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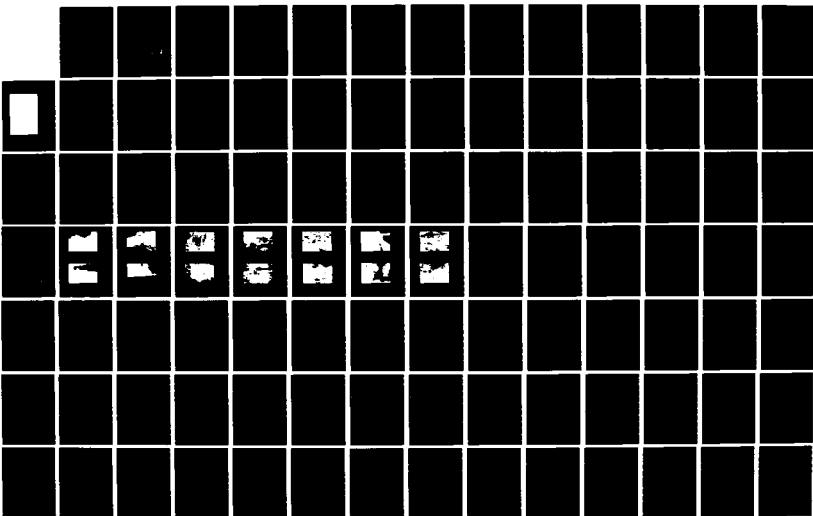
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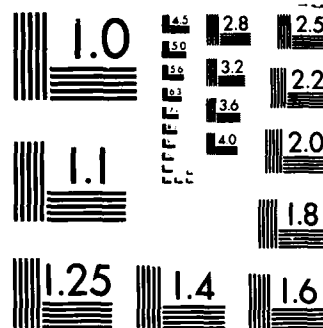
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**RICHELIEU RIVER BASIN
FAIRFAX**

AD-A157 514

**ST. ALBANS RESERVOIR DAM (SOUTH)
VT 00057**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



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JUL 19 1985**
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**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154**

SEPTEMBER 1978

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9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Richelieu River Basin Fairfax VT.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam is an earth fill dam about 1950 ft. long and 26 ft. high. It is small in size with a significant hazard potential. The $\frac{1}{2}$ PMF will overtop the dam by 1.1 ft. The dam is judged to be in fair condition. There were various significant conditions observed. There are recommendations which should be undertaken by the owner.		

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF

NEDED

MAY 14 1979

Honorable Richard A. Snelling
Governor of the State of Vermont
State Capitol
Montpelier, Vermont 05602

Dear Governor Snelling:

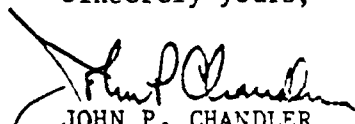
I am forwarding to you a copy of the St. Albans Reservoir Dam (South) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Water Resources, the cooperating agency for the State of Vermont. In addition, a copy of the report has also been furnished the owner, City of St. Albans, Department of Public Works, City Hall, St. Albans, Vermont 05478, ATTN: Mr. William Scott, Director.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Water Resources for your cooperation in carrying out this program.

Sincerely yours,


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

ST. ALBANS RESERVOIR DAM (SOUTH)

VT00057

FAIRFAX, VERMONT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.: VT00057
Name of Dam: St. Albans Reservoir Dam (South)
Town: Fairfax
County and State: Franklin County, Vermont
Stream: Unknown
Date of Inspection: August 3, 1978

BRIEF ASSESSMENT

The St. Albans Reservoir Dam (South) is an earth fill dam, approximately 1950 feet long with a maximum height of about 26 feet. The impoundment serves as a drinking water supply for the City of St. Albans. Appurtenant to the dam is an intake and gate house, and a concrete spillway channel. Located immediately below the dam is a pumping station to pump water to the North Reservoir.

The dam is classified as "small". The impoundment is estimated to have a normal storage volume of 322 acre-feet and a surface area of 26 acres. The drainage area for the impoundment includes the drainage area for St. Albans Reservoir and is approximately 2.28 square miles.

The hazard classification is judged to be "significant" due to the location of the water pumping station and a highway bridge immediately below the dam. Based on the size and hazard classification in accordance with "Recommended Guidelines for Safety Inspection of Dams, Department of the Army, November 1976" the test flood is the 1/2 Probable Maximum Flood (PMF). The 1/2 PMF will overtop the dam by 1.1 feet.

The dam is judged to be in fair condition.

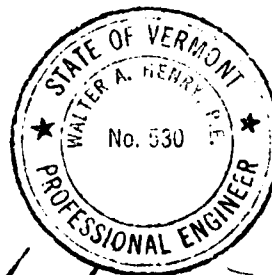
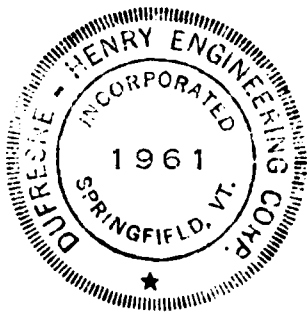
The following significant conditions were observed:

1. The concrete spillway has seriously deteriorated and is judged to be in poor condition.
2. The dam is overgrown with brush and some large trees.
3. There is evidence of erosion along the downstream slope at the right of the training wall.
4. There is evidence of wave cutting action on the upstream slope of the dam between the top of riprap and the dam crest.

5. The crest of the dam is uneven and has the potential of being overtopped by as much as 1.1 feet during the test flood of 1/2 PMF.

A detailed assessment and recommendations for remedial measures are contained in Section 7. In summary, it is recommended that the following investigations and designs be prepared by a qualified engineer and that a contractor be hired to make the necessary repairs within two years of the receipt of this report:

1. Inspect the downstream slope and toe of the dam when the reservoir is full to identify possible seeps or wet areas.
2. Provide design recommendations for the rehabilitation of the spillway structure.
3. Perform detailed hydraulic and hydrological studies to determine the significance of capacity of the spillway.
4. Place riprap along the top portion of the upstream slope.
5. Develop a maintenance program including removal of brush and trees from the dam, and routine periodic inspections.

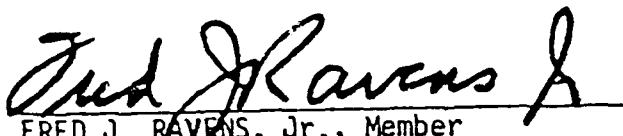


Walter A. Henry

This Phase I Inspection Report on St. Albans Reservoir Dam (South) has been reviewed by the undersigned Review Board members. In our opinion; the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.



CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

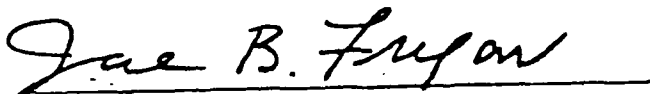


FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division



SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

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

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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APPENDIX A

Visual Inspection Check List

APPENDIX B

Project Records and Plans

APPENDIX C

Photographs

APPENDIX D

Hydraulic Computations

APPENDIX E

Inventory Forms

SECTION 6 - STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

The visual observations did not disclose any obvious stability problems. However, the reservoir level at the time of the inspection was below the elevation of the downstream toe, except in the vicinity of the gatehouse, and therefore seepage related stability problems which may be present at full reservoir conditions could not be evaluated. Potential stability related problems that were observed are presented below:

1. The presence of large trees growing and existence of large stumps on the embankment will or may have already resulted in rotting roots which could provide possible paths for internal erosion.
2. The upstream slope from the top of the riprap to the dam crest, about 2 to 4 feet in height, is eroded to a near vertical slope at many locations probably as a result of wave action.
3. The location where small channels were observed at the toe of the upstream riprap could be a source of seepage when the reservoir is full.
4. The poor condition of the spillway channel and training walls can result in erosion of the dam if a large water flow causes removal of pavement sections and collapse of the training walls.

b. Construction and Design Data

There are no design or construction data available to formally evaluate the stability of this dam.

c. Operating Records

The available operating records do not contain evidence of instability of the dam.

SECTION 5: HYDRAULIC AND HYDROLOGIC EVALUATION

5.1 Evaluation of Features

a. Design Data

No design data for the dam or spillway was available.

b. Experience Data

There are no records of high flow conditions at the site.

c. Visual Observations

The dam crest is irregular. If overtopping were to occur, the low spots would be subjected to greater flow velocities and would increase the possibility of eroding a channel in the dam face.

d. Overtopping Potential

Preliminary computations of the overtopping potential indicate that during the test flood (1/2 PMF), the spillway would not be capable of passing the discharge. The dam will overtop when the water surface elevation is greater than 722 feet MSL. The test flood water surface elevation is 723.1 feet MSL, resulting in a maximum surcharge of 1.1 feet over the dam. The average surcharge for the test flood is 0.7 feet with approximately 845 feet of the dam being overtopped. Discharge for the test flood is 3060 cfs (1340 csm).

e. Dam-Break Flood

Analysis of the flood wave that would be generated by a dam burst was based on engineering judgment. Assuming a flood wave of two-thirds the height of the dam, a 17-foot high wave would be produced. Failure of the dam could result in the destruction of the pumping station directly downstream of the dam face. Bridge 17 on Town Highway No. 10, approximately 2000 feet below the dam would probably be washed out. Damage to homes would be insignificant as they are located above the potential wave height.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The South Reservoir is used to augment the water in the North Reservoir. During dry periods water is pumped from the South Reservoir into the North Reservoir. In addition, if the South Reservoir gets low, it is possible to divert water from nearby Silver Lake into the South Reservoir.

4.2 Maintenance of Dam

The only maintenance of the dam consists of mowing a roadway on the crest of the dam from Route 104 to the pumping station.

4.3 Maintenance of Operating Facilities

There is no maintenance of the operating facilities.

4.4 Description of Warning System in Effect

None exists for this dam.

4.5 Evaluation

The maintenance presently being performed is insufficient to insure the safety of the dam. Recommendations for a maintenance program are outlined in Section 7.

Additional appurtenant structures which appeared to be abandoned included a valve chamber at the downstream toe of the dam, and several valves inside manholes.

d. Reservoir Area

The reservoir area is 26 acres at normal pool level (elevation 717 feet MSL). The surface area was assumed to increase at a rate of 2.7 acres per foot of water surface elevation increase.

e. Downstream Channel

The downstream channel was in generally poor condition on the day of the inspection. The channel had accumulated a large amount of tree debris and was overgrown with brush.

3.2 Evaluation

Based on visual inspection, the dam is in fair condition. Potential future problems are the lack of riprap and erosion near the crest of the dam, the trees and shrubs growing on the dam, and the condition of the spillway channel and training walls, the trees and shrubs that overhang the channel, and the seepage potential which could not be assessed at the time of the inspection because the reservoir was empty.

The downstream slope is generally overgrown with shrubs and trees. Trees and tree stumps up to 18 inches in diameter exist along the toe of the slope. No erosion of the slope was observed except as noted below; however, numerous crater-like depressions several feet in diameter and a few feet in depth were observed at or near the toe of the slope. These craters may have been as a result of stumps removed and the area not backfilled.

A stone masonry manhole at the toe of the slope was located about 1150 feet south of the entrance gate. The manhole has dimensions of about 6 feet wide by 12 feet long and 6 feet deep. A corrugated steel pipe about 8 inches in diameter discharges into the manhole. Because the manhole was in very poor repair, it was not possible to determine if the manhole was part of a toe drainage system.

Except at the gatehouse, the reservoir level during inspection was below the elevation of the downstream toe. Thus detection of reservoir related seeps was not possible. Small holes, up to 2 inches in diameter, which may have been the result of seepage and/or animals, were observed along the toe.

c. Appurtenant Structures

The gatehouse structure has numerous cracks in the concrete. The gate chamber was not observed as the entrance was blocked up. The outlet channel was the natural bed of the stream.

The spillway is located at the south end of the dam about 50 feet from the left abutment. The right and left training walls are constructed of stone masonry and are in poor condition and show evidence of repair in the past. The collapse of some stones at the downstream end of the right wall has produced some erosion of the adjacent downstream slope of the dam. The spillway channel is lined with concrete for 95 feet. The concrete is in very poor condition with two holes several feet in diameter and eroded down to the bedrock foundation. Below the concrete zone, the spillway channel is in bedrock. Numerous trees greater than 6 inches in diameter have fallen into and obstructed the channel. In addition, trees up to 18 inches in diameter overhang the channel and could possibly obstruct the spillway flow should they fall into the channel.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

The dam was judged to be in fair condition. The concrete spillway has seriously deteriorated. The dam is overgrown with brush. There is some evidence of erosion on the downstream slope and erosion on the upstream slope.

b. Dam

Sketches of the dam including a profile and cross sections are contained in Appendix B. The crest of the dam is uneven with elevations ranging from 722' to 725'.

During inspection, the reservoir level had been drawn down such that practically the entire upstream slope was exposed. The upper 2 to 4 feet of the upstream slope are covered by grass and shrubs and show significant bank erosion, as evident by a near vertical slope. Burrowing animal holes near the top of the slope were also observed. The rest of the slope down the toe is covered with riprap consisting of stone, ranging in size from a few inches to about 2 feet but generally from one to two feet. The riprap appears, in general, in good condition.

Channels were observed at the toe of the upstream slope about 1090 feet from the steel gate. The channels were dry, and it was not possible to determine whether they were caused by animals or by water flow.

The reservoir bottom from the gatehouse to the north end of the embankment was wet, and in some places flowing water was observed draining from the embankment. At one location the water was rusty in color.

The crest contains a grass-covered access way, about 8 feet wide, to the gatehouse. Shrubs and trees, several inches in diameter, exist on both the upstream and downstream edge of the crest. The crest of the dam from the gatehouse south to the emergency spillway does not have a regularly maintained access way, and as a result, numerous trees several feet high have overgrown this area.

SECTION 2: ENGINEERING DATA

2.1 Design

There is no design information available for this dam.

2.2 Construction

There is no information on the construction other than the date of construction - 1873.

2.3 Operation

In general, there is no operation involved with the dam.

2.4 Evaluation

a. Availability

The design and construction records for this dam are not available.

b. Adequacy

The lack of in-depth engineering data does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, cannot be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history and sound hydrologic and hydraulic engineering judgment.

c. Validity

Not applicable.

(6) Zoning

None known

(7) Impervious Core

None known

(8) Cutoff

None known

(9) Grout Curtain

None known

i. Spillway

The spillway is a concrete chute spillway, approximately 91 feet in length and approximately 34 feet wide. The side-walls of the chute taper from approximately 5 feet in height into ledge outcropping. The sidewalls are constructed of laid-up stone. The spillway crest is a triangular weir with a vertical upstream face, 34 wide, and located at elevation 719.8.

The end of the concrete flume elevated from 1 to 3 feet above ledge outcropping. The concrete has been severely undermined and pitted. The downstream channel is choked with branches and fallen trees.

j. Regulating Structures

A 16" cast iron pipe exists which allows the pond to be drained. The control of the pipe are located such that they would not be accessible during a flood. The 16" pipe, even if opened during a flood, would not significantly affect the reservoir level.

c.	<u>Elevation Data</u>	<u>Elevation (feet above MSL)</u>
	Top of Dam (Maximum)	725.1
	Test Flood (1/2 PMF)	723.1
	Top of Dam (Minimum)	722
	Spillway Crest	719.8
	Normal Pool	717
	Streambed at Centerline of Dam	705+
d.	<u>Reservoir Data</u>	<u>Feet</u>
	Length of Normal Pool	2640+
	Length of Test Flood Pool	3700+
e.	<u>Storage Data</u>	<u>Acre-Feet</u>
	Normal Pool	322
	Top of Dam (Minimum)	417
	Test Flood (1/2 PMF)	530
f.	<u>Reservoir Surface Area</u>	<u>Acres</u>
	Normal Pool	26
	Top of Dam (Minimum)	40+
	Test Flood (1/2 PMF)	42+
g.	<u>Dam</u>	
	(1) <u>Type</u>	
	Earth Dam	
	(2) <u>Length</u>	
	1950 (approximately) feet	
	(3) <u>Height</u>	
	26 feet	
	(4) <u>Top Width</u>	
	14 feet	
	(5) <u>Side Slopes</u>	
	Upstream: 1.75H to 1V	
	Downstream: 4H to 1V	

i. Normal Operation Procedure(s)

The South Reservoir stores water to augment the North Reservoir. When the North Reservoir cannot keep up with the water demand from the City, water is pumped from the South Reservoir to the North Reservoir.

1.3 Pertinent Data

a. Drainage Area

The drainage basin of the southern St. Albans Reservoir lies within the towns of Fairfax, Fairfield and St. Albans, Vermont. The basin encompasses approximately 2.28 square miles, of which 1.83 square miles is the drainage basin of the northern St. Albans Reservoir. The basin is roughly oval shaped with a general north-south trend.

The predominant soils within the drainage basin belong to the Lyman-Marlow-Peru, the Marlow-Peru, and the Peru associations. These are soils which were formed in the upland glacial tills. Hydrologically, these soils can be classified as C soils.

The major water course within the drainage basin is an unnamed tributary to the Mill River.

b. Discharge at the Dam Site

(1) Outlet Works

The primary outlet for the reservoir is a concrete chute spillway located at the southern end of the main earth fill portion of the dam. In addition to the spillway, water could be released by means of a gated 16" pipe which acts as a pond drain, or pump up to the North Reservoir.

(2) Maximum Known Flood at Dam Site

No records nor recollections of any flooding having occurred at the site could be found.

(3) Spillway Capacity

The capacity of the spillway at a reservoir elevation of 722 feet above MSL (the point at which the dam will over-top) is 310 cfs.

The St. Albans Reservoir Dam (South) is generally overgrown with brush and shrubs except for a grass roadway along the crest which is mowed. The upstream face at the waterline is covered with riprap.

Appurtenant to the dam is an intake and gatehouse, a valve chamber structure at the downstream toe of the dam, and a concrete spillway channel. In addition, there is a pump house immediately downstream from the dam.

c. Size Classification

The St. Albans Reservoir Dam (South) impounds about 26 acres of water. The maximum storage potential of the dam is 417 acre-feet. The height of the dam is 26 feet. The Army Corps of Engineers recommends that dams with a maximum storage volume of greater than 50 acre-feet but less than 1000 acre-feet or a height of greater than 25 feet but less than 40 feet be classified as small. In the case of this dam both criteria apply; the dam is classified as small.

d. Hazard Classification

A failure of St. Albans Reservoir Dam (South) would potentially destroy the pumping station immediately below the dam, and would damage a bridge on Town Highway 17. The hazard classification is therefore "significant."

e. Ownership

The owner of the St. Albans Reservoir (South) is:

The City of St. Albans
St. Albans Water Department
St. Albans, Vermont 05478
Attention: City Manager

f. Operator

The dam is operated by the St. Albans Water Department. Contact Mr. William Scott, Public Works Director, City Hall, St. Albans, Vermont 05478. Telephone 802-524-4830.

g. Purpose

The St. Albans Reservoir Dam (South) is a water supply for the City of St. Albans.

h. Design and Construction History

Little information is available on the design and construction history of the St. Albans Reservoir Dam (South) except the date of construction - 1873.

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
NAME OF DAM: ST. ALBANS RESERVOIR DAM (SOUTH)

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Dufresne-Henry Engineering Corporation has been retained by the New England Division to inspect and report on selected dams in the State of Vermont. Authorization and notice to proceed were issued to Dufresne-Henry Engineering Corporation under a letter of May 26, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0341 has been assigned by the Corps of Engineers for this work.

b. Purpose

1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
2. Encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.
3. To update, verify and complete the National Inventory of Dams.

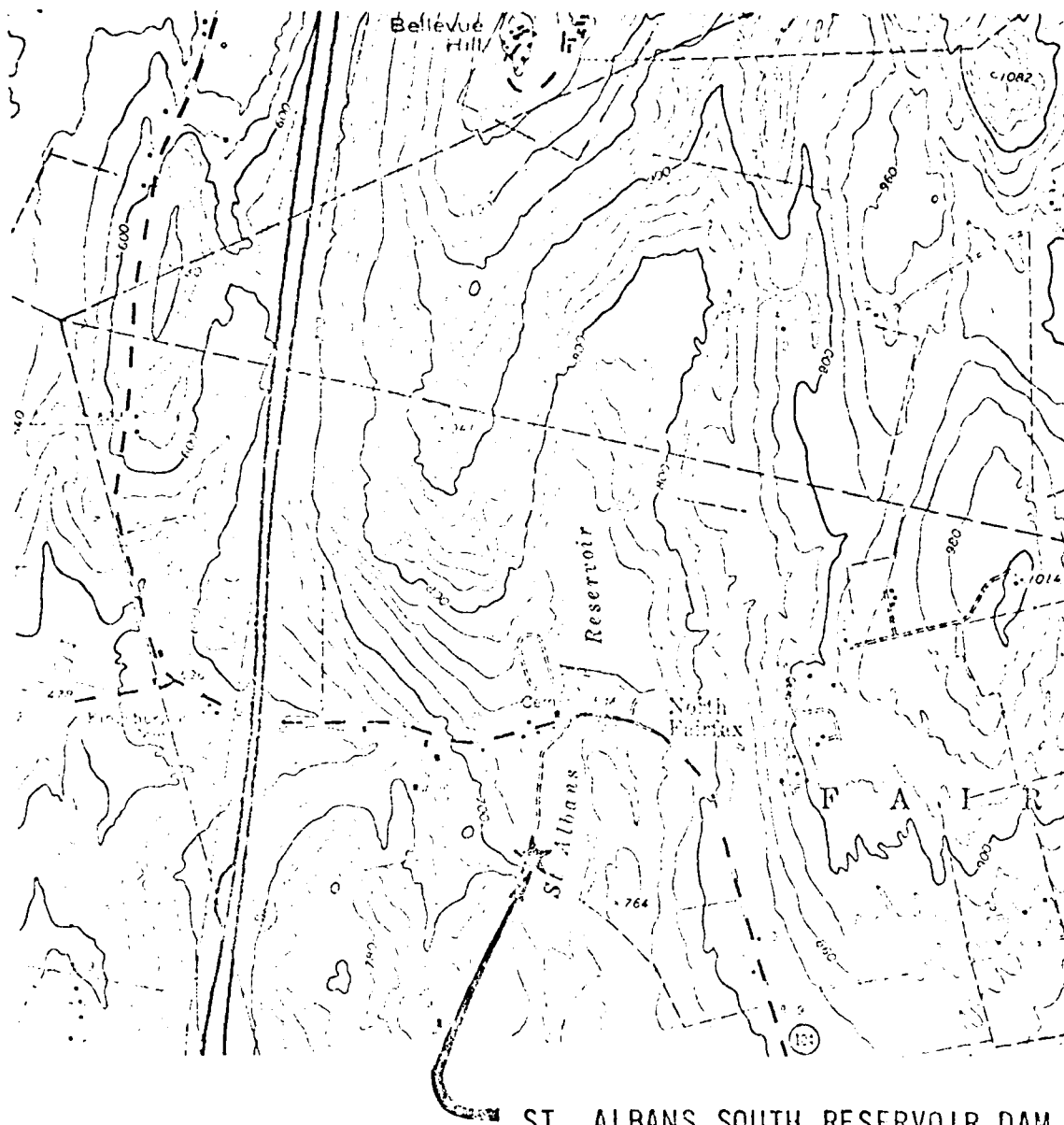
1.2 Description of Project

a. Location

The St. Albans Reservoir is located in the Town of Fairfax, Franklin County, Vermont. The reservoir is about 3.5 miles south of St. Albans on Route 104, and is tributary to the Mill River.

b. Description of Dam and Appurtenances

The St. Albans Reservoir Dam (South) is an earth fill dam which creates an impoundment that was originally the primary drinking water source for the City of St. Albans. Presently the South Reservoir serves to augment the water storage in the North Reservoir.



ST. ALBANS SOUTH RESERVOIR DAM

MAP SOURCE:

U.S. GEOLOGICAL SURVEY
ST. ALBANS QUADRANGLE
VERMONT
7.5 MIN SERIES
1:2400 1964

CLIENT NO	22-0557	DUFRESNE-HENRY ENGINEERING CORP.	
PROJ ENG	JRS	LOCATION MAP	
DRAWN BY	RB	ST. ALBANS SOUTH RESERVOIR	
DATE	9-8-78	FAIRFAX	VERMONT A 6015



OVERVIEW PHOTO
ST. ALBANS RESERVOIR DAM (SOUTH)
(NOTE ABNORMALLY LOW WATER LEVEL)

d. Post-Construction Changes

There are no records available indicating changes to the dam embankment since it was constructed in 1873. In 1969, however, a pump house was constructed at the downstream toe near the original outlet works and the piping from the outlet works was directed to the new pump house.

e. Seismic Stability

The dam is located in Seismic Zone No. 2 and in accordance with recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7: ASSESSMENT, RECOMMENDATIONS/ REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

Based on the visual inspection and the past operational record, the dam is judged to be in fair condition. However, the following conditions, if not remedied will cause the dam to deteriorate rapidly in the future:

1. Presence of large trees and stumps on the embankment.
2. Poor condition of the spillway.
3. Evidence of erosion along downstream slope at the right spillway training wall.
4. Apparent wave cutting action between top of riprap and the crest of the dam.
5. The overtopping potential of the dam in the test flood.

b. Adequacy of Information

Information necessary to formally analyze the stability of the dam such as cross sections and "AS-BUILT" construction drawings was not available and therefore evaluation of the stability of the dam was based solely on visual observations.

c. Urgency

The recommendations presented in Section 7.2 should be implemented within one year of receipt of the Phase I Inspection Report, unless an inspection of the dam, with a full reservoir, indicates that more immediate action is necessary.

d. Necessity for Additional Information

The Owner should perform the additional investigations recommended in Section 7.2.

7.2 Recommendations

An engineer experienced in the design of dams should be engaged to:

1. Perform an inspection of the downstream slope and toe when the reservoir is full to observe possible seeps or wet areas.
2. Develop a procedure for the removal of trees and shrubs from the dam and for planting of grasses to control erosion at the crest and downstream slope.
3. Provide design recommendations for the rehabilitation of the spillway retaining walls, channel and training walls.
4. Recommend procedures for placing riprap in the top portion of the upstream slope.
5. Investigate methods of increasing the spillway capacity or alternately installing an emergency draw-down structure, or increasing the elevation of the crest of the dam which presently is not consistent along the length of the embankment.

7.3 Remedial Measures

a. Alternatives

Not applicable.

b. Operating and Maintenance and Procedures

The following items should be included in a systematic dam maintenance program to be performed annually by the Owner.

1. The trees and brush growing on the dam should be removed periodically.
2. The spillway should be maintained clear of debris.
3. All operating valves appurtenant to the dam should be kept workable.

A bi-annual technical inspection should be performed after implementation of the recommendations contained in 7.2. A system for warning downstream residents in the event of an emergency condition should be formalized and implemented.

APPENDIX A

VISUAL INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT ST. ALBANS RESERVOIR DAM (SOUTH)

DATE August 18, 1978

TIME 12:00 Noon

WEATHER Clear

W.S. ELEV. _____ U.S. _____ DN.S.

Lake lowered for removal
of sludge

PARTY:

1. <u>G. Castro</u>	<u>GEI</u>	6. _____
2. <u>W. Fisher</u>	<u>GEI</u>	7. _____
3. <u>M. J. Chenette</u>	<u>D-H</u>	8. _____
4. _____		9. _____
5. _____		10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECK LIST

PROJECT ST. ALBANS RESERVOIR DAM (SOUTH)

DATE August 18, 1978

PROJECT FEATURE _____

NAME W. R. Fisher

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u>	
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	None observed.
Pavement Condition	Not applicable.
Movement or Settlement of Crest	Alignment of crest appears to have been controlled by the ground contours prior to construction and, therefore, is irregular.
Lateral Movement	None apparent.
Vertical Alignment	Surfaces too irregular to judge.
Horizontal Alignment	Surfaces too irregular to judge.
Condition at Abutment and at Concrete Structures	Good at gatehouse structure and both abutments but very poor at spillway.
Indications of Movement of Structural Items on Slopes	None apparent.
Trespassing on Slopes	None apparent.
Sloughing or Erosion of Slopes or Abutments	Minor sloughing of riprap on upstream slope. Erosion has occurred at the top of riprap on upstream slope and on the downstream slope adjacent to the right spillway training wall.
Rock Slope Protection - Riprap Failures	Minor sloughing and absence of riprap for a height of 2 to 4 feet below the crest of the dam.
Unusual Movement or Cracking at or near Toes	None apparent.
Unusual Embankment or Downstream Seepage	(Elevation of) reservoir was lower than the elevation of the downstream toe.
Piping or Boils	None apparent.
Foundation Drainage Features	None known or observed.
Toe Drains	Presence of stone masonry manhole on downstream toe may indicate presence of toe drain.

PERIODIC INSPECTION CHECK LIST

PROJECT ST. ALBANS RESERVOIR DAM (South)

DATE August 18, 1978

PROJECT FEATURE _____

NAME W. R. Fisher

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u> continued Instrumentation System Vegetation	None known. <u>Upstream Slope:</u> From riprap to crest of dam is covered with shrubs and small trees from right abutment to gatehouse. <u>Crest:</u> From right abutment to gatehouse the crest is grass covered. From gatehouse to left abutment the crest is overgrown with very large trees. <u>Downstream Slope:</u> Generally overgrown with shrubs and very large trees.

PERIODIC INSPECTION CHECK LIST

PROJECT ST. ALBANS RESERVOIR DAM (South)

DATE August 18, 1978

PROJECT FEATURE _____

NAME W. R. Fisher

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	
General Condition	Not applicable.
Loose Rock Overhanging Channel	Not applicable.
Trees Overhanging Channel	Not applicable.
Floor of Approach Channel	Not applicable.
b. Weir and Training or Sidewalls	
General Condition of Concrete	Very poor. Some blocks have fallen from the walls.
Rust or Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	None apparent.
c. Discharge Channel	
General Condition	Very poor.
Loose Rock Overhanging Channel	Loose rock from training walls could fall into channel.
Trees Overhanging Channel	Many several inches in diameter.
Floor of Channel	Concrete for 95 feet, then bedrock.
Other obstructions	Two large holes exist in concrete floor. One large tree and numerous branches have fallen into the channel.

PERIODIC INSPECTION CHECK LIST

PROJECT ST. ALBANS RESERVOIR DAM (SOUTH)

DATE August 18, 1978

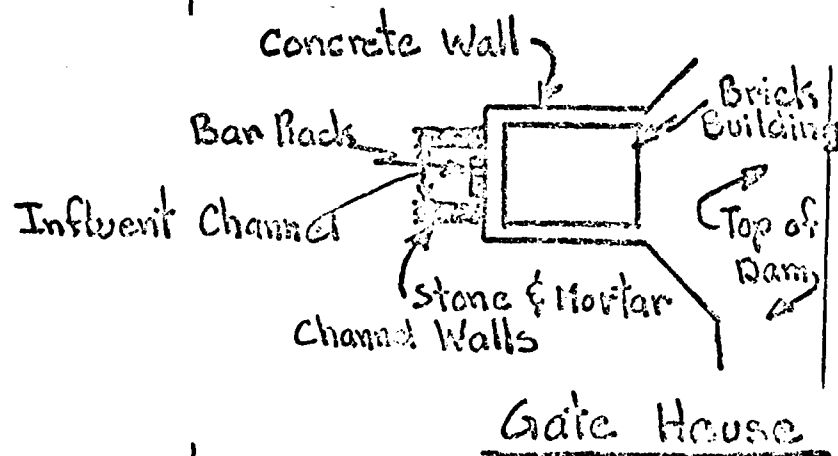
PROJECT FEATURE Intake

NAME M. J. Chenette

DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u> a. Approach Channel Slope Conditions Bottom Conditions Rock Slides or Falls Log Boom Debris Condition of Concrete Lining Drains or Weep Holes b. Intake Structure Condition of Concrete Stop Logs and Slots	Intake could not be assessed because the gatehouse was boarded up. The following sketch of the structure shows the relative location and components of the intake.



PERIODIC INSPECTION CHECK LIST

PROJECT ST. ALBANS RESERVOIR DAM (SOUTH)

DATE August 18, 1978

PROJECT FEATURE Intake

NAME M. J. Chenette

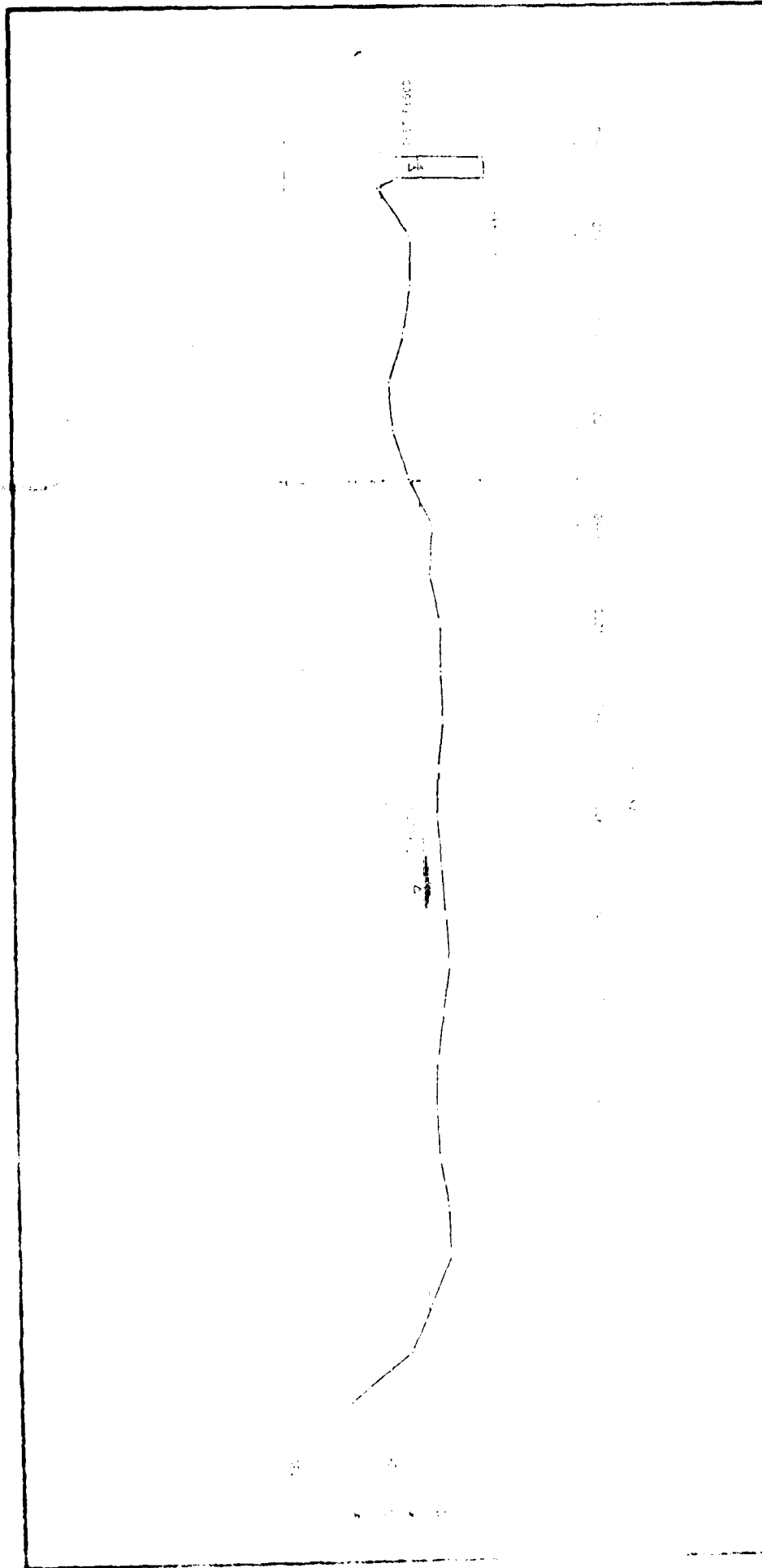
DISCIPLINE _____

NAME _____

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - CONTROL TOWER</u>	
a. Concrete and Structural	
General Condition	Fair. (Brick) Some loose bricks.
Condition of Joints	N/A
Spalling	N/A
Visible Reinforcing	N/A
Rusting or Staining of Concrete	N/A
Any Seepage or Efflorescence	N/A
Joint Alignment	N/A
Unusual Seepage or Leaks in Gate Chamber	N/A
Cracks	N/A
Rusting or Corrosion of Steel	N/A
b. Mechanical and Electrical	
Air Vents	N/A
Float Wells	N/A
Crane Hoist	N/A
Elevator	N/A
Hydraulic System	N/A
Service Gates	N/A
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System	N/A

APPENDIX B

PROJECT RECORDS AND PLANS



DUPRE-HENRY ENGINEERING CORP. 100 WEST 10TH STREET ST. LOUIS, MISSOURI 63102	U.S. ARMY ENGINEERING DIV., NEW ENGLAND 100 WEST 10TH STREET ST. LOUIS, MISSOURI 63102
NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS ST. ALBANS - SOUTH - RESERVOIR TOP OF DAM PROFILE AND TEST P.O.	

UPSTREAM

DOWNSTREAM

RESERVOIR

DE

DETAILED FROM DATE ADJUNCT
10/1/00

RESERVOIR

RESERVOIR

10/00

PROFESSIONAL ENGINEERING (P.E.)
U.S. ARMY ENGINEERING DISTRICT
WASHINGTON, D.C.

NATIONAL PROGRAM OF INSPECTION OF NAVY FLEET BAY

UPPER SECTIONS

10/1/00

ENGINEERING

APPENDIX C
PHOTOGRAPHS

1. Crest of Dam.
2. Dam and Gatehouse. Note Low Water Level on Date of Inspection.
3. Gatehouse and Riprap on Upstream Face of Dam.
4. Riprap on Upstream Face of Dam.
5. Valve Chamber at Toe of Dam.
6. Pumping Station Immediately Below Dam for Pumping Water to North Reservoir.
7. Holes, Borrows or Channels at Toe of Upstream Slope.
8. Possible Toe Drain Manhole, Abandoned.
9. Water Seeping Into Reservoir at Toe of Upstream Slope. Note that the Reservoir had been Drained.
10. Outlet Pipe from Reservoir.
11. Entrance to Spillway.
12. Spillway Training Wall.
13. Hole in Concrete Spillway.
14. Debris in Channel Downstream of Spillway.

ST. Albans (South)
Dam Rating Curve

726

725

724

723

722

721

720

719

WATER SURFACE ELEVATION (FT. AMSL)

Δ Spillway Discharge

□ Dam Rating Curve

○ Top of Dam

DISCHARGE CFS

500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8500

DUFRESNE-HENRY ENGINEERING CORPORATION

SUBJECT Spillway and Ventilation Control
St. Albans, N.H. - 1957

SHEET NO. _____ OF _____
 JOB NO. 22-2857

The spillway weir can be considered as a triangular weir, 34 feet in length, with
 15 ft. 1" slope downstream face and a vertical upstream face. The best approximation
 for a C value was taken from Keulegan's Handbook of Hydraulics, Table 5-7.

$$Q = C L H^{3/2}$$

Spillway Head (ft.)	Weir Length L (ft.)	C	Head H (ft.)	Discharge Q (cfs)
19.8	—	—	0	0
20.5	34	2.78	0.7	55
21	34	2.78	1.2	165
21.5	34	2.78	1.7	210
22.0	34	2.78	2.2	310
22.5	34	2.78	2.7	420
22	34	2.78	3.2	540
23.5	34	2.78	3.7	670
24	34	2.78	4.2	810

The dam is a gravity type with a crest width of 15'. Crest is
 15 ft. above T.M. 5.3 of Keulegan's Handbook of Hydraulics.

$$Q = C A H_{\text{over}}^{3/2}$$

Area A (sq. ft.)	Length L (ft.)	H (max) (ft.)	C	Discharge Q (cfs)
—	—	—	—	0
240	34	0.5	2.7	470
241	1225	1.0	2.63	2210
1474	1400	1.5	2.635	2760
2405	1550	2.0	2.63	3200

DUFRESNE-HENRY ENGINEERING CORPORATION

SUBJECT Hydrologic Data SHEET NO. 1 OF 1
St. Albans Reservoir (cont.) JOB NO. 68-0556

Albans Reservoir South

DRAINAGE AREA = 2.28 sq. mi. or 0.45 sq. mi. IF N. Reservoir is excluded.
 Pond Surface AREA = 96 ACRES

Soils: Lyman, Marlow, Peru: Type C

Dam size: SMALL

Hazard classification: Significant

Test Flood: 1/2 PMF

Soil Retention Rate = 0.12 in/hr

$$t_p = 2.2 \left(\frac{L \cdot L_c}{V S} \right)^{0.37}$$

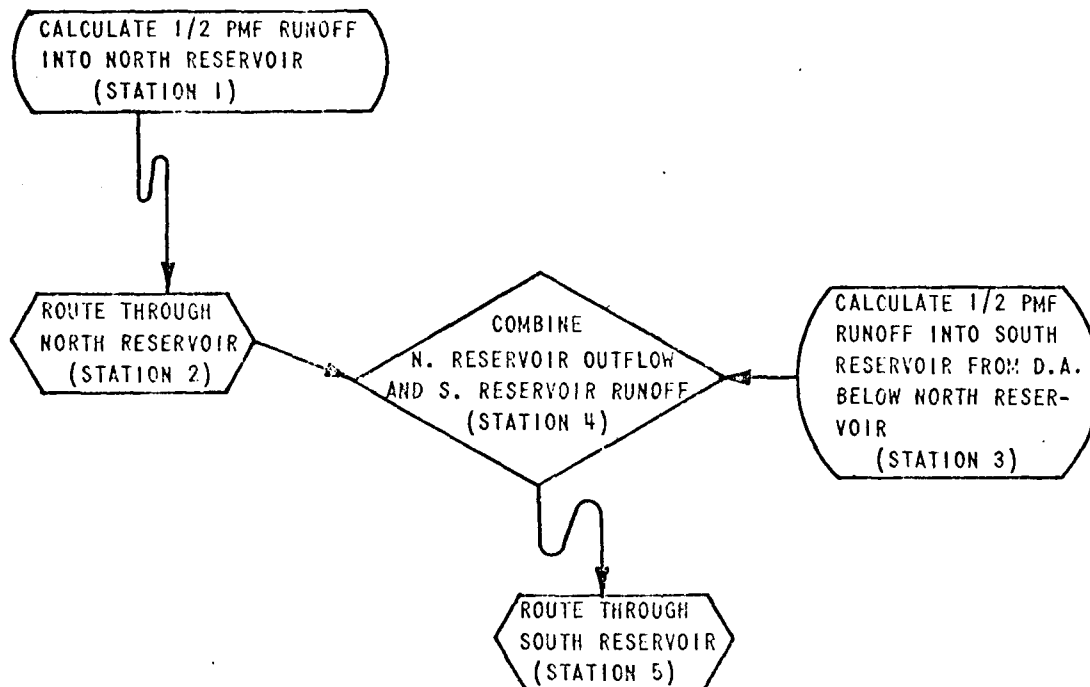
$$t_p = 2.2 \left(\frac{0.95 \cdot 0.57}{\sqrt{124.7}} \right)^{0.37}$$

$$t_p = 0.67 \text{ hrs.}$$

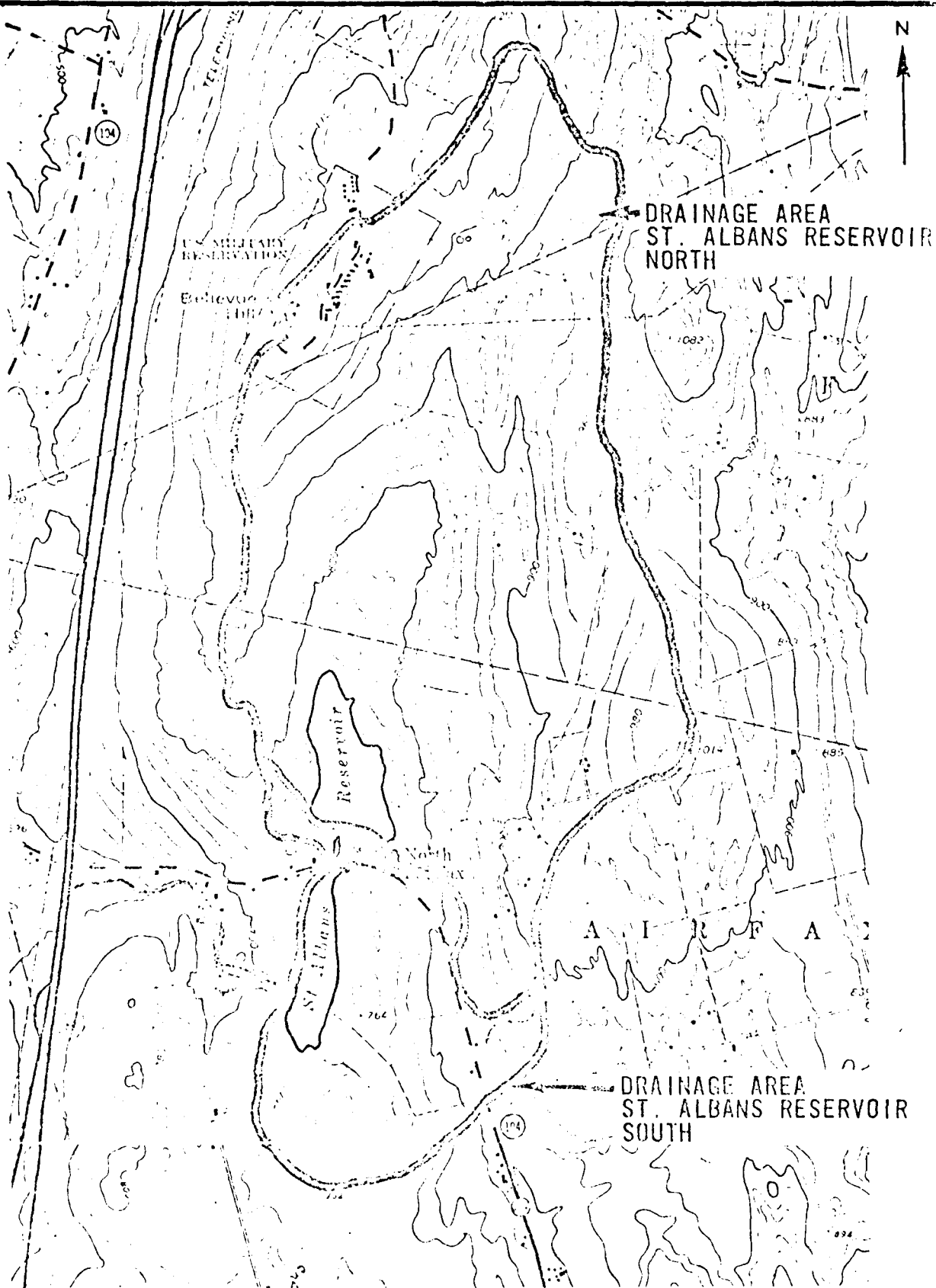
L = hydraulic length
 L_c = length to centroid = 0.66
 S = Avg. slope (ft/mi)

Time $\left\{ \begin{aligned} t_n &= \frac{t_p}{5.5} = 0.12 \text{ hrs} = 7.3 \text{ minutes} \end{aligned} \right.$

Note: For PMF - use 10 minute intervals over 24 hrs.



TEXT NO	22-0557	DUFRENE-HENRY ENGINEERING CORP. ST. ALBANS RESERVOIR HEC-1 SCHEMATIC FOR SOUTH RESERVOIR		
YOU EMP	EJS			
DRAWN BY	RB			
DATE	9-13-78			
		A 6032		



22-0557

JRS

KB

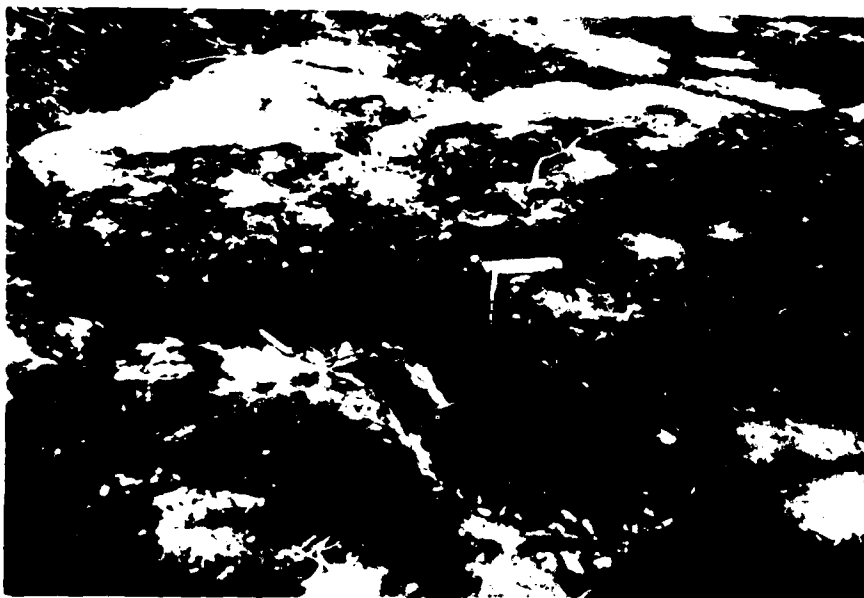
9-14-78

DUIRESNE HENRY ENGINEERING CORP.
DRAINAGE AREA
ST. ALBANS RESERVOIR NORTH & SOUTH

AT 6035

APPENDIX D

HYDRAULIC COMPUTATIONS



#13 HOLE IN CONCRETE SPILLWAY.



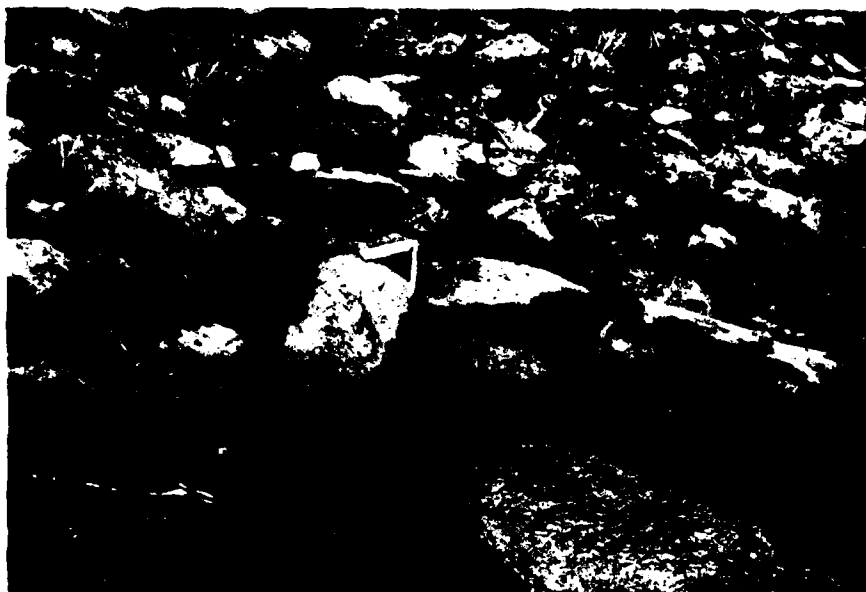
#14 DEBRIS IN CHANNEL DOWNSTREAM OF SPILLWAY.



#11 ENTRANCE TO SPILLWAY.



#12 SPILLWAY TRAINING WALL.



#9 WATER SEEPING INTO RESERVOIR AT TOE OF UPSTREAM SLOPE.
NOTE THAT THE RESERVOIR HAD BEEN DRAINED.



#10 OUTLET PIPE FROM RESERVOIR.



#7 HOLES, BORROWS OR CHANNELS AT TOE OF UPSTREAM SLOPE.



#8 POSSIBLE TOE DRAIN MANHOLE, ABANDONED.



#5 VALVE CHAMBER AT TOE OF DAM.



#6 PUMPING STATION IMMEDIATELY BELOW DAM FOR PUMPING WATER TO NORTH RESERVOIR.



#3 GATEHOUSE AND RIPRAP ON UPSTREAM FACE OF DAM.



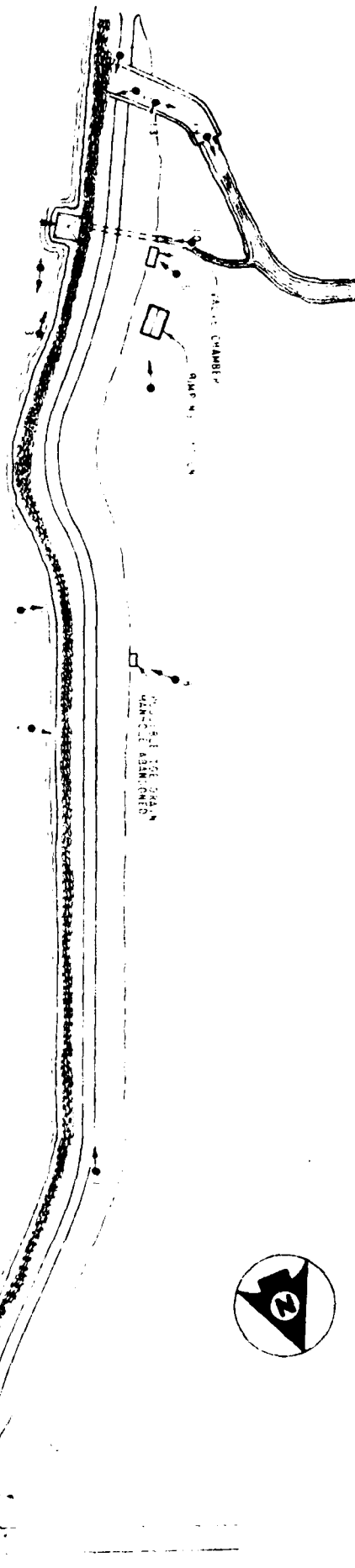
#4 RIPRAP ON UPSTREAM FACE OF DAM.



#1 CREST OF DAM.



#2 DAM AND GATEHOUSE. NOTE LOW WATER LEVEL ON DATE OF INSPECTION.



PHOTOGRAPHS
TAKEN

ST. ALBANS SOUTH RESERVOIR EAV

DUFRESNE-HENRY ENGINEERING CORPORATION

BY EG/12/2
DATE _____

SUBJECT Storage - Discharge Relations
St. Albans (South)

SHEET NO. _____ OF _____
JOB NO. 22-0557

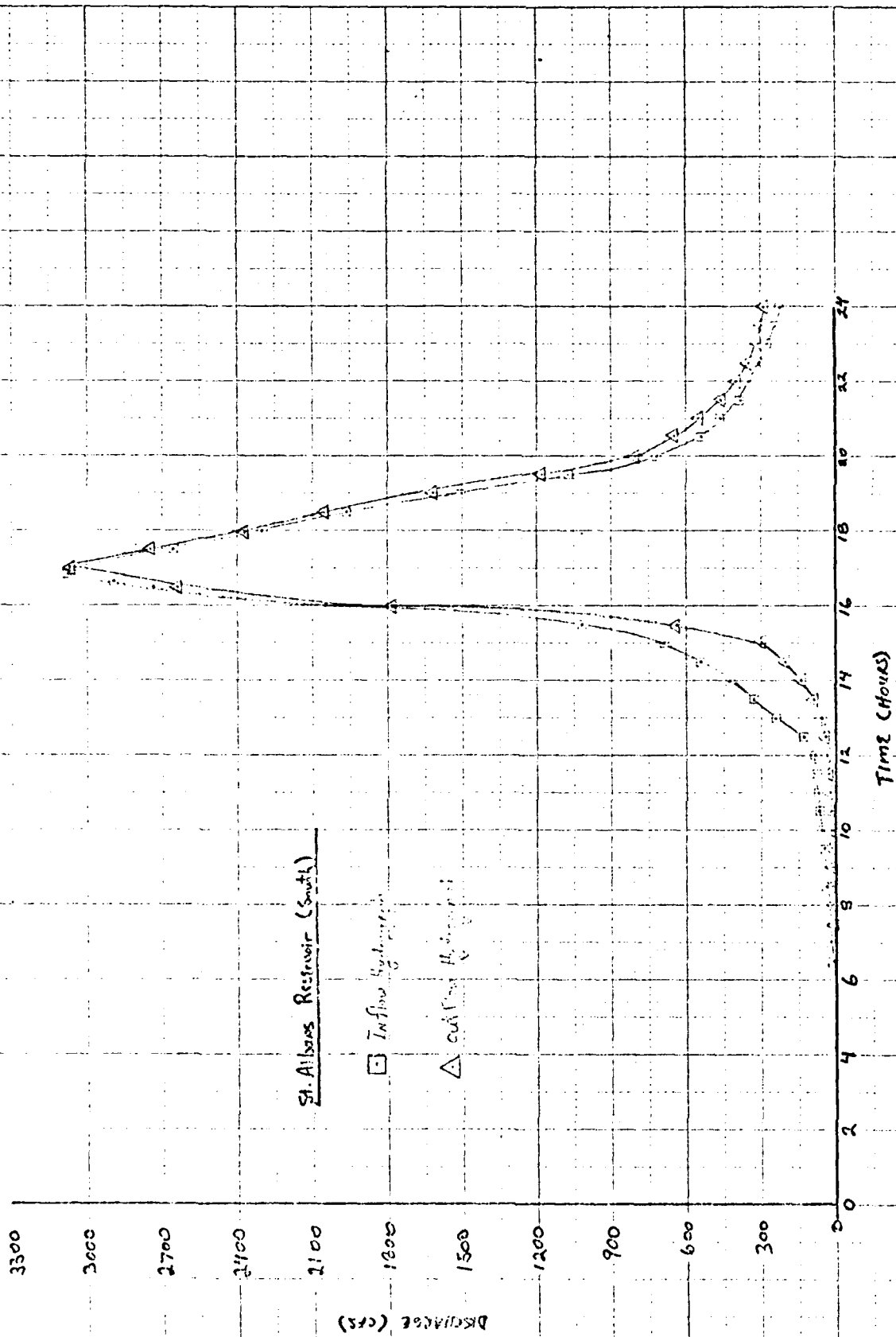
Storage - Discharge Rating Curve for St. Albans Reservoir (South)

Surface Area at Normal Pool (Elevation 717) = 26 Acres
Storage at Normal Pool (Elevation 717) = 322 Acres-foot

Surface area at Elevation 720 = 34 Acres
Storage at Elevation 720 = 424 Acres-foot

Storage is assumed to be an average of 17 Acres-foot additional storage per 0.5 feet of increase in water surface elevation.

Water Surface Elevation (ft., MSL)	Storage (Acres-foot)	DISCHARGE (CFS)
717	322	0
719.8	417	0
720.5	441	55
721	458	125
721.5	475	210
722	492	310
722.5	509	765
723	526	2390
723.5	543	4790
724	560	7745



 MSC-1 VERSION DATED JAN 1973
 UPDATED AUG 74
 CHANGE NO. 01

SPILLWAY DESIGN FLOOD
 SAINT ALBANS DAM SOUTH
 PHASE I DAM SAFETY INVESTIGATION

JOB SPECIFICATION
 NO NHR NMN IDAY IMR IMIN MEIRC IPLT IPAT NSTAN
 144 0 10 1 0 0 2 0 0
 JCPEA NMT
 3 0

SUB-AREA RUNOFF COMPUTATION

PROBABLE MAXIMUM 24-HOUR PRECIPITATION (NORTH RE
 1STAU TCOMP IECON ITAPE JPLT JPAT INAME
 1 0 0 0 0 1

HYDROGRAPH DATA

INVDG	LONG	TAPEA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.53	0.0	1.53	1.00	0.500	0	0	0

PRECIP DATA

SPEE	PMS	R0	R12	R24	R48	R72	R96
0.0	16.00	111.00	12.00	133.00	0.0	0.0	0.0

LOSS DATA

STKR	DLTR	RTIOL	EFALN	STKRS	RTIOK	STR7L	CNSTL	ALSMX	RTIMP
0.0	0.0	1.00	0.0	0.0	1.00	0.34	0.12	0.0	0.0

UNIT HYDROGRAPH DATA

TP# 1.30 CP#0.68 NTA# 0

RECESSION DATA

STATJ# 0.0 WCSN# 0.0 RTIOR# 1.00
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SYNER CP AND TP ARE TC# 8.96 AND R# 6.11 INTERVALS

UNIT HYDROGRAPH 38 END-OF-PERIOD ORIGINATES, LAG# 1.30 HOURS, CP# 0.68 VOL# 1.00

28.	104.	207.	321.	439.	558.	602.	628.	611.	545.
463.	393.	333.	283.	240.	204.	173.	147.	125.	106.
50.	76.	63.	53.	47.	39.	34.	28.	24.	20.
17.	15.	13.	11.	9.	8.	6.	6.	6.	6.

END-OF-PERIOD FLOW

TIME	RAIN	EXCS	COMP	Q
1 0 10	0.02	0.00	0.	0.
1 0 20	0.02	0.00	0.	0.
1 0 30	0.02	0.00	0.	0.
1 0 40	0.02	0.00	0.	0.
1 0 50	0.02	0.00	0.	0.
1 0 60	0.02	0.00	0.	0.
1 1 10	0.02	0.00	0.	0.
1 1 20	0.02	0.00	0.	0.
1 1 30	0.02	0.00	0.	0.

1 12 50	0.30	0.28	632.
1 12 50	0.30	0.28	632.
1 13 10	0.36	0.34	780.
1 13 20	0.36	0.34	534.
1 13 30	0.36	0.34	1094.
1 13 40	0.36	0.34	1251.
1 13 50	0.36	0.34	1384.
1 14 00	0.36	0.34	1516.
1 14 10	0.44	0.42	1635.
1 14 20	0.44	0.42	1750.
1 14 30	0.44	0.42	1863.
1 14 40	0.44	0.42	1973.
1 14 50	0.44	0.42	2082.
1 15 00	0.44	0.42	2188.
1 15 10	1.12	1.10	2311.
1 15 20	1.12	1.10	2483.
1 15 30	1.12	1.10	2711.
1 15 40	1.12	1.10	3000.
1 15 50	1.12	1.10	3374.
1 16 00	1.12	1.10	3758.
1 16 10	0.41	0.39	4236.
1 16 20	0.41	0.39	4631.
1 16 30	0.41	0.39	4935.
1 16 40	0.41	0.39	5107.
1 16 50	0.41	0.39	5135.
1 17 00	0.41	0.39	5041.
1 17 10	0.33	0.31	4856.
1 17 20	0.33	0.31	4608.
1 17 30	0.33	0.31	4332.
1 17 40	0.33	0.31	4066.
1 17 50	0.33	0.31	3825.
1 18 00	0.33	0.31	3607.
1 18 10	0.03	0.01	3394.
1 18 20	0.03	0.01	3189.
1 18 30	0.03	0.01	2968.
1 18 40	0.03	0.01	2733.
1 18 50	0.03	0.01	2485.
1 19 00	0.03	0.01	2224.
1 19 10	0.03	0.01	1960.
1 19 20	0.03	0.01	1700.
1 19 30	0.03	0.01	1457.
1 19 40	0.03	0.01	1242.
1 19 50	0.03	0.01	1054.
1 20 00	0.03	0.01	905.
1 20 10	0.03	0.01	773.
1 20 20	0.03	0.01	662.
1 20 30	0.03	0.01	567.
1 20 40	0.03	0.01	486.
1 20 50	0.03	0.01	418.
1 21 00	0.03	0.01	360.
1 21 10	0.03	0.01	310.
1 21 20	0.03	0.01	269.
1 21 30	0.03	0.01	230.
1 21 40	0.03	0.01	197.
1 21 50	0.03	0.01	164.
1 22 00	0.03	0.01	146.
1 22 10	0.03	0.01	126.
1 22 20	0.03	0.01	109.
1 22 30	0.03	0.01	97.
1 22 40	0.03	0.01	80.
1 22 50	0.03	0.01	80.
1 23 00	0.03	0.01	73.
1 23 10	0.03	0.01	67.
1 23 20	0.03	0.01	62.
1 23 30	0.03	0.01	59.

④

1 23 50 0.03 0.01 53.
1 23 60 0.03 0.01 51.

SUM 21.36 18.48 129837.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	5135.	3051.	902.	902.	129834.
INCHES		15.51	18.33	18.33	18.33
AC-FT		1513.	1789.	1789.	1789.

[illegible]

INFLUENCE OF OUTFLOW AND OBSERVED FLOW

400. 900. 1200. 1600. 2000. 2400. 2800. 0. 0. 0. 0.

3.

1

0

10

1

0

20

1

0

30

1

0

40

1

0

50

1

0

60

1

1

10

1

1

20

1

1

30

1

1

40

1

1

50

1

1

60

1

1

70

1

1

80

1

1

90

1

1

0

1

1

1

2

1

1

3

1

1 10 50.
1 11 60.
1 11 10.
1 11 20.
1 11 30.
1 11 40.
1 11 50.
1 11 60.
1 12 10.
1 12 20.
1 12 30.
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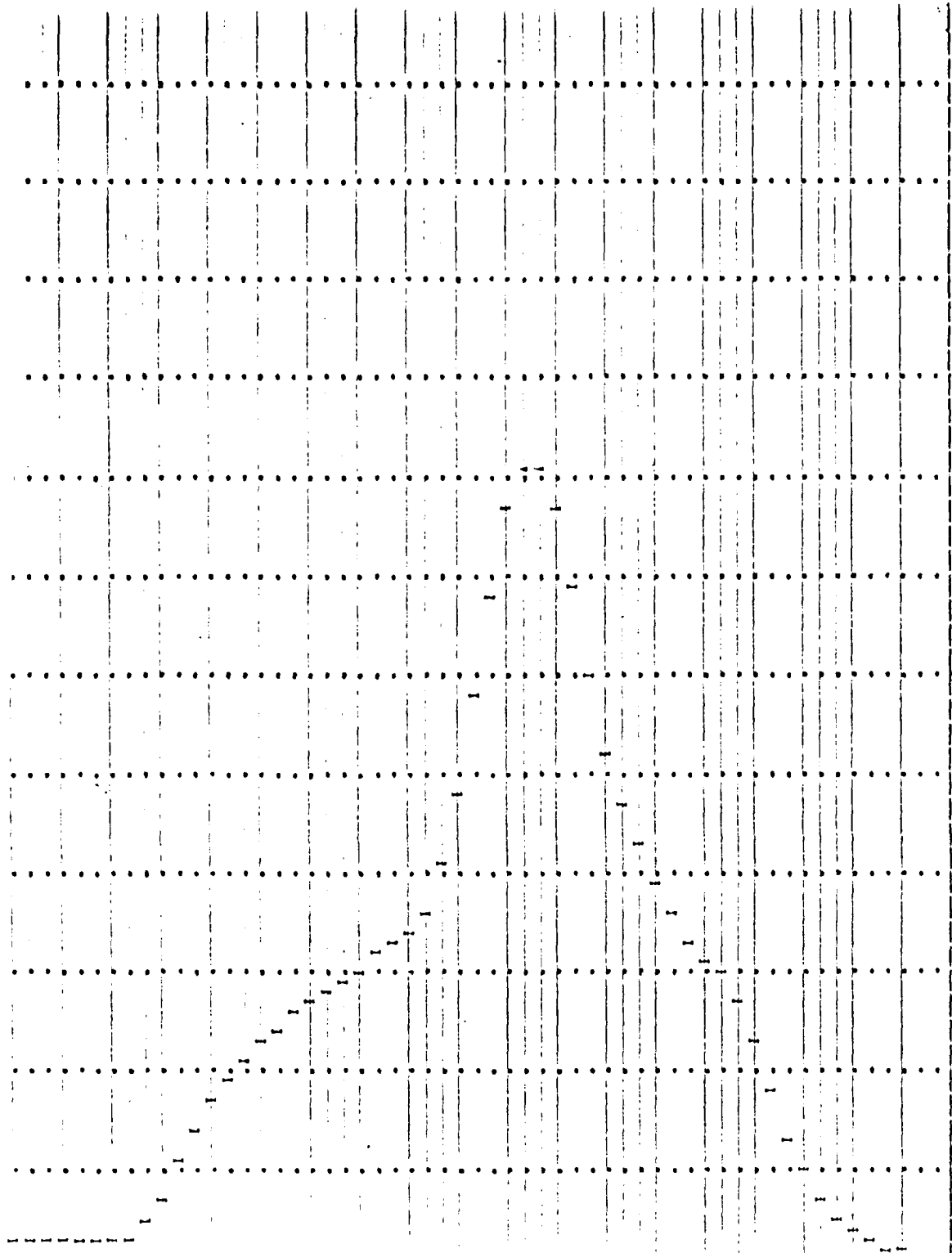
1 21 60.1
1 22 10.1
1 22 20.1
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1 23 10.1
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HYDROGRAPH ROUTING

| PULS RESERVOIR ROUTING | | JPLT | | JPR | | ISAME | |
|------------------------|-------|-------|-------|------|-----|-------|-------|
| ISTAQ | ICOMP | IECCN | ITAPE | JPLT | JPR | ISAME | ISAME |
| 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROUTING DATA | | | | | | | |
| WLOSS | CLOSS | LAG | AMSKK | X | TSK | STCRA | STCRA |
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -1. | -1. |
| NSTPS | | | | | | | |
| 0 | 0 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| EUP IN | | | | | | | |
| ECP OUT | | | | | | | |
| AVG IN | | | | | | | |
| EUP STOR | | | | | | | |
| TIME | | | | | | | |
| 1 | 0 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 0 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 0 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 0 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 0 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 0 60 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 1 60 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 2 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 2 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 2 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 2 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 2 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 3 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 3 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 3 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 3 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 3 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 4 60 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 40 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 50 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 5 60 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 6 10 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 6 20 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 6 30 | 943. | 0. | 0. | 0. | 0. | 0. |
| 1 | 6 40 | 943. | 0. | 0. | 0. | 0. | 0. |

STORAGE# 850. 943. 956. 1009. 1049. 1089. 1115. 1221. 1276.
OUTFLOW# 0. 0. 10. 120. 120. 205. 385. 685. 13735.

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INFLUENCE OF OUTFLOW AND UNOBSERVED FLUENCY

| 0. | 100. | 200. | 300. | 400. | 500. | 600. | 700. | 800. | 900. | 0. | 100. | 200. | 300. | 400. | 500. | 600. | 700. | 800. | 900. | 0. |
|---------|------|------|------|------|------|------|------|------|------|----|------|------|------|------|------|------|------|------|------|----|
| 1 0 101 | | | | | | | | | | | | | | | | | | | | |
| 1 0 201 | | | | | | | | | | | | | | | | | | | | |
| 1 0 301 | | | | | | | | | | | | | | | | | | | | |
| 1 0 401 | | | | | | | | | | | | | | | | | | | | |
| 1 0 501 | | | | | | | | | | | | | | | | | | | | |
| 1 0 601 | | | | | | | | | | | | | | | | | | | | |
| 1 1 101 | | | | | | | | | | | | | | | | | | | | |
| 1 1 201 | | | | | | | | | | | | | | | | | | | | |
| 1 1 301 | | | | | | | | | | | | | | | | | | | | |
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| 1 1 501 | | | | | | | | | | | | | | | | | | | | |
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| 1 2 301 | | | | | | | | | | | | | | | | | | | | |
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| 1 2 601 | | | | | | | | | | | | | | | | | | | | |
| 1 3 101 | | | | | | | | | | | | | | | | | | | | |
| 1 3 201 | | | | | | | | | | | | | | | | | | | | |
| 1 3 301 | | | | | | | | | | | | | | | | | | | | |
| 1 3 401 | | | | | | | | | | | | | | | | | | | | |
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| 1 6 601 | | | | | | | | | | | | | | | | | | | | |
| 1 7 101 | | | | | | | | | | | | | | | | | | | | |
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| 1 7 401 | | | | | | | | | | | | | | | | | | | | |
| 1 7 501 | | | | | | | | | | | | | | | | | | | | |
| 1 7 601 | | | | | | | | | | | | | | | | | | | | |
| 1 8 101 | | | | | | | | | | | | | | | | | | | | |
| 1 8 201 | | | | | | | | | | | | | | | | | | | | |
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| 1 8 601 | | | | | | | | | | | | | | | | | | | | |
| 1 9 101 | | | | | | | | | | | | | | | | | | | | |
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[illegible]

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| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|---------|--------|---------|---------|--------------|
| 1 15 50 | 1.12 | 1.11 | 1.11 | 1537. |
| 1 16 00 | 1.12 | 1.11 | 1.11 | 1531. |
| 1 16 10 | 0.41 | 0.40 | 0.40 | 1624. |
| 1 16 20 | 0.41 | 0.40 | 0.40 | 1624. |
| 1 16 30 | 0.41 | 0.40 | 0.40 | 1530. |
| 1 16 40 | 0.41 | 0.40 | 0.40 | 1370. |
| 1 16 50 | 0.41 | 0.40 | 0.40 | 1142. |
| 1 17 00 | 0.41 | 0.40 | 0.40 | 1044. |
| 1 17 10 | 0.33 | 0.31 | 0.31 | 937. |
| 1 17 20 | 0.33 | 0.31 | 0.31 | 822. |
| 1 17 30 | 0.33 | 0.31 | 0.31 | 761. |
| 1 17 40 | 0.33 | 0.31 | 0.31 | 719. |
| 1 17 50 | 0.33 | 0.31 | 0.31 | 667. |
| 1 18 00 | 0.33 | 0.31 | 0.31 | 628. |
| 1 18 10 | 0.33 | 0.31 | 0.31 | 590. |
| 1 18 20 | 0.03 | 0.01 | 0.01 | 535. |
| 1 18 30 | 0.03 | 0.01 | 0.01 | 456. |
| 1 18 40 | 0.03 | 0.01 | 0.01 | 361. |
| 1 18 50 | 0.03 | 0.01 | 0.01 | 267. |
| 1 19 00 | 0.03 | 0.01 | 0.01 | 191. |
| 1 19 10 | 0.03 | 0.01 | 0.01 | 137. |
| 1 19 20 | 0.03 | 0.01 | 0.01 | 101. |
| 1 19 30 | 0.03 | 0.01 | 0.01 | 75. |
| 1 19 40 | 0.03 | 0.01 | 0.01 | 56. |
| 1 19 50 | 0.03 | 0.01 | 0.01 | 43. |
| 1 20 00 | 0.03 | 0.01 | 0.01 | 34. |
| 1 20 10 | 0.03 | 0.01 | 0.01 | 28. |
| 1 20 20 | 0.03 | 0.01 | 0.01 | 24. |
| 1 20 30 | 0.03 | 0.01 | 0.01 | 21. |
| 1 20 40 | 0.03 | 0.01 | 0.01 | 18. |
| 1 20 50 | 0.03 | 0.01 | 0.01 | 17. |
| 1 21 00 | 0.03 | 0.01 | 0.01 | 16. |
| 1 21 10 | 0.03 | 0.01 | 0.01 | 15. |
| 1 21 20 | 0.03 | 0.01 | 0.01 | 15. |
| 1 21 30 | 0.03 | 0.01 | 0.01 | 15. |
| 1 21 40 | 0.03 | 0.01 | 0.01 | 15. |
| 1 21 50 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 00 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 10 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 20 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 30 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 40 | 0.03 | 0.01 | 0.01 | 15. |
| 1 22 50 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 00 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 10 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 20 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 30 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 40 | 0.03 | 0.01 | 0.01 | 15. |
| 1 23 50 | 0.03 | 0.01 | 0.01 | 15. |
| 1 24 00 | 0.03 | 0.01 | 0.01 | 15. |
| SUM | 21.36 | 19.02 | 32469. | |
| PEAK | 1624. | | | |
| CF5 | 795. | | | |
| INCHES | 16.44 | | | |
| AC-T | 396. | | | |
| | | 225. | 225. | 22468. |
| | | 18.64 | 18.64 | 18.64 |
| | | 447. | 447. | 447. |

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|---|----|----|------|------|------|
| 1 | 4 | 30 | 0.07 | 0.00 | 3. |
| 1 | 4 | 40 | 0.02 | 0.00 | 3. |
| 1 | 4 | 50 | 0.02 | 0.00 | 3. |
| 1 | 4 | 60 | 0.02 | 0.00 | 3. |
| 1 | 5 | 10 | 0.02 | 0.00 | 3. |
| 1 | 5 | 20 | 0.02 | 0.00 | 3. |
| 1 | 5 | 30 | 0.02 | 0.00 | 3. |
| 1 | 5 | 40 | 0.02 | 0.00 | 3. |
| 1 | 5 | 50 | 0.02 | 0.00 | 3. |
| 1 | 6 | 10 | 0.05 | 0.04 | 4. |
| 1 | 6 | 20 | 0.05 | 0.04 | 8. |
| 1 | 6 | 30 | 0.05 | 0.04 | 15. |
| 1 | 6 | 40 | 0.05 | 0.04 | 25. |
| 1 | 6 | 50 | 0.05 | 0.04 | 34. |
| 1 | 6 | 60 | 0.05 | 0.04 | 42. |
| 1 | 7 | 10 | 0.05 | 0.04 | 48. |
| 1 | 7 | 20 | 0.05 | 0.04 | 52. |
| 1 | 7 | 30 | 0.05 | 0.04 | 55. |
| 1 | 7 | 40 | 0.05 | 0.04 | 57. |
| 1 | 7 | 50 | 0.05 | 0.04 | 58. |
| 1 | 7 | 60 | 0.05 | 0.04 | 59. |
| 1 | 8 | 10 | 0.05 | 0.04 | 60. |
| 1 | 8 | 20 | 0.05 | 0.04 | 61. |
| 1 | 8 | 30 | 0.05 | 0.04 | 61. |
| 1 | 8 | 40 | 0.05 | 0.04 | 61. |
| 1 | 8 | 50 | 0.05 | 0.04 | 61. |
| 1 | 8 | 60 | 0.05 | 0.04 | 61. |
| 1 | 9 | 10 | 0.05 | 0.04 | 61. |
| 1 | 9 | 20 | 0.05 | 0.04 | 61. |
| 1 | 9 | 30 | 0.05 | 0.04 | 61. |
| 1 | 9 | 40 | 0.05 | 0.04 | 61. |
| 1 | 9 | 50 | 0.05 | 0.04 | 61. |
| 1 | 9 | 60 | 0.05 | 0.04 | 61. |
| 1 | 10 | 10 | 0.05 | 0.04 | 61. |
| 1 | 10 | 20 | 0.05 | 0.04 | 61. |
| 1 | 10 | 30 | 0.05 | 0.04 | 61. |
| 1 | 10 | 40 | 0.05 | 0.04 | 61. |
| 1 | 10 | 50 | 0.05 | 0.04 | 61. |
| 1 | 10 | 60 | 0.05 | 0.04 | 61. |
| 1 | 11 | 10 | 0.05 | 0.04 | 61. |
| 1 | 11 | 20 | 0.05 | 0.04 | 61. |
| 1 | 11 | 30 | 0.05 | 0.04 | 61. |
| 1 | 11 | 40 | 0.05 | 0.04 | 61. |
| 1 | 11 | 50 | 0.05 | 0.04 | 61. |
| 1 | 11 | 60 | 0.05 | 0.04 | 61. |
| 1 | 12 | 10 | 0.05 | 0.28 | 69. |
| 1 | 12 | 20 | 0.05 | 0.28 | 97. |
| 1 | 12 | 30 | 0.05 | 0.28 | 149. |
| 1 | 12 | 40 | 0.05 | 0.28 | 217. |
| 1 | 12 | 50 | 0.05 | 0.28 | 288. |
| 1 | 12 | 60 | 0.05 | 0.28 | 360. |
| 1 | 13 | 10 | 0.05 | 0.34 | 388. |
| 1 | 13 | 20 | 0.05 | 0.34 | 427. |
| 1 | 13 | 30 | 0.05 | 0.34 | 457. |
| 1 | 13 | 40 | 0.05 | 0.34 | 480. |
| 1 | 13 | 50 | 0.05 | 0.34 | 515. |
| 1 | 13 | 60 | 0.05 | 0.34 | 530. |
| 1 | 14 | 10 | 0.44 | 0.43 | 554. |
| 1 | 14 | 20 | 0.44 | 0.43 | 575. |
| 1 | 14 | 30 | 0.44 | 0.43 | 601. |
| 1 | 14 | 40 | 0.44 | 0.43 | 631. |
| 1 | 14 | 50 | 0.44 | 0.43 | 661. |
| 1 | 14 | 60 | 0.44 | 0.43 | 682. |
| 1 | 15 | 10 | 1.12 | 1.11 | 724. |

OVN

SUB-AREA RUNOFF COMPUTATION

PROBABLE MAXIMUM 24-HOUR PRECIPITATION (SOUTH RE

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1 21 30. 1 0
1 21 40. 1 0
1 21 50. 1 0
1 21 60. 1 0
1 22 10. 1 0
1 22 20. 1 0
1 22 30. 1 0
1 22 40. 1 0
1 22 50. 1 0
1 22 60. 1 0
1 23 10. 1 0
1 23 20. 1 0
1 23 30. 1 0
1 23 40. 1 0
1 23 50. 1 0
1 23 60. 1 0

OVF

STATION 2

INFLOW, OUTFLOW AND OBSERVED FLOW

400.

800.

1200.

1600.

2000.

2400.

2800.

3200.

3600.

4000.

1 0 101

1 0 201

1 0 301

1 0 401

1 0 501

1 1 101

1 1 201

1 1 301

1 1 401

1 1 501

1 2 101

1 2 201

1 2 301

1 2 401

1 2 501

1 3 101

1 3 201

1 3 301

1 3 401

1 3 501

1 4 101

1 4 201

1 4 301

1 4 401

1 4 501

1 5 101

1 5 201

1 5 301

1 5 401

1 5 501

1 6 101

1 6 201

1 6 301

1 6 401

1 6 501

1 7 101

1 7 201

1 7 301

1 7 401

1 7 501

1 8 101

1 8 201

1 8 301

1 8 401

1 8 501

1 9 101

1 9 201

1 9 301

1 9 401

1 9 501

1 0 101

1 0 201

1 0 301

1 0 401

1 0 501

1 1 101

1 1 201

1 1 301

1 1 401

1 1 501

| | | | |
|---------|-------|-------|-------|
| 1 17 00 | 1104. | 1050. | 1996. |
| 1 18 10 | 1101. | 1721. | 1714. |
| 1 18 20 | 1158. | 1647. | 1825. |
| 1 18 30 | 1155. | 1539. | 1730. |
| 1 18 40 | 1152. | 1425. | 1628. |
| 1 18 50 | 1148. | 1305. | 1520. |
| 1 18 00 | 1144. | 1177. | 1406. |
| 1 19 10 | 1140. | 1046. | 1286. |
| 1 19 20 | 1136. | 915. | 1162. |
| 1 19 30 | 1131. | 784. | 1030. |
| 1 19 40 | 1127. | 675. | 917. |
| 1 19 50 | 1123. | 575. | 803. |
| 1 19 00 | 1120. | 491. | 699. |
| 1 20 10 | 1116. | 420. | 606. |
| 1 20 20 | 1113. | 359. | 555. |
| 1 20 30 | 1110. | 307. | 531. |
| 1 20 40 | 1107. | 263. | 507. |
| 1 20 50 | 1103. | 226. | 481. |
| 1 20 00 | 1099. | 194. | 455. |
| 1 21 10 | 1095. | 168. | 429. |
| 1 21 20 | 1092. | 145. | 403. |
| 1 21 30 | 1088. | 125. | 381. |
| 1 21 40 | 1084. | 107. | 367. |
| 1 21 50 | 1081. | 92. | 354. |
| 1 22 00 | 1077. | 79. | 340. |
| 1 22 10 | 1073. | 68. | 326. |
| 1 22 20 | 1070. | 59. | 313. |
| 1 22 30 | 1066. | 52. | 300. |
| 1 22 40 | 1063. | 46. | 287. |
| 1 22 50 | 1059. | 42. | 277. |
| 1 23 00 | 1056. | 38. | 267. |
| 1 23 10 | 1053. | 35. | 257. |
| 1 23 20 | 1050. | 32. | 248. |
| 1 23 30 | 1047. | 30. | 238. |
| 1 23 40 | 1044. | 29. | 230. |
| 1 23 50 | 1041. | 27. | 221. |
| 1 24 00 | 1039. | 26. | 213. |

SUM

58046.

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|--------|--------|---------|---------|--------------|
| 2528. | 1372. | 403. | 403. | 58046. |
| CFS | 6.97 | 8.20 | 8.20 | |
| INCHES | 680. | 800. | 800. | |
| AC-FT | | | | |

| | | | |
|---------|-------|-------|-------|
| 1 7 10 | 944. | 23. | 1. |
| 1 7 20 | 945. | 43. | 1. |
| 1 7 30 | 945. | 53. | 2. |
| 1 7 40 | 946. | 63. | 2. |
| 1 7 50 | 947. | 71. | 3. |
| 1 7 60 | 948. | 78. | 4. |
| 1 7 70 | 949. | 84. | 5. |
| 1 7 80 | 950. | 89. | 6. |
| 1 7 90 | 950. | 94. | 7. |
| 1 8 00 | 952. | 94. | 7. |
| 1 8 10 | 953. | 97. | 8. |
| 1 8 20 | 954. | 100. | 9. |
| 1 8 30 | 955. | 103. | 10. |
| 1 8 40 | 955. | 103. | 10. |
| 1 8 50 | 957. | 105. | 12. |
| 1 8 60 | 958. | 107. | 14. |
| 1 8 70 | 959. | 109. | 17. |
| 1 8 80 | 961. | 110. | 20. |
| 1 8 90 | 962. | 111. | 22. |
| 1 9 00 | 963. | 112. | 25. |
| 1 9 10 | 964. | 113. | 27. |
| 1 9 20 | 965. | 114. | 30. |
| 1 9 30 | 967. | 115. | 32. |
| 1 9 40 | 968. | 115. | 34. |
| 1 9 50 | 969. | 116. | 37. |
| 1 9 60 | 970. | 116. | 39. |
| 1 9 70 | 971. | 116. | 41. |
| 1 9 80 | 972. | 117. | 43. |
| 1 9 90 | 973. | 117. | 45. |
| 1 10 00 | 974. | 117. | 47. |
| 1 10 10 | 975. | 117. | 49. |
| 1 10 20 | 976. | 117. | 51. |
| 1 10 30 | 977. | 119. | 53. |
| 1 10 40 | 978. | 127. | 55. |
| 1 10 50 | 979. | 146. | 58. |
| 1 10 60 | 981. | 178. | 61. |
| 1 10 70 | 983. | 224. | 68. |
| 1 10 80 | 986. | 284. | 72. |
| 1 10 90 | 990. | 353. | 80. |
| 1 11 00 | 994. | 430. | 90. |
| 1 11 10 | 1000. | 510. | 101. |
| 1 11 20 | 1007. | 588. | 115. |
| 1 11 30 | 1014. | 660. | 136. |
| 1 11 40 | 1022. | 726. | 150. |
| 1 11 50 | 1030. | 788. | 157. |
| 1 12 00 | 1039. | 846. | 214. |
| 1 12 10 | 1044. | 903. | 243. |
| 1 12 20 | 1058. | 959. | 273. |
| 1 12 30 | 1068. | 1014. | 308. |
| 1 12 40 | 1073. | 1057. | 346. |
| 1 12 50 | 1089. | 1125. | 385. |
| 1 13 00 | 1100. | 1198. | 458. |
| 1 13 10 | 1111. | 1298. | 535. |
| 1 13 20 | 1121. | 1430. | 753. |
| 1 13 30 | 1131. | 1546. | 1034. |
| 1 13 40 | 1140. | 1793. | 1287. |
| 1 13 50 | 1149. | 2008. | 1528. |
| 1 14 00 | 1156. | 2217. | 1751. |
| 1 14 10 | 1163. | 2341. | 1969. |
| 1 14 20 | 1169. | 2510. | 2207. |
| 1 14 30 | 1172. | 2561. | 2477. |
| 1 14 40 | 1173. | 2544. | 2528. |
| 1 14 50 | 1172. | 2476. | 2407. |
| 1 15 00 | 1171. | 2366. | 2395. |
| 1 15 10 | 1170. | 2235. | 2273. |
| 1 15 20 | 1168. | 2100. | 2141. |

1 20 40.1
1 20 50.1
1 20 60.1
1 21 10.1
1 21 20.1
1 21 30.1
1 21 40.1
1 21 50.1
1 21 60.1
1 22 10.1
1 22 20.1
1 22 30.1
1 22 40.1
1 22 50.1
1 22 60.1
1 23 10.1
1 23 20.1
1 23 30.1
1 23 40.1
1 23 50.1
1 23 60.1

OVN

COMBINE HYDROGRAPHS

COMBINED NORTH RESERVOIR OUTFLOW AND SOUTH RESERVOIR

ISTAQ ICGMP IECON ICAPE JPLT JPRT INAME

4 2 0 0 0 0 0 1

| SUM OF 2 HYDROGRAPHS AT | | | | | | | | | |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0. | 0. | 0. | 1. | 1. | 1. | 1. | 1. | 1. | 1. |
| 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. |
| 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. |
| 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. | 1. |
| 17. | 22. | 25. | 27. | 29. | 31. | 32. | 32. | 32. | 32. |
| 37. | 38. | 39. | 40. | 42. | 45. | 48. | 48. | 50. | 50. |
| 58. | 60. | 63. | 65. | 67. | 69. | 72. | 72. | 72. | 72. |
| 80. | 82. | 88. | 104. | 132. | 170. | 210. | 210. | 245. | 301. |
| 330. | 359. | 393. | 423. | 464. | 502. | 544. | 544. | 589. | 688. |
| 746. | 865. | 1015. | 1335. | 1717. | 2052. | 2340. | 2340. | 2569. | 2892. |
| 3073. | 3350. | 2955. | 2821. | 2663. | 2500. | 2358. | 2310. | 2209. | 2093. |
| 1958. | 1809. | 1654. | 1501. | 1354. | 1212. | 1075. | 942. | 825. | 716. |
| 620. | 565. | 541. | 516. | 490. | 463. | 436. | 411. | 388. | 372. |
| 351. | 347. | 334. | 321. | 308. | 295. | 284. | 274. | 264. | 255. |
| 245. | 237. | 229. | 223. | 208. | 195. | 184. | 174. | 164. | 155. |

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
|-----------|--------|---------|---------|--------------|
| CFS 3073. | 1695. | 516. | 516. | 74279. |
| INCHES | 8.92 | 8.42 | 8.42 | 8.42 |
| AC-FT | 841. | 1024. | 1024. | 1024. |

1 9 40.1
1 9 50.1
1 9 60.1
1 10 10.1
1 10 20.1
1 10 30.1
1 10 40.1
1 10 50.1
1 10 60.1
1 11 10.1
1 11 20.1
1 11 30.1
1 11 40.1
1 11 50.1
1 11 60.1
1 12 10.1
1 12 20.1
1 12 30.1
1 12 40.1
1 12 50.1
1 12 60.1
1 13 10.1
1 13 20.1
1 13 30.1
1 13 40.1
1 13 50.1
1 13 60.1
1 14 10.1
1 14 20.1
1 14 30.1
1 14 40.1
1 14 50.1
1 14 60.1
1 15 10.1
1 15 20.1
1 15 30.1
1 15 40.1
1 15 50.1
1 15 60.1
1 16 10.1
1 16 20.1
1 16 30.1
1 16 40.1
1 16 50.1
1 16 60.1
1 17 10.1
1 17 20.1
1 17 30.1
1 17 40.1
1 17 50.1
1 17 60.1
1 18 10.1
1 18 20.1
1 18 30.1
1 18 40.1
1 18 50.1
1 18 60.1
1 19 10.1
1 19 20.1
1 19 30.1
1 19 40.1
1 19 50.1
1 19 60.1
1 20 10.1
1 20 20.1

1 20 40.
1 21 50.
1 20 60.
1 21 10.
1 21 20.
1 21 30.
1 21 40.
1 21 50.
1 21 60.
1 22 10.
1 22 20.
1 22 30.
1 22 40.
1 22 50.
1 22 60.
1 23 10.
1 23 20.
1 23 30.
1 23 40.
1 23 50.
1 23 60.

HYDROGRAPH ROUTING

ISTAQ 5 ICOMP 1 IECON 0 ITAPE 0 JPLT 0 JPRY 0 INAME 1

ROUTING DATA
VLOSS 0.0 CLGSS 0.0 IRES 1 ISAME 0

NSTPS 0 NSTOL 0 LAG 0 AMSKK 0.0 X 0.0 TSK STORA -1.

STORAGE# 322. 0. 417. 0. 451. 55. 458. 125. 475. 210. 492. 509. 543. 560.
OUTFLOW# 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.

TIME EGP STOR

| TIME | EGP | STOR | AVG IN | EGP OUT |
|--------|------|------|--------|---------|
| 1 0 10 | 417. | 0. | 0. | 0. |
| 1 0 20 | 417. | 0. | 0. | 0. |
| 1 0 30 | 417. | 0. | 0. | 0. |
| 1 0 40 | 417. | 0. | 0. | 0. |
| 1 0 50 | 417. | 1. | 1. | 0. |
| 1 1 00 | 417. | 1. | 1. | 0. |
| 1 1 10 | 417. | 1. | 1. | 0. |
| 1 1 20 | 417. | 1. | 1. | 0. |
| 1 1 30 | 417. | 1. | 1. | 0. |
| 1 1 40 | 417. | 1. | 1. | 0. |
| 1 1 50 | 417. | 1. | 1. | 0. |
| 1 1 60 | 417. | 1. | 1. | 0. |
| 1 2 10 | 417. | 1. | 1. | 0. |
| 1 2 20 | 417. | 1. | 1. | 0. |
| 1 2 30 | 417. | 1. | 1. | 0. |
| 1 2 40 | 417. | 1. | 1. | 0. |
| 1 2 50 | 417. | 1. | 1. | 0. |
| 1 3 10 | 417. | 1. | 1. | 1. |
| 1 3 20 | 417. | 1. | 1. | 1. |
| 1 3 30 | 417. | 1. | 1. | 1. |
| 1 3 40 | 417. | 1. | 1. | 1. |
| 1 3 50 | 417. | 1. | 1. | 1. |
| 1 4 10 | 417. | 1. | 1. | 1. |
| 1 4 20 | 417. | 1. | 1. | 1. |
| 1 4 30 | 417. | 1. | 1. | 1. |
| 1 4 40 | 417. | 1. | 1. | 1. |
| 1 4 50 | 417. | 1. | 1. | 1. |
| 1 5 10 | 417. | 1. | 1. | 1. |
| 1 5 20 | 417. | 1. | 1. | 1. |
| 1 5 30 | 417. | 1. | 1. | 1. |
| 1 5 40 | 417. | 1. | 1. | 1. |
| 1 5 50 | 417. | 1. | 1. | 1. |
| 1 6 10 | 417. | 2. | 2. | 1. |
| 1 6 20 | 417. | 3. | 3. | 1. |
| 1 6 30 | 418. | 6. | 6. | 1. |
| 1 6 40 | 418. | 10. | 10. | 1. |

| | | | | | |
|---|----|----|------|------|------|
| 1 | 1 | 20 | 419. | 40. | 5. |
| 1 | 7 | 30 | 419. | 28. | 5. |
| 1 | 7 | 40 | 419. | 30. | 5. |
| 1 | 7 | 50 | 420. | 32. | 6. |
| 1 | 8 | 10 | 420. | 33. | 7. |
| 1 | 8 | 20 | 421. | 34. | 8. |
| 1 | 8 | 30 | 421. | 35. | 9. |
| 1 | 8 | 40 | 422. | 36. | 10. |
| 1 | 8 | 50 | 422. | 37. | 10. |
| 1 | 9 | 10 | 422. | 38. | 11. |
| 1 | 9 | 20 | 422. | 39. | 11. |
| 1 | 9 | 30 | 422. | 40. | 12. |
| 1 | 9 | 40 | 423. | 41. | 13. |
| 1 | 9 | 50 | 423. | 42. | 13. |
| 1 | 10 | 10 | 424. | 43. | 14. |
| 1 | 10 | 20 | 424. | 44. | 15. |
| 1 | 10 | 30 | 424. | 45. | 16. |
| 1 | 10 | 40 | 424. | 46. | 17. |
| 1 | 10 | 50 | 425. | 47. | 18. |
| 1 | 11 | 10 | 425. | 48. | 19. |
| 1 | 11 | 20 | 426. | 49. | 20. |
| 1 | 11 | 30 | 426. | 50. | 21. |
| 1 | 11 | 40 | 427. | 51. | 22. |
| 1 | 11 | 50 | 427. | 52. | 23. |
| 1 | 12 | 10 | 428. | 53. | 24. |
| 1 | 12 | 20 | 428. | 54. | 25. |
| 1 | 12 | 30 | 428. | 55. | 26. |
| 1 | 12 | 40 | 429. | 56. | 27. |
| 1 | 12 | 50 | 429. | 57. | 28. |
| 1 | 13 | 10 | 430. | 58. | 29. |
| 1 | 13 | 20 | 430. | 59. | 30. |
| 1 | 13 | 30 | 431. | 60. | 31. |
| 1 | 13 | 40 | 431. | 61. | 32. |
| 1 | 13 | 50 | 431. | 62. | 33. |
| 1 | 14 | 10 | 432. | 63. | 34. |
| 1 | 14 | 20 | 432. | 64. | 35. |
| 1 | 14 | 30 | 433. | 65. | 36. |
| 1 | 14 | 40 | 433. | 66. | 37. |
| 1 | 14 | 50 | 433. | 67. | 38. |
| 1 | 15 | 10 | 434. | 68. | 39. |
| 1 | 15 | 20 | 434. | 69. | 40. |
| 1 | 15 | 30 | 435. | 70. | 41. |
| 1 | 15 | 40 | 435. | 71. | 42. |
| 1 | 15 | 50 | 435. | 72. | 43. |
| 1 | 16 | 10 | 436. | 73. | 44. |
| 1 | 16 | 20 | 436. | 74. | 45. |
| 1 | 16 | 30 | 436. | 75. | 46. |
| 1 | 16 | 40 | 437. | 76. | 47. |
| 1 | 16 | 50 | 437. | 77. | 48. |
| 1 | 17 | 10 | 438. | 78. | 49. |
| 1 | 17 | 20 | 438. | 79. | 50. |
| 1 | 17 | 30 | 439. | 80. | 51. |
| 1 | 17 | 40 | 439. | 81. | 52. |
| 1 | 17 | 50 | 439. | 82. | 53. |
| 1 | 18 | 10 | 440. | 83. | 54. |
| 1 | 18 | 20 | 440. | 84. | 55. |
| 1 | 18 | 30 | 441. | 85. | 56. |
| 1 | 18 | 40 | 441. | 86. | 57. |
| 1 | 18 | 50 | 441. | 87. | 58. |
| 1 | 19 | 10 | 442. | 88. | 59. |
| 1 | 19 | 20 | 442. | 89. | 60. |
| 1 | 19 | 30 | 443. | 90. | 61. |
| 1 | 19 | 40 | 443. | 91. | 62. |
| 1 | 19 | 50 | 443. | 92. | 63. |
| 1 | 20 | 10 | 444. | 93. | 64. |
| 1 | 20 | 20 | 444. | 94. | 65. |
| 1 | 20 | 30 | 445. | 95. | 66. |
| 1 | 20 | 40 | 445. | 96. | 67. |
| 1 | 20 | 50 | 445. | 97. | 68. |
| 1 | 21 | 10 | 446. | 98. | 69. |
| 1 | 21 | 20 | 446. | 99. | 70. |
| 1 | 21 | 30 | 447. | 100. | 71. |
| 1 | 21 | 40 | 447. | 101. | 72. |
| 1 | 21 | 50 | 447. | 102. | 73. |
| 1 | 22 | 10 | 448. | 103. | 74. |
| 1 | 22 | 20 | 448. | 104. | 75. |
| 1 | 22 | 30 | 449. | 105. | 76. |
| 1 | 22 | 40 | 449. | 106. | 77. |
| 1 | 22 | 50 | 449. | 107. | 78. |
| 1 | 23 | 10 | 450. | 108. | 79. |
| 1 | 23 | 20 | 450. | 109. | 80. |
| 1 | 23 | 30 | 451. | 110. | 81. |
| 1 | 23 | 40 | 451. | 111. | 82. |
| 1 | 23 | 50 | 451. | 112. | 83. |
| 1 | 24 | 10 | 452. | 113. | 84. |
| 1 | 24 | 20 | 452. | 114. | 85. |
| 1 | 24 | 30 | 453. | 115. | 86. |
| 1 | 24 | 40 | 453. | 116. | 87. |
| 1 | 24 | 50 | 453. | 117. | 88. |
| 1 | 25 | 10 | 454. | 118. | 89. |
| 1 | 25 | 20 | 454. | 119. | 90. |
| 1 | 25 | 30 | 455. | 120. | 91. |
| 1 | 25 | 40 | 455. | 121. | 92. |
| 1 | 25 | 50 | 455. | 122. | 93. |
| 1 | 26 | 10 | 456. | 123. | 94. |
| 1 | 26 | 20 | 456. | 124. | 95. |
| 1 | 26 | 30 | 457. | 125. | 96. |
| 1 | 26 | 40 | 457. | 126. | 97. |
| 1 | 26 | 50 | 457. | 127. | 98. |
| 1 | 27 | 10 | 458. | 128. | 99. |
| 1 | 27 | 20 | 458. | 129. | 100. |
| 1 | 27 | 30 | 459. | 130. | 101. |
| 1 | 27 | 40 | 459. | 131. | 102. |
| 1 | 27 | 50 | 459. | 132. | 103. |
| 1 | 28 | 10 | 460. | 133. | 104. |
| 1 | 28 | 20 | 460. | 134. | 105. |
| 1 | 28 | 30 | 461. | 135. | 106. |
| 1 | 28 | 40 | 461. | 136. | 107. |
| 1 | 28 | 50 | 461. | 137. | 108. |
| 1 | 29 | 10 | 462. | 138. | 109. |
| 1 | 29 | 20 | 462. | 139. | 110. |
| 1 | 29 | 30 | 463. | 140. | 111. |
| 1 | 29 | 40 | 463. | 141. | 112. |
| 1 | 29 | 50 | 463. | 142. | 113. |
| 1 | 30 | 10 | 464. | 143. | 114. |
| 1 | 30 | 20 | 464. | 144. | 115. |
| 1 | 30 | 30 | 465. | 145. | 116. |
| 1 | 30 | 40 | 465. | 146. | 117. |
| 1 | 30 | 50 | 465. | 147. | 118. |
| 1 | 31 | 10 | 466. | 148. | 119. |
| 1 | 31 | 20 | 466. | 149. | 120. |
| 1 | 31 | 30 | 467. | 150. | 121. |
| 1 | 31 | 40 | 467. | 151. | 122. |
| 1 | 31 | 50 | 467. | 152. | 123. |
| 1 | 32 | 10 | 468. | 153. | 124. |
| 1 | 32 | 20 | 468. | 154. | 125. |
| 1 | 32 | 30 | 469. | 155. | 126. |
| 1 | 32 | 40 | 469. | 156. | 127. |
| 1 | 32 | 50 | 469. | 157. | 128. |
| 1 | 33 | 10 | 470. | 158. | 129. |
| 1 | 33 | 20 | 470. | 159. | 130. |
| 1 | 33 | 30 | 471. | 160. | 131. |
| 1 | 33 | 40 | 471. | 161. | 132. |
| 1 | 33 | 50 | 471. | 162. | 133. |
| 1 | 34 | 10 | 472. | 163. | 134. |
| 1 | 34 | 20 | 472. | 164. | 135. |
| 1 | 34 | 30 | 473. | 165. | 136. |
| 1 | 34 | 40 | 473. | 166. | 137. |
| 1 | 34 | 50 | 473. | 167. | 138. |
| 1 | 35 | 10 | 474. | 168. | 139. |
| 1 | 35 | 20 | 474. | 169. | 140. |
| 1 | 35 | 30 | 475. | 170. | 141. |
| 1 | 35 | 40 | 475. | 171. | 142. |
| 1 | 35 | 50 | 475. | 172. | 143. |
| 1 | 36 | 10 | 476. | 173. | 144. |
| 1 | 36 | 20 | 476. | 174. | 145. |
| 1 | 36 | 30 | 477. | 175. | 146. |
| 1 | 36 | 40 | 477. | 176. | 147. |
| 1 | 36 | 50 | 477. | 177. | 148. |
| 1 | 37 | 10 | 478. | 178. | 149. |
| 1 | 37 | 20 | 478. | 179. | 150. |
| 1 | 37 | 30 | 479. | 180. | 151. |
| 1 | 37 | 40 | 479. | 181. | 152. |
| 1 | 37 | 50 | 479. | 182. | 153. |
| 1 | 38 | 10 | 480. | 183. | 154. |
| 1 | 38 | 20 | 480. | 184. | 155. |
| 1 | 38 | 30 | 481. | 185. | 156. |
| 1 | 38 | 40 | 481. | 186. | 157. |
| 1 | 38 | 50 | 481. | 187. | 158. |
| 1 | 39 | 10 | 482. | 188. | 159. |
| 1 | 39 | 20 | 482. | 189. | 160. |
| 1 | 39 | 30 | 483. | 190. | 161. |
| 1 | 39 | 40 | 483. | 191. | 162. |
| 1 | 39 | 50 | 483. | 192. | 163. |
| 1 | 40 | 10 | 484. | 193. | 164. |
| 1 | 40 | 20 | 484. | 194. | 165. |
| 1 | 40 | 30 | 485. | 195. | 166. |
| 1 | 40 | 40 | 485. | 196. | 167. |
| 1 | 40 | 50 | 485. | 197. | 168. |
| 1 | 41 | 10 | 486. | 198. | 169. |
| 1 | 41 | 20 | 486. | 199. | 170. |
| 1 | 41 | 30 | 487. | 200. | 171. |
| 1 | 41 | 40 | 487. | 201. | 172. |
| 1 | 41 | 50 | 487. | 202. | 173. |
| 1 | 42 | 10 | 488. | 203. | 174. |
| 1 | 42 | 20 | 488. | 204. | 175. |
| 1 | 42 | 30 | 489. | 205. | 176. |
| 1 | 42 | 40 | 489. | 206. | 177. |
| 1 | 42 | 50 | 489. | 207. | 178. |
| 1 | 43 | 10 | 490. | 208. | 179. |
| 1 | 43 | 20 | 490. | 209. | 180. |
| 1 | 43 | 30 | 491. | 210. | 181. |
| 1 | 43 | 40 | 491. | 211. | 182. |
| 1 | 43 | 50 | 491. | 212. | 183. |
| 1 | 44 | 10 | 492. | 213. | 184. |
| 1 | 44 | 20 | 492. | 214. | 185. |
| 1 | 44 | 30 | 493. | 215. | 186. |
| 1 | 44 | 40 | 493. | 216. | 187. |
| 1 | 44 | 50 | 493. | 217. | 188. |
| 1 | 45 | 10 | 494. | 218. | 189. |
| 1 | 45 | 20 | 494. | 219. | 190. |
| 1 | 45 | 30 | 495. | 220. | 191. |
| 1 | 45 | 40 | 495. | 221. | 192. |
| 1 | 45 | 50 | 495. | 222. | 193. |
| 1 | 46 | 10 | 496. | 223. | 194. |
| 1 | 46 | 20 | 496. | 224. | 195. |
| 1 | 46 | 30 | 497. | 225. | 196. |
| 1 | 46 | 40 | 497. | 226. | 197. |
| 1 | 46 | 50 | 497. | 227. | 198. |
| 1 | 47 | 10 | 498. | 228. | 199. |
| 1 | 47 | 20 | 498. | 229. | 200. |
| 1 | 47 | 30 | 499. | 230. | 201. |
| 1 | 47 | 40 | 499. | 231. | 202. |
| 1 | 47 | 50 | 499. | 232. | 203. |
| 1 | 48 | 10 | 500. | 233. | 204. |
| 1 | 48 | 20 | 500. | 234. | 205. |
| 1 | 48 | 30 | 501. | 235. | 206. |
| 1 | 48 | 40 | 501. | 236. | 207. |
| 1 | 48 | 50 | 501. | 237. | 208. |
| 1 | 49 | 10 | 502. | 238. | 209. |
| 1 | 49 | 20 | 502. | 239. | 210. |
| 1 | 49 | 30 | 503. | 240. | 211. |
| 1 | 49 | 40 | 503. | 241. | 212. |
| 1 | 49 | 50 | 503. | 242. | 213. |
| 1 | 50 | 10 | 504. | 243. | 214. |
| 1 | 50 | 20 | 504. | 244. | 215. |
| 1 | 50 | 30 | 505. | 245. | 216. |
| 1 | 50 | 40 | 505. | 246. | 217. |
| 1 | 50 | 50 | 505. | 247. | 218. |
| 1 | 51 | 10 | 506. | 248. | 219. |
| 1 | 51 | 20 | 506. | 249. | 220. |
| 1 | 51 | 30 | 507. | 250. | 221. |
| 1 | 51 | 40 | 507. | 251. | 222. |
| 1 | 51 | 50 | 507. | 252. | 223. |
| 1 | 52 | 10 | 508. | 253. | 224. |
| 1 | 52 | 20 | 508. | 254. | 225. |
| 1 | 52 | 30 | 509. | 255. | 226. |
| 1 | 52 | 40 | 509. | 256. | 227. |
| 1 | 52 | 50 | 509. | 257. | 228. |
| 1 | 53 | 10 | 510. | 258. | 229. |
| 1 | 53 | 20 | 510. | 259. | 230. |
| 1 | 53 | 30 | 511. | 260. | 231. |
| 1 | 53 | 40 | 511. | 261. | 232. |
| 1 | 53 | 50 | 511. | 262. | 233. |
| 1 | 54 | 10 | 512. | 263. | 234. |
| 1 | 54 | 20 | 512. | 264. | 235. |
| 1 | 54 | 30 | 513. | 265. | 236. |
| 1 | 54 | 40 | 513. | 266. | 237. |
| 1 | 54 | 50 | 513. | 267. | 238. |
| 1 | 55 | 10 | 514. | 268. | 239. |
| 1 | 55 | 20 | 514. | 269. | 240. |
| 1 | 55 | 30 | 515. | 270. | 241. |
| 1 | 55 | 40 | 515. | 271. | 242. |
| 1 | 55 | 50 | 515. | 272. | 243. |
| 1 | 56 | 10 | 516. | 273. | 244. |
| 1 | 56 | 20 | 516. | 274. | 245. |
| 1 | 56 | 30 | 517. | 275. | 246. |
| 1 | 56 | 40 | 517. | 276. | 247. |
| 1 | 56 | 50 | 517. | 277. | 248. |
| 1 | 57 | 10 | 518. | 278. | 249. |
| 1 | 57 | 20 | 518. | 279. | 250. |
| 1 | 57 | 30 | 519. | 280. | 251. |
| 1 | 57 | 40 | 519. | 281. | 252. |
| 1 | 57 | 50 | 519. | 282. | 253. |
| 1 | 58 | 10 | 520. | 283. | 254. |
| 1 | 58 | 20 | 520. | 284. | 255. |
| 1 | 58 | 30 | 521. | 285. | 256. |
| 1 | 58 | 40 | 521. | 286. | 257. |
| 1 | 58 | 50 | 521. | 287. | 258. |
| 1 | 59 | 10 | 522. | 288. | 259. |
| 1 | 59 | 20 | 522. | 289. | 260. |
| 1 | 59 | 30 | | | |

| | | | |
|---------|--------|-------|-------|
| 1 18 30 | 523. | 2025. | 2057. |
| 1 18 45 | 521. | 1893. | 1919. |
| 1 18 50 | 520. | 1731. | 1770. |
| 1 18 55 | 518. | 1578. | 1617. |
| 1 19 10 | 516. | 1428. | 1467. |
| 1 19 20 | 515. | 1283. | 1321. |
| 1 19 30 | 513. | 1144. | 1180. |
| 1 19 40 | 512. | 1010. | 1045. |
| 1 19 50 | 511. | 885. | 918. |
| 1 19 55 | 509. | 770. | 801. |
| 1 20 10 | 508. | 668. | 738. |
| 1 20 20 | 506. | 593. | 642. |
| 1 20 30 | 505. | 553. | 649. |
| 1 20 40 | 503. | 529. | 612. |
| 1 20 50 | 502. | 503. | 578. |
| 1 21 00 | 501. | 476. | 546. |
| 1 21 10 | 500. | 450. | 516. |
| 1 21 20 | 499. | 423. | 487. |
| 1 21 30 | 498. | 400. | 460. |
| 1 21 40 | 497. | 382. | 436. |
| 1 21 50 | 496. | 368. | 415. |
| 1 21 55 | 495. | 354. | 396. |
| 1 22 10 | 495. | 341. | 379. |
| 1 22 20 | 494. | 327. | 363. |
| 1 22 30 | 493. | 314. | 348. |
| 1 22 40 | 493. | 301. | 333. |
| 1 22 50 | 492. | 290. | 320. |
| 1 22 55 | 492. | 279. | 309. |
| 1 23 10 | 491. | 269. | 306. |
| 1 23 20 | 491. | 260. | 303. |
| 1 23 30 | 490. | 251. | 298. |
| 1 23 40 | 489. | 242. | 294. |
| 1 23 50 | 488. | 233. | 289. |
| 1 23 55 | 488. | 225. | 284. |
| SUM | 65185. | | |

| | | | | |
|--------|--------|---------|---------|--------------|
| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL VOLUME |
| 3060. | 1665. | 480. | 480. | 65185. |
| GFS | 6-dl | 7.84 | 7.84 | 7.84 |
| INCHES | 828. | 953. | 953. | 953. |
| AC-FT | | | | |

INFLOW, OUTFLOW AND OBSERVED FLOW

800.

1200.

1600.

2000.

2400.

2800.

3200.

3600.

4000.

4400.

4800.

5200.

5600.

6000.

6400.

6800.

7200.

1 0 101

1 0 201

1 0 301

1 0 401

1 0 501

1 0 601

1 1 101

1 1 201

1 1 301

1 1 401

1 1 501

1 1 601

1 2 101

1 2 201

1 2 301

1 2 401

1 2 501

1 2 601

1 3 101

1 3 201

1 3 301

1 3 401

1 3 501

1 3 601

1 4 101

1 4 201

1 4 301

1 4 401

1 4 501

1 4 601

1 5 101

1 5 201

1 5 301

1 5 401

1 5 501

1 5 601

1 5 101

1 6 201

1 6 301

1 6 401

1 6 501

1 6 601

1 7 101

1 7 201

1 7 301

1 7 401

1 7 501

1 7 601

1 8 101

1 8 201

1 8 301

1 8 401

1 8 501

1 8 601

1 9 101

1 9 201

[illegible]

1 21 50. 10
1 21 60. 10
1 22 10. 1.
1 22 20. 10.
1 22 30. 10.
1 22 40. 1.
1 22 50. 10.
1 22 60. 10.
1 23 10. 10.
1 23 20. 10.
1 23 30. 10.
1 23 40. 10.
1 23 50. 10.
1 23 60. 10.

| | HYDROGRAPH AT | FEAR | STATION | STATION | STATION | STATION |
|---------------|---------------|-------|---------|---------|---------|---------|
| ROUTED TO | 1 | 2568. | 1525. | 451. | 451. | 1.83 |
| HYDROGRAPH AT | 2 | 2528. | 1372. | 403. | 403. | 1.83 |
| 2 COMBINED | 3 | 812. | 394. | 113. | 113. | 0.45 |
| ROUTED TO | 4 | 3073. | 1695. | 516. | 516. | 4.28 |
| | 5 | 3060. | 1669. | 480. | 480. | 4.28 |

APPENDIX E

Information as Contained in the National Inventory of Dams

