

LEVEL II

**DELAWARE RIVER BASIN
POHOPOGO CREEK, MONROE COUNTY**

**PENNSYLVANIA
NDI NO. PA.00998
DER NO.45-217**

SUN VALLEY DAM

OWNER: SUN VALLEY LAKE, INC.

PHASE I INSPECTION REPORT, NATIONAL DAM INSPECTION PROGRAM

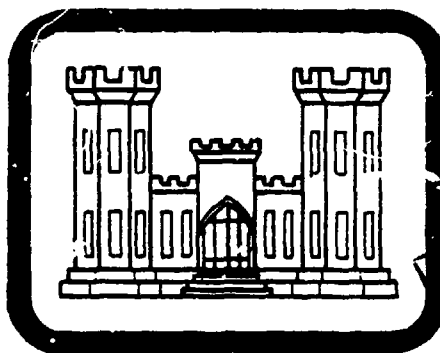
prepared by

Woodward-Clyde Consultants

PACW31-81-C-0025

**DTIC
ELECTE
DEC 31 1981**

H



**DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited**

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

JULY 1981 81 12 28 159

DA109114

DTIC FILE COPY

*Original contains color
plates. All DTIC reproductions
will be in black and
white.*

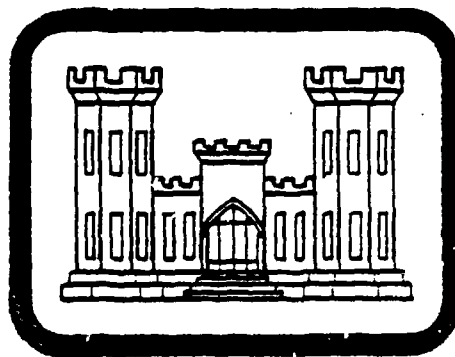
394151

DELAWARE RIVER BASIN

POHOPOCO CREEK
SUN VALLEY DAM
MONROE COUNTY, PENNSYLVANIA

NDI NO. PA 00998
DER NO. 45-217

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DTIC
ELECTE
DEC 31 1981

H

Prepared by:

WOODWARD-CLYDE CONSULTANTS
5120 Butler Pike
Plymouth Meeting, Pennsylvania 19462

Submitted to:

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

JULY 1981

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

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 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.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<input type="checkbox"/>
<i>from 50 on file</i>	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
A	

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Sun Valley Dam
County Located:	Monroe County
State Located:	Pennsylvania
Stream:	Pohopoco Creek
Coordinates:	Latitude 40° 58.8' Longitude 75° 28.0'
Date of Inspection:	March 17, 1981

Sun Valley Dam is owned by the Sun Valley Lake Corporation and is used for private recreational purposes. The spillway is in good condition and the embankment and emergency spillway are in poor condition. Internal piping may be acting to diminish the overall stability of the dam.

→ In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Small" and "Significant" hazard classification is the 100-year flood to one-half the Probable Maximum Flood. Based on the small capacity of the reservoir and the limited downstream development, the 100-year event has been selected as the spillway design flood.

→ Hydrologic and hydraulic computations presented in Appendix B indicate that the spillway structure is not capable of discharging the 100-year event. Thus, the spillway facilities of Sun Valley Dam are considered to be "Inadequate".

It is recommended that the following measures be undertaken immediately. Items 1 through 4 should be performed under the supervision of a registered professional engineer experienced in the design and construction of dams.

- (1) The seepage at the toe of the dam and downstream from the dam should be monitored for the development of turbidity and increase in quantity. The influence of this seepage upon the stability of the dam should be evaluated and any indicated remedial action taken.
- (2) The spillway capacity should be increased to discharge the 100-year event without overtopping the embankment. This can be accomplished by raising the entire embankment, including the emergency spillway area, to design elevation. If the emergency spillway is to remain, it should be evaluated from the standpoint of functioning safely during a storm, i.e. preventing erosion.

SUN VALLEY DAM NDI NO. PA 00998

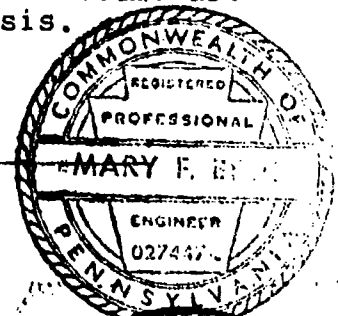
- (3) All trees and brush should be removed from the up- and downstream embankment slopes and from the crest of the dam. All embankment surfaces should be protected from erosion. Also, a vegetated growth should be established on the crest and upstream face of the dam above water level.
- (4) Procedures should be established to dewater the reservoir in the event of an emergency situation.
- (5) The erosion observed around the concrete spillway should be repaired and protection from erosion and/or foot traffic should be provided.

Because of the potential for property damage in the event of failure, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented for this facility. This procedure should include a method of warning downstream residents that high flows are expected.

In addition, an operation and maintenance procedure should also be developed to insure that all pertinent items are carefully inspected and maintained on a regular basis.

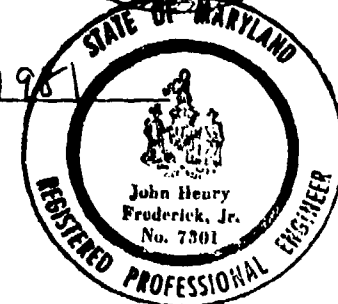
Mary F. Beck
Mary F. Beck, P.E.
Pennsylvania Registration 27447E
Woodward-Clyde Consultants

July 17, 1981
Date



John H. Frederick, Jr.
John H. Frederick, Jr., P.E.
Maryland Registration 7301
Woodward-Clyde Consultants

July 17, 1981
Date



APPROVED BY:

James W. Peck
James W. Peck
Colonel, Corps of Engineers
Commander and District Engineer

28 July 81
Date



OVERVIEW
SUN VALLEY DAM, MONROE COUNTY, PENNSYLVANIA

TABLE OF CONTENTS

	<u>PAGE</u>
Preface	i
Assessment and Recommendations	ii
Overview Photograph	iv
 SECTION 1 - PROJECT INFORMATION	
1.1 General	1
1.2 Description of Project	1
1.3 Pertinent Data	4
 SECTION 2 - ENGINEERING DATA	
2.1 Design	6
2.2 Construction	6
2.3 Operational Data	6
2.4 Evaluation	6
 SECTION 3 - VISUAL INSPECTION	
3.1 Findings	7
3.2 Evaluation	10
 SECTION 4 - OPERATIONAL PROCEDURES	
4.1 Procedures	11
4.2 Maintenance of the Dam	11
4.3 Maintenance of Operating Facilities	11
4.4 Warning Systems In Effect	11
4.5 Evaluation	11
 SECTION 5 - HYDROLOGY/HYDRAULICS	
5.1 Evaluation of Features	12
 SECTION 6 - STRUCTURAL STABILITY	
6.1 Evaluation of Structural Stability	14
 SECTION 7 - ASSESSMENT/REMEDIAL MEASURES	
7.1 Dam Assessment	16
7.2 Remedial Measures	16
 APPENDIX	
A Visual Inspection	
B Engineering Data, Design, Construction and Operation	
C Photographs	
D Hydrology/Hydraulics	
E Plates	
F Geology	

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
SUN VALLEY DAM
NATIONAL ID NO. PA 00998
DER NO. 45-217

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. Sun Valley Dam is an earthfill dam approximately 25 feet high across the Pohopoco Creek. The approximately 920-foot long dam impounds a reservoir with an estimated total capacity of 41 acre-feet. Sparse vegetation covers the 9 to 14-foot wide dam crest. The crest elevations range from 1169.8 to 1172.2 excluding the area referred to as the emergency spillway. Gravel and cobbles, in a sandy silt matrix, are exposed on the upstream face of the dam where wave action has created a small bench at about the spillway crest elevation. The upstream embankment slope is about 2.25H:1V above the waterline bench and below the waterline the upstream slope appeared to be slightly flatter. The downstream embankment slope varies from 1.43H:1V to 1.80H:1V. Typically, the downstream embankment slopes are 1.43H:1V where the embankment height is greater than about 15 feet and 1.75H:1V where the embankment height is less than 15 feet. Design drawings indicate a six-foot wide cut-off trench, three feet deep, under the dam centerline. Construction specifications indicate the trench was to be backfilled with select clay materials, the material excavated from the trench was to be placed in the upstream embankment portion, and large stones were to be placed in the downstream third of the embankment. Surficial materials on the downstream embankment include large boulders. Moderate to large size trees are growing on the downstream face of the dam and small trees and brush are growing on the upstream face.

A 20-foot wide spillway with a wood footbridge is located at the right abutment of the dam. A two-foot high Ogee type weir extends above the spillway slab and is located near the dam centerline. The concrete slab extends 11.5 feet downstream from the weir and according to the design drawing, four feet upstream from the weir. The spillway discharges into a channel excavated in original ground that curves toward the left and parallels the toe of the dam at a distance of about 50 feet away until rejoining the original stream channel.

The left abutment of the dam merges into a moderately sloping hillside. A portion of the dam crest at the left abutment has been lowered to serve as an emergency spillway. The emergency spillway is approximately 60 feet wide. The wasteway channel from the emergency spillway curves to the right and is located at about the toe of the dam for a distance of approximately 100 feet and then curves away from the dam.

b. Location. Sun Valley Dam is located approximately one-mile north of Merwinsburg in Chestnuthill Township, Monroe County, Pennsylvania. The dam is located on Pohopoco Creek. The dam site and reservoir are shown on the USGS Quadrangle Map entitled "Brodheadsville, Pennsylvania" at coordinates North 40°58.8' West 75°28.0'. A Regional Location Plan is enclosed as Plate 1, Appendix E.

c. Size Classification. The dam is classified as a "Small" size structure by virtue of its less than 40-foot height and less than 1,000 acre-foot total storage capacity.

d. Hazard Classification. A "Significant" hazard classification is assigned consistent with the potential for damage to downstream residential properties, but with few or no lives lost. See Section 3.1.e.

e. Ownership. The dam is owned by Sun Valley Lake, Inc. All correspondence should be addressed to Mr. William H. Cameron, Jr., Sun Valley Lake, Inc., Effort, Pennsylvania 18330.

f. Purpose of Dam. The dam and reservoir are used for recreational purposes.

g. Design and Construction History. Sun Valley Dam was designed by Michael A. Policelli, P.E., of Roseto, Pennsylvania, in 1953 and 1954. The application for the permit to build this dam was filed with the Water and Power Resources Board of the Department of Forests and Waters on March 25, 1954. The dam was to be 825 feet long and 22 feet high, impounding a four-acre pond with approximately 24.5 acre feet of storage to the spillway crest. The 0.79 square mile drainage area required a spillway capacity of 760 cfs. The side slopes of the dam were to

be 2H:1V with a crest width of 12 feet. The specifications indicated that the dam was to be constructed of compacted impervious material over a cutoff trench 3 feet deep and 6 feet wide at its bottom and backfilled with compacted select material. Because of the small lake size and its sheltered location, no protection was specified for the upstream embankment slope at the waterline. It was noted that springs existed near the downstream toe and the left abutment of the dam, requiring that the cutoff trench be inspected by State personnel before being backfilled.

The spillway was designed as a 25-foot wide Ogee type weir, two feet high, on a concrete base slab extending 10 feet both upstream and downstream from the weir. The base slab was designed with cutoff walls two feet deep at both upstream and downstream ends and antiseep fins four feet long at the dam centerline. Spillway walls extending four feet above the weir crest were designed to be one-foot wide at the top and to taper out to 2.5 feet wide at the base. There was no blowoff or pond drain conduit indicated in the design.

The wasteway channel downstream of the spillway was to be 25 feet wide with 1H:1V side slopes. The channel curved to the left and the left slope of the channel was to be riprapped.

The permit to construct Sun Valley Dam was issued on April 14, 1954. Three contractors, Mahlon Livengood, Herbert Gower, and Julius Krummel, were engaged on the construction of this dam at various times. A construction inspection was made by a Department of Forests and Water engineer on June 2, 1954. It was noted that the dam site had been cleared, Pohopoco Creek was diverted through a reinforced concrete pipe and the embankment construction was in progress. It was noted that the embankment material being placed was not of good quality and contained an appreciable amount of stone and shale greater than 6 inches in size. A sheepsfoot roller was in evidence on the site that was apparently being used for compaction.

In August, 1954, a request was made to the Department of Forests and Waters to place two 30-inch diameter pipes at the spillway location as a temporary spillway expedient. These pipes would then be filled over. In addition, the 8-inch diameter steel pipe previously existing in the creek bed was to be left in place. The Department of Forests and Waters responded that an open channel excavation for the spillway as designed would be the only acceptable alternate to completing construction of the spillway and the 8-inch diameter steel pipe was to be removed. Through 1955 and 1956 there was occasional correspondence extending the construction permit for the dam.

A 1966 inspection by the State noted that two 30-inch diameter reinforced concrete pipes had been placed at the

spillway location and filled over instead of the approved spillway. Also, an earth emergency spillway had been constructed at the left end of the embankment. (The Owner reported he constructed the emergency spillway during Hurricane Diane, August 1955, when overtopping of the embankment seemed imminent.) This emergency spillway was approximately 3 feet deep and 20 feet wide. Erosion in the channel below the emergency spillway was also noted. Subsequently, the Owner was directed to construct a spillway in accordance with the approved plans. By May 17, 1968, the concrete spillway was in place with only cleanup work remaining. Approximately one year later, the Owner notified the Department of Forests and Waters the dam was completed. Another inspection of the dam was made shortly thereafter and the State was satisfied as to the completion of the dam.

There are no subsequent dam inspection reports located in the Department of Environmental Resources (DER) files. The following information was reported by Mr. Cameron and a nearby resident. For the past three years the reservoir level could not be maintained, effectively eliminating swimming within the reservoir. This problem was attributed to seepage through the dam, which was reported to have increased considerably in the last few years, and to diversion of surface runoff to Penn Forest Reservoir, 4.5 miles southwest, owned by the Bethlehem Water Authority. The diversion permit issued by DER is to intercept flow in Tunkhannock Creek through a 30-inch conduit. The pipeline is shown crossing Sun Valley watershed on Plate 1, Appendix E, but does not intercept surface runoff from Sun Valley watershed. Eight to 10 years ago Mr. Cameron had 200 tons of clay material placed on the upstream embankment slope in an effort to reduce seepage. Recently a 150-foot deep well was drilled at the left end of the embankment in the expectation of obtaining a flowing artesian well to supplement inflow to the reservoir. The water level in the well is about 11 feet below the ground surface.

h. Normal Operating Procedures. Under normal operating conditions, all flow discharges over the spillway.

1.3 Pertinent Data.

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

a.	Drainage Area (square miles)	0.79
b.	Discharge at Dam Site (cfs)	
	Maximum Known Flood (1955)	unknown
	Concrete Spillway	
	At Minimum Embankment Crest	159
	At Design Embankment Crest	528
	Emergency Spillway (existing)	106

c. Elevation (feet above MSL) (1)	
Top of Dam	
(existing minimum)	1169.8
(design)	1172.0
Spillway Crest	1168.0
Emergency Spillway crest	1168.6
Downstream Toe	1145±
d. Reservoir (feet)	
Length at Normal Pool	350
Length at Maximum Pool (est)	500
e. Storage (acre-feet)	
Normal Pool (est)	32
Top of Dam (est)	
(design)	55
(existing)	41
f. Reservoir Surface (acres)	
Normal Pool	4.6
Top of Dam (existing)	5.7
g. Dam Data	
Type	Earth and Rockfill
Length(not including concrete spillway)	920 feet
Side Slopes	
Design	2.0H:1V
Upstream (above water line)	2.25H:1V
Downstream	1.43H:1V to 1.80H:1V
Volume	27,000 cu. yd.
Height (above downstream toe)	
At design Crest elevation	27±feet
Existing Conditions	25± feet
Crest Width	9-14 feet
Cutoff	Trench, 6 feet wide and 3 feet deep
Grout Curtain	None
h. Spillway	
Type	Concrete Ogee type weir
Elevation at Crest	1168 feet
Length	20 feet
Emergency Spillway	
Type	Channel excavated through embankment material
Elevation (minimum)	1168.6 feet
Width	60± feet

(1) Spillway crest elevation assumed to be 1168 from USGS map.
All other elevations are relative to this elevation.

SECTION 2 ENGINEERING DATA

2.1 Design.

a. Availability. There are no original engineering data for Sun Valley Dam other than construction drawings and one page of construction specifications. Principal documents containing pertinent data used for this report are limited to State inspection reports, correspondence and photographs. All of these data are contained within the Department of Environmental Resources (DER) files.

b. Design Features. A plan view and profile of the dam as measured during the field inspection are presented in Appendix A. The design plan, profile, cross-section and details of the dam are reproduced from the construction drawing and presented in Appendix E. The reference datum of the design drawing is unknown. A summary of the design features is included in Section 1.3.

2.2 Construction.

Nothing is known concerning the construction history of Sun Valley Dam beyond the information given in Section 1.2, paragraph g.

2.3 Operational Data.

There are no operational records maintained for this dam.

2.4 Evaluation.

a. Availability. All information presented herein was obtained from DER files and supplemented by conversations with the Owner and a nearby resident.

b. Adequacy. The available original data are not adequate to evaluate the engineering aspects of this dam.

c. Validity. There is no reason to question the validity of the limited available data, although changes from the approved design were made during construction.

SECTION 3 VISUAL INSPECTION

3.1 Findings.

a. General. The observations and comments of the field inspection team are contained in a checklist presented in Appendix A and are summarized and evaluated in the following subsections. In general, the appearance of the facilities indicates that the embankment and emergency spillway are in poor condition and the spillway is in good condition.

b. Dam. The vertical alignment of the dam crest was checked and the profile is shown on sheet 5C, Appendix A. Over one-half of the embankment, to the left of station 2+50, is below design elevation. Crest elevations range from 1172.2 to 1169.8. A depressed area at the left end of the embankment, elevation 1168.6, forms an emergency spillway, Photograph 7. The embankment crest elevation as shown in the Overview Photograph appears essentially the same as in a 1966 photograph taken by Department of Environmental Resources (DER). The crest width ranges from 9 to 14 feet and is essentially unprotected. No cracks, ruts or foot traffic damage was noted other than occasional worn areas over the up- and downstream edge of the crest. Sparse grassy vegetation, brush and small trees are growing on the upstream face of the dam. Cobbles and gravel in a matrix of brown sandy silt were observed on the upstream slope and dam crest. There was no riprap on the upstream embankment slope and a three to four-foot wide bench was created by wave action at about the spillway crest elevation, Photograph 10. At the time of the inspection the lake level was approximately 1.4 feet below the spillway crest elevation; thus, the bench was clearly visible. The upstream slope was observed to be generally 2.25H:1V above the bench and a slightly flatter slope below the bench.

The downstream slope of the dam supports a moderate to heavy growth of weeds, brush and trees up to 15 inches in diameter. Large boulders are exposed on lower portions of the downstream embankment slope, Photographs 11 through 13. There was one foot path down the downstream slope of the dam where localized erosion has occurred and other areas have minor foot traffic damage. A path was constructed on the downstream embankment slope, see Sheet 5A, Appendix A. Downstream embankment slope measurements ranged from 1.43H:1V to 1.80H:1V. In general, where the embankment height was greater than about 15 feet, the downstream slope was typically 1.43H:1V; where the embankment height was less than 15 feet, the downstream slope was typically about 1.75H:1V. Left of the maximum dam section, the downstream embankment surface is uneven, reportedly as a result of earth moving activities during construction.

There was an extraordinary amount of water at the downstream toe of this dam which can be divided into two categories: springs which pre-dated dam construction and seepage post-dating dam construction. Several seeps were observed at the toe of the dam from approximately 250 feet left of the spillway to where the embankment deflects upstream. At one location, approximately six feet above the embankment toe, water flowing within the embankment created a hollow sound. As previously noted, a considerable amount of boulders form the downstream face of the dam. The seepage flows into the downstream channel where the total volume of seepage was visually estimated to be on the order of 25 to 50 gpm, Photographs 14 through 16. At about the midpoint of the dam, where the alignment curves toward the north, a small seep was noted at the toe of the dam. At the time of inspection discharge under and/or through the dam appeared to be clear.

Several springs, referred to as "white sand springs", are located at and beyond the downstream toe, approximately at the locations shown on Plate 2, Appendix E, as a spring and stream. The springs and seepage are also shown on Sheet 5A, Appendix A, and described as follows:

Beginning approximately 100 feet from the left abutment, where the embankment is approximately 6 to 8 feet high, are small seeps along the edge of the emergency spillway channel at the toe of the dam. Seepage flows downstream through an approximately eight-foot wide channel oriented along the embankment toe. Erosion has occurred at the embankment toe and on the embankment slope, Photograph 9. The area where the channel curves away from the dam toward the pre-existing spring is soft, wet and marshy with frequent rivulets of flowing water. Additional seepage was observed at the toe of the dam between the spillway channel and the second spring.

The second spring also displayed small sand boils. As a result of earth moving in the area, seepage drainage patterns are complex (see Sheet 5A) with water draining toward both springs and discharging from both. Discharge from the larger pond at the embankment was visually estimated to be on the order of 100 to 200 gpm.

c. Appurtenant Structures. The concrete spillway is 20 feet wide with an Ogee type weir two feet high on a base slab. A very thin crack, approximately perpendicular to the dam center-line, was noted across the spillway weir and slab at about its midpoint. The spillway is in generally good condition with no evidence of significant surface deterioration, although there is some exposed aggregate on the spillway weir. Small cracks were noted at the junctions between the wing walls and the spillway walls.

A substantial amount of erosion has occurred on the right abutment and within the fill upstream of the antiseep fin (behind the right spillway wall), leaving a gully approximately one-foot deep below the top of the wall. Some erosion, but to a lesser extent, was observed behind the downstream right wall and behind the left wall. There is an accumulation of small boulders in the channel upstream of the weir. On the downstream side of the spillway, there was evidence of erosion of the spillway channel, exposing two feet of the cutoff wall, Photograph 4.

Spillway discharge has eroded the channel immediately downstream of the spillway, Photograph 4, and there is some erosion on the channel banks. Boulders have been placed in the channel in an effort to protect it, Photograph 3. Friable, decomposed bedrock was exposed on the channel bottom. The channel curves toward the left a short distance downstream from the spillway, Photograph 5, and directs flow through a lightly wooded area at the vicinity of the toe of the dam, Photograph 6.

The emergency spillway was installed during Hurricane Diane, August 1955, before the existing spillway was constructed. The Owner lowered the embankment area to permit water to overtop the structure at that point. Discharge then washed out the emergency spillway. It was reported that the emergency spillway has not discharged water since then but surface runoff from the adjacent roadway has caused erosion in the channel, Photographs 8 and 9. Erosion in the channel has been occurring since 1966 and, apparently, repairs have been made in the area.

d. Reservoir. The side slopes of the reservoir are at a generally moderate slope and are generally vegetated. There is a sand swimming beach along the northern side of the reservoir. Very little debris were noted along the shore line and very little sediment was observed entering into the lake.

e. Downstream Channel. The stream channel downstream from the dam is approximately 4 feet wide with banks about one foot high. The channel flows through a relatively narrow flood plain with no major obstructions. The first house immediately downstream from the dam is about 17 feet above the channel bottom. Further downstream, about 300 feet, there are two additional houses about 12 feet above the bottom of the channel. About 600 feet downstream from the dam there are two houses whose first floors are six to eight feet above a roadway crossing the stream, Photograph 19. Normal stream flow is carried under the road through a 38-inch diameter culvert that is partially silted up. The culvert would not carry the spillway design flood and large discharges from the dam would flow over the road. Failure of Sun Valley Dam would cause

damage to these homes. Since no loss of life is envisioned, a "Significant" hazard classification for this structure is indicated.

3.2 Evaluation and Summary.

Inspection of the dam and appurtenant facilities indicates that little routine maintenance has been provided to the structure. The embankment is judged to be in poor condition consistent with the large trees and brush growing on the dam and excessive seepage noted at the embankment toe. If the dam were constructed according to specifications, the boulders in the downstream fill would be in a matrix of soil. However, the hollow sound of water flowing through the dam indicates there is no soil between boulders, perhaps as a result of piping. There are no complete records of previous inspections of this dam and its seepage, although there are indications (reservoir level cannot be maintained at normal pool elevation and a verbal report) that the quantity of seepage has increased. Therefore, this seepage should be carefully monitored for development of turbidity or an increase in flow. The quantity of seepage in the "white sand springs" may or may not have increased as a result of dam construction. While flow in the springs should be monitored, it probably does not represent an imminent threat to embankment stability as may the seepage through the dam.

The concrete spillway is assessed to be in good condition. The unprotected discharge channel is in fair condition with some erosion. At the present time spillway discharge does not threaten the dam but future maintenance may be required. The emergency spillway was not designed to pass large flows without erosion and is in poor condition. The spillway and the channel require protection from erosion.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures.

Normal operating procedures of Sun Valley Dam do not require a dam tender. All flow is discharged over the spillway into Pohopoco Creek. There is no minimum downstream flow requirement.

4.2 Maintenance of Dam.

Dam maintenance provided by the Owner is generally limited to mowing grass and removing debris as required.

4.3 Maintenance of Operating Facilities.

There are no operating facilities at this dam that require maintenance.

4.4 Warning Systems in Effect.

There are no formal warning systems or procedures established to be followed during periods of exceedingly heavy rainfall.

4.5 Evaluation.

It is judged that the current operating procedure, which does not require a dam tender, is a realistic means of operating Sun Valley Dam.

There are no written operational or maintenance procedures or any type of warning system. Maintenance and operating procedures should be developed, including a checklist of items to be observed and inspected on a regular basis.

Since a formal warning system does not exist, one should be developed and implemented during periods of extreme rainfall. This procedure should consist of a method of notifying residents downstream that potentially high flows are imminent or that dangerous conditions are developing.

SECTION 5

HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features.

a. Design Evaluation Data. Original design data is limited to the State's requirement that the spillway be designed to discharge not less than 730 cfs. The spillway as designed, 25 feet long, was estimated to have a capacity of 760 cfs. The small mountaintop watershed is 100 percent wooded with residential development limited to the lower 40 percent of the watershed. The watershed is about 1.5 miles long and about 4,000 feet wide in the upper reaches and 2,000 feet wide in the lower reaches, having a total area of 0.79 square mile. Elevations range from a high of 2,008 feet in the upper reaches to a normal pool elevation of about 1168. The runoff characteristics of the watershed are not expected to change significantly in the near future.

In accordance with criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Small" size dam and "Significant" hazard classification is the 100-Year Flood to one-half the Probable Maximum Flood. Based on the small capacity of the reservoir and the fact that no loss of life is likely during failure of this structure, the 100-year event has been selected as the spillway design flood.

b. Experience Data. No reservoir level records or rainfall records are maintained for this dam by the Owner. During Hurricane Diane, August 1955, the embankment was threatened with overtopping and the Owner lowered the embankment at the left end to create an emergency spillway. Subsequently, the existing spillway was installed and water has not discharged through the emergency spillway since then.

c. Visual Observations. At the time of the inspection, the conditions observed that would indicate a reduced spillway capacity during an extreme event are the lowered embankment crest reducing the head, and therefore spillway capacity, and the reduced spillway width. Other observations regarding the conditions of the downstream channel, spillway and reservoir are located in Appendix A and discussed in greater detail in Section 3.

d. Overtopping Potential. The overtopping potential of this dam was estimated by comparing spillway capacity and the calculated peak inflow value during a 100-year storm. The peak inflow value, about 390 cfs, was determined according to procedures contained in the Department of Environmental Resources, Water Resources Bulletin No. 13, "Floods in Pennsylvania". The combined discharge from the spillway and emergency

spillway with the reservoir level at the minimum embankment crest is estimated to be 265 cfs. If the entire embankment crest is raised to the design elevation, four feet above the spillway crest, including the emergency spillway at the left embankment area, the maximum spillway capacity is estimated to be 528 cfs.

e. Spillway Adequacy. The spillway for this structure is considered to be "Inadequate" as it will not pass the spillway design storm without overtopping the embankment. If the embankment were raised to design elevation, 4 feet above the concrete spillway crest, the spillway would be considered "Adequate".

f. Downstream Conditions. Discharge from Sun Valley Dam flows about 600 feet through a fairly narrow, wooded valley to the first downstream road. Between the dam and the first downstream road are three houses whose first floors range from 17 feet to 12 feet above the channel bottom. The two houses at the first downstream road have first floor elevations of eight and 10 feet above the channel bottom and six to eight feet above a roadway crossing the stream. The discharge is conveyed under the roadway through a 38-inch diameter culvert that is partially silted up; thus, large flows will flow over the roadway. Failure of Sun Valley Dam would result in property damage but loss of life is not envisioned. Therefore, a "Significant" hazard potential classification is indicated.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations. Visual observations indicate evidence of potential embankment instability which would result from overtopping or a piping failure of the dam. The downstream embankment slope, which is the right side of the emergency spillway discharge channel, is being eroded by surface runoff. The amount of seepage through the dam, together with the possibility of piping, cannot be considered to represent a stable condition as there are no records to provide a basis for evaluation. The lack of a permanent pool during the last three summers indicates the amount of seepage is increasing. Although there is no evidence of turbidity or migration of fines in the immediate vicinity of the dam, this seepage should be further evaluated by monitoring measurements to determine if it represents a potentially dangerous condition to the dam.

The concrete spillway structure is in good condition. Minor erosion has occurred behind the spillway wall. The additional erosion noted in the channel downstream from the spillway where there is no riprap or other erosion protection does not appear to threaten the embankment stability at this time.

b. Design and Construction Data. No design or construction data exists other than the observations and reports contained in the Department of Environmental Resources files. All data concerning the physical features of the dam were obtained from these reports, visual observations of the dam and conversations with the Owner's representative.

c. Operating Records. There are no operational records for this structure.

d. Post-Construction Changes. As discussed in Section 1.2, paragraph g, construction of Sun Valley Dam proceeded in stages from 1954 to 1968. Significant changes from the approved design include the installation of an emergency spillway and the reduced size of the concrete spillway.

e. Embankment Stability. There were no embankment stability evaluations in the file. Despite the fairly steep slopes for an embankment of this size, there were no external signs of slope movement or instability. However, symptoms of internal piping suggest that the embankment may be only marginally stable at this time.

f. Seismic Stability. The dam is located in seismic zone one. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake conditions. Since the dam may be only marginally stable at the present time under static loading conditions, it could reasonably be considered to be unstable under seismic loading conditions.

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment.

a. Evaluation. Visual inspection indicates that the embankment and emergency spillway of Sun Valley Dam are in poor condition and the spillway facility is in good condition. Internal piping may be acting to diminish the overall stability of the dam.

In accordance with the criteria established by Federal (OCE) Guidelines, the recommended spillway design flood for this "Small" sized dam and "Significant" hazard classification is the 100-Year Flood to one half of the Probable Maximum Flood. Based on the small capacity of the reservoir and the fact that no loss of life is likely during failure of the structure, the 100-year event has been selected as the spillway design flood.

Hydrologic and hydraulic computations presented in Appendix D indicate that the spillway structure is not capable of discharging the 100-year event. Thus, the spillway facilities of Sun Valley Dam are considered to be "Inadequate".

b. Adequacy of Information. The combined visual inspection and simplified calculations presented in Appendix D were sufficient to indicate that further investigations are required for this dam.

c. Urgency. It is recommended that the measures presented in Section 7.2 be implemented as specified.

7.2 Remedial Measures.

a. Facilities. It is recommended that the following measures be undertaken immediately. Items (1) through (4) should be performed under the supervision of a registered professional engineer experienced in the design and construction of dams.

- (1) The seepage at the toe of the dam and downstream from the dam should be monitored for the development of turbidity and increase in quantity. The influence of this seepage upon the stability of the dam should be evaluated and any indicated remedial action taken.
- (2) The spillway capacity should be increased to discharge the 100-year event without overtopping the

embankment. This can be accomplished by raising the entire embankment, including the emergency spillway area, to design elevation. If the emergency spillway is to remain, it should be evaluated from the standpoint of functioning safely during a storm, i.e. preventing erosion.

- (3) All trees and brush should be removed from the up- and downstream embankment slopes and from the crest of the dam. All embankment surfaces should be protected from erosion. Also, a vegetated growth should be established on the crest and upstream face of the dam above water level.
- (4) Procedures should be established to dewater the reservoir in the event of an emergency situation.
- (5) The erosion observed around the concrete spillway should be repaired and protection from erosion and/or foot traffic should be provided.

b. Operation and Maintenance Procedures. Because of the potential for property damage in the event of a failure, a formal procedure of observation and warning during periods of high precipitation should be developed and implemented for this facility. This procedure should be coordinated with local authorities and should include a method of warning downstream residents that high flows are expected. In addition, an operation and maintenance procedure should be developed to insure that all pertinent items are carefully inspected and maintained on a regular basis.

APPENDIX

A

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Sun Valley Dam
 County Monroe State Pennsylvania
 NDI# PA 00998 DER# 45-217 Type of Dam Earth
 Hazard Category Significant
 Date(s) Inspection March 17, 1981
 Weather Partly sunny Temperature 30's
 Pool Elevation at Time of Inspection 1166.6 M.S.L.
 Tailwater at Time of Inspection None M.S.L.

Inspection Personnel:

<u>Mary F. Beck</u>	<u>John H. Frederick, Jr., Principal</u>
<u>Richard E. Mabry</u>	<u>Vincent McKeever</u>
<u>Raymond S. Lambert</u>	<u>Paul F. Marano</u>

Mary F. Beck Recorder

Remarks:

Mr. William H. Cameron, Jr., was on site and provided assistance to the inspection team.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	NA	
STRUCTURE TO ABUTMENT/ EMBANKMENT JUNCTIONS	NA	
DRAINS	NA	
WATER PASSAGES	NA	
FOUNDATION	NA	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SURFACE CRACKS
CONCRETE SURFACES

NA

STRUCTURAL CRACKING

NA

VERTICAL AND
HORIZONTAL
ALIGNMENT

NA

MONOLITH JOINTS

NA

CONSTRUCTION
JOINTS

NA

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Minor	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None noted	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Damage has been caused by foot traffic at one location over the downstream embankment slope and adjacent to spillway. Erosion has occurred on downstream embankment slope in emergency spillway channel. Other slightly worn areas were observed over the up-and downstream edges of the embankment crest.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	See sheets 5A and 5C.	
RIPRAP FAILURES	No riprap included in design, upstream embankment slope benched at normal pool elevation.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

VEGETATION

Up- and downstream embankment slopes sparsely vegetated with grass and covered with trees up to 15 inches in diameter. Sparse grass is on embankment crest.

JUNCTION OF
EMBANKMENT
AND ABUTMENT,
SPILLWAY AND
DAM

Foot traffic has caused erosion between the right abutment and spillway and between the spillway and embankment. Junction between left abutment and embankment in good condition.

ANY NOTICE-
ABLE SEEPAGE

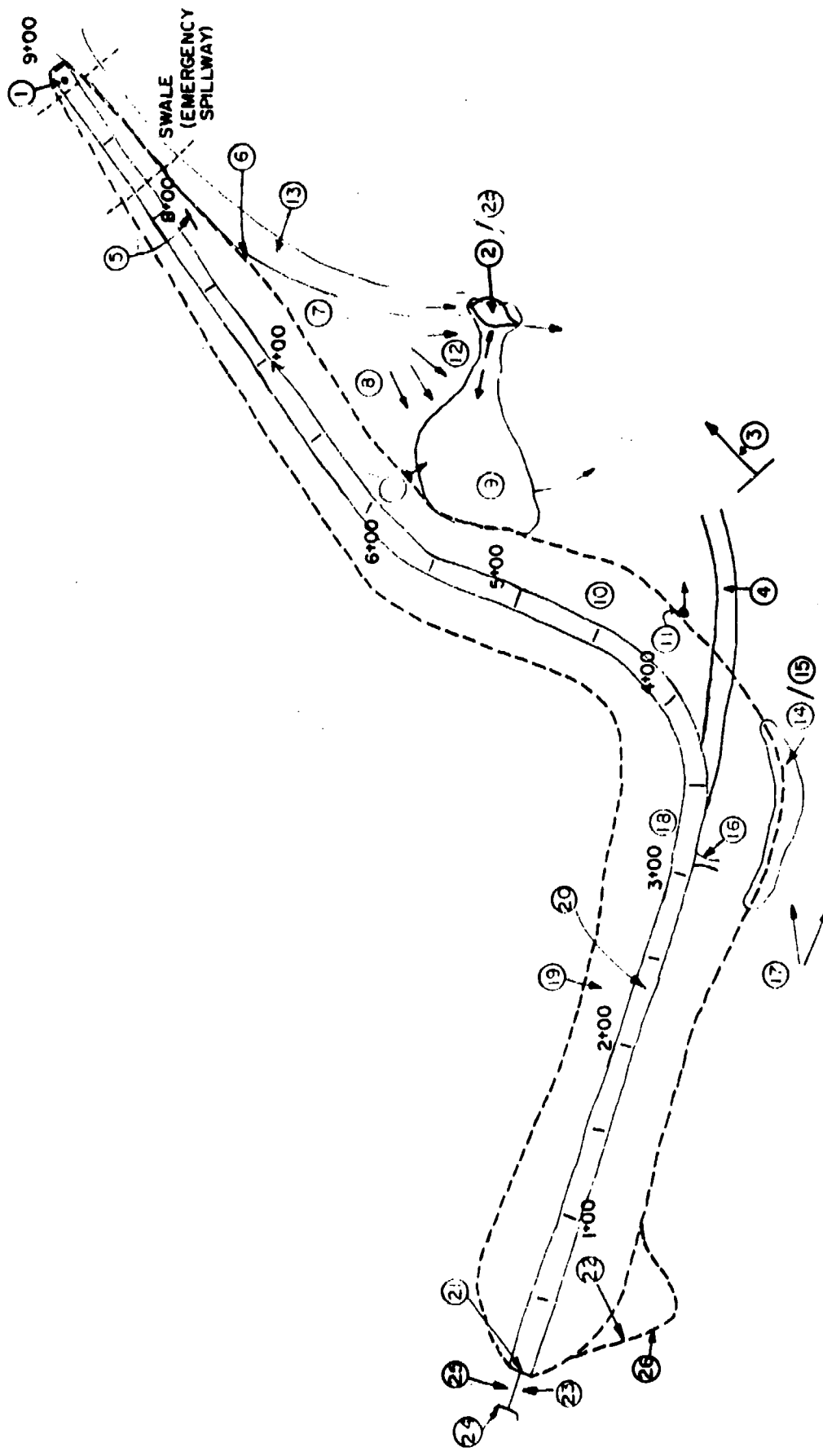
Excessive, see Sheet 5A.

STAFF GAGE
AND RECORDER

None.

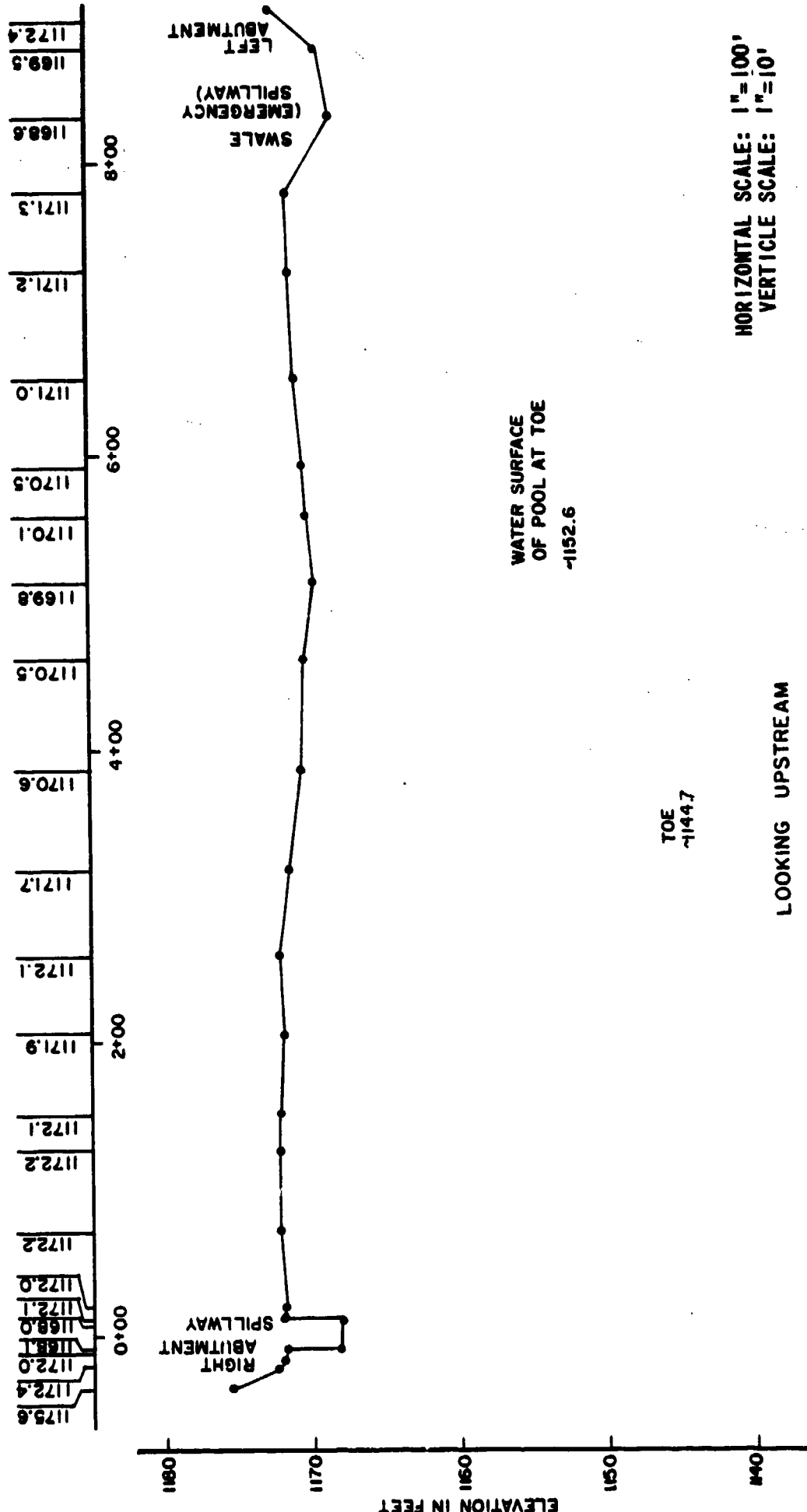
DRAINS

None.



FIELD OBSERVATION PLAN
SUN VALLEY DAM
SHEET 5A

1. Artesian well.
2. Location of spring shown on original site plan and
 - 2a. currently existing pond with large sand boils.
3. Downstream embankment slope and area beyond toe extremely uneven with some ridges approximately perpendicular to dam.
4. Path constructed on embankment slope.
5. Erosion under tree, Photograph 9.
6. Erosion and seeps along edge of channel.
- 7,8. Marsh and seeps.
9. Pool with small sand boils.
10. Trees and light underbrush on embankment slope.
11. Seep.
12. Marshy area.
13. Emergency spillway discharge channel.
14. Seepage through embankment.
15. Boulders included in downstream embankment fill material.
16. Approximate location of gully formed by foot traffic.
17. Spillway discharge spreads out, part flowing near embankment toe.
18. Embankment benched near spillway crest elevation.
19. Embankment becoming benched at lower pool level.
20. Very sparse grass on embankment crest, little or no damage to crest.
21. Minor cracking of spillway concrete.
22. No riprap as shown on design drawing.
23. Erosion in spillway channel and at downstream end of spillway.
24. Erosion.
25. Stones thrown upstream of weir by vandals.
26. Material, apparently excavated from spillway channel, forms spur dike deflecting spillway discharge away from toe.



OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CRACKING AND
SPALLING OF
CONCRETE
SURFACES IN OUTLET
CONDUIT

N/A

INTAKE STRUCTURE

N/A

OUTLET STRUCTURE

N/A

OUTLET CHANNEL

N/A

EMERGENCY GATE

N/A

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE WEIR

Appears in good condition with only minor cracking.

APPROACH CHANNEL

Rocks have been thrown into channel.

DISCHARGE CHANNEL

Erosion is occurring in spillway channel but does not threaten the dam at this time. The channel transitions into valley downstream of embankment allowing spillway discharge to flow toward embankment toe.

BRIDGE AND PIERS

The bridge over the spillway has no piers.

GATED SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
------------------------------	---------------------	-----------------------------------

TYPE		
------	--	--

	N/A	
--	-----	--

APPROACH CHANNEL		
------------------	--	--

	N/A	
--	-----	--

DISCHARGE CHANNEL		
-------------------	--	--

	N/A	
--	-----	--

BRIDGE AND PIERS		
------------------	--	--

	N/A	
--	-----	--

GATES AND OPERATION EQUIPMENT		
-------------------------------------	--	--

	N/A	
--	-----	--

INSTRUMENTATION

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

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SLOPES

Reservoir side slopes are moderate.

SEDIMENTATION

None observed, no debris in reservoir.

WATERSHED

Is completely wooded with residential development limited to lower 40 percent of watershed.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

Channel is about 4 feet wide with one-foot high banks. Channel meanders through flood plain with no major obstructions until the first downstream road.

SLOPES

The valley gradient is approximately 0.05%.

APPROXIMATE NO.
OF HOMES AND
POPULATION

The first house downstream of the dam is about 17 feet above the channel bottom. The second and third houses are about 12 feet above channel bottom. About 600 feet downstream of the dam are two houses whose first floors are 8 and 10 feet above the road across the stream where a 38-inch culvert would not carry the spillway design flood or discharge resulting from a breach.

APPENDIX

B

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Sun Valley DamNDI NO. PA 00998DER NO. 45-217

ITEM

REMARKS

AS-BUILT
DRAWINGS*None Available*REGIONAL
VICINITY
MAP*Plate 1, Appendix E*CONSTRUCTION
HISTORY*See text, Section 1.2*TYPICAL SECTIONS
OF DAM*Plate 2 , Appendix E*

OUTLETS - PLAN

Not Applicable

DETAILS

Not Applicable

CONSTRAINTS

*Not Applicable*DISCHARGE RATINGS *Not Applicable*

ITEM	REMARKS
RAINFALL/ RESERVOIR RECORDS	<i>None maintained by Owner</i>
DESIGN REPORTS	<i>None</i>
GEOLOGY REPORTS	<i>See Appendix F</i>
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	<i>No original studies, see Appendix D for Hydrology/Hydraulics evaluation</i>
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	<i>None</i>
POST CONSTRUCTION SURVEYS OF DAM	<i>None known</i>

ITEM	REMARKS
BORROW SOURCES	<i>Reservoir area</i>
MONITORING SYSTEMS	<i>None</i>
MODIFICATIONS	<i>None</i>
HIGH POOL RECORDS	<i>None</i>
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	<i>None, except state dam inspection reports</i>
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	<i>None</i>
MAINTENANCE OPERATION RECORDS	<i>None</i>

ITEM	REMARKS
------	---------

SPILLWAY PLAN	<i>See Appendix E</i>
---------------	-----------------------

SECTIONS

DETAILS

OPERATING EQUIPMENT PLANS AND DETAILS
--

None

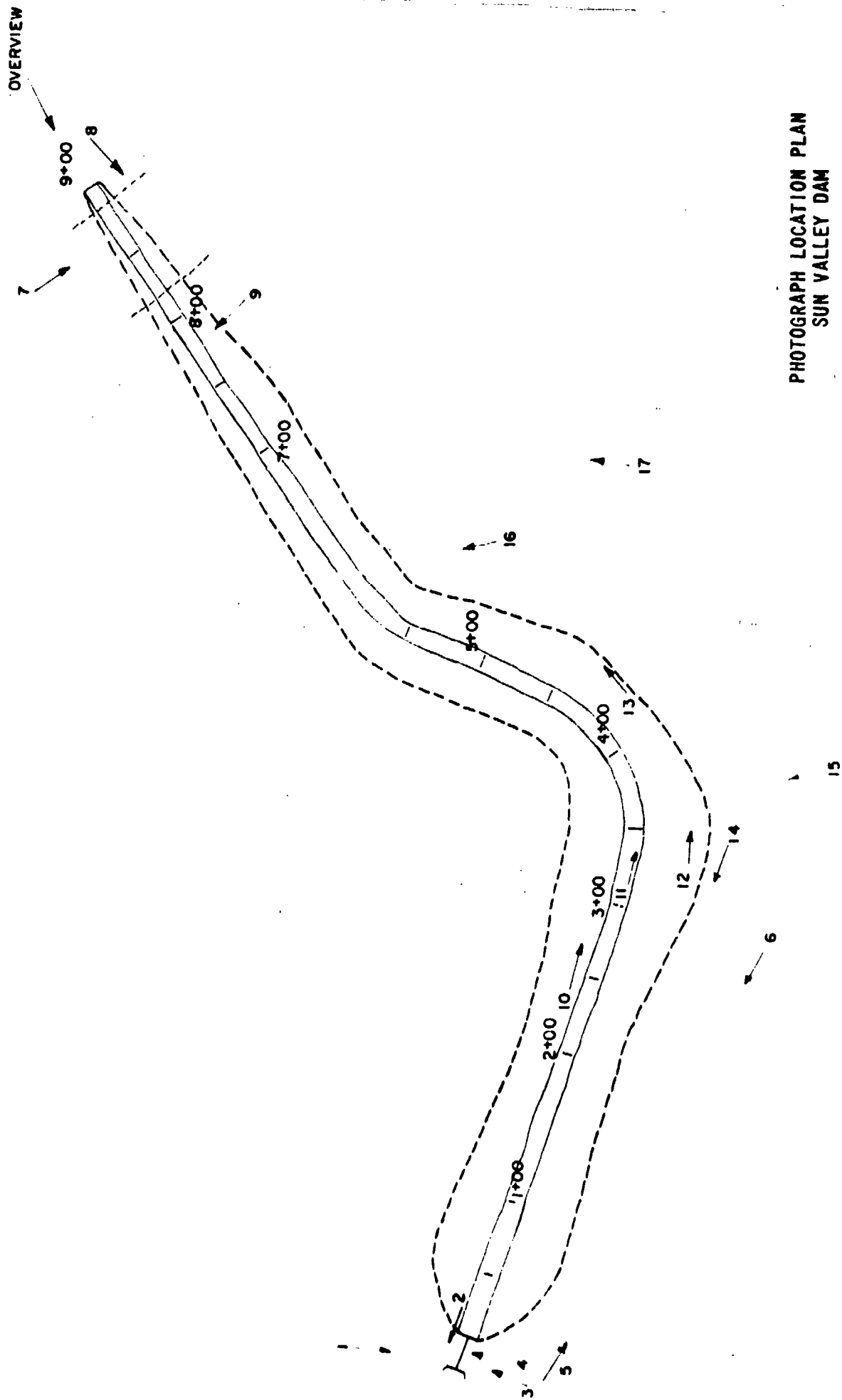
MISCELLANEOUS

The following are located in the DER files:

- 1. Preliminary and revised construction plans for dam and spillway.*
- 2. Construction specifications.*
- 3. Application to construct a dam, submitted by William H. Cameron, Jr., March 22, 1954.*
- 4. "Report Upon the Application of William Hall Cameron, Jr.", March 29, 1954.*
- 5. Permit to construct dam, April 14, 1954.*
- 6. Several memoranda of state inspections of dam during construction and after completion, 1954 through 1968.*
- 7. Correspondence between state and owner and owner's engineer.*
- 8. Applications for, reports upon, and extensions of construction permit.*
- 9. Two black and white photographs.*

APPENDIX

C



PHOTOGRAPH LOCATION PLAN
SUN VALLEY DAM

PLATE C-1



UPSTREAM SIDE OF SPILLWAY AT RIGHT ABUTMENT.

PHOTOGRAPH 1



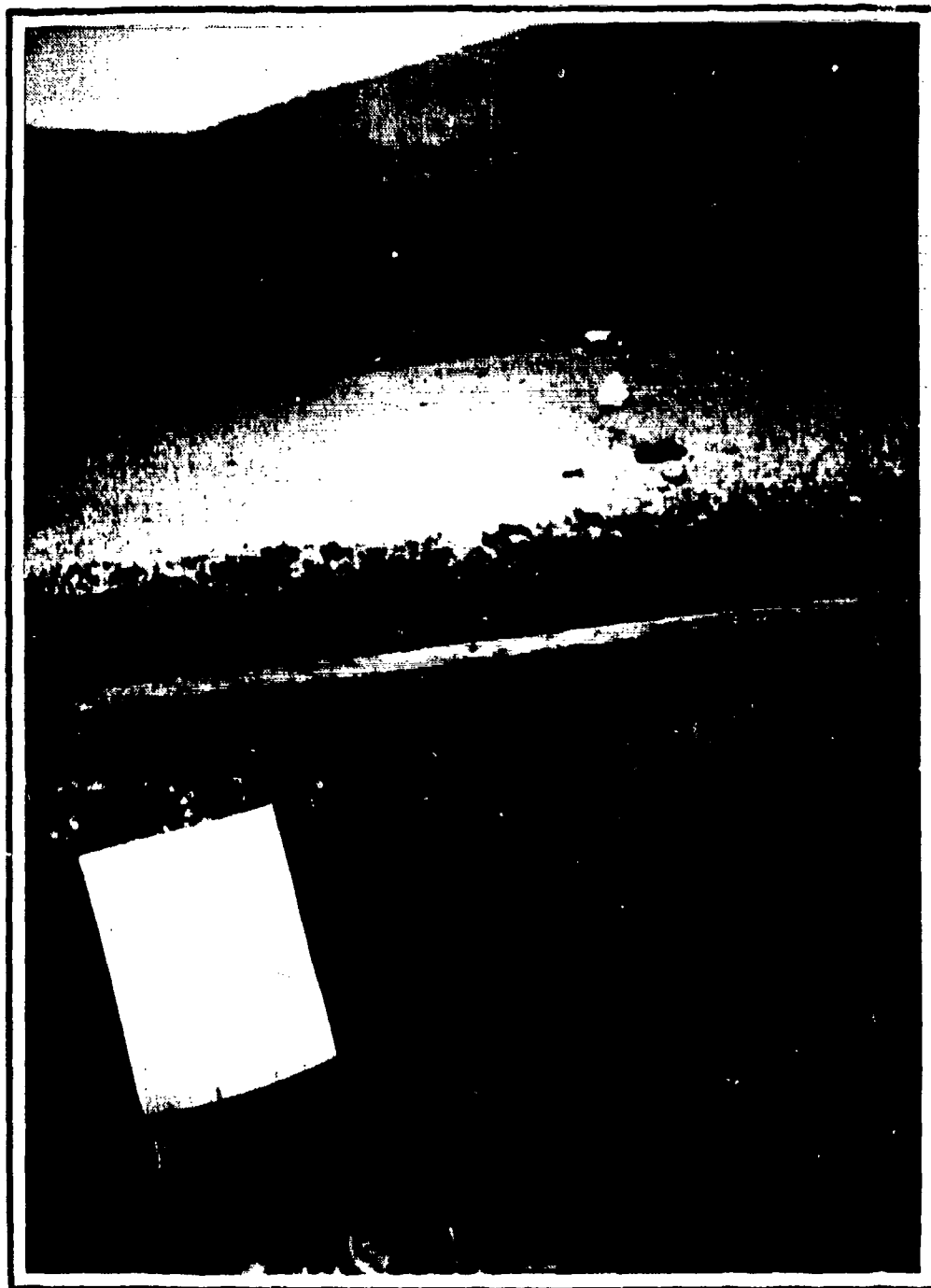
STAINS ON CONCRETE SHOW PREVIOUS NORMAL WATER LEVEL.

PHOTOGRAPH 2



SPILLWAY FROM DOWNSTREAM SIDE.

PHOTOGRAPH 3



PROGRESSIVE EROSION AT
DOWNSTREAM SPILLWAY APRON.

PHOTOGRAPH 4



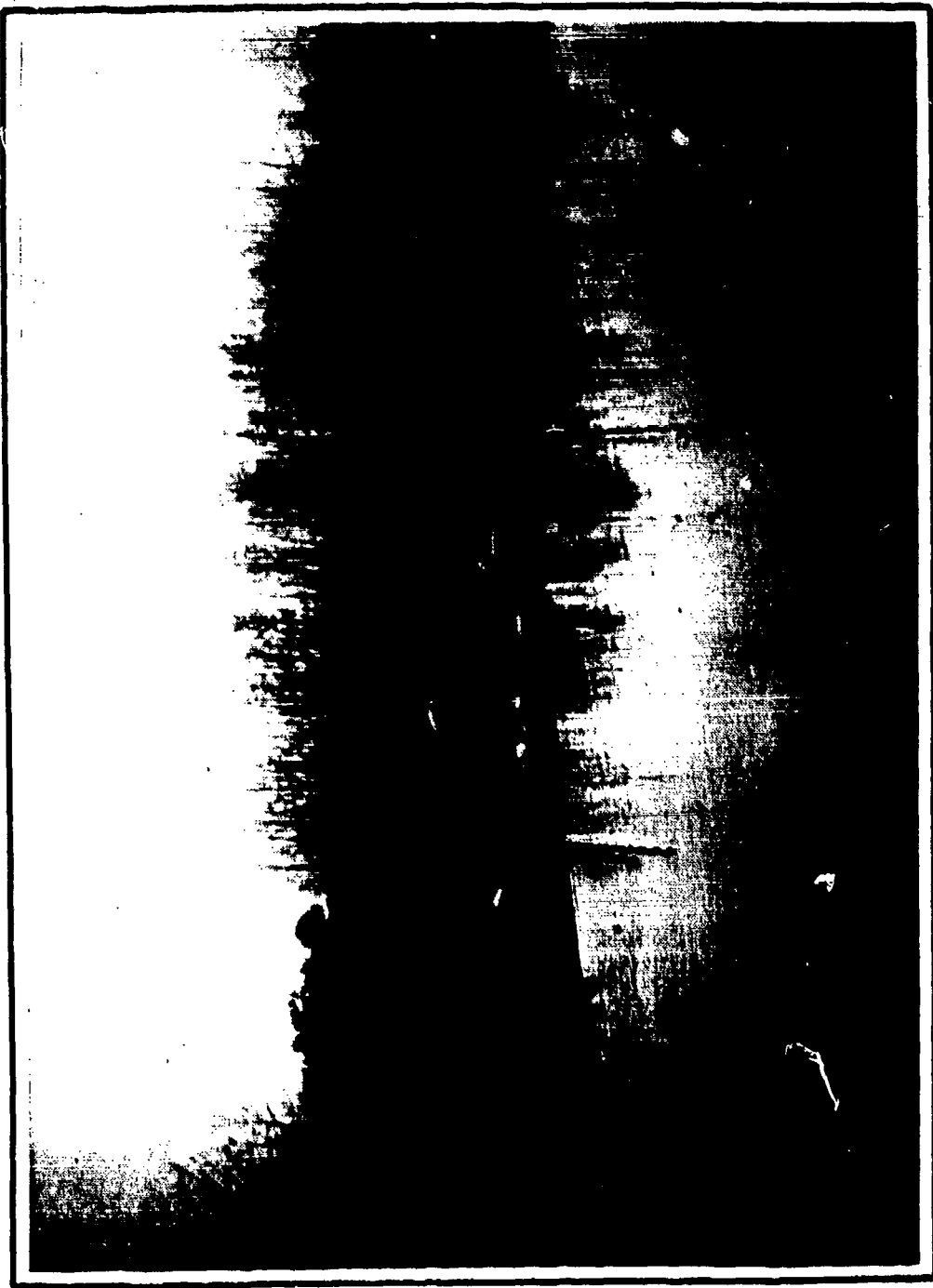
SPILLWAY DISCHARGE CHANNEL.

PHOTOGRAPH 5



OUTLET OF SPILLWAY DISCHARGE CHANNEL.

PHOTOGRAPH 6



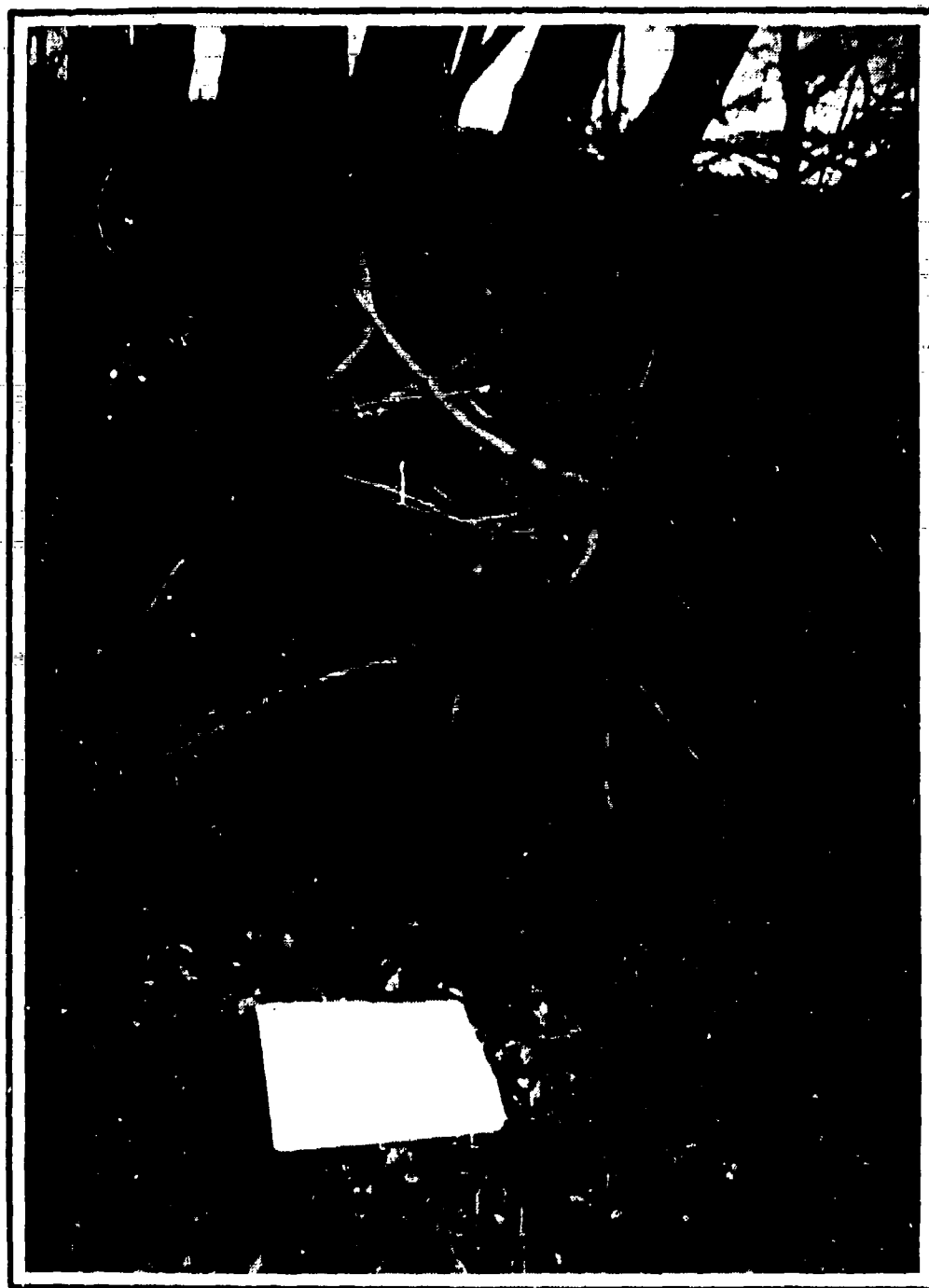
LEFT END OF EMBANKMENT LOWERED TO CREATE AN EMERGENCY SPILLWAY.

PHOTOGRAPH 7



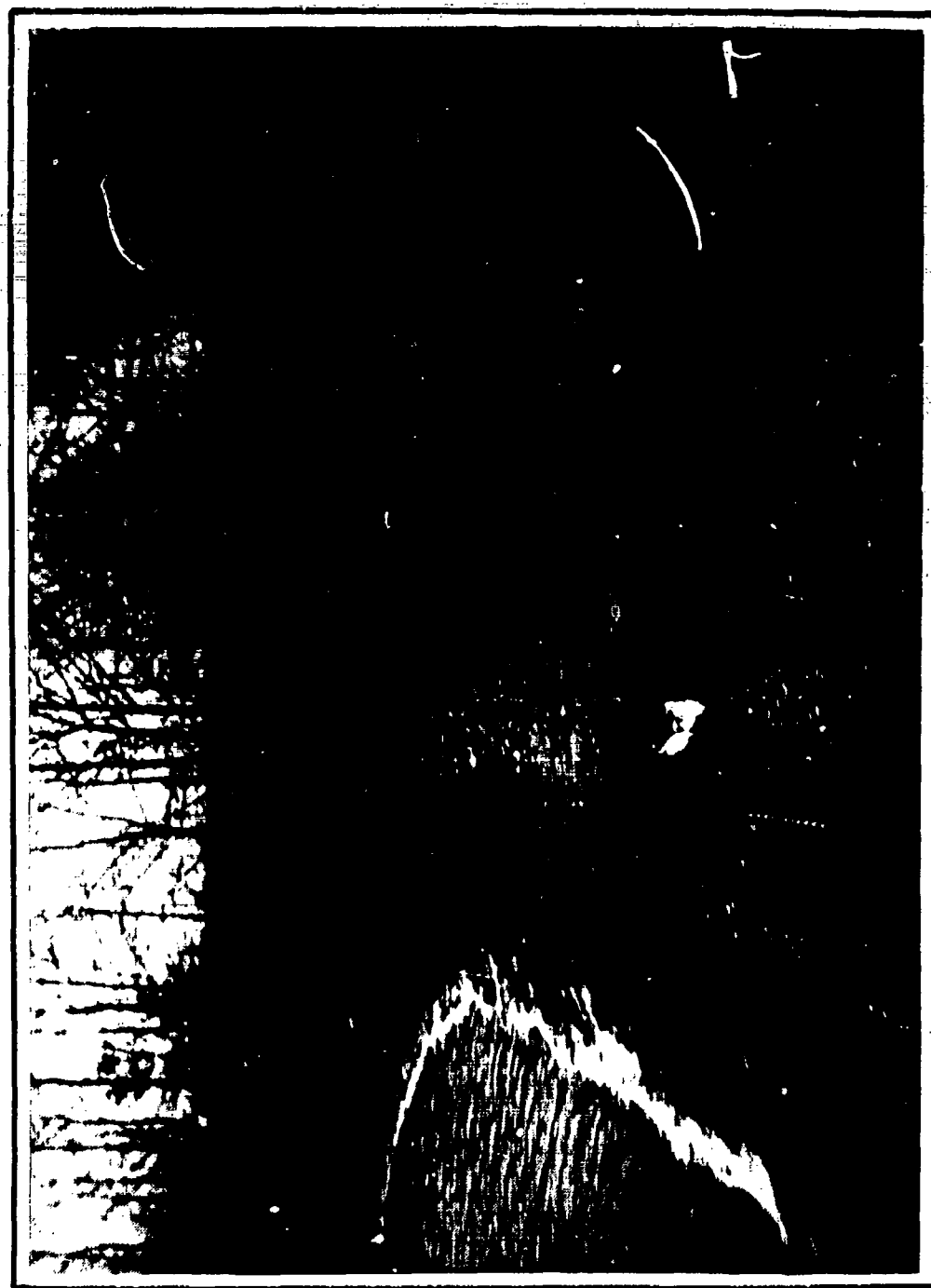
EMERGENCY SPILLWAY AND CHANNEL.

PHOTOGRAPH 8



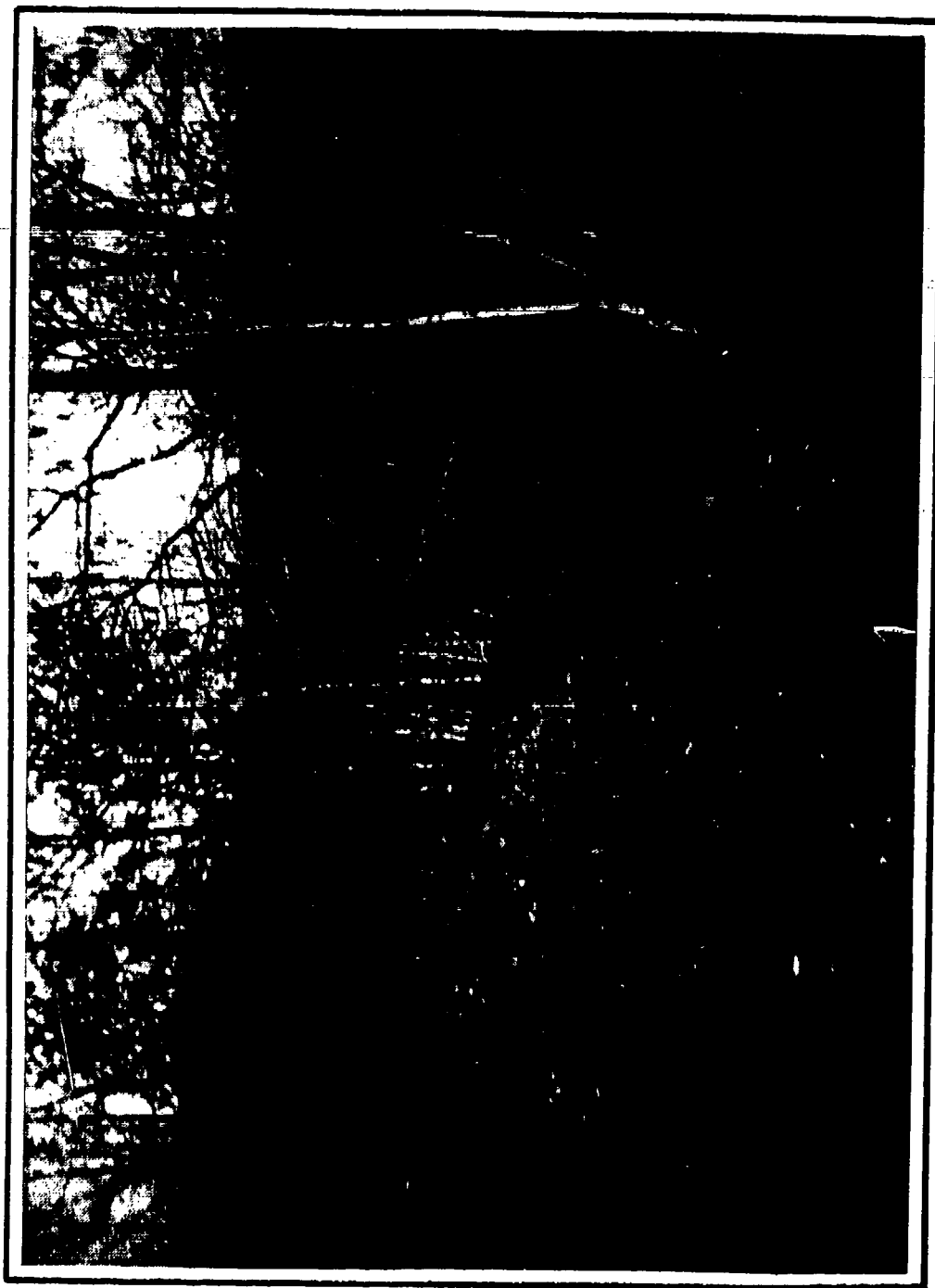
EROSION IN EMERGENCY SPILLWAY DISCHARGE CHANNEL.

PHOTOGRAPH 9



UPSTREAM EMBANKMENT SLOPE.

PHOTOGRAPH 10



VIEW OF CREST AND PATH CONSTRUCTED ON DOWNSTREAM EMBANKMENT SLOPE.

PHOTOGRAPH 11



VIEW OF BOULDERS AND TREES ON DOWNSTREAM EMBANKMENT SLOPE.

PHOTOGRAPH 12



DOWNSTREAM EMBANKMENT SLOPE.

PHOTOGRAPH 13



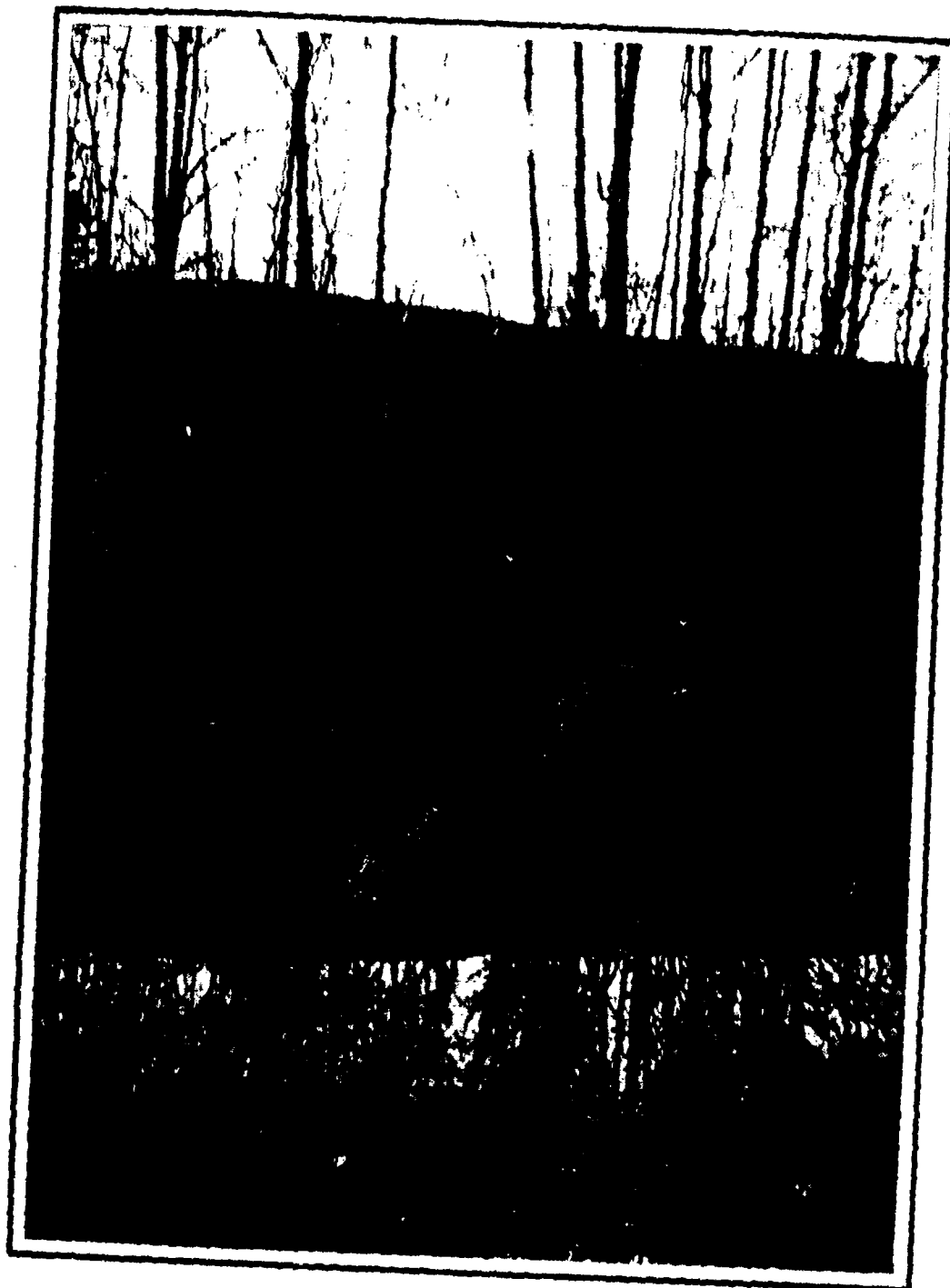
AREA OF SEEPAGE AT DOWNSTREAM TOE.

PHOTOGRAPH 14



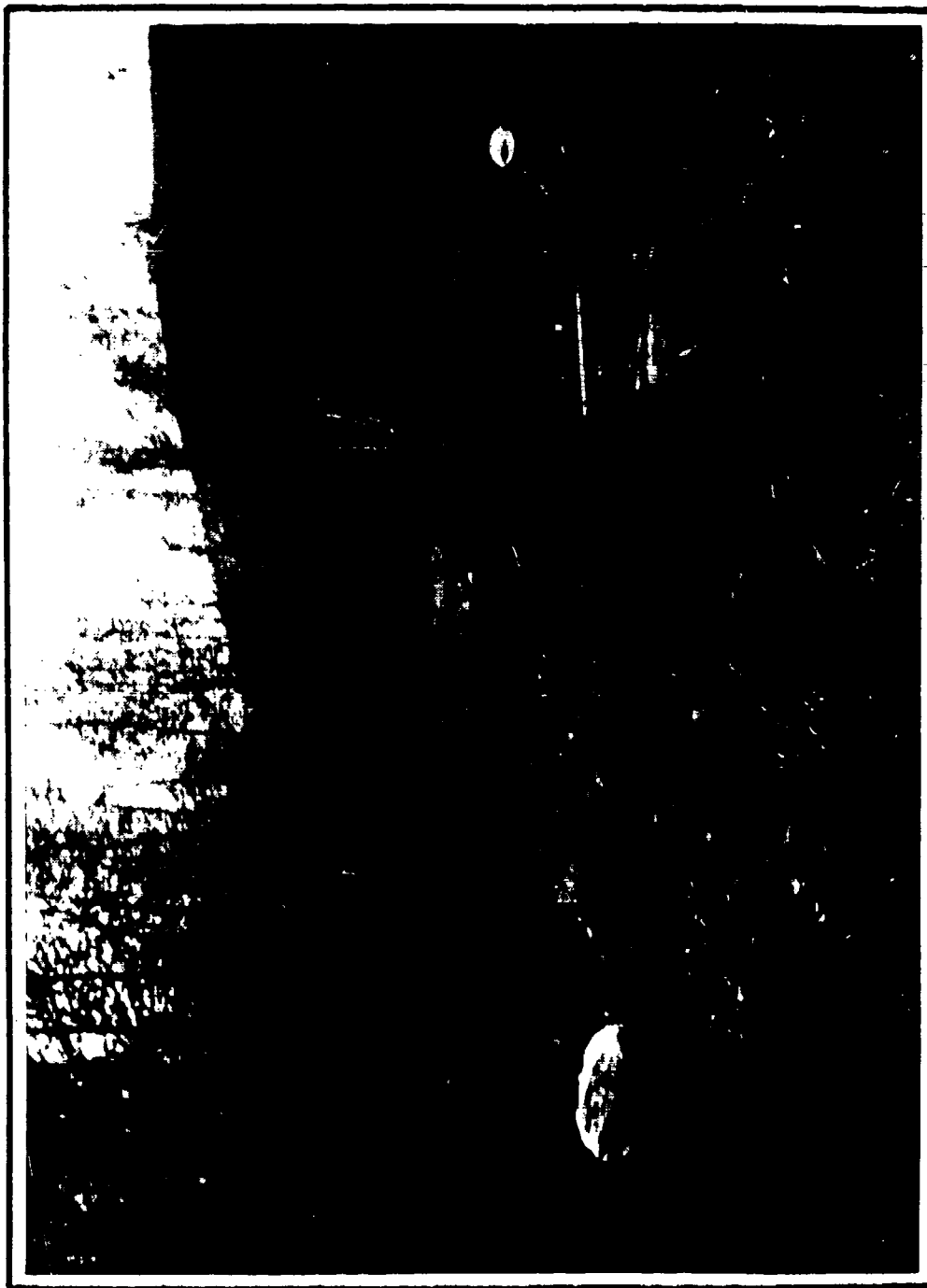
SEEPAGE THROUGH RIGHT HALF OF DAM ONLY.

PHOTOGRAPH 15



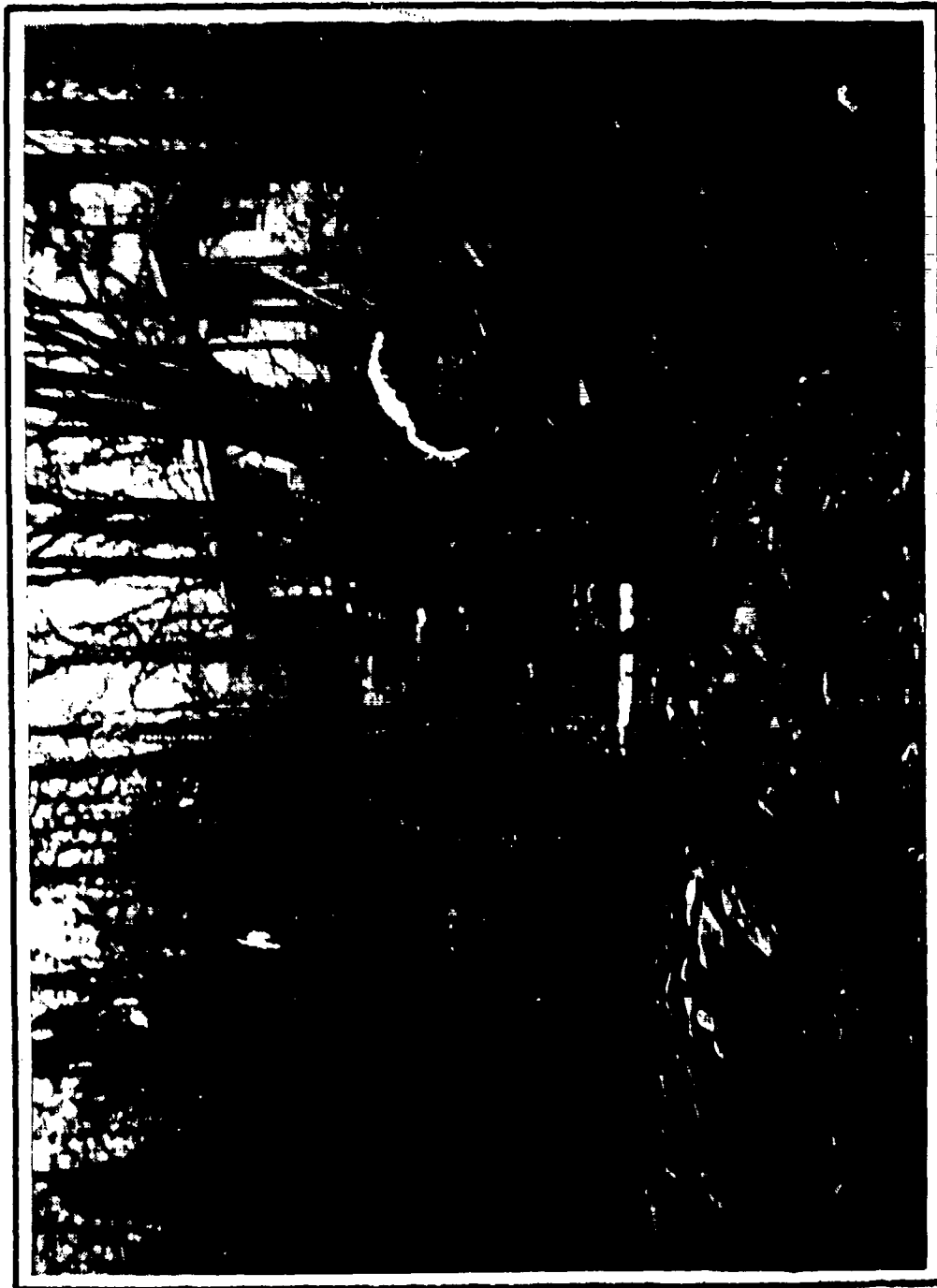
SPRING FED POOL AT DOWNSTREAM TOE.

PHOTOGRAPH 16



DISCHARGE FROM POOL SHOWN IN PHOTOGRAPH 16.

PHOTOGRAPH 17



DOWNSTREAM HOUSE ABOUT TEN FEET ABOVE CHANNEL BOTTOM.

PHOTOGRAPH 18

APPENDIX

D

SUN VALLEY DAM
CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

Sheet 1 of 5

DRAINAGE AREA

CHARACTERISTICS small, wooded, mountain top, residential develop-
ment limit to lower 40%

ELEVATION NORMAL

POOL (STORAGE CAPACITY): 1168.0 ft. (32 Ac-Ft)

ELEVATION TOP FLOOD CONTROL POOL

(STORAGE CAPACITY): 1169.8 ft. (41 Ac-Ft)

ELEVATION MAXIMUM DESIGN POOL: 1170.0 ft.

ELEVATION TOP DAM: 1169.8 ft.

SPILLWAY

a. Elevation 1168.0 ft.

b. Type concrete Ogee-type weir

c. Width 20 ft.

d. Length --

e. Location Spillover right abutment

f. Number and Type of Gates none

OUTLET WORKS:

a. Type none

b. Location N/A

c. Entrance inverts N/A

d. Exit inverts N/A

e. Emergency draindown facilities N/A

HYDROMETEOROLOGICAL GAGES:

a. Type none

b. Location N/A

c. Records N/A

MAXIMUM NON-DAMAGING DISCHARGE: not determined

Spillway crest elevation assumed to be 1168 from USGS map. All other elevations are relative to this elevation.

BY _____ DATE _____ SUBJECT _____ SHEET 2 OF 5
CHKD. BY _____ DATE _____ Sun Valley Dam JOB No. _____
Hydrology / Hydraulics

Drainage Area - 0.79 sq. miles, measured from USGS map

Spillway Design Storm - 100-yr event

Peak Inflow Value - 508 cfs, sheet 4

Spillway Capacity

Concrete Ogee-type

159 cfs, existing, sheet 3

528 cfs, at design head, sheet 3

Emergency

106 cfs, existing, sheet 4

BY MEB DATE 4/24/91
CHKD. BY REM DATE 6/4/91

SUBJECT Sun Valley Dam
Hydrology / Hydraulics

SHEET 3 OF 5
JOB No. _____

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

1. The hazard classification is rated as "Significant" as there would be appreciable economic loss with few or no lives lost in the event of failure of the dam.
2. The size classification is "Small" based on its $25 \pm$ ft. height and less than 1000 A-Ft total storage capacity.
3. The selected spillway design flood, based on size and hazard classification, is the 100yr event.

Hydrology and Hydraulic Analysis

1. Original Data.

The state specified the spillway capacity be equal to 730 cfs (or 850 cfs/sq mile). The approved spillway was 25 ft. long with an estimated capacity of 760 cfs.

$$Q = CLH^{3/2}$$

where Q = capacity of 760 cfs

$$L = 25 \text{ ft.}$$

$$H = 4 \text{ ft. From approved drawing}$$

$$760 = C \cdot 25 \cdot 4^{3/2}$$

$$C = 3.3$$

2. Evaluation Data.

Elevation-Discharge Data -

Concrete Spillway

$$Q = CLH^{3/2}$$

where: $L = 20 \text{ ft.}$ field measured

$C = 3.3$ Ref. Breter & King, Handbk of Hydraulics, 6th ed.

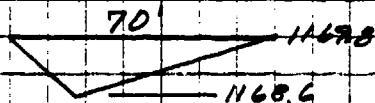
$$Q = 3.3 \cdot 20 \cdot (116.88 - 116.0)^{3/2}$$

Table 5.3

$$= 159 \text{ cfs existing conditions; design } Q = 3.3 \cdot 20 \cdot 4^{3/2} = 528$$

Emergency Spillway

Discharge through the emergency spillway is estimated using a simplified flow area and critical depth relationships.



(see sheet 5C, App. A)

$$H_e = 116.88 - 116.6 = 0.2'$$

$$H_e = \frac{Q^2}{gA^3}$$

ref. King & Breter Handbk of Hydraulics, 6th ed.

BY MEB DATE 7/13/81

SUBJECT

SHEET

OF 5CHKD. BY CSM DATE 7/14/81Sun Valley Dam

JOB No.

Hydrology/HydraulicsAssume $d_c = 0.96$ then top width $T = \frac{0.96}{1.2} \cdot 70 = 56'$ Flow area $A = \frac{1}{2} \cdot 0.96 \cdot 56 = 26.88'$ $H_c = 0.96 + \frac{26.88}{12 \cdot 56} = 1.2' \text{ OK}$ Discharge = $A \sqrt{g H/T}$ $= 26.88 \sqrt{32.2 (26.88)/56}$ $= 106 \text{ cfs}$ Elevation - Storage Data

Surface areas were measured from the drawing enclosed as Plate 2, Appendix E, and from USGS map. The surface area and normal pool elevation was used to convert the assumed datum elevations from Plate 2 to USGS datum. Surface areas above 1170 ft. are estimated. Volumes are estimated by the conic method.

$$\Delta V = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2}) \text{ where } h = \text{the vert. dist. between 2 surface areas}$$

elevation ft.	surface area A_c	capacity $A_c \cdot \text{ft}$
1147	0	0
1160	1.8	8
1164	2.9	17
1168	4.6	32
1170	5.8	42
1172	6.9	55
1174	8.5	70

Normal Pool

Design top of Dam

Existing top of dam - #1 $A_c - \text{ft}$

100-yr storm peak inflow value estimated according to procedures contained in DER Water Resources Bulletin No. 13, Floods in Pennsylvania.

The site is located in Flood-Frequency Region 5 (Plate 1)

$Q_{100} = 42.2 A^{0.751} P_1^{0.744}$
where A = watershed area, 0.79 sq miles

$P_1 = 51 - 26$ (Plate 2)

$Q_{100} = 380 \text{ cfs}$

BY HFB DATE 2/13/81

SUBJECT

SHEET 5 OF 5CHKD. BY REM DATE 7/14/81Sun Valley Dam

JOB No.

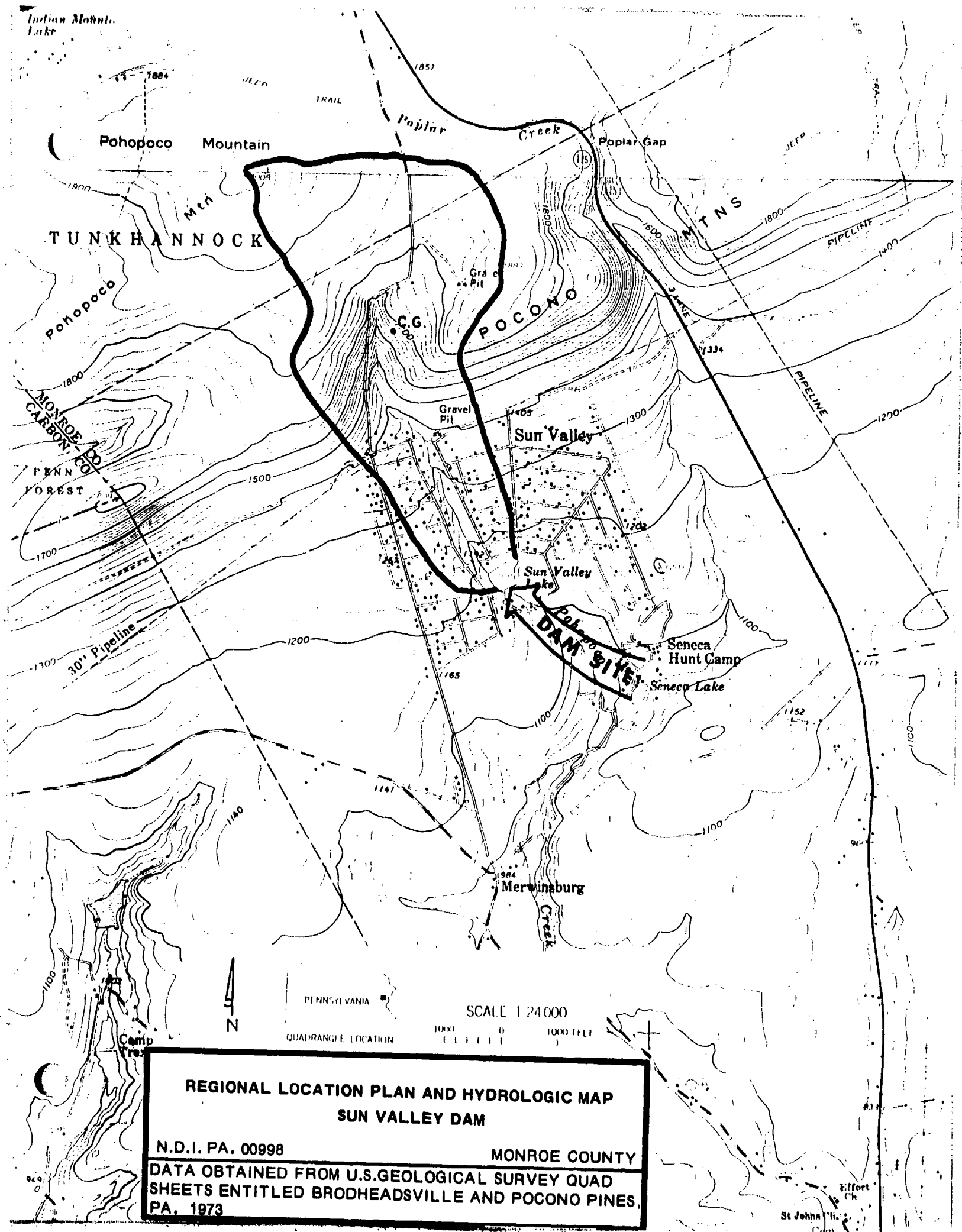
Hydrology / Hydraulics

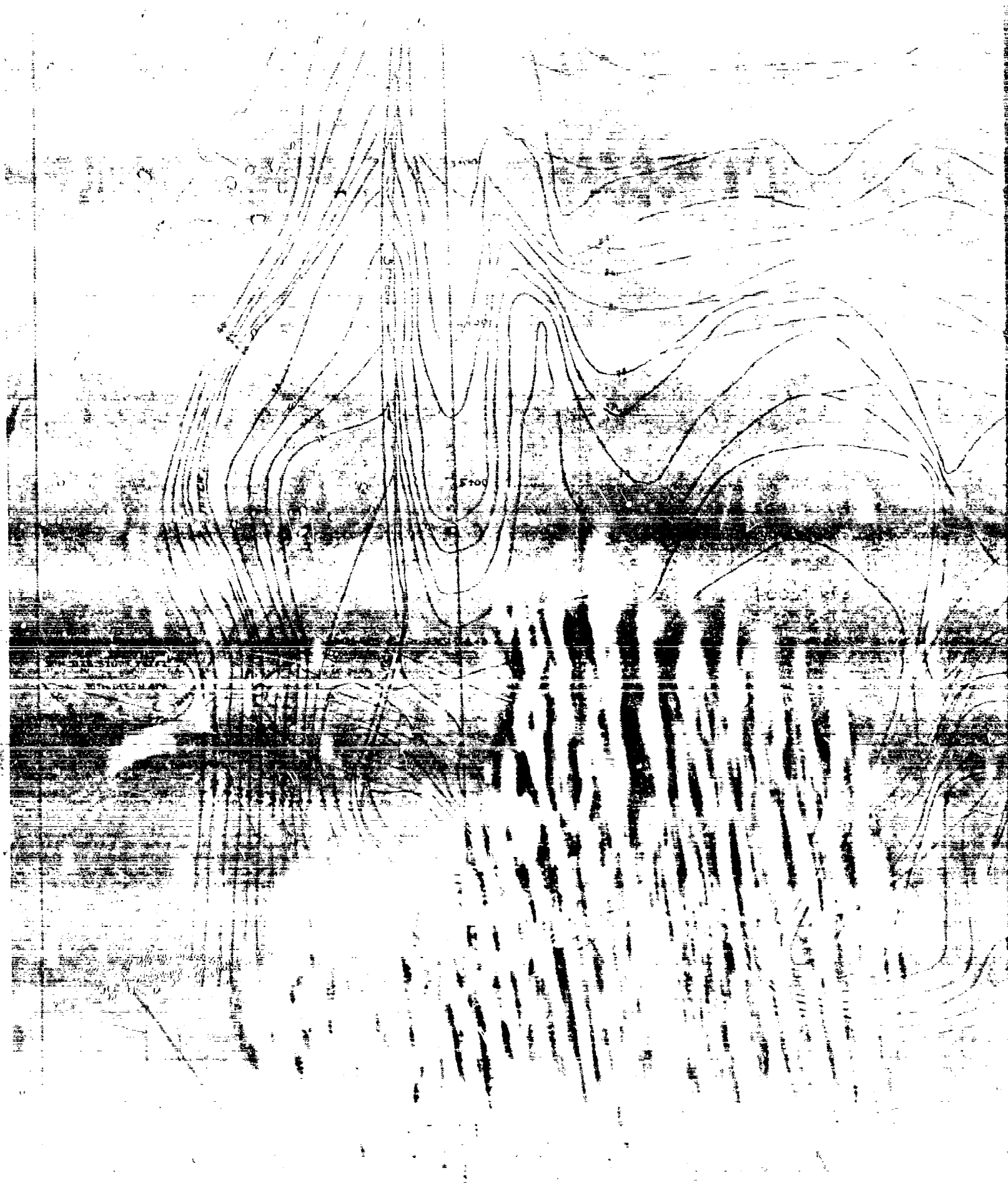
3. Spillway Adequacy

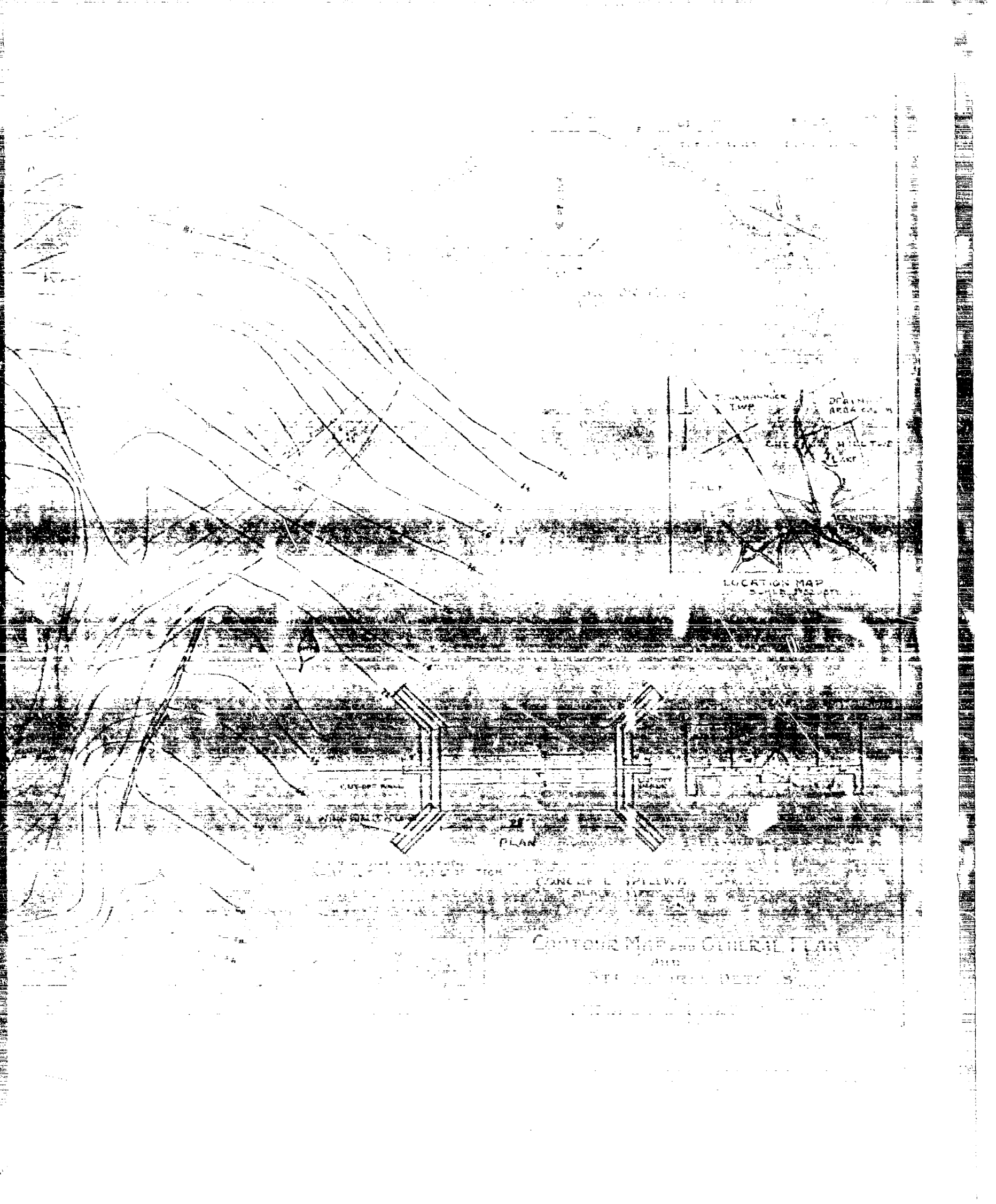
As the peak inflow value, 3.88 cfs, is greater than the combined spillway discharge, $1.59 + 1.06 = 2.65$ cfs, the embankment is expected to overtop during a 100-yr event and the spillway is considered "inadequate".

APPENDIX

E







APPENDIX

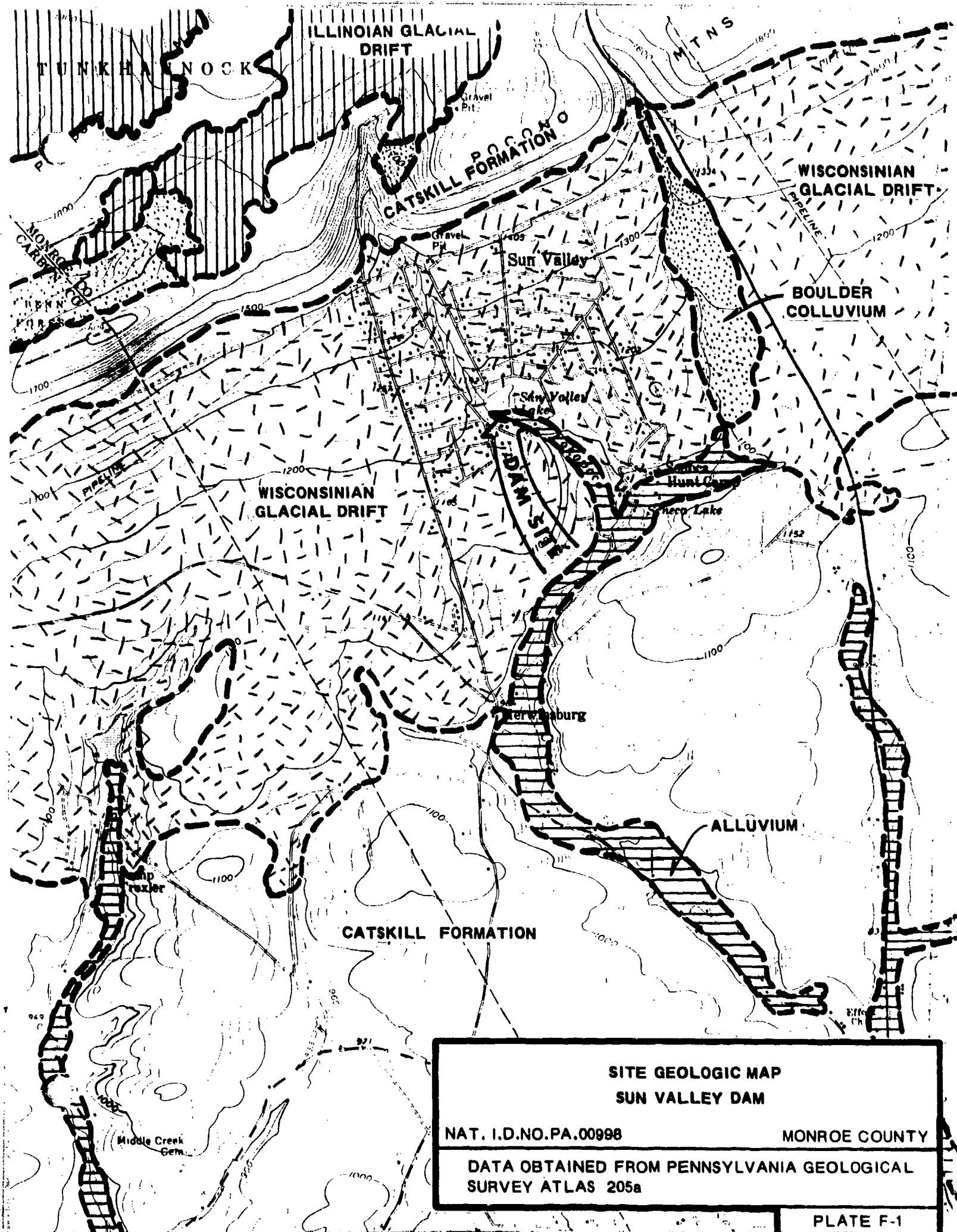
F

SUN VALLEY DAM

SITE GEOLOGY

Sun Valley Lake Dam is located in the Appalachian Mountain section of the Valley and Ridge physiographic province in an area adjacent to the Pocono Plateau section of the Appalachian Plateaus physiographic province. As shown on Plate F-1, the dam site and much of the surrounding areas are underlain by Pleistocene (Wisconsinian) age glacial drift and alluvium of Recent age. These deposits consist of varying amounts of gravel, sand, silt and clay. A limited exposure of bedrock along Pohopoco Creek downstream of the principal spillway was noted during the field inspection. The rock exposure consists of tan to red-brown siltstone and sandy siltstone of the Long Run Member of the Upper Devonian age Catskill Formation. Bedding strikes approximately N 80° E dipping 73° south (downstream). Jointing strikes N 55° W and N 10° W dipping near vertical.

Consistent with the variable compositional character of glacial deposits, there exists a potential for reservoir seepage through these deposits in addition to seepage along the relatively shallow soil-bedrock interface.



**SITE GEOLOGIC MAP
SUN VALLEY DAM**

NAT. I.D.NO.PA.00998

MONROE COUNTY

DATA OBTAINED FROM PENNSYLVANIA GEOLOGICAL
SURVEY ATLAS 205a

PLATE F-1