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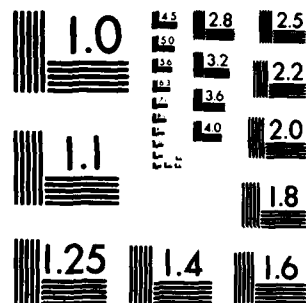
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NATIONAL PROGRAM OF INSPECTION OF NON-FEDERAL DAMS, TENNESSEE. --ETC(U)
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-4106241	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) National Program of Inspection of Non-Federal Dams Tennessee. Reed Lake Dam No. 2 (Inventory Number TN 16707) near Millington, Tennessee, Tipton County, TN, Loosahatchie River Basin		5. TYPE OF REPORT & PERIOD COVERED Phase 1 Investigation Report
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Reed Lake Dam No. 2 has a 10.1 acre lake and is located in Tipton County, Tennessee approximately one mile north of the Shelby County line and one mile west of Highway 51, and is an earth fill embankment 14 feet high and 320 feet long and the crest width is ten feet. Facilities for discharge from the reservoir are located in the right abutment and consists of two cuts in the abutments. The new spillway has a bottom and top width of 15 feet and 47 feet respectively and the old spillway has a bottom and top width of 12 feet and 33 feet respectively. The combined discharge is 149 cfs. The embankment slopes		

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are 1V on 2H on the upstream slope and 1V on 1H on the downstream slope. Both upstream and downstream slopes have undesirable vegetation. Reed Lake Dam No. 2 is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and I by the State of Tennessee. On the basis of hydraulic analysis, Reed Lake Dam No. 2 flood storage (15 acre-feet) and spillways are inadequate to safely pass the 1/2 Probable Maximum Flood (PMF), which Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories. The dam is considered "Unsafe-Non-emergency". It is recommended that a qualified engineer be engaged to: Plan and supervise the removal of all trees and underbrush from both slopes of the dam; determine if unsafe conditions exist on both slopes of the embankment and design and supervise construction of remedial measures to provide a safe embankment; design project modifications that will allow safe passage of the design flood; recommend stabilization measures to protect both slopes from wave erosion; evaluate the stability of the dam with earthquake loadings; develop a regular program of inspection and maintenance; develop an emergency action plan to alert downstream residents in the event a major problem develops with the dam.

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DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

2 SEP 1981

IN REPLY REFER TO

ORND-G

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

Furnished herewith is the Phase I Investigation Report on Reed Lake Dam No. 2 near Millington, Tennessee. The report was prepared under the authority and provisions of PL 92-367, the National Dam Inspection Act, dated 8 August 1972.

The report presents details of the field inspection, background information, technical analyses, findings, and recommendations for improving the condition of the dam.

Based upon the inspection and subsequent evaluation, Reed Lake Dam No. 2 is classified as unsafe-nonemergency due to insufficient storage and spillway capacity to pass the design flood and also instability of both the upstream and downstream slopes.

We do not consider this an emergency situation at this time, but the recommendation concerning project modifications to allow safe passage of the design flood and others contained in this report should be undertaken in the near future.

Public release of the report and initiation of public statements fall within your prerogative. However, under provisions of the Freedom of Information Act, the Corps of Engineers is required to respond fully to inquiries on information contained in the report and to make it accessible for review on request.

Your assistance in keeping me informed of any further developments will be appreciated.

Sincerely,

LEE W. TUCKER
Colonel, Corps of Engineers
Commander

1 Incl
As stated

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

PHASE I INSPECTION
REED LAKE DAM NO. 2
TIPTON COUNTY, TENNESSEE

Prepared By:
WINSETT-SIMMONDS, CONSTERDINE & ASSOCIATES, INC.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
TENNESSEE

Name of Dam	Reed Lake Dam No. 2
County	Tipton
Stream	Tributary North Fork Creek
Date of Inspection	April 7, 1981

This investigation and evaluation report was prepared for the Tennessee Department of Conservation, Division of Water Resources by Winsett-Simmonds, Consterdine & Associates, Inc., P.O. Box 40045, Memphis, TN 38104.

Prepared By:

Wm. E. Bush
Wm. E. Bush, P.E., Director
Civil & Water Resources Engineering



ABSTRACT

Reed Lake Dam No. 2 has a 10.1 acre lake and is located in Tipton County, Tennessee approximately one mile north of the Shelby County line and one mile west of Highway 51, and is an earth fill embankment 14 feet high and 320 feet long. The crest width is ten feet. Facilities for discharge from the reservoir are located in the right abutment and consists of two cuts in the abutments. The new spillway has a bottom and top width of 15 feet and 47 feet respectively and the old spillway has a bottom and top width of 12 feet and 33 feet respectively. The combined discharge is 149 cfs.

The embankment slopes are 1V on 2H on the upstream slope and 1V on 1H on the downstream slope. Both upstream and downstream slopes have undesirable vegetation.

Reed Lake Dam No. 2 is in the small size category and has a downstream hazard potential classification of high by the Corps of Engineers and I by the State of Tennessee.

On the basis of hydraulic analysis, Reed Lake Dam No. 2 flood storage (15 acre-feet) and spillways are inadequate to safely pass the $\frac{1}{2}$ Probable Maximum Flood (PMF), which Office of the Chief of Engineers (O.C.E.) Guidelines specify to be the design flood for a dam in the small size and high hazard categories.

At this time, the dam is considered "Unsafe-Non-emergency". It is recommended that a qualified engineer be engaged to: Plan and supervise the removal

of all trees and underbrush from both slopes of the dam; determine if unsafe conditions exist on both slopes of the embankment and design and supervise construction of remedial measures to provide a safe embankment; design project modifications that will allow safe passage of the design flood; recommend stabilization measures to protect both slopes from wave erosion; evaluate the stability of the dam with earthquake loadings; develop a regular program of inspection and maintenance; develop an emergency action plan to alert downstream residents in the event a major problem develops with the dam.

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OVERVIEW PHOTO

PHASE I INSPECTION
REED LAKE DAM NO. 2
TIPTON COUNTY, TENNESSEE

SECTION 1 - GENERAL

- 1.1 Authority - The Phase I inspection of this dam was carried out under the authority of the Tennessee Code Annotated 70-2501 to 70-2530, "The Safe Dams Act of 1973", in cooperation with the Corps of Engineers under the authority of PL 92-367, "The National Dam Inspection Act".
- 1.2 Purpose and Scope - This report is prepared under guidance contained in Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analysis involving topographic mapping, subsurface investigation, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. Additional data or data furnished containing incorrect information could alter the findings of this report.

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

- 1.3 Past Inspections - An inventory reconnaissance trip was made to Reed Lake Dam No. 2 by the Division of Water Resources, State of Tennessee.
- 1.4 Miscellaneous Details - On the day of the Phase I inspection, the weather was cloudy with temperatures of 75 and the wind was calm. The level of the lake was approximately at the crest of the emergency spillway.
- 1.5 Inspection Team Members - Field inspection was made by the following Winsett-Simmonds, Consterdine & Associates, Inc. personnel:
 - William E. Bush, P.E.
Civil Engineer
 - Dr. Fred H. Kellogg, P.E.
Geotechnical EngineerThe team was accompanied by Messrs. George Moore and David Roe of the Tennessee Division of Water Resources.

SECTION 2 - PROJECT DESCRIPTION

2.1 Location

Reed Lake Dam No. 2 is located in Tipton County, Tennessee approximately one mile north of the Shelby County line and one mile west of Highway 51. It can be located on the USGS map, "Munford, Tennessee" at longitude $89^{\circ}51'35''$ and latitude $35^{\circ}25'32''$.

2.2 Description

2.2.1 Embankment - The Reed Lake Dam No. 2 is an earth embankment with an east-west orientation, a maximum height of 14 feet and a length of 320 feet. The crest width is ten feet. The upstream slope averages less than one vertical on two horizontal from the waterline to the top of the dam. The downstream slope generally is one vertical on one horizontal. Several areas have deteriorated to a vertical slope. Embankment sketches are provided in Exhibit B.

2.2.2 Service Spillway/Low Level Outlet - There is no service spillway.

2.2.3 Emergency Spillway - Both the new and old emergency spillways are located in the right abutment. The new spillway is a trapezoidal shape with a bottom width of 15 feet and a top width of 47 feet, a depth of two feet and a maximum capacity of 96 cfs. The old spillway is located immediately west of the new emergency spillway and has bottom and top width of 12 feet and 33 feet. The bottom elevation is approximately 0.2 feet above the bottom elevation of the new spillway. The old spillway has a capacity of about 53 cfs.

2.2.4 Reservoir and Drainage Area - The reservoir has a surface area of 10.1 acres at normal pool elevation with a fetch of 850 feet. The normal impounding capacity of the reservoir is estimated to be 38.7 acre-feet with an additional 15 acre-feet of flood storage. The total drainage area for Dam No. 2 is 98.6 acres and the predominant soil is Memphis Silt Loam.

2.2.5 Miscellaneous - Reed Dam No. 2 was built in 1952. It was reported that some technical assistance was provided by the Tipton County Soil Conservation Service, but no plans or construction information were available. No failures, overtopping, or major repairs was reported. The lake is used for recreational purposes.

Reed Dam No. 2 is the middle dam in a series of three impoundment reservoirs. Reed Dam No. 3 is upstream from Reed Dam No. 2 approximately 850 feet. Reed Dam No. 1 is downstream approximately 900 feet.

SECTION 3 - INSPECTION FINDINGS

3.1 Specific Findings

3.1.1 Embankment

Geology - The dam embankment is from an area that is of clay with low plasticity (Group "CL" in the Unified Classification System). In the case of Reed Lake Dam No. 2, the underlying terrace sand and gravel do not appear to effect this dam.

Crest - The crest of the Reed Dam No. 2 is about ten feet wide. The crest is subject to vehicular traffic and has been protected somewhat by gravel. There are holes caused by boring animals all along the upstream edge of the crest. The level of the crest rises approximately $3\frac{1}{2}$ feet from the edge of the emergency spillway on the west to the east abutment.

Upstream Slope - The upstream slope has been eroded by wave action almost to the crest for virtually the entire length of the dam. It is badly overgrown with a dense growth of weeds and blackberry vines. There are crayfish holes about 200 feet west of the east abutment. Approximately 50 feet from the east end of the dam, a small slip was observed near the top of the dam. There were several other smaller slips along the top of the slope. Several large chunks were caving off along the way. Most of these large pieces were developed around fescue stools that had been undercut by wave action. Once undercut, these large clumps of fescue appear to have rolled

back down the slope. In one area, a row of holes approximately six inches below the top of the dam, delineated an area that was sloughing badly.

Downstream Slope - This slope generally is LV on LH. There is a path along a bench about halfway down the slope. The slope is generally very rough with a heavy cover of brush. About 50 to 200 feet east of the west abutment a slide was observed that had a nearly vertical face about eight feet high with a bulge below it. Three holes were observed in open areas on the backslope. The first, near Station 2+00, was approximately 12 inches in diameter and the opening was approximately two feet above the tailwater elevation of Reed Lake No. 1. The second hole was found near Station 3+80 and the opening was approximately ten inches by six inches and the depth was 15 inches. This hole occurred approximately five feet above the tailwater elevation of Reed Lake No. 1. The third hole was smaller than the second and was located near the second hole. The origin of these holes could not be determined by visual observation. Near the east abutment is an area that the owners have tried to stabilize by driving posts and using timber cribbing. This has failed and has been rotted out for several years.

Abutments - There is erosion along the contact of the downstream slope with the east abutment. Small gullies have developed. Slight erosion has occurred along the contact between the abutment and the upstream slope. This erosion is due primarily

to paths being cut by fisherman and cattle.

3.1.2 Seismic Zone - Reed Lake Dam No. 2 is in Seismic Zone 3. No record of any stability analysis could be found.

3.1.3 Seepage - The only evidence of seepage on the downstream slope was in the jug discussed in the above paragraph. This area was damp but did not have water flowing from it at the time of the reconnaissance.

3.1.4 Spillways - The spillway is a vegetated earth spillway and is located in the west abutment. The present spillway was apparently cut sometime after the dam had been completed. The old spillway was left open. The new spillway has a small rill in the control section and had a small flow at the time of the reconnaissance. The outflow of the spillway shows no significant erosion and is grown up in trees. The outflow enters the tail waters of Reed Lake No. 1 over an overfall of approximately two to three feet. This overfall shows some signs of erosion.

3.1.5 Downstream Inspection and Hazard Classification - The Reed Dam No. 2 has a downstream hazard potential classification of high. This classification was made because of the probable damage to Reed Lake No. 1 should Reed Lake No. 2 fail and resultant damage to the houses and trailers below Reed Dam No. 1.

3.1.6 Hydrology and Hydraulics - According to O.C.E. Guidelines, dams with a small size, high hazard classification should have storage and spillway capacity to pass the $\frac{1}{2}$ PMF without overtopping the dam. The Probable Maximum Precipitation (PMP) of 29.7 inches in six hours yields a $\frac{1}{2}$ PMF of 12.26 inches. Time of concentration was estimated to be 0.6 hours and flood storage from normal pool to the low point of top of dam is estimated to be 15 acre-feet.

Reed Dam No. 2 is in series with Reed Dam No. 3. The upstream dam is a small dam with a permanent pool of six acres and a height of 8.6 feet. Routing of the $\frac{1}{2}$ PMF flood through Reed Dam No. 3 produced a flow over the top of the structure and it was presumed that the structure would fail at this point. A breach hydrograph was developed for Reed Dam No. 3 using the Soil Conservation Service methods. This breach hydrograph was then combined with the $\frac{1}{2}$ PMF hydrograph for Dam No. 2. Routing of the combined $\frac{1}{2}$ PMF (Antecedent Moisture Condition II) produced a peak outflow of 1902 cfs. Reed Dam No. 2 was overtopped a maximum of one foot with flows that lasted 3.1 hours.

The 100-year, 6-hour (AMC III) flood was routed through structure no. 3 and 2. The 100-year, 6-hour precipitation was 5.5 inches. This produced a runoff of 3.53 inches. The 100-year flood was contained within Dam No. 3 and the routed hydrograph of Dam No. 3 was then combined with the uncontrolled area 100-year hydrograph for Dam No. 2. This combined hydrograph was then routed through Dam No. 2 and with a routed peak

discharge of 89.6 cfs. Reed Dam No. 2 contained the storm with flows of 1.5 feet in the emergency spillway and a free-board of 0.5 feet.

3.2 Conclusions and Recommendations

3.2.1 Conclusions

- a. Hydraulic analysis indicates that the Reed Lake Dam No. 2 spillway is seriously inadequate to pass the design flood. Outflow resulting from the $\frac{1}{2}$ PMF will overtop the dam a maximum of 1.0 feet with flows that lasted 3.1 hours.
- b. On the basis of engineering judgment and visual observations both the upstream and downstream slopes are showing signs of instability and could become dangerous in the not too distant future.
- c. Reed Lake Dam No. 2 is in Seismic Zone 3. Stability analysis of the embankment with earthquake loading is not within the scope of this report.
- d. Failure of Reed Lake Dam No. 2 could result in failure of the downstream structure, Reed Lake Dam No. 1.
- e. Reed Lake Dam No. 2 is considered as "Unsafe-Non-Emergency" because it is a dam with obviously serious deficiencies which clearly could develop or are developing into failure modes but do not yet pose the threat of immediate failure.

- #### 3.3.2 Recommendations - Remedial work should begin as soon as possible.
- The dam should be kept under surveillance by the owner for further

movement on the downstream slope and or erosion of the upstream slope close to the crest of the dam until remedial work is begun, also consideration should be given to methods and length of time required to completely draw down the reservoir. Qualified engineers should be engaged at an early date to:

- a. Plan and supervise the removal of all trees and underbrush from both slopes of the dam.
- b. Determine if unsafe conditions exist on both slopes of the embankment and design and supervise construction of remedial measures to provide a safe embankment.
- c. Design project modifications that will allow safe passage of the design flood without overtopping the dam. Basis for development of the design flood should include failure of Reed Dam No. 3, plus the $\frac{1}{2}$ PMF if no improvements are made to Reed Dam No. 3, or the $\frac{1}{2}$ PMF only if improvements are made to Reed Dam No. 3 so that it can safely pass the $\frac{1}{2}$ PMF without overtopping.
- d. Recommend stabilization measures to protect both the upstream and downstream slopes from wave erosion.
- e. Evaluate the stability of the dam with earthquake loadings.
- f. Develop a regular program for inspection and maintenance of the embankment and spillway on at least an annual basis.
- g. Develop an emergency action plan to alert downstream residents in the event a major problem develops with Reed Lake No. 2.

In addition, the owner should clear the embankment of all trees and underbrush.

SECTION 4 REVIEW BOARD FINDINGS

The Interagency Review Board for the National Program of Inspection of Non-Federal Dams met in Nashville on 2 June 1981 to examine the technical data contained in the Phase I investigation report for Reed Lake Dam No. 2. The Review Board considered the information and recommended that (1) the spillway should be described as a "seriously inadequate spillway", (2) the discrepancy in the description of the holes in Section 3.3.2 should be resolved, (3) the condition classification should be changed from "significantly deficient" to "unsafe-nonemergency", (4) slope instability and seriously inadequate spillway capacity should be given as reasons for classifying the dam as unsafe-nonemergency, and (5) an emergency action plan should be developed, including a warning system to alert downstream residents in the event a serious condition develops with the project. They agreed with other report conclusions and recommendations. A copy of the letter report presented by the Review Board is included in Appendix I.

APPENDIX A
DATA SUMMARY SHEET

APPENDIX A DATA SUMMARY SHEET

A.1 DAM - Reed Lake Dam No. 2

A.1.1 Type - Earth Fill

A.1.2 Dimensions and Elevations - Elevations were determined from assuming a normal pool elevation as shown on the USGS 15 minute quadrangle, Munford, Tennessee.

a.	Crest length	320 feet
b.	Crest width	10 feet
c.	Height	14 feet
d.	Crest elevation	354.5 feet
e.	Emergency spillway elev.	352.5 feet
f.	Embankment slope, U/S (from water surface to crest)	1V on 1 H
g.	Embankment slope, D/S from (toe to crest)	1V on 2H
h.	Size Classification	Small

A.1.3 Zones, Outoffs, Grout Curtains None

A.1.4 Instrumentation None

A.2 RESERVOIR AND DRAINAGE AREA

A.2.1 Reservoir - (Normal pool elevation 352.5 feet, two feet below the effective crest).

a.	Surface area	10.1 acres
b.	Length of pool	850 feet
c.	Capacity (Normal pool)	38.7 acre-feet
d.	Maximum surface area	10.7 acres
e.	Flood storage	15 acre-feet

A.2.2 Drainage Area

a. Size - 98.6 acres (0.154 square miles)

b. Characteristics:
Average watershed slope - 6.8%
soil - Memphis Silt Loam
Cover - Woods, 50.2%; open, 33.4%;
water 16.4%

c. Runoff PMF (AMC II) 24.52 inches

d. Runoff $\frac{1}{2}$ PMF (AMC II) 12.26 inches

e. Runoff P₁₀₀ (AMC III) 3.53 inches

A.3 OUTLET STRUCTURES

A.3.1 Drawdown Facilities - None

A.3.2 Service Spillway - None

A.3.3 Emergency Spillways (west abutment)

New Spillway

a.	Crest elevation	352.5 feet
b.	Side slope (left)	1V on 8H
c.	Side slope (right)	1V on 8H
d.	Depth	2 feet
e.	Bottom width	15 feet
f.	Control section length	20 feet

Old Spillway

a.	Crest elevation	352.7 feet
b.	Side slope (left)	1V on 4H
c.	Side slope (right)	1V on 6H
d.	Depth	1.8 feet
e.	Bottom width	12 feet
f.	Control section length	80 feet

Combined Maximum Capacity 149 cfs.

A.4 HISTORICAL DATA

A.4.1	Construction Date	1952
A.4.2	Designer	Unknown
A.4.3	Builder	Unknown
A.4.4	Owner	Paul Wayne Reed
A.4.5	Previous Inspection	Inventory Only
A.4.6	Seismic Zone	3

A.5 DOWNSTREAM HAZARD DATA

A.5.1	Downstream Hazard Potential Classification	
a.	Corps of Engineers	High
b.	State of Tennessee	I
A.5.2	Persons in Probable Flood Path	27 persons (est.)
A.5.3	Downstream Property	3 permanent houses and 5 trailers
A.5.4	Warning Systems	None

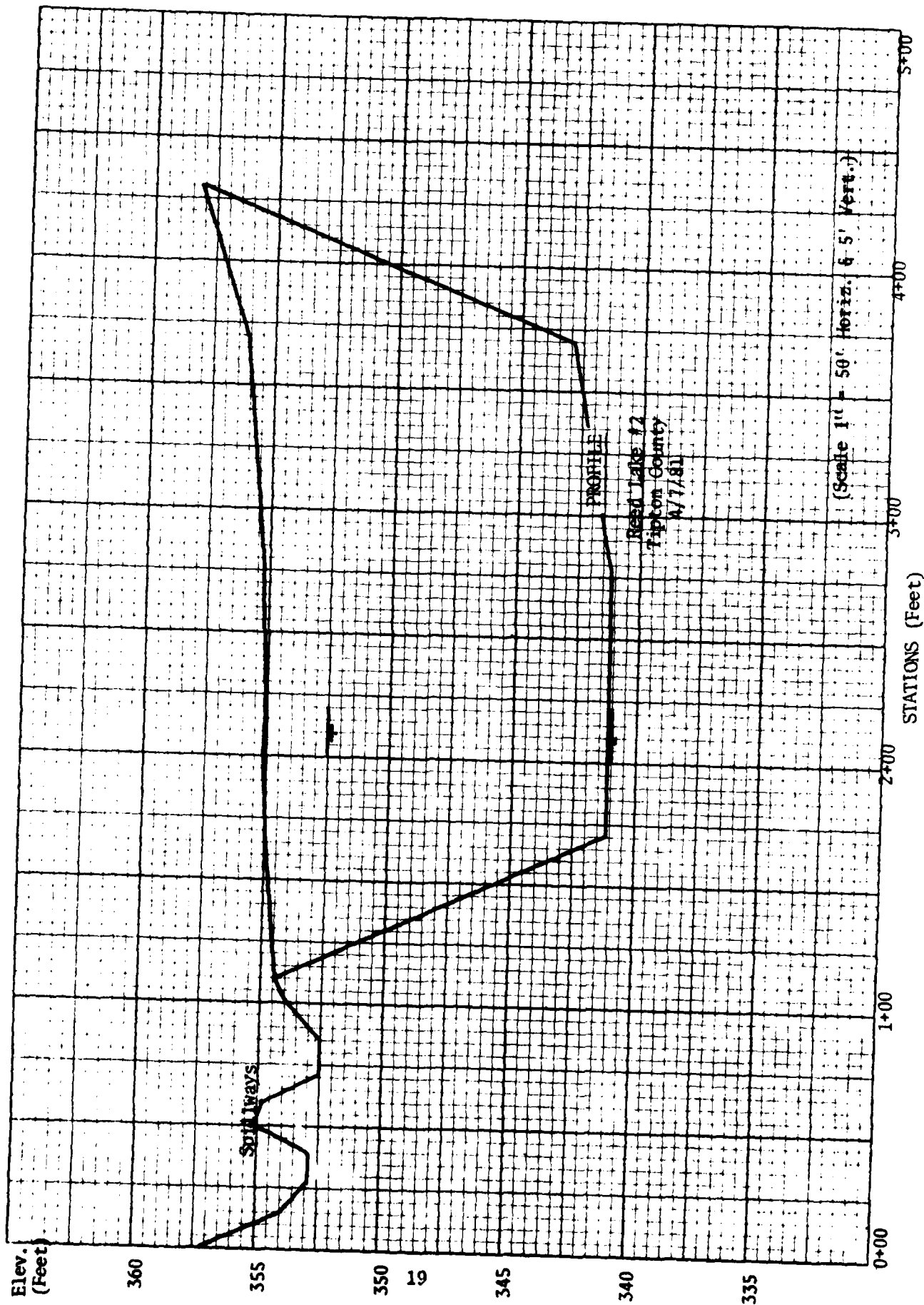
APPENDIX B
SKETCHES AND LOCATION MAPS



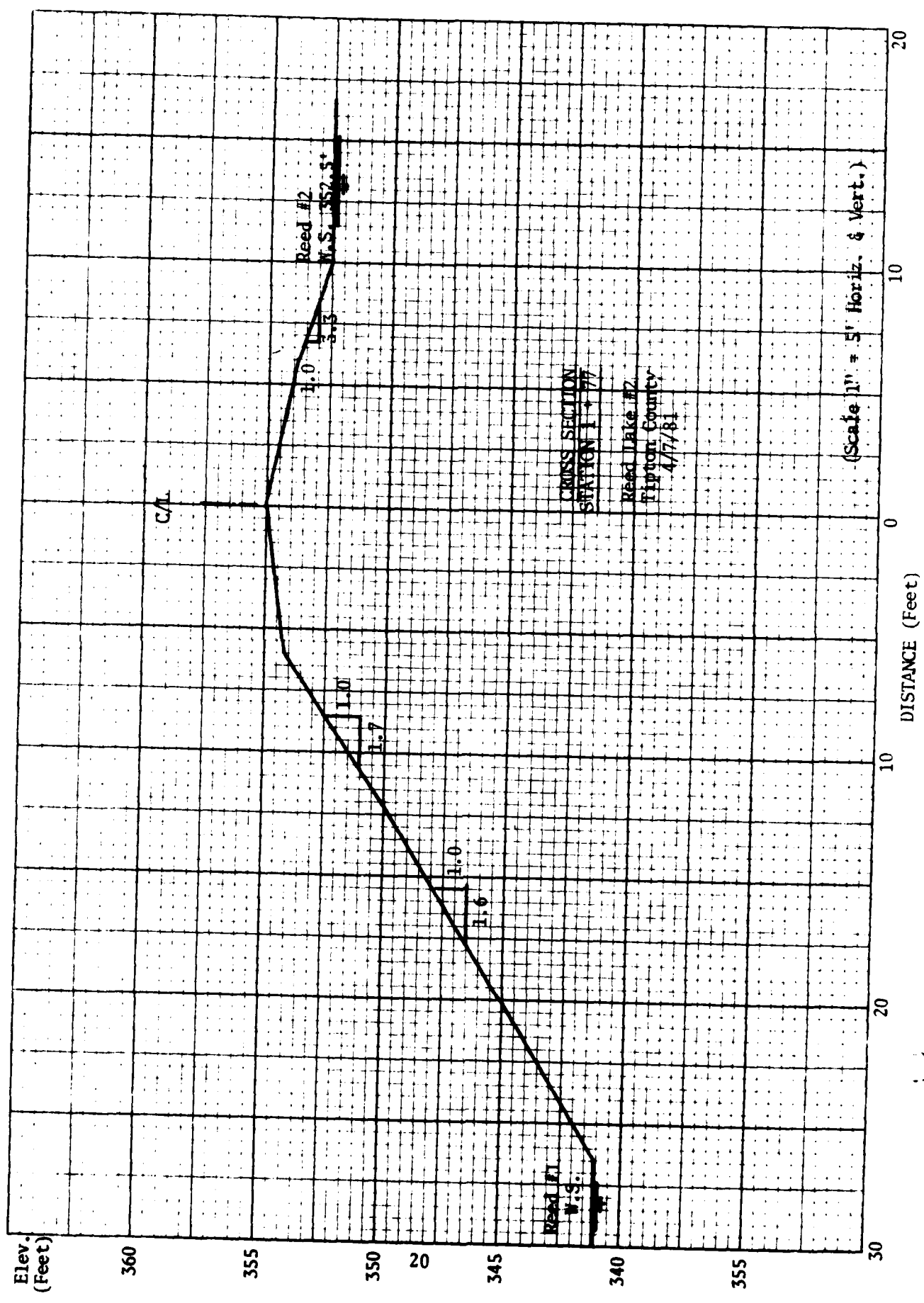
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REED LAKE DAM NO. 2



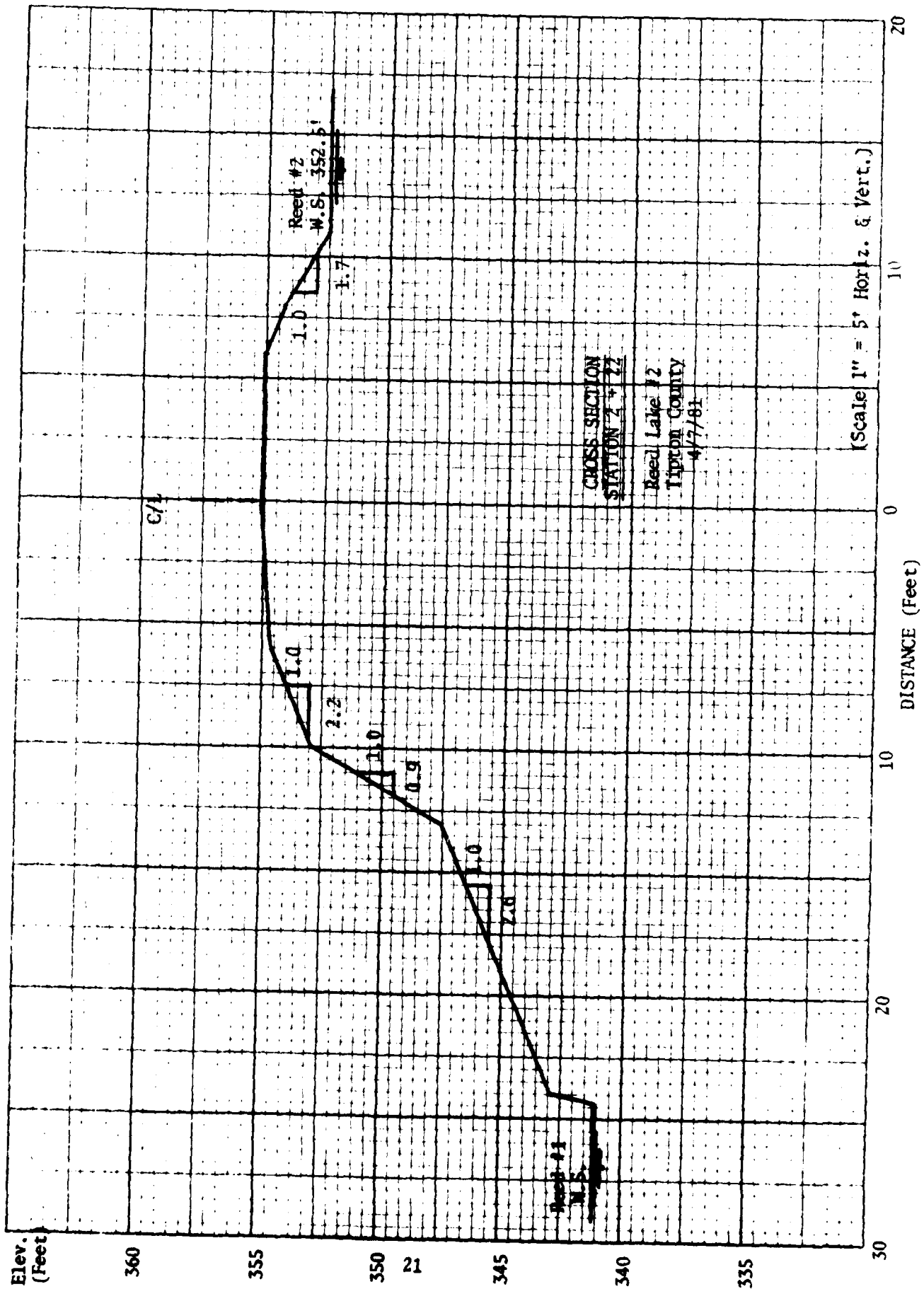
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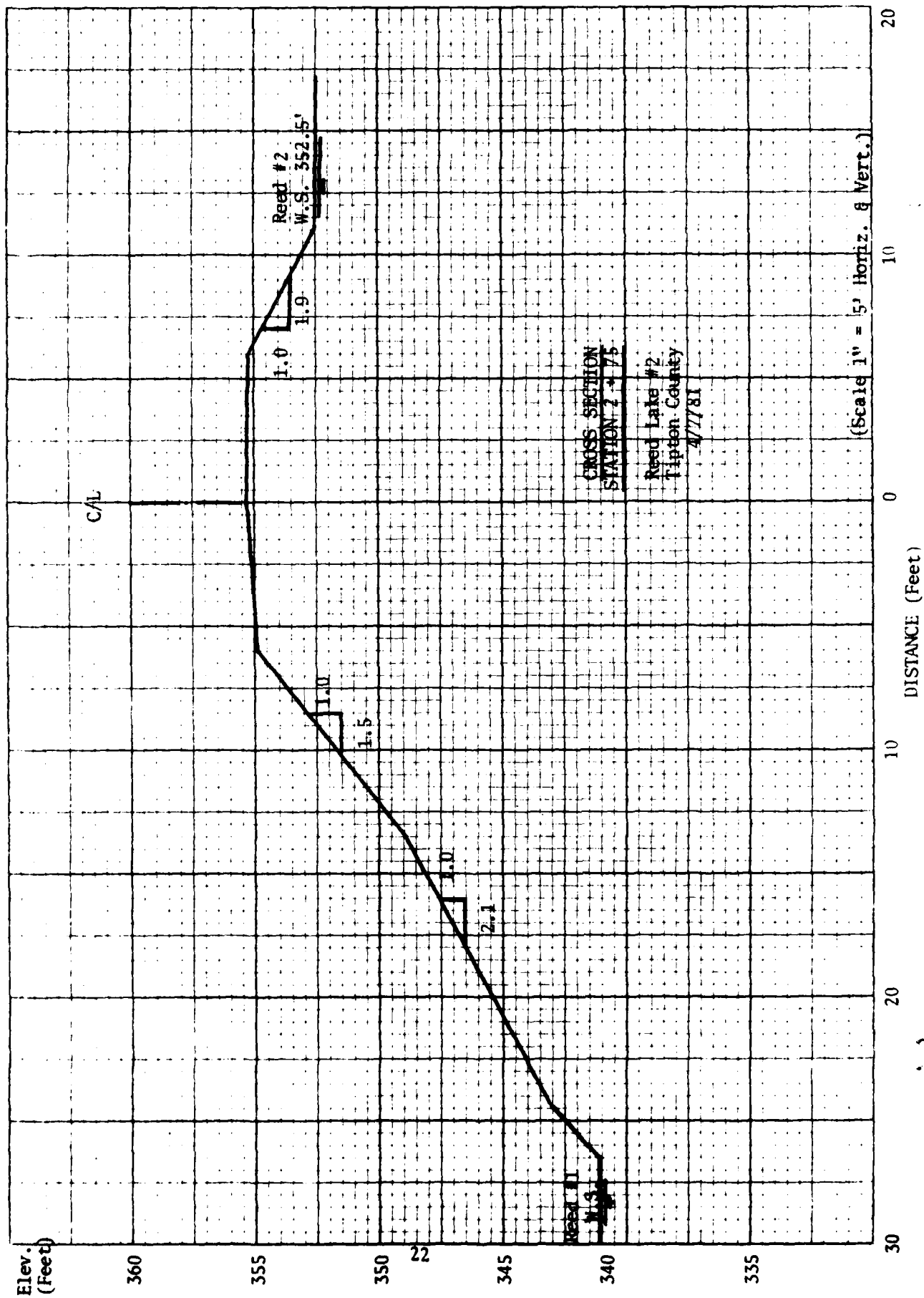


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APPENDIX C
PHOTOGRAPHIC RECORD



1. Crest of Reed Lake No. 2.



2. Front slope of Reed Lake No. 2. Note Erosion.



3. Backslope of Reed Lake No. 2. Note dense vegetation and normal pool elevation at Reed Lake No. 1 on slope.



4. Failed timber retaining wall on backslope Reed Lake No. 2.



5. Emergency spillway control section. Reed Lake No. 2.



6. Outfall emergency spillway Reed Lake No. 2. Note overfall into normal pool of Reed Lake No. 1.



7. View of Reed Lake No. 2. Note Reed Dam No. 3 at upper end of lake.



8. Reed Dam No. 3 including emergency spillway. Normal pool Reed Lake No. 2 backs up on downstream slope.

APPENDIX D
INSPECTION TEAM TRIP REPORTS

TRIP REPORT
REED LAKE DAM NO. 2
TIPTON COUNTY, TENNESSEE

GENERAL ENGINEERING OBSERVATIONS
April 7, 1981

GENERAL

An engineering inspection of the Reed Lake Dam No. 2 was made with Dr. Fred H. Kellogg, Kellogg Engineering, George Moore and David Roe of the Tennessee Division of Water Resources. The weather was clear with temperatures of 75 degrees. The wind was calm. The lake level was at the elevation of the top of the concrete riser.

EMBANKMENT

The crest of the Reed Lake Dam No. 2 has a grass cover which is worn by traffic crossing the dam. The dam has an east-west orientation and is straight. There were no longitudinal or transverse surface cracks observed. The general condition of the surface was fair, but depressions caused by traffic on the surface hold water. The average top width of the dam is ten feet.

The upstream slope is covered with heavy brush and blackberry briars. The entire upstream slope shows a continuous sloughing due to wave action. The only slope protection is the heavy brush and blackberry vines. There were longitudinal cracks all along the slope near the top of the crest. The growth on the upstream slope prevented a close observation of this slope, but in the areas that were clear, there was evidence of slips. About 50 feet from the east end of the dam, a small slip went all the way to the top

of the dam. There was evidence of large chunks caving off all along the slope. These slips could have been caused by wave action and the waves have definitely undercut the bank.

The downstream slope is also covered with undesirable growth of brush, blackberry vines and several large stumps showing new growth at the roots. The entire downstream slope is less than a 2:1 that is in many cases vertical. Vegetation on the backslope made it extremely difficult to see what lay underneath. Three holes were found in open areas. At one point on the slope, it appeared that the dam had overtopped. The tail water of Reed Lake Dam No. 1 is up on the backslope of Dam No. 2. Wave action had undermined part of the backslope. There was one hole found on the backslope that was approximately ten inches long and six inches wide and went back into the backslope. A timber retaining wall had been erected to stabilize a portion of the slope but the timber wall failed and the remains are in a rotted condition. Surface cracks on the face of the slope are along the heads of slips and slides. There is evidence of bulging on the backslope just above the tail water line of Dam No. 1. The hole mentioned above is approximately five feet above the tail water elevation and approximately 80 feet west of the east abutment. This hole showed evidence of seepage at the bottom of the hole approximately 15 inches deep. There is no drainage system in the backslope.

There was some erosion noted along the contact of the embankment with the abutment. This erosion was probably caused by people using the area for fishing. No springs or indications of seepage was found along the contact of the embankment with the abutments.

INSTRUMENTATION

There were no monuments for surveys, nor were there any observation wells, weirs, piezometers nor other instrumentation.

SPILLWAYS

Reed Lake Dam No. 2 has no service or pipe spillway. The emergency spillway is a grassed waterway in the west abutment. There was no defined entrance channel and the control section appeared to be approximately 20 feet in length. As with the other part of the spillway, it was grassed. The exit channel is down the abutment at a steep grade. There was an overfall of approximately two to three feet where the abutment had been undercut by wave action by Reed Lake No. 1.

RESERVOIR

The reservoir slopes were in fair condition. Sedimentation within this dam is unknown. Very little turbidity was noted at the time of the inspection. The water was clear. The upstream drainage area is primarily pasture and wood. The downstream area of this dam is the lake of Reed Dam No. 1. Any failure of Reed Dam No. 2 would be immediately felt by Reed Dam No. 1.

RECOMMENDATIONS

Both the upstream and downstream slopes of Reed Lake Dam No. 2 have been damaged severely. The downstream slope is badly sloughed and could become dangerous in the near future. Both the upstream and downstream slope should be cleared so better observation of the damage to the slopes could be obtained. The present conditions of this dam warrants having a qualified engineer look at the dam after it is cleared and determining the safety of this structure.

Wm. E. Bush

William E. Bush, P.E., Director
Civil and Water Resource Engineering
Tennessee License No. 4177

REED NO. 2 DAM
INSPECTION REPORT

INTRODUCTION. This is an earth dam at the headwaters of Reed Lake No. 1. It is about 15 ft high, situated in loess hills. The soil in the area is a clay of low plasticity (Group CL in the Unified Classification System). As in the case of Reed Lake Dam No. 2, the underlying terrace sands and gravels do not appear to affect this dam. There is no conduit to cover the pool.

West Abutment. There is an old emergency spillway behind the west abutment, which is not carrying any water. A new spillway has been cut about 100' to the east. There is a slight fill-abutment contact erosion on the downstream side, caused at least in part by footpaths.

Spillway. The new spillway is about 15 ft wide across the bottom and 25 ft wide across the top. Water was flowing across it at the time of the inspection. The channel is slightly eroded. Some sloughing was noted downstream about 20 ft east of the abutment. There is no outlet or service spillway.

Downstream Slope. This slope may be as steep as 1-1/2:1 on the west side. There is a path along a bench about halfway down the slope. The slope is generally very rough, with a heavy cover of brush. About 50 to 100' east of the west abutment is a slide with a nearly vertical face about 8 ft high, and a bulge below it. There is a big hole about 2 ft above water level on the No. 1 Lake. Another 25 ft east is a 2 to 3 ft drop and a smaller drop above it. From here on, the slope varies from vertical to 1 V on 2 H. Some 10" stumps have large brush growing out of them. About 100 ft from the east abutment is another hole. Posts have been driven into the slope here to stabilize it. The posts

are sloping downhill, indicating that the sliding continued. There is sloughing all along the downstream slope. About 78' west of the east abutment a jug 15-18" deep is wet at the bottom some 5' above the downstream pool.

East Abutment. There is erosion along the contact of the downstream slope with the east abutment, with gullies developed. Slight erosion has occurred along the contact between the abutment and the upstream slope.

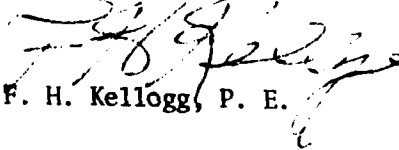
Crest. The crest was paced as 11 ft wide. It has a slightly gravelled road and some grass. There are holes, caused by boring animals, all along the upstream edge of the crest.

Upstream Slope. The upstream slope has been cut back almost to the crest for virtually the entire length of the dam. It is badly overgrown from about a foot to about 4 ft above water level. There are crayfish holes about 200' west of the east abutment. On the west end of the dam, no terraces have been cut in the slope, which appears to be about 1V on 2H.

Recommendations. The downstream slope is badly sloughed, and could become dangerous in the not-too-distant future. It should be cleared to get a better view. Just how much expense should be incurred depends on the risks to Reed Dam No. 1 from a failure of this dam. Eventually, a qualified engineer should be retained to drill, sample and test the fill and determine how much the slopes should be built up and stabilized to obtain the factors of safety required by the Corps of Engineers. Meanwhile, movements of downstream edge of the crest should be monitored every 3 months, and erosion of the upstream slope back to the crest should be checked. An inch of movement downstream

or erosion beyond the upstream edge of the crest should be followed by immediate repairs or lowering of the pool and breaching of the dam until the dam can be brought to the required factors of safety.

Report Submitted 4/18/81,


F. H. Kellogg, P. E.

FHK:lc

APPENDIX E
HYDRAULIC AND HYDROLOGIC DATA

HYDRAULICS AND HYDROLOGIC CALCULATIONS

Reed Lake Dam No. 2 is located in Tipton County, Tennessee. The present land use is estimated to be 50.2 percent woods, 33.4 percent open land, and 16.4 percent water. The soil is predominantly Memphis Silt Loam and is classified as a "B" soil. The runoff curve number was calculated to be 68 AMC II.

The Reed Lake Dam No. 2 is a small size, high hazard potential dam. As such, it is required to pass a $\frac{1}{2}$ PMF to full PMF without overtopping. Using the U.S. Weather Service TP-40, the 6-hour PMP was estimated to be 29.7 inches yielding 24.52 inches runoff (RCN 68 AMC II). The $\frac{1}{2}$ PMF which is derived from the Probable Maximum Precipitation was routed with a 12.56 inch runoff (RCN 68 AMC II).

The total inflow into the reservoir including the breach hydrograph from the upstream Dam No. 3, is about 101 acre-feet with a maximum peak of 1902 cfs. Reed Dam No. 2 reservoir has a maximum storage from the crest of the service spillway to the top of the dam of 15 acre-feet and a maximum discharge rate of 1902 cfs. The impoundment is insufficient to safely pass the $\frac{1}{2}$ PMF.

The 6-hour, 100-year flood containing 5.5 inches precipitation was routed through the dams 2 and 3 using a RCN of 82 (AMC III). This produced a runoff of 3.53 inches and a routed peak discharge of 90 cfs. Reed Dams No. 2 and 3 contained the storm with flows of 1.5 feet, and a freeboard of 0.5 ft.

The inflow hydrograph was calculated by methods contained in Section 4, Chapter 21, of the SCS National Engineering Handbook. Weir constants in the formula $Q = CLH^{3/2}$ were found in King and Brater "Handbook of Hydraulics", fifth edition. The routing equation used was:

$$I_1 + I_2 + \left(\frac{2S_1}{\Delta t} - O_1 \right) = \left(\frac{2S_2}{\Delta t} + O_2 \right) .$$

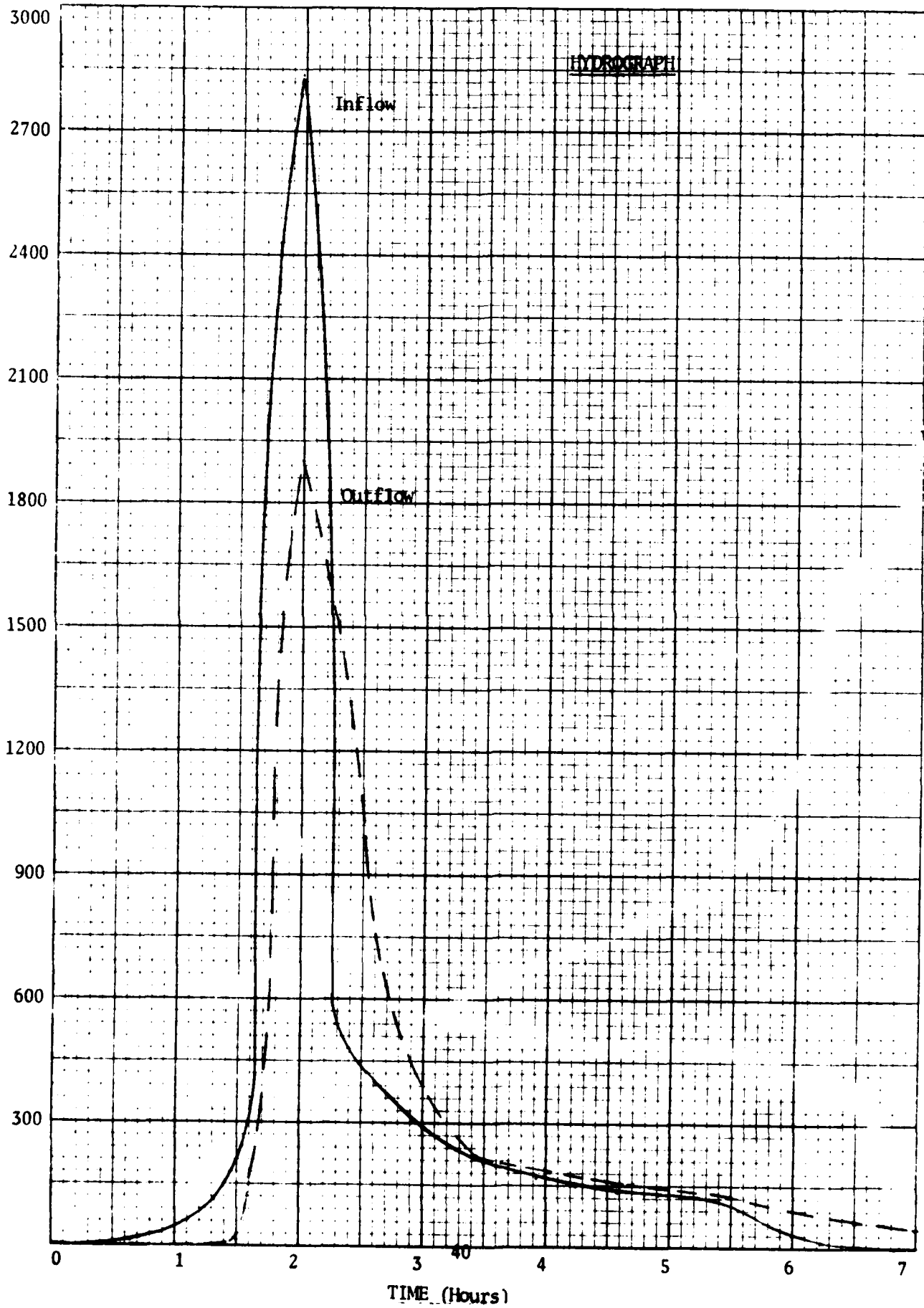
Basic Engineering Data was obtained from the following sources: Engineering surveys of the impoundment structure; U.S. Geologic Survey Topographic Maps; Aerial photographs; USDA Soil Conservation Service Soil Survey Maps; Rainfall Data and Hazard Classification from the Tennessee Division of Water Resources.

HYDRAULIC AND HYDROLOGIC SUMMARY

Frequency of Occurrence	Duration	Antecedent Moisture Condition	
		II	III
100-year	6-hour	Will Pass	Will Pass
100-year	10-day		
$\frac{1}{2}$ PMF ¹	6-hour	Will Overtop 0.9 feet for 3.5 hours	Will Overtop 1.0 feet for 3.5 hours
PMF	6-hour	Will Overtop 1.1 feet for 3.6 hours	Will Overtop 1.2 feet for 3.7 hours

¹Probable Maximum Flood

1/2 PMF REED NO. 2



NAME OF DAM = REED LAKE #2

STORM=1/2 PMF + BREACHED REED #3
TIME INCREMENT IN HOURS = 0.5

TIME	I (CFS)	2S/DT-0	2S/DT+0	O(CFS)
0.00	0.00	0.00	0.00	0.00
0.50	10.00	9.87	10.00	0.07
1.00	55.00	72.02	74.87	1.42
1.50	230.00	326.58	357.02	15.22
2.00	2840.00	407.55	3396.58	1902.06
2.50	440.00	717.95	2872.43	1077.25
3.00	300.00	1242.01	1457.95	107.97
3.50	205.00	1348.17	1747.01	199.42
4.00	165.00	1341.23	1718.17	189.47
4.50	140.00	1320.19	1646.23	160.02
5.00	128.00	1299.53	1588.19	144.33
5.50	100.00	1274.59	1527.53	126.47
6.00	35.00	1217.00	1409.54	96.30
6.50	7.00	1127.72	1259.00	65.64
7.00	2.00	1043.89	1136.72	46.41
7.50	0.00	975.90	1045.83	34.99

½ PMF (6 Hrs.) AMC II

HYDROGRAPH COMPUTATION		DATE <u>May 4, 1981</u> COMPUTED BY <u>BFS</u> CHECKED BY _____		
		$t = (t_p + T_p) \text{ Rev. } T_p$	$q = (q_c \cdot q_p \cdot KQKq_p)$	$Q_t = Q_c \cdot Q_p$
		t HOURS	q CFS	Q INCHES
Project <u>Reed Lake Dam No. 2</u>		1	0	0
		2	.33	4
		3	.66	16
		4	.98	47
		5	1.31	111
		6	1.64	415
		7	1.97	640
		8	2.29	540
		9	2.62	397
		10	2.95	302
		11	3.28	239
		12	3.60	199
		13	3.93	170
		14	4.26	149
		15	4.59	137
		16	4.91	130
		17	5.24	121
		18	5.57	93
		19	5.90	44
		20	6.22	16
		21	6.55	7
		22	6.88	4
		23	7.21	2
		24	7.53	0
		25		
		26	Check: 33 (3783)	= 12.57"
		27	645 (.154)	<u>OK</u>
		28		
		29		
		30		
		31		
		32		
		33		
		34		

DR. AREA .154 SQ. MI. STRUCTURE CLASS _____

T_c 0.60 HR. STORM DURATION 6 HR.

POINT RAINFALL 16.83 IN.

ADJUSTED RAINFALL:

AREAL FACTOR _____ IN. _____

DURATION FACTOR _____ IN. _____

RUNOFF CURVE NO. 68

Q 12.26 IN.

HYDROGRAPH FAMILY NO. 2

COMPUTED T_p .42 HR.

T_o 5.2 HR.

$(T_o + T_p)$ COMPUTED 12.38 USED 10

REVISED T_p 0.52

$q_p = \frac{484A}{\text{REV. } T_p} = \frac{143.34}{0.52} = 275.65$ CFS.

$Q_p = 1757.33$ CFS.

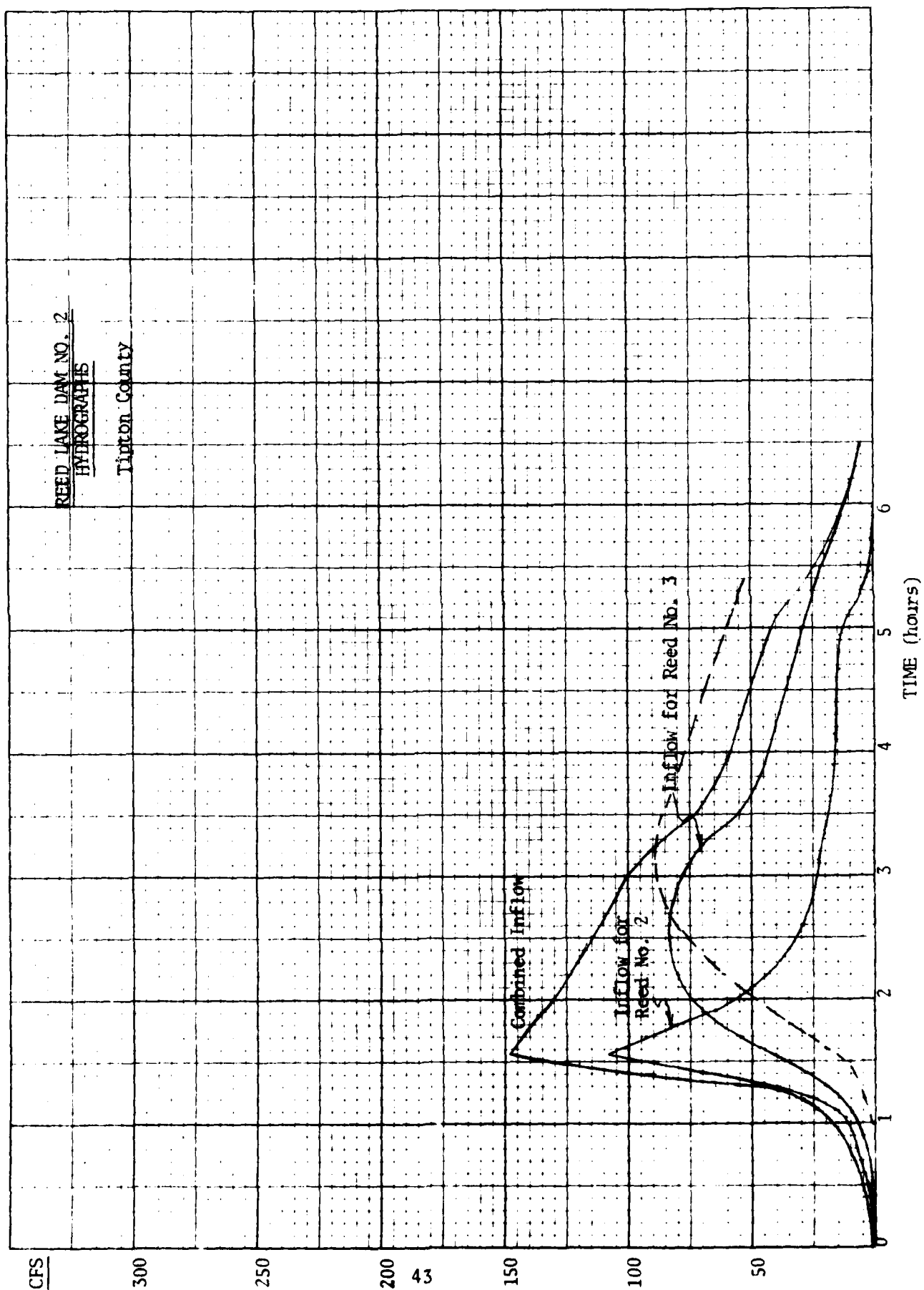
$K \text{ COLUMN} = (T_p / \text{REV. } T_p) \quad K \text{ COLUMN} = (q_c / q_p \cdot Q_p)$

$Q \text{ COLUMN} = (Q_c \cdot Q_p)$

t HOURS	q CFS	Q INCHES
1	0	0
2	.33	4
3	.66	16
4	.98	47
5	1.31	111
6	1.64	415
7	1.97	640
8	2.29	540
9	2.62	397
10	2.95	302
11	3.28	239
12	3.60	199
13	3.93	170
14	4.26	149
15	4.59	137
16	4.91	130
17	5.24	121
18	5.57	93
19	5.90	44
20	6.22	16
21	6.55	7
22	6.88	4
23	7.21	2
24	7.53	0
25		
26	Check: 33 (3783)	= 12.57"
27	645 (.154)	<u>OK</u>
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46 0780

PLANNED TO THE IN-HOME
NEUFEL A ESSER CO. 11



NAME OF DAM = REED LAKE #2

STORM=100 YEAR-6 HOURS- AND III
TIME INCREMENT IN HOURS = 0.25

TIME	I (CFS)	2S/DT-0	2S/DT+0	O (CFS)
0.00	0.00	0.00	0.00	0.00
0.25	2.00	1.99	2.00	0.01
0.50	5.00	8.87	8.93	0.06
0.75	10.00	23.37	23.87	0.25
1.00	17.00	48.82	50.37	0.78
1.25	37.00	98.22	102.82	2.30
1.50	148.00	261.79	283.22	10.71
1.75	140.00	491.15	549.73	29.32
2.00	130.00	665.06	761.15	48.04
2.25	121.00	788.77	916.05	63.65
2.50	115.00	873.85	1024.77	75.40
2.75	107.00	928.75	1095.85	83.55
3.00	100.00	959.33	1135.75	88.21
3.25	88.00	968.17	1147.33	89.53
3.50	72.00	953.54	1128.17	87.32

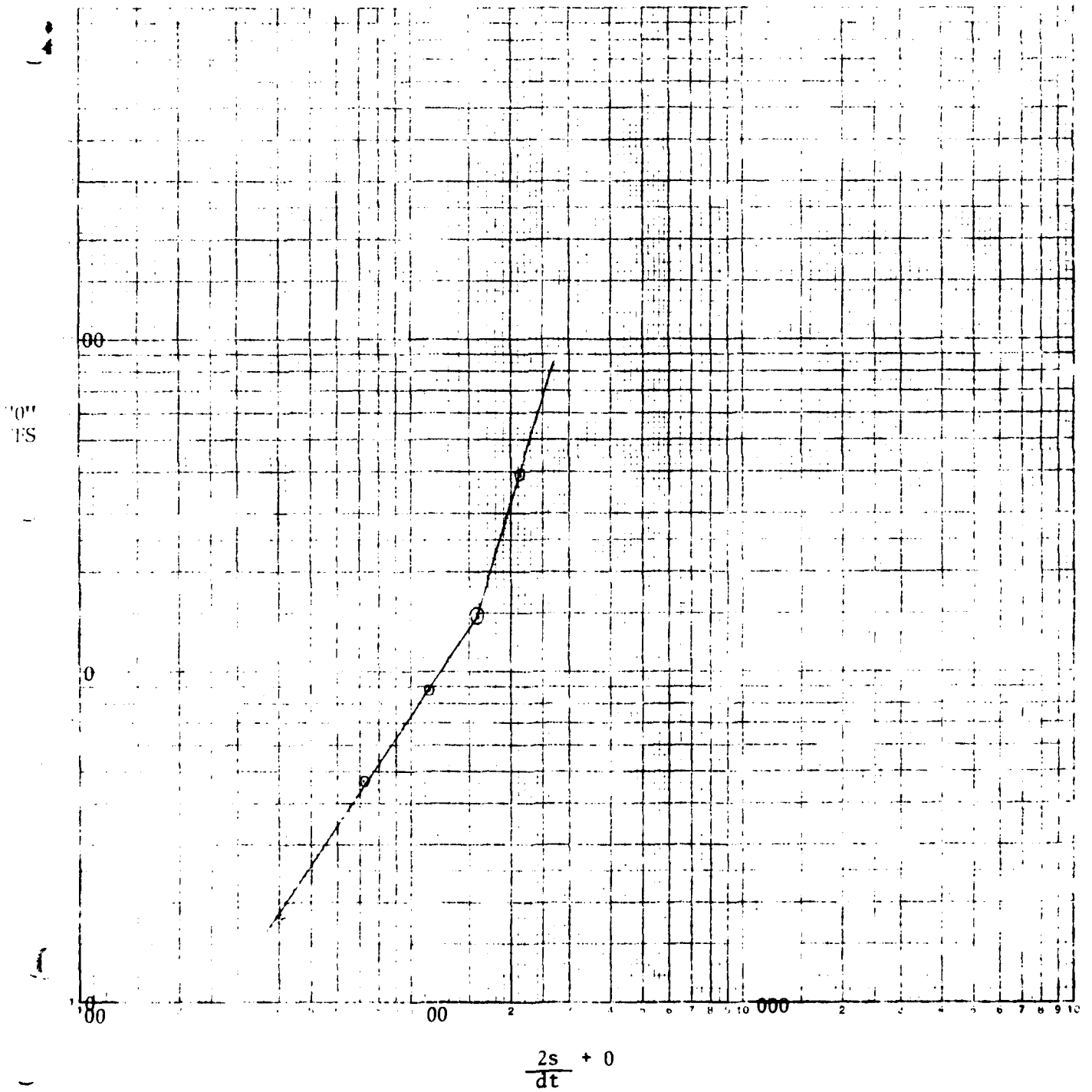
3.75	65.00	924.67	1090.54	82.93
4.00	59.00	892.37	1048.67	78.15
4.25	55.00	859.55	1006.37	73.41
4.50	50.00	826.88	964.55	68.83
4.75	45.00	794.14	922.83	64.37
5.00	42.00	761.93	882.14	60.16
5.25	38.00	725.95	836.93	55.49
5.50	24.00	682.65	782.93	50.15
5.75	19.00	635.47	724.65	44.54
6.00	12.00	587.11	665.47	39.15
6.25	8.00	538.94	607.11	34.03
6.50	5.00	492.95	551.94	29.43
6.75	0.00	447.50	497.95	25.23

100-Year (AMC III)

HYDROGRAPH COMPUTATION		DATE <u>April 29, 1981</u>																																																																																																																																																
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Project <u>Reed Lake Dam No. 2</u> DR. AREA <u>.06</u> SQ. MI. STRUCTURE CLASS _____ T_c <u>0.30</u> HR. STORM DURATION _____ HR. POINT RAINFALL <u>5.5</u> IN. ADJUSTED RAINFALL: _____ AREAL FACTOR _____ IN. _____ DURATION FACTOR _____ IN. _____ RUNOFF CURVE NO. <u>82</u> Q <u>3.53</u> IN. HYDROGRAPH FAMILY NO. <u>2</u> COMPUTED T_p <u>0.21</u> HR. T_o <u>5.0</u> HR. $(T_c + T_p)$ _____ COMPUTED <u>23.81</u> USED <u>25</u> REVISED T_p <u>0.20</u> $q_p = \frac{484A}{REV. T_p} = \frac{145.20}{0.20} = 726$ CFS. $(Q + q_p) = 512.56$ CFS. W COLUMN = $(T_c + T_p) REV. T_p$ W COLUMN = $(q_c / q_p) (Q + q_p)$ Q COLUMN = $(Q + q_p)$		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>$t = (T_c + T_p) REV. T_p$</th> <th>$q = (q_c / q_p) (Q + q_p)$</th> <th>$Q = (Q + q_p)$</th> </tr> <tr> <th></th> <th>HOURS</th> <th>CFS</th> <th>INCHES</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>.26</td><td>1</td><td></td></tr> <tr><td>3</td><td>.52</td><td>3</td><td></td></tr> <tr><td>4</td><td>.78</td><td>7</td><td></td></tr> <tr><td>5</td><td>1.04</td><td>12</td><td></td></tr> <tr><td>6</td><td>1.30</td><td>45</td><td></td></tr> <tr><td>7</td><td>1.56</td><td>108</td><td></td></tr> <tr><td>8</td><td>1.82</td><td>75</td><td></td></tr> <tr><td>9</td><td>2.08</td><td>50</td><td></td></tr> <tr><td>10</td><td>2.34</td><td>37</td><td></td></tr> <tr><td>11</td><td>2.60</td><td>29</td><td></td></tr> <tr><td>12</td><td>2.86</td><td>25</td><td></td></tr> <tr><td>13</td><td>3.12</td><td>23</td><td></td></tr> <tr><td>14</td><td>3.38</td><td>20</td><td></td></tr> <tr><td>15</td><td>3.64</td><td>18</td><td></td></tr> <tr><td>16</td><td>3.90</td><td>17</td><td></td></tr> <tr><td>17</td><td>4.16</td><td>16</td><td></td></tr> <tr><td>18</td><td>4.42</td><td>15</td><td></td></tr> <tr><td>19</td><td>4.68</td><td>14</td><td></td></tr> <tr><td>20</td><td>4.94</td><td>14</td><td></td></tr> <tr><td>21</td><td>5.20</td><td>7</td><td></td></tr> <tr><td>22</td><td>5.46</td><td>2</td><td></td></tr> <tr><td>23</td><td>5.72</td><td>1</td><td></td></tr> <tr><td>24</td><td>5.98</td><td>0</td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td></tr> <tr><td>26</td><td colspan="3">check: $.26 (539) = 3.62$</td></tr> <tr><td>27</td><td colspan="3">$645 (.06) = 38.7$</td></tr> <tr><td>28</td><td></td><td></td><td></td></tr> <tr><td>29</td><td></td><td></td><td></td></tr> <tr><td>30</td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td></tr> <tr><td>33</td><td></td><td></td><td></td></tr> <tr><td>34</td><td></td><td></td><td></td></tr> </tbody> </table>		$t = (T_c + T_p) REV. T_p$	$q = (q_c / q_p) (Q + q_p)$	$Q = (Q + q_p)$		HOURS	CFS	INCHES	1	0	0	0	2	.26	1		3	.52	3		4	.78	7		5	1.04	12		6	1.30	45		7	1.56	108		8	1.82	75		9	2.08	50		10	2.34	37		11	2.60	29		12	2.86	25		13	3.12	23		14	3.38	20		15	3.64	18		16	3.90	17		17	4.16	16		18	4.42	15		19	4.68	14		20	4.94	14		21	5.20	7		22	5.46	2		23	5.72	1		24	5.98	0		25				26	check: $.26 (539) = 3.62$			27	$645 (.06) = 38.7$			28				29				30				31				32				33				34			
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WILLIAM SHIMMICKS, Consulting Engineers, Inc.
 521 SOUTH BARKSDALE STREET P.O. BOX 1041 NEWTON, TENNESSEE 31044
 TELEPHONE 601 276-0000

STORAGE INDICATION CURVE
REED LAKE NO. 2



POWER CURVE FIT EQUATION

PROJECT = REED LAKE #2+ 1ST. EQ.

$Y=A+XB$

$A = 2.02647E+00$

$B = 1.51214E+00$

COEF. OF DETERMINATION= 0.998

POWER CURVE FIT EQUATION

PROJECT = REED LAKE #2+ 2ND EQ.

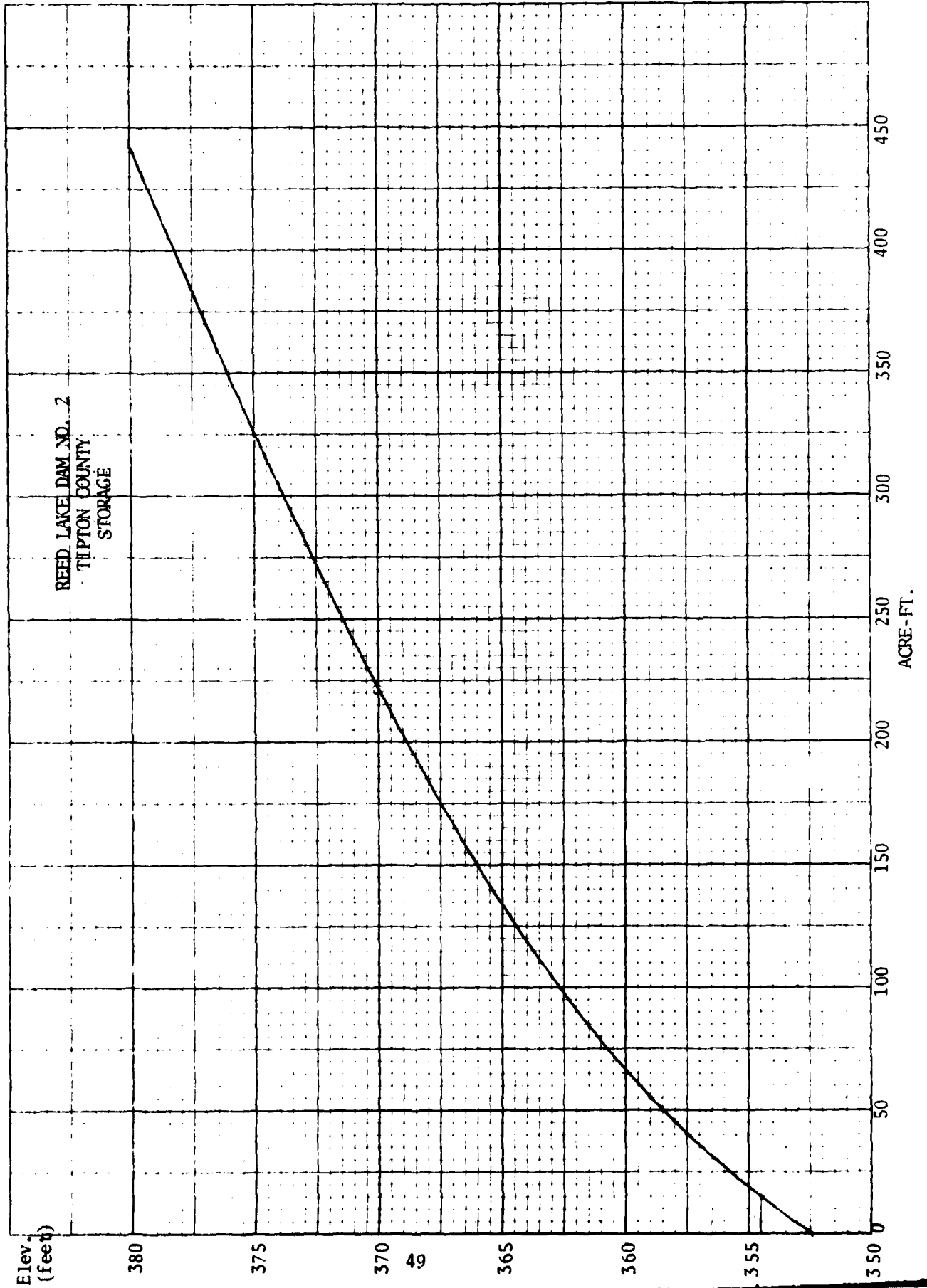
$Y=A+XB$

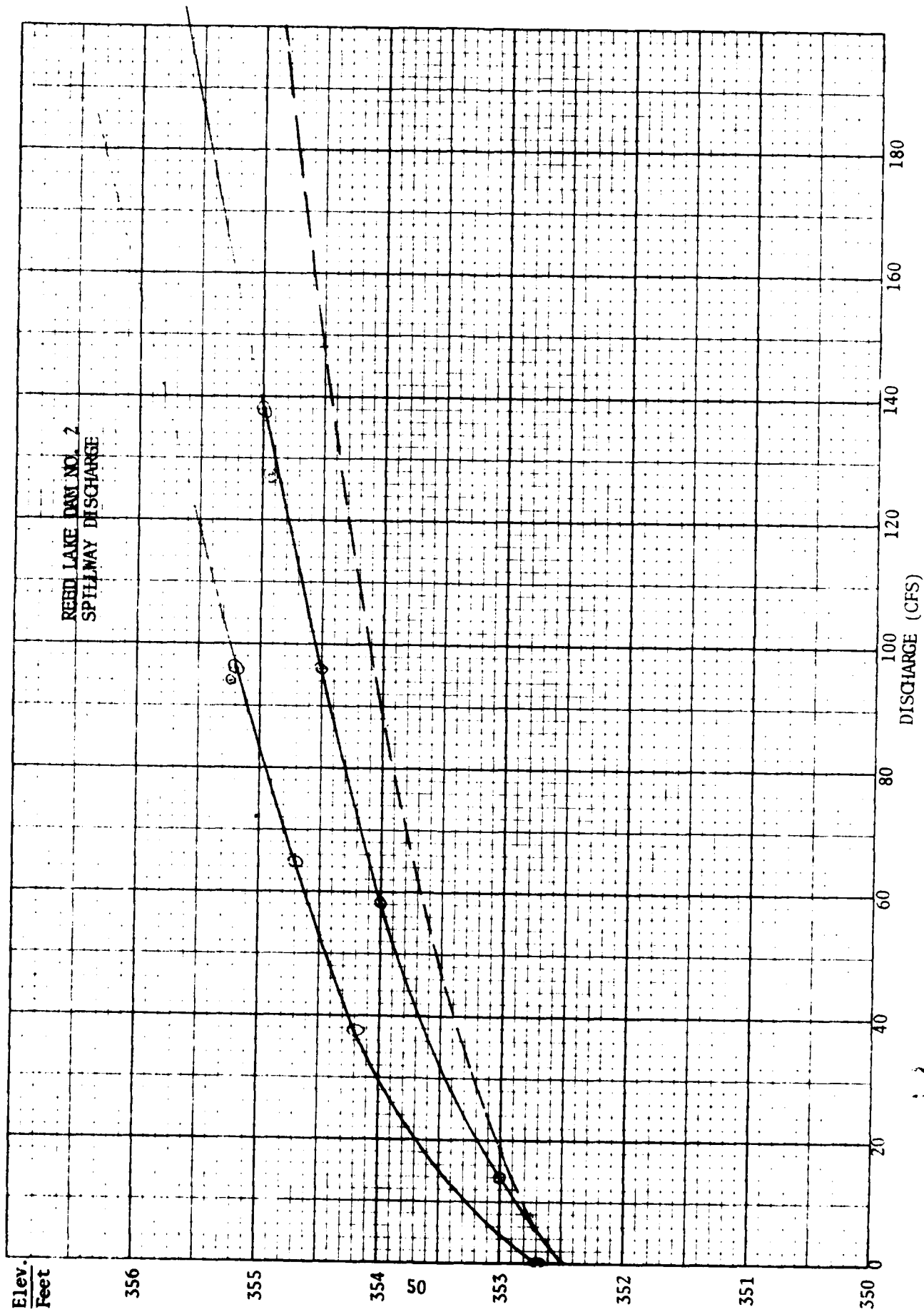
$A = 2.00237E+00$

$B = 2.39211E+00$

COEF. OF DETERMINATION= 1.000

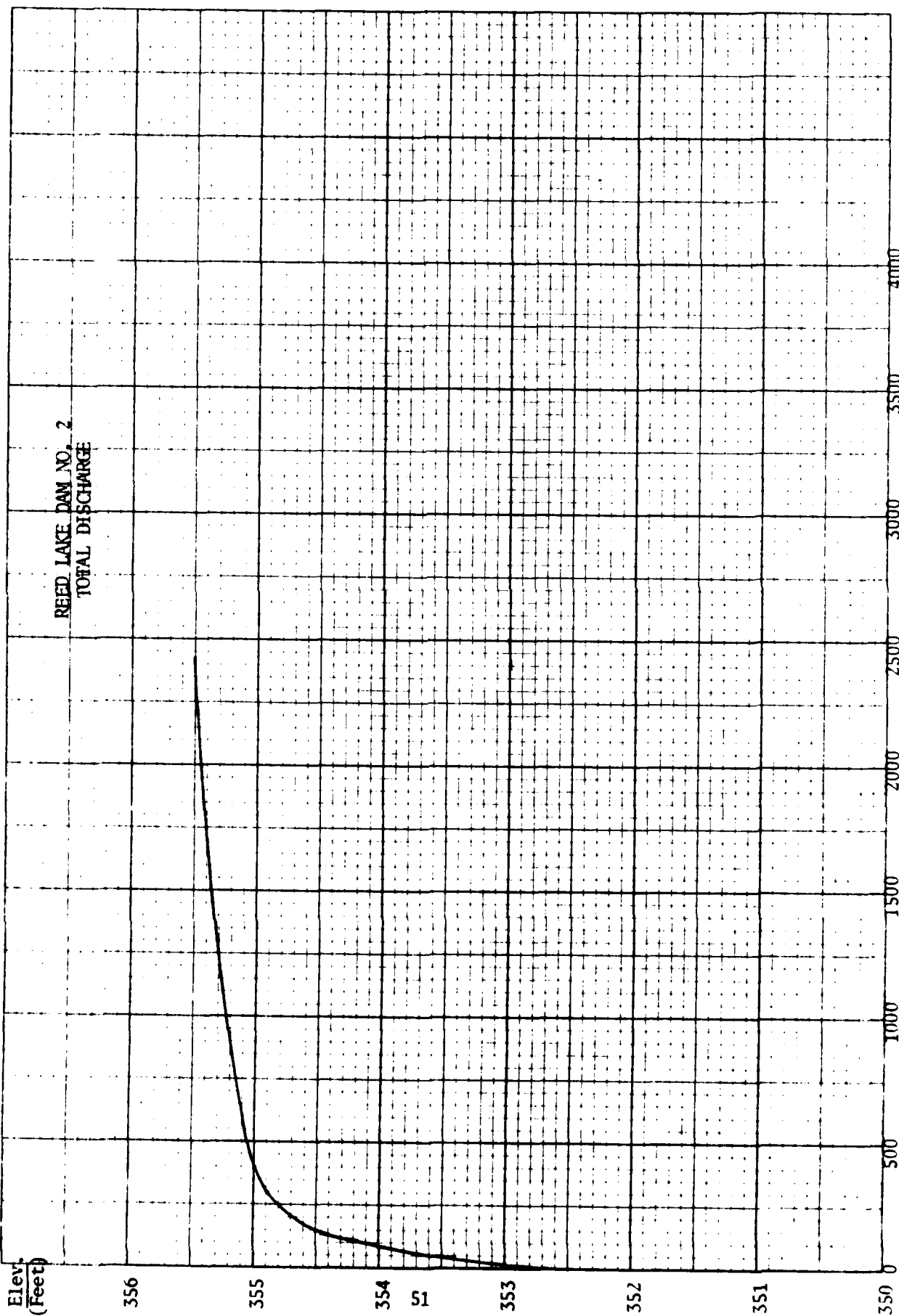
46 0780





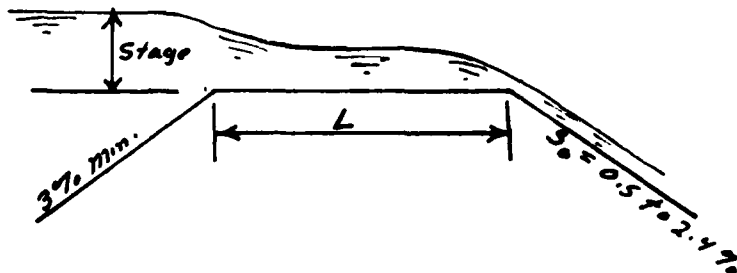
46 0780

DATE PLANT TO THE NCHS



EMERGENCY SPILLWAY CALCULATIONS

Note. Data taken from "Ponds for Water Supply and Recreation", USDA Soil Conservation Service, Agricultural Handbook No. 387.



Stage	1.5 ft.	2.0 ft.	2.5 ft.
20 ft. control (new)	3.9 cfs/ft.	6.4 cfs/ft.	9.2 cfs/ft.
80 ft. control (old)	3.1 cfs/ft.	5.4 cfs/ft.	8.0 cfs/ft.

Bottom Width New 15 ft.

Elev.	Cfs.
352.5	0
354.0	58.5
354.5	96.0
355.0	138.0

Bottom Width Old 12 ft.

Elev.	Cfs.
352.7	0
354.2	37.2
354.7	64.8
355.2	96.0

APPENDIX F
DAM INVENTORY DATA SHEET

DAM INVENTORY DATA SHEET
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

ID NUMBERS STATE(ID): 84-7007 FEDERAL(FED ID): TN-16707
NAME(PROJECT): Reed Lake Dam #2 REGION(R): West
OWNER(S): Paul Wayne Reed
ADDRESS: 4890 Second St., Millington, TN 38053
TELEPHONE RESIDENCE: 872-4814 BUSINESS: _____
COUNTY: Tipton QUAD: 408NE-Munford
LOCATION LATITUDE: 35 ° 24 ' 32 ", LONGITUDE: 89 ° 51 ' - 35 "
STREAM(SOURCE): Trib. North Fork Creek RIVER MILE: _____ BASIN: 43
PURPOSE OF DAM: Recreation YEAR COMPLETE: 1952
CONTRACTOR(CONT): _____ LOCATION: _____
ENGINEER(ENG): SCS LOCATION: Covington
TYPE OF DAM(TYC): Earth SIZE CLASSIFICATION: Small
DOWNSTREAM HAZARD POTENTIAL CLASSIFICATION STATE(H) 1 FEDERAL(FH) High
CERTIFICATE EXPIRATION DATE(EXP DATE): _____
STRUCTURAL HEIGHT(SHT): 14 FEET, HYDRAULIC HEIGHT(HHT): 12 FEET
CREST LENGTH(LGTH): 320 FEET, CREST WIDTH(WDTH): 10 FEET
UPSTREAM SLOPE(U/S): 2 :1, DOWNSTREAM SLOPE (D/S): 2 :1
POOL AREA NORMAL(NSURF): 10.1 ACRES, MAXIMUM(M/SURF): 10.7 ACRES
ELEVATION(FEET MSL), STORAGE CAPACITY(ACRE-FEET)
TOP OF DAM (ELEV1) 354.5, (TO/STR) 53.7
EMERGENCY SPILLWAY CREST (ELEV2) 352.5, (EM/STR) 38.7
NORMAL POOL (ELEV3) 352.5, (N/STR) 38.7
EMERGENCY SPILLWAY MATERIAL(ESM) Earth, SIZE(SZ) 15' w
SERVICE SPILLWAY MATERIAL(SSM) None, SIZE(SZ) _____
DRAINAGE AREA(DA): .15 SQ. MILES, CURVE NUMBER(CN): 68 AMCII
TIME OF CONCENTRATION(TC): .6 HOURS, MAXIMUM 6-HR RAIN: 29.7 INCHES
COMMENTS: INVENTORIED BY: Privett DATE: 7/14/81
REVISED BY: _____ DATE: _____ D/S HAZARD BY: Moore DATE: _____
OTHER NAME OF PROJECT: _____ POOL AREAS OBTAINED BY: Quad
OTHER CONTACT AT DAM: _____ PHONE: _____
DATA OBTAINED FROM: Phase I investigation
EMER. SPIL. DESC.: Trapezoidal earth channel 15' wide
SERV. SPIL. DESC.: _____
ELEVATIONS REF. TO: Normal pool level APPROX ELEV: 352.5 FT MSL
DRAWDOWN DRAIN: MATERIAL: None SIZE: _____ ELEVATION: _____
OTHER COMMENTS: _____

84-7

TENNESSEE DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES
2611 West End Avenue
Nashville, Tennessee 37203
Telephone (615) 741-2572

0
2
9am
2-8-78

INVENTORY DATA ON IMPOUNDMENT

Dam # _____

Quad # 408 NE 7

Name of Dam Reed Lake #2
Name of Owner PAUL WAYNE REED
Address 4890 SECOND ST.
6778 EASTLEY, Millington, Tenn. 38053 Tel. 872-4814
County Tipton Stream Trib., North Fork Creek (43)
Dam at Stream, Lat. 35° 24' 33", Long. 89° 51' 37"
Type of Dam Earth Purposes Recreation
Downstream Hazard Category, (D/S HAZ), 1 GALLOWAY 5-19-80
Type of Spillway Veg.
Length of Crest 350 Ft., ^{Width} Length of Spillway 20 32 Ft.
Hydraulic Cap. of all Spillways _____ cfs _____ cfs-sm
Spillway Lip Elev. _____ Ft. (MSL), Pool Area 10 Ac.
Volume in Dam 2656 Cu. Yds., Drainage Area 80 Ac.
Max. Vol. Pool 36 (1) 78 Ac. Ft., ^{Normal} Min-Vol. Pool 44 (1) Ac. Ft.
Structural Ht. Dam 14 Ft. Hydraulic Ht. Dam 11 Ft.
Engineered by SCS
Construction by _____
Year Completed 1952, Plans, No, At _____
Inspection by _____, Date _____
Certificate # _____, Issued on _____, Expires _____
Comments (1) Estimated by 0.4 factor

APPENDIX G
HAZARD POTENTIAL
AND
CONDITION CLASSIFICATION DEFINITIONS

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
HAZARD POTENTIAL CLASSIFICATION*

<u>Category</u>	<u>Loss of Life</u>	<u>Economic Loss</u>
Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Few (No urban developments and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)
High	More than few	Excessive (Extensive community, industry or agriculture)

*U.S. Army Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams.

TENNESSEE DEPARTMENT OF CONSERVATION

DIVISION OF WATER RESOURCES

DAMAGE POTENTIAL CATEGORY*

<u>Category</u>	<u>Description</u>
1.	Dams located where failure would probably result in any of the following: loss of human life; excessive economic loss due to damage of downstream properties; excessive economic loss, public damage to roads or any public or private utilities.
2.	Dams located in predominantly rural or agricultural areas where failure may damage downstream private or public property but such damage would be relatively minor and within the general financial capabilities of the dam owner. Public hazard or inconvenience due to loss of roads or any public or private utilities would be minor and of short duration. Chances of loss of human life would be possible but remote.
3.	Dams located in rural or agricultural areas where failure may damage farm buildings or agricultural land but such damage would be more or less confined to the dam owner's property. No loss of human life would be expected.

* Tennessee Department of Conservation, Division of Water Resources, Rules and Regulations Applied to the Safe Dams Act of 1973. Chapter 0400-4-1.

DEFINITION OF CONDITION CLASSIFICATION

"Unsafe - Emergency" - A dam in a state of imminent failure. State and local authorities and downstream residents should be advised immediately, reservoir drained, or combination of the above (e.g., advanced piping, major slope instability, recent sudden collapse of a portion of the foundation, imminent overtopping, etc.).

"Unsafe - Nonemergency" - A dam with obviously serious deficiencies which clearly could develop, or are developing, into failure modes but do not yet pose the threat of imminent failure. State and local authorities should be advised promptly and remedial work should begin as soon as practical. Someone should be assigned to periodically check on the dam's condition until remedial work is begun. Drawing down the reservoir should be considered, e.g., flowing seepage from embankment which could lead to piping, evidence of solution channels or cavitation in the foundation, seriously inadequate spillway capacity as per ETL 1110-2-234, history of recurring slope instability, etc.).

"Significantly Deficient" - A dam with deficiencies which, if left unchecked, would likely become serious deficiencies and could ultimately result in failure. Advise State authorities and recommend remedial work be scheduled in time to prevent substantial further deterioration of the condition(s)--usually within six months to a year or sooner (e.g., heavy growth of sizeable trees on slopes, potentially serious erosion, spillway discharge channel too close to embankment, etc.).

"Deficient" - A dam with deficiencies which need attention but which would not likely effect the safety of the dam unless left unchecked for a long period of time. Advise State authorities and recommend remedial action at owner's convenience but before the problem can escalate into a significant deficiency (e.g., brush and/or few or very small trees on embankment, long term deterioration of masonry or metal outlet features, formation of deep ruts in embankment roadway, deterioration of riprap, etc.).

"Not Deficient" - Well constructed and maintained dam with no apparent deficiencies relative to its safety and structural integrity.

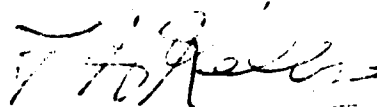
APPENDIX H
REED LAKE DAM NO. 3

REED LAKE NO. 3

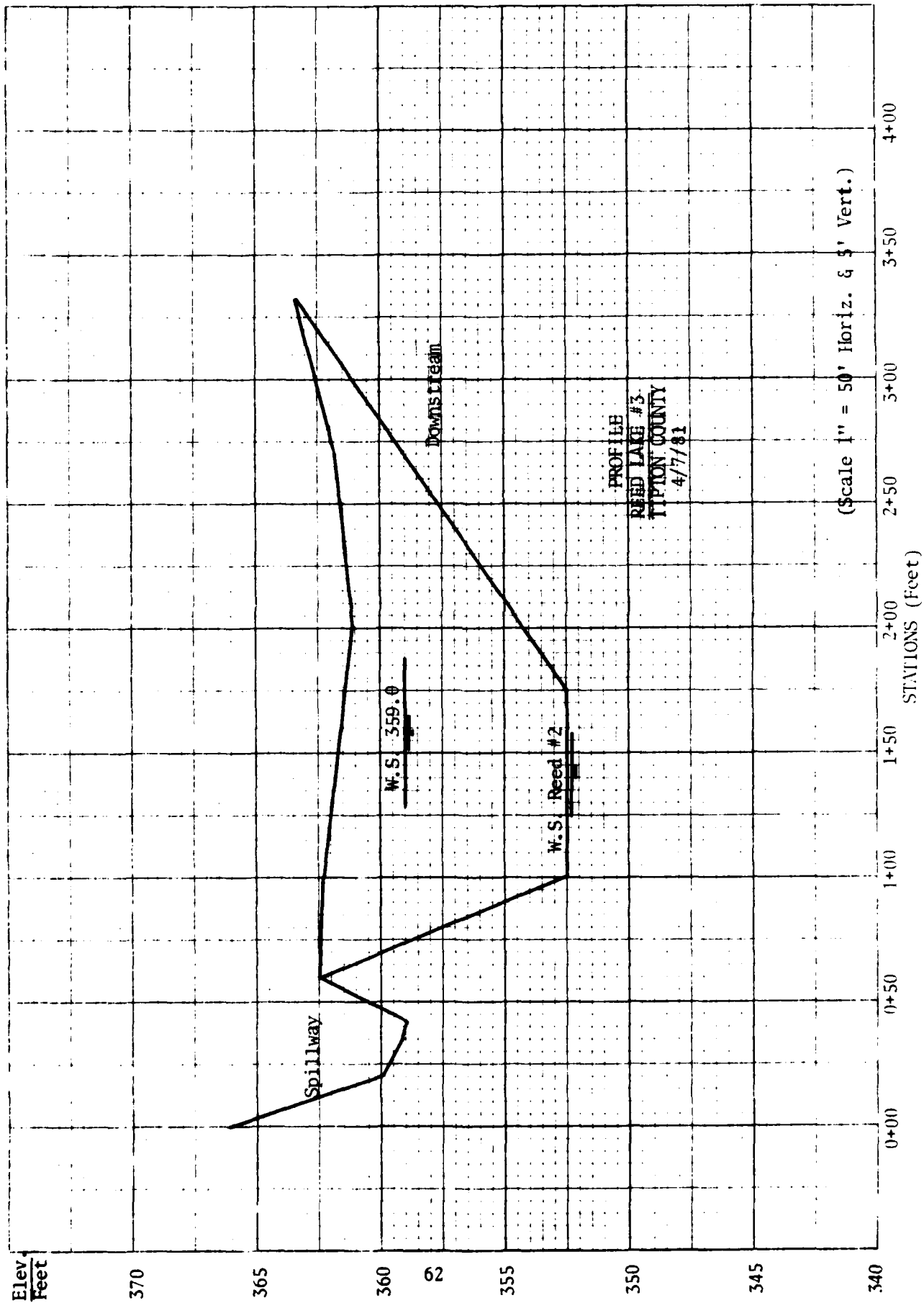
This dam has been constructed of siltier soils than were used for Reed Lake No. 2. An overflow spillway at the west abutment was running water when inspected. The level of water in the pool was about 3 ft below the crest and appeared to be about 10 ft above water level in Lake No. 2. The water in Lake No. 3 is rather turbid. The crest is irregular and bumpy. It is 10 ft wide except at one place near the center, where the dam was overtopped in 1973. Here, the crest is about 8 ft wide. The upstream slope is about 1V on 3H, irregular, and cut back to the edge of the crest in places by erosion triggered by cattle tracks. The downstream slope is about 1V on 1-1/2H. There is erosion almost to the center line of the dam at the contact of the downstream slope with the east abutment.

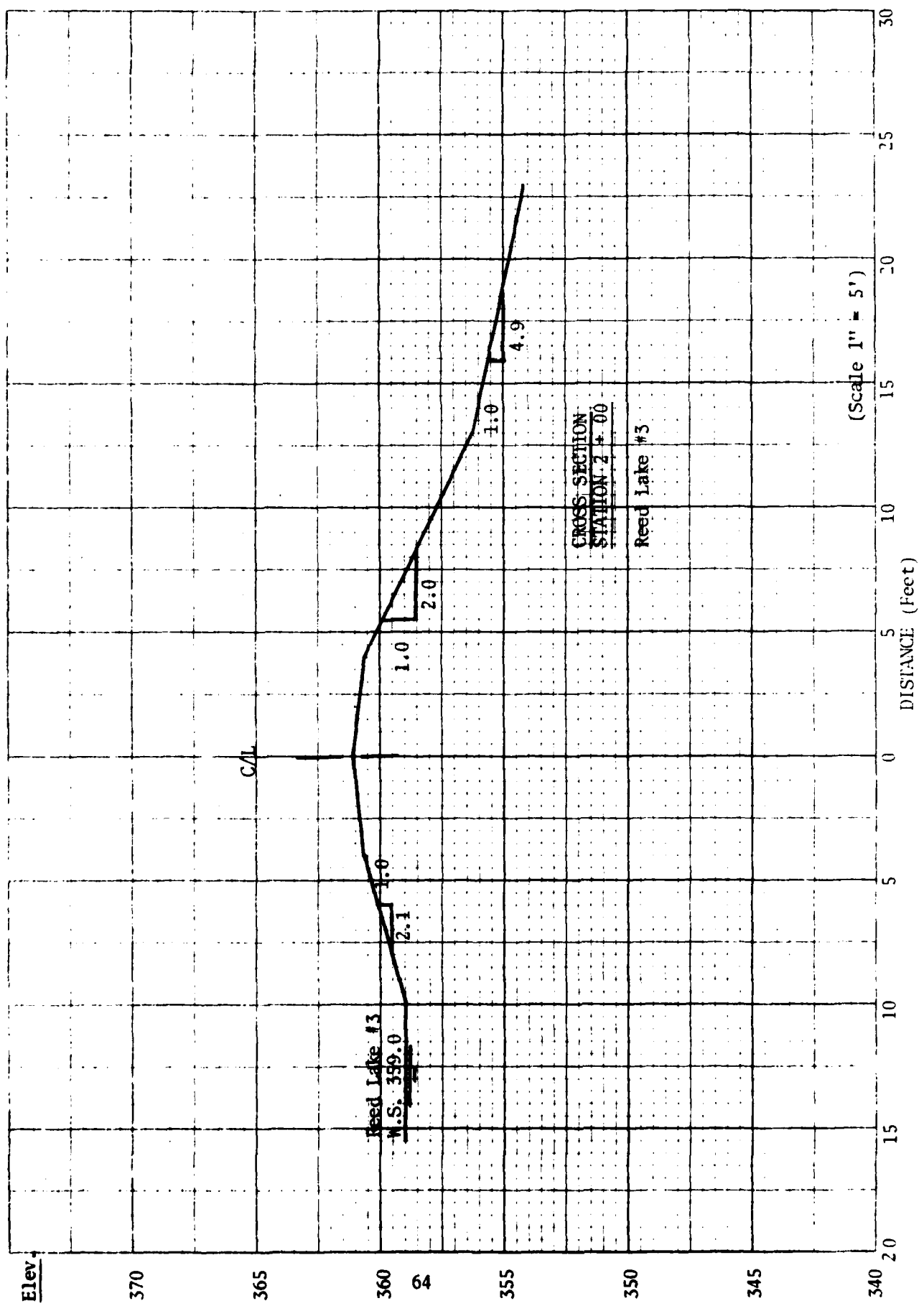
If a failure of this dam could cause failure of Dam No. 2, the eroision should be backfilled with well-tamped fill, fertilized and seeded.

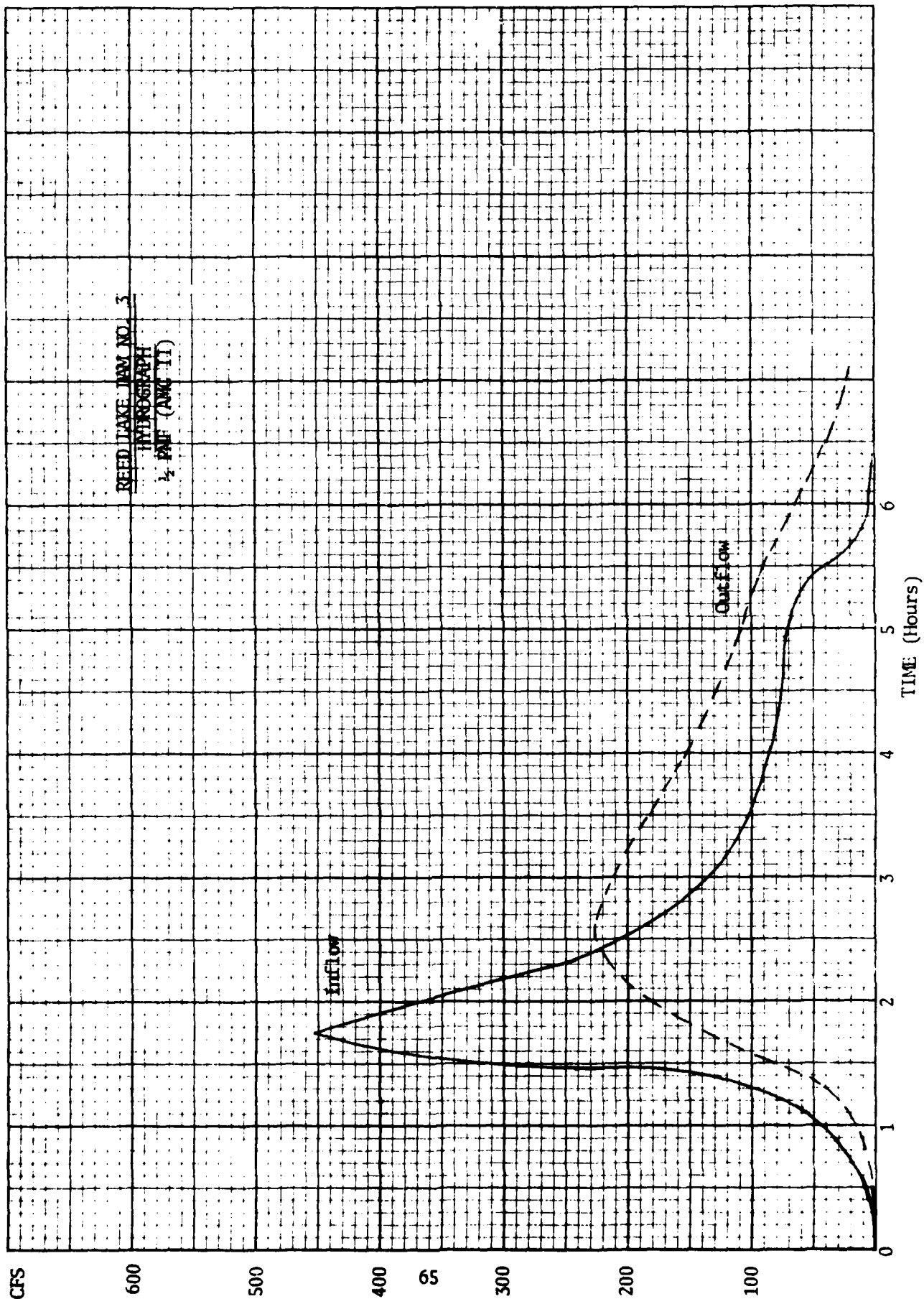
Report Submitted 4/17/81,


F. H. Kellogg, P. E.

FHK:1c







1/2 PMF (AMC II) 6-HOURS

HYDROGRAPH COMPUTATION		DATE <u>May 1, 1981</u> COMPUTED BY <u>BFS</u> CHECKED BY _____																																																																																																																																																	
Project <u>Reed Lake Dam No. 3</u> DR. AREA <u>0.09</u> SQ. MI. STRUCTURE CLASS _____ T_c <u>0.51</u> HR. STORM DURATION _____ HR. POINT RAINFALL <u>16.99</u> IN. ADJUSTED RAINFALL: AREAL FACTOR _____ IN. _____ DURATION FACTOR _____ IN. _____ RUNOFF CURVE NO. <u>66</u> Q <u>12.06</u> IN. HYDROGRAPH FAMILY NO. <u>2</u> COMPUTED T_p <u>0.357</u> HR. T_0 <u>5.15</u> HR. (T_c / T_p) COMPUTED <u>14.43</u> USED <u>16</u> REVISED T_p <u>0.322</u> $q_p = \frac{484A}{REV. T_p} = \underline{135.28}$ CFS. $(Q/q)_p = \underline{1631.48}$ CFS. W COLUMN = $(T_p / REV. T_p)$ Q COLUMN = $(q_c / q_p)(Q/q_p)$ Q COLUMN = (Q_1 / Q)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>$t = (T_p / REV. T_p)$</th> <th>$q = (q_c / q_p)(Q/q_p)$</th> <th>$Q_1 = (Q_1 / Q)$</th> </tr> <tr> <th></th> <th>HOURS</th> <th>CFS</th> <th>INCHES</th> </tr> </thead> <tbody> <tr><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>.29</td><td>3</td><td></td></tr> <tr><td>3</td><td>.58</td><td>11</td><td></td></tr> <tr><td>4</td><td>.87</td><td>33</td><td></td></tr> <tr><td>5</td><td>1.16</td><td>60</td><td></td></tr> <tr><td>6</td><td>1.45</td><td>241</td><td></td></tr> <tr><td>7</td><td>1.74</td><td>452</td><td></td></tr> <tr><td>8</td><td>2.03</td><td>349</td><td></td></tr> <tr><td>9</td><td>2.32</td><td>243</td><td></td></tr> <tr><td>10</td><td>2.61</td><td>183</td><td></td></tr> <tr><td>11</td><td>2.90</td><td>144</td><td></td></tr> <tr><td>12</td><td>3.19</td><td>119</td><td></td></tr> <tr><td>13</td><td>3.48</td><td>103</td><td></td></tr> <tr><td>14</td><td>3.77</td><td>91</td><td></td></tr> <tr><td>15</td><td>4.06</td><td>85</td><td></td></tr> <tr><td>16</td><td>4.35</td><td>78</td><td></td></tr> <tr><td>17</td><td>4.64</td><td>73</td><td></td></tr> <tr><td>18</td><td>4.93</td><td>72</td><td></td></tr> <tr><td>19</td><td>5.22</td><td>62</td><td></td></tr> <tr><td>20</td><td>5.51</td><td>38</td><td></td></tr> <tr><td>21</td><td>5.80</td><td>10</td><td></td></tr> <tr><td>22</td><td>6.09</td><td>5</td><td></td></tr> <tr><td>23</td><td>6.38</td><td>2</td><td></td></tr> <tr><td>24</td><td>6.67</td><td>0</td><td></td></tr> <tr><td>25</td><td></td><td></td><td></td></tr> <tr><td>26</td><td>check:</td><td>29(2457)</td><td>= 12.27</td></tr> <tr><td>27</td><td></td><td>645(.09)</td><td>OK</td></tr> <tr><td>28</td><td></td><td></td><td></td></tr> <tr><td>29</td><td></td><td></td><td></td></tr> <tr><td>30</td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td></tr> <tr><td>33</td><td></td><td></td><td></td></tr> <tr><td>34</td><td></td><td></td><td></td></tr> </tbody> </table>				$t = (T_p / REV. T_p)$	$q = (q_c / q_p)(Q/q_p)$	$Q_1 = (Q_1 / Q)$		HOURS	CFS	INCHES	1	0	0	0	2	.29	3		3	.58	11		4	.87	33		5	1.16	60		6	1.45	241		7	1.74	452		8	2.03	349		9	2.32	243		10	2.61	183		11	2.90	144		12	3.19	119		13	3.48	103		14	3.77	91		15	4.06	85		16	4.35	78		17	4.64	73		18	4.93	72		19	5.22	62		20	5.51	38		21	5.80	10		22	6.09	5		23	6.38	2		24	6.67	0		25				26	check:	29(2457)	= 12.27	27		645(.09)	OK	28				29				30				31				32				33				34			
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Winsell-Simmonds, Conserline & Associates, Inc.

821 SOUTH BARKSDALE STREET P.O. BOX 10045 MEMPHIS, TENNESSEE 38104

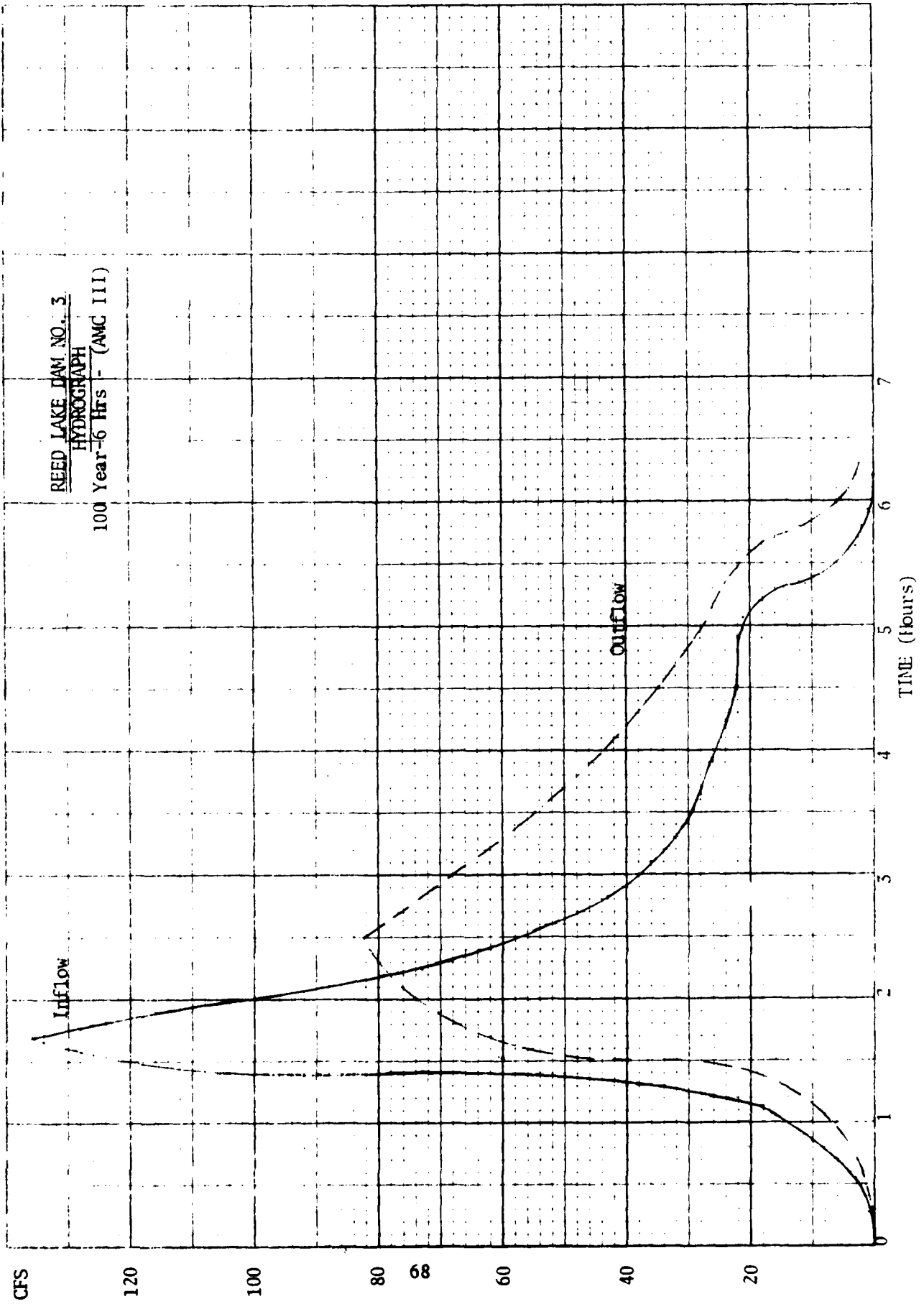
TELEPHONE 901 274-0488

NAME OF PROJECT=REED LAKE #3

STORM=1/2 PMF (AMC II) 6-HOURS
TIME INCREMENT IN HOURS = 0.5

TIME 1 CFS 2S/DT-0 2S/DT+0 0(CFS)

0.0000	0.00	0.00	0.00	0.00
0.5000	9.00	1.40	9.00	3.76
1.0000	40.00	20.34	53.48	16.57
1.5000	300.00	200.20	363.34	81.57
2.0000	452.00	588.59	952.30	181.80
2.5000	369.00	793.73	1249.59	227.93
3.0000	105.00	716.08	1137.73	210.92
3.5000	103.00	589.80	954.38	182.10
4.0000	85.00	470.50	777.30	153.60
4.5000	76.00	373.16	631.36	129.20
5.0000	70.30	299.63	519.16	109.76
5.5000	40.00	229.30	409.33	90.13
6.0000	5.00	145.23	274.38	64.58
6.5000	1.00	72.55	151.23	39.34
7.0000	0.00	30.35	73.35	21.60



 NAME OF DAM =RELD LINE #3

STORM=100 YEAR-6 HR- AND III
 TIME INCREMENT IN HOURS = 0.5

TIME	I (CFS)	2S-DT=0	2S-DT=2	OVERS
0.00	0.00	0.00	0.00	0.00
0.50	0.00	-0.02	3.03	1.51
1.00	14.50	4.41	17.43	6.54
1.50	120.00	65.60	138.91	36.66
2.00	136.00	174.21	321.63	73.69
2.50	56.00	202.00	366.21	82.10
3.00	38.00	158.44	296.00	63.73
3.50	29.00	115.76	225.44	54.84
4.00	25.50	83.43	170.23	43.40
4.50	22.00	61.14	130.93	34.89
5.00	21.00	46.45	104.14	28.84
5.50	6.00	30.30	73.43	21.57
6.00	0.50	12.52	36.89	12.14
6.50	0.00	2.79	13.02	5.12

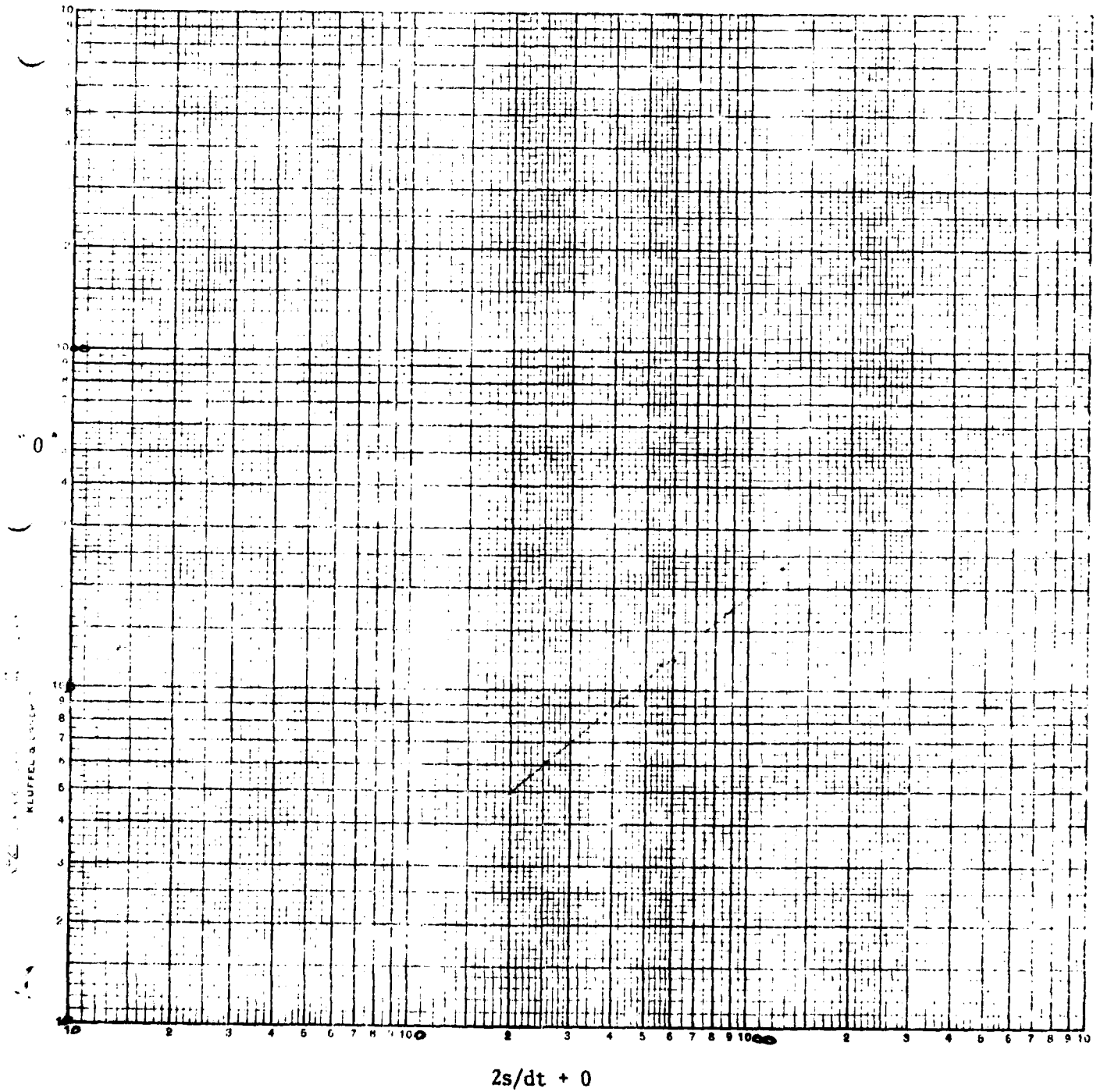
100 YEAR-6 HRS - (AMC III)

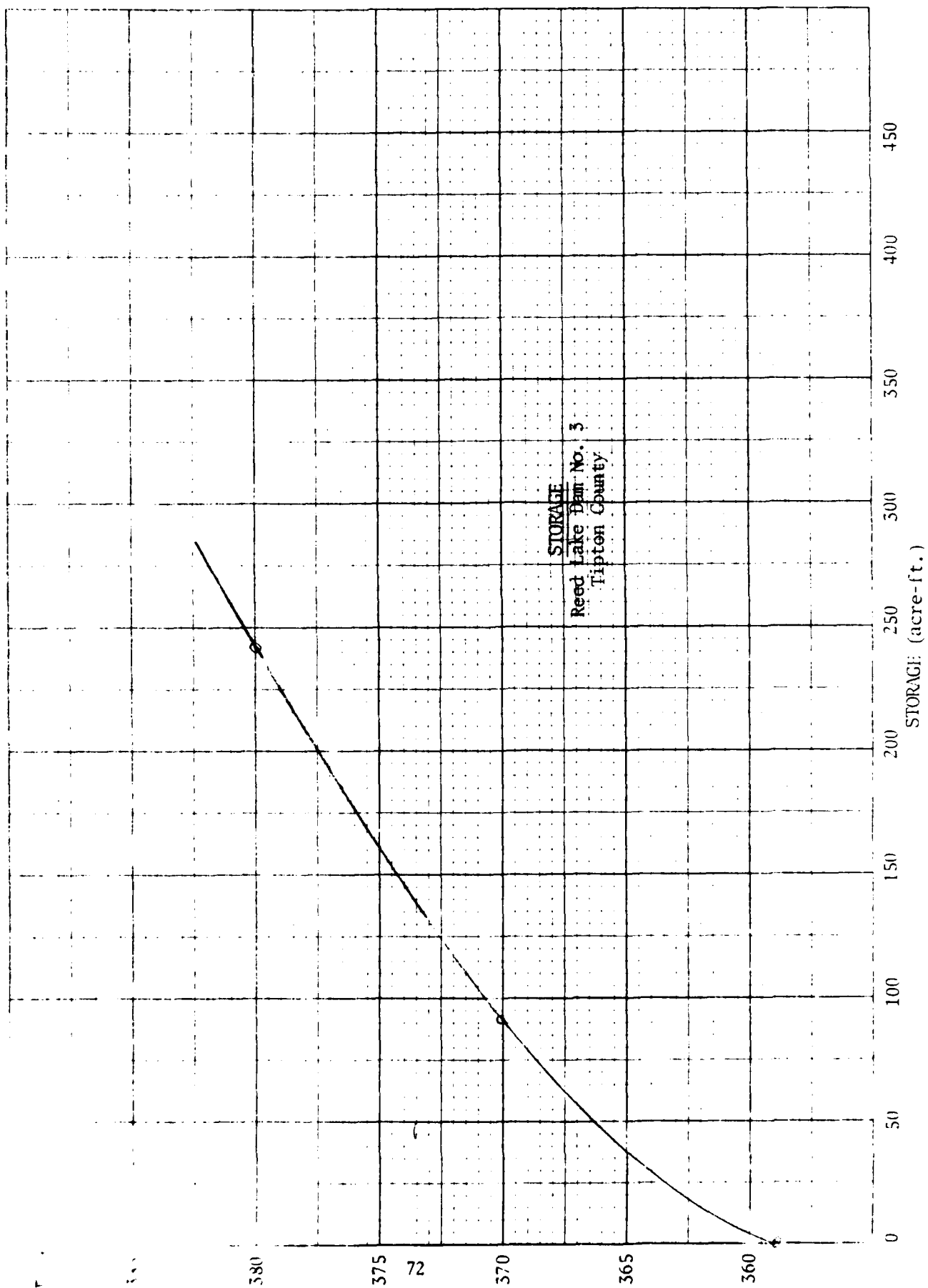
HYDROGRAPH COMPUTATION		DATE <u>April 27, 1981</u> COMPUTED BY <u>BES</u> CHECKED BY _____		
Project Reed Lake Dam No. 3 DR. AREA <u>0.09</u> SQ. MI. STRUCTURE CLASS _____ T_c <u>0.51</u> HR. STORM DURATION _____ HR. POINT RAINFALL <u>5.5</u> IN. ADJUSTED RAINFALL: AREAL: FACTOR _____ IN. _____ DURATION: FACTOR _____ IN. _____ RUNOFF CURVE NO. <u>82</u> Q <u>3.53</u> IN. HYDROGRAPH FAMILY NO. <u>2</u> COMPUTED T_p <u>0.357</u> HR. T_o <u>5.0</u> HR. (T_o / T_p) COMPUTED <u>14.01</u> ; USED <u>16</u> REVISED T_p <u>0.313</u> $q_p = \frac{484A}{REV. T_p} = \frac{139.17}{0.313} = 447.8$ CFS. $(Q/q_p) = \frac{3.53}{447.8} = 0.0079$ CFS. $Q(COLUMN) = (T_p / REV. T_p) \times q(COLUMN) = (0.313 / 0.357) \times 447.8 = 394.5$ CFS. $Q(COLUMN) = (Q_t / Q) \times Q$		$t = (t/T_p) \times REV. T_p$	$q = (q_c / q_p) \times Q \times q_p$	$Q_t = (Q_t / Q) \times Q$
		t HOURS	q CFS	Q INCHES
1	0	0	0	
2	.28	1		
3	.56	3		
4	.85	10		
5	1.13	18		
6	1.41	73		
7	1.69	136		
8	1.97	105		
9	2.25	73		
10	2.54	55		
11	2.82	43		
12	3.10	36		
13	3.38	31		
14	3.66	28		
15	3.94	26		
16	4.23	24		
17	4.51	22		
18	4.79	22		
19	5.07	21		
20	5.35	11		
21	5.63	3		
22	5.92	1		
23	6.20	0		
24	6.48	0		
25				
26	check: $(.29)(742) = 3.71$			
27	$645 \times 0.0079 = 5.1$			
28				
29				
30				
31				
32				
33				
34				

Winsell-Simmonds, Consterline & Associates, Inc.
 521 SOUTH BARKSDALE STREET P O BOX 2045 MEMPHIS, TENNESSEE 38104
 TELEPHONE 901 274-8480

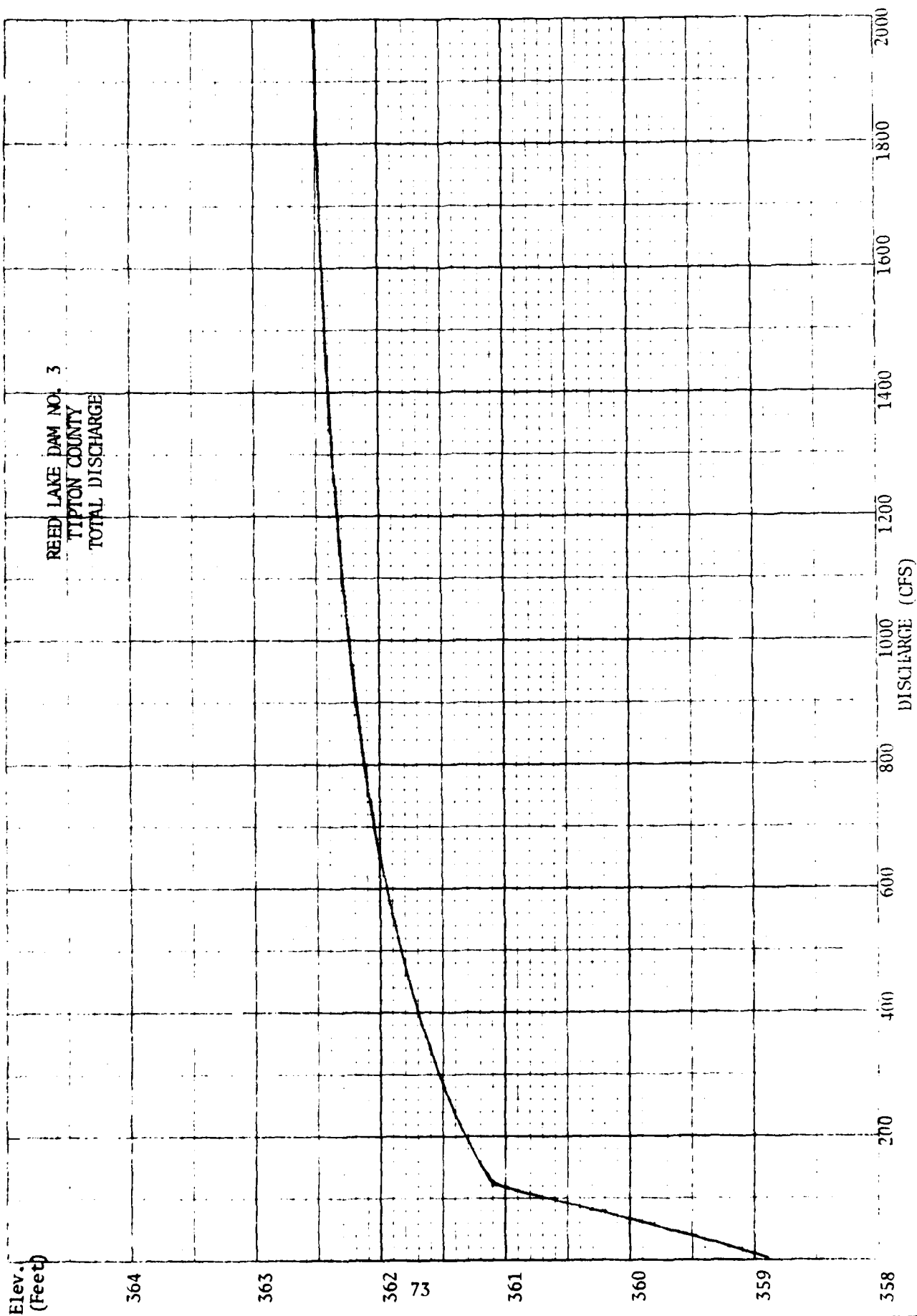
STORAGE INDICATION CURVE

REED LAKE DAM NO. 3





STORAGE
Reed Lake Dam No. 3
Tipton County



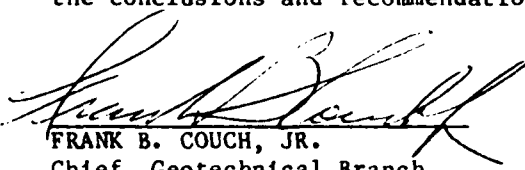
APPENDIX I
CORRESPONDENCE

NON-FEDERAL DAM INSPECTION REVIEW BOARD
PO BOX 1070
NASHVILLE, TENNESSEE 37202

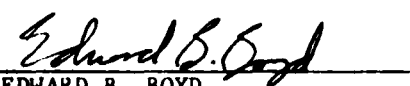
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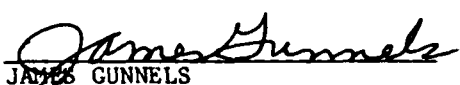
Commander
US Army Engineer District, Nashville
PO Box 1070
Nashville, TN 37202

1. The Interagency Review Board, appointed by your Memorandum of 8 October 1981, presents the following after meeting on 2 June 1981 to consider the Phase I investigation report on Reed Lake Dam No. 2 performed by Winsett-Simmonds, Consterdine & Associates, Inc., under contract to the Tennessee Department of Conservation.
2. There is some discrepancy in the description of the holes in Section 3.3.2. This should be resolved and this section rewritten.
3. The spillway should be described as a "seriously inadequate spillway."
4. The condition classification should be changed from "significantly deficient" to "unsafe-nonemergency."
5. Slope instability and seriously inadequate spillway capacity should be given as reasons for classifying the dam as unsafe-nonemergency.
6. An emergency action plan should be developed, including a warning system to alert downstream residents, in the event a serious condition develops with the project.
7. The Board considered the information contained in the report and agreed with the conclusions and recommendations following minor revisions.

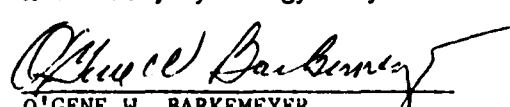

FRANK B. COUCH, JR.
Chief, Geotechnical Branch
Chairman


ROBERT A. HUNT
Director, Div of Water Resources
State of Tennessee


EDWARD B. BOYD
Hydrologic Technician
Alternate, US Geological Survey


JAMES GUNNELS
Structural Engineer
Alternate, Design Branch


THOMAS N. PORTER
Hydraulic Engineer
Alternate, Hydrology & Hydraulics Branch


O'GENE W. BARKEMEYER
State Conservation Engineer
Soil Conservation Service



DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1070
NASHVILLE, TENNESSEE 37202

IN REPLY REFER TO

12 JUN 1981

ORNED-G

Honorable Lamar Alexander
Governor of Tennessee
Nashville, TN 37219

Dear Governor Alexander:

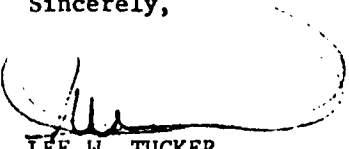
Please be informed of the results of an inspection, under authority of Public Law 92-367, conducted on Reed Lake Dam No. 2 in Tipton County, Tennessee. An inspection team, composed of personnel from Winnsett-Simmonds, Consterdine and Associates, Inc., and a member of your Division of Water Resources, observed conditions which indicate a high potential for failure of the embankment dam due to seriously inadequate spillway capacity and other serious deficiencies.

Reed Lake Dam No. 2 is classified as a high hazard potential, small size dam and, as such, should be able to regulate a one-half probable maximum flood (1/2 PMF) to conform to inspection program guidelines. A hydraulic analysis of the project's spillway showed the dam would be substantially overtopped by a one-half probable maximum flood. A visible inspection indicated that the stability of the embankment is questionable due to the steepness of the slope and undesirable growth on both the upstream and downstream slope.

Based on the results of the visual inspection and due to the seriously inadequate spillway capacity, the dam is considered unsafe. While I do not view this as an emergency at this time, I recommend you initiate prompt action by the State to cause the owner to correct the deficiencies as soon as practical.

A report of the technical investigation will be furnished your office upon completion.

Sincerely,


LEE W. TUCKER
Colonel, Corps of Engineers
Commander

CF:
Mr. Robert A. Hunt, Director
Division of Water Resources
4721 Trousdale Drive
Nashville, TN 37220

END

DATE
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