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REPORT DOCUMENTATION PAGE

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Exp Date Jun 30, 1986

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) This plan implements the Corps program to prepare emergency plans for all Corps dams. It provides a guide for actions to identify and mitigate or respond to various types of emergencies which, while rare, could occur in the operation of Red Lake Dam. <i>→ In 5. i</i>			
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SUBJECT

CENCS-ED-M(11-2-240A)

Emergency Plan Red Lake Dam

TO

FROM

DATE

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See Attached Distribution

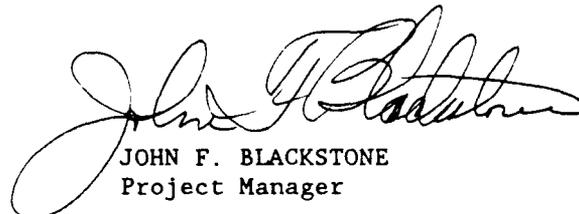
CENCS-ED-M

28 April 1988
Blackstone/429

Copies of the completed emergency plan for Red Lake Dam is enclosed for your reference. This report implements the Corps program to prepare emergency plans for all Corps dams. It provides a guide for identifying, mitigating, or responding to various types of emergencies which, although unlikely, could occur during the operation of the dam.

Please contact me at (612) 220-0429 with questions or comments or to request additional copies.

1 Encl



JOHN F. BLACKSTONE
Project Manager

EMERGENCY PLAN DISTRIBUTION

Red Lake Dam

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Dated
28 April 1988



DEPARTMENT OF THE ARMY
NORTH CENTRAL DIVISION, CORPS OF ENGINEERS
536 SOUTH CLARK STREET
CHICAGO, ILLINOIS 60605-1592

REPLY TO
ATTENTION OF

CENCD-ED-WH (1130-2-419)

4 - FEB 1988

MEMORANDUM FOR: Commander, St. Paul District, ATTN: CENCS-ED-WH

SUBJECT: Review and Approval of the Emergency Plans for Pine River Dam, Red Lake Dam, Highway 75 Dam, Lock and Dam 1 and St. Anthony Falls Lock and Dam

1. We have reviewed the subject emergency plans and have approved these plans with the exception of the plan for the Pine River Dam.

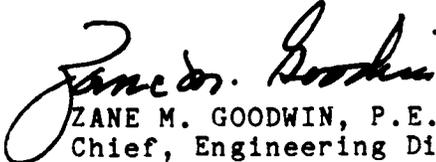
2. Since the simplified flood emergency plan for the Pine River Dam shows that failure significantly affects the downstream area, it will be necessary to prepare a detailed plan for this structure. Please provide us a schedule for completion of this plan no later than 27 February 1988.

3. References:

a. CENCS-ED-M Memorandum of 23 September 1987, subject: Emergency Plans for Cross Lake (Pine River Dam), Red Lake Dam and Highway 75 Dam.

b. CENCS-ED-M Memorandum of 19 June 1987, subject: Emergency Plans for Lock and Dam 1 and St. Anthony Falls Lock and Dam.

FOR THE COMMANDER:


ZANE M. GOODWIN, P.E.
Chief, Engineering Division



DEPARTMENT OF THE ARMY

ST PAUL DISTRICT CORPS OF ENGINEERS
1135 U.S. POST OFFICE & CUSTOM HOUSE
ST PAUL, MINNESOTA 55101-1479

Mr Blackstone
ED-M

REPLY TO
ATTENTION OF
CENCS-ED-M (350-3-2a)

23 SEP 1987

MEMORANDUM FOR: Commander, North Central Division, 536 South Clark Street,
Chicago, Illinois 60605-1592

SUBJECT: Emergency Plans for Cross Lake, Red Lake, and Highway 75 Dam

1. Subject reports are submitted in accordance with Engineer Regulation 1130-2-419.
2. These reports implement the Corps program to prepare emergency plans for all Corps dams. It provides a guide for identifying, mitigating, or responding to various types of emergencies, which, although unlikely, could occur during the operation of Cross Lake, Red Lake, and Highway 75 Dam.
3. Please contact Mr. John Blackstone at FTS 725-5949 if you have questions.

FOR THE COMMANDER:

- 3 Encls
1. EAP, Cross Lake (2 cys)
 2. EAP, Red Lake (2 cys)
 3. EAP, Highway 75 Dam

ROBERT F. POST
Chief, Engineering Division

4

EMERGENCY PLAN
FOR
RED LAKE DAM AND RESERVOIR

PREPARED BY THE
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

MAY 1987

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ELECTE
MAR 27 1988
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**EMERGENCY PLAN
FOR
RED LAKE DAM AND RESERVOIR**

1. Introduction

Much of the land surrounding Red Lake Reservoir that would be inundated by the Probable Maximum Flood is not in Federal ownership. The possibility therefore exists that high water levels could cause a hazard to life and property in the vicinity of the reservoir. In addition, a failure of the dam or embankment during normal pool, low flow conditions could result in the sudden release of a large volume of water from Red Lake Reservoir which could cause a hazard to life and property in the project area and surrounding lands.

a. Purpose

This plan implements the Corps program to prepare emergency plans for all Corps dams. It provides a guide for actions to identify and mitigate or respond to various types of emergencies which, while rare, could occur in the operation of Red Lake Dam. Specific information on emergency actions to be taken is provided in the following appendices:

- (1) APPENDIX A, Emergency Identification Subplan.
- (2) APPENDIX B, Emergency Notification Subplan.
- (3) APPENDIX C, Rating Curves and Notifications Chart.

b. Applicability

The emergency plan is applicable to all Corps elements and field offices concerned with operation of Red Lake Dam.

c. References

- (1) ER 1130-2-419, Dam Operations Management Policy, U.S. Army Corps of Engineers, 18 May 1979.
- (2) Director of Civil Works multiple letter dated 20 March 1978, subject: Evacuation Plans for Areas Downstream of Corps Dams and Corps/State Cooperation on Safety Review of Corps Dams.
- (3) Flood Emergency Plan for Lock and Dam 6, U.S. Army Corps of Engineers, St. Paul District, 1986.
- (4) Flood Emergency Plan for Lock and Dam 5, U.S. Army Corps of Engineers, St. Paul District, 1986.

- (5) Red Lake Dam and Red Lakes Reservoir: Reservoir Regulation Manual, Flood Control and Water Conservation, Red Lake River, Minnesota, Red River of the North Watershed, U.S. Army Corps of Engineers, St. Paul District, 1964.
- (6) Red Lake Dam and Bridge Periodic Inspection No. 3, U.S. Army Corps of Engineers, St. Paul District, 1980, includes Project Brochure.
- (7) Red Lake Bridge Supplement to Periodic Inspection No. 3, U.S. Army Corps of Engineers, St. Paul District, 1981.
- (8) Creativity, Conflict and Controversy: A History of the St. Paul District, U.S. Army Corps of Engineers, Raymond H. Merritt, U.S. Government Printing Office, 1979.
- (9) Flood Emergency Plan for Lock and Dam 10, U.S. Army Corps of Engineers, St. Paul District, 1983.
- (10) Flood Hydrograph Package, HEC-1, U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California, September 1981.
- (11) Research Document No. 19, Example Emergency Plan for Blue Marsh Dam and Lake (U.S. Army Corps of Engineers, St. Paul District, August 1983).

d. Scope

This plan addresses emergencies related to above normal reservoir water levels and/or rapid release of large volumes of water past the dam. It covers identification of impending or existing emergencies, and notification of other parties concerning impending or existing emergencies.

e. Datum

All elevation readings contained in this report have the designation National Geodetic Vertical Datum (NGVD) 1912.

2. Description of Project Area

a. Location

Red Lake Dam is located on the Red Lake River at the outlet of Lower Red Lake, approximately 18 miles northwest of the village of Red Lake, Minnesota and 196 river miles above the mouth of Red Lake River. Red Lake Reservoir has an area of about 451 square miles at the normal lake elevation (1174.0 feet). The bridge, No. 4613, is on Highways 1 and 89 in Clearwater County, Minnesota. The control structure is near the midpoint of a 36,500 foot long earthen dam which serves as a roadway

approach to the bridge. A location map and cross sections of Red Lake Dam and Bridge are shown on plates 1 and 2.

b. Topography

The Red Lake Watershed lies within the Red River of the North drainage basin. The Red Lake River subbasin has an area of 5988 square miles. The elevation of the subbasin ranges from 800 feet above mean sea level to the west, at the confluence of the Red Lake River and the Red River of the North, to 1,600 feet above mean sea level to the south.

c. Geology

The subbasin is divided into three distinct physiographic regions. In the southeast there is a glacial moraine consisting of hills and depressions. In the west there is a glacial lake plain that is extremely flat. The eastern edge of the lake plain ends in a series of narrow paleo-beach ridges running in a north-south direction. To the east of the beach ridges is a glacial lake-outwash plain that is flat to gently rolling with shallow bogs and peat areas. Both the lake plain and outwash plain areas were covered many thousands of years ago by glacial Lake Agassiz. Upper and Lower Red Lakes are a remnant of this glacial lake.

d. Climate

The climate in the Red River of the North Basin is a subhumid to humid continental climate with moderately warm summers and cold winters. The precipitation pattern over the Red River Basin is complex, but in general precipitation increases to the east. Average annual precipitation ranges from about 24 inches in the southeast to 17 inches in the northwest. December, January and February are normally the driest months and May through August are the wettest.

e. Description of the Red River of the North Basin

The watershed of the Red River of the North includes the northeastern corner of South Dakota, much of eastern North Dakota, northwestern Minnesota, and a small portion which drains from Manitoba, Canada through the United States. At the international boundary the river drains a total of 39,199 square miles. Approximately 573 square miles of the Red River of the North watershed are in South Dakota, 20,820 square miles are in North Dakota, and 17,806 square miles are in Minnesota. The Roseau River, which enters Canada before joining the Red River of the North, drains 1,160 square miles in northwestern Minnesota. About 5,800 square miles of the drainage area is noncontributing; 3,944 square miles is in the closed Devils Lake subbasin, and the remaining 1,056 square miles is in the upper reaches of the Sheyenne River drainage. Descriptions of subbasins in the Red River of the North Basin are presented in Table 1.

TABLE 1

Subbasin Descriptions, Red River of the North

Subbasin	Size (square miles)	Major Tributaries
Bois de Sioux-Mustinka Rivers	2,340 ⁽¹⁾	Mustinka River and Rabbit Creek
Ottertail River	1,920 ⁽²⁾	Pelican River
Wild Rice River (North Dakota)	2,233 ⁽³⁾	Wild Rice and Antelope Creeks
Sheyenne River	7,140 ⁽⁴⁾	Baldhill Creek, Maple River, and Rush River
Buffalo River	1,189 ⁽⁵⁾	South Branch
Elm River	510 ⁽⁶⁾	
Wild Rice-Marsh Rivers (Minnesota)	1,950 ⁽⁷⁾	White Earth River, Marsh Creek, South Branch Wild Rice River, Felton Ditch, and Spring Creek
Goose River	1,280 ⁽⁸⁾	Beaver Creek, North Middle, and South Branches
Sand Hill River	484 ⁽⁹⁾	Sand Hill Ditch
Red Lake River	5,970 ⁽¹⁰⁾	Clearwater and Thief Rivers
Turtle River	613 ⁽¹¹⁾	
Forest River	1,016 ⁽¹²⁾	North, Middle-South and Lower Branches
Middle-Snake Rivers	953 ⁽¹³⁾	Middle and Snake River
Park River	1,010 ⁽¹⁴⁾	South, Middle, and North Branches
Tamarac River	333 ⁽¹⁵⁾	
Two Rivers	1,112 ⁽¹⁶⁾	North, Middle, and South Branches

TABLE 1 (cont'd)

Subbasin	Size (square miles)	Major Tributaries
Pembina River	3,950 ⁽¹⁷⁾	Badger Creek, Long River, Little South Pembina River, and Tongue River
Roseau River	2,057 ⁽¹⁸⁾	South Fork, Hay Creek Sprague Creek, and Pine Creek

- (1) 551 square miles in South Dakota, 357 square miles in North Dakota, and 1,432 square miles in Minnesota.
- (2) Entirely in Minnesota.
- (3) 213 square miles in South Dakota and 2,020 square miles in North Dakota.
- (4) Entirely in North Dakota.
- (5) Clay and Becker Counties, Minnesota.
- (6) Steele, Cass and Trail Counties, North Dakota.
- (7) Mahnomen and Norman Counties, Minnesota.
- (8) Nelson, Grand Forks, Steele and Traill Counties, North Dakota.
- (9) Polk, Norman, and Mahnomen Counties, Minnesota.
- (10) Pennington, Clearwater, Beltrami, Marshall, Koochiching, Mahnomen, Roseau and Polk Counties, Minnesota.
- (11) Nelson and Grand Forks Counties, North Dakota.
- (12) Walsh, Grand Forks, Nelson and Ramsey Counties, North Dakota.
- (13) Marshall, Polk and Pennington Counties, Minnesota
- (14) Walsh, Pembina and Cavalier Counties, North Dakota.
- (15) Marshall, Kittson, and Roseau Counties, Minnesota.
- (16) Roseau and Kittson Counties, Minnesota.
- (17) 1,989 square miles in Canada and 1,961 square miles in United States (North Dakota).
- (18) 1,128 square miles in United States (Minnesota) and 929 square miles in Canada.

3. Description of Project Features

The dam and bridge were constructed in 1931 by the United States Department of the Interior, Bureau of Indian Affairs. A modification completed in 1951 by the Corps of Engineers created a spillway and stilling basin downstream of the structure and changed three stop log bays to closed bays with vertical lift gates on the upstream side of the bridge.

a. Red Lake Dam

Red Lake Dam consists of an earth dike with a top elevation of 1181.5 feet which extends along the western edge of Lower Red Lake. The maximum height of the dike is 15.5 feet and it is 36,500 feet long. A twenty-foot wide asphalt roadway extends the length of the dike. A 12-inch wide reinforced concrete core wall, 13.5 feet high, extends from the bridge 75 feet into the north embankment and 60 feet into the south embankment. At the bridge, the road grade elevation is 1180.25 feet and the elevation of the top of the core wall is 1177.0 feet.

b. Outlet Structure

The control structure is located in the natural outlet of Lower Red Lake. It consists of a concrete broad-crested weir with a crest elevation of 1169.6 feet, and a 64-foot spillway with four 16-foot bays. The discharge through three bays is regulated by lift gates and through the fourth bay by two 8-foot stop log sections. The gate openings are 5 feet high extending from the weir crest to the bulkheads. The abutments and intermediate piers of the outlet structure support the 71.5-foot reinforced concrete multi-span bridge structure. The width of the bridge is 22 feet which includes a 19-foot roadway.

Beginning at the downstream end of the abutments and extending through the stilling basin, vertical walls form the sides of the outlet structure. A curved drop section is located 39 feet downstream from the gates. The stilling basin is 12.0 feet long, 71.5 feet wide, and the floor is at elevation 1165.0 feet. An end sill with top elevation of 1166.0 feet is provided at the downstream end of the stilling basin. Flared wing walls at the end of the stilling basin tie into the 113-foot wide channel. Pertinent project data are presented in Table 2.

c. Reservoir - Upper and Lower Red Lakes

Red Lake Reservoir is located in the eastern portion of the Red Lake River drainage basin. The reservoir includes Upper Red Lake and Lower Red Lake which are connected by a small strait about 1 mile wide, known as the "Narrows". Pertinent Lake data are presented in Table 2. Most of the inflow into Red Lake Reservoir comes from the Tamarac, Battle, and Cormorant Rivers which enter the reservoir from the east. At normal lake elevation, 1174.0 feet, the reservoir capacity is 1,810,000 acre-feet and the area is 288,800 acres.

TABLE 2

PERTINENT DATA, RED LAKE DAM AND RED LAKESGeneral

Total drainage area	1,951 square miles
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Red Lakes

Maximum probable lake elevation	1179.0 ft m.s.l.
Capacity at maximum probable lake elevation (est.)	3,270,000 acre-feet
Normal lake elevation	1174.0 ft m.s.l.
Capacity at normal lake elevation	1,810,000 acre-feet
Area at normal lake elevation	288,000 acres
Maximum length of Upper Red Lake	21 miles
Maximum width of Upper Red Lake	10 miles
Maximum length of Lower Red Lake	23 miles
Maximum width of Lower Red Lake	12 miles

Red Lake Dam

Type	Earth dike road
Crest elevation	1181.5 ft m.s.l.
Total length of earth embankment	36,500 feet
Maximum height	15.5 feet
Freeboard above maximum probable lake elevation	2.5 feet
Total volume of earth dam	140,285 cubic yards

Outlet Structure

Type	Gated broad crested weir
Crest elevation	1169.6 ft m.s.l.
Length of crest	64.0 feet
Gates	3 - 16x5 lift gates 2 - 8x5 stop log sections
Design discharge	3700 cfs
Stilling basin	Rectangular
Length of stilling basin	12.0 feet
Width of stilling basin	71.5 feet
Elevation of stilling basin floor	1165.0 ft m.s.l.

Channel improvement

Red Lake River	27.5 miles, Mi. 154.3 to 178.5 and for 3.3 miles below outlet structure
Clearwater River	38.0 miles, Mi. 41.6 to 79.6

All of Lower Red Lake and about one-half of Upper Red Lake lie within the Red Lake Indian Reservation. Principal settlements and villages on the lakes are Red Lake where the agency headquarters are located; Redby, the center of the lumber and fishing industries; and Waskish on Upper Red Lake, the latter being located outside of the reservation.

d. Channel Improvement

The Red Lake River project includes: 1) rectification and enlargement of 27.5 miles of the Red Lake River channel between miles 154.3 and 178.5 and also a 3.3-mile reach below the outlet structure, 2) a submerged channel weir and low water bypass at mile 178.8, and 3) rectification, clearing and enlargement of 38.0 miles of channel in the Clearwater River between miles 41.6 and 79.6.

e. Public Use Areas

There are no public use areas associated with the project.

f. Instrumentation

A Friez, 24-hour dual-traverse rain and snow gage, 12-inch recording capacity, is the official gage (property of the U.S. Weather Bureau) for the Red Lake Reservoir. The gage is located at the Red Lake Indian Agency, Red Lake, Minnesota, about 19 miles by road from Red Lake Dam. The records are published by the Weather Bureau.

There are 23 permanent snow survey stations in or near the Red Lake Basin including stations at Red Lake Dam, 12 miles North of Red Lake Dam, and at Red Lake Agency, Minnesota.

No plans for sedimentation observations have been made for the Red Lake Reservoir.

g. Operations and Maintenance

The regulation of the operation of the Red Lake project is under the technical direction of the Reservoir Regulating Section, Hydraulics Branch, Engineering Division, St. Paul District, Army Corps of Engineers. The Dam Tender for Red Lake Dam is appointed by the Superintendent of the Red Lake Indian Agency. Operating instructions are transmitted directly by mail or telephone from the Reservoir Regulating Section to the Dam Tender. For other than normal operation of the dam, the Park Manager at Winnibigishish Dam on the Mississippi River will perform other necessary operation and maintenance functions at Red Lake Dam under the direction of the Operations Division of the District office.

4. Potentially Affected Project Areas

For the purpose of this report, "Potentially Affected Project Areas" would include all lands under the control of the Corps of Engineers and potentially affected by emergencies at Red Lake Dam and Reservoir. Red Lake Dam and Bridge, the roadway dike and all dams downstream on the Red Lake River could be affected by the increased flows they would have to handle. The Red Lake River Channel Improvement Project could also be affected.

5. Potentially Affected Non-project Areas

For the purpose of this report, "Potentially Affected Non-project Areas" would include all areas not presently under the control of the Corps of Engineers and potentially affected by emergencies at Red Lake Dam. This would include all the communities listed in Section 10 of this report.

6. Potential Causes of an Emergency

The potential causes of an emergency affecting the operation or safety of Red Lake Dam and Reservoir which were selected for planning include:

- a. Excessive Seepage
- b. Sabotage
- c. Extreme Storm
- d. Slope Failure
- e. Foundation Failure

Each of the above items is discussed briefly in the following paragraphs:

a. Excessive Seepage

A potential exists for seepage through, around or under the dam. Some seepage is normal and not considered hazardous. However, seepage that increases in amount or contains suspended solids may indicate piping which can lead to breach of the dam. Seepage problems are potentially controllable depending on their severity, location and other circumstances.

b. Sabotage

A potential exists that operation of the dam could be affected by

sabotage disrupting communications, disabling gate controls or equipment, breaching the dam or various combinations of the foregoing. Only breaching of the dam, for instance by use of explosive, would cause sudden release of a dangerous volume of water.

c. Extreme Storm

An extreme storm could occur in the area of the reservoir or over the watershed upstream of the reservoir. An extreme storm could result in large inflows to the reservoir causing a high reservoir level, large discharges over the spillway, and/or high waves on the reservoir surface. The potential for mitigating such problems depends on their severity and other circumstances.

d. Slope Failure

A sliding or sloughing of the dam face could occur. A slope failure that extended to the top of the embankment would effectively lower the crest. This could result in sudden release of a large volume of water if the reservoir water surface exceeded the elevation of the resulting dam crest. The potential for control of slope failure problems depends on their magnitude, severity, reservoir water surface elevation and other circumstances.

e. Foundation Failure

Failure of the foundation underlying either the concrete control structure or the earth embankment dam could occur. This could result in breaching of the dam and control structure allowing a sudden release of a large volume of water. The potential for control of foundation failure problems depends on their magnitude, severity, reservoir water surface elevations and other circumstances. Continued siltation at the upstream toe of the dam and spillway also contributes to excess foundation pressure, which can cause failure.

7. Probable Maximum Storm

Routing of the Probable Maximum Flood results in a peak pool elevation of 1179.6 feet on Red Lake Reservoir. At this elevation, there is 1.9 feet of freeboard available.

8. Existing Spillway Capacity

The existing spillway at Red Lake Dam was designed for a discharge of 3700 cfs and a maximum lake elevation of 1176.43 feet. The design capacity of the downstream channel is 1000 cfs. The U.S. Government holds flowage easements to 1177.0 feet. During the 1962 flood, the lake level of Red Lake reached 1176.5 feet.

9. Affected Areas

In periods of high runoff, Red Lake Reservoir is operated to reduce flooding in downstream areas. The occurrence of a maximum probable storm or a dam breach could cause uncontrolled release of water from the dam. Dam breach during a Probable Maximum Flood event would most likely produce a minor increase in the peak outflow.

The increased flow velocities and/or waves caused by the sudden release of a large volume of water under conditions of low flow and low tailwater would present a hazard to life and property in the vicinity of the dam at the time of failure.

Flood damage in the Red Lake River Basin is mostly agricultural. Facilities that could sustain damage due to flooding include bridges, culverts and roadways. There are few residences or urban areas that would be affected by an emergency at Red Lake Dam.

10. Identification of Needed Evacuation Planning

a. Jurisdictions Affected

The project area affected encompasses parts or all of the following jurisdictions in Beltrami, Clearwater and Pennington Counties, Minnesota.

- (1) Red Lake Indian Reservation
- (2) High Landing, Minnesota
- (3) Thief River Falls, Minnesota
- (4) Red Lake Falls, Minnesota
- (5) Crookston, Minnesota

b. Evacuation Plans

Plans pertinent to the dissemination of flood warnings and evacuation in the portions of the jurisdictions which would be affected in the case of the Probable Maximum Floods without or with dam failure, or failure at normal pool should incorporate the information presented in this report into all existing and future plans. A copy of this report is to be provided to the appropriate emergency personnel for each of the affected communities.

c. Evaluation of Evacuation Plans

Principal characteristics of evacuation plans which affect their potential for successful execution are shown in Table 3.

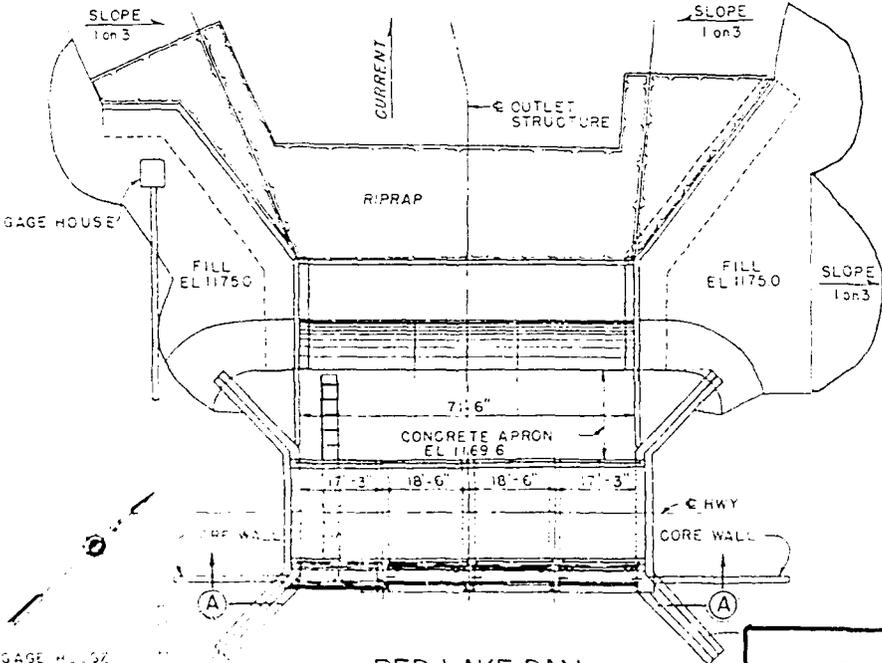
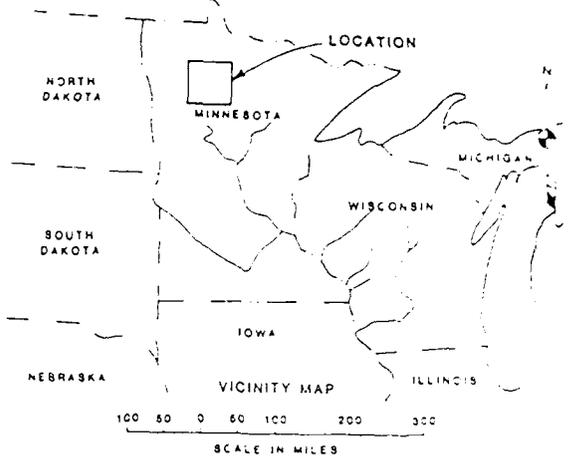
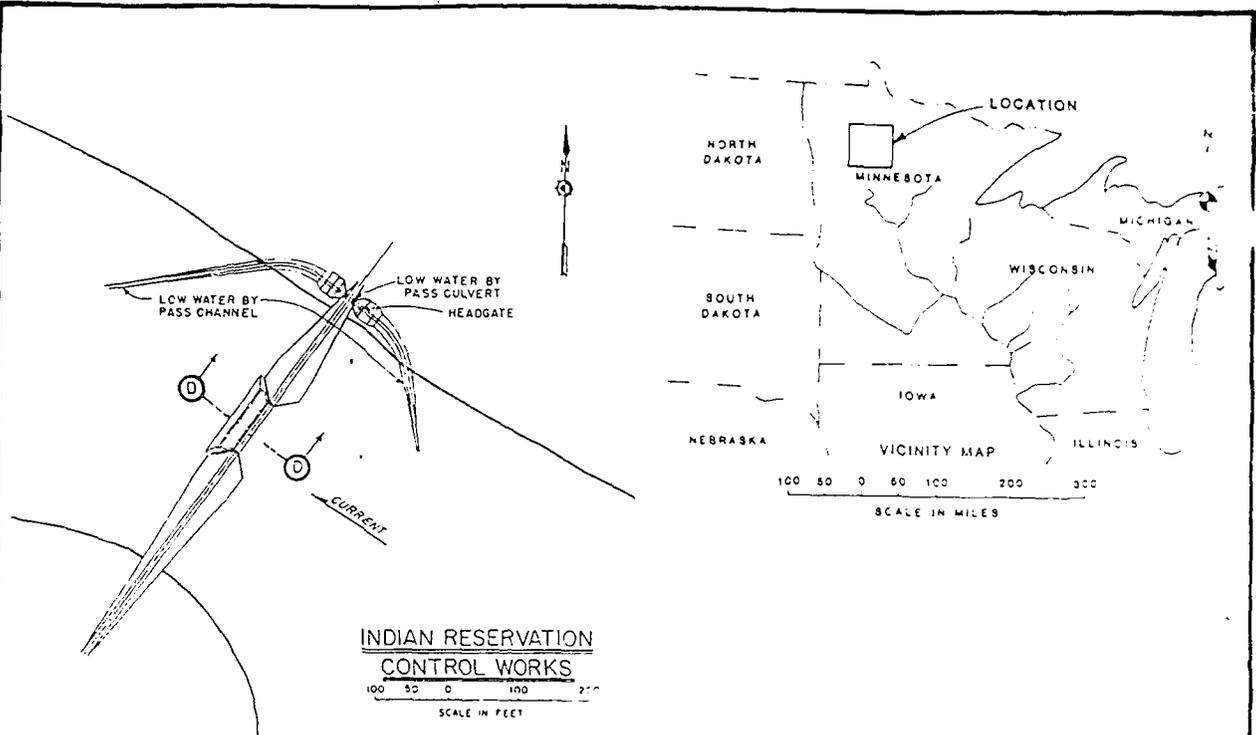
d. Evacuation Planning

Evacuation plans are to be developed through local coordination with the affected communities. Information on evacuation planning and examples of evacuation plans are available from the Corps of Engineers.

TABLE 3
 CHARACTERISTICS FOR EVACUATION PLANS
 RED LAKE DAM AND RESERVOIR

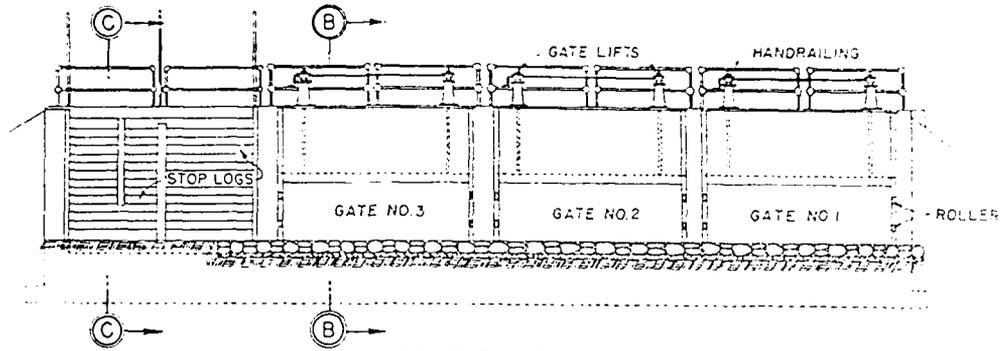
Plan Characteristic	Plan 1	Plan 2	Plan 3
Is plan written?			
Is plan current?			
Does plan have legal status through appropriate adoption or recognition by non-federal authorities?			
Does plan specify actions to be taken in sufficient detail to avoid indecision on whether or not to execute the plan and how it should be executed?	*		*
Does plan make specific assignments of responsibility for its initiation and execution?			
Does plan cover all parts of the jurisdiction requiring evacuation?	*		*
Is successful execution of plan in potential emergency situations reasonable in view of the warning time likely to be available for an emergency?			
Is plan consistent with various causes of emergencies likely to exist at time evacuation is required?			
Does plan evidence realistic analysis of means of warning and transporting evacuees, lane capacities of escape routes and other pertinent matters?			
Are equipment, personnel and materials required for execution of the plan identified?			
Does plan contain adequate provisions for updating, testing, practice and other maintenance activities to assure its continued viability?			

E V A C U A T I O N P L A N S
 A R E A L O C A L
 R E S P O N S I B I L I T Y



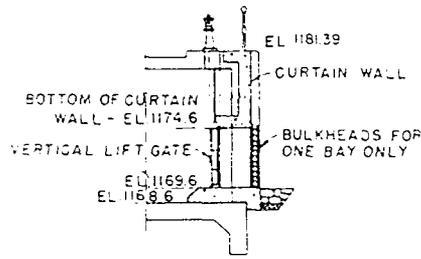
PROJECT PLAN

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS



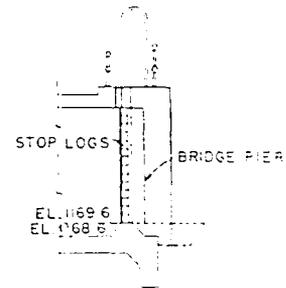
SECTION A-A

5 0 5 10 15
SCALE IN FEET



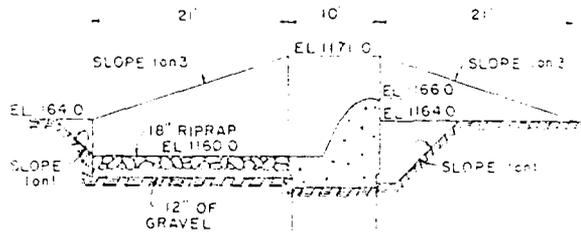
SECTION B-B

5 0 5 10 15
SCALE IN FEET



SECTION C-C

5 0 5 10 15
SCALE IN FEET



SECTION D-D

10 5 0 5 10 20
SCALE IN FEET

CROSS-SECTIONS

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U. S. ARMY CORPS OF ENGINEERS

EMERGENCY IDENTIFICATION SUBPLAN

APPENDIX A

TO

EMERGENCY PLAN

FOR

RED LAKE DAM AND RESERVOIR

MAY 1987

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EMERGENCY IDENTIFICATION SUBPLAN

RED LAKE DAM AND RESERVOIR

A-1. Introduction

Conditions affecting operation of Red Lake Dam and Reservoir could result in a hazard to life and/or property due to high reservoir levels and/or sudden release of large volumes of water. Early identification of the existence or potential for occurrence of such conditions is essential as a basis for initiating emergency operations and/or repairs and for issuing appropriate notifications to higher authority and potentially affected parties.

a. Purpose

This subplan implements a portion of the Corps program to prepare emergency plans for all Corps dams. It establishes procedures for identifying impending and existing emergencies affecting the operation and safety of Red Lake Dam.

b. Scope

This subplan deals with identification of impending and existing emergencies related to operation error, excessive seepage, foundation failure, abutment failure, extreme storm, equipment failure, and upstream dam failure. Instructions are included concerning:

- (1) Monitoring and reporting conditions.
 - (a) Routine - during duty hours. Monday through Friday (0800-1630).
 - (b) Non-routine - on a 24-hour basis or as directed by District Office.
- (2) Communications between the project office and the St. Paul District Office.
- (3) Criteria for action including declaration of a pre-emergency or emergency condition and activation of the Notification Subplan.

c. Applicability

This subplan is applicable to all Corps elements and field offices concerned with operation of Red Lake Dam and Reservoir.

A-2. Responsibility For Conduct

a. Dam Tender

- (1) Carrying out routine surveillance (paragraph A-3a).
- (2) Carrying out non-routine observations and measurements as directed by the District (paragraph A-3b).
- (3) Advising District of potentially hazardous situations (paragraph A-3c).
- (4) Maintaining proper records of communications (paragraph A-4).
- (5) Acting independently, when required by disruption of communications or the urgency of the circumstances, to declare a pre-emergency or emergency condition (paragraph A-7) and to activate the Notification Subplan.

b. Mississippi Headwaters Project Office

- (1) Providing direction and supervision to the Park Manager in coordination with the District Office.
- (2) Providing assistance to District as requested.
- (3) Assuming responsibilities of District in event of disruption of communications between the project area and District Office.

c. District

- (1) Carrying out routine monitoring of conditions potentially affecting regulation of Red Lake Dam (paragraph A-5a) and alerting the Dam Tender of situations requiring increased readiness and/or 24-hour supervision.
- (2) Providing guidance to the Dam Tender on all potentially hazardous situations which arise and directing any non-routine observations and measurements needed to assist in identification, confirmation or analysis of existing or impending threats to safe operation of the dam (paragraph A-5b).
- (3) Providing personnel for on-site evaluation of potentially hazardous conditions related to geology, soils and other aspects requiring expert analysis.
- (4) Declaring the existence of pre-emergency and emergency conditions and directing activation of the Notification Subplan.

- (5) Maintenance of the Subplan (paragraph A-8).

A-3. Observations, Tests and Reports by Dam Tender

a. Routine Observation and Tests (All entered in weekly log.)

(1) Daily

- (a) Local 24 hour precipitation and 8 a.m. temperature.
- (b) Pool and tailwater elevation for Red Lake Dam.
- (c) Slide gate setting for 3 gates, Red Lake Dam.
- (d) Stop log opening for 1 gate, Red Lake Dam.

(2) Monthly at Red Lake Dam

- (a) Visual inspection for excess seepage of downstream face of embankment, spillway, overflow spillway, abutment areas and valley floor immediately downstream of dam.
- (b) Visual inspection for slope failure and condition of both faces of all embankments.

(3) At request of District

- (a) Snow cover, water content (seasonal).
- (b) Test radio and other communication equipment.

b. Non-routine Observations and Tests

- (1) Perform snow surveys as requested (seasonal).
- (2) Perform comprehensive examination of seepage (amount, rate of change of flow, and presence of fines) whenever potential problems are observed.
- (3) Monitor precipitation gages as directed by the District Office when significant rain is occurring.
- (4) Examine all areas of embankment hourly if evidence of significant slope failure is found (to be continued until directed by District to cease).
- (5) Perform other observations and tests as directed by the District Office.

c. Reports

- (1) To the Chief, Water Control Center
 - (a) Precipitation of 1.5 inches or more in 24 hours or less in the vicinity of the dam.
 - (b) Pool elevation above seasonal normal.
 - (c) Reported severe ice conditions or temporary constrictions downstream of dam.
 - (d) Any conditions likely to require a change in gate operations or mode of regulation.
 - (e) River stage at High Landing is rising and reaches a stage of 4.5 feet.
- (2) To the Chief, Geotechnical Design Section
 - (a) Any conditions indicating distress of an embankment.
 - (b) Indications of unusual seepage.

A-4. Records

The Dam Tender will keep a log of all telephone, radio or other communications received from or sent to the District Office. This log should be a bound ledger or notebook used only as an official diary. Each communication will be described including:

- a. Date
- b. Time
- c. Person calling or called
- d. Information transmitted/instructions received
- e. Action requested by the District
- f. Action taken in response to request
- g. Result of action
- h. Remarks
- i. Name of the operator issuing information/orders
- j. Initials of person receiving communications

A-5. Observations, Tests and Alerts by the District Office

a. Daily Routine Observations and Tests

- (1) Check weather forecasts for areas affecting runoff.
- (2) Check concurrence of pool level readings from staff gage and recording gage.
- (3) Record, review and analyze piezometer and weir reading data and check with Geotechnical Design Section.

b. Non-routine Observations and Tests

Specify additional observations and tests by the Dam Tender and make additional observations and tests as necessary to:

- (1) Assure proper functioning of all instrumentation.
- (2) Assist in identification, confirmation or analysis of existing or impending threats to safe operation of the dam.

c. Alerts

Provide alerts to Dam Tender and appropriate District Office personnel when:

- (1) Weather, ice or other conditions require heightened readiness, increased surveillance or the possible need for activation of the Emergency Operations Center.
- (2) Consideration is being given to declaration of a pre-emergency or emergency condition.

A-6. Communications

a. Normal

Communications between the District and Dam Tender will normally be by mail or by telephone.

b. Back-up

The agency at Red Lake now has radio communication for their own use and future plans may be developed to set up a direct tie to the present District network for emergency use only.

c. Emergency

During a situation when both radio and telephone communications between the District Office and the Red Lake Project Office are lost, others equipped with radio or telephone facilities will be called on for assistance.

A-7. Declaration of Pre-emergency and Emergency Conditions

a. Responsibility

The District Office is responsible for the declaration of "pre-emergency" or "emergency" conditions in all but extreme cases where the loss of communications or the speed of onset of a situation prevents the Dam Tender from conferring with the District Office.

Pre-emergency and emergency declarations will be made by the Commander/District Engineer. The Dam Safety Committee will provide recommendations to the District Engineer.

b. Conditions Warranting Declaration

Not every situation requiring declaration of a pre-emergency or an emergency condition can be specified. Initiative must be exercised by all involved personnel and each situation judged individually on the basis of all relevant factors.

(1) Pre-emergency

Examples of circumstances warranting declaration of a pre-emergency condition include:

- (a) Spring runoff is always handled as a pre-emergency condition. During the remainder of the year, the National Weather Service flood stage at the control point, or higher shall be the warranting factor.
- (b) Malfunction of flood control gate system during flood operations which impedes release of water and creates potential spillway flow.
- (c) Minor seepage problems including: unexplained increases or decreases in amount, cloudy appearance of seepage or presence of fines, development of new seepage areas as indicated by soft boggy areas or new or lush vegetation and substantial unexplained fluctuation in piezometer readings.

- (d) Minor slope failures including: tension cracks at crest or in slopes of embankment, small bulges in slopes or in foundation near toe of slope, small depressions or sags in crest or slopes, changes in horizontal crest alignment and gullies forming in or near embankment or junction of the embankment and abutments.
- (e) Threats of sabotage or occurrence of sabotage of non-critical project features.

(2) Emergency

Examples of conditions warranting declaration of an emergency condition include:

- (a) Lake level is at or over the National Weather Service flood at the control point and the stage at the control point is increasing.
- (b) Major seepage problems including: large increases in piezometer readings, movement of large amounts of material in existing or new seeps, pipes in embankment or foundation materials, seepage at higher elevations on downstream face of dam or in abutment areas and substantial increases in normal seepage amounts (especially when associated with movement of material from embankment or foundation).
- (c) Major slope failures including: appreciable depressions or sloughs in the crest or slopes of the dam or bulges in the slopes or foundation, large gullies developing and continuing to erode in the embankment or at the junction of the embankment and abutments, displacement of structures or instrumentation on the dam and continuing expansion of tension cracks after their appearance on the dam crest or slope.
- (d) Threats of sabotage or occurrence of sabotage to critical project features.

c. Action Upon Declaration

(1) Dam Tender

- (a) Attend telephones as directed by the District Office. Cancel normal schedules and provide for 24-hour duty as needed.
- (b) Activate appropriate portions of Notification Subplan.
- (c) Maintain 24-hour monitoring/surveillance of situation responsible for declaration.

- (d) Perform non-routine observations and tasks as directed by the District Office.
 - (e) Test radio communication.
 - (f) Request assistance needed from the District Office to perform (a) through (e) above.
- (2) Mississippi River Headwaters Office
- (a) Monitor telephone on 24-hour basis.
 - (b) Place all personnel on standby for emergency duty if directed by District Office.
 - (c) Test radio communications.
- (3) District Office
- (a) Activate Emergency Operations Center.
 - (b) Attend telephones on 24-hour basis.
 - (c) Test radio communications.
 - (d) Place key staff on standby for emergency duty.
 - (e) Provide detailed instructions to the Dam Tender for directing specific non-routine observations and tests.
 - (f) Dispatch personnel to dam site as required to provide expert evaluation of situation and to assist Dam Tender as needed.
 - (g) Activate appropriate portions of Notifications Subplan.

A-8. Subplan Maintenance

a. Updating

This subplan shall be updated as needed by the Dam Safety Officer, including:

- (1) Annually.
- (2) Whenever needed by modifications in instrumentation at or affecting the project, dam operating procedures, overall District emergency procedures, and/or changes of personnel.

b. Testing

The Chief, Project Operations Branch shall annually direct a thorough inspection of all mechanical, electrical, and other equipment pertinent to conduct of this subplan. The inspection shall include all tests, servicing and calibration necessary to ensure proper functioning.

c. Familiarization

The Dam Safety Officer shall ensure all pertinent Corps personnel are aware of and familiar with this subplan including:

- (1) Circulation of each updated version for review and signature by pertinent District staff and the Red Lake Project Office.
- (2) Periodic review session with staff of the Water Control Center and Dam Tender.
- (3) Briefing, within two weeks of assuming duties, of all new Water Control staff.
- (4) Briefing, before assumption of duties, of any new Dam Tender.

EMERGENCY NOTIFICATION SUBPLAN

APPENDIX B

TO

EMERGENCY PLAN

FOR

RED LAKE DAM AND RESERVOIR

MAY 1987

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EMERGENCY NOTIFICATION SUBPLAN

RED LAKE DAM AND RESERVOIR

B-1. Introduction

Conditions affecting operation of Red Lake Dam and Reservoir could result in a hazard to life and/or property due to high reservoir levels or sudden release of large volumes of water. Prompt issuance of appropriate notifications is essential for minimizing hazards to life and property.

a. Purpose

This subplan implements a portion of the Corps program to prepare emergency plans for all Corps dams. It establishes procedures for issuing notifications of impending and existing emergencies affecting the operation and safety of Red Lake Dam and Reservoir.

b. Scope

This subplan specifies notifications and other actions to be taken upon declaration of a pre-emergency or emergency condition. Notifications and actions specified are those necessary for:

- (1) Ensuring safety.
- (2) Vacating project areas where emergency operations and repairs may be conducted.
- (3) Internal coordination of Corps of Engineers activities.
- (4) Coordination with non-Federal units of government and other Federal agencies.

c. Applicability

This subplan is applicable to all Corps elements and field offices concerned with operation of Red Lake Dam and Reservoir.

B-2. Basis of Activation

This subplan is to be activated immediately upon declaration of a pre emergency or emergency condition.

B-3. Parties to be Notified

a. Corps Offices

Corps Offices to be notified of all pre-emergency or emergency conditions that are declared are listed in Appendix C.

b. Other Parties

Other parties to be notified according to the nature of an emergency or pre-emergency condition are listed in Appendix C.

c. For High Pool Levels

Additional parties to be notified in the event of anticipated high pool levels are listed in Appendix C.

B-4. Responsibility for Notification

Notifications listed in Appendix C are the responsibility of the office (Park Manager, Mississippi Headwaters Project Office, or District) making the declaration of a pre-emergency or emergency condition. Assistance in making notifications may be requested from other Corps offices and/or other parties. In the event all communications between offices are disrupted after declaration of a pre-emergency or emergency condition, each office will assume responsibility for making all notifications.

B-5. Communications

a. Corps Offices

(1) Normal

Communications between the District and Dam Tender are normally by mail or telephone. Telephones at each office will be manned as required during all flood emergencies and whenever a pre-emergency or emergency condition is in effect. (Office and home phone numbers of key Corps Personnel are listed in Appendix C.)

(2) Back-up

The agency at Red Lake now has radio communication for their own use and future plans may be developed to set up a direct tie to the present District network for emergency use only.

(3) Emergency

During a situation when both radio and telephone communications between the District Office and project area are lost, others equipped with radio or telephone facilities will be called on for assistance. Those to whom application for assistance may be made are identified in Appendix C along with information for telephone numbers.

b. Other Parties

(1) Normal

Communications with other parties will normally be by telephone. Office and home phone numbers of key contacts are listed in Appendix C.

(2) Back-up

Communications with other parties will be by radio in the event telephone service is disrupted. Those parties which can be requested to forward notifications to offices lacking radio equipment are also listed in Appendix C.

B-6. Timing of Notifications

Parties listed in Appendix C are to be notified as soon as possible after declaration of a pre-emergency or emergency condition. Notifications listed in Appendix C are dependent on reservoir water surface elevation and other conditions and should be made as soon as a high probability of the eventual need for notification is predicted.

B-7. Content of Notification Message

a. Corps Offices

Notifications are to include the key information needed as a basis for decision making and/or action including, as appropriate and to the extent possible, the following:

(1) Description of Situation

- (a) Nature and severity of problem(s).
- (b) Current and predicted reservoir conditions including water elevation, inflow and discharge.
- (c) Current and forecasted weather conditions.

(2) Action Planned or Underway

- (a) Type of corrective actions.
- (b) Estimated time to complete corrective actions.
- (c) Outlook for success.
- (d) Assistance required/being furnished.
- (e) Potential complications.
- (f) Recommended evacuation.

(3) Other

- (a) Staff at dam site.
- (b) Visitors at project.
- (c) Road conditions.

b. Other Parties

Notification messages are to include a description of the nature of impending or existing hazard, potential timing of its occurrence, and recommendations for evacuation and other action (needed evacuation on project lands managed by the Corps will be directed rather than recommended).

B-8. Pre-emergency Actions

a. Dam Tender

For a Dam Tender declared pre-emergency or suspect pre-emergency situation, the Dam Tender must notify the Mississippi Headwaters Project Office.

If contact with the Mississippi Headwaters Project Office cannot be made, contact the Chief Lock and Dam Section, Project Operations Branch and/or Emergency Operations Center.

b. Mississippi Headwaters Project Office

Evaluate the situation and declare a pre-emergency condition if warranted.

Notify Dam Safety Officer, Chief Lock & Dam Section, Project Operations Branch and Emergency Operations Center.

Provide assistance as needed to Dam Tender and District Office.

c. District

(1) Dam Safety Officer

- (a) The Dam Safety Officer is to be kept informed of all conditions of the pre-emergency situation.
- (b) Responsible for identifying and/or providing the necessary engineering or technical support required to resolve the pre-emergency situation.
- (c) Evaluate the situation and declare a pre-emergency condition if warranted.
- (d) Notify the North Central Division Dam Safety Officer. The pre-emergency condition was declared by the Dam Tender or District Office.
- (e) Notify the Dam Safety Committee, the Emergency Operations Center and the Project Operations Branch of the situation.

(2) Project Operations Branch

- (a) Must be kept informed of all pre-emergency situations.
- (b) Responsible for identifying a person-in-charge of the pre-emergency situation. Also, responsible for matters involving normal dam operations and/or any other matters not covered by other District elements.
- (c) Responsible for contacting the Dam Safety Officer for engineering and technical assistance and keeping him informed of the situation. Also, contact the Emergency Operations Center and keep them informed of the situation.
- (d) Evaluate the situation and declare a pre-emergency condition if warranted.
- (e) Provide needed assistance and/or instructions to the Dam Tender and person-in-charge of the pre-emergency situation.

(3) Emergency Operations Center

- (a) Must be kept informed of all pre-emergency situations.
- (b) Twenty-four (24) hour telephone service.
- (c) Responsible for contacting Dam Safety Officer,

Project Operations Branch, District Engineer, Public Affairs Officer, and the NCD Emergency Manager.

- (d) Responsible for matters involving National Security, Disasters, and Mobilization. Provide emergency response in accordance with ER 500-1-1, National Disaster Procedures.
- (e) Evaluate the situation and declare a pre-emergency condition if warranted.

(4) Others

The district personnel listed under this category in are only to be contacted if none of the above District elements could be reached.

- (a) Evaluate the pre-emergency conditions and declare a pre-emergency condition if warranted.
- (b) Notify the Dam Safety Officer, the Emergency Operations Center and the Project Operations Branch as soon as possible.
- (c) If the Project Operations Branch cannot be contacted, appoint a temporary person-in-charge of the pre-emergency situation.
- (d) Provide needed assistance and/or instructions the Dam Tender and person-in-charge of the pre-emergency situation.

B-9. Emergency Actions

The order in which the following emergency actions are to be performed would depend on the type and timing of occurrence of the emergency situation. Priority should always be given to the immediate safety of any endangered human life. For example, in the case of a failure at normal pool, low tailwater, since this situation provides the greatest hazard to life and is the fastest occurring, the Dam Tender would first want to take action to notify and evacuate areas in the vicinity of the dam. Then the Dam Tender would proceed with the other emergency actions and notifications.

a. Dam Tender

- (1) For a Dam Tender declared emergency, the Lockmaster must notify the Mississippi Headwaters Project Office.

If contact with the Mississippi Headwaters Project Office cannot be made, contact the Dam Safety Officer, Project Operations Branch and Emergency Operations Center.

- (2) Cancel normal work schedule and provide for 24-hour duty as needed.
- (3) Assess project areas which are or may become unsafe including but not limited to:
 - (a) Reservoir water surface
 - (b) Day use and recreational areas within project boundaries including those managed by others.
- (4) Identify areas required for conduct of emergency operations and repairs including any necessary access routes.
- (5) Take action to notify and evacuate areas which are unsafe, potentially unsafe, or where emergency operations and repair work may be carried out including, as appropriate:
 - (a) Directing evacuation of affected project areas managed by the Corps.
 - (b) Closing project roads to incoming traffic.
 - (c) Moving equipment to safe areas.
- (6) Request assistance as needed in carrying out items (5)(a) and (5)(b) from agencies listed in Appendix C.
- (7) Assume District responsibilities for notifications if emergency condition was declared by Dam Tender.
- (8) Verify appropriate warnings if announced over local radio and television.

b. Mississippi Headwaters Project Office

Evaluate the situation and declare an emergency condition if warranted.

Notify Dam Safety Officer, Project Operations Branch and Emergency Operations Center.

- (1) Cancel normal work schedule and provide for key staff as needed.
- (2) Assess projects areas which are or may become unsafe including but not limited to:
 - (a) Reservoir water surface.
 - (b) Day use and recreational areas within project boundaries

including those managed by others.

- (3) Identify areas required for conduct of emergency operations and repairs including any necessary access routes.
- (4) Take action to notify and evacuate areas which are unsafe, potentially unsafe or where emergency operations and repair work may be carried out including, as appropriate.
 - (a) Directing evacuation of affected project areas managed by the Corps.
 - (b) Closing project roads to incoming traffic.
 - (c) Moving equipment to safe areas.
- (5) Request assistance as needed in carrying out items (4) (a) and (4) (b) above, from agencies listed in Appendix C.
- (6) Assume District responsibilities for notifications if emergency condition was declared by Dam Tender.
- (7) Verify that appropriate warnings are announced over local radio and television.

c. District

- (1) Dam Safety Officer
 - (a) The Dam Safety Officer is to be kept informed of all conditions of the emergency situation.
 - (b) Responsible for identifying and/or providing the necessary engineering or technical support required to resolve the emergency situation.
 - (c) Evaluate the situation and declare a emergency condition if warranted.
 - (d) Notify the North Central Division Dam Safety Officer if the emergency condition was declared by the Dam Tender or District Office.
 - (e) Notify the Dam Safety Committee, the Emergency Operations Center and the Project Operations Branch of the situation.
- (2) Project Operations Branch
 - (a) Must be kept informed of all emergency situations.
 - (b) Responsible for identifying a person-in-charge of the emergency situation. Also, responsible for matters involving normal Dam Operations and/or any

other matters not covered by other District elements.

- (c) Responsible for contacting the Dam Safety Officer for engineering and technical assistance and keeping him informed of the situation. Also, contact the Emergency Operations Center and keep them informed of the situation.
 - (d) Evaluate the situation and declare an emergency condition if warranted.
 - (e) Provide needed assistance and/or instructions to the Park Manager and person-in-charge of the emergency situation.
 - (f) Cancel normal work schedule and provide for key staff as needed.
 - (g) Determine which of the two planning conditions represents potential inundation and needs for evacuation: (1) flood without failure, (2) flood with failure, (3) normal pool low tailwater dam failure.
 - (h) Determine need for warning of high reservoir levels.
 - (i) Formulate and issue warning message(s) to affected non-federal parties.
 - (j) Verify appropriate warnings as released over local radio and television.
- (3) Others
- (a) The District personnel listed under this category are only to be contacted if none of the above District personnel can be reached.
 - (b) Evaluate the emergency conditions and declare an emergency conditions if warranted. Notify the Dam Safety Officer, the Emergency Operations Center and the Project Operations Branch as soon as possible.
 - (c) If the Project Operations Branch cannot be contacted, appoint a temporary person-in-charge of the emergency situation.
 - (d) Provide needed assistance and/or instructions to the Park Manager and person-in-charge of the emergency situation.

d. North Central Division

Notify the Office of the Chief of Engineers and other Federal agencies as appropriate.

e. Office of the Chief of Engineers

Notify other Federal agencies as appropriate, such as the Federal Emergency Management Agency.

B-10. Example Messages

Preparation of warning messages should begin as soon as their potential need is apparent so that they can be issued promptly upon declaration of an emergency condition. When time is available, all public notices should be released by the Public Affairs Office. Contact Emergency Management or the Hastings Electronic Service Center if the Public Affairs Office cannot be reached. In some cases, an emergency condition may be declared with little or no advance notice. The following example messages provide a model for the first announcements in such cases. The Public Affairs Office would then be contacted as soon as time permits. They would release subsequent announcements to provide additional details.

a. Announcement for Slowly Developing Conditions

THE ARMY CORPS OF ENGINEERS AT ST. PAUL ANNOUNCED AT (time) TODAY THAT AN EMERGENCY CONDITION EXISTS AT (name of dam) DAM DUE TO (general description of problem). THE DAM IS LOCATED ON (stream) ABOUT (distance) MILES UPSTREAM OF (name of downstream community and state).

A CORPS SPOKESMAN SAID THAT THE WATER LEVEL OF (name of reservoir) WAS BEING LOWERED (as a precautionary measure/to reduce pressure on the dam/to enable repair work).

THE SPOKESMAN EMPHASIZED THAT THE DRAWDOWN OF THE POOL WAS BEING CARRIED OUT UNDER CONTROLLED CONDITIONS AND THERE IS NO IMMEDIATE DANGER OF THE DAM FAILING. HOWEVER, THE LARGE RELEASES OF WATER THAT ARE BEING MADE MAY CAUSE FLOODING ALONG (stream). SHOULD (evacuate/be alert for high water and prepare to evacuate).

ADDITIONAL INFORMATION WILL BE RELEASED AS PROMPTLY AS POSSIBLE.

b. Announcement for Rapidly Developing Conditions

URGENT: THE ARMY CORPS OF ENGINEERS HAS ANNOUNCED THAT (name of

Dam) DAM IS IN IMMINENT DANGER OF FAILURE. THE DAM IS LOCATED ABOUT (distance) MILES UPSTREAM OF (Name of downstream community and state).

ATTEMPTS TO SAVE THE DAM ARE UNDERWAY BUT THEIR SUCCESS CANNOT BE DETERMINED YET. RESIDENTS ALONG THE (stream) SHOULD EVACUATE TO HIGH GROUND IMMEDIATELY. RESIDENTS ALONG THE (stream) IN THE VICINITY OF (city) AND DOWNSTREAM SHOULD REMAIN ALERT FOR FURTHER INFORMATION.

IF THE DAM FAILS, WATER WILL TAKE APPROXIMATELY (time) HOURS TO REACH THE LOWER END OF (city, stream, etc.). AREAS CLOSER TO DAM WILL BE FLOODED SOONER.

ADDITIONAL INFORMATION WILL BE RELEASED AS PROMPTLY AS POSSIBLE.

c. Announcement for High Reservoir Levels

THE ARMY CORPS OF ENGINEERS AT ST. PAUL ANNOUNCED AT (time) TODAY THAT AN EMERGENCY CONDITION EXISTS AROUND (name of reservoir) DUE TO EXPECTED HIGH WATER LEVELS. THE LAKE IS LOCATED ON (stream) ABOUT (distance) MILES UPSTREAM OF (community and state).

THE CORPS SPOKESMAN SAID THAT THE WATER LEVEL IN THE LAKE WAS EXPECTED TO REACH ELEVATION (elev) AT (time). DUE TO (general description of problem). THIS WATER LEVEL WILL (describe major effects).

LARGE RELEASES OF WATER ARE BEING MADE FROM THE DAM IN AN ATTEMPT TO CONTROL THE LAKE LEVEL. RESIDENTS OF LOW LYING AREAS ALONG (stream) SHOULD BE ALERT TO POSSIBLE FLOODING AND PREPARE TO EVACUATE.

FURTHER INFORMATION WILL BE RELEASED AS PROMPTLY AS POSSIBLE.

RATING CURVES AND NOTIFICATION CHART

APPENDIX C

TO

EMERGENCY PLAN

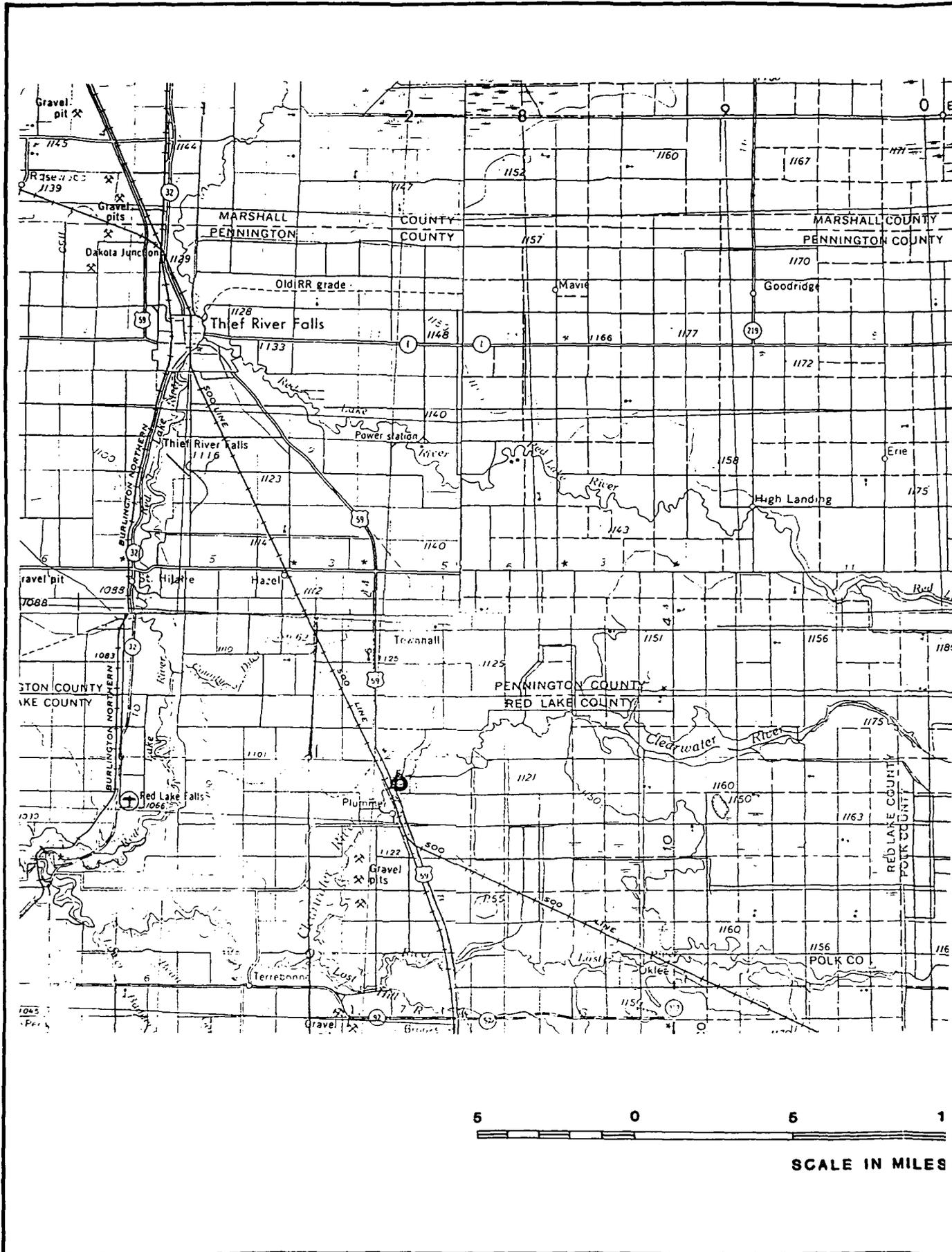
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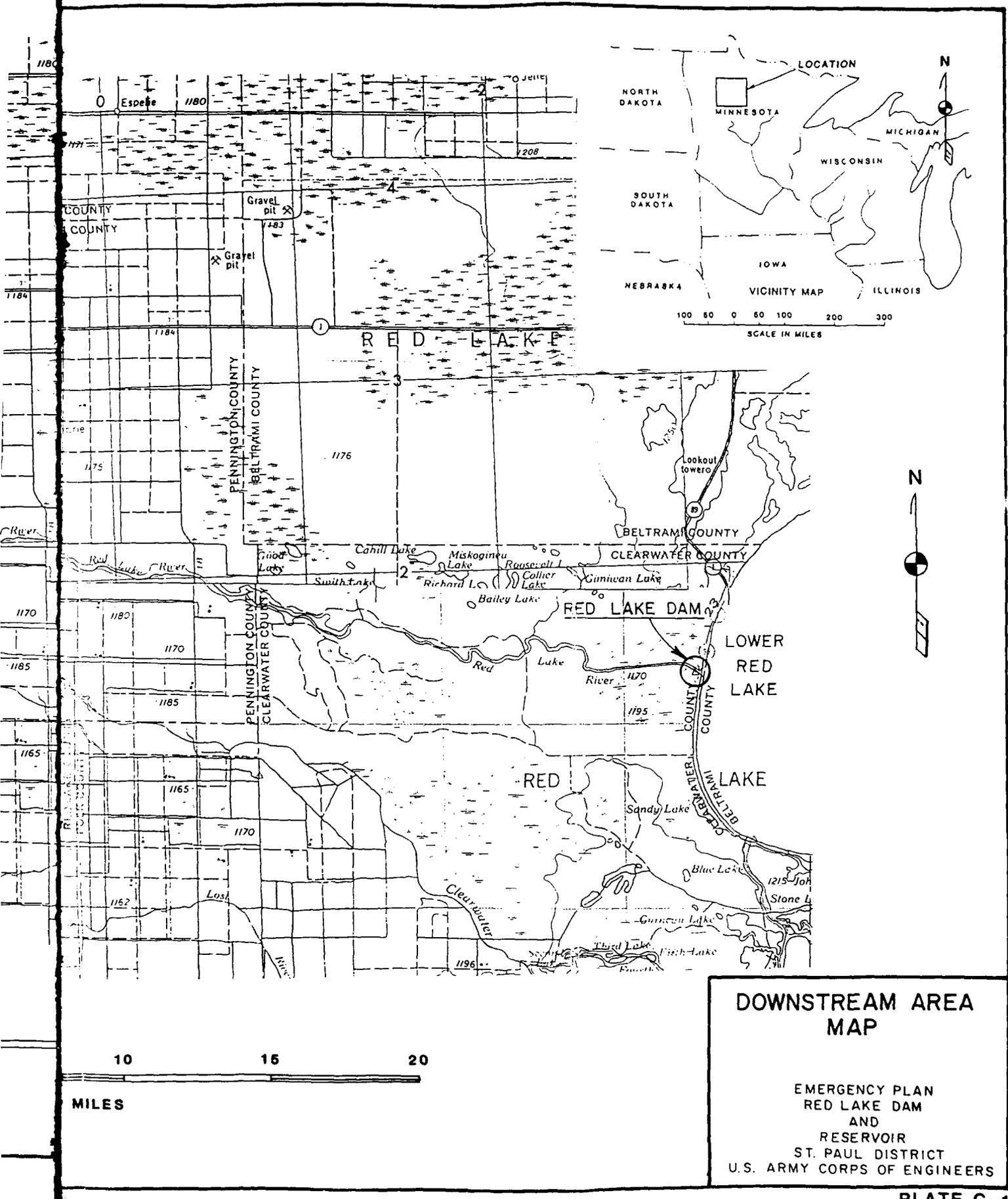
RED LAKE DAM AND RESERVOIR

MAY 1987

LIST OF PLATES

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- Plate C-2 - Rating Curves, 1-16 Foot Gate Bay, Submerged Flow
- Plate C-3 - Rating Curves, 1-16 Foot Gate Bay, Gate Out of Water
- Plate C-4 - Rating Curves, 1-Stop Log Bay, Sharp Crested Weir
- Plate C-5 - Rating Curves, 1-Stop Log Bay, Submerged Flow
- Plate C-6 - Notification for Dam Problems





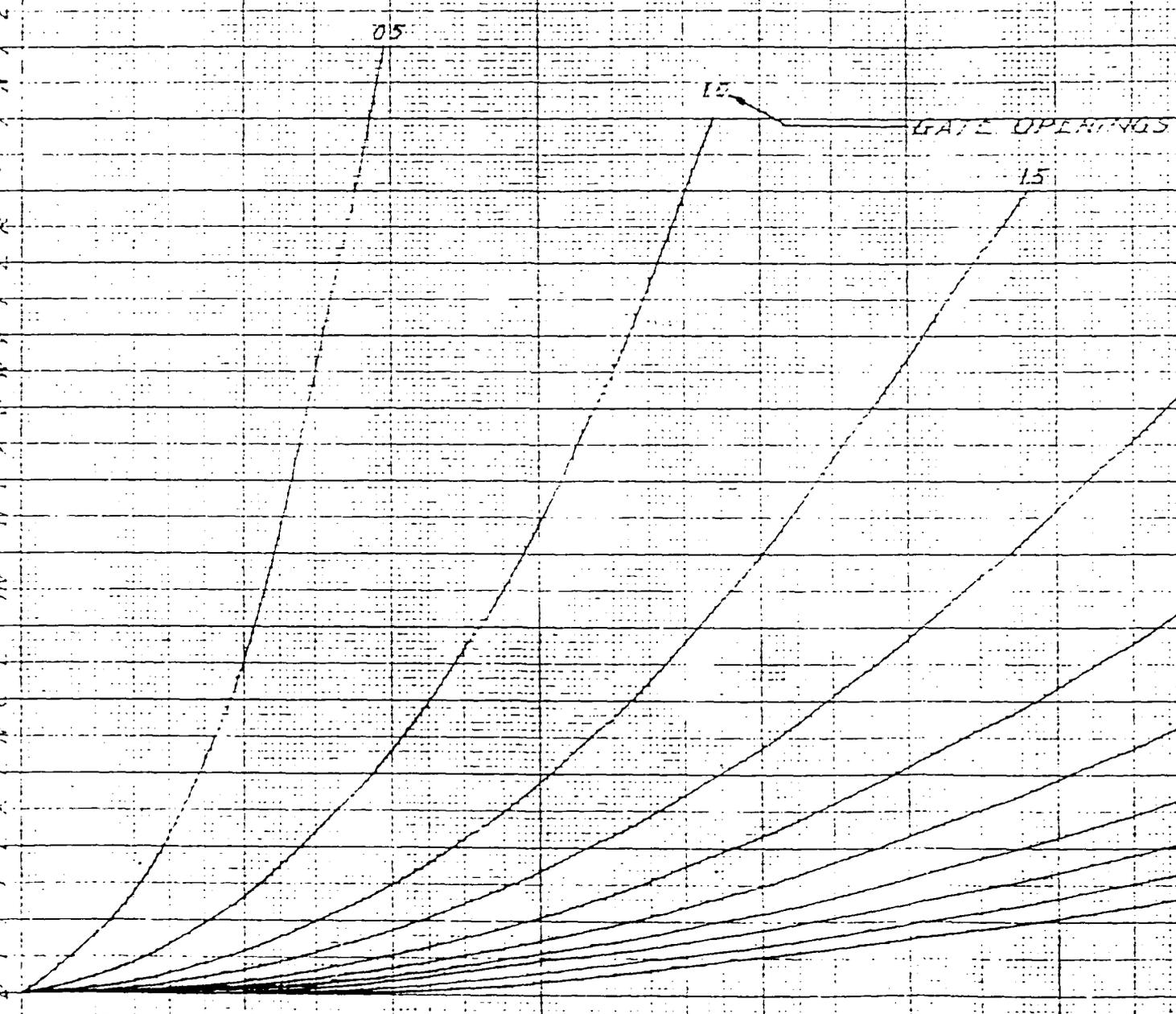
**DOWNSTREAM AREA
MAP**

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

D I S E H A R G E I N S E C O

WATER

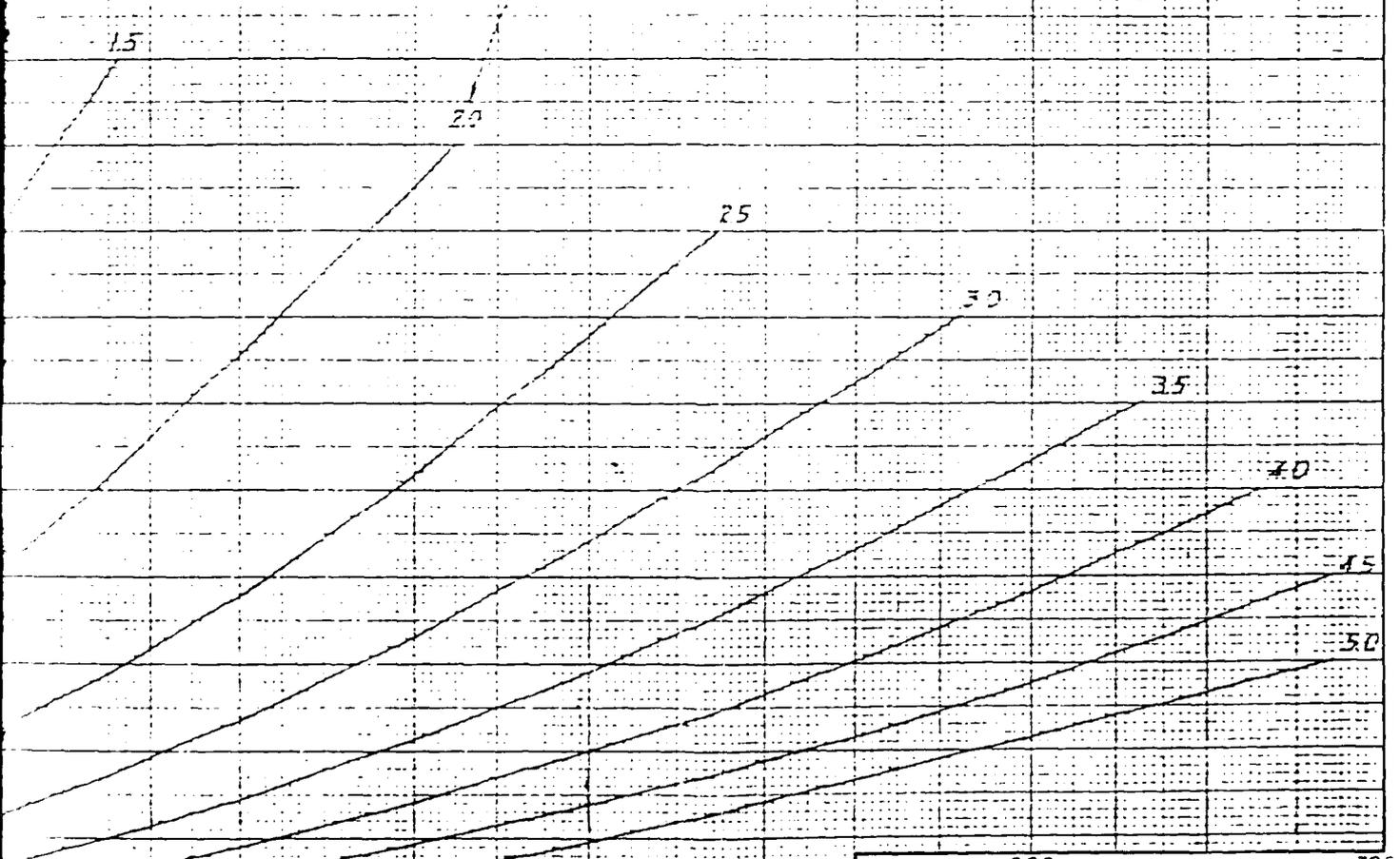
0 50 100 200 300
D I S C H A R G E I N S E C O N



S E C O N D - F E E T

Note:
Discharge based on the formula
 $Q = C_o \sqrt{2g}$

FELT GATE OPERATIONS IN FELT

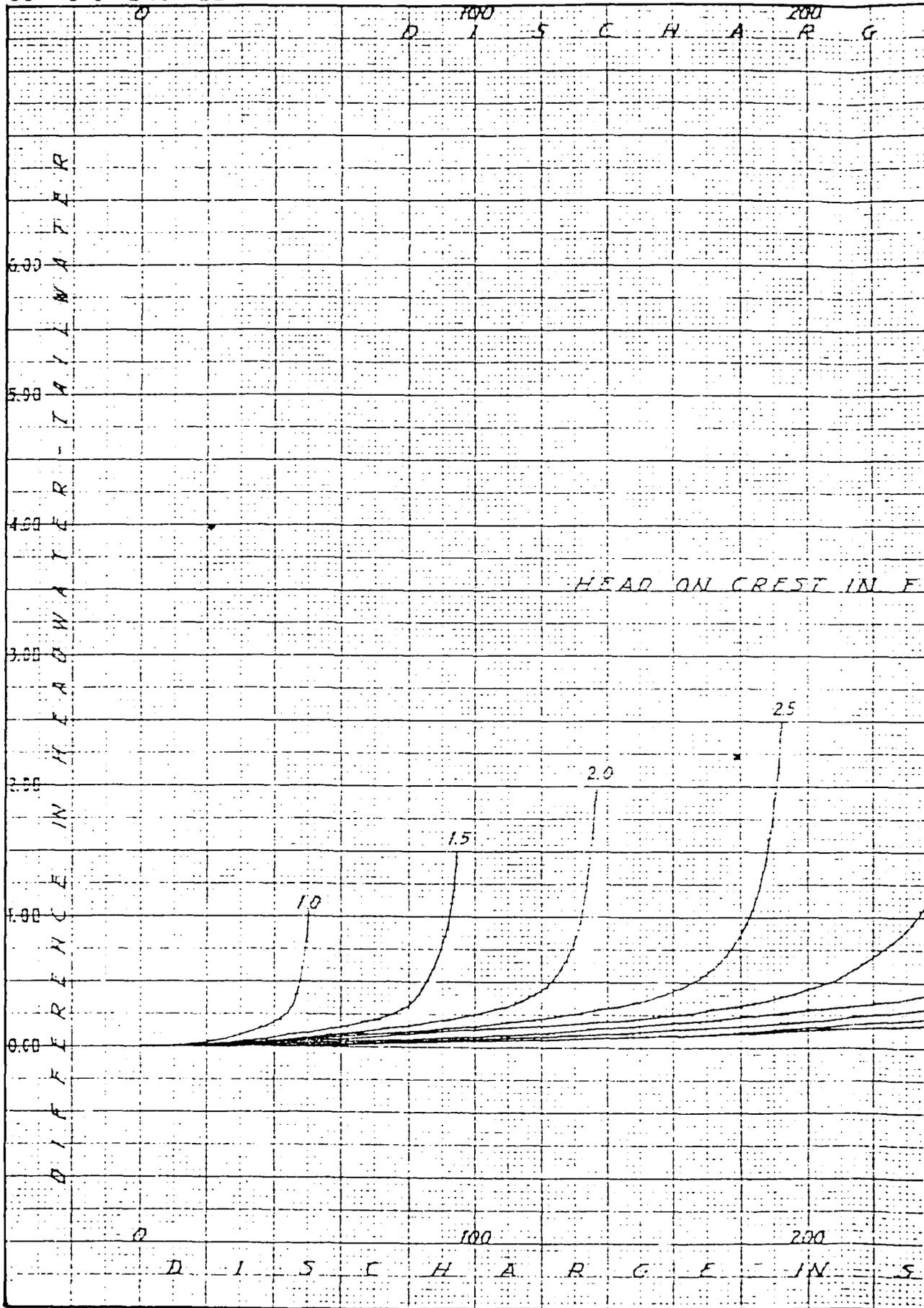


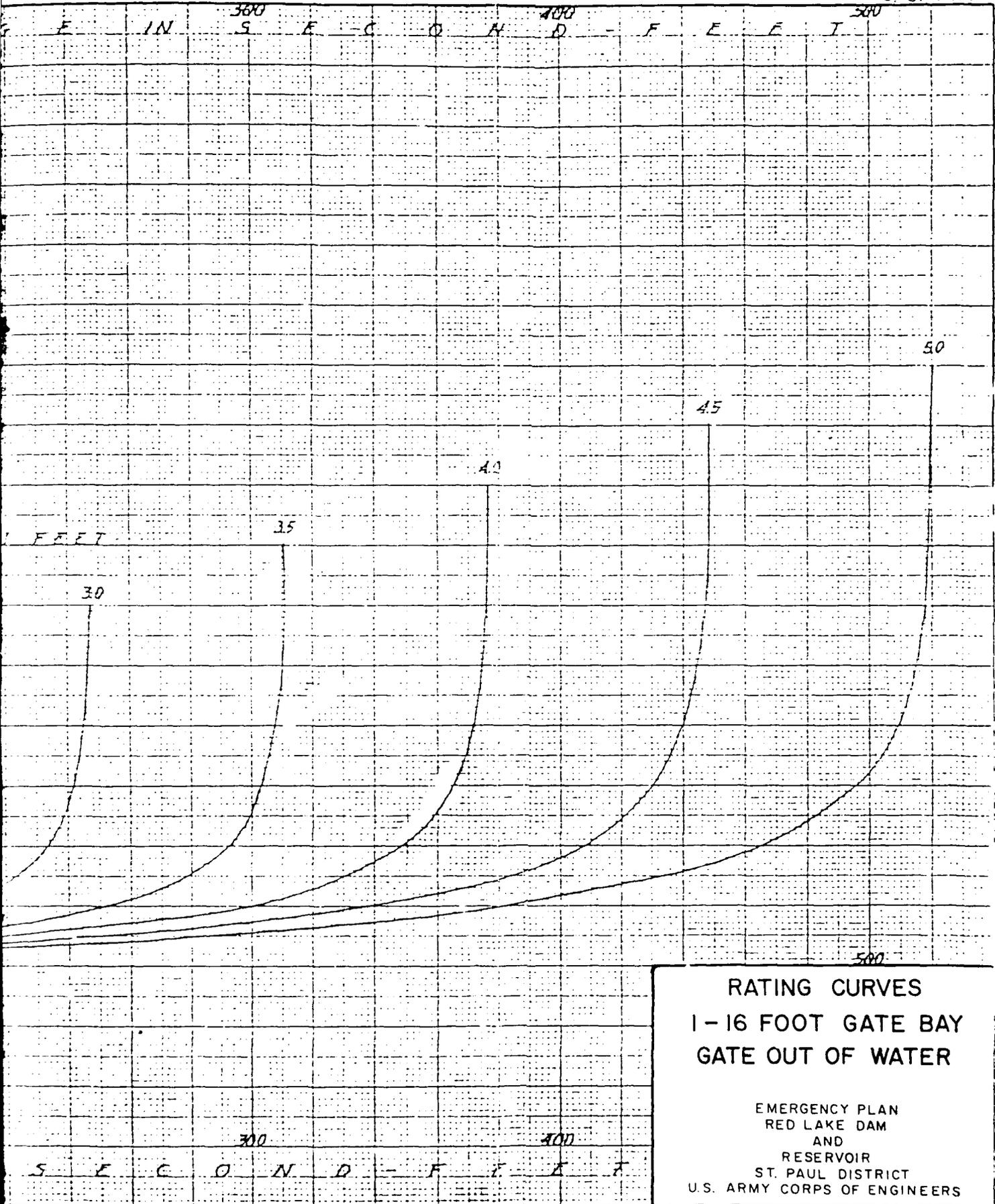
**RATING CURVES
1-16 FOOT GATE BAY
SUBMERGED FLOW**

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U. S. ARMY CORPS OF ENGINEERS

S E C O N D - F E E T

CORPS OF ENGINEERS

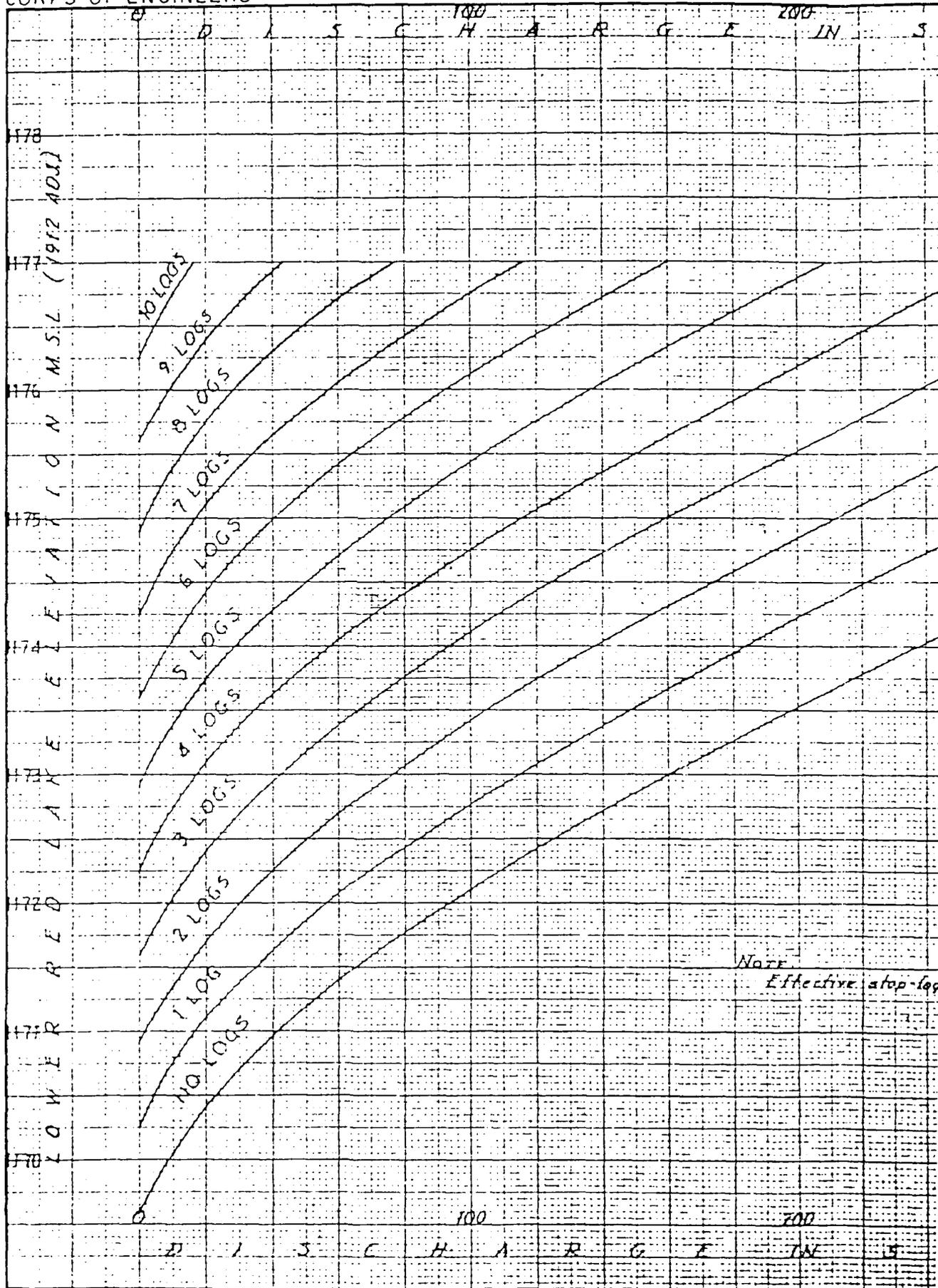




**RATING CURVES
1-16 FOOT GATE BAY
GATE OUT OF WATER**

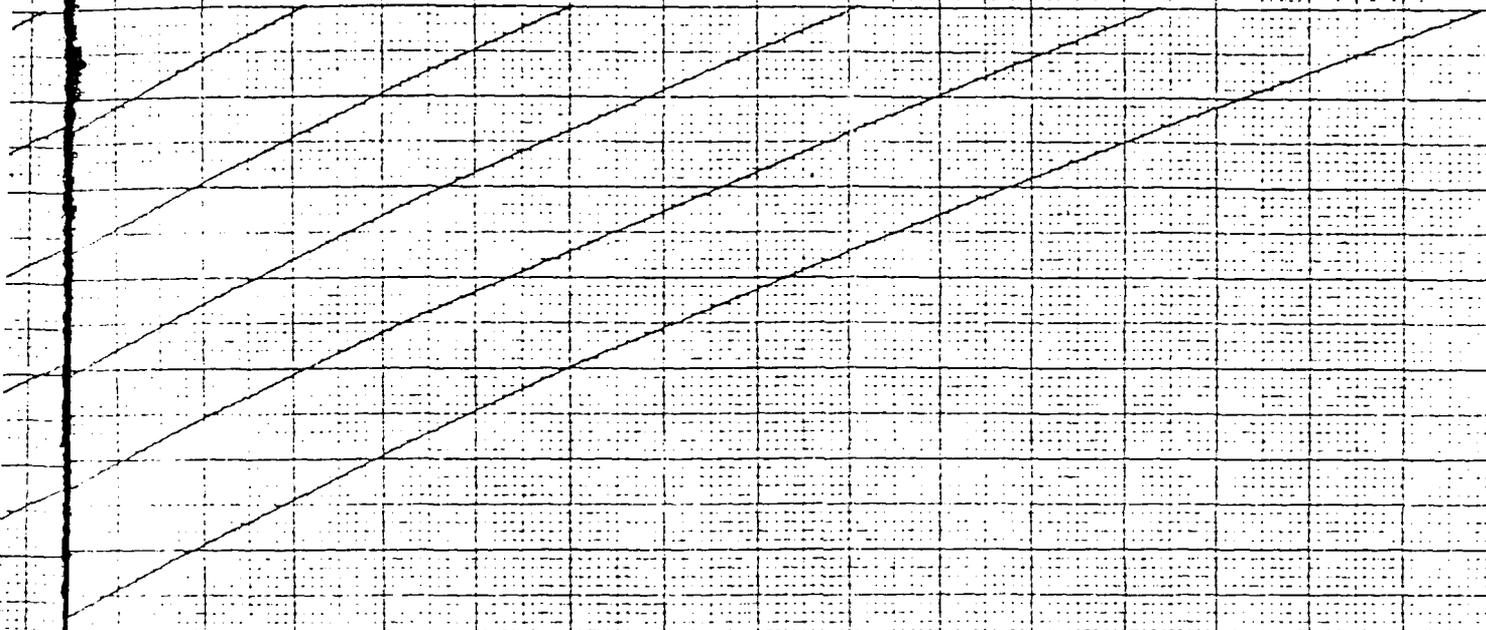
EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CORPS OF ENGINEERS



E V S E C 300 N D - F E T 400

500



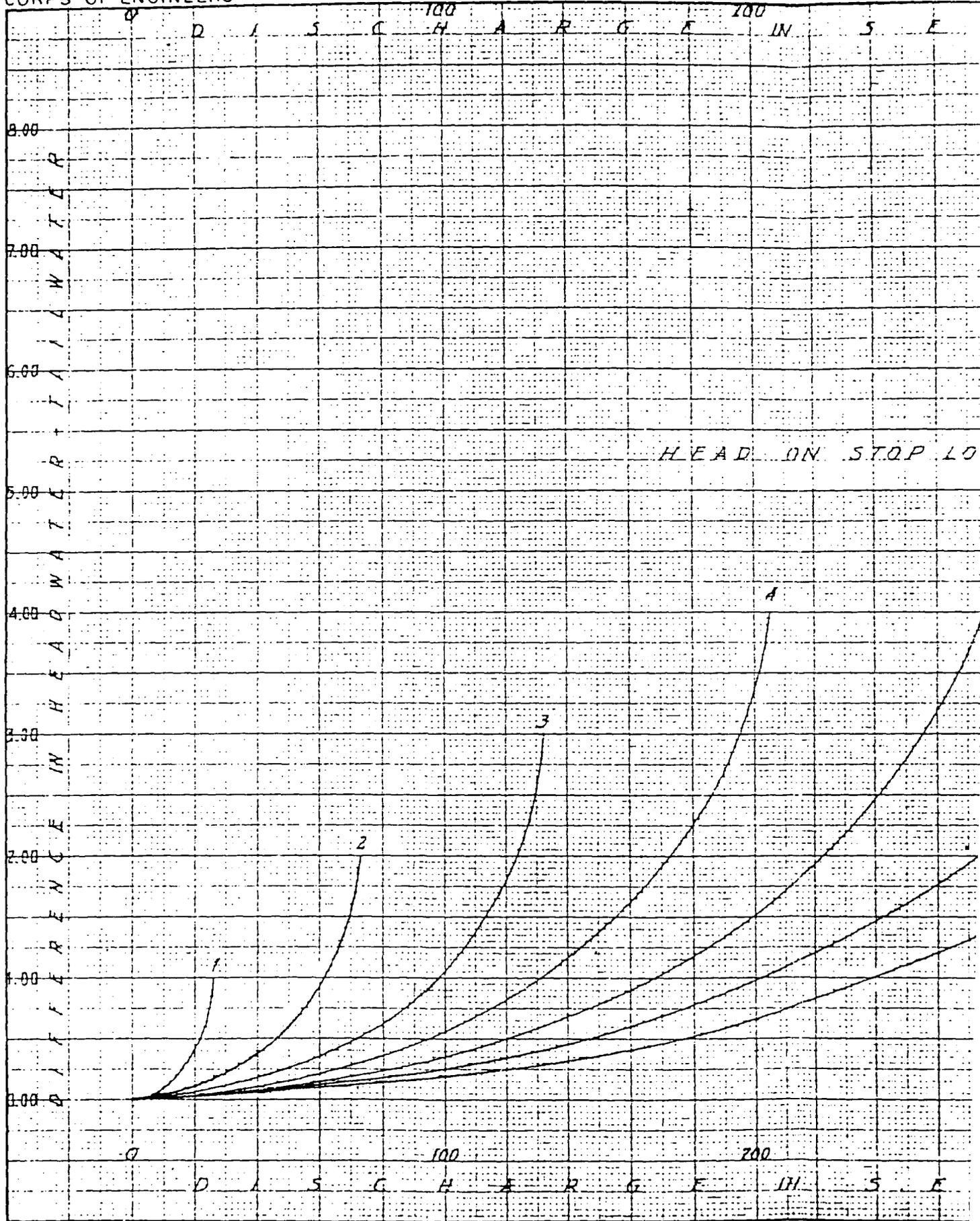
Five stop-log size 7-8" X 8" X 8"

500

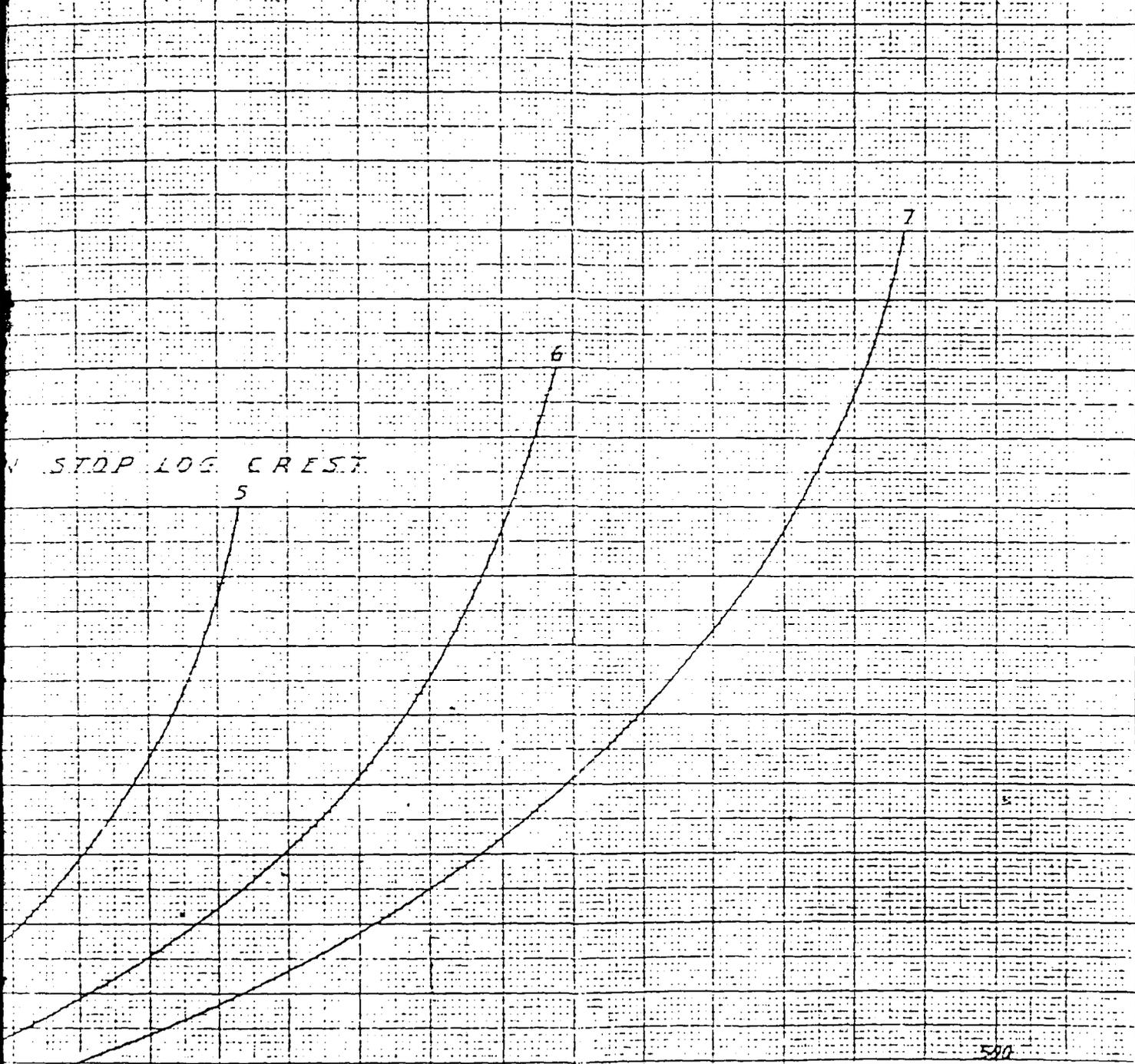
**RATING CURVES
I-STOP LOG BAY
SHARP CRESTED WEIR**

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U. S. ARMY CORPS OF ENGINEERS

300 400 E V S E C N D - F E T



S E C O N D - F E E T 300 400 500



**RATING CURVES
1- STOP LOG BAY
SUBMERGED FLOW**

EMERGENCY PLAN
RED LAKE DAM
AND
RESERVOIR
ST. PAUL DISTRICT
U. S. ARMY CORPS OF ENGINEERS

NOTIFICATION FOR DAM PROBLEMS



US Army Corps
of Engineers
St. Paul District

PROJECT RED LAKE DAM



US Army Corps
of Engineers
St. Paul District

OBSERVER
<ol style="list-style-type: none">1. Observe potential dam problem.2. Gather pertinent facts to describe situation.3. Assess whether slowly developing, rapidly developing, or imminent failure.4. Notify first available Dam Supervisor in order shown. <p>(If contact cannot be made with supervisors listed below, contact Area Project Office. If contact cannot be made, contact the Dam Safety Officer, Project Operations Branch, or Emergency Operations Center, as shown on attached list.)</p>

* Dam Supervisor (218)246-8107 Radio SSB WUD 631 (Winnibigoshish Dam Supervisors)						
<p style="text-align: center;"><u>Home Phone</u></p> <table><tbody><tr><td>Irving L. Seelye</td><td>(218)246-8107</td></tr><tr><td>Gregg Struss</td><td>(218)327-1060</td></tr><tr><td>Dennis Dickson</td><td>(218)566-2952</td></tr></tbody></table> <ol style="list-style-type: none">1. Assess observer's report.2. Take necessary emergency actions.3. Notify Area Project Office. (If contact cannot be made, contact Dam Safety Officer, Project Operations Branch, or Emergency Operations center, shown on attached list.)	Irving L. Seelye	(218)246-8107	Gregg Struss	(218)327-1060	Dennis Dickson	(218)566-2952
Irving L. Seelye	(218)246-8107					
Gregg Struss	(218)327-1060					
Dennis Dickson	(218)566-2952					

Area Project Office (218)566-2306 Radio SSB WUD 639		
<p style="text-align: center;"><u>Home Phone</u></p> <table><tbody><tr><td>James Ruyak</td><td>(218)566-1294</td></tr></tbody></table> <ol style="list-style-type: none">1. Assess the situation2. Take necessary emergency actions.3. Notify Dam Safety Officer, Project Operations Branch, or Emergency Operations Center.	James Ruyak	(218)566-1294
James Ruyak	(218)566-1294	

DAM SAFETY OFFICE

	OFFICE	HOME
Robert Post (1)	(612)220-0303	(612)437-1316
William Goetz	(612)220-0310	(612)454-3722
Stan Kulmpula	(612)220-0304	(612)484-8957

PROJECT OPERATIONS BRANCH

	OFFICE	HOME
Thomas Oksness	(612)220-0322	(612)439-0272
Dennis Erickson	(612)220-0325	(612)452-6850
Dennis Cin	(612)220-0320	(612)455-6786

EMERGENCY OPERATIONS CENTER

	OFFICE	HOME
District EOC	(612)220-0220	(24-hr. number)
David Christenson	(612)220-0204	(612)690-5749

DISTRICT ENGINEER

COL Joseph Briggs
Office (612)220-0300
Home (612)894-7142

PUBLIC AFFAIRS

Kennon Gardner
Office (612)220-0201
Home (612)884-9023

DAM SAFETY COMMITTEE

	OFFICE	HOME
William Goetz	(612)220-0310	(612)454-3722
Stan Kumpula	(612)220-0304	(612)484-8957
Helmer Johnson	(612)220-0600	(612)633-7791
Robert Engelsted	(612)220-0610	(612)459-6343
Robert Fletcher	(612)220-0510	(612)484-4998
Dennis Cin	(612)220-0320	(612)455-6786
David Christenson	(612)220-0204	(612)690-5749
Dale Mazar	(612)220-0444	(612)631-1940

NCD EMERGENCY MANAGER

Natural Disaster Planner
Bernard Bochantin
Office (312)353-5275
Home (815)568-7544
Chief Emergency Management
Tim Monteen
Office (312)886-8451
Home (312)961-2195

NCD DAM SAFETY COMMITTEE

	OFFICE	HOME
Zane Goodwin(2)	(312)353-6311	(312)823-4606
Carl Cable	(312)353-6372	(312)983-6375
Don Leonard	(312)353-6355	(312)359-3372
Lee Hoglind	(312)353-6358	(312)579-0148

OCE DAM SAFETY COMMITTEE

	OFFICE	HOME
Lloyd Duscha (3)	(202)272-0382	(703)860-1319
William McCormick	(202)272-0397	(703)569-4323
John McCormick	(202)272-0215	(703)659-2650
Edward Pritchett(4)	(202)272-0207	(301)865-5876
Robert Smith(4)	(202)272-0220	(703)569-3128
Earl Eiker(4)	(202)272-8500	(301)465-2120
John Elmore(4)	(202)272-0196	(703)339-8279

DISTRICT RADIO

Contact Hastings Message
Center at (612)437-2210
(call letters - WUD6)
SSB Primary - 5400Khz
1st Alternate - 6020Khz
For additional radio information
see Appendix CNCS 500-1-1
Emergency - 5015KhzLSB

- (1) NCS Dam Safety Officer
(2) NCD Dam Safety Officer
(3) OCE Dam Safety Officer
(4) Member HQUSACE Dam Safety Committee

CITIES

Thief River Falls, MN Police Department (218)681-6161 (24 Hours)
Crookston, MN Police Department (218)281-3111

COUNTIES

Beltrami County, Minnesota

	Office	Residence
Sheriff	(218)751-9111 (24 Hours)	
Civil Defense	(218)751-4845	(218)751-6923

Clearwater County, Minnesota

Sheriff	(218)694-6226 (24 Hours)	
Civil Defense	(218)694-6226/6323	(218)694-2636

Pennington County, Minnesota

Sheriff	(612)681-6161 (24 Hours)	
Civil Defense	(612)681-6161	

STATE AGENCIES

Statewide Emergency Number 1-800-422-0798
Metro Area 649-5451 Backup Only (612)296-2100

FEDERAL AGENCIES

National Weather Service	(612) 725-3401
Fish and Wildlife Service District Office	(507)452-4232

GLOSSARY

GLOSSARY

- Pre-emergency Condition - An identified impending or existing threat to the safe operation of the dam or reservoir in which no significant hazard to life or property is expected to occur.
- Emergency Condition - An occurrence of a significant hazard to life and/or property is possible or certain to occur.
- District - The U.S. Army Corps of Engineers, North Central Division, St. Paul District.
- Dam Safety Officer - The individual responsible for identifying and/or providing the necessary engineering or technical support required for the Pre-Emergency or Emergency situation.
- Engineering Division - A division of the Corps responsible for all engineering matters.
- Construction & Operations Division - A division of the Corps responsible for construction, inspection, maintenance and normal operations of the dam.
- Planning Division - A division of the Corps responsible for management support and matters involving environmental analysis and cultural resources.
- Emergency Operations Branch - A branch of the Engineering Division responsible for matters involving national Operations security, disasters and Branch mobilization.
- Design Branch - A branch of the Engineering Division responsible for matters involving the structural integrity of the removable dam and outlet structures.
- Geotechnical Hydraulics & Hydrology Branch - A branch of the Engineering Division responsible for matters involving integrity of earth dams.
- Project Management Branch - A branch of the Engineering Division responsible for management support.
- Water Control Center - Part of Hydrology Section in Geotechnical, Hydraulics and Hydrologic Engineering Branch. Responsible for matters involving reservoir regulation.
- Project Operations Branch - A branch of the Construction and Operations Division responsible for matters involving dam operations and/or other matters not covered by the District elements.

- River Mile - The distance along the channel of the Red Lake River measured from its confluence with the Red River of the North.
- Distance from Dam - The distance along the channel upstream or downstream from the dam.
- Peak Elevation - The computed maximum water surface elevation which would be reached at a location due to assumed conditions. Datum is mean sea level (NGVD).
- Cross Section - Point at which the shape of a stream channel or valley is measured, usually in a direction perpendicular to the direction of flow.
- NGVD - National Geodetic Vertical Datum (distance above mean sea level).