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NATIONAL DAM SAFETY PROGRAM, DESSIEUX LAKE DAM (MO 30994), MISS-ETC(U)
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**DESSIEUX LAKE DAM
WASHINGTON COUNTY, MISSOURI
MO 30994**

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PHASE 1 INSPECTION REPORT NATIONAL DAM SAFETY PROGRAM



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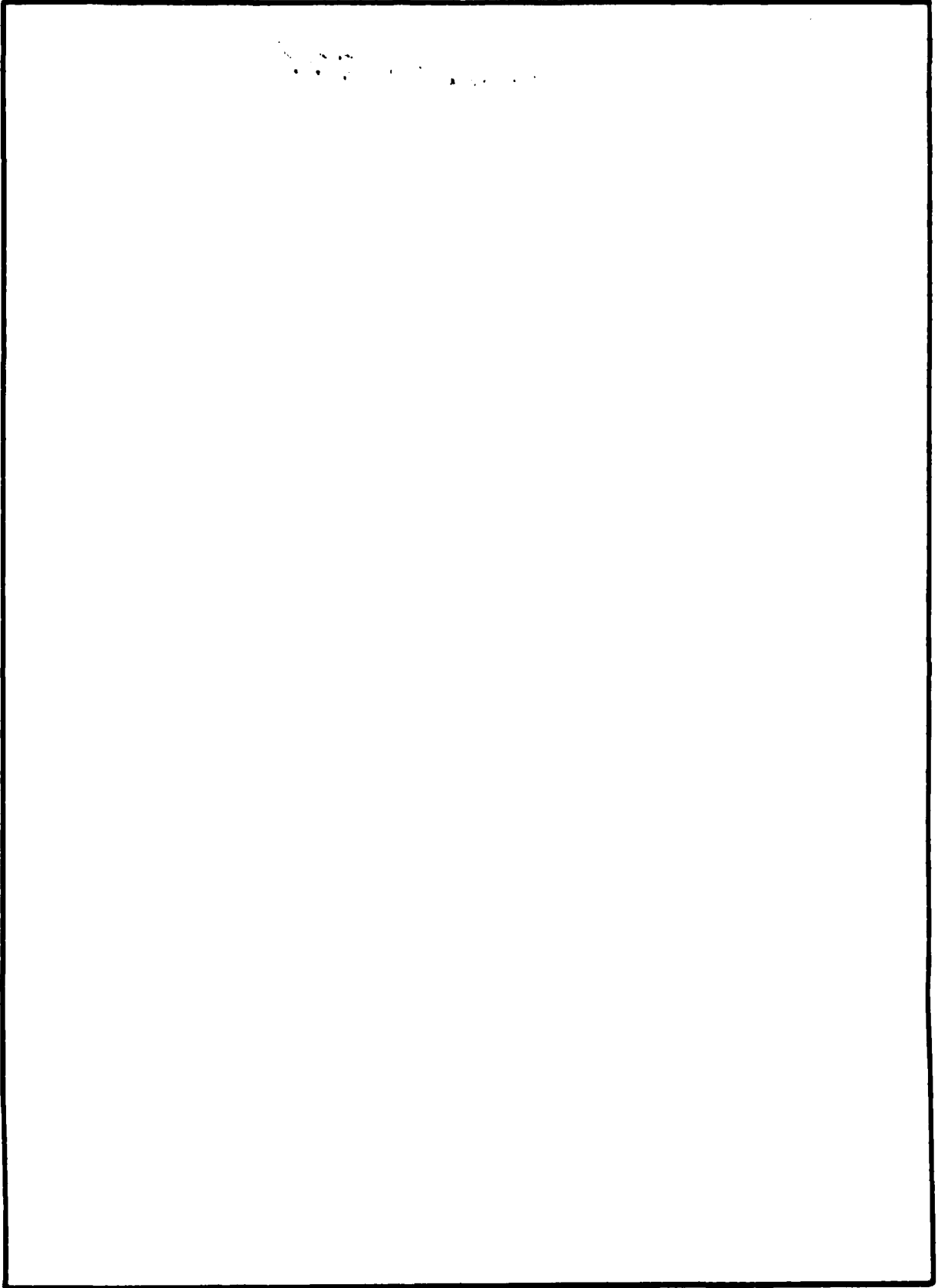
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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: Dessieux Lake Dam (Mo. 30994)

This report presents the results of field inspection and evaluation of the Dessieux Lake Dam (Mo. 30994).

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

This dam has been classified as unsafe because of extensive seepage on the downstream face and left abutment of the dam, and a seriously inadequate spillway that will pass only 13 percent of the Probable Maximum Flood without overtopping the dam.

SUBMITTED BY: SIGNED
Chief, Engineering Division

11 JAN 1979
Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer

11 JAN 1979
Date

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DESSIEUX LAKE DAM
WASHINGTON COUNTY, MISSOURI
MISSOURI INVENTORY NO. 30994

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY:

HORNER & SHIFRIN, INC.
5200 OAKLAND AVENUE
ST. LOUIS, MISSOURI 63110

FOR:

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS

DECEMBER 1978

HS-7848-10

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Dessieux Lake Dam
State Located: Missouri
County Located: Washington
Stream: Tributary Bates Creek
Date of Inspection: 24 August 1978

The Dessieux Lake Dam was visually inspected by engineering personnel of the office of Horner & Shifrin, Inc., Consulting Engineers, St. Louis, Missouri. The purpose of the inspection was to assess the general condition of the dam with respect to safety and, based upon this inspection and available data, determine if the dam poses a hazard to human life or property.

The following summarizes the findings of the inspection and the results of certain hydrologic/hydraulic investigations performed under the direction of the inspection team.

The following deficiencies were noticed during the inspection and are considered to have an adverse effect on the overall safety and future operation of the dam and spillways:

1. A dense cover of vegetation (lespedeza) that may contain animal burrows is present on the upstream and downstream faces of the dam. Animal burrows can provide passageways for seepage that could develop into a piping condition and subsequent failure of the dam.
2. At the time of the inspection it could not be determined if the 8-inch diameter drawdown pipe passing through the dam could be isolated in order to prevent loss of foundation soils should collapse of the pipe within the dam occur. Voids resulting from loss of material into the conduit can produce settlement of the embankment resulting in overtopping of the dam.


3. At the time of the inspection, restoration of the approach and outlet channels for the principal spillway was in progress. Fill material containing logs, small tree branches, and large pieces of broken concrete slab was being placed in the channel in order to reconstruct these sections. Fill material containing organic material is unsatisfactory for this purpose and will contribute to later erosion.
4. The left side (bank) of the outlet channel for the principal spillway is eroded downstream of the spillway crest. Continued erosion of the spillway channel at this location will reduce the embankment section and impair the stability of the dam.
5. Shallow surface cracks, extending the entire length of the dam, exist in the exposed downstream side of the dam crest. The possibility exists that water entering these cracks could result in the formation of a shear plane within the embankment, resulting in instability and failure of the downstream slope of the dam.
6. Considerable erosion of the subgrade at the outlet end of the 8-inch diameter pipe through the dam has occurred and a water filled pool has been created at this point. The possibility exists that continued erosion may back-cut the downstream slope of the dam, resulting in settlement of the slope and/or instability at the embankment.
7. Seepage, evidenced by extensive areas of wet, soft ground, was observed on the downstream face of the dam and at the left abutment. Seepage can develop into a piping condition and subsequent failure of the dam.
8. Vegetation (lespedeza) is present on the upstream slope of the dam to protect the slope from erosion by wave action. Vegetation is not considered adequate to protect the slope against erosion by wave action. Erosion of the bank will reduce the cross section of the dam and could result in instability and/or overtopping of the dam.

The conditions described above are not considered to be serious at this time to warrant immediate remedial measures.

Based on the criteria set forth in the recommended guidelines (see text), and since numerous homes and a summer camping facility lie within the estimated flood zone, recommended spillway design flood for this dam, which is classified as small in size and of high hazard potential, is Probable Maximum Flood (PMF). PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. Results of a hydrologic/hydraulic analysis indicated that the existing spillways (principal and emergency) are inadequate to pass the lake outflow resulting from a storm of PMF magnitude without overtopping the dam. A similar analysis also indicated that the spillways are inadequate to pass the lake outflow resulting from the 1 percent chance (100-year frequency) flood without overtopping the dam. The spillways are capable of passing lake outflow corresponding to approximately 13 percent of the PMF without overtopping the dam. The length of the downstream damage zone, should failure of the dam occur, is estimated to be six miles. The city of Potosi, Missouri, lies 3 miles downstream of the dam. To evaluate the hazard potential, downstream routing would be required. Within the first 1.5 miles downstream of the dam are six to eight homes and associated buildings, one county road bridge, and several secondary roads. A summer recreational and camping facility is also located about 1.5 miles below the dam.

A review of available data did not disclose that seepage and stability analyses of the dam were performed. This is considered a deficiency and should be rectified.

It is recommended that the Owner take the necessary action in the near future to correct or control the deficiencies and safety defects reported herein.


Albert B. Becker, Jr.
P.E. Missouri E-9168



OVERVIEW OF LAKE AND DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
DESSIEUX LAKE DAM - ID NO. 30994

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DESSIEUX LAKE DAM - ID NO. 30994

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority. National Dam Inspection Act, Public Law 92-367, dated 8 August 1972.

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

c. Evaluation Criteria. This evaluation was performed in accordance with the "Phase I" investigation procedures as prescribed in "Recommended Guidelines for Safety Inspection of Dams," Appendix D to "Report of the Chief of Engineers on the National Program of Dams," dated May 1975.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances. The Dessieux Lake Dam is an earthfill type embankment rising approximately 30 feet above the original stream bed. The dam has a length of approximately 630 feet and a crest width of about 18 feet. In general, the embankment has an upstream slope of 1v on 1.6h above the waterline and a downstream slope of 1v on 1.7h between the top of the dam and a point approximately 18 feet below the crest, where the slope flattens to 1v on 3.5h. The slope of the upstream face underwater could not be determined. A dense cover of vegetation (lespedeza) exists on the upstream and downstream slopes of the dam.

An 8-inch diameter steel pipe that passes through the embankment at a point near the center of the dam is provided for dewatering the lake. The valve which controls the flow through the pipe is located on the outlet end of the pipe. The valve is housed within a circular steel chamber that has a steel cover. Considerable erosion of the subgrade at the outlet end of the 8-inch pipe has occurred and a water-filled pool exists at that location.

The lake level is governed by an uncontrolled spillway, located at the right abutment, consisting of a U-shaped, broad-crested section having a 20 foot bottom width. At the time of the inspection, the spillway channel was undergoing repairs. The outlet channel joins the original stream immediately below the dam.

An emergency spillway, consisting of a U-shaped, broad-crested section having a 25 foot bottom width, is located at the left abutment. The crest elevation of the spillway is approximately 2.0 feet higher than the principal spillway crest and 2.3 feet lower than the top of the dam at its lowest point. Flow passing the spillway will follow a course along the junction of the downstream slope with the left abutment, joining the original stream immediately below the dam.

At normal pool level, the lake surface occupies approximately 18 acres.

b. Location. The lake and dam are located on an unnamed tributary of Bates Creek within Section 34, Township 37 North, Range 2 East, and approximately 4 miles southwest of Potosi, Missouri, in Washington County, as shown on the Regional Vicinity Map, Plate 1.

c. Size Classification. The size classification, based on the height of the dam and storage capacity, is categorized as small. (Per Table 1, Recommended Guidelines for Safety Inspection of Dams.)

d. Hazard Classification. The Dessieux Lake Dam, according to the St. Louis District, Corps of Engineers, has a high hazard potential, meaning that

If the dam should fail, there may be loss of life, serious damage to homes, extensive agricultural, industrial and commercial facilities, important public utilities, main highways, or railroads. As determined by the St. Louis District, the estimated flood damage zone, should failure of the dam occur, extends six miles downstream of the dam. There are six to eight homes, and associated buildings, one county road bridge, and several secondary roads within the first 1.5 miles downstream of the dam. A summer recreational facility is also located about 1.5 miles below the dam.

e. Ownership. The lake and dam are co-owned by Mr. Russell Dessieux and Mrs. Charlene Portell. The mailing address of Mr. Dessieux is 328 Lilac Drive, Potosi, Missouri, 63664. The mailing address of Mrs. Portell is Box 46, Mineral Point, Missouri, 63660.

f. Purpose of Dam. The dam impounds water for the purpose of recreation by the Owners.

g. Design and Construction History. The dam was designed by Mr. Russell Dessieux. Mr. Dessieux reported that the design was based largely on experience gained from the design of several dams for the mining industry located in the nearby Potosi area. Reportedly, no design data or engineering analyses were employed to determine the structural stability of the dam or the hydraulic adequacy of the spillways.

The dam was constructed in 1970 by Mr. Kelley Smith, a local contractor, who has since retired. The Owner indicated that Mr. Smith was experienced in the construction of earthfill type dams.

h. Normal Operational Procedure. The lake level is unregulated.

1.3 PERTINENT DATA

a. Drainage Areas. The area tributary to the lake is virtually undeveloped and covered with timber. The watershed above the dam amounts to approximately 750 acres. The watershed area is outlined on Plate 1.

b. Discharge at Damsite.

- (1) Estimated known maximum flood at damsite ... 540 cfs⁽¹⁾
- (2) Principal and emergency spillway capacity ... 880 cfs

c. Elevation (ft. above MSL). All elevations are based on the estimated elevation (1,013) of the original stream channel at the dam as determined from the 1958 Potosi, Missouri, Quadrangle Map, 7.5 minute series. The invert of the outlet end of the 8-inch diameter steel drawdown pipe was used as a benchmark with an elevation of 1,013.0.

- (1) Top of dam ... 1,041.6 (min.)
- (2) Normal pool (principal spillway crest) 1,037.3
- (3) Principal spillway crest ... 1,037.3⁽²⁾
- (4) Emergency spillway crest ... 1,039.3
- (5) Streambed at centerline of dam ... 1,013+
- (6) Maximum tailwater ... Unknown
- (7) Pool on date of inspection ... 1,036.0

d. Reservoir.

- (1) Length of normal pool (elevation 1,037.3) ... 2,000 ft.
- (2) Length of maximum pool (elevation 1,041.6) ... 2,300 ft.

e. Storage.

- (1) Normal pool ... 220 ac.ft.
- (2) Top of dam (incremental) ... 101 ac.ft.

f. Reservoir Surface.

- (1) Top of dam ... 29 acres
- (2) Normal pool ... 18 acres

g. Dam.

- (1) Type ... Earthfill, clay core (per Owner)
 - (2) Length ... 630 ft.
- (1) Spillway discharge computed for water surface at elevation 1,041.0 based upon a high lake level indicated by the Owner.
 - (2) Elevation of eroded spillway crest on day of inspection.

- (3) Height ... 30 ft.
- (4) Top width ... 18 ft.
- (5) Side slopes
 - (a) Upstream ... 1v on 1.6h (above waterline)
 - (b) Downstream ... 1v on 1.7h (above elevation 1,024)
1v on 3.5h (below elevation 1,024)
- (6) Cutoff ... Core trench (per Owner)
- (7) Slope protection
 - (a) Upstream ... Vegetation (lespedeza)
 - (b) Downstream ... Vegetation (lespedeza)

h. Principal Spillway.

- (1) Type ... Uncontrolled, broad-crested U-shaped section
- (2) Width (bottom) ... 20 ft.
- (3) Crest ... Elevation 1,037.3 (ft. above MSL)
- (4) Entrance channel ... Lake
- (5) Exit channel ... Earth cut

i. Emergency Spillway.

- (1) Type ... Uncontrolled, broad-crested U-shaped section
- (2) Width (bottom) ... 25 ft.
- (3) Crest ... Elevation 1,039.3 (ft. above MSL)
- (4) Entrance channel ... Lake
- (5) Exit channel ... Follows junction of embankment and abutment

j. Outlet for Lake Drawdown.

- (1) Size ... 8-inch
- (2) Type ... Steel pipe
- (3) Location ... Near center of dam
- (4) Control ... Gate, manual, on downstream end
- (5) Invert elevation at outlet end ... 1,013.0 (ft. above MSL)
- (6) Invert elevation at inlet end ... Unknown (submerged)

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No engineering data relating to the design of the dam are known to exist.

2.2 CONSTRUCTION

No formal records were kept during construction of the dam. Mr. Dessieux, co-owner of the dam, reported that a trench was excavated approximately 20 feet wide to bedrock along the longitudinal centerline of the dam. The trench was backfilled with clay and the embankment constructed. The backfill was compacted with the earth moving equipment used to haul the fill. The material used to backfill the trench was obtained from the hillsides around the lake. The material used to construct the embankment was obtained from the area to be occupied by the lake.

The Owner also reported that, prior to construction, a spring existing within the foundation limits of the embankment was treated to control the flow leaving the spring. Reportedly, a 3/4-inch diameter plastic tube was installed in the spring in order to relieve subsurface hydrostatic pressure and the outlet end of the tube was extended beyond the downstream toe of slope. The spring was sealed by placing crushed rock followed by clay in an excavation about the spring. At the time of the inspection, water was flowing from the end of the plastic tube.

2.3 OPERATION

The lake level is uncontrolled and governed by the crest of the principal spillway located at the right abutment. An emergency spillway, with a crest elevation 2 feet higher than the crest elevation of the principal spillway and

about 2.3 feet lower than the top of the dam at its lowest point, is located at the left abutment. The surface of the principal spillway as observed had been eroded to bedrock and was undergoing repairs at the time of the inspection. According to the Owner, the desired crest elevation of the principal spillway is about 1.5 feet higher than the elevation observed on the date of the inspection. The Owner reported that the lake surface has reached a level approximately 1 foot below the top of the dam.

2.4 EVALUATION

a. Availability. Engineering data for assessing the design of the dam and spillways were unavailable.

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

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General. A visual inspection of the dam and spillways was made by Horner & Shifrin engineering personnel on 24 August 1978. Also inspected at this time were the various downstream road crossings and homes from the dam to a point about six miles downstream of the dam. Photographs of the dam and spillways taken at the time of the inspection are included on pages A-1 through A-5 of the Appendix.

b. Dam. The visible portions of the upstream and downstream faces of the dam (see Photos 1 and 2) appeared to be in sound condition, with the exception of some minor erosion across the entire downstream slope. The upstream and downstream slopes of the dam are covered with a dense growth of vegetation that, according to the Owner, is Serica Lespedeza. The dam crest is sparsely covered. Surface cracks, approximately 1/4-inch wide and 3 inches deep, were noticed on the downstream side of the exposed areas of the crest across the entire length of the dam. The cracks appeared to be a result of shrinkage due to drying of the exposed, unprotected surface.

A 3/4-inch diameter plastic tube (see Photo 3) exists at the downstream toe of slope near the right abutment. The area about this tube, which provides pressure relief for the capped spring within the dam foundation, was covered with high grass and weeds. At the time of the inspection, the tube was discharging flow at a rate estimated to be about 0.5 gpm. The discharge flows along the downstream toe of slope and joins the original stream course immediately below the dam.

Erosion of the channel subgrade to a depth of about 2 feet (see Photos 4 and 5) at the outlet end of the 8-inch lake drawdown pipe has created an 18-inch deep water-filled pool that extends downstream for about 10 feet. The steel cylindrical chamber housing (see Photo 4) the valve controlling flow in

the pipe was in good condition. The valve was leaking at the packing at a rate estimated to be about 0.5 gpm. The exposed end of the 8-inch steel pipe appeared to be in satisfactory condition although a coating of rust was noticed in several locations.

Wet, soft ground (see Photo 6), apparently due to seepage, was noticed at the downstream face and left abutment of the dam. The seepage area encompassed approximately the lower half of the downstream slope, for a distance of about 100 feet, and a strip (about 40 feet wide) at the left abutment. Due to the large area over which seepage was occurring, an estimate of seepage flow could not be made. Numerous burrows (see Photo 7) were present at the downstream toe of slope in the wet ground. These burrows, believed to be made by crawfish, were about 8 to 9 inches deep.

c. Spillways.

(1) Principal Spillway. At the time of the inspection, several areas of the principal spillway channel were undergoing repairs. Clay fill, containing small tree branches and broken sections of concrete slab (see Photos 8 and 9), was being placed in the bottom of the channel in order to restore the invert to grade. It did not appear that the material being placed in the channel was being compacted, except by the equipment used to transport and place the fill. The spillway outlet channel joins the Bates Creek tributary at a point immediately below the dam. A profile of the spillway through the control section is shown on Plate 2.

(2) Emergency Spillway. The crest of the emergency spillway (see Photo 10) appeared to be founded on bedrock. The crest invert was overlaid with a thin layer of sand. According to survey data, the crest of the emergency spillway is 2 feet higher than the crest of the principal spillway and approximately 2.3 feet lower than the low point at the top of the dam. The spillway outlet channel also joins the Bates Creek tributary immediately below the dam. A profile of the spillway through the control section is shown on Plate 2.

d. Downstream Channel. The downstream channel is unimproved. The stream joins Bates Creek approximately 2,000 feet below the dam; Bates Creek joins Mine Breton Creek approximately six miles downstream of the dam. Bates Creek Camp, a summer recreational and camping facility, lies about 1.5 miles below the dam on the right (east) side of the stream.

3.2 EVALUATION

With the exception of the seepage through the dam and at the left abutment, the deficiencies observed during the inspection are not considered of major consequence to warrant immediate remedial action. An investigation should be performed to determine the cause of the seepage. Recommendations concerning methods for controlling the seepage should be implemented as soon as feasible since a piping condition may develop that could result in failure of the dam. It is also advised that repair of the spillway and protection of the dam at the spillway be accomplished in the near future. The vegetation on the upstream and downstream slopes of the dam should be cut to a height that will not hinder inspection of the slopes.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The spillway is uncontrolled. The water surface level is governed by rainfall runoff, evaporation, seepage, and the capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM AND SPILLWAYS

Based on the presence of the dense cover of vegetation on the upstream and downstream faces of the dam, it is apparent that these areas receive a limited amount of attention. According to the Owner, the grass on the slopes is not mowed. Further, based on the remedial work in progress and the poor condition of the principal spillway, it appears that maintenance was overdue.

4.3 MAINTENANCE OF OUTLET OPERATING FACILITIES

No outlet operating facilities exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEMS IN EFFECT

The inspection did not reveal the existence of a dam warning system.

4.5 EVALUATION

Lack of proper maintenance is considered detrimental to the safety of the dam. It is recommended that maintenance of the entire dam and spillways be undertaken on a regular basis. It is also recommended that the top of the dam be covered with grass in order to avoid drying of the embankment material and subsequent cracking due to shrinkage.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data. Design data are not available.

b. Experience Data. The drainage area and lake surface area were obtained using a 1958 USGS Potosi, Missouri, Quadrangle Map. The proportions and dimensions of the spillways and dam were determined from surveys made during the inspection.

c. Visual Observations.

(1) A principal spillway exists at the right (looking downstream) abutment. Fill was being placed in the spillway approach and outlet channel at the time of the inspection in order to restore the section. Spillway releases within the capacity of the spillway section will not endanger the integrity of the dam but may cause erosion of the newly placed and lightly compacted invert and the dam unless protection is provided adjacent to the spillway.

(2) An auxiliary spillway exists at the left (looking downstream) abutment. The crest elevation of the spillway is 2 feet higher than the crest elevation of the principal spillway and about 2.3 feet lower than the low point of the top of dam. Spillway releases within the capacity of the spillway section will not endanger the integrity of the dam.

(3) Seepage was noticed at the downstream face near the center of the dam and at the left abutment.

(4) An 8-inch pipe is provided to dewater the lake.

d. Overtopping Potential. The spillway sections are inadequate to pass the probable maximum flood, the 1/2 probable maximum flood, or the 1 percent

chance (100-year frequency) flood without overtopping the dam. The results of a dam overtopping analysis are as follows:

<u>Ratio of PMF</u>	<u>Q - Peak Outflow (cfs)</u>	<u>Max. Lake Water Surface Elev.</u>	<u>Max. Depth of Flow Over Dam (Elev. 1,041.6)</u>	<u>Duration of Overtopping of Dam (Hours)</u>
0.13	880	1,041.6	0	0
0.5	6,020	1,043.9	2.3	5.2
1.0	12,520	1,045.2	3.6	6.8
100-Year Flood	2,750	1,042.9	1.3	1.2

The flow safely passing the spillways (principal and emergency) just prior to overtopping amounts to about 880 cfs, which is the lake outflow resulting from a storm of 13 percent probable maximum flood magnitude. The flow safely passing the spillway is less than the lake outflow resulting from a storm of 1 percent chance (100-year frequency) magnitude.

Procedures and data for determining the probable maximum flood, the 100-year frequency flood, and the discharge rating curve for flow over the spillways and the dam crest are presented on Pages B-1 and B-2 of the Appendix. A listing of the HEC-1 (Dam Safety Version) input data is shown on Page B-3 and a copy of the computer output table entitled "Summary of Dam Safety Analysis" is shown on Page B-4 of the Appendix.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Conditions visually observed which adversely affect the structural stability of the dam are discussed in Section 3, paragraph 3.1b.

b. Design and Construction Data. No design or construction data relating to the structural stability of the dam is known to exist.

c. Operating Records. No appurtenant structures or facilities requiring operation exist at this dam. According to the Owner, no records have been kept of lake level, spillway discharge, dam settlement, or seepage.

d. Post Construction Changes. According to the Owner, no post construction changes have been made.

e. Seismic Stability. Since the dam is located within a Zone II seismic probability area, an earthquake of the magnitude predicted is not expected to produce a hazardous condition to the dam, provided that static stability conditions are satisfactory and conventional safety margins exist.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety. A hydraulic analysis indicated that the principal and emergency spillways are capable of passing lake outflow of about 880 cfs without the level of the lake exceeding the top of the dam. A hydrologic analysis of the runoff from the lake watershed area, as discussed in Section 5, indicated that for a storm runoff of probable maximum flood magnitude, the lake outflow would be on the order of 12,520 cfs, which would result in a 3.6 foot maximum depth of flow over the crest of the dam. For the 1 percent chance (100-year frequency) flood, the lake outflow would be about 2,750 cfs, which would result in a 1.3 foot maximum depth of flow over the crest of the dam.

A potentially serious item noticed during the visual inspection that may adversely affect the safety of the dam is the seepage condition that exists at the downstream face and at the left abutment of the dam.

Investigations made during the inspection did not disclose that stability and seepage analyses of the dam had been performed.

b. Adequacy of Information. Due to the lack of engineering and construction data, the assessments reported herein were based on external conditions as determined during the visual inspection. Those recommendations with regard to the hydrology of the lake and the capacity of the spillway were based on a hydrologic/hydraulic study as indicated in Section 5. Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available, which is considered a deficiency.

c. Urgency. The safety defects noted in paragraph 7.1a and the remedial measures recommended in paragraph 7.2 should be accomplished in the near future.

d. Necessity for Phase II. Based on the results of the Phase I inspection, a Phase II investigation is not recommended.

e. Seismic Stability. Since the dam is located within a Zone II seismic probability area, an earthquake of the magnitude predicted is not expected to produce a hazardous condition to the dam, provided that static stability conditions are satisfactory and conventional safety margins exist.

7.2 REMEDIAL MEASURES

a. Recommendations. The following actions are recommended:

(1) Based upon criteria set forth in the recommended guidelines, alterations to the design of the dam should be made in order to pass lake outflow resulting from a storm of at least probable maximum flood magnitude. In any event, the spillway should be protected to prevent erosion.

(2) Obtain the necessary soil data and perform stability and seepage analyses in order to determine the structural stability of the dam for all operational conditions. Seepage and stability analyses should be performed by a professional engineer experienced in the design and construction of dams.

(3) An investigation should be performed to determine the reasons for the seepage at the left abutment. Recommendations concerning methods by which the seepage could be controlled should be included in the investigation. Recommendations to control the seepage should be implemented as soon as feasible since a piping condition could develop that may lead to failure of the dam.

b. Operations and Maintenance (O & M) Procedures. The following O & M procedures are recommended:

(1) Remove the organic material contained in the fill placed and/or being placed in the principal spillway channel in order to minimize settlement

due to voids that may occur when the organic material decomposes. Provide some form of protection for the principal spillway channel and crest in order to prevent the types of erosion which presently occur.

(2) Maintain the grass cover (lespedeza) on the upstream and downstream faces of the dam at a height that will not hinder inspection of the slopes nor provide cover for burrowing animals.

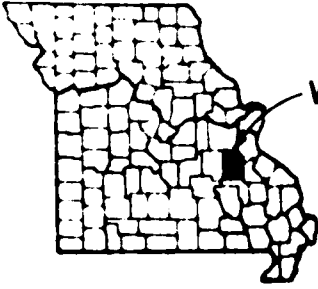
(3) The control valve located at the outlet end of the drawdown pipe should be tested periodically for proper operation in order to insure the valve's usefulness.

(4) The eroded area at the outlet end of the lake drawdown pipe should be restored. Improvements to the subgrade should be made at the pipe outlet in order to prevent erosion of this area in the future and possible back-cutting of the embankment.

(5) Provide some form of slope protection for the upstream face of the dam at and above the normal waterline in order to prevent erosion by wave action.

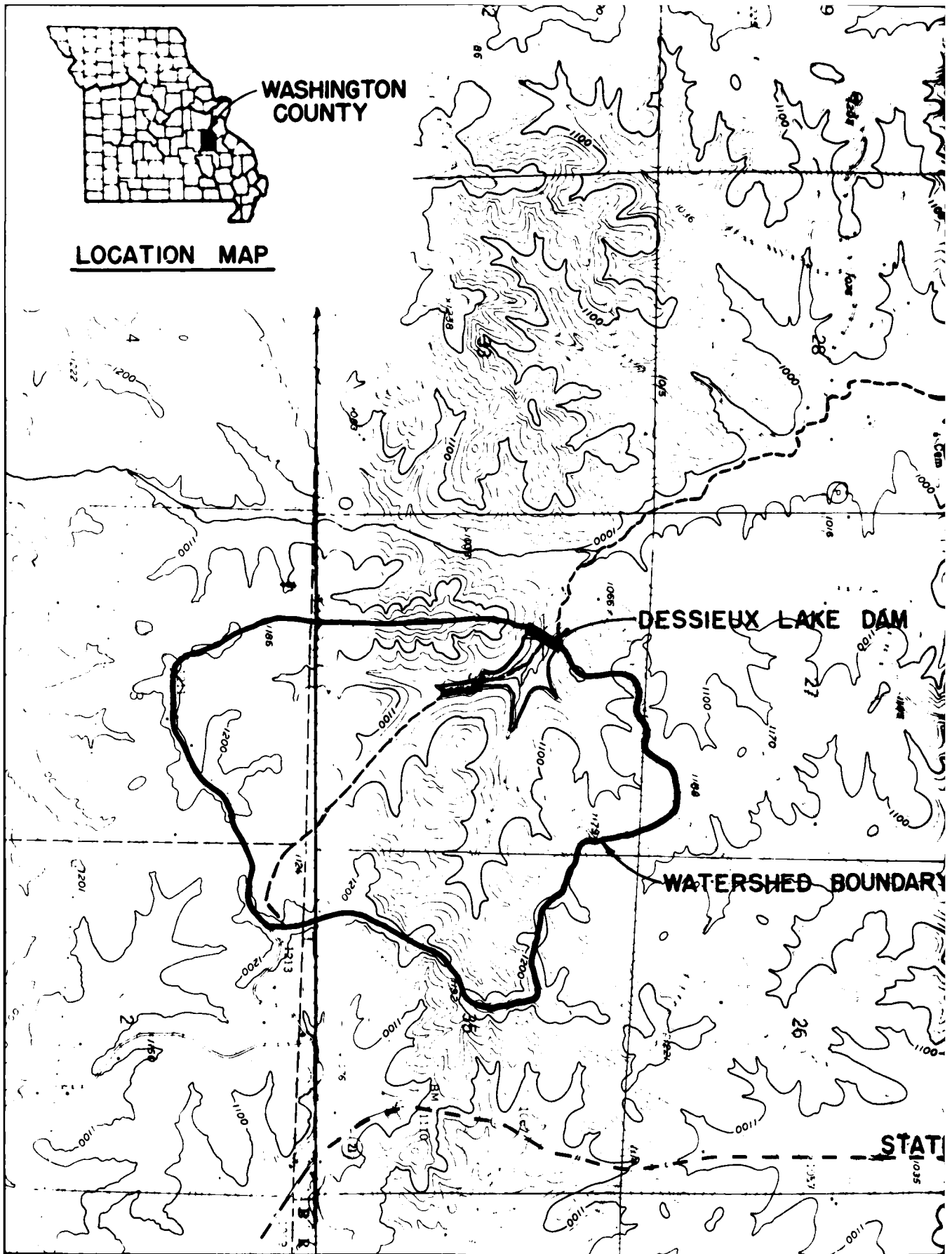
(6) Repair the surface cracks in the dam crest and provide some means to prevent future surface cracking.

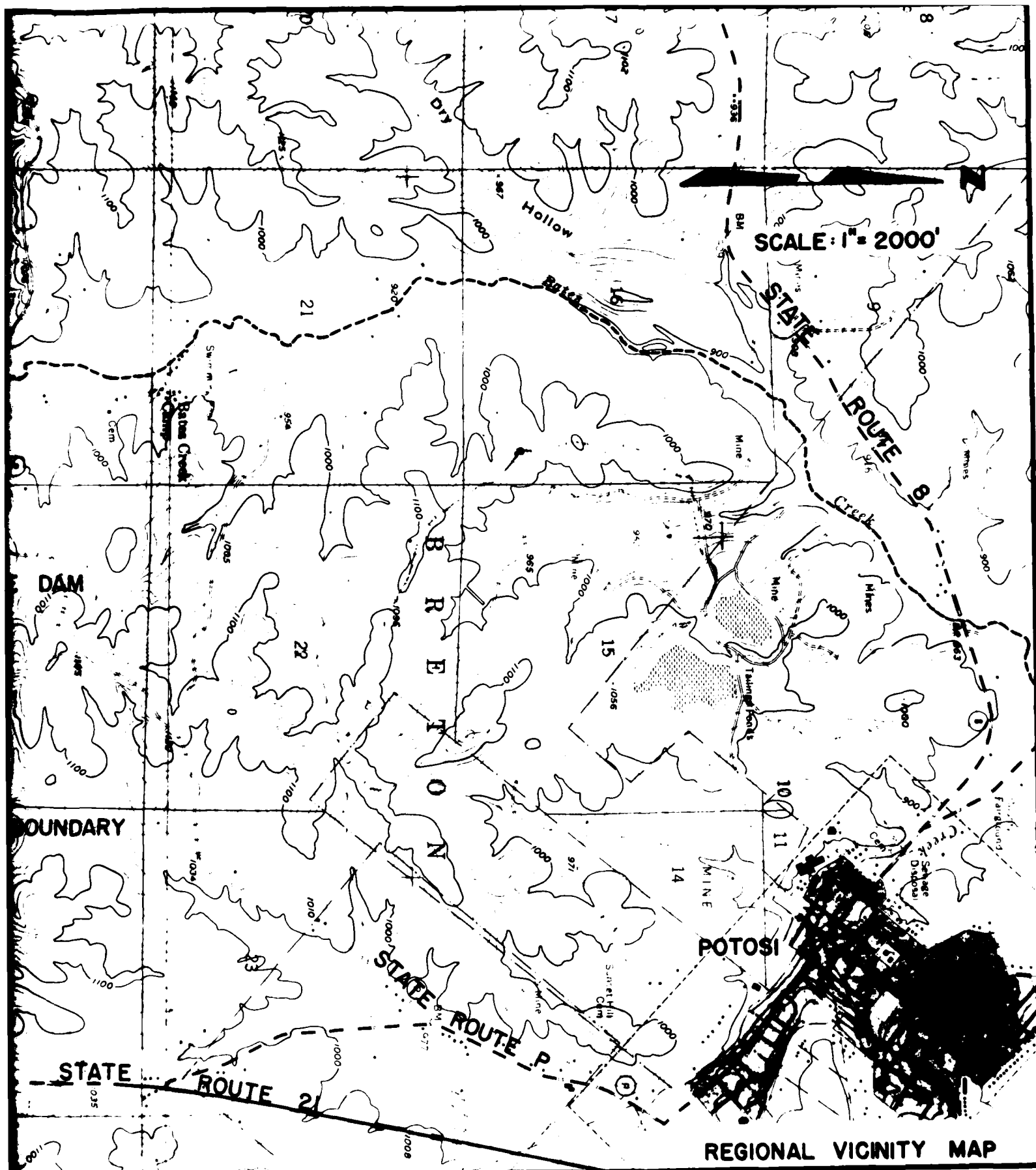
(7) A detailed inspection of the dam should be instituted on a regular basis by an engineer experienced in the design and construction of dams. It is also recommended, for future reference, that records be kept of all inspections made and remedial measures taken.

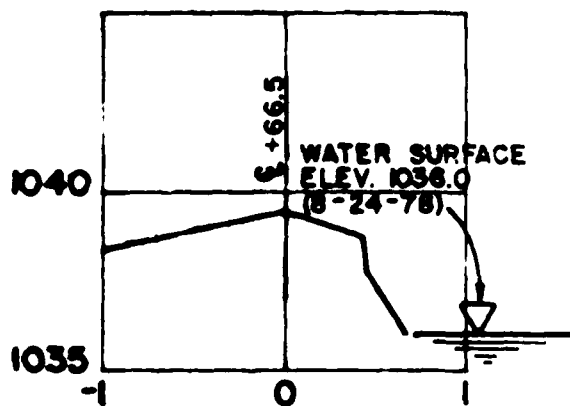
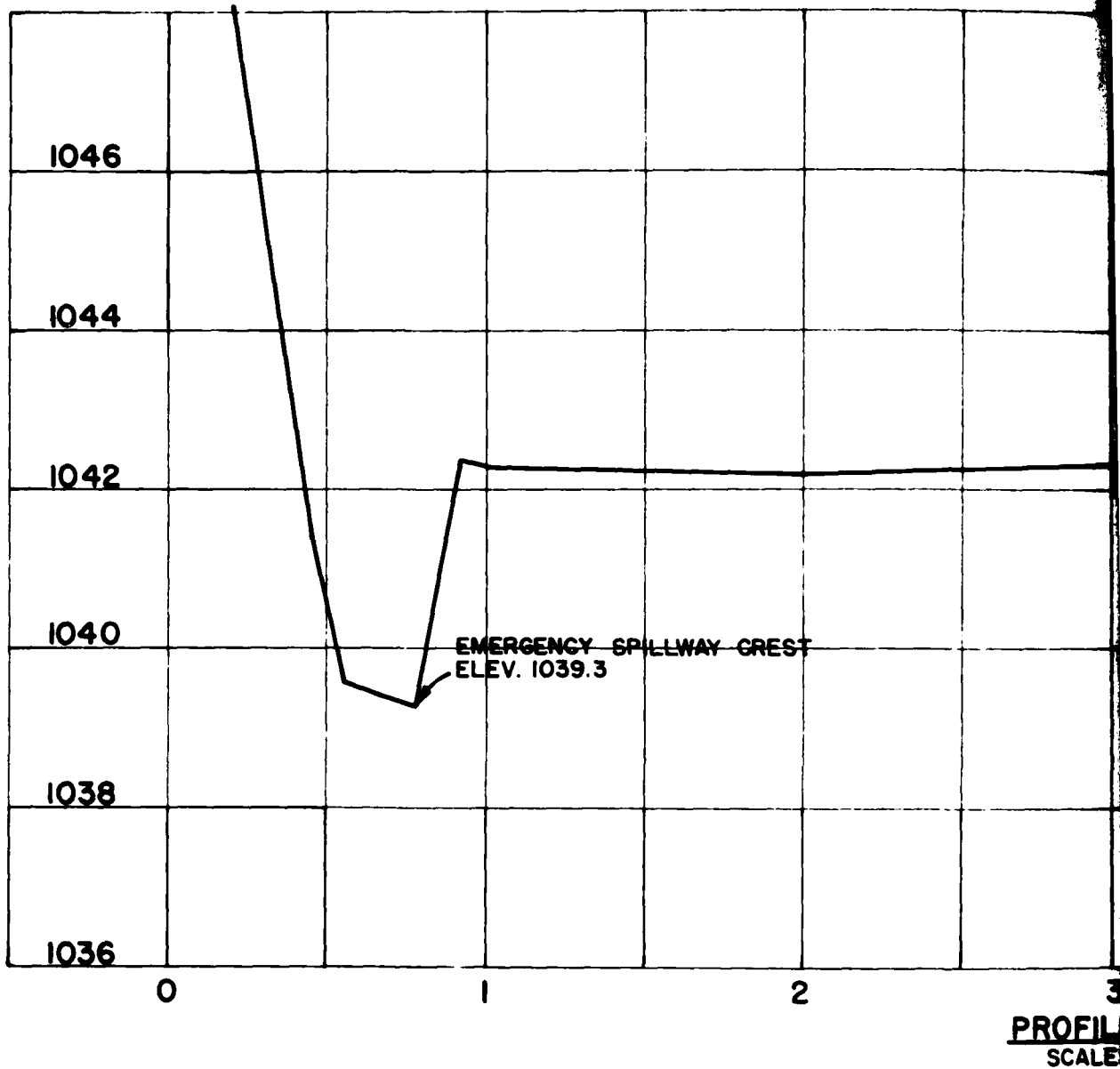


WASHINGTON
COUNTY

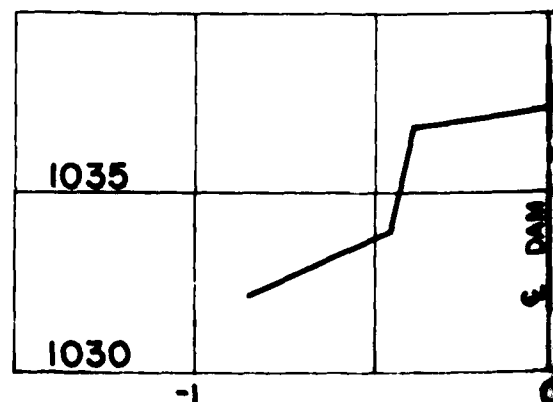
LOCATION MAP







PROFILE EMERGENCY SPILLWAY
 SCALES: 1" = 5' V., 1" = 100' H.



PROFILE

**NOTE: DAM PROFILE LOOKING DOWNSTREAM.
DAM AXIS STRAIGHT.**

TOP OF DAM

PRINCIPAL
SPILLWAY
CREST
ELEV. 1037.3

PROFILE DAM CREST

SCALES: 1" = 2' V., 1" = 50' H.

ELEV. 1037.3

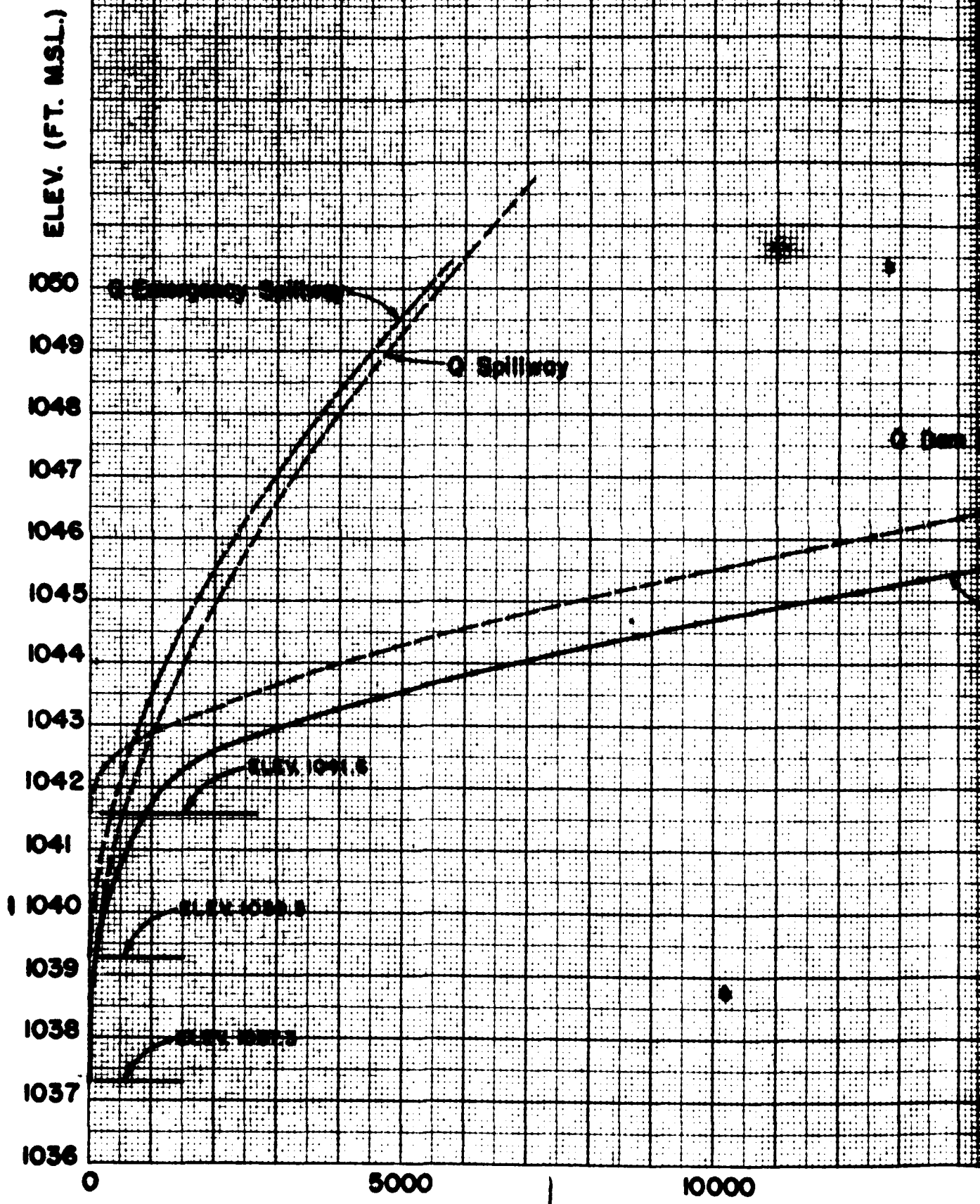
WATER SURFACE
ELEV. 1036.0
(8-24-78)

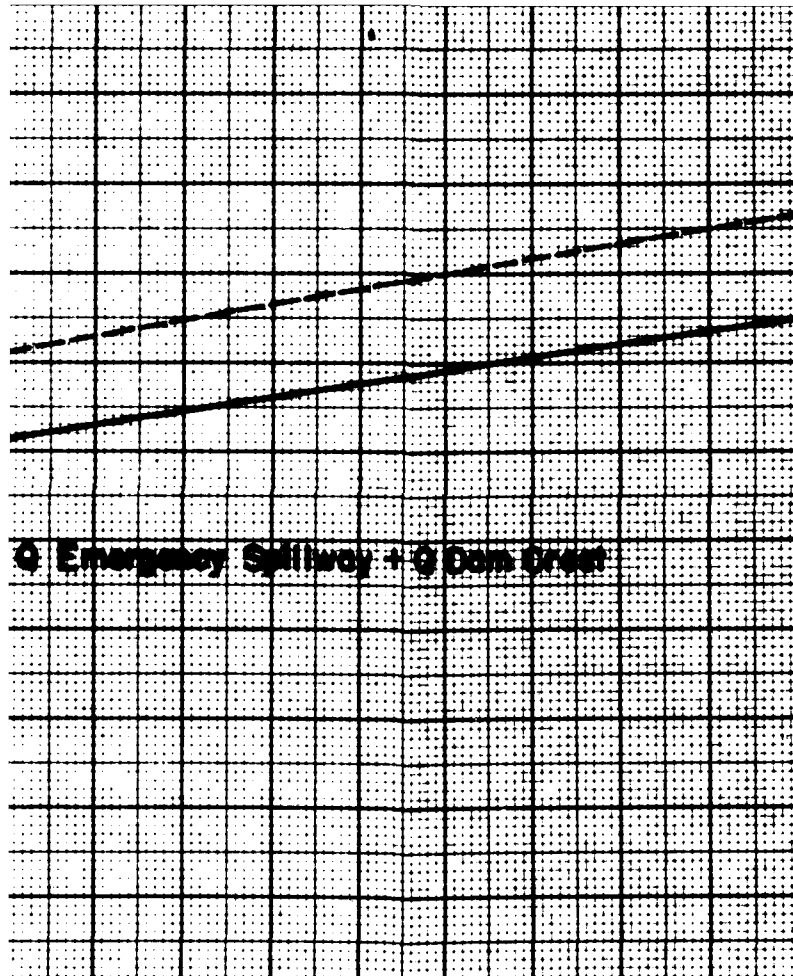
E. DAM

PROFILE PRINCIPAL SPILLWAY

SCALES: 1" = 5' V., 1" = 50' H.

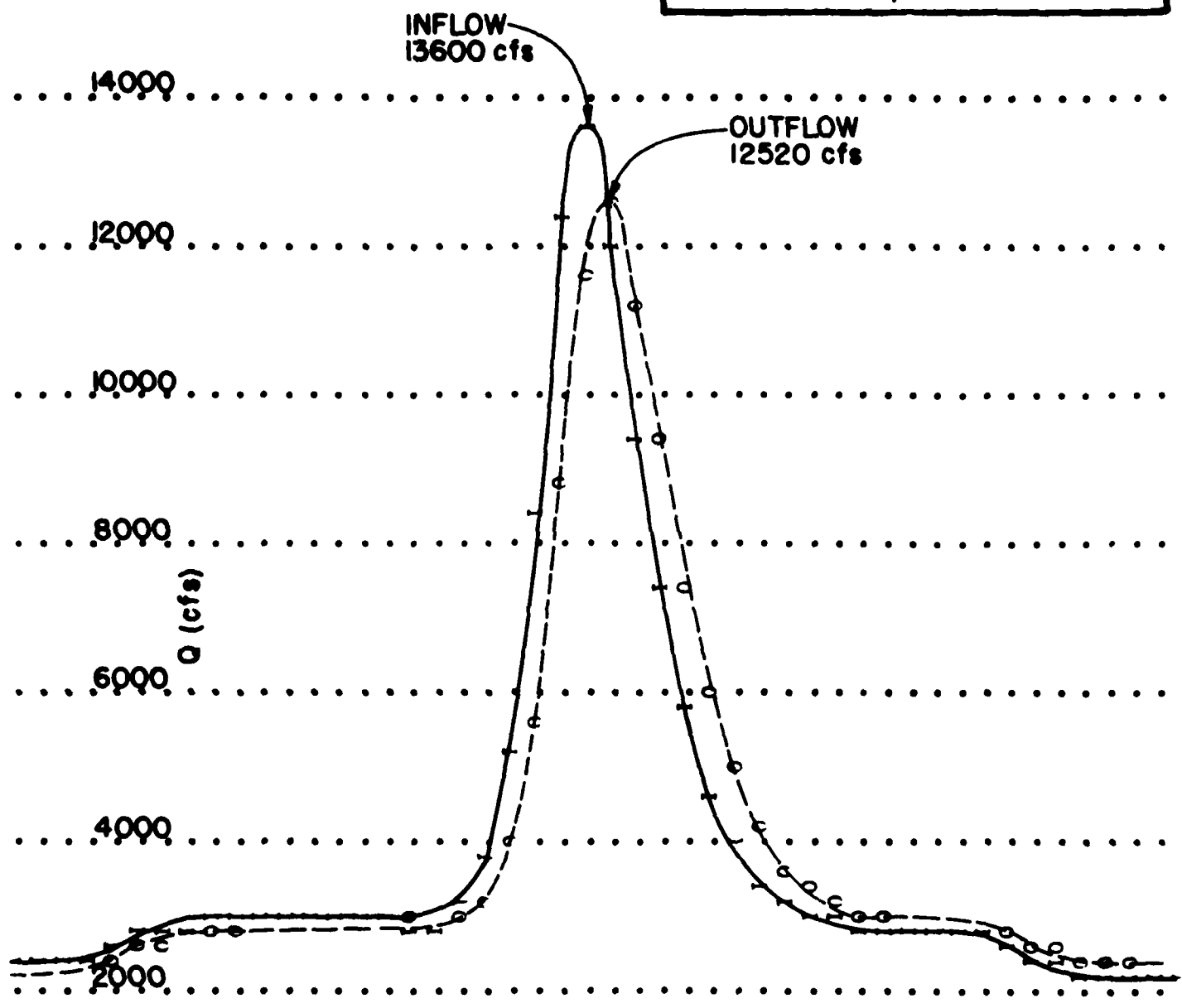
**DESSIEUX LAKE
DAM & SPILLWAY PROFILES
Horner & Shifrin, Inc. Nov. 1976**





DESSIEUX LAKE PMF INFLOW & OUTFLOW HYDROGRAPHS

Horner & Shifrin, Inc. Nov. 1978



TIME (Hr./Min.) FROM BEGIN OF RAINFALL	
13.50	16A.
13.55	167.
14.00	16A.
14.05	169.
14.10	170.
14.15	171.
14.20	172.
14.25	173.
14.30	174.
14.35	175.
14.40	176.
14.45	177.
14.50	178.
14.55	179.
15.00	180.
15.05	181.
15.10	182.
15.15	183.
15.20	184.
15.25	185.
15.30	186.
15.35	187.
15.40	188.
15.45	189.
15.50	190.
15.55	191.
16.00	192.
16.05	193.
16.10	194.
16.15	195.
16.20	196.
16.25	197.
16.30	198.
16.35	199.
16.40	200.
16.45	201.
16.50	202.
16.55	203.
17.00	204.
17.05	205.
17.10	206.
17.15	207.
17.20	208.
17.25	209.
17.30	210.
17.35	211.
17.40	212.
17.45	213.

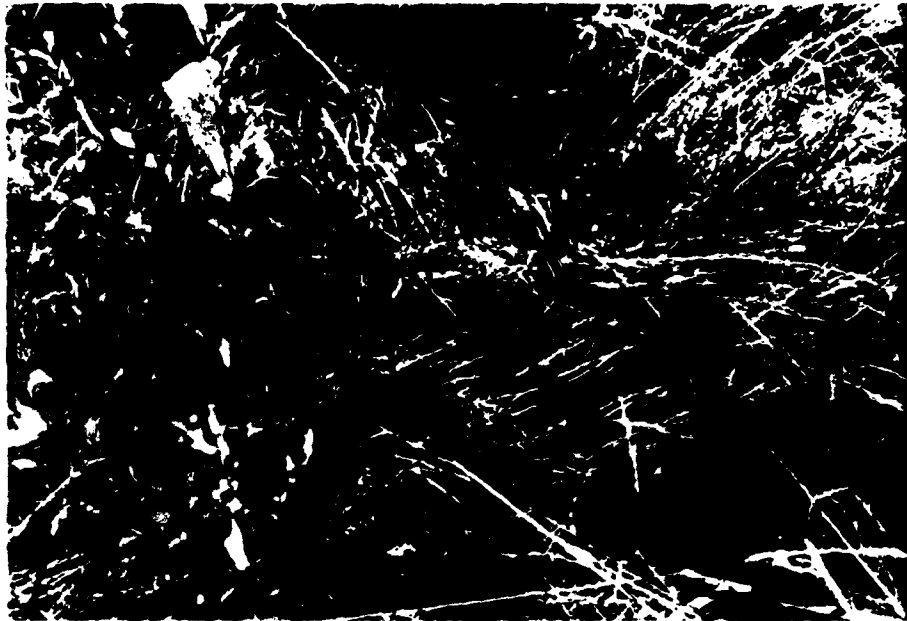
APPENDIX



NO. 1: UPSTREAM FACE OF DAM



NO. 2: DOWNSTREAM FACE OF DAM



NO. 3: 3/4-INCH PRESSURE RELIEF TUBE



NO. 4: OUTLET END 8-INCH DRAWDOWN PIPE



NO. 5: POOL AT OUTLET END OF DRAWDOWN PIPE



NO. 6: WET CONDITION AT DOWNSTREAM FACE OF DAM



NO. 7: CRAWFISH BURROWS IN SEEPAGE AREA



NO. 8: PRINCIPAL SPILLWAY CHANNEL (LOOKING DOWNSTREAM)



NO. 9: PRINCIPAL SPILLWAY CHANNEL (LOOKING UPSTREAM)



NO. 10: CREST OF EMERGENCY SPILLWAY

HYDROLOGIC COMPUTATIONS

1. The HEC-1 Dam Safety Version (July 1978) program was used to develop inflow and outflow hydrographs and dam overtopping analyses, with hydrologic inputs as follows:

a. Probable maximum precipitation (200 sq. mile, 24-hour value equals 26.0 inches) from Hydrometeorological Report No. 33. One hundred year frequency (point precipitation, 24-hour value equals 7.21 inches) from U.S. Weather Bureau Technical Paper No. 40.

b. Drainage area = 1.17 square miles
= 750 acres

c. SCS parameters
Lag time = 0.20
Soil type CN = 91 (Soil type C, AMC III)

2. The spillway sections consist of broad-crested, approximately U-shaped sections for which conventional weir formulae do not apply.

Spillway release rates were determined as follows:

- (1) Spillway crest section properties (area, a and top width, t) were computed for various depths, d .
- (2) It was assumed that flow over the spillway crest would occur at critical depth. Flow at critical depth (Q_c) was computed as $Q_c = \frac{a^3}{t} g^{0.5}$ for the various depth, d .

Corresponding velocities (v_c) and velocity heads (H_{vc}) were determined using conventional formulae.

- (3) Static lake levels corresponding to the various Q_c values passing over the spillway were computed as critical depths plus critical velocity head ($d_c + H_{vc}$), and the relationship between lake level and spillway discharge was thus obtained. The procedure neglects the minor insignificant friction losses across the length of the spillway.

3. The profile of the dam crest is irregular and flow over the dam crest cannot be determined by conventional weir formulas. Flow quantities overtopping the dam crest were computed as described in the preceding paragraph and corresponding flow over the dam and spillways for given elevations were added to obtain the combined outflow rating curve for the dam and spillways. This rating curve is shown on Plate 3. The inflow-outflow hydrographs for the PMF are shown on Plate 4.

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

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF									
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF DESSIEUX LAKE DAM									
RATIOS OF PMF ROUTED THROUGH RESERVOIR									
	2RR	0	5	-0	-0	-0	-0	-0	-0
1									
A1									
A2									
A3									
R	2RR	0	5	-0	-0	-0	-0	-0	-0
R1	5								
J	1	3	1						
J1	0.13	0.50	1.00						
K	0	INFLOW							
K1		INFLOW HYDROGRAPH							
M	1	2	1.17						
P	0	24.0	102						
T				120	130				
W2		0.20							
X	-1.0	-0.10	2.0						
K	1	DAM							
K1		RESERVOIR ROUTING BY MODIFIED PULS							
Y				1	2	3	1		
Y1	1								
Y4	1037.3	1039.3	1040	1041	1042	1042.5	219.5	1043.5	1044
Y4	1046	1047	1048						
Y5	0	100	100	540	1100	1730	2920	4650	6560
Y5	16990	23350	30500						
SA	0	18.4	24.2						
SE	1001.5	1037.3	1040						
SE	1037.3								
SE	1041.6								
K	99								

PL 1 1570

B-4

