AD-A105 312 REITZ AND JENS INC ST LOUIS MO F/G 13/13
NATIONAL DAM SAFETY PROGRAM. JIM BAIR DAM (MO 30020), MISSOURI --ETC(U)
NOV 78 H M REITZ, J J BAILEY DACW43-78-C-0162
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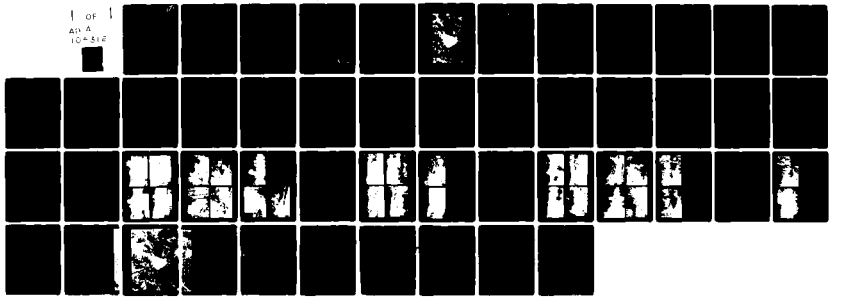


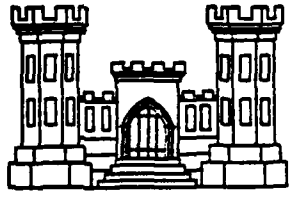
MISSOURI-KANSAS CITY BASIN

JIM BAIR DAM

ST. CHARLES COUNTY, MISSOURI

MO 30020

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



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

FOR: STATE OF MISSOURI

NOVEMBER 1978

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A105	3. RECIPIENT'S CATALOG NUMBER 312
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Jim Bair Dam (MO 30020) St. Charles County, Missouri		5. TYPE OF REPORT & PERIOD COVERED Final Report.
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Reitz & Jens, Inc.		8. CONTRACT OR GRANT NUMBER(s) DACW43-78-C-0162
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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

IN REPLY REFER TO

SUBJECT: Jim Bair Dam, MO ID No. 30020
Phase I Inspection Report

This report presents the results of field inspection and evaluation of the Jim Bair Dam.

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 25 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.

SUBMITTED BY: SIGNED 16 FEB 1979
Chief, Engineering Division Date

APPROVED BY: SIGNED 16 FEB 1979
Colonel, CE, District Engineer Date

Accession For	
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PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Jim Bair Dam
State Located	Missouri
County Located	St. Charles County
Stream	Sehrt Creek
Date of Inspection	24 October 1978

Jim Bair Dam was inspected by an interdisciplinary team of engineers from Reitz & Jens, Inc. under contract with the St. Louis District Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations and private engineers. Based on these guidelines, this dam is classified as a small dam with a high downstream hazard potential. The estimated damage zone from failure of this dam extends two miles downstream from the dam.

Failure would threaten the life and property of three families and cause appreciable damage to associated farm buildings, three county roads and one state highway.

Our inspection and evaluation indicates the dam is deficient in that the spillways are inadequate. The guidelines for a dam having the above size and hazard potential require that the spillway be capable of passing a one-half PMF (Probable Maximum Flood). A 25% PMF will begin to overtop the dam. The dam and spillways are adequate to contain the 100-year flood.

Our inspection and evaluation indicate significant tree and underbrush growth on both faces of the dam which could lead to conditions causing rupture of the dam. Other deficiencies found are lack of erosion protection on the upstream slope of the dam, no effective erosion protection on the spillways and lack of seepage and stability analyses records.

We recommend the owner take action to correct or control the deficiencies described.

HENRY M. REITZ, President
Reitz & Jens, Inc.

JOHN J. BAILEY, JR., Vice President
Chief Engineer
Reitz & Jens, Inc.

OVERVIEW – 30020

PLATE 1

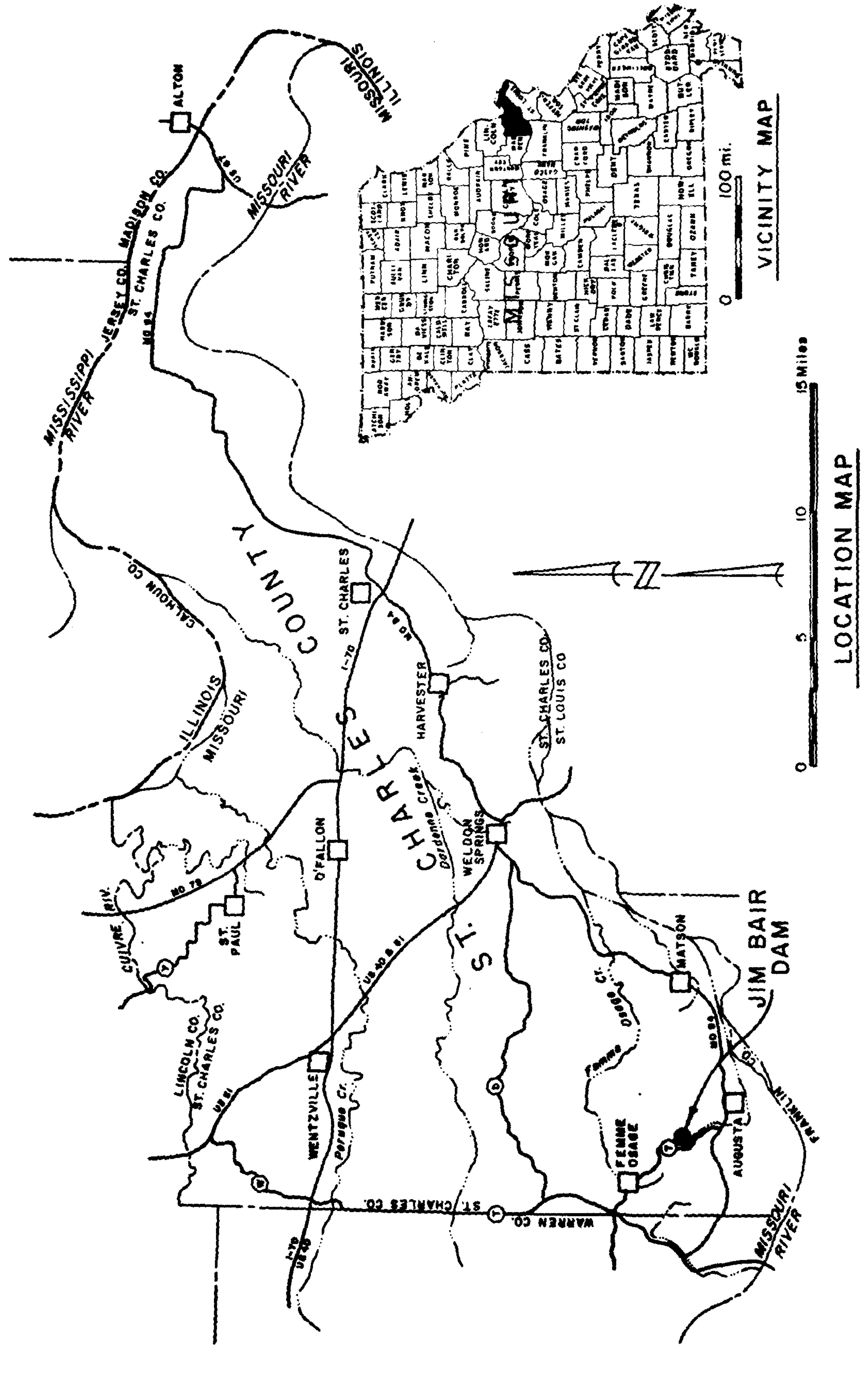
LOCATION MAP
VICINITY MAP
0 5 10 15 Miles
0 100 mi.
ST. CHARLES COUNTY
MISSISSIPPI RIVER
MISSOURI RIVER
ILLINOIS
MISSOURI
ALTON
ST. CHARLES
HARVESTER
WELDON SPRINGS
O'FALLON
ST. PAUL
WENTZVILLE
MATSON
AUGUSTA
FEMME OSAGE
JIM BAIR DAM
CALHOUN CO.
JERSEY CO.
MADISON CO.
ST. CHARLES CO.
ST. LOUIS CO.
LINCOLN CO.
WARREN CO.
FRANKLIN CO.
CUIVRE RIV.
Dardenne Creek
I-70
US 61

PLATE 2

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
JIM BAIR DAM MO. ID NO. 30020

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(Cont.)

LIST OF PLATES

LIST OF INDICES AND PHOTOGRAPH NUMBERS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority The National Dam Inspection Act, Public Law 92-367 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer contracted with Reitz & Jens, Inc. (Contract DACW43-78-C-0162) for a safety inspection of the Jim Bair dam, MO ID No. 30020.

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

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

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

(1) The dam is an earth structure built in the uplands of Sehrt Creek, 2-1/2 miles from the edge of the Missouri River Valley. Topography adjacent to the valley is steep. Soils are Union Silt Loam, a thin loessial soil over a clay which, in turn, is on bedrock of the Ordovician System.

There is no principal spillway. There are two emergency spillways. At the east end is an emergency spillway about 180 feet long on a flat grade in virgin soil approximately 50 feet wide and 3 feet deep. At the west end is a smaller capacity spillway which is a dip in a road with low point more than 2 feet higher.

Topography in the vicinity of the dam is shown on Plate 3.

Pertinent physical data are given in paragraph 1.3 below.

b. Location The dam is located in the western portion of St. Charles County on Highway T, 2.6 miles northeast of Augusta, Missouri, as shown on Plate 2. The dam and lake are located in the NE¼ of the NE¼ of Section 4, T44N, R1E and are shown on the Missouri, St. Charles and Franklin County Washington East Quadrangle Sheet, 1972 Edition. The dam is not shown on the 1945 edition of the Augusta Quadrangle, 15-Minute Series.

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

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

e. Ownership The dam is owned by Joe W. Randolph, Box 119C, Femme Osage Road, Augusta, Missouri 63332.

f. Purpose of Dam The dam forms a 3.3- acre recreational lake.

g. Design and Construction History The inspection team was unable to find applicable data on this dam. It was reported that construction on the dam began in 1972+ and water impoundment commenced upon completion.

h. Normal Operating Procedure Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation. The maximum water depth ever experienced at the spillway is unknown.

1.3 PERTINENT DATA

a. Drainage Area - 89 acres

b. Discharge at Damsite

(1) All discharge at the damsite is through uncontrolled spillways.

(2) Estimated experienced maximum flood at damsite - unknown

(3) Estimated ungated emergency spillway capacity at maximum pool elevation -

(1) East Spillway	-	223 cfs
(2) West Spillway	-	26 cfs
(3) Total		249 cfs

c. Elevation (Feet Above M.S.L.)

(1) Top of dam - 633.5 ± (see Plate 3)

(2) Spillway crest (+) 630.4

(3) Streambed at centerline of dam - 613.9 from survey

(4) Maximum tailwater - unknown.

d. Reservoir Length of maximum pool - 570 feet ±.

e. Storage

(1) Spillway crest - 29 acre feet

(2) Top of dam - 41 acre feet

f. Reservoir Surface (Acres)

(1) Top of dam - 4.2 acres

(2) Spillway crest - 3.4 acres

g. Dam

(1) Type - earth embankment

(2) Length - 400 feet

(3) Height - 22 feet maximum (from survey)

(4) Top width - 11-12 feet

(5) Side slopes -

(a) Downstream - 1V on 2.5H (determined from section at station 2+2)(See Plate 3).

(b) Upstream - 1V on 4.0H

(6) Zoning - unknown

(7) Impervious core - unknown

(8) Cutoff - unknown

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel None

i. Spillways (Emergency)

(1) East spillway 180-foot channel on flat grade. Section is irregular. Depth is about 3 feet and top width varies from about 45 feet to 55 feet.

(2) West spillway crest is too high for it to be effective until dam starts to overtop. It is a 3-foot dip in the road about 60 feet wide.

j. Regulating Outlets None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No detailed design was found readily available for the dam as it appears to have been built. Records from the Soil Conservation Service, United States Department of Agriculture, indicated a primary 6-inch pipe spillway through the dam which was not found. The structures were designed with farm-pond criteria.

2.2 CONSTRUCTION

The dam was constructed in 1972 or shortly thereafter.

2.3 OPERATION

The maximum loading on the dam is unknown. The lake level seems to remain stable during average precipitation of 38 inches per year. There are no records of operation of the dam.

It appears,from the condition of the emergency spillway, that there has been discharge through it at some time since completion.

2.4 EVALUATION

a. Availability No construction or operation records were found.

b. Adequacy The engineering data available were inadequate to make a detailed assessment of design, construction and operation. The owner should have an engineer, experienced in the design of dams, perform detailed seepage and stability analyses.

However, for the size of dam, materials used and measurements taken, a satisfactory hydrologic/hydraulic evaluation resulted. For the dam section as visually observed, the reservoir of at least 6 years of age and the condition of the dam, indicated that even though a detailed assessment of the design and construction in an analytical sense was not possible when considered by the experienced engineers, a defensible evaluation of the dam as a structure was feasible.

c. Validity Not applicable, since existing structure is materially different from information supplied by the Soil Conservation Service.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General Visual inspection of Jim Bair dam was made on 24 October 1978 This followed four days of field measurements by a survey party in September and October, 1978. The training and experience in these inspections included hydrologic, hydraulic engineering, soils and materials engineering, surveying and structural engineering. This section only states those aspects visually observed during the inspections. It does not comment upon items reported to have been installed but which would not be evident during September and October.

b. Dam The dam is an earth dam, top width 11-12-feet. Downstream slope 1V:2-1/2H; upstream slope 1V:4H above the water surface. The height is 22 feet; length approximately 400 feet. The elevation of the top of dam varies 1-1/2 feet with the lower portion being at the northeast end near the main emergency spillway. There is no erosion protection on the reservoir side of the dam (D-1). Due to the relative steepness of the watershed around the dam and the heavily wooded character of the watershed which prevent much wind across the lake area, there is very little erosion visible either on the upstream face of the dam or on the banks of the lake. The downstream slope of the dam is heavily overgrown by shrub-height plants and saplings (D-3, D-4, D-5). The upstream face of the dam has marked tree-growth (D-1, D-10).

Inspection of the downstream slope of the dam and contiguous areas beyond the toe of the dam indicates neither growth of hydrophilic plants nor any soft, wet areas. No sign of underseepage along the contact between the toe of the dam and original ground surface could be observed. There does not appear to be any indication of through seepage on the dam.

c. Spillways No evidence of a low-level outlet pipe was found on or below the downstream face of the dam or was there any indication of a pipe as a primary spillway in the reservoir area. The control elevation of the northeast spillway (S-1, S-5), which is the larger spillway and has the predominant amount of capacity is 2-1/2 feet between the control elevation on the southwest spillway (S-2, S-4). Both of these spillways are in virgin soil. The main northeast spillway is connected to a relatively wide channel (S-6, S-7, S-8 with weed) approximately 160 feet long and appears wholly within virgin soil. There is erosion at the lower end of the channel approximately 200 feet from the closest edge of the lake.

d. Reservoir Area No wave-wash, excessive erosion or slides were observed along the shore of the reservoir.

e. Downstream Channel Except as described in paragraph 3.1c above the downstream channel is in good condition.

3.2 EVALUATION

None of the conditions observed is significant enough to indicate the need for immediate remedial action or a serious potential failure. Annual attention to cutting growth on the slopes of the dam is necessary.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

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

4.2 MAINTENANCE OF DAM

Based on the amount of brush and size of trees on the downstream slope, the dam has had little maintenance at best.

4.3 MAINTENANCE OF OPERATING FACILITIES

No operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT.

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

4.5 EVALUATION

If the uncontrolled vegetation on the downstream slope is allowed to continue, a serious potential of failure may develop.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data No reliable design data available.

b. Experience Data The drainage area is developed from USGS Washington East Missouri Quadrangle. Also available are 1"=2000' aerial stereo pairs taken 22 March 1977, by Surdex Corporation. Lake area is measured on a 1"=200' enlargement of a portion of one of these photographs and shown on Plate 1. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations

(1) The east spillway channel has no serious erosion. At its downstream end, 180 feet beyond the dam, it has eroded 6 feet deep.

(2) No drawdown facilities are available to evacuate the pool.

(3) The only effective spillway with exit channel capacity is located at the east end of the dam.

d. Overtopping Potential Hydrologic and hydraulic calculations are in Appendix A. The spillways are too small to pass the minimum required flood of one-half the Probable Maximum without overtopping. The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions reasonably possible in the region. The dam will start to be overtopped by a flood equal to 25% of the PMF. The one-half PMF will overtop the dam to a maximum depth of about 0.7 foot. The depth will vary to zero across the dam because of the sloping crest. A width of 300 feet of dam crest will be subject to some overtopping flow. Maximum rate of flow over the dam crest will be about 265 cubic feet per second. Overtopping flow will have a duration of about 0.8 hour. The existing lake and spillway will pass a 100-year frequency flood below the crest of the dam.

According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, the 100-year frequency flood is only adequate for a low hazard dam of small size.

The effect from rupture of the dam could extend approximately two miles downstream of the dam. There are three farmhouses downstream of the dam which could be severely damaged and lives of the inhabitants could be lost should failure of the dam occur.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations Visual observations of existing conditions which adversely affect the structural stability of this dam are discussed in paragraph 3.1.b.

b. Design and Construction Data No design or construction data relating to the structural stability of the dam were found.

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

d. Post Construction Changes No post construction changes, other than those referenced in paragraph a above, exist which will affect the structural stability of the dam.

e. Seismic Stability Considering the seismic zone (2) in which this dam is located, an earthquake of this magnitude is not expected to cause a structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety The dam will be overtopped by 25% of the Probable Maximum Flood (PMF).

The reservoir and emergency spillway are adequate to contain a flood which has a 1% chance of being exceeded (100-year flood) in any given year.

Several items were noted during the visual inspection by the inspection team which should be corrected or controlled. The heavy growth of trees on the upstream and downstream slopes of the dam is a safety deficiency. An armor-coat to protect the reservoir slope of the dam against wave-wash is needed. Erosion protection for the spillway is deficient.

The stability of and seepage conditions on the downstream slope should be investigated by an engineer experienced in the design of dams.

b. Adequacy of Information Due to the lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers that these data are sufficient to support the conclusions herein.

c. Urgency The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. If the safety deficiencies listed in paragraph a are not corrected in the near future, they will continue to deteriorate and may lead to a serious potential of failure.

d. Necessity for Phase II Based on the results of the Phase I Inspection, no Phase II inspection is recommended.

e. Seismic Stability This dam is located in Seismic Zone 2. An earthquake of this magnitude is not expected to be hazardous to this dam.

7.2 REMEDIAL MEASURES

a. Alternatives The owner should obtain the services of an experienced engineer to design and observe construction of remedial measures to prevent overtopping the dam by the one-half PMF. The spillway size could be increased (and outlet channel steepened) or an uncontrolled drawdown tube installed through the dam to assure that reservoir levels are maintained at no more than slightly higher than current levels. Increasing spillway size would require provision of erosion protection on the upslope of the dam.

b. Stability and Seepage Analyses The owner should have an engineer experienced in the design and construction of dams prepare seepage and stability analyses.

c. O&M Maintenance and Procedures The following O&M maintenance and procedures are recommended:

(1) Remove uncontrolled vegetation growth on the downstream slope of the dam.

(2) After removal of existing tree growth, vegetation on the dam should be periodically cut.

(3) Control growth of vegetation on the dam.

(4) Remove first-year sapling trees and vegetation from the downstream slope. Care should be taken during removal not to destroy the existing condition of the downstream slope.

(5) Construct an erosive-resistant sill in the spillway completely across the control section and remove the humps and irregularities in the spillway channel.

(6) The owner should keep a record of all future repairs and maintenance.

(7) A detailed inspection of the dam should be made periodically by an engineer experienced in design and construction of dams. Records should be kept of these inspections and major maintenance.

APPENDIX A

HYDROLOGIC COMPUTATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33". Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the spillways and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-area curve. The hydraulic capacity of the spillways and the sloping top of dam is defined by a composite elevation-discharge curve.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on Plate 1A. Definitions of these variables are contained in the "User's Manual" for the computer program.

5. The capacity of the east spillway was calculated using critical velocity at the control section at the lower end of the 180-foot long spillway channel. A drawdown curve taking into account velocity head changes and friction was then calcuated up the channel to determine the corresponding lake elevation. The capacity of the west spillway was calculated using critical depth and velocity at the control section which was found to be at the axis of the dam. To allow for friction, velocity head changes and transition losses 0.2 velocity head was added when calculating reservoir elevations.

6. Discharge over the irregular top of dam (the crest is not level) was calculated using a coefficient of 3.0 in the broad-crested weir equation for the sections of dam crest at different elevations. One hundred feet of the berm along the spillway channel was included as an extension of the dam crest which bonfines flow in the spillway. All emergency spillways and overtopping discharges were included in a composite rating curve. Dummy values of 0.1 for dam length, coefficient of discharge and exponent were entered on the $D card to supporess diagnostic statements in the output. The amount of this dummy flow is never greater than 0.02 cfs.

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********************************
    1                 A  ********** ID # 30020 JIM BAIR DAM * ADD 530 FOR USGS ELEV. *******
    2                 A  ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
    3                 A  ********** REITZ & JENS, INC. -    AUGUST 1978 **********************
    4                 B    288        0        5       -0       -0       -0       -0       -0       -4       -0
    5                 I      5
    6                 J      1        2        3
    7                 JI  0.10     0.15     0.20     0.25     0.30     0.35     0.40     0.50     1.00
    8                 K      0   PMF                              1        3        1
    9                 1  ***** INFLOW HYDROGRAPH - SCS METHOD *****
   10                 M      1        2    0.139                          1                          1
   11                 P             24.8      101      120      130
   12                 1                                                            -1      -85                0.07
   13                 R2            0.17                               .
   14                 X            -0.10      2.0
   15                 K      1       05                               1        1
   16                 1  ***** RESERVOIR ROUTING - RATING CURVE SUPPLIED - SLOPING DAM *****
   17                 Y                                        1        1
   18                 Y1     1                                                  -100.4       -1
   19                 Y4 100.4     100.6    100.8    101.0    101.5    102.0    102.5    103.0    103.5    104.0
   20                 Y4 104.5     105.0    105.5
   21                 Y5   0.0       1.0      3.0      7.0     20.0     40.0     84.0    139.0    249.0    519.0
   22                 Y51206.0    2278.0   3962.0
   23                 YA   0.00     3.35     5.97    10.56
   24                 YC     75      100      110      130
   25                 Y$ 100.4
   26                 YD 103.5       0.1      0.1      0.1
   27                 K      99
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TABLE A-1
Sheet 1 of 5

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********

RUN  DATE0 11/20/78.
     TIME0 16.43.16.

     * ********** ID # 30020 JIM BAIR DAM * ADD 530 FOR USGS ELEV. *******
      ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
      ********** REITZ # JENS, INC. -    AUGUST 1978 **********

                              JOB SPECIFICATION
        NO      NHR     NMIN     IDAY     IHR     IMIN    METRC     IPLT     IPRT    NSTAN
       288       0        5       -0       -0       -0       -0       -0       -4       -0
                              JOPER      NWT    LROPT    TRACE
                                 5       -0       -0       -0

                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                NPLAN= 1 NRTIO= 9 LRTIO= 1
          RTIOS=     .10     .15     .20     .25     .30     .35     .40     .50    1.00

**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

      ***** INFLOW HYDROGRAPH - SCS METHOD *****
                        ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                        PMF        0       -0       -0       1       3       1       -0       -0

                                HYDROGRAPH DATA
         IHYDG    IUHG    TAREA    SNAP    TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
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                                PRECIP DATA
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                   -0.00   24.80  101.00  120.00  130.00   -0.00   -0.00   -0.00

                                LOSS DATA
        LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
           -0   -0.00   -0.00    1.00   -0.00   -0.00    1.00   -1.00  -85.00   -0.00     .07

          CURVE NO =  -85.00  WETNESS =   -1.00  EFFECT CN =   85.00

                              UNIT HYDROGRAPH DATA
                            TC= -0.00    LAG=   .17

                                RECESSION DATA
                          STRTQ=   -0.00    QRCSN=    -.10    RTIOR= 2.00

          UNIT HYDROGRAPH 12 END OF PERIOD ORDINATES, TC=   -0.00 HOURS, LAG=    .17  VOL= 1.00
        96.      292.      300.      188.       94.       50.       27.       14.        7.        4.
         2.        1.

     0                          END-OF-PERIOD FLOW
   MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q
```

TABLE A-1
Sheet 2 of 5

						END-OF-PERIOD FLOW						
MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	0.	1.01	12.05	145	.21	.20	.01	79.
1.01	.10	2	.01	.00	.01	0.	1.01	12.10	146	.21	.20	.01	119.
1.01	.15	3	.01	.00	.01	1.	1.01	12.15	147	.21	.20	.01	160.
1.01	.20	4	.01	.00	.01	1.	1.01	12.20	148	.21	.20	.01	186.
1.01	.25	5	.01	.00	.01	1.	1.01	12.25	149	.21	.20	.01	199.
1.01	.30	6	.01	.00	.01	1.	1.01	12.30	150	.21	.20	.01	206.
1.01	.35	7	.01	.00	.01	1.	1.01	12.35	151	.21	.20	.01	211.
1.01	.40	8	.01	.00	.01	1.	1.01	12.40	152	.21	.20	.01	213.
1.01	.45	9	.01	.00	.01	1.	1.01	12.45	153	.21	.20	.01	214.
1.01	.50	10	.01	.00	.01	1.	1.01	12.50	154	.21	.20	.01	215.
1.01	.55	11	.01	.00	.01	1.	1.01	12.55	155	.21	.20	.01	216.
1.01	1.00	12	.01	.00	.01	1.	1.01	13.00	156	.21	.20	.01	217.
1.01	1.05	13	.01	.00	.01	1.	1.01	13.05	157	.25	.24	.01	221.
1.01	1.10	14	.01	.00	.01	1.	1.01	13.10	158	.25	.24	.01	233.
1.01	1.15	15	.01	.00	.01	1.	1.01	13.15	159	.25	.24	.01	245.
1.01	1.20	16	.01	.00	.01	1.	1.01	13.20	160	.25	.24	.01	253.
1.01	1.25	17	.01	.00	.01	1.	1.01	13.25	161	.25	.24	.01	258.
1.01	1.30	18	.01	.00	.01	1.	1.01	13.30	162	.25	.24	.01	260.
1.01	1.35	19	.01	.00	.01	1.	1.01	13.35	163	.25	.24	.01	261.
1.01	1.40	20	.01	.00	.01	1.	1.01	13.40	164	.25	.24	.01	262.
1.01	1.45	21	.01	.00	.01	1.	1.01	13.45	165	.25	.25	.01	263.
1.01	1.50	22	.01	.00	.01	1.	1.01	13.50	166	.25	.25	.01	263.
1.01	1.55	23	.01	.00	.01	1.	1.01	13.55	167	.25	.25	.00	264.
1.01	2.00	24	.01	.00	.01	1.	1.01	14.00	168	.25	.25	.00	264.
1.01	2.05	25	.01	.00	.01	1.	1.01	14.05	169	.31	.31	.01	270.
1.01	2.10	26	.01	.00	.01	1.	1.01	14.10	170	.31	.31	.01	280.
1.01	2.15	27	.01	.00	.01	1.	1.01	14.15	171	.31	.31	.01	307.
1.01	2.20	28	.01	.00	.01	1.	1.01	14.20	172	.31	.31	.00	314.
1.01	2.25	29	.01	.00	.01	1.	1.01	14.25	173	.31	.31	.00	325.
1.01	2.30	30	.01	.00	.01	1.	1.01	14.30	174	.31	.31	.00	328.
1.01	2.35	31	.01	.00	.01	2.	1.01	14.35	175	.31	.31	.00	331.
1.01	2.40	32	.01	.00	.01	2.	1.01	14.40	176	.31	.31	.00	331.
1.01	2.45	33	.01	.00	.01	2.	1.01	14.45	177	.31	.31	.00	332.
1.01	2.50	34	.01	.00	.01	2.	1.01	14.50	178	.31	.31	.00	332.
1.01	2.55	35	.01	.00	.01	2.	1.01	14.55	179	.31	.31	.00	333.
1.01	3.00	36	.01	.00	.01	3.	1.01	15.00	180	.31	.31	.00	333.
1.01	3.05	37	.01	.00	.01	3.	1.01	15.05	181	.19	.19	.00	321.
1.01	3.10	38	.01	.00	.01	3.	1.01	15.10	182	.38	.38	.00	304.
1.01	3.15	39	.01	.00	.01	3.	1.01	15.15	183	.38	.38	.00	303.
1.01	3.20	40	.01	.00	.01	3.	1.01	15.20	184	.57	.57	.01	375.
1.01	3.25	41	.01	.00	.01	3.	1.01	15.25	185	.67	.66	.01	463.
1.01	3.30	42	.01	.00	.01	4.	1.01	15.30	186	1.62	1.61	.01	650.
1.01	3.35	43	.01	.00	.01	4.	1.01	15.35	187	2.67	2.65	.02	1097.
1.01	3.40	44	.01	.00	.01	4.	1.01	15.40	188	1.05	1.04	.01	1509.
1.01	3.45	45	.01	.00	.01	4.	1.01	15.45	189	.67	.66	.00	1574.
1.01	3.50	46	.01	.00	.01	4.	1.01	15.50	190	.57	.57	.00	1208.
1.01	3.55	47	.01	.00	.01	4.	1.01	15.55	191	.38	.38	.00	950.
1.01	4.00	48	.01	.00	.01	4.	1.01	16.00	192	.38	.38	.00	733.
1.01	4.05	49	.01	.00	.01	5.	1.01	16.05	193	.29	.29	.00	575.
1.01	4.10	50	.01	.00	.01	5.	1.01	16.10	194	.29	.29	.00	466.
1.01	4.15	51	.01	.00	.01	5.	1.01	16.15	195	.29	.29	.00	396.
1.01	4.20	52	.01	.00	.01	5.	1.01	16.20	196	.29	.29	.00	356.
1.01	4.25	53	.01	.01	.01	5.	1.01	16.25	197	.29	.29	.00	336.
1.01	4.30	54	.01	.01	.01	5.	1.01	16.30	198	.29	.29	.00	324.
1.01	4.35	55	.01	.01	.01	5.	1.01	16.35	199	.29	.29	.00	318.
1.01	4.40	56	.01	.01	.01	5.	1.01	16.40	200	.29	.29	.00	315.
1.01	4.45	57	.01	.01	.01	6.	1.01	16.45	201	.29	.29	.00	314.
1.01	4.50	58	.01	.01	.01	6.	1.01	16.50	202	.29	.29	.00	314.
1.01	4.55	59	.01	.01	.01	6.	1.01	16.55	203	.29	.29	.00	313.
1.01	5.00	60	.01	.01	.01	6.	1.01	17.00	204	.29	.29	.00	313.

TABLE A-1
Sheet 3 of 5

1.01	5.05	61	.01	.01	6.	1.01	17.05	205	.23	.23	.00	307.
1.01	5.10	62	.01	.01	6.	1.01	17.10	206	.23	.23	.00	269.
1.01	5.15	63	.01	.01	6.	1.01	17.15	207	.23	.23	.00	270.
1.01	5.20	64	.01	.01	6.	1.01	17.20	208	.23	.23	.00	259.
1.01	5.25	65	.01	.01	6.	1.01	17.25	209	.23	.23	.00	253.
1.01	5.30	66	.01	.01	7.	1.01	17.30	210	.23	.23	.00	250.
1.01	5.35	67	.01	.01	7.	1.01	17.35	211	.23	.23	.00	246.
1.01	5.40	68	.01	.01	7.	1.01	17.40	212	.23	.23	.00	241.
1.01	5.45	69	.01	.01	7.	1.01	17.45	213	.23	.23	.00	247.
1.01	5.50	70	.01	.01	7.	1.01	17.50	214	.23	.23	.00	240.
1.01	5.55	71	.01	.01	7.	1.01	17.55	215	.23	.23	.00	246.
1.01	6.00	72	.01	.01	7.	1.01	18.00	216	.23	.23	.00	240.
1.01	6.05	73	.01	.03	10.	1.01	18.05	217	.02	.02	.00	226.
1.01	6.10	74	.01	.03	16.	1.01	18.10	218	.02	.02	.00	165.
1.01	6.15	75	.01	.03	26.	1.01	18.15	219	.02	.02	.00	148.
1.01	6.20	76	.01	.03	33.	1.01	18.20	220	.02	.02	.00	138.
1.01	6.25	77	.01	.03	36.	1.01	18.25	221	.02	.02	.00	129.
1.01	6.30	78	.01	.04	39.	1.01	18.30	222	.02	.02	.00	120.
1.01	6.35	79	.01	.04	41.	1.01	18.35	223	.02	.02	.00	114.
1.01	6.40	80	.01	.04	43.	1.01	1.40	224	.02	.02	.00	105.
1.01	6.45	81	.01	.04	44.	1.01	18.45	225	.02	.02	.00	98.
1.01	6.50	82	.01	.04	46.	1.01	18.50	226	.02	.02	.00	91.
1.01	6.55	83	.01	.05	47.	1.01	18.55	227	.02	.02	.00	85.
1.01	7.00	84	.01	.05	48.	1.01	19.00	228	.02	.02	.00	77.
1.01	7.05	85	.01	.05	49.	1.01	19.05	229	.02	.02	.00	74.
1.01	7.10	86	.01	.05	50.	1.01	19.10	230	.02	.02	.00	67.
1.01	7.15	87	.01	.05	50.	1.01	19.15	231	.02	.02	.00	65.
1.01	7.20	88	.01	.05	51.	1.01	19.20	232	.02	.02	.00	60.
1.01	7.25	89	.01	.05	52.	1.01	19.25	233	.02	.02	.00	56.
1.01	7.30	90	.01	.05	53.	1.01	19.30	234	.02	.02	.00	52.
1.01	7.35	91	.01	.05	53.	1.01	19.35	235	.02	.02	.00	47.
1.01	7.40	92	.01	.05	54.	1.01	19.40	236	.02	.02	.00	46.
1.01	7.45	93	.01	.05	55.	1.01	19.45	237	.02	.02	.00	43.
1.01	7.50	94	.01	.05	55.	1.01	19.50	238	.02	.02	.00	40.
1.01	7.55	95	.01	.05	56.	1.01	19.55	239	.02	.02	.00	37.
1.01	8.00	96	.01	.05	56.	1.01	20.00	240	.02	.02	.00	33.
1.01	8.05	97	.01	.05	57.	1.01	20.05	241	.02	.02	.00	32.
1.01	8.10	98	.01	.05	57.	1.01	20.10	242	.02	.02	.00	30.
1.01	8.15	99	.01	.05	58.	1.01	20.15	243	.02	.02	.00	28.
1.01	8.20	100	.01	.05	58.	1.01	20.20	244	.02	.02	.00	26.
1.01	8.25	101	.01	.06	58.	1.01	20.25	245	.02	.02	.00	24.
1.01	8.30	102	.01	.06	59.	1.01	20.30	246	.02	.02	.00	23.
1.01	8.35	103	.01	.06	59.	1.01	20.35	247	.02	.02	.00	22.
1.01	8.40	104	.01	.06	59.	1.01	20.40	248	.02	.02	.00	22.
1.01	8.45	105	.01	.06	60.	1.01	20.45	249	.02	.02	.00	22.
1.01	8.50	106	.01	.06	60.	1.01	20.50	250	.02	.02	.00	22.
1.01	8.55	107	.01	.06	60.	1.01	20.55	251	.02	.02	.00	22.
1.01	9.00	108	.01	.06	61.	1.01	21.00	252	.02	.02	.00	22.
1.01	9.05	109	.01	.06	61.	1.01	21.05	253	.02	.02	.00	22.
1.01	9.10	110	.01	.06	61.	1.01	21.10	254	.02	.02	.00	22.
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1.01	9.25	113	.01	.06	62.	1.01	21.25	257	.02	.02	.00	22.
1.01	9.30	114	.01	.06	62.	1.01	21.30	258	.02	.02	.00	22.
1.01	9.35	115	.01	.06	62.	1.01	21.35	259	.02	.02	.00	22.
1.01	9.40	116	.01	.06	63.	1.01	21.40	260	.02	.02	.00	22.
1.01	9.45	117	.01	.06	63.	1.01	21.45	261	.02	.02	.00	22.
1.01	9.50	118	.01	.06	63.	1.01	21.50	262	.02	.02	.00	22.
1.01	9.55	119	.01	.06	63.	1.01	21.55	263	.02	.02	.00	22.
1.01	10.00	120	.01	.06	63.	1.01	22.00	264	.02	.02	.00	22.

TABLE A-1
Sheet 4 of 5

1.01	10.05	121	.07	.06	.01	63.	1.01	22.05	265	.02	.02	.00	22.
1.01	10.10	122	.07	.06	.01	64.	1.01	22.10	266	.02	.02	.00	22.
1.01	10.15	123	.07	.06	.01	64.	1.01	22.15	267	.02	.02	.00	22.
1.01	10.20	124	.07	.06	.01	64.	1.01	22.20	268	.02	.02	.00	22.
1.01	10.25	125	.07	.06	.01	64.	1.01	22.25	269	.02	.02	.00	22.
1.01	10.30	126	.07	.06	.01	64.	1.01	22.30	270	.02	.02	.00	22.
1.01	10.35	127	.07	.06	.01	64.	1.01	22.35	271	.02	.02	.00	22.
1.01	10.40	128	.07	.06	.01	65.	1.01	22.40	272	.02	.02	.00	22.
1.01	10.45	129	.07	.06	.01	65.	1.01	22.45	273	.02	.02	.00	22.
1.01	10.50	130	.07	.06	.00	65.	1.01	22.50	274	.02	.02	.00	22.
1.01	10.55	131	.07	.06	.00	65.	1.01	22.55	275	.02	.02	.00	22.
1.01	11.00	132	.07	.06	.00	65.	1.01	23.00	276	.02	.02	.00	22.
1.01	11.05	133	.07	.06	.00	65.	1.01	23.05	277	.02	.02	.00	22.
1.01	11.10	134	.07	.06	.00	65.	1.01	23.10	278	.02	.02	.00	22.
1.01	11.15	135	.07	.06	.00	65.	1.01	23.15	279	.02	.02	.00	22.
1.01	11.20	136	.07	.06	.00	65.	1.01	23.20	280	.02	.02	.00	22.
1.01	11.25	137	.07	.06	.00	66.	1.01	23.25	281	.02	.02	.00	22.
1.01	11.30	138	.07	.06	.00	66.	1.01	23.30	282	.02	.02	.00	22.
1.01	11.35	139	.07	.06	.00	66.	1.01	23.35	283	.02	.02	.00	22.
1.01	11.40	140	.07	.06	.00	66.	1.01	23.40	284	.02	.02	.00	22.
1.01	11.45	141	.07	.06	.00	66.	1.01	23.45	285	.02	.02	.00	22.
1.01	11.50	142	.07	.06	.00	66.	1.01	23.50	286	.02	.02	.00	22.
1.01	11.55	143	.07	.06	.00	66.	1.01	23.55	287	.02	.02	.00	22.
1.01	12.00	144	.07	.06	.00	66.	1.02	0.00	288	.02	.02	.00	22.
									SUM	32.24	30.36	1.88	33706.
										(819.)	(771.)	(48.)	954.45)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1574.	366.	117.	117.	33705.
CMS	45.	10.	3.	3.	954.
INCHES		24.52	31.33	31.33	31.33
MM		622.84	795.74	795.74	795.74
AC-FT		182.	232.	232.	232.
THOUS CU M		224.	286.	286.	286.

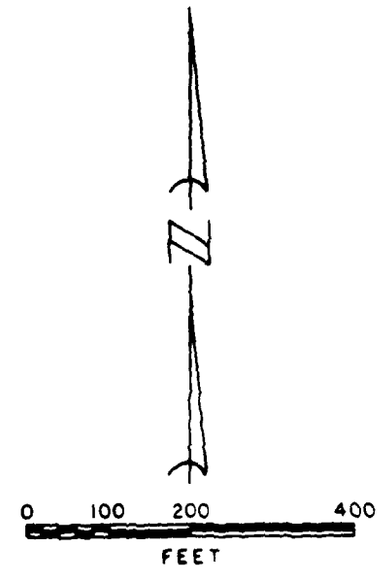
SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	100.40	100.40	103.50
STORAGE	29.	29.	41.
OUTFLOW	0.	0.	249.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	102.43	0.00	37.	78.	0.00	16.00	0.00
.15	102.96	0.00	39.	134.	0.00	15.92	0.00
.20	103.31	0.00	40.	208.	0.00	15.92	0.00
.25	103.58	.08	41.	294.	.17	15.83	0.00
.30	103.77	.27	42.	394.	.33	15.83	0.00
.35	103.92	.42	43.	478.	.50	15.83	0.00
.40	104.04	.54	43.	567.	.50	15.83	0.00
.50	104.20	.70	44.	797.	.75	15.75	0.00
1.00	104.69	1.19	46.	1618.	4.17	15.75	0.00

TABLE A-1
Sheet 5 of 5



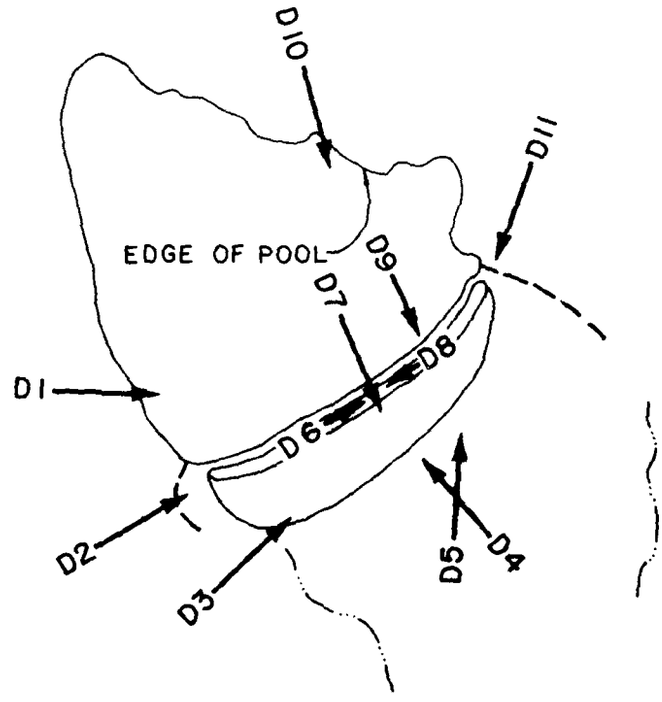


PHOTO INDEX I
FOR
DAM

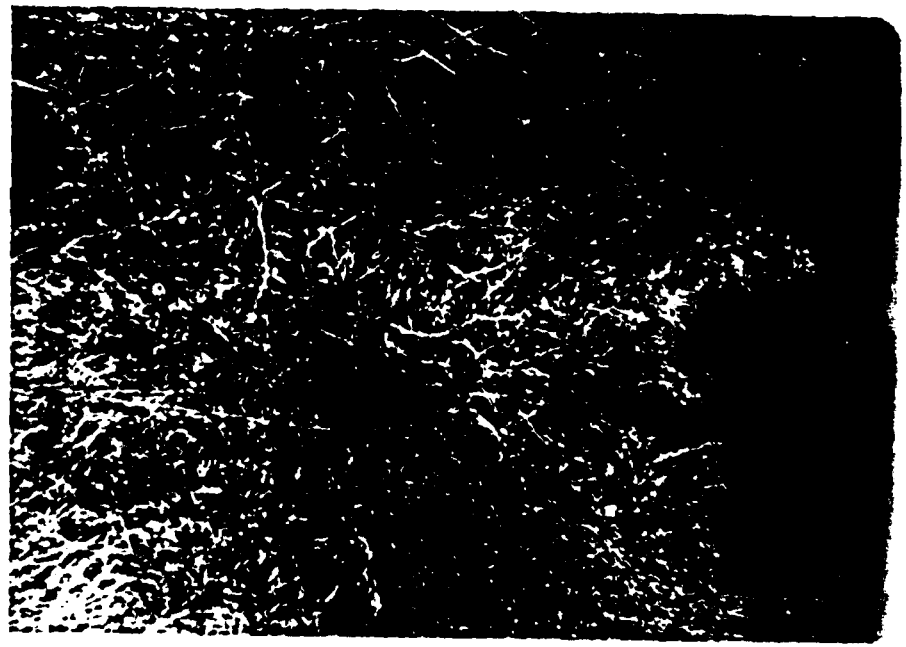
JIM BAIR DAM
ST. CHARLES COUNTY, MO.
OCTOBER 1978

PREPARED BY
REITZ & JENS, INC.

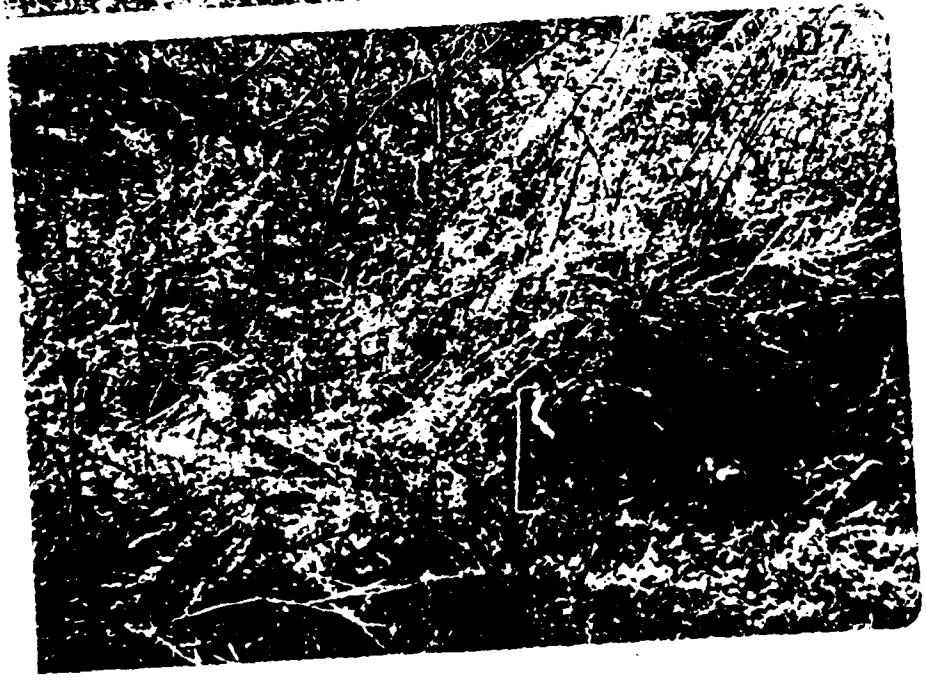

D1


D2

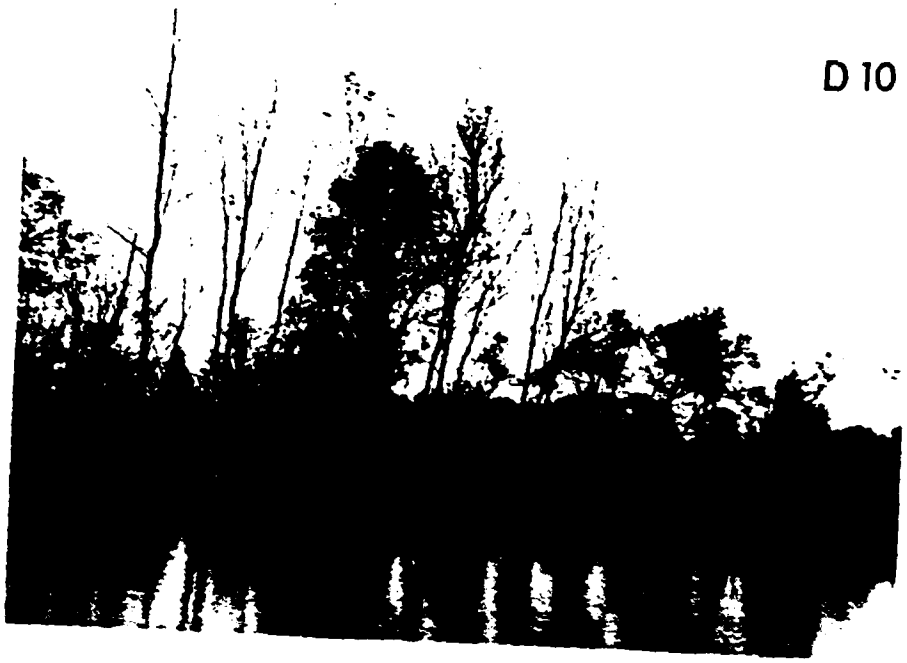

D3
DAM




D6

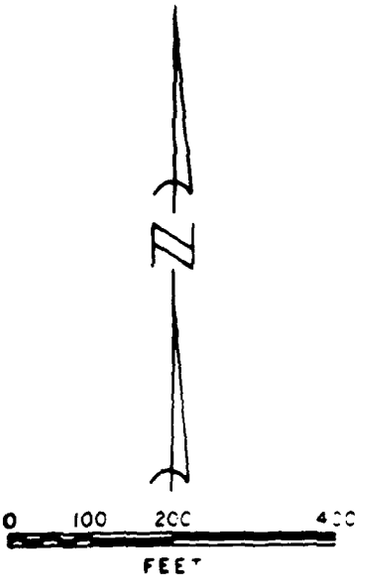

D7


D8



D 10

D11



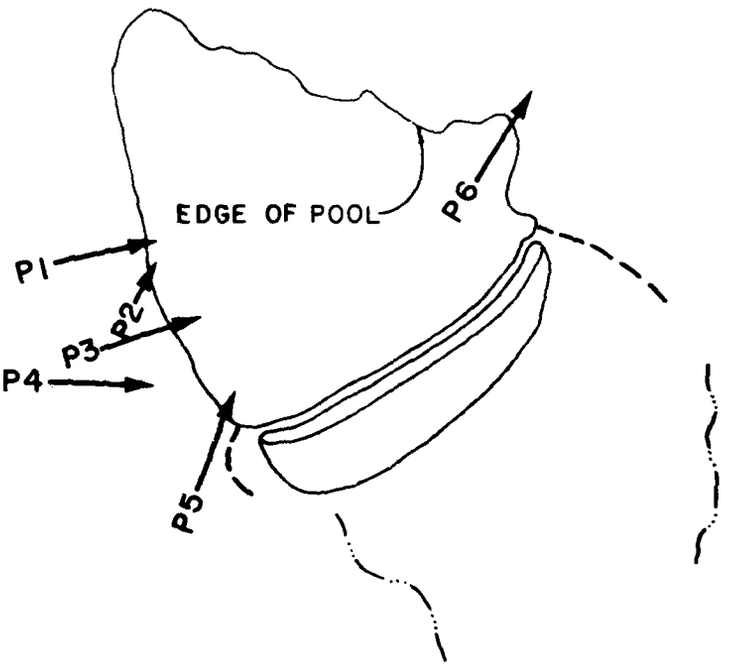
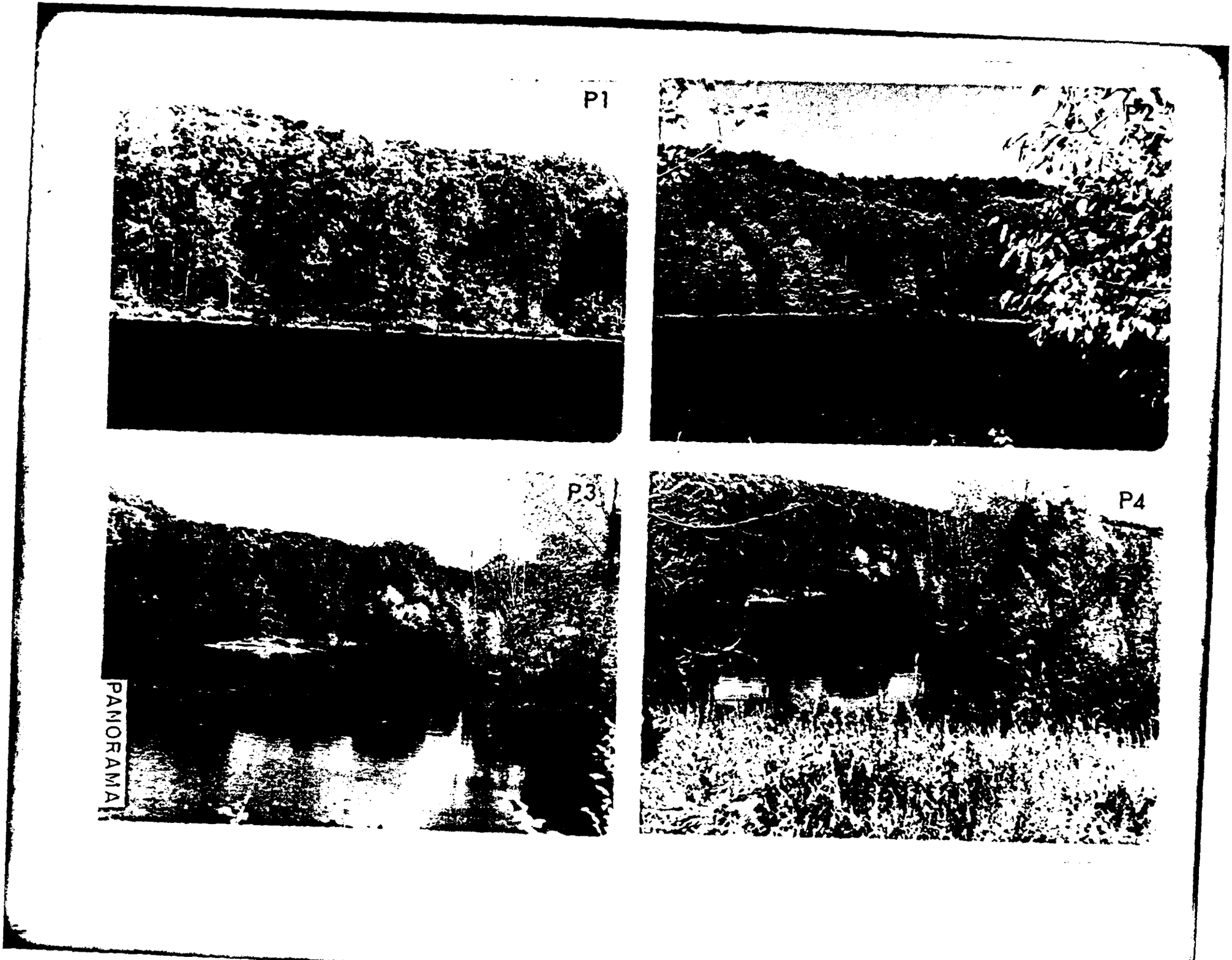


PHOTO INDEX 2
FOR
PANORAMA

JIM BAIR DAM
ST. CHARLES COUNTY, MO.
OCTOBER 1978

PREPARED BY
REITZ & JENS, INC.


P1
P2
P3
P4
PANORAMA

P5

P6

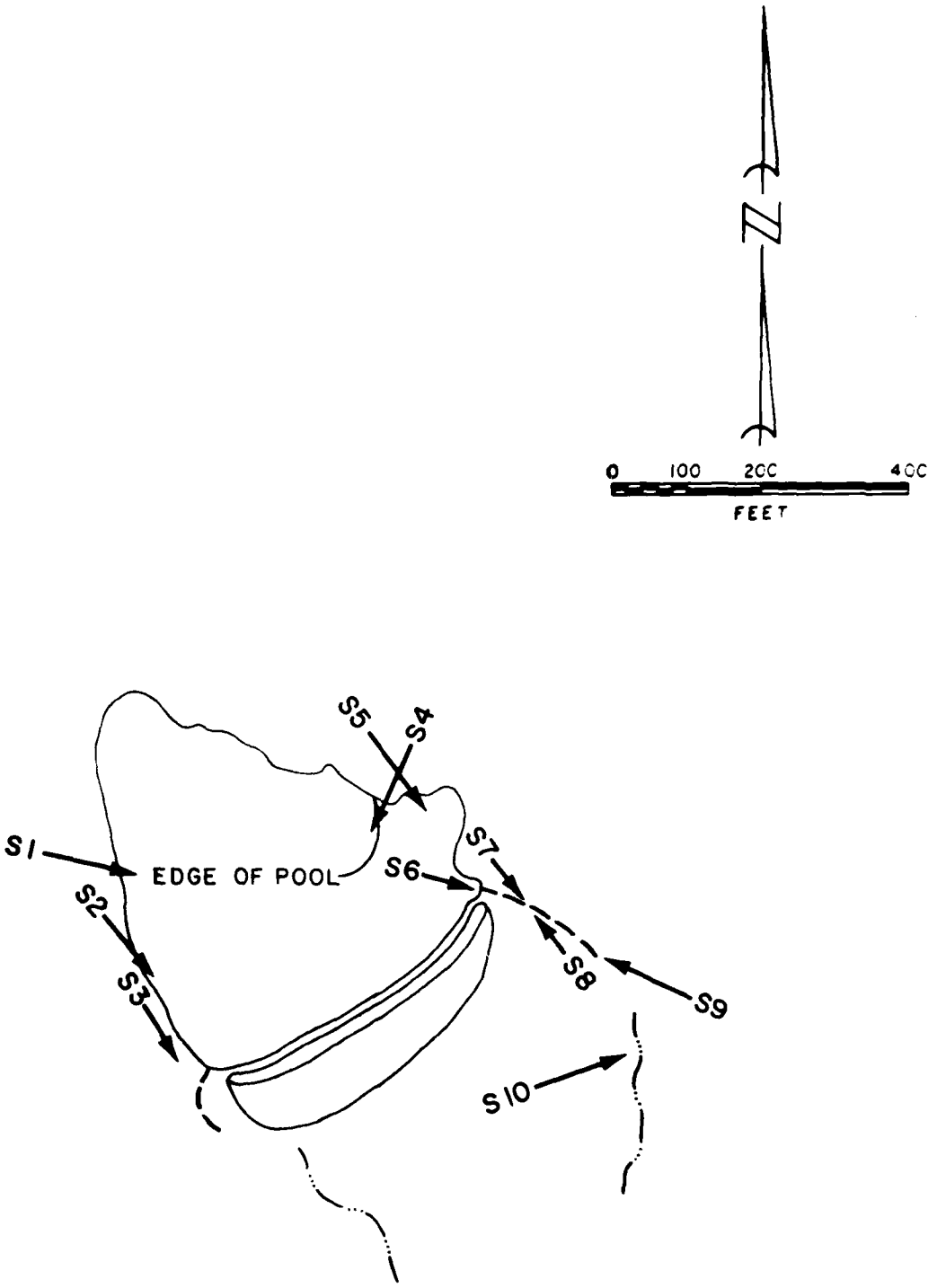
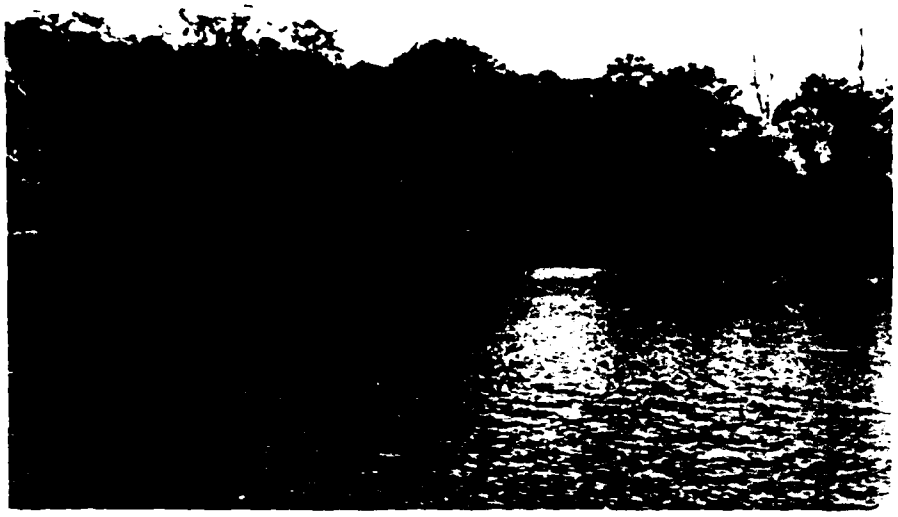


PHOTO INDEX 3
FOR
SPILLWAY

JIM BAIR DAM
ST. CHARLES COUNTY, MO.
OCTOBER 1978

PREPARED BY
REITZ & JENS, INC.

S1



S2

S3

SPILLWAYS

S4

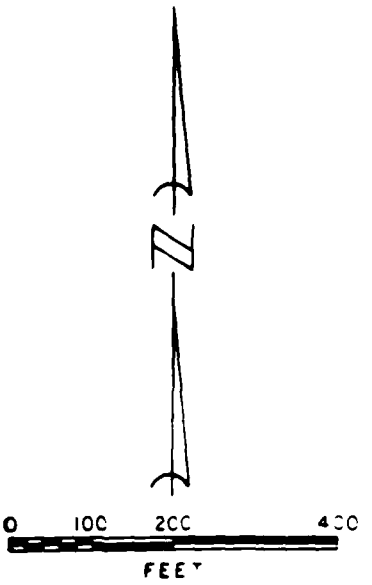

S5


S6


S7


8

SPILLWAYS



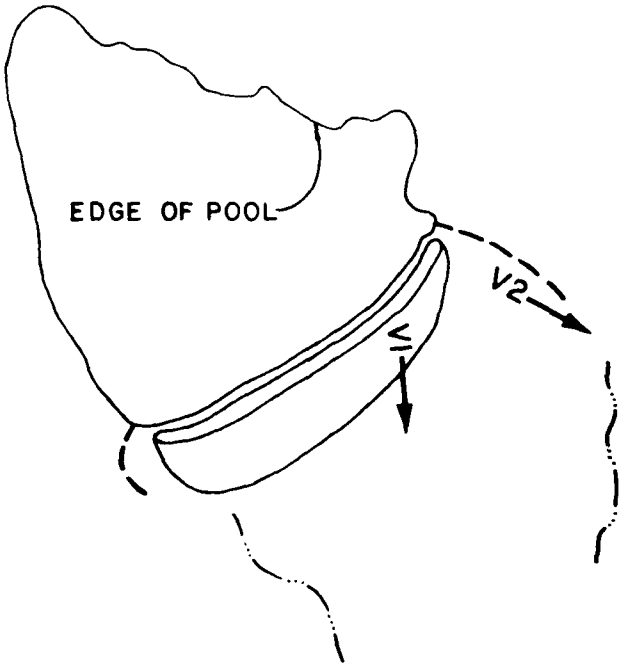
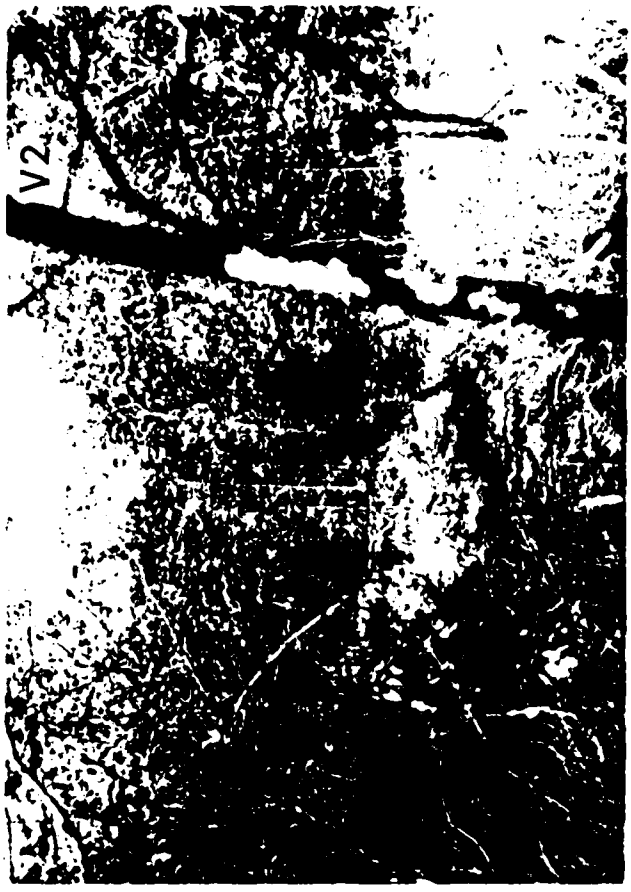


PHOTO INDEX 4
FOR
VALLEY BELOW DAM

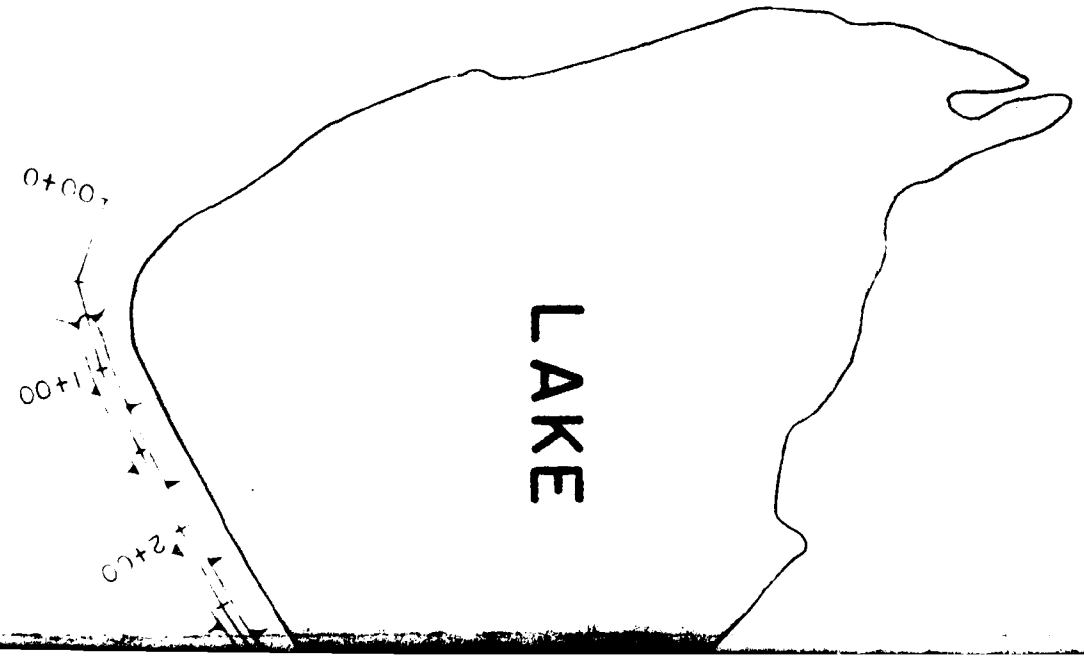
JIM BAIR DAM
ST. CHARLES COUNTY, MO.
OCTOBER 1978

PREPARED BY
REITZ & JENS, INC.



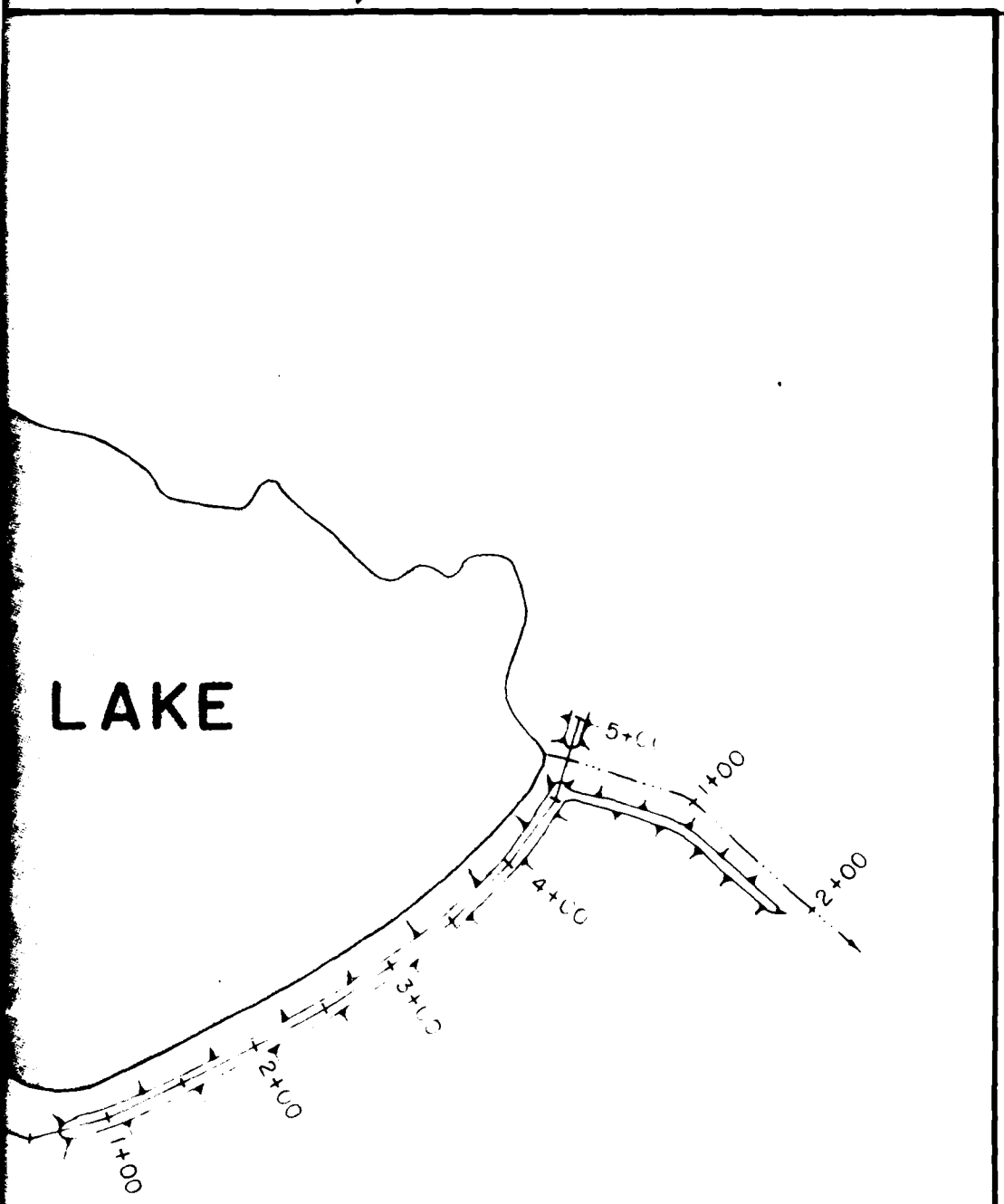
VALLEY BELOW DAM

FINAL SURVEY		BY	DATE
NOTE BOOK NO	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		



PLAN OF DAM A

12

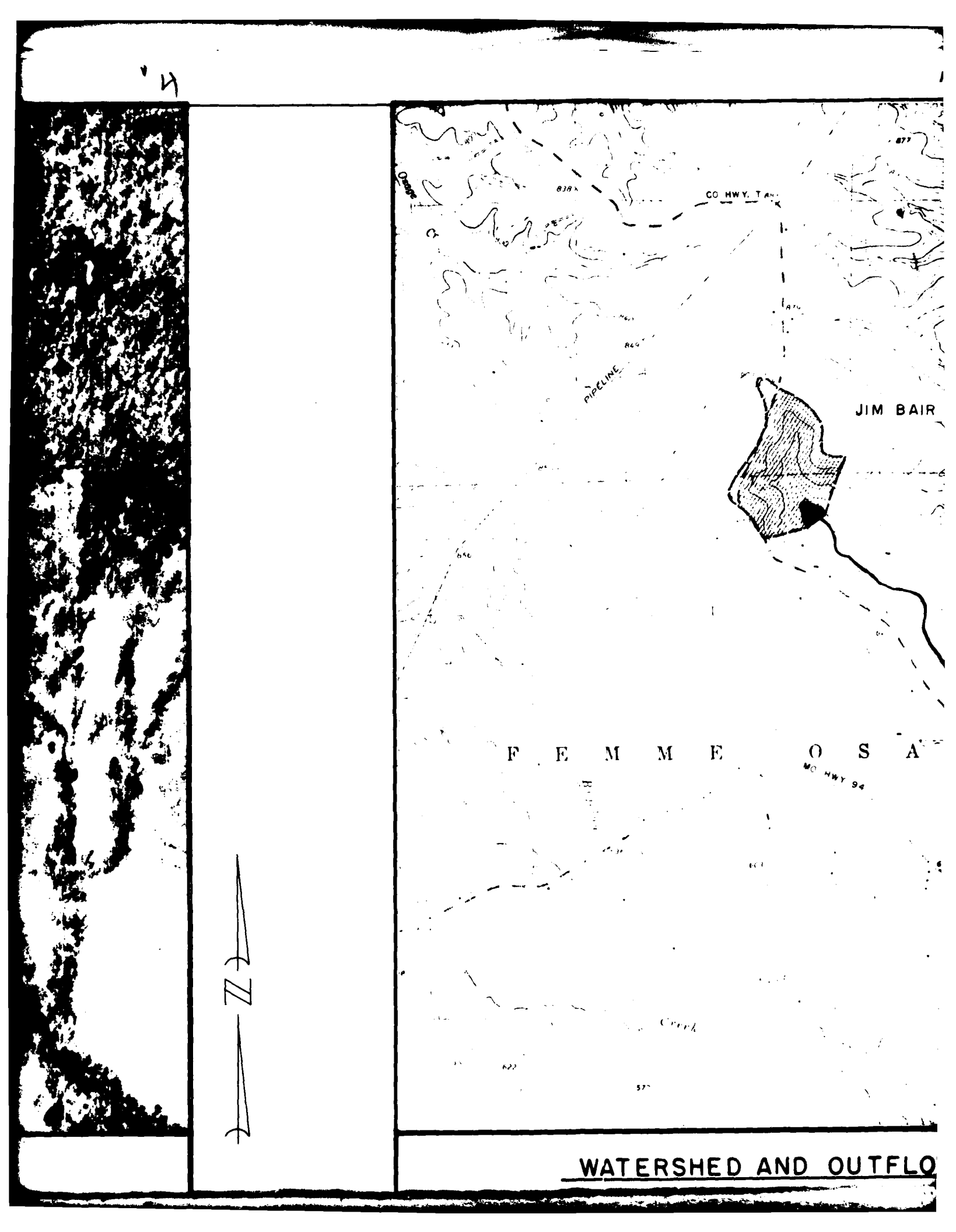


N

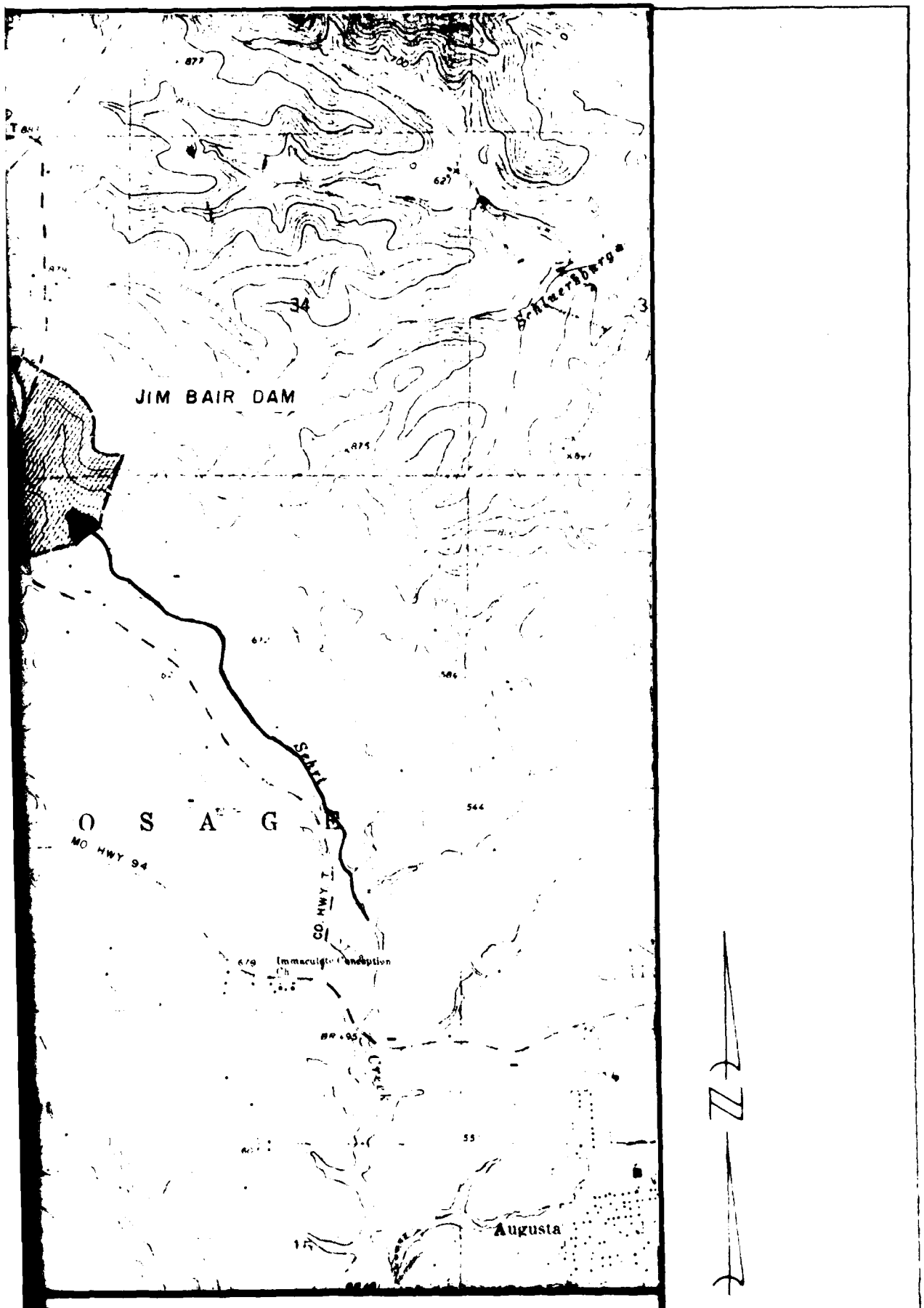
PLAN OF DAM AND SPILLWAY

13

PLAN OF LAKE

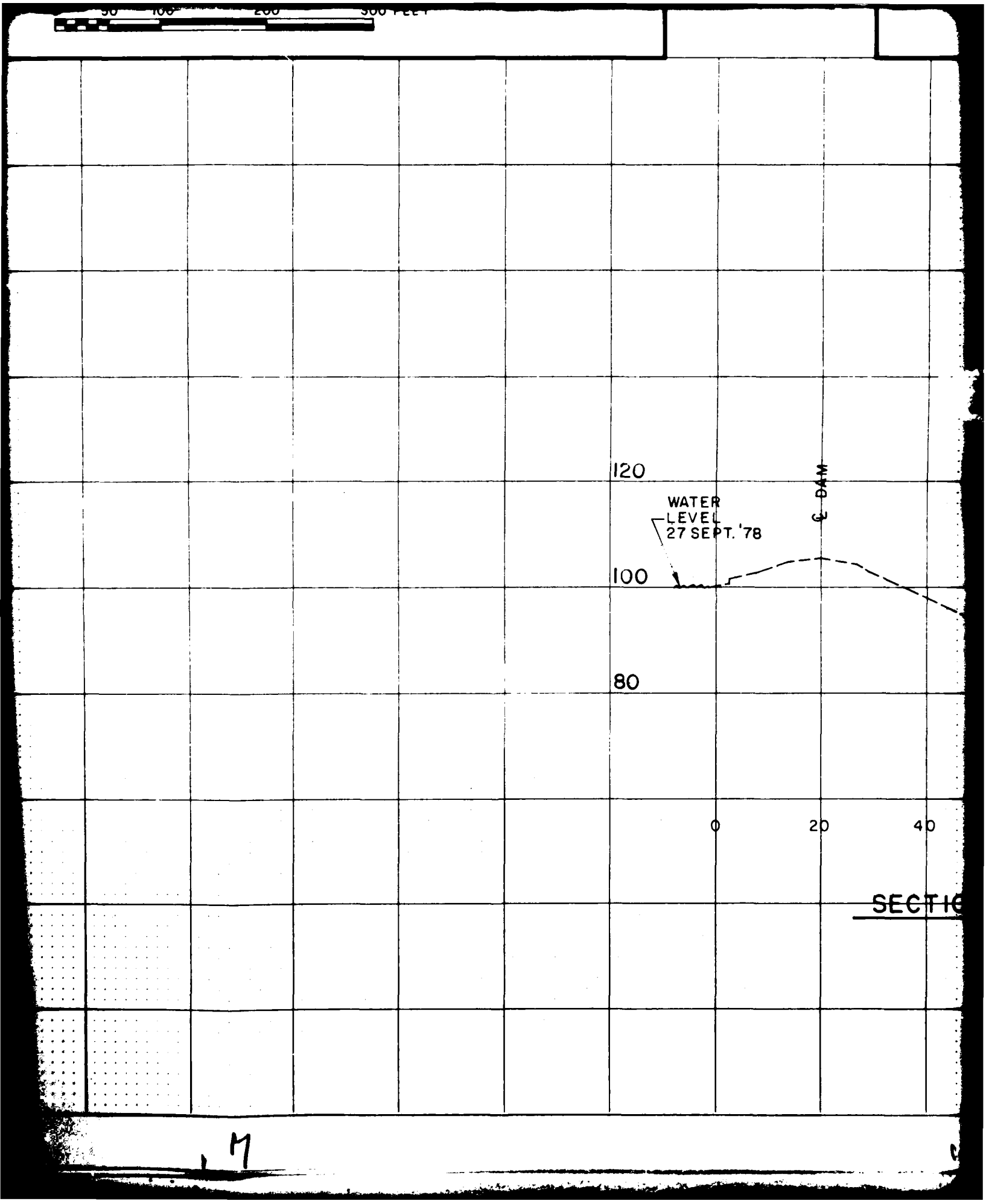


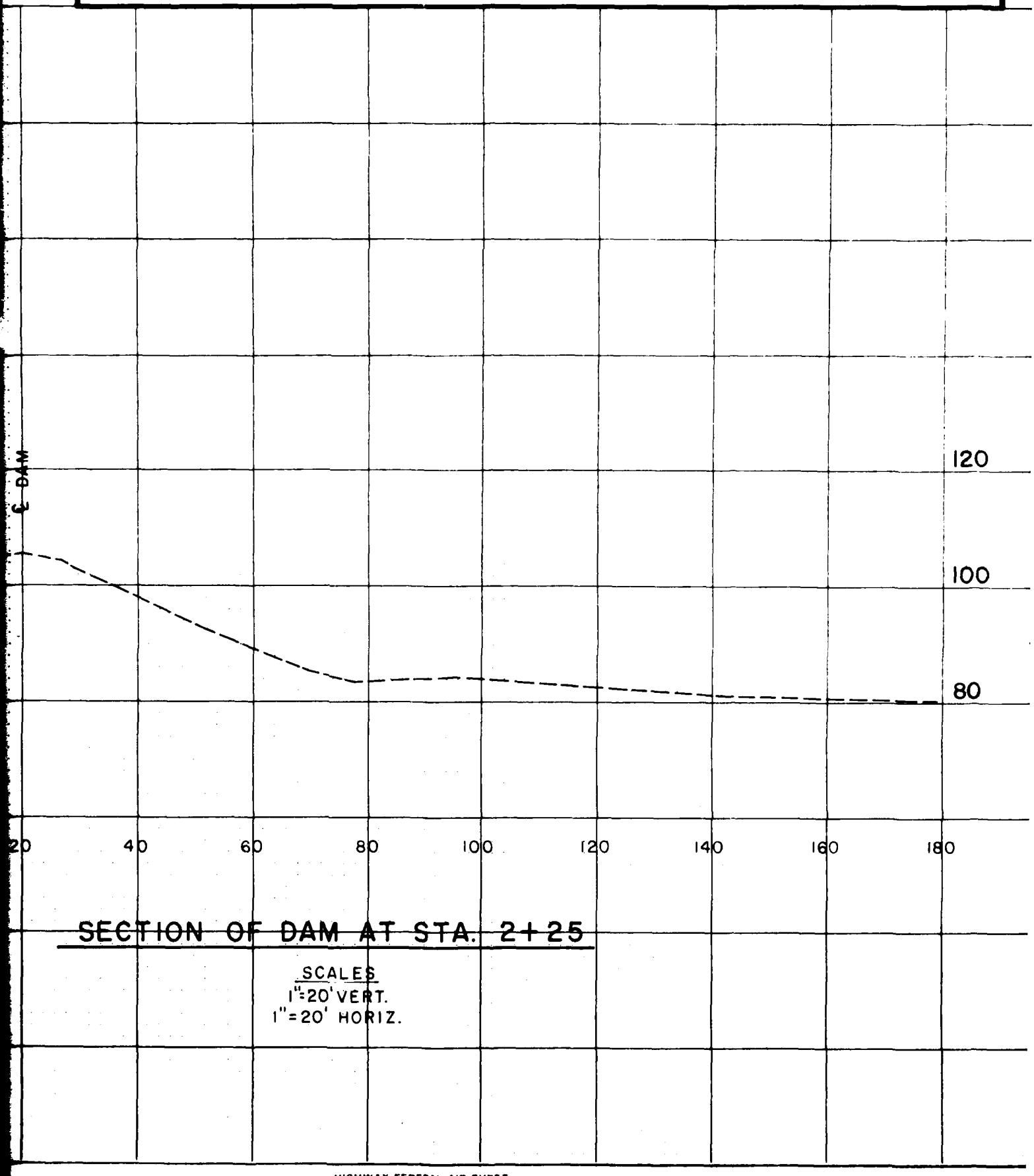
WATERSHED AND OUTFLO



D OUTFLOW CHANNEL

ORIGINAL SURVEY		BY	DATE
NOTE BOOK NO.	SURVEYED		
	PLOTTED		
	TEMPLATE		
	AREAS		
	AREAS CHECKED		

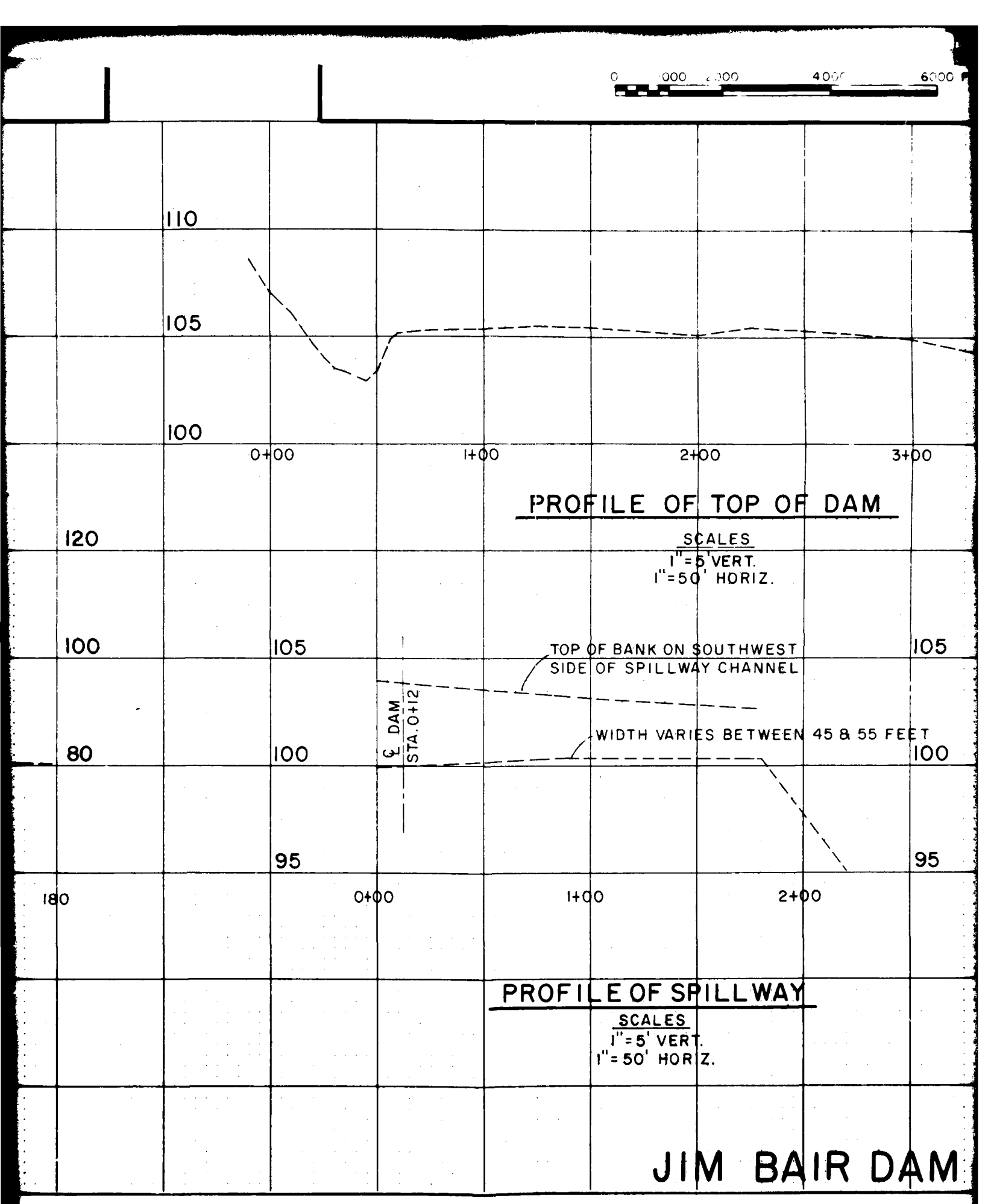

50 100 200 300 FEET
120
100
80
WATER LEVEL 27 SEPT. '78
C. D&M
0
20
40
SECTIO



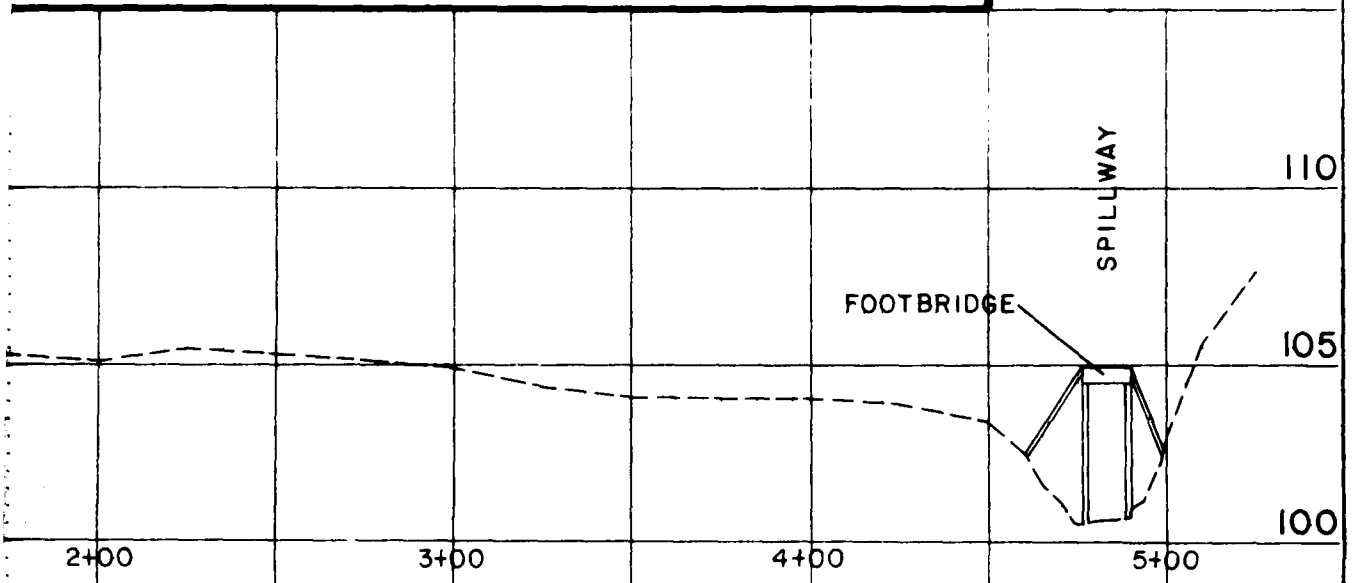
SECTION OF DAM AT STA. 2+25

SCALES
1"=20' VERT.
1"=20' HORIZ.

TELEDYNE NATIONAL TRACING PAPER
INDIANAPOLIS, INDIANA
PRINTED IN U.S.A.


0
4000
6000
110
105
100
0+00
1+00
2+00
3+00
PROFILE OF TOP OF DAM
SCALES
1"=5' VERT.
1"=50' HORIZ.
120
100
105
105
TOP OF BANK ON SOUTHWEST
SIDE OF SPILLWAY CHANNEL
℄ DAM
STA. 0+12
WIDTH VARIES BETWEEN 45 & 55 FEET
80
100
100
95
95
180
0+00
1+00
2+00
PROFILE OF SPILLWAY
SCALES
1"=5' VERT.
1"=50' HORIZ.
JIM BAIR DAM

1000 2000 4000 6000 FEET



OF TOP OF DAM

SCALES
1"=5' VERT.
1"=50' HORIZ.

K ON SOUTHWEST
ILLWAY CHANNEL

105

H VARIES BETWEEN 45 & 55 FEET

100

95

2+00

ADD 530' TO ELEVATIONS SHOWN TO OBTAIN APPROXIMATE U.S.G.S. DATUM.

F SPILLWAY

ALES
' VERT.
' HORIZ.

PHASE I - INSPECTION
COUNTY I.D. NO. 183
ST. CHARLES COUNTY, MISSOURI

INVENTORY NO. I. D. 30020

FOR ST. LOUIS DISTRICT, CORPS OF ENGINEERS

REITZ & JENS, INC.
CONSULTING ENGINEERS

ST LOUIS, MISSOURI
NOVEMBER 1978

JIM BAIR DAM

PLATE 3