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ACKENHEIL AND ASSOCIATES INC PITTSBURGH PA
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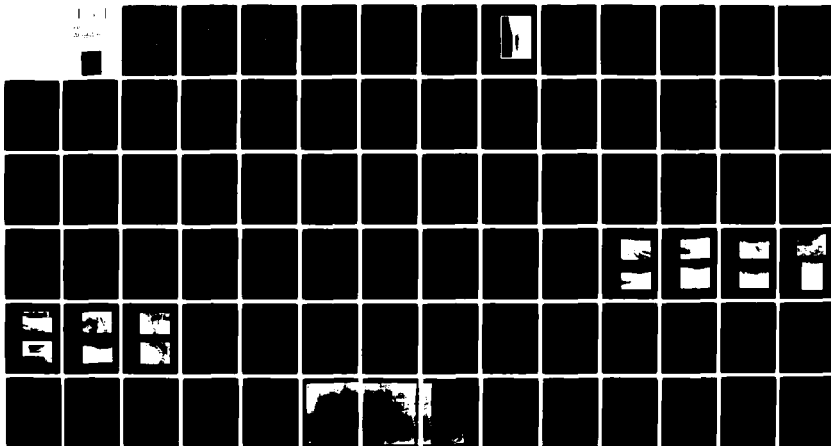
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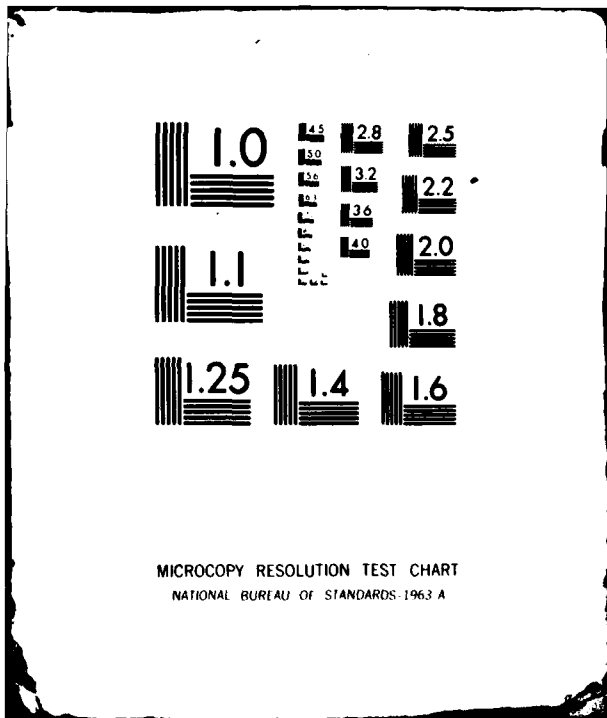
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NDI No. PA 00485
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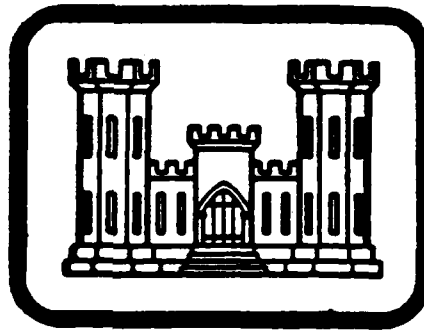
BRESKIN DAM No. 2

JOSEPH BRESKIN

DA0031-80-C-0026

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NOV 12 1980



PREPARED FOR

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

BY

ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
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OHIO RIVER BASIN

⑥ National Dam Inspection Program

BRESKIN DAM ~~Number 1~~ Number 2

WESTMORELAND COUNTY, COMMONWEALTH OF PENNSYLVANIA

Number ~~(NDIA No. PA 00485)~~
PenNER No. 65-134

Ohio River Basin, Four-mile Run, Westmoreland County, Pennsylvania

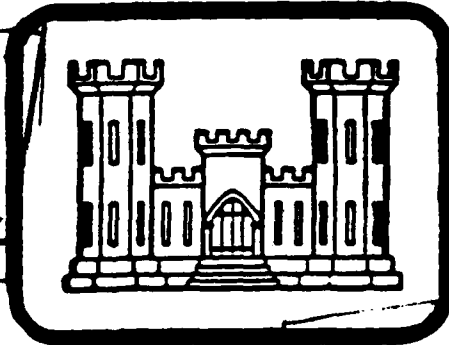
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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⑩ James P. Harrison
James Ellsworth

Bank II



⑮ DACN 31-80-C-0026

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

Prepared by: ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
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1000 Banksville Road
Pittsburgh, Pennsylvania 15216

Date: July 1980

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams for Phase I investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, materials testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify the need for such studies which should be performed by the owner.

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 the dam depends on numerous and constantly changing internal and external factors which are 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 time 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 investigations 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" (PMF) 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.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS

NAME OF DAM: Breskin Dam No. 2
STATE LOCATION: Pennsylvania
COUNTY LOCATION: Westmoreland
STREAM: Unnamed tributary to Fourmile Run, a tributary of Loyalhanna Creek.
DATE OF INSPECTION: 5 May 1980
COORDINATES: Lat. 40°13'39",
Long. 79°19'16"

ASSESSMENT

Based on a review of available design information and visual observations of conditions as they existed on the date of the field inspection, the general condition of the Breskin Dam No. 2 is considered to be good.

The structure is classified as an "intermediate" size, "high" hazard dam and the Spillway Design Flood is the Probable Maximum Flood. The spillway capacity was found to be "inadequate" because the non-overtopping flood discharge capacity, as estimated using the HEC-1 computer program, was found to be 42 percent of the PMF. The spillway is not "seriously inadequate", because in the opinion of the evaluating engineer, the dam will not fail at 50 percent of the PMF.

The visual observations indicated several deficiencies which are not considered serious. The deficiencies can be corrected or improved through implementation of the following recommendations:

RECOMMENDATIONS

1. Additional Investigation: Immediately retain a professional engineer knowledgeable in dam design and construction to perform a detailed hydrologic/hydraulic analysis of the reservoir and spillway and make recommendations on increasing the capacity of the system to make it adequate.

2. Remedial Work: The Phase I investigation of Breskin Dam No. 2 also disclosed several deficiencies of lower priority which should be corrected during routine maintenance. The corrections to be made include:

SYNOPSIS OF ASSESSMENT AND RECOMMENDATIONS (CONT'D)
Breskin Dam No. 2

(a) Repair wheel ruts on the embankment crest, bench and downstream slope.

(b) Revegetate barren areas on the crest and downstream slope.

(c) Erect a barricade to prevent vehicle traffic from traversing the downstream slope near the junction of the main embankment and left dike.

3. Emergency Operation and Warning Plan: Concurrent with the additional investigation recommended above, the owner should develop an Emergency Operation and Warning Plan including:

(a) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(b) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(c) Procedures for emergency drawdown of the reservoir under emergency conditions.

(d) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.



James P. Hannan
James P. Hannan
Project Engineer

25 July 1982
Date

James E. Barrick, II
James E. Barrick, P.E.
PA Registration No. 022639-E

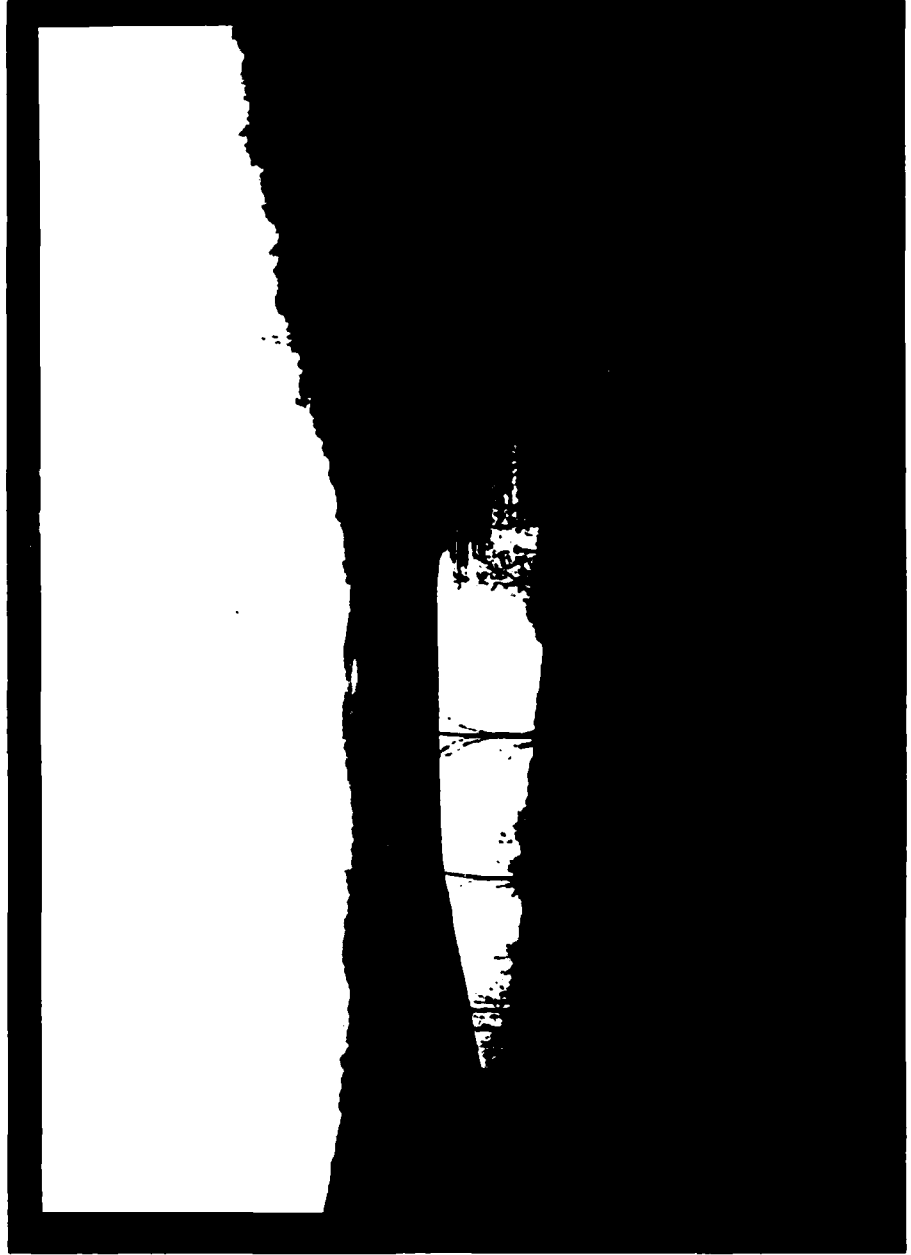
29 July 1982
Date

Approved by: *James W. Peck*

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

21 Aug 1982
Date

BRESKIN DAM No.2



OVERVIEW

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
BRESKIN DAM NO. 2
NATIONAL I. D. NO. PA 00485
PennDER No. 65-134

SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority: The Phase I investigation was performed pursuant to authority granted by Public Law 92-367 (National Dam Inspection Act) to the Secretary of the Army through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose: The purpose of the investigation is to make a determination on whether or not the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

a. Dam and Appurtenances:

(1) Main Embankment: Breskin Dam No. 2 was designed and constructed as a homogeneous earthfill structure but was later modified to include an internal drain below the downstream slope. The embankment is 230 feet long, with a maximum toe to crest height of 42 feet and a crest width of thirteen feet. The embankment's upstream slope was observed to be 1.0H:1.0V above the water line; the downstream slope was observed to be 1.7H:1.0V above a thirteen foot wide bench and 2.2H:1.0V below the bench.

(2) Left Dike: The left dike was also designed and constructed as a homogeneous earthfill structure. The left dike is 650 feet long and has a crest width of thirteen feet. The dike's upstream slope was observed to be 2.5H:1.0V above the waterline; the downstream slope was observed to be 1.8H:1.0V. The dike has a toe to crest height of 9.8 feet at the section measured.

(3) Outlet Works: The outlet works (pond drain) consists of a 10 inch "drainline" constructed through the embankment. Flow is controlled upstream by a sluice gate with a handwheel control above the pond waterline. The pond drain outlet is a 30 inch diameter CMP, installed during embankment modifications in 1973.

(4) Principal (and Emergency) Spillway: An uncontrolled open channel spillway was constructed on the right abutment to maintain the reservoir pool level and pass storm flows. The spillway walls are constructed of 3 x 3 x 12 foot gabion baskets filled with rock. The overflow crest and discharge channel base of the spillway are constructed gabion mats. A bridge crosses the spillway to provide access to and from the right abutment.

Below the bridge the spillway channel flows down the side of the hill into the natural stream channel.

(5) Downstream Conditions: The unnamed tributary to Fourmile Run, passes through a relatively steep sided, narrow valley, below the dam. Approximately 3,000 feet below the dam the stream enters Fourmile Run. Fourmile Run flows into Loyalhanna Creek west of Latrobe. There are approximately five inhabited dwellings in the floodplain within the first 3,000 feet below the dam.

(6) Reservoir: Breskin Dam No. 2's reservoir is 850 feet long at normal pool elevation and has a normal pool area of six acres. When the lake is at maximum pool, the reservoir length increases to 900 feet and the surface area is 8.1 acres.

(7) Watershed: The watershed contributing to Breskin Dam No. 2 is wooded with some pasture land. Breskin Dam No. 1 is approximately 500 feet upstream of the pool of Breskin Dam No. 2. Breskin Dam No. 1 does not currently impound water and its pond drain valve is usually open. Breskin Dam No. 1 is approximately 370 feet long and 30 feet high.

b. Location: Breskin Dam No. 2 is located in Ligonier Township, Westmoreland County, Pennsylvania.

c. Size Classification: The dam has a maximum storage capacity of 66 acre-feet and a maximum toe to crest height of 42 feet. Based on Corps of Engineers Guidelines, this dam is classified as an "intermediate" size structure.

d. Hazard Classification: Breskin Dam No. 2 is classified as a "high" hazard dam. In the event of a dam failure, at least five inhabited dwellings within the first one half mile downstream would be subjected to substantial damage and loss of life could occur.

e. Ownership: Breskin Dam No. 2 is owned by Joseph E. and Kathleen Breskin. Correspondence should be addressed to:

Joseph and Kathleen Breskin
506 Magee Building
336 Fourth Avenue
Pittsburgh, Pennsylvania 15222

f. Purpose: Breskin Dam No. 2 was constructed for recreational purposes.

g. Design and Construction History: The designer of the dam is not known. The dam was constructed in 1971 by Latimer Construction Company of New Alexandria, Pennsylvania. Ronald E. Kelly, P.E., of Greensburg, Pennsylvania, performed a structural evaluation and designed structure improvements in 1972. Various modifications and repairs were made in 1973 and 1978.

h. Normal Operating Procedure: Breskin Dam No. 2 was designed to operate as an uncontrolled structure. Under normal operating conditions, the pool level is maintained at Elev. 1445 by the broad crested weir of the principal spillway. A pond drain with upstream sluice gate control provides reservoir drawdown capability.

1.3 PERTINENT DATA

a. Drainage Area: 0.32 sq. mi.

b. Discharge at Dam Facility

Maximum Flood at Dam Facility	Unknown
Principal (Ungated) Spillway	
Capacity at Top of Dam	326 cfs

c. Elevation (feet above MSL)**

Design Top of Dam	1450*
Current Top of Dam (low point)	1449.4
Normal Pool	1445.0
Principal (Ungated) Spillway	
Overflow Crest	1445.0
Maximum Tailwater	Unknown
Inlet Invert of Pond Drain	Unknown
Outlet Invert of Pond Drain	1409.5
Channel Invert of Pond Drain	1408+

d. Reservoir Length

Length of Maximum Pool	900 feet
Length of Normal Pool	850 feet

e. Reservoir Storage

Current Top of Dam	66 acre-feet
Principal (Ungated) Spillway	
Weir Crest	36 acre-feet*
Normal Pool	36 acre-feet*

f. Reservoir Surface

Current Top of Dam	8.1 acres
Principal Spillway Crest	6.0 acres*
Normal Pool	6.0 acres*
Sediment Pool	6.0 acres*

g. Embankment

	<u>Main</u>	<u>Dike</u>
Type	Earth*	Earth*
Length	230 feet	650 feet
Height	42 feet	9.8 feet
Crest width	13 feet	13 feet
Slopes		
Downstream	1.7H:1V	1.8H:1V
	2.2H:1V (below bench)	
Upstream	1.0H:1.0V	2.5H:1V
Impervious core	Unknown	Unknown
Cutoff provisions	No*	No*
Grout curtain	No*	No*

h. Principal (and Emergency) Spillway
(Regulating And Emergency Outlet)

Type	Gabion lined open channel, broad crested weir
Length of Weir	12.3 feet
Weir Crest Elevation	1445.0 feet*

i. Outlet Works (Pond Drain)

Type	10 inch diameter with 30 inch diameter CMP extension
Inlet	At sluice gate
Upstream Flow Control	Yes
Conduit length	Unknown
Anti-seep Collars	Unknown

*Taken or derived from original specifications and/or drawings.

**To get the elevations on the drawing in Appendix E subtract 450 feet.

SECTION 2
ENGINEERING DATA

2.1 DESIGN

a. Data Available: The owner constructed this dam in 1971 prior to obtaining a state permit. After comments from downstream property owners, the Department of Environmental Resources instructed Mr. Breskin to obtain the services of an engineer knowledgeable in dams and soil mechanics to provide the state with the information needed in order to grant a permit for the structure. There is no record of any design information in the files of the Department of Environmental Resources and the owner could not provide any design documentation for this dam.

2.2 CONSTRUCTION

a. Constructor: The dam was constructed in 1971 by Latimer Construction Company of New Alexandria, Pennsylvania.

b. Modifications: After a downstream slope failure during the winter of 1971-1972, the owner obtained the services of Ronald E. Kelley, Consulting Engineer of Greensburg, Pennsylvania to make recommendations for modifications to the dam to meet all necessary conditions for safety and performance. The recommended modifications included:

(1) Construction of a rock toe and inverted filter at the base of the main embankment slope.

(2) Construction of a soil buttress above the rock toe and filter.

(3) Grouting up (with low strength concrete) of a 30 inch CMP riser type spillway.

(4) Extending the 10 inch pond drain through the rock toe of the embankment via the addition of a section of 30 inch diameter CMP.

(5) Installation of a gabion lined spillway on the right abutment.

After upstream slope instability was noted in the spring of 1978, the owner again retained the services of Ronald E. Kelley, Consulting Engineer and upon his recommendations the following modifications were performed:

(1) Filled open cracks with Volclay and regraded the disturbed areas after the cracks were sealed.

(2) Lined the upstream slope with riprap in order to further stabilize the slope by using the riprap as a counter weight.

2.3 OPERATION

The dam was designed to operate without a dam tender and no operational data is available. The outlet works (pond drain) has an upstream flow control utilizing a handwheel operated sluice gate.

2.4 EVALUATION

a. Availability: Available design information and drawings were obtained from the Pennsylvania Department of Environmental Resources and were supplemented by conversation with Mr. Joseph Breskin, the owner.

b. Adequacy: The available design information supplemented by field inspection and supporting engineering analysis presented in succeeding sections, is adequate for the purposes of this Phase I inspection report.

c. Validity: Based on the available data, there appears to be no reason to question the validity of the available design information and drawings.

SECTION 3
VISUAL INSPECTION

3.1 FINDINGS

a. General: The visual observations of Breskin Dam No. 2 were performed on 5 May 1980, and consisted of:

- (1) Visual observations of the embankment crest and slopes, groins and abutments;
- (2) Visual observations of the spillway including overflow weir, gabion walls and approach and discharge channels.
- (3) Visual observations of the pond outlet and sluice gate control.
- (4) Visual observations of the embankment's downstream toe area including the pond drain discharge channel.
- (5) Visual observations of downstream conditions and evaluation of the downstream hazard potential.
- (6) Visual observations of the reservoir shoreline and inlet stream channels.
- (7) Transit stadia survey of relative elevations along the embankment crest centerline, spillway, and across the embankment slopes.
- (8) Visual observations of the watershed, including Breskin Dam No. 1.

The visual observations were made during periods when the reservoir and tailwater were at normal operating levels.

The visual observations checklist, field plan, profiles and sections containing the observations and comments of the field inspection team are contained in Appendix A. Specific observations are illustrated on photographs in Appendix C. Detailed findings of the visual inspection are presented in the following sections.

b. Embankment:

(1) Crest: The embankment crest was generally straight through both the main portion and along the left dike. The crest was partially vegetated with grass and contained several wheel ruts that appeared to have contained standing water at one time. Several barren areas were noted on the crest. The stadia survey showed a low point at Elev. 1449.4 on the left dike near the main embankment.

Numerous drying cracks were observed along the entire length of the crest of the embankment. No structural cracks, either longitudinal or transverse, were observed during the inspection.

(2) Upstream Slope: The upstream slope was generally grass covered and well cared for. The slope was generally uniform between the crest and the pool level. No scarps, bulges or indications of sloughing were observed anywhere along the upstream slope.

Riprap for wave erosion protection was observed on the upstream slope, along the entire length of the main embankment and for approximately 300 feet along the left dike. The riprap extended to approximately 1 foot above the water line and was visible below the waterline. Rock size ranged from 6 to 18 inches and the riprap was in generally good condition.

(3) Downstream Slope: The downstream slope was in reasonably good condition throughout the length of the embankment. On the main embankment section, there was a dense covering of crown vetch on the slope between the crest and the bench. On the bench and lower slope, vegetation was somewhat more sparse and contained local barren areas.

Near the toe of the main embankment, there was a path containing numerous deer tracks. Just above this was a noticeable line across the toe of the embankment marking a change in vegetal conditions. Below the line, vegetation was somewhat sparser than above. However, the embankment surface was dry and hard both above and below the line.

At the junction of the main embankment and the left dike, on the downstream slope, a barren trail apparently caused by motorcycles and four-wheel drive vehicles was observed. Some erosional rutting has developed on the trail below the bench.

The left dike was observed to be in a condition similar to the main embankment. Vegetal cover was dense on the slope between the crest and the bench and somewhat sparser below. Wheel ruts were observed near the upstream end of the bench. They were dry at the time of observation but appeared to have contained water at one time.

(4) Groins (Junction of Embankment and Abutment): The groins of the main embankment were dry and uneroded. They were vegetated and appeared to be well maintained. There was no indication of seepage or other erosional distress. The groin of the left dike consists of the road drainage ditch at the toe of the dike, along Legislative Route 64284. The ditch was in generally good condition. The exposed soil was moist but not wet. No flowing water was observed anywhere along the ditch. Erosional features of the ditch appeared to be the result of normal roadside drainage.

c. Abutments:

(1) Right: The right abutment was wooded and brush covered and contained the channel for the principal (and emergency) spillway. Observation of the right abutment indicated no seeping water conditions or indications of instability.

(2) Left: The left abutment consists of Legislative Route 64284 which approximately parallels the centerline of the left dike crest. No indications of seepage or instability were observed along or beyond the road.

d. Pond Drain:

(1) Intake Structure: The intake structure for the pond drain was not observed due to the pool level in the reservoir. A slide gate valve stem with a broken handwheel was observed just above the water line near the center of the main embankment. The valve stem was protected by several tires that had been wired to the stem. The valve stem was anchored at the crest by a small concrete pier.

The handwheel was operated in the presence of Mr. Breskin and flow was observed at the outlet end of the pond drain. The valve was then closed.

(2) Conduit: The pond drain outlet is 30 inch diameter CMP that discharges directly to the original stream channel at the downstream toe of the embankment.

(3) Outlet Structure: The pond drain discharges immediately beyond a rock wall which has been placed at the toe of the embankment.

(4) Outlet Channel: The outlet channel immediately below the pond drain outlet is rock and tree lined and contained some debris. However, performance of the pond drain is not dependent upon the condition of the channel.

e. Principal (and Emergency) Spillway:

(1) Approach Channel: The approach channel of the principal spillway is quite short and was unobstructed on the date of inspection. There were no conditions that would impair the adequate performance of the spillway.

(2) Overflow Crest: The overflow crest for the spillway consists of a broad crested weir 12.3 feet wide, that lies at the entrance to a gabion lined spillway channel. The weir area was physically and hydraulically in good condition on the date of inspection.

(3) Discharge Channel: The discharge channel consists of a gabion lined open channel that passes over the right abutment to a point approximately 40 feet below the reservoir pool. The channel leaves the pond area diagonally into the abutment and curves gently as it passes over the abutment. The initial reach of the discharge channel was 5.3 feet deep and 12.3 to 15.3 feet wide.

(4) Bridge and Piers: A bridge crosses the principal spillway channel at the embankment crest. The bridge is constructed of 15 inch steel I-beams set on concrete block piers. The bridge deck is reinforced concrete and has a log handrail. The bridge appeared to be in excellent condition.

(5) Downstream Channel: Below the gabion lined channel, principal spillway discharge is to a earth cut channel excavated into the right abutment. The left slope of the downstream channel consists of an earthen dike apparently constructed from material

excavated from the channel. Approximately 200 feet below the reservoir, the channel drops steeply and has eroded a 4 to 5 foot gully into the hillside. In the area of severe erosion, the channel bottom appears to be on natural hillside bedrock. Below this, the channel turns sharply to the left, traverses the flood plain, which has been heavily clogged with silt, rock and rock debris from the erosion above, and rejoins the original stream channel near the center of the valley. The confluence of the spillway downstream channel and the original creek channel is approximately 60 feet below the toe of the main embankment.

f. Instrumentation: No instrumentation was observed during the inspection.

g. Downstream Conditions:

(1) Seepage: The only seepage observed anywhere in the vicinity of Breskin Dam No. 2 was noted below the rock wall that comprises the headwall of the pond drain outlet. The area was observed to be damp and a minor amount of water was observed. The rate of seepage was too small to estimate.

(2) Downstream Channel: The downstream channel below the dam is a typical mountain brook channel, winding and littered with trees, downtimber and boulders. The valley below the dam is heavily wooded and uninhabited for a distance of 2500 feet below the dam.

(3) Floodplain Development: At least five inhabited dwellings lie on the floodplain in the 3000 foot reach between the dam and the confluence with Fourmile Run below.

h. Reservoir:

(1) Slopes: The reservoir left slope is flat and generally brush and small tree covered in the reach between the end of the left dike and the upper end of the reservoir. A depressed area with vertical scarp was noted along the left bank. The area appears to be the result of slumping of the hillside. However, it did not appear to affect the reservoir or reservoir water level in a detrimental way. Some minor surface erosion was noted, apparently from runoff.

The right reservoir slope is moderately steep, and generally tree covered over the length between the main embankment and the upstream end of the reservoir. Only minor surficial erosion as a result of surface runoff was noted in this area.

(2) Inlet Streams: Two small streams enter the reservoir near the upstream end. Each stream approaches the reservoir in a small, shallow, steep sided channel that is grass and brush covered. Both channels had a small amount of flowing water on the date of inspection.

(3) Sedimentation: No significant sedimentation was observed at the upstream end of the reservoir. However, some shallowing of this area was noted as a result of deposition of sand for a small beach.

i. Watershed:

(1) Upstream Dam: Breskin Dam No. 1 lies approximately 500 feet upstream of the upstream end of Breskin Dam No. 2's reservoir. A cursory observation indicated that Breskin Dam No. 1 is an earth fill embankment approximately 30 feet high, having a crest width of 25 feet and a crest length of approximately 370 feet. The embankment crest was barren and the downstream slope was partially vegetated. At the time of observation, the reservoir area was empty and a slide gate pond drain was open, permitting discharge of inflowing waters. A principal spillway consisting of a 30 inch inside diameter, asphalt coated CMP riser was observed to be embedded into the embankment. The free board between the top of the riser and the crest of the embankment appeared to be approximately 3 feet. On the left abutment, a small shallow channel had been dug to permit discharge of storm flows around the end of the embankment. Mr. Breskin indicated that the reservoir is normally maintained in a empty condition although it is sometimes filled during the summer months.

(2) Development: The watershed was observed to be more or less as indicted on the U.S.G.S. 7-1/2 minute topographic map. The watershed is almost entirely wooded except for the Breskin farm area and a sawmill near the ridge crest. Some of the upper watershed's woodland has been thinned by lumbering.

3.2 EVALUATION

a. Embankment: Based on visual observations, the general overall condition is considered to be good. However, several barren areas were noted on the crest and downstream slope. In particular, the vehicle trail near the junction of the main embankment and left dike is considered to be a deficiency. The wheel ruts on the crest and bench are considered minor deficiencies.

The upstream slope and riprap erosion protection appeared to be in good condition. Also in good condition were the dam's groins and abutment areas.

b. Pond Drain: The pond drain was observed to be operational. The broken handwheel made operation of the sluice gate difficult but not impossible.

c. Principal Spillway: The principal spillway was observed to be in good condition. There were no flow obstructions that would compromise spillway performance during flood flows.

The spillway's downstream channel was somewhat eroded, but appeared to be founded on bedrock. This condition did not appear to present a threat to the integrity of the dam.

d. Reservoir: A significant landslide condition was observed on the hillside upstream of the end of the left dike. The condition appeared to be long-term and would not seem to threaten the integrity of the dam.

e. Upstream Dam: Breskin Dam No. 1, although empty at the time of observation, creates a significant impoundment zone above Breskin Dam No. 2. This impoundment is drained only by a small pond drain pipe and has no significant storm water discharge facility.

f. Hazard Classification: Based on visual observations of floodplain conditions below the dam, the hazard classification is determined to be "high" since loss of life may occur as a result of failure of the dam.

SECTION 4
OPERATIONAL FEATURES

4.1 PROCEDURE

Reservoir pool level is maintained by the uncontrolled weir crest of the principal spillway. Normal operating procedure does not require a dam tender.

4.2 MAINTENANCE OF DAM

The embankment and appurtenances are maintained by the owner. Maintenance reportedly consists of periodically repairing eroded areas and making miscellaneous necessary repairs.

4.3 INSPECTION OF DAM

The owner is required by the State of Pennsylvania to inspect the dam annually and make needed repairs.

4.4 WARNING SYSTEM

There is no warning system and no formal emergency procedure to alert or evacuate downstream residents upon threat of a dam failure.

4.5 EVALUATION

Maintenance of the dam is considered to be good. The lack of a downstream warning system is assessed to be a deficiency. The recommendations presented in Section 7 should be implemented as part of a general maintenance and surveillance program at the dam.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: The Breskin Dam No. 2 has a watershed of 205 acres which is vegetated primarily by woodland and pasture. The watershed is about one half mile long and one mile wide and has a maximum elevation of 1750 feet (MSL). At normal pool, the dam impounds a reservoir with a surface area of 6 acres and has a storage volume of 36 acre-feet. Normal pool level is maintained at Elev. 1445 by the broad crested weir overflow crest of the principal spillway.

Spillway capacity and embankment freeboard were made sufficient to accommodate 500 cubic feet per second which was considered sufficient for this structure and watershed at the time of design. No additional hydrologic calculations were found relating reservoir/spillway performance to the Probable Maximum Flood or fractions thereof.

b. Experience Data: Records are not kept of reservoir level or rainfall amounts. There is no record or report of the embankment ever being overtopped.

c. Visual Observations: On the date of the field reconnaissance, no serious deficiencies were observed that would prevent the principal spillway from functioning.

Breskin Dam No. 1 lies in the watershed above Breskin Dam No. 2 and may have some influence on the hydrologic/hydraulic performance of the No. 2 dam. However, due to lack of design information, the effect of No. 1 dam was not taken into consideration in our analysis.

d. Overtopping Potential: Overtopping potential was investigated through the development of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF and fractions of the PMF through the reservoir and spillway. According to Corps of Engineers Guidelines, the spillway design flood for "intermediate" size, "high" hazard dams is the Probable Maximum Precipitation.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.2 inches. No calculations are available to indicate whether the reservoir and spillway are sized to pass a flood corresponding the runoff from 19.2 inches of rainfall in 24 hours. Consequently, an evaluation of the reservoir/spillway system was performed to determine whether the dam's spillway capacity is adequate under current Corps of Engineers guidelines.

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

The peak inflow to Breskin Dam No. 2 was determined by HEC-1 to be 770 cfs for a full PMF.

An initial pool elevation of 1445 was assumed prior to commencement of the storm.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be 0.48 PMF by HEC-1. According to Corps of Engineers' guidelines, Breskin Dam No. 2's spillway is "inadequate." At 0.50 PMF, Breskin Dam No. 2 is overtopped by 0.12 feet of water for a duration of one hour and fifteen minutes. In the opinion of the evaluating engineer, this overtopping would not cause failure of the embankment. An overtopping depth of at least one foot above the minimum elevation of the dam was judged by the engineer to be necessary to cause failure of the dam. Consequently, a downstream routing and breach analysis were not performed.

Therefore, in accordance with Corps of Engineers guidelines, the spillway is rated "inadequate" but not "seriously inadequate".

SECTION 6
STRUCTURAL STABILITY

6.1 AVAILABLE INFORMATION

a. Design and Construction Data: All available design documentation, calculations and other data received from the Pennsylvania Department of Environmental Resources were reviewed. There is no record of who designed the dam or any design calculations. A detailed list of available information is found in Appendix B.

b. Operating Records: There are no written operating records or procedures for this dam.

c. Post-Construction Changes: In the winter of 1971-1972, the downstream slope of the left dike failed. In 1973, upon the recommendation of Ronald E. Kelly, Consulting Engineer, a rock toe and inverted filter were placed around the downstream slope. On top of the rock toe, a soil buttress was placed to increase the stability. According to Mr. Kelly's report, the factor of safety against sliding with the new configuration is 2.37.

After reservoir drawdown during the winter of 1977-1978, the upstream slope failed. Mr. Kelly stated that he believed, that in all probability the slope had reached a stable configuration and additional stability could be provided by placing large rocks at the toe of the slope to act as a counterweight.

d. Visual Observations: The field inspection disclosed no evidence of potential instability of the embankment or its components. The embankment slopes showed no signs of displacement or sloughing. There was no exterior evidence indicating anomalous seepage through the embankment.

e. Performance: The dam's downstream slope showed signs of instability shortly after its construction in 1971. This was resolved by adding a rock toe with filter and soil buttress along the downstream slope in 1973. The upstream slope showed signs of distress after the water was drawdown in 1977. Repairs were made in late 1978. The performance of this embankment has been questionable during its nine year life.

6.2 EVALUATION

a. Design Documents: The design documentation, by itself, is considered inadequate to evaluate the structure. The structural calculations were based on limited laboratory testing and test boring information.

b. Embankment: Based on results of the visual inspection that included observations of embankment slopes, materials, seepage and groundwater conditions, Breskin Dam No. 2 appeared to be stable.

c. Principal Spillway: Based on results of the visual inspection, the principal spillway structure for Breskin Dam No. 2 appeared to be stable.

d. Seismic Stability: According to the Seismic Risk Map of the United States, Breskin Dam No. 2 is located in Zone 1 where damage due to earthquakes would most likely be minor.

A dam located in Seismic Zone 1 may be assumed to present no hazard from an earthquake provided static stability conditions are satisfactory and conventional safety margins exist. However, no calculations were performed to verify this assumption.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Evaluation:

(1) Embankment: Breskin Dam No. 2's embankment is considered to be in good condition. This is based on visual observations that revealed only minor deficiencies including wheel ruts on the crest, bench and downstream slope, and barren areas on the crest and downstream slopes.

(2) Outlet Works: The condition of the outlet works is considered to be good. The 10 inch pond drain has an upstream slide gate and its operation was observed during the field inspection.

(3) Principal Spillway: The condition of the principal spillway is considered to be fair. This is based on the "inadequate" capacity rating determined using the HEC-1 computer program. The spillway was found to pass only 42 percent of the PMF. The Spillway Design Flood is the PMF because of the dam size and hazard classification.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and hydrology and hydraulic calculations was sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

c. Urgency: The recommendations presented in Section 7.2a and 7.2c should be implemented immediately.

7.2 RECOMMENDATIONS

a. Additional Investigation: Retain a professional engineer knowledgeable in dam design and construction to perform a detailed hydrologic/hydraulic analysis of the reservoir and spillway and make recommendations on increasing the capacity of the system to make it adequate.

b. Remedial Work: The Phase I investigation of Breskin Dam No. 2 also disclosed several deficiencies of lower priority which should be corrected during routine maintenance.

(1) Repair wheel ruts on the embankment crest, bench and downstream slope.

(2) Revegetate barren areas on the crest and downstream slope.

(3) Erect a barricade to prevent vehicle traffic from traversing the downstream slope near the junction of the main embankment and left dike.

c. Emergency Operation and Warning Plan: Concurrent with the additional investigation recommended above, the owner should develop an Emergency Operation and Warning Plan including:

(1) Guidelines for evaluating inflow during periods of heavy precipitation or runoff.

(2) Procedures for around the clock surveillance during periods of heavy precipitation or runoff.

(3) Procedures for drawdown of the reservoir under emergency conditions.

(4) Procedures for notifying downstream residents and public officials, in case evacuation of downstream areas is necessary.

APPENDIX A
VISUAL INSPECTION CHECKLIST

VISUAL OBSERVATIONS CHECKLIST I
(NON-MASONRY IMPOUNDING STRUCTURE)

Name Dam Breskin No. 2 County Westmoreland State Pennsylvania National ID # PA 00485

Type of Dam Earth Hazard Category High

Date (s) Inspection 5 May 1980 Weather Clear, hot Temperature 85°F

Pool Elevation at Time of Inspection Elev. 1445. 4 (MSL)

Inspection Personnel: J. E. Barrick, P.E. Ackenheil & Associates, Hydrologist and Project Manager.
J. P. Hannan Ackenheil & Associates, Geotechnical Engineer
S. G. Mazzella Ackenheil & Associates, Civil Engineer
J. E. Breskin Owner
E. Linhard Caretaker

Recorder J. E. Barrick

GEO Project G79153-S
PENNDER I.D. No. 65-134

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	Numerous drying cracks observed along crest of embankment. No cracks observed in either upstream or downstream slope. Some wheel rutting observed on left dike bench.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Minor erosion observed on main embankment downstream slope. Bike trail observed on junction of main embankment and left dike. Minor erosion observed on right abutment just beyond the spillway.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal alignment appears to be straight over both main embankment and the left dike. Vertical alignment - the crest appears to be level around the entire perimeter. The crest rises slightly near the right abutment as it approaches the spillway bridge.	

EMBANKMENT (cont'd)

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
RIPRAP FAILURES	Riprap extends across the upstream face of the main embankment and for about 300 feet along the left dike. Riprap extends to about 1 foot above the water line and appears to be in generally good condition. Riprap consists of rock ranging in size from 6 inches to 18 inches.	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The left groin consists of the intersection of the embankment toe and Solomon Temple Road, Legislative Route 64284. The groin is the roadside ditch and was observed to be generally damp, but not wet. No water was flowing in the ditch. No significant erosion observed. The right groin between the embankment and the right abutment was observed to be dry, uneroded, adequately vegetated and in good condition. Likewise, the left groin of the main embankment.	
ANY NOTICEABLE SEEPAGE	Minor seepage observed in the vicinity of the pond drain outlet. Flow too small to determine. No erosion or movement of soil particles.	
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

OUTLET WORKS

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet conduit (pond drain) is 30 inch diameter CMP. It discharges at the toe of the main embankment.	
INTAKE STRUCTURE	The intake structure was not observed due to the reservoir pool level. The slide gate stem and handwheel (broken) were observed at the water line. The handwheel was turned to evaluate operability of the pond drain. Water discharged at the toe below and the handwheel was closed. System is operative. Rubber tires have been anchored to the stem to protect it from ice damage.	
OUTLET STRUCTURE	The CMP has no headwall at the outlet. Discharges directly to a rock lined channel at the toe of the dam.	
OUTLET CHANNEL	The outlet channel consists of the original stream bed below the outlet for the pond drain. Some small woody vegetation and debris noted in the channel. No effect upon operation of pond drain system.	
EMERGENCY GATE	None observed.	

PRINCIPAL (AND EMERGENCY) SPILLWAY

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
CONCRETE WEIR	None observed. Spillway flow control is by gabion surfaced broad crested weir.	
APPROACH CHANNEL	Approach channel clear and free of obstructions that would hinder discharge through the spillway.	
DISCHARGE CHANNEL	Discharge channel consists of a 12.3 to 15.3 feet wide rectangular open channel that lies between rock-filled gabion baskets. The base of the channel is also a gabion structure. The channel leaves the reservoir diagonally near the right abutment. About 15 feet below the embankment crest, the channel turns and runs perpendicular to the crest centerline for another 25 feet before turning slightly to the left and entering a steeper earth cut channel in the right abutment. The earth cut channel is founded on rock and continues approximately 100 feet downstream where it enters an erosional cut formed by spillway flows. The base of the erosional cut appears to be natural rock.	
BRIDGE AND PIERS	A bridge crosses over the principal spillway to provide access to the right abutment. The bridge is constructed of 15 inch steel, wide flange beams seated on concrete block piers. The bridge has three supporting beams which are connected by 9 inch cross channels. The bridge deck is a 6 inch concrete slab constructed on the steel channels. The hydraulic channel beneath the bridge is gabion lined. The bridge deck has log handrails.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	<p>The reservoir slopes beyond the upper end are generally flat, grass and brush covered. The right slope is moderately steep and generally wooded. Minor erosion observed at local points along both slopes appearing to be the result of surface runoff. Some significant shoreline sloughing was observed on the left, upper end of the reservoir beyond the upper end of the left dike. However, performance of the dam and reservoir did not appear to be comprised.</p>	
SEDIMENTATION	<p>No significant sedimentation observed at upper end of lake. Upper end is relatively shallow as a result of the apparent deposition of sand for a small beach.</p>	
INLET STREAMS	<p>Two small streams enter the reservoir at the upstream end. One on each side of the beach described above. These two streams approach the lake through small shallow, steep sided channels that are overgrown with grass and brush. The left channel appears to originate near the toe of an upstream dam described below.</p>	
UPSTREAM DAM	<p>An earthen dam exists in the watershed immediately upstream of Breskin Dam No. 2. The structure was briefly observed and found to be approximately 30 feet high with a crest length of 370 feet and a crest width of 25 feet. cursory observation revealed no indication</p>	

RESERVOIR (cont'd)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
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**UPSTREAM DAM
(continued)**

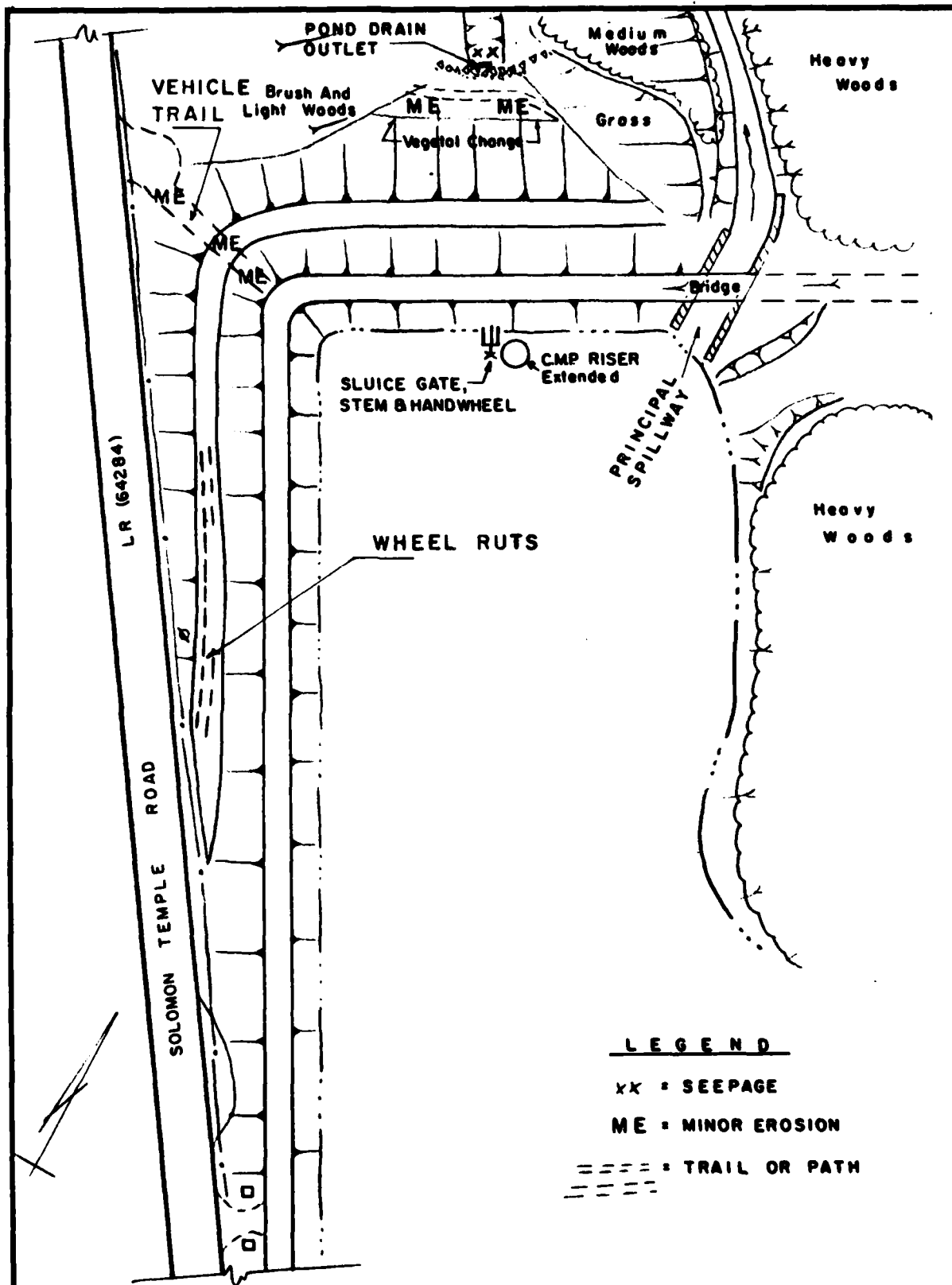
of slope instability. The slopes appeared to be relatively flat. The outlet works consisted of a CMP with slide gate at the upstream base of the embankment. The impoundment was empty at the time of observation. Mr. Breskin, the owner, indicated that he normally maintains the reservoir in an empty condition. It will occasionally be filled during the summer and then is drawn down over the winter months. The principal spillway consisted of a 30 inch I.D. asphalt coated CMP riser structure embedded in the upstream slope. Free board appeared to be 2 to 3 feet. A small, shallow excavation has been made on the right abutment, apparently to direct dam threatening flows to the abutment area. Grass and vegetal cover on the crest were minimal and sparse on the downstream slope.

WATERSHED

The watershed was observed to be more or less as indicated on the U.S.G.S. 7-1/2 minute topographic map. The watershed appears to be almost entirely wooded except for the Breskin farm and lake and a sawmill area near the crest of the ridge. Some of the upper woodland has been thinned by foresting.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel below Breskin Dam No. 2 is a typical mountain brook with winding, rock and tree lined channel. The valley below Breskin Dam No. 2 is heavily wooded and, approximately 1/2 mile below the dam, large sandstone boulders were observed on the valley walls. The first inhabited dwelling below Breskin dam lies approximately 2500 feet below the dam.	
APPROXIMATE NO. OF HOMES AND POPULATION		Three inhabited dwellings were observed on the floodplain of the unnamed tributary of Fourmile Run in the 3000 foot reach between the dam and Fourmile Run below.



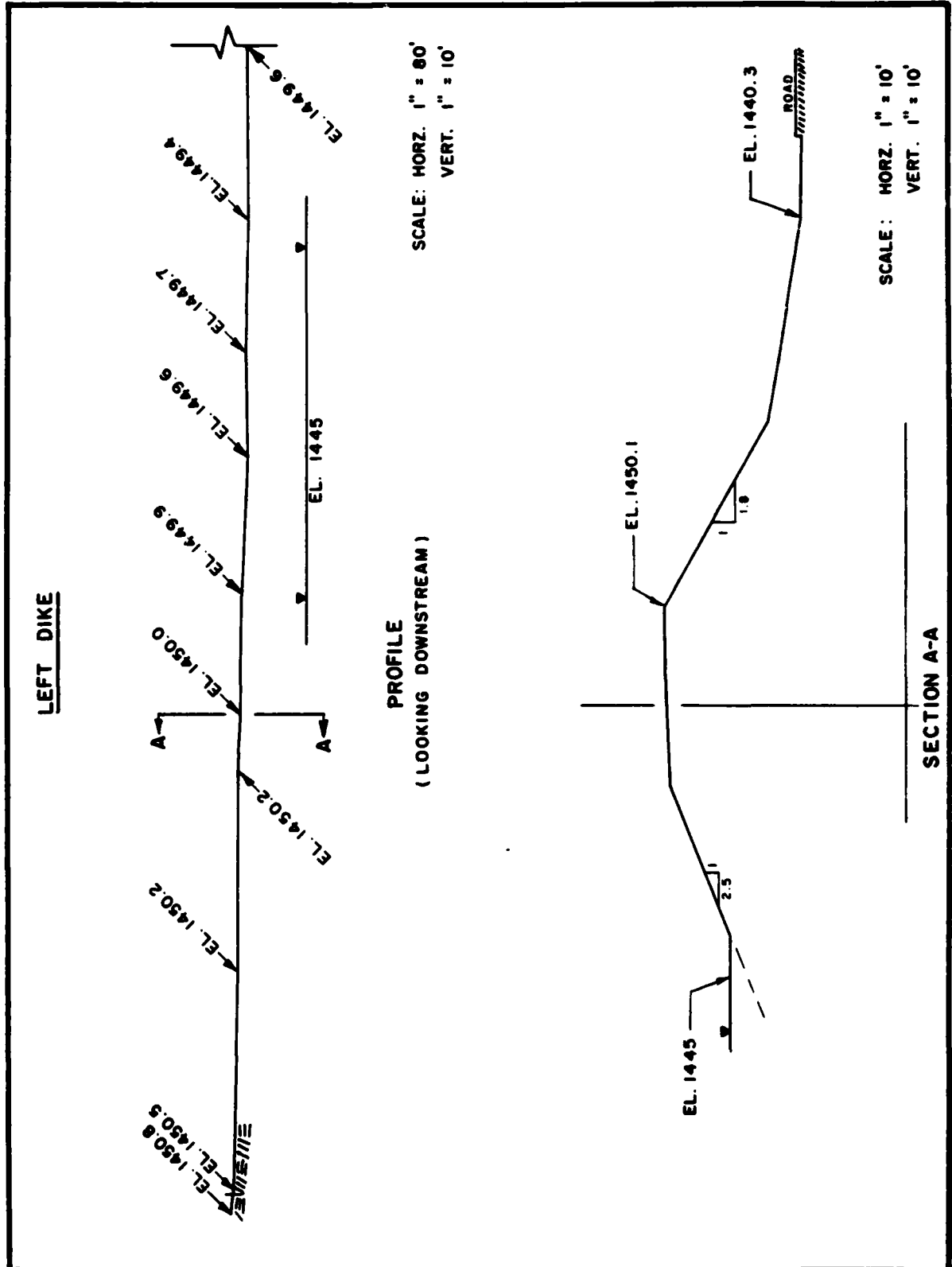
LEGEND

XX = SEEPAGE

ME = MINOR EROSION

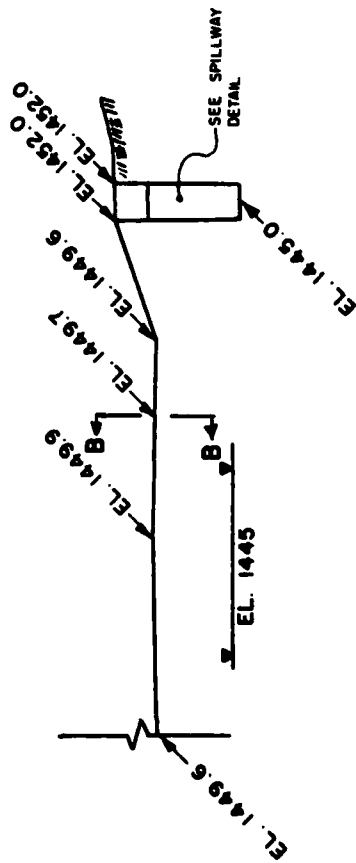
== = TRAIL OR PATH

DATE: JULY 1980		BRESKIN DAM No. 2		FIELD PLAN
SCALE: NONE		NATIONAL DAM INSPECTION PROGRAM		
DR: PT	CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		



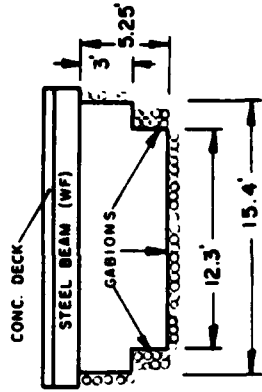
DATE: JULY 1980		BRESKIN DAM No. 2 NATIONAL DAM INSPECTION PROGRAM		FIELD PROFILE AND SECTION
SCALE: AS SHOWN				
DR: JF	CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		

MAIN EMBANKMENT



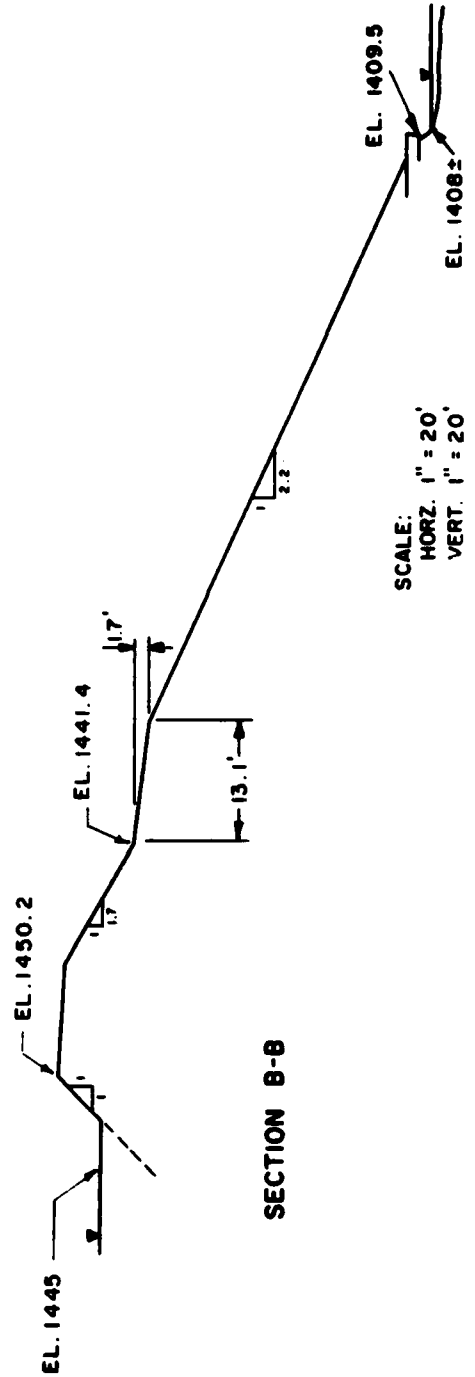
**PROFILE
(LOOKING DOWNSTREAM)**

SCALE:
HORZ. 1" = 80'
VERT. 1" = 10'



SPILLWAY ELEVATION

SCALE:
HORZ. 1" = 10'
VERT. 1" = 10'



SECTION B-B

SCALE:
HORZ. 1" = 20'
VERT. 1" = 20'

DATE: JULY 1980

SCALE: AS SHOWN

DR: JF

CK: JEB

BRESKIN DAM No. 2
NATIONAL DAM INSPECTION PROGRAM

A. C. ACKENHEIL & ASSOCIATES, INC.
CONSULTING ENGINEERS
PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.

FIELD
PROFILE,
SECTION
& SPILLWAY
ELEVATION

APPENDIX B
ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Breskin Dam No. 2
I.D. No. PA 00485

ITEM	REMARKS
Design Drawings	None available.
As-Built Drawings	"Lake Ligonier" 10 February 1972, by R. M. Keddal and Associates, Bethel Park, Pennsylvania, Topographic Survey. "Existing Earth Dams on Tributary of Fourmile Run", 1 of 2, February 1972, by J. Fred Triggs, P.E., Pittsburgh, Pennsylvania. Plan view of dams. "Existing Earth Dams on Tributary of Fourmile Run", 2 of 2, February 1972, by J. Fred Triggs, P.E., Pittsburgh, Pennsylvania, Sections of Dams.
Regional Vicinity Map	U.S.G.S. 7-1/2 Minute Stahlstown, Pennsylvania Quadrangle Map.
Construction History	Constructed by Latimer Construction Company of New Alexandria, Pennsylvania in 1971. Buttress embankment on downstream slope and spillway added in 1973 by Latimer Construction Company of New Alexandria, Pennsylvania.

ITEM	REMARKS
*Typical Sections of Dam	Transverse sections, see As-Built Drawings.
*Outlets-Plan Details Constraints Discharge Ratings	See As-Built Drawings. See "Design Recommendations for Dam No. 2 on Tributary to Fourmile Run" dated 23 August 1972 and supporting calculations on Embankment Reservoir dated 22 August 1972 both by Ronald E. Kelley, Consulting Engineer.
*Rainfall/Reservoir Records	None available.
*Design Reports	Report upon the Application of Joseph Breskin, dated 1 November 1972 prepared by the Dams Section, Department of Environmental Resources.
Geology Reports	None available.
Design Computations	None available.
Hydrology and Hydraulics	See "Design Recommendations for Dam No. 2 . . ." dated 23 August 1972 and three sheets of Spillway Design Calculation dated 19 August 1972 both by Ronald E. Kelley, Consulting Engineer. See Outlets . . . above.
Dam Stability	See "Engineering Report Condition of Existing Dams on Tributary to Fourmile Run" by J. Fred Triggs and Associates dated 27 February 1972. See "Stability Analysis for Dam No. 2 on Tributary to Fourmile Run" by Ronald E. Kelley Consulting Engineers dated 10 October 1972.

ITEM	REMARKS
Dam Stability (Continued)	<p>See "Modified Profile of Main Embankment for Dam No. 2 on Tributary of Fourmile Run, Ligonier Township, Westmoreland County" by Ronald E. Kelley Consulting Engineers, dated 12 October 1972.</p> <p>See "Engineering Investigation of Upstream Slope Along Side Embankment at Earth Dam by Ronald E. Kelley Consulting Engineers, dated 18 January 1979.</p>
*Seepage Studies	<p>See "Engineering Report, Condition of Existing Dams on Tributary of Fourmile Run" dated 27 February 1972 by J. Fred Triggs and Associates.</p>
*Materials Investigations, Boring Records, Laboratory, Field	<p>See report on the laboratory testing of Solomon Temple Road, by Pittsburgh Testing Laboratories dated 12 May 1972. The reports included logs of two test borings at this site, one Shelby tube at each boring, one grain size, one plastic limit test and one direct shear test on each Shelby tube sample.</p>
*Post-Construction Surveys of Dam	<p>See As-Built Drawing in Appendix E.</p>
*Borrow Sources	<p>On site.</p>
Monitoring Systems	<p>None reported.</p>
*Modifications	<p>The following modifications were performed in 1973.</p> <p>Construction of rock toe and inverted filter at the base of the main embankment slope.</p>

ITEM	REMARKS
*Modifications (Continued)	Construction of soil buttress on top of newly placed rock toe and filter.
	30 inch CMP outlet pipe grouted up with low strength concrete.
	24 inch drainline extended through the rock toe to the streambed.
	Installation of gabion lined spillway.
	In 1979, the following modifications were performed:
	1. Filled open cracks with Volclay and regrade disturbed area.
	2. Lined the upstream slope with riprap.
*High Pool Records	None available.
*Post-Construction Engineering Studies and Reports	Laboratory test results and driller logs by Pittsburgh Testing Laboratories dated 12 May 1972.
	"Engineering Report Conditions of Existing Dams on Tributary of Fourmile Run dated 27 February 1972 by J. Fred Triggs and Associates.
	The following studies were performed by Ronald E. Kelley Consulting Engineer:
	"Engineering Investigation and Design Recommendations for Two Dams on Tributary of Fourmile Run," dated 24 July 1972.

ITEM

REMARKS

#Post-Construction Engineering Studies and Reports (Continued)

"Stability Analysis for Dam No.2 on Tributary of Fourmile Run" dated 10 October 1972.

"Design Recommendations for Dam No. 2 on Tributary of Fourmile Run" dated 23 August 1972

"Modified Profile of Main Embankment for No. 2 Dam on Tributary of Fourmile Run" dated 21 October 1972.

"Final Report on Completion of Reinforcements and Modifications to Two Dams on a Tributary of Four-mile Run" dated 20 July 1973.

"Engineering Investigation of Upstream Slope Along Side Embankment at Earth Dam" dated 18 January 1979.

None available.

Maintenance, Operation, Records

See As-Built Drawings above.

#Spillway Plan Sections Details

See As-Built Drawings above.

#Operating Equipment Plans and Details

Miscellaneous correspondence involving application requirements and approval conditions including:

#Miscellaneous

Application of Joseph Breskin for consent or permit to construct and maintain an existing dam on an unnamed tributary to Fourmile Run,

ITEM

REMARKS

***Miscellaneous (Continued)**

Ligonier Township, Westmoreland County, Pennsylvania dated 3 April 1972.

"Permit" to construct a dam across an unnamed tributary to Fourmile Run, Ligonier Township, Westmoreland County, Pennsylvania by Department of Environmental Resources to Joseph Breskin dated 21 November 1972.

Miscellaneous correspondence related to dam inspections of Breskin Dam No. 2 by the Department of Environmental Resources personnel dated 10 November 1971, 19 May 1972, 17 July 1972, 5 August 1973 and 30 May 1978.

Note: The inspection report of 17 July 1972 was authored by A. Zlaten, of the Earth Dam Section Hydraulic Structure Branch, U.S. Bureau of Reclamation, Denver, Colorado who conducted the inspection with Department of Environmental Resources Personnel present.

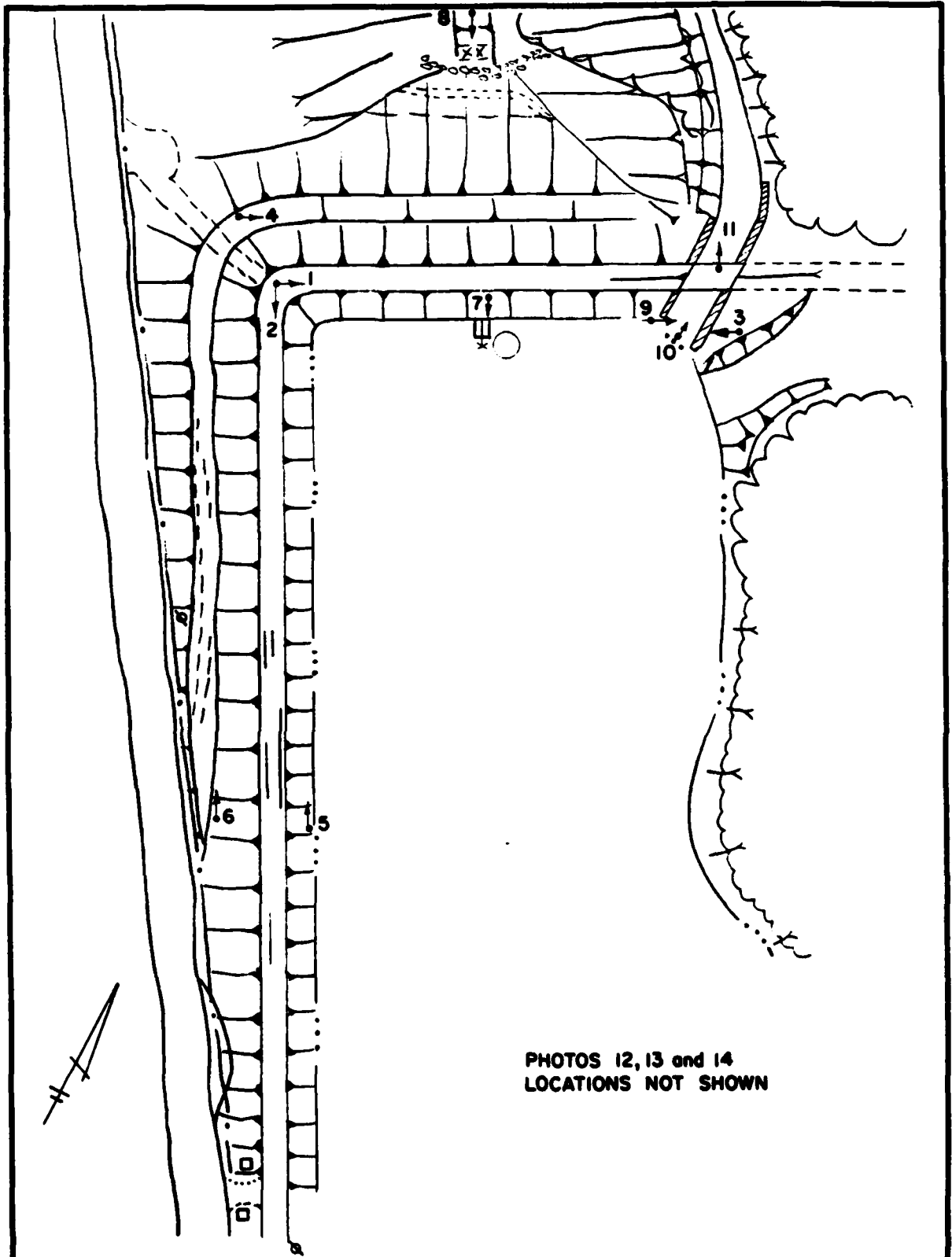
Miscellaneous correspondence regarding the various engineering analysis personnel and state requirements from 10 November 1971.

***Prior Accidents or Failure of Dam Description Reports**

Downstream slope failure, Winter 1971 - 1972.
Upstream slope failure, Spring 1978.

* Information and data may be obtained from the PennDER, Harrisburg, Pennsylvania.
**Reduced size reproductions contained in Appendix E.

APPENDIX C
PHOTOGRAPHS



PHOTOS 12, 13 and 14
LOCATIONS NOT SHOWN

DATE: JULY 1980		BRESKIN DAM No. 2 NATIONAL DAM INSPECTION PROGRAM	PHOTO KEY MAP
SCALE: NONE			
DR: JF	CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	

BRESKIN DAM No. 2



PHOTO 1. CREST



PHOTO 2. CREST

BRESKIN DAM No. 2



PHOTO 3. UPSTREAM SLOPE



PHOTO 4. DOWNSTREAM SLOPE

BRESKIN DAM No. 2



PHOTO 5. UPSTREAM SLOPE



PHOTO 6. DOWNSTREAM SLOPE

BRESKIN DAM No. 2



PHOTO 7. POND DRAIN



PHOTO 8. DOWNSTREAM SLOPE

BRESKIN DAM No. 2



PHOTO 9. PRINCIPAL SPILLWAY INLET

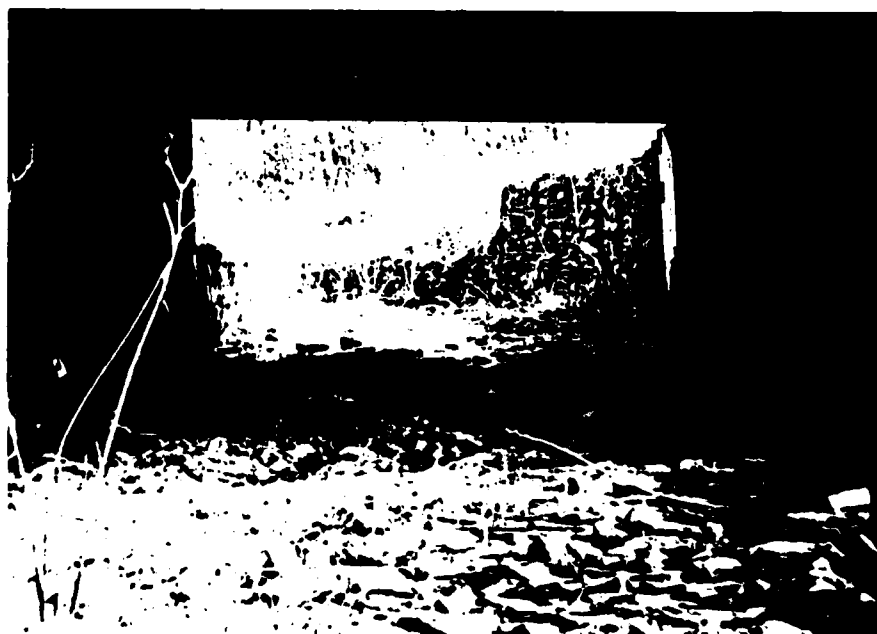


PHOTO 10. PRINCIPAL SPILLWAY CHANNEL

BRESKIN DAM No. 2



PHOTO 11. PRINCIPAL SPILLWAY DISCHARGE CHANNEL



PHOTO 12. BRESKIN DAM No. 1

BRESKIN DAM No. 2



PHOTO 13. DOWNSTREAM HAZARD



PHOTO 14. DOWNSTREAM HAZARD

DETAILED PHOTO DESCRIPTIONS

- Photo 1 Crest of main embankment.
- Photo 2 Crest of left dike. Note Breskin Dam No. 1 behind house.
- Photo 3 Upstream Slope of main embankment as seen from right abutment. Note riprap on slope and inlet to principal spillway at bottom of photo.
- Photo 4 Downstream Slope of main embankment looking toward right abutment.
- Photo 5 Upstream Slope of left dike looking downstream.
- Photo 6 Downstream Slope of left dike looking downstream.
- Photo 7 Pond Drain slide gate control.
- Photo 8 Downstream Slope showing pond drain outlet.
- Photo 9 Principal Spillway Inlet.
- Photo 10 Principal Spillway Channel below bridge.
- Photo 11 Principal Spillway Discharge Channel as seen from bridge.
- Photo 12 Breskin Dam No. 1 as seen from below.
- Photo 13 Downstream Hazard.
- Photo 14 Downstream Hazard.

APPENDIX D
HYDROLOGY AND HYDRAULICS
ANALYSES

APPENDIX D
HYDROLOGY AND HYDRAULICS

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

1. Precipitation: The Probable Maximum Precipitation (PMP) is derived and determined from regional charts prepared from past rainfall records including "Hydrometeorological Report No. 33" prepared by the U.S. Weather Bureau.

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

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

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

<u>Parameter</u>	<u>Definition</u>	<u>Where Obtained</u>
Ct	Coefficient representing variations of watershed	From Corps of Engineers*
L	Length of main stream channel	From U.S.G.S. 7.5 minute topographic map
Lca	Length on main stream to centroid of watershed	From U.S.G.S. 7.5 minute topographic map

Cp	Peaking coefficient	From Corps of Engineers*
A	Watershed size	From U.S.G.S. 7.5 minute topographic map

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

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

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

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

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

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Predominately wooded, no
development noted.

ELEVATION TOP NORMAL POOL (STORAGE
CAPACITY): 1445.0 (36 acre-feet.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE
CAPACITY): 1449.4 (66 acre-feet.)

ELEVATION MAXIMUM DESIGN POOL: 1450.0

ELEVATION TOP DAM: 1449.4 (minimum)

OVERFLOW SECTION

- a. Elevation 1445.0
- b. Type Open channel broadcrested weir
- c. Width 12 to 15 feet
- d. Length N/A
- e. Location Spillover Right abutment
- f. Number and Type of Gates None

OUTLET WORKS

- a. Type None
- b. Location _____
- c. Entrance Inverts _____
- d. Exit Inverts _____
- e. Emergency Drawdown Facilities 10 inch outlet pipe
(pond drain) left of center of main embankment

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location N/A
- c. Records None

MAXIMUM REPORTED NON-DAMAGING
DISCHARGE None available.

HEC-1 DAM SAFETY VERSION
 HYDROLOGY AND HYDRAULIC ANALYSIS
 DATA BASE

NAME OF DAM: Breskin Dam No. 2	NDI ID NO. PA 485
Probable Maximum Precipitation (PMP)	24*
Drainage Area	0.32 sq. mi.
Reduction of PMP Rainfall for Data Fit	0.8 (24)
Reduce by 20%, therefore PMP rainfall =	=19.2 in.
Adjustments of PMF for Drainage Area (Zone 7)	
6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
Snyder Unit Hydrograph Parameters	
Zone	24**
C _p	0.45
C _t	1.6
L	1.14 mile
L _{ca}	0.57 mile
t _p = C _t (L · L _{ca}) ^{0.3} =	1.41 hours
Loss Rates	
Initial Loss	1.0 inch
Constant Loss Rate	0.05 inch/hour
Base Flow Generation Parameters	
Flow at Start of Storm	1.5 cfs/sq.mi=0.48 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0
Overflow Section Data	
Crest Length	12.3-15.3 feet
Freeboard	4.4 feet
Discharge Coefficient	2.63-2.7
Exponent	1.5
Discharge Capacity	326 cfs

* Hydrometeorological Report 33
 ** Hydrological zone defined by Corps of Engineers,
 Baltimore District, for determining Snyder's Coefficients
 (C_p and C_t).

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 PITTSBURGH, PA. 15216
 (412) 531-7111

Sheet _____ of _____

Job BRESKIN DAM No. 2 Job No. 791535
 Subject DATA INPUT
 Made By JDH Date 6/8/80 Checked SGM Date 6/29/80

LOSS RATES AND BASE FLOW PARAMETERS

As Recommended by Corp of Engineers, Baltimore District

STRTL = 2 INCH
 CNSTL = 0.5 inches/hour
 STRTQ = 1.5 cfs/mi²
 Q/CFSN = 0.05 (5% of Peak Flow)
 RTIOR = 2.0

ELEVATION - AREA - CAPACITY RELATIONSHIPS

From U.S.G.S., 7.5 min Quad, PENN DER FILES AND FIELD Inspection Data

At Spillway Crest Elevation 1445.0

Initial Storage 36 ACRE-Feet

POND AREA 6 ACRES

At elevation 1480 Area = 23 Acres

From conic method for Reservoir Volume
 Flood Hydrograph Package (HEC-1)
 Dam Safety Version (USERS MANUAL)

$$H = 3V/A$$

$$= 3(36)/6$$

$$= 18 \text{ feet}$$

ELEVATION where Area equal zero

$$1445 - 18 = 1427.0$$

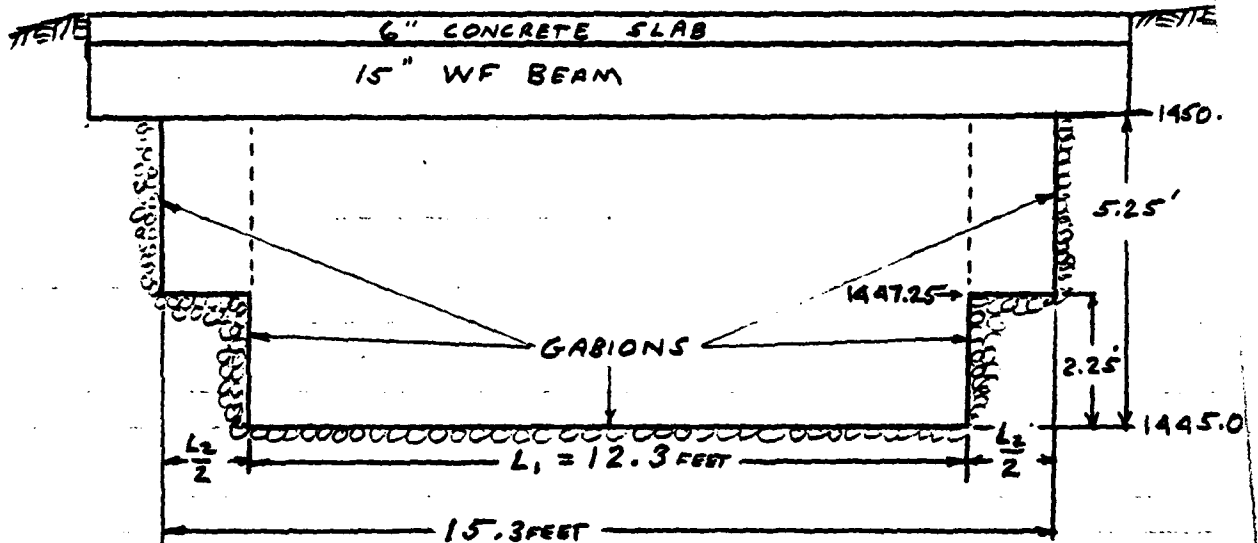
AREA	SA	0.0	6.0	23.0
ELEVATION	SE	1427.0	1445.0	1480.0

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Job BRESKIN DAM No. 2 Job No. 7915
 Subject SPILLWAY SECTION / RATING CUR
 Made By JPH Date 6/8/60 Checked SGM Date 6/12

SPILLWAY CROSS-SECTION

SCALE:
 1" = 3'



SPILLWAY RATING CURVE $Q = CLH^{1.5}$

ELEVATION	H ₁	H ₂	C ₁ *	C ₂ *	L ₁	L ₂	Q ₁	Q ₂	Q _{TOTAL}
1445.0	0	0	0	0	0	0	0	0	0
1445.2	0.2	0	2.68	0	12.3	0	2.9	0	2.9
1445.4	0.4	0	2.70	0		0	8.4	0	8.4
1445.6	0.6	0	2.70	0		0	15.4	0	15.4
1445.8	0.8	0	2.64	0		0	23.2	0	23.2
1446.0	1.0	0	2.63	0		0	32.3	0	32.3
1446.2	1.2	0	2.64	0		0	42.7	0	42.7
1446.4	1.4	0	2.64	0		0	53.8	0	53.8
1446.6	1.6	0	2.63	0		0	65.5	0	65.5
1446.8	1.8	0	2.63	0		0	78.1	0	78.1
1447.0	2.0	0	2.63	0		0	91.5	0	91.5
1447.25	2.25	0	2.63	0		0	109.2	0	109.2
1447.5	2.5	0.25	2.63	2.69		3	127.9	1.0	128.9
1448.0	3.0	0.75	2.63	2.64		3	168.1	5.1	173.2
1448.5	3.5	1.25	2.63	2.63		3	211.8	11.0	222.8
1449.0	4.0	1.75	2.63	2.63		3	258.8	18.3	277.1
1449.5	4.5	2.25	2.63	2.63		3	308.8	26.6	335.4
1450.0	5.0	2.75	2.63	2.63		3	361.7	36.0	398.7
1450.5	5.5	3.25	2.63	2.63	12.3	3	417.3	46.2	463.5

* VALUES OF "C" TAKEN FROM "KING AND BRATER"
 TABLE 5-3 PAGE 5-46.

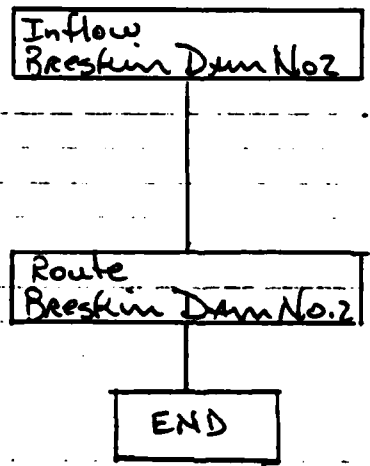
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(412) 531-7111

Sheet _____ of _____
Job BRESKIN DAM NO. 2 Job No. 791535
Subject DATA INPUT
Made By JPA Date 4/8/80 Checked SGM Date 6/24/80

Overtop Parameters

Top of Dam Elevation (MINIMUM) 1449.4
Length of Dam (Excluding Spillway) 885 feet
Coefficient of Discharge (c) 3.09
 $S U_{max} 890$ $S U_{max} = 1451$

Program Schedule



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

1	A1	NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS										
2	A2	HYDROLOGIC AND HYDRAULIC ANALYSIS OF BRESKIN DAM NO. 2										
3	A3	PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD										
4	B	300	0	15	0	0	0	0	0	0	-4	0
5	B1	5										
6	J	1	3	1								
7	J1	1.	.5	.2								
8	K	0	1					1				
9	K1	INFLOW HYDROGRAPH FOR BRESKIN DAM NO. 2										
10	M	1	1	0.32		0.32						1
11	P		24	102	120	130						
12	T							1.0	0.05			
13	W	1.41	0.45									
14	X	-1.5	-0.05	2.0								
15	K	1	2					1				
16	K1	ROUTING AT BRESKIN DAM NO. 2										
17	Y				1	1						
18	Y1	1						36.	-1			
19	Y4	1445.	1445.2	1445.4	1445.6	1445.8	1446.	1446.2	1446.4	1446.6	1446.8	
20	Y4	1447.	1447.25	1447.5	1448.	1448.5	1449.	1449.5	1450.	1450.5		
21	Y5	0.	2.9	8.4	15.4	23.2	32.3	42.7	53.8	65.5	78.1	
22	Y5	91.5	109.2	128.9	173.2	222.8	277.1	335.4	398.7	463.5		
23	\$A	0.0	6.	23.								
24	\$E	1427.	1445.	1480.								
25	\$H	1445.										
26	\$D	1449.4	3.09	1.5	885.							
27	\$L	60.	460.	480.	500.	630.	710.	775.	885.	890.		
28	\$V	1449.4	1449.6	1449.8	1450.	1450.2	1450.4	1450.6	1450.8	1451.		
29	K	99										
30	A											
31	A											
32	A											
33	A											
34	A											

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT 1
 ROUTE HYDROGRAPH TO 2
 END OF NETWORK

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

RUN DATE: 25 JUN 80
 RUN TIME: 7.25.54

NATIONAL PROGRAM FOR THE INSPECTION OF NON FEDERAL DAMS
 HYDROLOGIC AND HYDRAULIC ANALYSIS OF BRESKIN DAM NO. 2
 PROBABLE MAXIMUM FLOOD PMF/UNIT HYDROGRAPH BY SNYDER'S METHOD

JOB SPECIFICATION										
NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN	
300	0	15	0	0	0	0	0	-4	0	
			JOPER	NWT	LROPT	TRACE				
			5	0	0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTIO= 3 LRTIO= 1
 RTIOS= 1.00 0.50 0.20

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR BRESKIN DAM NO. 2

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

HYDROGRAPH DATA

IHYDG IUHG TAREA SNAP TRSDA TRSPC RATIO ISNOW ISAME LOCAL
 1 1 0.32 0.0 0.32 0.0 0.0 0 1 0

PRECIP DATA

SPFE PMS R6 R12 R24 R48 R72 R96
 0.0 24.00 102.00 120.00 130.00 0.0 0.0 0.0

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT STRKR DLTKR RTIOL ERAIN STRKS RTIOK STRTL CNSTL ALSMX RTIMP
 0 0.0 0.0 1.00 0.0 0.0 1.00 1.00 0.05 0.0 0.0

UNIT HYDROGRAPH DATA

TP= 1.41 CP=0.45 NTA= 0

RECESSION DATA

STRTO= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 52 END-OF-PERIOD ORDINATES, LAG= 1.41 HOURS, CP= 0.45 VOL= 1.00

4.	16.	32.	49.	61.	65.	62.	56.	50.	45.
40.	36.	32.	29.	26.	23.	21.	19.	17.	15.
13.	12.	11.	10.	9.	8.	7.	6.	6.	5.
4.	4.	4.	3.	3.	3.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.								

0		END-OF-PERIOD FLOW											
MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
			SUM	24.96	23.08	1.88							19230.
				(634.)	(586.)	(48.)							544.53

HYDROGRAPH ROUTING

ROUTING AT BRESKIN DAM NO. 2

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

ROUTING DATA

GLOSS CLOSS AVG IRES ISAME IOPT IPMP LSTR
 0.0 0.0 0.0 1 1 0 0 0

NSTPS NSTDL LAG AMSKK X TSK STORA ISPRAT
 1 0 0 0.0 0.0 0.0 36. -1

STAGE	1445.00	1445.20	1445.40	1445.60	1445.80	1446.00	1446.20	1446.40	1446.60	1446.80
	1447.00	1447.25	1447.50	1448.00	1448.50	1449.00	1449.50	1450.00	1450.50	
FLOW	0.0	2.90	8.40	15.40	23.20	32.30	42.70	53.80	65.50	78.10
	91.50	109.20	128.90	173.20	222.80	277.10	335.40	398.70	463.50	

SURFACE AREA= 0. 6. 23.
 CAPACITY= 0. 36. 511.
 ELEVATION= 1427. 1445. 1480.

CREL 1445.0 SPWID 0.0 COQW 0.0 EKPW 0.0 ELEV 0.0 COQL 0.0 CAREA 0.0 EXPL 0.0

DAM DATA
 TOPEL 1449.4 COQD 3.1 EKPD 1.5 DAMMID 885.

CREST LENGTH 60. 460. 480. 500. 630. 710. 775. 885. 890.
 AT OR BELOW
 ELEVATION 1449.4 1449.6 1449.8 1450.0 1450.2 1450.4 1450.6 1450.8 1451.0
 PEAK OUTFLOW IS 767. AT TIME 17.25 HOURS
 PEAK OUTFLOW IS 358. AT TIME 17.75 HOURS
 PEAK OUTFLOW IS 131. AT TIME 18.25 HOURS

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

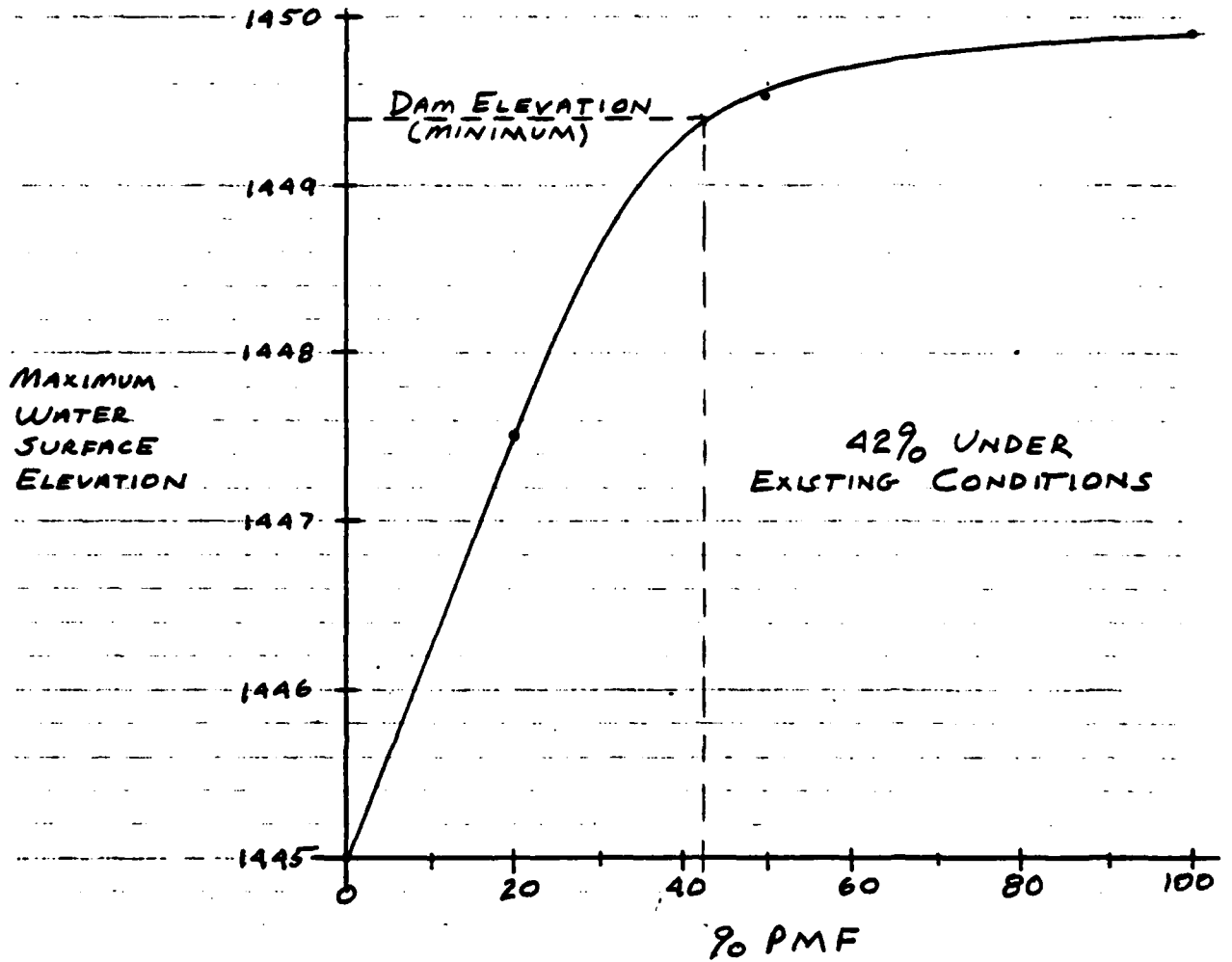
OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS		
				RATIO 1	RATIO 2	RATIO 3
				1.00	0.50	0.20
HYDROGRAPH AT	1	0.32	1	770.	385.	154.
	(0.83)	(21.81)	10.91)	4.36)
ROUTED TO	2	0.32	1	767.	358.	131.
	(0.83)	(21.72)	10.13)	3.71)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION	INITIAL VALUE		SPILLWAY CREST		TOP OF DAM	
		STORAGE	OUTFLOW	STORAGE	OUTFLOW	STORAGE	OUTFLOW
		1445.00	0.	1445.00	0.	1449.40	324.
		36.	0.	36.	0.	66.	
RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1449.90	0.50	70.	767.	5.00	17.25	0.0
0.50	1449.52	0.12	67.	358.	1.25	17.75	0.0
0.20	1447.53	0.0	52.	131.	0.0	18.25	0.0

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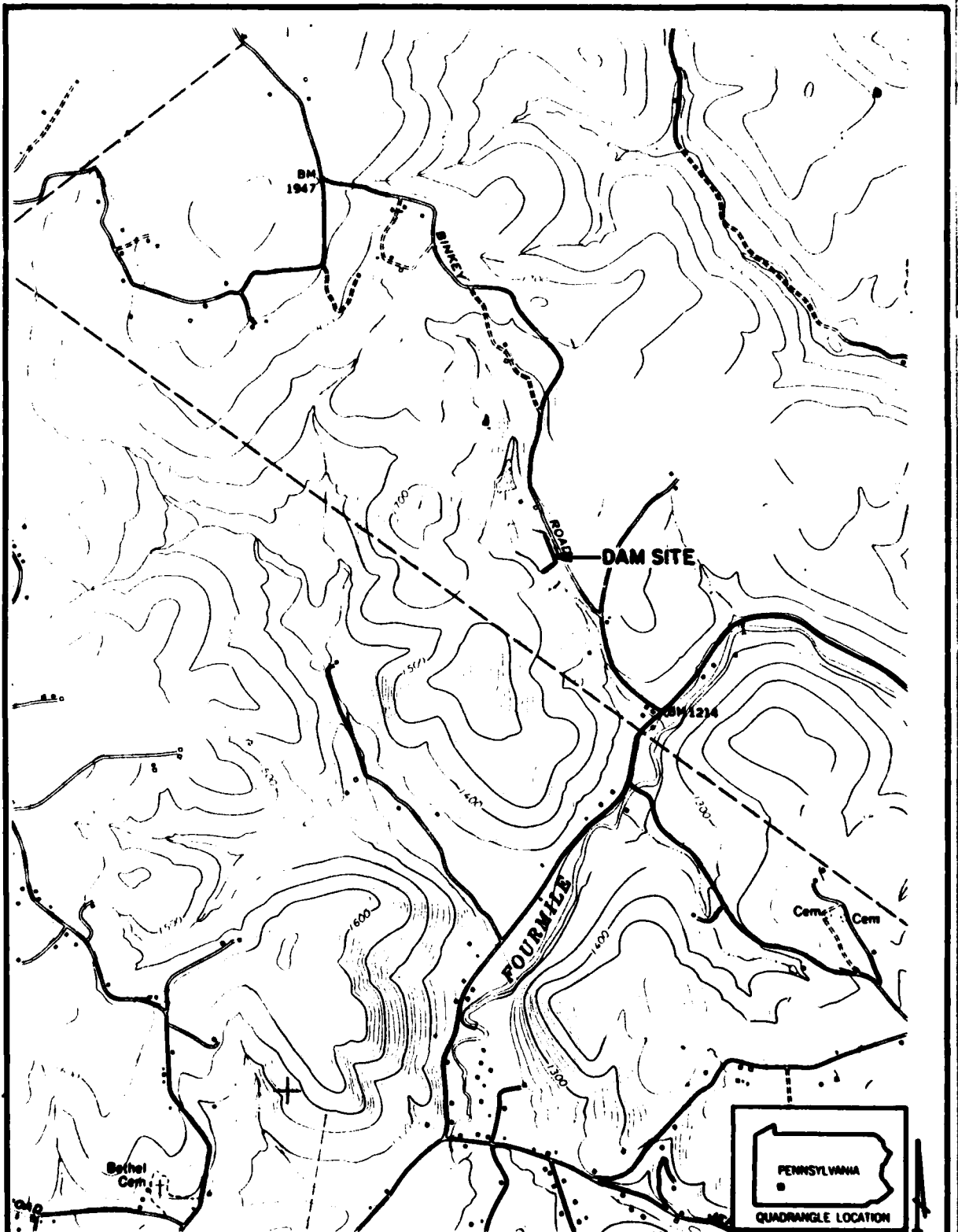
Job BRESKIN DAM No. 2 Job No. 79153-S
Subject HYDROLOGIC PERFORMANCE PLOT
Made By JPH Date 6/25/80 Checked SGM Date 6/26/80



APPENDIX E
PLATES

LIST OF PLATES

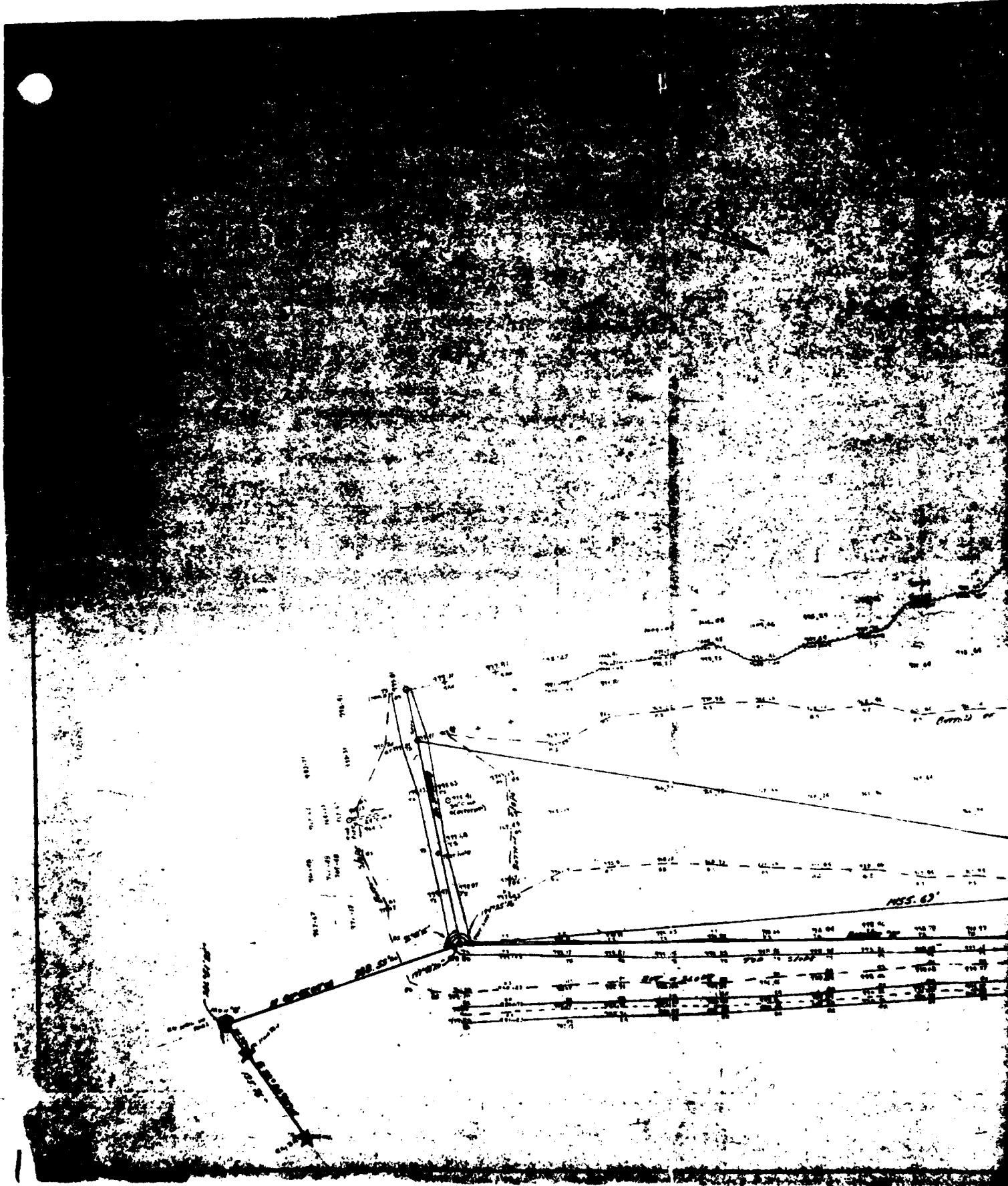
- Plate I Regional Vicinity Map.
- Plate II Lake Ligonier - Topographic Survey
- Plate III Existing Earth Dams on Tributary of Four
Mile Run, Sheet 1 of 2.
- Plate IV Existing Earth Dams on Tributary of Four
Mile Run, Sheet 2 of 2.

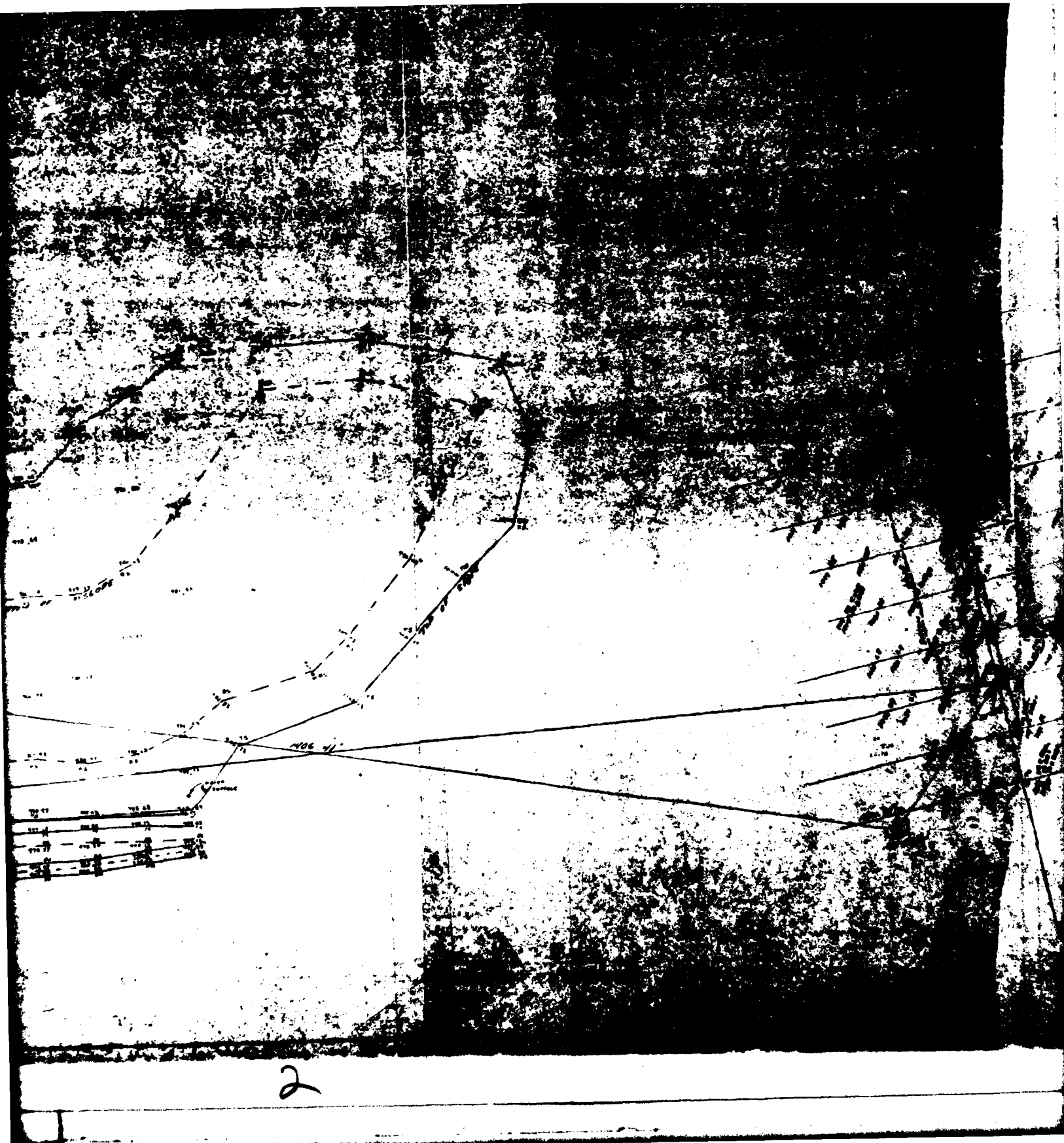


STAHLSTOWN U.S.G.S. 7 1/2 min. QUADRANGLE

DATE: JULY 1960		BRESKIN DAM No. 2		REGIONAL VICINITY MAP
SCALE: 1" = 2000'		NATIONAL DAM INSPECTION PROGRAM		
DR: JF	CK:	A. C. ACKENHEIL & ASSOCIATES, INC.		
DWG. NO. PLATE I		CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.		

10 7100 ALABAMA A. & G. SMITH CO., PHOENIX, PA.





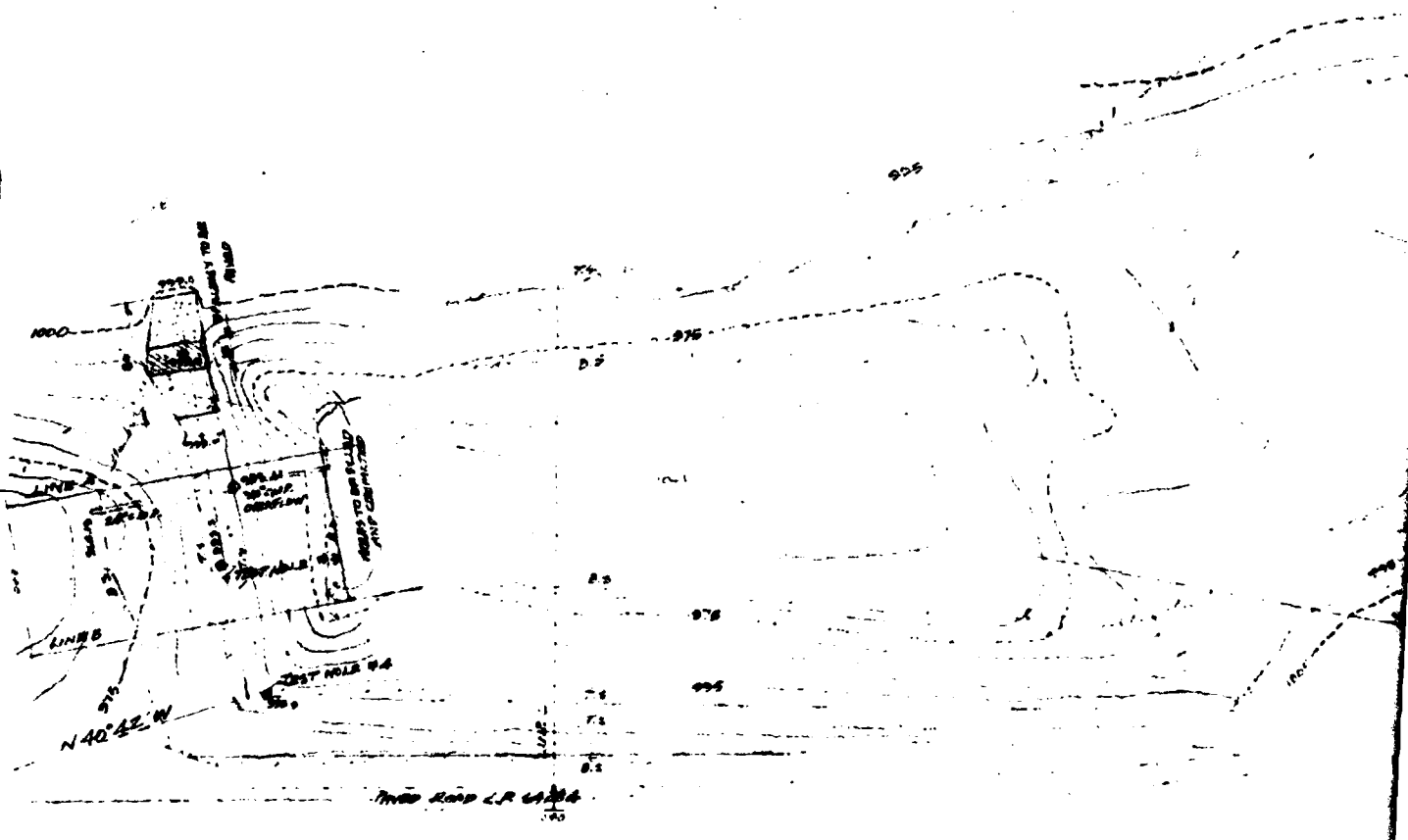
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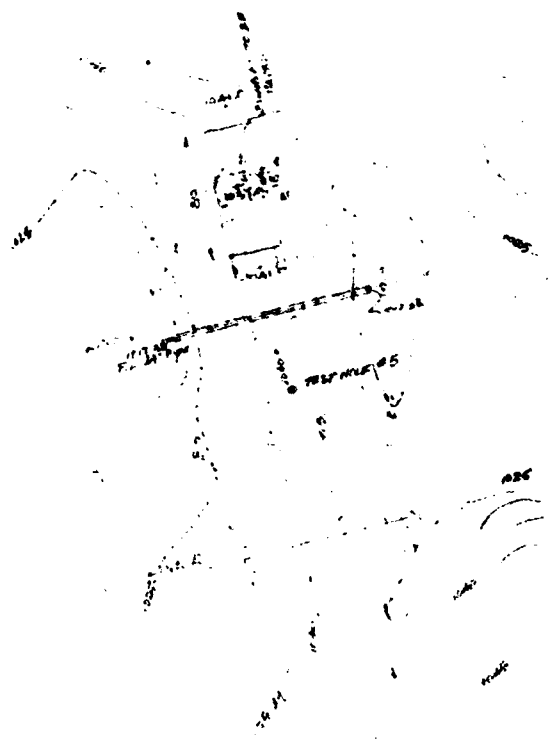
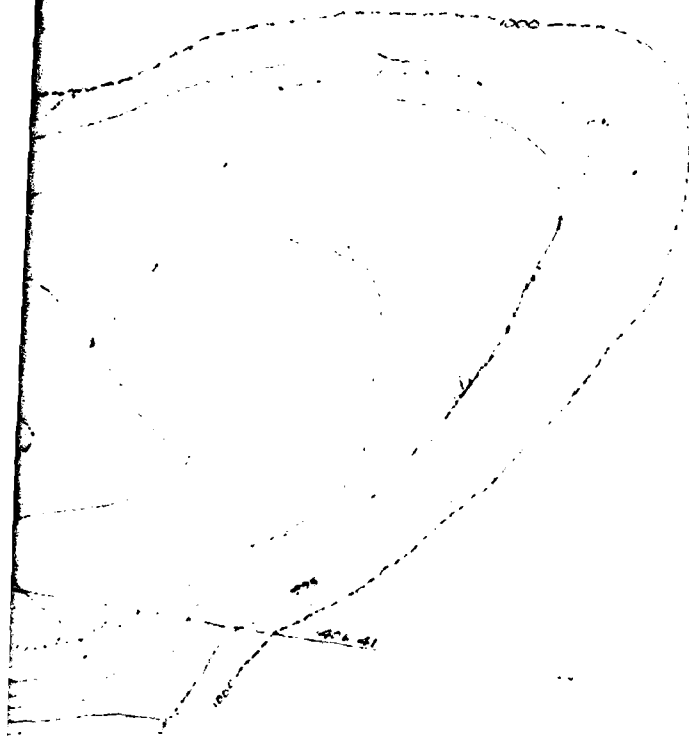


LIRE LIBRARY
CREATED BY
JOSEPH BERG

3

PLATE II





2



EXISTING BATHY LYONS
 ON TRIBUTARY OF FOUR MILE RUN
 SITE LEONER TWP. WESTMID CO.
 BUILT FOR
 MAINTAIN DEVELOPMENT COOP.
 SCALE 1"=50' FEB. 1972
 J. FRAD TRIGGS, P.E.
 1601 PENN AVE
 PITTSBURGH 21, PA.

1 OF 2

NOTE: THIS DRAWING IS FROM SECTION THREE BY R. M. BODAL / 10000 FEB. 1972

PLATE III

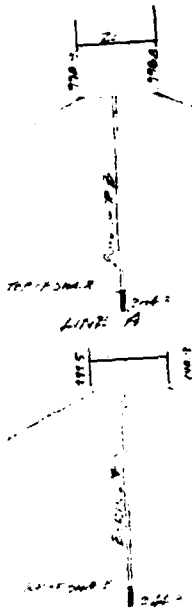
400
380
360
370
390

1000
990
980
970
960

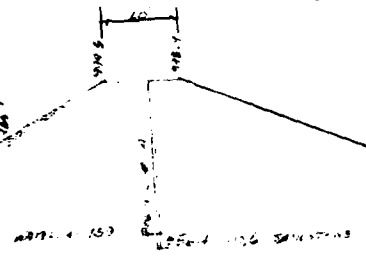
1000
990
980
970
960

1050
1040
1030
1020
1010

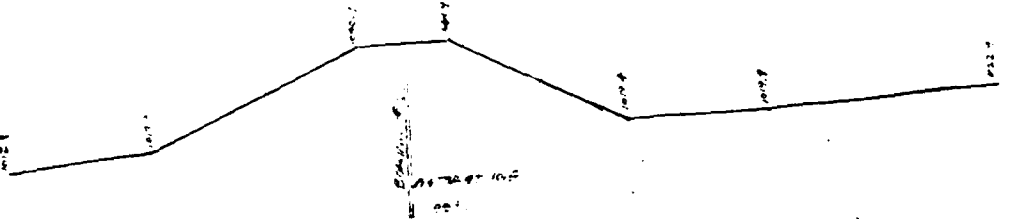
1080
1070
1060
1050



LINE B



LINE C

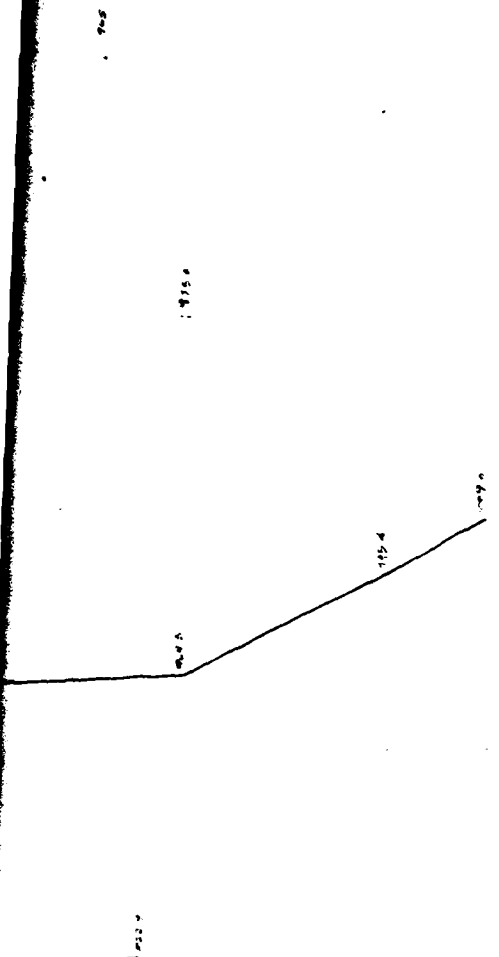


LINE D

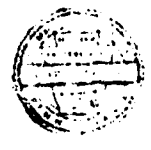


LINE E

SECTIONS OF DAMS.
SCALE 1" = 20'



THE STATE OF TEXAS
 COUNTY OF DALLAS
 CITY OF DALLAS
 COUNTY DEVELOPMENT DEPARTMENT
 1000 FORT WORTH
 TEXAS 75202



2

2072

SECTION TWO BY R. M. HARRIS, JR. 10/1/72
PLATE IV

APPENDIX F

GEOLOGY

GEOLOGY

Geomorphology

The rocks which underlie the area of Breskin Dam No. 2 are part of the Allegheny Mountain section of the Appalachian Plateau Physiographic Province. This section is characterized by northeast trending anticlinal ridges which have been deeply cut by streams. The dam site is located on an unnamed tributary of Fourmile Run. The valley bottom at the dam site is at Elevation 1450 feet. The secondary ridge on the sides of this valley are at Elevation 1600 to 1700 feet.

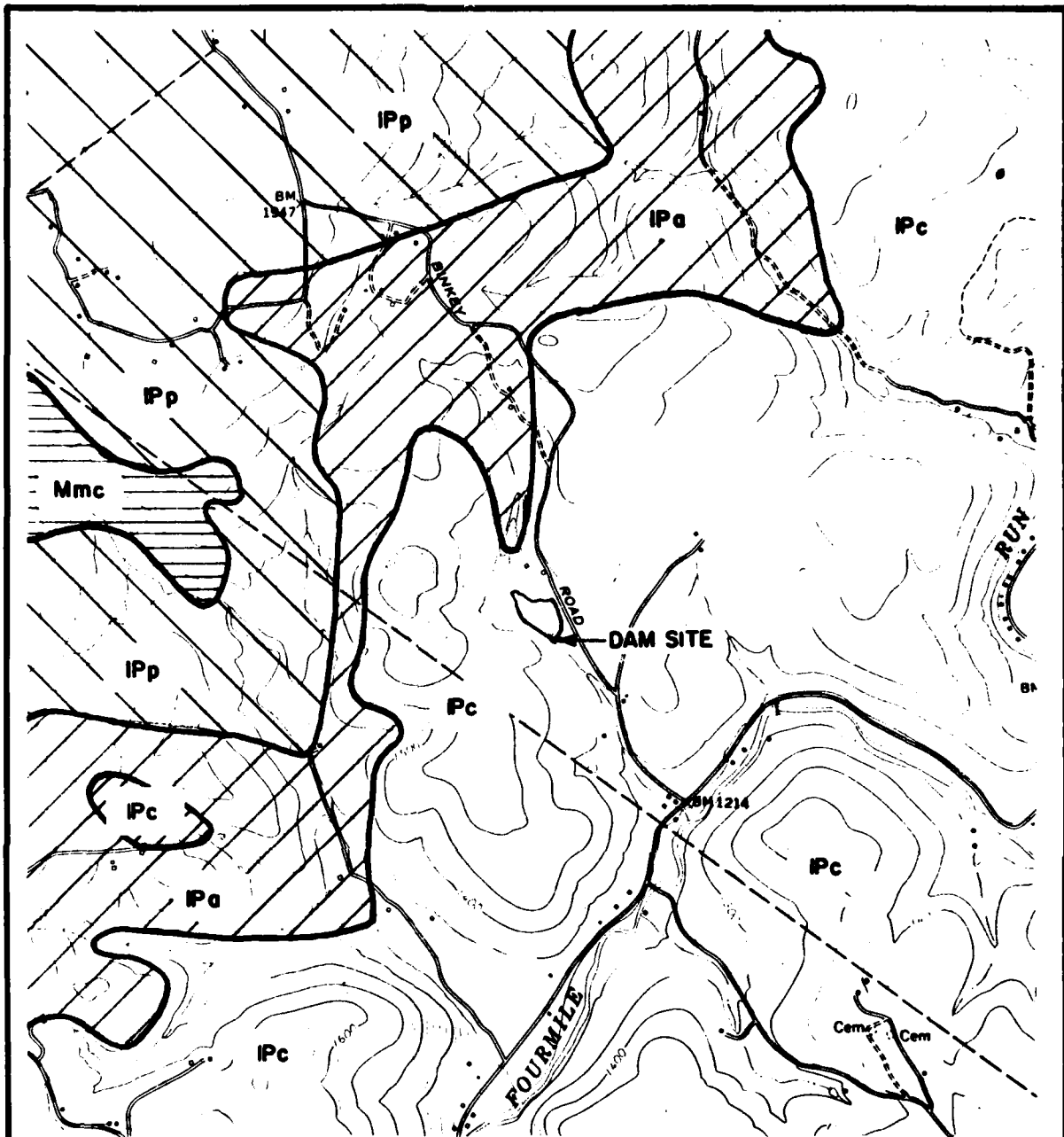
Structure

The dam lies on the east flank of the Chestnut Ridge Anticline approximately 2 miles from this structure's axis. The bedrock at the dam site strikes to the northeast and has a dip of 800 feet/mile (8.6°) to the southeast.

Stratigraphy

General: The rocks exposed in the immediate area of Breskin Dam No. 2 are part of the Conemaugh Group of Pennsylvanian Age, and include primarily the lower members of the Glenshaw Formation. The upper Freeport Coal Seam which stratigraphically marks the bottom of the Conemaugh Group and the top of the Allegheny Group is estimated to outcrop in the upstream valley at Elevation 1600 to 1700 feet.

Rock Types: Rocks at the dam site are composed of sandstones, shale and claystones. Some thin bedded limestones and coal seams may also be present.



STAHLSTOWN QUADRANGLE, WESTMORELAND COUNTY, PENNSYLVANIA

SCALE:  1: 24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

 FORMATION CONTACT



DATA DERIVED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY GREATER PITTSBURGH REGION GEOLOGIC MAP AND CROSS SECTIONS, 1975 and GREATER PITTSBURGH REGION STRUCTURE CONTOUR MAP, 1975

DATE JUL 1988	BRESKIN DAM No. 2	GEOLOGIC MAP
SCALE 1:24000	NATIONAL DAM INSPECTION PROGRAM	
BY [Signature]	A. C. ACKENHIL & ASSOCIATES, INC. GEOTECHNICAL ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	

AGE	V C O S S P - T - R - P	COLUMNAR SECTION	PROMINENT BEDS
QUATERNARY			PLEISTOCENE GLACIAL OUTWASH, RIVER TERRACE DEPOSITS AND ALLUVIUM
PERMIAN	DURAND (Pp)		UPPER WASHINGTON LIMESTONE
	WASHINGTON (Pp-1)		WASHINGTON COAL
PENNSYLVANIAN	MORGANTOWN (Pp)		WYTHESBURG SANDSTONE
			WYTHESBURG COAL
	CORNUM (Pp)		LIGHTTOWN SANDSTONE
			LIGHTTOWN COAL
	ALEGHENY (Pp)		BENWOOD LIMESTONE
			SEWICKLEY COAL
	FORTHALL (Pp)		PITTSBURGH SANDSTONE
			PITTSBURGH COAL
	POCONO (Pp)		CONNELLSVILLE SANDSTONE
			MORGANTOWN SANDSTONE
	Pocahontas (Pp)		AMES LIMESTONE
			PITTSBURGH RED BEDS
MIDDLE DEVONIAN		SALTSBURG SANDSTONE	
		MAHONING SANDSTONE	
LOWER DEVONIAN		UPPER FREEPORT COAL	
		UPPER HITTANNING COAL	
UPPER SILURIAN		WORTHINGTON SANDSTONE	
		LOWER HITTANNING COAL	
LOWER SILURIAN		HOMEWOOD SANDSTONE	
		MERCER SANDSTONE, SHALE & COAL	
MIDDLE SILURIAN		CONNOQUENESSING SANDSTONE	
		BURBOON SANDSTONE	
LOWER SILURIAN		CUYAHOGA SHALE	
		BEREA SANDSTONE	

DATE: JULY 1980

SCALE: 1" = 360'

DR: JF CK:

BRESKIN DAM No. 2
NATIONAL DAM INSPECTION PROGRAM

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GEOLOGIC
COLUMN