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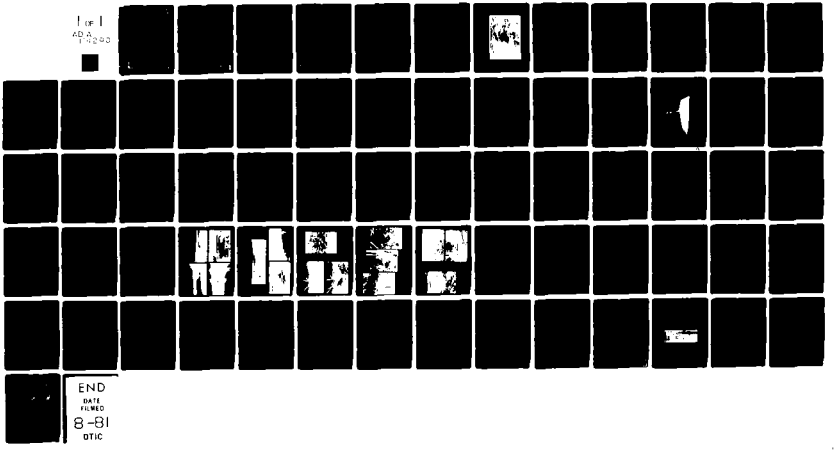

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SUSQUEHANNA RIVER BASIN
TRIBUTARY OF SOUTH BRANCH TUNKHANNOCK CREEK,
LACKAWANNA COUNTY

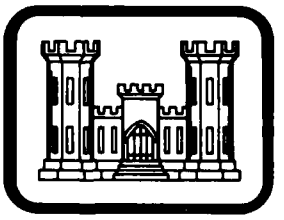
PENNSYLVANIA

COLEMAN DAM

NDI ID NO. PA-00191
DER ID NO. 35-94

FRANK BIONCONI

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



Prepared by
Geo-Technical Services, Inc.
CONSULTING ENGINEERS & GEOLOGISTS
851 S. 19th Street
Harrisburg, Pennsylvania 17104

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

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MAY 1981

SUSQUEHANNA RIVER BASIN

TRIBUTARY OF SOUTH BRANCH TUNKHANNOCK CREEK,
LACKAWANNA COUNTY, PENNSYLVANIA

COLEMAN DAM

NDI ID No. PA-00191

DER ID No. 35-94

FRANK BIONCONI

National Dam Inspection Program. Coleman Dam (NDI ID Number PA-ØØ191, DER ID Number 35-94), Susquehanna River Basin, Tributary of South Branch Tunkhannock Creek, Lackawanna County, Pennsylvania.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

12) 67

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(11) May 1981

PREFACE

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

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable 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.

TABLE OF CONTENTS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Coleman Dam NDI ID No. 00191 DER ID No. 35-94
Size:	Small (6.5 feet high; 80 acre-feet)
Hazard Classification:	Significant
Owner:	Frank Bionconi Box 463, R. D. #1 Jermyn, PA. 18433
State Located:	Pennsylvania
County Located:	Lackawanna
Stream:	Tributary of South Branch Tunkhannock Creek
Date of Inspection:	March 2, 1981

Based on visual inspection, Coleman Dam is judged to be in poor condition. In the absence of a spillway, the dam is subject to frequent overtopping. Based on the downstream hazard and in accordance with the recommended guidelines, the minimum selected Spillway Design Flood (SDF) for the facility is the 100-year flood. Results of the hydrologic and hydraulic analysis indicate that the peak discharge of the 100-year flood is 200 cfs. The existing facility will not pass the 100-year flood without overtopping the dam. Although the dam has withstood frequent overtopping since its construction, the maximum depth of past overtopping could not be verified. Therefore, in the absence of a spillway and based on the downstream hazard, the facility is rated inadequate.

Although there is significant leakage and seepage through the dam, the available information is insufficient to evaluate its structural stability.

The Dam is not properly maintained, as evidenced by the heavy growth of trees on the embankment and the numerous burrows on its downstream slope.

COLEMAN DAM

The following investigations and remedial measures are recommended for immediate implementation by the Owner:

(1) Provide an adequate spillway for the facility.

(2) Remove trees and brush from the crest and downstream slope of the dam under the supervision of a professional engineer. Thoroughly examine the condition of the earth embankment and properly fill all existing burrows. The top of the dam should be reconstructed to provide a uniform width and horizontal alignment.

(3) Monitor the rate and clarity of seepage flow at the toe of the dam and the leakage through the exposed downstream face of the stone wall and take appropriate action as required.

(4) Develop a method for drawing down the reservoir in case of emergency.

All investigations, studies, design and supervision of construction should be performed by a professional engineer, experienced in the design and construction of dams.

In addition, it is recommended that the Owner take the following precautionary operational and maintenance measures:

(1) Develop a detailed emergency operation procedure and warning system to facilitate timely and orderly evacuation of the downstream population due to hazardous conditions at the dam.

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

(3) After satisfactory implementation of the remedial measures resulting from the recommended additional investigations, institute a formal inspection and maintenance program for the dam. As presently required by the Bureau of Dams and Waterway Management of PENNDER, the program shall include an annual inspection of the dam by a professional engineer, experienced in the design and construction of dams. Deficiencies found during annual inspection should be remedied as necessary.

Submitted by:
GEO-TECHNICAL SERVICES, INC.

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL GIDEON YACHIN No. 4934-E

GIDEON YACHIN, P.E.

Date: May 29, 1981

Approved:
DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

Date: 3 JUNE 1981

COLEMAN DAM & GRAVES POND

OVERVIEW

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

COLEMAN DAM

NDI# PA 00191 PENNDER# 35-94

SECTION 1

GENERAL INFORMATION

1.1 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to inititate a program of inspection of dams throughout the United States.

1.2 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.3 Description of Project.

a. Dam and Appurtenances. Coleman Dam is a composite earthfill-masonry structure, approximately 170 feet long and 6.5 feet high at its maximum section. A near vertical downstream, dry masonry wall is exposed along a 13-foot stretch of the dam, near the maximum section.

There are no provisions for spillway and outlet works for the facility. Normal outflow from the reservoir is through and over the exposed dry stone section of the dam.

b. Location. Coleman Dam, previously known as Graves Pond Dam, is located on a tributary of the South Branch of Tunkhannock Creek in Scott Township, Lackawanna County, Pennsylvania. The village of Montdale is located about 2.3 miles south of the dam, at the intersection of Pennsylvania Routes 247 and 438. The dam and reservoir are contained within the Carbondale, Pennsylvania 7.5 minutes series USGS Quadrangle Map, at Latitude N 41° 34'07" and Longitude W 75°36'42". A Location Map is shown on Exhibit E-1.

c. Size Classification. Small (6.5 feet high; 80 acre-feet storage capacity at top of dam).

d. Hazard Classification. Significant (see paragraph 3.1e and 5.3c).

e. Ownership. Frank Bionconi; Box 463, RD#1, Jermyn, PA 18433.

f. Purpose of Dam. Recreation.

g. Design and Construction History. Information related to the design and construction of the dam is not available. Data obtained from the Pennsylvania Department of Environmental Resources (PennDER) indicate that the dam existed prior to 1924. Although "as built" drawings are not available, inspection reports, correspondence and photographs provide information on the condition of the dam since 1927.

h. Normal Operational Procedure. The pool is maintained at the level of the lowest crest elevation of the dam. Excess inflow is being discharged through the dam and over the exposed portion of the downstream stone wall into the tributary of the South Branch of Tunkhannock Creek.

1.4 Pertinent Data

a. Drainage Area. (square miles)	0.12
b. Discharge at Damsite. (cfs)	
Maximum known flood at damsite	Not Known
Outlet works at maximum pool elevation	Not Applicable
Spillway capacity at maximum pool elevation	
Design conditions	Unknown
Existing conditions	Not Applicable
c. Elevation. (feet above msl)	
Top of Dam	
Design conditions	Not Known
Existing conditions	1572.0
Maximum pool	
Design conditions	Not Known
Existing conditions	1572.0
Normal pool (at lowest top of dam elevation)	1572.0
Upstream invert outlet works	Not Applicable
Downstream invert outlet works	Not Applicable
Streambed at toe of dam	1565.5
d. Reservoir length (feet)	
Normal pool	1400
Maximum pool (at top of dam)	1400
e. Storage. (acre-feet)	
Normal pool	80
Maximum pool	
Design conditions	Not Known
Existing conditions	80
f. Reservoir surface. (acres)	
Normal pool	18.4
Maximum pool	
Design conditions	Not Known
Existing conditions	18.4

g. Dam.

Type	Composite earthfill and rubble masonry.
Length (feet)	170
Height (feet)	6.5
Top Width (feet)	
Design conditions (reported)	12
Existing conditions	varies $0.1^{\pm}$' to $6^{\pm}$'
Side slopes	upstream varies 1V:6H to 1V:7H downstream varies 1V:1.8H to 1V:3.8H
Zoning	see Type, above.
Cut-off	Not Known
Impervious Core	Not Known
Grout curtain	Not Known

h. Diversion and Regulating Tunnel. Not Known

i. Spillway.

Type	Not Applicable
Length of Weir	Not Applicable
Crest Elevation	Not Applicable
Upstream Channel	None
Downstream Channel	Not Applicable

j. Outlet Works.

Type	Not Applicable
Length	Not Applicable
Closure and Regulating Facilities	Not Applicable
Access	Not Applicable

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. There are no available data or information related to the design and construction of the dam. The earliest information available consists of data compiled for a 1924 stream survey. Inspection reports accompanied with photographs indicate the conditions of the dam since 1927. The above cited information and related correspondence is available on file with PENNDER.

b. Design Features. Coleman Dam is a composite earthfill and dry stone masonry structure with no spillway or outlet works. The 1927 inspection report provides the following description of the dam:

"An earth embankment with a vertical dry wall on the downstream side, the top (is) 12 to 13 ft. wide, (of which) the wall being about 4 ft. (and) the remainder (is) earth. At the upstream side is a cutoff of two 1" inclined planks with an earthfill on the upstream side. The outlet is a flume of plank 18" x 12" near the middle (of the dam). The freeboard is about 15" at the ends and about 6" near the middle."

A photograph illustrating the extent of the downstream dry stone wall and showing the location of the wooden flume is presented in Exhibit E-2.

2.2 Construction Records.

There are no records available for evaluation of construction methods and the classification, or quality of material placed in the dam.

2.3 Operation.

There are no records available to indicate the past operation procedures of the dam. The present normal operation of the facility is described in paragraph 1.2h, Section 1.

2.4 Other Investigations.

Available reports indicate that on-site inspections were made in 1927, 1928, 1930, 1931, 1932, 1933, 1934, and 1957. Information obtained from previous on-site inspections indicate the following:

(i) The wooden flume spillway rotted and broke in 1928, resulting in overflow over the top of the dam. The general appearance of the dam and its maintenance were rated as poor.

(ii) The absence of spillway at the Coleman Dam was repeatedly brought to the attention of the previous owners since 1930.

(iii) Sheathing along the upstream face rotted and the entire stream flow was flowing through the dam on July 8, 1931.

(iv) A perceptible bulge in the downstream face to the right of center of the structure was reported in 1932. The entire flow of the stream was observed to leak through and under the right half of the structure on July 13, 1932.

(v) Growth of brush and young trees on top of the dam and on the downstream slope of the embankment was noted in 1957.

2.5 Evaluation.

a. Availability of Data. Engineering data was extracted from PENNDER files. The owner stated that he has no plans of the dam. Pertinent dam features were obtained by survey on the inspection date (3/02/81). There are no other sources of information available for the evaluation of the facility.

b. Adequacy. In the absence of plans, engineering specifications and construction records, assessment of the structural integrity of the dam and its safety is based primarily on the visual inspection and the hydrologic and hydraulic analysis presented in Section 5. The data available is considered adequate for a Phase I Report.

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

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The overall appearance of the dam is very poor. Location of observed deficiencies are shown on the General Plan presented in Exhibit A-1, Appendix A. The profile and typical sections of the dam are presented in Exhibits A-2 and A-3 and are based on field survey made on the day of the inspection. The survey datum for this inspection is elevation 1572 feet above mean sea level for the normal water surface of the Lake (see Exhibit E-1). On the inspection date (3/02/81), the lake level was approximately at elevation 1572, which is also the low point near the middle of the dam crest (see Exhibit A-2). Deficiencies observed during the field inspection are described below, and are illustrated in Exhibit A-1, Appendix A. Visible features are depicted in photographs, presented in Appendix C.

b. Dam. Observations made during the inspection indicate that the earth and dry stone masonry dam is in poor condition. Upstream views of the dam and the conditions at its abutments are shown in photographs 1 through 4, Appendix C. The upstream embankment slope varies from 1 on 6 to 1 on 7 and has no riprap protection. The top of the dam varies in width from a few inches in the middle half of the dam to 3 feet wide near the left abutment and 6 feet wide near the right abutment (see Exhibit A-1). The downstream slope varies from 1V on 1.8H to 1V on 3.8H and has a vertical dry stone wall near the center of the dam. Directly upstream of this wall is a 30 foot wide low section of the dam that serves as an overflow section (see Photograph No. 8, Appendix C). On the day of the inspection, overflow from this low area and leakage through the stone wall was estimated at 400 gallons per minute (GPM). A large oval seepage area (10' x 30') at the downstream toe, left of the wall (see Photograph No. 14), was discharging a flow of about 10 GPM. A smaller (5' diameter) seepage area at the downstream toe near the right abutment (see Photo No. 10) was discharging about ¼ GPM. No accumulation of fine sediments was observed at these seepage areas. The entire dam embankment is covered with brush and trees up to 18 inches in diameter (see Photos Nos. 6 thru 10). At least 6 groundhog holes (3 to 12" Dia. and 2 to 3' deep) were observed in the upper slopes of the dam (see Photos Nos. 11 thru 13). An active garbage dump is located at the downstream toe near the left abutment (see Photos Nos. 7 and 14). An area of about two acres on the gently sloping left abutment is used by the State Highway Department to stock pile aggregates (see Photos Nos. 2 and 5). The flat to gently sloping right abutment contains many near horizontal outcrops of sandstone bedrock (see Photos Nos. 4 and 6).

c. Appurtenant Structures.

(1) Spillway. There is no visible evidence of a constructed spillway. When inflow into the Lake exceeds seepage and leakage through

the dam, excess flow will be discharged through the 30-foot-wide low area near the center of the dam.

(2) Outlet Works. There is no visible evidence of outlet works or control facilities.

d. Reservoir Area. With the exception of about 12 acres of woodland at the upstream end, the Lake is surrounded by open farmland and brush. Both abutment slopes are about 5 percent. Upper reaches of the watershed have slopes ranging from 5 to 10 percent. There is no evidence of unstable slope conditions or features that could affect the safety of the dam.

3. Downstream Channel. The channel downstream of the dam is a natural wooded channel with an average slope of about 5 percent in the first 400 feet. The channel slope steepens from 10 to 20 percent in the next 3,000 feet then flattens out on the flood plain of the South Branch of Tunkhannock Creek. Approximately 800 feet downstrean of the dam, the stream crosses a road (LR 35095) through a 36-inch diameter Corrugated Metal Pipe (CMP) culvert. The top of the road is 7.5 feet above the invert of the culvert (see Photo No. 15, Appendix C). About 3,600 feet downstream of the dam is an occupied dwelling located about 200 feet left of the creek (see Photo No. 16, Appendix C). This home would be extensively damaged and a few lives could be lost should the dam fail. Consequently, Coleman Dam is classified as a significant hazard structure.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure.

The reservoir is maintained at normal pool level with excess inflow discharging over the 30-foot-long low section near the center of the dam. Lower inflows discharge as leakage and seepage through the dam.

4.2 Maintenance of Dam.

Maintenance of the dam by the present owner appears to be minimal and is considered unsatisfactory. Past history of the dam indicates that maintenance was neglected by previous owners. The entire dam is presently covered with brush and trees and many groundhog holes exist in the upper slopes.

4.3 Maintenance of Operating Facilities.

There are no operating facilities at the dam.

4.4 Warning System in Effect.

There is no emergency operation and warning system in effect.

4.5 Evaluation.

The maintenance of the dam is inadequate. The groundhog holes should be filled and trees and brush should be removed from the dam proper. The owner should institute regularly scheduled maintenance inspections. Findings and subsequent maintenance and repair work should be documented. An emergency warning system is necessary to detect adverse conditions at the dam and to prevent loss of life should the dam fail.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Design Data.

There are no spillway design data for Coleman Dam.

5.2 Experience Data.

The probable flood of record in the South Branch of Tunkhannock Creek and its tributaries is the flood of March 1964. Neither flood stage information nor flow records are available for the damsite. No records are available of the maximum stage of the reservoir or to indicate the extent of past overtopping of Coleman Dam.

5.3 Visual Observations.

Based on visual inspection and field survey described in Section 3 of this report, the observations relevant to hydrology and hydraulics are evaluated below.

a. Dam. Irregularities in top of dam elevation are presented in Exhibit A-2. The lowest crest elevation 1572 is located upstream of the exposed dry stone wall (see Section B, Exhibit A-3). On the day of the inspection the reservoir level was approximately ¼-inch above the lowest dam crest elevation, resulting in overtopping of the dam. Water overflowing the crest was observed to flow over and through the exposed downstream stone wall into the stream channel.

b. Reservoir Area. There are no upstream structures that have an influence on the rate and time of flood inflow into Graves Pond. There are no visible indications to suggest drastic changes in the prevailing land use within the watershed which would significantly alter the hydrologic and hydraulic analysis, summarized in Paragraph 5.5.

c. Downstream Conditions. No conditions were observed downstream of the dam that would affect the overtopping analysis of Coleman Dam. Should the dam fail, a hazard would exist to a single dwelling located 3,600 feet downstream of the dam. Consequently, a significant hazard classification is warranted for Coleman Dam.

5.4 Method of Analysis.

Hydrologic and hydraulic evlauation was made in accordance with the procedures and guidelines established by the U.S. Army Corps of Engineers, Baltimore District, Phase I Safety Inspection of Dams. The analysis has been performed utilizing the HEC-1DB program developed by the U. S. Army Corps of Engineers, Hydrologic Engineering Center, Davis, California. A brief description of the program capabilities, as well as

the input and output data used specifically for this analysis is presented in Appendix D.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). According to criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (small) and Hazard potential (significant) of Coleman Dam is between the 100-year Flood and the one-half Probable Maximum Flood (½PMF). Based on the potential hazard survey downstream of the dam and in accordance with the recommended guidelines, the 100-year flood is selected as the SDF for Coleman Dam.

b. Results of Analysis. Pertinent results are tabluated in Appendix D. In the absence of a spillway, the dam is overtopped when the reservoir inflow exceeds the seepage and leakage through the dam. The computed peak discharge of the 100-year flood is 200 cubic feet per second (cfs). It is judged that failure of the dam would result from flows of this magnitude under the prevailing condition and in the absence of an adequate spillway.

c. Spillway Adequacy. In the absence of a spillway, and based on the significant downstream hazard potential, the structure is rated as inadequate.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations.

The visual inspection of Coleman Dam, described in Section 3, revealed the growth of brush and trees on the crest and downstream slope of the dam (see Photograph Nos. 6 and 7, Exhibit C). The downstream face of the dam opposite the low part of the dam crest consists of near-vertical dry stone wall (see Photos Nos. 8 and 9). On the day of the inspection (3/02/81), leakage through and over the exposed stone wall was at an estimated rate of 400 GPM. Seepage at the toe of the dam was also observed to emanate near the right abutment and left of the stream channel (see Exhibit A-1 and Photos Nos. 10 and 14, Appendix C). Vertical and horizontal groundhog holes exist within the downstream slope of the dam as shown in Exhibit A-1 and Photographs 11, 12, and 13, Appendix C. There is no indication of internal erosion, undermining at the toe of the dam, or the existence of surface depressions on the downstream slope of the earth embankment. In the absence of visible structural deficiencies, the dam appears to be structurally stable under normal load conditions.

6.2 Design and Construction Data.

Available design and construction data are inadequate to assess the structural integrity of the dam.

6.3 Post-Construction Changes.

Comparison between the present downstream features of the dam (Photos Nos. 6 thru 10, Appendix C) and the appearance of the dam in 1927 (Exhibit E-2) indicate that an earthfill embankment was placed against the downstream stone wall. Available data indicate that this post-construction activity took place prior to 1957. The addition of the downstream earth embankment resulted in a very irregular width of the dam crest, illustrated in Exhibits A-1 and A-3, Appendix A.

6.4 Past Performance.

Previous investigations cited in Paragraph 2.4 indicate that in 1932, a bulge was observed on the downstream face of the dam, to the right of the center of the structure. Extensive leakage through the dam was also reported in 1931 and 1932. Consequently, it is conceivable that the downstream earth embankment described in Paragraph 6.3, was added to reduce the leakage through the dam, as well as to increase the stability of the structure.

6.5 Seismic Stability.

The dam is located in Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. As the dam appears to be stable under static loading conditions, it is assumed to be able to withstand minor earthquake loadings in this zone.

SECTION 7

ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on the visual inspection, field survey, available records, calculations and past operational performance, Coleman Dam is judged to be in poor condition. In the absence of a spillway, the dam is subject to frequent overtopping. Based on the hazard classification (significant) and in accordance with the recommended guidelines, the minimum selected Spillway Design Flood (SDF) for the facility is the 100-year flood. Results of the hydrologic and hydraulic analysis indicate that the peak discharge of the 100-year flood is 200 cfs. The existing facility will not pass the 100-year flood without overtopping the dam. Although the dam has withstood frequent overtopping since its construction, the maximum depth of past overtopping could not be verified. In the absence of a spillway and based on the significant downstream hazard, the facility is rated inadequate.

(2) A summary of the observed deficiencies is described below:

Description	Observed Deficiencies
Dam:	
Exposed dry stone wall	Leakage along entire exposed face; overtopping due to absence of spillway.
Earth embankment	Growth of trees and brush on the crest and downstream slope. Near-vertical and horizontal burrows (groundhog holes) on the downstream slope. Seepage at toe, left of stream channel and near the right abutment. Irregular crest width and top of dam elevations.
Appurtenant Structures:	
Spillway	Not provided, resulting in frequent overtopping of dam when inflow into the reservoir exceeds leakage and seepage through the dam.
Outlet works	Not provided; consequently, drawing down the reservoir in emergencies or for dam repair or maintenance activities cannot be readily achieved.

(3) The present maintenance of the dam is inadequate. The use of the immediate downstream area near the left abutment for a garbage dump may attract burrowing rodents and increase the number of observed burrows in the embankment.

b. Adequacy of Information. The data collected from previously cited dam inspection reports, past performance, visual inspection and computations performed as part of this study are sufficient for the Phase I safety assessment, delineated in sub-paragraph a., above.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented as soon as practical or as dictated by the recommended additional investigations that follow.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlines in Paragraph 7.2, further investigations by a professional engineer, experienced in the design and construction of dams, will be necessary.

7.2 Recommendations and Remedial Measures.

a. The following investigations and remedial measures are recommended for immediate implementation by the owner.

(1) Provide an adequate spillway for the facility.

(2) Remove trees and brush from the crest and downstream slope of the dam under the supervision of a professional engineer. Throughly examine the condition of the earth embankment and properly fill all existing burrows. The top of the dam should be reconstructed to provide a uniform width and horizontal alignment.

(3) Monitor the rate and clarity of seepage flow at the toe of the dam and the leakage through the exposed downstream face of the stone wall and take appropriate action as required.

(4) Develop a method for drawing down the reservoir in case of emergency.

All investigations, studies, design and supervision of construction should be performed by a professional engineer, experienced in the design and construction of dams.

b. In addition, it is recommended that the owner take the following precautionary operational and maintenance measures:

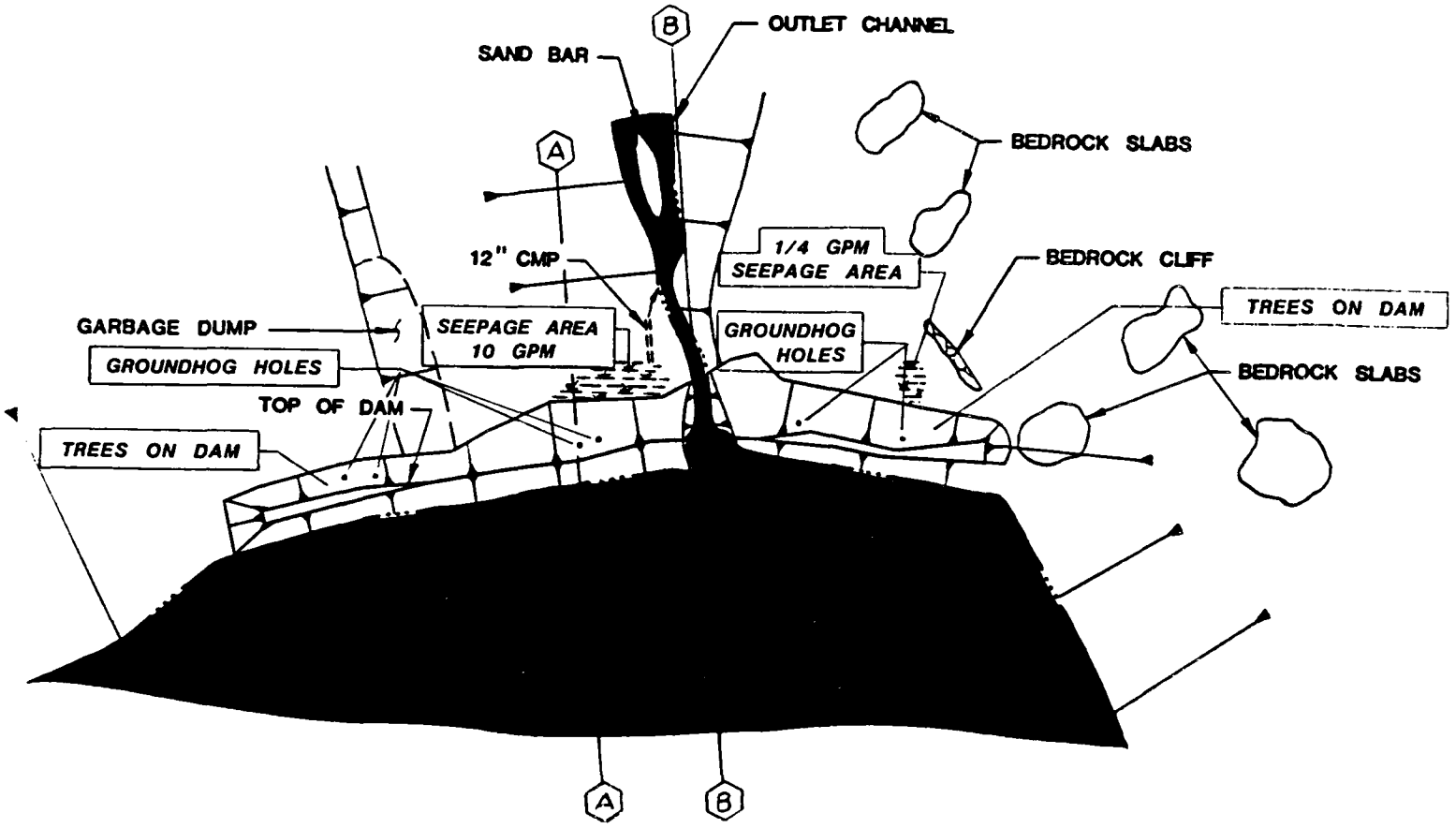
(1) Develop a detailed emergency operation procedure and warning system to facilitate timely and orderly evaculation of the downstream population due to hazardous conditions at the dam.

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

(3) After satisfactory implementation of the remedial measures resulting from the recommended additional investigations, institute a formal inspection and maintenance program for the dam. As presently required by the Bureau of Dams and Waterway Management of PENNDER, the program shall include an annual inspection of the dam by a professional engineer, experienced in the design and constructions of dams. Deficiencies found during annual inspection should be remedied as necessary.

APPENDIX A

VISUAL INSPECTION - CHECKLIST AND FIELD SKETCHES



COLEMAN DAM

GENERAL PLAN - FIELD INSPECTION NOTES

EXHIBIT A-1

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

COLEMAN DAM

DRAWN BY WEH DATE 3/16/81

CHECKED BY _____ DATE _____

SCALE _____

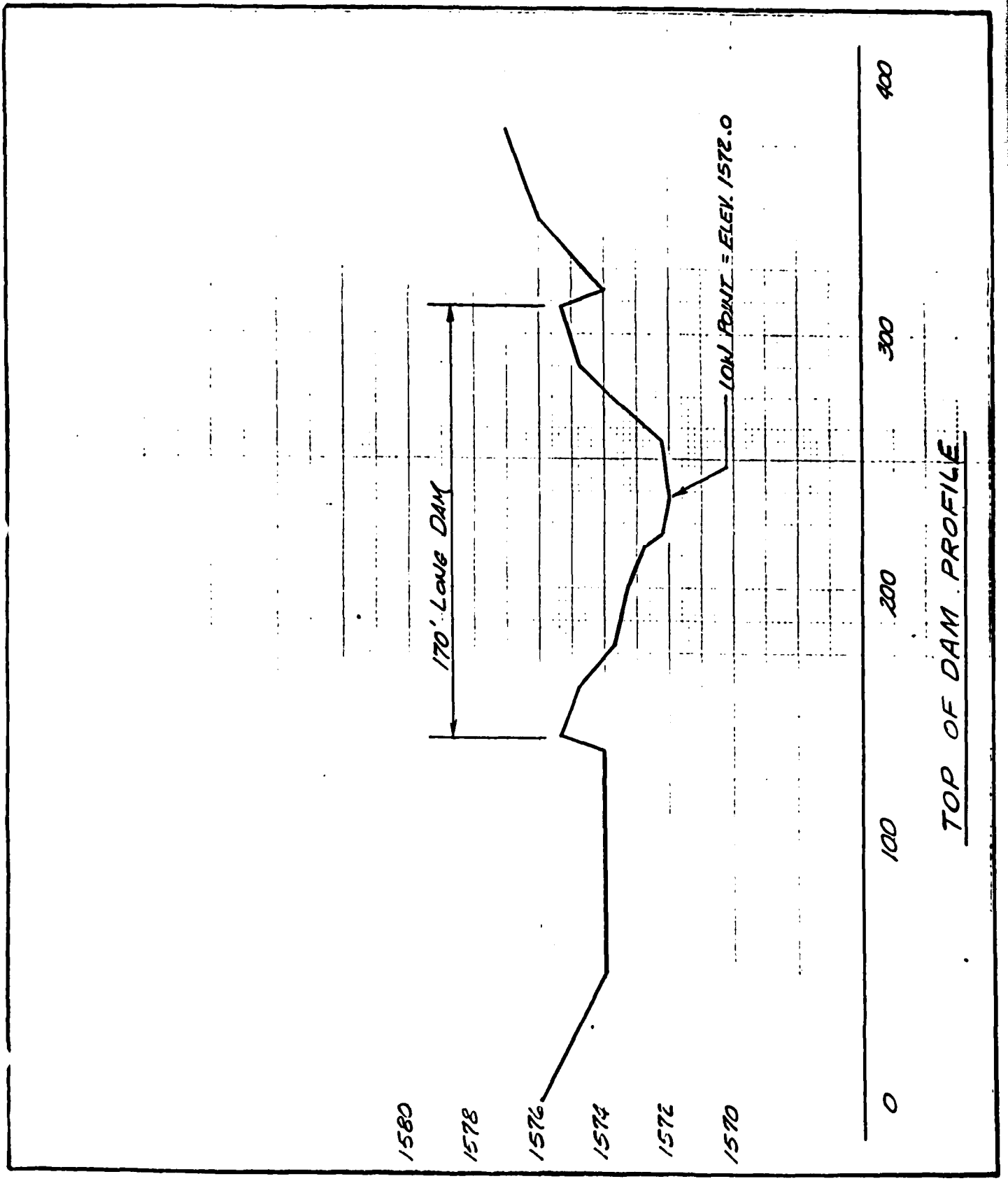
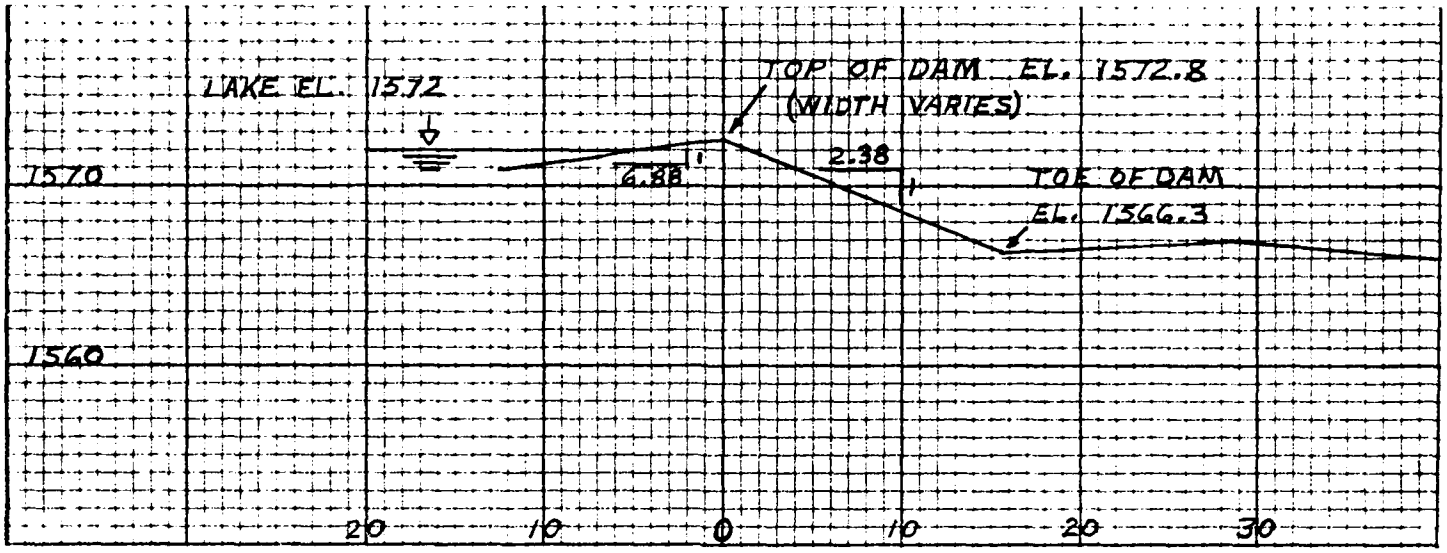
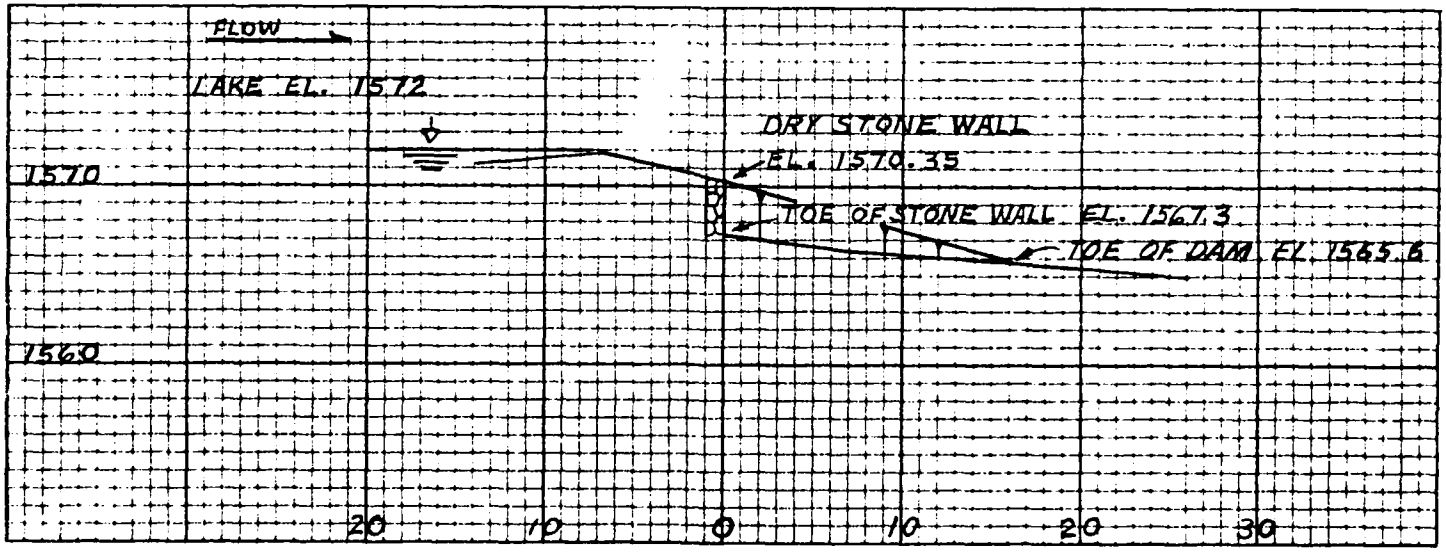


EXHIBIT A-2

TYPICAL DAM SECTIONS



SECTION A



SECTION B

EXHIBIT A-9

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM COLEMAN DAM STATE Pennsylvania COUNTY Lackawanna

NDI # PA — 00191 PENNDER # 35-94

TYPE OF DAM Earth & dry stone masonry SIZE Small HAZARD CATEGORY Significant

DATE(S) INSPECTION 3/02/81 WEATHER Cloudy TEMPERATURE 40° @ 10:00 AM

POOL ELEVATION AT TIME OF INSPECTION 1572.0 M.S.L

TAIL WATER AT TIME OF INSPECTION _____ M.S.L

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	*OTHERS*
Gideon Yachin, P.E.	Frank Bionconi	John Chernesky, PENNDER
James Diaz, Geologist		
Ronald Mather, Surveyor		

RECORDED BY James Diaz

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
SURFACE CRACKS	None
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None. However, there are at least six (6) groundhog holes (4" to 12" diameter and 2' to 4.5' deep) in the upper slopes of the dam.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical alignment of the dam crest varies as much as 4 feet. Horizontal alignment is irregular and the dam crest varies in width from less than 1 foot to about 6 feet.
RIPRAP FAILURES	Other than scattered sandstone slabs, there is no riprap.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Satisfactory. A garbage dump encroaches on the downstream toe of the dam on the left abutment.

EMBANKMENT

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	Green grassy areas are located in the seepage areas described below. The entire dam area is covered with brush and trees up to 18 inches in diameter.
ANY NOTICEABLE SEEPAGE	A small seepage area (5' dia.) near the right abutment discharges about ¼GPM. A large seepage area (10' x 30') near the center of the dam discharges about 10 GPM (see Photographs 10 and 14, Appendix C).
STAFF GAGE AND RECORDER	None
DRAINS	None
ROCK OUTCROPS	Large areas of gently sloping sandstone bedrock are exposed on the surface of the right abutment. Strike N45°-65°E, Dip 3 - 5° SE (see Photographs 4 and 6, Appendix C).
MISCELLANEOUS	A low area in the center part of the dam has dry stone wall on the downstream side. Leakage through the wall and overflow at the low area of the dam has a combined flow of about 400 GPM (see Photos. 8 and 9 Appendix C).

OUTLET WORKS

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
INTAKE STRUCTURE	None
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	None
OUTLET STRUCTURE	None
OUTLET CHANNEL	None
GATE(S) AND OPERATIONAL EQUIPMENT	None

EMERGENCY SPILLWAY

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
TYPE AND CONDITION	None. Excess inflow was discharging about 400 GPM through the low area and over the stone wall near the center of the dam (see Photos 8 and 9, Appendix C).
APPROACH CHANNEL	None
SPILLWAY CHANNEL AND SIDEWALLS	None
STILLING BASIN PLUNGE POOL	None
DISCHARGE CHANNEL	None
BRIDGE AND PIERS EMERGENCY GATES	None

SERVICE SPILLWAY

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
TYPE AND CONDITION	None
APPROACH CHANNEL	None
OUTLET STRUCTURE	None
DISCHARGE CHANNEL	None

INSTRUMENTATION

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS	NDI# PA - 00191
MONUMENTATION SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHERS		

RESERVOIR AREA AND DOWNSTREAM CHANNEL

ITEM	OBSERVATIONS/REMARKS/RECOMMENDATIONS NDI# PA - 00191
SLOPES: RESERVOIR	Slopes adjacent to the reservoir area are generally less than 5 percent.
SEDIMENTATION	A small sand bar about 60 feet downstream of the dam is believed to be the result of surface erosion of embankment material from the low area on the dam.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Natural wooded channel, crossing a road (LR 35095).
SLOPES: CHANNEL VALLEY	Between the dam and the road, the channel gradient is about 5 percent. Downstream of the road, the channel gradient increases from 10 to 20 percent.
APPROXIMATE NUMBER OF HOMES AND POPULATION	One occupied dwelling is located about 3,600 feet downstream of the dam.

APPENDIX B

ENGINEERING DATA - CHECKLIST

CHECK LIST
ENGINEERING DATA
PHASE I

NAME OF DAM COLEMAN DAM

NDI# PA - 00191

ITEM	REMARKS
PERSONS INTERVIEWED AND TITLE	Frank Bionconi, Owner
REGIONAL VICINITY MAP	see Exhibit E-1, Appendix E
CONSTRUCTION HISTORY	Unknown. Constructed prior to 1924
AVAILABLE DRAWINGS	None
TYPICAL DAM SECTIONS	For typical sections obtained by survey (3/02/81), see Appendix A
OUTLETS PLAN DETAILS DISCHARGE RATINGS	Not Applicable (no outlet works)

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS NDI# PA · 00191
SPILLWAY PLAN SECTION DETAILS	Not applicable. Overflow by overtopping (see Exhibits A-2 and A-3)
OPERATING EQUIPMENT PLANS AND DETAILS	None
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	None available other than noted. 1927 design criteria reported as 600 cfs per square mile of drainage area above dam.
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	None available

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA - 00191
BORROW SOURCES	Not known	
POST CONSTRUCTION DAM SURVEYS	None available prior to 1981. For conditions on 3/02/81, see top of dam profile and typical sections, Appendix A.	
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Inspection reports (1927, 1928, 1930, 1931, 1932, 1933, 1934 and 1957) on file with PENNDER	
HIGH POOL RECORDS	No formal records are available	
MONITORING SYSTEMS	None	
MODIFICATIONS	Addition of earthfill, downstream of the original dry stone wall, prior to 1957.	

CHECK LIST
ENGINEERING DATA
PHASE I
(CONTINUED)

ITEM	REMARKS	NDI# PA - 00191
PRIOR ACCIDENTS OR FAILURES	Not reported	
MAINTENANCE RECORDS MANUAL	None available	
OPERATION RECORDS MANUAL	Not available	
OPERATIONAL PROCEDURES	Flow is regulated by leakage through the exposed stone wall section of the dam. Excess flow is conveyed into the downstream channel by overtopping of the dam.	
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	Not available	
MISCELLANEOUS		

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # 00191
PENNDER ID # 35-94

SIZE OF DRAINAGE AREA: 0.12 square mile

ELEVATION TOP NORMAL POOL 1572.0 STORAGE CAPACITY 80 acre-feet

ELEVATION TOP FLOOD CONTROL POOL NA STORAGE CAPACITY NA

ELEVATION MAXIMUM DESIGN POOL Unknown STORAGE CAPACITY Unknown

ELEVATION TOP DAM: 1572.0 STORAGE CAPACITY: 80 acre-feet

SPILLWAY DATA NA (no spillway)

CREST ELEVATION:

TYPE:

CREST LENGTH:

CHANNEL LENGTH:

SPILLOVER LOCATION:

NUMBER AND TYPE OF GATES:

OUTLET WORKS NA (no outlet works)

TYPE:

LOCATION.

ENTRANCE INVERTS:

EXIT INVERTS:

EMERGENCY DRAWDOWN FACILITIES.

HYDROMETEOROLOGICAL GAGES

TYPE: None

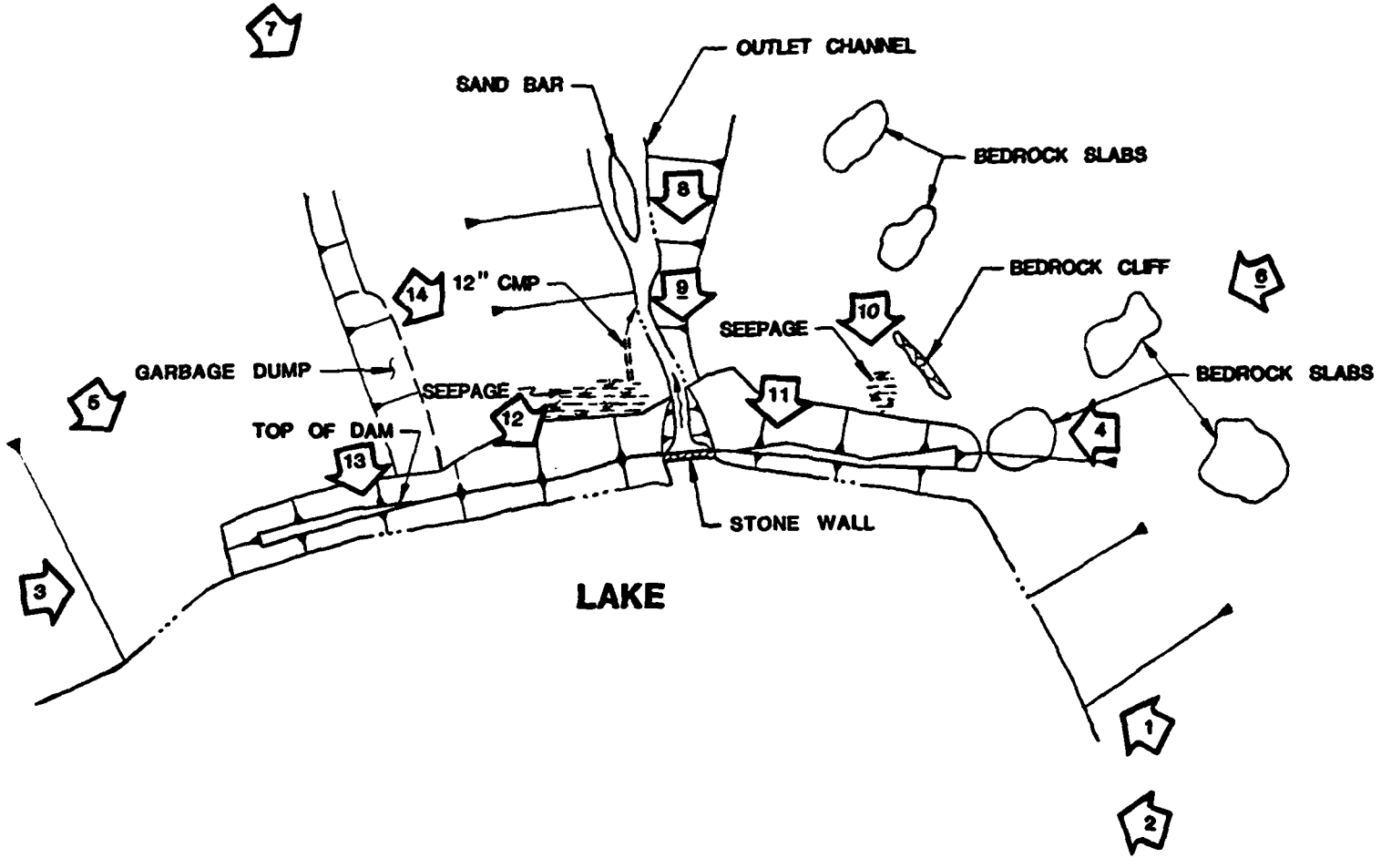
LOCATION: NA

RECORDS. NA

MAXIMUM NON-DAMAGING DISCHARGE: See paragraph 7.1a, Section 7

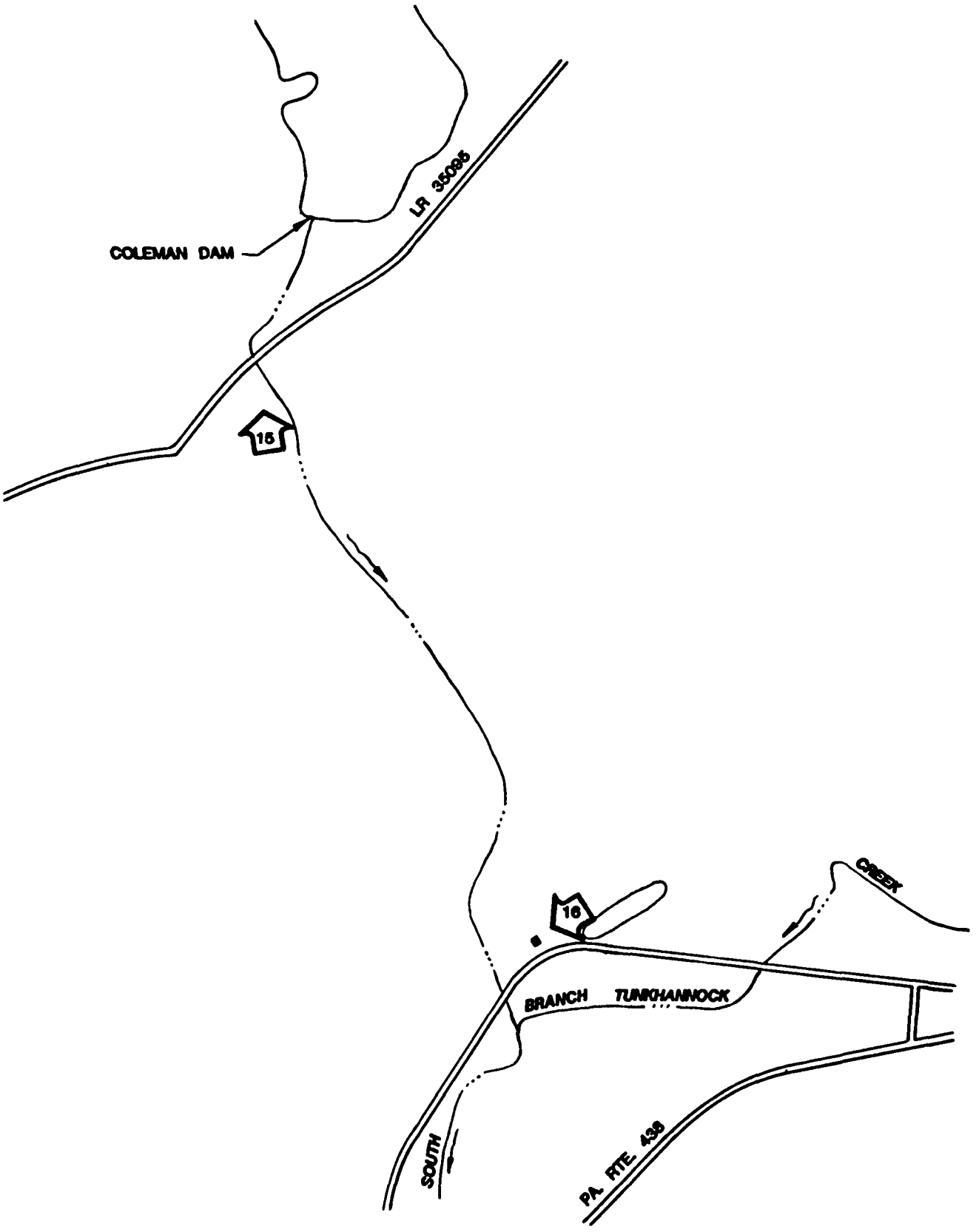
APPENDIX C

PHOTOGRAPHS



COLEMAN DAM
PHOTOGRAPHS LOCATION MAP

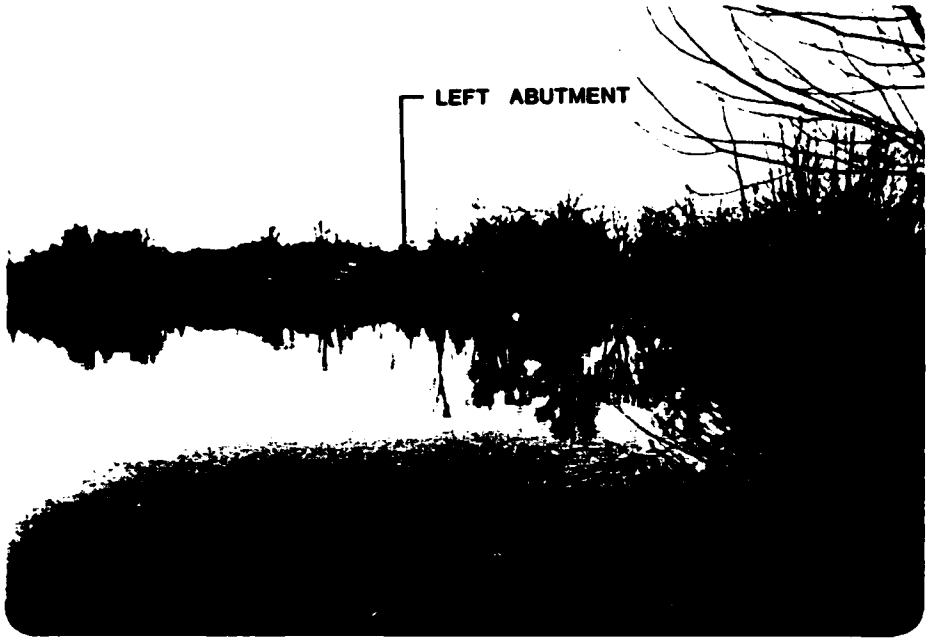
EXHIBIT C-1



COLEMAN DAM

DOWNSTREAM PHOTOGRAPHS LOCATION MAP

EXHIBIT 9-2



1. VIEW FROM RIGHT SHORELINE

3. VIEW FROM LEFT ABUTMENT

2. LEFT ABUTMENT DETAIL

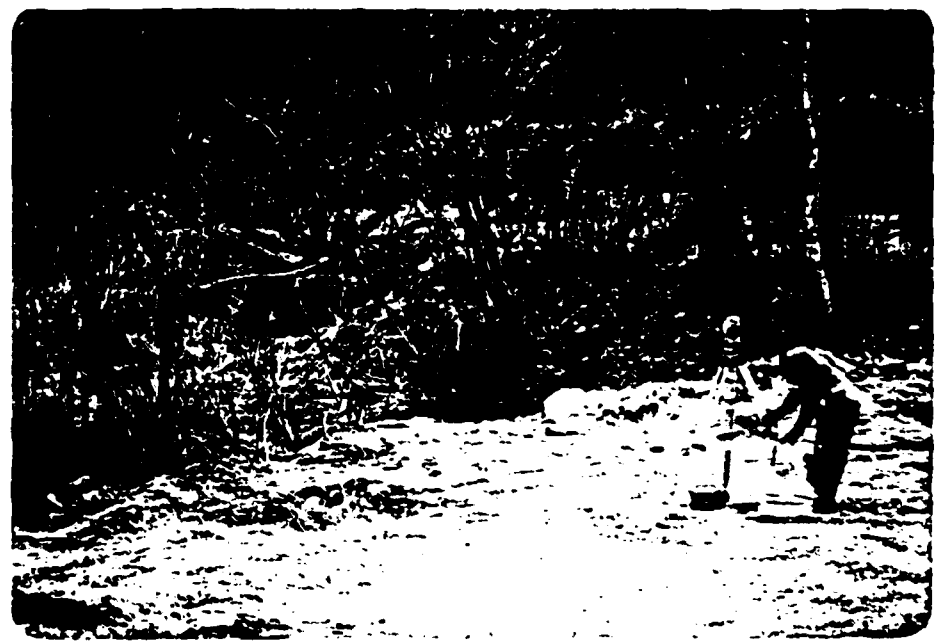
UPSTREAM VIEW OF DAM

4. ROCK OUTCROP ON RIGHT ABUTMENT

DAM ABUTMENTS

5. LAKESHORE – LEFT ABUTMENT

6. DOWNSTREAM OUTCROP – BELOW RIGHT ABUTMENT



7. TOP OF DUMP BELOW LEFT ABUTMENT

DOWNSTREAM VIEW

8. OVERFLOW - STONE WALL AND DOWNSTREAM CHANNEL

9. CLOSE-UP OF DRY STONE WALL (TREE GROWING ON TOP OF WALL AND DEBRIS ON EACH SIDE)

10. SEEP AT TOE OF DAM NEAR RIGHT ABUTMENT

DOWNSTREAM FACE OF DAM

11.

12.

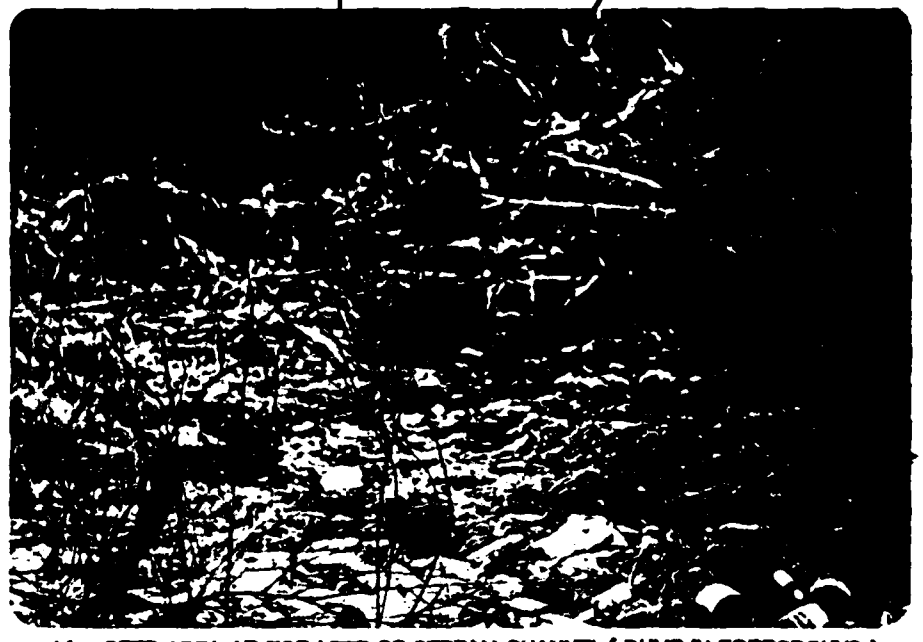
13.

NOTE : SEE PHOTOGRAPH LOCATION MAP

11, 12 & 13 TYPICAL GROUNDHOG HOLES – DOWNSTREAM SLOPE OF DAM

15. 36" DIAMETER CMP CULVERT
800' DOWNSTREAM OF DAM

15 & 16 DOWNSTREAM CONDITIONS



14. SEEP AREA AT TOE LEFT OF STREAM CHANNEL (DUMP IN FOREGROUND)

16. 3600' DOWNSTREAM OF DAM, STREAM IN BACK OF HOUSE
(WITHIN TREES IN BACKGROUND)

APPENDIX D

HYDROLOGY AND HYDRAULICS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY INVESTIGATIONS

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the over-topping potential of the dam, and (2) estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam over-topping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would over-top the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge, time of the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

For detailed information regarding this program, refer to the Users Manual for the Flood Hydrograph Package (HEC-1), Dam Safety Investigations prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

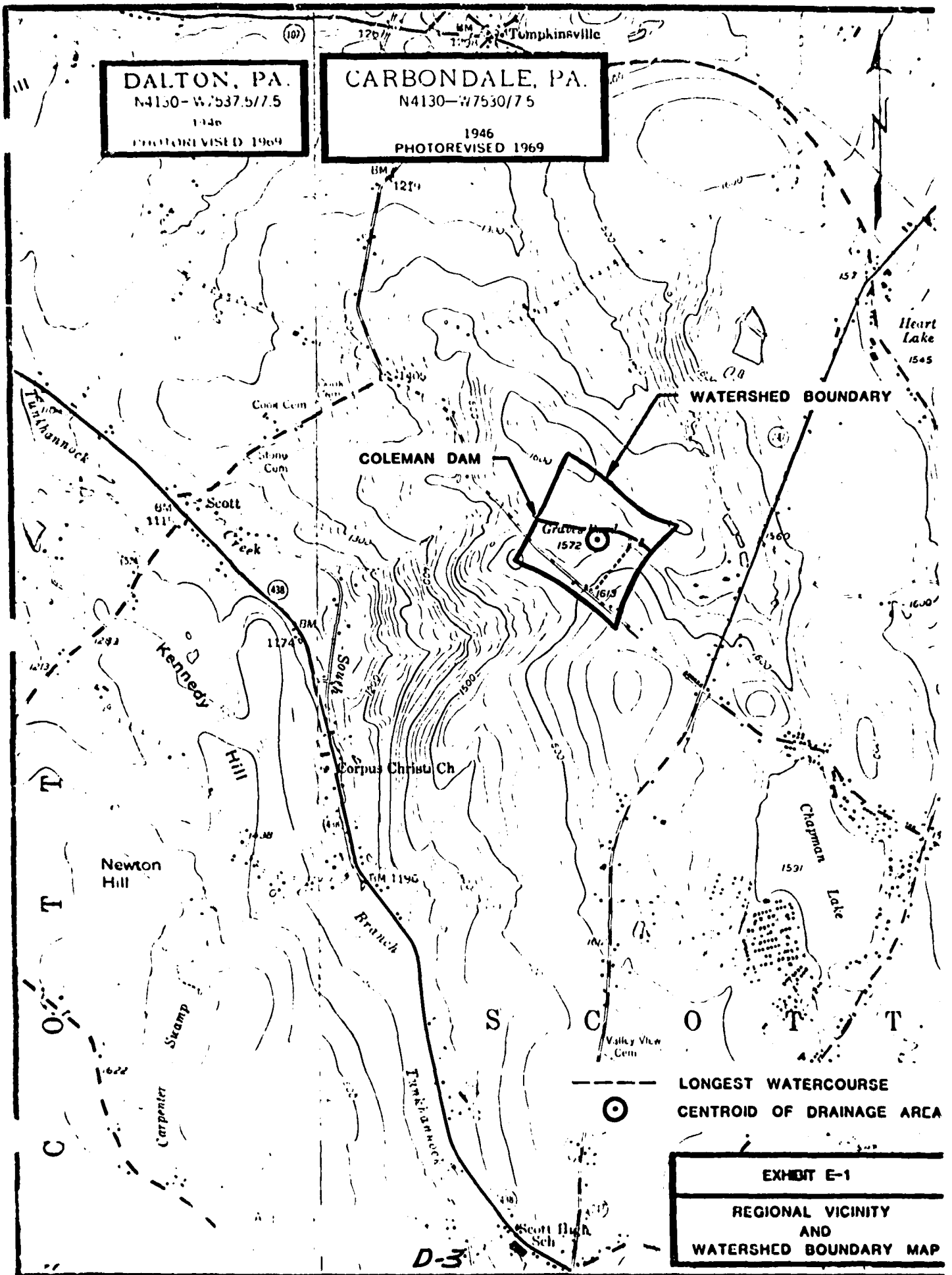
GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB [illegible]
SHEET NO. 1
CALCULATED BY VLH DATE
CHECKED BY DATE
SCALE

SUMMARY OF HYDRAULIC COMPUTATIONS

1.) PERFORM A MULTI-RATIO OVERTOPPING ANALYSIS

2.) DUE TO THE DOWNSTREAM HAZARD CLASSIFICATION, NO DOWNSTREAM ROUTING OR BREACH ANALYSIS WILL BE MADE


DALTON, PA.
N4130—W7537.5/7.5
1946
PHOTOREVISED 1969
CARBONDALE, PA.
N4130—W7530/7.5
1946
PHOTOREVISED 1969
Tunkhannock
Tompkinsville
WATERSHED BOUNDARY
COLEMAN DAM
Heart Lake
Scott Creek
Kennedy Hill
Corpus Christi Ch
Newton Hill
Chapman Lake
Carpenter Swamp
Valley View Cem
Scott Elem Sch
SCOTT
LONGEST WATERCOURSE
CENTROID OF DRAINAGE AREA
EXHIBIT E-1
REGIONAL VICINITY AND WATERSHED BOUNDARY MAP
D-3

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB COLEMAN DAM PA 00121
SHEET NO. ____ OF ____
CALCULATED BY WEH DATE 3/13/81
CHECKED BY ____ DATE ____
SCALE ____

GENERAL DATA

RIVER BASIN	SUSQUEHANNA (SUB-BASIN 4) *
STREAM NAME	TRIB. SO. BR. TUNKHANNOCK CR.
DAM NAME	COLEMAN DAM
NDI ID No.	PA 00121
DER ID No.	35-094
OWNER	FRANK BIANCONI
LOCATION	SCOTT TWP., LACKAWANNA CO., PA
	LAT. N 41°34'07"
	LONG. W 75°36'42"
SIZE CATEGORY	SMALL
HAZARD CATEGORY	SIGNIFICANT
UPSTREAM DAMS	NONE
DOWNSTREAM DAMS	NONE

* PENN-DER WATER RESOURCES BULLETIN No. 5

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB COLEMAN DAM PA 00191
SHEET NO OF
CALCULATED BY WEH DATE 3/13/81
CHECKED BY DATE
SCALE

DRAINAGE BASIN & UNIT HYDROGRAPH DATA

DRAINAGE AREA 0.12 Sq. Mi.

REGIONAL UNIT HYDROGRAPH COEFFICIENTS
AS SUPPLIED BY BALT. DIST CDE (SUSQUEHANNA BASIN ZONE II)

$C_P = 0.62$
$C_t = 1.50$

LAG TIME - DUE TO LOCATION OF CENTROID
USE $T_p = C_t \times L'^{0.6}$

$L' = 0.10$ MI. FROM RESERVOIR INLET TO DRAINAGE DIVIDE

$\therefore T_p = 1.50 \times 0.10^{0.6} = 0.38$ HRS

RAINFALL DATA

SEE HYDROMETEOROLOGICAL REPORT No. 40 (SUSQUEHANNA BASIN)
GEOGRAPHIC ADJUSTMENT FACTOR = 0.985
PMF RAINFALL = 22.2" (24 HR & 200 Sq. Mi.)
$22.2 \times 0.985 = 21.9$"

RAINFALL DISTRIBUTION

6 HR	113%
12 HR	127%
24 HR	136%
48 HR	142%

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB CHEEMAN LAKE
JOB NO.
CALCULATED BY DSH DATE
CHECKED BY DATE
SCALE

DAM DATA

TOP OF DAM ELEV. (LOW POINT)		1572.0
DAM LENGTH (INC. SPILLWAY)		170'
DAM HEIGHT	6.5'	
DAM WIDTH	0.1' to 6'±	
"C" VALUE - DAM	2.6	

NON-LEVEL DAM

LENGTH OF DAM	BELOW ELEV.
0'	1572.0
36'	1572.2
48'	1572.8
105'	1574.0
250'	1574.8
323'	1575.4
347'	1576.0
408'	1577.0

SPILLWAY DATA

THERE IS NO EMERGENCY OR SERVICE SPILLWAY. NORMAL OUTFLOW OCCURS BY LEAKAGE THRU & OVER A MASONRY WALL NEAR THE MIDDLE OF THE DAM.

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB COLEMAN DAM PA 00191
SHEET NO OF
CALCULATED BY WEH DATE 3/13/81
CHECKED BY DATE
SCALE

OUTLET WORKS DATA

THERE ARE NO EXISTING OUTLET WORKS

STORAGE DATA

ELEV. (FT.)	AREA (AC)	STORAGE (MG)	STORAGE (AC.FT.)	DESCRIPTION
1559	0	0	0	RESERVOIR BOT.
1572	18.4	26 *	80	EXIST. W.S.
1580	32	91	279	CONTOUR

ESTABLISH ELEV. @ 0 AREA
USE STORAGE PER BULLETIN 5 OF 26 MG. @ ELEV. 1572.0
$\Delta E = 3S/A = (3)(80)/18.4 = 13.0'$
ELEV. @ 0 AREA = 1572 - 13 = 1559.0

... DEP. WATER RESOURCES BULLETIN No. 5

... Concord Mass 01742

17

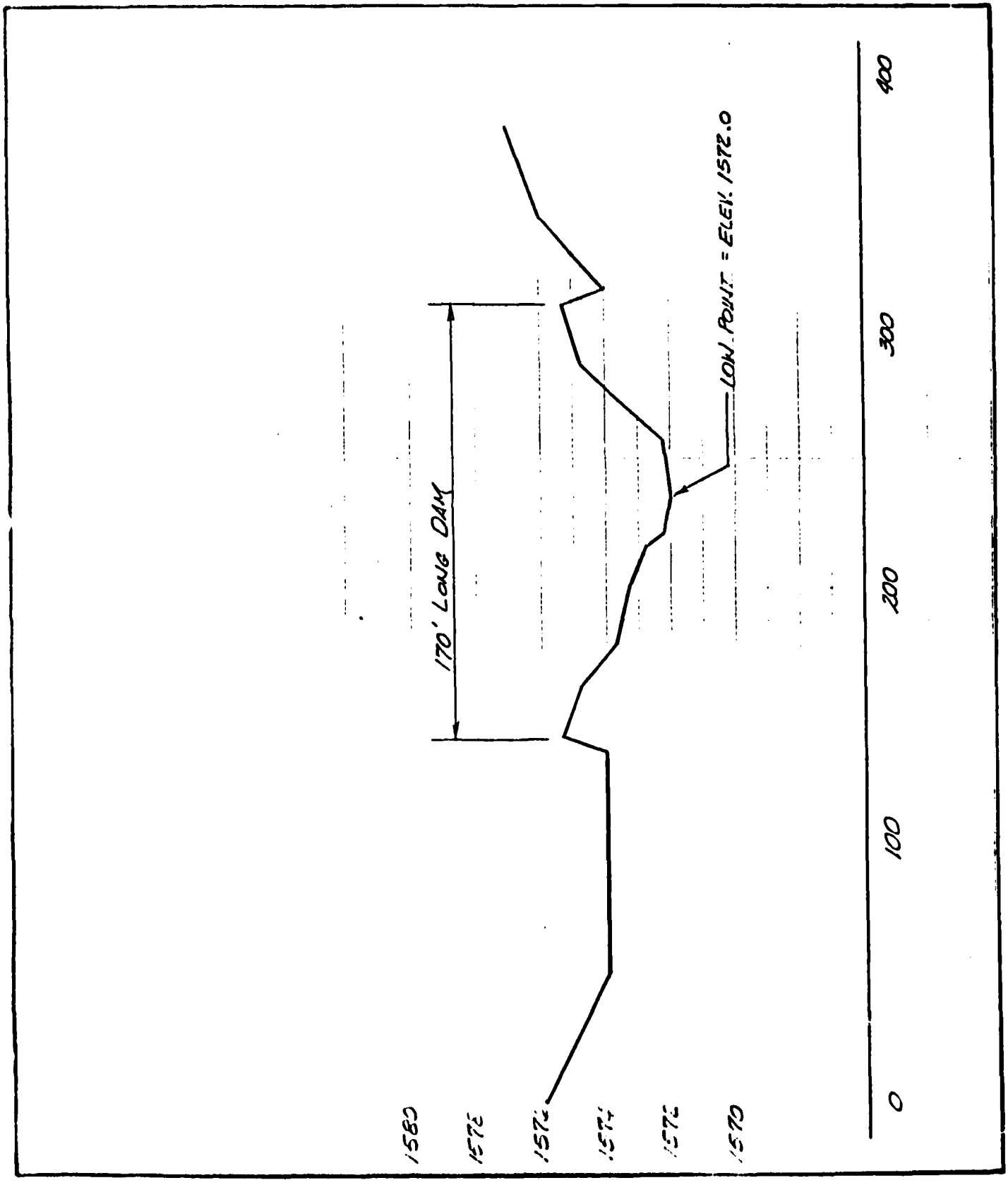
GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

COLEMAN DAM PA 00191

BY WEH DATE 3/16/81

CHECKED BY DATE

SCALE



GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB COLEMAN DAM
SHEET NO 1 OF 1
CALCULATED BY SPW DATE 5/81
CHECKED BY G.V. DATE 5/04/81

100 YEAR FLOOD FLOW DETERMINATION

REF. (1) C.O.E. 4/22/81 MEMO
(2) HYDROLOGIC STUDY - TROPICAL STORM AGNES - COE DEC. 75
(3) BULLETIN NO. 13 - FLOODS IN PENNSYLVANIA - USGS OCT. 1977
(4) [illegible] 1977

CORPS REGIONAL REGRESSION (Ref. 2)

[illegible] LONG. W 75°36'42"

METHOD A

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

$A = 0.12 \text{ mi}^2$

$C_m = 2.1$ ✓

$$\text{Log}(Q_m) = 2.1 + 0.75 \text{ Log}(0.12) = 1.41$$ ✓

$$\text{Log}(Q_p) = \text{Log}(Q_m) + K_{p,g} S$$

$p = 100$

$g = 0.4$ ✓

$K_{pg} = 2.615$ (From Ref. 4; $K_{pg} = 2.61539$)

$S = C_s - 0.05 \text{ Log}(A)$

$C_s = 0.35$ ✓

$S = 0.35 - 0.05 \text{ Log}(0.12) = 0.40$ ✓

$$\text{Log}(Q_{100}) = 1.41 + 2.615(.40) = 2.456$$ ✓

$\therefore Q_{100} = 285.8$ ✓

METHOD B

BULL. 13 (Ref. 3)

$Q_T = c A^x$

$T = 100$

$c = 564$ ✓

$x = 0.744$ ✓

} MODEL FOR REG. 2 ✓

$\therefore Q_{100} = 116$ ✓

AVERAGE VALUES OF METHODS A & B

$$\bar{Q}_{100} = \frac{285.8 + 116}{2} = 200.9 \text{ say } \underline{200 \text{ cfs}}$$

100 YR FLOOD

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
**********
    1          A1       NATIONAL DAM INSPECTION PROGRAM
    2          A2       COLEMAN DAM--PA00191 (OVERTOPPING ANALYSIS)
    3          A3       SCOTT TWP, LACKAWANNA CO, PA
    4          B    150      0      15       0       0       0       0       0      -4       0
    5          B1     5      0       0       0       0       0       0       0       0       0
    6          J      1      7       1       0       0       0       0       0       0       0
    7          J1    .1     .2      .3      .4      .5     .75       1       0       0       0
    8          K      0      1       0       0       0       0       1       0       0       0
    9          K1       INFLOW TO RESERVOIR
   10          M      1      1    0.12       0       0       0       0       0       1       0
   11          P      0   21.9     118     127     136     142       0       0       0       0
   12          T      0      0       0       0       0       0       1     .05       0       0
   13          W   0.38   0.62       0       0       0       0       0       0       0       0
   14          X   -1.5   -.05       2       0       0       0       0       0       0       0
   15          K      1      2       0       0       0       0       1       0       0       0
   16          K1       ROUTE THRU RESERVOIR
   17          Y      0      0       0       1       1       0       0       0       0       0
   18          Y1     1      0       0       0       0       0   -1572       0       0       0
   19          $A     0   18.4      32       0       0       0       0       0       0       0
   20          $E  1559   1572    1580       0       0       0       0       0       0       0
   21          $$  1572      0       0       0       0       0       0       0       0       0
   22          $D  1572    2.6     1.5     300       0       0       0       0       0       0
   23          $L     0     36      48     105     250     323     347     408       0       0
   24          $V  1572 1572.2  1572.8    1574  1574.8  1575.4    1576    1577       0       0
   25          K     99      0       0       0       0       0       0       0       0       0
```

6-0

NOTE: COLEMAN DAM HAS NO OUTLET FACILITIES

SPILLWAY VALUES REFER TO LOW POINT TOP OF DAM

****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 01 APR 80
****

RUN DATE= 81/05/05.
TIME= 09.25.34.

NATIONAL DAM INSPECTION PROGRAM
COLEMAN DAM--PA00131 (OVERTOPPING ANALYSIS)
SCOTT TWP, LACKAWANNA CO, PA

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
150	0	15	0	0	0	0	0	-4	0

	JOPER	NWT	LROPT	TRACE
	5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 7 LRTIO= 1

RTIOS= .10 .20 .30 .40 .50 .75 1.00

01-D

****

SUB-AREA RUNOFF COMPUTATION

INFLOW TO 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	.12	0.00	.12	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.90	119.00	127.00	136.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= .38 CP= .62 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 8 END-OF-PERIOD ORDINATES, LAG= .38 HOURS, CP= .62 VOL= 1.00

58.	113.	79.	34.	15.	6.	3.	1.

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.88	22.63	2.25	7158.
										(632.)	(575.)	(57.)	(202.69)

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

HYDROGRAPH ROUTING

ROUT. THRU RESERVOIR

ISTAO	ICOMP	ICOMP	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	1	3	0	0	1	1	0

ROUTING DATA

CLOSS	CLOSS	AVG	IRES	ISAME	ICON	IPMP		LSTR
1.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	2	0	0.000	0.000	0.000	-1572.	0

SURFACE AREA=	0.	18.	32.					
CAPACITY=	0.	80.	279.					
ELEVATION=	1559.	1572.	1580.					

CRVL	SPWID	COQW	EXPW	ELEVL	COQL	CARemail	EXPL
1572.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1578.0	2.6	1.5	300.

CREST LENGTH	0.	36.	48.	105.	250.	323.	347.	408.
AT OR BELOW ELEVATION	1572.0	1572.2	1572.8	1574.0	1574.8	1575.4	1576.0	1577.0

PEAK OUTFLOW IS 24. AT TIME 41.00 HOURS

PEAK OUTFLOW IS 63. AT TIME 40.75 HOURS

PEAK OUTFLOW IS 107. AT TIME 40.50 HOURS

PEAK OUTFLOW IS 157. AT TIME 40.50 HOURS

PEAK OUTFLOW IS 209. AT TIME 40.50 HOURS

PEAK OUTFLOW IS 344. AT TIME 40.50 HOURS

PEAK OUTFLOW IS 484. AT TIME 40.50 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 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .50	RATIO 6 .75	RATIO 7 1.00
HYDROGRAPH AT	1	.12	1	73.	145.	218.	291.	364.	545.	727.
	(	.31)	(	2.06)(	4.12)(	6.18)(	8.24)(	10.29)(	15.44)(	20.59)(
ROUTED TO	2	.12	1	24.	67.	107.	157.	209.	344.	484.
	(	.31)	(	.68)(	1.90)(	3.04)(	4.43)(	5.90)(	9.75)(	13.70)(

DAM SAFETY ANALYSIS

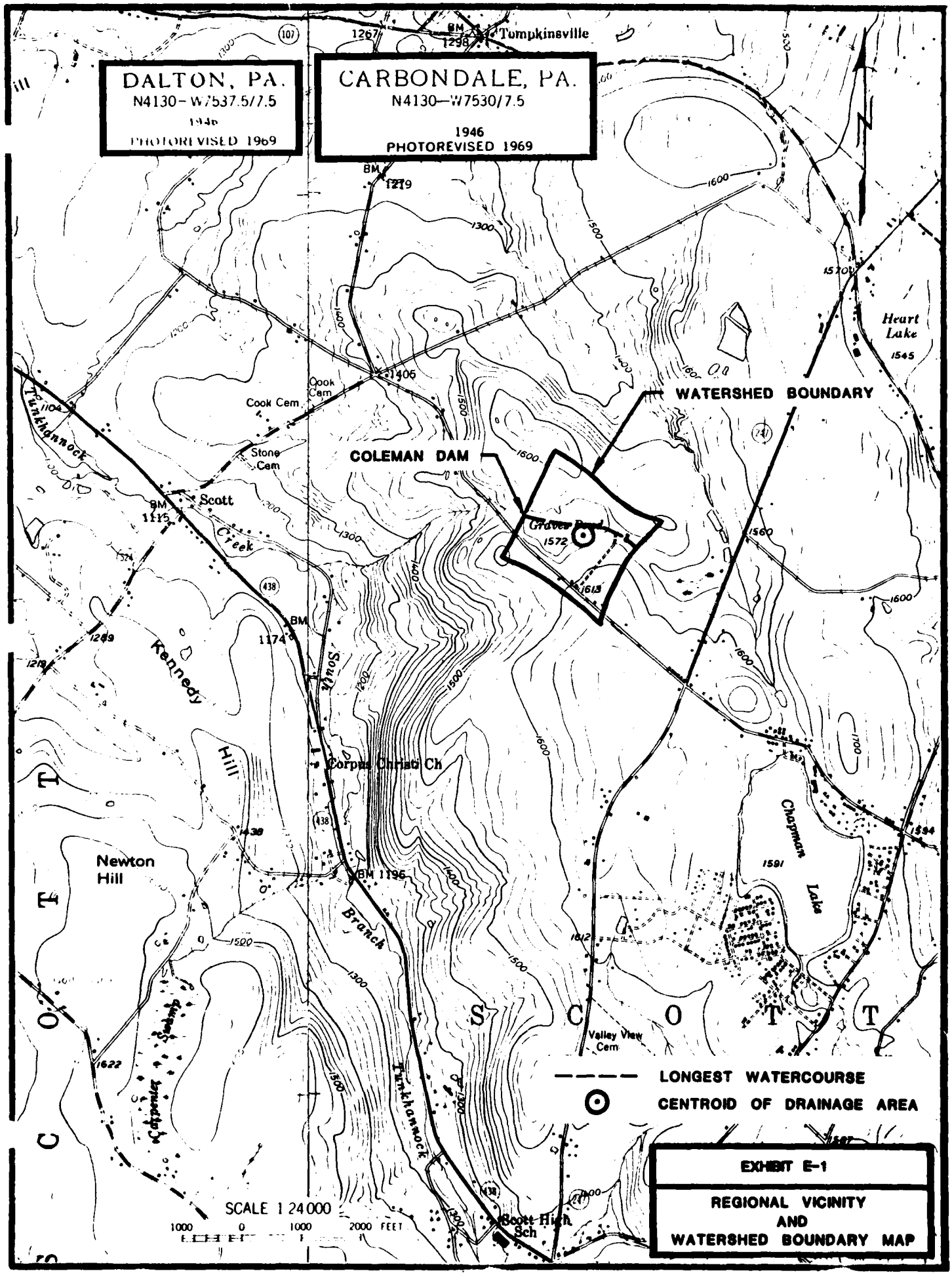
PLAN 1 .....

	ELEVATION STORAGE OUTFLOW	INITIAL VALUE 1572. 80. 0.	SPILLWAY CREST 1572.00 80. 0.	TOP OF DAM 1572.00 80. 0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE ACRE-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1572.44	.44	88.	24.	48.00	41.00	0.00
.20	1572.75	.75	94.	63.	44.00	40.75	0.00
.30	1572.99	.99	98.	107.	48.00	40.50	0.00
.40	1573.20	1.20	103.	157.	48.00	40.50	0.00
.50	1573.39	1.39	107.	209.	48.00	40.50	0.00
.75	1573.77	1.77	115.	344.	48.00	40.50	0.00
1.00	1574.09	2.09	121.	484.	48.00	40.50	0.00

APPENDIX E

EXHIBITS


DALTON, PA.
N4130—W7537.5/7.5
1946
PHOTOREVISED 1969
CARBONDALE, PA.
N4130—W7530/7.5
1946
PHOTOREVISED 1969
WATERSHED BOUNDARY
COLEMAN DAM
Gravel Pond
1572
1613
Heart Lake
1545
Cook Cem
Stone Cem
Scott Creek
Kennedy Hill
South Branch
Tunkhannock
Corpus Christi Ch
Newton Hill
Chapman Lake
1591
Valley View Cem
Scott High Sch
Tumpkinsville
BM 1219
BM 1115
BM 1174
BM 1196
1267
1298
1406
1439
1622
1812
1594
1560
1520
SCALE 1:24000
1000 0 1000 2000 FEET
LONGEST WATERCOURSE
CENTROID OF DRAINAGE AREA
EXHIBIT E-1
REGIONAL VICINITY
AND
WATERSHED BOUNDARY MAP

DOWNSTREAM VIEW OF DAM (1927)

APPENDIX F

GEOLOGY

COLEMAN DAM

APPENDIX F

GEOLOGY

The Coleman Dam and reservoir area are located within the Glaciated Allegheny Plateau Section of the Appalachian Plateau Physiographic Province. The site is about 5 miles northwest of the axis of the Northern Anthracite Coal Field of Pennsylvania. Except where bedrock is exposed, deposits of glacial drift of variable thickness cover the entire area. The drift was deposited by the Wisconsin Ice Sheet during the Pleistocene period of geologic time.

The glacial drift is composed primarily of till which is reddish-brown, unsorted, compact mixture of clay, silt, sand, gravel, and cobbles with occasional boulder sized pieces, The stone pieces are sub-angular to rounded and consist mainly of sandstone and siltstone derived from the Catskill Formation, the dominant rock formation in the area. The clay content and compact nature of the till makes it a relatively impervious soil type.

Some deposits of glacial outwash and Kame terraces are also found in the area. These deposits are composed of loose, poorly sorted to stratified deposits of silt, sand and gravel. The Kame and outwash deposits are generally very pervious.

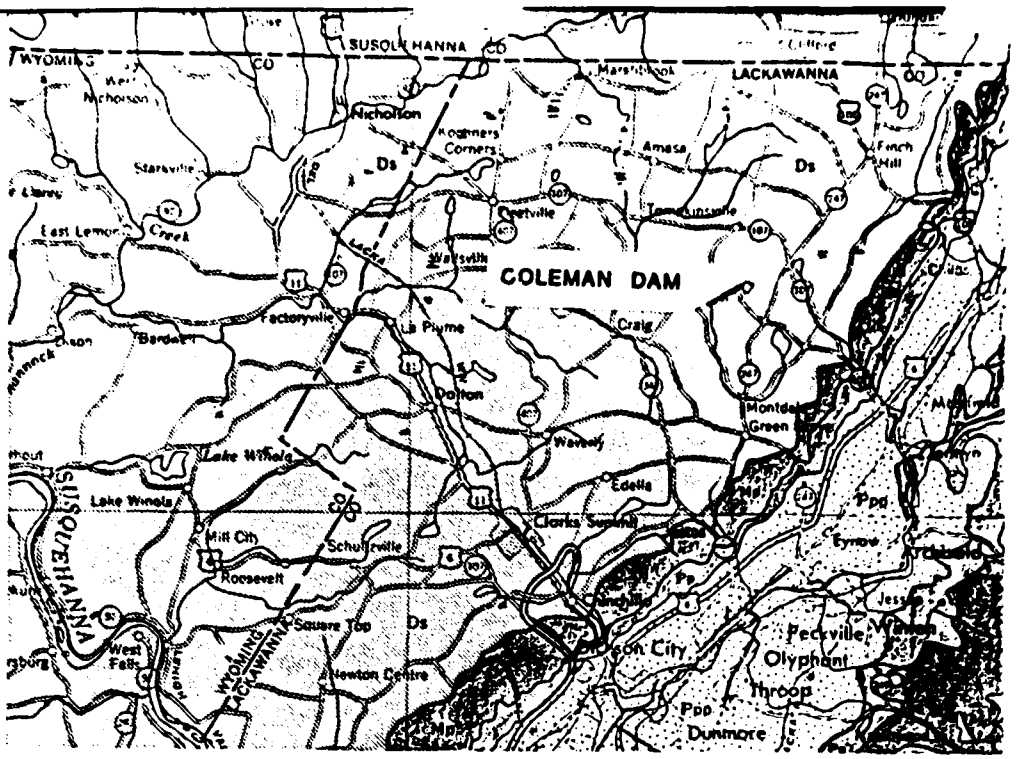
Other loose, pervious soils in the area are the recent deposits of alluvial silt, sand, and gravel with some clay. These soils are localized and limited to streambeds and flood plain areas such as along the South Branch Tunkhannock Creek southwest of the dam.

The bedrock underlying the entire dam and reservoir area is the Catskill Formation of the Susquehanna Group. This group of formations is of Upper Devonian age. The Catskill strata generally consists of well indurated red shale, siltstone and fine sandstone with some gray, green and brown shale, siltstone and sandstone layers. Occasional conglomeratic layers are encountered. The red shales are the dominant lithology and the residual soils derived from this rock are usually high in clay and silt and contain numerous flaky and angular fragments and flat, slabby boulders. The gently sloping area on the right abutment of the dam and reservoir area is covered with many such flat, slabby boulders and the dry masonry walls of the dam itself are constructed from similar one and two-man sized boulders.

The regional structure of the bedrock in the area indicates that the bedrock underlying the dam and reservoir area is gently folded. Surface exposures of gray sandstone bedrock on the right abutment strike $N45^{o}-65^{o}E$ and dip $3^{o}-5^{o}SE$. Depth to bedrock on the left abutment is unknown.

Ref.: Ground Water of Northeastern Pennsylvania, Stanley W. Lohman, 1937; Bulletin W-4, Pennsylvania Geologic Survey

Ground Water Resources of Lackawanna County, J.R. Hallowell, 1975; Water Resources Report 41, Pennsylvania Geologic Survey



0 1 2 3 4 5 10 MILES

SCALE: 1 4 MILES

LEGEND

PENNSYLVANIAN

ANTHRACITE REGION

Pos — **Post-Pottsville Formations**
Brown or gray sandstones and shales with some conglomerate and numerous minable coals.

Pp — **Pottsville Group**
Light gray to white, coarse grained sandstones and conglomerates with some minable coal; includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.

MISSISSIPPIAN

Mmc — **Mauch Chunk Formation**
Red shales with brown to greenish gray flaggy sandstones, includes Greenbrier Limestone in Fayette, Westmoreland, and Somerset counties, Loyalhanna Limestone at the base in southwestern Pennsylvania.

Mp — **Pocono Group**
In places mostly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale, includes in the Appalachian Plateau Burgoon, Shenango, Cuyahoga, Cussewago, Corry, and Knapp Formations, includes part of "Oswayo" of M. L. Fuller in Potter and Tioga counties.

DEVONIAN

UPPER

CENTRAL AND EASTERN PENNSYLVANIA

Dosh — **Oswayo Formation**
Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses, includes red shales which become more numerous eastward. Relation to type Oswayo not proved.

Dck — **Catskill Formation**
Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

Dm — **Marine beds**
Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Ds — **Susquehanna Group**
Barbed line is "Chemung-Catskill" contact of Second Pennsylvania Survey County reports, barbs on "Chemung" side of line.

NOTE:
GEOLOGIC MAP AND LEGEND OBTAINED FROM GEOLOGIC MAP OF PENNSYLVANIA BY PA. TOPOGRAPHIC AND GEOLOGIC SURVEY, DATED 1980

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

COLEMAN DAM (GRAVES POND)
GEOLOGIC MAP

GEO - Technical Services, Inc.
HARRISBURG, PA

FEBRUARY 1981

EXHIBIT F


DAT
ILM