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NATIONAL DAM INSPECTION PROGRAM. ICE POND DAM (NDI ID NUMBER PA--ETC(U)
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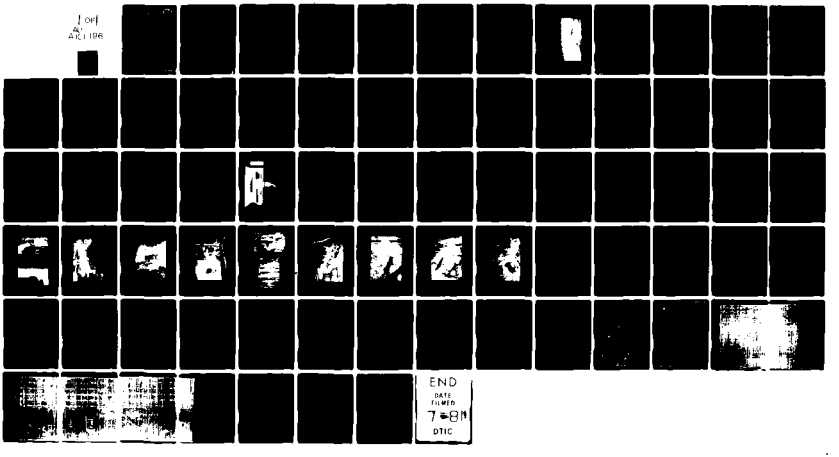

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LEVEL II

SUSQUEHANNA RIVER BASIN
TRIBUTARY TO LITTLE WAPWALLOPEN CREEK
LUZERNE COUNTY

PENNSYLVANIA

ICE POND DAM

NDI ID NO. PA-00566
DER ID NO. 40-79

SERVICE DEVELOPMENT CORPORATION

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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

AD NUMBER	DATE	DTIC ACCESSION NOTICE
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SUSQUEHANNA RIVER BASIN

TRIB. TO LITTLE WAPWALLOPEN CREEK, LUZERNE COUNTY

PENNSYLVANIA

ICE POND DAM

NDI ID No. PA-00566
DER ID No. 40-79

SERVICE DEVELOPMENT CORPORATION

(12) 75

(6) National Dam Inspection Program. Ice Pond Dam (NDI ID Number PA-ØØ566, DER ID Number 4Ø-79), Susquehanna River Basin, Tributary to Little Wapwallopen Creek, Luzerne County, Pennsylvania.

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared By:

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

APRIL 1981

409111

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

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.

ICE POND DAM

NDI ID No. PA-00566, DER ID No. 40-79

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION
AND
RECOMMENDED ACTION

Name of Dam: Ice Pond Dam
NDI ID No. PA 00566
DER ID No. 40-79

Size: Small (12.6 feet high; 230 acre-feet)

Hazard Classification: Significant

Owner: Service Development Corporation
Allentown, Pennsylvania

State Located: Pennsylvania

County Located: Luzerne

Stream: Tributary to Little Wapwallopen Creek

Dates of Inspection: 21 October 1980 & 9 March 1981

The visual inspection and review of available design and construction information indicate that Ice Pond Dam is in fair condition. Deficiencies noted during the inspection included the undermined and deteriorated spillway concrete and heavy growth on the downstream embankment face and a portion of the crest. In accordance with the recommended guidelines, the spillway design flood for this facility is in the range of the 100 year flood to the 1/2 PMF. Based on the size of the dam, the selected SDF is the 100 year flood.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and spillway discharge capacity cannot pass the Spillway Design Flood (100 year flood) prior to overtopping the embankment. Therefore, in accordance with the criteria outlined and evaluated in Section 5.5 of this report, the spillway for Ice Pond Dam is considered to be inadequate.

The following recommendations should be implemented without delay:

a. The owner should retain a qualified professional engineer to further assess measures required to provide adequate spillway capacity. This should include a determination of remedial measures necessary to repair the spillway and an evaluation of the need for providing a drawdown facility for the dam.

b. The heavy growth on the embankment should be removed under the guidance of a qualified professional engineer.

c. Erosion protection should be provided on the upstream face of the dam.

d. A uniform profile and width should be established for the dam crest.

e. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolonged precipitation.

f. An operation and maintenance manual or plan should be prepared for use as a guide in the operation and maintenance of the dam during normal and emergency conditions.

g. A schedule of regular inspection by a qualified engineer should be developed.

APPROVED BY:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

DATE: 18 MAY 81

UCF POND DAM

OVERVIEW

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

ICE POND DAM

NDI ID NO PA 00566
DER ID NO 40-79

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 non-Federal dams throughout the United States.

b. Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 Description of Project

a. Description of Dam and Appurtenances

Ice Pond Dam is an earthfill structure approximately 12.6 feet high and 510 feet in length (including spillway). The spillway is an uncontrolled broad-crested weir approximately 28 feet in length and spanned by an old roadway bridge. The outlet facilities for the dam consist of a drop inlet with stoplogs and a 14 inch diameter outlet pipe. The present spillway crest is 1.8 feet below existing top of dam.

> Note: The U.S.G.S 7.5 minute Quadrangle Sheet (Wilkes-Barre West, Pa.) indicates reservoir elevation of 1145 MSL, which is used in this report as existing spillway crest elevation.

b. Location: Wright Township, Luzerne County
U.S.G.S. Quadrangle - Wilkes-Barre West, Pa.
Latitude: 41° 8.5' Longitude 75° 56.5'
Ref. Appendix E, Plates I & II.

c. Size Classification: Small: Height - 12.6 feet
Storage - 230 Ac. ft.

d. Hazard Classification: Significant (Refer to Section 3.1.E)

e. Ownership: Service Development Corporation
Room 206
956 Hamilton Mall
Allentown, Pennsylvania 18101
c/o Mr. Turney Gratz, Manager

f. Purpose: Future Land Development

g. Design and Construction History: Information concerning the original design and construction of the dam is very limited. The dam was designed by a civil engineer. A previous owner (Mr. George L. Fenner, Jr.) reported that the dam was built around 1909 consisting of only a "concrete wall". Mr. Fenner also stated that field stones and random fill were added to both sides of the wall at least two different times, eventually creating slopes of about 1V:2H. The original outlet works is blocked at the downstream end; however, an additional outlet facility, now partially obstructed, was built at a higher elevation sometime after 1938.

h. Normal Operating Procedures

The reservoir is normally maintained at the crest level of the drop inlet. Inflow occurring when the lake is above the inlet crest is discharged through the uncontrolled spillway.

1.3 Pertinent Data

a. Drainage Area (square miles)

From files:	0.09
Computed for this report:	1.23
Use:	1.23

b. Discharge at Damsite (cubic feet per second)

Maximum known flood	unknown
Outlet works with maximum pool (El.1146.8)	13
Spillway with maximum pool (El.1146.8)	180

c. Elevations (feet above mean sea level)

Top of Dam	
Design	unknown
Existing	1146.8
Normal pool (Drop Inlet Crest)	1144.5

c. Elevations (feet above mean sea level) (Cont'd)

Spillway Crest	
Design	unknown
Existing	1145.0
Outlet Works	
Note: Original sluiceway not functional	
Crest of Drop Inlet	
Design	unknown
Existing	1144.5
Downstream outlet invert	
Design	unknown
Existing	1140.0
Streambed at toe	1134.2

d. Reservoir Length (feet)

Normal pool (El.1144.5)	2,000
Maximum pool (El.1146.8)	2,200

e. Storage (acre-feet)

Normal pool (El.1144.5)	150
Maximum pool (El.1146.8)	230

f. Reservoir Surface (acres)

Normal pool (El.1144.5)	40
Maximum pool (El.1146.8)	46

g. Dam

Note: Refer to plates in Appendix E for plans and sections.

Type: Earthfill w/concrete core wall.
Length: 510 feet (including spillway).
Top Width: Average 7 feet; 3.5 feet minimum (as surveyed).
Height: 12.6 feet (as surveyed; low point to d/s toe).
Side Slopes:
Upstream 1V:2.5H (average)
Downstream Varies 1V:5H to 1V:12H; then 1V:2H
Zoning: None
Cutoff: Corewall extends 4 feet (minimum) into original ground.
Grouting: None

h. Outlet Works

Type: Drop inlet w/stop logs
Conduit: 14 inch diameter iron pipe
Closure: None.

i. Spillway

Type: Uncontrolled rectangular concrete broad-crested weir
Location: Center of dam
Length: 28.0 feet, 25.5 feet effective flow length.
Crest Elevation 1145.0
Freeboard 1.8 feet
Approach Channel Reservoir
Downstream Channel Earth and Rock
Bridge Low steel at Elev. 1146.5, one pier 2.5 feet in width

SECTION 2

ENGINEERING DATA

2.1 Design

The available data for Ice Pond Dam consist of files provided by the Pennsylvania Department of Environmental Resources (PennDER). Information available includes state inspection reports, various related correspondence, and a report dated 2 June 1915 which provides a general description of the facility. Two drawings dated Oct 1913 showing a plan and sections of the dam are also available. No other information concerning design of the facility is known to exist.

2.2 Construction

Very little information is available on the original construction of the dam, other than a letter from the original owner stating it was constructed as designed. Modifications made to the dam since its original construction include random placement of fill on both sides of the dam and construction of an additional outlet facility consisting of a drop inlet w/stoplogs and a 14 inch diameter outlet pipe.

2.3 Operation

No formal records of operation or maintenance exist, other than a report submitted to PennDER dated 8 June 1936 which provided information relative to spillway flow during the flood of March 1936. The current owner stated he checks the dam periodically and during storm events. The most recent PennDER inspection report (28 December 1964) indicated that the dam was in generally fair condition.

2.4 Evaluation

a. Availability

All available written information and data were contained in the permit files provided by PennDER.

b. Adequacy

The available data, including that collected during the recent detailed visual inspection, are considered to be adequate to make a reasonable assessment of the dam.

SECTION 3

VISUAL INSPECTION

3.1 Observations

a. General. The overall appearance and general condition of the dam and appurtenances are fair. Noteworthy deficiencies are described below. The visual inspection checklist and field sketch are provided in Appendix A. Photographs taken during the inspection are reproduced in Appendix C.

The reservoir pool was approximately one foot below spillway crest on the day of the initial inspection. Present during this inspection were Turney Gratz of the Service Development Corporation, owner of the dam, and Gerard Gagne of Spotts, Stevens and McCoy, Incorporated, consultants for Service Development Company.

On the day of the review inspection there was approximately 0.1 foot of water flowing over the spillway and the outlet works conduit was discharging at a depth of 0.1 foot.

b. Embankment. The horizontal alignment of the crest is good with no evidence of cracking or instability. The upstream face slopes at 1V:2.5H except for the upper two feet which varies in slope from 1V:1H to near vertical. The massive downstream face is irregular with the slopes varying between 1V:5H and 1V:12H for at least 40 feet downstream before steepening to 1V:2H. This irregularity is apparently due to the random placement of large quantities of additional fill sometime after construction and not from any stability problems. Two to twelve inch stone protects the entire upstream face below the spillway crest elevation. The slope above this elevation is steep, apparently due to erosion. Localized erosion has reduced the crest width to 3.5 feet near the spillway. The upstream face near the crest is covered with brush and some trees. The portion of the crest to the right of the spillway and the entire downstream face of the dam are overgrown with brush and trees. The vertical alignment varies a maximum of about one foot with the low spot occurring approximately 120 feet to the left of the spillway. No signs of seepage, sloughing or instability were observed.

c. Appurtenant Structures. The outlet works and spillway are located in the center of the dam. The spillway crest is cracked and spalled and is undermined on the upstream side to a depth of about one foot. The downstream face of the weir and the spillway walls are severely deteriorated and spalled. Although the right wall is not as deteriorated as the left, clear water is flowing at about 8 gallons per minute from a hole near the base of the wall about eight feet below spillway crest. Siltation and debris have buried the bottom step and concrete apron of the spillway. A severely deteriorated wooden bridge which crosses the spillway crest has a 2.5 feet wide pier which is in

poor condition. It was apparent during the review inspection that the condition of the spillway had worsened considerably since the initial inspection.

The original outlet works consisted of an 18 inch square sluice culvert through the base of the spillway. This outlet is presently inoperable and the control is rusted and deteriorated. The downstream end was not found. Sometime after 1938 another outlet structure was added which consisted of a drop inlet with stoplogs located at the upstream side of the spillway and a 14 inch diameter iron discharge pipe. This pipe exits the downstream face of the spillway approximately 6.5 feet below the crest. The pipe is in fair condition and was discharging about 4 gallons per minute on the day of the initial inspection. This flow was apparently due to seepage through the stoplogs, since the reservoir elevation was below the top of the drop inlet. The drop inlet is partially filled with leaves and rocks. It is obvious from the location of the discharge pipe that the lake level cannot be lowered more than about 6.5 feet below the spillway crest.

d. Reservoir Area. The reservoir slopes are flat and wooded with no residential development. No potential for massive slides appears to exist.

e. Downstream Channel. Approximately 1,200 feet downstream of this dam is Blue Giant Meadow Pond Dam, DER No. 40-80, which is classified as a significant hazard dam. This dam forms a lake that extends to within 250 feet of Ice Pond Dam. Immediately downstream of this lower dam is a road with a five foot diameter culvert. Approximately 200 feet further downstream is one trailer home with the first floor approximately 2.5 feet above the spillway crest of the Blue Giant Meadow Dam. Approximately five feet of the foundation or basement wall is exposed. After passing through this area, which is relatively flat, the stream becomes more confined before joining Little Wapwallopen Creek about 3,500 feet downstream of the dam. Approximately 2.5 miles further downstream is Andy Pond.

It is apparent that failure of Ice Pond Dam would cause failure of the lower dam and create the potential for the loss of a few lives and property downstream. The downstream development is shown on Plate E-II.

f. Evaluation. Based on the above visual observations, it is apparent that no maintenance of the dam has been performed for some time. The trees and brush should be removed from the embankment. The spillway crest, discharge channel and walls should be repaired. The spillway bridge and pier should also be rehabilitated or removed since the structure could block the spillway if it collapses. The embankment and spillway appear stable since no signs of movement were noted and the core wall and downstream slope are adequate.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

The facility is essentially self-regulating. Inflow would normally pass through the drop inlet located in the spillway. Inflows in excess of the drop inlet capacity would be stored until the lake elevation reaches spillway crest. No formal operations manual is known to exist.

4.2 Maintenance of Dam.

The condition of the dam as observed by the inspection team is indicative of a general lack of maintenance. No maintenance appears to have been performed in the recent past as the embankment has heavy tree and brush growth and the spillway has deteriorated. In addition, the outlet facility is partially blocked. No formal maintenance manual exists.

4.3 Maintenance of Operating Facilities.

See Section 4.2 above.

4.4 Warning System.

No formal warning system exists.

4.5 Evaluation.

Routine maintenance of the facility should include removal of trees, brush and high weeds. No adequate means currently exists to lower the elevation of the lake if required for any repair of the structure. A means to lower the lake should be developed. Formal manuals of maintenance and operation are recommended to ensure that all needed maintenance is identified and performed regularly. In addition, a formal warning system for the protection of downstream inhabitants should be developed. Included in the plan should be provisions for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

SECTION 5

HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No formal design reports or calculations are known to exist for the facility. Design drawings of Ice Pond Dam are located in PennDER files. These drawings were compared to the existing facility. Differences are noted below.

5.2 Experience Data.

Records of reservoir levels and/or spillway discharges are not available. Review of the PennDER files indicated that the March 1936 flood event had a maximum depth of six inches over the spillway. No other records of past performance are known to exist.

5.3 Visual Observations.

On the date of the inspection, no conditions were observed that would prevent the facility from operating at existing spillway capacity. Several modifications have been made to the dam since it was originally completed. Fill has been added to the embankment, and a bridge has been added across the spillway. The sluiceway shown on the design drawings could not be located; however, a drop inlet structure was constructed at an unknown date.

5.4 Method of Analysis.

The facility has been analyzed in accordance with procedures and guidelines established by the U.S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. This analysis has been performed using a modified version of a HEC-1 program developed by the U.S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California. Capabilities of the program are briefly outlined in the preface contained in Appendix D.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with the procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the SDF for Ice Pond Dam ranges between the 100 year flood and one-half the Probable Maximum Flood (PMF). This classification is based on the relative size of the dam (small), and the potential hazard of dam failure to downstream development (significant). Due to the small storage (approximately 230 ac-ft) and the small height (12.6 feet), the SDF selected is the 100 year flood.

b. Results of the Analysis. Ice Pond Dam was evaluated under near normal operating conditions. The starting lake elevation was set at 1145.0 (spillway crest) which assumed the drop inlet was blocked. The top of embankment (low point) was elevation 1146.8.

The 100 year flood peak is derived by averaging the peak flow value obtained from two regression equations. The first regression equation is from Bulletin 13, Floods in Pennsylvania Water Resources Bulletin. Guidelines are provided to determine the peak value by use of regional statistical data. The second regression equation is from the Hydrologic Study, Tropical Storm Agnes, North Atlantic Division, U.S. Army Corps of Engineers, 1975. Guidelines are provided to determine the flood peak by use of map coefficients and logarithmic equations. The following results are obtained.

100 Year Flood Peak		CFS
Bulletin 13	-	405
North Atlantic Division - Tropical Storm Agnes	-	1,145
Average 100 year flood peak	-	780

To determine the adequacy of the spillway, the average value for the 100 year flood is compared against the maximum outflow at low point top of dam. If the maximum outflow exceeds the 100 year average peak value derived above, then the spillway is rated adequate. If however, the 100 year average peak value exceeds the maximum outflow at low point top of dam, the spillway is rated inadequate. Results are as follows.

		CFS
Maximum outflow at low point top of dam	-	180
Average 100 year flood peak	-	780

5.6 Spillway Adequacy.

Under existing conditions, Ice Pond Dam cannot pass the 100 year flood peak value. Since this structure cannot pass the selected SDF (100 year flood), the spillway is rated inadequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observation.

(1) Embankment.

Visual observations of Ice Pond Dam did not reveal any signs of distress in the embankment. The dam consists of a massive random earth embankment with a thick concrete corewall. The embankment appears to have been randomly dumped and spread because the slopes vary considerably. No signs of seepage, sloughing, or other problems were found during the inspection. The top 2 feet of the upstream embankment have a 1H:1V slope to near vertical; it then flattens out to a 2.5H:1V slope and is protected by 2 to 12 inch stone below spillway crest elevation. Localized erosion of the upstream slope above the stone protection is occurring. Erosion of the embankment adjacent to the spillway has reduced the crest width to 3.5 feet.

(2) Appurtenant Structures.

The emergency spillway, original outlet works and drop inlet works are incorporated in one concrete structure. This structure is spalled and deteriorated, exposing some large aggregate. No signs of distress or movement were found in the spillway. Remedial work should be performed on these structures.

b. Design and Construction Data.

(1) Embankment.

Drawings indicate that the structure was designed by a civil engineer. Available data consist of a profile, a section at the spillway and plan view of the dam. No construction data are known to exist. Excavation for the concrete corewall was designed to extend to an average depth of 4 feet, except in the maximum section where it is shown to be about 9 feet deep. The corewall is not shown to have reinforcing; however, the wall appears to be adequately thick as it varies from 3 feet 8 inches for wall heights under about 13 feet to 4 feet 3 inches where the wall is higher. Fill was added on the upstream and downstream sides of this wall to within 4 feet of the top.

(2) Appurtenant Structures

Design data for the spillway and outlet works consist of a section and plan view. The 4 foot 3 inch corewall is utilized as a portion of the upstream side of the spillway.

c. Operating Records.

No records are known to exist. Operational features of the dam are not considered to affect the stability of the dam.

d. Post-Construction Changes.

The dam was constructed around 1909. A change for the spillway was submitted in 1915 to the Water Resources Board (now PennDER), which is the data mentioned in 6.1b(1). No other requests for changes exist; however, changes have been made. Inspection reports and information from a previous owner indicate that fill was added to the dam on several occasions. A drop inlet with a 14 inch diameter outlet pipe was added to the spillway, but the date this was done is not known. The drop inlet may have been added in 1964 when repairs were made to the spillway, since the concrete is similar in appearance.

e. Seismic Stability.

The dam is located in Seismic Zone 1. Based on visual observations, the dam is considered to be statically stable. Therefore, based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from an earthquake.

SECTION 7

ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment.

a. Safety.

The visual inspection and review of available design and construction information indicate that Ice Pond Dam is in fair condition. Deficiencies noted during the inspection included the undermined and deteriorated spillway concrete and heavy growth on the downstream embankment face and a portion of the crest. In accordance with the recommended guidelines, the spillway design flood for the facility is in the range of the 100 year flood to the 1/2 PMF. Based on the size of the dam, the selected SDF is the 100 year flood.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and spillway discharge capacity cannot pass the SDF (100 year flood) prior to overtopping the embankment. Therefore, in accordance with the criteria outlined and evaluated in Section 5.5, the spillway for Ice Pond Dam is considered to be inadequate.

b. Adequacy of Information. The design and construction data contained in PennDER files, in conjunction with data collected during the visual inspection, are considered to be adequate for making a reasonable assessment of this dam.

c. Urgency. The recommendations presented below should be implemented without delay.

d. Necessity for Additional Studies. The results of this inspection indicate a need for additional investigations to determine measures required to provide adequate spillway capacity for this facility.

7.2 Recommendations.

a. The owner should retain a qualified professional engineer to further assess measures required to provide adequate spillway capacity. This should include a determination of the remedial measures necessary to repair the spillway and an evaluation of the need for providing a drawdown facility for the dam.

b. The heavy growth on the embankment should be removed under the guidance of a qualified professional engineer.

c. Erosion protection should be provided on the upstream face of the dam.

d. A uniform profile and width should be established for the dam crest.

e. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolonged precipitation.

f. An operation and maintenance manual or plan should be prepared for use as a guide in the operation of the dam during normal and emergency conditions.

g. A schedule of regular inspection by a qualified engineer should be developed.

APPENDIX A

CHECKLIST - VISUAL INSPECTION

Visual Inspection Check List
Phase 1

Name Dam Ice Pond Dam County Luzerne State Pennsylvania

*Date(s) Inspection 21 Oct 80 Weather Cloudy Temperature 50°

Pool Elevation at Time of Inspection 1144.0 M.S.L. Tailwater at Time of Inspection 1134.2 M.S.L.

Inspection Personnel:

J. Bianco (C.O.E.) E. Hecker (C.O.E.) Turney Gratz, Service Dev. Co.

B. Cortright (C.O.E.) L. Reeser (C.O.E.) Gerard Gagne, Spotts, Stevens & McCoy, Inc.

J. Evans (C.O.E.)

E. Hecker Recorder

*Review Inspection

Date 9 Mar 81 Weather Cloudy Temperature 45°

Pool Elevation 1145.1 M.S.L. Tailwater 1134.2 M.S.L.

Personnel:

J. Bianco (C.O.E.) P. Maggitti (C.O.E.)

B. Cortright (C.O.E.)

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
Any Noticeable Seepage	None
Junction of Embankment with: Abutments Spillway	Abutments - good, no erosion or settlement Spillway - good except for erosion of upstream face
Surface Cracks	None
Crest Alignment: Vertical Horizontal	Vertical: Freeboard exceeds that shown on drawings; maximum variation of 1.5 feet. Horizontal: Good
Unusual Movement or Cracking at or beyond the Toe	None observed.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS
Sloughing or Erosion: Embankment Crest/Slope Abutment Slopes	Upper two feet of upstream face eroded to near vertical; severe local erosion at crest. No erosion of abutment slopes
Riprap	2"-12" stone with average size of 6". On upstream face below spillway crest elevation only. No failures.
Staff Gage and Recorder	None
Instrumentation	None
Miscellaneous	Brush along upstream slope; heavy brush and trees along right half of crest and along entire downstream face.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS
Intake Structure	18" x 18" drop inlet w/stoplogs; located on U/S side spillway.
Outlet Conduit	14" dia. iron pipe through spillway fair condition 18"x18" concrete sluiceway through base of spillway not found.
Outlet Structure	14" conduit ends flush with face of spillway Sluiceway not viewed; apparently buried by siltation.
Emergency Gate	No gate noted for 14" iron pipe The control for the orig. sluiceway visible at crest; poor condition; inoperable
Outlet Channel	Same as spillway channel; see page A-5

UNGATED SPILLWAY

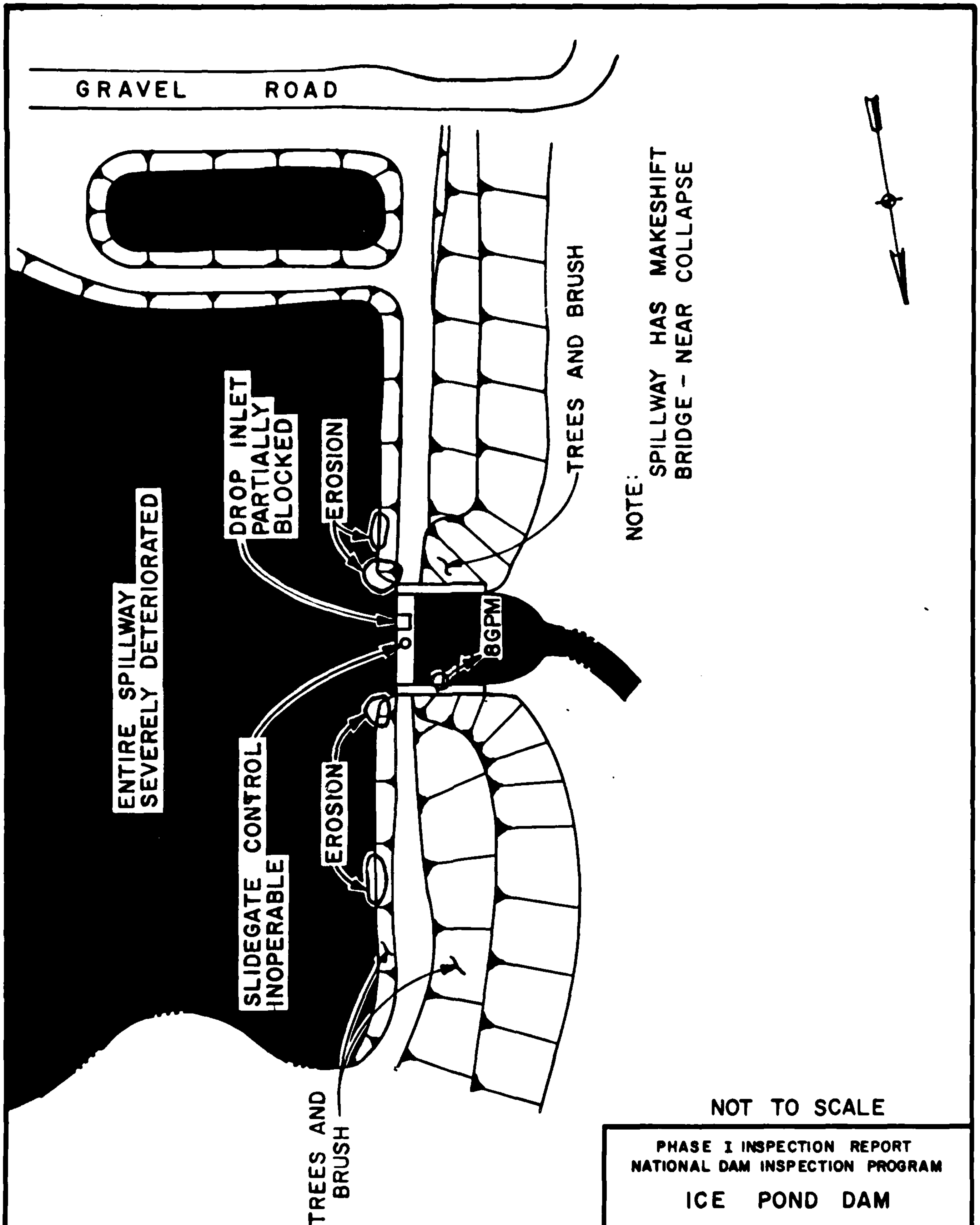
VISUAL EXAMINATION OF	OBSERVATIONS
Approach Channel	Reservoir
Concrete Weir	Broad-crested; concrete in poor condition with some spalling and cracking. Undermined on u/s side.
Bridge and Piers	Deteriorated wooden bridge on railroad rails. One stone masonry pier in center of crest; poor condition
Discharge Channel	Partially obstructed w/brush and trees. Spillway walls severely eroded. Seepage thru hole in right wall - 8 gpm

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS
Slopes	Flat; wooded w/no residential development
Sedimentation	None

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS
Condition: Obstructions Debris	Partially obstructed w/brush & trees. Flows into Blue Giant Meadow Dam about 250' downstream
Slope	Flat to Blue Giant; Flat to moderate below Blue Giant
Approximate Number of Homes	One trailer home 1500 feet d/s of Ice Pond Dam (300 feet d/s Blue Giant Meadow Dam)



NOT TO SCALE

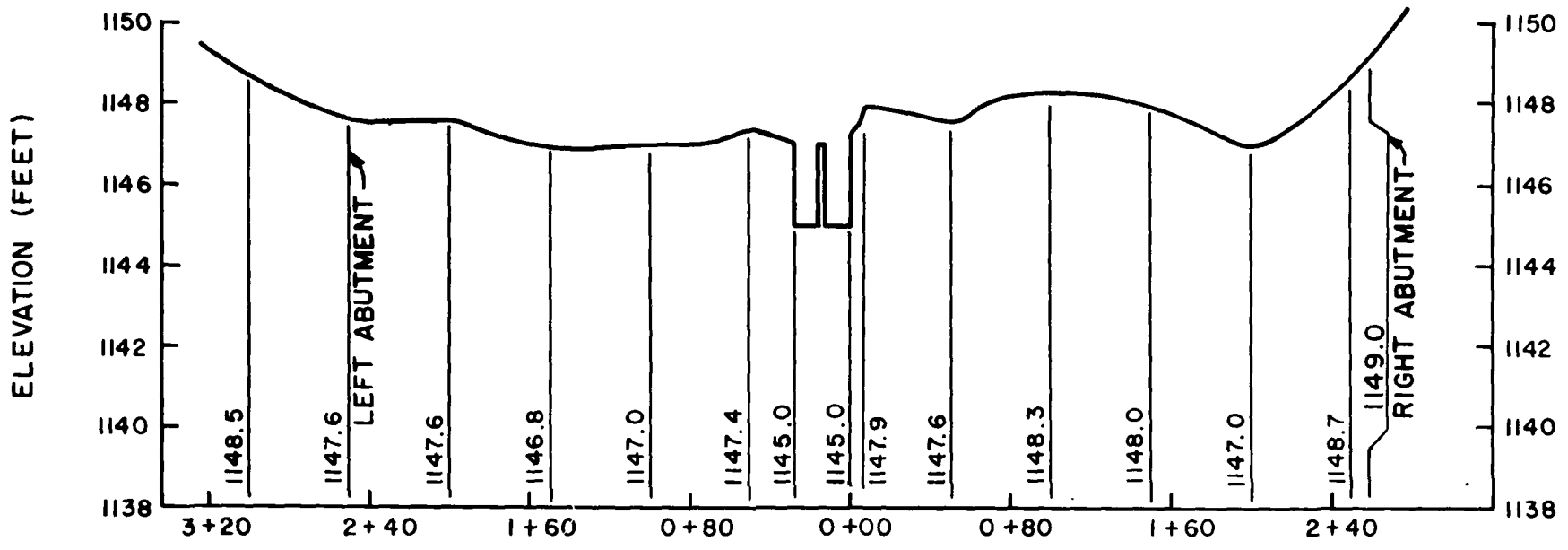
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ICE POND DAM

SERVICE DEVELOPMENT CORP.

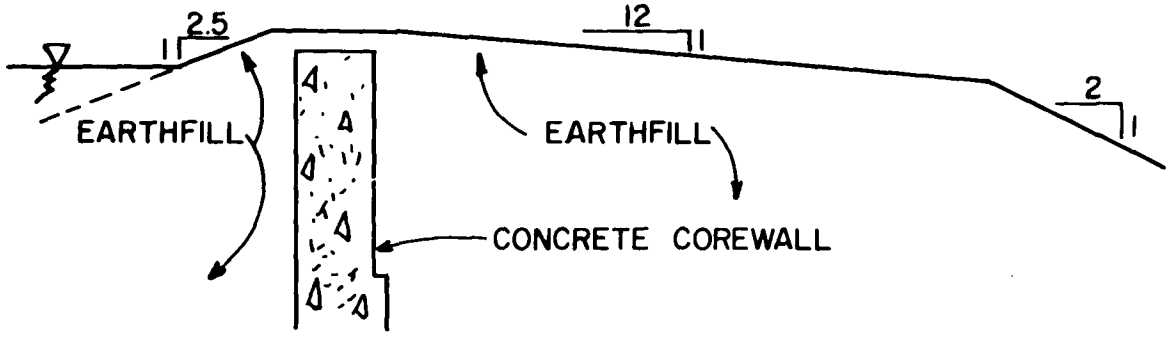
FIELD SKETCH

EXHIBIT A-1



TOP OF DAM – PROFILE

SCALE – HORIZ.: 1 IN. = 80 FT.
VERT. : 1 IN. = 4 FT.



SECTION
NO SCALE

NOTE: SEE APPENDIX E FOR SECTION OF SPILLWAY

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ICE POND DAM

SERVICE DEVELOPEMENT CORP.

PROFILE AND SECTION

MAY 1981

EXHIBIT A-2

APPENDIX B

CHECKLIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERAITON
PHASE 1

NAME OF DAM ICE POND DAM

ID # 40-79

ITEM	REMARKS
AS-BUILT DRAWINGS	None
REGIONAL VICINITY MAP	U.S.G.S. Wilkes-Barre West, PA Quadrangle, 7 1/2 minute Quad sheet. See Appendix E. Plate E-II.
CONSTRUCTION HISTORY	A 1915 (Penn DER) report contains post-construction information. Dam built around 1909. It has a thick concrete wall and earthfill on upstream and downstream.
TYPICAL SECTIONS OF DAM	Longitudinal section.
OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Drawings show an 18" X 18" sluiceway.
RAINFALL/RESERVOIR RECORDS	None

ITEM	REMARKS
DESIGN REPORTS	None
GEOLOGY REPORTS	None
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None
POST-CONSTRUCTION SURVEYS OF DAM	Non reported.
BORROW SOURCES	No data.

ITEM	REMARKS
MONITORING SYSTEMS	None
MODIFICAITONS	Change was made to spillway. Fill added at various times.
HIGH POOL RECORDS	None
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Unknown
MAINTENANCE OPERATION RECORDS	None

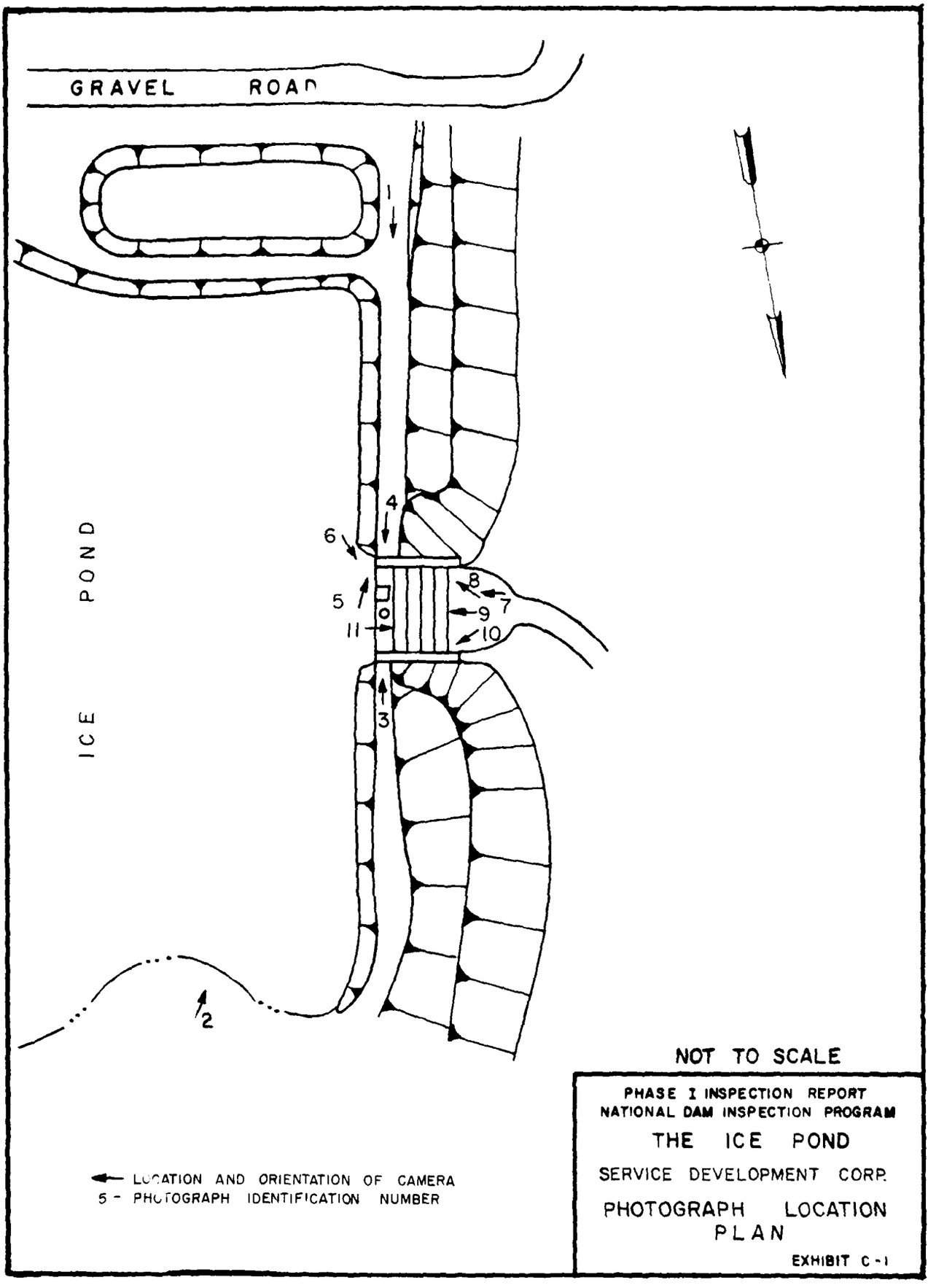
ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	Drawings from 1913 show plan and section of spillway.
DETAILS	See Appendix E.
OPERATING EQUIPMENT PLANS & DETAILS	None
SPECIFICATIONS	None
MISCELLANEOUS	Penn DER inspection reports.

APPENDIX F

GEOLOGY

APPENDIX C

PHOTOGRAPHS


GRAVEL ROAD
ICE POND
1
2
3
4
5
6
7
8
9
10
11
NOT TO SCALE
← LOCATION AND ORIENTATION OF CAMERA
5 - PHOTOGRAPH IDENTIFICATION NUMBER
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
THE ICE POND
SERVICE DEVELOPMENT CORP.
PHOTOGRAPH LOCATION PLAN
EXHIBIT C-1

1. Crest and right abutment.

2. Upstream face and left abutment.

3. Erosion of crest adjacent to right spillway wall.

4. Erosion of upstream face and crest. Spillway bridge in background.

5. Deteriorated left spillway wall at crest. Left side of drop inlet in foreground. (Railroad rails support bridge decking.)

6. Spillway crest, bridge and drop inlet. Note undermining of crest slab. Iron pipe at center of crest is control for sluiceway gate.

7. [illegible] sluiceway [illegible] conduit [illegible] pipe.

8. Left spillway wall downstream of crest.

9. Center portion of downstream face of spillway. Note deteriorated bridge pier at top of picture.

10. Downstream face of spillway and right spillway wall.

Ice Pond Dam. Downstream channel. Blue Giant Meadow Lake in background.

APPENDIX D

HYDROLOGY AND HYDRAULICS

PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: 1) the evaluation of the overtopping potential of the dam; and 2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.

c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequence resulting from an assumed structural failure (breach) of the dam is typically performed as shown below.

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir.

c. Development of a failure hydrograph(s) based on specified breach criteria and normal reservoir outflow.

d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak and maximum water surface elevations of failure hydrographs for each location.

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 1 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-5-81

DAM CLASSIFICATION:

SIZE OF DAM - SMALL
HAZARD - SIGNIFICANT
REQUIRED SDF - 100 YEAR FLOOD TO ½PMF

DAM STATISTICS:

HEIGHT OF DAM - 12.6 FEET
STORAGE AT NORMAL POOL - ~150 AC-FT.
STORAGE AT TOP OF DAM - ~230 AC-FT.
DRAINAGE AREA ABOVE DAMSITE - 1.23 mi^2

ELEVATIONS: (M.S.L.)

TOP OF DAM LOW POINT (FIELD) -	1146.8
NORMAL POOL -	1144.5
STREAMBED AT CENTERLINE OF DAM -	1134.8
SPILLWAY CREST -	1145.0
DROP INLET CREST (REMOVABLE STOPLOGS) -	1144.5

HYDROGRAPH PARAMETERS:

RIVER BASIN - SUSQUEHANNA RIVER BASIN
ZONE - 13
SYNDER COEFFICIENTS

C_p - 0.50
C_t - 1.85

MEASURED PARAMETERS: *

L = LENGTH OF LONGEST WATERCOURSE $L = 2.05$ mi
L_{CA} = LENGTH OF LONGEST WATERCOURSE TO CENTROID OF THE BASIN $L_{CA} = 0.83$ mi

NADB FORM 1232, 26 MAR 74

* FROM U.S.G.S. QUAD SHEET, WILKES-BARRE WEST, PA
7½ MINUTE SERIES SCALE: 1:24000

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 2 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-5-81

NOTE: ELEVATIONS ARE REFERENCED TO U.S.G.S. QUAD SHEET ENTITLED WILKES BARRE WEST, PA., ELEVATION GIVEN ON QUAD SHEET IS 1145 WHICH WILL BE ASSUMED TO BE AT THE SPILLWAY CREST.

t_p = SYNDERS BASIN LAG TIME TO PEAK IN HOURS

$$t_p = C_t (L L_{CA})^{0.3}$$

$$= 1.85(2.05\ (0.83))^{0.3} = 2.17 \text{ hours}$$

RESERVOIR CAPACITY:

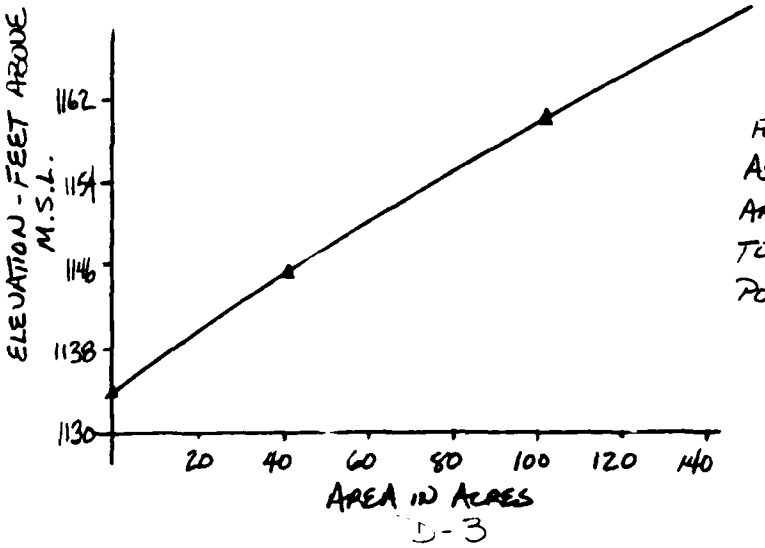
- SURFACE AREA AT SPILLWAY CREST (1145.0) - 41 ACRES
- SURFACE AREA AT ELEVATION 1160.0 - 102 ACRES (PLANIMETERED VALUE)

ASSUME CONICAL METHOD APPLIES TO FIND LOW POINT IN POOL, BELOW NORMAL POOL.

VOLUME AT NORMAL POOL $\cong$ 150 AC.-FT (FROM DER FILES)

$V = \frac{1}{3}AH$; $H = \frac{3V}{A} = \frac{3(150 \text{ AC-FT})}{(41 \text{ AC})} = 11.0$ FT.

$\therefore$ ZERO STORAGE AT ELEVATION = 1133.5



FOR FLOOD ROUTING PURPOSES ASSUME THE AVERAGE END AREA METHOD IS SUITABLE TO ELEVATIONS ABOVE NORMAL POOL - ELEVATION AND

$$\Delta V = \left(\frac{A_1 + A_2}{2}\right)\Delta H$$

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 3 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-5-81

ELEVATION - STORAGE TABLE

ELEVATION (MSL)	AREA (Ac)	ΔH (ft)	(*) INCREMENTAL VOLUME $\Delta V = \left(\frac{A_1+A_2}{2}\right)\Delta H$ (AC-FT)	CUMLATIVE VOLUME (AC-FT)	
1133.5	0	-	-	0	
1145.0	41	SPILLWAY CREST	153	153	150
1146.0	44	1.0	42.5	195.5	200
1147.0	47	1.0	45.5	241.0	240
1148.0	51	1.0	49.0	290.0	290
1149.0	55	1.0	53.0	343.0	340
1150.0	60	1.0	57.5	400.5	400
1155.0	80	5.0	350.0	750.5	750
1160.0	102	5.0	455.0	1205.5	1210

(*) TO BE USED FOR VALUES ABOVE NORMAL POOL

T.O.D @ 1146.8 ~232ac-ft

NOTE: DRAINAGE AREA ABOVE DAM IS 1.23 mi^2

ELEVATION (MSL)	STORAGE (AC-FT)
1133.5	0
1145.0	150
1146.0	200
1147.0	240
1148.0	290
1149.0	340
1150.0	400
1155.0	750
1160.0	1210

↑ ROUNDED TO NEAREST 10 AC-FT.

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 4 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-9-81

SDF: BASED ON THE SMALL HEIGHT OF DAM AND THE SMALL STORAGE, THE SDF SELECTED FOR THIS POND WAS THE 100 YEAR FLOOD. THIS IS IN ACCORDANCE WITH THE GUIDENCE PROVIDED.

∴ USE SDF = 100 YEAR FLOOD

PMP CALCULATIONS

SINCE THE SDF SELECTED FOR THIS POND HAS BEEN THE 100 YEAR FLOOD, NO CALCULATIONS ARE NECESSARY TO COMPUTE THE PROBABLE MAXIMUM PRECIPATATION (PMP) OR THE PROBABLE MAXIMUM FLOOD (PMF).

NADB FORM 1232, 28 MAR 74

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 5 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-9-81

EMERGENCY SPILLWAY CAPACITY

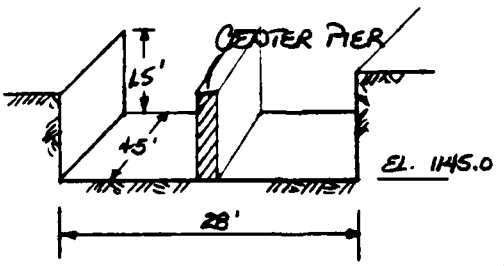
NOTE: SPILLWAY IS LOCATED IN CENTER OF DAM. SEE FIELD SKETCH IN APPENDIX A, EXHIBIT-1.

SPILLWAY DATA

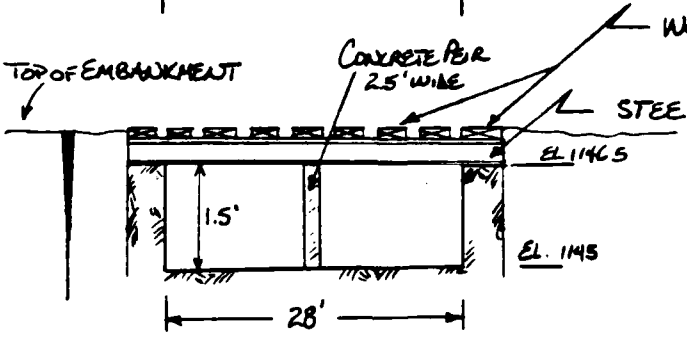
TYPE - BROAD CRESTED, ~4.5 FEET WIDE
LENGTH - 25.5 FEET
CREST ELEVATION - 1145 MSL
LOW POINT TOP OF DAM - 1146.8 MSL
SPILLWAY FREEBOARD - 1.5 FEET (small bridge will obstruct flow)
C VALUES - 2.85 for spillway
use 2.85 for embankment

NOTE: THESE C VALUES WILL BE USED BASED ON WIDTH PARALLEL TO FLOW, SPILLWAY 4.5 FEET, EMBANKMENT ~ 7 FEET. THESE VALUES WILL BE HELD CONSTANT FOR ALL HEADS AND WILL BE CONSERVATIVE FOR FACILITY RATING.

SPILLWAY RATING CURVE:



CENTER PIER IS 2.5 FEET IN WIDTH, LEAVING A FLOW AREA OF 24.5 FEET BY 1.5 FEET. BRIDGE SECTION OVER SPILLWAY NOT SHOWN.



SPILLWAY WIDTH IS 25.5 FEET, WITH A FREEBOARD OF 1.5 PRIOR TO PRESSURE FLOW. BRIDGE SECTION SHOWN.

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BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM · SHEET 6 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-10-81

SINCE THE WOOD PLANKING WOULD FLOAT OUT AND THE STEEL I-BEAMS ARE SPACED ABOUT 18 INCHES APART, THE BRIDG WOULD HAVE A MINOR EFFECT ON THE SPILLWAY RATING CURVE.

SPILLWAY RATING CURVE $C=2.85$, $L=25.5$ FEET

POOL ELEVATION (MSL)	H (FT)	Q (CFS)	ROUNDED Q (CFS)
1145.0	0	0	0
1145.5	0.5	25.7	30
1146.0	1.0	72.7	70
1146.8 * (TOD)	1.8	175.5	180
1147.0	2.0	205.5	210
1148.0	3.0	377.6	380
1149.0	4.0	581.4	580
1150.0	5.0	812.5	810
1155.0	10.0	2298.2	2300

$Q = CLH^{3/2}$ FOR DISCHARGE VALUES

* TOD = TOP OF DAM

EMBANKMENT RATING CURVE:

THIS ANALYSIS ASSUMES THAT THE EMBANKMENT BEHAVES AS A BROAD CRESTED WEIR IF OVERTOPPING OCCURS. THIS DISCHARGE CAN BE ESTIMATED BY:

$$Q = CL_1 H_w^{3/2}$$

WHERE: Q = DISCHARGE OVER EMBANKMENT, IN CFS

L_1 = LENGTH OF EMBANKMENT, FT

H_w = WEIGHTED HEAD, IN FEET, AVERAGE FLOW AREA WEIGHTED ABOVE LOW POINT OF DAM

C = COEFFICIENT OF DISCHARGE

BALTIMORE DISTRICT, CORPS OF ENGINEERS PAGE

SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 7 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-10-81

LENGTH OF EMBANKMENT INNUNDATED VS. RESERVOIR ELEVATION :

RESERVOIR ELEVATION (MSL)	EMBANKMENT LENGTH (FT)
1146.8 (TOD)	0
1147.0	80
1148.0	388
1149.0	482*
1150.0	482*
1155.0	482*

EMBANKMENT RATING TABLE:

RESERVOIR ELEVATION (MSL)	L_1 (FT)	L_2 (FT)	INCREMENTAL HEAD, H_i (FT)	① INCREMENTAL FLOW AREA, A_i (FT^2)	TOTAL FLOW AREA, A_T (FT^2)	② WEIGHTED HEAD H_ω (FT)	③ Q (CFS)
1146.8	-	0	-	-	-	-	0
1147.0	80	0	0.2	8.0	8.0	0.10	7.3
1148.0	388	80	1.0	234.0	242.0	0.62	539.8
1149.0	482	388	1.0	435.0	677.0	1.40	2275
1150.0	482	482	1.0	482.0	1159.0	2.40	5107
1155.0	482	482	5.0	2410.0	3569.0	7.40	27652

① - $A_i = H_i [(L_1 + L_2)/2]$

② - $H_\omega = A_T / L_1$

③ - $Q = C L_1 H_\omega^{3/2}$

recall C = 2.85 FROM SHEET 5 OF THIS APPENDIX.

*MAXIMUM LENGTH OF EMBANKMENT NOT INCLUDING OVERBANK AREAS OR WIDTH OF SPILLWAY.

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SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 8 OF _____ SHEETS

COMPUTED BY YPB CHECKED BY _____ DATE 2-10-81

TOTAL FACILITY RATING CURVE:

RESERVOIR ELEVATION (MSL)	Q SPILLWAY (CFS)	Q EMBANK (CFS)	Q TOTAL (CFS)
1145.0	0	0	0
1145.5	30	0	30
1146.0	70	0	70
1146.8 (T.O.D.)	180	0	180
1147.0	210	10	220
1148.0	380	540	920
1149.0	580	2280	2860
1150.0	810	5110	5920
1155.0	2300	27650	29950

NOTE: STOP LOG FACILITY WILL BE IGNORED FOR FACIUTY RATING CURVE, ASSUME BLOCKED.

100 YEAR FLOOD ANALYSIS:

THE SELECTED SDF FOR THE ICE POND DAM HAS BEEN THE 100 YEAR FLOOD. THIS IS BASED ON THE SIZE OF THE DAM AND THE HAZARD CATAGORE1/ OF THE DAM.

TO DEVELOP THE 100 YEAR FLOOD, TWO REGRESSION EQUATIONS WILL BE USED TO DETERMINE THE PEAK VALUE. THE AVERAGE OF THE TWO REGRESSION PEAKS WILL BE THE 100 YEAR FLOOD PEAK USED IN THIS ANALYSIS.

BULLETIN 13 FLOOD PEAK:

FROM PLATE NO. 1 - ICE POND DAM IS IN REGION 5.

∴ REGRESSION EQUATION IS -

$$Q_T = cA^x(P_1)^p$$

NADB FORM 1232, 28 MAR 74

where:

Q_T = PEAK FLOW FOR RETURN PERIOD T, IN YEAR

c = REGRESSION CONSTANT

A = DRAINAGE AREA IN SQUARE MILES

X = REGRESSION COEFFICIENT

P_i = ANNUAL PRECIPITATION INDEX = AVERAGE ANNUAL EXCESS PRECIPITATION WHICH EQUALS AVERAGE ANNUAL PRECIPITATION MINUS ESTIMATE POTENTIAL ANNUAL EVAPOTRANSPIRATION.

P = REGRESSION COEFFICIENT.

FROM PLATE #2

AVERAGE ANNUAL PRECIPATION = 42 INCHES
POTENTIAL ANNUAL EVAPOTRANSPIRATION = 25 INCHES

$P_i = 42 - 25 = 17$

$A = 1.23\ mi^2$

FOR 100 YEAR ANALYSIS:

$c = 42.2$ $\quad P_i = 17$
$X = 0.751$ $\quad A = 1.23\ mi^2$
$P = 0.744$ $\quad T = 100$

THEREFORE, $Q_T = cA^X(P_i)^P$

$$Q_T = 42.2(1.23)^{0.751}(17)^{0.744}$$

$Q_{100} = 405.77$ CFS FROM BULLENTIN 13

NOW COMPUTE THE 100 YEAR FLOOD PEAK FROM HYDROLOGIC STUDY - TROPICAL STORM AGNES, NORTH ATLANTIC DIVISION 1975

$$\text{LOG}(Q_m) = C_m + 0.75\ \text{Log}(A)$$

where: C_m = a map COEFFICIENT FOR MEAN LOG OF ANNUAL PEAK
Q_m = Geometric mean of ANNUAL FLOOD PEAKS, CFS
A = DRAINAGE AREA, mi^2

$$Log(Q_m) = C_m + 0.75 \log(A)$$

recall $A = 1.23\ mi^2$

FROM FIGURE 21 $C_m = 2.00$

$$\therefore Log(Q_m) = 2.00 + 0.75 \log(1.23)$$

$$\log(q_m) = 2.0674$$

now, Compute the STANDARD DEVIATION

$$S = C_S - 0.05 \log(A)$$

where: S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS

C_S = a MAP COEFFICIENT FOR STANDARD DEVIATION

A = DRAINAGE AREA, mi^2

$\therefore$ FROM FIGURE 22 $C_S = 0.38$

$$S = 0.38 - 0.05 \log(1.23)$$

$$S = 0.3755$$

now, COMPUTE THE 100 YEAR FLOOD PEAK FROM THE FOLLOWING:

$$Log(Q(p)) = \log(q_m) + K(P,g)\,S$$

where: $Log(Q(p))$ = Log OF THE ANNUAL FLOOD PEAK FOR A GIVEN EXCEEDENCE FREQUENCY (P)

$Log(Q(m))$ = MEAN LOGARITHM OF ANNUAL FLOOD PEAK

$K(P,g)$ = STANDARD DEVIATE FOR A GIVEN EXCEEDENCE FREQUENCY (P) AND SKEW COEFFICIENT (g)

S = STANDARD DEVIATION, LOGS OF ANNUAL FLOOD PEAKS

$\therefore$ WE NEED TO KNOW SKEW COEFFICIENT, FROM FIGURE 23

$$g = 0.43$$

$\therefore$ INTERPOLATED VALUE FROM CHART (EXHIBIT 39 - STATISTICAL METHODS IN HYDROLOGY - LEO BEARD - U.S. ARMY CORPS OF ENGINEERS - JAN. 1962)

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SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 11 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 4-24-81

* $K(P,g) = 2.64$ 06 - 2.77
0.4 - 2.62

$$Log(Q_{100}) = Log(Q_m) + K(P,g)S$$

$$Log(Q_{100}) = 2.0674 + 2.64(0.3755)$$

$$Log(Q_{100}) = 3.0587$$

$$Q_{100} = 1145 \text{ CFS}$$

THEREFORE, $Q_{100} = 1145$ CFS FROM TROPICAL STORM AGNES REPORT, NORTH ATLANTIC DIVISION

NOW COMPUTE THE 100 YEAR FLOOD PEAK BY AVERAGING THE TWO REGRESSION PEAKS.

$$Q_{100} = \frac{405.77 + 1145}{2} = 775.38$$

$$\therefore Q_{100} \approx 780 \text{ CFS.}$$

SPILLWAY ADEQUACY:

THE SPILLWAY IS CONSIDERED ADEQUATE IF THE MAXIMUM OUTFLOW THROUGH THE SPILLWAY AT LOW POINT TOP OF DAM IS GREATER THAN THE Q_{100} PEAK CALCULATED ABOVE.

THEREFORE,

MAXIMUM OUTFLOW AT TOP OF DAM = 180 CFS
MAXIMUM 100 YEAR INFLOW = 780 CFS

SINCE THE MAXIMUM INFLOW IS GREATER THAN THE MAXIMUM OUTFLOW, THE SPILLWAY IS RATED INADEQUATE

NADB FORM 1232, 28 MAR 74

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SUBJECT DAM SAFETY ANALYSIS

COMPUTATIONS ICE POND DAM SHEET 12 OF SHEETS

COMPUTED BY JPB CHECKED BY DATE 2-11-81

DROP INLET:

CONCRETE STRUCTURE WITH WOODEN STOPLOGS (REMOVABLE)

INTAKE ELEVATION - 1144.5 (½ FOOT BELOW SPILLWAY)
OUTLET ELEVATION - 1140.0

UNDER EXISTING CONDITIONS, THE DROP INLET IS NON-OPERABLE. WE WILL ASSUME THAT THE OUTLET CAN BE MADE OPERABLE AND THAT THE FOLLOWING VALUES WOULD BE APPLICABLE.

RECTANGULAR DROP INLET 12" by 14' AT ELEV 1144.5, AND A 14" DIAMETER IRON PIPE. ASSUME INLET ACTS AS WEIR ON 3 SIDES. C=2.60, TOTAL LENGTH = 42 INCHES.

POOL ELEVATION (MSL)	WEIR FLOW ① $Q=CLH^{3/2}$	ORIFICE FLOW ② $Q=CA\sqrt{2gh}$	USE
1144.5	0	~~0~~	0
1145.0	3.2	~~11.5~~	3
1146.0	~~16.7~~	12.6	13
1146.8 (TOP)	~~37.7~~	~~13.4~~	13

① WEIR EQUATION: $Q=CLH^{3/2}$

where $L = 12"(2) + 14" = 42$ INCHES
$= 3.5$ FEET

H = POOL ELEVATION $- 1144.5$

② ORIFICE EQUATION: $Q=CA\sqrt{2gh}$

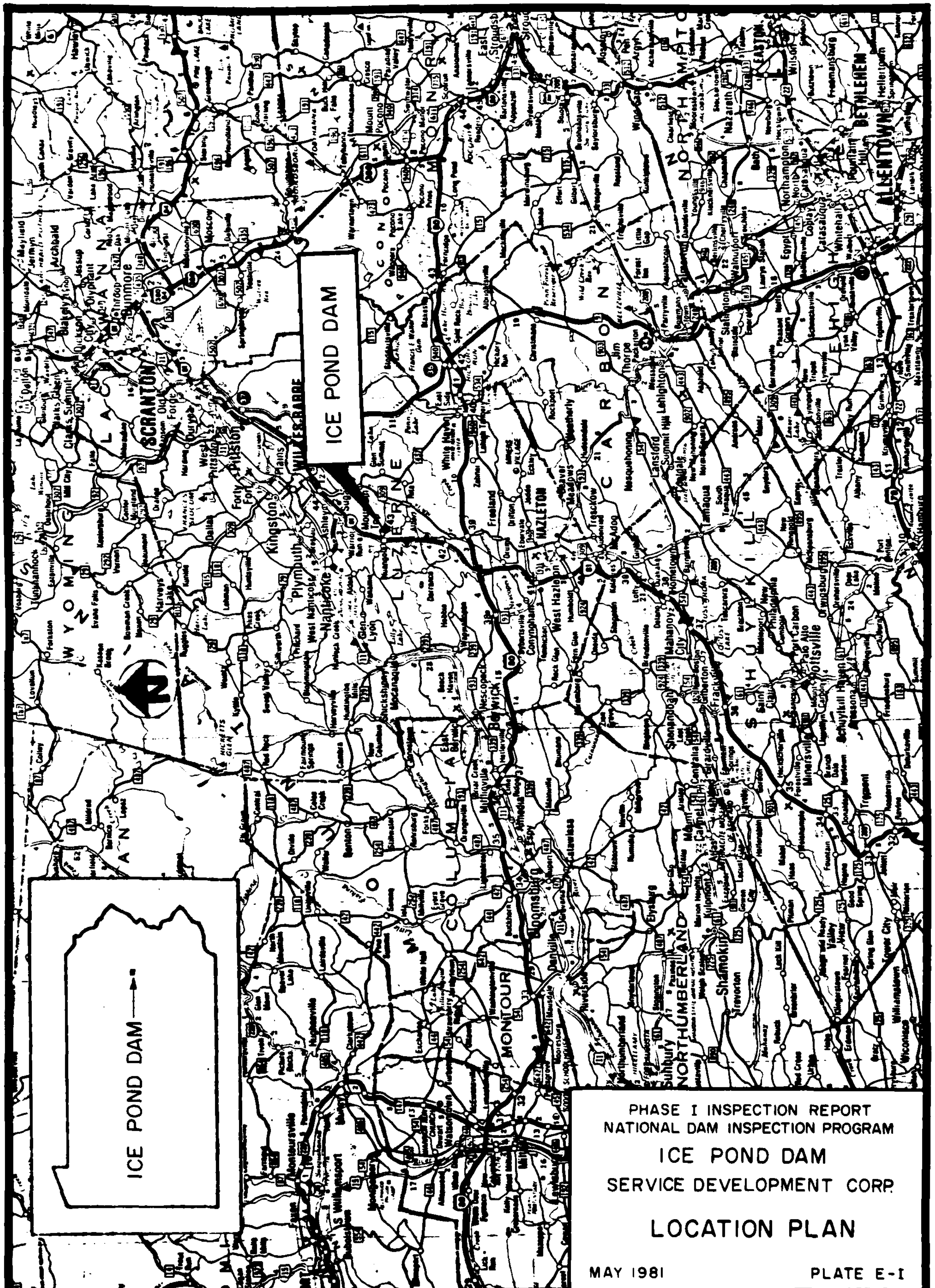
$C = 0.6$
A = area of pipe $= \pi D^2/4 = \frac{\pi}{4}(\frac{14}{12})^2 = 1.07\ FT^2$
$g = 32.2\ FT/SEC^2$
h = POOL ELEVATION $- 1140.0$

NOTE: SMALLER VALUE OF WEIR FLOW OR ORIFICE FLOW WOULD BE USED FOR THAT ELEVATION

BADD FORM 1232, 28 MAR 74

APPENDIX E

PLATES



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

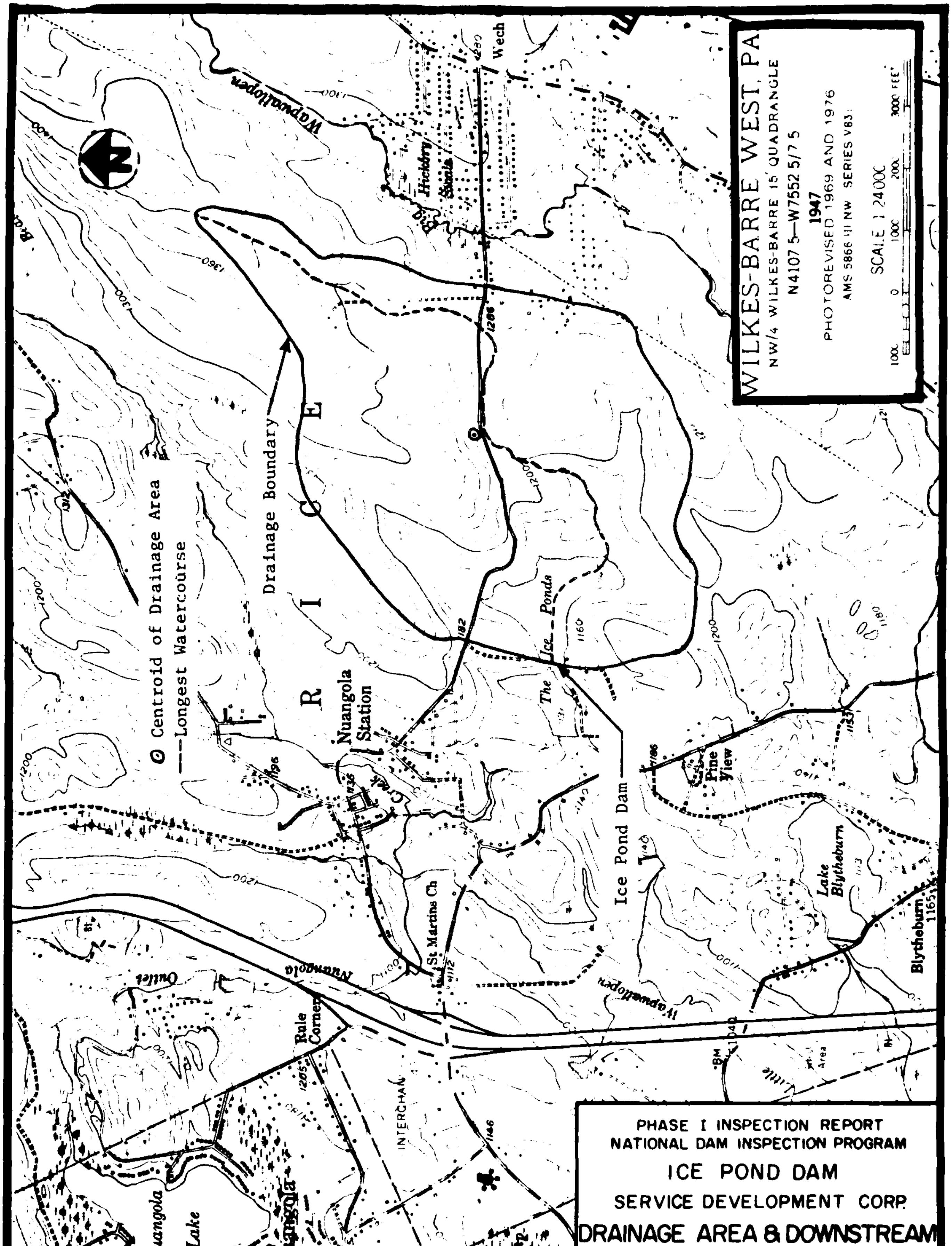
ICE POND DAM

SERVICE DEVELOPMENT CORP.

LOCATION PLAN

MAY 1981

PLATE E-I



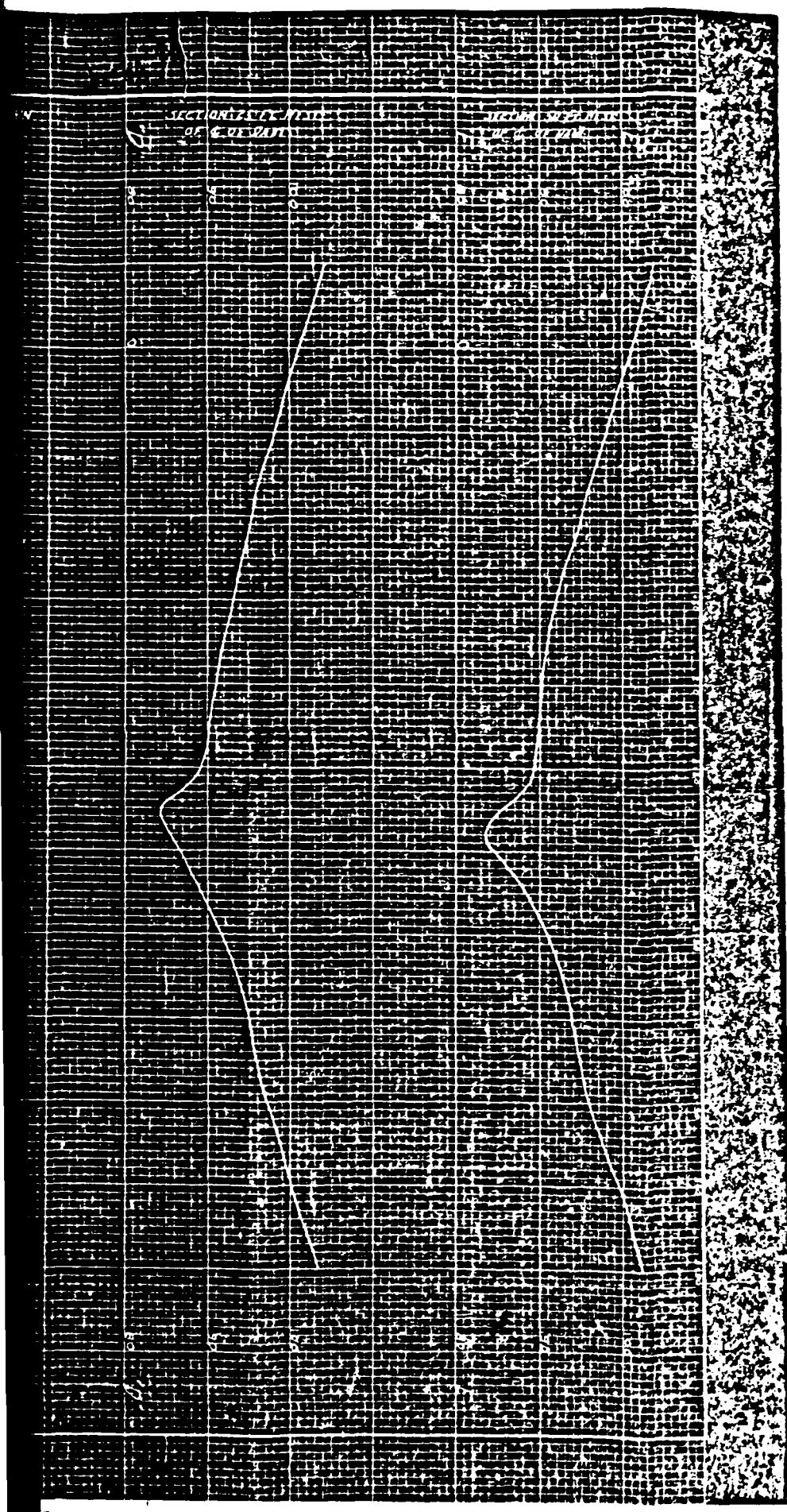
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ICE POND DAM

SERVICE DEVELOPMENT CORP.

DRAINAGE AREA & DOWNSTREAM DEVELOPMENT PLAN

MAY 1981 PLATE E-II



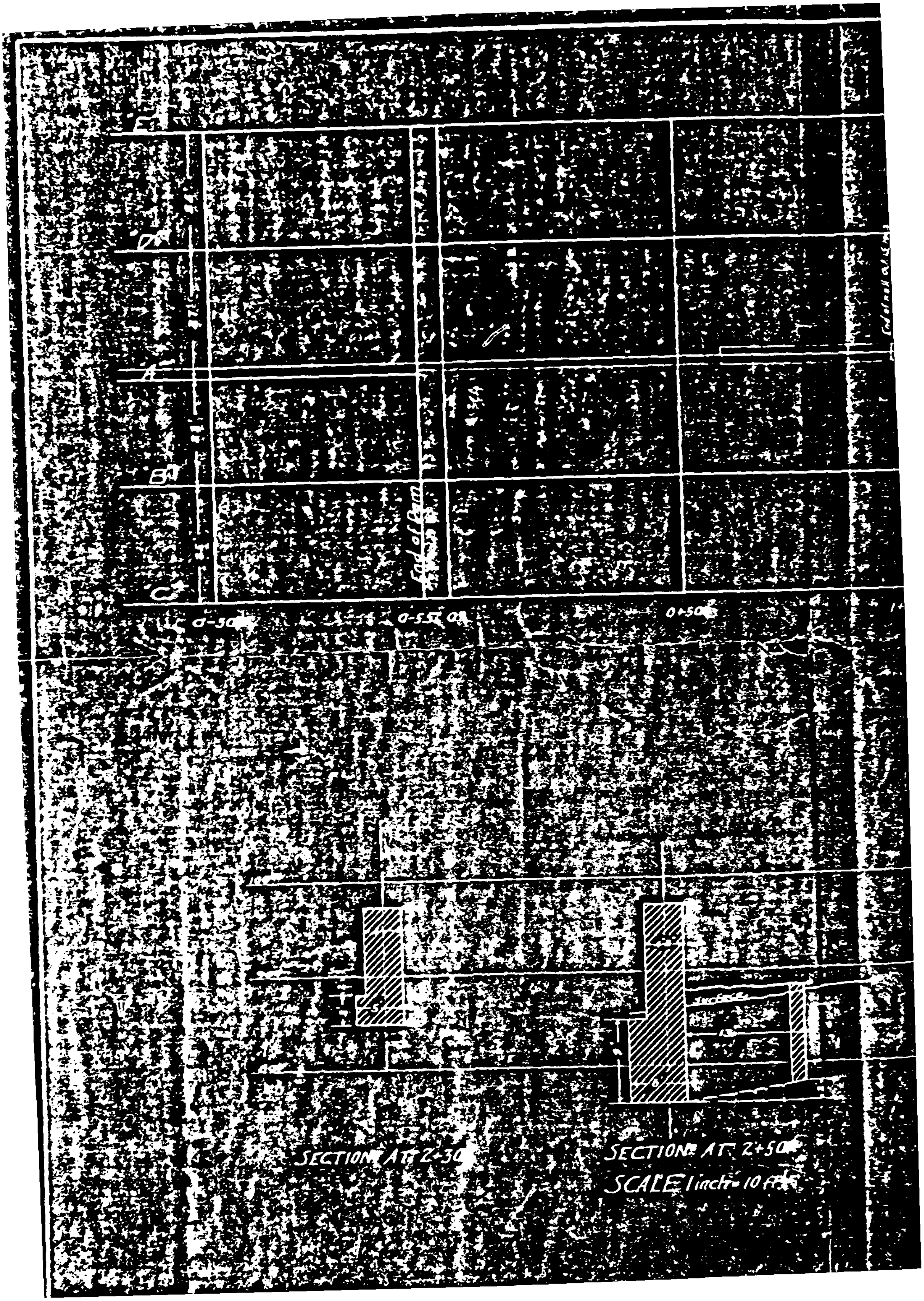
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

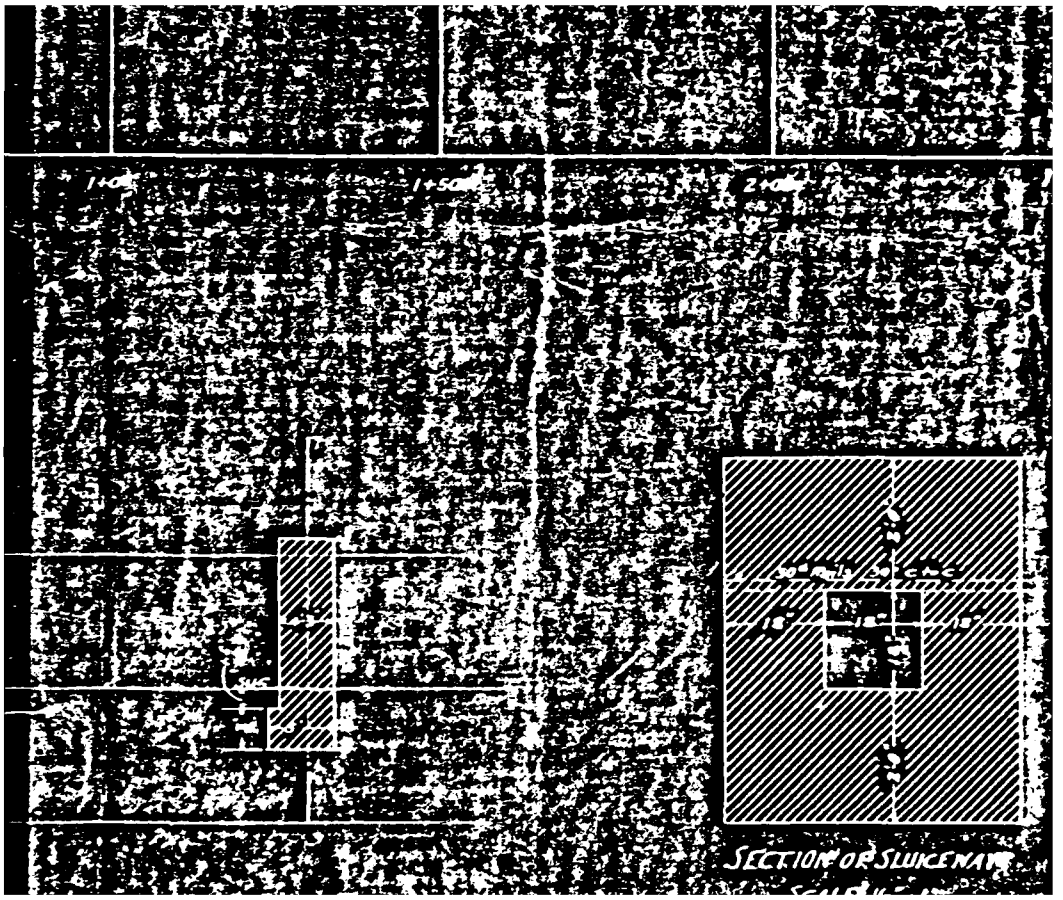
ICE POND DAM

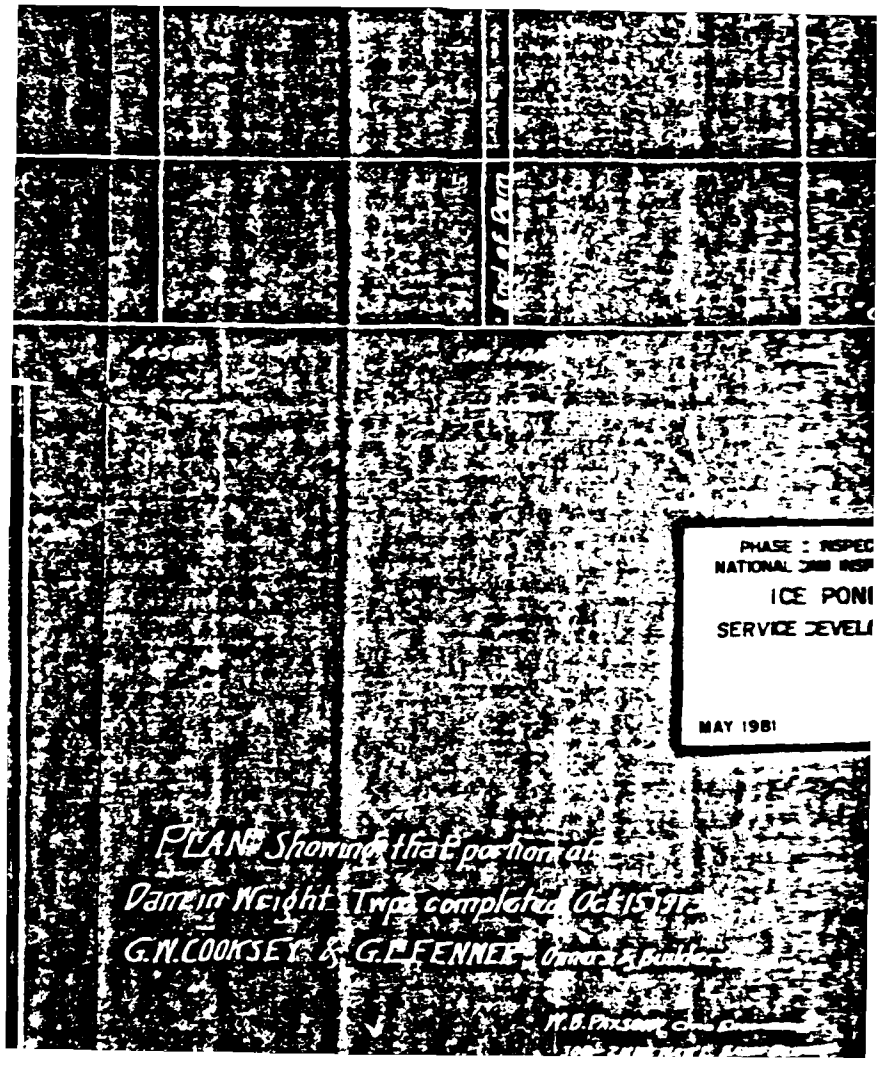
SERVICE DEVELOPMENT CORP.

MAY 1981

PLATE E-III


SECTION AT 2+30
SECTION AT 2+50
SCALE 1 inch = 10 ft


SECTION OF SLUICEWAY


PHASE I INSPEC
NATIONAL DAM INSP
ICE PONI
SERVICE DEVELI
MAY 1981
PLAN Showing that portion of
Darrein Weight Twp completed Oct 15 19
G.N. COOKSEY & G.L. FENNER Owners & Builders
M.B. Parsons

E

D

A

B

C

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ICE POND DAM
SERVICE DEVELOPMENT CORP.

1981 PLATE E-IV

NDE NO. R.23

APPENDIX F

GEOLOGY

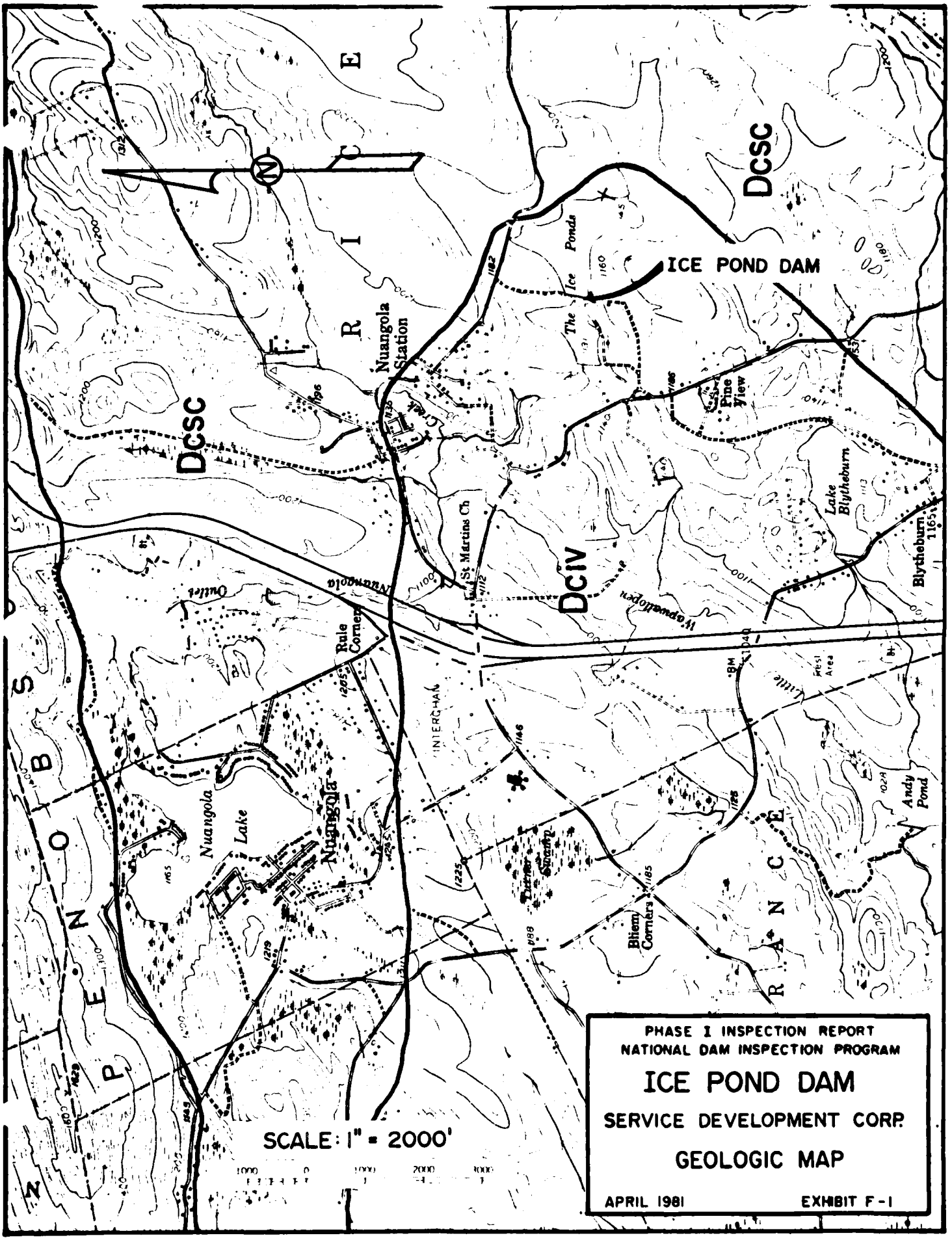
ICE POND DAM

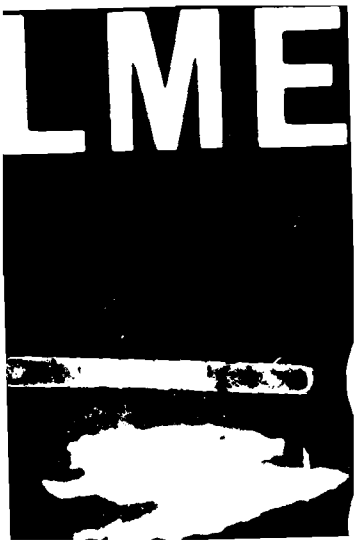
GENERAL GEOLOGY

The bedrock at Ice Pond Dam is the Irish Valley Member of the Catskill Formation. This member consists of marine and nonmarine siltstone interbedded and grayish-red sandstone and claystone. Late Wisconsinan glacial drift, probably till, is believed to overlie the bedrock at this site. The thickness of drift is probably less than 2m, but locally it may be thicker particularly to the northeast of Ice Pond.

LEGEND
(Bedrock)

Dcsc	CATSKILL FORMATION, SHERMAN CREEK MEMBER - Alternating grayish-red siltstone and claystone in poorly defined, fining-upward cycles, and minor intervals of gray sandstone; laterally equivalent to Berry Run, Sawmill Run, Packerton, and Long Run Members.
Dciv	CATSKILL FORMATION, IRISH VALLEY MEMBER - Light-olive-gray marine siltstone interbedded with nonmarine, gray and grayish-red sandstone and grayish-red claystone, arranged in fining-upward cycles.


ICE POND DAM
DCSC
DCSC
DCIV
Nuangola Station
Ice Ponds
The Ice Ponds
Pine View
Lake Blytheburn
Blytheburn
St Martins Ch
Rule Corner
Nuangola
Nuangola Lake
Interchange
Rest Area
Andy Pond
Bliem Corners
Turner Summit
Outlet
SCALE: 1" = 2000'
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ICE POND DAM
SERVICE DEVELOPMENT CORP.
GEOLOGIC MAP
APRIL 1981
EXHIBIT F-1


LME