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NATIONAL DAM INSPECTION PROGRAM. SILVER CREEK DAM, NDS ID NUMBE--ETC(U)
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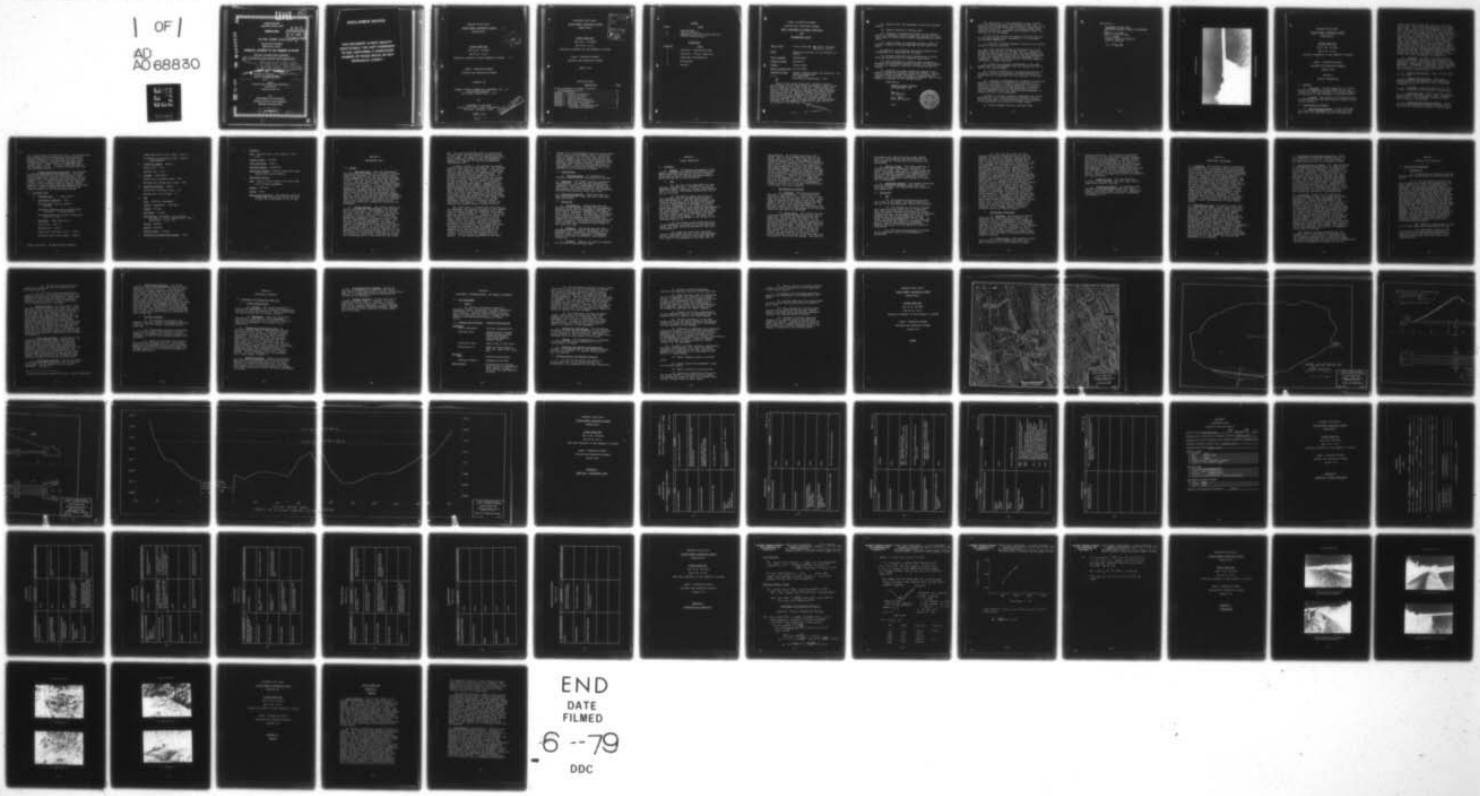

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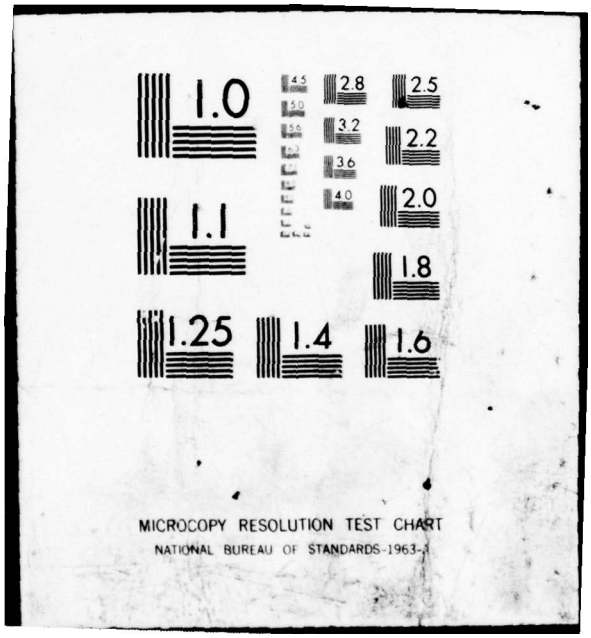
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DELAWARE RIVER BASIN
SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID NO. PA-00665
DER ID NO. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Silver Creek Dam, NDS ID Number PA-00665, DER ID Number 54-23. Municipal Authority of the Township of Blythe. Delaware River Basin, Silver Creek, Schuylkill County, Pennsylvania. Phase I Inspection Report.

73 p.

Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

411004

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

AUGUST 1978

411004

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DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

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MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

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DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

C O N T E N T S

PLATES

APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Silver Creek Dam (NDS ID No. PA-00665; DER ID No. 54-23)
Owner:	Municipal Authority of the Township of Blythe
State Located:	Pennsylvania
County Located:	Schuylkill
Stream:	Silver Creek
Date of Inspection:	28 June 1978
Inspection Team:	Gannett Fleming Corddry and Carpenter, Inc. Consulting Engineers P.O. Box 1963 Harrisburg, Pennsylvania 17105

Based on the visual inspection, available records, calculations and past operational performance, Silver Creek Dam is judged to be in fair condition. The spillway and the low overbanks adjacent to the spillway have sufficient capacity to pass the Probable Maximum Flood (PMF) without overtopping the dam. Based on criteria established for these studies by the Department of the Army, Office of the Chief of Engineers (OCE), the spillway capacity is rated as adequate. The existing spillway and the adjacent overbanks can accommodate a flood with a peak inflow of 115 percent of the PMF peak flow.

(2) Remove brush from embankment slopes and spillway channel.

(3) Repair concrete on spillway weir.

(4) Construct a diversion structure in the stream channel or otherwise provide a means for testing all valves on at least an annual basis without contaminating the water supply.

(5) Install valves or otherwise develop a means of rapidly closing off the upstream ends of the outlet conduits.

In addition, the following operational measures are recommended to be undertaken by the Owner:

(1) Provide round-the-clock surveillance of Silver Creek Dam during periods of unusually heavy rains.

(2) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

(3) Implement an annual inspection program of all project features and maintain inspection records. Special attention should be given each year to reevaluating the capacity of the spillway and adjacent overbanks based on the change in character of the overbank growth.

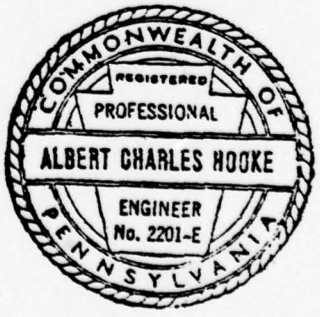
Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

ACHooke

A. C. HOOKE
Head, Dam Section

Date:



The combination of steep embankment slopes, particularly the downstream slope, and seepage are such that it is believed that the embankment does not have a large margin of safety for stability. A change in conditions from those observed during this inspection could adversely affect the stability of the embankment.

In view of the concern for safety of Silver Creek Dam, the following measures are recommended to be undertaken by the Owner immediately:

(1) Develop a detailed emergency operation and warning system for Silver Creek Dam.

(2) Clear the area along the downstream toe of the embankment and identify all seepage outlets. Construct a system of channels and weirs so that flow measurements can be made for all seepage points and so that any accumulation of soils that might be coming from the embankment can be recognized. Monitor and record data so that any change in conditions is readily apparent.

(3) Install two or more inclinometers in the downstream slope of the embankment near the maximum section to monitor any slope movement.

(4) Install piezometers in the downstream portion of the dam to establish the phreatic surface and along the downstream toe to determine the exit gradient of the seepage.

(5) Undertake an embankment and foundation exploration program to ascertain the engineering properties of the materials and perform a study to determine the factor of safety for stability of the embankment and to determine the piping susceptibility of the embankment materials. Take any remedial action that might be found necessary to ensure stability of the embankment.

In order to correct operation, maintenance and repair deficiencies, and to more accurately determine the condition of the dam, the following measures are recommended to be undertaken by the Owner in a timely manner:

(1) Repair damaged riprap on upstream slope.

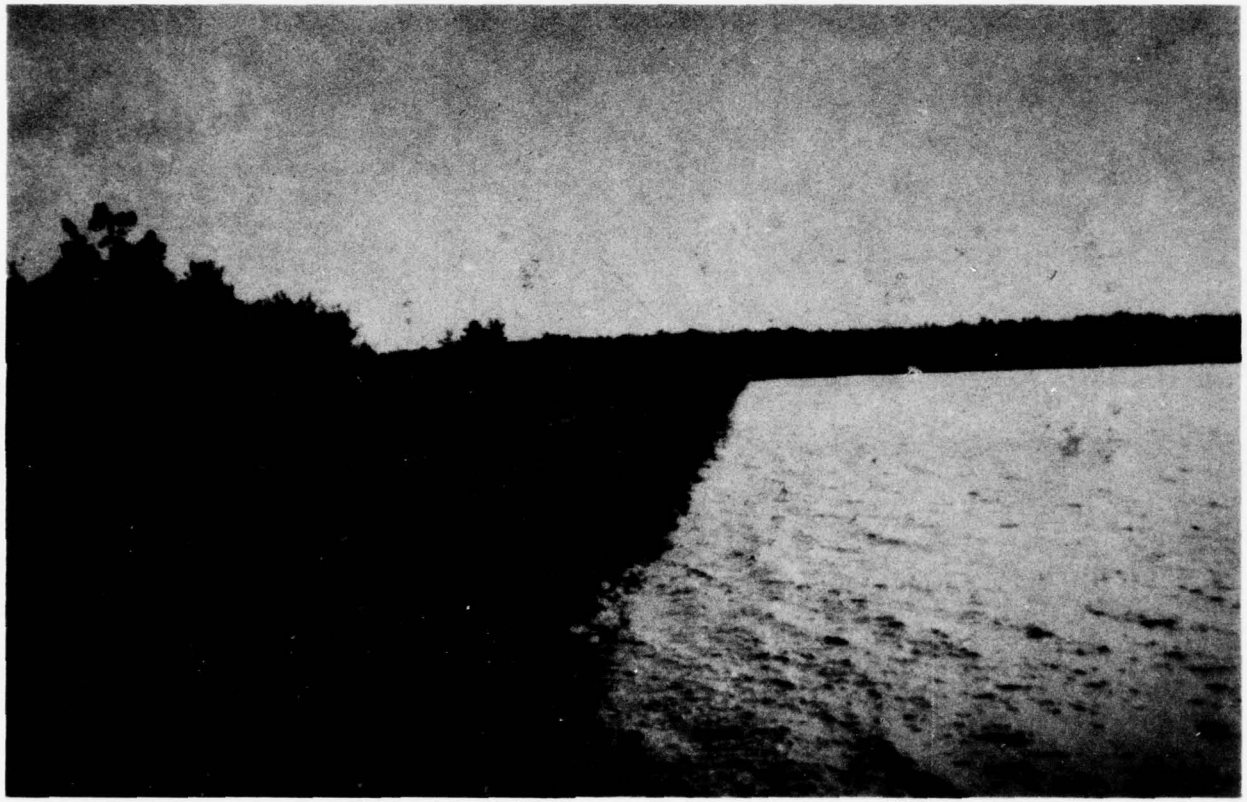
Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

G. K. WITHERS
Colonel, Corps of Engineers
District Engineer

Date: 8 Sep 78

SILVER CREEK DAM



View from Left Abutment

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

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. Silver Creek Dam is an earthfill embankment 38 feet high and 1,000 feet long. The upstream slope has slush-grouted

riprap from below normal pool level to 1 foot from top of dam. The entire downstream slope is covered with riprap. The top of the embankment is 10 feet wide. The upstream slope is 1V on 2.8 H from the toe to 6 feet from top of dam, where the slope steepens to 1V on 1H. The downstream slope is about 1V on 1.5 H. The spillway is located along the east shore of the reservoir about 0.25 mile from the left end of the dam. The spillway consists of a 1 foot high weir with a crest length of 50 feet, a 25-foot length of stone-lined channel, and an earthen channel. The outlet works is located at the center of the embankment and consists of three 12-inch diameter cast-iron pipes (CIP) through the embankment and a gatehouse at the downstream toe. The various features of the project are shown on the Plates at the end of this report and on the Photographs in Appendix D.

b. Location. The dam is located on Silver Creek about 3 miles upstream of the confluence with Schuylkill River. Silver Creek Dam is shown on USGS Quadrangle, Shenandoah, Pennsylvania, with coordinates N40°45'10" - W76°07'50" in Schuylkill County and is 6 miles northeast of Pottsville, Pennsylvania. The location map is shown on Plate 1.

c. Size Classification. Small (38 feet high, 850 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Silver Creek Dam (Paragraph 5.1.e.).

e. Ownership. Municipal Authority of the Township of Blythe, New Philadelphia, Pennsylvania.

f. Purpose of Dam. Water supply for Silver Creek, Cumbola, New Philadelphia, Kaska, Middleport, and portions of East Norwegian Township and New Castle Township, Pennsylvania.

g. Design and Construction History. Silver Creek Dam was constructed between 1848 and 1850 by the Schuylkill Navigation Company to provide water

for a canal along the Schuylkill River. The construction was performed under the direction of Elwood Morris, Resident Engineer for the Northern Division of the Navigation Company. The Contractor was John Gaynor of Minersville, Pennsylvania. The embankment was raised 2 feet in 1901. In 1908, riprap was added to the embankment slopes. A concrete spillway weir was constructed about 1931.

h. Normal Operational Procedure. The reservoir is normally maintained at spillway crest level with excess inflow going over the spillway weir. Water for distribution is withdrawn from the middle 12-inch diameter CIP. The valves on the other two pipes are normally closed. Water withdrawn from the reservoir travels a short distance along the natural stream channel to a small intake reservior formed by an 8-foot high dam. Water is carried by pipeline from the intake reservoir to the distribution network.

1.3 Pertinent Data

a. Drainage Area. 1.1 square miles.

b. Discharge at Damsite. (cfs.)

Maximum known flood at damsite - unknown.

Emergency drawdown line at maximum pool elevation - 30 (approximate).

Spillway capacity with pool at Elevation 1502.7 - 2,150.

c. Elevation. (Feet above msl.)

Top of dam - 1502.7.*

Maximum pool - 1502.7.

Normal pool (spillway crest) - 1498.5.

Upstream invert outlet works - 1466.0.

*Lowest elevation. Design elevation unknown.

Downstream invert outlet works - 1465.4.

Streambed at centerline of dam - 1465.0 (approximate).

d. Reservoir Length. (Miles.)

Normal pool - 0.44.

Maximum pool - 0.45.

e. Storage. (Acre-feet.)

Normal pool (spillway crest) - 640.

Maximum pool (design top of dam) - 850.

f. Reservoir Surface. (Acres.)

Normal pool (spillway crest) - 49.

Maximum pool (top of dam) - 54.

g. Dam.

Type - Earthfill embankment.

Length - Embankment - 1000 feet.

Height - 38 feet.

Top Width - 10 feet.

Side Slopes - Upstream - 1V on 1H above El. 1496.7 - 1V on 2.8H below El. 1496.7
Downstream - 1V on 1.5H.

Zoning - Unknown.

Cutoff - Unknown.

Grout Curtain - Unknown.

h. Diversion and Regulating Tunnels. None.

i. Spillway.

Type - Concrete weir 1 foot high by 1 foot wide.

Length of Weir - 50 feet.

Crest Elevation - 1498.5.

Upstream Channel - Reservoir.

Downstream Channel - 25-foot long stone-lined channel and unlined channel.

j. Regulating Outlets.

Type - Three 12-inch diameter cast-iron pipes (CIP) through embankment.

Length - 160 feet.

Access - None.

Regulating Facilities - Two manually operated rising stem 12-inch gate valves for each 12-inch CIP in gatehouse at toe of dam.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. The only engineering data available for review were a report on the dam prepared by engineers of the Pennsylvania Water Supply Commission in 1914 and one section through the embankment and the outlet works that was drawn in 1914. The 1914 report indicated that almost nothing was known about the dam. Foundation conditions were not discussed. It was not known whether or not a cutoff trench was constructed under the embankment, nor was there any information concerning the embankment except that it was built from a mixture of clay and disintegrated conglomerate. A note on the section through the embankment and outlet works indicates that the information shown for the outlet works was based on a drawing and a letter dated 1870. The section did not provide any additional information concerning the embankment.

b. Design Features. The primary features of Silver Creek Dam are the embankment, the spillway and the outlet works. The embankment is 38 feet high and 1,000 feet long. A plan of the reservoir is shown on Plate 2, and a section through the embankment is shown on Plate 3. It is not known whether the embankment is founded on rock or soil. The top width of the embankment is 10 feet. According to available information, the upstream slope of the embankment is 1V on 1H for the top six feet of the dam, and 1V on 2.8H below that level. The downstream slope is slightly irregular, but it apparently has no sections steeper than 1V on 1.5H. The portion of the upstream slope that is 1V on 1H is covered with hand-placed, slush-grouted riprap that terminates about 1 foot below the top of the

dam. The entire downstream slope is covered with 12-inch riprap that was placed to prevent erosion of the slope. The report by the Pennsylvania Water Supply Commission indicates that the embankment material is a mixture of clay and disintegrated conglomerate rock.

As shown on Plate 2, the spillway is located along the east shore of the reservoir. The spillway weir is 1 foot high and 1 foot wide. The approach area for the spillway is the reservoir, and it has a gentle adverse slope and a shallow depth. The spillway weir has a crest length of 50 feet. A section of stone-lined channel, which has a slope of about 1V on 5H, begins at the weir and extends 25 feet downstream. At this point, an unlined channel of lesser slope begins. Apparently, this channel was excavated through a drainage divide. Any discharge from the spillway leaves the Silver Creek watershed and flows into the Big Creek watershed. As shown on Plate 1, water from the spillway would flow into a lake formed by a stip mine that is located 1,500 feet downstream from the spillway before following the course of the Big Creek stream channel to the Schuylkill River. Low, wooded overbanks, adjacent to the spillway, provide additional flow capacity. A profile across the spillway and overbank areas is shown on Plate 4.

The outlet works is located near the center of the embankment and consists of three 12-inch diameter cast-iron pipes through the embankment and a gatehouse at the downstream toe. Details of the outlet works are shown on Plate 3. A masonry structure in the reservoir acts as a headwall for the three pipes. There are no valves or gates at the upstream ends of the pipes. Available information indicates that the three pipes are collectively enclosed by stone masonry. The drawing also shows two masonry structures along the length of the conduits, one located at the centerline of the embankment and one located 40 feet further upstream. The purpose of these structures was reported to be a cutoff for seepage along the masonry. A stone masonry gatehouse at the down-

stream toe of the embankment shelters 6 gate valves, two for each 12-inch diameter pipe. The outlet works discharges into a 10-foot long stone-lined reach of channel, and the water then follows the natural stream channel for a short distance before entering a small intake reservoir created by an 8-foot high dam. Water for distribution enters a transmission line from the reservoir and is then conveyed to the distribution network.

2.2 Construction.

a. Data Available. No information is available concerning the construction of the dam.

2.3 Operation. Few formal records of operation are available. The dam has been inspected at irregular intervals by Commonwealth authorities since 1914. The available records indicate that the problems that were observed in this inspection have developed gradually since about 1925.

2.4 Other Investigations. There have been no known investigations of the dam other than those described herein.

2.5 Evaluation.

a. Availability. Engineering data was provided by the Division of Dams and Encroachments, Bureau of Water Quality Management, Department of Environmental Resources, Commonwealth of Pennsylvania, and by the Owner, the Municipal Authority of the Township of Blythe. The Owner made available their consulting engineer and a caretaker for information and operating demonstrations during the visual inspection. The Owner also researched his files for additional information upon request of the inspection team.

b. Adequacy. The design data and other engineering data are almost nonexistent, and the assessment must be based on the combination of available data, visual inspection, performance history, hydrologic assumptions, and hydraulic assumptions.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings.

a. General. The general appearance of this project indicated that some project features have deteriorated with age and are in need of repair, while other projects features have been properly maintained and are in good condition.

b. Dam.

(1) The top of the embankment had some vertical irregularities. A survey of the top of embankment showed elevations varying from Elevation 1502.7 to 1503.8. The design elevation for top of dam was not known.

(2) The mortar between the riprap on the upstream slope was cracked along the water line (Photograph A). Near the left abutment, the cracking was accompanied by differential movement of up to 3 inches and by displacement of some of the stones (Photograph D). At other areas, the riprap was intact and in good condition (Photograph A). The slush-grouted riprap ends about 100 feet from the right abutment. The riprap beyond the grouted riprap is intact, but it is overgrown with ferns and light brush (Photograph C). The Owner said that the cause of the damage to the riprap on the upstream slope is ice.

(3) The riprap on the downstream slope of the embankment was generally in good condition except that light brush was growing in some areas (Photograph B).

(4) Eight wet areas were identified along or downstream from the toe of the embankment. The wet areas were located in the reach from 250 feet right of the gatehouse to 250 feet left of

the gatehouse. Of the eight wet areas, five showed flow of water ranging from 3 gallons per minute (gpm) to 50 gpm. The 50 gpm flow is the estimated cumulative flow from numerous seepage points within one large wet area. Of the five wet areas where flow was obvious, three appeared to have some accumulations of fine soil near where the seepage emerged. However, the water flowing from all the seepage points was clear at the time of the inspection. A detailed description of the location and the character of the eight wet areas is in Appendix B. Three of the wet areas are shown on Photographs E, F, and G. Inspection of the area was hindered somewhat by growth of heavy brush that begins at the toe of the embankment. Ditches along the toe of the dam, which are about 3 feet deep, were also overgrown.

c. Appurtenant Structures.

(1) Spillway. The concrete spillway weir was in poor condition. The concrete was cracked at intervals of 3 to 4 feet, and a 3-foot long section was missing near the left end. Light brush was growing in portions of the stone-lined channel, and all of the unlined channel was overgrown with 3-foot high brush (Photograph H). It was also observed that significant flow across the overbanks would occur on both sides of the spillway before the dam would be overtopped.

(2) Outlet Works. The exposed portions of the gate valves in the gatehouse were in good condition. The stems were lubricated and the stands were mostly covered with paint. At the time of inspection, a small flow was coming out of the middle pipe to feed the small intake reservoir located just downstream. The Owner said that only the center pipe is used to withdraw water, and that the valves on the other two lines had not been opened for at least 12 years. Because of concern for contamination of the water in the intake reservoir, the valves on the two pipes that are normally closed were not opened. The valve on

the middle pipe, which was open a small amount prior to the inspection, was opened further for this inspection. No difficulty of operation was encountered.

d. Reservoir Area. The slopes adjacent to the reservoir were covered with hardwoods. No evidence of creep, rock slides, or land slides was noted. The Owner indicated that sedimentation is not a problem from standpoint of reduced reservoir capacity. The watershed is completely owned by the Municipal Authority of the Township of Blythe and is undeveloped.

e. Downstream Channel. The channel downstream from the dam passes through wooded areas and strip-mined areas. No obstructions are located in the channel area.

3.2 Evaluation.

a. Dam

(1) The original design elevation for top of dam is not known. The lowest elevation on the top of the dam determines the spillway capacity.

(2) The cracking of the mortar between the riprap along the water line is a condition that will cause progressive deterioration of the slope protection. At the areas where the differential movement and stone displacement has occurred, the deterioration has already progressed to the extent of being unsatisfactory. At the right end of the dam where the riprap is not grouted, there were no signs of unsatisfactory performance. However, the growth of brush among the riprap is undesirable.

(3) The brush growing among the riprap on the downstream slope of the embankment is undesirable.

(4) The eight wet areas that were observed during this inspection are of concern. Research of records of previous inspections indicates that the first seepage developed about 1927, at which time the dam was 77 years old. The first seepage that developed was along the toe of the embankment to the right of the gatehouse. Apparently, seepage was first observed to the left of the gatehouse about 1933. Because detailed descriptions of the character and quantity of seepage are not available, it is not possible to determine to what extent the problem has increased. Inspections performed after 1933 indicate that the seepage continued, but the descriptions are somewhat sketchy. It appears that the conditions observed in this inspection are essentially similar to those observed in previous years. However, almost nothing is known about the design or construction of the dam. Consequently, the possible effects of the seepage are difficult to evaluate. During this inspection, three of the eight wet areas appeared to have accumulations of fine soil at their outlets. Although all the flow was clear at the time of the inspection, there might have been some migration of embankment materials in the recent past. The age of the dam, which is 128 years, the lack of information concerning its design and construction, and the extent and character of the seepage combine to create a situation that is of special concern.

b. Appurtenant Structures.

(1) Spillway. The spillway of Silver Creek Dam is a minor structural feature, and, therefore, has little importance with respect to hazard to the dam. Hydraulically, the overbanks adjacent to the spillway would carry significant quantities of floodwaters. However, it is important that the spillway area be maintained so that it can pass as much water as possible. The brush growing in the spillway channel is probably dense enough to have the effect of reducing the spillway capacity somewhat.

(2) Outlet Works. The condition of the dam is such that it is considered essential to have the gates on all three conduits in good

operating condition. The situation of possible contamination of the water supply during testing of the gates is unsatisfactory. Another condition that is potentially hazardous is the lack of any controls on the upstream ends of the conduits. A failure of a pipe under pressure through an embankment could result in severe internal erosion of the embankment. The available information indicates that all three pipes are in a masonry enclosure, and this does reduce the hazard potential to some extent. However, the pipes are old and the potential for trouble exists.

c. Reservoir Area. No conditions were observed in the reservoir area that might present significant hazard to the dam.

d. Downstream Channel. No conditions were observed in the downstream channel that might present significant hazard to the dam. Additional discussion on downstream conditions is presented in Paragraph 5.1.e.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir level is maintained at spillway crest, with excess inflow flowing over the spillway into the adjacent Big Creek watershed. Three 12-inch diameter cast-iron pipes are available to draw water from the reservoir at about Elevation 1466. The pipes can also be used as sediment blowoffs. Normally, only the middle pipe is used, and valves on the other two pipes are closed. The water is discharged into Silver Creek below the dam where it flows along the natural stream channel for about 2,000 feet before it enters a small intake reservoir. A single pipeline draws water from the intake reservoir and carries it to the communities of Cumbola, New Philadelphia, Silver Creek, Kaska, Middleport, and portions of East Norwegian and New Castle Townships. Since all discharge from the outlet works enters the intake reservoir, the pipes cannot be used as sediment blowoffs without contaminating the water supply system.

4.2 Maintenance of Dam. The dam is visited daily by a caretaker who takes a water sample from the reservoir, checks the reservoir level, and adjusts the discharge valve as required by the demand. The caretaker, who has been on the job for 12 years, adjusts the discharge valve based on past experience. The caretaker is also responsible for observing the general condition of the dam and appurtenant structures for reporting any changes or deficiencies to the Executive Director of the Blythe Township Water Authority. Penneast Corporation, engineering consultant to the Authority, inspects the dam as part of an annual inspection of the water supply system. However, a formal, detailed inspection of the dam for the purpose of monitoring the performance of the embankment and the appurtenant structures is not performed. The brush on the embankment is cut annually.

4.3 Maintenance of Operating Facilities. There is no regularly scheduled maintenance program for the outlet works at the dam. Any maintenance of the operating facilities is performed as needed.

4.4 Warning Systems in Effect. The Owner explained to the inspection team what chain of command would be followed during an emergency. No formalized notification procedure had been established at the time of the inspection. The Owner related to the inspection team how Silver Creek Dam, and other dams owned by the Authority, had been kept under constant observation during Tropical Storm Agnes in June, 1972. The vehicle used by the caretaker is equipped with a two-way radio to communicate with the Water Authority office. Responsibility for notification of emergency conditions to local authorities rests on the Executive Director of the water authority, who would base his decision on the engineering consultant's recommendations.

4.5 Evaluation. Except for not opening all valves on a regular basis, the normal operational procedure for Silver Creek Dam appears to be satisfactory, as does the maintenance of the embankment and the outlet works. The inability to open the valves on the pipes for test purposes without risk of contamination of the water system is unsatisfactory. The inspection procedures used by the Owner are adequate for evaluating the need for normal repairs and maintenance, but the overall condition of the dam indicates a need for special inspections of the dam and for records of its performance. Surveillance of the dam during storms appears to be adequate, but it relies heavily on the diligence of the personnel involved. Because more than one dam is under their care and because few personnel are involved, the absence of one or more personnel could result in inadequate surveillance of the dam.

The emergency warning procedures are too informal, and, in the event of an emergency that would require a quick decision, the surveillance and warning system might not be effective because the consulting engineer who would make the recommendation would not be immediately available at the site.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data.

(1) No hydrologic or hydraulic analyses for the Silver Creek Dam design were available for review.

(2) In the recommended guidelines for safety inspection of dams, the Department of the Army, Office of the Chief of Engineers (OCE) established criteria for rating the capacity of spillways. The recommended spillway design flood for the size (small) and hazard potential (high) classification of Silver Creek Dam is from one-half the Probable Maximum Flood (PMF) to the PMF. Because the size of Silver Creek Dam is close to the upper limit for classification as a small dam and because the downstream area has many houses that would be affected by failure of the dam, the recommended spillway design flood for Silver Creek Dam is the PMF. If the dam and spillway are not capable of passing the PMF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

(3) The Silver Creek Dam watershed is completely owned by the Municipal Authority of the Township of Blythe and is undeveloped. Hydrologic analysis for this study was based on existing conditions and the effects of future development of the watershed were not considered.

b. Experience Data. For this study, a PMF peak flow rate of 1,700 cfs per square mile and a PMF storm runoff volume of 24 inches were used[1]. The PMF peak flow was estimated to be 1,870 cfs at Silver Creek Dam. The spillway capacity was calculated by including overbank flow on the low-lying wooded areas adjacent to the spillway. The 1914 report by the Pennsylvania Water Supply Commission made mention of this overbank flow, but did not include an estimate for it. Calculations made for this study showed the spillway and overbank capacity to be about 2,150 cfs when the reservoir is at Elevation 1502.7, the maximum pool level based on the lowest elevation of top of dam. Hydrologic and hydraulic computations are included in Appendix C.

c. Visual Observations. On the date of the inspection, the spillway channel approach was clear and free of obstructions. The spillway outlet channel was overgrown with heavy brush. Since such obstructions are easily cleared and represent a relatively minor maintenance task, the hydraulic effects of the brush growing in the outlet channel were not considered in this study. The overbank areas adjacent to the spillway are wooded. The undergrowth on the overbanks varies from small weeds to a few areas of dense brush.

d. Overtopping Potential. For an occurrence of the PMF, the peak inflow of 1,870 is less than the capacity of the spillway and the adjacent overbanks. (Appendix C.)

---

[1] Obtained from the Baltimore District, Corps of Engineers.

e. Downstream Conditions. The entire length of Silver Creek downstream from the Silver Creek Dam is shown on Plate 1. The valley near the dam is sparsely populated and extensively strip mined. Houses that are in the first 2.4-mile reach downstream from the dam are on high ground. There are some low-lying houses in the next 0.2 mile reach of the stream before, Silver Creek enters the Borough of New Philadelphia. In the Borough of New Philadelphia are many structures that would suffer flood damage due to high flows in Silver Creek. The confluence of Silver Creek with the Schuylkill River is 3.1 miles downstream from the dam. The downstream conditions indicate that a high hazard classification is warranted for Silver Creek Dam.

f. Spillway Adequacy.

(1) The spillway and adjacent low overbank areas are capable of passing the PMF peak inflow of 1,870 cfs without overtopping Silver Creek Dam.

(2) The maximum tailwater is estimated to be Elevation 1465 at the end of the outlet conduits. At maximum pool elevation, there is a difference of about 37 feet between headwater and tailwater.

(3) Based on established OCE criteria as outlined in Paragraph 5.1a.(2), the spillway capacity of Silver Creek Dam is rated as adequate. Neglecting the effects of surcharge storage, the spillway capacity of 2,150 cfs is 115 percent of the PMF peak inflow.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Silver Creek Dam resulted in a number of observations relevant to structural stability. These observations are listed herein for the various features.

(2) Embankment. Eight wet areas were observed at or near the toe of the embankment. The detailed description and evaluation of the wet areas are in Paragraph 3.1b.(4) and 3.2a.(4), respectively.

b. Design and Construction Data. No records of design data or stability computations were available for review. Furthermore, except for exterior lines and grades, almost nothing is known about the design or construction of the embankment. The plans show that the upstream slope is about 1V on 2.8H except for the top 6 feet, which is 1V on 1H. The plans show the downstream slope to be about 1V on 1.5H, and this was confirmed by surveys made during this inspection. Slopes of these grades, and particularly the downstream slope, are considerably steeper than present standard practice would allow. Consequently, it is not believed that the embankment has a large margin of safety.

c. Operating Records. There is no evidence that any stability problems have occurred for the dam during its operational history of 128 years. However, it should be recognized that conditions have changed, particularly with respect to seepage, that might significantly affect the future performance of the dam.

d. Post-Construction Changes. Except for raising the embankment by 2 feet in 1901, there have been no other significant structural modifications. There is no information available concerning the raising of the embankment.

e. Seismic Stability. Silver Creek Dam is located in Seismic Zone 1. Normally, it can be considered that if a dam in this zone is stable under static loading conditions, it can be assumed safe for any expected earthquake loading. However, the theoretical static stability of Silver Creek Dam is not known.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on the visual inspection, available records, calculations and past operational performance, Silver Creek Dam is judged to be in fair condition. However, deficiencies of varying degree of importance were noted. A summary of the features and observed deficiencies is listed below:

Feature and Location	Observed Deficiencies
Embankment	
Top of embankment	Vertical irregularities
Upstream slope	Deterioration of mortar between grouted riprap; riprap displacement; light brush among ungrouted riprap.
Downstream slope	Light brush at some areas.
Downstream toe	Eight wet areas along or near toe; heavy brush along toe.
Spillway:	
Weir	Concrete deteriorated.
Discharge channel	Overgrown with brush.
Outlet Works:	No provision for testing valves without contaminating water supply; no means to stop flow from upstream ends of pipes.

(2) The overtopping potential analysis shows that Silver Creek will not be overtopped by the PMF. While the spillway has relatively little capacity, the adjacent overbanks are low enough and of such character that the PMF will not cause overtopping of the embankment. Based on OCE criteria, as outlined in Paragraph 5.1a. (2), the spillway and dam are rated as adequate. The existing spillway and the adjacent overbanks can pass 115 percent of th PMF peak flow. The Owner should recognize, however, that a change in character of the overbank areas, such as widespread growth of dense brush, could significantly reduce the hydraulic capacity of the overbanks.

(3) The combination of steep embankment slopes, particularly the downstream slope, and seepage are such that it is believed that the embankment does not have a large margin of safety for stability. A change in conditions from those observed during this inspection could adversely affect the stability of the embankment.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented immediately or in a timely manner, as noted.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations will be required.

7.2 Recommendations and Remedial Measures.

a. In view of the concern for safety of Silver Creek Dam, the following measures are recommended to be undertaken by the Owner immediately:

(1) Develop a detailed emergency operation and warning system for Silver Creek Dam.

(2) Clear the area along the downstream toe of the embankment and identify all seepage outlets. Construct a system of channels and weirs so that flow measurements can be made for all seepage points and so that any accumulation of soils that might be coming from the embankment can be recognized. Monitor and record data so that any change in conditions is readily apparent.

(3) Install two or more inclinometers in the downstream slope of the embankment near the maximum section to monitor any slope movement.

(4) Install piezometers in the downstream portion of the dam to establish the phreatic surface and along the downstream toe to determine the exit gradient of the seepage.

(5) Undertake an embankment and foundation exploration program to ascertain the engineering properties of the materials and perform a study to determine the factor of safety for stability of the embankment and to determine the piping susceptibility of the embankment materials. Take any remedial action that might be found necessary to ensure stability of the embankment.

b. In order to correct operation, maintenance and repair deficiencies, and to more accurately determine the condition of the dam, the following measures are recommended to be undertaken by the Owner in a timely manner:

(1) Repair damaged riprap on upstream slope.

(2) Remove brush from embankment slopes and spillway channel.

(3) Repair concrete on spillway weir.

(4) Construct a diversion structure in the stream channel or otherwise provide a means for testing all valves at least on an annual basis without contaminating the water supply.

(5) Install valves or otherwise develop a means of rapidly closing off the upstream ends of the outlet conduits.

c. In addition, the following operational measures are recommended to be undertaken by the Owner:

(1) Provide round-the-clock surveillance of Silver Creek Dam during periods of unusually heavy rains.

(2) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

(3) Implement an annual inspection program of all project features and maintain inspection records. Special attention should be given each year to reevaluating the capacity of the spillway and adjacent overbanks based on the change in character of the overbank growth.

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

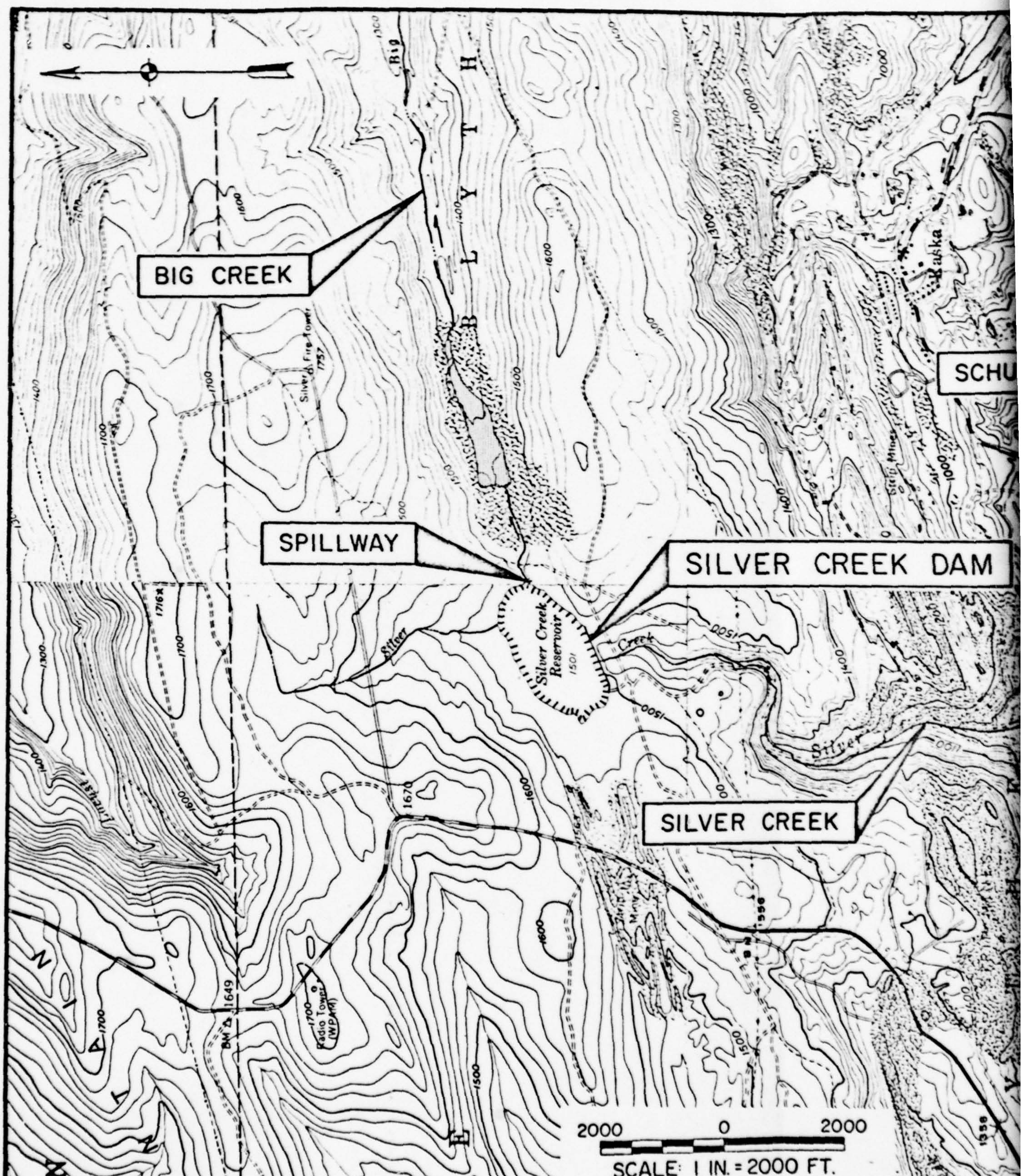
MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

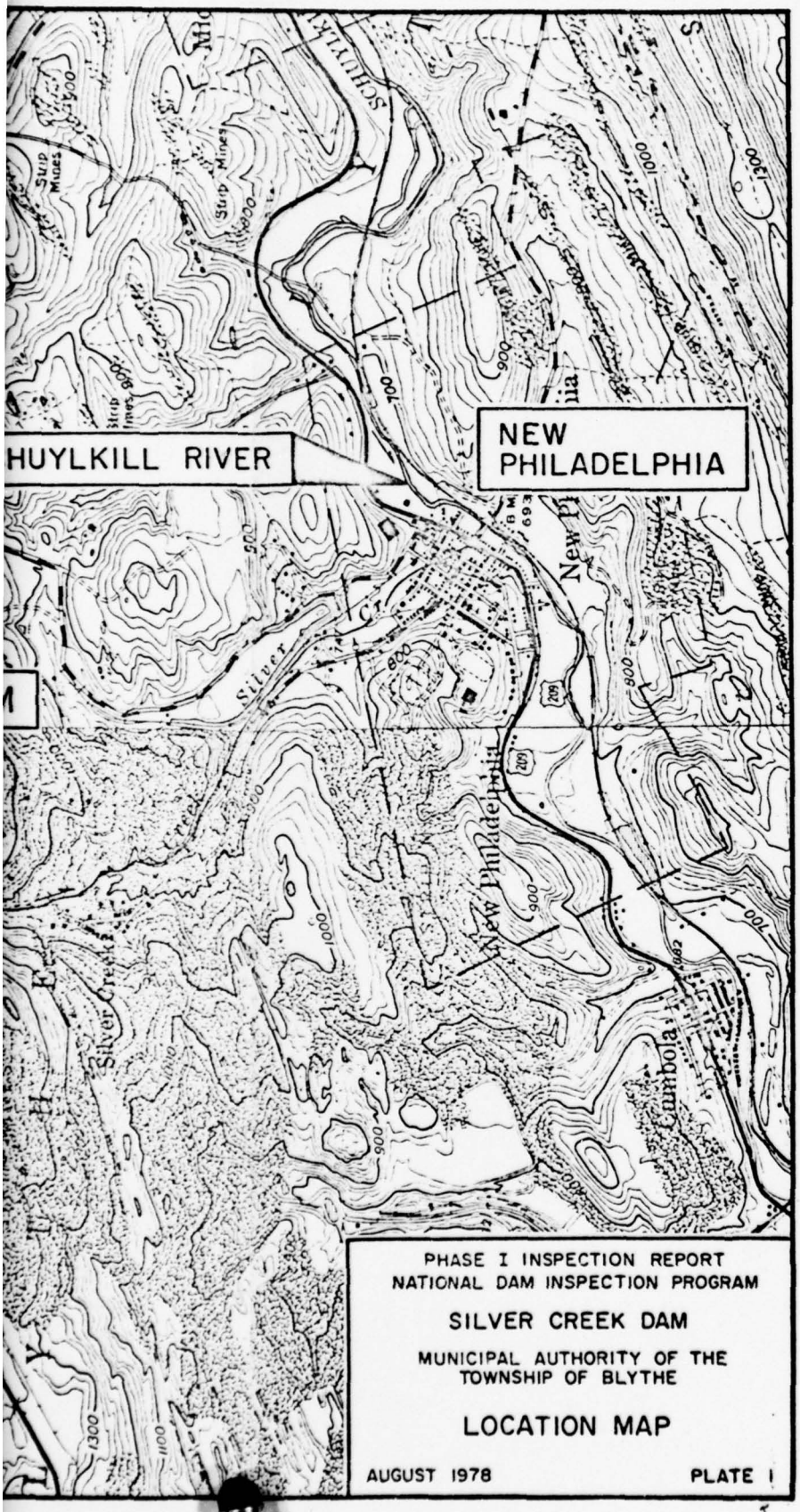
PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

PLATES


BIG CREEK
SPILLWAY
SILVER CREEK DAM
SILVER CREEK
SCHU
Silver Creek Reservoir
2000 0 2000
SCALE: 1 IN. = 2000 FT.



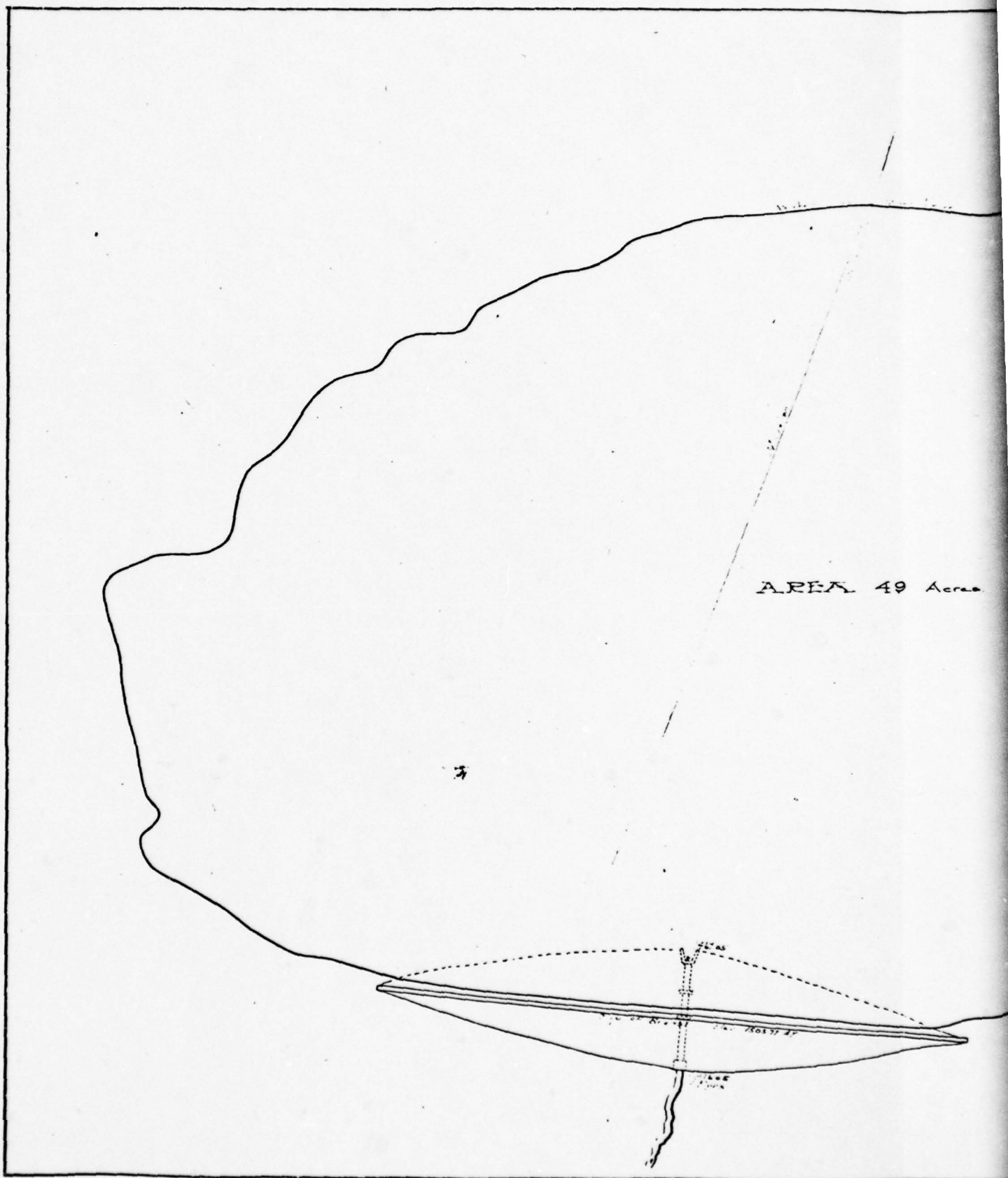
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

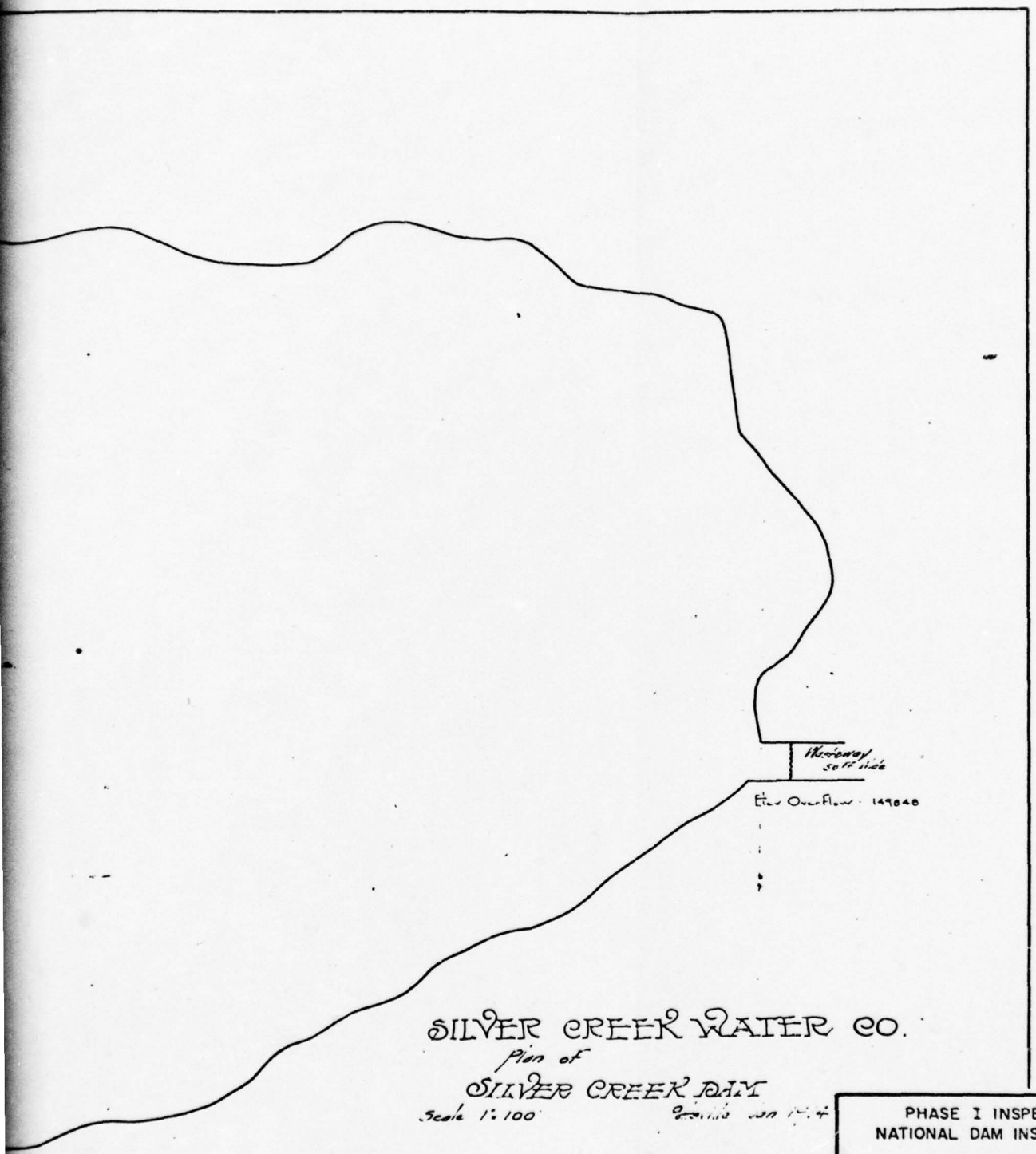
SILVER CREEK DAM

MUNICIPAL AUTHORITY OF THE
TOWNSHIP OF BLYTHE

LOCATION MAP

AUGUST 1978 PLATE 1


AREA 49 Acres



SILVER CREEK WATER CO.

Plan of

SILVER CREEK DAM

Scale 1:100

Capacity 210 805 848 Gallons

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SILVER CREEK DAM

MUNICIPAL AUTHORITY OF THE
TOWNSHIP OF BLYTHE

PLAN OF RESERVOIR

AUGUST 1978 PLATE 2

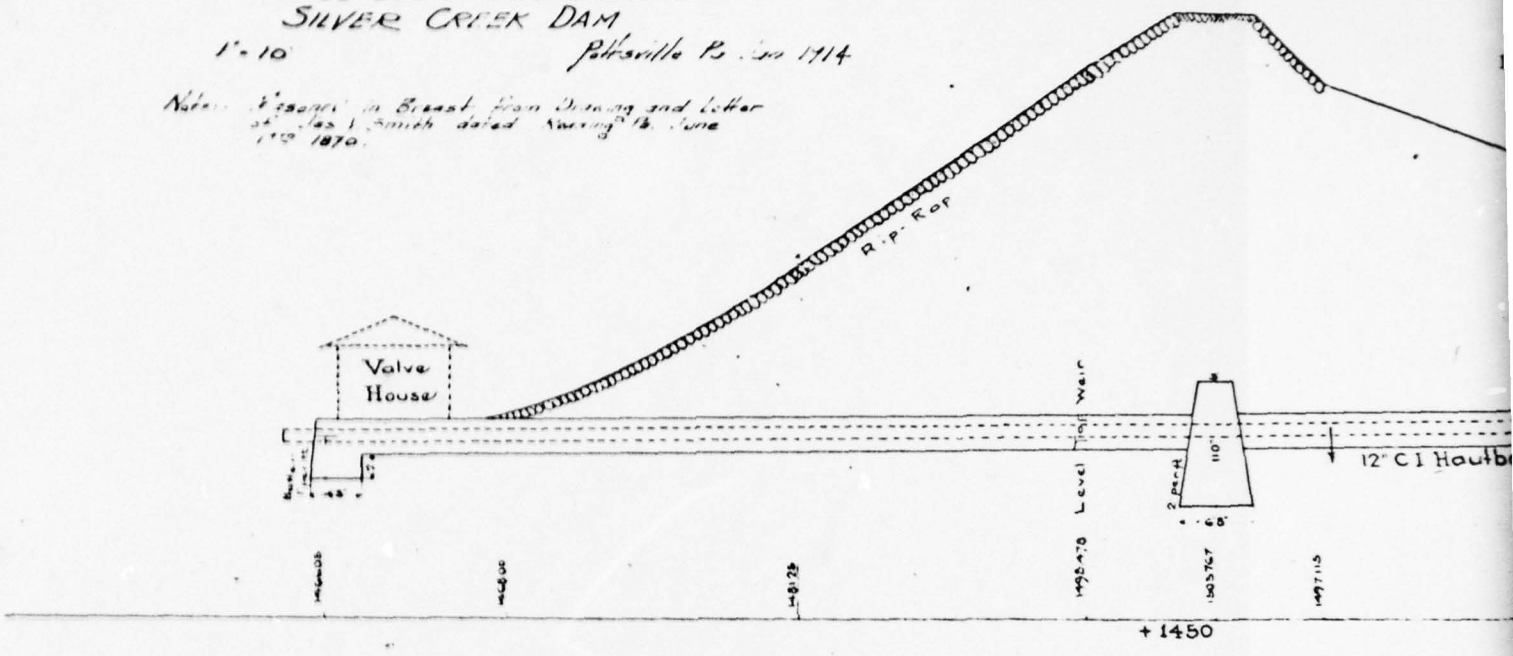
11-1

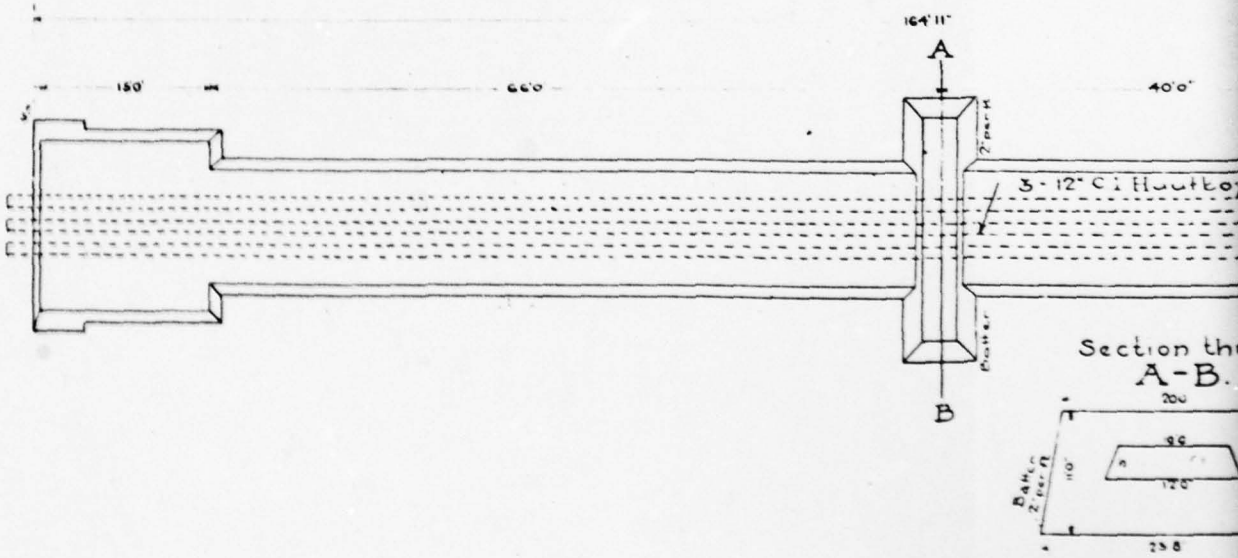
SILVER CREEK WATER CO

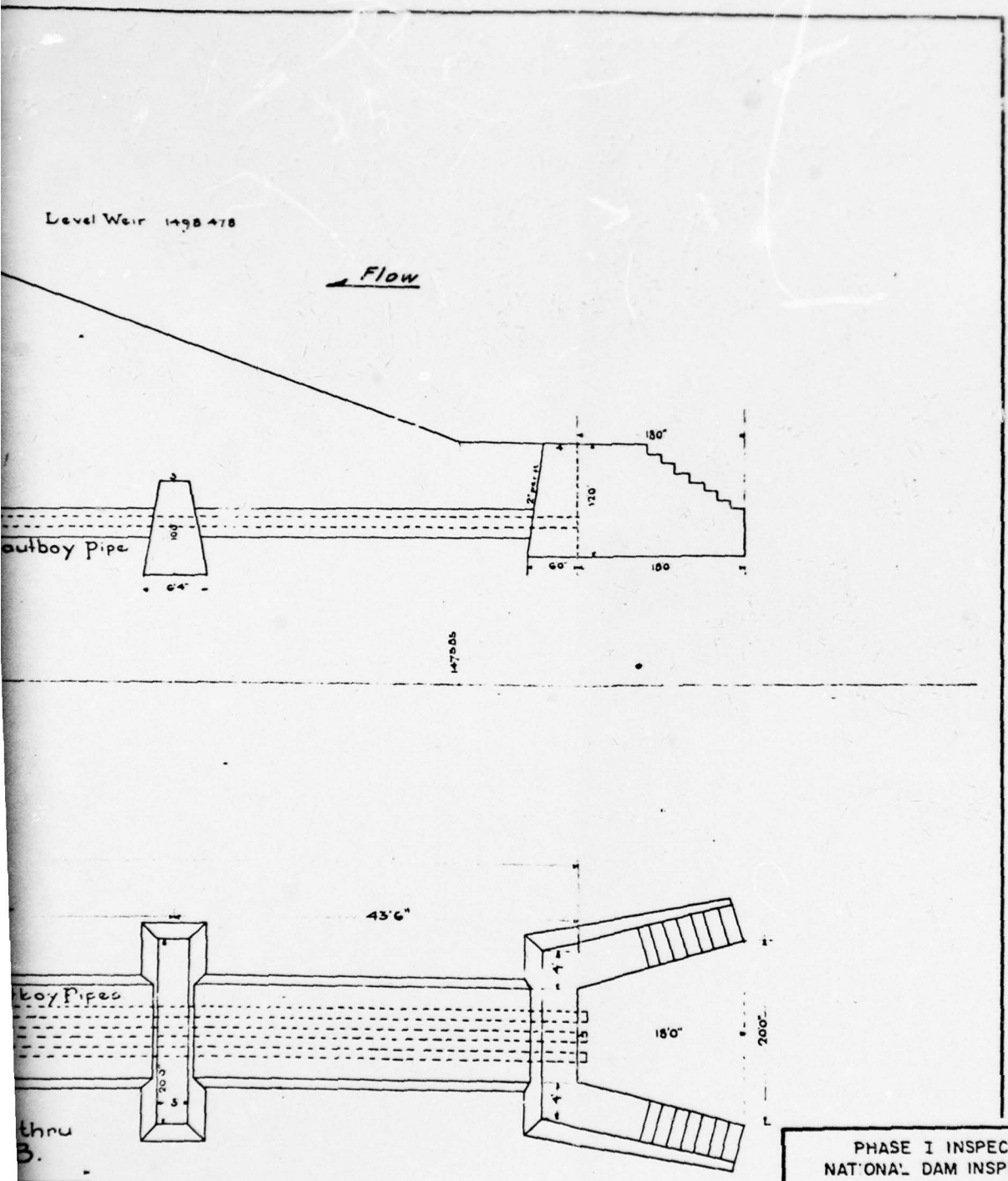
Cross Section thru Breast of
SILVER CREEK DAM

1" = 10' Pittsville Pa. Jan 1914

Note: Dimensions in Breast from Drawing and Letter of Jas I Smith dated Waverly Pa. June 1st 1870.







PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

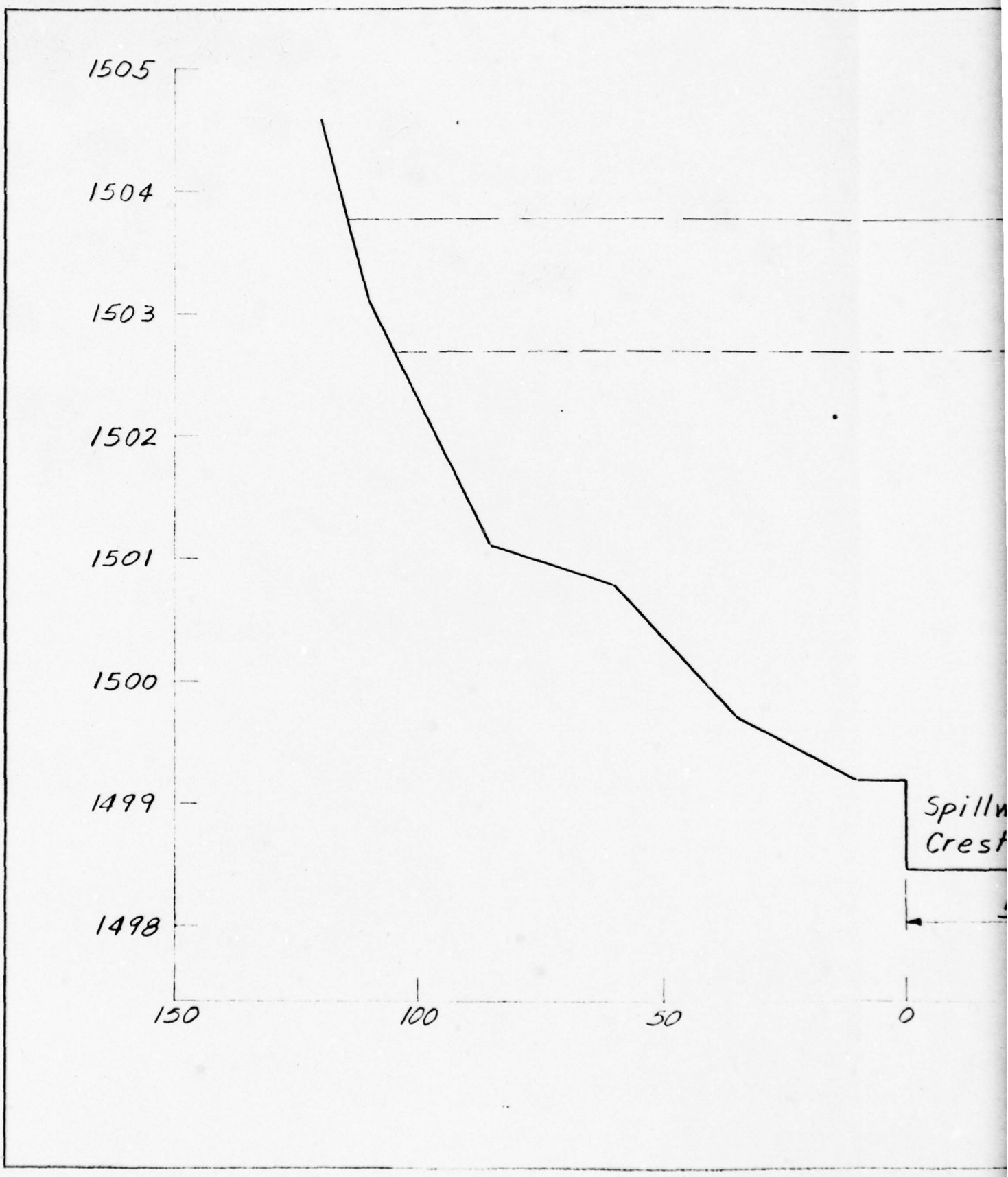
SILVER CREEK DAM

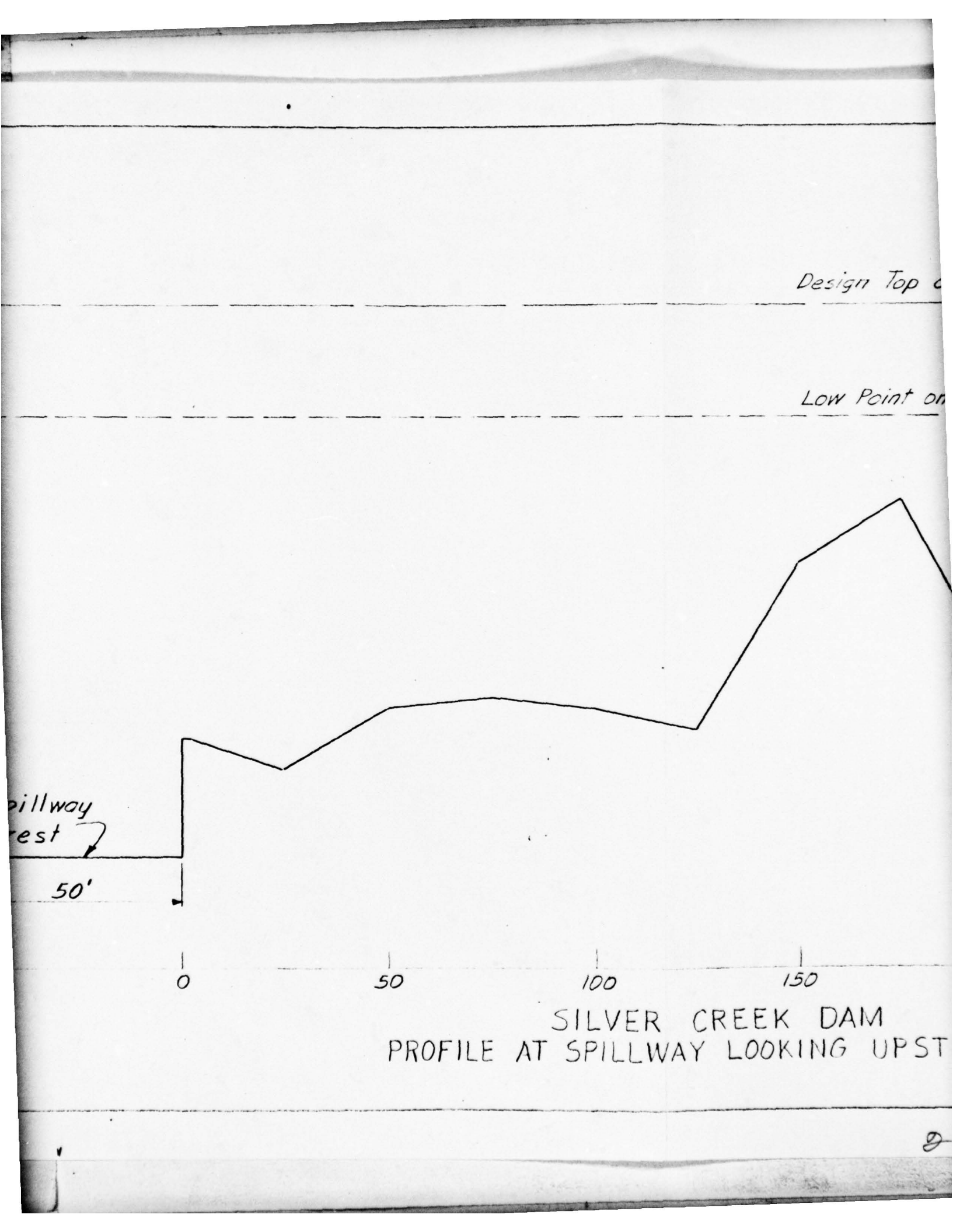
MUNICIPAL AUTHORITY OF THE
TOWNSHIP OF BLYTHE

EMBANKMENT AND
OUTLET WORKS SECTION

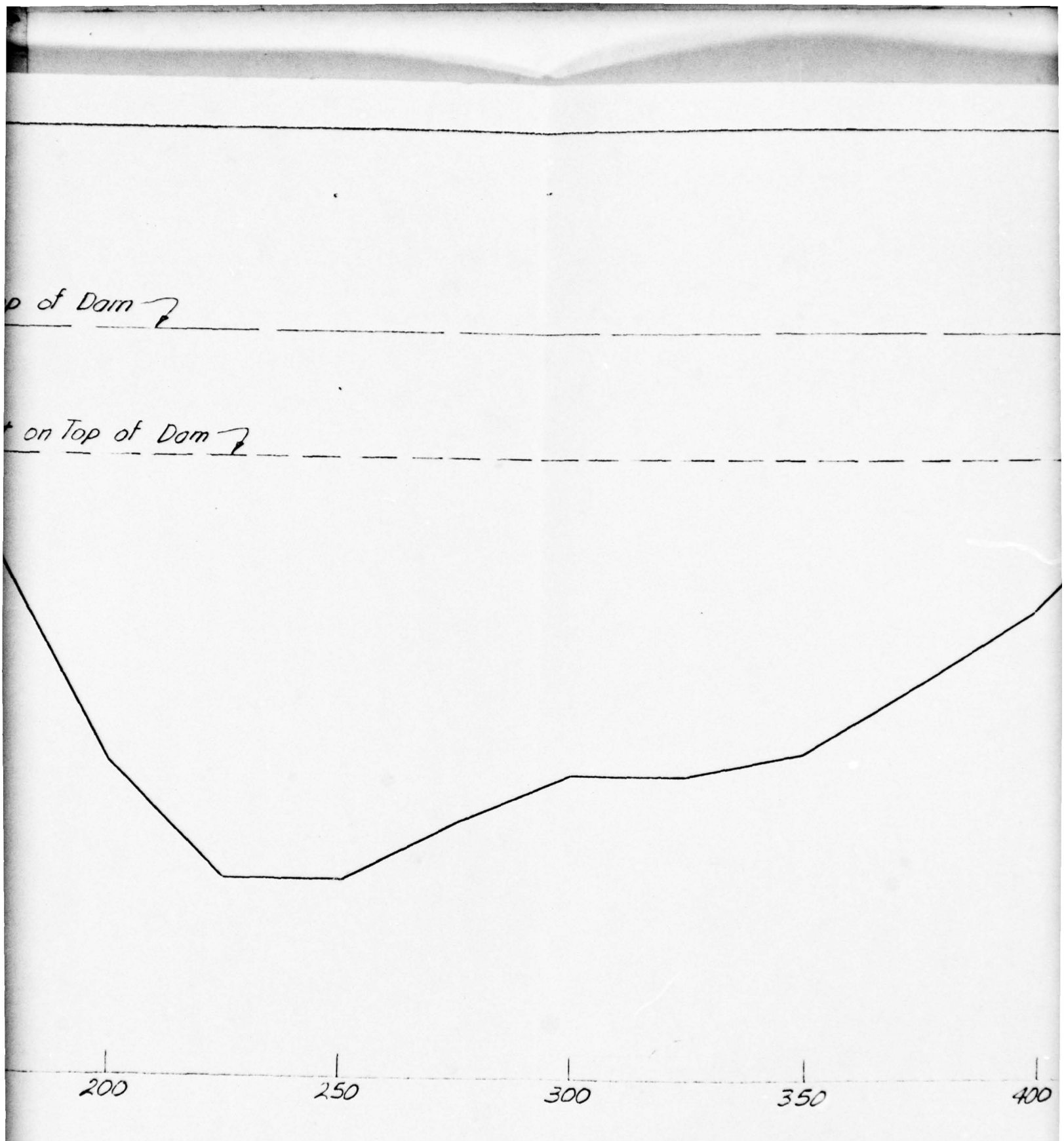
AUGUST 1978 PLATE 3

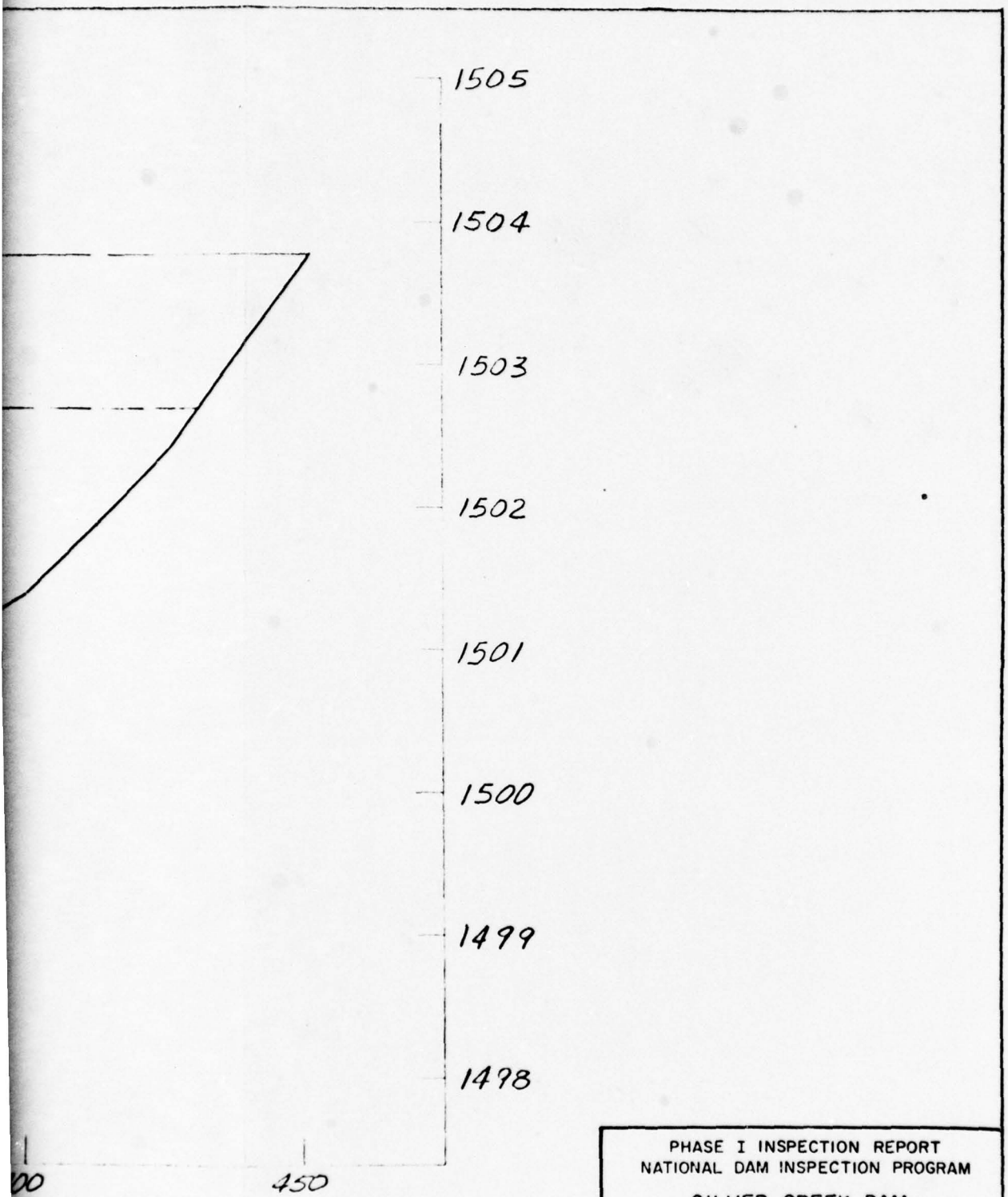
4 1 2


1505
1504
1503
1502
1501
1500
1499
1498
150
100
50
0
Spillw
Crest



SILVER CREEK DAM
PROFILE AT SPILLWAY LOOKING UPST


p of Dam 7
on Top of Dam 7
200
250
300
350
400
STREAM



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SILVER CREEK DAM

MUNICIPAL AUTHORITY OF THE
TOWNSHIP OF BLYTHE

PROFILE ALONG SPILLWAY

AUGUST 1978 PLATE 4

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: Silver Creek Dam

NDS ID NO.: PA-00665 DER ID NO.: 54-23

ITEM	REMARKS
AS-BUILT DRAWINGS	One embankment section dated 1914.
REGIONAL VICINITY MAP	Project is shown on USGS Quadrangle Sheet Shenandoah, Pennsylvania; N 4045-W7607.5/7.5; 1955; Photorevised 1969.
CONSTRUCTION HISTORY	Constructed 1848-1850 by Schuylkill Navigation Company. Modified 1901, 1908, and 1931.
TYPICAL SECTIONS OF DAM	One section dated 1914.
OUTLETS: Plan Details Constraints Discharge Ratings	Plan and profile dated 1914. No details or discharge ratings.

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	None.
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	None.
POSTCONSTRUCTION SURVEYS OF DAM	1942: Survey of pertinent dimensions.

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	Unknown.
MONITORING SYSTEMS	None.
MODIFICATIONS	1901: Embankment raised 2 feet. 1908: Riprap placed on embankment slopes. 1931±: Concrete spillway crest constructed.
HIGH POOL RECORDS	1914 Report: 2 feet over spillway crest at an unknown time.
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	1914: General evaluation of condition of dam and spillway capacity by Pennsylvania Water Supply Commission.
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	None.

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	None.
SPILLWAY: Plan Sections Details	None.
OPERATING EQUIPMENT: Plans Details	Plan and profile only.
PREVIOUS INSPECTIONS Dates Deficiencies (Continued on Sheet A-5)	1923: Water can flow over low divide at spillway. 1927: Two small streams from toe at right of gatehouse. 1931: Leakage at right of gatehouse. 1933: Small trees in spillway channel; brush close to toe; small flow from toe ditch 20 feet left of gatehouse; moderate flow 40 feet right and 100 feet right of gatehouse. 1938: Swampy area 50 feet beyond toe 300 feet from right end; same seepage as 1933; riprap on upstream slope settled. 1942: Riprap on upstream slope bulged and heaved; swampy area as in 1938; trees and brush in spillway; leakage through blowoff. 1946: Same as 1942 except riprap repaired and grouted.

ENGINEERING DATA

ITEM	REMARKS
PREVIOUS INSPECTIONS (Continued from Sheet A-4)	1962: Considerable leakage 100 feet left and 100 feet right of gatehouse; trees growing around spillway crest.

CHECKLIST

ENGINEERING DATA

HYDROLOGY AND HYDRAULICS

NAME OF DAM: Silver Creek Dam NDS ID NO.: PA-00665 DER ID NO.: 54-23

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): Elevation 1498.5

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): Elevation 1502.7

ELEVATION MAXIMUM DESIGN POOL: Elevation 1502.7

ELEVATION TOP DAM: Elevation 1502.7

SPILLWAY CREST:
- a. Elevation 1498.5
- b. Type Concrete Weir
- c. Width 1 foot
- d. Length 55 feet
- e. Location Spillover East side of reservoir
- f. Number and Type of Gates None

OUTLET WORKS:
- a. Type Three 12-inch diameter CIP
- b. Location Center of embankment.
- c. Entrance Inverts Elevation 1466.0.
- d. Exit Inverts Elevation 1465.4
- e. Emergency Draindown Facilities Same as outlet works.

HYDROMETEOROLOGICAL GAGES:
- a. Type None.
- b. Location None.
- c. Records None.

MAXIMUM NONDAMAGING DISCHARGE: Unknown

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: Silver Creek Dam County: Schuylkill State: Pennsylvania

NDS ID No.: PA-00665 DER ID No.: 54-23

Type of Dam: Earthfill Hazard Category: High

Date(s) Inspection: 28 June 1978 Weather: Clear Temperature: 90°

Pool Elevation at Time of Inspection: 1497.6 msl/Tailwater at Time of Inspection: 1465.0 msl

Inspection Personnel:

D. Wilson (GFCC)	S. Dobies (Water Auth.)	
D. Wolf (GFCC)	L. Schad (Water Auth.)	
D. Ebersole (GFCC)		

D. Wilson (GFCC) Recorder

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	Woods and heavy brush begin at toe.
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	None.	
CREST ALIGNMENT: Vertical Horizontal	Horizontal: no irregularities. Vertical: elevation varies from El. 1502.7 to El. 1503.8.	
RIPRAP FAILURES	1. Downstream riprap good. 2. Upstream riprap: mortar cracked along water line; some differential settlement near left end; some light brush right end.	1. Light brush at some areas. 2. Owner said ice is main problem for mortared riprap.

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	No abnormalities.	Outcrop of conglomerate at left abutment.
ANY NOTICEABLE SEEPAGE (Continued on Sheet B-9)	1. 250 feet right of gatehouse: seepage from toe; 150 S.F. wet area. 2. 250 feet right of gatehouse: seepage 35 feet from toe; 600 S.F. wet area.	1. Clear flow 5 gpm±; no sign of piped materials. 2. Several point sources; total flow 50 gpm±; all clear; 6 inches standing water.
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	
OTHER	Ditches were constructed along toe of dam.	Ditches are about 3 feet deep and overgrown with brush.

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Not applicable.	
INTAKE STRUCTURE	None. Pipes extend into reservoir.	No valves on upstream end.
OUTLET STRUCTURE	Gatehouse at toe of embankment.	Two gate valves on each line. Only center pipe is normally used.
OUTLET CHANNEL	10-foot long stone lined section followed by natural stream channel.	
EMERGENCY GATE	12-inch lines are double valved at downstream ends only.	

UNGATED SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	1-foot wide x 1-foot high; poor condition.	Appears to be concrete placed over old stone weir.
APPROACH CHANNEL	Clear (reservoir area); shallow; gentle adverse slope.	
DISCHARGE CHANNEL	Hand placed riprap on 1V on 5H slope for 25 feet; natural channel beyond; dense brush beyond lined section.	Discharges into strip mine which drains into another watershed.
BRIDGE AND PIERS	None.	
OVERBANKS	Significant overflow would occur around spillway through woods before overtopping of dam.	

INSTRUMENTATION

Sheet 1 of 1

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

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Generally mild; hardwood cover; no sign of instability.	
SEDIMENTATION	Owner reported no problem.	
WATERSHED DESCRIPTION	All owned by Water Authority; no development.	

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

APPENDIX C

HYDROLOGY AND HYDRAULICS

Classification

The hazard classification is high since the downstream population is 93 - ref. Recommended Guidelines for Safety Inspection of Dams. pD-9

The size classification is Small since the height equals 38 feet and the capacity is 210 million gallons (640 Acre-Ft.). - ref. same, pD-8.

Spillway Design Flood

The spillway design flood should be ½ PMF to PMF for a high hazard dam of small size. - ref, same, pD-12

Note: SDF used is PMF, since 38' is very close to the size class limit of 40 ft.

Hydrologic and Hydraulic Analysis

Reference - Phase I Procedure Package

II. A. Silver Creek Dam is ideally situated. There are no impoundments upstream of Silver Creek Dam

2. The PMF inflow hydrograph is not available

a. As per contact with NAB, use PMF peak @ 1700 cfs/Mi^2 with a volume of 24" of runoff.

$$PMF_{peak} = 1700 \frac{cfs}{Mi^2} \times 1.1 = 1870 \text{ cfs}$$

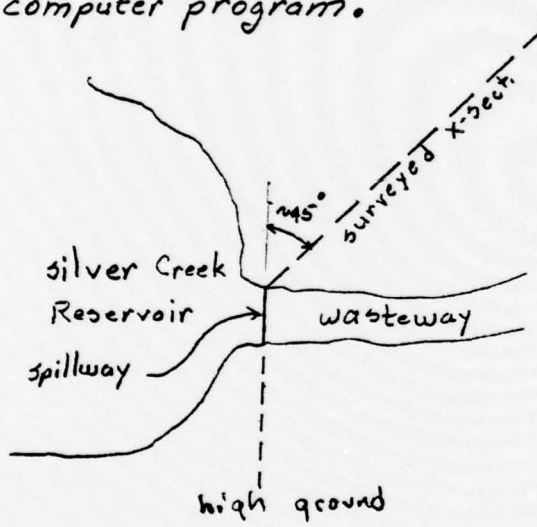
$$Vol = 2' \times 1.1 Mi^2 \times 640 \frac{Acres}{Mi^2} = 1408 \text{ Ac-Ft} \times \frac{43560}{3600} = 17,036 \text{ cfs-hr}$$

$$b = Vol \times \left(\frac{2}{1870}\right) = \frac{2 \times 17036}{1870} = 18.2 \text{ hrs}$$

3. Ability of Spillway to pass the PMF

The emergency outflow from the dam will occur over the spillway and as overbank flow on the low-lying ground adjacent to the spillway. This emergency flow will go into the next watershed (Big Creek).

The depth of flow @ Q = 1870 cfs was analyzed using surveyed cross section data and the HEC-2 computer program.

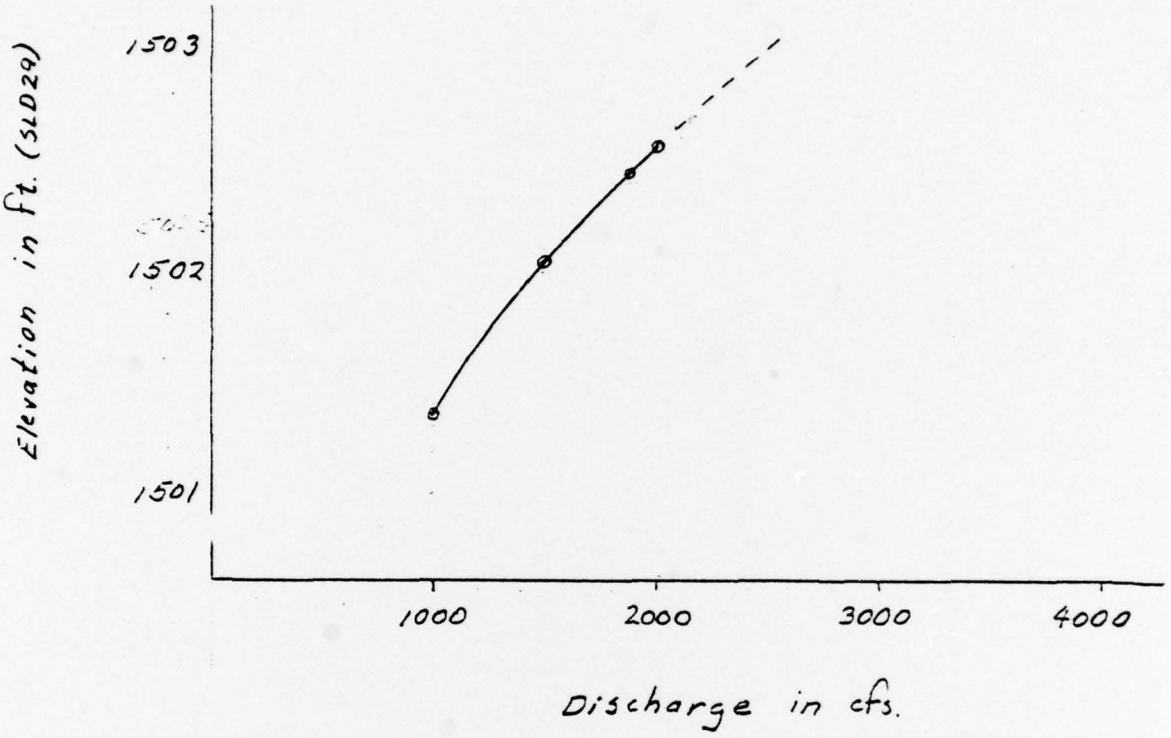


Assomptions for computing spillway capacity:

1. "n" values:
   a. Left overbank: n = 0.085
   b. Right overbank: n = 1.20
   c. Channel : n = 0.040
2. Critical depth assumed at weir

The results are

Q	Depth	Elevation	Remarks
935	2.69	1501.27	½ PMF
1000	2.79	1501.37	
1500	3.47	1502.05	
1870	3.87	1502.45	PMF
2000	4.00	1502.58	



from extended rating curve (above) $Q_{max} = 2150$ cfs @ Pool = 1502.7

$$\% = \frac{2150}{1870} \times 100 = 115\%$$

A. . The recomended PMF peak Flow of 1370 cfs is less than the capacity of the spillway and adjacent overbank flow for a pool level less than top of dam.

1. No routing of the PMF is necessary

2. The dam can be assumed to handle the PMF.

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

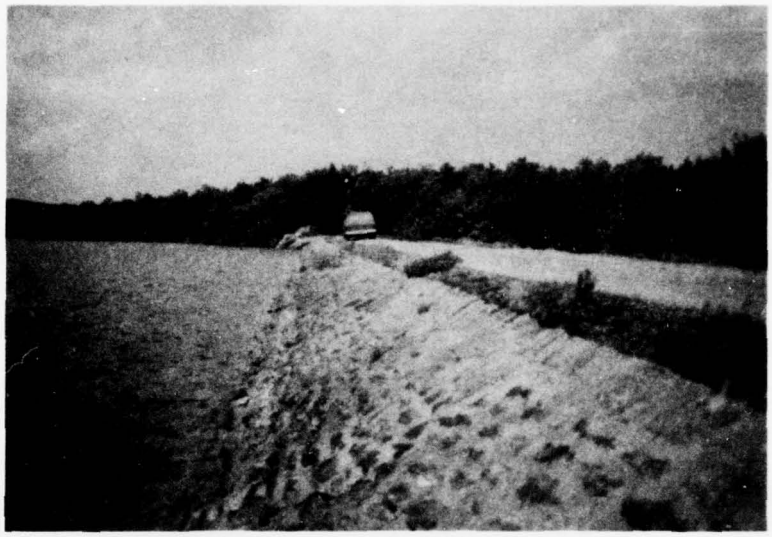
PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

APPENDIX D

PHOTOGRAPHS



A. Upstream Slope of Embankment.
View Toward Left Abutment.

B. Downstream Slope of Embankment.
View Toward Left Abutment.

C. Right Abutment Area.

D. Damaged Riprap Near Left Abutment.

E. Wet Area No. 2.

F. Wet Area No. 4.

G. Wet Area No. 6.

H. Spillway.

DELAWARE RIVER BASIN

SILVER CREEK, SCHUYLKILL COUNTY

PENNSYLVANIA

SILVER CREEK DAM

NDS ID No. PA-00665

DER ID No. 54-23

MUNICIPAL AUTHORITY OF THE TOWNSHIP OF BLYTHE

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

AUGUST 1978

APPENDIX E

GEOLOGY

SILVER CREEK DAM

APPENDIX E

GEOLOGY

1. General Geology. The dam and reservoir are located in Schuylkill County. The County lies entirely south of the Wisconsin and Illinoian drift borders. The Jerseyan drift border is believed to traverse the middle of the county, but very few definite deposits of drift have been located. The rock formations exposed in Schuylkill County range from the post-Pottsville formations, of Pennsylvania age, down to the Tuscarora Sandstone of Silurian age. The youngest formations, the post-Pottsville, crop out in the large Southern anthracite field and part of the Western Middle field. The oldest formation, the Tuscarora, crops out along Kittatinny (Blue) Mountain which forms the southern boundary of the County.

The geologic structure of Schuylkill County is complex. The strata have been sharply folded along northeast axes, and the truncated hard and soft beds now form an intricate system of long narrow ridges and valleys. The carboniferous rocks suffer the most intense folding and are overturned in many places. The most important structure feature economically is the large synclinorium of the Southern anthracite field which occupies the center of the County. This basin consists of a number of smaller connected basins, which become successively deeper and have steeper sides as they progress towards the South. In the southern part of the County, the Silurian and Devonian rocks have been folded for some distance on both sides of the Schuylkill River. An anticline passes eastward from Cressona, exposing the Cayuga group and part of the Clinton formation. A syncline extending West from Landingville exposes the Catskill group.

The Lehighton anticline of Carbon County extends into Schuylkill County as far as Reynolds. The ridge north of Port Clinton is an anticlinal ridge exposing the Clinton formation, and a syncline crosses the Schuylkill River just north of Port Clinton exposing the Cayuga Group.

The geology produces a complex runoff pattern in Schuylkill County whereby there is drainage in five different directions. The northwestern part is drained by Mahantango Creek, and smaller streams, all of which drain into the Susquehanna River north of Harrisburg. The southwestern part is drained by Swatara Creek, which drains into the Susquehanna River south of Harrisburg. The northern most part is drained by Catawissa Creek, which drains into the North Branch of the Susquehanna River upstream of Danville. The eastern portion of the County is drained by tributaries of the Lehigh River, which in turn drains into the Delaware River near Easton. The central and greater part of the County is drained by tributaries of the Schuylkill River, which, in turn, drains into the Delaware River near Philadelphia.

2. Site Geology. The damsite is located in the central part of Schuylkill County. The area is drained by the Schuylkill River and geologically is part of the large synclinorium of the Southern anthractie field. The bedrock in the vicinity, and apparently underlying the dam, is a soft gray conglomerate of the Pottsville formation known locally as "Buck Mountain Rock." The soil overburden consists of a mixture of decomposed conglomerate and clay. Decomposition of the conglomerate is apparently to a greater depth in the valley portion of the damsite than it is in the abutments, since some outcrops are visible in the hillside. Foundation conditions for the embankment and appurtenant structures are unknown. It appears probable that they are founded on and in decomposed conglomerate.