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WOODWARD-CLYDE CONSULTANTS PLYMOUTH MEETING PA
NATIONAL DAM INSPECTION REPORT. GOLDSBORO DAM (NDS ID PA 00149,--ETC(U)
JUL 79 J BOSCHUK, J H FREDERICK

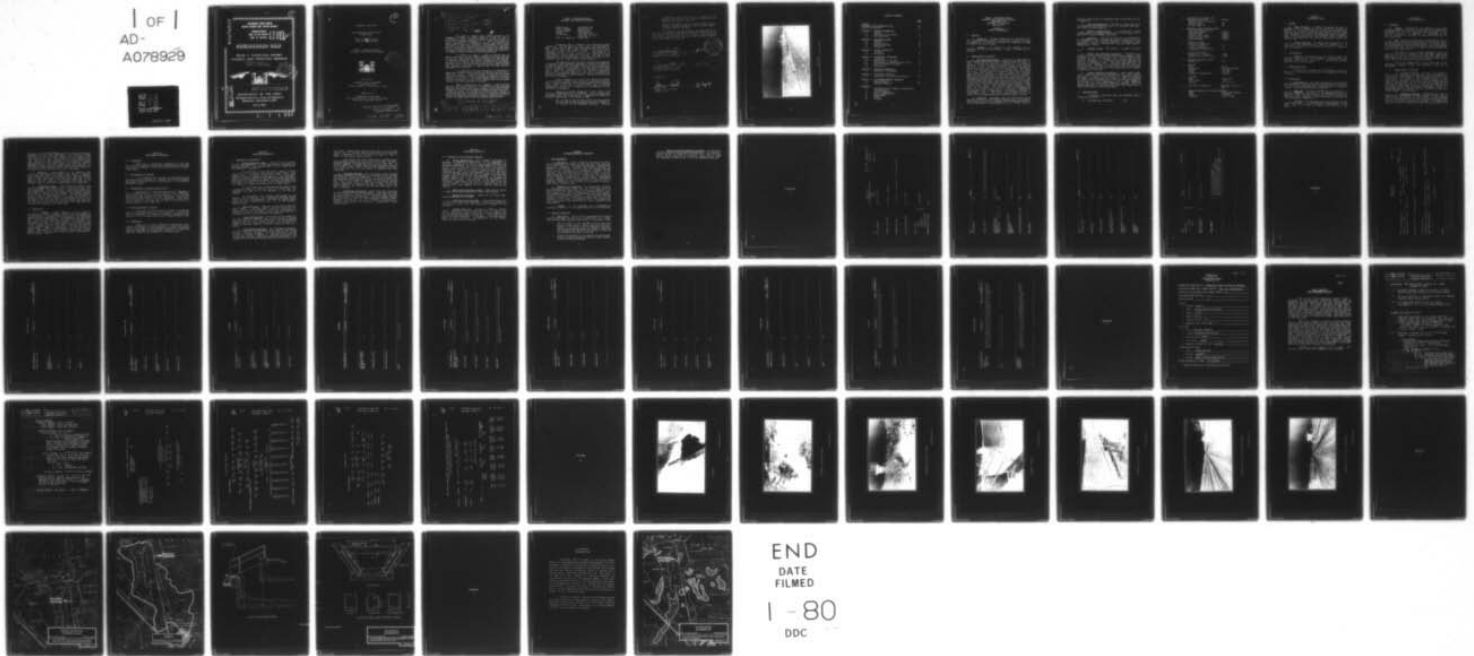
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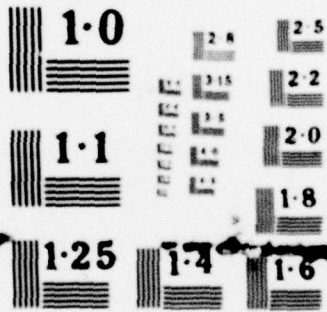
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

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DELAWARE RIVER BASIN
OAKES SWAMP RUN, WAYNE COUNTY

PENNSYLVANIA
NDS ID PA. 00149
DER ID 64-148

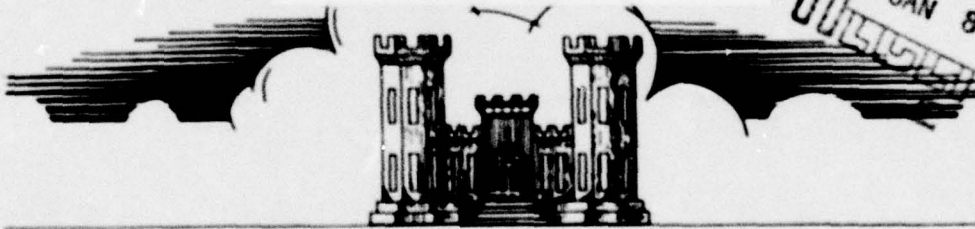
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GOULDSBORO DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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Contract No. DACW31-79-C-0017

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DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JULY 1979

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DELAWARE RIVER BASIN

GOULDSBORO DAM, WAYNE COUNTY
PENNSYLVANIA

(NDS I.D. ^{Number} PA 00149,
DER I.D. ~~64-148~~)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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Prepared by:

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Submitted to:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

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JULY 1979

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394 157 JLM

⑥ National Dam Inspection Report.
 Goldsboro Dam (NDS ID
 PA 00149, DER ID Number 64-148)
 Delaware River Basin, Wayne County,
 Pennsylvania. Phase I
 Inspection Report, PREFACE

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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 the Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I investigation is to expeditiously identify 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 investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for more detailed 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.

⑪ Jul 79

⑮ DACW31-79-C-0017

⑩ John Boschuk, Jr.
 John Henry Frederick, Jr.

⑫ 61

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam: Gouldsboro Dam
County Located: Wayne County
State Located: Pennsylvania
Stream: Oaks Swamp Run
Coordinates: Latitude 41° 14.1'
Longitude 75° 27.2'
Date of Inspection: 2 May 1979

Gouldsboro Dam is owned by the Pennsylvania Fish Commission. The dam abuts a higher, wider railroad embankment. According to DER files, Gouldsboro Dam was built in 1895 and at least the outlet portion of the drop inlet discharge conduit was built in 1912. The facility is considered to be in fair condition and classified as a "Significant" hazard potential structure. The dam is also classified as an "Intermediate" size dam by virtue of its reported 1,089 acre-feet normal storage capacity.

The hydrologic and hydraulic calculations presented in Appendix C and discussed in Section 5 indicate the dam will not be overtopped during the PMF. Excess flows will pass over natural ground at the northeast end of the lake across Route 507 at Gouldsboro, Pennsylvania, and eventually into Snag Pond. Thus, in accordance with the Corps of Engineers' definition of spillway capacity, this dam is classified as having an "Adequate" spillway capacity, assuming unrestricted flow to the northeast.

Visual inspection of the dam and reservoir detected no significant problems other than an unserviceable drain gate. Since the dam and railroad embankment have a combined crest width on the order of 85 feet and would not overtop during large storms, it is judged that the stability of the embankment is adequate.


Based on findings presented in this report, the following recommendations are presented. All work should be performed under the direction of a registered professional engineer experienced in the design of dams.

1. The low area at the northeast end of the lake should be kept free of debris and obstructions to enable it to function as an emergency spillway. Serious

consideration should be given to acquiring this property and designing the channel to serve as the emergency spillway for the dam.

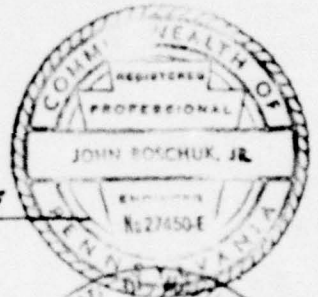
2. Routine maintenance of the channel should be performed to prevent excessive brush and woody vegetation from obstructing flow.

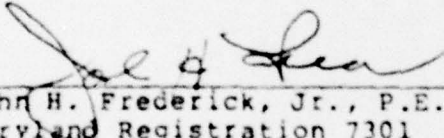
An operation and maintenance procedure should be developed, which would include an inspection checklist to be used during routine inspection of the dam. This checklist would help insure that all items are inspected and maintained in the best possible condition.



John Boschuk, Jr., P.E.
Pennsylvania Registration 27450E
Woodward-Clyde Consultants

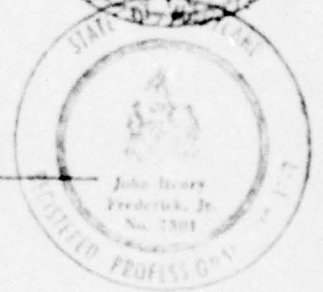
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Date



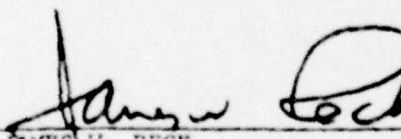


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Maryland Registration 7301
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Date

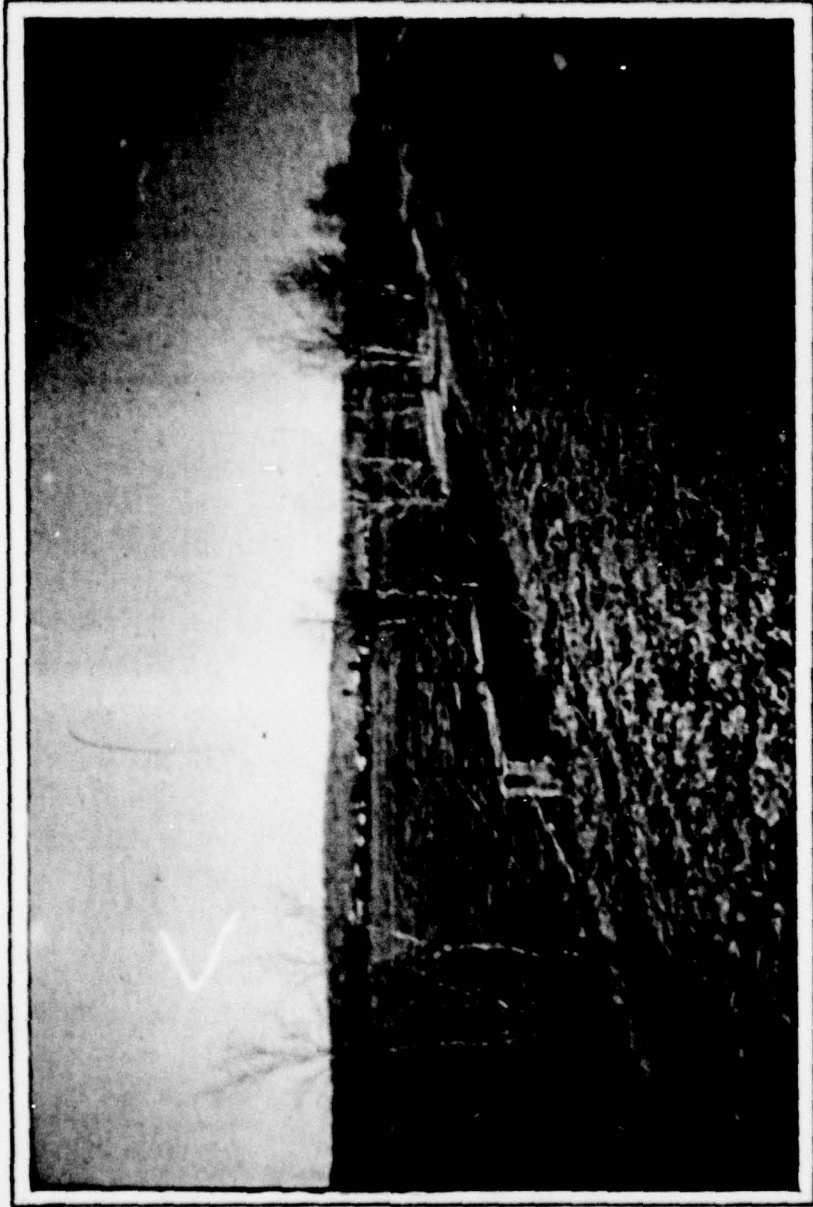


APPROVED BY:



JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

11 Sep 79
Date



OVERVIEW
GOULDSBORO DAM, WAYNE COUNTY, PENNSYLVANIA

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
GOULDSBORO DAM
NATIONAL ID #PA 00149
DER #64-148

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The 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. According to Department of Environmental Resources' files, Gouldsboro Dam was built in 1895. There are no drawings or descriptions of the dam or spillway. Either the entire spillway or the outlet portion was built in 1912. Gouldsboro Lake is bounded on the east by double railroad tracks (the rails are dated 1958). The tracks are in a cut toward the south end of the lake and a fill toward the north. The spillway is a concrete drop inlet structure that discharges through a culvert beneath the railroad, emptying into a swampy area to the east, as shown on Plate 1. The culvert entrance invert is eight feet below the weir. The upstream and downstream portions of the culvert are six feet wide and seven feet high. The central portion of the culvert is six feet wide and seven feet high with a horseshoe or semi-circular top. The top of the railroad track is about 7.7 feet above the weir crest. The railroad grade decreases to the north and increases to the south. Views of the embankment looking south and looking north are included in Appendix D, Photographs 6 and 7, respectively. The spillway is shown in Photographs 4 and 5. The lake collects water from a 3.9 square mile drainage basin and is about 260 acres in area.

b. Location. Gouldsboro Dam was constructed across Oaks Swamp Run in Lehigh Township, Wayne County, Pennsylvania. The dam and reservoir are located on the "Tobyhanna, Pennsylvania" Quadrangle at coordinates N 41° 14.1' W 75° 27.2'. A

regional location plan of Gouldsboro Lake is enclosed as Plate 1, Appendix E.

c. Size Classification. The dam is classified as an "Intermediate" size dam by virtue of its reported 1,089 acre-foot normal storage capacity.

d. Hazard Classification. A "Significant" hazard classification is assigned consistent with the potential for appreciable property damage downstream.

e. Ownership. The dam is owned by the Pennsylvania Fish Commission. All correspondence should be sent to Mr. E. J. Grindall, Senior Project Engineer, Pennsylvania Fish Commission, Division of Engineering, Robinson Lane, Belfont, Pennsylvania 16823.

f. Purpose of Dam. The reservoir is used for recreation.

g. Design and Construction History. According to a letter from the original owner, Mountain Ice Company, dated September 10, 1943, the dam was built in 1895 by North Jersey & Pocono Mountain Ice Company, the original name of the Mountain Ice Company. It is likely that the dam increased the size of a preexisting lake. The lake was used for ice harvesting and remnants of an extensive physical plant can still be seen. The date on the outlet end of the culvert indicates at least a portion of the culvert was built in 1912, probably by the railroad.

h. Normal Operating Procedures. Under normal conditions, reservoir outflow is through the drop inlet spillway and culvert. Based on 1964 through 1971 inspection reports and memos, and photographs dating back to 1943, the spillway once had a sluice gate and hoist. The gate and hoist appear to be operable in a 1943 photograph. In a 1964 inspection report, the hoist was deemed "completely useless". The 1971 photographs show no hoist and during this 1979 inspection, no signs of the gate or hoist were found.

1.3 Pertinent Data.

A summary of pertinent data for Gouldsboro Dam is presented as follows.

a. Drainage Area (sq miles)	3.88
-----------------------------	------

b.	Discharge of Spillway (cfs)	
	Maximum Known Flood	Unknown
	Reservoir Level at Verge of Overflowing	69
	Maximum Capacity	149
c.	Elevation (MSL from Quad sheet)	
	Top of Railroad Track at Spillway Section	1,901.7
	Spillway Crest	1,894.0
	Culvert Inlet Invert	1,886.0
	Culvert Outlet Invert	1,884.0±
	Downstream Toe	1,883.7
d.	Reservoir (miles)	
	Length at Normal Pool (north to south)	1.4
	Fetch at Normal Pool (relative to drop inlet)	1.0
e.	Storage (acre-feet)	
	Normal Pool (reported)	1,089
	Maximum Pool (1,895.5 est)	1,500
f.	Reservoir Surface (acres)	
	Normal Pool	260
g.	Dam Data	
	Type	Earth
	Dimensions	Not well defined
	Height	≈18 feet
	Width	≈85 feet
	Foundation Preparation	Unknown
h.	Spillway	
	Type	Drop Inlet
	Weir Length	13.25'
	Culvert	6 ft x 7 ft
i.	Flow Path of Overflow	Northeast corner of lake
j.	Average Dimensions of Overflow Channel	
	Type	Grass lined channel
	Size	130 feet
	Elevation	1,895.5 feet

SECTION 2 ENGINEERING DATA

2.1 Design.

a. Data Available. A summary of engineering data on Gouldsboro Dam is presented on the checklist attached as Appendix A. Principal documents containing pertinent data used for this report include a "Description of North Jersey Pond Indicated on the Pocono Quadrangle USGS Map as Gouldsboro Lake, Owned by the Mountain Ice Company", State inspection reports, correspondence and several photographs dating from 1943 to 1971.

b. Design Features. Principal design features of the drop inlet are illustrated on Plate 2, Appendix E. A description of features is presented in Section 1.2, "Description of Project".

2.2 Construction.

Based on discussions with the present owners and available documentation in Department of Environmental Resources' (DER) files, there are no construction records pertaining to this structure.

2.3 Operational Data.

There are no minimum flow requirements downstream. There are no available records as to the operation of this structure.

2.4 Evaluation.

a. Availability. All data reproduced in this report and studied for this investigation were provided through the files of DER and supplemented by conversations with representatives of the Pennsylvania Fish Commission.

b. Adequacy. The data provided was not sufficient to make a comprehensive evaluation of the embankment section or spillway. Thus, the entire evaluation of this structure was based on visual inspection, field measurements and calculations presented in Appendix C.

c. Validity. The available data was extremely limited and, since there is no contradictory documentation in the files, there is no reason to question the validity of the data.

SECTION 3
VISUAL INSPECTION

3.1 Findings.

a. General. Observations and comments of the field inspection team are contained in the checklist enclosed herein as Appendix B, and are summarized and evaluated in the following sections. In general, the appearance of the facility indicates the spillway and pond drain system are not well maintained.

b. Dam. Along the eastern shore of Gouldsboro Lake it is difficult to differentiate between original ground, original dam embankment and railroad embankment. An access road is located between the railroad tracks and the lake, and remnants of a railroad track once used to transport ice are between the shore and the access road.

The slope of the upstream embankment below the waterline could not be measured. The embankment slope above waterline to the top of the access road was judged to be approximately 2H:1V and covered with riprap and woody vegetation. The total crest width is about 85 feet.

Due to the swampy nature on the east side of the embankment, seepage through the embankment could not be determined.

c. Appurtenant Structures.

1. Principal Spillway. As shown in Photograph 1, there is some cracking of the spillway walls and spalling of the concrete, which appears to have been patched at least once in the past. An October 1, 1971 inspection report in DER files and a photograph show what at first appears to be a crack in the spillway. Due to the quantity of flow passing over the spillway at the time of this 1979 inspection, the existence of this crack could not be confirmed. However, it is unlikely the spillway is cracked. Examination of the 1971 photograph seems to indicate that the, so-called, crack is a branch wedged in the spillway.

2. Emergency Spillway. Gouldsboro Dam was not designed with an emergency overflow system. However, the low end of the lake adjacent to the railroad at the northeast corner of the reservoir is the first point of overtopping when the weir and conduit capacity are exceeded. Overtopping has occurred in 1942, 1955 and 1958, when the water flowed north

and over the railroad embankment into the creek and Snag Pond. Subsequent to the 1942 overtopping, the railroad company excavated a ditch to a culvert under the railroad about 1,000 feet north of the lake. The culvert was not located during this inspection. The excavated ditch is less than 10 feet wide. During the field inspection, a cross-section assessed representative of the path excess flow from the lake is expected to take during an extreme event was measured. The cross-section has a bottom width of 130 feet and is bounded on the east by the tracks and a low dike on the west.

d. Reservoir. Reconnaissance of the reservoir disclosed the side slopes are stable, flat and well vegetated with trees and brush to the water's edge. There are several homes located around the north end of the lake and a State park on the west shore. The extreme upper end of the reservoir was not reasonably accessible, but there was no sediment noted on the north or east sides of the reservoir.

e. Downstream Channel. The downstream channel flows through a swampy area before entering Snag Pond about 5,000 feet downstream of the lake outlet. Snag Pond outlets into the Lehigh River. During high flows, water floods the streets and property adjacent to the stream. The valley gradient below the dam is approximately 0.002. At Snag Pond and PA Route 507 are two houses subject to flooding. Overtopping of Gouldsboro Lake does not occur at the embankment but at the northeast end of the lake over natural ground, and flows over the railroad tracks and Route 507 about 1,000 feet north of the lake and eventually into Snag Pond.

3.2 Evaluation.

In summary, visual inspection of the structure disclosed no evidence of apparent past or present movement of the embankment or its appurtenant facilities. The downstream swamp prevented observation of any seepage at the downstream toe of the railroad embankment. The drop inlet spillway is in fair condition with some deterioration of concrete. The "emergency spillway" is in poor condition as no real defined channel exists, and heavy brush debris and trees are growing in the expected path of the water. The sluice gate is unserviceable. Based on discussions with the local townspeople, overflowing of the northeast corner has occurred several times. The high water level in recent history was at about elevation 1,893±.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures.

There are no operational procedures for this dam and, with the exception of the unserviceable pond drain gate at the base of the weir, there are no facilities which require a dam tender.

4.2 Maintenance of the Dam.

It is reported that the dam is maintained by the Pennsylvania Fish Commission. However, very little evidence was found indicating routine maintenance of the upstream embankment slope.

4.3 Maintenance of Operating Facilities.

Maintenance of operating facilities is reported to be the responsibility of the Pennsylvania Fish Commission. There were some concrete patches observed on the spillway walls which, when compared to a 1971 photograph, indicate that the work was done prior to the 1971 inspection. Thus, there is no evidence to indicate that the dam is maintained on a regular basis since at least 1971.

4.4 Warning Systems In Effect.

There are no formal warning systems or procedures specifically established for this structure. It is noted that the Fish Commission is preparing a standard emergency procedure for all of its dams, which would include Gouldsboro Lake.

4.5 Evaluation.

There are no written operational procedures, maintenance procedures or warning systems in effect during the time of the inspection. Maintenance and operating procedures should be developed, which includes a checklist of items to be observed, operated and inspected on a regular basis.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features.

a. Design/Evaluation Data. There are no original design data available. A 1943 State report evaluates the spillway capacity. Calculations made for this investigation are presented in Appendix C.

The watershed is long and narrow, about 3.8 miles long and 0.7 to 1.4 miles wide, having a total area of 3.88 square miles. Elevations range from 2,120 in the upper reaches to 1,894 at normal pool elevations. The watershed is about 95 percent wooded with less than 20 percent developed. Throughout the watershed are swamps, visually estimated from USGS maps to be about 250 acres. Runoff characteristics are not expected to change significantly in the near future.

The 1943 State report evaluated the spillway to have a discharge capacity of 682 cfs with a six foot head. No statement was made as to the adequacy of the spillway capacity.

In accordance with criteria established by the Federal (OCE) Guidelines, the recommended spillway design flood for this "Intermediate" size dam and "Significant" hazard potential classification is 0.5 to 1.0 PMF (Probable Maximum Flood).

b. Experience Data. There are no records of reservoir water levels. A National Weather Service reporting rain gaging station is in Gouldsboro. There are no estimates or records of previous high water levels other than reports of flooding over the railroad tracks in Gouldsboro.

c. Visual Observations. On the date of the inspection, the only condition observed that would indicate a reduced spillway capacity during an extreme event is the downstream swampy area and flat channel slope, both indicating a potential spillway capacity reduction resulting from tailwater.

d. Overtopping Potential. The overtopping potential of this structure was estimated using "HEC-1, Dam Safety Version", computer program. A brief description of the program is included in Appendix C. Because of the potential for spillway tailwater reducing the spillway discharge, it was assumed that the maximum spillway capacity occurred with a 2.5

foot head. Excess water flows north, west of the railroad tracks, until it can flow over the tracks and into Snag Pond. Water is expected to flow north when the reservoir level is about 1.5 feet above the weir crest.

Calculations for this investigation estimate spillway discharge of about 149 cfs with a 2.5 foot head. The HEC-1 program computed the peak PMF inflow to be 5,403 cfs. As shown in Appendix C, maximum reservoir water surface elevation for the PMF is about 1,898. The railroad embankment is about 1,000 feet north of the lake before it becomes lower than 1,900 feet.

e. Spillway Adequacy. As no portion of the railroad embankment adjacent to the lake is overtopped during the PMF, the spillway is rated as "Adequate". It is to be noted that this spillway rating applies only as long as the ditch on the west side of the tracks is capable of carrying off excess flow. The actual ditch is less than 10 feet wide but the section assessed to represent the path of water is 130 feet wide, bounded on the east by the railroad tracks and a low dike on the west.

f. Downstream Conditions. About 5,000 feet downstream of the spillway outlet, Oakes Swamp Run flows under PA Route 507 into Snag Pond. About 1,500 farther downstream, Snag Pond discharge enters the Lehigh River. Potential damage centers are two houses at Route 507 and downstream highway bridges. Therefore, as loss of life is not likely in the event of a failure, the structure is rated as a "Significant" hazard classification.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Field inspection disclosed no evidence of potential instability of the embankment or spillway. Because of the size of the railroad embankment and because the embankment is not overtopped adjacent to the lake, but at a point 1,000 feet north of the lake, there does not appear to be a problem of instability even during a period of overtopping. There is no exterior evidence found indicating anomalous seepage through the embankment, but it is pertinent to note that the downstream area is swampy and could mask seepage through the toe of the embankment. The weir and conduit appear to be in fair condition but are incapable of passing storm flows. The spillway rating depends on the relatively unrestricted flow north of the lake along the railroad tracks. The sluice gate is inoperable and, at the present time, there appears to be no way of draining the reservoir.

b. Design and Construction Data. There were no design or construction data available to review and evaluate.

c. Operating Procedures. There are no written operating procedures for this dam.

d. Post-Construction Changes. Since reconstruction of the culvert in 1912, there have been no reports or evidence to indicate that there were post-construction changes to this structure.

e. Seismic Stability. The dam is located in Seismic Zone 1. Normally it can be considered that if a dam in this zone is stable under static conditions, it can be assumed safe for any expected earthquake conditions. Since there is no discernible dam embankment, as opposed to a railroad embankment, to this structure, an assessment of the seismic stability could not be evaluated.

SECTION 7
ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Evaluation. Visual inspection and review of available documentation indicates the dam and drop inlet spillway are in fair condition. The hydrologic/hydraulic computations presented in Appendix C indicate the existing spillway and channel at the northern end will pass the Probable Maximum Flood without overtopping the embankment adjacent to the spillway. The spillway system for this structure is considered "Adequate" as long as the channel at the north end remains relatively unobstructed. In the event of overtopping at the northeast corner during extreme events, appreciable property damage with little possibility of loss of life is expected. Therefore, the structure is considered a "Significant" hazard potential dam.

b. Adequacy of Information. Since there was no design or construction data, there was not sufficient data to evaluate embankment materials or construction methods. However, based on the visual inspection and performance history of the embankment, sufficient performance data is available to evaluate the embankment stability. The spillway adequacy rating is based on a relatively unobstructed flow to the northeast in the event of an extreme event. The representative cross-section was determined by visual inspection and measurements.

c. Urgency. It is concluded that recommendations presented in Section 7.2 be implemented as soon as practical.

7.2 Remedial Measures.

a. Facilities. The following recommendations should be performed under the direction or supervision of a registered professional engineer experienced in the design of dams.

1. The low area at the northeast end of the lake should be kept free of debris and obstructions to enable it to function as an emergency spillway. Serious consideration should be given to acquiring this property and designing the channel to serve as the emergency spillway for the dam.
2. Routine maintenance of the channel should be performed to prevent excessive brush and woody vegetation from obstructing flow.

b. Operation and Maintenance Procedures. An operation and maintenance procedure should be developed. This procedure should include an inspection checklist which would be used during routine inspection of the dam to insure that all items are inspected and maintained in the best possible condition.

APPENDIX

A

NAME OF DAM Gouldsboro Dam
ID # PA 00149

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

Sheet 1 of 4

REMARKS
None in DER files.

ITEM
AS-BUILT DRAWINGS

See Plate 1, Appendix E.

REGIONAL VICINITY MAP

See Section 1 of this report. Data was very limited.

CONSTRUCTION HISTORY

None available.

TYPICAL SECTIONS OF DAM

See Appendix E.

OUTLETS - PLAIN
DETAILS
CONSTRAINTS
DISCHARGE RATINGS

RAINFALL/RESERVOIR RECORDS
None

ITEM _____ REMARKS _____

DESIGN REPORTS

None

GEOLOGY REPORTS

None. See Appendix F for data developed for this report.

DESIGN COMPUTATIONS

HYDROLOGY & HYDRAULICS

DAM STABILITY ----- }

SEEPAGE STUDIES ----- }

See Appendix C.

None

None

MATERIALS INVESTIGATIONS

BORING RECORDS

LABORATORY

FIELD

No data available.

POST-CONSTRUCTION SURVEYS OF DAM

None

BORROW SOURCES

Unknown.

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	None in DER files.
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None in DER files.
MISCELLANEOUS	<ol style="list-style-type: none">1. 12 black and white photographs.2. Miscellaneous State inspection reports.3. Two page document entitled, "Description of North Jersey Pond known as Gouldsboro Lake, owned by the Mountain Ice Company," September 24, 1943.4. Miscellaneous letters pertaining to the dam.

APPENDIX

B

CHECK LIST
VISUAL INSPECTION
PHASE I

Sheet 1 of 11

Name Dam Gouldsboro Dam County Wayne State Pennsylvania National ID # PA 00149
Type of Dam Earth Hazard Category II-Significant Temperature 60's
Date(s) Inspection 2 May 1979 Weather Clear

Pool Elevation at Time of Inspection 1894.5 ± M.S.L. Tailwater at Time of Inspection N/A M.S.L.

Inspection Personnel:

John Boschuk, Jr. (Geotechnical) Raymond Lambert (Geologist) John H. Frederick (Geotechnical)
Mary E. Beck (Hydrologist) Vincent McKeever (Hydrologist)

John Boschuk, Jr. Recorder

Remarks:

CONCRETE/MASONRY DAMS

Sheet 2 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

ANY NOTICEABLE SEEPAGE

N/A

STRUCTURE TO
ABUTMENT/EMBANKMENT
JUNCTIONS

N/A

DRAINS

N/A

WATER PASSAGES

N/A

FOUNDATION

N/A

CONCRETE/MASONRY DAMS

Sheet 3 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N/A	
STRUCTURAL CRACKING	N/A	
VERTICAL AND HORIZONTAL ALIGNMENT	N/A	
MUROLITH JOINTS	N/A	
CONSTRUCTION JOINTS	N/A	

EMBANKMENT

Sheet 4 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

SURFACE CRACKS

None observed.

UNUSUAL MOVEMENT OR
CRACKING AT OR BEYOND
THE TOE

There is no true toe to this embankment. See Sheet 5a.

SLOUGHING OR EROSION OF
EMBANKMENT AND ABUTMENT
SLOPES

Not applicable.

VERTICAL AND HORIZONTAL
ALIGNMENT OF THE CREST

Good condition.

RIPRAP FAILURES

Not applicable.

EMBANKMENT

Sheet 5 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

JUNCTION OF EMBANKMENT
AND ABUTMENT, SPILLWAY
AND DAM

None

ANY NOTICEABLE SEEPAGE

None

STAFF GAGE AND RECORDER

None

DRAINS

Probably no drains.

OUTLET WORKS

Sheet 6 of 11

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CRACKING AND SPALLING OF
CONCRETE SURFACES IN
OUTLET CONDUIT *Minor spalling observed along conduit.*

INTAKE STRUCTURE

*Fair condition with some spalling and concrete deterioration.
See photographs*

OUTLET STRUCTURE

*Wing walls are in fair condition with only minor spalling.
Channel is in good condition.*

OUTLET CHANNEL

Channel is in stable condition.

DRAIN GATE

*Wooden stop logs are fused in the tracks and the gate mechanism
has deteriorated.*

UNGATED SPILLWAY

Sheet 7 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

CONCRETE WEIR *See page 6.*

APPROACH CHANNEL *See page 6.*

DISCHARGE CHANNEL *See page 6.*

BRIDGE AND PIERS *See page 6.*

GATED SPILLWAY

Sheet 8 of 11

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE STILL	<i>None</i>	
APPROACH CHANNEL	<i>None</i>	
DISCHARGE CHANNEL	<i>None</i>	
BRIDGE AND PIERS	<i>None</i>	
GATES AND OPERATION EQUIPMENT	<i>None</i>	

INSTRUMENTATION

Sheet 9 of 11

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION

MONUMENTATION/SURVEYS

None

OBSERVATION WELLS

None

WEIRS

None

PIEZOMETERS

None

OTHER

None

RESERVOIR

Sheet 10 of 11

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

SLOPES

Reservoir slopes are stable, flat and well vegetated with trees and brush to water's edge. Homes located around north end of lake.

SEDIMENTATION

Upper end of reservoir not reasonably accessible, no sediment noted at north end or east side of reservoir.

DOWNSTREAM CHANNEL

Sheet 11 of 11

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

The downstream channel flows through swampy area before entering Snag Pond about 5000 feet downstream of the outlet of Gouldsboro Lake. During high flows, water floods the streets and property adjacent to the stream.

SLOPES

The valley gradient is less than 0.002.

APPROXIMATE NO.
OF HOMES AND
POPULATION

At Snag Pond and Pa. Rt. 507 is one house subject to flooding. Overtopping of Gouldsboro Lake does not occur at the embankment but at the north-east end of the lake, over natural ground and flows through the town.

APPENDIX

C

GOULDSBORO LAKE
CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately wooded, less than 25% developed

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1894.0 ft.* (1089 Acre-Feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): ---

ELEVATION MAXIMUM DESIGN POOL: ---

ELEVATION TOP DAM: ---

SPILLWAY:

a. Elevation 1894.0 ft

b. Type Concrete drop inlet and culvert

c. Width 13.25 ft.

d. Length 91± ft.

e. Location Spillover ----

f. Number and Type of Gates None

OUTLET WORKS:

a. Type Sluice Gate- Inoperable

b. Location Through drop inlet structure

c. Entrance inverts Unknown

d. Exit inverts Unknown

e. Emergency draindown facilities None Known

HYDROMETEOROLOGICAL GAGES:

a. Type 24 Hour Rain Gage

b. Location Gouldsboro

c. Records Report to National Weather Service

MAXIMUM NON-DAMAGING DISCHARGE: Not Determined

* Taken from USGS Map: All other elevations are relative.

SHEET

HEC-1, REVISED
FLOOD HYDROGRAPH PACKAGE

The original "Flood Hydrograph Package" (HEC-1), developed by the Hydrologic Engineering Center, Corps of Engineers, has been modified for use under the National Dam Inspection Program. The "Flood Hydrograph Package (HEC-1), Dam Safety Version", hereinafter referred to as, HEC-1, Rev., has been modified to require less detailed input and to include a dam breach analysis. The required input is obtained from the field inspection of a dam, any available design/evaluation data, relatively simple hydraulic calculations, or information from the USGS Quadrangle maps. The input format is flexible in order to reflect any unique characteristics of an individual dam.

HEC-1, Rev. computes a reservoir inflow hydrograph based on individual watershed characteristics such as: area, percentage of impervious surface area, watershed shape, and hydrograph characteristics determined from regional correlation studies by the Corps of Engineers, Baltimore District. The inflow is routed through the reservoir using spillway discharge data obtained from the field inspection or design data. Flood storage capacity is determined from USGS maps or design information and verified by the field inspection. In the event a spillway cannot discharge 0.5 PMF without overtopping and failure of the dam, downstream channel characteristics obtained from the field inspection and USGS maps are inputted and flows are routed downstream to the damage center and a dam breach analysis is performed.

Included in this Appendix are the HEC-1, Rev. pertinent input values and a summary print-out tables.

Classification (Ref. Recommended Guidelines for Safety Inspection of Dams)

1. The hazard potential is rated as "Significant" as there would be appreciable economic loss in the event of failure.
2. The size classification is "Intermediate" based on its reported 1089 Ac-ft normal storage capacity.
3. The spillway design, based on size and hazard classification, is 0.5 to 1.0 PMF (Probable Maximum Flood).

Hydrology and Hydraulic Analysis

1. Original/Evaluation data. A 1943 state report lists information taken from "The Gazetteer of Lakes and Ponds," reservoir surface area, 250 Ac; drainage area, 4.1 sq. miles; normal storage, 355 mgal (1089 Ac-ft). The state evaluated the spillway capacity to be 682 cfs with head = 6 ft and coefficient of discharge = 3.5, and weir length = 13.3 ft.

2. Evaluation of structure was by use of the computer program. Computer input as follows:

Inflow Hydrograph

drainage area - measured from current USGS map, Tobyhanna, Pa (1973), is 3.88 sq. miles
 rainfall shown on sheet 6, Ref. Hydrometeorological Report No. 33.

Snyder's hydrograph parameters, t_p & C_p

$$t_p = C_p (L')^{0.6}$$

$C_p = 2.1$ Information received from Corps of Engineers, Baltimore, for Zone 2.
 $L' = 2.4$ miles - from USGS, the distance from upper end of the reservoir to the watershed divide, used because the watershed center of gravity is very near the reservoir.

$$t_p = 2.1 \cdot 2.4^{0.6} = 3.55$$

BY MEB DATE 7/3/79
CHKD BY [Signature] DATE 7/26/79

SUBJECT _____
Gouldsboro Lake Dam
Hydrology / Hydraulics

SHEET 4 OF 8
JOB No. _____

Reservoir Routing

elevation - storage, shown on sheet 7
normal storage - original reported value
flood storage - taken from USGS map

elevation - discharge, shown on sheet 7

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

$L = 13.25$ ft - measured inside length of weir

$C = 2.85$ ref. King & Brater, Handbook of Hydraulics, Table 5-3

The field inspection, as does inspection of USGS maps, indicates tailwater may affect spillway discharge during an extreme event. Therefore, assume weir discharge remains constant for heads greater than 2.5 ft.

channel discharge $Q = b d \frac{1.49}{n} (d)^{4/3} s^{1/2}$ (wide channel)

when the lake level is 1.5 ft above weir crest, water will flow north parallel to the railroad tracks until it crosses the tracks and enters Snag Pond.

$b = 130$ ft } field

$n = 0.07$ } estimated

$s = 0.0026$ estimated from USGS map

The channel discharge is added to spillway discharge

Overtopping Potential - as shown on sheet B, the PMF reservoir level is 1898.06 which will flood the intersection of the tracks and RR Rt. 507 in Gouldsboro, but the railroad embankment will not be overtopped adjacent to Gouldsboro Lake.

Spillway Adequacy - the spillway is rated as "Adequate"

MFB
C99

7/5/79

Gouldsboro Lake Dam
Hydrology / Hydraulics

SH. 5 of 8

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT IN
ROUTE HYDROGRAPH TO OUT
END OF NETWORK

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

RUN DATE: 79/07/05.
TIME: 06.02.34.

GOULDSBORO LAKE DAM
WAT ID NO. PA 00149 DER NO. 64-148
OVERTOPPING ANALYSIS

JOB SPECIFICATION									
NO	NHR	NMIN	IDAT	IHR	IIM	METRC	IFLT	IFRT	NSTAN
150	0	15	0	0	0	0	0	-4	0
			JOPER	MUT	LKOPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
MPLAN= 1 NRTIO= 4 LRTIO= 1
RTIO= .30 .50 .70 1.00

MFB
9/9

7/5/79

Gouldsboro Lake Dam
Hydrology / Hydraulic

SH 6 OF 8

SUB-AREA KUMOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAD	ICUMF	IECON	ITAPE	JPLT	WRT	IRAME	ISTAGE	IAUTO
IM	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INTDG	IUNG	TAKEA	SNAP	IRSDA	IRSPC	RATIO	ISROW	ISAME	LOCAL
1	1	3.88	0.00	3.88	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PAS	R4	R12	R24	R48	K72	R96
0.00	22.00	111.00	124.00	134.00	142.00	0.00	0.00

IRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LAOPT	STRA	DETR	NIJDL	ERAIN	STRES	RIJOK	SIRTL	CMSTL	ALSMK	RTINP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.55 CP= .45 NTA= 0

RECESSION DATA

SIRTO= -1.50 BRCSM= -.05 RTIOR= 2.00

UNIT HYDROGRAPH100 END-OF-PERIOD ORIGINATES, LAG= 3.58 HOURS, CP= .45 VOR= .98

5.	20.	42.	68.	98.	130.	164.	199.	232.	261.
285.	304.	318.	325.	324.	313.	300.	287.	274.	262.
251.	240.	230.	220.	210.	201.	192.	184.	176.	169.
161.	154.	148.	141.	135.	129.	124.	118.	113.	108.
104.	99.	95.	91.	87.	83.	79.	76.	73.	70.
67.	64.	61.	58.	56.	53.	51.	49.	47.	45.
43.	41.	39.	37.	36.	34.	33.	31.	30.	29.
27.	26.	25.	24.	23.	22.	21.	20.	19.	18.
18.	17.	16.	15.	15.	14.	14.	13.	12.	12.
11.	11.	10.	10.	9.	9.	9.	8.	8.	8.

END-OF-PERIOD FLOW

NO.BA	NR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	NO.BA	NR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
-------	-------	--------	------	------	------	--------	-------	-------	--------	------	------	------	--------

SUM 24.99 22.62 2.37 151022.
 (635.1) (575.1) (69.1) (4559.64)

MFB
9/19

7/5/79

Gouldsboro Lake Dam
Hydrology / Hydraulics

SH. 7 OF 8

HYDROGRAPH ROUTING

OUTFLOW HYDROGRAPH

ISTAD	ICORF	IEEDM	ITAPE	JPLI	JPRT	INAME	ISTAGE	IAUTO
OUT	1	0	0	0	0	1	0	0

ROUTING DATA

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

MSIPS	MSIDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1894.	-1

STAGE 1894.00 1895.00 1895.50 1896.50 1897.50 1898.50 1899.50

FLOW 0.00 38.00 69.00 290.00 596.00 029.00 1570.00

CAPACITY= 1089. 5601. 9350.

ELEVATION= 1894. 1900. 1910.

CREL	SPUID	COQU	EXPU	ELEV	COOL	CAREA	EXPL
1894.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQB	EIPB	DAMID
1901.7	2.5	1.5	1000.

MEB
9/9

7/5/79

Gouldsboro Lake Dam
Hydrology / Hydraulics

SH. 0 OF 8

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	RATIOS APPLIED TO FLOWS			
				RATIO 1	RATIO 2	RATIO 3	RATIO 4
	IN	3.88	1	1.621.	2702.	3782.	5403.
	(	10.05)	(	45.90)	(76.50)	(107.10)	(153.00)
	OUT	3.88	1	56.	205.	416.	840.
	(	10.05)	(	1.58)	(5.81)	(11.79)	(23.77)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM	RAILROAD				
	STORAGE	1894.00	1894.00	1901.70	TRACK				
	OUTFLOW	1089.	1089.	6238.					
		0.	0.	2760.					
RATIO	MAXIMUM	MAXIMUM	MAXIMUM	DURATION	TIME OF	TIME OF			
OF	RESERVOIR	DEPTH	STORAGE	OVER TOP	MAX OUTFLOW	FAILURE			
PRF	U.S.ELEV	OVER DAM	AC-FT	HOURS	HOURS	HOURS			
.30	1895.29	0.00	2056.	0.00	48.00	0.00			
.50	1896.12	0.00	2680.	0.00	48.00	0.00			
.70	1896.91	0.00	3280.	0.00	48.00	0.00			
1.00	1898.06	0.00	4144.	0.00	48.00	0.00			

APPENDIX

D



SPILLWAY.

PHOTOGRAPH NO. 1



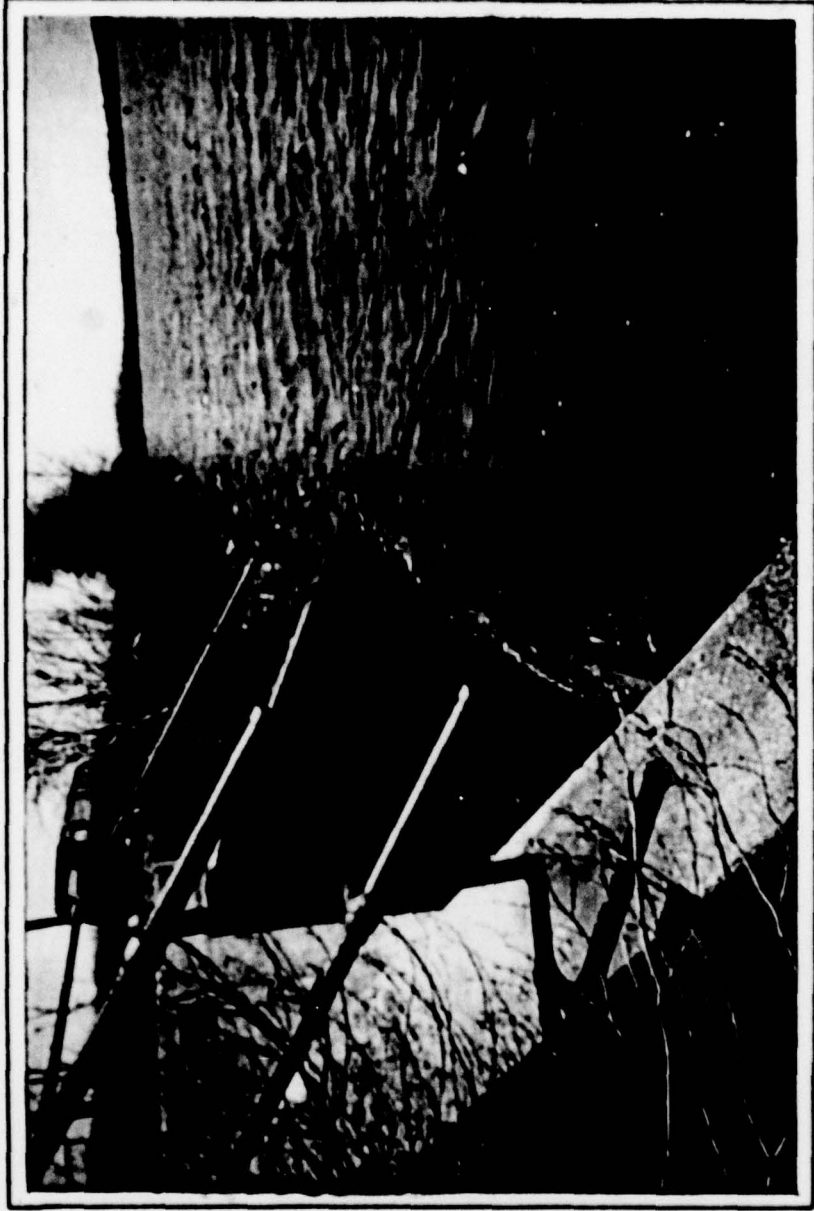
SPILLWAY DISCHARGE TUNNEL.

PHOTOGRAPH NO. 2



SPELLWAY DISCHARGE CHANNEL

PHOTOGRAPH NO. 3



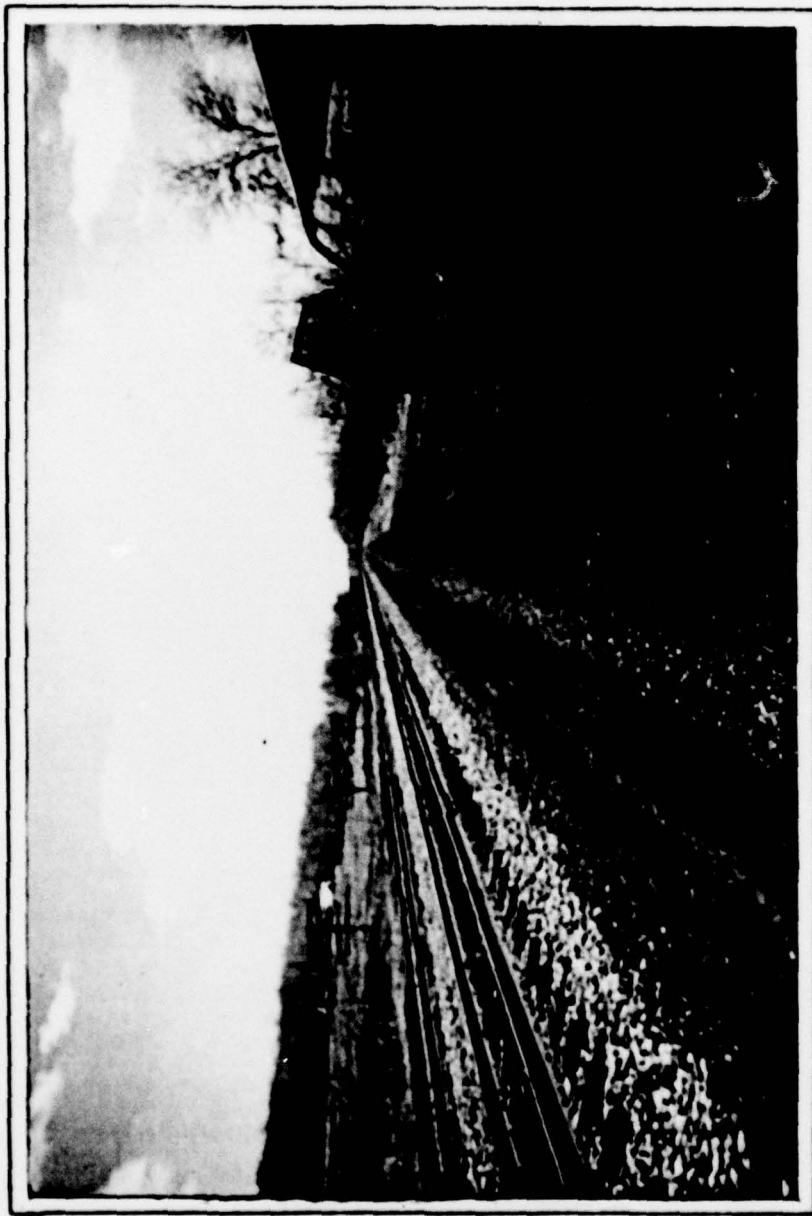
SPILLWAY OVERVIEW.

PHOTOGRAPH NO. 4



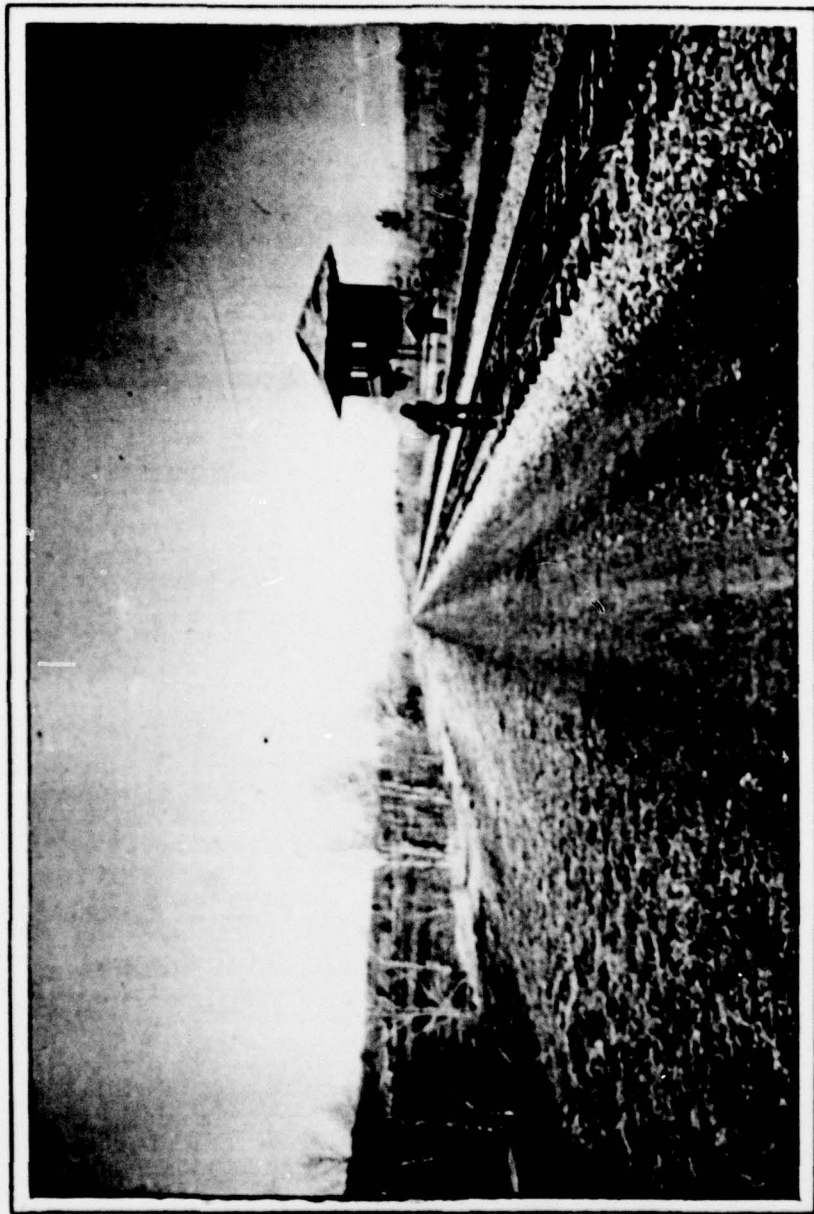
ALTERNATE VIEW OF SPILLWAY.

PHOTOGRAPH NO. 5



OVERVIEW OF RIGHT SIDE OF EMBANKMENT.

PHOTOGRAPH NO. 6

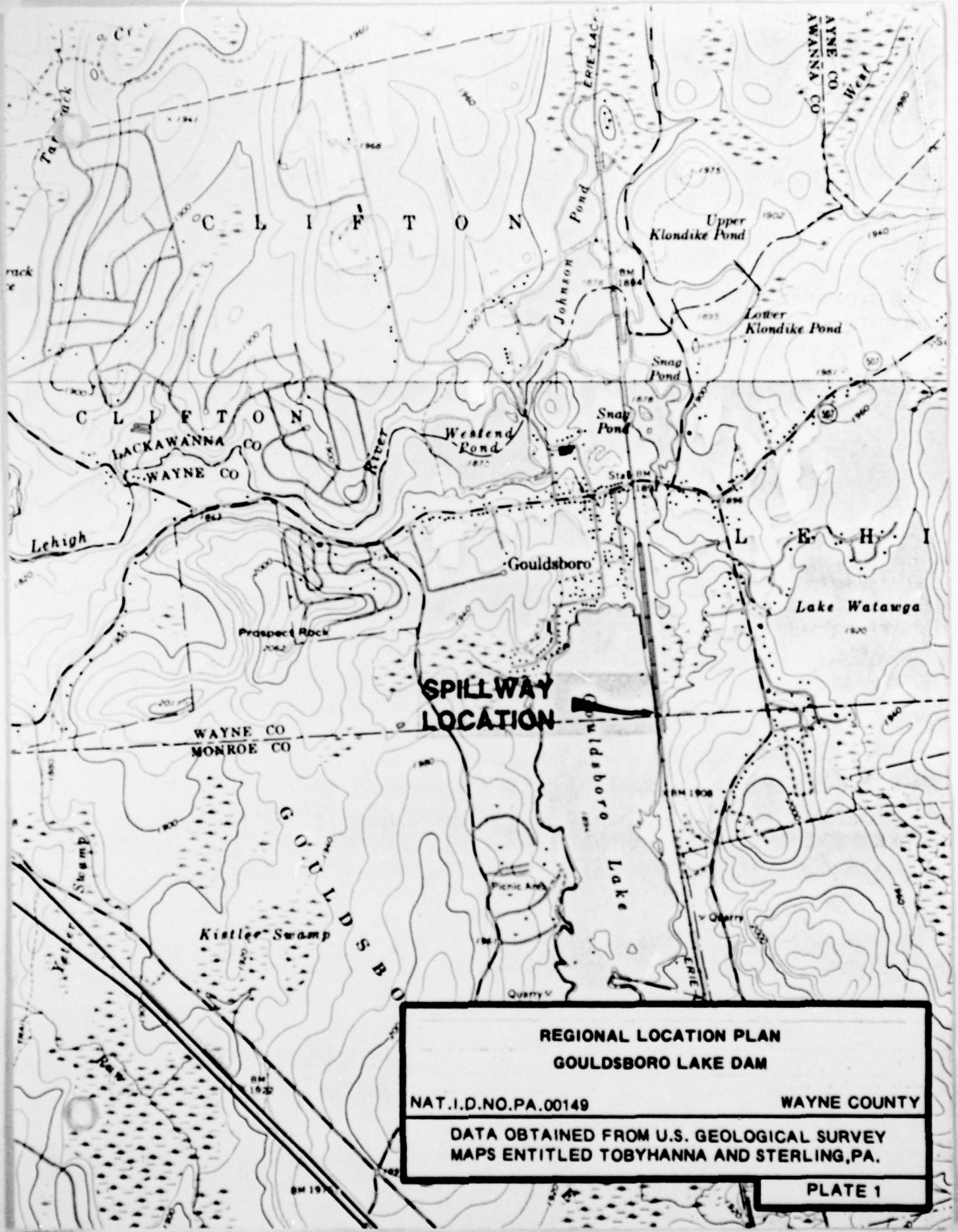


OVERVIEW OF LEFT SIDE OF EMBANKMENT.

PHOTOGRAPH NO. 7

APPENDIX

E



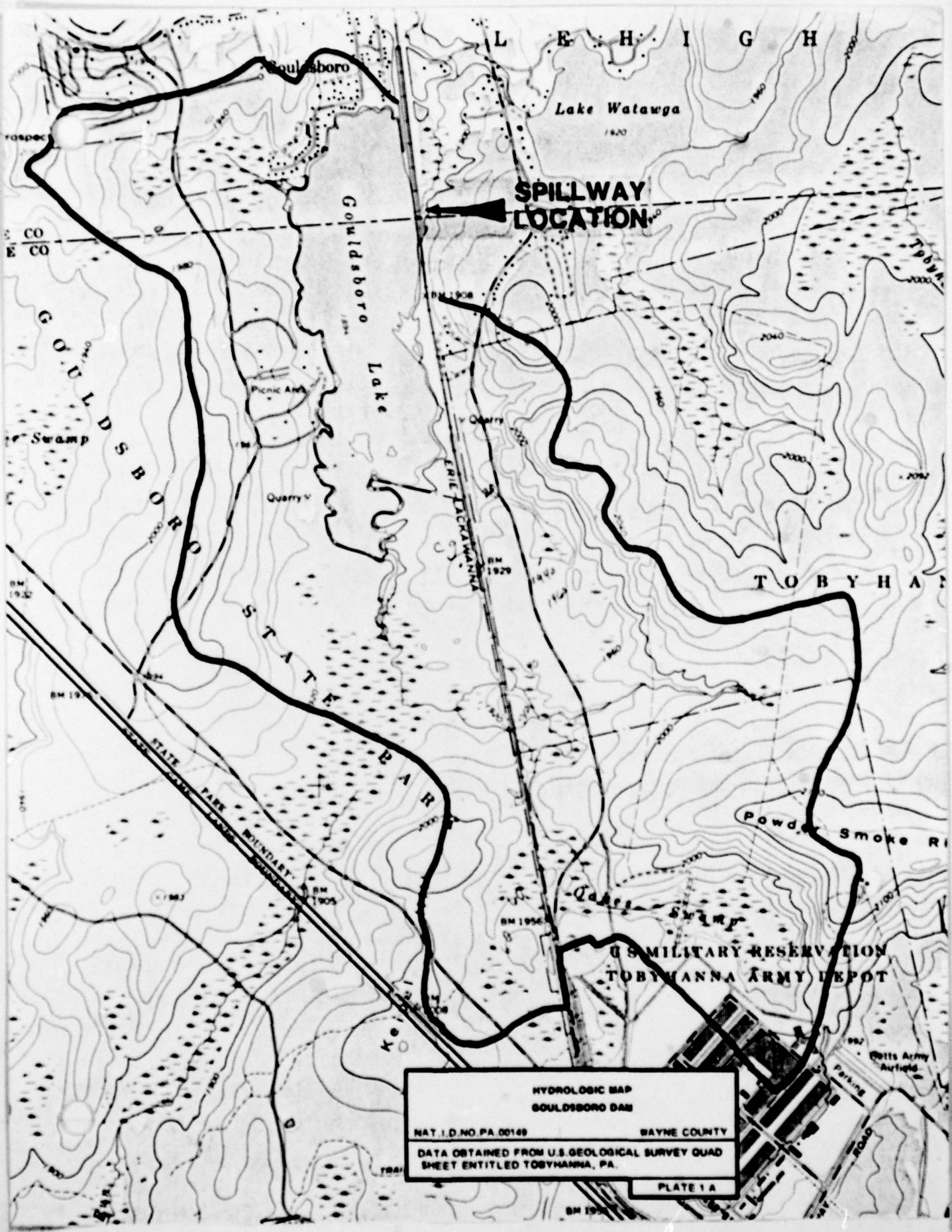
**SPILLWAY
LOCATION**

**REGIONAL LOCATION PLAN
GOULDSBORO LAKE DAM**

NAT. I.D. NO. PA. 00149 WAYNE COUNTY

DATA OBTAINED FROM U.S. GEOLOGICAL SURVEY
MAPS ENTITLED TOBYHANNA AND STERLING, PA.

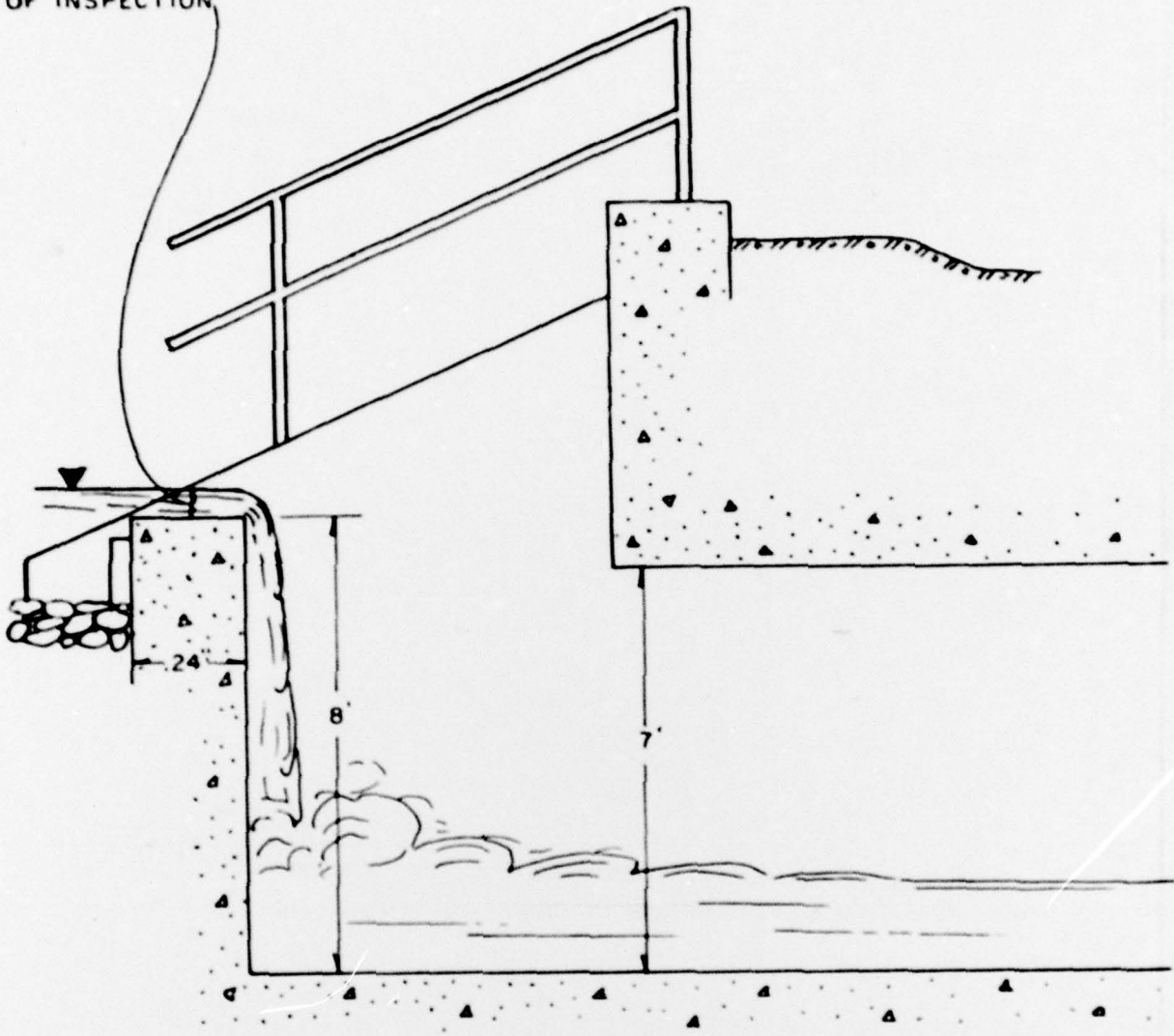
PLATE 1



**SPILLWAY
LOCATION**

HYDROLOGIC MAP
GOULDSBORO DAM
NAT. I.D. NO. PA 00149 WAYNE COUNTY
DATA OBTAINED FROM U.S. GEOLOGICAL SURVEY QUAD
SHEET ENTITLED TOBYHAMMA, PA.
PLATE 1 A

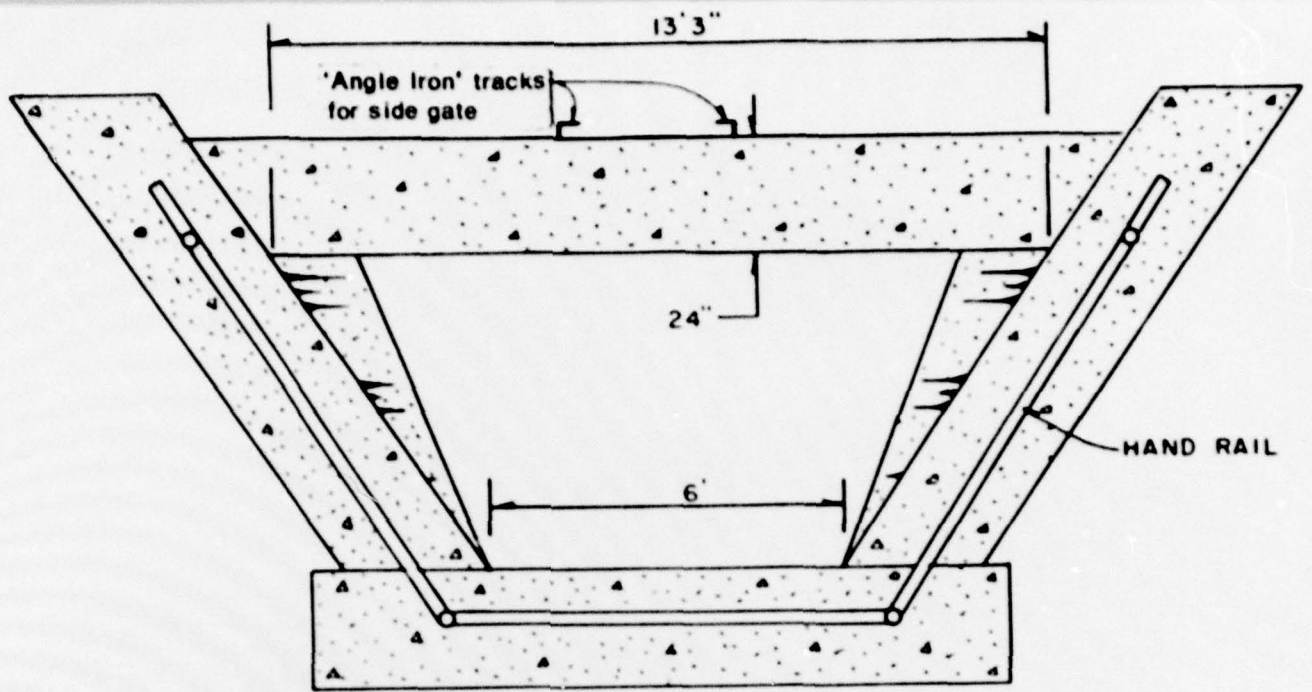
5" AT TIME
OF INSPECTION



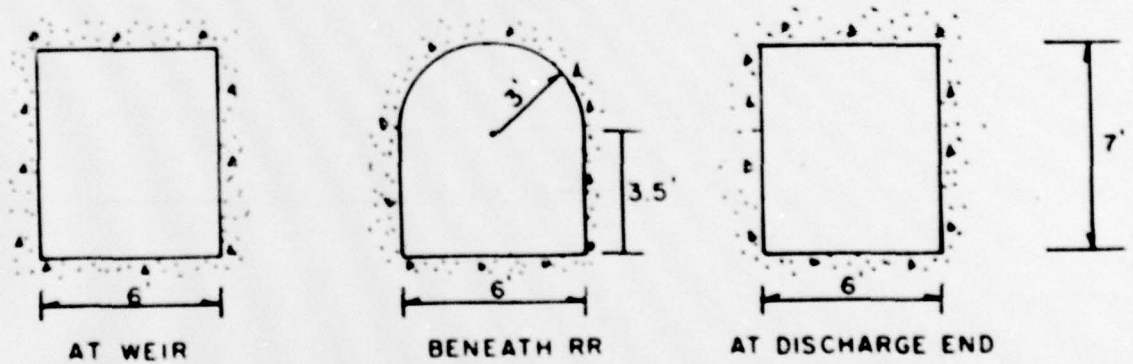
PROFILE OF WEIR AND CONDUIT

Scale: See D

1



PLAN OF WEIR



TYPICAL SECTIONS ALONG DISCHARGE CONDUIT

Scale: See Dimensions

**SPILLWAY DATA
GOULDSBORO DAM**

NAT.I.D.NO.PA.00149

WAYNE COUNTY

DATA OBTAINED FROM FIELD MEASUREMENTS TAKEN
DURING INSPECTION, 2 MAY 1979

PLATE 2

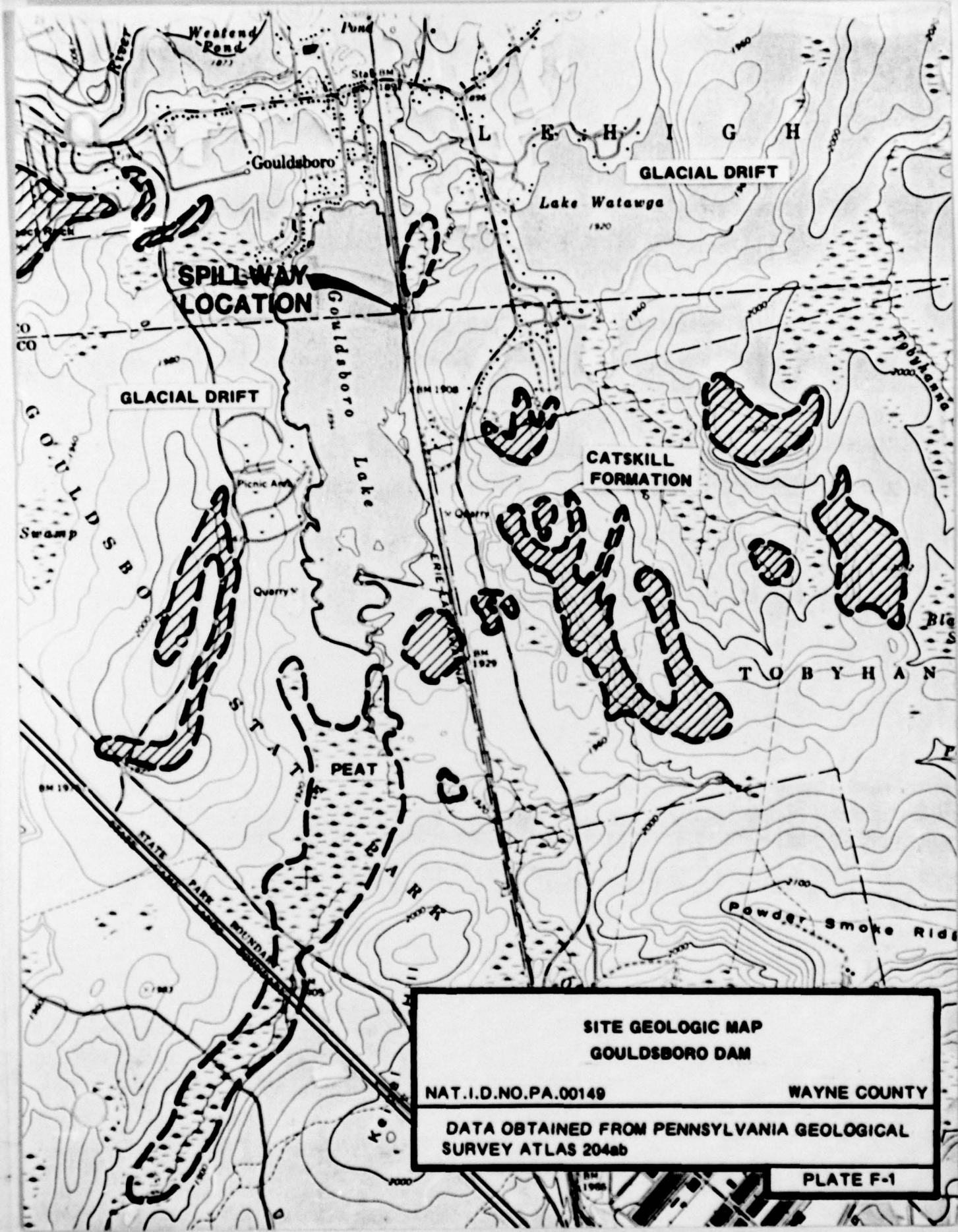
APPENDIX

F

SITE GEOLOGY
GOULDSBORO DAM

Gouldsboro Dam is located in the Pocono Plateau Section of the Appalachian Plateaus Physiographic Province. As shown on Plate F-1, the dam and surrounding region, as is much of northeastern Pennsylvania, are underlain by the Upper Devonian age Catskill Formation, which is overlain by a partial mantle of Wisconsin age glacial drift. The bedrock in the dam site area consists of resistant sandstone and conglomerate belonging to the Duncannon Member. Rock exposures are generally limited to the topographically high areas. The topographically low areas (i.e., the dam site) are usually covered with a variable thickness of boulder-rich glacial drift. Located immediately downstream from the spillway is a deposit of fibrous and woody peat.

Although no bedrock exposures were observed during the field inspection, State mapping indicated that bedding generally strikes near east-west with low angle northerly (upstream direction) dips. High angle rock jointing commonly strikes to the northeast and northwest.



**SITE GEOLOGIC MAP
GOOLDSBORO DAM**

NAT. I. D. NO. PA. 00149 WAYNE COUNTY

DATA OBTAINED FROM PENNSYLVANIA GEOLOGICAL
SURVEY ATLAS 204ab

PLATE F-1