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KIMBALL (L ROBERT) AND ASSOCIATES EBENSBURG PA  
NATIONAL DAM INSPECTION PROGRAM. LAKE SHERIDAN DAM (NDS-ID NUMB--ETC(U)  
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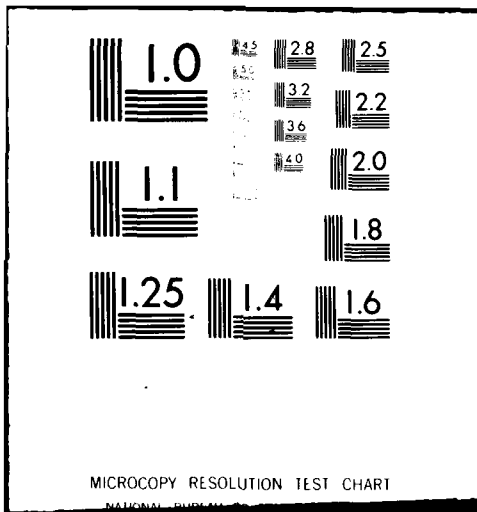
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SUSQUEHANNA RIVER BASIN  
LAKE SHERIDAN OUTLET, WYOMING COUNTY

PENNSYLVANIA

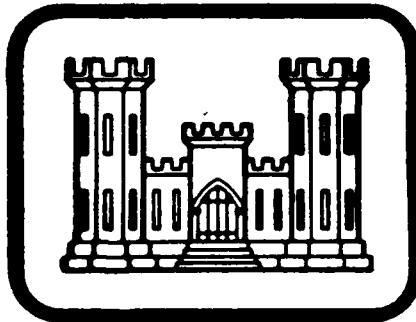
**LAKE SHERIDAN DAM**

NDS ID NO. PA-744

DER ID NO. 66-45

LAKE SHERIDAN COTTAGERS ASSOCIATION

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM



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✓ DAC W31-80-C-0020

Prepared By

L. ROBERT KIMBALL & ASSOCIATES  
CONSULTING ENGINEERS & ARCHITECTS  
EBENSBURG, PENNSYLVANIA  
15931

FOR

DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT CORPS OF ENGINEERS  
BALTIMORE, MARYLAND  
21203

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SUSQUEHANNA RIVER BASIN  
LAKE SHERIDAN OUTLET, WYOMING COUNTY

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PENNSYLVANIA  
**LAKE SHERIDAN DAM**

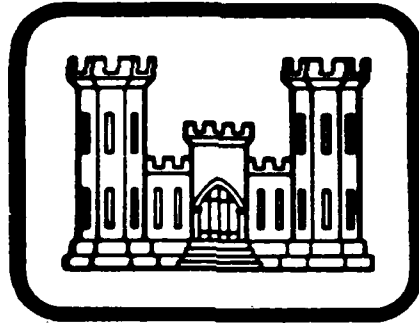
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~~LAKE SHERIDAN COTTAGERS ASSOCIATION~~

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

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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 a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. 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 frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design 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.

Availability Codes

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Availability Codes

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PHASE I REPORT  
NATIONAL DAM INSPECTION REPORT

NAME OF DAM	Lake Sheridan Dam
STATE LOCATED	Pennsylvania
COUNTY LOCATED	Wyoming
STREAM	Lake Sheridan outlet (unnamed tributary to the south branch of the Tunkhannock Creek)
DATE OF INSPECTION	April 10, 1980

ASSESSMENT

The assessment of Lake Sheridan Dam is based upon visual observation at the time of inspection, review of available data, hydraulic and hydrologic analysis.

In general, the dam appears to be in good condition. Lake Sheridan Dam is a high hazard-small size dam. The spillway design flood for this dam is the 1/2 PMF to PMF. The spillway design flood was selected as the PMF (probable maximum flood) based on the downstream potential for loss of life and property damage. The spillway is capable of controlling only 2% of the PMF. Based on criteria established by the Corps of Engineers, the spillway is termed inadequate. Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of overtopping that can be safely controlled is unknown. In this case the amount of overtopping is directly related to the structural stability of the dam. No visible seepage or other obvious deficiencies affecting the stability of the dam were noted during the inspection.

The following recommendations and remedial measures should be instituted immediately.

1. A structural stability analysis should be conducted to determine the amount of overtopping that can be safely controlled by the dam. In the event that the dam cannot safely control the SDF a hydrologic and hydraulic study in conjunction with structure stability analysis should be conducted to increase the spillway capacity. The studies should be conducted by a professional engineer knowledgeable in dam design.

2. It should be determined if the drainline and valves are operable and in good condition. The valve mechanism for the dam should be operated and lubricated on a regular basis.

3. An investigation should be conducted to determine if a warning system for this dam is in operation and if not one should be implemented.

LAKE SHERIDAN DAM  
PA 744

4. Regular safety inspections should be conducted in accordance with provisions stipulated by the Commonwealth of Pennsylvania regarding the inspection of dams.



L. ROBERT KIMBALL & ASSOCIATES  
CONSULTING ENGINEERS AND ARCHITECTS

*R. Jeffrey Kimball*

Date

R. Jeffrey Kimball, P.E.

APPROVED BY:

*15 August 80* *James W. Peck*

Date

JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer



Overview of Lake Sheridan Dam



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PHASE I  
NATIONAL DAM INSPECTION PROGRAM  
LAKE SHERIDAN DAM  
NDI. I.D. NO. PA 744  
DER I.D. NO. 66-45

SECTION 1  
PROJECT INFORMATION

1.1 General.

a. Authority. The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Lake Sheridan Dam is a rubble masonry and concrete gravity dam. The dam is 89 feet long and 9 feet high. The intercore of the dam consists of the original rubble masonry construction. The concrete portion of the dam was added during the 1966 modifications. The dam consists of an overflow and a non-overflow section. The downstream slope of the non-overflow section is less than .5H:1V. The majority of the downstream face of the non-overflow section is buttressed by the stream banks. The upstream slope of the concrete cap section (non overflow) of the dam is less than .5H:1V. The upstream slope of the original rubble masonry construction could not be determined. The non-overflow section of the dam is enclosed by a steel chain linked fence.

The overflow section of the dam serves as the normal spillway for the reservoir. The crest length of the spillway is 40 feet. A reservoir drain valve is located on the upstream end of the right non-overflow section. The valve controls the drainline which extends through the overflow section of the dam and outlets on the downstream face of the spillway. The type, length and diameter of the pipe could not be determined.

b. Location. The dam is located on the Lake Sheridan outlet, approximately 2 miles northeast of the village of Factoryville, Wyoming County, Pennsylvania. Lake Sheridan Dam can be located on the Factoryville, U.S.G.S. 7.5 minute quadrangle.

c. Size Classification. Lake Sheridan Dam is a small size (9 feet high, 834 ac-ft).

d. Hazard Classification. Lake Sheridan Dam is a high hazard dam. Downstream conditions indicate that loss of more than a few lives is probable should the structure fail. One home is located approximately 1/2 mile downstream of the dam. The stream which serves as the outlet for the Lake Sheridan Dam passes through the village of Factoryville where it discharges into the South Branch of the Tunkhannock Creek.

e. Ownership. Lake Sheridan Dam is owned by the Lake Sheridan Cottagers Association. Correspondence should be addressed to:

Wayne Clark, President  
Lake Sheridan Cottagers Association  
Box 124 R.D. 2  
Nicholson, Pennsylvania 18416  
(717) 945-5379

f. Purpose of Dam. Lake Sheridan Dam is used for recreation.

g. Design and Construction History. Lake Sheridan Dam has a very long and complicated history. Information obtained from the PennDER files suggest that the dam was originally constructed around 1872. Other correspondence suggest that the dam was built by subscription of the Lake Sheridan Property Owners and the Nokomis Water Company. The original owner appears to be Mr. C.A. Sisk who was listed as an administrator of the estate of S.C. Mathewson. The original construction of the dam appears to have been completed for the purpose of serving as a sawmill flow pond.

Prior to 1965 when the lake was purchased by the Lake Sheridan Cottagers Association, there appears to have been an on-going struggle between several parties as per the operation and maintenance of the dam. The owner, Mr. Sisk was somewhat reluctant to maintain the structure since it had no apparent value to him. The property owners which surround Lake Sheridan were interested in the upkeep of the dam since it affected their individual properties. The Nokomis Water Company's interest in the lake appears to have been to supply water to the residents of Factoryville. Several attempts were made to repair the dam, but in all cases it appears as though the work was minimal.

The Cottagers Association obtained ownership of Lake Sheridan in 1965. Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania was retained as the engineer for the modifications to the Lake Sheridan Dam. The firm was contacted for the purposes of obtaining information for this report but a

representative of the firm was unable to supply any design information.

Review of correspondence supplied by the Pennsylvania Department of Environmental Resources indicate that the dam had a history of seepage and that the dam apparently experienced a breach in 1928. Pictures supplied by PennDER suggest that the breach was not extensive. Limited drawings which were obviously prepared by the Northeastern Engineering Company were of little value in the preparation of this report. Several notes on the drawings suggest that the original dam was to be rebuilt as per original construction and covered with a concrete cap to increase the stability of the structure. Inspection of the existing dam indicates that modifications were made to the drainline and valve control system. No information was available regarding the type of pipe, length or diameter of pipe used in the modifications, or whether the existing pipe was replaced.

h. Normal Operating Procedures. In addition to the direct runoff from the approximate two square mile drainage area of Lake Sheridan Dam, inflow to Lake Sheridan is affected by two upstream dams. Baylor's Pond appears to be a natural lake which would not affect storage or inflow to Lake Sheridan and therefore was disregarded in the analysis. Needles Lake is located below Baylor's Pond and upstream of Lake Sheridan. Its affect on Lake Sheridan is discussed in Section 5.

The association was notified of the inspection but did not send a representative. Since no personal interviews, were conducted no determination as to the operations at the dam could be made.

### 1.3 Pertinent Data.

a. Drainage Area.

2.0 mi <sup>2</sup> Uncontrolled
3.97 mi <sup>2</sup> Controlled
5.97 mi <sup>2</sup> Total

b. Discharge at Dam Site (cfs).

Maximum known flood at dam site	Unknown
Drainline capacity at normal pool	Unknown
Spillway capacity at top of dam	309 cfs

c. Elevation (U.S.G.S. Datum) (feet). - Field survey based on pool elevation 998, from U.S.G.S. 7.5 minute quadrangle.

Top of dam (non-overflow section)	999.8
Top of dam - design height	Unknown
Maximum pool - design surcharge	Unknown

Normal pool	998.0
Spillway crest	998.0
Upstream invert - drainline	Unknown
Downstream invert - drainline	Unknown
Maximum tailwater	Unknown
Toe of dam	990.6

d. Reservoir (feet).

Length of maximum pool	6000 feet
Length of normal pool	5800 feet

e. Storage (acre-feet).

Normal pool	621
Top of dam	834

f. Reservoir Surface (acres).

Top of dam	80
Normal pool	63
Spillway crest	63

g. Dam.

Type	Rubble masonry with concrete cap
Length	89 feet
Height	9 feet
Top width	7 feet
Side slopes - upstream	Less than .5H:1V
- downstream	Less than .5H:1V
Zoning	None
Impervious core	None
Cutoff	Unknown
Grout curtain	None

h. Reservoir Drain.

Type	Unknown
Length	Unknown
Closure	Gate valve
Access	Upstream (right non- overflow section)
Regulating facilities	Valve on upstream end of non-overflow section

1. Spillway.

Type  
Length  
Crest elevation  
Upstream channel  
Downstream channel

Broad crested weir  
40 feet  
998.0  
Lake (unrestricted)  
Lake Sheridan outlet

SECTION 2  
ENGINEERING DATA

2.1 Design. No information exists concerning the original structure at Lake Sheridan. The dam experienced several attempts at repair although all work appears to have been minimal. In 1966 modifications were made to the dam by the Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania. The firm was contacted for the purposes of obtaining information relative to the 1966 modifications but representatives of the firm advised that no information was available. Several drawings of the existing dam were made available by the Pennsylvania Department of Environmental Resources and these drawings contained remarks relative to the modifications by Northeastern Engineering Company.

2.2 Construction. No information exists on the construction of the dam.

2.3 Operation. No operations are known to be conducted at the dam.

2.4 Evaluation.

a. Availability. No engineering data is available for this dam. Various representatives of the Lake Sheridan Cottagers Association were contacted by mail but no response was received. Phone calls to various members failed to lead to any discussion with any present official of the association. No representatives of the association accompanied the inspection team on the inspection.

b. Adequacy. Detailed analyses cannot be made because of the lack of detailed design information. This Phase I Report is based on available data, visual observation and hydrologic and hydraulic analysis. Sufficient information exists to complete a Phase I Report.



SECTION 3  
VISUAL INSPECTION

3.1 Findings.

a. General. The onsite inspection of Lake Sheridan Dam was conducted by personnel of L. Robert Kimball and Associates on April 10, 1980. The inspection consisted of:

1. Visual inspection of the retaining structure, abutments and toe.
2. Examination of the spillway facilities, exposed portion of any outlet works and other appurtenant works.
3. Observations affecting the runoff potential of the drainage basin.
4. Evaluation of the downstream area hazard potential.

b. Dam. The dam appears to be in fair condition. From a brief survey conducted during the inspection, it was noted that the crest of the spillway and non-overflow section appeared to be level. No major problems were noted in the non-overflow section. No cracking or leaching of the concrete was observed. The observable rubble masonry section of the dam appears to be in good condition as well as the mortared joints. Only a small portion of the masonry on the downstream slope was observable. Regulating facilities for the drain valve appeared to be in fair condition. No determination as to the condition of the drainlines could be made due to spillway discharges obstructing the downstream view of the pipe. The pipe appeared to be about 24" in diameter.

c. Appurtenant Structures. The exposed portions of the regulating facilities were observed during the inspection. The facilities appeared to be in fair condition. The reservoir drain and outlet pipes are located through the structure and close observations could not be made. These pipes or valves were not observed during the inspection and were not operated.

d. Reservoir Area. The watershed area is covered mostly with woodland. Two upstream dams exist in the Lake Sheridan watershed. The uppermost lake, Baylor's Pond appears to be a natural lake. Approximately 1/2 mile upstream of Lake Sheridan is Needles Lake dam which was constructed around 1973. The watershed and reservoir slopes are moderate to steep but do not appear to be susceptible to landslides which would affect the storage volume of the reservoir or overtopping at the dams by displacing water. The hydrologic and hydraulic consequences pertaining to the upstream dams are discussed in Section 5.

e. Downstream Channel. Approximately 2 miles downstream of Lake Sheridan, the outlet stream of Lake Sheridan joins the South Branch of the Tunkhannock Creek. The outlet for Lake Sheridan Dam joins the south branch of the Tunkhannock Creek at the village of Factoryville. One home is located approximately 1/2 mile downstream of the dam.

3.2 Evaluation. In general, the dam and appurtenant structures appear to be in fair condition.

SECTION 4  
OPERATIONAL PROCEDURES

4.1 Procedures. The reservoir is maintained at the spillway crest elevation 998.0. The drain valve is located on the upstream end of the dam and could be used to drain the dam. The type, length and size of the pipe could not be determined during the inspection.

4.2 Maintenance of the Dam. No information was available as per the maintenance of the dam. Attempts to locate and discuss the operation and maintenance of the dam with an officer of the Lake Sheridan Cottagers Association have been futile.

4.3 Maintenance of Operating Facilities. No information is available as per the maintenance of the spillway or outlet works. The condition of the spillway and is considered fair.

4.4 Warning System in Effect. No determination could be made as to the existance of the warning system.

4.5 Evaluation. Evaluation of the maintenance of the dam and operating facilities could not be made. Visual observations made during the inspection indicate that maintenance at the dam is fair.

SECTION 5  
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features.

a. Design Data. No calculations or design data pertaining to the hydrology and hydraulics of the dam were available.

b. Experience Data. No rainfall, runoff or reservoir level data were available. The spillway was rebuilt as part of the 1966 modifications.

c. Visual Observations. The overflow section of the spillway appears to be in fair condition.

d. Overtopping Potential. Overtopping potential was investigated through the development of the probable maximum flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway.

The Corps of Engineers, Baltimore District, has directed that the HEC-1 Dam Safety Version systemized computer program be utilized. The program was prepared by the Hydrologic Engineering Center (HEC), U.S. Army Corps of Engineers, Davis, California, July, 1978. The major methodologies or key input data for this program are discussed briefly in Appendix D.

5.2 Evaluation Assumptions. To enable us to complete the hydraulic and hydrologic analysis for this structure, it was necessary to make the following assumptions.

1. Pool elevation prior to the storm is at spillway crest elevation 998.0.

2. The top of the non-overflow sections were considered as the top of dam.

3. Baylor's Pond, the furthestmost upstream dam of the two dams, was not considered as having an effect on the inflow to Lake Sheridan.

4. Needles Lake, located approximately 1/2 mile upstream of Lake Sheridan, was considered as having failed as part of this analysis.

5.3 Summary of Overtopping Analysis. Complete summary sheets for the computer output are presented in Appendix D.

Peak inflow (PMF)	14755 cfs
Spillway capacity (Lake Sheridan)	309 cfs

a. Spillway Adequacy Rating. The Spillway Design Flood (SDF) for this dam is the 1/2 PMF to PMF. Based on the downstream potential for loss of life and property damage, the spillway design flood for this dam was selected as the PMF. The SDF is based on the hazard and size classification of the dam and the downstream potential for loss of life. Based on the following definition provided by the Corps of Engineers, the spillway is rated as inadequate as a result of our hydrologic analysis.

Inadequate - All high hazard dams not capable of passing 50% of the spillway design flood.

The spillway and reservoir are capable of controlling approximately 2% of the PMF without overtopping the non-overflow section. A computer printout of the analysis is included in Appendix D.

Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of overtopping that can be safely controlled is unknown. In this case the amount of overtopping is directly related to the structural stability of the dam.

5.4 Summary of Dam Breach Analysis. As the subject dam cannot satisfactorily pass 50% of the PMF without failure (based on our analysis) it was necessary to perform a dam breach analysis and downstream routing of the flood wave. This analysis determined the degree of increased flooding due to dam failure.

A reservoir pool elevation of 1001.0 was considered as sufficient to cause failure of Lake Sheridan Dam. This elevation represents an overtopping of 2.1 feet and it was assumed that failure would be caused by erosion at the abutments.

The flood wave was routed downstream with and without dam failure considered. The downstream potential for loss of life and property damage is not significantly increased by dam failure. Lake Sheridan's spillway is rated as inadequate, not seriously inadequate.

SECTION 6  
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. No visible signs of instability were observed during the inspection. The observable rubble masonry section of the dam appeared to be in fair condition. No seepage was noted at the time of inspection, however water was discharging over the spillway. The concrete cap which was added as part of the 1966 modification appeared to be in good condition and no cracks were noted. Due to the lack of any structural details, no calculated stability could be determined.

The effects of overtopping of the structure on the stability are unknown since no information exists on the construction of the dam.

b. Design and Construction Data. No design data are available for this dam. No stability analysis is known to have been performed for the dam.

c. Operating Records. No operating records are known to exist.

d. Post Construction Changes. The original dam was constructed in the late 1800's. Since then and prior to 1966 several attempts had been made to upgrade the structure. It appears that the work conducted at the dam was completed to upgrade the appearance of the structure rather than improving the stability. In 1966 modifications were completed by the Northeastern Engineering Company, Clarks Summit, Pennsylvania, the construction work was completed by the M.J. Spott Construction Company, Inc. The work was initiated by the present owners, the Lake Sheridan Cottagers Association.

e. Seismic Stability. The dam is located in seismic zone 1. No seismic stability analyses has been performed. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading. However, since the stability is questionable, the seismic stability should be assessed during the investigation recommended in Section 7.

SECTION 7  
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The dam appears to be in fair condition. The visual observations and hydrologic and hydraulic calculations indicate that the Lake Sheridan spillway is inadequate. The spillway is capable of controlling less than 2% of the PMF without overtopping the non-overflow section of the dam. Since Lake Sheridan Dam's non-overflow section consists of a concrete section over rubble masonry, the non-overflow section should be capable of safely controlling a partial overflow. However, the amount of overtopping that can be safely controlled is unknown. In this case the amount of overtopping is directly related to the structural stability of the dam. No data are available on the design or construction of the dam. No stability analysis are known to have been performed on the dam. No visible signs of instability were noted during the inspection.

b. Adequacy of Information. A detailed analysis of the structure cannot be made because of the lack of any design, construction information or drawings. This Phase I Report is based upon the visual observations made at the time of inspection. Sufficient information exists to complete a Phase I Report.

c. Urgency. The recommendations suggested below should be implemented immediately.

d. Necessity for Further Investigation. In order to accomplish some of the recommendations/remedial measures outlined below, further investigations will be required.

7.2 Recommendations/Remedial Measures.

1. A structural stability analysis should be conducted to determine the amount of overtopping that can be safely controlled by the dam. In the event that the dam cannot safely control the SDF a hydrologic and hydraulic study in conjunction with structure stability analysis should be conducted to increase the spillway capacity. The studies should be conducted by a professional engineer knowledgeable in dam design.

2. It should be determined if the drainline and valves are operable and in good condition. The valve mechanism for the dam should be operated and lubricated on a regular basis.

3. An investigation should be conducted to determine if a warning system for this dam is in operation; and, if not, one should be implemented.

4. Regular safety inspections should be conducted in accordance with provisions stipulated by the Commonwealth of Pennsylvania regarding the inspection of dams.

APPENDIX A  
CHECKLIST, VISUAL INSPECTION, PHASE I



CHECK LIST  
VISUAL INSPECTION  
PHASE I

NAME OF DAM Lake Sheridan Dam COUNTY Wyoming STATE Pennsylvania ID# PA 744  
Rubble masonry  
TYPE OF DAM concrete gravity HAZARD CATEGORY High  
DATE(S) INSPECTION April 10, 1980 WEATHER clear and warm TEMPERATURE 60°  
POOL ELEVATION AT TIME OF INSPECTION 998.2 M.S.L. TAILWATER AT TIME OF INSPECTION 990.7 M.S.L.

INSPECTION PERSONNEL:

R. Jeffrey Kimball, P.E. - L. Robert Kimball and Associates

James T. Hockensmith - L. Robert Kimball and Associates

O.T. McConnell - L. Robert Kimball and Associates

James T. Hockensmith RECORDER

EMBANKMENT - Not Applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS		
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE		
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES		
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST		
RIPRAP FAILURES		

EMBANKMENT - Not applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION		
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM		
ANY NOTICEABLE SEEPAGE		
STAFF GAUGE AND RECORDER		
DRAINS		

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	None.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Appears to be in good condition.	
DRAINS	None.	
WATER PASSAGES	40 foot overflow section, appears to be in good condition.	
FOUNDATION	Unknown.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	None.	
STRUCTURAL CRACKING	None noted.	
VERTICAL AND HORIZONTAL ALIGNMENT	Good.	
MONOLITH JOINTS	Good.	
CONSTRUCTION JOINTS	No visible deficiencies.	
STAFF GAUGE OR RECORDER	None.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet structure was unobserved during the inspection. The outlet pipe for the reservoir drain is located on the downstream face of the overflow section and was hidden from view by discharging water. It appears as though the outlet pipe is approximately 24 inches in diameter.	
INTAKE STRUCTURE	Unobserved.	
OUTLET STRUCTURE	Not visible.	
OUTLET CHANNEL	Lake Sheridan outlet - unnamed tributary to the South Branch of the Tunkhannock Creek.	
EMERGENCY GATE	Unobserved.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	40 foot overflow section. Appears to be in good condition.	
APPROACH CHANNEL	Lake - unrestricted.	
DISCHARGE CHANNEL	Lake Sheridan outlet.	
BRIDGE AND PIERS	None.	

GATED SPILLWAY - Not applicable

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		
APPROACH CHANNEL		
DISCHARGE CHANNEL		
BRIDGE AND PIERS		
GATES AND OPERATION EQUIPMENT		



DOWNSTREAM CHANNEL

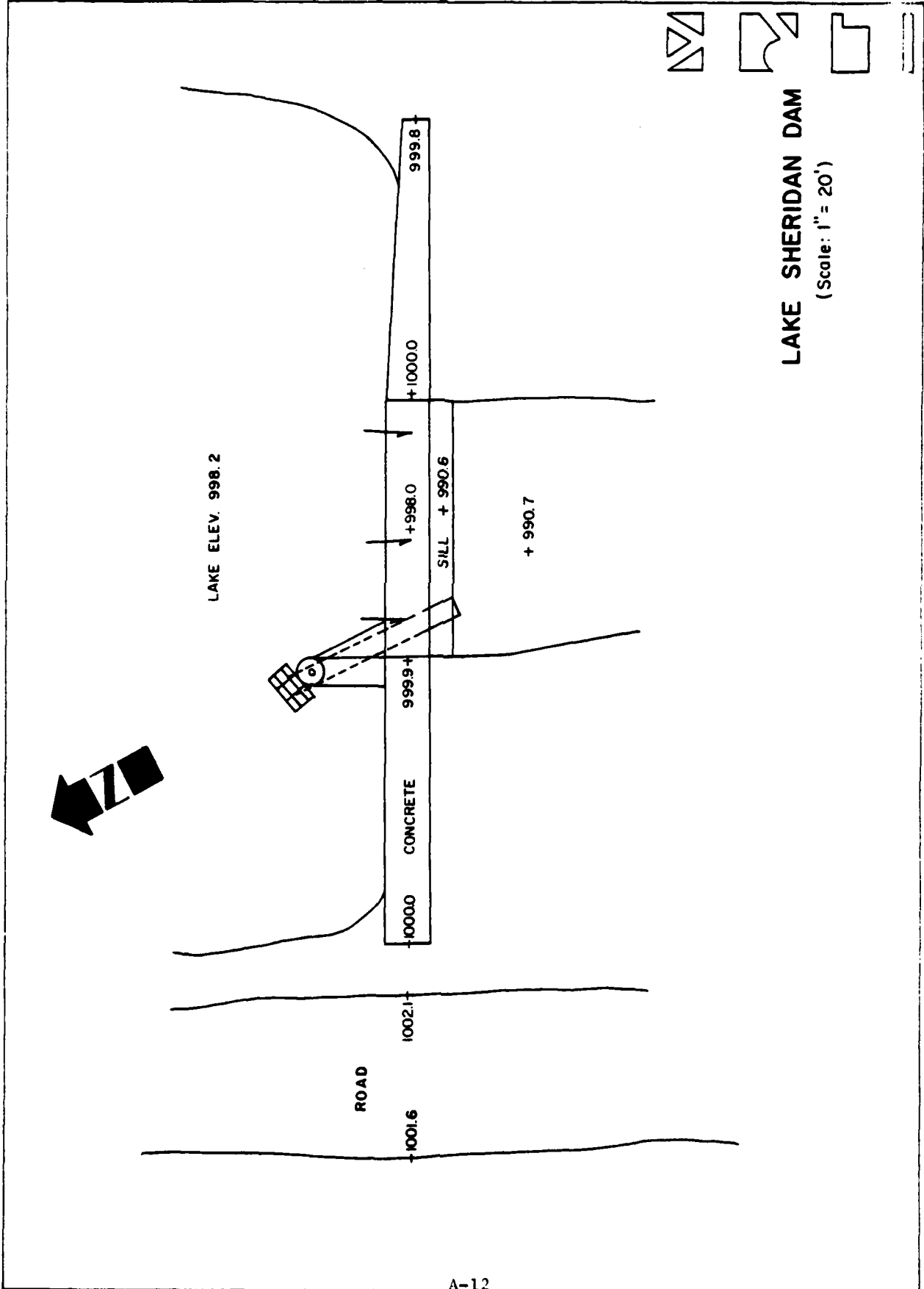
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
<p style="text-align: center;">CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)</p>	<p>Debris beginning to collect immediately below the overflow section of the dam.</p>	
<p style="text-align: center;">SLOPES</p>	<p>Moderate. Appear to be stable.</p>	
<p style="text-align: center;">APPROXIMATE NO. OF HOMES AND POPULATION</p>	<p>One home located approximately 1/2 mile downstream, approximately 4 people. Village of Factoryville located 2 miles downstream. Other homes located between dam and village of Factoryville.</p>	

RESERVOIR

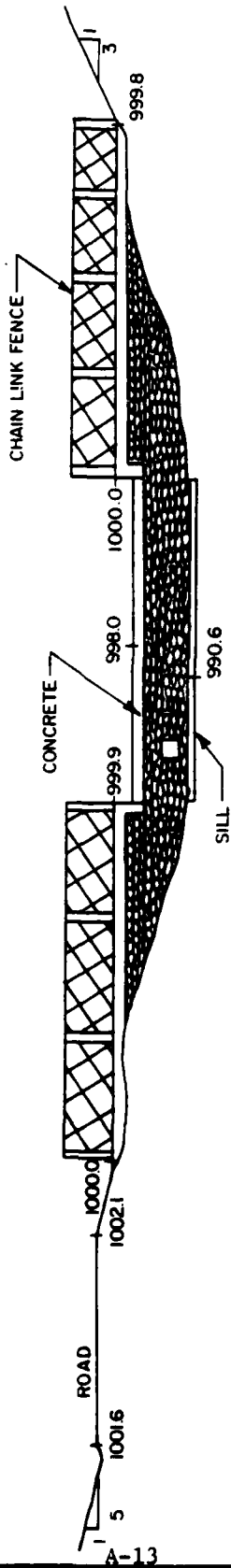
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderate appear to be stable.	
SEDIMENTATION	Unknown.	

**INSTRUMENTATION**

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	



**LAKE SHERIDAN DAM**  
 (Scale: 1" = 20')



PROFILE  
 LOOKING UPSTREAM  
 (Scale: 1" = 20')

LAKE SHERIDAN DAM



APPENDIX B  
CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION,  
PHASE I

CHECK LIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Lake Sheridan Dam

ID# PA 744

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. 7.5 minute quadrangle.
CONSTRUCTION HISTORY	None.
TYPICAL SECTIONS OF DAM	None.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS RAINFALL/RESERVOIR RECORDS	None. None. None. None. None.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Unknown.
POST-CONSTRUCTION SURVEYS OF DAM	Several undocumented prior to 1966. 1966 modifications by Northeastern Engineering Company Inc., Clarks Summit, Pennsylvania. No information available as per the 1966 modification.
BORROW SOURCES	Not applicable.



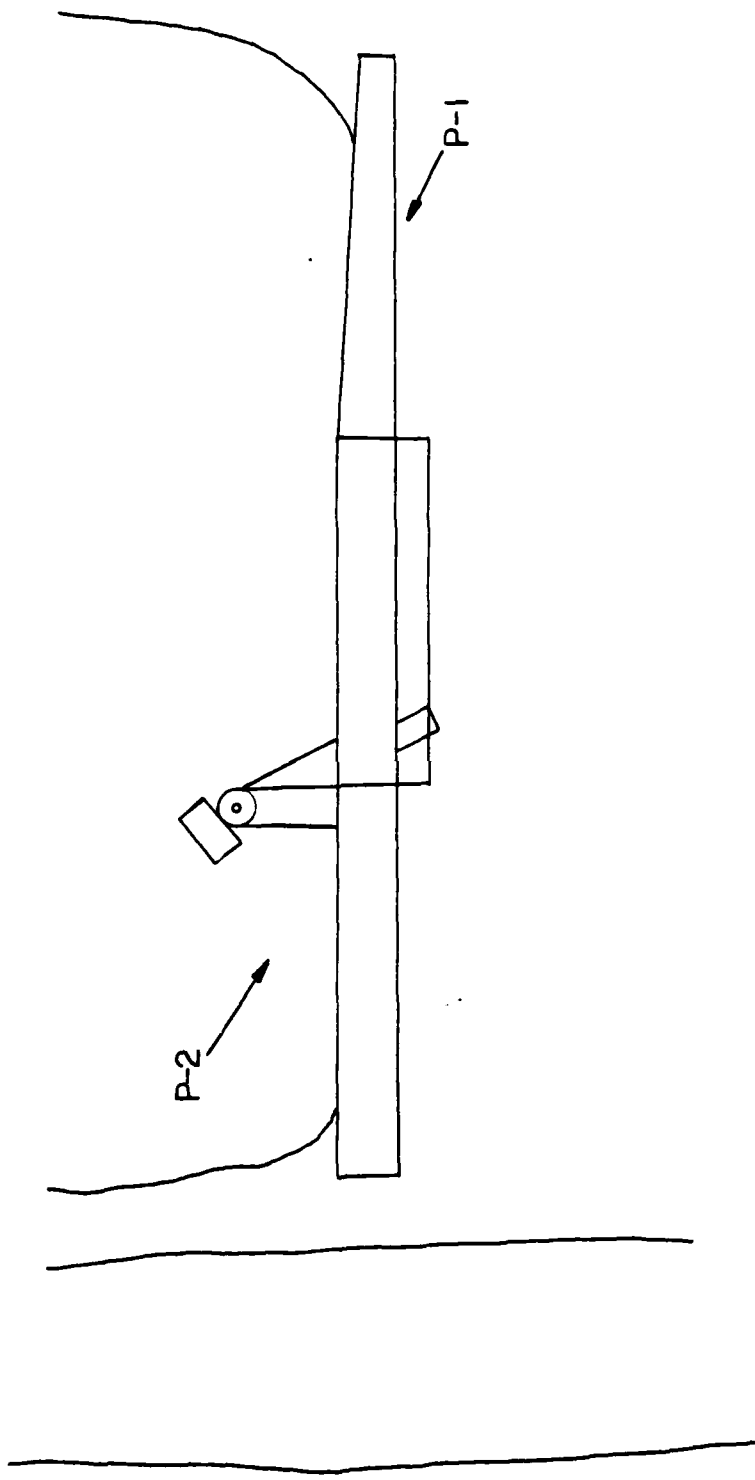
ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Several minor modifications prior to 1966. 1966 modifications by Northeastern Engineering Company, Inc. Modifications appears to have included reconstruction of the rubble masonry section of the dam and a concrete cap.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	1966 by Northeastern Engineering Company Inc.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Minor breach in 1928, photos available in DER files.
MAINTENANCE OPERATION RECORDS	Unknown.

ITEM	REMARKS
<p style="text-align: center;">SPILLWAY PLAN SECTIONS DETAILS</p>	<p style="text-align: center;">Details unknown.</p>
<p style="text-align: center;">OPERATING EQUIPMENT PLANS &amp; DETAILS</p>	<p style="text-align: center;">Unknown.</p>

APPENDIX C  
PHOTOGRAPHS



LAKE SHERIDAN DAM  
PHOTO INDEX



P- INDICATES PHOTO LOCATION

C-1

LAKE SHERIDAN DAM  
PA 744

Photograph Description

Sheet 1. Front

- (1) Upper left - View of structure from left abutment.
- (2) Upper right - Upstream view towards right abutment.
- (3) Lower left - Downstream exposure.
- (4) Lower right - Middle Lake, upstream of Lake Sheridan.

TOP OF PAGE

1	2
3	4



APPENDIX D  
HYDROLOGY AND HYDRAULICS

APPENDIX D  
HYDROLOGY AND HYDRAULICS

Methodology. The dam overtopping and breach analyses were accomplished using the systemized computer program HEC-1 (Dam Safety Investigation), September, 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. A brief description of the methodology used in the analysis is presented below.

1. Precipitation. The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 40" prepared by the U.S. Weather Bureau.

The index rainfall is reduced from 10% to 20% depending on watershed size by utilization of what is termed the HOP Brook adjustment factor. Distribution of the total rainfall is made by the computer program using distribution methods developed by the Corps.

2. Inflow Hydrograph. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for reservoir routing.

The unit hydrograph is developed using the Snyder method. This method requires calculation of several key parameters. The following list gives these parameters their definition and how they were obtained for these analysis.

Parameter	Definition	Where Obtained
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel miles	From U.S.G.S. 7.5 minute topographic
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic
Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic

\*Developed by the Corps of Engineers on a regional basis for Pennsylvania.



3. Routing. Reservoir routing is accomplished by using Modified Plus routing techniques where the flood hydrograph is routed through reservoir storage. Hydraulic capacities of the outlet works, spillways and the crest of the dam are used as outlet controls in the routing.

The hydraulic capacity of the outlet works can either be calculated and input or sufficient dimensions input and the program will calculate an elevation discharge relationship.

Storage in the pool area is defined by an area - elevation relationship from which the computer calculates storage. Surface areas are either planimetered from available mapping or U.S.G.S. 7.5 minute series topographic maps or taken from reasonably accurate design data.

4. Dam Overtopping. Using given percentages of the PMF the computer program will calculate the percentage of the PMF which can be controlled by the reservoir and spillway without the dam overtopping.

5. Dam Breach and Downstream Routing. The computer program is equipped to determine the increase in downstream flooding due to failure of the dam caused by overtopping. This is accomplished by routing both the pre-failure peak flow and the peak flow through the breach (calculated by the computer with given input assumptions) at a given point in time and determining the water depth in the downstream channel. Channel cross-sections taken from U.S.G.S. 7.5 minute topographic maps were used in the downstream flood wave routing. Pre and post failure water depths are calculated at locations where cross-sections are input.

HYDROLOGY AND HYDRAULICS ANALYSIS  
DATA BASE

NAME OF DAM: Lake Sheridan Dam

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 (0.96) = 21.31

STATION	1	2	3
Station Description	Baylors Pond	Needles Lake A B	Lake Sheridan
Drainage Area (square miles)	2.32	0.32 1.33	2.0
Cumulative Drainage Area (square miles)	2.32	2.64 3.97	5.97
Adjustment of PMF for Drainage Area (%) <sup>(1)</sup>			
6 hours	117	117	117
12 hours	127	127	127
24 hours	136	136	136
48 hours	142	142	142
72 hours	145	145	145
Snyder Hydrograph Parameters			
Zone <sup>(2)</sup>	11	11	11
C <sub>p</sub> <sup>(3)</sup>	0.62	0.62	0.62
C <sub>t</sub> <sup>(3)</sup>	1.50	1.50	1.50
L (miles) <sup>(4)</sup>	2.60	0.76 2.40	2.50
L <sub>ca</sub> (miles) <sup>(4)</sup>	1.10	0.43 1.20	1.20
t <sub>p</sub> = C <sub>t</sub> (LxL <sub>ca</sub> ) 0.3 hrs.	2.06	1.07 2.06	2.09
Spillway Data			
Crest Length (ft)	5	42	40
Freeboard (ft)	2	3.0	1.8
Discharge Coefficient	C'=0.95	C'=0.95	C'=0.95
Exponent	N/A	N/A	N/A

(1) Hydrometeorological Report 40 (Figure 1), U.S. Army Corps of Engineers, 1965.

(2) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's coefficients (C<sub>p</sub> and C<sub>t</sub>).

(3) Snyder's Coefficients.

(4) L=Length of longest water course from outlet to basin divide.  
L<sub>ca</sub>=Length of water course from outlet to point opposite the centroid of drainage area.

CHECK LIST  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 5.97 mi<sup>2</sup> wooded, moderate slopes

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 621 ac-ft

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 834 ac-ft

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 999.8 - low spot

SPILLWAY CREST:

- a. Elevation 998.0
- b. Type Rectangular - broad crest
- c. Width 40 feet - weir length
- d. Length Unknown
- e. Location Spillover Mid embankment - overflow section
- f. Number and Type of Gates None

OUTLET WORKS:

- a. Type Unknown
- b. Location Through structure
- c. Entrance inverts Unknown
- d. Exit inverts Undeterminable
- e. Emergency draindown facilities Unknown

HYDROMETEOROLOGICAL GAUGES:

- a. Type None
- b. Location None
- c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Unknown



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EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN

I.D. NUMBER 744

SHEET NO. 1 OF 3

BY CAB DATE 5-8-80

### LOSS RATE AND BASE FLOW PARAMETERS

RECOMMENDED BY THE CORPS OF ENGINEERS  
BALTIMORE DISTRICT.

$$\text{STATL} = 1 \text{ INCH}$$

$$\text{CNSTL} = .05 \text{ IN/HR}$$

$$\text{STRTO} = 1.5 \text{ CFS/MI}^2$$

$$\text{QRCSN} = .05 \text{ (5\% OF PEAK FLOW)}$$

$$\text{RTIOR} = 2.0$$

### ELEVATION - AREA - CAPACITY RELATIONSHIPS

FROM U.S.G.S. 7.5 MIN. QUAD., DER FILES AND FIELD  
INSPECTION DATA.

#### BAYLORS POND

NATURAL CREST ELEV. = 1135

POND SURFACE AREA = 84.5 AC

POND BOTTOM AREA = 6.4 AC.

FROM THE FORMULA FOR THE VOLUME OF A  
FRUSTUM OF A CONE.

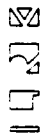
$$V = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

ELEV. WHERE STORAGE EQUALS ZERO = 1100

STORAGE AT ELEV. 1135 = 1331 AC FT

STORAGE AT ELEV. 1140 = 1780 AC FT

STORAGE AT ELEV. 1160 = 5235 AC FT



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EBENSBURG PENNSYLVANIA

DAM NAME LAKE SHERIDAN  
I.D. NUMBER 744  
SHEET NO. 2 OF 9  
BY CAJ DATE 5-8-60

\$S	0	1135	1140	1160
\$E	1100	1331	1980	5235

NEEDLES LAKE (MIDDLE LAKE)

SPILLWAY CREST ELEV. = 1075  
POND SURFACE AREA = 22 AC.  
ELEV WHERE STORAGE EQUALS ZERO = 1065

FROM THE CONIC METHOD OF RESERVOIR STORAGE

$$V = (h)(A) / 3$$

INITIAL STORAGE CAPACITY = 73 AC FT.  
STORAGE AT ELEV 1078 = 140 AC FT  
STORAGE AT ELEV 1080 = 225 AC FT

\$S	0	73	140	225
\$E	1065	1075	1078	1080

LAKE SHERIDAN

SPILLWAY CREST ELEV. = 998'  
POND SURFACE AREA  
UPPER PORTION = 63 AC.  
LOWER PORTION = 28 AC.  
POND BOTTOM AREA  
UPPER PORTION = 7 AC.  
LOWER PORTION = 0 AC.  
POND AREA AT 1000'  
UPPER PORTION = 80 AC  
LOWER PORTION = 36 AC  
POND AREA AT 990  
UPPER PORTION = 29 AC  
LOWER PORTION = 0



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DAM NAME LAKE SHERIDAN  
I.D. NUMBER 744

SHEET NO. 3 OF 9  
BY CAB DATE 5-8-80

FROM THE FORMULA FOR THE VOLUME OF A FRUSTUM OF A CONE.

$$V_u = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

ELEV. WHERE STORAGE EQUALS ZERO = 950  
STORAGE AT ELEV. 998 = 546 AC.FT  
STORAGE AT ELEV. 1000 = 735 AC.FT  
STORAGE AT ELEV. 990 = 167 AC.FT  
STORAGE AT ELEV. 1020 = 1974 AC.FT

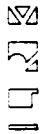
FROM THE CONIC METHOD OF RESERVOIR STORAGE

$$V_L = (h)(A)/3$$

ELEV. WHERE STORAGE EQUALS ZERO = 990  
STORAGE AT ELEV. 998 = 75 AC.FT  
STORAGE AT ELEV. 1000 = 120 AC.FT  
STORAGE AT ELEV. 1020 = 510 AC.FT

$$V_{TOTAL} = V_u + V_L$$

\$S	0	167	621	858	2484
\$E	980	990	998	1000	1020



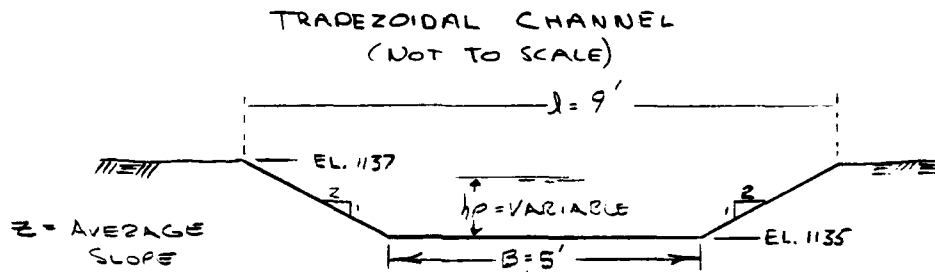
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DAM NAME LAKE SHERIDAN  
I.D. NUMBER 744

SHEET NO. 4 OF 9  
BY CAB DATE 5-6-80

DISCHARGE RATING CURVE

BAYLORS POND



ELEV.	TRAPEZOIDAL		WEIR		Q <sup>TOTAL</sup> (CFS)
	h <sub>p</sub> (ft)	Q* (CFS)	h <sub>p</sub> (ft)	Q* (CFS)	
1135.0	0	0			0
1135.5	.5	5			5
1136.0	1.0	20			20
1136.5	1.5	40			40
1137.0	2.0	65			65
1138.0			1.0	30	95
1140.0			3.0	150	215
1145.0			8.0	650	715
1150.0			13.0	1350	1415

\* VALUES ROUNDED TO NEAREST 5 CFS.

TRAPEZOIDAL FLOW FROM:

$$Q = 8.03 C h_v^{1/2} (h_p - h_v) [B + z(h_p - h_v)]$$

$$h_v = \frac{3(2zh_p + B) - (16z^2h_p^3 + 10zBh_p + 9B^2)^{1/2}}{10z}$$

$$B = 5 \quad z = 2 \quad C = .75$$



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DAM NAME LAKE SHERIDAN

I.D. NUMBER 774

SHEET NO. 5 OF 9

BY CAC DATE 5-8-60

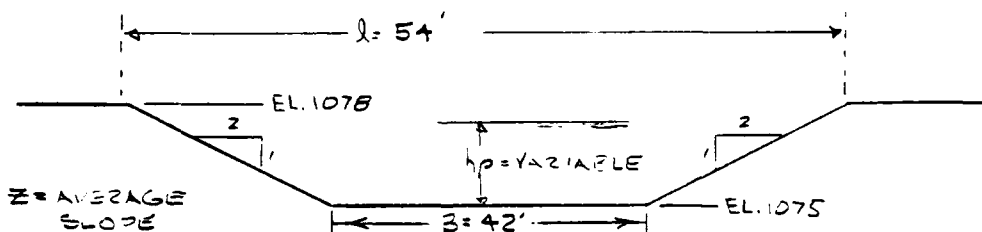
WEIR FLOW FROM:

$$Q = CLh_p^{1.5}$$

$$C = 3.2 \quad L = 9.0$$

SOURCE: WATER & WASTEWATER ENGINEERING  
by FAIR, GEYER & OKUM 1966  
NEEDLES LAKE (MIDDLE LAKE)

TRAPEZOIDAL SPILLWAY  
(NOT TO SCALE)



ELEV.	TRAPEZOIDAL		WEIR		Q <sup>*</sup> <sub>TOTAL</sub> (CFS)
	h <sub>p</sub> (FT)	Q <sup>*</sup> (CFS)	h <sub>p</sub> (FT)	Q <sup>*</sup> (CFS)	
1075.0	0	0			0
1075.5	.5	45			45
1076.0	1.0	125			125
1076.5	1.5	240			240
1077.0	2.0	370			370
1077.5	2.5	525			525
1078.0	3.0	700			700
1079.0			1.0	170	870
1080.0			2.0	490	1190
1085.0			7.0	3200	3900





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DAM NAME LAKE SHERIDAN

I.D. NUMBER 744

SHEET NO. 6 OF 9

BY LAE DATE 5-8-50

\* VALUES ROUNDED TO NEAREST 5 CFS

TRAPEZOIDAL FLOW FROM:

$$Q = 8.03 C' h_v^{1/2} (h_p - h_v) [B + z(h_p - h_v)]$$

$$h_v = \frac{3(2zh_p + B) - \sqrt{16z^2 h_p^2 + 16zBh_p + 9B^2}}{10z}$$

$$B = 42' \quad z = 2 \quad C' = .95 \text{ (ENTRANCE COEFF.)}$$

WEIR FLOW FROM:

$$Q = CLh_p^{1.5}$$

$$C = 3.2 \quad L = 54$$

SOURCE: WATER & WASTEWATER ENGINEERING  
by FAIR, GEYER & OKUM 1966

LAKE SHERIDAN

DISCHARGE RATING CURVE DETERMINED BY  
THE HEC-1 COMPUTER PROGRAM.

SPILLWAY CREST = 998.0

SPILLWAY LENGTH = 40'

COEFFICIENT OF DISCHARGE = 3.2



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DAM NAME LAKE SHERIDAN

I.D. NUMBER 744

SHEET NO. 7 OF 9

BY CAB DATE 5-8-60

OVERTOPPING PARAMETERS

BAYLORS POND

THE NATURAL LAKE WILL BE CONSIDERED  
A DAM FOR THIS ANALYSIS

TOP OF DAM ELEV. = 1137  
LENGTH OF DAM (EXCLUDING EXIT CHANNEL) = 10'  
COEFFICIENT OF DISCHARGE = 3.0

SL	10	46	134	174	208	242
SV	1137	1138	1140	1142	1144	1146

NEELES LAKE (MIDDLE LAKE)

TOP OF DAM ELEV. = 1078  
LENGTH OF DAM = 100'  
COEFFICIENT OF DISCHARGE = 3.0

SL	100	158	216	246	286
SV	1078	1079	1080	1082	1085



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DAM NAME LAKE SHERIDAN

I.D. NUMBER 744

SHEET NO. 8 OF 9

BY CA3 DATE 5-6-80

LAKE SHERIDAN

TOP OF DAM ELEV. = 999.8

LENGTH OF DAM (EXCLUDING SPILLWAY) = 89'

COEFFICIENT OF DISCHARGE = 3.1

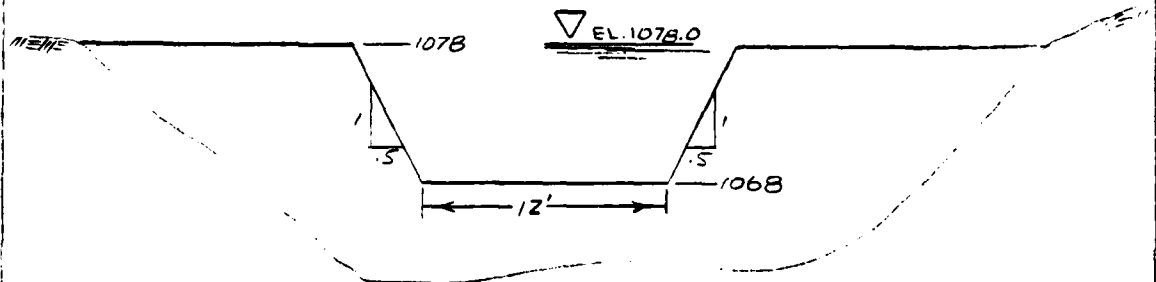
\$L	2	37	89	127	131	139
\$V	999.8	999.9	1000.0	1001.0	1002.0	1003.0

DAM BREACH PARAMETERS

BAYLORS POND

WILL NOT BREACH

NEEDLES LAKE (MIDDLE LAKE)



FAILURE TIME (T<sub>FAIL</sub>) = 20 HR

FAILURE ELEV. (FAILEL) = 1078.0



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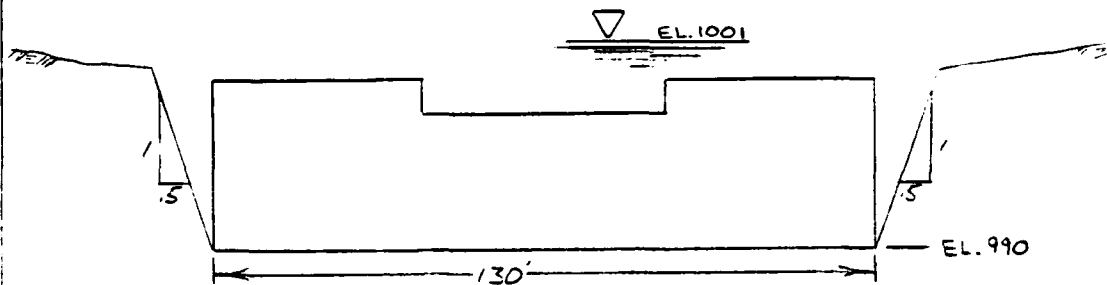
DAM NAME LAKE SHERIDAN

I.D. NUMBER 744

SHEET NO. 9 OF 9

BY CAR DATE 5-14-60

LAKE SHERIDAN



FAILURE TIME (T<sub>FAIL</sub>) = 5.0 HR  
FAILURE ELEV. (E<sub>FAIL</sub>) = 1001

CHANNEL ROUTING

CHANNEL ROUTING CROSS SECTIONS OBTAINED  
FROM U.S.G.S. 7.5-MIN. QUAD.

CHANNEL MANNING'S  $n$  (Q<sub>N-2</sub>) = 0.05  
OVERBANK MANNING'S  $n$  (Q<sub>N-1</sub>) = 0.06

*****									
FLOOD HYDROGRAPH PACKAGE (HEC-1)									
DAM SAFETY VERSION JULY 1978									
LAST MODIFICATION 26 FEB 79									
*****									
ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF									
HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF THE LAKE SHERIDAN DAM									
RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (744)									
1	A1	288	0	15	0	0	0	0	0
2	B1	5							
3	J	1	5	1					
4	J1	.1	.2	.3	.4	1			
5	K	0	1						
6	K1	INFLW TO BAYLORS POND				1			
7	M	1	1	2.32					
8	P	1	21.31	117	127	136	142	145	
9	T							1.0	.05
10	W	2.06	.62						
11	X	-1.5	-0.05	2.0					
12	K	1	2						
13	K1	ROUTE THROUGH BAYLORS POND AND DOWNSTREAM				1			
14	Y								
15	Y1	1							
16	Y4	1135.0	1135.5	1136.0	1136.5	1137.0	1138.0	1140.0	1145.0 1150.0
17	V5	0	5	20	40	65	95	215	715 1415
18	SS	0	1125	1140	1160				
19	SE	1100	1321	1900	5235				
20	SS	1135							
21	SD	1137	3.0	1.5	10				
22	SL	10	46	134	174	208	242		
23	SV	1137	1138	1140	1142	1144	1146		
24	K	0	3						
25	K1	INFLW TO MIDDLE LAKE FROM SUBAREA A				1			
26	M	1		.32					
27	P	1	21.31	117	127	136	142	145	
28	T							1.0	.05
29	W	.77	.82						
30	X	-1.5	-0.05	2.0					
31	K	0	4						
32	K1	INFLW TO MIDDLE LAKE FROM SUBAREA B				1			
33	M	1	1	1.33					
34	P	1	21.31	117	127	136	142	145	
35	T							1.0	.05
36	W	2.06	.62						
37	X	-1.5	-0.05	2.0					
38	K	3	5						
39	K1	COMBINING THREE HYDROGRAPHS				1			
40	K	1	6						
41	K1	ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM				1			
42	Y								
43	Y1								
44	Y4								
45	Y5								



\*\*\*\*\*  
 FLOOD HYDROGRAPH PACKAGE (HEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
 \*\*\*\*\*

RUN DATE\* 80/05/12  
 TIME\* 06.37.19.

ANALYSIS OF DAM OVERTOPPING USING RATIOS OF PMF  
 HYDROLOGIC-HYDRAULIC ANALYSIS OF SAFETY OF THE LAKE SHERIDAN DAM  
 RATIOS OF PMF ROUTED THROUGH THE RESERVOIR (744)

NO NHR MMIN IDAY JOPER NWT LROPT TRACE JPLT IPRT NSTAN  
 288 0 15 0 5 0 0 0 0 0 0 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 5 LRTIO= 1

RRTIO= .10 .20 .30 .40 1.00

\*\*\*\*\*

SUB-AREA RUNOFF COMPUTATION

INFLOW TO BAYLORS POND

ISIAO	ICOMP	TECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

SPFE	PMS	R6	R72	R74	R76	R78	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	SIRKX	DLTKR	RTIOL	ERAIN	SINKS	RTIOK	SIRTL	CNSIL	ALSMX	KTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA  
 TP= 2.06 CP= .62 NIA= 0

RECESSION DATA  
 STRIU= -1.50 ORCSN= -.05 RTIOR= 2.00  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00  
 18. 68. 138. 216. 299. 374. 428. 458. 463. 432.  
 382. 335. 257. 225. 198. 173. 152. 133. 117.

102.	90.	78.	69.	60.	53.	46.	41.	36.	31.
27.	24.	21.	18.	16.	14.	12.	11.	10.	8.
7.	6.	6.	5.	4.	4.				

HYDROGRAPH ROUTING

ROUTE THROUGH BAYLORS POND AND DOWNSTREAM

D-17  
 TSTAG 1 2  
 ICOMP 1 1  
 YCON 0 0  
 IYAPE 0 0  
 JPLT 0 0  
 JPRI 0 1  
 TRAME 1 1  
 TSTAGE 0 0  
 TAUTO 0 0  
 ROUTING DATA  
 TRES 1 1  
 TSAME 1 1  
 TOPT 0 0  
 TPMP 0 0  
 LSTR 0 0  
 NSTPS 1 1  
 NSTOL 0 0  
 LAG 0 0  
 AMSRK X  
 YSK 0.000 0.000  
 STORA -1135.  
 TSPRAT -1

STAGE	1135.00	1136.00	1136.50	1137.00	1138.00	1140.00	1145.00	1150.00
FLOW	0.00	20.00	40.00	65.00	95.00	215.00	715.00	1415.00
CAPACITY	0.	1135.	1140.	1160.				
ELEVATIONS	1100.	1331.	1980.	5235.				

CREL SPWID 0.0  
 COWW 0.0  
 EXPM 0.0  
 ELEV 0.0  
 COUL 0.0  
 CANEA 0.0  
 EXPL 0.0

DAM DATA  
 TOPEL 1137.0  
 COOD 3.0  
 EXPD 1.5  
 DAMWID 10.

CREST LENGTH 10.  
 AT OR BELOW ELEVATION 1137.0  
 1138.0  
 1140.0  
 1142.0  
 1144.0  
 1146.0  
 174.  
 174.  
 208.  
 242.



SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA A

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRY	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IMYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.32	0.00	.32	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	SIRK	DLIK	RTIOL	ERAIN	SIRKS	RTIOK	SIRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA  
 TP = .77 CP = .62 NTA = 0

RECESSION DATA

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC = 3.78 AND R = 2.62 INTERVALS  
 STARTQ = -1.50 DRESN = .05 RTIOR = 2.00

UNIT HYDROGRAPH 16 END-OF-PERIOD ORDINATES, LAG = .77 HOURS, CP = .63 VOL = 1.00

25.	89.	9.	6.	4.	3.	2.	19.
13.	150.	162.	128.	87.	59.	40.	27.

SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA B

ISTAG ICOMP TECOH ITAPE JPLT JPRY INAME ISTAGE TAUTO

HYDG IUNG TAREA SNAP TRSDA TRSPC RATIO ISNOW ISAME LOCAL

HYDROGRAPH DATA

I 1.33 0.00 1.33 0.00 0.00 0 0 0

PRECIP DATA

SPE PMS R6 R12 R24 R48 R72 R96

0.00 21.31 117.00 127.00 136.00 142.00 145.00 0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT STRKR DLTKR RTIOL ERAIN STRKS RTIOK STRIL CNSTL ALSMX RTIMP

0 0.00 0.00 1.00 0.00 0.00 1.00 1.00 1.00 .05 0.00 0.00

UNIT HYDROGRAPH DATA  
 TP= 2.06 CP= .62 NTA= 0

RECESSION DATA

SITU= -1.50 UNCSN= .05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH	46	END-OF-PERIOD	ORDINATES,	LAG=	2.05	HOURS,	CP=	.62	VOL=	1.00
11.	39.	79.	124.	171.	214.	245.	263.	265.	248.	
219.	192.	168.	147.	129.	113.	99.	87.	76.	67.	
59.	51.	45.	39.	30.	27.	23.	20.	18.	18.	
18.	14.	12.	11.	8.	7.	6.	5.	5.	5.	
4.	4.	3.	2.	2.						

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HYDROGRAPH ROUTING

ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	I STAGE	IAUTO
6	1	0	0	0	0	1	0	0

QLOSS	CLOSS	AVG	IRCS	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1075.	-1

STAGE	1075.00	1076.50	1077.00	1077.50	1078.00	1079.00	1080.00
FLOW	0.00	125.00	240.00	370.00	525.00	700.00	1190.00

CAPACITY= 0.      73.      140.      225.  
 ELEVATION= 1065.      1075.      1078.      1080.

CREL	SPID	COQM	EXPW	ELEV	COOL	CAREA	EXPL
1075.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWD
1078.0	3.0	145	100.

CREST LENGTH	100.	158.	216.	246.	286.
AT OR BELOW ELEVATION	1078.0	1079.0	1080.0	1082.0	1085.0

DAM BREACH DATA

BRWID	ELDM	IFAIL	WSEL	FAILEL
12.	50	1068.00	2.00	1075.00
			1078.00	

STATION      6.      PLAN 1.      RATIO 1

BEGIN DAM FAILURE AT 41.25 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OVN\*

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUMG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.00	0.00	2.00	0.00	0.000	0	0	0

PRECIP DATA

SPPE	PMS	R6	R12	R24	R58	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	149.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

D-21

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	SINKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.09 CP= .62 NTA= 0

RECESSION DATA

STRTO= -1.50 ORCSN= -2.05 RTTOR= 2.00  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.45 AND R= 7.65 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.07 HOURS, CP= .62 VOL= 1.00									
15.	57.	115.	180.	250.	314.	361.	388.	395.	374.
333.	292.	256.	225.	197.	173.	152.	133.	117.	102.
90.	79.	69.	61.	53.	47.	41.	36.	32.	28.
24.	21.	19.	16.	14.	13.	11.	10.	9.	7.
7.	6.	5.	4.	4.	3.				

COMBINE HYDROGRAPHS

COMBINING TWO HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	2	0	0	0	0	1	0	0

10/27

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HYDROGRAPH ROUTING

ROUTE THROUGH LAKE SHERIDAN

ISTAU	ICOMP	IECON	ITAPE	JPLT	JPRI	INAME	ISTAGE	IAUTO
9	1	0	0	0	0	1	0	0
ROUTING DATA								
QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
NSTPS NSTDL LAG AMSKK X TSK STORA ISPRAT								
	1	0	0	0.000	0.000	0.000	-998.	0

CAPACITY= 0. 167. 621. 858. 1000. 1020.  
 ELEVATION= 980. 998. 1000.

CREL SPMID COBN EXPW EVEL COOL CAREA EXPL  
 998.0 40.0 3.2 1.5 0.0 0.0 0.0 0.0

DAM DATA  
 TOPEL COOD EXPD DAMMID  
 999.8 3.1 1.5 89.

CREST LENGTH 2. 37. 89. 127. 131. 169.  
 AT OR BELOW  
 ELEVATION 999.8 999.9 1000.0 1001.0 1002.0 1003.0

STATION 9. PLAN 1. RATIO 1

11  
2.1

PEAK FLOW AND STORAGE TEND OF PERIOD SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILLS (SQUARE KILOMETERS)

OPERATION STATION AREA PLAN RATIO 1 RATIO 2 RATIO 3 RATIO 4 RATIO 5  
 .10 .20 .30 .40 1.00

HYDROGRAPH AT 1 2.32 1 582. 1163. 1745. 2326. 5816.4  
 ( 6.01) ( 16.47) ( 32.94) ( 49.40) ( 65.87) ( 164.68)

ROUTED TO 2 2.32 1 580. 1162. 1745. 2327. 5818.  
 ( 6.01) ( 16.41) ( 32.92) ( 49.41) ( 65.88) ( 164.74)

HYDROGRAPH AT 3 .32 1 131. 261. 392. 523. 1306.  
 (.83) ( 3.70) ( 7.40) ( 11.10) ( 14.80) ( 37.00)

HYDROGRAPH AT 4 1.33 1 333. 667. 1000. 1334. 3334.  
 ( 3.44) ( 9.44) ( 18.88) ( 28.32) ( 37.76) ( 94.41)

3 COMBINED 5 3.97 1 978. 1960. 2941. 3921. 9804.  
 ( 10.28) ( 27.70) ( 55.49) ( 83.27) ( 111.03) ( 277.61)

ROUTED TO 6 3.97 1 1341. 2461. 2904. 3849. 9766.  
 ( 10.28) ( 37.99) ( 69.69) ( 82.23) ( 108.99) ( 276.53)

HYDROGRAPH AT 7 2.00 1 499. 998. 1497. 1996. 4989.  
 ( 5.18) ( 14.13) ( 28.26) ( 42.38) ( 56.51) ( 141.28)

2 COMBINED 8 5.97 1 1748. 3459. 4399. 5816. 14755.  
 ( 15.46) ( 49.50) ( 97.95) ( 124.57) ( 164.70) ( 417.80)

ROUTED TO 9 5.97 1 1290. 2828. 4157. 5565. 14356.  
 ( 15.46) ( 36.53) ( 80.07) ( 117.72) ( 157.59) ( 406.51)

SUMMARY OF DAM 5 TY ANALYSIS

PLAN 1 .....

ELEVATION STORAGE OUTFLOW  
 1135.00 172.0 0.  
 INITIAL VALUE  
 1135.00 1135.00 1137.00  
 SPILLWAY CREST TOP OF DAM  
 172.0 182.0  
 0.0 65.0

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1139.17	2.17	192.	580.	10.25	41.75	0.00
.20	1140.08	3.08	197.	1162.	13.50	41.75	0.00
.30	1140.69	3.69	200.	1745.	17.75	41.75	0.00
.40	1141.21	4.21	202.	2327.	19.50	41.75	0.00
1.00	1143.48	6.48	214.	5818.	25.50	41.75	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

ELEVATION STORAGE OUTFLOW  
 1075.00 73.0 0.  
 INITIAL VALUE  
 1075.00 1075.00 1078.00  
 SPILLWAY CREST TOP OF DAM  
 73.0 140.  
 0.0 700.0

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1078.21	.21	149.	1341.	1.38	43.25	41.25
.20	1078.70	.70	170.	2461.	2.50	41.75	39.75
.30	1078.93	.93	179.	2904.	4.75	42.00	39.00
.40	1079.64	1.64	210.	3849.	6.00	42.00	38.50
1.00	1082.28	4.28	322.	9766.	9.25	41.75	37.25

D-24

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

ELEVATION STORAGE OUTFLOW  
 998.00 621.0 0.  
 INITIAL VALUE  
 998.00 998.00 999.80  
 SPILLWAY CREST TOP OF DAM  
 621.0 834.  
 0.0 309.0

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1001.29	1.49	963.	1290.	8.00	43.75	0.00
.20	1002.58	2.78	1067.	2828.	11.25	42.50	0.00
.30	1003.43	3.63	1137.	4157.	13.25	42.50	0.00
.40	1004.20	4.40	1199.	5665.	14.50	42.50	0.00
1.00	1007.94	8.14	1506.	14356.	20.25	42.25	0.00

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 FLOOD HYDROGRAPH PACKAGE (MEC-1)  
 DAM SAFETY VERSION JULY 1978  
 LAST MODIFICATION 26 FEB 79  
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1 A1 RATIOS OF THE PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM  
 2 A2 DOWNSTREAM CONDITION DUE TO OVERTOPPING OF THE LAKE SHERIDAN DAM (744)  
 3 A3 PLAN 1 ASSUMES BREACH, PLAN 2 ASSUMES NO BREACH

4	B	288	0	15	0	0	0	0	0	0
5	01	5	1							
6	J	2	1							
7	J1	02								
8	K	0	1							
9	K1			INFLOW TO BAYLORS POND						
10	M	1	2.32							
11	P		21.31	117	127	136	142	145		
12	T							1.0	.05	
13	W	2.06	.62							
14	X	-1.05	-.05	2.0						
15	K	1	2							
16	K1			ROUTE THROUGH BAYLORS POND AND DOWNSTREAM						
17	Y									
18	V1	1	1							
19	V1	1135.0	1135.5	1136.0	1137.0	1137.0	1138.0	1140.0	1145.0	1150.0
20	V5	0	5	20	40	65	95	215	715	1415
21	S5	0	1135	1140	1160					
22	SE	1100	1331	1980	5235					
23	S8	1135								
24	S0	1137	3.0	1.5	10					
25	SL	10	48	134	174	208	242			
26	SV	1137	1138	1140	1142	1144	1146			
27	K	0	3							
28	K1			INFLOW TO MIDDLE LAKE FROM SUBAREA A						
29	M	1	1	.92						
30	P		21.31	117	127	136	142	145		
31	T							1.0	.05	
32	W	.77	.62							
33	K	-1.05	-.05	2.0						
34	K	0	4							
35	K1			INFLOW TO MIDDLE LAKE FROM SUBAREA B						
36	M	1	1	1.33						
37	P		21.31	117	127	136	142	145		
38	T							1.0	.05	
39	W	2.06	.62							
40	X	-1.05	-.05	2.0						
41	K	3	5							
42	K1			COMBINING THREE HYDROGRAPHS						
43	K	1	6							
44	K1			ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM						
45	Y									

D-25

46	V1	1	1							
47	V41075.0	1075.5	1076.0	1076.5	1077.0	1077.5	1078.0	1079.0	1080.0	1085.0
48	V5	0	45	125	240	370	525	700	870	1190
49	S5	0	73	140	225					
50	SE	1065	1075	1078	1080					



51	SS	1075								
52	SD	1078	3.0	1.5	100					
53	SL	100	198	216	248	286				
54	SV	1078	1079	1080	1082	1085				
55	SB	12	.5	1068	2.0	1075	1078			
56	K	U	7							1
57	K1	INFLOW TO LAKE SHERIDAN								
58	M	1	1	2.0						1
59	P		2131	117	127	136	142	145	1.0	.05
60	T									
61	W	2.09	.62							
62	X	-1.92	-0.05	2.0						
63	K	2	8							1
64	K1	COMBINING TWO HYDROGRAPHS								
65	K	1	9							1
66	K1	ROUTE THROUGH LAKE SHERIDAN								
67	Y									1
68	Y1	1								-998
69	SS	0	167	621	858	2484				
70	SE	980	990	998	1000	1020				
71	SS	998	40	372	1.5					
72	SD	999.8	3.1	1.5	.89					
73	SL	2	37	89	127	131	169			
74	SV	999.8	999.9	1000.0	1001.0	1002.0	1003.0			
75	SB	130	.5	990	5.0	998	1001			
76	SB	130	.5	990	5.0	998	1010			
77	K	1	10							1
78	K1	ROUTE THROUGH STREAM								
79	Y									1
80	Y1	1								
81	Y6	.06	.05	.06	.938	980	1750	.03		
82	Y7	0	.980	125	960	200	940	204	209	938
83	Y7	213	940	400	960	475	980			
84	K									99

19/27

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FLOOD HYDROGRAPH PACKAGE (HEC-1)  
DAM SAFETY VERSION JULY 1978  
LAST MODIFICATION 26 FEB 79  
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RUN DATE\* 00/05/19.  
TIME\* 12.09.10.

RATIOS OF THE PMF ROUTED THROUGH THE RESERVOIR AND DOWNSTREAM  
DOWNSTREAM CONDITION DUE TO OVERTOPPING OF THE LAKE SHERIDAN DAM (7441)  
PLAN 1 ASSUMES BREACH. PLAN 2 ASSUMES NO BREACH

NO	NMR	MHIN	DAY	IMR	IMIN	METRC	IPLT	IPRT	NSTAN
288	0	15	0	0	0	0	0	0	0

JOPER 5  
JMT 0  
LROPT 0  
TRACE 0

MULTI-PLAN ANALYSES TO BE PERFORMED  
NPLAN# 2 NRTION# 1 CRTION# 1

RTIOS\* 020

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO BAYLORS POND

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

TRYDG	TUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	TSAME	LOCAL
1	1	2.32	0.00	2.32	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS \*800

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

16/27

UNIT HYDROGRAPH DATA  
TP= 2.06 CP= .62 NTA= 0

RECESSION DATA  
STRTQ= -1.50 GRCSN= -.05 RTIOR= 2.00  
APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES, LAG= 2.05 HOURS, CP= .62 VOL= 1.00

18.	68.	138.	216.	299.	374.	428.	458.	463.	432.
382.	335.	293.	257.	225.	198.	173.	152.	133.	117.
102.	90.	78.	69.	60.	53.	46.	41.	36.	31.
27.	24.	21.	18.	16.	14.	12.	11.	10.	8.
7.	6.	5.	4.	3.	2.	1.	1.	1.	1.

17/27

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HYDROGRAPH ROUTING

ROUTE THROUGH BAYLORS POND AND DOWNSTREAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	TSTAGE	TAUTO
2	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRIS	ISAME	IOPT	IPMP	LSR
0.00	0.000	0.00	1	1	0	0	0

MSL	MSL	LAG	AMSK	K	STOR	SPRAT
1	0	0	0.000	0.000	0.000	-1

STAGE	1135.00	1136.00	1136.50	1137.00	1138.00	1140.00	1145.00	1150.00
FLOW	0.00	20.00	40.00	65.00	95.00	215.00	715.00	1415.00

CAPACITY	0.	1135.	1140.	1160.
----------	----	-------	-------	-------

ELEVATIONS	1100.	1131.	1180.	1235.
------------	-------	-------	-------	-------

CREL	SPWID	COOM	EXPW	ELEVL	COOL	CAREA	EXPL
1135.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TOPEL	COOD	EXPD	DAMWID
1137.0	3.0	1.5	10.

CREST LENGTH AT OR BELOW ELEVATION	10.	46.	134.	174.	208.	242.
	1137.0	1138.0	1140.0	1142.0	1144.0	1146.0

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA A

ISTAQ	JCOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INYDG	IUMG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.32	0.000	.32	0.000	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	149.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= .77 CP= .62 NTA= 0

RECESSION DATA

STRIO= -1.50 ORCSN= -.05 RTIOR= 2.00  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 3.78 AND R= 2.62 INTERVALS

UNIT HYDROGRAPH 16 END-OF-PERIOD ORDINATES, LAG= .77 HOURS, CP= .63 VOL= 1.00

29.	89.	150.	182.	87.	59.	40.	27.	19.
13.	9.	6.	4.	3.	2.			

\*\*\*\*\*

SUB-AREA RUNOFF COMPUTATION

INFLOW TO MIDDLE LAKE FROM SUBAREA B

ISTAQ ICOMP IECON ITAPE JPLT JPRT INAME ISTAGE IAUTO

HYDROGRAPH DATA  
 THYDG TUNG TAREA SNAP TRSDA TRSPC RATIO TSNDW TSAME LOCAL

PRECIP DATA  
 SPFE PMS R6 R12 R24 R48 R72 R96

TRSPC COMPUTED BY THE PROGRAM IS .600

LOSS DATA  
 LROPT STKR DLTKR RTIOL ERAIN SINKS RTIOK STRIL CNSTL ALSMX RTIMP

UNIT HYDROGRAPH DATA  
 TP= 2.06 CP=.62 NTA= 0

RECESSION DATA  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.29 AND R= 7.60 INTERVALS

UNIT HYDROGRAPH 46 END-OF-PERIOD ORDINATES; LAG= 2.05 HOURS; CP= .62 VOL= 1.00	
11.	248.
39.	248.
124.	263.
168.	265.
45.	76.
39.	76.
11.	20.
3.	5.

\*\*\*\*\*  
 \*\*\*\*\*  
 COMBINE HYDROGRAPHS  
 \*\*\*\*\*

COMBINING THREE HYDROGRAPHS

TSTA0 5 ICOMP 3 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 1 AUTO 0  
 \*\*\*\*\*  
 \*\*\*\*\*  
 \*\*\*\*\*

HYDROGRAPH ROUTING

ROUTE THROUGH MIDDLE LAKE AND DOWNSTREAM

ISTAO 6 ICOMP 1 IECON 0 ITAPE 0 JPLT 0 JPRT 0 INAME 1 ISTAGE 1 AUTO 0  
 \*\*\*\*\*  
 \*\*\*\*\*  
 \*\*\*\*\*

ALL PLANS HAVE SAME ROUTING DATA

CROSS 0.0 CLOSS 0.000 AVG 0.000 IRES 1 ISAME 1 TOPT 0 TPMP 0 LSTR 0  
 NSTPS 1 MSTOL 0 LAG 0 ANSKK 0 TSK STORA ISPRAT -1  
 107950 107800 107850 107750 107800 107900 107900 108000  
 0.00 49.00 125.00 240.00 370.00 525.00 700.00 870.00 1190.00

D-32

STAGE 107950 107800 107850 107750 107800 107900 107900 108000  
 FLOW 0.00 49.00 125.00 240.00 370.00 525.00 700.00 870.00 1190.00  
 CAPACITY= 0% 75% 140% 225%

ELEVATION= 1069. 1079. 1078. 1080.

CREL 1079.0 0.0  
 SPWID 0.0  
 COON 0.0  
 EXPW 0.0  
 ELEV 0.0  
 EXPL 0.0  
 CARER 0.0  
 EXPL 0.0

DAM DATA

TOPEL 1078.0  
 COOD 3.0  
 EXPD 1.5  
 DAMWID 100.

CREST LENGTH 100. 158. 216. 246. 286.  
 AT OR BELOW ELEVATION 1078.0 1079.0 1080.0 1082.0 1085.0

BRWID 12. 50 1068.00 2.00 1075.00 1078.00  
 DAM BREACH DATA  
 WSEL 1075.00 1078.00

OVN\*

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SUB-AREA RUNOFF COMPUTATION

INFLOW TO LAKE SHERIDAN

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

TRVDC	TURG	TAREA	SNAP	TRSDA	TRSPC	RATIO	TSNOW	TSAME	LOCAL
1	1	2.00	0.00	2.00	0.00	0.000	0	1	0

HYDROGRAPH DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.31	117.00	127.00	136.00	142.00	145.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 800

PRECIP DATA

LRDPT	STKR	DLTR	RTIOC	ERAIN	STRS	RTIDK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

LOSS DATA

TP= 2.09 CP= .62 NTA= 0

UNIT HYDROGRAPH DATA

RECESSION DATA

STRIO= -1.50 ORCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 9.45 AND R= 7.65 INTERVALS

15.	57.	115.	180.	250.	314.	361.	388.	374.
333.	292.	256.	225.	197.	173.	152.	133.	102.
90.	79.	69.	61.	53.	47.	41.	36.	28.
24.	21.	19.	16.	14.	13.	11.	10.	9.
7.	6.	4.	4.	4.	3.			

PLAN 2 SAME AS PLAN 1

\*\*\*\*\*

COMBINE HYDROGRAPHS

COMBINING TWO HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	2	0	0	0	0	1	0	0



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HYDROGRAPH ROUTING

ROUTE THROUGH LAKE SHERIDAN

ISTAG ICOMP IECON ITAPE JPLT JPRT INAME JSTAGE IAUTO  
9 1 0 0 0 0 0 1 0 0

ALL PLANS HAVE SAME

D-34

ROUTING DATA															
QLOSS	CLOSS	AVG	URES	ISAME	IOPT	IPMP	LSTR	NSTPS	MSDLS	LAG	AMSKK	X	TSK	STORA	ISPRAT
0.00	0.000	0.000	1	1	0	0	0	0	0	0.000	0.000	0.000	0.000	-998.	0

CAPACITY= 0. 167. 621. 988. 2484.

ELEVATION= 980. 990. 998. 1000. 1020.

CREL	SPVID	COOM	EXPW	ELEVEL	COOL	CAREA	EXPL
998.0	80.0	3.2	1.5	0.0	0.0	0.0	0.0

DAM DATA			
TOPEL	COOD	EXPD	DAMWID
999.8	3.1	1.5	89.

CREST LENGTH AT OR BELOW ELEVATION	2.	37.	89.	127.	131.	169.
999.8	999.9	1000.0	1001.0	1002.0	1003.0	

BRWID	Z	ELBM	TFAIL	MSEL	FAILEL
130.	.50	990.00	5.00	998.00	1001.00

DAM BREACH DATA



PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION STATION AREA PLAN RATIO 1 RATIO APPLIED TO FLOWS  
 .20

HYDROGRAPH AT 1 2.32 1 1163.  
 ( 87017 ( 3219411

2 1163.  
 ( 3219411

ROUTED TO 2 2.32 1 1162.  
 ( 6.011 ( 3219211

2 1162.  
 ( 3219211

HYDROGRAPH AT 3 .32 1 261.  
 ( .831 ( 74011

2 261.  
 ( 74011

HYDROGRAPH AT 4 1.33 1 667.  
 ( 32447 ( 182811

2 667.  
 ( 182811

3 COMBINED 5 3.97 1 1960.  
 ( 10.281 ( 554911

2 1960.  
 ( 554911

ROUTED TO 6 3.97 1 261.  
 ( 10.281 ( 696911

2 261.  
 ( 696911

HYDROGRAPH AT 7 2.00 1 998.  
 ( 52187 ( 282611

2 998.  
 ( 282611

2 COMBINED 8 5.97 1 3459.  
 ( 15.461 ( 979511

25/21

2 3459.  
1 97.9511

ROUTED TO

9 5.97  
1 15.461  
1 4242  
1 120.1211  
2 2827.  
1 80.0711

ROUTED TO

10 5.97  
1 15.461  
1 4242.  
1 120.1311

2 2827.  
1 80.0511

SUMMARY OF DAM SAFETY ANALYSIS

.....  
 ELEVATION INITIAL VALUE SPILLWAY CREST TOP OF DAM  
 STORAGE 1135.00 1135.00 1137.00  
 OUTFLOW 172. 172. 182.  
 0. 0. 65.

RATIO OF PMF .20  
 MAXIMUM DEPTH OVER DAM 3.08  
 MAXIMUM STORAGE AC-FT 197.  
 MAXIMUM OUTFLOW CFS 1162.  
 DURATION OVER TOP HOURS 13.50  
 TIME OF MAX OUTFLOW HOURS 41.75  
 TIME OF FAILURE HOURS 0.00

PLAN 2 .....  
 ELEVATION INITIAL VALUE SPILLWAY CREST TOP OF DAM  
 STORAGE 1135.00 1135.00 1137.00  
 OUTFLOW 172. 172. 182.  
 0. 0. 65.

RATIO OF PMF .20  
 MAXIMUM DEPTH OVER DAM 3.08  
 MAXIMUM STORAGE AC-FT 197.  
 MAXIMUM OUTFLOW CFS 1162.  
 DURATION OVER TOP HOURS 13.50  
 TIME OF MAX OUTFLOW HOURS 41.75  
 TIME OF FAILURE HOURS 0.00

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....  
 ELEVATION INITIAL VALUE SPILLWAY CREST TOP OF DAM  
 STORAGE 1075.00 1075.00 1078.00  
 OUTFLOW 73. 73. 140.  
 0. 0. 700.

RATIO OF PMF .20  
 MAXIMUM DEPTH OVER DAM .70  
 MAXIMUM STORAGE AC-FT 170.  
 MAXIMUM OUTFLOW CFS 2461.  
 DURATION OVER TOP HOURS 2.50  
 TIME OF MAX OUTFLOW HOURS 41.75  
 TIME OF FAILURE HOURS 39.75

PLAN 2 .....  
 ELEVATION INITIAL VALUE SPILLWAY CREST TOP OF DAM  
 STORAGE 1075.00 1075.00 1078.00  
 OUTFLOW 73. 73. 140.  
 0. 0. 700.

RATIO OF PMF .20  
 MAXIMUM DEPTH OVER DAM .70  
 MAXIMUM STORAGE AC-FT 170.  
 MAXIMUM OUTFLOW CFS 2461.  
 DURATION OVER TOP HOURS 2.50  
 TIME OF MAX OUTFLOW HOURS 41.75  
 TIME OF FAILURE HOURS 39.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....	ELEVATION STORAGE	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	621.	998.00	998.00	999.80
	0.	621.	0.	834.
	0.	0.	0.	309.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1001.86	2.06	1010.	4243.	3.50	44.13	41.25

PLAN 2 .....	ELEVATION STORAGE	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	621.	998.00	998.00	999.80
	0.	621.	0.	834.
	0.	0.	0.	309.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1002.98	2.78	1057.	2828.	11.25	42.50	0.00

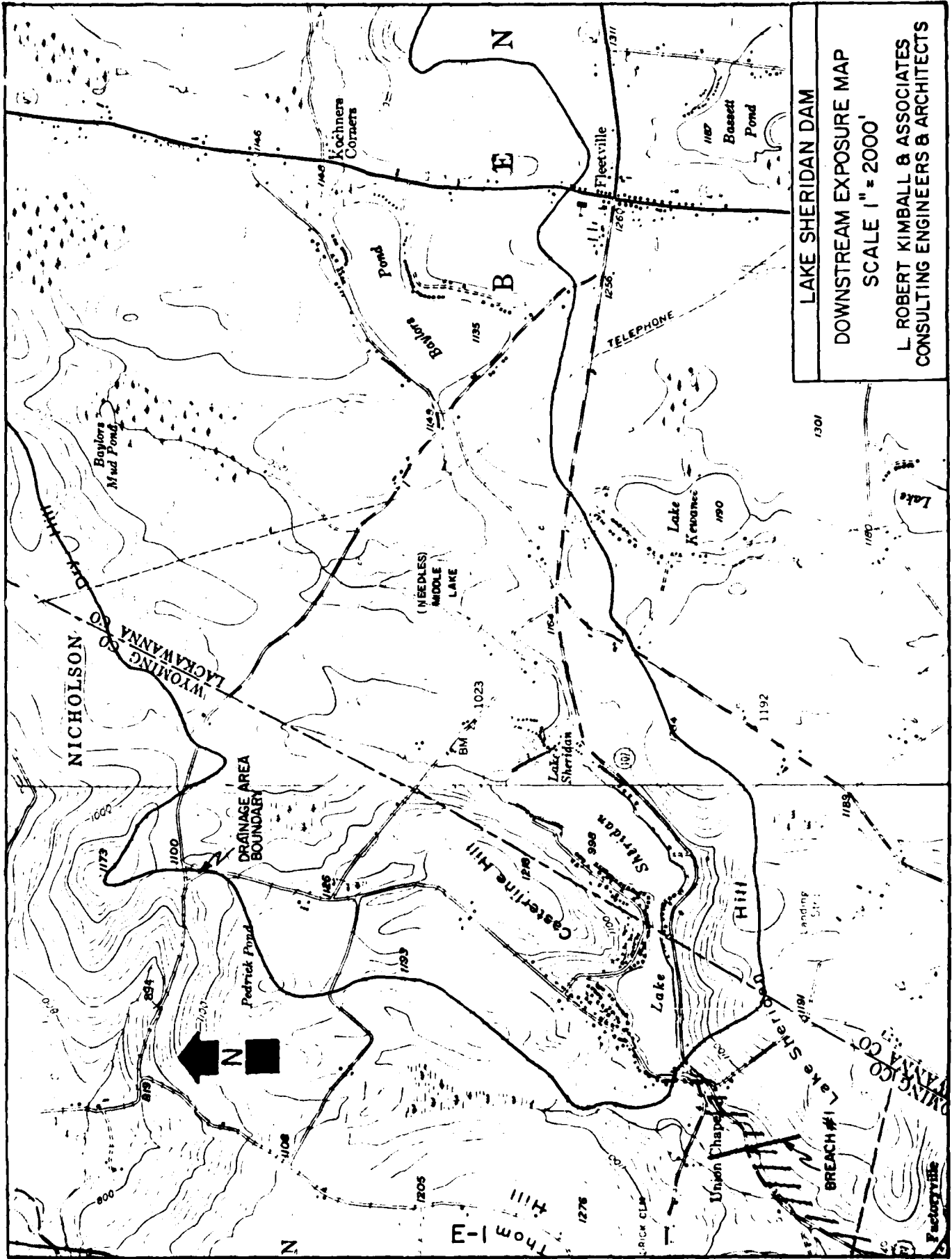
PLAN 1 STATION 10

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	4242.	946.2	46.00

PLAN 2 STATION 10

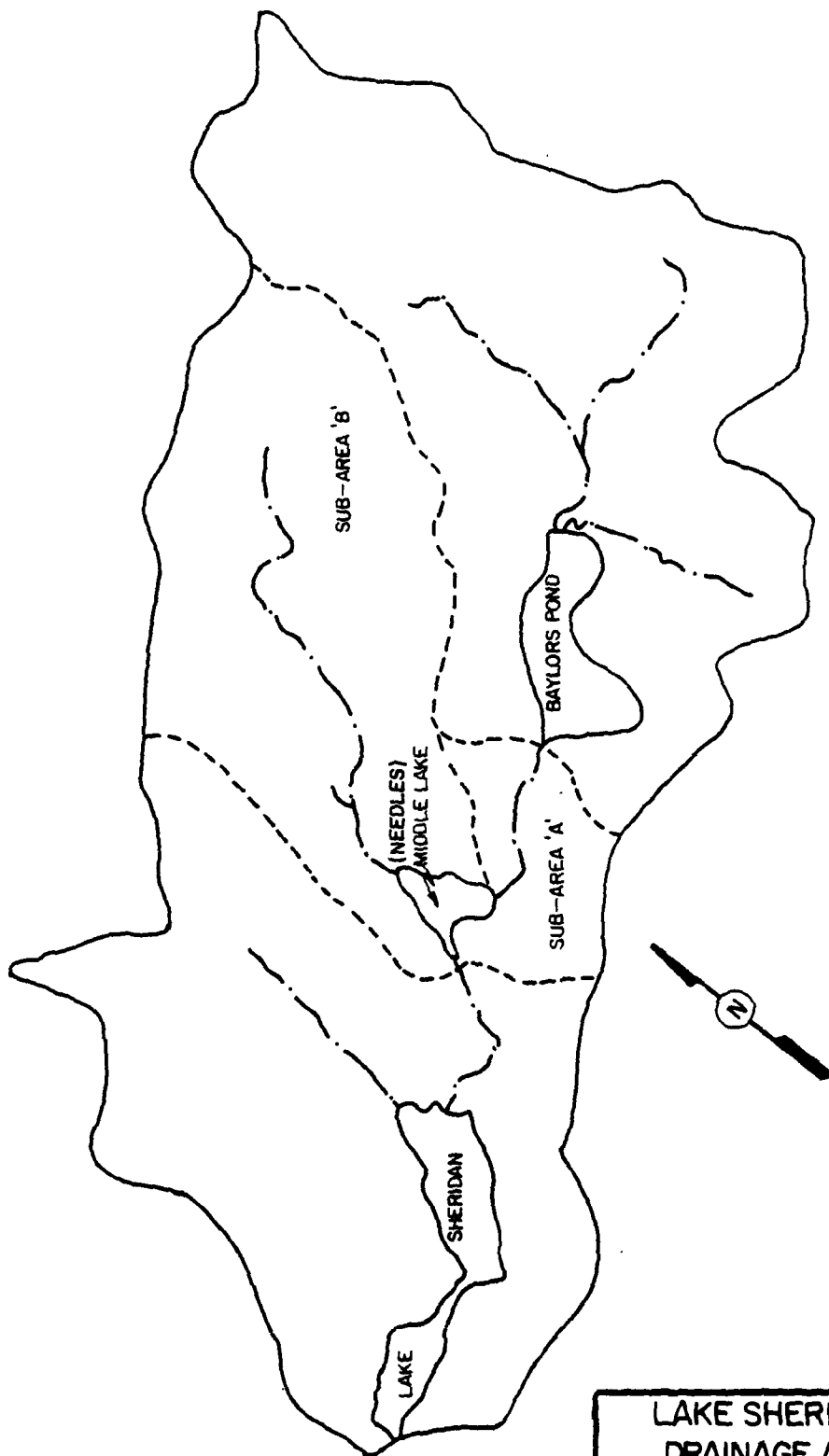
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	2827.	945.0	42.75

APPENDIX E  
DRAWINGS



**LAKE SHERIDAN DAM**  
**DOWNSTREAM EXPOSURE MAP**  
SCALE 1" = 2000'  
L. ROBERT KIMBALL & ASSOCIATES  
CONSULTING ENGINEERS & ARCHITECTS





**LAKE SHERIDAN DAM  
DRAINAGE AREA MAP**

**SCALE 1" = APPROX. 2700'**

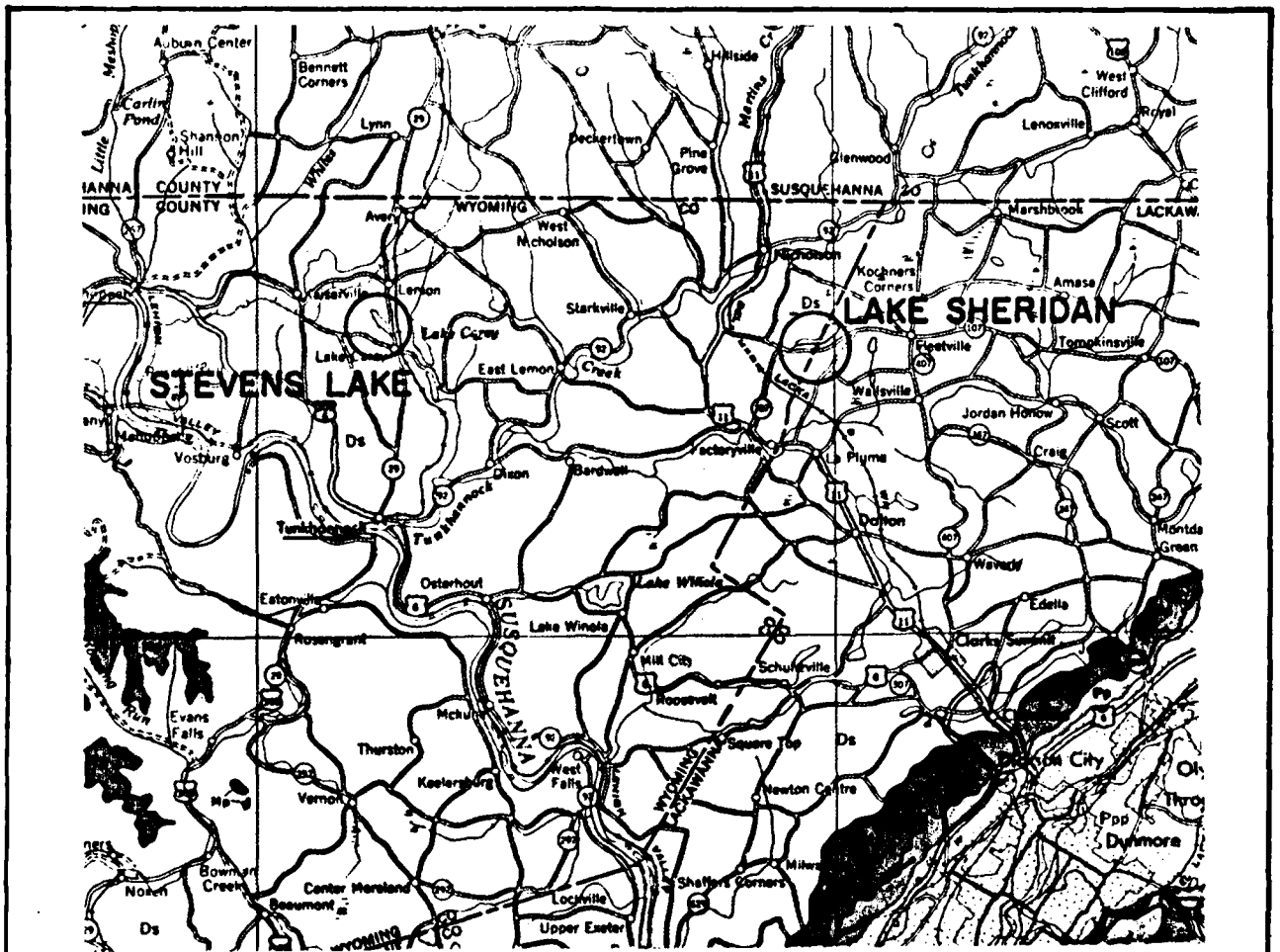
**L. ROBERT KIMBALL & ASSOCIATES  
CONSULTING ENGINEERS & ARCHITECTS**

APPENDIX F  
GEOLOGY

## General Geology

Lake Sheridan lies within the (Glaciated) Low Plateaus Section of the Appalachian Plateau Physiographic Province. This area is characterized by broad anticlines and synclines and little, if any, faulting. There are no known faults in the vicinity of the dam.

The rocks underlying the lake and dam consist of the Devonian aged Susquehanna Group. This is a complex unit of conglomerate, sandstone, siltstone and shale. The usually well developed bedding ranges in thickness from less than one to over fifteen feet. The well developed joints are regular and closely spaced in the shales and siltstones. They are vertical or steeply dipping and usually form a blocky or platy pattern. The shales disintegrate rapidly, but the siltstone, sandstone and conglomerate are fairly resistant to weathering. The rocks of the Susquehanna Group form a good foundation for heavy structures if excavated to sound material and the shales and siltstones are kept waterfree. The interstitial porosity of the coarser rocks is low, but joint development has created a medium level of total effective porosity.



Geologic Map of The Area Around Stevens Lake And Lake Sheridan Dams

CENTRAL AND EASTERN PENNSYLVANIA



**Onwayo Formation**  
*Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous eastward. Relation to type Onwayo not proved.*



**Catakill Formation**  
*Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Silk Mountain, Honesdale, Shohola, and Delaware River in the east.*



**Marine beds**  
*Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Burket, Walker, Harvell, and Trimmers Rock; Tully Limestone at base.*



**Susquehanna Group**  
*Barbed line is "Chemung-Catakill" contact of Second Pennsylvania Survey. County reports barbs on "Chemung" side of line.*

Scale: 1:250,000