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NATIONAL DAM SAFETY PROGRAM. COLES RUN DAM (VA 01519). POTOMAC --ETC(U)
SEP 78 M BAKER DACW65-78-D-0016

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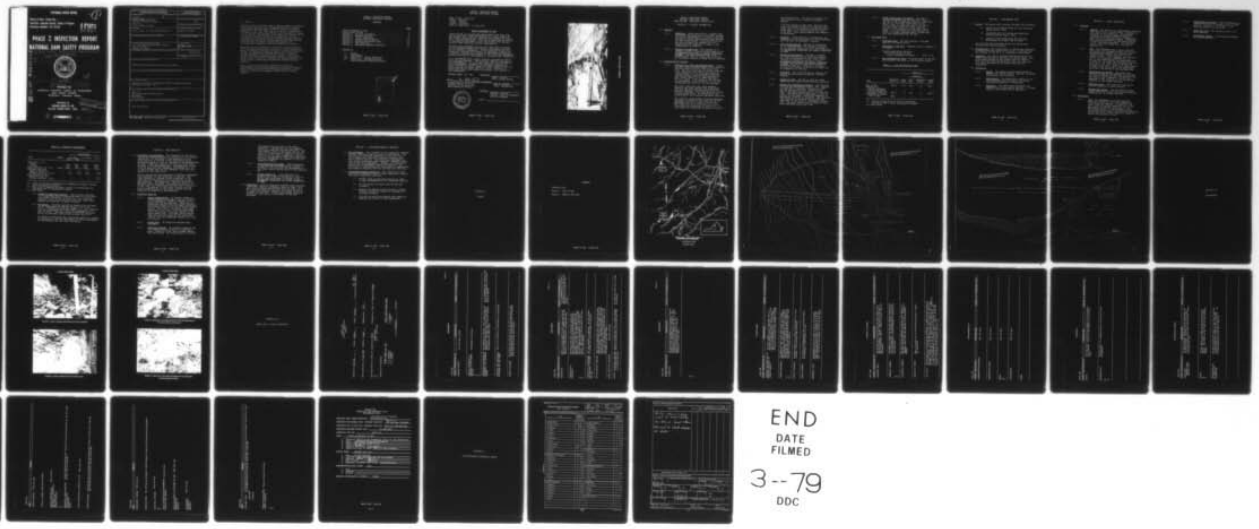

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POTOMAC RIVER BASIN

Name of Dam: Coles Run Dam
Location: Augusta County, State of Virginia
Inventory Number: VA 01519

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Coles Run Dam (VA 01519). Potomac River Basin. Augusta County, State of Virginia. Phase I Inspection Report.

Final rept.,

U.S. ARMY CORPS OF ENGINEERS · NORFOLK DISTRICT

Michael Baker, III

DACW65-78-D-0016

PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

PREPARED BY

MICHAEL BAKER, JR., INC.
BEAVER, PENNSYLVANIA 15009

49 p.

SEPTEMBER 1978

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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4. TITLE *(and Subtitle)* Phase I Inspection Report National Dam Safety Program Coles Run Augusta County, Virginia		5. TYPE OF REPORT & PERIOD COVERED Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael Baker, Jr., Inc.-Michael Baker III		8. CONTRACT OR GRANT NUMBER(s) DACW 65-78-D-0016
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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Dams - VA
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Dam Safety
Dam Inspection

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SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the 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 conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface 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.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam and appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Coles Run
State: Virginia
County: Augusta
Stream: Coles Run
Date of Inspection: 13 July 1978

BRIEF ASSESSMENT OF DAM

Coles Run Dam is an earth dam approximately 440 feet long and 65 feet high, owned and operated as a water supply by the Augusta County Service Authority and designed by John S. Hale, Consulting Engineer. The visual inspection and review of engineering data made in July and August 1978 indicate several items requiring further investigation.

The principal-emergency spillway will pass only 83 percent of the Probable Maximum Flood without overtopping the dam and is therefore inadequate. Visual observation during the inspection indicated no evidence of embankment instability or piping, although heavy growth on the downstream embankment greatly affected the thoroughness of the surficial inspection.

It is recommended that further study be initiated to determine spillway adequacy. The following remedial measures are also recommended: cut and remove the brush from the downstream embankment, reinspect the embankment immediately after clearing the brush, check the clear seepage at the toe during periods of higher reservoir levels, initiate an annual maintenance and inspection program, with records of the inspections.

MICHAEL BAKER, JR., INC.

Michael Baker, III, P.E.
Chairman of the Board and
Chief Executive Officer

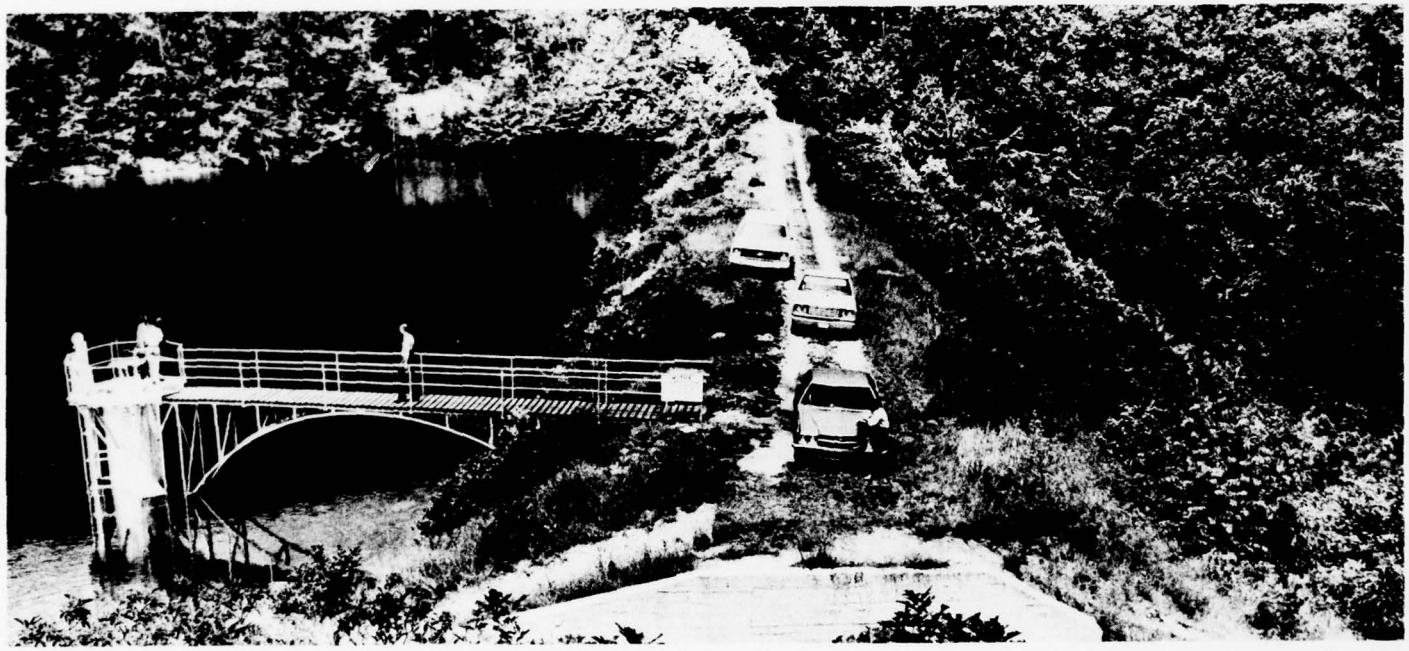
COMMONWEALTH OF VIRGINIA
MICHAEL
BAKER III
NO. 3176
CERTIFIED PROFESSIONAL ENGINEER

SUBMITTED: _____
James A. Walsh
Chief, Design Branch

RECOMMENDED: _____
Zane M. Goodwin
Chief, Engineering

APPROVED: _____
Douglas L. Haller
Colonel, Corps of Engineers
District Engineer

Date: _____



OVERALL VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: COLES RUN, ID# VA 01519

SECTION 1 - PROJECT INFORMATION

1.1 General

1.1.1 Authority: Public Law 92-367, 8 August 1972 authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams. The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: Coles Run Dam, used for water supply, is an earthfill structure about 440 feet long and 65 feet high. The top of the dam is 18 feet wide and is at elevation 1933.5 feet based upon an assumed datum (P.D.-plan datum) consistent with the design plans and approximately 45 feet higher than U.S.G.S. Mean Sea Level (M.S.L.) datum. Side slopes of the dam are two horizontal to one vertical (2:1) on the downstream side and 2.5:1 on the upstream.

The inlet tower near the right abutment controls the water supply with slide gates and also controls the lake drain which is manually operated. The tower does not control or pass storm flows. All storm flows are controlled by the principal-emergency spillway.

The concrete, side-channel principal-emergency spillway is located at the right end of the embankment and has a width of 38.75 feet. The inlet weir is at elevation 1919.5 P.D. The normal pool elevation of 1924.5 P.D. is controlled by flashboards installed on top of

the entrance weir. The spillway extends 146 feet and exits into a heavily riprapped channel.

A 72 inch asphalt coated steel pipe with the invert at elevation 1885.6 P.D. passes from a trash rack in the reservoir through the inlet tower where it is constricted by a 30 inch slide gate. This piping permits the reservoir to be drained.

1.2.2 Location: Coles Run Dam is located near the headwater of Coles Run about 2.3 miles upstream from the Town of Rivermont, Virginia.

1.2.3 Size Classification: The dam is classified as an "intermediate" size structure because of its maximum height of 65 feet according to the Recommended Guidelines for Safety Inspection of Dams.

1.2.4 Hazard Classification: The dam is located 2.3 miles upstream of the Town of Rivermont. This dam is considered in the "high" hazard category as defined by Section 2.1.2 of Recommended Guidelines for Safety Inspection of Dams. The hazard classification used to categorize dams is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: The Coles Run Dam is owned by the Augusta County Service Authority, Staunton, Virginia.

1.2.6 Purpose of Dam: The dam is used for water supply by the Augusta County Service Authority.

1.2.7 Design and Construction History: The existing facility was designed by John S. Hale, Consulting Engineer of Staunton, Virginia in 1949. The dam and spillway were constructed by Echol's Brothers Construction Co. in 1950 and 1951. The spillway was redesigned in 1965 by Johnson and Williams, Consulting Engineers of Washington, District of Columbia. The construction involved in widening the spillway was completed in 1969 by E. G. Alexander Construction. No other construction is known to have been undertaken since that time.

1.2.8 Normal Operational Procedures: The dam is normally operated with the reservoir level at the top of the flashboards elevation 1924.5 P.D. The two (2) five feet slide gates on the intake tower at elevations 1917.5 and 1903.5 P.D. are used to draw off water near the surface of the reservoir as the water level drops. A 10 inch cast-iron pipe carries the water to a water treatment plant located one-half mile downstream from the dam.

1.3 Pertinent Data

1.3.1 Drainage Areas: The dam controls a drainage area of 2.61 square miles.

1.3.2 Discharge at Dam Site: Maximum flood at damsite is not known.

Principal-Emergency Spillway:
Pool level at top of dam
(after flashboard collapse) . . . 6272 c.f.s.

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet P.D.	Reservoir Area acres	Reservoir Capacity Acre-feet	Reservoir Capacity Watershed inches	Length feet
Top of dam	1933.5	9.3	256	1.8	1320
Maximum pool, design surcharge	-	-	-	-	-
Principal-Emergency spillway crest (a)	1924.5	7.3	181	1.3	1214.4
Streambed at center-line of dam	1865	-	-	-	-

(a) Controls normal pool at top of flashboards (elevation 1919.5 after flashboard collapse).
P.D.-Plan Datum

SECTION 2 - ENGINEERING DATA

2.1 Design: The design data reviewed included the following:

1) Copies of the Design Plans for the Coles Run Dam by John S. Hale.

2) Specifications for the Dam and Waterline Construction by John S. Hale.

3) Copies of the Design Plans for Spillway Enlargement by Johnson and Williams.

All existing data have been filed with the Norfolk District for future reference.

2.2 Construction: The construction of the dam was completed by Echols Brothers Construction in 1951. The spillway was widened in 1969 by E. G. Alexander Construction.

2.3 Operation: The dam is operated and maintained by the Augusta County Service Authority for water supply. Two slide gates mounted on the intake tower are used to draw off water from the reservoir into a 10 inch line to a water treatment plant located one-half mile downstream.

2.4 Evaluation

2.4.1 Design: The design drawings were generally adequate for design review. However, no design calculations were available.

2.4.2 Construction: No construction reports or as-built drawings were available to evaluate construction methods or alterations.

2.4.3 Operation: The operational procedures are adequate for a water supply facility. A formal record of gate operation is desirable.

SECTION 3 - VISUAL INSPECTION

3.1 Findings

3.1.1 General: The dam and its appurtenant structures were found to be in good overall condition at the time of the inspection. The problems noted do not require immediate remedial treatment, but they should be corrected as a part of the maintenance program. Noteworthy deficiencies observed are described briefly in the following paragraphs. The complete visual inspection check list is given in Appendix III.

3.1.2 Dam: The embankment was in good condition with minor clear seepage noted at two places. Non-measurable seepage was observed from sandstone and rockfill near the 72 inch conduit outlet. Clear seepage (red in color due to iron staining) amounting to 0.25 g.p.m. was observed near the downstream toe. In addition, an eight inch drainpipe from the rock toe on the right side of the dam was flowing at 10 g.p.m. There is a heavy growth of small trees and brush on the downstream face and a few bushes on the upstream face.

3.1.3 Appurtenant Structures: Some water was leaking through the flashboards at the areas of contact between the spillway concrete and the wood of the flashboard. Cracks have appeared at the jointure of the old and new concrete of the widened spillway.

3.1.4 Reservoir Area: The reservoir area had no serious shoreline or gully erosion.

3.1.5 Downstream Channel: The downstream channel slopes were shallow and the water was flowing, unobstructed, on cobbles and rock.

3.2 Evaluation

3.2.1 Dam: The embankment is in good physical condition except for the heavy vegetation, which should be removed. In addition, the small trees and brush beyond the toe of the dam should be removed, especially in the downstream channel of the emergency outlet. The seepage areas should be monitored especially during periods of higher reservoir levels to detect any increase in flow.

3.2.2 Appurtenant Structures: The flashboards are leaking water but they appear to be in good physical condition. The cracks in the spillway bottom slab are minor.

3.2.3 Reservoir Area: The reservoir area is in good condition.

3.2.4 Downstream Channel: The downstream channel is in good condition.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures: Operational procedures are generally discussed in paragraphs 1.2.8 and 2.3. The normal reservoir elevation is controlled by overflow of the flashboards mounted in the primary-emergency spillway.

Rapid drawdown is controlled by a 30 inch slide gate which is located in the water intake tower. A platform is provided on the top of the dam to operate all gates.

4.2 Maintenance of Dam: The Augusta County Service Authority is responsible for the maintenance of the dam since they are using the stored water for part of their water supply. An inspection (1977) was made by the U.S. Forest Service and is included in Appendix V.

4.3 Maintenance of Operating Facilities: Maintenance personnel from the Augusta County Service Authority operate the slide gates at regular intervals, especially during low runoff periods when the reservoir level drops.

4.4 Warning System: At the present time there is no warning system or evacuation plan in operation. It is recommended that a formal emergency procedure be prepared and prominently displayed and furnished to all operating personnel. This should include:

1) How to operate the dam during an emergency.

2) Who to notify, including public officials, in case evacuation from the downstream area is necessary.

3) Procedures for evaluating inflow during periods of emergency operation.

4.5 Evaluation: The maintenance of the operating facilities appears to be sufficient; however, formal records should be kept of the operation of the emergency outlet.

SECTION 5 - HYDRAULIC/HYDROLOGY DATA

5.1 Design: The Coles Run Dam was designed by John S. Hale, Consulting Engineer, Staunton, Virginia for the Augusta County Service Authority in 1949. The spillway was redesigned by Johnson and Williams, Consulting Engineers of Washington, District of Columbia in 1965. The owner has made available design plans for each structure as well as specifications for the original dam. Hydraulic and hydrologic information was not available for review. The results contained herein are therefore based upon limited information received and collected by Michael Baker, Jr., Inc.

5.2 Hydrologic Records: No records were available at the dam site.

5.3 Flood Experience: The owner indicated that since the spillway reconstruction, the flashboards have not failed during several major storms most notably Tropical Storm "Camille" in 1969 and Tropical Storm "Agnes" in 1972.

5.4 Flood Potential: The performance of the reservoir was analyzed by routing the Probable Maximum Flood (P.M.F.) through the reservoir as required for a dam classified by the Recommended Guidelines for Safety Inspection of Dams as an "intermediate" size-"high" hazard dam.

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1, paragraph 1.3.3. Except for withdrawal for water supply, regulation of flow from the reservoir is automatic. Normal and flood flows are controlled by the principal-emergency spillway at elevation 1924.5 P.D. before flashboard collapse and elevation 1919.5 P.D. after collapse.

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance for P.M.F., one-half P.M.F. and 100 year flood hydrographs are shown in the following table:

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal	Hydrographs			
		100 year (a)	100 year (b)	1/2 P.M.F.	P.M.F.
Peak flow, c.f.s.					
Inflow	-	505	930	3764	7529
Outflow	-	2100	900	3710	7520
Peak elevation, ft. P.D.	1924.5	1926.3	1923.5	1929.5	1934.3
Principal spillway					
Depth of flow, ft.	-	1.3	4.5	6.6	9.8
Average velocity, f.p.s.	-	6.3	12.0	14.6	17.8
Non-overflow section					
Depth of flow, ft.	-	-	-	-	0.5
Average velocity, f.p.s.	-	-	-	-	0.9

(a) Inflow on 100 year hydrograph at flashboard collapse, outflow after flashboard collapse.
(b) Data after flashboard collapse, outflow is second peak not including flow at flashboard collapse.
P.D.-Plan Datum

5.7 Reservoir Emptying Potential: The 30 inch slide gate on the upstream side of the outlet works at a low level will permit withdrawal of about 200 c.f.s. with the reservoir level at the spillway crest and essentially dewater the reservoir in about 16 hours.

5.8 Evaluation: Spillway capacity is based on the collapse of the flashboards during the one-half P.M.F. and P.M.F. Calculations by Michael Baker, Jr., Inc. indicate that the flashboards will fail when overtopped by 1.8 feet of water. The owner should investigate the possibility of enlarging the spillway to pass the P.M.F.

It should be indicated that conclusions pertain to present day conditions, and that the effect of future development on the hydrology has not been considered.

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: The foundation of the dam in the valley lowland consists of granular soil of variable composition, as indicated in the schematic profile along the axis of the dam in the construction plans. The maximum depth of soil is indicated to be approximately 15 feet. Some minor deposits of wet silty soils were observed in the downstream area. Approximately 20 feet of silty sand and rock fragments are exposed in a cut in the hillside near the left abutment, with less soil apparent on the right side.

The key trench had been excavated to bedrock (presumably hard sandstone) on the centerline of the dam. The right abutment is founded on hard sandstone to the elevation of the bottom of the concrete wall of the open spillway. The sandstone in the left abutment is apparently more weathered. The sandstone dips at 10° to the north in a downstream direction with a strike of N.70°E. The bedrock is vertically jointed with two series perpendicular to each other causing a blocky condition as observed in the exposures.

6.2 Stability Analysis

6.2.1 Visual Observations: No tension cracks or other evidence of movement such as sloughing of the embankment slopes or movement at or beyond the toe was observed. There was non-measurable seepage from the dipping sandstone and rockfill near the 72 inch blow-off conduit outlet. There were a few small clear seeps measured at 0.25 g.p.m. near the downstream toe at the outlet of the old channel in the right center area. An eight inch drainpipe from the rock toe filter on the right side outlets into the downstream channel at a rate of 10 g.p.m.

6.2.2 Design Data: No stability analyses were available.

6.2.3 Operating Records: An inspection made by the U.S. Forest Service in May 1977 reported a minor "slump and slide" which needed seeding and fertilizing. No slope failure or erosion

was observed at the time of the Phase I inspection. Apparently the clear seepage previously mentioned had been observed. The "settlement" noted on the check list for the last U.S. Forest Service inspection was not observed in the visual inspection. There is still a thick growth of trees and brush which had been recommended for removal in the 1977 inspection report.

6.2.4 Post-Construction Changes: Some alterations to the dam have been made which included a widening of the spillway and improvements to the water control system since it was constructed.

6.2.5 Seismic Stability: Coles Run Dam is in Seismic Zone 2 and is considered to have no hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams.

6.3 Evaluation: Since no stability analyses were available, a detailed stability assessment cannot be made. The minor clear seepage and drainage from the rock toe of the zoned dam structure does not show signs of piping or stability problems. However the seepage should be checked at least yearly to determine if the flow increases.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: The findings of this inspection indicate several items that require further investigation. The spillway is considered inadequate to pass the P.M.F. Clear seepage was observed at several locations near the toe and at the toe. The downstream embankment is very heavily overgrown which hindered a complete inspection of the whole embankment. However, no evidence of instability of embankment slopes was observed. As-built plans, design hydrologic and hydraulic computations, and stability analyses were not available for this dam.

7.2 Recommended Remedial Measures: The inspection of the Coles Run Dam revealed the following items which require the owner's immediate attention:

1) Further study of spillway capacity in order to make recommendations for increased capacity.

2) Cut and remove all brush from the dam and reinspect.

3) Observe the seepage during periods of higher reservoir levels for signs of increased flow or muddy discharge.

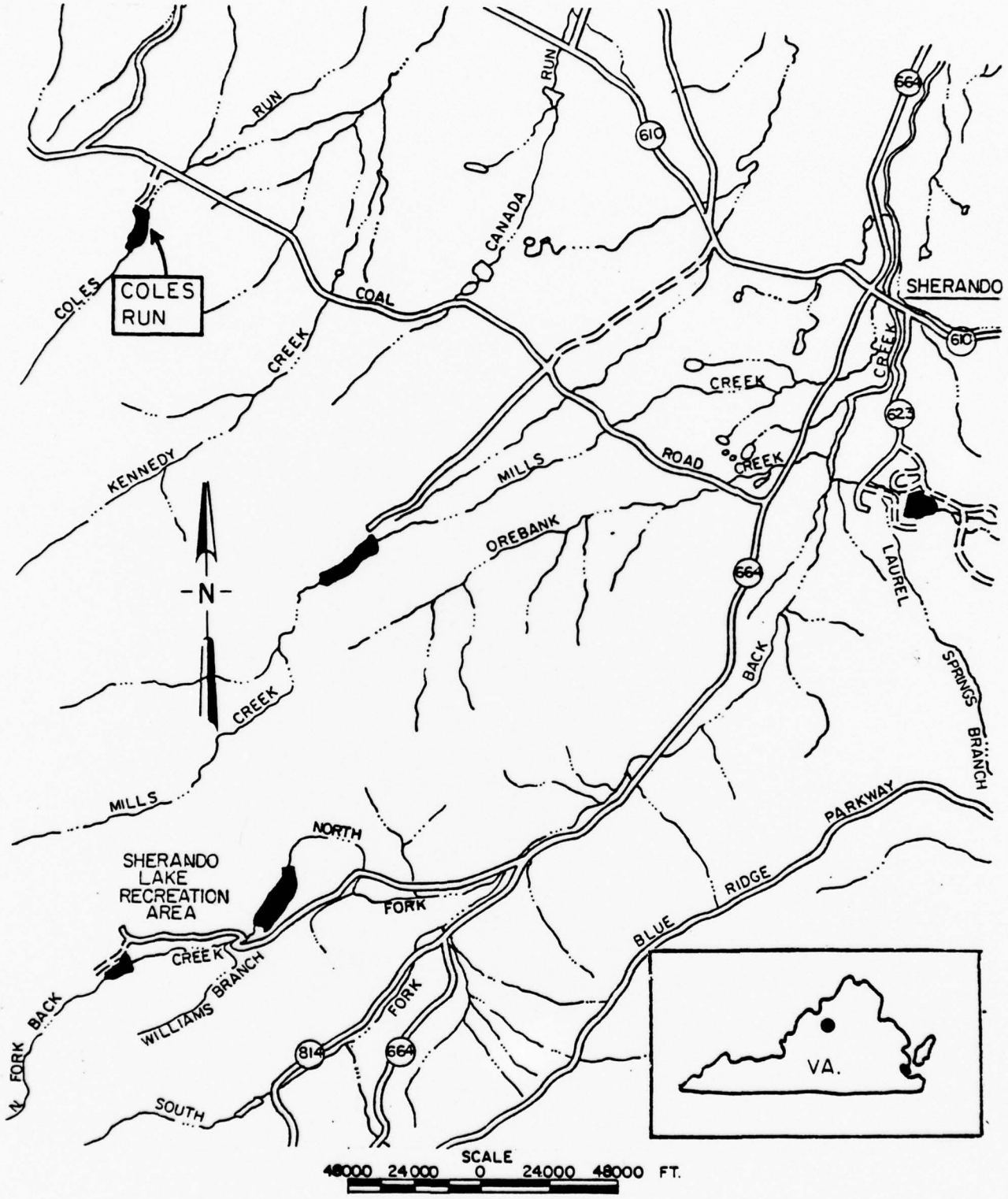
4) Initiate an annual maintenance and inspection program with records of the inspections.

APPENDIX I

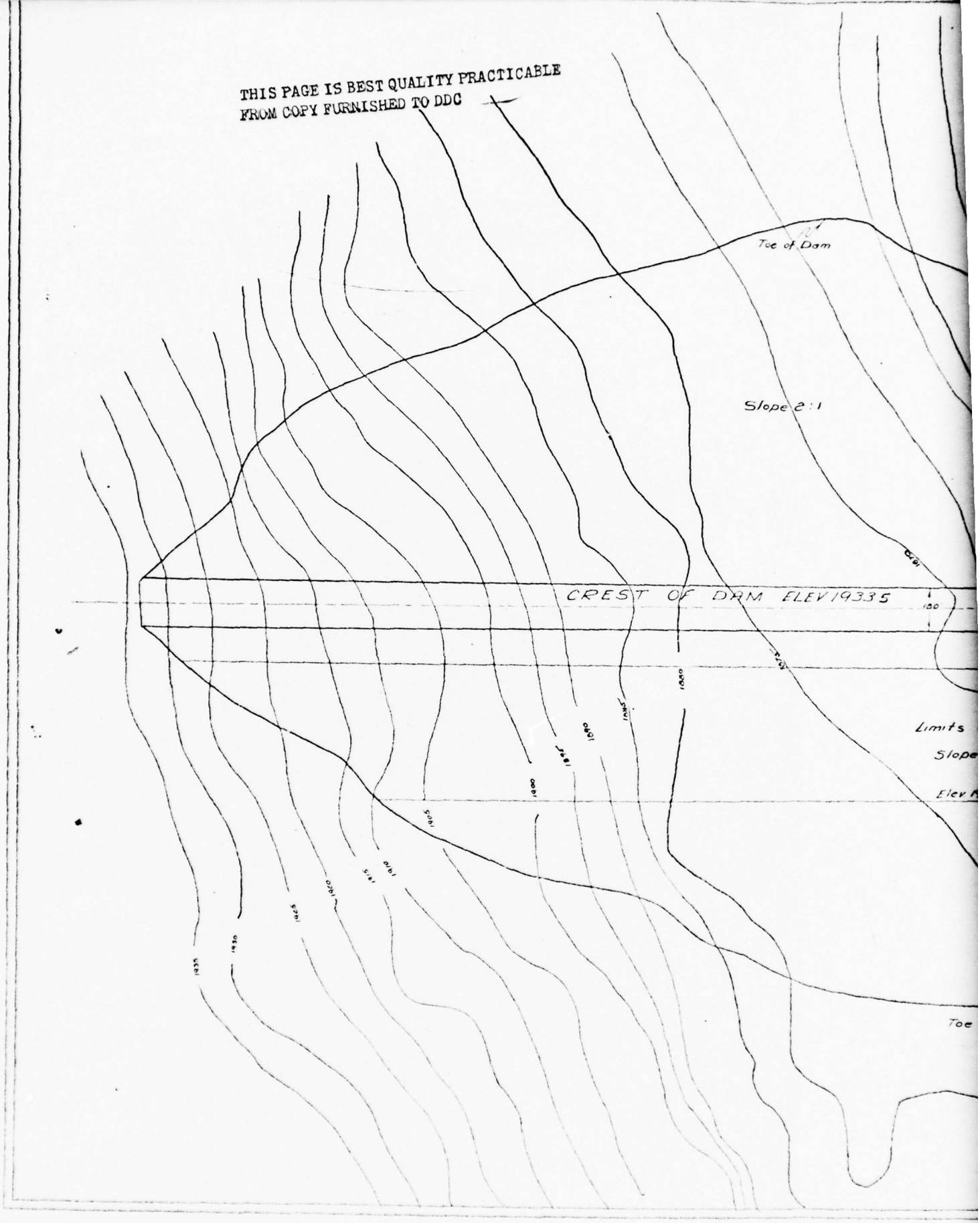
PLATES

CONTENTS

NAME OF DAM: COLES RUN



LOCATION PLAN
COLES RUN



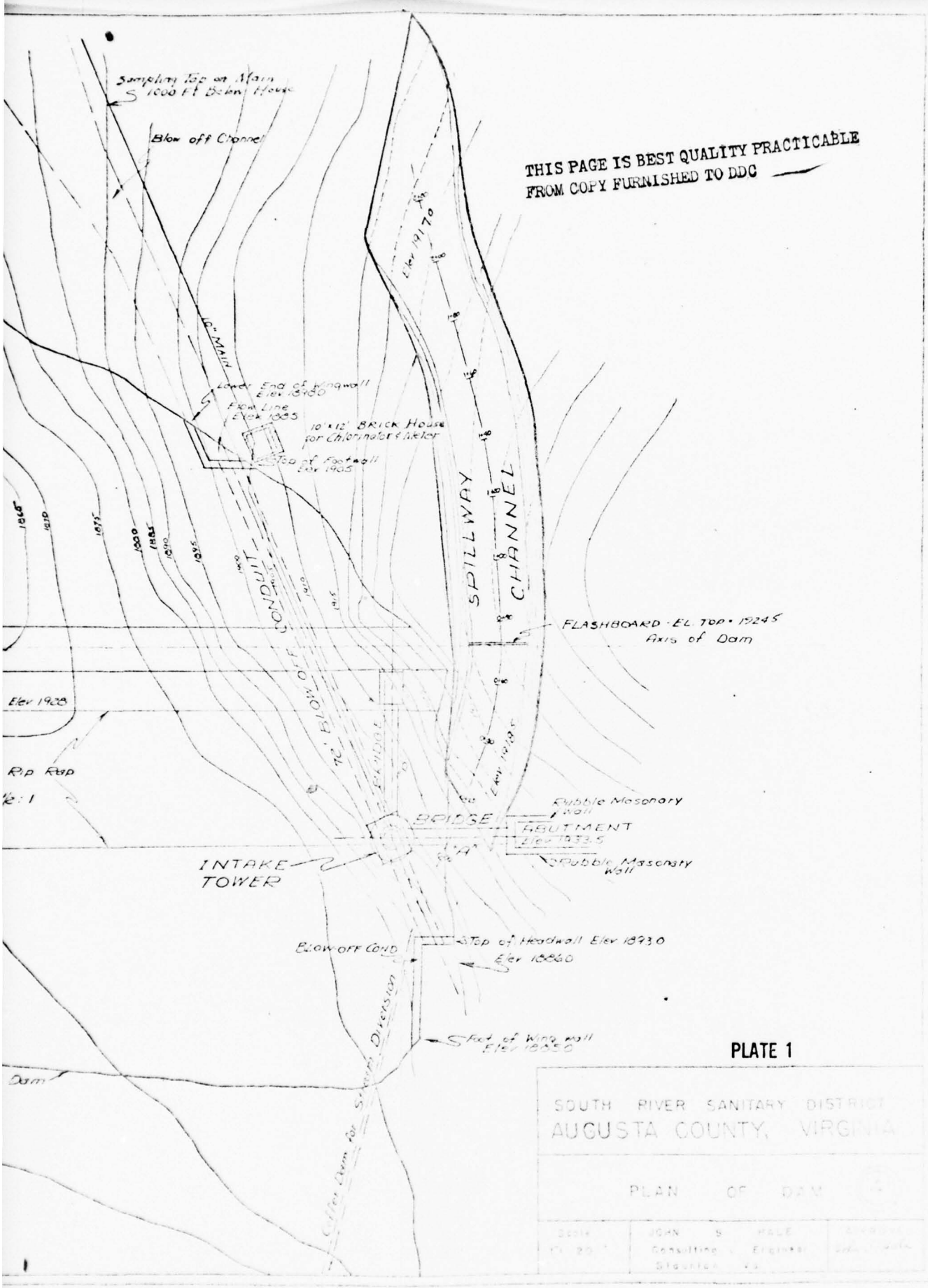


PLATE 1

SOUTH RIVER SANITARY DISTRICT
AUGUSTA COUNTY, VIRGINIA

PLAN OF DAM

DESIGN	JOAN S. HALE Consulting Engineer Staunton, Va.	SCALE
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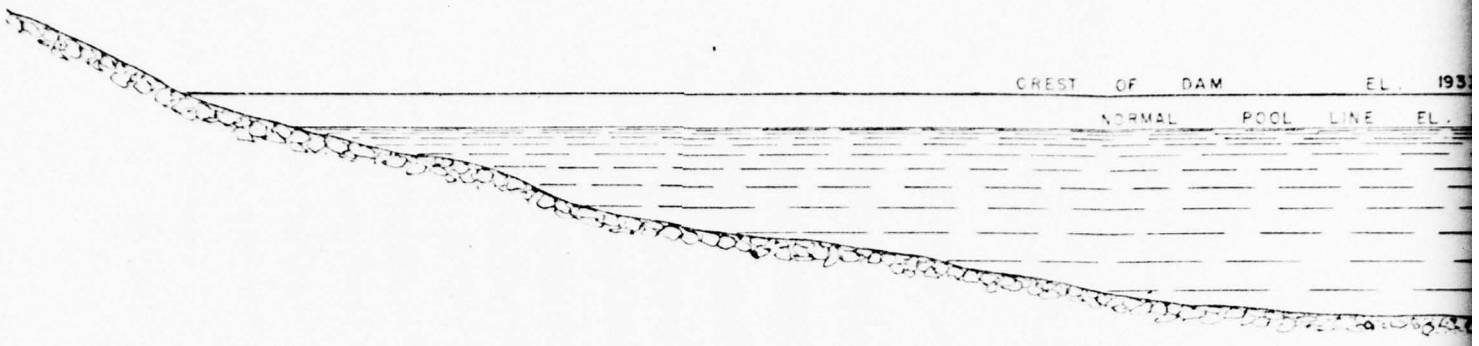
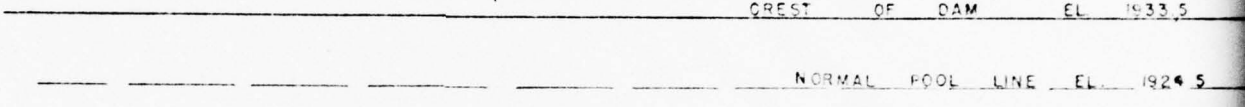
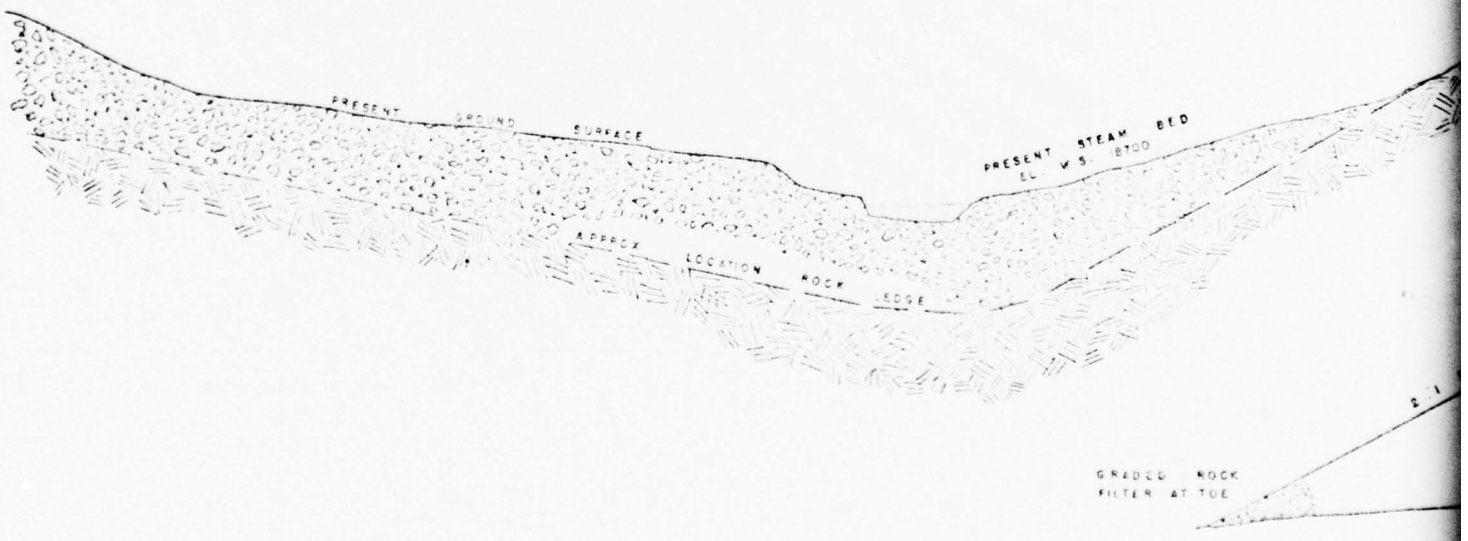
CHECKED		
DATE		



ELEVATION LOOK

SCALE





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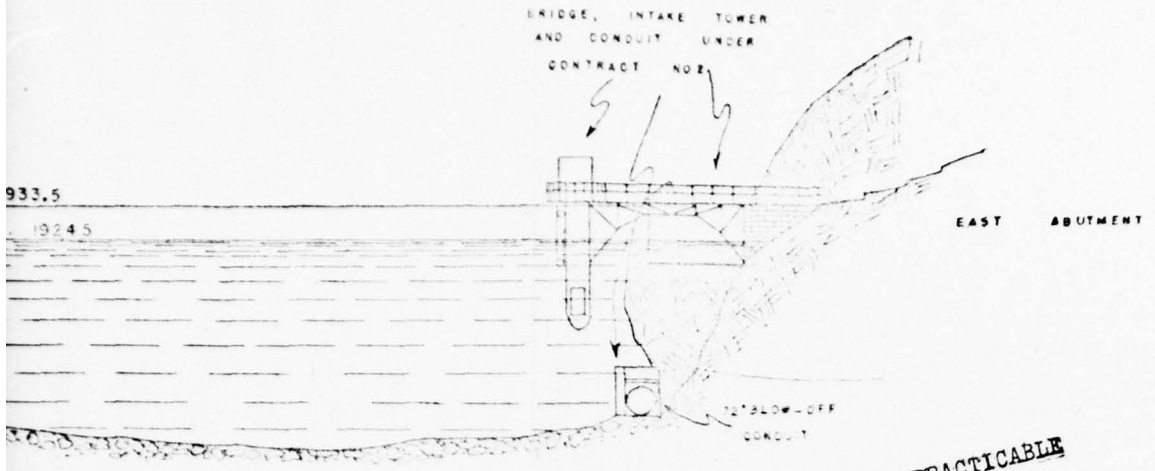
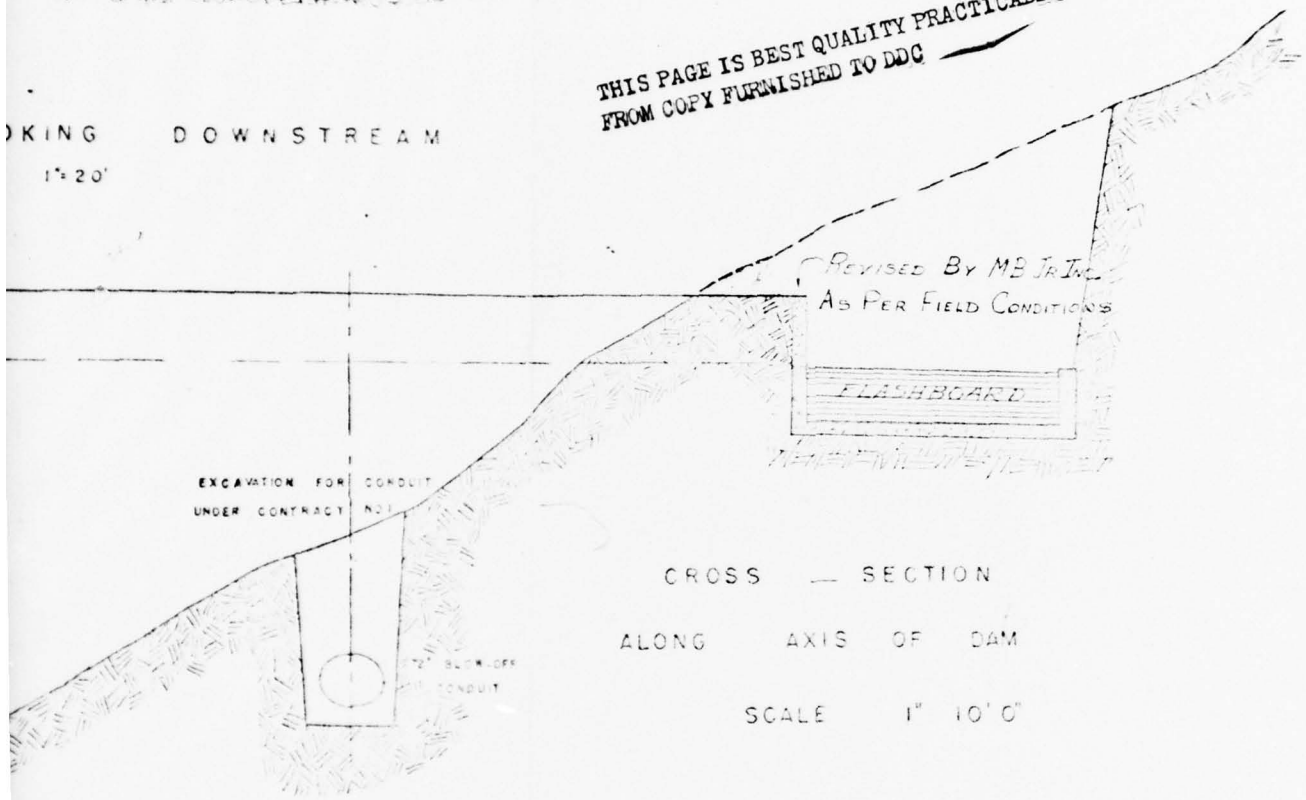


OKING DOWNSTREAM

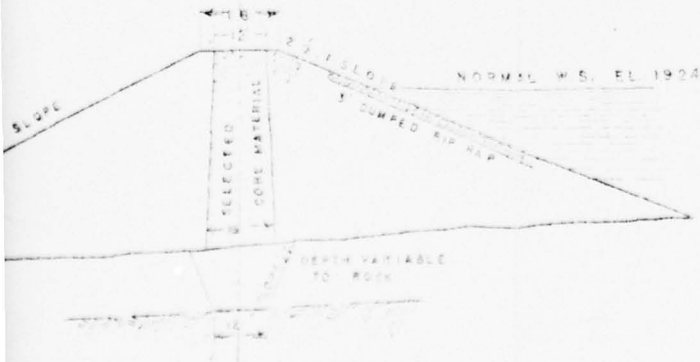
1"=20'



CROSS — SECTION

ALONG AXIS OF DAM

SCALE 1" 10' 0"



PICAL CROSS SECTION

PLATE 2

SOUTH RIVER SANITARY DISTRICT
AUGUSTA COUNTY, VIRGINIA

ELEVATIONS AND SECTIONS
EARTH DAM

5

Scale	JOHN S. HALE	APPROVED
1"=20'	Consulting Engineer	

2

APPENDIX II

PHOTOGRAPHS

CONTENTS

Note: Photographs were taken 13 July 1978.

NAME OF DAM: COLES RUN

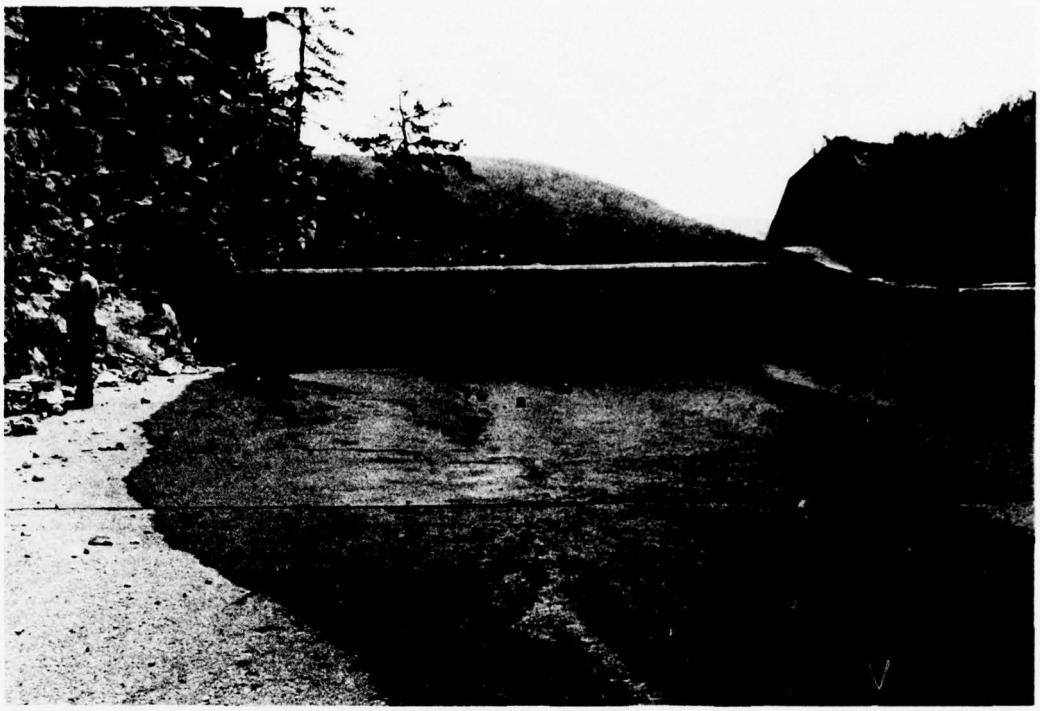


PHOTO 1. Weir in Spillway With Leakage Principally on Right Side Near Dam

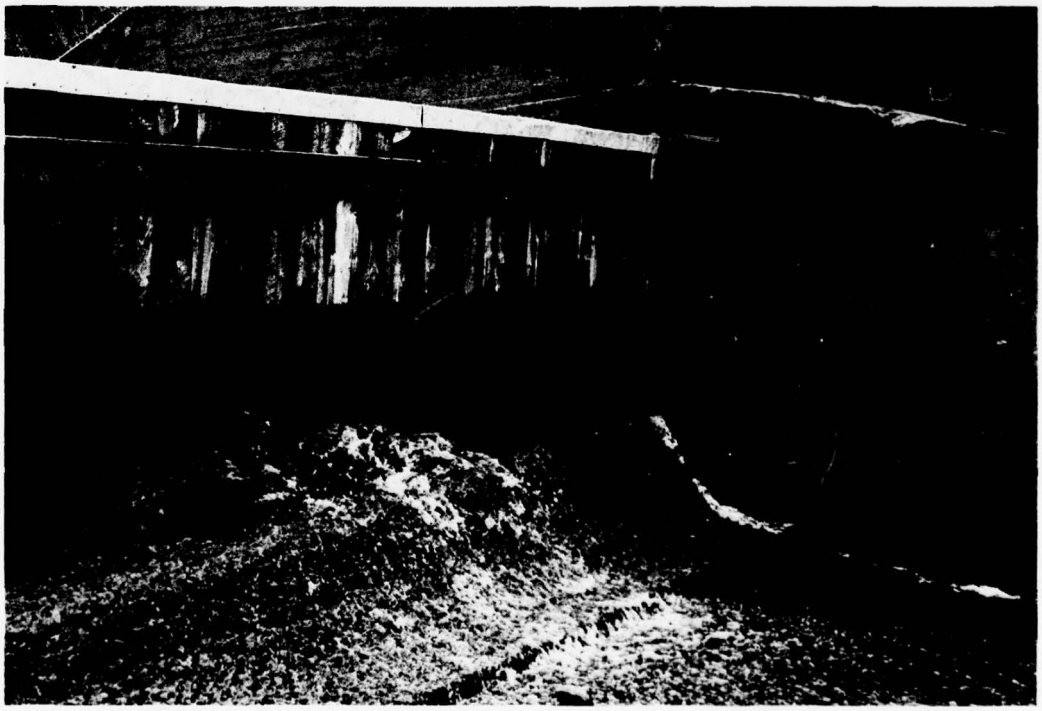


PHOTO 2. Leakage Under Weir and Concrete Deterioration in Spillway Wall Adjacent to Dam

PHOTO 3. Rocks in Channel Downstream From Open Spillway

PHOTO 4. Outlet of Blowoff Pipe From Intake Tower

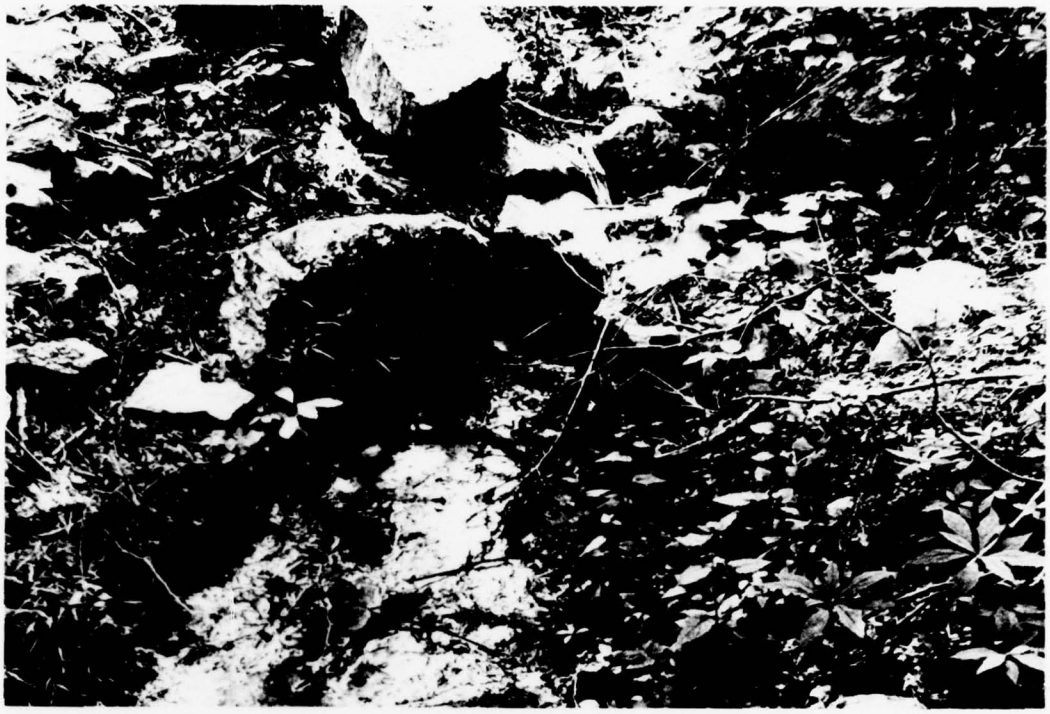


PHOTO 5. Seepage of Red Water at 0.25 G. P. M. From Downstream Rock Toe Drain in Old Channel

PHOTO 6. Clear 10 G. P. M. Flow From Eight Inch Toe Drain Pipe Into Downstream Channel

APPENDIX III

CHECK LIST - VISUAL INSPECTION

Check List
Visual Inspection
Phase 1

Name Dam Coles Run County Augusta State Virginia Coordinates Lat. 3758.6 Long. 7901.8

Date Inspection 13 July 1978 Weather Cloudy Temperature 78°F.

Pool Elevation at Time of Inspection 1924.8 assumed datum (P.D. - plan datum) Tailwater at Time of Inspection Unknown

III-1

Inspection Personnel:

MICHAEL BAKER, JR., INC.:

D. J. Greenwood
J. M. Thompson
W. L. Sheafer

VIRGINIA WATER CONTROL BOARD:

B. Chewning
T. Mizell

D. J. Greenwood Recorder

EMBANKMENT

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No cracks were visible.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	No movement was observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing was observed. Only slight erosion was observed near the road on the crest of the dam in sandy soil. The slope drains at the left abutment are overgrown with small trees.	It is recommended that the heavy tree growth in the abutment slope drain areas be removed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	There is not evidence of displacement or misalignment.	
RIPRAP FAILURES	No failures were observed in the very hard and blocky sandstone riprap which covers (three inches thick) the upstream slope above and below the pool elevation.	

EMBANKMENT

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
VEGETATION	There is a heavy growth of small trees and brush on most of the downstream slope. Somewhat less of this vegetation covers portions of the upstream slope.	It is recommended that the heavy vegetation be cut and cleared, and this portion of the dam be reinspected.
CONSTRUCTION MATERIALS	According to the plans, the dam was constructed with a selected clay core from the bottom of the key trench to the dam crest, in a zone near the centerline of the dam. The remainder was unclassified except for a rock toe drain. Fine silty sand and rock fragments were observed on most of the surface. Some red silty clay was seen at the crest near the right abutment.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	The right abutment is sandstone. The left abutment is residual soil overlying weathered sandstone.	
ANY NOTICEABLE SEEPAGE	There was non-measurable clear seepage from the sandstone and rockfill near the 72 inch conduit outlet and the open spillway. There were a few small clear seeps (red in color due to iron staining) measured at 0.25 g.p.m. near the downstream toe and the outlet of the old channel in the right center.	
STAFF GAGE AND RECORDER	None were observed.	
DRAINS	According to the plans, there is a graded rock filter of hard sandstone at the downstream toe. An eight inch drainpipe on the right side flows at a rate of 10 g.p.m.	The eight inch drain was not shown on the plans.

EMBANKMENT

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
FOUNDATION	The plans show the foundation of the dam in the key trench on rock (presumably hard sandstone). The recorded dip in the spillway was 10° NW. in a downstream direction with a strike of N. 70° E. The bedrock is jointed vertically in two sets perpendicular to each other.	

OUTLET WORKS

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	The outlet conduit is a 72 inch pipe used as a diversion channel during construction. It is now used for the emergency outlet. The retaining walls at the downstream end are in good condition. The masonry and concrete outlet channel is eroded.	
INTAKE STRUCTURE	The intake structure is for water supply and drawdown purposes only. The intake tower is five feet in diameter with slide gates for the regulation of water supply and draining the lake. According to the owner, the gates are all operable and were opened during the last major storm. The tower is in good condition.	
OUTLET STRUCTURE	The drain outlets into a masonry channel which is in poor condition. The area shows signs of erosion.	
OUTLET CHANNEL	The concrete spillway empties into a rockfilled channel. The discharge is reddish-brown in color.	
EMERGENCY GATE	The emergency drain is located in the six feet diameter tunnel under the control tower. The drain is a 30 inch slide gate operated by the control wheel on top of the tower. The 30 inch gate empties into the six feet tunnel.	

UNGATED SPILLWAY

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The spillway has a very low weir upon which wooden flashboards are mounted. The weir shows signs of erosion, as does the downstream channel. Leakage is present under the flashboards.	
APPROACH CHANNEL	The channel is lined with very hard jointed sandstone with a 10° dip downstream. The sandstone appears to be stable. The section adjacent to the dam abutment is covered by concrete wing wall.	
DISCHARGE CHANNEL	Very hard jointed sandstone is exposed in the channel at the end of the concrete spillway for 50 feet. Dumped hard sandstone riprap lines the remainder of the downstream channel.	
BRIDGE AND PIERS	There is a center pier on the spillway entrance to support the flashboards.	
CUT SLOPE	The cut slope, in very hard blocky sandstone, is almost vertical along the major joint planes. The slope appears to be stable except for some small breakage. The beds dip at 10° NW. downstream with a strike N. 70° E. there is a 10 feet joint zone in the cut slope for the approach channel. Another set of joints is perpendicular to the major series and parallel to the dam. Less than one foot of sand overlies the bedrock. There is slight clear seepage at the contact of the flashboard and rock cut.	

INSTRUMENTATION

COLES RUN

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	There are none.	
OBSERVATION WELLS	There are none.	
WEIRS	There are none.	
PIEZOMETERS	There are none.	
OTHER		

RESERVOIR

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The steep slopes are wooded and composed of silty sand and rock fragments. There is no development on the upstream slopes.	
SEDIMENTATION	Sediment deposit or suspended solids in the reservoir were not apparent.	

DOWNSTREAM CHANNEL

COLES RUN

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The general channel below the dam to the damaged area is poorly defined. According to the owners, water crosses the divide during flood season to other streams in a large flat area.	
SLOPES	The side slopes are shallow in sand and gravel with cobbles. The channel slope from the dam is uniform. However, flood flows can spill over to three different streams.	
APPROXIMATE NO. OF HOMES AND POPULATION	The nearest population center is the Town of Rivermont, 2.5 miles downstream. There are only a few homes located adjacent to Coles Run on State Route 610. The estimated population of the area is about 20.	

APPENDIX IV

CHECK LIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

COLES RUN

ITEM	REMARKS
PLAN OF DAM	The plan of dam was provided by the owner.
REGIONAL VICINITY MAP	There is a vicinity map in the plans, however, a U.S.G.S. quad is included in this report.
CONSTRUCTION HISTORY	No construction records were provided by the owner.
TYPICAL SECTIONS OF DAM	The design plans show typical sections.
HYDROLOGIC/HYDRAULIC DATA	No hydrologic/hydraulic calculations were available to the original spillway design or the later enlargement.
OUTLETS - PLAN	There are none.
- DETAILS	There are none.
- CONSTRAINTS	There are none.
- DISCHARGE RATINGS	There are none.
RAINFALL/RESERVOIR RECORDS	There are none.

COLES RUN

ITEM	REMARKS
DESIGN REPORTS	There are none.
GEOLOGY REPORTS	None were available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	There are none.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Several shallow boring logs were shown with the construction plans for the key trench. No other data was available.
POST-CONSTRUCTION SURVEYS OF DAM	There were none.
BORROW SOURCES	Selected material was obtained from the Kennedy mine located 1.5 miles east of the dam. Other borrow sources were not indicated on the plans.

COLES RUN

ITEM	REMARKS
MONITORING SYSTEMS	There are none.
MODIFICATIONS	The spillway was enlarged in 1966 (designed by Johnson & Williams Consulting Engineers).
HIGH POOL RECORDS	There are none.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	There are none.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	There were none.
MAINTENANCE OPERATION RECORDS	There are none.

COLES RUN

ITEM	REMARKS
SPILLWAY PLAN	The original plans and the spillway enlargement plans show sections and details, and will be on file at the Norfolk District of the U.S. Army Corps of Engineers.
SECTIONS	
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	These are shown on the plans.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.61 square miles of completely forested steep land

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1924.5 P.D. (181 acre-feet, estimated)

ELEVATION TOP OF DAM POOL (STORAGE CAPACITY): 1933.5 P.D. (256 acre-feet)

ELEVATION MAXIMUM DESIGN POOL: Not Applicable

ELEVATION TOP DAM: 1933.5 P.D.

CREST: Primary and emergency spillway

a. Elevation 1924.5 P.D. (top flashboards) 1919.5 P.D. (top concrete weir)
b. Type Side-channel with weir and flashboards
c. Width Weir 39 feet, channel 49 feet
d. Length 140 feet
e. Location Spillover Right abutment
f. Number and Type of Gates None, 5.17 feet flashboards

OUTLET WORKS: Emergency drain only

a. Type 30 inch slide gate
b. Location Under inlet tower near the right abutment
c. Entrance inverts 1885.6 P.D.
d. Exit inverts 1885.6 P.D.
e. Emergency draindown facilities As described above

HYDROMETEOROLOGICAL GAGES: None

a. Type
b. Location
c. Records

MAXIMUM NON-DAMAGING DISCHARGE Unknown

NAME OF DAM: COLES RUN

APPENDIX V

DAM MAINTENANCE INSPECTION REPORT

USDA-FOREST SERVICE

---DAM MAINTENANCE INSPECTION REPORT

Ref: FSM 7572.23

1. REGION (3-4)	2. FOREST (5-6)	3. RANGER DIST. (7-8)	4. FOREST INV. NO. (9-12)
08	23	05	0028

5. NAME OF DAM: Coles Run — West Augusta County

BLOCK I - MAINTENANCE INSPECTION CHECKLIST

CARD NO. 12

ITEM (Describe deficient items on attached sheets)	NEEDED REPAIRS (By priority) 1	2	None
1. EMBANKMENTS			
a. Slumps, slides		✓	
b. Settlement		✓	
c. Cracks			✓
d. Seepage			✓
e. Erosion			✓
f. Slope facing			
g. Debris			✓
h. Traffic damage			✓
i. Brush, trees	✓		
j. Burrows			✓
k. Other			
2. CONCRETE STRUCTURES			
a. Settlement			✓
b. Overturning			✓
c. Heaving			✓
d. Cracks, spalls			✓
e. Joints			✓
f. Undermining			✓
g. Drains			✓
h. Seepage			✓
i. Other			
3. GATES, CONTROLS			
a. Corrosion			✓
b. Mechanical			✓
c. Structural			✓
d. Clogging			✓
e. Access			✓
f. Other			

ITEM (Describe deficient items on attached sheet)	NEEDED REPAIRS (By priority) 1	2	None
4. CLOSED CONDUITS			
a. Settlement			✓
b. Displacement			✓
c. Cracks, spalls			✓
d. Seepage		✓	
e. Clogging			✓
f. Erosion			✓
g. Corrosion			✓
h. Joints			✓
i. Other			
5. SPILLWAYS			
a. Obstructions			✓
b. Erosion			✓
c. Structural			✓
d. Vegetation			✓
e. Other			
6. DOWNSTREAM CONDITION			
a. Backwater			✓
b. Erosion			✓
c. Bars, pools			✓
d. Boils, piping			✓
e. Other			
7. RESERVOIR			
a. Shore erosion			✓
b. Debris			✓
c. Sediment			✓
d. Other			
8. OTHER (Identify)			
a.			
b.			
c.			
d.			

BLOCK II - MAINTENANCE COST ESTIMATE

ITEM OF WORK	UNIT	UNIT COST	QUANTITY PRIORITY 1	QUANTITY PRIORITY 2	COST PRIORITY 1	COST PRIORITY 2
1(a), (b) - Slumps + Slides need to seed + fertilize. 1(d) - Remove brush + trees 4(d) need to check seepage on pipes.						
TOTALS (Enter in Block III, below) ▶						

BLOCK III - SUMMARY MAINTENANCE INSPECTION REPORT

1. DATE OF INSP. (13 18): 5 / 19 / 77 (MO. / DAY / YR.)

2. HIGHEST PRIORITY CHECKED IN BLOCK 1. (19): –

3. EST. MAINT. COST ($1,000)
- a. PRIORITY 1 (20 23): – – – . –
- b. PRIORITY 2 (24 27): – – – . –

4. EST. ENGINEER TIME NEEDED (MAN-HR.)
- a. PRIORITY 1 (28 30): – – –
- b. PRIORITY 2 (31 33): – – –

5. EST. AID & TECH. TIME NEEDED (MAN-HR.)
- a. PRIORITY 1 (34 36): – – –
- b. PRIORITY 2 (37 39): – – –

6. NOTICE TO OWNER (40): YES / – NO

7. DATE OF NOTICE (41 46): – – / – – / – – (MO. / DAY / YR.)

8. LIMITATION (47): YES / – NO

9. TYPE OF LIMITATION (48): –

10. REVISED ESTIMATE OF INSPECTION TIME (MAN-HRS.)
- a. ENGINEER (49-50): – –
- b. FOREST OFFICER (51-52): – –
- c. AID & TECH. (53-54): – –

CARD NO. 12

REPORTED BY (Name & signature): Richard Grace

TITLE: Civil Engr.

DATE: 5-19-77

GPO 870-811