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NATIONAL DAM INSPECTION PROGRAM. FAIRCHANCE RESERVOIR DAM. (NDI--ETC(U)
APR 80 J P HANNAN, J E BARRICK DACW31-80-C-0026
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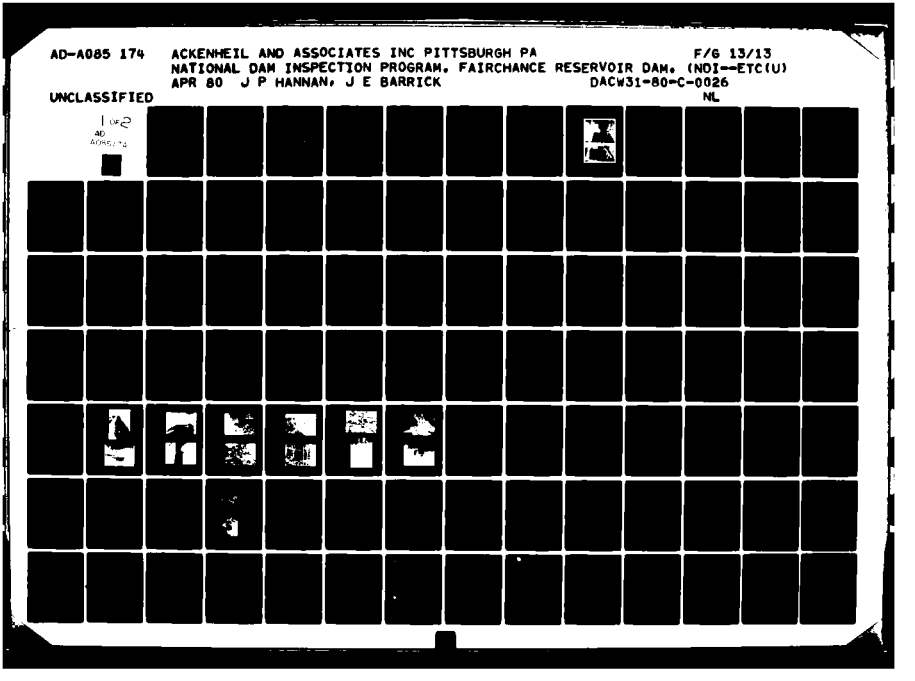

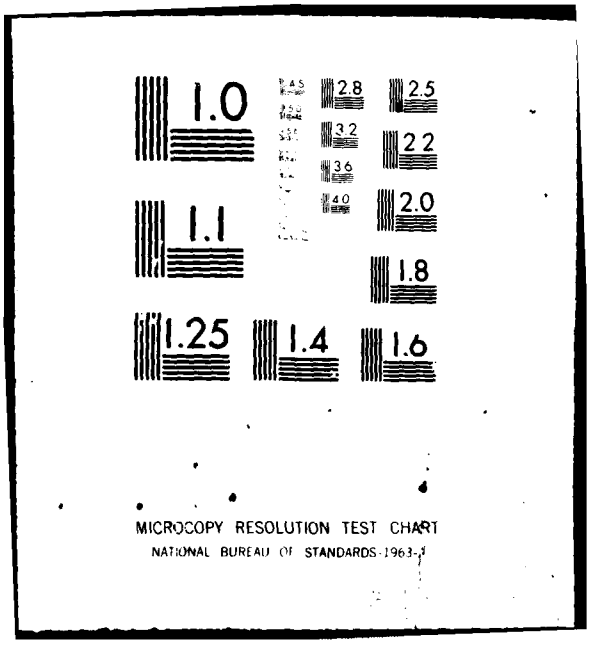
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OHIO RIVER BASIN
CAVE HOLLOW STREAM
FAYETTE COUNTY

LEVEL II

PENNSYLVANIA

NDI No. PA 00208
PENN DER No. 26-70

FAIRCHANCE RESERVOIR DAM

BOROUGH OF FAIRCHANCE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PREPARED FOR

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

BY

ACKENHEIL & ASSOCIATES GEO SYSTEMS, INC.
CONSULTING ENGINEERS
1000 BANKSVILLE ROAD
PITTSBURGH, PENNSYLVANIA 15216

APRIL 1980

ACKENHEIL & ASSOCIATES
DACW31-80-C-0026

(10) James P./Hannan
James E./Barrick

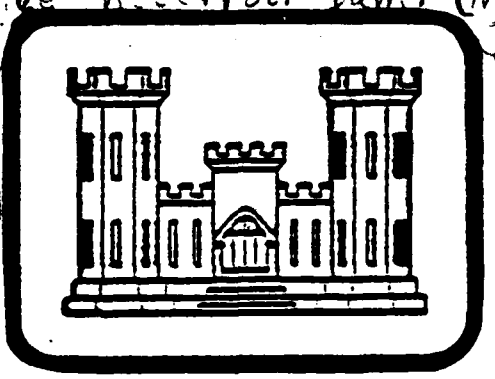
(1) OHIO RIVER BASIN

(2) FAIRCHANCE RESERVOIR DAM
FAYETTE COUNTY, COMMONWEALTH OF PENNSYLVANIA
NDI NO. PA 00208
PennDER NO. 26-70

(3) FAIRCHANCE BOROUGH

(6) PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM.

Fairchance Reservoir Dam. (NDI number PA-00208, PennDER Number 26-70) Ohio River Basin. Fayette County, Commonwealth of Pennsylvania. Phase I. Inspection Report.



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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(15) DACW21-80-C-0096

(12) 96

Date: (11) April 1980

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 improved.

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:	Fairchance Reservoir
STATE LOCATION:	Pennsylvania
COUNTY LOCATION:	Fayette
STREAM:	Cave Hollow branch of Georges Creek, a tributary of the Monongahela River.
DATE OF INSPECTION:	6 November 1979
COORDINATES:	Lat. 39°48'44", Long. 79°43'45"

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 Fairchance Reservoir dam is considered to be fair.

This classification is based on:

(1) The visual observation of the seeps in the pond drain discharge channel,

(2) The presence of growing and fallen trees on the embankment slope,

(3) Outlet works pipes through the embankment that have no positive upstream flow controls,

(4) An "inadequate" spillway capacity.

The origin of the seepage is not known and may represent a potential hazard to the dam.

The fallen trees on and immediately below the embankment represent embankment distress that should be repaired. The growing trees including all stumps and roots greater than 1-1/2 inches in diameter should be removed to prevent possible future seepage and stability problems.

The structure is classified as a "small" size, "high" hazard dam for which the Corps of Engineers guidelines require a Spillway Design Flood (SDF) of 0.5 to 1 PMF. For the observed downstream conditions the Fairchance Reservoir dam SDF is one half the Probable Maximum Flood

next page

(PMF). Spillway capacity is "inadequate" because the non-overtopping flood discharge capacity, as estimated using the HEC-1 computer program was found to be 4 percent of the PMF. The spillway is not "seriously inadequate" because failure of the structure would not significantly increase the flood stage and risk of loss of life downstream.

Several other minor deficiencies were observed that should be corrected as recommended below.

RECOMMENDATIONS

The following recommendations should be implemented immediately:

1. Additional Investigations: Retain a professional engineer knowledgeable in dam design and construction to:

(a) 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) Provide recommendations on installing positive upstream flow controls for the water supply and pond drain pipelines.

(c) Inspect the seeps in the pond drain discharge channel and at the pond drain outlet and provide recommendations for monitoring or control.

2. Remedial Work: The Phase I investigation of Fairchance Reservoir dam also disclosed several deficiencies of lower priority which should be corrected during routine maintenance.

(a) Remove the trees from the embankment's downstream slope. This work should be performed under the direction of a professional engineer, knowledgeable in dam design and construction.

(b) Fill the embankment's crest to design elevation.

(c) Remove the fence over the spillway's discharge channel.

(d) Repair cracks in the spillway walls, slab and weir and in the cemented riprap on the upstream slope.

(e) Develop and implement formal maintenance and inspection procedures.

3. Emergency Operation and Warning Plan: Concurrent with the additional investigations 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 rapid drawdown of the reservoir under emergency conditions.

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

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
James Ellsworth Barrick, II
ENGINEER
No. 22639-E

James P. Hannan — Date
Project Engineer

James E. Barrick, P.E. — 18 April 1990 — Date
PA Registration No. 022639-E

Approved by: — 9 May 1990 — Date
JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

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FAIRCHANCE RESERVOIR DAM

OVERVIEW

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
FAIRCHANCE RESERVOIR DAM
NATIONAL I. D. NO. PA 00208
PennDER No. 26-70

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) Embankment: Fairchance Reservoir dam was designed and constructed as an homogeneous earthfill structure with a concrete cutoff wall along the centerline. The embankment is 190 feet long, with a maximum toe to crest height of 29 feet and a crest width of 12 feet. The embankment's upstream slope was observed to be 2.4H:1V above the water line; the downstream slope was observed to be 2.2H:1 near the crest, flattening to 2.5H:1V near the toe.

(2) Outlet Works: Two outlet facilities were constructed through the embankment. One, consisting of a 12 inch (nominal) diameter cast iron pipe, provides water for Fairchance Borough. The other, also a 12 inch (nominal) diameter cast iron pipe, is the pond drain. Both lines were encased in concrete. There are no positive flow controls on the inlets of either pipeline.

(3) Principal (Ungated) Spillway: An uncontrolled open channel spillway was constructed on the right abutment to maintain the reservoir pool level and to pass storm flows. The spillway control section is a two foot high concrete capped, masonry wall weir across the spillway channel at the embankment crest centerline.

Current freeboard at the dam is 1.1 feet.

Below the weir wall is a concrete lined "wasteway" channel. Below this, discharge is via an excavated channel which turns sharply to the left and enters the original Cave Hollow valley about 400 feet downstream of the toe of the embankment.

(4) Downstream Conditions: Cave Hollow branch, below Fairchance Reservoir dam passes through a relatively narrow, steep-sided, uninhabited valley. Approximately 2000 feet below the dam, the valley broadens markedly. At 0.7 mile below the dam, the branch enters the outskirts of Fairchance Borough. At about one mile below the dam, the branch joins Georges Creek whose floodplain has considerable residential and commercial development. In the first mile below the dam, at least seven inhabited dwellings lie on the floodplain. Ultimately, Georges Creek enters the Monongahela River at the Village of New Geneva, Pennsylvania, 17 miles below the dam.

(5) Reservoir: Fairchance Reservoir is 440 feet long at normal pool elevation and has a normal surface area of one acre. When the pool is at the crest of the dam, the reservoir length increases to 470 feet and the surface area is 1.5 acres.

(6) Watershed: The Watershed contributing to Fairchance Reservoir is completely wooded and uninhabited. The watershed is almost wholly owned by the Borough of Fairchance and the unowned portions lie within State Gamelands No. 138.

b. Location: Fairchance Reservoir dam is located in Georges Township, Fayette County, Pennsylvania, approximately 1.7 miles from the center of Fairchance Borough.

c. Size Classification: The dam has a maximum storage capacity of 10.5 acre-feet and a maximum toe to crest height of 29 ft. Based on the Corps of Engineers guidelines, this dam is classified as a "small" size structure.

d. Hazard Classification: Fairchance Reservoir dam is classified as a "high" hazard dam. In the event of a dam failure, numerous inhabited dwellings, and considerable commercial development on the floodplain below the dam would be subjected to substantial damage and loss of life could result.

e. Ownership: Fairchance Reservoir dam is owned by the Borough of Fairchance, Pennsylvania. Correspondence should be addressed to:

Borough of Fairchance
Borough Building
Fairchance, Pennsylvania 15436
Attention: Mr. Fred Tanner
(412) 564-7462

f. Purpose of Dam: Fairchance Reservoir dam was constructed to provide a water supply reservoir for the Borough of Fairchance.

g. Design and Construction History: The dam was designed by Homer L. Burchinal of Uniontown, Pennsylvania and George Porter of Pittsburgh, Pennsylvania in 1925. A permit to construct a dam across "Cave Hollow Stream" was issued by the Water and Power Resources Board (predecessor to PennDER) on 22 July 1925.

Construction of the dam was started by Younkin and Fletcher of Uniontown and Fairchance, Pennsylvania in 1925. In May 1926, William A. Owens of Uniontown was hired to replace Younkin and Fletcher and the dam was completed in December 1926.

h. Normal Operating Procedure: Fairchance Reservoir dam was designed to operate as an uncontrolled structure. Under normal operating conditions, the pool level is maintained at Elev. 1372 by the weir wall of the principal spillway. A water supply pipeline through the dam provides water and pressure head for the Borough of Fairchance water supply system. The pipeline is normally operative and under full head. A pond drain through the embankment provides for reservoir drawdown. The pond drain is normally not operative, but is under full head through the embankment because the control valve is located near the downstream toe of the embankment.

1.3 PERTINENT DATA

a. Drainage Area:	1.59 sq. mi.
b. Discharge at Dam Facility:	
Maximum Flood at Dam Facility	Unknown
Principal (Ungated) Spillway Capacity at Top of Dam	138 cfs

c. Elevation (feet above MSL)

Design Top of Dam	1,374.*
Current Top of Dam (low point)	1,373.1
Normal Pool	1,372.*
Principal (Ungated) Spillway Overflow Crest	1,372.*
Maximum Tailwater	Unknown
Inlet Invert of Pond Drain	1,355±*
Outlet Invert of Pond Drain	1,344±*
Inlet Invert of Water Supply Pipeline	1,349±*
Invert of Water Supply Pipeline at Control Chamber	1,342±*

d. Reservoir Length

Length of Maximum Pool	470 ft.
Length of Normal Pool	440 ft.

e. Reservoir Storage

Current Top of Dam	10.5 acre-feet
Principal (Ungated) Spillway Weir Crest	9.2 acre-feet*
Normal Pool	9.2 acre-feet*

f. Reservoir Surface

Current Top of Dam	1.5 acres
Principal (Ungated) Spillway Crest	1.0 acres*
Normal Pool	1.0 acres*
Sediment Pool	1.0 acres*

g. Embankment

Type	Impervious Earth*
Length	190 ft.
Height	29 ft.
Crest width	12 ft.
Slopes	
Downstream	2.2H:1V to 2.5H:1V
Upstream	2.4H:1V
Impervious core	Yes*
Cutoff provisions	Yes-concrete wall*
Grout curtain	Yes*

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

Type	Masonry and concrete weir wall in open channel
Length of Weir	40 ft.
Weir Crest Elevation	1,372. ft.*
Approach Channel Slope	-4%*
Discharge Channel Slope	4%

i. Outlet Works (Pond Drain)

Type	12 inch (nominal) diameter cast iron, concrete encased*
Inlet	Unknown
Upstream Flow Control	No
Conduit length	160 ft.*
Gate Valve	Yes, at toe of embankment
Anti-seep Collars	Yes, 1*

j. Outlet Works (Water Supply Pipeline)

Type	12 inch (nominal) diameter cast iron, concrete encased*
Inlet	Screen Well*
Upstream Flow Control	No
Conduit length	140 ft.*
Gate Valve	Yes, at control chamber
Anti-seep Collars	Yes, 1*

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

SECTION 2
ENGINEERING DATA

2.1 DESIGN

a. Data Available: The following written information and data may be obtained from the Pennsylvania Department of Environmental Resources, Harrisburg, Pennsylvania. The information was reviewed for this study.

(1) Miscellaneous correspondence related to permit application requirements and approval conditions.

(2) "Application of The Borough of Fairchance, Fayette County, Pennsylvania" for consent or permit to construct a reservoir on Cave Hollow, Georges Township, Fayette County, Pennsylvania, dated 13 June 1925.

(3) Two design drawings by Homer L. Burchinal, Uniontown, Pennsylvania showing plans and sections of the proposed dam, dated 1925.

(4) "Permit" to construct a dam across Cave Run in Georges Township, Fayette County issued by the Water and Power Resources Board, Department of Forests and Waters, Commonwealth of Pennsylvania, to the Borough of Fairchance, 22 July 1925.

(5) Miscellaneous correspondence related to dam inspections of Fairchance Reservoir by the Water and Power Resources Board, dated 11 May 1927, 28 April 1931, 10 June 1941 and 28 August 1961.

(6) Application by Borough of Fairchance for permit to make a change to a water supply reservoir across Cave Run in Cave Hollow, dated 28 October 1935. Changes requested included increasing size of reservoir, riprap placement on resevoir slopes, deepening an existing drainage ditch on the "south bank", pointing-up existing grouted riprap, cleaning the present basin and constructing a small settling basin at inlet end of reservoir. "Permit" issued 30 October 1935. Permit reapplied for 17 June 1946.

(7) Drawing showing plan and details of proposed improvements of the Fairchance Reservoir dam dated 21 October 1935, resubmitted 17 June 1946.

(8) Report upon the application of the Borough of Fairchance, dated 7 November 1935 prepared for the Water and Power Resources Board.

(9) Correspondence related to a permit for additional construction on Fairchance Reservoir dated on 17 May 1946.

(10) Denial of request for changes in the spillway by C.K. Weigle, Chief, Division of Dams, Department of Forests and Water dated 4 June 1946.

b. Design Features: The embankment and appurtenances were designed in accordance with Water and Power Resources Board criteria.

(1) Field Investigation: No predesign geotechnical investigation was performed at the site. However, as per requirement of the Water and Power Resources Board, two test borings were drilled 20 feet into the core wall foundation in June 1926. One hole was at each end of the "central section." The left hole showed 14 feet of hard shale over sandstone while the right hole showed 5 feet of hard shale over sandstone. Both holes emitted water upon contact with the sandstone.

(2) Embankment: The embankment was designed to be compacted earth fill with a concrete cutoff. The specifications required an impervious mix of loam, sand, gravel and clay with maximum stone size of four inches. The fill was to have been placed in 6 inch layers after wetting and rolling. The design drawings indicated that if necessary, the cutoff wall be extended to the flow line. There is no indication as to whether or not this was done. The embankment slopes were to be 2H:1V and the crest was to be 12 feet wide. The embankment's upstream slope was to have a twelve inch riprap cover placed over the entire length of the slope.

The embankment foundation preparation was to consist of removing trees and roots to a degree that, in the engineers opinion, a "tight bottom" would be obtained.

(3) Outlet Works: The dam was designed with two outlet pipes through the embankment. On the left, a 12 inch water supply line would be encased in concrete. One anti-seep collar was provided on the upstream side of the embankment. The pipe was to have a screen well intake structure and a 10 inch and 6 inch gate valve in a valve house below the dam. The 6 inch gate valve

was to control a 6-inch drain to the existing stream and the 10-inch gate valve was to control flow into the supply pipeline.

On the right, a pond drain was designed, consisting of a 12-inch pipe encased in concrete. One anti-seep collar was specified for the conduit. The pond drain inlet appears to be at a construction dam to the right of the screen well. The discharge end of the pond drain is an unprotected gate valve at the toe of the embankment.

There is no provision for upstream flow control on either the pond drain or the water supply pipe. The exact invert elevations of these lines are unknown.

(4) Principal (Ungated) Spillway: The original design called for a riprap paved "wasteway" channel with level section at Elev. 1370. The sides of the "wasteway" channel were to consists of a concrete wingwall on the left and the natural valley slope on the right. The spillway was designed to function as both the regulating and emergency outlet for the reservoir. The spillway was to have a negative 4 percent approach channel slope and a 5 percent discharge channel slope with a 40 foot level section at Elev. 1370. Two concrete cutoff walls were provided across the spillway, one along the centerline of the crest and the other at the downstream end of the riprap paved discharge channel.

2.2 CONSTRUCTION

a. Contractors: According to the correspondence cited in 2.1a (5) above, construction was started by Younkin and Fletcher of Uniontown and Fairchance and was completed by William A. Owens of Uniontown, Pennsylvania.

b. Construction Period: The embankment and appurtenances were constructed between October 1925 and December 1926.

c. Field Changes: According to the correspondence there is no record of any field changes during the construction of Fairchance Reservoir dam.

d. Construction Inspection: On site inspection by representatives of the Commonwealth of Pennsylvania was performed during construction on 16 June 1926 and following completion of the structure on 11 May 1927. Throughout the construction period, the progression of work was monitored by Homer L. Burchinal, the design engineer.

2.3 MODIFICATION/REPAIR

In October 1935 the Borough of Fairchance applied for a permit to (1) increase the capacity of the reservoir, (2) place riprap on the spillway bank and the south bank of the reservoir, (3) deepen a drainage ditch along the south bank, (4) point-up grouted riprap, (5) clean the present basin and, (6) construct a small settling basin at the inlet to the reservoir. A permit was issued on 30 October 1935. The work was not performed due to financial conditions and the permit expired. On 17 June 1946 the permit was reapplied for and issued with the exception that the proposed two foot high masonry wall in the "wasteway" channel was not approved.

On the date of the Phase I visual inspection a two foot high weir wall was observed in the "wasteway" channel. Also, the spillway channel right bank was observed to be riprapped and the upstream slope riprap was cemented. The proposed settling basin and south bank riprap were not observed.

2.4 OPERATION

According to the Water and Power Resources Board, the Borough of Fairchance is responsible for the operation of Fairchance Reservoir dam. The principal (and emergency) spillway is uncontrolled and performance and operation records are not maintained. The pond drain is normally closed and does not require a dam tender.

2.5 EVALUATION

a. Availability: Available design information and drawings were obtained from the Pennsylvania Department of Environmental Resources and were supplemented by conversation with Mr. Fred Tanner of the Fairchance Borough Water Department.

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 Fairchance Reservoir and dam were performed on 6 November 1979, and consisted of:

(1) Visual observations of the embankment crest and slopes, groins and abutments;

(2) Visual observations of the spillway including weir wall, concrete walls and approach and discharge channels.

(3) Visual observations of the embankment's downstream toe area including the pond drain discharge channel and springs and the water supply control chamber.

(4) Visual observations of downstream conditions and evaluation of the downstream hazard potential.

(5) Visual observations of the reservoir shoreline and inlet stream channel.

(6) Transit stadia survey of relative elevations along the embankment crest centerline, spillway, and across the embankment slopes.

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

The visual observations checklist, field plan, profile and section 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 observed to be generally straight and approximately level, except for a sag near the left abutment where the access road approached the crest. This was confirmed by a transit stadia survey which showed the embankment crest to be level over most of the right half, but 0.9 foot low on the left. The crest was 12 feet wide and grass and gravel covered. No cracks were observed.

(2) Upstream Slope: The upstream slope was entirely covered by cemented riprap, which contained minor cracks and a small amount of vegetation growing. The slope protection was in good condition.

(3) Downstream Slope: The embankment's downstream slope was covered with brush, weeds and trees up to 12 inches in diameter. The lower half of the slope was observed to have a rock or riprap covering. The slope appeared uniform between the abutments but the stadia survey showed the slope to range from 2.2H:1V near the crest to 2.5H:1V near the toe. No cracking, bulging, sloughing or unusual movement or misalignment was observed. However, the dense vegetal covering made close observation impossible. Also, two of the larger trees on the right side of the slope have overturned, creating cavities in the slope where the root systems have been pulled up. Three other trees at and just below the toe of the embankment have suffered similar distress with the same results.

c. Groins: Both groins (junction of embankment and abutment) were observed to be riprap lined from embankment toe to crest. No erosion or seeping water was observed in either groin.

d. Abutments:

(1) Left: The left abutment beyond the crest contained a ditch that extended halfway up the reservoir. The ditch was grass lined but had an unmortared rock training wall. The ditch was located immediately to the left (abutment side) of the access road and discharged to the pond drain channel 50 feet below the toe of the dam. The abutment above the ditch was observed to be steep and heavily wooded.

Below the crest and access road and above the left groin, the abutment slope was observed to be steep and densely covered with brush and trees. No erosional distress, sloughing, bulging or seeping water was observed.

(2) Right: The right abutment above the principal spillway channel was observed to be steep and heavily wooded.

Below the spillway channel, the right abutment was similar to the lower left abutment. No erosional distress, sloughing, bulging or seeping water was observed.

e. Outlet Works:

(1) Water Supply Facility: A water supply pipeline, 12 inch (nominal) cast iron, was observed in a reinforced concrete control chamber just below the toe of the embankment and immediately left of the pond drain discharge channel. The pipeline entered the chamber below ground level through the upstream wall, where it was connected to a T-fitting, a reducer fitting and a 10 inch gate valve. A 10 inch (nominal) diameter pipeline then exited the chamber through the downstream wall, below ground level.

A six inch (nominal) diameter cast iron pipe originated at the T-fitting, was connected to a gate valve and exited the chamber through the right wall, below ground level. The other end of the pipe was not located.

The concrete structure was in good condition with no cracking or spalling observed. The concrete chamber top slab appeared to be much older than the structure walls.

Inside the chamber, water was standing to a depth of four inches.

The pipeline intake structure was not observed because of the reservoir pool level and no mechanism or controls were observed to indicate the existence of a positive upstream flow control.

(2) Pond Drain: A pond drain consisting of a 12 inch (nominal) diameter cast iron pipe with gate valve, was observed to exit the embankments's foundation at the downstream toe, discharging to an excavated pond drain channel. Immediately above the gate valve, a T-fitting originated a six inch (nominal) diameter cast iron pipe that was connected to a gate valve; the six inch pipe disappeared into the right abutment. Neither gate valve had a handwheel or opening device.

Seepage was noted along or in the immediate vicinity of the pond drain pipe and gate valve.

Additional seepage was noted along the perimeter of the pond drain channel. Total seepage was estimated at 10 to 15 gpm. No silting or discolored flows were observed. The pond drain channel was observed to be about four feet deep and contained nine inches of standing water.

The pipeline intake structure was not observed because of the reservoir pool level and no mechanism or controls were observed to indicate the existance of a positive upstream flow control.

f. Principal (Ungated) Spillway:

(1) General Configuration: The principal spillway for Fairchance Reservoir dam is an ungated, open channel on the right abutment. The channel has a concrete training wall on the left (embankment side) that extends 60 feet upstream and a training dike retaining wall that extends 76 feet downstream of the embankment crest centerline. The right side is excavated into natural ground and was observed to be riprap lined upstream and downstream of the weir wall.

On the date of inspection, the condition of the principal spillway was good.

(2) Approach Channel: The approach channel is contained by the upstream training wall on the left and the riprap covered shore on the right. No obstructions were observed that would hinder flows or adversly affect the spillway performance.

(3) Weir Wall: The weir wall is constructed of mortar bound rock with a concrete cap and lies along the embankment crest centerline. The weir was observed to be 40 feet long, 18 inches wide and two feet high. The stadia survey showed a slight unevenness with the low part near the concrete training wall. The weir was in generally good condition and gave indications that it had been repaired in the past.

(4) Discharge Channel: The discharge channel is contained by the concrete retaining wall on the left and the riprap covered abutment on the right. The bottom of the channel was covered with a concrete slab that did not appear to have been smoothed or have construction joints. A large crack and minor displacement was observed near the lower end of the slab near the retaining wall.

The slope of the slab was surveyed and found to be 0.04 feet/foot (4%).

Just below the end of the slab, a peninsula of land juts into the channel presenting a flow constriction. A wire fence crosses the channel from the abutment to the peninsula.

About 100 feet below the end of the slab, the discharge channel steepens significantly and turns sharply left, before rejoining the original creek channel in the valley below the embankment.

Considerable bank erosion has occurred where the discharge channel turns and drops. A steep, 12 to 15 foot high barren slope was observed and a recently fallen tree gave indication of continuing erosion.

The condition however did not appear to present a threat to the dam.

g. Instrumentations: No instrumentation was observed during the inspection.

h. Downstream Conditions:

(1) Toe Area: The valley bottom immediately below the toe of the embankment was generally dry with brush, weed and tree cover. The only seepage observed was in the pond drain discharge channel as described in 3.1e(2). No seepage or wet conditions were observed in the cavities created by the fallen trees described in 3.1b(3) above.

(2) Downstream Channel: Cave Hollow branch channel below the dam passes through a heavily wooded, steep-sided valley for about 1,500 feet. The channel slope in this reach is 0.05 feet/foot (5%). Below, the valley broadens for another 700 feet, until the channel enters the outskirts of the Borough of Fairchance where the floodplain broadens dramatically. Here, Cave Hollow branch joins Georges Creek.

(3) Floodplain Development: The Borough of Fairchance lies on the Georges Creek floodplain and contains considerable residential and commercial development. At least seven inhabited dwellings lie on the floodplain in the first mile below the dam.

i. Reservoir:

(1) Shoreline: The reservoir shoreline was observed to be generally steep and densely wooded. No bank erosion or instability was observed.

(2) Inlet Stream: The inlet stream is a typical mountain brook having a winding, rock and debris littered channel.

(3) Watershed: The watershed contributing to Fairchance Reservoir is mostly wooded and undeveloped. Mr. Tanner of the Borough of Fairchance stated that most of this watershed is owned by the Borough. The remainder lies in State Game Lands No. 138.

3.2 EVALUATION

a. Embankment: The general, overall condition of the embankment is assessed to be fair. This is based on the observed fallen trees and associated embankment distress. Also, the inability to closely observe the embankment because of vegetal growth and ground litter was considered to be a deficiency. However, no seepage or stability problems were observed on the embankment.

b. Downstream Toe Area: The seepage and springs observed in the pond drain discharge channel presented some concern. It could not be determined if seepage was occurring along the pond drain pipe. However, the seepage activity appeared to be long standing and no indications of subsurface erosion or piping were observed.

c. Outlet Works:

(1) Water Supply Facility: The condition of the water supply intake structure and pipeline through the embankment could not be observed and therefore could not be assessed. However, there were no visual indications of problems. The observed portions of the facility were assessed to be in good condition. The apparent lack of an upstream flow control is assessed to be a deficiency.

(2) Pond Drain: The condition of the pond drain intake structure and pipeline through the embankment could not be observed and therefore could not be assessed. Seepage observed in the immediate vicinity of the drain outlet may be a problem although no indications of piping or recent changes in conditions were observed.

d. Principal Spillway: The principal spillway was assessed to be in generally good condition. Minor cracks and structural deficiencies were noted but are not considered serious.

The wire fence and peninsula of land below the discharge channel slab are possible flow constrictions but appeared to be a sufficient distance below the weir wall (both physically and hydraulically) so as not to present hindrance to large flow performance of the spillway.

The erosional area at the lower end of the "wasteway" channel was assessed to present no threat to 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 Borough of Fairchance. Maintenance reportedly consists of periodically repairing eroded areas and making miscellaneous necessary repairs. According to Mr. Fred Tanner, the reservoir is drained bi-annually, cleaned and repairs made as required.

4.3 INSPECTION OF DAM

The Borough of Fairchance 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

The water supply pipeline is controlled by a gate valve located downstream of the embankment. The valve is normally open and the pipeline is under full pressure through the embankment. This is considered to be a deficiency.

The pond drain pipeline is controlled by a gate valve located downstream of the embankment. The gate valve is normally closed and the pipeline is under full pressure through the embankment. This is considered to be a deficiency.

The bi-annual draining and maintenance program should be continued. However, there are no written operation, maintenance or inspection procedures, nor is there a warning system or formal emergency procedure for this dam. These procedures should be developed in the form of checklists and step by step instructions, and should be implemented as necessary.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

a. Design Data: The Fairchance Reservoir dam has a watershed of 1,018 acres which is vegetated primarily by woodland. The watershed is about two miles long and one mile wide and has a maximum elevation of 2740 feet (MSL). At normal pool the dam impounds a reservoir with a surface area of one acre and a storage volume of 9.2 acre-feet. Normal pool level is maintained at Elev. 1372 by a weir wall.

Spillway capacity and embankment freeboard where made sufficient to accomodate 770 cubic feet per second which was considered sufficient for this structure and watershed at the time of design. However, a post construction change as described in Paragraph 5.1c limits this capacity to a computed 138 cfs for the observed cross-section and existing freeboard conditions. 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. However, there is a record of a significant flow in the "wasteway" channel during the storm of March 1936. This depth, six inches, corresponds to a water surface elevation of 1370.5. The measurement was taken before the two foot high masonry weir wall was constructed in the "wasteway" channel.

c. Visual Observations: On the date of the field reconnaissance, no serious defficiencies were observed that would prevent the principal spillway from functioning. However, the two foot high weir wall in the "wasteway" channel has significantly reduced the spillway's original design capacity.

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. The Corps of Engineers guidelines recommend 0.5 to 1 times the Probable Maximum Flood (PMF) for "small" size, "high" hazard dams. Based on observed downstream conditions, Fairchance Reservoir dam has a Spillway Design Flood (SDF) of 0.5 PMF.

Hydrometeorological Report No. 33 indicates the adjusted 24 hour Probable Maximum Precipitation (PMP) for the subject site is 19.4 inches. No calculations are available to indicate whether the reservoir and spillway are sized to pass a flood corresponding to one half of the runoff from 19.4 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 Fairchance Reservoir dam was determined by HEC-1 to be 3,402 cfs for a full PMF. The peak inflow for the SDF was determined to be 1,701 cfs.

An initial pool elevation of 1372 was assumed prior to commencement of the storm.

According to the HEC-1 analysis, at 0.50 PMF, Fairchance Reservoir dam is overtopped by 1.72 feet of water for 15 hours and 10 minutes. The analysis is included in Appendix D.

e. Spillway Adequacy: The capacity of the combined reservoir and spillway system was determined to be 0.04 PMF by HEC-1. According to Corps of Engineers' guidelines, Fairchance Reservoir dam spillway is "inadequate."

Because the reservoir/spillway system capacity is less than 0.5 PMF and overtopping depth and duration conditions were judged by the evaluating engineer to cause failure of the embankment, a dam breach analysis was performed to determine if the spillway is "seriously inadequate."

For the dam breach analysis, it was assumed that dam failure would begin when the water level in the reservoir reached Elev. 1374.1 which corresponds to a depth of 1 foot above the crest's observed minimum elevation.

To achieve the assumed overtopping failure condition, a 0.25 PMF was routed through the reservoir/spillway system. Initially, the flood wave was routed downstream without embankment failure conditions considered. Results of the dam breach analysis indicated that downstream flooding and the risk of loss of life would not be significantly increased by the assumed failure of the dam. The stream level in the Borough of Fairchance would rise 0.8 feet with an increase in flow of 31 percent.

Therefore the Fairchance Reservoir dam's 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. A detailed listing of this data is included and discussed in Section 2 and selected items are presented in Appendix E.

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

c. Post-Construction Changes: The only change noted was the installation of the two foot high weir wall in the "wasteway" channel, grouting of the riprap on the upstream slope, and riprap lining of the right abutment along the spillway channel.

6.2 EVALUATION

a. Design Documents: The design documentation was, by itself, considered inadequate to evaluate the structure. There were no structural calculations associated with the stability of the embankment or of the appurtenant structures.

b. 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. Based on these observations, the embankment appears to be stable.

The observed flattening of the embankment's downstream slope toward the toe is not believed to be a deficiency. The slope is considerably flatter than design requirements and is covered with broken rock or riprap that was not required by design drawings or specifications.

The downstream slope was vegetated with numerous trees up to 12 inches in diameter. The trees are assessed to be potential deficiencies. The growth of extensive root systems within the embankment may lead to preferred seepage channels (pipes) particularly following the death of the tree and rotting of the root system.

The principal spillway was inspected and judged to be functional.

c. Performance: No record was found indicating any problem related to stability over the 54 year life of the structure.

d. Seismic Stability: According to the Seismic Risk Map of the United States, Fairchance Reservoir dam 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: Fairchance Reservoir dam's embankment is assessed to be in fair condition. This is based on visual observations of growing and fallen trees on the embankment's downstream slope and a sag in the left portion of the crest. Also, the inability to closely observe the downstream slope due to considerable brush and vegetal growth is considered to be a deficiency.

(2) Outlet Works: The condition of the two pipelines through the embankment could not be determined. The lack of upstream flow control devices is considered to be a deficiency.

The observed portion of the water supply pipeline was in good condition.

The observed portion of the pond drain was in good condition. However, there was evidence of possible seepage along the pipeline that was discharging to the pond drain discharge channel.

(3) Principal Spillway: The condition of the principal spillway was assessed to be poor. This is based on the "inadequate" capacity rating determined using the HEC-1 computer program. The spillway was found to pass only 4 percent of the PMF. The Spillway Design Flood is 0.5 PMF because of the dam size and hazard classification. A breach analysis indicated that downstream flooding and the risk of loss of life would not be significantly increased by the assumed failure at the dam. Also, minor deficiencies were observed including a fence over the discharge channel near the end of the concrete slab and cracks in the walls, slab, and weir.

(4) Downstream Toe Area: Seepage observed along the pond drain discharge channel is considered to be a deficiency. However, the seepage appeared to be a long-term phenomenon and no indication of movement of soil fines or increasing flows was observed.

b. Adequacy of Information: The information available on design, construction, operation and performance history in combination with visual observations and

hydrology and hydraulic calculations were sufficient to evaluate the embankment and appurtenant structures in accordance with the Phase I investigation guidelines.

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

7.2 RECOMMENDATIONS

a. Additional Investigations: Retain a professional engineer knowledgeable in dam design and construction to:

(1) 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) Provide recommendations on installing positive upstream flow controls for the water supply and pond drain pipelines.

(3) Inspect the seeps in the pond drain discharge channel and at the pond drain outlet and provide recommendations for monitoring or control.

b. Remedial Work: The Phase I investigation of Fairchance Reservoir dam also disclosed several deficiencies of lower priority which should be corrected during routine maintenance.

(1) Remove the trees from the embankment's downstream slope. This work should be performed under the direction of a professional engineer, knowledgeable in dam design and construction.

(2) Fill the embankment's crest to design elevation.

(3) Remove the fence over the spillway's discharge channel.

(4) Repair cracks in the spillway walls, slab and weir and in the cemented riprap on the upstream slope.

(5) Develop and implement formal maintenance and inspection procedures.

c. Emergency Operation and Warning Plan: Concurrent with the additional investigations 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 rapid 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 Fairchance Reservoir County Fayette State Pennsylvania National ID # PA 00208

Type of Dam Earth Hazard Category High

Date (s) Inspection 6 November 1979 Weather Partly cloudy Temperature 55°F

Pool Elevation at Time of Inspection 1372+ (MSL)
Tailwater at Time of Inspection Unknown

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. B. Zeppieri	Ackenheil & Associates, Geologist
Fred Tanner	Water Department Head, Borough of Fairchance,
Lauren Smith	Water Department Employee, Borough of Fairchance

Recorder J. E. Barrick

GEO Project G79153-G
PennDER I.D. No. 26-70

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed - Upstream slope is covered with grouted riprap. Downstream slope is covered with trees (some 12 inches in diameter), underbursh, and down timber. Approximately two-thirds of the way along the crest toward the right abutment, a large tree has overturned, pulling its root system with it and a cavity has been created at the crest line. Immediately below that, a second tree has overturned, creating a second cavity.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	A 12 inch tree has overturned, falling in the downstream direction, pulling with it its root system, leaving a cavity at the immediate toe of the embankment. A second smaller tree has fallen near the right and a third larger tree below that. Careful observation of the cavity caused by the fallen tree at the immediate toe indicates moist soil but no wet or seeping water conditions.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing observed. Minor erosion observed along a diversion ditch which traverses the left abutment. This ditch runs along the reservoir, past the end of the embankment along the access road continuing downstream and entering the outlet channel 50 feet below the embankment toe. It appears to have carried water recently. Also, minor erosion has occurred on the access road where it approaches the crest. The crest in this area is lower than remainder of crest but upstream slope protection maintains the integrity of the reservoir pool zone.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Embankment crest appears level and straight except at left end as noted above. Crest width is 12 feet.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RIPRAP FAILURES	Grouted riprap is in good condition. No signs of distress. Minor cracks observed with some vegetation growing. Recent repair (patching) work observed. Overall condition very good. The lower half of the downstream embankment slope is rock covered with trees and brush growing through.	
SETTLEMENT	None observed.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The access road to the structure approaches along the left abutment and rises to the embankment crest. This portion of the road is barren of grass cover and has eroded gradually over the years causing a slight lowering of the embankment crest as noted above. Both embankment groins are overgrown with brush, down timber and trees. No seepage or erosion observed. Both groins appear to be rock or riprap covered to the crest.	
ANY NOTICEABLE SEEPAGE	Seeping water is evident around the perimeter of the pond drain discharge channel excavation. The flow is estimated to be 5 to 10 gpm, although additional flow may be occurring into submerged portions of the channel.	
STAFF GAGE AND RECORDER	None reported, none observed.	
DRAINS	None observed.	

OUTLET WORKS
12 INCH CAST IRON PIPE
(WATER SUPPLY FACILITY)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Conduit is cast iron.	
INTAKE STRUCTURE	Not observed because of reservoir pool level.	
OUTLET STRUCTURE	Structure is reinforced concrete box. Dimensions are 10 feet by 8 feet with the 8 foot dimension parallel to the embankment crest centerline. The structure is 8 feet deep. No spalling or cracking is apparent. Top cap is much older than sides. Four inches of water standing in structure, but no inflow observed.	
OUTLET CHANNEL	None existing. Fourteen inch (O.D.) cast iron pipe enters structure through upstream side (below ground surface), passes a T-fitting with 7 inch (O.D.) connection, passes a reducer to 11 inch (O.D.) then passes a gate valve before exiting through downstream wall (below ground surface). The 7 inch (O.D.) pipe that originates at the T-fitting passes a gate valve (no handwheel) and exits the right side of the structure below the ground surface.	
EMERGENCY GATE	None observed.	

OUTLET WORKS
12 INCH CAST IRON PIPE
(POND DRAIN)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Conduit is cast iron. The visible portion consists of a gate valve having an outside diameter of 14 inches. No handwheel is available for operation of the gate valve.	
INTAKE STRUCTURE	Not observed because of reservoir pool level.	
OUTLET STRUCTURE	Gate valve. Two feet upstream of gate valve is a 8 inch T-fitting. Eight inch (O.D.) cast iron pipe leaves T, parallels crest, toward right abutment. Seepage is occurring along pipe.	
OUTLET CHANNEL	Discharge channel is excavated approximately 4 feet into original ground. There is approximately 9 inches of water standing in the channel. Seepage exists around the perimeter of outlet pond.	
EMERGENCY GATE	None observed.	

PRINCIPAL (UNGATED) SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	Mortar bound rock wall, 18 inches wide and 2 feet high with concrete cap. Located between the embankment side training wall along embankment crest centerline and the hand placed riprap on the abutment slope. The weir wall is 40 feet long. Freeboard to top of training wall - 2 feet, 5 inches.	
APPROACH CHANNEL	Concrete training wall on left (embankment side) extends 60 feet upstream of dam. Right side is riprap on valley wall. No condition observed that would hinder or reduce flows reaching weir.	
DISCHARGE CHANNEL	Embankment side training wall extends 76 feet downstream from the masonry weir wall. The wall has several vertical cracks which appear to have been patched in the past. In general, its condition is good. No spalling or construction joint distress is evident. Throughout this length the bottom of the outlet channel is rough concrete covered. One large crack and slab displacement at approximately 65 feet down the training wall and 5 feet off of the wall. The right wall of the channel abutment is covered with hand placed riprap to an elevation approximately 6 feet above the pool level, tending back into the reservoir area approximately 60 feet. Hand placed riprap also exists on the abutment side downstream of the weir crest but it is considerably more deteriorated than the upstream riprap. Peninsula of land, with tree cover, juts into discharge channel just below end of training wall and slab. Also, a fence crosses the discharge channel from the abutment to the peninsula.	
BRIDGE AND PIERS	None reported, none observed.	

DOWNSTREAM CHANNEL

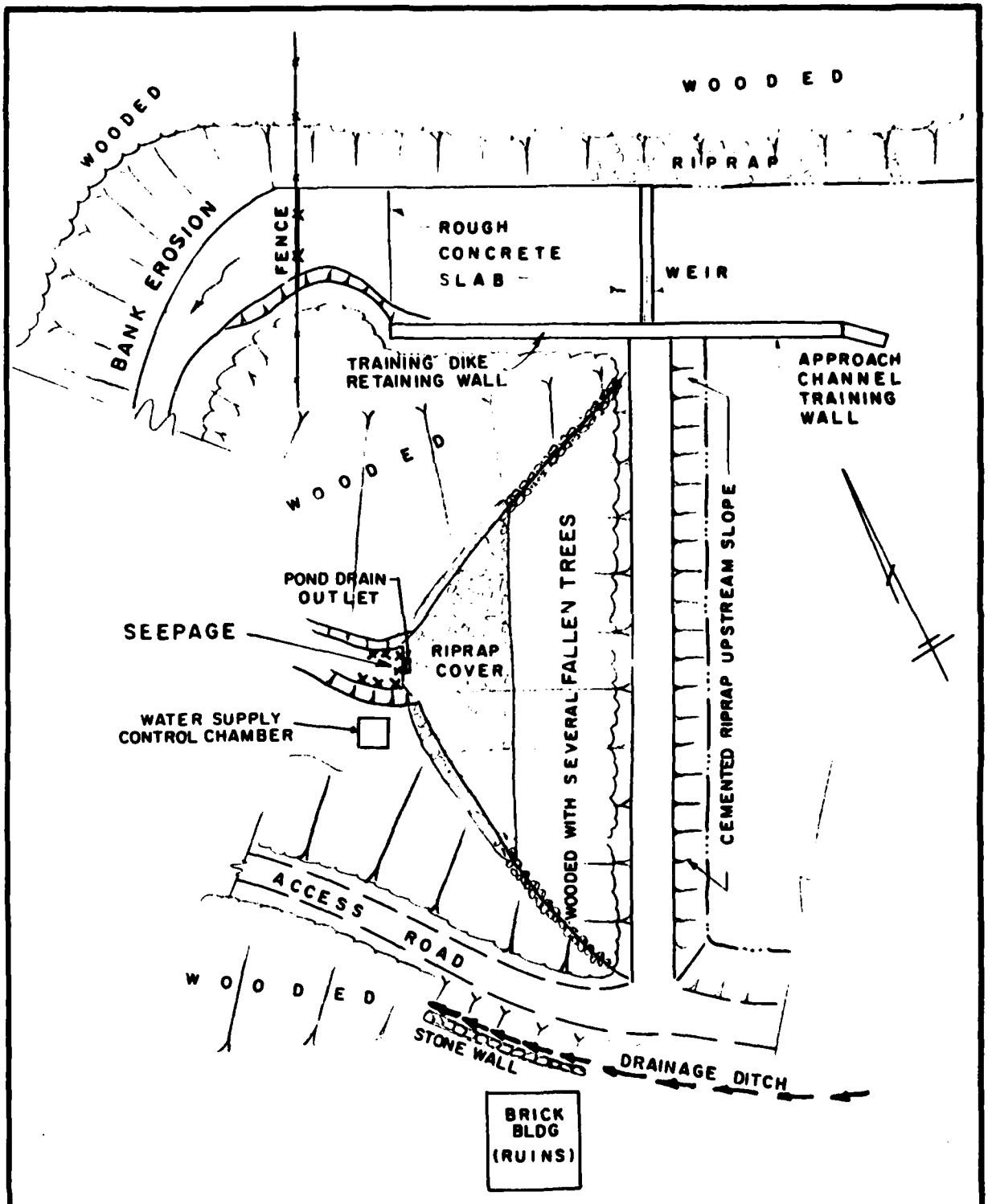
VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The channel below the spillway contains significant amounts of large rock, down timber and debris. Approximately 100 feet below the end of the concrete slab, the channel impinges on a hillside and considerable erosion has occurred. A very steep, barren earth face 12 to 15 feet high has resulted. Erosion is continuing as indicated by a fallen tree in the channel. This condition does not appear to threaten the safety of the dam.	
SLOPES	Steep slopes covered by trees and woody vegetation for a distance of 1,500 feet. Valley bottom slopes at 5% (0.05) in the first 1,200 feet below discharge channel outlet. Valley broadens drastically below and remains wooded to 2,200 feet below dam. Enters outskirts of Borough of Fairchance where floodplain broadens again.	
APPROXIMATE NO. OF HOMES AND POPULATION	Borough of Fairchance begins 0.7 miles below dam. Numerous homes and businesses lie on the flood plain.	

INSTRUMENTATION

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

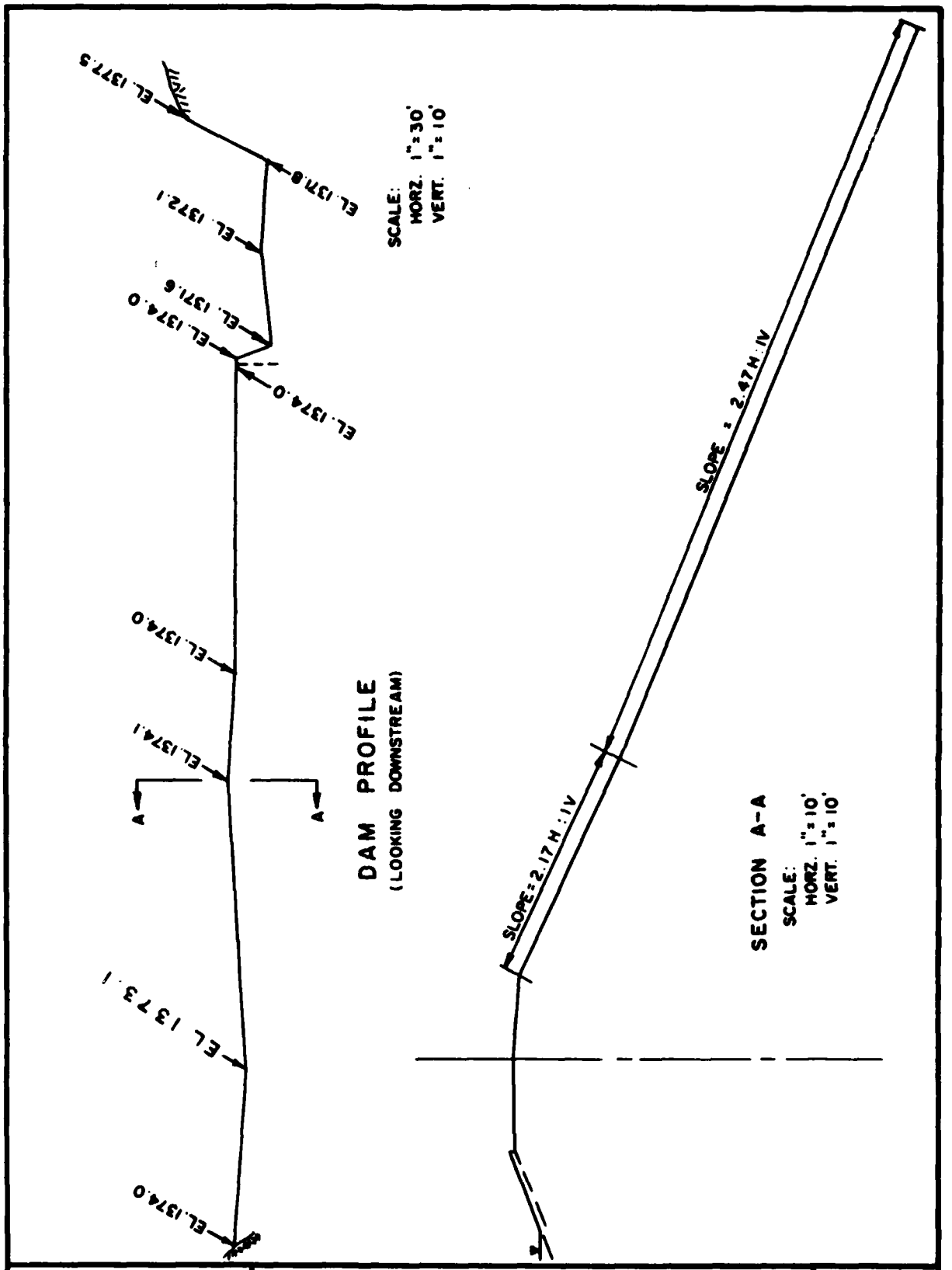
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The reservoir slopes are relatively steep, but appear to be generally stable. There are no apparent signs of recent sloughing or erosional activity anywhere around the perimeter of the reservoir.	
SEDIMENTATION	Discussions with Mr. Fred Tanner, Head of the Water Department, Borough of Fairchance, indicates that the reservoir is drained and cleaned biennially.	
WATERSHED	Entirely wooded. Some in State Game Land PA 138. Watershed not observed. No access. Reported to be undeveloped by Fairchance Borough officials.	



See Page A11 For Field Profile And Section

DATE: MARCH 1980	FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM	FIELD PLAN
SCALE: NONE		
DR: [illegible] CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	



DATE: MARCH 1980		FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM	FIELD PROFILE AND SECTION
SCALE: AS SHOWN			
DR: J F	CK: J E B	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	

10 7100 ALBANENE A. & B. SMITH CO., PGH., PA.

APPENDIX B

ENGINEERING DATA CHECKLIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Fairchance Reservoir
I.D. No. PA 00208

ITEM	REMARKS
*Design Drawings	Design drawings by Homer L. Burchinal, Uniontown Pennsylvania including: "Location Plan-Proposed Cave Hollow Water Supply for Fairchance Borough", May 1925. "General Plan of Proposed Dam".** undated. "Plan and Details of Proposed Improvements at the Fairchance Borough Reservoir", 22 October 1935, resubmitted June 1946.**
As-Built Drawings	None available.
Regional Vicinity Map	U.S.G.S. 7-1/2 Minute Brownfield, Pennsylvania Quadrangle Map.
*Construction History	Construction begun by Younkin and Fletcher, Uniontown and Fairchance, Pennsylvania in 1925; completed by William A. Owens of Uniontown, Pennsylvania in 1926. See Progress Report upon the Dam of Fairchance Borough, dated 28 June 1926 for the Water and Power Resources Board by the Assistant Engineer.

ITEM	REMARKS
*Typical Sections of Dam	Longitudinal and transverse sections, see Design Drawings.
*Outlets-Plan Details Constraints Discharge Ratings	See Design Drawings.
*Rainfall/Reservoir Records	Correspondence dated 13 April 1936 to Water and Power Resources Board in response to request for information on March 1936 flood. Data included maximum pool rise of 6 inches, rainfall duration 24 hours, runoff duration 2 days, no blow-off valves open.
*Design Reports	Report upon the Application of the Borough of Fairchance, dated 20 July 1925 prepared by the Division Engineer for the Water and Power Resources Board.
Geology Reports	None available.
Design Computations	None available.
Hydrology and Hydraulics	None available.
Dam Stability	None available.
Seepage Studies	None available.
*Materials Investigations, Boring Records, Laboratory, Field	Two test borings drilled 20 feet into core wall foundation in June 1926 at request of Water and Power Resources Board Inspector. One hole at each end of "central section". Left hole showed

ITEM	REMARKS
*Materials Investigation, etc. (cont'd)	14 feet hard shale over sandstone. Right hole showed 5 feet of hard shale over sandstone. Both holes emitted water upon contact with sandstone.
Post-Construction Surveys of Dam	None recorded.
Borrow Sources	Data not available.
Monitoring Systems	None reported.
*Modifications	Sometime before 12 November 1940, a drainage ditch was excavated on the left abutment near the chlorination house. In 1946 the upstream embankment riprap was grouted with concrete, riprap was placed along the lower left abutment. Sometime after 4 June 1946, the two foot high overflow weir wall was constructed across the principal spillway channel.
*High Pool Records	See Rainfall/Reservoir Records above.
Post-Construction Engineering Studies and Reports	None available.
Maintenance, Operation, Records	None available.

ITEM	REMARKS
*Spillway Plan Sections Details	See Design Drawings above.
*Operating Equipment Plans and Details	See Design Drawings above.
*Specifications	SPECIFICATIONS AND INFORMATION for the installation of a Water Supply System for Fairchance Borough, Fayette County, Pennsylvania; undated.
*Miscellaneous	Miscellaneous correspondence involving application requirements and approval conditions including: "Application of the Borough of Fairchance, Fayette, County, Pennsylvania" for consent or permit to construct a reservoir on Cave Hollow, Georges Township, Fayette County, Pennsylvania dated 13 June 1925. "Permit" to construct a dam across Cave Run in Georges Township, Fayette County issued by the Water and Power Resources Board, Department of Forests and Waters, Commonwealth of Pennsylvania, to the Borough of Fairchance, 22 July 1925. Miscellaneous correspondence related to dam inspections of Fairchance Reservoir by the Water and Power Resources Board personnel dated 11 May 1927, 28 April 1931, 10 June 1941, 28 August 1961.

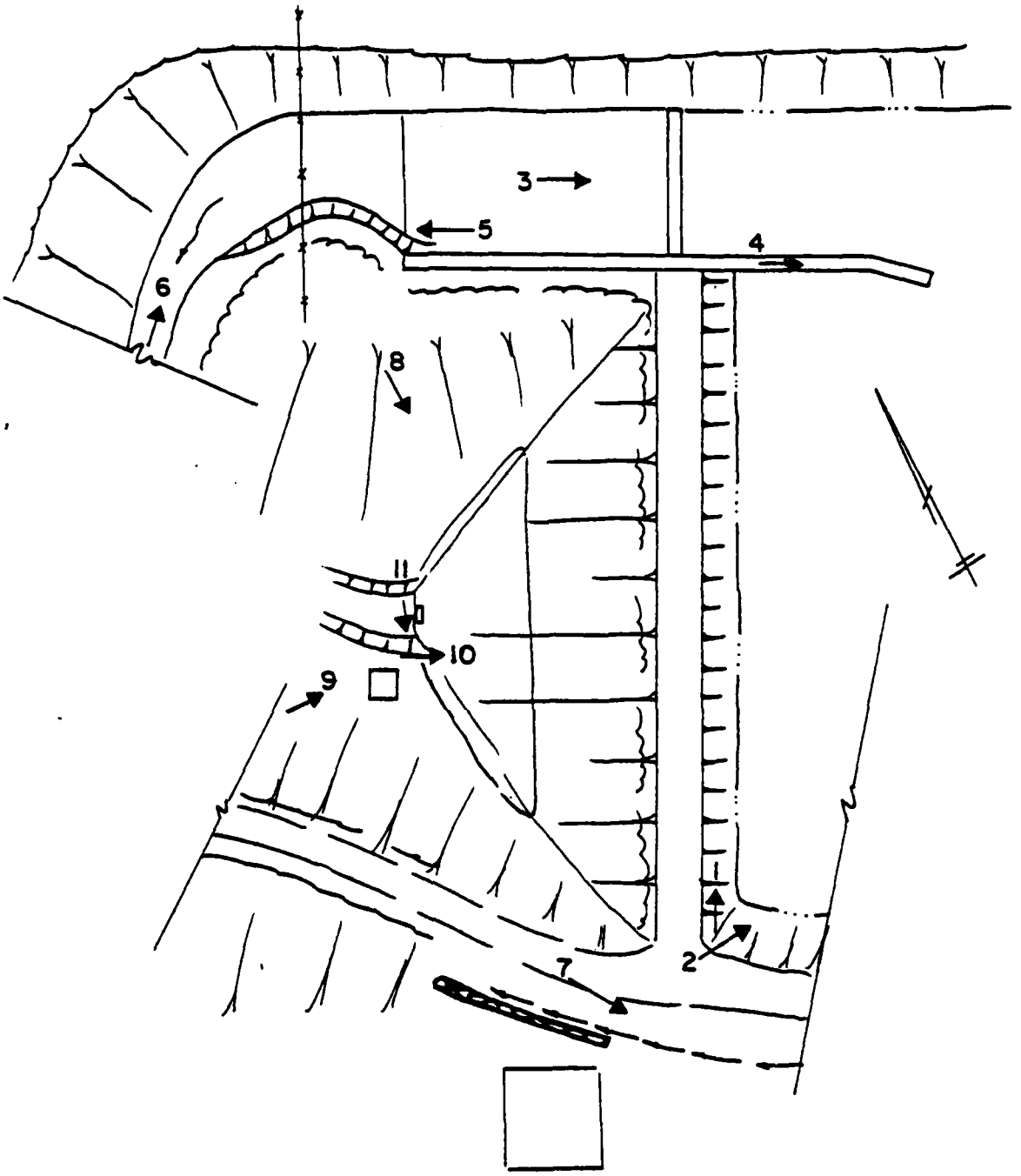
ITEM	REMARKS
*Miscellaneous (cont'd)	Application by Borough of Fairchance for permit to make a change to a water supply reservoir across Cave Run in Cave Hollow dated 28 October 1935. Changes requested included increasing size of reservoir, rip-rap placement on reservoir slopes, deepen an existing drainage ditch along the "south bank", point-up grouted riprap, clean present basin and construct a small settling basin at inlet end of reservoir. "Permit" issued 30 October 1935. Permit reapplied for 17 June 1946. Report upon the Application of the Borough of Fairchance, dated 7 November 1935 prepared for the Water and Power Resources Board (incomplete). Correspondence related to a permit for additional construction on Fairchance Reservoir dated on 17 May 1946. Denial for changes in the spillway by C. K. Weigle, Chief, Division of Dams Department of Forests and Water, dated 4 June 1946.
Prior Accidents or Failure of Dam Description Reports	None reported.

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

APPENDIX C

PHOTOGRAPHS

PHOTO 12 LOCATION NOT SHOWN



DATE: MARCH 1980		FAIRCHANCE RESERVOIR DAM 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.	

PHOTO 1. VIEW OF EMBANKMENT, CEMENTED RIPRAP, AND SPILLWAY TRAINING WALL

PHOTO 2. OVERVIEW OF RESERVOIR

PHOTO 3. UPSTREAM VIEW OF SPILLWAY CHANNEL

PHOTO 4. DETERIORATION OF TRAINING WALL

PHOTO 5. DOWNSTREAM VIEW OF SPILLWAY CHANNEL

PHOTO 6. UPSTREAM VIEW OF LOWER END OF SPILLWAY CHANNEL

PHOTO 7. VIEW OF LEFT ABUTMENT NEAR EMBANKMENT CREST

PHOTO 8. OVERVIEW OF DOWNSTREAM SLOPE

PHOTO 9. VIEW OF POND DRAIN AND WATER SUPPLY CONTROL CHAMBER

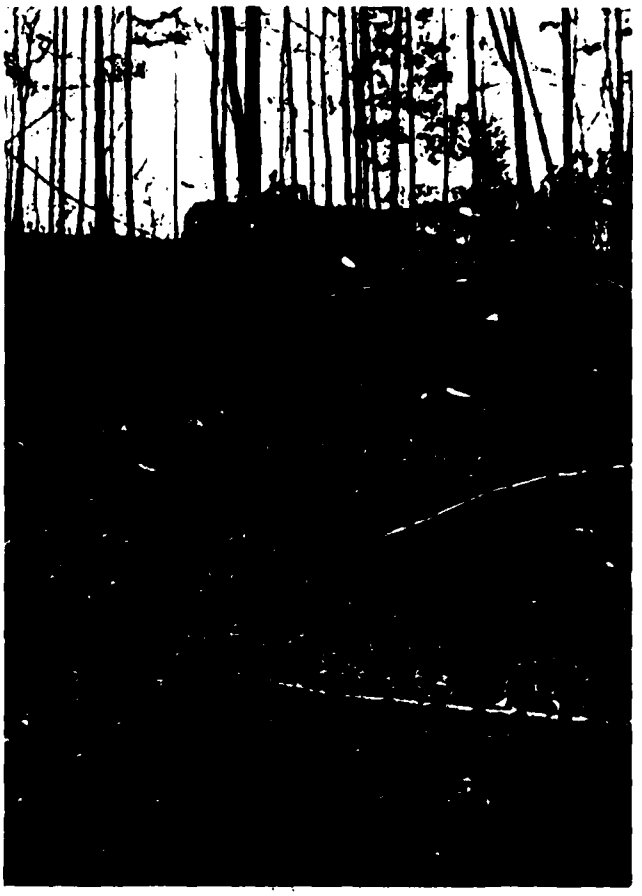


PHOTO 10. VIEW OF DOWNSTREAM SLOPE

PHOTO 11. SEEPAGE ALONG POND DRAIN DISCHARGE CHANNEL

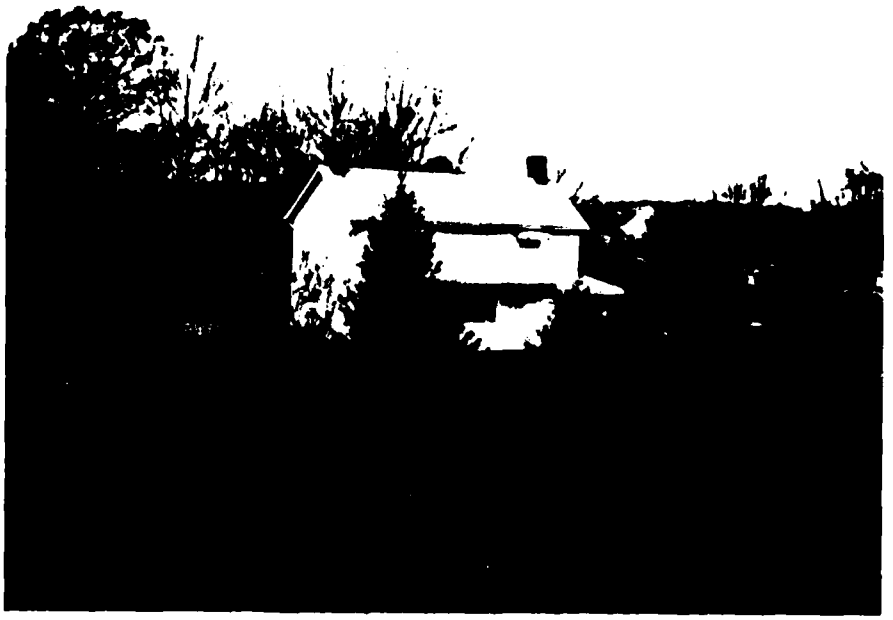


PHOTO 12. INHABITED RESIDENCE DOWNSTREAM OF DAM

DETAILED PHOTO DESCRIPTIONS

Photo 1 View of Embankment, Cemented Riprap, and Spillway Training Wall from left abutment.

Photo 2 Overview of Reservoir from left abutment. Cave Hollow Stream at center of photo.

Photo 3 Upstream View of Spillway Channel showing weir and training dike retaining wall (on right of photo).

Photo 4 Deterioration of Training Wall.

Photo 5 Downstream View of Spillway Channel. Note debris in channel, wire fence crossing channel, and bank erosion below.

Photo 6 Upstream View of Lower End of Spillway Channel as seen from the original valley bottom.

Photo 7 View of Left Abutment near Embankment Crest. Note drainage ditch and abandoned structure on right. Access road is on left.

Photo 8 Overview of Downstream Slope from upper right groin. Note (top to bottom) abandoned structure, water suppy control chamber and pond drain.

Photo 9 View of Pond Drain and Water Supply Control Chamber.

Photo 10 View of Downstream Slope from pond drain discharge channel area. Truck is on embankment crest and pond drain is near toe.

Photo 11 Seepage along Pond Drain Discharge Channel near pond drain outlet.

Photo 12 Inhabited Residence Downstream of Dam. Cave Hollow Stream in foreground and house is approximately 4500 feet downstream of the dam.

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.

Parameter	Definition	Where Obtained
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.

5. Dam Breach Downstream Routing: The computer program is equipped to determine the increase in downstream flooding due to failure of the dam caused by overtopping. This is accomplished by routing both the pre-failure peak flow and the peak flow through the breach (calculated by the computer with given input assumptions) at a given point in time and determining the water depth in the downstream channel. Channel cross-sections taken from U.S.G.S. 7.5 minute topographic maps were used in the downstream flood wave routing. Pre and post failure water depths are calculated at locations where cross-sections are input.

*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): 1372.0 (9.2 acre-feet.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1373.1 (10.5 acre-feet.)

ELEVATION MAXIMUM DESIGN POOL: 1374.0

ELEVATION TOP DAM: 1373.9 (average) 1373.1 (minimum)

OVERFLOW SECTION

a. Elevation 1372.0
b. Type Masonry weir wall
c. Width 40 feet
d. Length N/A
e. Location Spillover Right abutment
f. Number and Type of Gates None

OUTLET WORKS

a. Type 12 inch outlet pipe (water supply pipe)
b. Location Left of centerline, near downstream toe
c. Entrance Inverts 1349
d. Exit Inverts 1342
e. Emergency Drawdown Facilities 12 inch outlet pipe (pond drain) left of center of dam

HYDROMETEOROLOGICAL GAGES

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

MAXIMUM REPORTED NON-DAMAGING DISCHARGE Pool rise 6 inches, March 1936

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

NAME OF DAM: Fairchance Reservoir Dam	NDI ID NO. PA 208
Probable Maximum Precipitation (PMP)	24.2*
Drainage Area	1.59 sq. mi.
Reduction of PMP Rainfall for Data Fit Reduce by 20%, therefore PMP rainfall =	0.8 (24.2) =19.4 in.
Adjustments of PMF for Drainage Area (Zone 7)	
6 hrs.	102%
12 hrs.	120%
24 hrs.	130%
Snyder Unit Hydrograph Parameters	
Zone	29**
C_p	0.5
C_t	1.6
L	2.1 mile
L_{ca}	1.1 mile
$t_p = C_t (L \cdot L_{ca})^{0.3}$ =	2.06 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=2.39 cfs
Base Flow Cutoff	0.05 x Q peak
Recession Ratio	2.0
Overflow Section Data	
Crest Length	40 feet
Freeboard	1.1 feet
Discharge Coefficient	2.64-3.32
Exponent	1.5
Discharge Capacity	138 cfs
Breach Parameters	
Section Slope	3.51:1
Section Height	26.1 feet
Duration of Failure	1.0 hour
Depth of Maximum Overtopping Prior to Failure	1.0 foot
PMF Storm	0.25

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

Sheet _____ of _____

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job Fairchance Reservoir Dam Job No. 7915-2G

Subject DATA INPUT

Made By JPH Date 3/19/80 Checked SAM Date 3/19/80

LOSS RATE AND BASE FLOW PARAMETERS

As RECOMMENDED BY CORPS OF ENGINEERS, BALTIMORE DISTRICT

STRTL = 1 inch
CNSTL = 0.05 "/hour
STRTQ = 1.5 CFS/mi²
QRCSN = 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 = 1372

Initial Storage = 9.2 Acre-feet

Pond Surface Area = 1.0 Acres
AT ELEVATION 1380, AREA = 4.6 ACRES
At elevation 1400, Area = 9.2 Acres

At elevation 1420, Area = 11.0 Acres

From conic method for Reservoir volume
Flood hydrograph Package (HEC-1)
DAM Safety version (users manual)

$H = 3V/A$

$= 3(9.2)/1.0$

$= 27.6$

Elevation where Area equals zero:

$1372 - 27.6 = 1344.4$

Area	SA	0.0	1.0	4.6	9.2	11.0
Elevation	SE	1344.4	1372	1380	1400	1420

Sheet _____ of _____

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GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job FAIRCHANCE RESERVOIR DAM Job No. 79153G

Subject SPILLWAY RATING CURVE

Made By JPH Date 3/19/80 Checked SGM Date 3/19/80

STAGE - DISCHARGE RELATIONSHIP

$Q_T = Q_1 + Q_2$

$Q_1 = C L_1 H^{1.5}$ $\quad L_1 = 40$ FEET

$Q_2 = C Z_2 H^{2.5}$ $\quad Z = 1.5$ FEET

ELEV.	H	C	Q_1	Q_2	Q_T
1072.0	0	0	0	0	0
1072.5	0.5	2.64	37.3	0.7	38.0
1073.0	1.0	2.75	110.0	4.1	114.1
1073.5	1.5	2.99	219.7	12.4	232.1
1074.0	2.0	3.03	342.8	25.7	363.5
1074.5	2.5	3.28	518.6	48.6	567.2
1075.0	3.0	3.32	690.0	77.6	767.6
1075.5	3.5	3.32	896.6	114.1	983.7
1076.0	4.0	3.32	1062.4	159.4	1221.8
1076.5	4.5	3.32	1267.7	213.9	1481.6
1077.0	5.0	3.32	1484.7	278.4	1763.1
1077.5	5.5	3.32	1712.9	353.3	2066.2
1078.0	6.0	3.32	1951.8	439.1	2390.9

ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job Fairchance Reservoir Dam Job No. 79E3B

Subject Data Input

Made By JDH Date 3/19/80 Checked SGM Date 3/19/80

Overtop Parameters

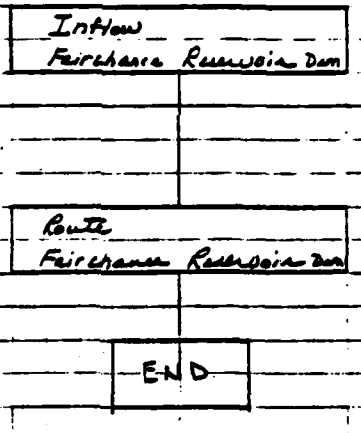
Top of Dam Elevation (MINIMUM) = 1373.1

Length of Dam (Excluding Spillway) = 190

Coefficient of Discharge (C) = 2.63

L_{MAX} = 200 V_{MAX} = 1377

Program Schedule



Sheet _____ of _____

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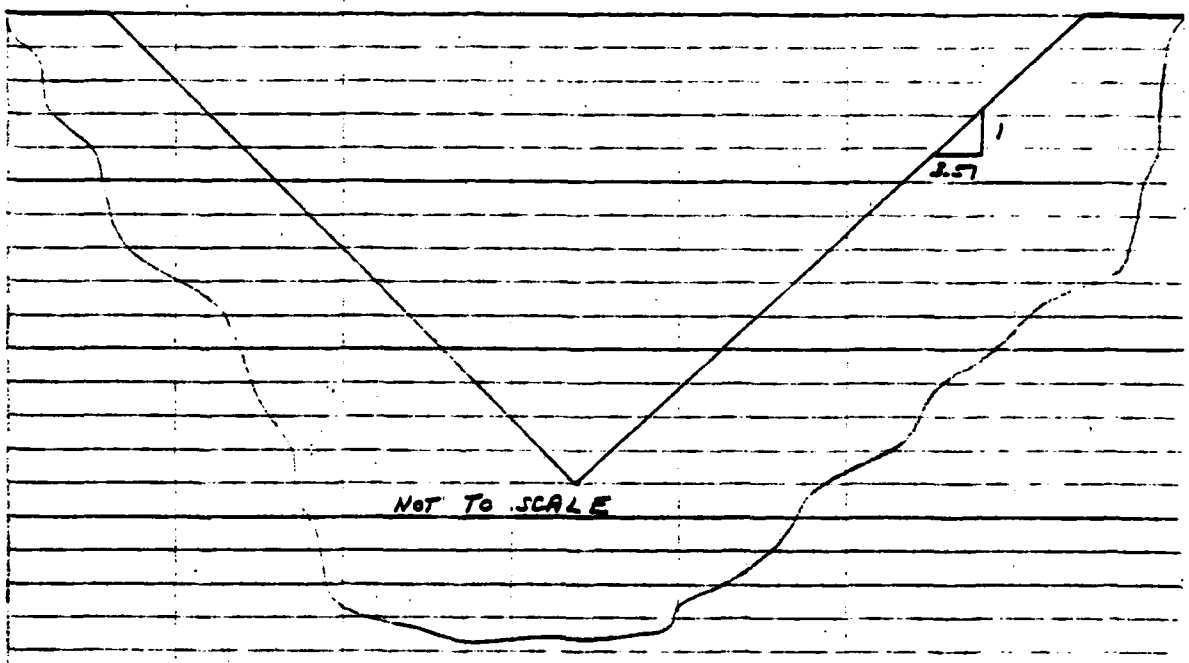
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job Fairchance Res. Dam Job No. 7915-2G

Subject BREACH AND DOWNSTREAM ROUTING PARAMETERS

Made By JPH Date 3/19/80 Checked SGM Date 3/19/80

BREACH PARAMETERS



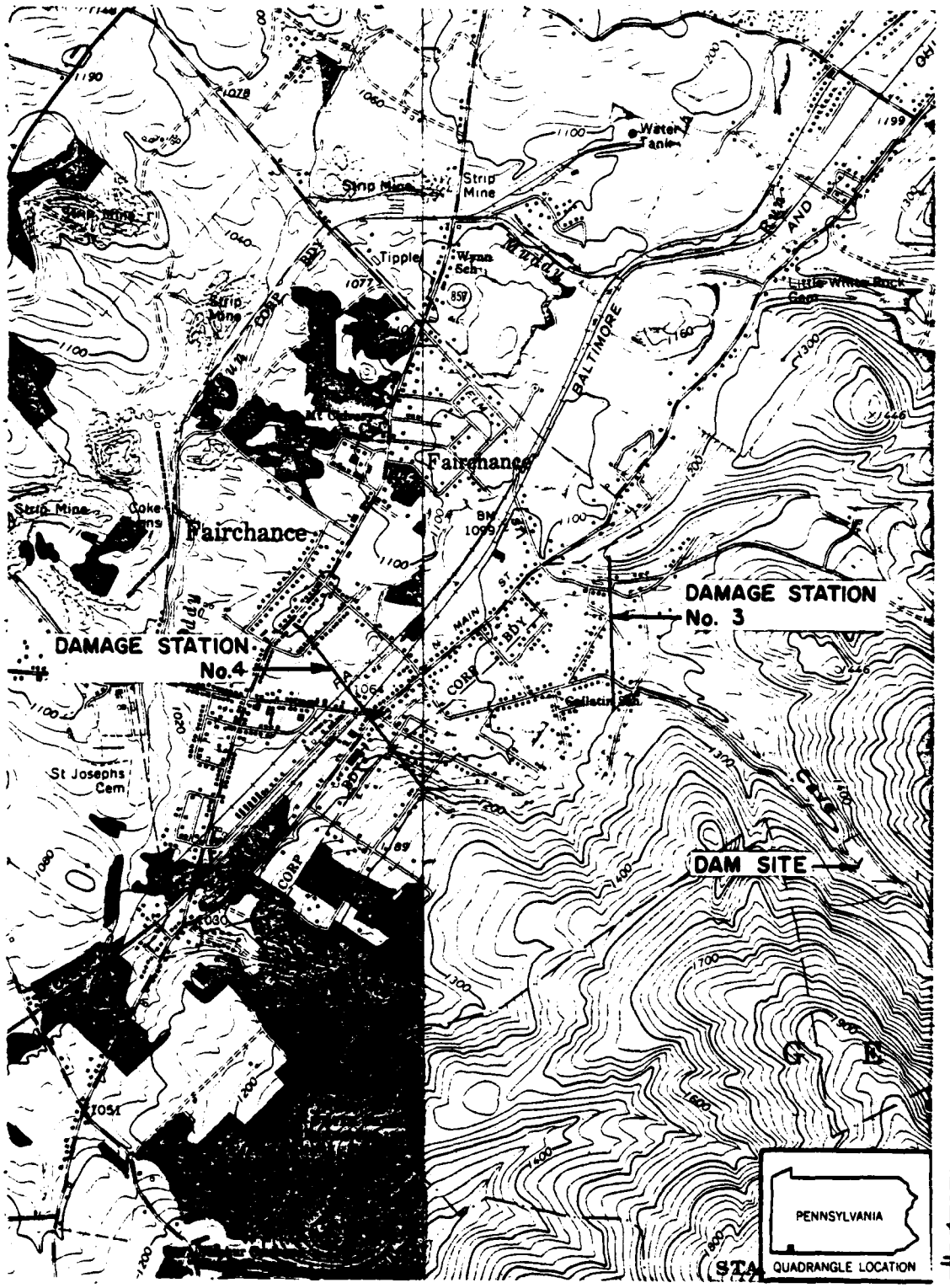
RATIO OF PMF (RTIO) = 0.25
SIDE SLOPE OF BREACH (Z) = 3.5:1
FAILURE TIME (TFAIL) = 1 HR.

CHANNEL ROUTING

CHANNEL CROSS SECTIONS OBTAINED FROM U.S.G.S. 7½' QUAD.

CHANNEL MANNINGS "n" QN(2) = 0.09

OVERBANK MANNINGS "n" QN(1) = 0.07



SMITHFIELD and BROWNFIELD U.S.G.S. 7½ min. QUADRANGLES

DATE: MARCH 1980	FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM		DAMAGE STATION MAP
SCALE: 1" = 2000'			
DR: JF	CK: JPH	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
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    1              A1       NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
    2              A2       HYDROLOGIC AND HYDRAULIC ANALYSIS OF FAIRCHANCE RESERVOIR
    3              A3       PROBABLE MAXIMUM FLOOD PMF/UNIT GRAPH BY SNYDERS METHOD
    4              B   300       0       5       0       0       0       0       0      -4       0
    5              B1    5
    6              J     1       5       1
    7              J1   1.     0.5     0.2     0.1    0.05
    8              K     0       1                                       1
    9              K1       INFLOW HYDROGRAPH FOR FAIRCHANCE RESERVOIR
   10              M     1       1    1.59            1.59       1                       1
   11              P            19.4     102     120     130
   12              T                                                1.0    0.05
   13              W  2.06     0.5
   14              X  -1.5   -0.05     2.0
   15              K     1       2                                       1
   16              K1       ROUTING AT FAIRCHANCE RESERVOIR
   17              Y                                    1       1
   18              Y1    1                                                9.21      -1
   19              Y4 1372.  1372.5   1373.  1373.5   1374.  1374.5   1375.  1375.5   1376.  1376.5
   20              Y4 1377.  1377.5   1378.
   21              Y5   0.0    38.0   114.1   232.1   368.5   567.2   767.6   983.7  1221.8  1481.6
   22              Y51763.1  2066.2  2390.9
   23              $A   0.0      1.     4.6     9.2    11.0
   24              $E1344.4  1372.   1380.   1400.   1420.
   25              $$ 1372.
   26              $D1373.1   2.63     1.5    190.
   27              $L   80.    180.    190.    195.    200.
   28              $V1373.1  1374.   1375.   1376.   1377.
   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


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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
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RUN DATE: 20 MAR 80
RUN TIME: 7.31. 7

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
HYDROLOGIC AND HYDRAULIC ANALYSIS OF FAIRCHANCE RESERVOIR
PROBABLE MAXIMUM FLOOD PMF/UNIT GRAPH BY SNYDERS METHOD

JOB SPECIFICATION

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

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1
RTIOS= 1.00 0.50 0.20 0.10 0.05

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR FAIRCHANCE RESERVOIR

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	1.59	0.0	1.59	1.00	0.0	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	19.40	102.00	120.00	130.00	0.0	0.0	0.0

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= 2.06 CP=0.50 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH100 END-OF-PERIOD ORDINATES, LAG= 2.08 HOURS, CP= 0.50 VOL= 0.92

2.	7.	15.	25.	36.	48.	61.	74.	89.	103.
119.	135.	151.	167.	182.	196.	209.	220.	230.	238.
245.	251.	255.	257.	257.	254.	248.	241.	234.	227.
220.	214.	208.	202.	196.	190.	184.	179.	174.	169.
164.	159.	154.	150.	145.	141.	137.	133.	129.	125.
122.	118.	115.	111.	108.	105.	102.	99.	96.	93.
90.	88.	85.	83.	80.	78.	76.	73.	71.	69.
67.	65.	63.	61.	60.	58.	56.	55.	53.	51.
50.	48.	47.	46.	44.	43.	42.	41.	39.	38.
37.	36.	35.	34.	33.	32.	31.	30.	29.	28.

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	25.22	23.34	1.88	260925.
										(641.)	(593.)	(48.)	(7388.58)

**********   **********   **********   **********   **********

HYDROGRAPH ROUTING

ROUTING AT FAIRCHANCE RESERVOIR

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

ROUTING DATA

QLOSS	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	9.	-1

STAGE	1372.00	1372.50	1373.00	1373.50	1374.00	1374.50	1375.00	1375.50	1376.00	1376.50
	1377.00	1377.50	1378.00							
FLOW	0.0	38.00	114.10	232.10	368.50	567.20	767.60	983.70	1221.80	1481.60
	1763.10	2066.20	2390.90							

SURFACE AREA=	0.	1.	5.	9.	11.
CAPACITY=	0.	9.	30.	165.	367.
ELEVATION=	1344.	1372.	1380.	1400.	1420.

CREL	SPWID	COQW	EXPW	ELEVL	COOL	CAREA	EXPL
1372.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1373.1	2.6	1.5	190.

CREST LENGTH	80.	180.	190.	195.	200.
AT OR BELOW ELEVATION	1373.1	1374.0	1375.0	1376.0	1377.0

PEAK OUTFLOW IS 3402. AT TIME 17.67 HOURS

PEAK OUTFLOW IS 1701. AT TIME 17.67 HOURS

PEAK OUTFLOW IS 680. AT TIME 17.67 HOURS

PEAK OUTFLOW IS 340. AT TIME 17.67 HOURS

PEAK OUTFLOW IS 170. AT TIME 17.67 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 1.00	RATIO 2 0.50	RATIO 3 0.20	RATIO 4 0.10	RATIO 5 0.05
HYDROGRAPH AT	1	1.59	1	3402.	1701.	680.	340.	170.
		(4.12)		(96.35)(	48.17)(	19.27)(	9.63)(	4.82)(
ROUTED TO	2	1.59	1	3402.	1701.	680.	340.	170.
		(4.12)		(96.34)(	48.17)(	19.27)(	9.63)(	4.81)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1372.00	1372.00	1373.10
STORAGE	9.	9.	10.
OUTFLOW	0.	0.	138.

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	1375.85	2.75	16.	3402.	16.67	17.67	0.0
0.50	1374.82	1.72	13.	1701.	15.17	17.67	0.0
0.20	1374.00	0.90	12.	680.	9.67	17.67	0.0
0.10	1373.55	0.45	11.	340.	6.25	17.67	0.0
0.05	1373.20	0.10	11.	170.	2.58	17.67	0.0

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
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    1              A1       NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
    2              A2       HYDROLOGIC AND HYDRAULIC ANALYSIS OF FAIRCHANCE RESERVOIR
    3              A3       PROBABLE MAXIMUM FLOOD PMF/UNIT GRAPH BY SNYDERS METHOD
    4              B   300       0       5       0       0       0       0       0      -4       0
    5              B1    5
    6              J     2       1       1
    7              J1 0.25
    8              K     0       1                                               1
    9              K1       INFLOW HYDROGRAPH FOR FAIRCHANCE RESERVOIR
   10              M     1       1    1.59            1.59       1                       1
   11              P            19.4     102     120     130
   12              T                                                       1.0    0.05
   13              W  2.06     0.5
   14              X  -1.5   -0.05     2.0
   15              K     1       2                                               1
   16              K1       ROUTING AT FAIRCHANCE RESERVOIR
   17              Y                                       1       1
   18              Y1    1                                                  9.21      -1
   19              Y4 1372.  1372.5    1373.  1373.5   1374.  1374.5   1375.  1375.5   1376.  1376.5
   20              Y4 1377.  1377.5    1378.
   21              Y5  0.0     38.0   114.1   232.1   368.5   567.2   767.6   983.7  1221.8  1481.6
   22              Y51763.1  2066.2  2390.9
   23              $A  0.0      1.     4.6     9.2    11.0
   24              $E1344.4  1372.   1380.   1400.   1420.
   25              $$ 1372.
   26              $D1373.1    2.63     1.5     190.
   27              $L  80.     180.    190.    195.    200.
   28              $V1373.1  1374.   1375.   1376.   1377.
   29              $B          3.51   1347.     1.0   1372.  1374.1
   30              $B          3.51   1347.     1.0   1372.  1376.0
   31              K     1       3                                               1
   32              K1       MOD PULS ROUTING FROM DAM TO STATION THREE
   33              Y                                       1       1
   34              Y1    1
   35              Y6  .07     .03     .07   1125.   1200.   5280.   .042
   36              Y7  0.0    1200.    800.  1167.5   1600.   1135.  1601.   1125.   1611.   1125.
   37              Y7 1612.   1135.   1862.  1167.5   2112.   1200.
   38              K     1       4                                               1
   39              K1       MOD PULS ROUTING FROM STATION 3 TO STATION 4
   40              Y                                       1       1
   41              Y1    1
   42              Y6  .07     .03     .07   1045.   1100.   6000.   .013
   43              Y7   0.    1100.    600.  1077.5   1200.   1055.  1204.   1045.   1214.   1045.
   44              Y7 1218.   1055.   2009.  1127.5   2800.   1100.
   45              K    99
   46              A
   47              A
   48              A
   49              A
   50              A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
END OF NETWORK	

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

RUN  DATE: 20 MAR 80
RUN  TIME:  7.22.58
```

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
HYDROLOGIC AND HYDRAULIC ANALYSIS OF FAIRCHANCE RESERVOIR
PROBABLE MAXIMUM FLOOD PMF/UNIT GRAPH BY SNYDERS METHOD

JOB SPECIFICATION

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

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 2 NRTIO= 1 LRTIO= 1

RTIOS= 0.25

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH FOR FAIRCHANCE RESERVOIR

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

HYDROGRAPH DATA

IRYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.59	0.0	1.59	1.00	0.0	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.0	19.40	102.00	120.00	130.00	0.0	0.0	0.0

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= 2.06 CP=0.50 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -0.05 RTIOR= 2.00

UNIT HYDROGRAPH 100 END-OF-PERIOD ORDINATES, LAG= 2.08 HOURS, CP= 0.50 VOL= 0.92

2.	7.	15.	25.	36.	48.	61.	74.	89.	103.
119.	135.	151.	167.	182.	196.	209.	220.	230.	238.
245.	251.	255.	257.	257.	254.	248.	241.	234.	227.
220.	214.	208.	202.	196.	190.	184.	179.	174.	169.
164.	159.	154.	150.	145.	141.	137.	133.	129.	125.
122.	118.	115.	111.	108.	105.	102.	99.	96.	93.
90.	88.	85.	83.	80.	78.	76.	73.	71.	69.
67.	65.	63.	61.	60.	58.	56.	55.	53.	51.
50.	48.	47.	46.	44.	43.	42.	41.	39.	38.
37.	36.	35.	34.	33.	32.	31.	30.	29.	28.

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	25.22	23.34	1.88	260925.
										(641.)	(593.)	(48.)	(7388.58)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING AT FAIRCHANCE RESERVOIR

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

ALL PLANS HAVE SAME ROUTING DATA

CLOSS	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	9.	-1

STAGE	1372.00	1372.50	1373.00	1373.50	1374.00	1374.50	1375.00	1375.50	1376.00	1376.50
	1377.00	1377.50	1378.00							
FLOW	0.0	38.00	114.10	232.10	368.50	567.20	767.60	983.70	1221.80	1481.60
	1763.10	2066.20	2390.90							
SURFACE AREA=	0.	1.	5.	9.	11.					
CAPACITY=	0.	9.	30.	165.	367.					
ELEVATION=	1344.	1372.	1380.	1400.	1420.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1372.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1373.1	2.6	1.5	190.

CREST LENGTH AT OR BELOW ELEVATION					
	80.	180.	190.	195.	200.
	1373.1	1374.0	1375.0	1376.0	1377.0

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
0.	3.51	1347.00	1.00	1372.00	1374.10

BEGIN DAM FAILURE AT 17.08 HOURS

PEAK OUTFLOW IS 1136. AT TIME 17.44 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
0.	3.51	1347.00	1.00	1372.00	1376.00

PEAK OUTFLOW IS 850. AT TIME 17.67 HOURS

************ ************ ************ ************ ************

HYDROGRAPH ROUTING

MOD PULS ROUTING FROM DAM TO STATION THREE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

CLOSS	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	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0300	0.0700	1125.0	1200.0	5280.	0.04200

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.0 1200.00 800.00 1167.50 1600.00 1135.00 1601.00 1125.00 1611.00 1125.00
1612.00 1135.00 1862.00 1167.50 2112.00 1200.00

STORAGE	0.0	4.97	10.32	22.65	87.37	213.11	399.86	647.63	956.41	1326.21
	1757.03	2248.86	2801.71	3415.58	4090.46	4826.35	5623.27	6481.20	7400.14	8380.10
OUTFLOW	0.0	725.14	1918.93	3830.22	10794.71	28029.11	59643.03	109189.44	179887.12	274720.12
	396495.87	547881.25	731424.81	949579.31	1204709.00	1499113.00	1835013.00	2214582.00	2639934.00	3113140.00
STAGE	1125.00	1128.95	1132.89	1136.84	1140.79	1144.74	1148.68	1152.63	1156.58	1160.53
	1164.47	1168.42	1172.37	1176.31	1180.26	1184.21	1188.16	1192.10	1196.05	1200.00
FLOW	0.0	725.14	1918.93	3830.22	10794.71	28029.11	59643.03	109189.44	179887.12	274720.12
	396495.87	547881.25	731424.81	949579.31	1204709.00	1499113.00	1835013.00	2214582.00	2639934.00	3113140.00

MAXIMUM STAGE IS 1130.2

MAXIMUM STAGE IS 1129.4

HYDROGRAPH ROUTING

MOD PULS ROUTING FROM STATION 3 TO STATION 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

CLOSS	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	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0700	0.0300	0.0700	1045.0	1100.0	6000.	0.01300

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.0 1100.00 600.00 1077.50 1200.00 1055.00 1204.00 1045.00 1214.00 1045.00
1218.00 1055.00 2009.00 1127.50 2800.00 1100.00

STORAGE	0.0	4.45	9.82	16.12	29.64	82.14	178.01	317.24	499.84	725.81
	995.13	1307.83	1663.89	2063.31	2506.10	2992.26	3521.78	4094.66	4710.91	5370.53
OUTFLOW	0.0	289.29	871.78	1690.55	3010.16	6123.73	12397.86	22969.70	38828.59	60873.43
	89939.56	126813.81	172244.25	226947.31	291611.69	366902.87	453466.69	551929.94	662904.00	786984.06
STAGE	1045.00	1047.89	1050.79	1053.68	1056.58	1059.47	1062.37	1065.26	1068.16	1071.05
	1073.95	1076.84	1079.73	1082.63	1085.52	1088.42	1091.31	1094.21	1097.10	1100.00
FLOW	0.0	289.29	871.78	1690.55	3010.16	6123.73	12397.86	22969.70	38828.59	60873.43
	89939.56	126813.81	172244.25	226947.31	291611.69	366902.87	453466.69	551929.94	662904.00	786984.06

MAXIMUM STAGE IS 1051.5

MAXIMUM STAGE IS 1050.7

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 0.25
HYDROGRAPH AT	1 (4.12)	1.59	1	851. (24.09)(
			2	851. (24.09)(
ROUTED TO	2 (4.12)	1.59	1	1131. (32.02)(
			2	850. (24.08)(
ROUTED TO	3 (4.12)	1.59	1	1116. (31.61)(
			2	850. (24.06)(
ROUTED TO	4 (4.12)	1.59	1	1083. (30.66)(
			2	847. (24.00)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1372.00	1372.00	1373.10
STORAGE	9.	9.	10.
OUTFLOW	0.	0.	138.

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
0.25	1374.11	1.01	12.	1136.	4.31	17.44	17.08

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1372.00	1372.00	1373.10
STORAGE	9.	9.	10.
OUTFLOW	0.	0.	138.

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
0.25	1374.16	1.06	12.	850.	10.67	17.67	0.0

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.25	1116.	1130.2	17.50

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.25	850.	1129.4	17.67

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.25	1083.	1051.5	17.58

PLAN 2 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.25	847.	1050.7	17.83

Sheet _____ of _____

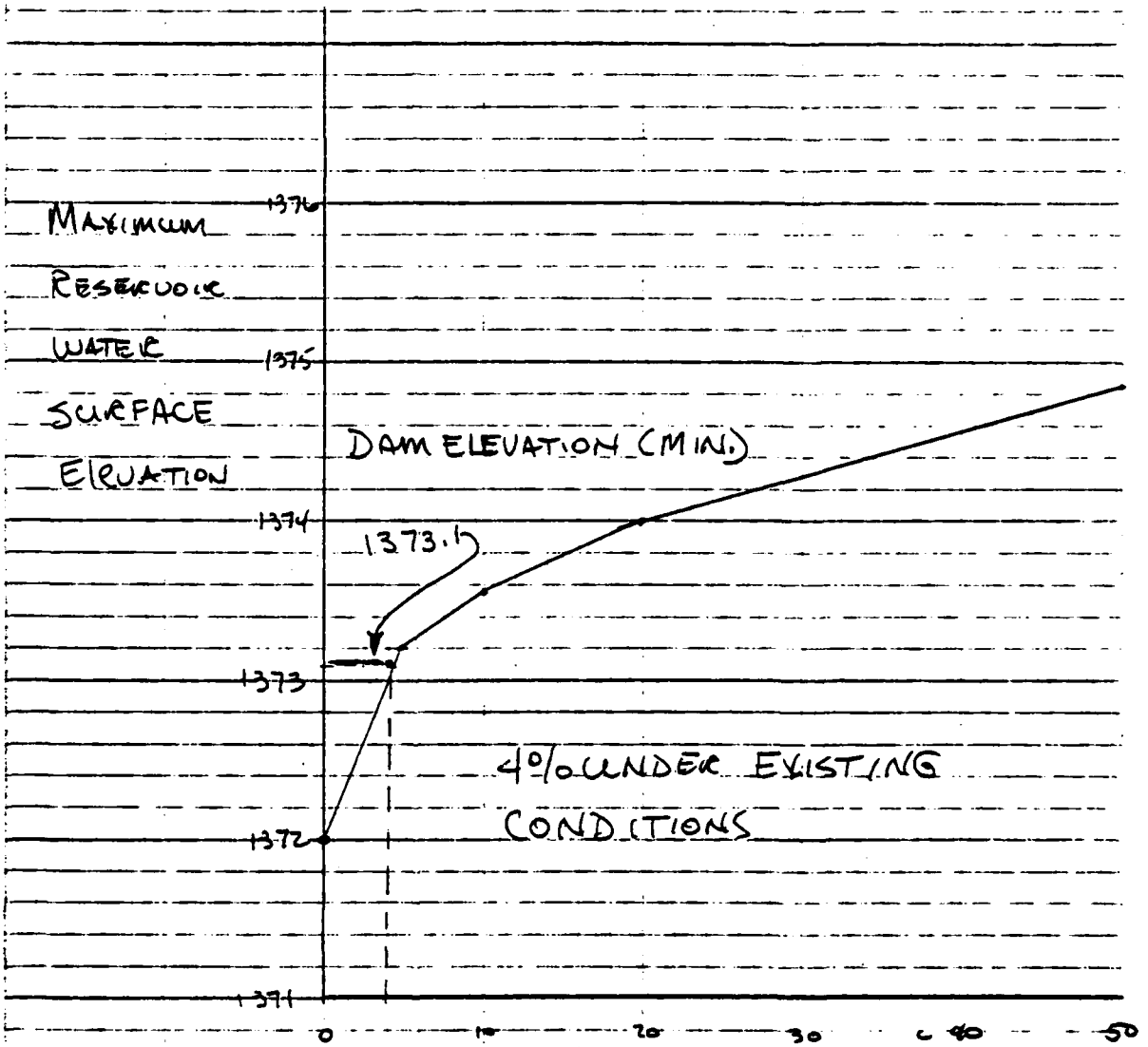
ACKENHEIL & ASSOCIATES
GEO Systems, Inc.
1000 Banksville Road
PITTSBURGH, PA. 15216
(412) 531-7111

Job Fairchance Reservoir Dam Job No. 7953

Subject Spillway/Reservoir Rating Curve

Made By JDH Date 3/19/80 Checked SGM Date 3/19/80

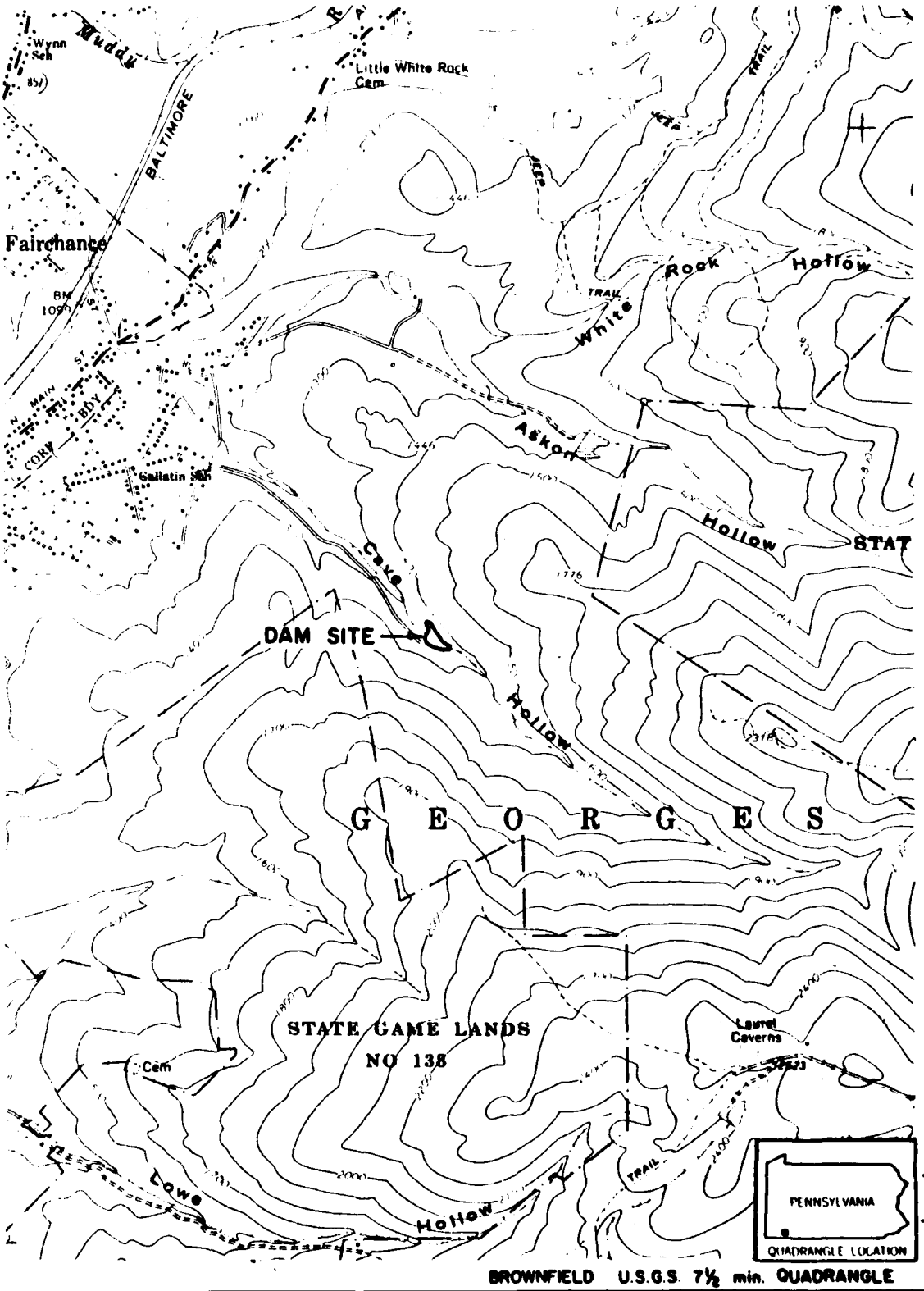
HYDROLOGIC PERFORMANCE PLOT



APPENDIX E

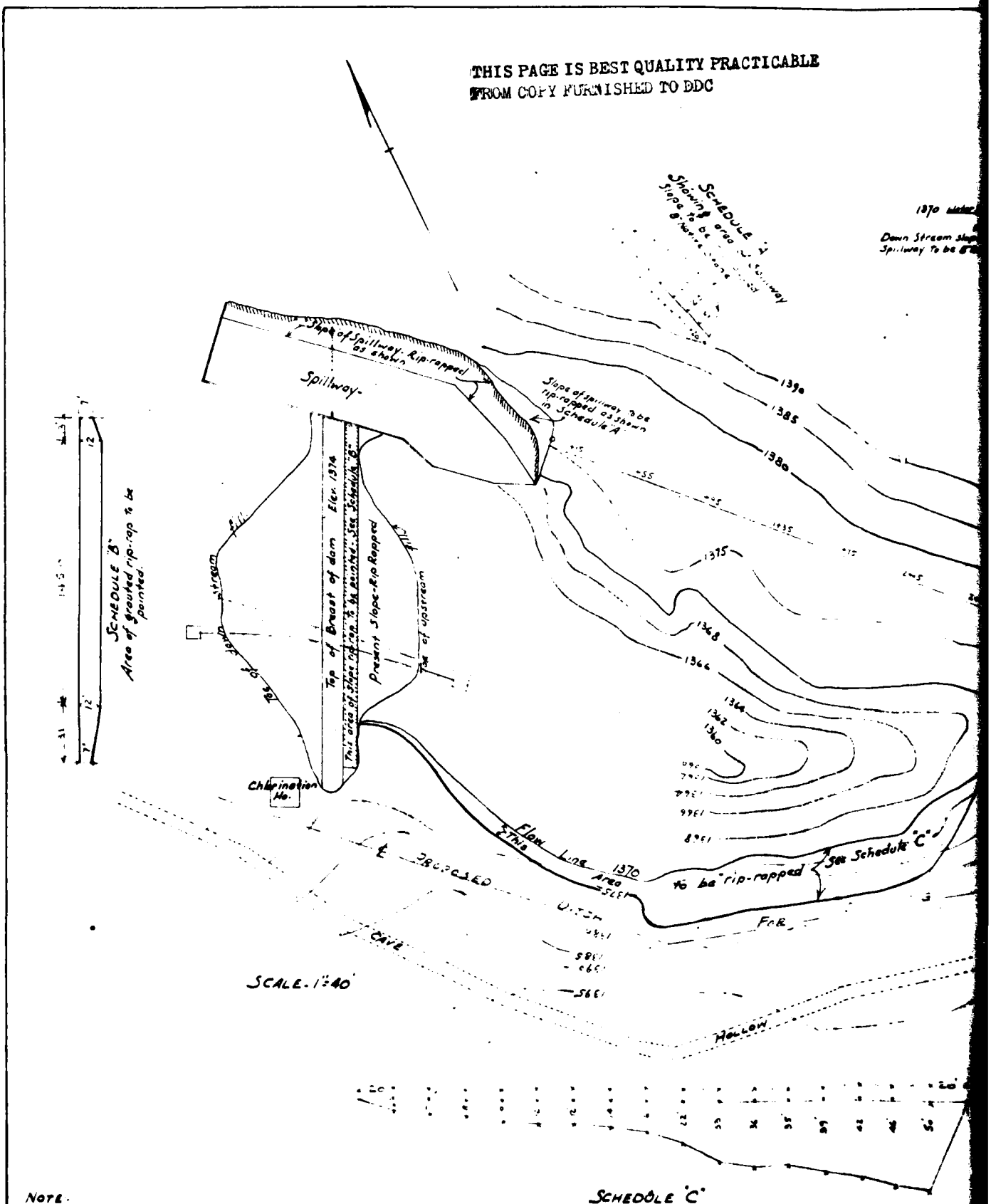
PLATES

LIST OF PLATES



BROWNFIELD U.S.G.S. 7½ min. QUADRANGLE

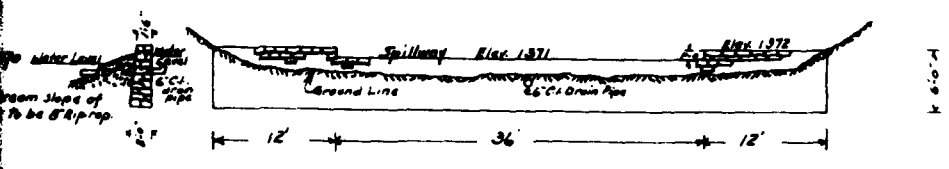
DATE: MARCH 1980	FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM	REGIONAL VICINITY MAP
SCALE: 1" = 2000'		
DR: J F CK: J E B	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	
PLATE I		



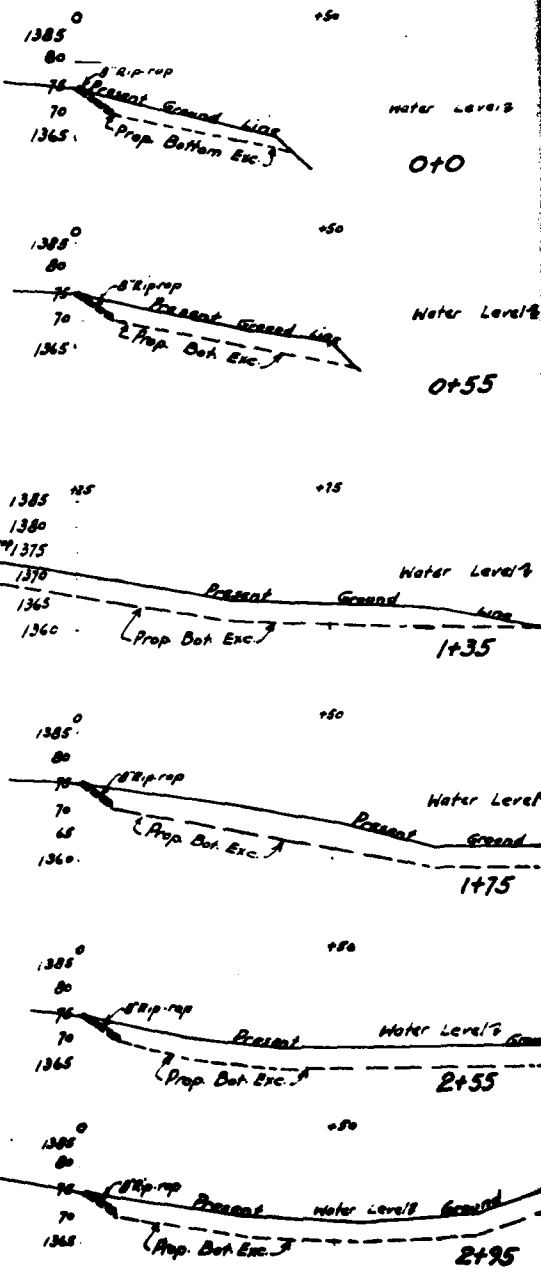
NOTE.
Reservoir is located on property owned by Fairchance Borough, but is outside the Corporate limits. It is situated on Cove Run in Georges Township

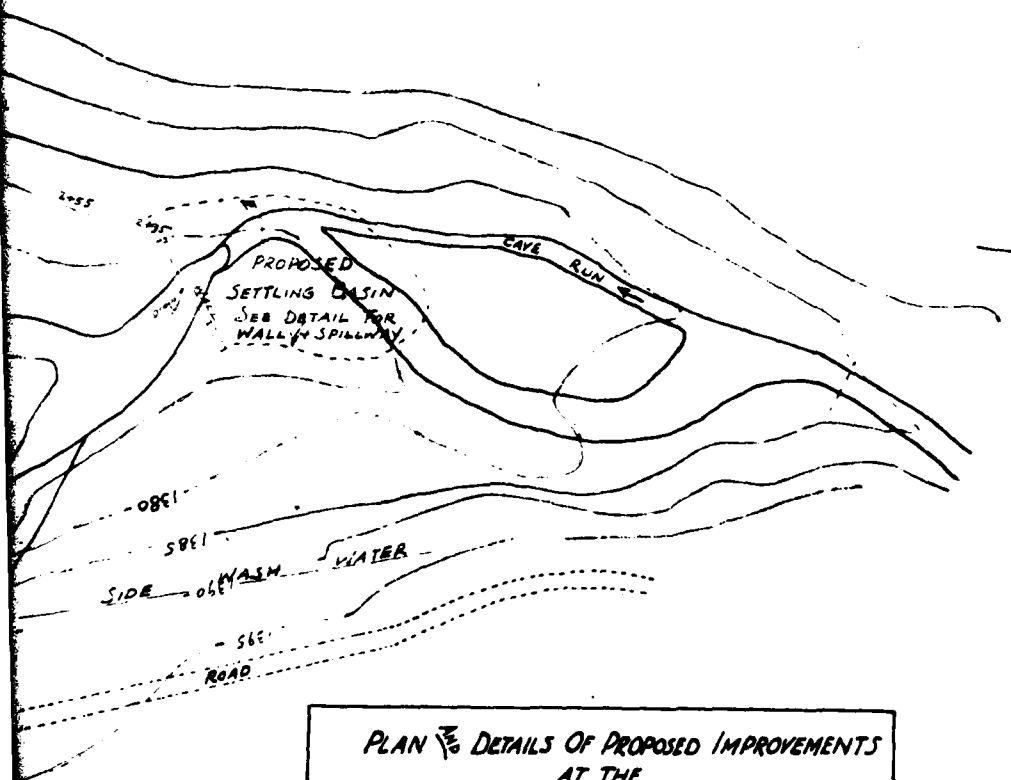
SCHEDULE 'C'
Showing Area along South bank to be rip-rapped. 6" Native Stone

DETAIL OF MASONRY WALL & SPILLWAY
FOR SETTLING BASIN
SCALE-1"=10'



CROSS SECTIONS OF
SHOWING EXCAVATION
SCALE-1"=20'
ALL SECTIONS TAKEN L





PLAN & DETAILS OF PROPOSED IMPROVEMENTS
AT THE
FAIRCHANCE BOROUGH RESERVOIR
FAIRCHANCE, FAYETTE CO., PA.

Homer L Burchinal Reg Engr. Uniontown, Pa.
Resubmitted 6-17-46
10-22-35
by A.J. Oppermann, Reg. Engr.

ALITY PRACTICABLE
TO DDC

OF STREAM BED
ON IN BASIN
LOOKING UPSTREAM

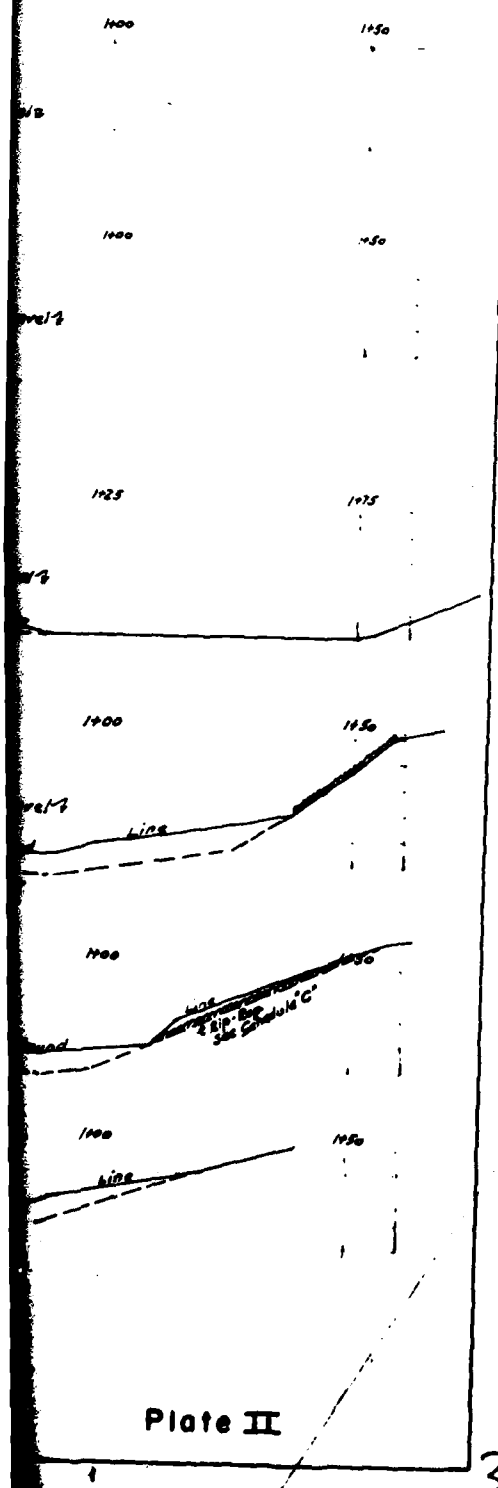
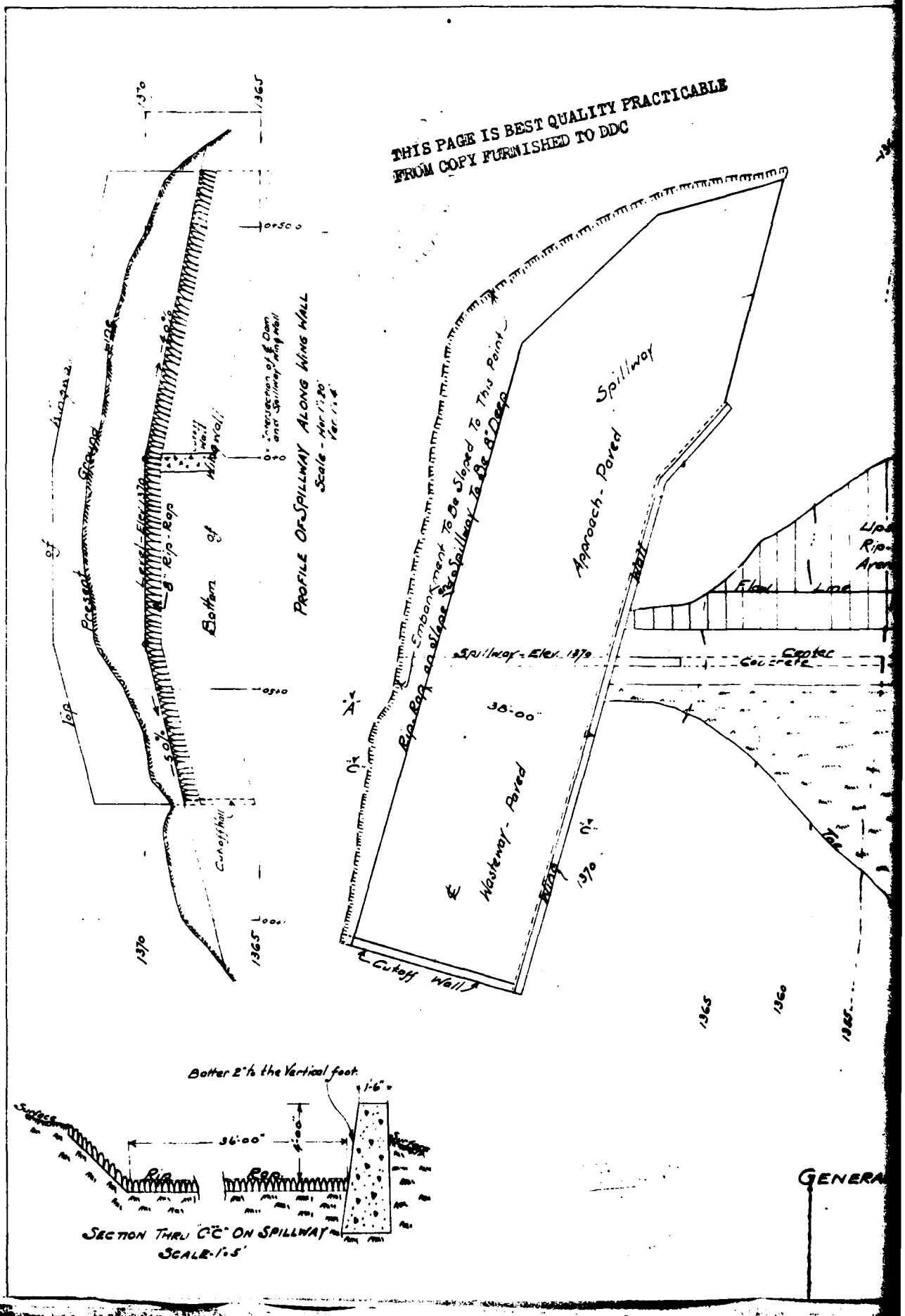
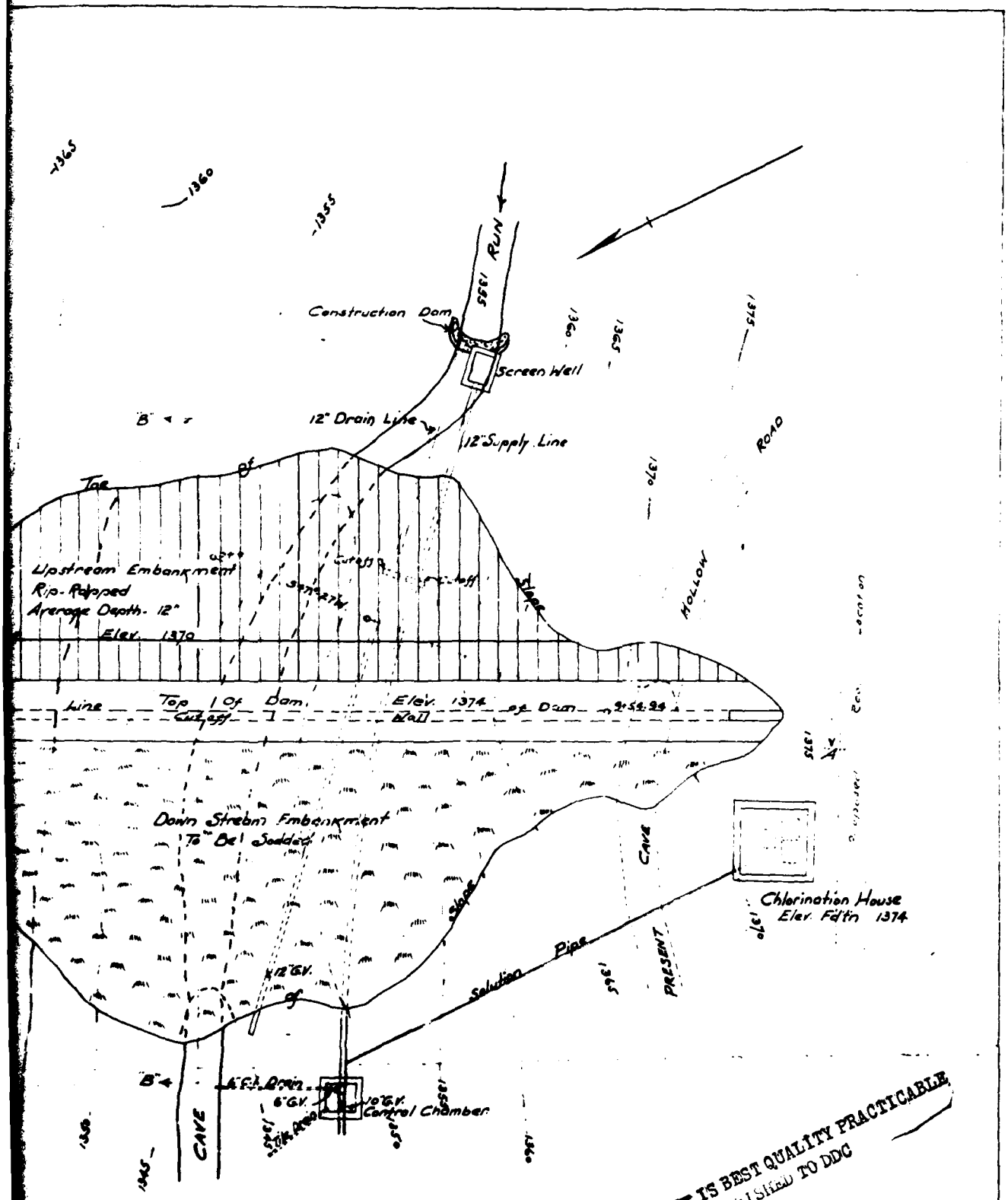


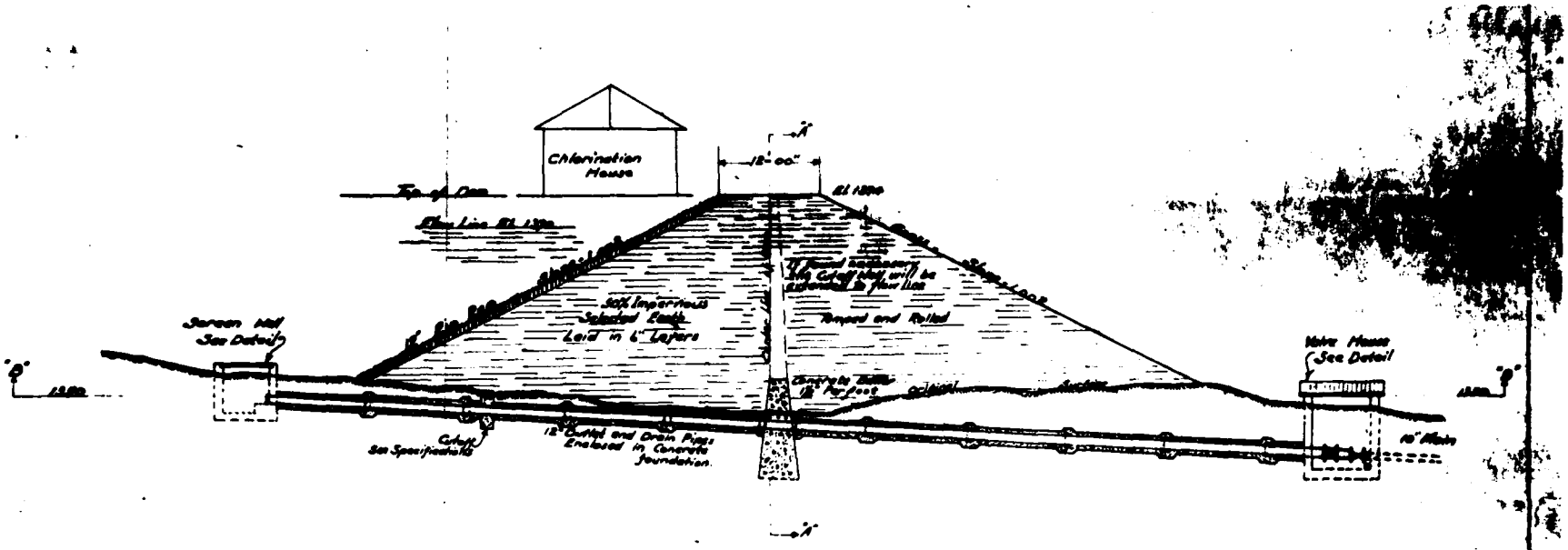
Plate II

3





RAL PLAN OF PROPOSED DAM
SCALE 1" 20'



TRANSVERSE SECTION THROUGH 'B-B'
SCALE 1:10'.

Plate II

TRANSVERSE SECTION

PROPOSED
CAVE HOLLOW WATER SUPPLY
FOR
FAIRCHANCE BOROUGH
FAIRCHANCE, FAYETTE COUNTY, PA.

ENGINEERS:
Homer L. Burchinal, Uniontown, Pa.
Geo. Porter, Jr. Pittsburgh, Pa.
Sheet - No. 3

APPROVED BY FAIRCHANCE BOROUGH COUNCIL
_____ 1955
_____ PRESIDENT
_____ BURGESS

ATTEST
_____ SECRETARY

APPENDIX F

GEOLOGY

GEOLOGY

Geomorphology

Fairchance Reservoir is located in Cave Hollow on the extreme western flank of Chestnut Ridge. Chestnut Ridge is the westernmost in a series of anticlines which comprise the Allegheny Mountain section of the Appalachian Plateau physiographic province. Both the east and west flanks of Chestnut Ridge have been notched by small streams rising near the crestline and flowing down the flanks. Cave Hollow Stream is one of these small streams.

Structure

General: The dam site lies on the west flank of the Chestnut Ridge Anticline approximately 2 miles west of the anticlinal axis. This feature trends NE-SW. According to estimates based on the "Coal and Surface Structure Map of Fayette County, Pennsylvania," the strata strike at N24°E and dip 11° to the NW.

Faults: No observations were made that would indicate faulting in the rocks outcropping around the dam site. In general, only a few evidences of faulting have been observed in all of Fayette County.

Stratigraphy

General: The rocks exposed in the area of Fairchance Reservoir dam belong to the Pocono, Loyalhanna and Mauch Chunk formations of Mississippian age and the Pottsville group of Lower Pennsylvanian age. Upper Mississippian Mauch Chunk strata are separated from the overlying lower Pennsylvanian Pottsville rocks by an erosional unconformity.

Fairchance Reservoir dam is located in the immediate vicinity of the contact between the Mauch Chunk and the Pottsville, although outcrops in the area have been obscured by the large amounts of float.

Pennsylvanian Rocks

Pottsville Group: This group is composed primarily of sandstone and sandy shale but may contain some thin beds of coal and fire clay just above the middle. This group is composed of three formations: the Connoquenessing, the Mercer and the Homewood.

Connoquenessing Sandstone: The lower portion of this unit is a gray thick bedded to massive iron stained and micaceous sandstone which in some places may be replaced by a sandy shale. The upper portion of this unit is similar to the lower and it may be replaced in areas by a clay shale or a sandy shale. The Quakertown coal and shale may be present in the middle of this unit. These beds are of no commercial significance and are characterized as a thin low quality coal while the associated shale is gnarly black and carbonaceous.

Mercer: This heterogeneous unit is composed of fire clays, 3 coal beds of marginal value, black shales and brown sandstones.

Homewood: This unit is a thick bedded to massive, light colored or white orthoquartzitic sandstone. Clay balls may be present in the upper part of this unit. Jointing is common in the massive beds of the Homewood.

Mississippian Rocks

Three formations comprise the Mississippian rocks on Chestnut Ridge. They are the Lower Pocono, the Middle Loyalhanna, and the Upper Mauch Chunk.

Mauch Chunk: This formation consists of 3 members:

1. A lower red and green shale and micaceous sandstone.

2. A dark fossilferous limestone and interbedded gray shale.

3. An upper bright red shale with some green shale and micaceous sandstone.

The lower red and green shales are extremely variable in thickness, ranging from 5 to 60 feet thick. The dark fossiliferous limestone, referred to as the Greenbrier is often replaced by or may have interbeds of dark gray calcareous shale. This unit ranges from 5 to 40 feet in thickness. The upper member of the Mauch Chunk is rarely observed in outcrop as it is usually obscured by overlying Pottsville sandstone float. Its thickness is believed to range from 100 to 175 feet.

Loyalhanna: This formation, although often referred to as a limestone, is best described as an homogenous, massive, cross bedded sandstone with calcareous cement.

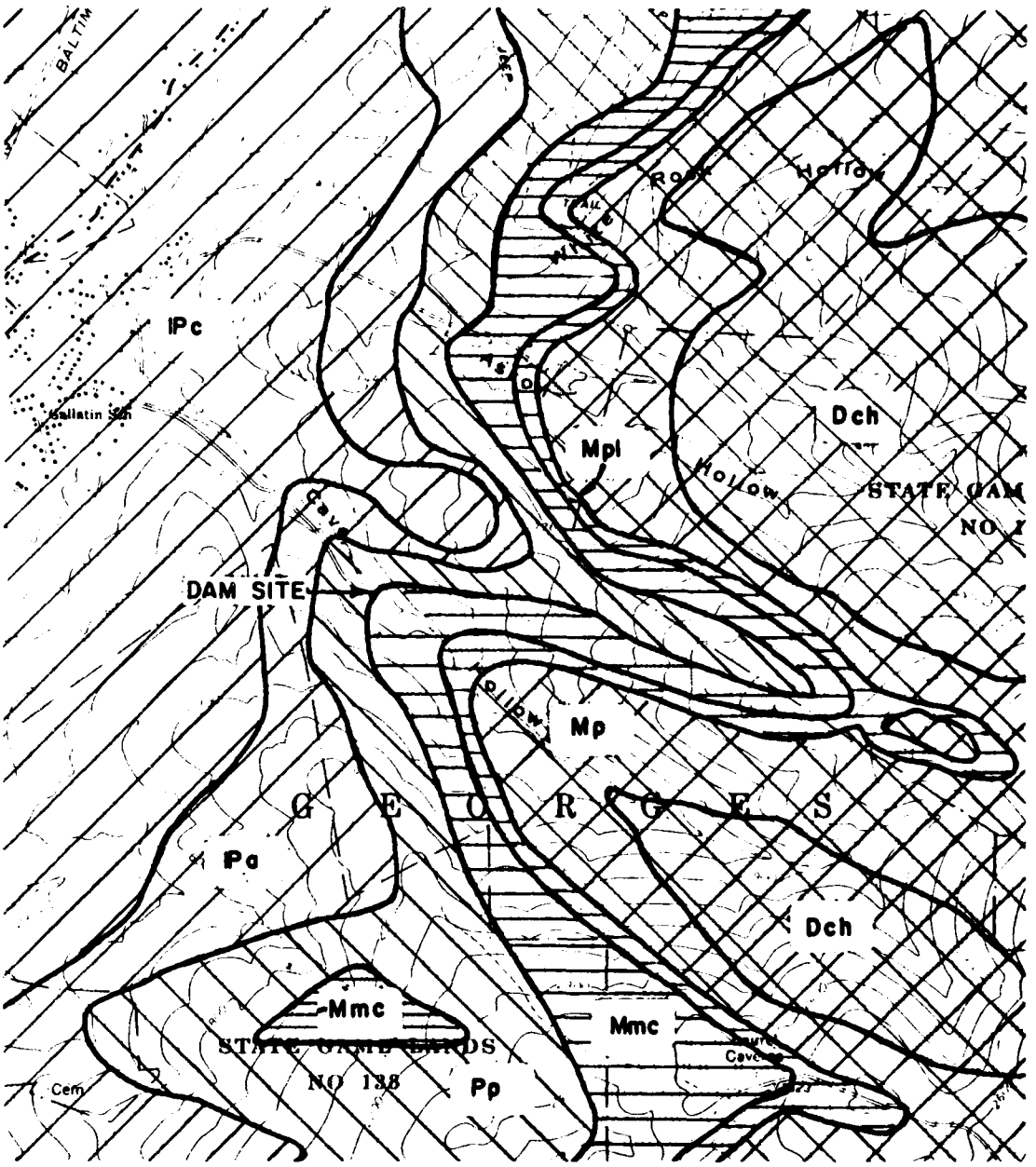
Pocono: This lower most formation of the Mississippian is composed of 3 members: a lower Berea sandstone, a middle Cuyahoga shale and an upper Burgoon sandstone.

Berea: A gray, hard, coarse grained sandstone.

Cuyahoga: A gray to greenish shale or sandy shale.

Burgoon: A gray, coarse grained sandstone.

The total thickness of the Pocono averages 300 feet and is seldom less than 250 feet. It is doubtful that a complete section of the Pocono as described above is present in Fayette County.



BROWNFIELD QUADRANGLE, FAYETTE COUNTY, PENNSYLVANIA

SCALE: 0 1/2 MILE 1:24000

CONTOUR INTERVAL 20 FT. DATUM IS MEAN SEA LEVEL

FORMATION CONTACT

N

DATA OBTAINED FROM PENNSYLVANIA TOPOGRAPHIC AND GEOLOGIC SURVEY, GEOLOGIC MAP OF FAYETTE COUNTY, PENNSYLVANIA, 1940 and COAL AND SURFACE STRUCTURE MAP OF FAYETTE COUNTY, PENNSYLVANIA, 1940

DATE: MARCH 1980		FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM	GEOLOGIC MAP
SCALE: 1" = 2000'			
DR: JF	CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA, CHARLESTON, W. VA. & BALTIMORE, MD.	

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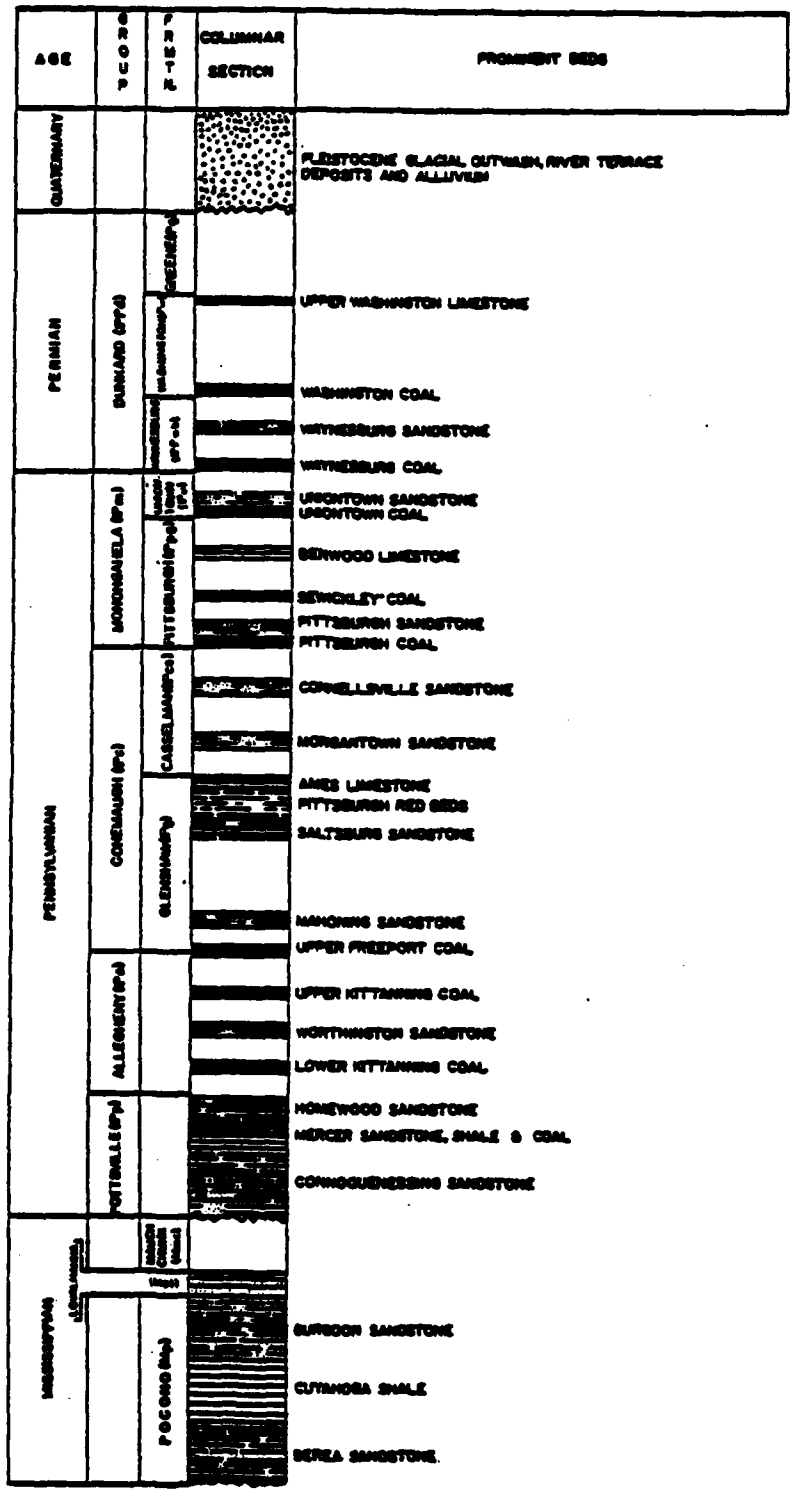
NATIONAL DAM INSPECTION PROGRAM. FAIRCHANCE RESERVOIR DAM. (NDI--ETC(U)
APR 80 J P HANNAN, J E BARRICK DACW31-80-C-0026
UNCLASSIFIED NL



DATE: MARCH 1980	FAIRCHANCE RESERVOIR DAM NATIONAL DAM INSPECTION PROGRAM	GEOLOGIC COLUMN
SCALE: 1" = 360'		
DR: JRF CK: JEB	A. C. ACKENHEIL & ASSOCIATES, INC. CONSULTING ENGINEERS PITTSBURGH, PA., CHARLESTON, W. VA. & BALTIMORE, MD.	