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PREFACE

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This report is prepared under guidance contained in the <u>Recommended</u> <u>Guidelines for Safety Inspection of Dams</u>, 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, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any 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 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 point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

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National Low In Line transmission Sauch Fair Prov (NJI I. J. Nume MA-43244. I. St. J. Multer 32-14) Construction Universe Transmission Thus high Secret, Line and Transmission Phase I Inspectice Format, Harrison Phase I Inspection Format, 11/19801 Anne. (1=)671 NAME OF DAM: Sample Run Dam STATE LOCATED: Pennsylvania COUNTY LOCATED: Indiana OWNER: Clearfield Coal Company DATE OF INSPECTION. STREAM: Sample Run, a Tributary of Two Lick Creek

ASSESSMENT: Based on the evaluation of the existing conditions, the condition of Sample Run Dam is considered to be poor. The dam is abandoned and is in complete disrepair. A valve house located at the downstream toe of the dam has collapsed, covering most of the operating equipment with rubble. A reinforced concrete wall on the upstream side, which provides erosion protection for the embankment, has partially collapsed. The crest of the embankment is irregular and up to one foot below the design crest level. At some locations, the concrete in the spillway structures was found to be seriously deteriorated.

In view of these deficiencies, it is recommended that the condition of the dam be more completely evaluated by a professional engineer and plans be prepared and implemented for the repair and restoration of the embankment, spillway, and outlet works structures or orderly abandonment.

The flood discharge capacity of the dam was evaluated according to the recommended procedure and was found to pass 20 percent of the probable maximum flood (PMF). which is less than the recommended spillway capacity range of 50 percent to full PMF. For 50 percent of the PMF, it was found that the low spot on the embankment would be overtopped for a duration of 4.3 hours with a maximum depth of 0.5 foot. The overtopping depth and duration are not considered to present a significant breaching potential. Therefore, according to the recommended criteria, the capacity of the spillway is rated to be inadequate, but not seriously inadequate. A further analysis indicates that if the low spot on the crest of the dam were to be filled, the spillway capacity would be about 50 percent of the PMF.

The following recommendations should be implemented immediately or on a continuing basis:

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1. The owner should immediately retain a professional engineer to prepare and execute

plans for the repair and restoration of the embankment, spillway structures, and outlet facilities or develop a procedure for orderly abandonment of the dam. Repair and restoration should include, but not be limited to, the following work:

- a. Restore the regulating facilities in the valve house to a working order and develop a means for upstream control on all the pipes through the embankment.
- b. Conduct additional studies to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity. Filling of the low areas on the crest of the dam should be considered in conjunction with this study.
- c. Repair the concrete wall on the upstream side of the dam.
- d. Repair deteriorating concrete in the spillway structures.
- e. Clear brush and trees on the embankment.
- Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.



3. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.



auri Lawrence D. Andersen, P.F.

Vice President

March 5, 1980 Date

Approved by:

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JAMES W. PECK Oglonel, Corps of Engineers District Engineer->/ March 1980 Date

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SAMPLE RUN DAM NDI I.D. PA-284 NOVEMBER 30, 1979

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Upstream Face



Downstream Face

v

TABLE OF CONTENTS

	PAGE
SECTION 1 - PROJECT INFORMATION	1
1.1 General	1
1.2 Description of Project	1
1.3 Pertinent Data	2
SECTION 2 - DESIGN DATA	5
2.1 Design	5
2.2 Construction	6
2.3 Operation	6
2.4 Other Investigations	6
2.5 Evaluation	6
SECTION 3 - VISUAL INSPECTION	8
3.1 Findings	8
3.2 Evaluation	9
SECTION 4 - OPERATIONAL FEATURES	10
4.1 Procedure	10
4.2 Maintenance of the Dam	10
4.3 Maintenance of Operating Facilities	10
4.4 Warning System	10
4.5 Evaluation	10
SECTION 5 - HYDRAULICS AND HYDROLOGY	11
5.1 Evaluation of Features	11
SECTION 6 - STRUCTURAL STABILITY	12
6.1 Evaluation of Structural Stability	12
SECTION 7 - ASSESSMENT AND RECOMMENDATIONS/PROPOSED	
REMEDIAL MEASURES	13
7.1 Dam Assessment	13
7.2 Recommendations/Remedial Measures	13

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vi

TABLE OF CONTENTS (Continued)

APPENDIX A - CHECKLIST, VISUAL INSPECTION, PHASE I APPENDIX B - CHECKLIST, ENGINEERING DATA, DESIGN, CONSTRUCTION, OPERATION, AND HYDROLOGIC AND HYDRAULIC, PHASE I APPENDIX C - PHOTOGRAPHS APPENDIX D - HYDROLOGY AND HYDRAULICS ANALYSES APPENDIX E - PLATES APPENDIX F - REGIONAL GEOLOGY

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vii

PHASE I REPORT NATIONAL DAM INSPECTION PROGRAM SAMPLE RUN DAM NDI I.D. PA-284 DER I.D. 32-14

SECTION 1 PROJECT INFORMATION

1.1 General

a. <u>Authority</u>. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. <u>Purpose</u>. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Sample Run Dam consists of an earth embankment approximately 325 feet long with a maximum height of approximately 23 feet from the downstream toe. The crest width is approximately 10 feet. As designed, the downstream face of the dam was to be protected by grass, and a vertical concrete wall on the upstream side was to provide shoreline protection. Presently, the downstream face of the dam is covered with brush and trees up to 10 feet high and the concrete wall on the upstream side has partially collapsed.

The flood discharge facilities for the reservoir consist of a concrete overflow structure located on the left abutment (looking downstream). ¹The spillway structures are comprised of an 18-foot-wide concrete ogee overflow section which discharges into an 18-foot-long concrete channel, incorporating an energy dissipator sill.

The dam was originally constructed for industrial water supply with outlet facilities incorporating low-level and high-level supply water intakes in addition to a low-level reservoir blow-off pipe. The blow-off and the low-level outlet pipes are shown to be 24-inch cast-iron pipes founded on concrete cradles. The design drawings show these pipes to be equipped with wrought iron cutoff collars encased in concrete. The high-level intake pipe consists of a 16-inch cast-iron pipe receiving flow from an intake structure located on the upstream side of the dam about 100 feet from the right abutment. The invert of the high-level intake pipe is located about 2 feet below the spillway crest level. Presently, the highlevel intake pipe serves as a primary spillway maintaining the normal pool level below the crest of the overflow spillway. To the extent that can be determined, flow through the low-level outlet and blow-off pipes is controlled by valves located in a valve house downstream of the dam. The valve house has collapsed, burying the operating equipment under rubble. As it presently exists, the dam has no functional emergency drawdown facilities.

b. Location. Sample Run Dam is located on Sample Run, approximately one mile upstream from its confluence with Two Lick Creek in Cherry Hill Township, Indiana County, Pennsylvania. Plate 1 illustrates the location of the dam.

c. <u>Size Classification</u>. Small (based on 23-foot height and 37 acre-feet maximum storage capacity).

d. <u>Hazard Classification</u>. The dam is classified to be in the high hazard category. An industrial equipment storage yard, a warehouse, and one residence are estimated to be within the potential flood plain of the dam. It is estimated that failure of the dam would cause loss of a few lives and some property damage.

e. <u>Ownership</u>. Clearfield Coal Company (address: c/o Mc. H. B. Kramp, Property Manager, Barnes and Tucker Company, 1912 Chestnut Avenue, Barnesboro, Pennsylvania 15714).

f. <u>Purpose of Dam</u>. The dam was built for the purpose of industrial supply, but presently the dam has reportedly been abandoned.

g. <u>Design and Construction History</u>. The dam was designed and constructed by Clearfield Coal Company in 1916. In 1930, the dam was enlarged by the same company to its present configuration.

h. <u>Normal Operating Procedure</u>. As it presently exists, the reservoir is normally maintained at the invert level of the highlevel intake pipe which is functioning as a primary spillway. The invert of the high-level intake pipe is located about 2.3 feet below the crest level of the overflow spillway. Inflow in excess of the capacity of the high-level intake pipe would be discharged through the overflow spillway.

1.3 Pertinent Data

a. Drainage Area

0.3 square mile

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site Outlet conduit at maximum pool Gated spillway capacity at maximum pool Ungated spillway capacity at maximum pool Total spillway capacity at maximum pool

Unknown

192

192

Not applicable(1) $<_1(2)$

c. Elevation (USGS Datum) (feet)

	Top of dam	1349.1 (measured low spot); 1350 (as designed)
	Maximum pool	1349.1
	Normal pool	1344.7(3)
	Upstream invert outlet works	Unknown
	Downstream invert outlet works	Unknown
	Streambed at center line of dam	1320+
	Maximum tailwater	Unknown
	Toe of dam	1326+
d.	Reservoir Length (feet)	
	Normal pool level	500
	Maximum pool level	550+
e.	Storage (acre-feet)	
	Normal pool level	25
	Maximum pool level	37
f.	Reservoir Surface (acres)	
	Normal pool level	4.6
	Maximum pool level	5+
g.	Dam	
	Туре	Earth
	Length	325 feet
	Height	23 feet
	Top width	10 feet

(1)Visual observations indicate that the reservoir is significantly silted; therefore, the outlet pipe is not likely to be operable. (2) Estimated capacity of high-level intake pipe.

(3)Invert elevation of high-level intake pipe.

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	Side slopes	Downstream:
		2H:1V
		Upstream:
		2H:1V
	Zoning	No
	Impervious core	Yes
	Cutoff	Yes
	Grout curtain	No
h.	Regulating Outlet	
	Туре	Two 24-inch
		cast-jron
		pipes ⁽⁴⁾
	Length	Unknown
	Closure	Gate valves at
		downstream end
	Access	Valve house
	Regulating facilities	Gate valves
i.	Spillway	
	Туре	Ogee overflow
		section
	Length	18 feet
		(perpendicular
		to flow)
	Crest elevation	1347
	Upstream channel	Lake
	Downstream channel	Rectangular

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overflow on et endicular ow) ngular concrete channel

(4) Regulating facilities on 16-inch high-level intake pipe are dismantled.

SECTION 2 DESIGN DATA

2.1 Design

a. <u>Data Available</u>. The available data consist of files provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER) which contain design drawings and specifications, past inspection reports, and correspondence.

(1) <u>Hydrology and Hydraulics</u>. A state report entitled, <u>Report</u> <u>Upon the Application of the Clearfield Bituminous Coal Corporation</u>, dated September 3, 1930, reports the design capacity of the spillway used during the enlargement of the dam in 1930.

(2) <u>Embankment</u>. The available information consists of design drawings, construction specifications, construction progress reports, and correspondence.

(3) <u>Appurtement Structures</u>. The available information consists of design drawings.

b. Design Features

(1) Embankment. Review of the records indicates that Sample Run Dam was originally designed and constructed in 1916 and was later enlarged in 1930. Plate 2 illustrates a subsurface profile obtained from an investigation conducted for the original design. The valley is shown to consist of about 20 feet of clay underlain by foundation rock. A typical cross section of the original dam is illustrated in Plate 3. The dam is shown to consist of homogeneous fill with a 2 horizontal to 1 vertical slope on both the upstream and downstream faces and a concrete core wall along the upstream edge of the crest. Plate 3 also indicates that an embankment which existed prior to 1916 was also incorporated into the design, forming a portion of the downstream slope. Spillway details of the original design are illustrated in Plate 4. A report prepared by the state in 1916 on the review of the original design indicates that the concrete core wall was to be founded on adequately impervious material and was to extend beyond the limits of the embankment and the spillway into the abutments.

In 1930, the dam was enlarged to its current configuration. Plate 5 illustrates the details of this enlargement. The enlargement consisted of placing additional fill on the downstream face and crest of the dam to increase the crest level by about 4 feet. The spillway crest level was also increased. As illustrated in Plate 5, the concrete core wall was extended beyond the upstream slope of the dam to provide upstream slope protection against wave action.

(2) <u>Appurtement Structures</u>. The appurtement structures consist of an overflow spillway and outlet facilities. The spillway is an 18-foot-wide ogee-crested overflow section discharging into a rectangular concrete channel equipped with an energy dissipator sill.

The outlet facilities consist of low- and high-level supply pipes and a reservoir blow-off pipe. The layout of the reservoir blow-off pipe and low-level supply pipe is illustrated in Plate 3. Both pipes consist of 24-inch cast-iron pipes founded on concrete cradles. As shown in Plate 4, the pipes are equipped with wrought iron cutoff collars encased in concrete. It appears that the 16-inch high-level intake pipe was constructed during the enlargement of the dam in 1930. As it presently exists, this high-level intake pipe receives flow from an intake structure located on the upstream side of the dam, about 100 feet from the right abutment, and discharges into an earth channel about 50 feet from the toe of the dam. As illustrated in Plate 3, flow through the reservoir blow-off pipe and low-level supply pipe is controlled by valves located in the valve house.

c. Design Data

(1) <u>Hydrology and Hydraulics</u>. A 1930 state report indicates that the spillway was designed for a capacity of 280 cfs.

(2) <u>Embankment</u>. No engineering data are available on the design of the embankment.

(3) <u>Appurtement Structures</u>. No design data are available on the appurtement structures.

2.2 <u>Construction</u>. Available construction progress reports indicate that the original dam was constructed according to the design drawings. No unusual construction difficulties were reported.

Other than the 1930 enlargement of the dam as described above, available information indicates that no major post-construction changes have been made.

2.3 <u>Operation</u>. Available information includes no operating records for the dam.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability

(1) <u>Hydrology and Hydraulics</u>. The available information consists of the design discharge capacity of the spillway. This information is not considered to be adequate to assess the adequacy of the spillway.

(2) <u>Embankment</u>. The dam was apparently constructed according to the design drawings. In view of the age of the dam, completed in 1916 and later enlarged in 1930, the design approach and construction techniques are not likely to be in conformance with currently accepted engineering practices. The design lacks such considerations as embankment slope stability and seepage analysis and other quantitative data to aid in the assessment of the adequacy of design. However, the design incorporated a positive cutoff and concrete core wall, and it appears that the dam was constructed with adequate care. Based on the past performance of the dam, the design is considered to be adequate.

(3) <u>Appurtement Structures</u>. Review of the design drawings indicates that no significant design deficiencies exist that would affect the overall performance of the appurtement structures.

SECTION 3 VISUAL INSPECTION

3.1 Findings

a. <u>General</u>. The on-site inspection of Sample Run Dam consisted of:

- 1. Visual inspection of the embankment, abutments, and embankment toe.
- 2. Visual examination of the spillway structures and outlet facilities.
- 3. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 6.

b. <u>Embankment</u>. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the embankment is considered to be poor. A portion of the reinforced concrete wall on the upstream side of the dam, which provides slope protection, was found to be collapsed. A segment of the downstream slope immediately behind the valve house appears to be creeping. It appears that this creeping slope has led to the collapse of the back wall of the valve house. A swampy area was found immediately below the valve house. However, it appears that the swampiness is caused by leaking pipes in the valve house. The downstream face and the crest of the dam were found to be covered with brush and trees.

The crest of the dam was surveyed relative to the spillway crest elevation; it was found that the crest in some locations is nearly one foot below the design elevation. The dam crest profile is illustrated in Plate 7. In the transverse direction, the crest of the dam was irregular. The average crest width was estimated to be 10 feet. The downstream slope was surveyed and was found to be reasonably within the 2 horizontal to 1 vertical design slope.

c. Appurtenant Structures. The spillway structures were examined for deterioration and other signs of distress and obstructions that would limit flow. The spillway structures were found to be in fair condition. However, at certain locations, serious concrete deterioration was observed.

8

Most of the operating facilities in the valve house are buried beneath the rubble of the collapsed wall and the roof of the valve house. Visible portions of the operating equipment indicate that the operating equipment is seriously corroded and leaking.

d. <u>Reservoir Area</u>. A map review and visual observations indicate that the watershed is predominantly covered by woodlands. No signs of landslide activity were observed. A review of the regional geology is included in Appendix F.

e. <u>Downstream Channel</u>. Below the dam, Sample Run flows along the toe of a coal mine refuse pile, then flows under Route 286 about 1/2 mile downstream from the dam and joins Two Lick Creek approximately one mile downstream. Further description of the downstream conditions is included in Section 1.2d.

3.2 <u>Evaluation</u>. The overall condition of the dam is considered to be poor. The embankment, spillway structures, and outlet facilities are in need of repair and restoration or orderly abandonment.

SECTION 4 OPERATIONAL FEATURES

4.1 <u>Procedure</u>. There are no formal operating procedures for the dam. As it presently exists, the reservoir is maintained at the invert elevation of the high-level intake pipe, which is functioning as the primary spillway.

4.2 <u>Maintenance of the Dam</u>. The dam has reportedly been abandoned and maintenance is nonexistent.

4.3 <u>Maintenance of Operating Facilities</u>. Most of the operating equipment is buried under the rubble of the collapsed valve house. Maintenance of the operating facilities is nonexistent.

4.4 <u>Warning System</u>. No formal warning system exists for the dam. Telephone communication facilities are available in the vicinity of the dam site.

4.5 <u>Evaluation</u>. The dam is in poor maintenance condition. It has reportedly been abandoned and no longer is maintained.

SECTION 5 HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Sample Run Dam has a watershed of 0.3 square mile and impounds a reservoir with a surface area of 4.6 acres at normal pool level. The floed discharge facilities for the dam consist of an 18-foot-wide ogee-crested overflow section. The capacity of the spillway, based on the available 2.1 feet of freeboard relative to the low spot on the crest of the dam, was determined to be 192 cfs.

b. Experience Data. As previously stated, Sample Run Dam is classified as a small dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass half to full PMF. Based on small storage capacity, the one-half PMF is chosen as (SDF). The PMF inflow hydrograph for the reservoir was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer analysis are presented in Appendix D. The one-half PMF and full PMF inflow hydrographs were found to have peak flows of 442 cfs and 884 cfs, respectively. Computer input and a summary of computer output are also included in Appendix D.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate that the capacity of the spillway would be significantly reduced in the event of a flood.

d. <u>Overtopping Potential</u>. Various percentages of PMF inflow hydrograph were routed through the reservoir, and it was found that the spillway can pass 20 percent of the PMF without overtopping the embankment. It was found that during the passage of 50 percent of the PMF, the dam would be overtopped for a duration of 4.3 hours with a maximum depth of 0.5 foot over the low spot on the crest of the dam. For full PMF, it was found that the overtopping depth would be 0.9 foot and the duration 7.7 hours. A further analysis, assuming the low sections on the crest of the dam to be filled to the design elevation, indicates that the spillway would pass 50 percent of the PMF without significantly overtopping the embankment.

e. <u>Spillway Adequacy</u>. The spillway was found to pass 20 percent of the PMF without overtopping the low spot on the crest of the dam. Overtopping of the low spot on the crest of the dam for a duration of 4.3 hours with a maximum depth of 0.5 foot during the passage of 50 percent of the PMF is not considered to create a significant breach potential. Therefore, the spillway capacity is classified to be inadequate, but not seriously inadequate.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) <u>Embankment</u>. As discussed in Section 3, although numerous deficiencies were noted, none were considered to be serious relative to the overall stability of the dam at this time.

(2) <u>Appurtemant Structures</u>. Serious concrete deterioration was found in various locations of the spillway structures. However, none appeared to be a threat to the overall stability of the spillway structures. The outlet facilities are buried under the rubble of the collapsed valve house. Visible portions indicate that the outlet facilities are seriously corroded and leaking.

b. Design and Construction Data

(1) <u>Embankment</u>. The available information does not include any quantitative data to aid in the assessment of the structural stability of the dam. However, as previously noted, the dam appears to have been constructed with adequate care and structurally has performed satisfactorily since its construction. Therefore, based on visual observations, the static stability of the dam is considered to be adequate.

(2) <u>Appurtement Structures</u>. Available information does not include adequate data to assess the structural adequacy of the appurtement structures. The available data consist of design drawings only.

c. <u>Operating Records</u>. The structural stability of the dam is not considered to be affected by the operational features of the dam.

d. <u>Post-Construction Changes</u>. The dam was constructed in 1916 and was later enlarged in 1930. A description of this enlargement is included in Section 2.2.

e. <u>Seismic Stability</u>. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam appears to be adequate. Therefore, based on recommended criteria for the evaluation of seismic stability of dams, the structure is presumed to present no hazards from earthquakes.

SECTION 7 ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. <u>Assessment</u>. The visual observations indicate that Sample Run Dam is in poor condition. The dam has been abandoned and is not being maintained. The dam crest is irregular and up to about one foot below the design elevation. A portion of the downstream slope appears to be creeping. A portion of the reinforced concrete wall on the upstream side of the dam providing erosion protection has collapsed. The valve house also collapsed, burying the operating facilities under rubble. Sections of the concrete in the spillway structures are seriously deteriorated.

In view of the above conditions, it is recommended that the overall condition of the dam should be evaluated by a professional engineer to repair and restore the embankment, spillway structures, and outlet facilities or develop a procedure for orderly abandonment.

The spillway capacity was found to be less than the recommended spillway capacity range of 50 percent to full PMF; therefore, the spillway is classified as inadequate. However, it was not rated to be seriously inadequate.

b. <u>Adequacy of Information</u>. Available information, in conjunction with visual observations, is considered to be sufficient to make the following recommendations.

c. <u>Urgency</u>. The following recommendations should be implemented immediately or on a continuing basis.

d. <u>Necessity for Additional Data</u>. In view of the conditions described above, the owner should retain the services of a professional engineer to prepare and implement plans for the repair and restoration of the dam and to conduct additional hydrological and hydraulic analyses to provide adequate spillway capacity or develop a procedure for orderly abandonment.

7.2 <u>Recommendations/Remedial Measures</u>. It is recommended that the following recommendations be implemented immediately or on a continuing basis:

1. The owner should immediately retain a professional engineer to prepare and execute plans for the repair and restoration of the embankment, spillway structures, and outlet facilities or develop a procedure for orderly abandonment of the dam. Repair and restoration should include, but not be limited to, the following work:

SALARD STUDIES AND ADDRESS OF

- a. Restore the regulating facilities in the valve house to a working order and develop a means for upstream control on all the pipes through the embankment.
- b. Conduct additional studies to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity. Filling of the low areas on the crest of the dam should be considered in conjunction with this study.
- c. Repair the concrete wall on the upstream side of the dam.
- d. Repair deteriorating concrete in the spillway structures.
- e. Clear brush and trees on the embankment.
- Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.
- 3. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.

APPENDIX A

CHECKLIST VISUAL INSPECTION PHASE I

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APPENDIX A

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CHECKLIST VISUAL INSPECTION PHASE I

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DF DAM Sample Run Dam COUNTY Indiana DF DAM Earth HAZ DF DAM Earth HAZ DF DAM Earth HAZ D INSPECTION NOvember 30, 1979 WEATHER Cloudy D INSPECTION NOvember 30, 1979 WEATHER Cloudy D INSPECTION NOvember 30, 1979 WEATHER Cloudy TION PERSONNEL: REVIEW INSPECTION 1344.7 M.S.L. TION PERSONNEL: REVIEW INSPECTION PRS TION PERSONNEL: REVIEW INSPECTION PRS

Page Al of 9

Page A2 of 9

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VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANCHENT AND ABUTHENT SLOPES	A portion of the downstream slope behind the valve house appears to be creeping.	This condition should be periodically observed to determine if the condition is worsening.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	See Plate 7 for dam crest profile.	
RIPRAP FAILURES	A reinforced concrete wall along the upstream aide provides shoreline protection. A portion of the wall has collapsed.	This wall should be repaired.

VISUAL INSPECTION PHASE I EMBANKMENT

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	EMBANKMENT	
VISUAL EXAMINATION OF	ORSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANOMENT AND ABUTHENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	A swampy area is located below the valve house. However, the swampy area appears to be caused by leakage from the outlet pipes.	
STAFF CACE AND RECORDER	None	
DRATHS	None	

Page A3 of 9

VISUAL INSPECTION PHASE I OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SHIRFACES IN OUTLET CONDUIT	No portions of the outlet pipes are visible.	
INTAKE STRUCTURE	Submerged	
M'TLET STRUCTURE	The outlet pipe discharges into an earth channel. The pipe is partially blocked with debris.	The debris should be cleared.
MITLET CHANNEL	An earth channel partially blocked by debris.	
EMERGENCY GATE	The valve house has collapsed, burying the operating equipment under rubble. None of the operating facilities appear to be functional.	Necessary repairs should be made to restore the outlet facilities to a functional condition.

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VISUAL INSPECTION PHASE I UNGATED SPILLMAY

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VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Eighteen-foot-wide concrete ogee overflow section. In fair condition.	
APPROACH CHANNEL	Submerged. Appears to be free of debris.	
DISCHARGE CHANNEL	An 18-foot-long rectangular concrete channel discharging into an earth channel. Concrete in portions of the discharge channel is seriously deteriorated.	Deteriorating concrete in the spiilway structures should be repaired.
BRIDGE AND PIERS	Rone	

Page A5 of 9

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VISUAL INSPECTION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	Not applicable	
APROACH CHANNEL	Not applicable	
DISCHARGE CHANNEL	Not applicable	
BRIDGE PIERS	Not applicable	
GATES AND OPERATION EQUIPMENT	Not applicable	

Page A6 of 9

REMARKS OR RECOMMENDATIONS					
OBSERVATION	None	None	None	None	None
VISUAL EXAMINAT: ON OF	HONUMENTAT ION/SURVEYS	OBSERVATION WELLS	WEIRS	PIEZOMETERS	THER

VISUAL INSPECTION PHASF I INSTRUMENTATION

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Page A7 of 9

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REMARKS OR RECOMMENDATIONS					
ORGERVATIONS	Muderately steep to steep. No significant shoreline	The reservoir appears to be significantly silted.	None		
VISUAL EXAMINATION OF	SLOPES	SEDIMENTATION	UPSTREAM RESERVOIRS		

Page AR of 9

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VISUAL INSPECTION PHASE I RESERVOIR

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REMARKS OR RECONSENDATIONS One industrial warehouse and a residence are likely to be in the potential flood plain. Population: approximately 10. There are no obstructions downstream from the dam that would affect the discharge capacity of the spiilway. No features pertinent to the safety of the dam. VISUAL INSPECTION PHASE I DOWNSTREAM CHANNEL ORSERVATIONS VISUAL EXAMINATION OF APPROXIMATE IN THER OF HOMES AND POPULATION CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) SLOPES

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Page A9 of 9

APPENDIX B

CHECKLIST ENGINEERING DATA DESIGN, CONSTRUCTION, OPERATION AND HYDROLOGIC AND HYDRAULIC PHASE I

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APPENDIX B

CHECKLIST ENGINEERING DATA DESIGN, CONSTRUCTION, OPERATION PHASE I

NAME OF DAM Sample Run Dam 1D# NDI I.D. PA-264

DER I.D. 32-14 The dam was designed and constructed by the Clearfield Bituminous Coel Company in 1916. The dam was enlarged in 1930. The drawings are available in the state files. REMARKS See Plates 3, 4, and 5. See Plates 3 and 5. See Plate 1. OUTLETS - PLAN - DETAILS - CONSTRATNTS - DISCHARGE RATINGS TYPICAL SECTIONS OF DAM RECTONAL VICINITY MAP CONSTRUCTION HISTORY AS-BUILT DRAWINGS 11EM

Page Bl of 5

CHECKLIST ENCINEERING DATA Design, construction, operation Phase I

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1154	RPARKS
RAINFALL/RESERVOIR RECORDS	Not maintained
DESIGN REPORTS	None available
GEOLOCY REPORTS	None available (see Plate 2 for subsurface profile).
DESIGN COMPUTATIONS HYDROLOCY & HYDRAULICS Dam Stability Seepage Studies	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	See Plate 2 for the typical subsurface profile.

Page B2 of 5

CHECKLIST FNCINFERING DATA DESIGN, CONSTRUCTION, OPERATION PHASE I

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ITEN	RIJARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	The dam was enlarged in 1930.
HIGH POOL RECORDS	Not recorded

Page B3 of 5

CHECKLIST ENCINEERING DATA DESIGN, CONSTRUCTION, OPERATION PHASE I

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POST CONSTRUCTION ENCINEERING	REMARKS
STUDIES AND REPORTS	
PRIOR ACCIDENTS OR FAILURE OF DAM Description Reports	None reported
MAINTENANCE OPERATION RECORDS	Not maintd
SPILLWAY PLAN Sections Details	See Plates 4 and 5.
OPERATING EQUIPMENT Plans and details	See Plate 3.

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Page B4 of 5

CHECKLIST ENGINEERING DATA HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 0.3 square miles ELEVATION, TOP OF NORMAL POOL AND STORAGE CAPACITY: 1347⁽¹⁾(25 acre-feet) ELEVATION, TOP OF FLOOD CONTROL POOL AND STORAGE CAPACITY: 1349.1 (37 acre-feet) ELEVATION, MAXIMUM DESIGN POOL: 1350 (design crest elevation) ELEVATION, TOP OF DAM: 1349.1 (measured low spot) SPILLWAY:

a. Elevation 1347

b. Type <u>Concrete ogee overflow section</u>

c. Width 18 feet

d. Length Not applicable

e. Location Spillover Adjacent to spillway

f. Number and Type of Gates None

OUTLET WORKS:

.

a. Type Two 24-inch cast-iron pipes

b. Location Center of embankment

c. Entrance Inverts Unknown

d. Exit Inverts Unknown

e. Emergency Drawdown Facilities <u>None functional at this time</u> HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

MAXIMUM NONDAMAGING DISCHARGE: 192 cfs (existing spillway capacity)

(1) Overflow spillway crest level.

Page B5 of 5

APPENDIX C PHOTOGRAPHS

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LIST OF PHOTOGRAPHS SAMPLE RUN DAM NDI I.D. PA-284 NOVEMBER 30, 1979

PHOTOGRAPH NO.

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DESCRIPTION

1	Crest (looking east).
2	Overflow spillway and dam crest (looking west).
3	Overflow spillway (looking upstream)
4	Primary spillway intake.
5	Valve house (collapsed).
6	Flood plain (view from dam crest).



Photograph No. 1 Crest (looking east).



Photograph No. 2 Overflow spillway and dam crest (looking west).



Photospiphile, 3 (Mentoe colitic foreign apstream).



Photocraph So. 3 Primary piller entake.



Photograph No. 5 Valve house (collapsed).



Photograph No. 6 Flood plain trees from law press).

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

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HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: Sample Run Dam (NDI I.D. PA-284)

ALC: NO.

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PROBABLE MAXIMUM PRECIPITATION (PMP) = _______ INCHES/24 HOURS⁽¹⁾

STATION	1	2	3	4	5
Station Description	Reservoir	Dam			
Drainage Area (square miles)	0.33	-			
Cumulative Drainage Area (square miles)	0.33	0.33			
Adjustment of PMF for Drainage Area (%)	Zone 7				
6 Hours	102	-			
12 Hours	120	-			
24 Hours	130	-			
48 Hours	140	-			
72 Hours	-	-			
Snyder Hydrograph Parameters					
Zone ⁽³⁾	24	-			
$c_p/c_t^{(4)}$	0.45/1.6	-			
L (miles) ⁽⁵⁾	0.8	-			
L (miles) ⁽⁵⁾	0.4	-			
$t_p = C_t (L^{+}L_{ca})^{0.3} \text{ (hours)}$	1.14	-			
Spillway Data					
Crest Length (ft)	-	18.0			
Freeboard (ft)	-	2.1			
Discharge Coefficient	-	3.5			
Exponent	-	1.5			

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) <u>Hydrometeorological Report 33</u> (Figure 17, 0.5. nim7, outpoor Engineers, 1956.
(3) Hydrometeorological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
(4) Snyder's Coefficients.

 $\binom{(5)}{L}$ = Length of longest water course from outlet to basin divide. L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE	VS.	ELEVATION	
---------	-----	-----------	--

ELEVATION	AH, FEET	AREA (ACRES) ⁽¹⁾	AVOLUME (ACRE-FEET) (2)	STORAGE (ACRE-FEET)
1360	13.0	7.3	76.7	101.3
1347.0		4.6		24.6
Reservoir Bottom		-	24.6***	0

(1) Planimetered from USGS maps.

(2) $\Delta Volume = \Delta H/3 (A_1 + A_2 + \sqrt{A_1A_2}).$ (3) From PennDER files.

⁽⁴⁾From field survey, 11-30-79.

PAGE D1 of 6

9 PAGE D2 of

COMPUTER INPUT OVERTOPPING ANALYSIS

SNYDLP UMIT MYDROGRAPH_FLOOD ROUTING AND DAM OVERTOPPING AMALYSES Sample Run Dam_indiama county. Ndi-1.d.pa.284 project N0.79-543-17 For 2u%.3u%.4u%.5c%.6c%.70%.bc%.9t%, and 10u% pmf 0 0 10 c c c c c 0 0 0 0.0216 1.60 1 RUN DAM 0.90 <u>.</u>05 ROUTING FLOW THROUGH SAMPLE RUN DAM (NDI-I.D.PA.284) 0F SNYDER INFLOW HYDROGRAPH TG SAPPLE 0.33 102 120 130 14L 0.80 1.0 325.0 1349.8 -1347.0 0.10 288.C 1349.7 0.60 275.0 + 325.U 2250.D 1349.5 0.50 • 101.3 1360.0 3.50 1.5 200.0 0.40 2.0 CALCULATION 24.0 1347.0 18.00 5.08 160.0 1349.2 0.30 o 0.45 -L.05 23.7 FLOOD HYDNOGRAFH FACKAGE (MEC-1) Dam Safety Versicn July 1978 Last Mudification 17 Jan 8C se1326.0 ss1347.0 s01349.1 su 50.0 sv1349.1 sv1349.1 K 99 C.20 1.14 300 **~** ~ 0°0 C --× a a 2 3 Ę 24 5. -

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ROUTING	AGE D3
FLOOD	P.

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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 kilopeters)

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0PEA 110N	NOLTATZ	AREA	PLAN	84116 1 .20	RATIO 2 .30	RATIOS AP1 Ratic 3 .40	LIED TO F Ratio 4 .50	LOUS Ratio 5 	RA110 6	RATIC 7 . RD	RATIC 8 .°C	RATIC 5 1.00
NYBROGRAPH	AT 1	.33	- ۲	177. 5.0136	265. 7.51) (354. 10.C1) (442. 12.51)(530. 15.C2)(619. 17.52)(707. 20.02)(795. 22.52)(25.(3)
ROUTED TO	~	. 33 . 85)	- `	159. 4.51)(256.	351. 9.95) (441. 12.48)(529.	618. 17.50) (796. 20.003 (795.	883. 25.01)

PAGE D4 of 6

OVERTOPPING ANALYSIS SUMMARY

	ELEVATION Storage Outflow	INITIAL 1347	VALUE .00 25. 0.	SPILLAY CR 1347.00 25. 0.	EST 10P	0f DAM 349.1J 37. 192.	
RATIO 0f Prif	MAXIMUM RESERVOIR U.S.ELEV	MAKIMUM DEPTH Over dam	MAX1MUP Storage Ac-ft	FAX JMUH OUT FL OH C FS	DUMATION Over top Hours	TIME OF Max Outflow Hours	TIME OF FAILURE HOURS
.20	1348.86	96 . 0	36.	159.	0,00	41.33	0,06
.30	1349.32	.22	38.	256.	2.33	41.00	0.06
0 • •	1349.48	.38	39.	351.	3.33	40.63	0.00
.50	1349.60	.50	40.	441.	4.33	40.83	0.60
.60	1349.69	• 5 9	40.	529.	5.33	40.83	0.66
.70	1349.78	.68	£1.	618.	6. PG	40.63	
58.	1349.85	.75	41.	706.	6.67	40.83	
. 90	1349.92	.82	42.	795.	7.17	40.63	(,)C
1.03	1349.99	.89	42.	b 63.	7.67	40.83	C.UL

CUMMANT OF DAM SAFETY ANALYSTS

PLAN 1

NATION PARTY & MAR REPORT

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(USING DESIGN CREST ELEVATION) COMPUTER INPUT FLOOD ROUTING

SWYDER UMIT MYDROGRAPM,FLOOD ROUTING AND DAM QVERTOPFING AMALYSES Sample Run dam,indiana county. Ydi-L.D.Pa.264 project ND.79-543-47 For 201,301,401,501,601,701,851,901, And 1001 pri #####_10.41 1350.00 For 201,301,401,501,601,701,851,901, And 1001 pri #####_10.41 1350.00 For 201,301,401,501,601,701,851,901, And 1001 Pri #####_10.41 1350.00 0.0216 ROUTING FLOW TWROUGH SAMPLE RUN DAM (NDI-1.D.PA.284) (4444 TO RE 7990-07 1.00 OF SNYDER INFLOU MYDROGRAPH TO SAPPLE RUN DAN 0.33 0.33 0.33 102 120 130 140 06.0 .03 0.80 1.0 -1347.0 0.70 0.60 -0.50 325.0 . 1.5 * 0+0 101.3 1360.0 3.50 1.5 2.0 • CALCULATION 4.6 1347.0 18.00 3.08 0.05 0.30 23.7 • se1326.0 ss1347.0 se1350.0 se1350.0 sv9350.0 sv9350.0 sv9350.0 sv9350.0 300 0.20 1.14 0.0 0 Z 5 a 6 5 2 E ŝ 2 ן æ 803507455454560788488 566745545456078848 **1 2**

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SUMMARY OF DAM SAFETY ANALYSIS

0P 0f DAM 1350.00 27. 327.	N TIME OF TIME OF P Max Outflow Fallure Hours Hours	41.67 0.00	41.50 0.00	41.50 0.00	41.00 0.00	40.83 0.00	40.83 0.00	40.03 0.00	
T T	DURATIO Over To: Mours	0.00	0.00	0.00	2.00	2.83	3.50	4.00	
SPILLWAY CR 1347.00 5. 0.	PAX IMUN OUT FLOW C FS	154.	236.	318.	433.	528.	617.	706.	
VALUE .00 .5 0.	MAXIMUN Storage AC-f1	18.	23.	26.	28.	29.	30.	30.	
1347 1347	MAX IMUM DEPTH Over Dam	0.00	0.00	0.00	.18	. 29	.37	.45	
ELE VA 7 10N 5 TORAGE 0 UT FL OW	MAKIMUM RESERVOIR M.S.ELEV	1348,82	1349.41	1349.94	1350.18	1350.29	1350.37	1350.45	
	RA110 0f Paf	.20	.30	04.	- 50	. 60	.70	. 81	
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PAGE D6 of 6

OVERTOPPING ANALYSIS SUMMARY (USING DESIGN CREST ELEVATION)

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APPENDIX E PLATES

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PLATE 2



FOR POWER PLANT CLYMER, PA. CLEARFIELD BITUMINOUS COAL CORF'N SCALES AS SHOWN APRIL 1916

LOCATION PLAN AND LONGITUDINAL SECTION OF RESERVOIR FOR POWER PLANT



















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APPENDIX F REGIONAL GEOLOGY

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APPENDIX F

REGIONAL GEOLOGY

Sample Run Dam is located in the Pittsburgh Plateau section of the Appalachian Plateau Physiographic Province. The area is characterized by rolling topography. The geologic structure consists of gentle folds trending northeast and the site is approximately two miles west of the Chestnut Ridge anticline and two miles east of the Latrobe syncline. The strata dip approximately 200 feet per mile to the northwest. In general, the structural discontinuities trend northwest and northeast.

The reservoir is underlain by strata of the lower part of the Conemaugh Group and the Allegheny Group. The Conemaugh Group in this area consists almost entirely of the Mahoning Sandstone, a thick-bedded sandstone. The strata above the Mahoning Sandstone are predominantly shale and claystone. The Allegheny Group consists of thick sandstone beds, shale beds, and several coal seams and limestone beds. The top of the group, defined by the Upper Freeport coal seam, is approximately 40 feet below the reservoir of the dam.

The Upper Freeport coal seam has been strip mined south of the reservoir. Both the Upper Freeport and Lower Kittanning coal seams are minable in this area. (However, the coal beneath the dam and reservoir does not appear to have been mined.)

It is doubtful that large slides could occur in this area due to the relatively gentle slopes and the presence of thick sandstone beds near the reservoir.

The limestone seams present are thin and discontinuous and do not appear to be subject to solutioning.





DRAWN ACS CHECKED BY BE 1/4/50 DRAWING 79-54

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