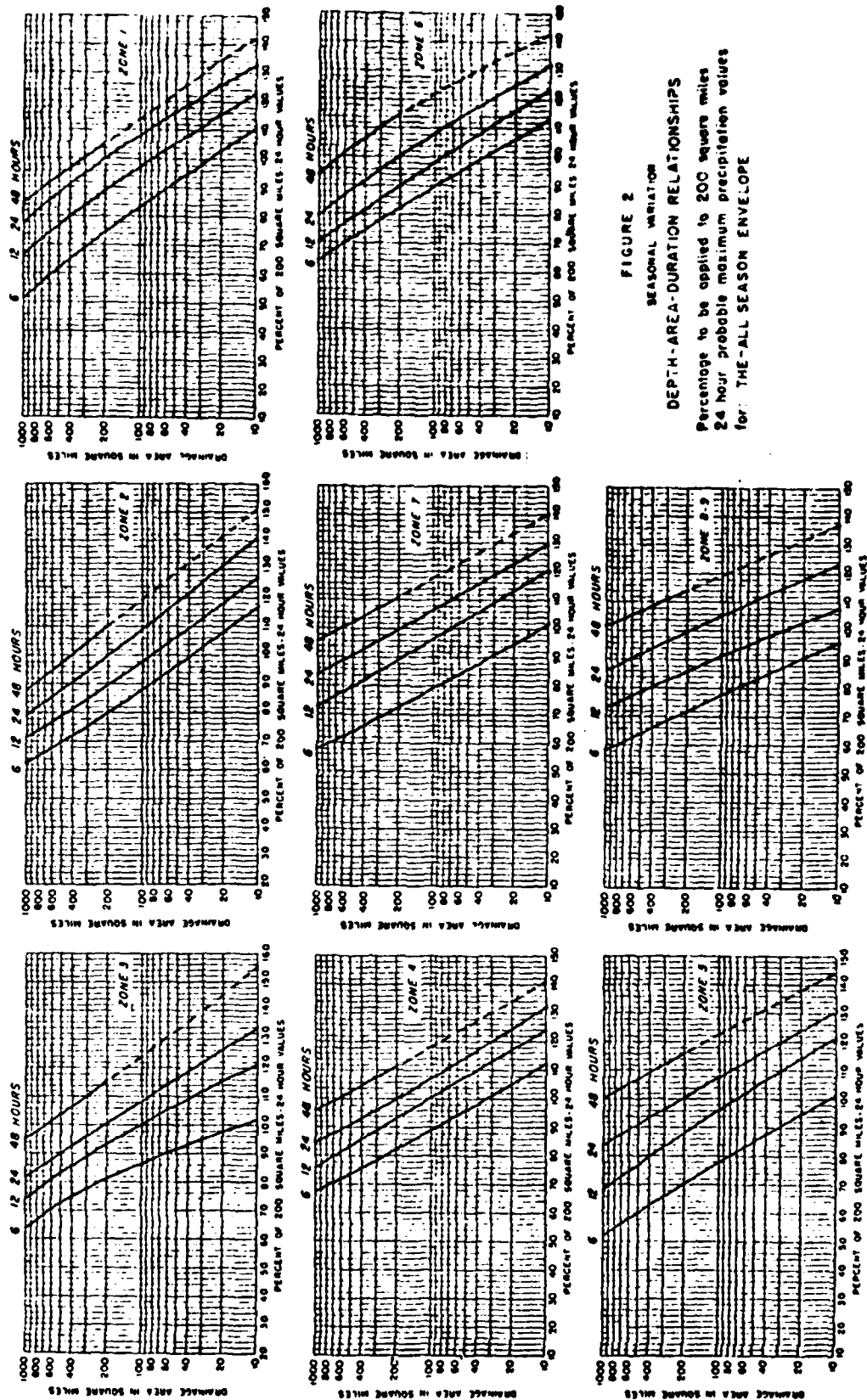


FIGURE 2
SEASONAL VARIATION
DEPTH-AREA-DURATION RELATIONSHIPS
Percentage to be applied to 200 square miles
24 hour probable maximum precipitation values
for THE-ALL SEASON ENVELOPE

DAM SAFETY INSPECTION / MISSOURI SHEET NO. 1 OF
BUSH WILDLIFE AREA LAKE NO. 35 DAM (MO. MAP) JOB NO. 1240-001
TERMINATION OF HYDROLOGIC SOIL GROUP & SCS CURVE NUMBER BY JAS DATE 6-26-79

BUSH WILDLIFE AREA LAKE NO. 35 DAM

TERMINATION OF HYDROLOGIC SOIL GROUP & SCS CURVE NO.

1. According to the Soil Map of Missouri the watershed soils consist of Group 'D' Soils.
2. About 95 percent of the watershed area are in park and open space and used for recreational purpose. The remaining area has been developed for commercial and industrial uses. Assume 'Fair' condition for the park and open space area.

$$\begin{aligned}\text{Thus } CN &= 0.95 \times 84 + 0.05 \times 93 \\ &= 85 \text{ for Soil Group D} \\ &\quad \& \text{ AMC-II}\end{aligned}$$

$$\Rightarrow CN = 94 \text{ for AMC-III}$$

DAM SAFETY INSPECTION - MISSOURI SHEET NO. 1 OF
 BUSCH WILDLIFE AREA LAKE NO 35 DAM (#10092) JOB NO. 1240-001
 100 YR FLOOD FROM REGRESSION EQUATION BY KLB DATE 6-26-79

BUSCH WILDLIFE AREA LAKE NO 35 DAM
100 YR FLOOD BY REGRESSION EQUATION

REGRESSION EQUATION FOR 100-YR FLOOD
 FOR MISSOURI:

$$Q_{100} = 85.1 A^{0.934} S^{-0.02} 0.576$$

WHERE

A = DRAINAGE AREA IN SQ. MI.

S = MAIN CHANNEL SLOPE FT./MI.
 (AVG. SLOPE BETWEEN 0.11 AND 0.85 L)

FOR BUSCH WILDLIFE AREA NO. 35 DAM:

$$A = 3.29 \text{ SQ. MI. (TOTAL)}$$

$$S = 50 \text{ FT./MI.}$$

$$Q_{100} = 85.1 (3.29)^{0.934} (50)^{-0.02} 0.576$$

$$Q_{100} = \underline{\underline{2400 \text{ CFS.}}}$$

HEC1DB INPUT DATA

LINE	ITEM	VALUE	UNIT	HYDROGRAPH PARAMETERS FOR U/S DAM (100%)	HYDROGRAPH PARAMETERS FOR P/L DAM (100%)
1	1. DAY SAFETY INSPECTION - MISSOURI				
2	2. BUSCH WILDLIFE AREA NO. 75 LAKE DAM (100%)				
3	3. PMF AND 50 PERCENT PMF DETERMINATION AND ROUTING				
4	4. 300	0	0	0	0
5	5. 1	1			
6	6. 100%	100%			
7	7. K1 INPUT PMF INDEX RAINFALL, SCS UNIT HYDROGRAPH PARAMETERS FOR U/S DAM (100%)				
8	8. 1	0.35	0.35	1.0	
9	9. 1	25.1	120	120	
10	10. 1	0.75			
11	11. 1	0.75			
12	12. 1	100%			
13	13. K1 ROUTE HYDROGRAPH THROUGH U/S DAM (100%)				
14	14. 1	100%			
15	15. 1	100%			
16	16. 1	100%			
17	17. 1	100%			
18	18. 1	100%			
19	19. 1	100%			
20	20. 1	100%			
21	21. 1	100%			
22	22. 1	100%			
23	23. 1	100%			
24	24. 1	100%			
25	25. 1	100%			
26	26. 1	100%			
27	27. 1	100%			
28	28. 1	100%			
29	29. 1	100%			
30	30. 1	100%			
31	31. 1	100%			
32	32. 1	100%			
33	33. 1	100%			
34	34. 1	100%			
35	35. 1	100%			
36	36. 1	100%			
37	37. 1	100%			
38	38. 1	100%			
39	39. 1	100%			
40	40. 1	100%			
41	41. 1	100%			
42	42. 1	100%			
43	43. 1	100%			
44	44. 1	100%			
45	45. 1	100%			
46	46. 1	100%			
47	47. 1	100%			
48	48. 1	100%			
49	49. 1	100%			
50	50. 1	100%			

51 2 10092
 52 41 COMBINE LOCAL HYDROGRAPHS WITH U78 ROUTED HYDROGRAPHS FOR RCLTING
 53 1 10092
 54 1 10092
 55 1 10092
 56 1 10092
 57 1 10092
 58 1 10092
 59 1 10092
 60 1 10092
 61 1 10092
 62 1 10092
 63 1 10092

1 10092
 2 10092
 3 10092
 4 10092
 5 10092
 6 10092
 7 10092
 8 10092
 9 10092
 10 10092
 11 10092
 12 10092
 13 10092
 14 10092
 15 10092
 16 10092
 17 10092
 18 10092
 19 10092
 20 10092
 21 10092
 22 10092
 23 10092
 24 10092
 25 10092
 26 10092
 27 10092
 28 10092
 29 10092
 30 10092
 31 10092
 32 10092
 33 10092
 34 10092
 35 10092
 36 10092
 37 10092
 38 10092
 39 10092
 40 10092
 41 10092
 42 10092
 43 10092
 44 10092
 45 10092
 46 10092
 47 10092
 48 10092
 49 10092
 50 10092
 51 10092
 52 10092
 53 10092
 54 10092
 55 10092
 56 10092
 57 10092
 58 10092
 59 10092
 60 10092
 61 10092
 62 10092
 63 10092

1 10092
 2 10092
 3 10092
 4 10092
 5 10092
 6 10092
 7 10092
 8 10092
 9 10092
 10 10092
 11 10092
 12 10092
 13 10092
 14 10092
 15 10092
 16 10092
 17 10092
 18 10092
 19 10092
 20 10092
 21 10092
 22 10092
 23 10092
 24 10092
 25 10092
 26 10092
 27 10092
 28 10092
 29 10092
 30 10092
 31 10092
 32 10092
 33 10092
 34 10092
 35 10092
 36 10092
 37 10092
 38 10092
 39 10092
 40 10092
 41 10092
 42 10092
 43 10092
 44 10092
 45 10092
 46 10092
 47 10092
 48 10092
 49 10092
 50 10092
 51 10092
 52 10092
 53 10092
 54 10092
 55 10092
 56 10092
 57 10092
 58 10092
 59 10092
 60 10092
 61 10092
 62 10092
 63 10092

PREVIEW OF SEQUENCE OF STAFF NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 10091
ROUTE HYDROGRAPH TO 10091
ROUTE HYDROGRAPH AT 10091
ROUTE HYDROGRAPH TO 10091
COMBINE 2 HYDROGRAPHS AT 10091
RUNOFF HYDROGRAPH AT 10091
COMBINE 2 HYDROGRAPHS AT 10091
ROUTE HYDROGRAPH TO 10091
END OF FILE

INFLOW PMF AND ONE-HALF PMF HYDROGRAPHS

UPSTREAM DAM (MO. 10093)

[illegible]

SAFETY INSPECTION - MISSOURI
LAW ENFORCEMENT AREA NO. 10 LAKE LAKE (10002)
ONE AND 50 PERCENT PMF DETERMINATION AND ROUTING

USE SPECIFICATION

[illegible]

```

MULTI-CLASS ANALYSIS TO BE PERFORMED
'IPCLAS=1' OPTION 2 LBYIO=1

```

.....

.....

.....

.....

.....

SH -AREA RUNOFF CONTROL

INPU* PMP JUNE RAINFALL, SUS UNIT HYDROGRAPH CAPMETERS FOR JUS DAM (11093)

ICSTAT	ICCODE	ICNAME	JPLT	JPEY	ICNAME	ICSTAT	ICCODE
1	0	0	0	0	1	0	0

INSTR	INSTR	TAREA	SNAP	TRSDC	TRSDC	RATIO	ISAD	ISAF	LOCAL
1	1	0.94	0.00	0.15	1.00	0.300	1	1	

CRUISE DATA

Size	ms	R ²	R ² _{adj}	R ² _{pred}	R ² _{cv}
0.00	25.10	100.00	120.00	120.00	1.00
0.01	25.10	100.00	120.00	120.00	1.00
0.02	25.10	100.00	120.00	120.00	1.00
0.03	25.10	100.00	120.00	120.00	1.00
0.04	25.10	100.00	120.00	120.00	1.00
0.05	25.10	100.00	120.00	120.00	1.00
0.06	25.10	100.00	120.00	120.00	1.00
0.07	25.10	100.00	120.00	120.00	1.00
0.08	25.10	100.00	120.00	120.00	1.00
0.09	25.10	100.00	120.00	120.00	1.00
0.10	25.10	100.00	120.00	120.00	1.00
0.11	25.10	100.00	120.00	120.00	1.00
0.12	25.10	100.00	120.00	120.00	1.00
0.13	25.10	100.00	120.00	120.00	1.00
0.14	25.10	100.00	120.00	120.00	1.00
0.15	25.10	100.00	120.00	120.00	1.00
0.16	25.10	100.00	120.00	120.00	1.00
0.17	25.10	100.00	120.00	120.00	1.00
0.18	25.10	100.00	120.00	120.00	1.00
0.19	25.10	100.00	120.00	120.00	1.00
0.20	25.10	100.00	120.00	120.00	1.00
0.21	25.10	100.00	120.00	120.00	1.00
0.22	25.10	100.00	120.00	120.00	1.00
0.23	25.10	100.00	120.00	120.00	1.00
0.24	25.10	100.00	120.00	120.00	1.00
0.25	25.10	100.00	120.00	120.00	1.00
0.26	25.10	100.00	120.00	120.00	1.00
0.27	25.10	100.00	120.00	120.00	1.00
0.28	25.10	100.00	120.00	120.00	1.00
0.29	25.10	100.00	120.00	120.00	1.00
0.30	25.10	100.00	120.00	120.00	1.00
0.31	25.10	100.00	120.00	120.00	1.00
0.32	25.10	100.00	120.00	120.00	1.00
0.33	25.10	100.00	120.00	120.00	1.00
0.34	25.10	100.00	120.00	120.00	1.00
0.35	25.10	100.00	120.00	120.00	1.00
0.36	25.10	100.00	120.00	120.00	1.00
0.37	25.10	100.00	120.00	120.00	1.00
0.38	25.10	100.00	120.00	120.00	1.00
0.39	25.10	100.00	120.00	120.00	1.00
0.40	25.10	100.00	120.00	120.00	1.00
0.41	25.10	100.00	120.00	120.00	1.00
0.42	25.10	100.00	120.00	120.00	1.00
0.43	25.10	100.00	120.00	120.00	1.00
0.44	25.10	100.00	120.00	120.00	1.00
0.45	25.10	100.00	120.00	120.00	1.00
0.46	25.10	100.00	120.00	120.00	1.00
0.47	25.10	100.00	120.00	120.00	1.00
0.48	25.10	100.00	120.00	120.00	1.00
0.49	25.10	100.00	120.00	120.00	1.00
0.50	25.10	100.00	120.00	120.00	1.00
0.51	25.10	100.00	120.00	120.00	1.00
0.52	25.10	100.00	120.00	120.00	1.00
0.53	25.10	100.00	120.00	120.00	1.00

1957-1958

	LN0PT	STPKR	DLT..	RITOL	EPAAT	-IION	STRYL	ALSPK	RTIPZ
	9.000	8.600	1.000	9.000	1.000	-1.000	-94.000	0.000	0.000

CURVE 'JO' = -14.90 DEGREE - 1.00 EFFECT (N) = 96.00

IC= J.00 LAT= 0.0
JULY 1970 GRAPH T-1A

```

*TRI0= 1.70          REGRSSION DATA          RTI0R= 1.00
              GACIVE= 0.00

```

UNIT	HYDROGRAPH	% FND OF	PERIOD	ADDITIONAL	ICE	MOUSE	LIT	%	VOL
26.	18.	31.	413.	4.1.	349.	31.	217.	151.	187.
79.	36.	40.	28.	20.	14.	10.	7.	4.	

WADA	MR,IN	PERI	DATE	LOSS	END-OF-PERIOD	NO,MO	PERIOD	DATE	LOSS	WADA
1.01	0.05	1	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.10	2	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.15	3	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.20	4	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.25	5	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.30	6	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.35	7	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.40	8	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.45	9	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.50	10	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.55	11	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.60	12	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.65	13	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.70	14	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.75	15	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.80	16	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.85	17	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.90	18	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	0.95	19	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.00	20	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.05	21	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.10	22	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.15	23	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.20	24	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.25	25	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.30	26	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.35	27	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.40	28	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.45	29	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.50	30	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.55	31	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.60	32	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.65	33	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.70	34	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.75	35	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.80	36	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.85	37	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.90	38	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	1.95	39	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.00	40	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.05	41	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.10	42	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.15	43	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.20	44	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.25	45	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.30	46	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.35	47	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.40	48	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.45	49	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.50	50	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.55	51	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.60	52	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.65	53	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.70	54	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.75	55	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.80	56	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.85	57	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.90	58	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	2.95	59	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.00	60	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.05	61	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.10	62	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.15	63	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.20	64	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.25	65	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.30	66	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.35	67	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.40	68	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.45	69	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.50	70	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.55	71	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.60	72	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.65	73	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.70	74	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.75	75	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.80	76	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.85	77	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.90	78	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	3.95	79	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.00	80	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.05	81	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.10	82	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.15	83	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.20	84	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.25	85	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.30	86	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.35	87	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.40	88	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.45	89	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.50	90	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.55	91	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.60	92	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.65	93	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.70	94	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.75	95	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.80	96	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.85	97	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.90	98	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	4.95	99	01	0.00	0	1.01	1.01	1.01	0.00	1.01
1.01	5.00	100	01	0.00	0	1.01	1.01	1.01	0.00	1.01

1.01	4.40	56	.01	.01	.00	280	1.01	17.010	26	.23	.23	.00	234
1.01	4.45	57	.01	.01	.00	280	1.01	17.015	207	.23	.23	.00	234
1.01	4.50	58	.01	.01	.00	280	1.01	17.020	208	.23	.23	.00	234
1.01	4.55	59	.01	.01	.00	280	1.01	17.025	209	.23	.23	.00	234
1.01	4.60	60	.01	.01	.00	280	1.01	17.030	210	.23	.23	.00	234
1.01	4.65	61	.01	.01	.00	280	1.01	17.035	211	.23	.23	.00	234
1.01	4.70	62	.01	.01	.00	280	1.01	17.040	212	.23	.23	.00	234
1.01	4.75	63	.01	.01	.00	280	1.01	17.045	213	.23	.23	.00	234
1.01	4.80	64	.01	.01	.00	280	1.01	17.050	214	.23	.23	.00	234
1.01	4.85	65	.01	.01	.00	280	1.01	17.055	215	.23	.23	.00	234
1.01	4.90	66	.01	.01	.00	280	1.01	17.060	216	.23	.23	.00	234
1.01	4.95	67	.01	.01	.00	280	1.01	17.065	217	.23	.23	.00	234
1.01	5.00	68	.01	.01	.00	280	1.01	17.070	218	.23	.23	.00	234
1.01	5.05	69	.01	.01	.00	280	1.01	17.075	219	.23	.23	.00	234
1.01	5.10	70	.01	.01	.00	280	1.01	17.080	220	.23	.23	.00	234
1.01	5.15	71	.01	.01	.00	280	1.01	17.085	221	.23	.23	.00	234
1.01	5.20	72	.01	.01	.00	280	1.01	17.090	222	.23	.23	.00	234
1.01	5.25	73	.01	.01	.00	280	1.01	17.095	223	.23	.23	.00	234
1.01	5.30	74	.01	.01	.00	280	1.01	17.100	224	.23	.23	.00	234
1.01	5.35	75	.01	.01	.00	280	1.01	17.105	225	.23	.23	.00	234
1.01	5.40	76	.01	.01	.00	280	1.01	17.110	226	.23	.23	.00	234
1.01	5.45	77	.01	.01	.00	280	1.01	17.115	227	.23	.23	.00	234
1.01	5.50	78	.01	.01	.00	280	1.01	17.120	228	.23	.23	.00	234
1.01	5.55	79	.01	.01	.00	280	1.01	17.125	229	.23	.23	.00	234
1.01	5.60	80	.01	.01	.00	280	1.01	17.130	230	.23	.23	.00	234
1.01	5.65	81	.01	.01	.00	280	1.01	17.135	231	.23	.23	.00	234
1.01	5.70	82	.01	.01	.00	280	1.01	17.140	232	.23	.23	.00	234
1.01	5.75	83	.01	.01	.00	280	1.01	17.145	233	.23	.23	.00	234
1.01	5.80	84	.01	.01	.00	280	1.01	17.150	234	.23	.23	.00	234
1.01	5.85	85	.01	.01	.00	280	1.01	17.155	235	.23	.23	.00	234
1.01	5.90	86	.01	.01	.00	280	1.01	17.160	236	.23	.23	.00	234
1.01	5.95	87	.01	.01	.00	280	1.01	17.165	237	.23	.23	.00	234
1.01	6.00	88	.01	.01	.00	280	1.01	17.170	238	.23	.23	.00	234
1.01	6.05	89	.01	.01	.00	280	1.01	17.175	239	.23	.23	.00	234
1.01	6.10	90	.01	.01	.00	280	1.01	17.180	240	.23	.23	.00	234
1.01	6.15	91	.01	.01	.00	280	1.01	17.185	241	.23	.23	.00	234
1.01	6.20	92	.01	.01	.00	280	1.01	17.190	242	.23	.23	.00	234
1.01	6.25	93	.01	.01	.00	280	1.01	17.195	243	.23	.23	.00	234
1.01	6.30	94	.01	.01	.00	280	1.01	17.200	244	.23	.23	.00	234
1.01	6.35	95	.01	.01	.00	280	1.01	17.205	245	.23	.23	.00	234
1.01	6.40	96	.01	.01	.00	280	1.01	17.210	246	.23	.23	.00	234
1.01	6.45	97	.01	.01	.00	280	1.01	17.215	247	.23	.23	.00	234
1.01	6.50	98	.01	.01	.00	280	1.01	17.220	248	.23	.23	.00	234
1.01	6.55	99	.01	.01	.00	280	1.01	17.225	249	.23	.23	.00	234
1.01	6.60	100	.01	.01	.00	280	1.01	17.230	250	.23	.23	.00	234
1.01	6.65	101	.01	.01	.00	280	1.01	17.235	251	.23	.23	.00	234
1.01	6.70	102	.01	.01	.00	280	1.01	17.240	252	.23	.23	.00	234
1.01	6.75	103	.01	.01	.00	280	1.01	17.245	253	.23	.23	.00	234
1.01	6.80	104	.01	.01	.00	280	1.01	17.250	254	.23	.23	.00	234
1.01	6.85	105	.01	.01	.00	280	1.01	17.255	255	.23	.23	.00	234
1.01	6.90	106	.01	.01	.00	280	1.01	17.260	256	.23	.23	.00	234
1.01	6.95	107	.01	.01	.00	280	1.01	17.265	257	.23	.23	.00	234
1.01	7.00	108	.01	.01	.00	280	1.01	17.270	258	.23	.23	.00	234
1.01	7.05	109	.01	.01	.00	280	1.01	17.275	259	.23	.23	.00	234
1.01	7.10	110	.01	.01	.00	280	1.01	17.280	260	.23	.23	.00	234
1.01	7.15	111	.01	.01	.00	280	1.01	17.285	261	.23	.23	.00	234
1.01	7.20	112	.01	.01	.00	280	1.01	17.290	262	.23	.23	.00	234
1.01	7.25	113	.01	.01	.00	280	1.01	17.295	263	.23	.23	.00	234
1.01	7.30	114	.01	.01	.00	280	1.01	17.300	264	.23	.23	.00	234
1.01	7.35	115	.01	.01	.00	280	1.01	17.305	265	.23	.23	.00	234

INFLOW PMF AND ONE-HALF PMF HYDROGRAPHS

UPSTREAM DAM (MO. 10089)

PEAK JUTFLOW VS 1424.47 114E 16.20 HOURS

PEAK	6-MON	9-MON	12-MON	TOTAL
1454	521	137	101	3032
1455	9	5	3	876
1456	834	1110	1110	1110
1457	21171	91097	21197	281997
1458	180	213	213	213
1459	107	263	263	263

INPUT PMF INDEX RAINFALL, SCS UNIT HYDROGRAPH PARAMETERS FOR U/S DAM (110000)

ISTAQ	ICOMP	IFCON	ITYPE	JPLY	JPRY	INAME	ISTAGE	IAUTS
100F9	0	0	0	0	0	1	0	0

THWTC	JUNG	TAREA	SNAP	HYDROGRAPH DATA			RATIO	ISNOW	ISAME	LOCAL
				TRSCA	TRSPC					
1	2	1.26	0.00	1.27	1.00		0.000			

	P6	R29	R72	P96
PRECIP DATA				
SPEE	PMS	R12	R88	P96
0.00	25.10	100.00	120.00	100.00
			0.30	0.00

[illegible]

CURVE NO = 99.00 UPFLSS = -1.00 EFFECT CN = 99.00

UNIT HYDROGRAPH DATA

7C# 0.00 L10= .42

REF ID: A66337

STP10= 9430 GCSN= 0.14 PTH= 1.00
 UNIT HYDROGRAPH OF FLOW OF PERIOD ORDINATES, TCF 0.0, HOURS, LAG= .42 VOL= 1.00
 116. 537. 1112. 1404. 1566. 116. 969. 799. 5100
 374. 216. 160. 80. 2. 49. 37. 27.
 12. 9. 4. 2.

DATA	PERIOD	RAIN	EXCS	LOSS	COMP 2	ENVELOPE FLOW	PERIOD	RAIN	EXCS	LOSS	COMP 0
1.01	1	.01	0.00	.01	0.	1.01	12.45	.21	.21	.00	1513.
1.01	13	.01	0.00	.01	3.	1.01	12.49	.21	.21	.00	1648.
1.01	15	.01	0.00	.01	7.	1.01	12.47	.21	.21	.00	1748.
1.01	20	.01	0.00	.01	12.	1.01	12.50	.21	.21	.00	1817.
1.01	25	.01	0.00	.01	17.	1.01	12.55	.21	.21	.00	1870.
1.01	30	.01	0.00	.01	22.	1.01	13.00	.21	.21	.00	1911.
1.01	35	.01	0.00	.01	27.	1.01	13.00	.21	.21	.00	1946.
1.01	40	.01	0.00	.01	32.	1.01	13.10	.25	.25	.00	1983.
1.01	45	.01	0.00	.01	37.	1.01	13.15	.25	.25	.00	2030.
1.01	50	.01	0.00	.01	42.	1.01	13.25	.25	.25	.00	2089.
1.01	55	.01	0.00	.01	47.	1.01	13.25	.25	.25	.00	2153.
1.01	60	.01	0.00	.01	52.	1.01	13.25	.25	.25	.00	2215.
1.01	65	.01	0.00	.01	57.	1.01	13.30	.25	.25	.00	2269.
1.01	70	.01	0.00	.01	62.	1.01	13.35	.25	.25	.00	2314.
1.01	75	.01	0.00	.01	67.	1.01	13.45	.25	.25	.00	2367.
1.01	80	.01	0.00	.01	72.	1.01	13.50	.25	.25	.00	2371.
1.01	85	.01	0.00	.01	77.	1.01	13.55	.25	.25	.00	2393.
1.01	90	.01	0.00	.01	82.	1.01	13.55	.25	.25	.00	2420.
1.01	95	.01	0.00	.01	87.	1.01	14.05	.31	.31	.00	2449.
1.01	100	.01	0.00	.01	92.	1.01	14.15	.31	.31	.00	2503.
1.01	105	.01	0.00	.01	97.	1.01	14.25	.31	.31	.00	2573.
1.01	110	.01	0.00	.01	102.	1.01	14.35	.31	.31	.00	2658.
1.01	115	.01	0.00	.01	107.	1.01	14.45	.31	.31	.00	2742.
1.01	120	.01	0.00	.01	112.	1.01	14.55	.31	.31	.00	2817.
1.01	125	.01	0.00	.01	117.	1.01	14.55	.31	.31	.00	2879.
1.01	130	.01	0.00	.01	122.	1.01	14.55	.31	.31	.00	2924.
1.01	135	.01	0.00	.01	127.	1.01	14.55	.31	.31	.00	2957.
1.01	140	.01	0.00	.01	132.	1.01	14.55	.31	.31	.00	2992.
1.01	145	.01	0.00	.01	137.	1.01	15.05	.31	.31	.00	3091.
1.01	150	.01	0.00	.01	142.	1.01	15.05	.31	.31	.00	3201.
1.01	155	.01	0.00	.01	147.	1.01	15.15	.38	.38	.00	3300.
1.01	160	.01	0.00	.01	152.	1.01	15.20	.38	.38	.00	3375.
1.01	165	.01	0.00	.01	157.	1.01	15.30	.57	.57	.00	3504.
1.01	170	.01	0.00	.01	162.	1.01	15.30	.57	.57	.00	3576.
1.01	175	.01	0.00	.01	167.	1.01	15.35	.57	.57	.00	3657.
1.01	180	.01	0.00	.01	172.	1.01	15.35	.57	.57	.00	3742.
1.01	185	.01	0.00	.01	177.	1.01	15.45	.67	.67	.00	3833.
1.01	190	.01	0.00	.01	182.	1.01	15.45	.67	.67	.00	3924.
1.01	195	.01	0.00	.01	187.	1.01	15.50	.67	.67	.00	4015.
1.01	200	.01	0.00	.01	192.	1.01	15.50	.67	.67	.00	4106.
1.01	205	.01	0.00	.01	197.	1.01	15.55	.67	.67	.00	4197.
1.01	210	.01	0.00	.01	202.	1.01	15.55	.67	.67	.00	4288.
1.01	215	.01	0.00	.01	207.	1.01	16.05	.67	.67	.00	4379.
1.01	220	.01	0.00	.01	212.	1.01	16.10	.67	.67	.00	4470.
1.01	225	.01	0.00	.01	217.	1.01	16.15	.67	.67	.00	4561.
1.01	230	.01	0.00	.01	222.	1.01	16.20	.67	.67	.00	4652.
1.01	235	.01	0.00	.01	227.	1.01	16.25	.67	.67	.00	4743.
1.01	240	.01	0.00	.01	232.	1.01	16.35	.67	.67	.00	4834.
1.01	245	.01	0.00	.01	237.	1.01	16.35	.67	.67	.00	4925.
1.01	250	.01	0.00	.01	242.	1.01	16.40	.67	.67	.00	5016.

1.01	4.15	51	.01	.01	.00	92.	1.01	16.45	201	.29	.29	.00	3660.
1.01	4.20	52	.01	.01	.00	93.	1.01	16.50	202	.29	.29	.00	3651.
1.01	4.25	53	.01	.01	.00	94.	1.01	16.55	203	.29	.29	.00	3600.
1.01	4.30	54	.01	.01	.00	95.	1.01	17.00	204	.29	.29	.00	3186.
1.01	4.35	55	.01	.01	.00	96.	1.01	17.05	205	.29	.29	.00	3095.
1.01	4.40	56	.01	.01	.00	97.	1.01	17.10	206	.29	.29	.00	3019.
1.01	4.45	57	.01	.01	.00	98.	1.01	17.15	207	.29	.29	.00	2918.
1.01	4.50	58	.01	.01	.00	99.	1.01	17.20	208	.29	.29	.00	2818.
1.01	4.55	59	.01	.01	.00	100.	1.01	17.25	209	.29	.29	.00	2708.
1.01	4.60	60	.01	.01	.00	101.	1.01	17.30	210	.29	.29	.00	2605.
1.01	4.65	61	.01	.01	.00	102.	1.01	17.35	211	.29	.29	.00	2515.
1.01	4.70	62	.01	.01	.00	103.	1.01	17.40	212	.29	.29	.00	2440.
1.01	4.75	63	.01	.01	.00	104.	1.01	17.45	213	.29	.29	.00	2383.
1.01	4.80	64	.01	.01	.00	105.	1.01	17.50	214	.29	.29	.00	2343.
1.01	4.85	65	.01	.01	.00	106.	1.01	17.55	215	.29	.29	.00	2315.
1.01	4.90	66	.01	.01	.00	107.	1.01	18.00	216	.29	.29	.00	2256.
1.01	4.95	67	.01	.01	.00	108.	1.01	18.05	217	.29	.29	.00	2258.
1.01	5.00	68	.01	.01	.00	109.	1.01	18.10	218	.29	.29	.00	2175.
1.01	5.05	69	.01	.01	.00	110.	1.01	18.15	219	.29	.29	.00	2017.
1.01	5.10	70	.01	.01	.00	111.	1.01	18.20	220	.29	.29	.00	1775.
1.01	5.15	71	.01	.01	.00	112.	1.01	18.25	221	.29	.29	.00	1502.
1.01	5.20	72	.01	.01	.00	113.	1.01	18.30	222	.29	.29	.00	1226.
1.01	5.25	73	.01	.01	.00	114.	1.01	18.35	223	.29	.29	.00	980.
1.01	5.30	74	.01	.01	.00	115.	1.01	18.40	224	.29	.29	.00	775.
1.01	5.35	75	.01	.01	.00	116.	1.01	18.45	225	.29	.29	.00	627.
1.01	5.40	76	.01	.01	.00	117.	1.01	18.50	226	.29	.29	.00	519.
1.01	5.45	77	.01	.01	.00	118.	1.01	18.55	227	.29	.29	.00	439.
1.01	5.50	78	.01	.01	.00	119.	1.01	19.00	228	.29	.29	.00	378.
1.01	5.55	79	.01	.01	.00	120.	1.01	19.05	229	.29	.29	.00	333.
1.01	5.60	80	.01	.01	.00	121.	1.01	19.10	230	.29	.29	.00	298.
1.01	5.65	81	.01	.01	.00	122.	1.01	19.15	231	.29	.29	.00	274.
1.01	5.70	82	.01	.01	.00	123.	1.01	19.20	232	.29	.29	.00	256.
1.01	5.75	83	.01	.01	.00	124.	1.01	19.25	233	.29	.29	.00	242.
1.01	5.80	84	.01	.01	.00	125.	1.01	19.30	234	.29	.29	.00	232.
1.01	5.85	85	.01	.01	.00	126.	1.01	19.35	235	.29	.29	.00	224.
1.01	5.90	86	.01	.01	.00	127.	1.01	19.40	236	.29	.29	.00	216.
1.01	5.95	87	.01	.01	.00	128.	1.01	19.45	237	.29	.29	.00	210.
1.01	6.00	88	.01	.01	.00	129.	1.01	19.50	238	.29	.29	.00	211.
1.01	6.05	89	.01	.01	.00	130.	1.01	19.55	239	.29	.29	.00	208.
1.01	6.10	90	.01	.01	.00	131.	1.01	20.00	240	.29	.29	.00	208.
1.01	6.15	91	.01	.01	.00	132.	1.01	20.05	241	.29	.29	.00	208.
1.01	6.20	92	.01	.01	.00	133.	1.01	20.10	242	.29	.29	.00	208.
1.01	6.25	93	.01	.01	.00	134.	1.01	20.15	243	.29	.29	.00	208.
1.01	6.30	94	.01	.01	.00	135.	1.01	20.20	244	.29	.29	.00	208.
1.01	6.35	95	.01	.01	.00	136.	1.01	20.25	245	.29	.29	.00	208.
1.01	6.40	96	.01	.01	.00	137.	1.01	20.30	246	.29	.29	.00	208.
1.01	6.45	97	.01	.01	.00	138.	1.01	20.35	247	.29	.29	.00	208.
1.01	6.50	98	.01	.01	.00	139.	1.01	20.40	248	.29	.29	.00	208.
1.01	6.55	99	.01	.01	.00	140.	1.01	20.45	249	.29	.29	.00	208.
1.01	6.60	100	.01	.01	.00	141.	1.01	20.50	250	.29	.29	.00	208.
1.01	6.65	101	.01	.01	.00	142.	1.01	20.55	251	.29	.29	.00	208.
1.01	6.70	102	.01	.01	.00	143.	1.01	21.00	252	.29	.29	.00	208.
1.01	6.75	103	.01	.01	.00	144.	1.01	21.05	253	.29	.29	.00	208.
1.01	6.80	104	.01	.01	.00	145.	1.01	21.10	254	.29	.29	.00	208.
1.01	6.85	105	.01	.01	.00	146.	1.01	21.15	255	.29	.29	.00	208.
1.01	6.90	106	.01	.01	.00	147.	1.01	21.20	256	.29	.29	.00	208.
1.01	6.95	107	.01	.01	.00	148.	1.01	21.25	257	.29	.29	.00	208.
1.01	7.00	108	.01	.01	.00	149.	1.01	21.30	258	.29	.29	.00	208.
1.01	7.05	109	.01	.01	.00	150.	1.01	21.35	259	.29	.29	.00	208.
1.01	7.10	110	.01	.01	.00	151.	1.01	21.40	260	.29	.29	.00	208.

[illegible]

INFLOW PMF AND ONE-HALF PMF HYDROGRAPHS

BUSCH NO. 35 LAKE DAM

1.01	4.40	8	0.01	6.00	-0.1	3.	1.01	13.10	158	.26	.25	.25	.00	2867.
1.01	4.45	9	0.01	6.00	-0.1	0.	1.01	13.15	159	.25	.25	.25	.00	2867.
1.01	4.50	10	0.01	6.00	-0.1	0.	1.01	13.20	160	.25	.25	.25	.00	2869.
1.01	4.55	11	0.01	6.00	-0.1	0.	1.01	13.25	161	.25	.25	.25	.00	2879.
1.01	4.60	12	0.01	6.00	-0.1	1.	1.01	13.30	162	.25	.25	.25	.00	2889.
1.01	4.65	13	0.01	6.00	-0.1	1.	1.01	13.35	163	.25	.25	.25	.00	2934.
1.01	4.70	14	0.01	6.00	-0.1	1.	1.01	13.40	164	.25	.25	.25	.00	2999.
1.01	4.75	15	0.01	6.00	-0.1	1.	1.01	13.45	165	.25	.25	.25	.00	3054.
1.01	4.80	16	0.01	6.00	-0.1	8.	1.01	13.50	166	.25	.25	.25	.00	3097.
1.01	4.85	17	0.01	6.00	-0.1	10.	1.01	13.55	167	.25	.25	.25	.00	3128.
1.01	4.90	18	0.01	6.00	-0.1	10.	1.01	13.60	168	.25	.25	.25	.00	3153.
1.01	4.95	19	0.01	6.00	-0.1	21.	1.01	13.65	169	.25	.25	.25	.00	3179.
1.01	5.00	20	0.01	6.00	-0.1	21.	1.01	13.70	170	.25	.25	.25	.00	3215.
1.01	5.05	21	0.01	6.00	-0.1	31.	1.01	13.75	171	.25	.25	.25	.00	3268.
1.01	5.10	22	0.01	6.00	-0.1	31.	1.01	13.80	172	.25	.25	.25	.00	3278.
1.01	5.15	23	0.01	6.00	-0.1	4.	1.01	13.85	173	.25	.25	.25	.00	3344.
1.01	5.20	24	0.01	6.00	-0.1	4.	1.01	13.90	174	.25	.25	.25	.00	3346.
1.01	5.25	25	0.01	6.00	-0.1	50.	1.01	13.95	175	.25	.25	.25	.00	3345.
1.01	5.30	26	0.01	6.00	-0.1	50.	1.01	14.00	176	.25	.25	.25	.00	3383.
1.01	5.35	27	0.01	6.00	-0.1	54.	1.01	14.05	177	.25	.25	.25	.00	3387.
1.01	5.40	28	0.01	6.00	-0.1	54.	1.01	14.10	178	.25	.25	.25	.00	3387.
1.01	5.45	29	0.01	6.00	-0.1	64.	1.01	14.15	179	.25	.25	.25	.00	3396.
1.01	5.50	30	0.01	6.00	-0.1	72.	1.01	14.20	180	.25	.25	.25	.00	3398.
1.01	5.55	31	0.01	6.00	-0.1	72.	1.01	14.25	181	.25	.25	.25	.00	3398.
1.01	5.60	32	0.01	6.00	-0.1	72.	1.01	14.30	182	.25	.25	.25	.00	3398.
1.01	5.65	33	0.01	6.00	-0.1	84.	1.01	14.35	183	.25	.25	.25	.00	3398.
1.01	5.70	34	0.01	6.00	-0.1	84.	1.01	14.40	184	.25	.25	.25	.00	3398.
1.01	5.75	35	0.01	6.00	-0.1	87.	1.01	14.45	185	.25	.25	.25	.00	3398.
1.01	5.80	36	0.01	6.00	-0.1	90.	1.01	14.50	186	.25	.25	.25	.00	3398.
1.01	5.85	37	0.01	6.00	-0.1	92.	1.01	14.55	187	.25	.25	.25	.00	3398.
1.01	5.90	38	0.01	6.00	-0.1	95.	1.01	14.60	188	.25	.25	.25	.00	3398.
1.01	5.95	39	0.01	6.00	-0.1	95.	1.01	14.65	189	.25	.25	.25	.00	3398.
1.01	6.00	40	0.01	6.00	-0.1	103.	1.01	14.70	190	.25	.25	.25	.00	3398.
1.01	6.05	41	0.01	6.00	-0.1	103.	1.01	14.75	191	.25	.25	.25	.00	3398.
1.01	6.10	42	0.01	6.00	-0.1	105.	1.01	14.80	192	.25	.25	.25	.00	3398.
1.01	6.15	43	0.01	6.00	-0.1	107.	1.01	14.85	193	.25	.25	.25	.00	3398.
1.01	6.20	44	0.01	6.00	-0.1	109.	1.01	14.90	194	.25	.25	.25	.00	3398.
1.01	6.25	45	0.01	6.00	-0.1	111.	1.01	14.95	195	.25	.25	.25	.00	3398.
1.01	6.30	46	0.01	6.00	-0.1	112.	1.01	15.00	196	.25	.25	.25	.00	3398.
1.01	6.35	47	0.01	6.00	-0.1	118.	1.01	15.05	197	.25	.25	.25	.00	3398.
1.01	6.40	48	0.01	6.00	-0.1	118.	1.01	15.10	198	.25	.25	.25	.00	3398.
1.01	6.45	49	0.01	6.00	-0.1	118.	1.01	15.15	199	.25	.25	.25	.00	3398.
1.01	6.50	50	0.01	6.00	-0.1	118.	1.01	15.20	200	.25	.25	.25	.00	3398.
1.01	6.55	51	0.01	6.00	-0.1	121.	1.01	15.25	201	.25	.25	.25	.00	3398.
1.01	6.60	52	0.01	6.00	-0.1	122.	1.01	15.30	202	.25	.25	.25	.00	3398.
1.01	6.65	53	0.01	6.00	-0.1	124.	1.01	15.35	203	.25	.25	.25	.00	3398.
1.01	6.70	54	0.01	6.00	-0.1	124.	1.01	15.40	204	.25	.25	.25	.00	3398.
1.01	6.75	55	0.01	6.00	-0.1	124.	1.01	15.45	205	.25	.25	.25	.00	3398.
1.01	6.80	56	0.01	6.00	-0.1	124.	1.01	15.50	206	.25	.25	.25	.00	3398.
1.01	6.85	57	0.01	6.00	-0.1	129.	1.01	15.55	207	.25	.25	.25	.00	3398.
1.01	6.90	58	0.01	6.00	-0.1	130.	1.01	15.60	208	.25	.25	.25	.00	3398.
1.01	6.95	59	0.01	6.00	-0.1	131.	1.01	15.65	209	.25	.25	.25	.00	3398.
1.01	7.00	60	0.01	6.00	-0.1	132.	1.01	15.70	210	.25	.25	.25	.00	3398.
1.01	7.05	61	0.01	6.00	-0.1	133.	1.01	15.75	211	.25	.25	.25	.00	3398.
1.01	7.10	62	0.01	6.00	-0.1	135.	1.01	15.80	212	.25	.25	.25	.00	3398.
1.01	7.15	63	0.01	6.00	-0.1	135.	1.01	15.85	213	.25	.25	.25	.00	3398.
1.01	7.20	64	0.01	6.00	-0.1	135.	1.01	15.90	214	.25	.25	.25	.00	3398.
1.01	7.25	65	0.01	6.00	-0.1	137.	1.01	15.95	215	.25	.25	.25	.00	3398.
1.01	7.30	66	0.01	6.00	-0.1	137.	1.01	16.00	216	.25	.25	.25	.00	3398.
1.01	7.35	67	0.01	6.00	-0.1	139.	1.01	16.05	217	.25	.25	.25	.00	3398.

1.01	5.95	61	.01	.01	1.01	14.10	218	.02	.00	2498.
1.01	5.95	62	.01	.01	1.01	14.15	219	.02	.00	2499.
1.01	5.95	63	.01	.01	1.01	14.20	220	.02	.00	2500.
1.01	5.95	64	.01	.01	1.01	14.25	221	.02	.00	2501.
1.01	5.95	65	.01	.01	1.01	14.30	222	.02	.00	2502.
1.01	5.95	66	.01	.01	1.01	14.35	223	.02	.00	2503.
1.01	5.95	67	.01	.01	1.01	14.40	224	.02	.00	2504.
1.01	5.95	68	.01	.01	1.01	14.45	225	.02	.00	2505.
1.01	5.95	69	.01	.01	1.01	14.50	226	.02	.00	2506.
1.01	5.95	70	.01	.01	1.01	14.55	227	.02	.00	2507.
1.01	5.95	71	.01	.01	1.01	14.60	228	.02	.00	2508.
1.01	5.95	72	.01	.01	1.01	14.65	229	.02	.00	2509.
1.01	5.95	73	.01	.01	1.01	14.70	230	.02	.00	2510.
1.01	5.95	74	.01	.01	1.01	14.75	231	.02	.00	2511.
1.01	5.95	75	.01	.01	1.01	14.80	232	.02	.00	2512.
1.01	5.95	76	.01	.01	1.01	14.85	233	.02	.00	2513.
1.01	5.95	77	.01	.01	1.01	14.90	234	.02	.00	2514.
1.01	5.95	78	.01	.01	1.01	14.95	235	.02	.00	2515.
1.01	5.95	79	.01	.01	1.01	15.00	236	.02	.00	2516.
1.01	5.95	80	.01	.01	1.01	15.05	237	.02	.00	2517.
1.01	5.95	81	.01	.01	1.01	15.10	238	.02	.00	2518.
1.01	5.95	82	.01	.01	1.01	15.15	239	.02	.00	2519.
1.01	5.95	83	.01	.01	1.01	15.20	240	.02	.00	2520.
1.01	5.95	84	.01	.01	1.01	15.25	241	.02	.00	2521.
1.01	5.95	85	.01	.01	1.01	15.30	242	.02	.00	2522.
1.01	5.95	86	.01	.01	1.01	15.35	243	.02	.00	2523.
1.01	5.95	87	.01	.01	1.01	15.40	244	.02	.00	2524.
1.01	5.95	88	.01	.01	1.01	15.45	245	.02	.00	2525.
1.01	5.95	89	.01	.01	1.01	15.50	246	.02	.00	2526.
1.01	5.95	90	.01	.01	1.01	15.55	247	.02	.00	2527.
1.01	5.95	91	.01	.01	1.01	15.60	248	.02	.00	2528.
1.01	5.95	92	.01	.01	1.01	15.65	249	.02	.00	2529.
1.01	5.95	93	.01	.01	1.01	15.70	250	.02	.00	2530.
1.01	5.95	94	.01	.01	1.01	15.75	251	.02	.00	2531.
1.01	5.95	95	.01	.01	1.01	15.80	252	.02	.00	2532.
1.01	5.95	96	.01	.01	1.01	15.85	253	.02	.00	2533.
1.01	5.95	97	.01	.01	1.01	15.90	254	.02	.00	2534.
1.01	5.95	98	.01	.01	1.01	15.95	255	.02	.00	2535.
1.01	5.95	99	.01	.01	1.01	16.00	256	.02	.00	2536.
1.01	5.95	100	.01	.01	1.01	16.05	257	.02	.00	2537.
1.01	5.95	101	.01	.01	1.01	16.10	258	.02	.00	2538.
1.01	5.95	102	.01	.01	1.01	16.15	259	.02	.00	2539.
1.01	5.95	103	.01	.01	1.01	16.20	260	.02	.00	2540.
1.01	5.95	104	.01	.01	1.01	16.25	261	.02	.00	2541.
1.01	5.95	105	.01	.01	1.01	16.30	262	.02	.00	2542.
1.01	5.95	106	.01	.01	1.01	16.35	263	.02	.00	2543.
1.01	5.95	107	.01	.01	1.01	16.40	264	.02	.00	2544.
1.01	5.95	108	.01	.01	1.01	16.45	265	.02	.00	2545.
1.01	5.95	109	.01	.01	1.01	16.50	266	.02	.00	2546.
1.01	5.95	110	.01	.01	1.01	16.55	267	.02	.00	2547.
1.01	5.95	111	.01	.01	1.01	16.60	268	.02	.00	2548.
1.01	5.95	112	.01	.01	1.01	16.65	269	.02	.00	2549.
1.01	5.95	113	.01	.01	1.01	16.70	270	.02	.00	2550.
1.01	5.95	114	.01	.01	1.01	16.75	271	.02	.00	2551.
1.01	5.95	115	.01	.01	1.01	16.80	272	.02	.00	2552.
1.01	5.95	116	.01	.01	1.01	16.85	273	.02	.00	2553.
1.01	5.95	117	.01	.01	1.01	16.90	274	.02	.00	2554.
1.01	5.95	118	.01	.01	1.01	16.95	275	.02	.00	2555.
1.01	5.95	119	.01	.01	1.01	17.00	276	.02	.00	2556.
1.01	5.95	120	.01	.01	1.01	17.05	277	.02	.00	2557.
1.01	5.95	121	.01	.01	1.01	17.10	278	.02	.00	2558.
1.01	5.95	122	.01	.01	1.01	17.15	279	.02	.00	2559.
1.01	5.95	123	.01	.01	1.01	17.20	280	.02	.00	2560.
1.01	5.95	124	.01	.01	1.01	17.25	281	.02	.00	2561.
1.01	5.95	125	.01	.01	1.01	17.30	282	.02	.00	2562.
1.01	5.95	126	.01	.01	1.01	17.35	283	.02	.00	2563.
1.01	5.95	127	.01	.01	1.01	17.40	284	.02	.00	2564.
1.01	5.95	128	.01	.01	1.01	17.45	285	.02	.00	2565.
1.01	5.95	129	.01	.01	1.01	17.50	286	.02	.00	2566.
1.01	5.95	130	.01	.01	1.01	17.55	287	.02	.00	2567.
1.01	5.95	131	.01	.01	1.01	17.60	288	.02	.00	2568.
1.01	5.95	132	.01	.01	1.01	17.65	289	.02	.00	2569.
1.01	5.95	133	.01	.01	1.01	17.70	290	.02	.00	2570.
1.01	5.95	134	.01	.01	1.01	17.75	291	.02	.00	2571.
1.01	5.95	135	.01	.01	1.01	17.80	292	.02	.00	2572.
1.01	5.95	136	.01	.01	1.01	17.85	293	.02	.00	2573.
1.01	5.95	137	.01	.01	1.01	17.90	294	.02	.00	2574.
1.01	5.95	138	.01	.01	1.01	17.95	295	.02	.00	2575.
1.01	5.95	139	.01	.01	1.01	18.00	296	.02	.00	2576.
1.01	5.95	140	.01	.01	1.01	18.05	297	.02	.00	2577.
1.01	5.95	141	.01	.01	1.01	18.10	298	.02	.00	2578.
1.01	5.95	142	.01	.01	1.01	18.15	299	.02	.00	2579.
1.01	5.95	143	.01	.01	1.01	18.20	300	.02	.00	2580.

1.01	10.40	.07	.07	.00	886.	1.01	23.10	.278	.02	.02	.00	270.
1.01	10.45	.07	.07	.00	887.	1.01	23.15	.279	.02	.02	.00	270.
1.01	10.50	.10	.07	.00	887.	1.01	23.20	.280	.02	.02	.00	270.
1.01	10.55	.11	.07	.00	887.	1.01	23.25	.281	.02	.02	.00	270.
1.01	11.00	.12	.07	.00	887.	1.01	23.30	.282	.02	.02	.00	270.
1.01	11.05	.13	.07	.00	887.	1.01	23.35	.283	.02	.02	.00	270.
1.01	11.10	.14	.07	.00	888.	1.01	23.40	.284	.02	.02	.00	270.
1.01	11.15	.15	.07	.00	888.	1.01	23.45	.285	.02	.02	.00	270.
1.01	11.20	.16	.07	.00	888.	1.01	23.50	.286	.02	.02	.00	270.
1.01	11.25	.17	.07	.00	889.	1.01	23.55	.287	.02	.02	.00	270.
1.01	11.30	.18	.07	.00	889.	1.02	0.00	.288	.02	.02	.00	270.
1.01	11.35	.19	.07	.00	890.	1.02	.05	.289	.00	.00	.00	268.
1.01	11.40	.19	.07	.00	890.	1.02	.10	.290	.00	.00	.00	268.
1.01	11.45	.19	.07	.00	890.	1.02	.15	.291	.00	.00	.00	268.
1.01	11.50	.19	.07	.00	890.	1.02	.20	.292	.00	.00	.00	268.
1.01	11.55	.19	.07	.00	891.	1.02	.25	.293	.00	.00	.00	268.
1.01	12.00	.19	.07	.00	891.	1.02	.30	.294	.00	.00	.00	268.
1.01	12.05	.19	.21	.00	892.	1.02	.35	.295	.00	.00	.00	268.
1.01	12.10	.19	.21	.00	892.	1.02	.40	.296	.00	.00	.00	268.
1.01	12.15	.19	.21	.00	893.	1.02	.45	.297	.00	.00	.00	268.
1.01	12.20	.19	.21	.00	894.	1.02	.50	.298	.00	.00	.00	268.
1.01	12.25	.19	.21	.00	895.	1.02	.55	.299	.00	.00	.00	268.
1.01	12.30	.19	.21	.00	896.	1.02	.60	.300	.00	.00	.00	268.
1.01	12.35	.19	.21	.00	897.	1.02	.65	.301	.00	.00	.00	268.
1.01	12.40	.19	.21	.00	898.	1.02	.70	.302	.00	.00	.00	268.
1.01	12.45	.19	.21	.00	899.	1.02	.75	.303	.00	.00	.00	268.
1.01	12.50	.19	.21	.00	900.	1.02	.80	.304	.00	.00	.00	268.
1.01	12.55	.19	.21	.00	901.	1.02	.85	.305	.00	.00	.00	268.
1.01	13.00	.19	.21	.00	902.	1.02	.90	.306	.00	.00	.00	268.
1.01	13.05	.19	.21	.00	903.	1.02	.95	.307	.00	.00	.00	268.
1.01	13.10	.19	.21	.00	904.	1.02	1.00	.308	.00	.00	.00	268.
1.01	13.15	.19	.21	.00	905.	1.02	1.05	.309	.00	.00	.00	268.
1.01	13.20	.19	.21	.00	906.	1.02	1.10	.310	.00	.00	.00	268.
1.01	13.25	.19	.21	.00	907.	1.02	1.15	.311	.00	.00	.00	268.
1.01	13.30	.19	.21	.00	908.	1.02	1.20	.312	.00	.00	.00	268.
1.01	13.35	.19	.21	.00	909.	1.02	1.25	.313	.00	.00	.00	268.
1.01	13.40	.19	.21	.00	910.	1.02	1.30	.314	.00	.00	.00	268.
1.01	13.45	.19	.21	.00	911.	1.02	1.35	.315	.00	.00	.00	268.
1.01	13.50	.19	.21	.00	912.	1.02	1.40	.316	.00	.00	.00	268.
1.01	13.55	.19	.21	.00	913.	1.02	1.45	.317	.00	.00	.00	268.
1.01	14.00	.19	.21	.00	914.	1.02	1.50	.318	.00	.00	.00	268.
1.01	14.05	.19	.21	.00	915.	1.02	1.55	.319	.00	.00	.00	268.
1.01	14.10	.19	.21	.00	916.	1.02	1.60	.320	.00	.00	.00	268.
1.01	14.15	.19	.21	.00	917.	1.02	1.65	.321	.00	.00	.00	268.
1.01	14.20	.19	.21	.00	918.	1.02	1.70	.322	.00	.00	.00	268.
1.01	14.25	.19	.21	.00	919.	1.02	1.75	.323	.00	.00	.00	268.
1.01	14.30	.19	.21	.00	920.	1.02	1.80	.324	.00	.00	.00	268.
1.01	14.35	.19	.21	.00	921.	1.02	1.85	.325	.00	.00	.00	268.
1.01	14.40	.19	.21	.00	922.	1.02	1.90	.326	.00	.00	.00	268.
1.01	14.45	.19	.21	.00	923.	1.02	1.95	.327	.00	.00	.00	268.
1.01	14.50	.19	.21	.00	924.	1.02	2.00	.328	.00	.00	.00	268.
1.01	14.55	.19	.21	.00	925.	1.02	2.05	.329	.00	.00	.00	268.
1.01	15.00	.19	.21	.00	926.	1.02	2.10	.330	.00	.00	.00	268.
1.01	15.05	.19	.21	.00	927.	1.02	2.15	.331	.00	.00	.00	268.
1.01	15.10	.19	.21	.00	928.	1.02	2.20	.332	.00	.00	.00	268.
1.01	15.15	.19	.21	.00	929.	1.02	2.25	.333	.00	.00	.00	268.
1.01	15.20	.19	.21	.00	930.	1.02	2.30	.334	.00	.00	.00	268.
1.01	15.25	.19	.21	.00	931.	1.02	2.35	.335	.00	.00	.00	268.
1.01	15.30	.19	.21	.00	932.	1.02	2.40	.336	.00	.00	.00	268.
1.01	15.35	.19	.21	.00	933.	1.02	2.45	.337	.00	.00	.00	268.
1.01	15.40	.19	.21	.00	934.	1.02	2.50	.338	.00	.00	.00	268.
1.01	15.45	.19	.21	.00	935.	1.02	2.55	.339	.00	.00	.00	268.
1.01	15.50	.19	.21	.00	936.	1.02	2.60	.340	.00	.00	.00	268.
1.01	15.55	.19	.21	.00	937.	1.02	2.65	.341	.00	.00	.00	268.
1.01	16.00	.19	.21	.00	938.	1.02	2.70	.342	.00	.00	.00	268.
1.01	16.05	.19	.21	.00	939.	1.02	2.75	.343	.00	.00	.00	268.
1.01	16.10	.19	.21	.00	940.	1.02	2.80	.344	.00	.00	.00	268.
1.01	16.15	.19	.21	.00	941.	1.02	2.85	.345	.00	.00	.00	268.
1.01	16.20	.19	.21	.00	942.	1.02	2.90	.346	.00	.00	.00	268.
1.01	16.25	.19	.21	.00	943.	1.02	2.95	.347	.00	.00	.00	268.
1.01	16.30	.19	.21	.00	944.	1.02	3.00	.348	.00	.00	.00	268.
1.01	16.35	.19	.21	.00	945.	1.02	3.05	.349	.00	.00	.00	268.
1.01	16.40	.19	.21	.00	946.	1.02	3.10	.350	.00	.00	.00	268.
1.01	16.45	.19	.21	.00	947.	1.02	3.15	.351	.00	.00	.00	268.
1.01	16.50	.19	.21	.00	948.	1.02	3.20	.352	.00	.00	.00	268.
1.01	16.55	.19	.21	.00	949.	1.02	3.25	.353	.00	.00	.00	268.
1.01	17.00	.19	.21	.00	950.	1.02	3.30	.354	.00	.00	.00	268.
1.01	17.05	.19	.21	.00	951.	1.02	3.35	.355	.00	.00	.00	268.
1.01	17.10	.19	.21	.00	952.	1.02	3.40	.356	.00	.00	.00	268.
1.01	17.15	.19	.21	.00	953.	1.02	3.45	.357	.00	.00	.00	268.
1.01	17.20	.19	.21	.00	954.	1.02	3.50	.358	.00	.00	.00	268.
1.01	17.25	.19	.21	.00	955.	1.02	3.55	.359	.00	.00	.00	268.
1.01	17.30	.19	.21	.00	956.	1.02	3.60	.360	.00	.00	.00	268.
1.01	17.35	.19	.21	.00	957.	1.02	3.65	.361	.00	.00	.00	268.
1.01	17.40	.19	.21	.00	958.	1.02	3.70	.362	.00	.00	.00	268.
1.01	17.45	.19	.21	.00	959.	1.02	3.75	.363	.00	.00	.00	268.
1.01	17.50	.19	.21	.00	960.	1.02	3.80	.364	.00	.00	.00	268.
1.01	17.55	.19	.21	.00	961.	1.02	3.85	.365	.00	.00	.00	268.
1.01	18.00	.19	.21	.00	962.	1.02	3.90	.366	.00	.00	.00	268.
1.01	18.05	.19	.21	.00	963.	1.02	3.95	.367	.00	.00	.00	268.
1.01	18.10	.19	.21	.00	964.	1.02	4.00	.368	.00	.00	.00	268.
1.01	18.15	.19	.21	.00	965.	1.02	4.05	.369	.00	.00	.00	268.
1.01	18.20	.19	.21	.00	966.	1.02	4.10	.370	.00	.00	.00	268.
1.01	18.25	.19	.21	.00	967.	1.02	4.15	.371	.00	.00	.00	268.
1.01	18.30	.19	.21	.00	968.	1.02	4.20	.372	.00	.00	.00	268.
1.01	18.35	.19	.21	.00	969.	1.02	4.25	.373	.00	.00	.00	268.
1.01	18.40	.19	.21	.00	970.	1.02	4.30	.374	.00	.00	.00	268.
1.01	18.45	.19	.21	.00	971.	1.02	4.35	.375	.00	.00	.00	268.
1.01	18.50	.19	.21	.00	972.	1.02	4.40	.376	.00	.00	.00	268.
1.01	18.55	.19	.21	.00	973.	1.02	4.45	.377	.00	.00	.00	268.
1.01	19.00	.19	.21	.00	974.	1.02	4.50	.378	.00	.00	.00	268.
1.01	19.05	.19	.21	.00	975.	1.02	4.55	.379	.00	.00	.00	268.
1.01	19.10	.19	.21	.00	976.	1.02	4.60	.380	.00	.00	.00	268.
1.01	19.15	.19	.21	.00	977.	1.02	4.65	.381	.00	.00	.00	268.
1.01	19.20	.19	.21	.00	978.	1.02	4.70	.382	.00	.00	.00	268.
1.01	19.25	.19	.21	.00	979.	1.02	4.75	.383	.00	.00	.00	268.
1.01	19.30	.19	.21	.00	980.	1.02	4.80	.384	.00	.00	.00	268.
1.01	19.35	.19	.21	.00	981.	1.02	4.85	.385	.00	.00	.00	268.
1.01	19.40	.19	.21	.00	982.	1.02	4.90	.386	.00	.00	.00	268.
1.01	19.45	.19	.21	.00	983.	1.02	4.95	.387	.00	.00	.00	268.
1.01	19.50	.19	.21	.00	984.	1.02	5.00	.388	.00	.00	.00	268.
1.01	19.55	.19	.21	.00	985.	1.02	5.05	.389	.00	.00	.00	268.
1.01	20.00	.19	.21	.00	986.	1.02	5.10	.390	.00	.00	.00	268.
1.01	20.05	.19	.21	.00	987.	1.02	5.15	.391	.00	.00	.00	268.
1.01	20.10	.19	.21	.00	988.	1.02	5.20	.392	.00	.00	.00	268.
1.01	20.15	.19	.21	.00	989.	1.02	5.25	.393	.00	.00	.00	268.

COMBINE LOCAL HYDROGRAPHS WITH U/S ROUTED HYDROGRAPHS BEFORE PLOTTING

[illegible]

	P.M.P.	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	233.6	89.7	274.3	265.1	796.309
CFS	560.	241.	74.	17.	2252.1
INCHES		24.11	31.23	31.23	31.23
MM		612.38	793.29	793.29	793.29
ACFT		5477	5477	5477	5477
THOUS CU M		5215	6756	5756	6756

SUN OF 2 HYCROGRAPHS AT 1009 PLAN 1-RTD 2

[illegible]

306.	594.	62.	64.	68.	71.	74.	76.	79.	82.
86.	91.	93.	96.	97.	98.	99.	100.	101.	102.
104.	107.	108.	109.	110.	111.	112.	113.	114.	115.
117.	119.	120.	121.	122.	123.	124.	125.	126.	127.
130.	132.	133.	134.	135.	136.	137.	138.	139.	140.
143.	145.	146.	147.	148.	149.	150.	151.	152.	153.
156.	158.	159.	160.	161.	162.	163.	164.	165.	166.
169.	171.	172.	173.	174.	175.	176.	177.	178.	179.
182.	184.	185.	186.	187.	188.	189.	190.	191.	192.
195.	197.	198.	199.	200.	201.	202.	203.	204.	205.
208.	210.	211.	212.	213.	214.	215.	216.	217.	218.
221.	223.	224.	225.	226.	227.	228.	229.	230.	231.
234.	236.	237.	238.	239.	240.	241.	242.	243.	244.
247.	249.	250.	251.	252.	253.	254.	255.	256.	257.
260.	262.	263.	264.	265.	266.	267.	268.	269.	270.
273.	275.	276.	277.	278.	279.	280.	281.	282.	283.
286.	288.	289.	290.	291.	292.	293.	294.	295.	296.
299.	301.	302.	303.	304.	305.	306.	307.	308.	309.
312.	314.	315.	316.	317.	318.	319.	320.	321.	322.
325.	327.	328.	329.	330.	331.	332.	333.	334.	335.
338.	340.	341.	342.	343.	344.	345.	346.	347.	348.
351.	353.	354.	355.	356.	357.	358.	359.	360.	361.
364.	366.	367.	368.	369.	370.	371.	372.	373.	374.
377.	379.	380.	381.	382.	383.	384.	385.	386.	387.
390.	392.	393.	394.	395.	396.	397.	398.	399.	400.
403.	405.	406.	407.	408.	409.	410.	411.	412.	413.
416.	418.	419.	420.	421.	422.	423.	424.	425.	426.
429.	430.	431.	432.	433.	434.	435.	436.	437.	438.
441.	443.	444.	445.	446.	447.	448.	449.	450.	451.
454.	456.	457.	458.	459.	460.	461.	462.	463.	464.
467.	469.	470.	471.	472.	473.	474.	475.	476.	477.
480.	482.	483.	484.	485.	486.	487.	488.	489.	490.
493.	495.	496.	497.	498.	499.	500.	501.	502.	503.
506.	508.	509.	510.	511.	512.	513.	514.	515.	516.
519.	520.	521.	522.	523.	524.	525.	526.	527.	528.
531.	533.	534.	535.	536.	537.	538.	539.	540.	541.
544.	546.	547.	548.	549.	550.	551.	552.	553.	554.
557.	559.	560.	561.	562.	563.	564.	565.	566.	567.
570.	572.	573.	574.	575.	576.	577.	578.	579.	580.
583.	585.	586.	587.	588.	589.	590.	591.	592.	593.
596.	598.	599.	600.	601.	602.	603.	604.	605.	606.
609.	611.	612.	613.	614.	615.	616.	617.	618.	619.
622.	624.	625.	626.	627.	628.	629.	630.	631.	632.
635.	637.	638.	639.	640.	641.	642.	643.	644.	645.
648.	650.	651.	652.	653.	654.	655.	656.	657.	658.
661.	663.	664.	665.	666.	667.	668.	669.	670.	671.
674.	676.	677.	678.	679.	680.	681.	682.	683.	684.
687.	689.	690.	691.	692.	693.	694.	695.	696.	697.
699.	701.	702.	703.	704.	705.	706.	707.	708.	709.
712.	714.	715.	716.	717.	718.	719.	720.	721.	722.
725.	727.	728.	729.	730.	731.	732.	733.	734.	735.
738.	740.	741.	742.	743.	744.	745.	746.	747.	748.
751.	753.	754.	755.	756.	757.	758.	759.	760.	761.
764.	766.	767.	768.	769.	770.	771.	772.	773.	774.
777.	779.	780.	781.	782.	783.	784.	785.	786.	787.
790.	792.	793.	794.	795.	796.	797.	798.	799.	800.
803.	805.	806.	807.	808.	809.	810.	811.	812.	813.
816.	818.	819.	820.	821.	822.	823.	824.	825.	826.
829.	830.	831.	832.	833.	834.	835.	836.	837.	838.
841.	843.	844.	845.	846.	847.	848.	849.	850.	851.
854.	856.	857.	858.	859.	860.	861.	862.	863.	864.
867.	869.	870.	871.	872.	873.	874.	875.	876.	877.
879.	881.	882.	883.	884.	885.	886.	887.	888.	889.
892.	894.	895.	896.	897.	898.	899.	900.	901.	902.
905.	907.	908.	909.	910.	911.	912.	913.	914.	915.
918.	920.	921.	922.	923.	924.	925.	926.	927.	928.
931.	933.	934.	935.	936.	937.	938.	939.	940.	941.
944.	946.	947.	948.	949.	950.	951.	952.	953.	954.
957.	959.	960.	961.	962.	963.	964.	965.	966.	967.
970.	972.	973.	974.	975.	976.	977.	978.	979.	980.
983.	985.	986.	987.	988.	989.	990.	991.	992.	993.
996.	998.	999.	1000.	1001.	1002.	1003.	1004.	1005.	1006.

DEAR
 GFS 1127
 C/L
 INCHES
 ACFT
 THOUS CU W

POUL COMBINED HYDROGRAPHS THROUGH BUSCH NO. 35 LAKE DAM (10042)

STAGE	557.00	559.00	560.00	561.50	562.00	563.00	564.00	565.00	566.00
FLOW	0.00	142.00	143.00	144.00	145.00	146.00	147.00	148.00	149.00
CAPACITY	0.00	120.00	121.00	122.00	123.00	124.00	125.00	126.00	127.00
ICOMP	1								
ICOMP2	1								
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS
CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	CLASS	

SUMMARY OF PMF AND ONE-HALF PMF FLOOD ROUTING

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS	
				RATIO 1 1.20	RATIO 2 1.20
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9
10	10	10	10	10	10
11	11	11	11	11	11
12	12	12	12	12	12
13	13	13	13	13	13
14	14	14	14	14	14
15	15	15	15	15	15
16	16	16	16	16	16
17	17	17	17	17	17
18	18	18	18	18	18
19	19	19	19	19	19
20	20	20	20	20	20
21	21	21	21	21	21
22	22	22	22	22	22
23	23	23	23	23	23
24	24	24	24	24	24
25	25	25	25	25	25
26	26	26	26	26	26
27	27	27	27	27	27
28	28	28	28	28	28
29	29	29	29	29	29
30	30	30	30	30	30
31	31	31	31	31	31
32	32	32	32	32	32
33	33	33	33	33	33
34	34	34	34	34	34
35	35	35	35	35	35
36	36	36	36	36	36
37	37	37	37	37	37
38	38	38	38	38	38
39	39	39	39	39	39
40	40	40	40	40	40
41	41	41	41	41	41
42	42	42	42	42	42
43	43	43	43	43	43
44	44	44	44	44	44
45	45	45	45	45	45
46	46	46	46	46	46
47	47	47	47	47	47
48	48	48	48	48	48
49	49	49	49	49	49
50	50	50	50	50	50
51	51	51	51	51	51
52	52	52	52	52	52
53	53	53	53	53	53
54	54	54	54	54	54
55	55	55	55	55	55
56	56	56	56	56	56
57	57	57	57	57	57
58	58	58	58	58	58
59	59	59	59	59	59
60	60	60	60	60	60
61	61	61	61	61	61
62	62	62	62	62	62
63	63	63	63	63	63
64	64	64	64	64	64
65	65	65	65	65	65
66	66	66	66	66	66
67	67	67	67	67	67
68	68	68	68	68	68
69	69	69	69	69	69
70	70	70	70	70	70
71	71	71	71	71	71
72	72	72	72	72	72
73	73	73	73	73	73
74	74				

HYDROGRAPH AT	10097	(	36	1	2021.	1511.
			.034	(	88.5516	45.7816
ROUTED TO	10093		.36	1	2046.	1424.
			.931	(	81.1331	45.3216
HYDROGRAPH AT	10089		1.26	1	9772.	4849.
			3.261	(	276.7216	134.1316
ROUTED TO	10084		1.26	1	8605.	3845.
			3.231	(	243.7216	116.6316
2 COMBINED	10092		1.52	1	11245.	5149.
			4.201	(	319.5516	145.7216
HYDROGRAPH AT	10092		1.57	1	10119.	4705.
			4.331	(	333.1816	171.5316
2 COMBINED	10092		1.29	1	23319.	11072.
			8.521	(	560.5316	315.7216
ROUTED TO	10092		3.521	1	21007.	7935.
			8.521	(	276.7216	124.6316

SUMMARY OF DAM SAFETY ANALYSIS

PLP 1

ELEVATION STORAGE OUTFLOW	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
597.00	597.00	597.00	593.00		
87.	87.	87.	200.		
0.	0.	0.	60.		
MAXIMUM RESERVOIR WATERLEVEL	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
593.00	210.	2864.	4.00	14.00	0.00
593.00	211.	1424.	3.25	16.00	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION STORAGE OUTFLOW	INITIAL VALUE 596.0 60. 0.	SPILLWAY CREST 596.00 60. 0.	TOP OF DAM 600.00 130. 1301.	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
MAXIMUM REFUGIARY U.S. EL.	600.74 502.65	MAXIMUM STORAGE AC-FT	299. 217.	8509. 3886.	5.92 3.17	16.17 16.17	0.00 0.00
RATIO OF PHF	1.70 1.40	MAXIMUM DEPTH OVER DAM	1.74 2.61				

SUMMARY OF DAM SAFETY ANALYSIS

PLA 1	ELEVATION STORAGE OUTFLOW	MAXIMUM RESERVOIR W. ELEV	MAXIMUM STORAGE 22-FT	MAXIMUM OUTFLOW CFS	DURATION OVER 10 HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
INITIAL VALUE	587.00	557.00	563.00	1001.	16.25	16.42	0.00
1001.	1001.	1001.	1001.	1001.	1001.	1001.	1001.
2751.	2751.	2751.	2751.	2751.	2751.	2751.	2751.

PERCENT OF PMF FLOOD ROUTING
EQUAL TO SPILLWAY CAPACITY

46

D-54

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 10011
 ROUTE HYDROGRAPH TO 10049
 ROUTE HYDROGRAPH AT 10049
 ROUTE HYDROGRAPH TO 10049
 COMPUTE HYDROGRAPHS AT 10049
 RUNOFF HYDROGRAPH AT 10049
 COMBINE HYDROGRAPHS AT 10049
 ROUTE HYDROGRAPH TO 10049
 END OF NETWORK

RUN DATE: 10/02/03
TIME: 12057.35

DAP SAFETY INSPECTION - MISSOURI
USCM WILDLIFE AREA NO. 15 LAKE DAP (18092)
PERCENT OF TIME DETERMINATION AND ROUTING

NO	YMS	MAIN	DAY	JOB SPECIFICATION				IPLT	IPRT	NSTAN
000	0	0	0	INP	IN	WTRC	0	0	4	
				JOBER	WNT	LRGPT	TRACE			
					0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED

[illegible]

SUB-AREA RUFF COMPUTATION

INPUT ONE INDEX RAINFALL. SCS UNIT HYDROGRAPH PARAMETERS FOR U/S DAM (10093)

ISTAL	IEMP	IECON	ITAPE	JPLY	JPRY	ITAVE	ISTAGE	IAUTO
0	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

ISNO	ISAME	LOCAL	ISNO	ISAME	LOCAL
1	0	0	1	0	0
2	0	0	2	0	0
3	0	0	3	0	0
4	0	0	4	0	0
5	0	0	5	0	0
6	0	0	6	0	0
7	0	0	7	0	0
8	0	0	8	0	0
9	0	0	9	0	0
10	0	0	10	0	0
11	0	0	11	0	0
12	0	0	12	0	0
13	0	0	13	0	0
14	0	0	14	0	0
15	0	0	15	0	0
16	0	0	16	0	0
17	0	0	17	0	0
18	0	0	18	0	0
19	0	0	19	0	0
20	0	0	20	0	0
21	0	0	21	0	0
22	0	0	22	0	0
23	0	0	23	0	0
24	0	0	24	0	0
25	0	0	25	0	0
26	0	0	26	0	0
27	0	0	27	0	0
28	0	0	28	0	0
29	0	0	29	0	0
30	0	0	30	0	0
31	0	0	31	0	0
32	0	0	32	0	0
33	0	0	33	0	0
34	0	0	34	0	0
35	0	0	35	0	0
36	0	0	36	0	0
37	0	0	37	0	0
38	0	0	38	0	0
39	0	0	39	0	0
40	0	0	40	0	0
41	0	0	41	0	0
42	0	0	42	0	0
43	0	0	43	0	0
44	0	0	44	0	0
45	0	0	45	0	0
46	0	0	46	0	0
47	0	0	47	0	0
48	0	0	48	0	0
49	0	0	49	0	0
50	0	0	50	0	0
51	0	0	51	0	0
52	0	0	52	0	0
53	0	0	53	0	0
54	0	0	54	0	0
55	0	0	55	0	0
56	0	0	56	0	0
57	0	0	57	0	0
58	0	0	58	0	0
59	0	0	59	0	0
60	0	0	60	0	0
61	0	0	61	0	0
62	0	0	62	0	0
63	0	0	63	0	0
64	0	0	64	0	0
65	0	0	65	0	0
66	0	0	66	0	0
67	0	0	67	0	0
68	0	0	68	0	0
69	0	0	69	0	0
70	0	0	70	0	0
71	0	0	71	0	0
72	0	0	72	0	0
73	0	0	73	0	0
74	0	0	74	0	0
75	0	0	75	0	0
76	0	0	76	0	0
77	0	0	77	0	0
78	0	0	78	0	0
79	0	0	79	0	0
80	0				

PPICIP DATA

[illegible]

LOSS DATA

	LNQDPI	SPRNG	DLFKH	RTICL	EPALI	STRKS	RTION	STRIL	CNSTL	ALSYK	RTIMP
	0.00	0.00	0.00	1.00	0.00	0.00	1.00	-1.00	-9.00	0.00	0.00

CC-06 = 43 J0343 CC-01 = 2 SSMJM 00006 = OF. JAHM

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .35

RECEIVED

```
STATIQ= 0.00 GRCSNE 0.00 RTIOM= 1.00
```

END-OF-PERIOD FLOW

NO. 1	NO. 2	PERIOD	RAIN	EXCS	LOSS	COMP O	MO. DA	HR. MIN	PERIOD	RAIN	EXCS	LOSS	COMP O
1	2	3	4	5	6	7	8	9	10	11	12	13	14

SUM 32.63 31.68 .75 88799.
 (129.01 MIC.) 19.1 (251.51)

ROUTE HYDROGRAPH THROUGH UZ DAM (INCH)

ISTAG	ICOMP	TECON	ITAPE	JPLT	UP-T	INAME	ISTAGE	IAUTO
1-1-63	1	0	0	0	0	1	3	0
OLDS	CLDS	AV	ROUTING DATA	TCPT	TEMP		LSTP	
0.0	0.000	0.00	1-1-63	1	0			
ASTDS	ASTOL	LAG	ANSM	X	TSK	STORA	ISPRAT	
1	0	0.010	0.00	0.000	-547.		-1	

STAGE	887.00	589.00	591.00	592.00	595.00	596.00
ELW	0.00	62.00	65.00	68.00	6761.00	12416.00

CAPACITY	0.	20.	87.	200.	398.	800.
ELEVATION	568.	563.	567.	593.	600.	610.

CPEL	PMID	COU4	RYEN	ELEV	COAL	CAREA	EXPL
587.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TYPEL	COOD	RYEN	TEMP
503.0	0.0	0.0	0.

PEAK OUTFLOW IS 187. AT TIME 17.75 HOURS

PEAK OUTFLOW IS 224. AT TIME 17.33 HOURS

PEAK OUTFLOW IS 252. AT TIME 17.08 HOURS

PEAK OUTFLOW IS 289. AT TIME 16.83 HOURS

PEAK OUTFLOW IS 330. AT TIME 16.67 HOURS

PEAK OUTFLOW IS 392. AT TIME 16.50 HOURS

PEAK OUTFLOW IS 444. AT TIME 16.42 HOURS

PEAK OUTFLOW IS 543. AT TIME 16.33 HOURS

PBOJ 0.00 653.00 1301.00 2926.00 4991.00 9895.00 14121.00
 CAPACITY= 0. 59. 158. 315. 500.
 ELEVATIONS 480. 530. 600. 606. 610.
 CREL SPJID COOL EXPD EVEL COOL CAREA EXPL
 596.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA
 TOPFL CORD FJPD DAMPID
 500.0 0.0 0.0 0.0

PEAK OUTFLOW IS 1941. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2019. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2197. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2175. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2211. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2326. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2405. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2482. AT TIME 16.25 HOURS
 PEAK OUTFLOW IS 2558. AT TIME 16.25 HOURS

COMBINE HYDROGRAPHS

COMBINE ROUTED U/S HYDROGRAPHS

ISTAG	ICOMP	ISECON	ITIME	UPLT	INAME	ISTAGE	TAUTO
10002	2	0	0	0	1	1	1

SUB-AREA RUNOFF COMPUTATION

INPUT RNF INDEX RAINFALLY SEC UNIT HYDROGRAPH PARAMETERS FOR MAIN DAM (11000)
 ISTAG ICOMP ISECON ITIME UPLT INAME ISTAGE TAUTO

	\$97.08	\$60.00	\$63.50	\$64.00	\$65.00
TAG:					
	149.00	1856.00	2751.00	4008.00	8952.00
ELOW	- .00				1472.

CAPACITY	0.	10.	115.	1001.	1274.	1658.	2596.
ELEVATIONS	525.	545.	550.	557.	560.	564.	570.
	CRFL	SPUD	CRW	EFW	FLEVL	COCL	CAREL
	557.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA			
TOPEL	COOC	EXPO	DAMUD
564.0	0.0	0.0	0.0

5 AT OUTFLOW IS 235% AT TIME 17.05 HOURS

PEAK OUTFLOW IS 245% AT TIME 17.15 HOURS

PEAK OUTFLOW IS 257% AT TIME 17.15 HOURS

PEAK OUTFLOW IS 268% AT TIME 17.15 HOURS

PEAK OUTFLOW IS 274% AT TIME 17.15 HOURS

PEAK OUTFLOW IS 311% AT TIME 17.08 HOURS

PEAK OUTFLOW IS 335% AT TIME 17.00 HOURS

PEAK OUTFLOW IS 360% AT TIME 16.02 HOURS

PEAK OUTFLOW IS 330% AT TIME 16.00 HOURS

.....

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS								
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
HYDROGRAPH AT	10093	36	1	841.		706.	937.	967.	957.	1027.	1037.	1086.
		(952)	(25.75)	(24.31)		(26.52)	(27.58)	(28.33)	(29.09)	(29.94)	(30.80)	(31.66)
ROUTED TO	10092	36	1	137.	244.	322.	284.	332.	392.	461.	543.	609.
		(953)	(54.00)	(6.53)		(7.14)	(8.04)	(9.55)	(11.11)	(13.14)	(15.23)	(17.23)
HYDROGRAPH AT	10094	124	1	2754.	2334.	2932.	3027.	3127.	3225.	3323.	3420.	3518.
		(3.26)	(77.48)	(83.25)		(89.02)	(95.79)	(84.55)	(91.33)	(94.04)	(96.85)	(99.68)
ROUTED TO	10089	126	1	1641.	2019.	2097.	2175.	2251.	2328.	2405.	2482.	2559.
		(3.26)	(54.95)	(57.16)		(59.37)	(61.58)	(63.76)	(65.93)	(68.10)	(70.27)	(72.43)
2 COMBINED	10092	162	1	2907.	2085.	2144.	2242.	2322.	2444.	2795.	3002.	3197.
		(4.23)	(50.83)	(59.05)		(61.26)	(63.43)	(65.77)	(74.21)	(74.13)	(85.00)	(85.41)
HYDROGRAPH AT	10092	167	1	3302.	3515.	3776.	3757.	3878.	3999.	4121.	4242.	4363.
		(4.33)	(96.07)	(99.52)		(102.95)	(106.37)	(107.82)	(113.25)	(115.58)	(120.11)	(123.54)
2 COMBINED	10092	329	1	5212.	5409.	5606.	5802.	5997.	6194.	6391.	6582.	6780.
		(9.52)	(147.57)	(153.17)		(158.73)	(164.30)	(169.82)	(175.33)	(180.86)	(186.37)	(191.86)
ROUTED TO	10092	329	1	2353.	2457.	2572.	2688.	2874.	3151.	3364.	3604.	3830.
		(9.52)	(66.03)	(49.68)		(72.82)	(76.03)	(81.38)	(88.65)	(95.41)	(101.98)	(108.45)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION
STORAGE
OUTFLOW

INITIAL VALUE
597.00
87%
0%

SPILLWAY CREST
597.00
87%
0%

TOP OF DAM
598.00
90%
6%

PATIO OF PBF	MAXIMUM RESERVATION ELEV	MAXIMUM TUPIN OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
28	593.34	0.4	2014	187.	1.25	17.76	0.00
29	593.25	0.5	2014	224.	1.67	17.33	0.00
30	593.16	0.6	2014	252.	1.92	17.01	0.00
31	593.06	0.6	202.	284.	2.08	16.83	0.00
32	593.08	0.6	202.	332.	2.22	16.67	0.00
33	593.17	0.7	203.	362.	2.42	16.50	0.00
34	593.17	0.7	203.	444.	2.50	16.42	0.00
35	593.14	0.8	204.	543.	2.54	16.33	0.00
36	593.16	0.8	204.	604.	2.54	16.33	0.00

SUMMARY OF DAM SAFETY ANALYSIS

ELEVATION STORAGE OUTFLOW		INITIAL VALUE	SPILLWAY CAPCY	TOP OF DAM	TIME OF FAILURE	
		596.00	596.00	600.00	HOURS	
		0%	0%	15%		
				1501.		
RATIO	MAXIMUM RESERVOIR ELEV	MINIMUM OVER DAM	MAXIMUM STORAGE	MAXIMUM OUTFLOW	TIME OF OVER TOP	TIME OF MAX OUTFLOW
			LC-FT	LF	HOURS	HOURS
0.20	600.74	0.70	11.0	194.1	1.08	16.25
0.30	601.14	0.80	16.5	209.7	1.17	16.25
0.40	601.54	0.9	16.8	209.7	1.17	16.25
0.50	601.94	1.0	17.3	217.3	1.25	16.25
0.60	602.34	1.1	17.5	226.1	1.42	16.25
0.70	602.74	1.2	17.5	232.4	1.57	16.25
0.80	603.14	1.3	17.9	240.5	1.70	16.25
0.90	603.54	1.4	18.2	248.2	1.88	16.25
1.00	603.94	1.5	18.5	254.1	1.97	16.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION
STORAGE
OUTFLOW

INITIAL VALUE
557.00
1001.00
0.00

SPILLWAY CREST
557.00
1001.00
0.00

TOP OF DAM
563.00
1654
2751.00

RATIO
OF
PWF

MAXIMUM
RESERVOIR
W-SALLEV

MAXIMUM
DEPTH
OVER DAM

MAXIMUM
STORAGE
AC-FT

MAXIMUM
OUTFLOW
CFS

DURATION
OVER TOP
HOURS

TIME OF
MAX OUTFLOW
HOURS

TIME OF
FAILURE
HOURS

.20	562.83	0.00	1545.	2353.	0.00	17.25	0.00
.20	563.01	0.00	1604.	2457.	0.00	17.33	0.00
.30	563.20	0.00	1625.	2572.	0.00	17.33	0.00
.31	563.19	0.00	1646.	2685.	0.00	17.33	0.00
.32	563.15	.35	1665.	2878.	.75	17.25	0.00
.33	563.05	.15	1680.	3131.	1.25	17.08	0.00
.34	563.75	.13	1694.	3360.	1.50	17.00	0.00
.35	563.94	.54	1707.	3601.	1.75	16.92	0.00
.36	563.01	.44	1720.	3830.	1.92	16.92	0.00