

# **EMERGENCY ACTION PLAN AND PROCEDURES**

**For the:**

**Auxiliary Fly Ash Pond  
VA ID #071001**

**Bottom Ash Pond Complex  
VA ID #071002**

**West Pond  
VA ID #071008**

**Located at:**

**AEP Glen Lyn Plant  
Glen Lyn, Giles County, Virginia**

**Owned by:**

**Appalachian Power Company  
American Electric Power**

Issue Date: April, 2026

EMERGENCY ACTION PLAN  
CFR 257.73 (a)(3)  
AUXILIARY ASH POND COMPLEX &  
BOTTOM ASH POND COMPLEX  
GLEN LYN PLANT

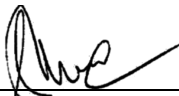
GERS-26-005

**PREPARED BY**

  
Mohammad A. Ajlouni, Ph.D., P.E.


**DATE** 04/24/2026

**REVIEWED BY**

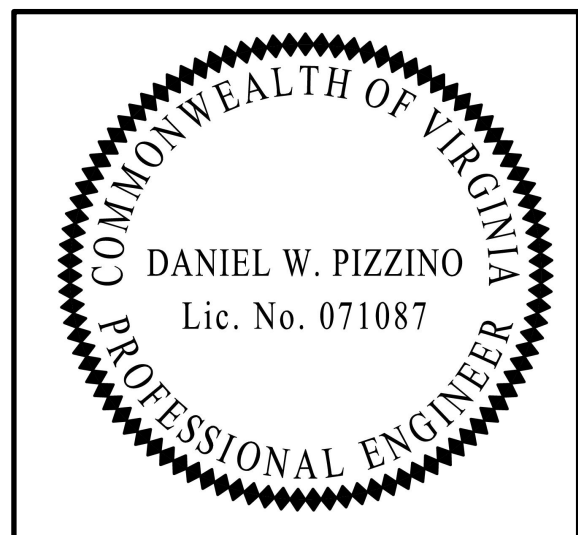
  
Shahriyar S. Baig, P.E.

**DATE** 04/27/2026

**APPROVED BY**

  
Daniel W. Pizzino, P.E.  
Director – Civil Engineering

**DATE** 04/27/2026




I certify to the best of my knowledge, information, and belief that the information contained in Emergency Action Plan meets the requirements of 40 CFR § 257.73 (a)(3)

**TABLE OF CONTENTS**

	<u>Page</u>
PART I – Certifications.....	3
PART II – Notification Flowchart.....	5
PART III – Statement of Purpose.....	7
PART IV – Project Description.....	8
PART V – Emergency Detection, Evaluation, and Classification.....	9
PART VI – General Responsibilities under the EAP.....	17
Part VII – Preparedness.....	18
Part VIII – Inundation Map.....	19
Part IX – Appendices.....	21
Appendix A – Investigation and Analyses of Impounding Structure Floods	
Appendix B – Plans for Training, Exercising, Updating, Posting the EAP	
Appendix C – Site-Specific Concerns	

**PART I – CERTIFICATIONS**

This plan was updated by American Electric Power Service Corporation (AEPSC).

<u>Name</u>	<u>Title</u>	<u>Date</u>
<u>William Cummings</u> Printed Name	<u>Maintenance Superintendent SR</u>	<u>04/21/2026</u>
 Signature		


This plan has been approved by the Glen Lyn Maintenance Superintendent SR:

  
William Cummings, Mtce Supt'd SR

**Signature and Distribution List**

Signature:

The undersigned states he/she will distribute a copy of the Emergency Action Plan to the persons named in the Distribution List below:

<u>Name</u>	<u>Title</u>	<u>Date</u>
<u>William Cummings</u> Printed Name	<u>Maintenance Superintendent SR</u>	<u>04/21/2026</u>
 Signature		

**Distribution:**

The following is a list of the persons and agencies that will receive a copy of this Emergency Action Plan:

**Update April, 2026**

<b>Name</b>	<b>Address</b>	<b>Copy Nos.</b>
Mohammad Ajlouni P.E.	AEPSC Geotechnical Engineering Section	1
Josh Coulter, Plant Coordinator	AEP Glen Lyn Plant	2
Chris McKlarney, Coordinator Giles County	315 North Main St Pearisburg, VA 24134	3
Office of Emergency Services Giles County Sheriff Morgan Millirons	503 Wenonah Ave. Pearisburg, VA 24134	4
Tim Estes, Sr. VA Department of Emergency Management Region 4	225 State St. Marion, VA 24354	5
Steven Bricker Regional Engineer VA Department of Conservation And Recreation	220-C East Main Street Radford, VA 24141	6
Jeremiah E Carter	AEPSC Environmental Services	7
William Cummings	AEP Glen Lyn Plant	8

## **PART II – NOTIFICATION FLOWCHART**

The Notification Flowchart is presented on the following page.



### **PART III – STATEMENT OF PURPOSE**

The purpose of this document is to provide monitoring guidelines for the Auxiliary Fly Ash Pond Bottom Ash Pond Complex and West Pond under various conditions and to specify a series of actions that must be implemented when confronted with a possible or imminent pond failure. The plan's implementation and use will help to ensure that an emergency situation at the pond will be observed promptly and reported to the appropriate agencies.

## **PART IV – PROJECT DESCRIPTION**

The Fly Ash Auxiliary Pond, the Bottom Ash Pond Complex and the West Pond are ash disposal impoundments located northwest of Appalachian Power Company's Glen Lyn Plant on the New River near the mouth of East River. The ponds are near Glen Lyn in Giles County, Virginia.

The Auxiliary Fly Ash Pond is a fly ash impoundment adjacent to the New River and is currently capped and closed. The West Pond is a sedimentation pond west of the Auxiliary Fly Ash Pond, separated by the dry ash landfill.

The Bottom Ash Pond Complex consists of the North and South Bottom Ash Ponds and the Clear Water Pond. The ash ponds have a bottom elevation of about 1500 feet, and the dike has a top elevation of about 1515 feet. The pond has an internal outfall at elevation 1501.3 feet. Side slopes are about 2 to 3 horizontal to 1 vertical.

The ponds are inspected annually by personnel from AEPSC's Geotechnical Engineering Section and a report prepared under the direction of a registered professional engineer.

**PART V – EMERGENCY DETECTION, EVALUATION, AND CLASSIFICATION**

**Section A - NORMAL CONDITIONS**

Ponds will be inspected according to the prescribed schedule and checked for items specified on the pond inspection checklist. Normal conditions are defined as weather that would not typically stress the pond and the adjoining land. This would include normal weather patterns and normal rainfall. In general, normal rainfall is rainfall not exceeding about 3 inches of rain over a 24 hour period (estimated) or 4 inches over a 7-day period (from weekly measurements). The areas to be inspected will include an examination of the structure for structural weaknesses, status of impounding capacity, excessive erosion, clogging of outlet works, and other potentially hazardous conditions, including whirlpools in the pond or an unexpected drop in the pond level. Reports shall be filed by the person performing the inspections. These reports shall be retained at the operations office, submitted to AEPSC Geotechnical Engineering Section, and shall be made available for inspection by authorized representatives of the Virginia Department of Emergency Management (VADEM).

<b>Action</b>	<b>Responsibility*</b>
1. Regular quarterly inspections of the pond.	Plant Personnel
2. Table 1, Inspection Response Table provides a partial list of potential deficient and unsafe features associated with the performance of the pond. If during the inspection a minor deficiency is found, report the deficiency on inspection checklist and write a job order, if appropriate.	Plant Personnel
3. If a marginal deficiency is found, contact AEPSC, report on inspection checklist and increase inspection frequency in accordance with AEPSC recommendations	Plant Personnel
4. If an unsafe, non-emergency feature is observed, proceed to Section C-Standby Alert	Plant Personnel
5. If an unsafe, emergency feature is observed, proceed to Section D– Evacuation Conditions	Plant Personnel
6. Annual geotechnical safety inspection	Registered Professional Engineer
*Appropriate names, addresses, and phone numbers are provided in Part VI	

**TABLE 1.**

**INSPECTION RESPONSE TABLE**

PERFORMANCE LEVEL OF POND	MALFUNCTIONS OR UNDESIRABLE FEATURES	ACTIONS TO BE TAKEN BY FIELD PERSONNEL (In Order Indicated)
Minor Deficiency	<ul style="list-style-type: none"> <li>• Damaged instrumentation</li> <li>• Sloughing</li> <li>• Rodent burrows</li> <li>• Superficial erosion</li> <li>• Trees and tall vegetation</li> <li>• Poor vegetal cover</li> <li>• Deteriorated rip rap</li> </ul>	<ol style="list-style-type: none"> <li>1. Report on inspection checklist.</li> <li>2. Write repair order, if appropriate.</li> </ol>
Marginal Deficiency	<ul style="list-style-type: none"> <li>• Cracks parallel or transverse to pond.</li> <li>• Soft zones in downstream face or toe.</li> <li>• Previously undetected springs with clear water and stable flow rate on face of pond or abutments.               <ul style="list-style-type: none"> <li>• Excessive settlement of crest.</li> <li>• Elevated water levels in piezometers or observation well.</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li>1. Contact AEPSC Geotechnical Engineering Section.</li> <li>2. Report on inspection checklist.</li> <li>3. Increase frequency of inspection as necessary.</li> </ol>
<b>Unsafe Non-Emergency</b>	<ul style="list-style-type: none"> <li>• Springs on abutments or downstream face with muddy water but stable flow rate.</li> <li>• Pipes, cavities or holes, which could be attributed to internal erosion even without evidence of seepage.</li> <li>• Clogged drains.</li> <li>• Significant slide with no seepage and that does not reach the pond crest.</li> <li>• Noticeable increase in amount of foundation or abutment seepage or flow in drains without apparent reason.</li> </ul>	<ol style="list-style-type: none"> <li>1. Notify Production Services Superintendent who in turn should issue a Standby Alert</li> <li>2. Initiate daily or more frequent surveillance program.</li> <li>3. Read all field instrumentation daily.</li> <li>4. Report on inspection checklist.</li> <li>5. Contact AEPSC Geotechnical Engineering Section.</li> </ol>
<b>Unsafe Emergency</b>	<ul style="list-style-type: none"> <li>• Overtopping or activation of the emergency spillway.</li> <li>• Breach or slide below the waterline which reaches the pond crest and/or seeps water.</li> <li>• Springs on abutment or downstream slope with muddy water and progressively increasing flow rate.</li> </ul>	<ol style="list-style-type: none"> <li>1. Notify Production Services Superintendent who in turn should issue a notification and evacuation order.</li> <li>2. Continue 24 hr. surveillance program, if possible.</li> <li>3. Read all field instrumentation daily, if possible.</li> <li>4. Report on inspection checklist.</li> <li>5. Contact AEPSC Geotechnical Engineering Section.</li> </ol>

## **Section B - ADVERSE CONDITIONS**

Ponds will be inspected within 24 hours of the conditions described, and daily while adverse conditions exist. Adverse Conditions are defined as weather that could be in anyway stressful to the pond and adjoining land. This would include rainfall greater than about three inches within 24 hours (estimated) or greater than 4 inches in 7 days (from weekly measurements), or heavy snow melt. Reports shall be filed by the person performing the inspections. These reports shall be retained at the operations office, submitted to AEPSC Geotechnical Engineering Section as soon as possible, and shall be made available for inspection by authorized representatives of VADEM.

If no potentially hazardous conditions are identified and adverse conditions no longer exist, then resume routine inspection schedule as outlined in section A - Normal Conditions.

<b>Action</b>	<b>Responsibility</b>
1. Inspect pond within 24 hours of adverse conditions rainfall.	Plant Personnel
2. Table 1, Inspection Response Table provides a partial list of deficient and unsafe features associated with the performance of the pond. If during the monthly inspection a minor deficiency is found, report on inspection checklist and write a job order, if appropriate.	Plant Personnel
3. If a marginal deficiency is found, contact AEPSC, report on checklist and increase inspection frequency as per AEPSC recommendations.	Plant Personnel
4. If an unsafe, non-emergency feature is observed, proceed to Section C - Standby Alert	Plant Personnel
5. If an unsafe, emergency feature is observed proceed to section D - Evacuation Conditions	Plant Personnel

**Section C - STANDBY ALERT**

Pond has specific problem(s), which could lead to an unsafe, emergency condition requiring evacuation. Daily or more frequent surveillance is initiated and a Standby Alert is issued. Emergency repairs begin, if possible.

Specific problems or undesirable features are summarized in Table 1.

<b>Action</b>	<b>Responsibility</b>
1. Notify Production Services Superintendent and begin daily or more frequent surveillance of pond	Plant Personnel
2. Standby Alert shall be issued in accordance with wording and checklist below.	Plant Manager or Production Services Superintendent in consultation with AEPSC Geotechnical Engineering Section
3. Start emergency communications network, if necessary based upon the continuing deterioration of site conditions. Request additional assistance as necessary	Giles Co. OES (911) or (540-921-2525) or Giles Co. Sheriff (540-921-3842) or Plant Personnel
4. Evaluation of the pond and problem areas for corrective action	Plant Personnel & AEPSC Geotechnical Eng. section
5. Commence corrective/emergency repairs, if possible	Plant Personnel or Hired Contractor

The following Advisory will be issued to the agencies listed below by AEP. The responsible person notifying the agencies should note the date, time and name of the contact person.

**ADVISORY**

“This is     (Name)     of Appalachian Power Company advising you that we are starting constant surveillance of the ash ponds at the Glen Lyn Plant in accordance with the emergency action plan. We are notifying you, (see list below) of this condition, and will inform you if a decision to evacuate a potential flood area has been made, or when the cancellation of the surveillance is decided.”

**Check when notified**

     Giles County OES

     VA Department of Emergency Management  
Emergency Operations Center

     VA DCR Regional Engineer

**Telephone Number**

911 or (540)921-2525

(804) 674-2400

(804)363-0992

**Section D - EVACUATION CONDITIONS**

A pond failure is imminent or has occurred. Notification shall be initiated and an evacuation order shall be given, if warranted.

Features that would necessitate evacuation conditions are listed on Table 1 under Unsafe Emergency Performance Level.

<b>Action</b>	<b>Responsibility</b>
1. Continue constant surveillance of pond condition.	Plant Personnel or VDEM or AEPSC
2. If evacuation is deemed necessary proceed immediately with Section E.	Plant Manager, Production Services Superintendent, or VDEM

NOTE: The primary means of communication is a digital radio system. Portable radios are carried by individuals so communication can be maintained with individuals inspecting the pond.

**Section E – EVACUATION**

Due to the proximity of the ponds to the New River, the evacuation of residences is not anticipated. However, the following actions should be taken if the local officials determine evacuation is necessary.

<b>Action</b>	<b>Responsibility</b>
1. Notify agencies according to checklist and wording below.	Plant Manager, Production Services Superintendent, or VADEM

**NOTIFICATION**

The responsible person shall phone the following agencies and deliver the following statement:

"This is  (responsible person)  of Appalachian Power Company notifying you that an evacuation order for the ash ponds at the Glen Lyn Plant has been given by  (person or agency issuing evacuation order)  at  (time) . Evacuation of people downstream will commence according to the Giles County Emergency Operations Plan."

Operators at 911 should contact OES directors such that a coordinated notification process and appropriate emergency planning/preparation are implemented.

**Check when notified**

**Telephone Number**

- |   |                      |
|---|----------------------|
| <input type="checkbox"/> Giles County OES   | 911 or (540)921-2525 |
| <input type="checkbox"/> VA Department of Emergency Management<br>Emergency Operations Center | (804) 674-2400       |
| <input type="checkbox"/> VA DCR Regional Engineer   | (804) 363-0992       |
| <input type="checkbox"/> American Water   | (304) 466-5050       |

Once notification has been given by AEP to the Giles County OES/911/Sheriff’s Office to begin evacuation procedures, the OES/911/Sheriff’s offices will follow their County Emergency Operations Plan. Roadblocks should be established to assist in the evacuation process. Notice to evacuate will be given personally to residents or by loudspeaker or bullhorn, or other means deemed necessary by the OES. If possible, evacuation teams and roadblock personnel should utilize radio contact throughout the evacuation process. The Giles County OES will be the agency in charge once evacuation orders have been issued to begin the implementation of evacuation procedures. The following measures will be implemented for an evacuation:

<b>Action</b>	<b>Responsibility</b>
1. Notification of downstream residents and any campers, boaters, or fisherman that may be on riverbanks.	Giles County OES, Giles County Sheriff and State Police with assistance from Plant Personnel as requested.
2. Contact and transport downstream residents to point(s) of safety with priority to the infirm or disabled	Giles County OES, Giles County Sheriff and State Police with assistance from Plant Personnel as requested.

3. Establish a command post at the Glen Lyn Plant if necessary, direct emergency operations to organize recovery efforts and direct officials of cooperating agencies.	Planned by Giles County OES Director and executed by local officers.
4. Notify American Red Cross, or agencies in charge of evacuation centers, including food and medical facilities. Handle inquiries on the status of evacuees.	Planned by Giles County OES Director and executed by local officers.
5. Police security of area to maintain or initiate alternate vehicular traffic and to prevent looting.	Ranking local law enforcement officers.
6. Establish roadblocks to prevent unauthorized entry.	Planned by Giles County OES Director and executed by local officers.
7. Locate additional or alternate evacuation centers, as needed.	Planned by the American Red Cross or county OES Director and executed by local officers with assistance from Plant Personnel as requested.

**Section F - NO FAILURE**

Cancellation of evacuation order.

<b>Action</b>	<b>Responsibility</b>
1.Cancel Evacuation Notification	Plant Manager, Production Services Superintendent, or VADEM

**Check when notified**

- | <b><u>Check when notified</u></b>   | <b><u>Telephone Number</u></b> |
|---|--------------------------------|
| <input type="checkbox"/> Giles County OES   | 911 or (540)921-2525           |
| <input type="checkbox"/> VA Department of Emergency Management<br>Emergency Operations Center | (804) 674-2400                 |
| <input type="checkbox"/> VA DCR Regional Engineer   | (804) 363-0992                 |
| <input type="checkbox"/> American Water   | (304) 466-5050                 |

**PART VI – GENERAL RESPONSIBILITIES UNDER THE EAP**

Specific responsibilities regarding decisions, notifications, and evacuations are given in Part V. Listed below is contact information for those included in Part V.

The Glen Lyn Plant manager shall serve as the EAP Coordinator.

Glen Lyn Plant  
Plant Mailing Address – 100 APCO Road, Glen Lyn, VA 24093  
Plant Physical Location – 0.5 miles east of Glen Lyn, VA  
Plant Telephone: 540-726-1165

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Glen Lyn Plant Contacts:

	<u>Office</u>	<u>Cell</u>
William Cummings, Glen Lyn Plant:		740-645-6992
Josh Coulter, Plant Coordinator	681-552-3152	681-552-3152
Mark Perkins, Safety Supervisor	540-994-1254	540-922-5777

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AEP Service Corporation Contacts:

	<u>Office</u>	<u>Cell</u>
Mohammad Ajlouni, P.E., Geotechnical Engineering	614-716-2939	614-747-0953
Daniel W Pizzino, P.E., Director, Civil Engineering	614-716-1472	614-363-9895
Jeremiah E Carter, Engineer, Erv Permit Services		304-928-5207
Jill Parker Witt P.E., Engineer, Ash Management Services	318-673-3816	318-673-3816

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AEP Appalachian Power Company Contacts:

	<u>Office</u>
Brian Abraham, President & COO	304-348-4123

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Local and State Contacts:

Chris McKlarney, Coordinator Office of Emergency Services Giles County, VA	540- 921-2525
Morgan Millirons, Sherriff Giles County, VA	540-921-3842
Tim Estes, Coordinator Region 4 VA Department of Emergency Management Marion, VA 24354	804-212-5437
Steven E. Bricker, P.E. VA Department of Conservation and Recreation Radford, VA 24141	804-363-0992

## **PART VII – PREPAREDNESS**

Actions taken prior, during, and after an emergency condition are given in Part V.

## **PART VIII – INUNDATION MAP**

The Emergency Evacuation/Inundation Map has been included in a map pocket following this page. This map shows the locations of the Auxiliary Fly Ash Pond, the Bottom Ash Complex, and the West Pond.

It should be noted that, due to the method and procedure used to develop the flooded area, the limits of flooding shown are approximate and should be used solely as a guideline for establishing evacuation zones. Actual evacuation zones may be greater than the area covered by the flood areas shown and should be re-established by local officials based on their judgment and knowledge of local conditions. Evacuation of residents outside of the area shown may be warranted and shall be at the discretion of the Giles County OES and/or sheriff's departments.

### **Changes in Potential Impacts on Inundation Zone**

Since the most recent update of the EAP, no changes to the existing condition took place. The most recent dam break map was prepared in 2009.

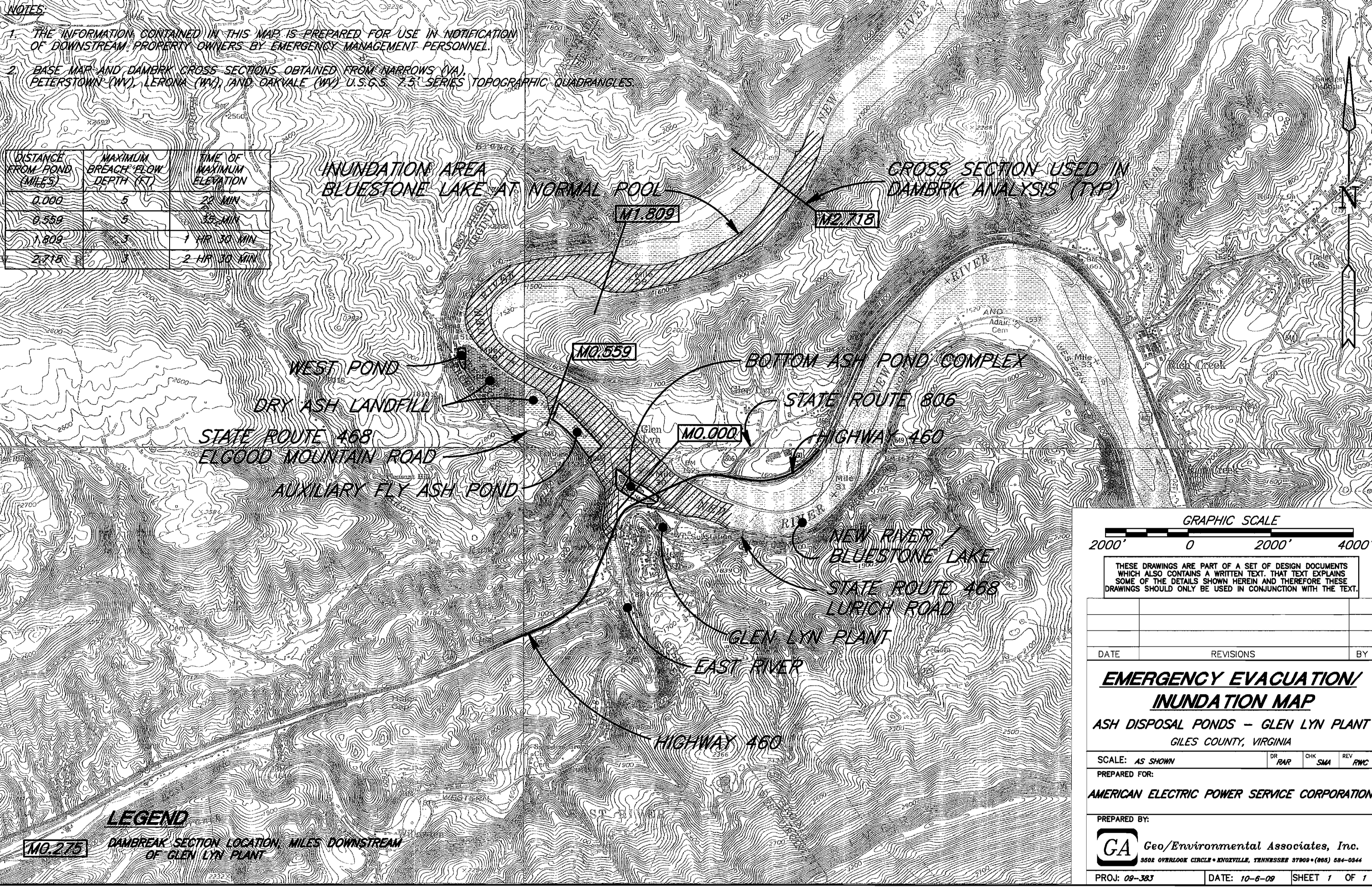
Using 2009 analysis is conservative since the plant is not operating and the bottom ash pond at the sunny day condition is dry with no inflow from the plant. In addition, the fly ash pond is now closed with no free water.

The only free water existing currently is less than 100,000 yd<sup>3</sup>. which in case of dam failure will result in a minimal rise of river water level (less than 1 foot) within the projected inundation area.

**NOTES:**

1. THE INFORMATION CONTAINED IN THIS MAP IS PREPARED FOR USE IN NOTIFICATION OF DOWNSTREAM PROPERTY OWNERS BY EMERGENCY MANAGEMENT PERSONNEL.
2. BASE MAP AND DAMBRK CROSS SECTIONS OBTAINED FROM NARROWS (VA), PETERSTOWN (WV), LERONA (WV), AND OAKVALE (WV) U.S.G.S. 7.5' SERIES TOPOGRAPHIC QUADRANGLES

DISTANCE FROM POND (MILES)	MAXIMUM BREACH FLOW DEPTH (FT)	TIME OF MAXIMUM ELEVATION
0.000	5	20 MIN
0.559	5	35 MIN
1.809	3	1 HR 30 MIN
2.715	3	2 HR 30 MIN



INUNDATION AREA BLUESTONE LAKE AT NORMAL POOL  
 CROSS SECTION USED IN DAMBRK ANALYSIS (TYP)

WEST POND  
 DRY ASH LANDFILL  
 STATE ROUTE 468  
 ELGOOD MOUNTAIN ROAD  
 AUXILIARY FLY ASH POND  
 BOTTOM ASH POND COMPLEX  
 STATE ROUTE 806  
 HIGHWAY 460  
 NEW RIVER / BLUESTONE LAKE  
 STATE ROUTE 468  
 LURICH ROAD  
 GLEN LYN PLANT  
 EAST RIVER  
 HIGHWAY 460



THESE DRAWINGS ARE PART OF A SET OF DESIGN DOCUMENTS WHICH ALSO CONTAINS A WRITTEN TEXT. THAT TEXT EXPLAINS SOME OF THE DETAILS SHOWN HEREIN AND THEREFORE THESE DRAWINGS SHOULD ONLY BE USED IN CONJUNCTION WITH THE TEXT.

DATE	REVISIONS	BY

**EMERGENCY EVACUATION/  
 INUNDATION MAP**  
 ASH DISPOSAL PONDS – GLEN LYN PLANT  
 GILES COUNTY, VIRGINIA

SCALE: AS SHOWN DR RAR CHK SMA REV RWC  
 PREPARED FOR:  
**AMERICAN ELECTRIC POWER SERVICE CORPORATION**

PREPARED BY:  
 **Geo/Environmental Associates, Inc.**  
 3502 OVERLOOK CIRCLE • KNOXVILLE, TENNESSEE 37909 • (615) 584-0344

**LEGEND**

**MO.275** DAMBREK SECTION LOCATION, MILES DOWNSTREAM OF GLEN LYN PLANT

**PART IX – APPENDICES**

## **Appendix A – Investigation and Analyses of Impounding Structure Failure Flood**

Separate breach analyses were performed for the Auxiliary Ash Pond and the Bottom Ash Pond Complex. The geometry of the Bottom Ash Complex was conservatively simplified to assume there is one pond with no internal dikes.

For a high or significant hazard dam, it is common that a breach analysis be performed to evaluate the downstream impacts from a failure under normal operating conditions and during the Probable Maximum Flood (PMF).

Upon review of the downstream area, it became apparent that the PMF occurring over the watershed would inundate the downstream area whether the dam breached or not. Therefore, since the failure of the dam during a PMF does not cause significant additional impact upon the downstream area, the breach analysis was performed for the normal operating conditions or a "sunny day" breach.

The breach analysis was performed using Army Corps of Engineers' *HEC-1* Flood Hydrograph Package, 1990, and the National Weather Services' NWS DAMBRK model, 1988. The *HEC-1* analysis was performed to estimate the breach flows from the dam.

The failure analysis for the Auxiliary Fly Ash Pond used the following breach parameters:

- 1) a base width of 96 feet (i.e., 2 times the breach height),
- 2) side slopes of 1.0 horizontal to 1.0 vertical,
- 3) time to breach of 0.5 hour (the recommended range for a well-constructed earth dam is 0.5 to 3.0 hours),
- 4) a breach height of 48 feet was used (i.e., bottom elevation of 1490 feet and maximum operating pool of 1538 feet), and
- 5) the pool was set at elevation 1538 feet for the beginning of the breach.

The failure analysis for the Bottom Ash Complex used the following breach parameters:

- 1) a base width of 30 feet (i.e., 2 times the breach height),
- 2) side slopes of 1.0 horizontal to 1.0 vertical,
- 3) time to breach of 0.5 hour (the recommended range for a well-constructed earth dam is 0.5 to 3.0 hours),
- 4) a breach height of 15 feet was used (i.e., bottom elevation of 1500 feet), and
- 5) the pool was set at elevation 1506.3 feet for the beginning of the breach (5 feet above the internal outfall to conservatively account for human or mechanical error).

Since the flow from the Auxiliary Fly Ash Pond was much greater, that discharge hydrograph was conservatively used in the DAMBRK analysis. The following parameters were used in the DAMBRK analysis:

- 1) flow could be either subcritical or supercritical,
- 2) 4 cross sections were selected over a distance of 2.718 miles downstream
- 3) Manning's coefficient "n" ranged from 0.06 for the flow area within the main channel to 0.10 for the flow area in the floodplain where vegetation would retard flow.

Cross sections were taken from 1" = 2000' USGS Quadrangle Maps or topographic mapping provided by AEP. The analysis results are included in this appendix.

We utilized DAMBRK to estimate flow conditions along the New River to a distance approximately 2.718 miles downstream of the plant, where the breach flow was estimated to increase the water less than 4 feet.

The flows and water elevations from the DAMBRK analyses have been used to estimate the extent of flooding. A map is included in Part VIII to show the areas where inundation is predicted, which would need to be evacuated in the event of a "sunny day" breach of the dam.

It should be noted that, due to the method and procedure used to develop the flooded area, the limits of flooding shown are approximate and should be used solely as a guideline for establishing evacuation zones. Actual evacuation zones may be greater than the area covered by the flood areas shown and should be reestablished by local officials based on their judgment and knowledge of local conditions. Evacuation of residents outside of the area shown may be warranted and shall be at the discretion of the affected counties' offices of emergency services and/or sheriff's department.

**BREACH ANALYSIS – BOTTOM ASH POND COMPLEX**

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1*****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
  SEPTEMBER 1990
  VERSION 4.0
*
* RUN DATE 10/05/2009 TIME 15:13:07 *
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

\*\*\* FREE \*\*\*

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1 ID *****
2 ID *
3 ID * Glyn Lyn Plant Bottom Ash Complex File: glbapbr.inp
4 ID * Computation of Dambreak Hydrograph
5 ID * GA Project No. 09-383
6 ID *
7 ID *
8 ID * Analyses by: Geo/Environmental Associates
9 ID * Knoxville, TN
10 ID * September 2009
11 ID *****
12 IT 3 0 0 300
13 IO 3 0
14 VS IMP IMP IMP
15 VV 2.11 6.11 7.11
16 KK IMP
17 RS 1 ELEV 1506.3
18 SA 4.2 4.6 5.5
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22 SB 1500 30 0.5 0.5 1506.3
23 ZZ

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* VERSION 4.0
*
* RUN DATE 10/05/2009 TIME 15:13:07 *
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
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*
* Glyn Lyn Plant Bottom Ash Complex File: glbapbr.inp
* Computation of Dambreak Hydrograph
*

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*      GA Project No. 09-383      *
*      *                          *
*      Analyses by: Geo/Environmental Associates *
*      Knoxville, TN             *
*      September 2009            *
*      *                          *
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13 IO      OUTPUT CONTROL VARIABLES
          IPRNT      3  PRINT CONTROL
          IPLOT      0  PLOT CONTROL
          QSCAL      0.  HYDROGRAPH PLOT SCALE

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IT        HYDROGRAPH TIME DATA
          NMIN      3  MINUTES IN COMPUTATION INTERVAL
          IDATE     1  0  STARTING DATE
          ITIME     0000 STARTING TIME
          NQ        300 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE    1  0  ENDING DATE
          NDTIME    1457 ENDING TIME
          ICENT     19  CENTURY MARK

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          COMPUTATION INTERVAL .05 HOURS
          TOTAL TIME BASE     14.95 HOURS

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ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW               CUBIC FEET PER SECOND
STORAGE VOLUME    ACRE-FEET
SURFACE AREA      ACRES
TEMPERATURE       DEGREES FAHRENHEIT

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USER-DEFINED OUTPUT SPECIFICATIONS

TABLE 1

VS STATION	IMP	IMP	IMP							
VV VARIABLE CODE	2.11	6.11	7.11	.00	.00	.00	.00	.00	.00	.00

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*****
*      *
16 KK  *      IMP *
*      *
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HYDROGRAPH ROUTING DATA

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17 RS      STORAGE ROUTING
          NSTPS      1  NUMBER OF SUBREACHES
          ITYP       ELEV TYPE OF INITIAL CONDITION
          RSVRIC     1506.30 INITIAL CONDITION
          X          .00 WORKING R AND D COEFFICIENT

18 SA      AREA      4.2      4.6      5.5

19 SQ      DISCHARGE  0.      0.      0.

20 SE      ELEVATION  1500.00  1510.00  1515.00

21 ST      TOP OF DAM
          TOPEL     1515.00 ELEVATION AT TOP OF DAM
          DAMWID    900.00  DAM WIDTH
          COQD      3.00   WEIR COEFFICIENT
          EXPD      1.50   EXPONENT OF HEAD

22 SB      BREACH DATA
          ELBM     1500.00 ELEVATION AT BOTTOM OF BREACH
          BRWID    30.00  WIDTH OF BREACH BOTTOM
          Z        .50   BREACH SIDE SLOPE
          TFAIL    .50   TIME FOR BREACH TO DEVELOP
          FAILEL   1506.30 W.S. ELEVATION TO TRIGGER FAILURE

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COMPUTED STORAGE-ELEVATION DATA

STORAGE .00 43.98 69.20  
 ELEVATION 1500.00 1510.00 1515.00

BEGIN DAM FAILURE AT .00 HOURS

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HYDROGRAPH AT STATION IMP

PEAK OUTFLOW IS 993. AT TIME .50 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW				
(CFS)	(HR)	6-HR	24-HR	72-HR	14.95-HR	
993.	.50	55.	22.	22.	22.	
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	27.	28.	28.	28.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)	6-HR	24-HR	72-HR	14.95-HR
27.	.05	4.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
(FEET)	(HR)	6-HR	24-HR	72-HR	14.95-HR
1506.30	.01	1500.87	1500.37	1500.37	1500.37

CUMULATIVE AREA = .00 SQ MI

RUNOFF SUMMARY  
 FLOW IN CUBIC FEET PER SECOND  
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
ROUTED TO	IMP	993.	.50	55.	22.	22.	.00	1506.30	.01

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION IMP  
 (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	1506.30	1506.30	1515.00	1515.00
	STORAGE	27.	69.	69.
	OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1506.30	.00	27.	993.	.00	.50	.00

TABLE 1	STATION	IMP FLOW	IMP STORAGE	IMP STAGE
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PER DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
1	1	0000	.00	27.24	1506.30
2	1	0003	.00	27.24	1506.30
3	1	0006	.00	27.24	1506.30
4	1	0009	.00	27.24	1506.30
5	1	0012	.00	27.24	1506.30
6	1	0015	.00	27.24	1506.30
7	1	0018	9.13	27.24	1506.30
8	1	0021	152.54	26.95	1506.23
9	1	0024	399.62	25.84	1505.98
10	1	0027	696.95	23.58	1505.47
11	1	0030	992.63	20.08	1504.68
12	1	0033	738.54	16.54	1503.87
	1	0036	564.96	13.86	1503.25
	1	0039	442.19	11.80	1502.77
	1	0042	352.79	10.16	1502.39

16	1	0045	286.09	8.85	1502.09
	1	0048	235.31	7.77	1501.84
	1	0051	195.94	6.89	1501.63
	1	0054	164.96	6.14	1501.45
20	1	0057	140.19	5.52	1501.31
21	1	0100	120.18	4.98	1501.18
22	1	0103	103.80	4.52	1501.07
23	1	0106	90.29	4.12	1500.98
24	1	0109	79.03	3.77	1500.89
25	1	0112	69.61	3.47	1500.82
26	1	0115	61.61	3.20	1500.76
27	1	0118	54.80	2.96	1500.70
28	1	0121	48.95	2.74	1500.65
29	1	0124	43.92	2.55	1500.61
30	1	0127	39.55	2.38	1500.57
31	1	0130	35.74	2.22	1500.53
32	1	0133	32.43	2.09	1500.50
33	1	0136	29.51	1.96	1500.47
34	1	0139	26.93	1.84	1500.44
35	1	0142	24.63	1.74	1500.41
36	1	0145	22.60	1.64	1500.39
37	1	0148	20.78	1.55	1500.37
38	1	0151	19.16	1.47	1500.35
39	1	0154	17.70	1.39	1500.33
40	1	0157	16.38	1.32	1500.31
41	1	0200	15.19	1.26	1500.30
42	1	0203	14.11	1.20	1500.29
43	1	0206	13.14	1.14	1500.27
44	1	0209	12.25	1.09	1500.26
45	1	0212	11.44	1.04	1500.25
46	1	0215	10.71	1.00	1500.24
47	1	0218	10.03	.95	1500.23
48	1	0221	9.40	.91	1500.22
49	1	0224	8.83	.88	1500.21
50	1	0227	8.30	.84	1500.20

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PFR	DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
	1		0230	7.81	.81	1500.19
52	1		0233	7.37	.78	1500.18
53	1		0236	6.95	.75	1500.18
54	1		0239	6.56	.72	1500.17
55	1		0242	6.22	.69	1500.17
56	1		0245	5.88	.67	1500.16
57	1		0248	5.58	.65	1500.15
58	1		0251	5.28	.62	1500.15
59	1		0254	5.02	.60	1500.14
60	1		0257	4.77	.58	1500.14
61	1		0300	4.54	.56	1500.13
62	1		0303	4.32	.54	1500.13
63	1		0306	4.11	.53	1500.13
64	1		0309	3.92	.51	1500.12
65	1		0312	3.75	.50	1500.12
66	1		0315	3.57	.48	1500.11
67	1		0318	3.41	.47	1500.11
68	1		0321	3.27	.45	1500.11
69	1		0324	3.13	.44	1500.10
70	1		0327	2.99	.43	1500.10
71	1		0330	2.86	.41	1500.10
72	1		0333	2.74	.40	1500.10
73	1		0336	2.64	.39	1500.09
74	1		0339	2.54	.38	1500.09
75	1		0342	2.44	.37	1500.09
76	1		0345	2.34	.36	1500.09
77	1		0348	2.24	.35	1500.08
78	1		0351	2.15	.34	1500.08
79	1		0354	2.08	.33	1500.08
80	1		0357	2.01	.33	1500.08
81	1		0400	1.94	.32	1500.08
82	1		0403	1.87	.31	1500.07
83	1		0406	1.80	.30	1500.07
84	1		0409	1.73	.30	1500.07
85	1		0412	1.66	.29	1500.07
86	1		0415	1.60	.28	1500.07
87	1		0418	1.54	.27	1500.07
	1		0421	1.50	.27	1500.06
	1		0424	1.45	.26	1500.06
	1		0427	1.41	.26	1500.06

91	1	0430	1.37	.25	1500.06
	1	0433	1.33	.25	1500.06
	1	0436	1.29	.24	1500.06
	1	0439	1.25	.24	1500.06
95	1	0442	1.21	.23	1500.06
96	1	0445	1.17	.23	1500.05
97	1	0448	1.13	.22	1500.05
98	1	0451	1.09	.22	1500.05
99	1	0454	1.05	.21	1500.05
100	1	0457	1.01	.21	1500.05

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN			
101	1		0500	.98	.20	1500.05
102	1		0503	.94	.20	1500.05
103	1		0506	.92	.19	1500.05
104	1		0509	.90	.19	1500.05
105	1		0512	.88	.19	1500.05
106	1		0515	.87	.19	1500.04
107	1		0518	.85	.18	1500.04
108	1		0521	.83	.18	1500.04
109	1		0524	.81	.18	1500.04
110	1		0527	.80	.18	1500.04
111	1		0530	.78	.17	1500.04
112	1		0533	.76	.17	1500.04
113	1		0536	.74	.17	1500.04
114	1		0539	.73	.17	1500.04
115	1		0542	.71	.16	1500.04
116	1		0545	.69	.16	1500.04
117	1		0548	.68	.16	1500.04
118	1		0551	.66	.16	1500.04
119	1		0554	.64	.15	1500.04
120	1		0557	.63	.15	1500.04
121	1		0600	.61	.15	1500.04
122	1		0603	.60	.15	1500.03
123	1		0606	.58	.14	1500.03
124	1		0609	.57	.14	1500.03
	1		0612	.55	.14	1500.03
	1		0615	.53	.14	1500.03
	1		0618	.52	.13	1500.03
128	1		0621	.50	.13	1500.03
129	1		0624	.49	.13	1500.03
130	1		0627	.48	.13	1500.03
131	1		0630	.46	.12	1500.03
132	1		0633	.45	.12	1500.03
133	1		0636	.43	.12	1500.03
134	1		0639	.42	.11	1500.03
135	1		0642	.40	.11	1500.03
136	1		0645	.39	.11	1500.03
137	1		0648	.38	.11	1500.03
138	1		0651	.36	.10	1500.02
139	1		0654	.35	.10	1500.02
140	1		0657	.34	.10	1500.02
141	1		0700	.32	.10	1500.02
142	1		0703	.31	.09	1500.02
143	1		0706	.31	.09	1500.02
144	1		0709	.31	.09	1500.02
145	1		0712	.31	.09	1500.02
146	1		0715	.31	.09	1500.02
147	1		0718	.31	.09	1500.02
148	1		0721	.31	.09	1500.02
149	1		0724	.31	.09	1500.02
150	1		0727	.31	.09	1500.02

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN			
151	1		0730	.31	.09	1500.02
152	1		0733	.31	.09	1500.02
153	1		0736	.31	.09	1500.02
154	1		0739	.31	.09	1500.02
155	1		0742	.31	.09	1500.02
156	1		0745	.31	.09	1500.02
	1		0748	.31	.09	1500.02
	1		0751	.31	.09	1500.02
	1		0754	.31	.09	1500.02

160	1	0757	.31	.09	1500.02
	1	0800	.31	.09	1500.02
	1	0803	.31	.09	1500.02
	1	0806	.31	.09	1500.02
164	1	0809	.31	.09	1500.02
165	1	0812	.31	.09	1500.02
166	1	0815	.31	.09	1500.02
167	1	0818	.31	.09	1500.02
168	1	0821	.31	.09	1500.02
169	1	0824	.31	.09	1500.02
170	1	0827	.31	.09	1500.02
171	1	0830	.31	.09	1500.02
172	1	0833	.31	.09	1500.02
173	1	0836	.31	.09	1500.02
174	1	0839	.31	.09	1500.02
175	1	0842	.31	.09	1500.02
176	1	0845	.31	.09	1500.02
177	1	0848	.31	.09	1500.02
178	1	0851	.31	.09	1500.02
179	1	0854	.31	.09	1500.02
180	1	0857	.31	.09	1500.02
181	1	0900	.31	.09	1500.02
182	1	0903	.31	.09	1500.02
183	1	0906	.31	.09	1500.02
184	1	0909	.31	.09	1500.02
185	1	0912	.31	.09	1500.02
186	1	0915	.31	.09	1500.02
187	1	0918	.31	.09	1500.02
188	1	0921	.31	.09	1500.02
189	1	0924	.31	.09	1500.02
190	1	0927	.31	.09	1500.02
191	1	0930	.31	.09	1500.02
192	1	0933	.31	.09	1500.02
193	1	0936	.31	.09	1500.02
194	1	0939	.31	.09	1500.02
195	1	0942	.31	.09	1500.02
196	1	0945	.31	.09	1500.02
197	1	0948	.31	.09	1500.02
198	1	0951	.31	.09	1500.02
199	1	0954	.31	.09	1500.02
	1	0957	.31	.09	1500.02

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
201	1		1000	.31	.09	1500.02
202	1		1003	.31	.09	1500.02
203	1		1006	.31	.09	1500.02
204	1		1009	.31	.09	1500.02
205	1		1012	.31	.09	1500.02
206	1		1015	.31	.09	1500.02
207	1		1018	.31	.09	1500.02
208	1		1021	.31	.09	1500.02
209	1		1024	.31	.09	1500.02
210	1		1027	.31	.09	1500.02
211	1		1030	.31	.09	1500.02
212	1		1033	.31	.09	1500.02
213	1		1036	.31	.09	1500.02
214	1		1039	.31	.09	1500.02
215	1		1042	.31	.09	1500.02
216	1		1045	.31	.09	1500.02
217	1		1048	.31	.09	1500.02
218	1		1051	.31	.09	1500.02
219	1		1054	.31	.09	1500.02
220	1		1057	.31	.09	1500.02
221	1		1100	.31	.09	1500.02
222	1		1103	.31	.09	1500.02
223	1		1106	.31	.09	1500.02
224	1		1109	.31	.09	1500.02
225	1		1112	.31	.09	1500.02
226	1		1115	.31	.09	1500.02
227	1		1118	.31	.09	1500.02
228	1		1121	.31	.09	1500.02
229	1		1124	.31	.09	1500.02
230	1		1127	.31	.09	1500.02
231	1		1130	.31	.09	1500.02
	1		1133	.31	.09	1500.02
	1		1136	.31	.09	1500.02
	1		1139	.31	.09	1500.02

235	1	1142	.31	.09	1500.02
	1	1145	.31	.09	1500.02
	1	1148	.31	.09	1500.02
	1	1151	.31	.09	1500.02
239	1	1154	.31	.09	1500.02
240	1	1157	.31	.09	1500.02
241	1	1200	.31	.09	1500.02
242	1	1203	.31	.09	1500.02
243	1	1206	.31	.09	1500.02
244	1	1209	.31	.09	1500.02
245	1	1212	.31	.09	1500.02
246	1	1215	.31	.09	1500.02
247	1	1218	.31	.09	1500.02
248	1	1221	.31	.09	1500.02
249	1	1224	.31	.09	1500.02
250	1	1227	.31	.09	1500.02

ITABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
251	1		1230	.31	.09	1500.02
252	1		1233	.31	.09	1500.02
253	1		1236	.31	.09	1500.02
254	1		1239	.31	.09	1500.02
255	1		1242	.31	.09	1500.02
256	1		1245	.31	.09	1500.02
257	1		1248	.31	.09	1500.02
258	1		1251	.31	.09	1500.02
259	1		1254	.31	.09	1500.02
260	1		1257	.31	.09	1500.02
261	1		1300	.31	.09	1500.02
262	1		1303	.31	.09	1500.02
263	1		1306	.31	.09	1500.02
264	1		1309	.31	.09	1500.02
265	1		1312	.31	.09	1500.02
266	1		1315	.31	.09	1500.02
267	1		1318	.31	.09	1500.02
268	1		1321	.31	.09	1500.02
	1		1324	.31	.09	1500.02
	1		1327	.31	.09	1500.02
271	1		1330	.31	.09	1500.02
272	1		1333	.31	.09	1500.02
273	1		1336	.31	.09	1500.02
274	1		1339	.31	.09	1500.02
275	1		1342	.31	.09	1500.02
276	1		1345	.31	.09	1500.02
277	1		1348	.31	.09	1500.02
278	1		1351	.31	.09	1500.02
279	1		1354	.31	.09	1500.02
280	1		1357	.31	.09	1500.02
281	1		1400	.31	.09	1500.02
282	1		1403	.31	.09	1500.02
283	1		1406	.31	.09	1500.02
284	1		1409	.31	.09	1500.02
285	1		1412	.31	.09	1500.02
286	1		1415	.31	.09	1500.02
287	1		1418	.31	.09	1500.02
288	1		1421	.31	.09	1500.02
289	1		1424	.31	.09	1500.02
290	1		1427	.31	.09	1500.02
291	1		1430	.31	.09	1500.02
292	1		1433	.31	.09	1500.02
293	1		1436	.31	.09	1500.02
294	1		1439	.31	.09	1500.02
295	1		1442	.31	.09	1500.02
296	1		1445	.31	.09	1500.02
297	1		1448	.31	.09	1500.02
298	1		1451	.31	.09	1500.02
299	1		1454	.31	.09	1500.02
300	1		1457	.31	.09	1500.02
			MAX	992.63	27.24	1506.30
			MIN	.00	.09	1500.02
			AVE	22.23	1.60	1500.38

NORMAL END OF HEC-1 \*\*\*

**BREACH ANALYSIS – AUXILIARY FLY ASH POND**

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* SEPTEMBER 1990
* VERSION 4.0
*
* RUN DATE 09/17/2009 TIME 09:00:33
*
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
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X X X X X
X X XXXXXXX XXXXX XXX

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

\*\*\* FREE \*\*\*

```

1 ID *****
2 ID *
3 ID * Glyn Lyn Plant Auxiliary Fly Ash Pond File: glafabr.inp *
4 ID * Computation of Dambreak Hydrograph *
5 ID * GA Project No. 09-383 *
6 ID *
7 ID *
8 ID * Analyses by: Geo/Environmental Associates *
9 ID * Knoxville, TN *
10 ID * September 2009 *
11 ID *****
12 IT 3 0 0 300
13 IO 3 0
14 VS IMP IMP IMP
15 VV 2.11 6.11 7.11
16 KK IMP
17 RS 1 ELEV 1538
18 SA 3.4 4.4 5.4 8.3
19 SQ 0 0 0 0
20 SE 1490 1500 1520 1538
21 ST 1540 300 3.0 1.5
22 SB 1490 96 0.5 0.5 1538
23 ZZ

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1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* SEPTEMBER 1990
* VERSION 4.0
*
* RUN DATE 09/17/2009 TIME 09:00:33
*
*****

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*****
*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 756-1104
*
*****

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*
* Glyn Lyn Plant Auxiliary Fly Ash Pond File: glafabr.inp
* Computation of Dambreak Hydrograph
* GA Project No. 09-383
*
* Analyses by: Geo/Environmental Associates
* Knoxville, TN
* September 2009
*
*****

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IPRNT 3 PRINT CONTROL  
 IPLOT 0 PLOT CONTROL  
 QSCAL 0. HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA  
 NMIN 3 MINUTES IN COMPUTATION INTERVAL  
 IDATE 1 0 STARTING DATE  
 ITIME 0000 STARTING TIME  
 NQ 300 NUMBER OF HYDROGRAPH ORDINATES  
 NDDATE 1 0 ENDING DATE  
 NDTIME 1457 ENDING TIME  
 ICENT 19 CENTURY MARK

COMPUTATION INTERVAL .05 HOURS  
 TOTAL TIME BASE 14.95 HOURS

ENGLISH UNITS  
 DRAINAGE AREA SQUARE MILES  
 PRECIPITATION DEPTH INCHES  
 LENGTH, ELEVATION FEET  
 FLOW CUBIC FEET PER SECOND  
 STORAGE VOLUME ACRE-FEET  
 SURFACE AREA ACRES  
 TEMPERATURE DEGREES FAHRENHEIT

USER-DEFINED OUTPUT SPECIFICATIONS

TABLE 1

VS STATION	IMP	IMP	IMP							
VV VARIABLE CODE	2.11	6.11	7.11	.00	.00	.00	.00	.00	.00	.00

\*\*\* \*\*

\*\*\*\*\*  
 \* \*  
 16 KK \* IMP \*  
 \* \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

17 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1538.00 INITIAL CONDITION  
 X .00 WORKING R AND D COEFFICIENT

18 SA AREA 3.4 4.4 5.4 8.3

19 SQ DISCHARGE 0. 0. 0. 0.

20 SE ELEVATION 1490.00 1500.00 1520.00 1538.00

21 ST TOP OF DAM  
 TOPEL 1540.00 ELEVATION AT TOP OF DAM  
 DAMWID 300.00 DAM WIDTH  
 COQD 3.00 WEIR COEFFICIENT  
 EXPD 1.50 EXPONENT OF HEAD

22 SB BREACH DATA  
 ELBM 1490.00 ELEVATION AT BOTTOM OF BREACH  
 BRWID 96.00 WIDTH OF BREACH BOTTOM  
 Z .50 BREACH SIDE SLOPE  
 TFAIL .50 TIME FOR BREACH TO DEVELOP  
 FAILLEL 1538.00 W.S. ELEVATION TO TRIGGER FAILURE

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	38.89	136.72	259.09
ELEVATION	1490.00	1500.00	1520.00	1538.00

BEGIN DAM FAILURE AT .00 HOURS

\*\*\* \*\*

HYDROGRAPH AT STATION IMP

PEAK OUTFLOW IS 9171. AT TIME .29 HOURS

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
(CFS)	(HR)	6-HR	24-HR	72-HR	14.95-HR
9156.	.30	527.	212.	212.	212.

(INCHES) .000 .000 .000 .000  
 (AC-FT) 261. 262. 262. 262.

PEAK STORAGE TIME  
 + (AC-FT) (HR)  
 259. .05  
 MAXIMUM AVERAGE STORAGE  
 6-HR 24-HR 72-HR 14.95-HR  
 15. 6. 6. 6.  
 PEAK STAGE TIME  
 + (FEET) (HR)  
 1538.00 .01  
 1493.01 1491.21 1491.21 1491.21  
 CUMULATIVE AREA = .00 SQ MI

RUNOFF SUMMARY  
 FLOW IN CUBIC FEET PER SECOND  
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
ROUTED TO	IMP	9156.	.30	527.	212.	212.	.00	1538.00	.01

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION IMP  
 (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	1538.00	1538.00	1540.00	1540.00
	STORAGE	259.	276.	276.
	OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1538.00	.00	259.	9171.	.00	.29	.00

TABLE 1 STATION IMP FLOW IMP STORAGE IMP STAGE

DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
1	1	0000	.00	259.09	1538.00
2	1	0003	171.01	258.94	1537.98
3	1	0006	1443.48	256.06	1537.63
4	1	0009	3898.25	245.31	1536.31
5	1	0012	6669.29	223.38	1533.48
6	1	0015	8634.21	191.35	1529.00
7	1	0018	9155.85	154.09	1523.09
8	1	0021	8468.76	117.47	1516.37
9	1	0024	7607.59	84.27	1509.79
10	1	0027	6824.44	54.48	1503.48
11	1	0030	6109.88	27.73	1497.38
12	1	0033	2027.35	12.76	1493.57
13	1	0036	875.63	7.17	1492.05
14	1	0039	448.95	4.56	1491.32
15	1	0042	258.59	3.14	1490.91
16	1	0045	161.82	2.29	1490.67
17	1	0048	107.73	1.74	1490.51
18	1	0051	75.28	1.37	1490.40
19	1	0054	54.63	1.11	1490.32
20	1	0057	40.83	.91	1490.27
21	1	0100	31.35	.76	1490.22
22	1	0103	24.61	.65	1490.19
23	1	0106	19.71	.56	1490.16
24	1	0109	16.01	.49	1490.14
25	1	0112	13.21	.43	1490.13
26	1	0115	11.02	.38	1490.11
27	1	0118	9.30	.34	1490.10
28	1	0121	7.90	.30	1490.09
29	1	0124	6.78	.27	1490.08
30	1	0127	5.85	.25	1490.07
31	1	0130	5.09	.23	1490.07
32	1	0133	4.46	.21	1490.06
33	1	0136	3.92	.19	1490.06
34	1	0139	3.47	.18	1490.05
35	1	0142	3.10	.16	1490.05
	1	0145	2.76	.15	1490.04
	1	0148	2.48	.14	1490.04
	1	0151	2.23	.13	1490.04
39	1	0154	2.02	.12	1490.04
40	1	0157	1.82	.11	1490.03
41	1	0200	1.67	.11	1490.03
42	1	0203	1.53	.10	1490.03

43	1	0206	1.39	.10	1490.03
44	1	0209	1.27	.09	1490.03
45	1	0212	1.18	.09	1490.03
46	1	0215	1.09	.08	1490.02
47	1	0218	1.01	.08	1490.02
48	1	0221	.93	.07	1490.02
	1	0224	.85	.07	1490.02
	1	0227	.78	.06	1490.02

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN			
51	1		0230	.74	.06	1490.02
52	1		0233	.70	.06	1490.02
53	1		0236	.67	.06	1490.02
54	1		0239	.63	.06	1490.02
55	1		0242	.60	.05	1490.02
56	1		0245	.56	.05	1490.02
57	1		0248	.53	.05	1490.01
58	1		0251	.50	.05	1490.01
59	1		0254	.47	.05	1490.01
60	1		0257	.44	.04	1490.01
61	1		0300	.40	.04	1490.01
62	1		0303	.38	.04	1490.01
63	1		0306	.35	.04	1490.01
64	1		0309	.32	.04	1490.01
65	1		0312	.29	.03	1490.01
66	1		0315	.26	.03	1490.01
67	1		0318	.26	.03	1490.01
68	1		0321	.26	.03	1490.01
69	1		0324	.26	.03	1490.01
70	1		0327	.26	.03	1490.01
71	1		0330	.26	.03	1490.01
72	1		0333	.26	.03	1490.01
73	1		0336	.26	.03	1490.01
74	1		0339	.26	.03	1490.01
75	1		0342	.26	.03	1490.01
76	1		0345	.26	.03	1490.01
77	1		0348	.26	.03	1490.01
78	1		0351	.26	.03	1490.01
79	1		0354	.26	.03	1490.01
80	1		0357	.26	.03	1490.01
81	1		0400	.26	.03	1490.01
	1		0403	.26	.03	1490.01
	1		0406	.26	.03	1490.01
84	1		0409	.26	.03	1490.01
85	1		0412	.26	.03	1490.01
86	1		0415	.26	.03	1490.01
87	1		0418	.26	.03	1490.01
88	1		0421	.26	.03	1490.01
89	1		0424	.26	.03	1490.01
90	1		0427	.26	.03	1490.01
91	1		0430	.26	.03	1490.01
92	1		0433	.26	.03	1490.01
93	1		0436	.26	.03	1490.01
94	1		0439	.26	.03	1490.01
95	1		0442	.26	.03	1490.01
96	1		0445	.26	.03	1490.01
97	1		0448	.26	.03	1490.01
98	1		0451	.26	.03	1490.01
99	1		0454	.26	.03	1490.01
100	1		0457	.26	.03	1490.01

TABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN			
101	1		0500	.26	.03	1490.01
102	1		0503	.26	.03	1490.01
103	1		0506	.26	.03	1490.01
104	1		0509	.26	.03	1490.01
105	1		0512	.26	.03	1490.01
106	1		0515	.26	.03	1490.01
107	1		0518	.26	.03	1490.01
108	1		0521	.26	.03	1490.01
109	1		0524	.26	.03	1490.01
110	1		0527	.26	.03	1490.01
111	1		0530	.26	.03	1490.01
112	1		0533	.26	.03	1490.01
113	1		0536	.26	.03	1490.01
	1		0539	.26	.03	1490.01
	1		0542	.26	.03	1490.01
	1		0545	.26	.03	1490.01
117	1		0548	.26	.03	1490.01
118	1		0551	.26	.03	1490.01
119	1		0554	.26	.03	1490.01
120	1		0557	.26	.03	1490.01

121	1	0600	.26	.03	1490.01
122	1	0603	.26	.03	1490.01
123	1	0606	.26	.03	1490.01
124	1	0609	.26	.03	1490.01
125	1	0612	.26	.03	1490.01
126	1	0615	.26	.03	1490.01
	1	0618	.26	.03	1490.01
	1	0621	.26	.03	1490.01
	1	0624	.26	.03	1490.01
130	1	0627	.26	.03	1490.01
131	1	0630	.26	.03	1490.01
132	1	0633	.26	.03	1490.01
133	1	0636	.26	.03	1490.01
134	1	0639	.26	.03	1490.01
135	1	0642	.26	.03	1490.01
136	1	0645	.26	.03	1490.01
137	1	0648	.26	.03	1490.01
138	1	0651	.26	.03	1490.01
139	1	0654	.26	.03	1490.01
140	1	0657	.26	.03	1490.01
141	1	0700	.26	.03	1490.01
142	1	0703	.26	.03	1490.01
143	1	0706	.26	.03	1490.01
144	1	0709	.26	.03	1490.01
145	1	0712	.26	.03	1490.01
146	1	0715	.26	.03	1490.01
147	1	0718	.26	.03	1490.01
148	1	0721	.26	.03	1490.01
149	1	0724	.26	.03	1490.01
150	1	0727	.26	.03	1490.01

ITABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
151	1		0730	.26	.03	1490.01
152	1		0733	.26	.03	1490.01
153	1		0736	.26	.03	1490.01
154	1		0739	.26	.03	1490.01
155	1		0742	.26	.03	1490.01
156	1		0745	.26	.03	1490.01
157	1		0748	.26	.03	1490.01
158	1		0751	.26	.03	1490.01
	1		0754	.26	.03	1490.01
	1		0757	.26	.03	1490.01
	1		0800	.26	.03	1490.01
162	1		0803	.26	.03	1490.01
163	1		0806	.26	.03	1490.01
164	1		0809	.26	.03	1490.01
165	1		0812	.26	.03	1490.01
166	1		0815	.26	.03	1490.01
167	1		0818	.26	.03	1490.01
168	1		0821	.26	.03	1490.01
169	1		0824	.26	.03	1490.01
170	1		0827	.26	.03	1490.01
171	1		0830	.26	.03	1490.01
172	1		0833	.26	.03	1490.01
173	1		0836	.26	.03	1490.01
174	1		0839	.26	.03	1490.01
175	1		0842	.26	.03	1490.01
176	1		0845	.26	.03	1490.01
177	1		0848	.26	.03	1490.01
178	1		0851	.26	.03	1490.01
179	1		0854	.26	.03	1490.01
180	1		0857	.26	.03	1490.01
181	1		0900	.26	.03	1490.01
182	1		0903	.26	.03	1490.01
183	1		0906	.26	.03	1490.01
184	1		0909	.26	.03	1490.01
185	1		0912	.26	.03	1490.01
186	1		0915	.26	.03	1490.01
187	1		0918	.26	.03	1490.01
188	1		0921	.26	.03	1490.01
189	1		0924	.26	.03	1490.01
190	1		0927	.26	.03	1490.01
191	1		0930	.26	.03	1490.01
192	1		0933	.26	.03	1490.01
193	1		0936	.26	.03	1490.01
194	1		0939	.26	.03	1490.01
195	1		0942	.26	.03	1490.01
196	1		0945	.26	.03	1490.01
197	1		0948	.26	.03	1490.01
	1		0951	.26	.03	1490.01
	1		0954	.26	.03	1490.01
200	1		0957	.26	.03	1490.01

ITABLE 1 STATION IMP IMP IMP  
(CONT.) FLOW STORAGE STAGE

PER	DAY	MON	HRMN			
201	1		1000	.26	.03	1490.01
202	1		1003	.26	.03	1490.01
203	1		1006	.26	.03	1490.01
204	1		1009	.26	.03	1490.01
	1		1012	.26	.03	1490.01
	1		1015	.26	.03	1490.01
	1		1018	.26	.03	1490.01
208	1		1021	.26	.03	1490.01
209	1		1024	.26	.03	1490.01
210	1		1027	.26	.03	1490.01
211	1		1030	.26	.03	1490.01
212	1		1033	.26	.03	1490.01
213	1		1036	.26	.03	1490.01
214	1		1039	.26	.03	1490.01
215	1		1042	.26	.03	1490.01
216	1		1045	.26	.03	1490.01
217	1		1048	.26	.03	1490.01
218	1		1051	.26	.03	1490.01
219	1		1054	.26	.03	1490.01
220	1		1057	.26	.03	1490.01
221	1		1100	.26	.03	1490.01
222	1		1103	.26	.03	1490.01
223	1		1106	.26	.03	1490.01
224	1		1109	.26	.03	1490.01
225	1		1112	.26	.03	1490.01
226	1		1115	.26	.03	1490.01
227	1		1118	.26	.03	1490.01
228	1		1121	.26	.03	1490.01
229	1		1124	.26	.03	1490.01
230	1		1127	.26	.03	1490.01
231	1		1130	.26	.03	1490.01
232	1		1133	.26	.03	1490.01
233	1		1136	.26	.03	1490.01
234	1		1139	.26	.03	1490.01
235	1		1142	.26	.03	1490.01
236	1		1145	.26	.03	1490.01
237	1		1148	.26	.03	1490.01
238	1		1151	.26	.03	1490.01
239	1		1154	.26	.03	1490.01
240	1		1157	.26	.03	1490.01
241	1		1200	.26	.03	1490.01
242	1		1203	.26	.03	1490.01
243	1		1206	.26	.03	1490.01
	1		1209	.26	.03	1490.01
	1		1212	.26	.03	1490.01
246	1		1215	.26	.03	1490.01
247	1		1218	.26	.03	1490.01
248	1		1221	.26	.03	1490.01
249	1		1224	.26	.03	1490.01
250	1		1227	.26	.03	1490.01

TABLE 1 STATION  
(CONT.)

PER	DAY	MON	HRMN	IMP FLOW	IMP STORAGE	IMP STAGE
251	1		1230	.26	.03	1490.01
252	1		1233	.26	.03	1490.01
253	1		1236	.26	.03	1490.01
254	1		1239	.26	.03	1490.01
255	1		1242	.26	.03	1490.01
256	1		1245	.26	.03	1490.01
257	1		1248	.26	.03	1490.01
258	1		1251	.26	.03	1490.01
259	1		1254	.26	.03	1490.01
260	1		1257	.26	.03	1490.01
261	1		1300	.26	.03	1490.01
262	1		1303	.26	.03	1490.01
263	1		1306	.26	.03	1490.01
264	1		1309	.26	.03	1490.01
265	1		1312	.26	.03	1490.01
266	1		1315	.26	.03	1490.01
267	1		1318	.26	.03	1490.01
268	1		1321	.26	.03	1490.01
269	1		1324	.26	.03	1490.01
270	1		1327	.26	.03	1490.01
271	1		1330	.26	.03	1490.01
272	1		1333	.26	.03	1490.01
273	1		1336	.26	.03	1490.01
274	1		1339	.26	.03	1490.01
275	1		1342	.26	.03	1490.01
	1		1345	.26	.03	1490.01
	1		1348	.26	.03	1490.01
	1		1351	.26	.03	1490.01
279	1		1354	.26	.03	1490.01
280	1		1357	.26	.03	1490.01
281	1		1400	.26	.03	1490.01
282	1		1403	.26	.03	1490.01

283	1	1406	.26	.03	1490.01
284	1	1409	.26	.03	1490.01
285	1	1412	.26	.03	1490.01
286	1	1415	.26	.03	1490.01
287	1	1418	.26	.03	1490.01
288	1	1421	.26	.03	1490.01
	1	1424	.26	.03	1490.01
	1	1427	.26	.03	1490.01
	1	1430	.26	.03	1490.01
292	1	1433	.26	.03	1490.01
293	1	1436	.26	.03	1490.01
294	1	1439	.26	.03	1490.01
295	1	1442	.26	.03	1490.01
296	1	1445	.26	.03	1490.01
297	1	1448	.26	.03	1490.01
298	1	1451	.26	.03	1490.01
299	1	1454	.26	.03	1490.01
300	1	1457	.26	.03	1490.01
		MAX	9155.85	259.09	1538.00
		MIN	.00	.03	1490.01
		AVE	210.97	6.41	1491.29

\*\*\* NORMAL END OF HEC-1 \*\*\*

**DAMBRK ANALYSIS**

---

ANALYSIS OF THE DOWNSTREAM FLOOD HYDROGRAPH  
PRODUCED BY THE DAM BREAK OF

Glen Lyn Plant

ON

New River

ANALYSIS BY

GeoEnvironmental Associates, Inc.  
AEP Appalachian Power GA FILE NO. 09-  
383 (gldb.inp)

BASED ON PROCEDURE DEVELOPED BY  
DANNY L. FREAD, PH.D., SR. RESEARCH HYDROLOGIST

QUALITY CONTROL TESTING AND OTHER SUPPORT BY  
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SILVER SPRING, MARYLAND 20910

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\*\*\* SUMMARY OF INPUT DATA \*\*\*  
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INPUT CONTROL PARAMETERS FOR Glen Lyn Plant

PARAMETER	VARIABLE	VALUE
*****	*****	*****
NUMBER OF DYNAMIC ROUTING REACHES	KKN	9
TYPE OF RESERVOIR ROUTING	KUI	0
MULTIPLE DAM INDICATOR	MULDAM	0
PRINTING INSTRUCTIONS FOR INPUT SUMMARY	KDMP	5
NO. OF RESERVOIR INFLOW HYDROGRAPH POINTS	ITEH	16
INTERVAL OF CROSS-SECTION INFO PRINTED OUT WHEN JNK=9 NPRT		0



CROSS-SECTIONAL VARIABLES FOR New River  
BELOW Glen Lyn Plant

PARAMETER	UNITS	VARIABLE
LOCATION OF CROSS-SECTION	MILE	XS (I)
ELEVATION (MSL) OF FLOODING AT CROSS-SECTION	FEET	FSTG (I)
ELEV CORRESPONDING TO EACH TOP WIDTH	FEET	HS (K, I)
TOP WIDTH CORRESPONDING TO EACH ELEV (ACTIVE FLOW PORTION)	FEET	BS (K, I)
TOP WIDTH CORRESPONDING TO EACH ELEV (OFF-CHANNEL PORTION)	FEET	BSS (K, I)
NUMBER OF CROSS-SECTION		I
NUMBER OF ELEVATION LEVEL		K

1

CROSS-SECTION NUMBER 1  
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XS (I) = .000 FSTG (I) = .00

HS ...	1490.0	1500.0	1520.0
BS ...	700.0	820.0	1360.0
BSS ...	.0	.0	.0

CROSS-SECTION NUMBER 2  
\*\*\*\*\*

XS (I) = .275 FSTG (I) = .00

HS ...	1487.0	1500.0	1520.0
BS ...	460.0	560.0	1100.0
BSS ...	.0	.0	.0

CROSS-SECTION NUMBER 3  
\*\*\*\*\*

XS (I) = .919 FSTG (I) = .00

HS ...	1480.0	1500.0	1520.0
BS ...	600.0	1280.0	1460.0
BSS ...	.0	.0	.0

CROSS-SECTION NUMBER 4  
\*\*\*\*\*

XS (I) = 1.373 FSTG (I) = .00

HS ...	1475.0	1480.0	1500.0
BS ...	460.0	520.0	920.0
BSS ...	.0	.0	.0

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MANNING N ROUGHNESS COEFFICIENTS FOR THE GIVEN REACHES  
(CM(K, I), K=1, NCS) WHERE I = REACH NUMBER

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REACH 1 ...	.060	.080	.100
REACH 2 ...	.060	.080	.100
REACH 3 ...	.060	.080	.100

CROSS-SECTIONAL VARIABLES FOR New River  
BELOW Glen Lyn Plant

PARAMETER	UNITS	VARIABLE
MINIMUM COMPUTATIONAL DISTANCE USED BETWEEN CROSS-SECTIONS	MILE	DXM(I)
CONTRACTION - EXPANSION COEFFICIENTS BETWEEN CROSS-SECTIONS		FKC(I)

REACH NUMBER	DXM(I)	FKC(I)
1	.045	.000
2	.046	.000
3	.032	.000

DOWNSTREAM FLOW PARAMETERS FOR New River  
BELOW Glen Lyn Plant

PARAMETER	UNITS	VARIABLE	VALUE
MAX DISCHARGE AT DOWNSTREAM EXTREMITY	CFS	QMAXD	.0
MAX LATERAL OUTFLOW PRODUCING LOSSES	CFS /FEET	QLL	.000
INITIAL SIZE OF TIME STEP	HOOR	DTHM	.0000
DOWNSTREAM BOUNDARY PARAMETER	FEET	YDN	.000000
SLOPE OF CHANNEL DOWNSTREAM OF DAM	FPM	SOM	.00
THETA WEIGHTING FACTOR		THETA	.00
CONVERGENCE CRITERION FOR STAGE	FEET	EPSY	.000000
TIME AT WHICH DAM STARTS TO FAIL	HOOR	TFI	.00

AT REACH= 1 DXM SHOULD BE CHANGED TO .037 DUE TO (WAVE SPEED \* DT) CRITERIA  
 AT REACH= 2 DXM SHOULD BE CHANGED TO .036 DUE TO (WAVE SPEED \* DT) CRITERIA  
 AT REACH= 3 DXM SHOULD BE CHANGED TO .031 DUE TO (WAVE SPEED \* DT) CRITERIA

COMPUTATIONS WILL USE THE FOLLOWING DXM VALUES

.045 .046 .032

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*** SUMMARY OF OUTPUT DATA ***
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CROSS-SECTION NO.	BOTTOM ELEVATION MILE	BOTTOM ELEVATION FEET	REACH NO.	REACH LENGTH MILE	SLOPE FPM	MESSAGE
1	.00	1490.00				
2	.28	1487.00	1	.28	10.91	
3	.92	1480.00	2	.64	10.87	
4	1.37	1475.00	3	.45	11.01	

INITIAL CONDITIONS

I= 1	X= .000	YN= 1490.29	DEPN= .29	YC= 1490.08	DEPC= .08	IFR= 0	ITN= 12	ITC= 12
I= 2	X= .046	YN= 1489.80	DEPN= .30	YC= 1489.59	DEPC= .09	IFR= 0	ITN= 12	ITC= 12
I= 3	X= .092	YN= 1489.31	DEPN= .31	YC= 1489.09	DEPC= .09	IFR= 0	ITN= 12	ITC= 12
I= 4	X= .138	YN= 1488.83	DEPN= .33	YC= 1488.60	DEPC= .10	IFR= 0	ITN= 12	ITC= 12
I= 5	X= .183	YN= 1488.34	DEPN= .34	YC= 1488.11	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 6	X= .229	YN= 1487.85	DEPN= .35	YC= 1487.61	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 7	X= .275	YN= 1487.37	DEPN= .37	YC= 1487.11	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 8	X= .321	YN= 1486.87	DEPN= .37	YC= 1486.61	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 9	X= .367	YN= 1486.36	DEPN= .36	YC= 1486.11	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 10	X= .413	YN= 1485.86	DEPN= .36	YC= 1485.61	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 11	X= .459	YN= 1485.36	DEPN= .36	YC= 1485.11	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 12	X= .505	YN= 1484.85	DEPN= .35	YC= 1484.61	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 13	X= .551	YN= 1484.34	DEPN= .34	YC= 1484.10	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 14	X= .597	YN= 1483.85	DEPN= .35	YC= 1483.60	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 15	X= .643	YN= 1483.34	DEPN= .34	YC= 1483.10	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 16	X= .689	YN= 1482.84	DEPN= .34	YC= 1482.60	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 17	X= .735	YN= 1482.33	DEPN= .33	YC= 1482.10	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 18	X= .781	YN= 1481.83	DEPN= .33	YC= 1481.60	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 19	X= .827	YN= 1481.33	DEPN= .33	YC= 1481.10	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 20	X= .873	YN= 1480.82	DEPN= .32	YC= 1480.59	DEPC= .09	IFR= 0	ITN= 13	ITC= 13
I= 21	X= .919	YN= 1480.31	DEPN= .31	YC= 1480.10	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 22	X= .951	YN= 1479.96	DEPN= .32	YC= 1479.74	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 23	X= .984	YN= 1479.61	DEPN= .32	YC= 1479.39	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 24	X= 1.016	YN= 1479.25	DEPN= .33	YC= 1479.03	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 25	X= 1.049	YN= 1478.90	DEPN= .33	YC= 1478.67	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 26	X= 1.081	YN= 1478.55	DEPN= .34	YC= 1478.31	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 27	X= 1.114	YN= 1478.20	DEPN= .34	YC= 1477.96	DEPC= .10	IFR= 0	ITN= 13	ITC= 13
I= 28	X= 1.146	YN= 1477.84	DEPN= .34	YC= 1477.61	DEPC= .11	IFR= 0	ITN= 13	ITC= 13
I= 29	X= 1.178	YN= 1477.49	DEPN= .35	YC= 1477.25	DEPC= .10	IFR= 0	ITN= 12	ITC= 12
I= 30	X= 1.211	YN= 1477.14	DEPN= .35	YC= 1476.89	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 31	X= 1.243	YN= 1476.78	DEPN= .35	YC= 1476.54	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 32	X= 1.276	YN= 1476.43	DEPN= .36	YC= 1476.18	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 33	X= 1.308	YN= 1476.08	DEPN= .37	YC= 1475.82	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 34	X= 1.341	YN= 1475.73	DEPN= .37	YC= 1475.47	DEPC= .11	IFR= 0	ITN= 12	ITC= 12
I= 35	X= 1.373	YN= 1475.38	DEPN= .38	YC= 1475.11	DEPC= .11	IFR= 0	ITN= 12	ITC= 12

(IFR(I), I=1,N)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

IN= 35	YNN= 1475.38	DEP= .38						
I= 34	X= 1.341	QIL= 100.	YIL= 1475.73	DEP= .37	ITB= 4			
I= 33	X= 1.308	QIL= 100.	YIL= 1476.08	DEP= .37	ITB= 4			
I= 32	X= 1.276	QIL= 100.	YIL= 1476.43	DEP= .36	ITB= 4			
I= 31	X= 1.243	QIL= 100.	YIL= 1476.79	DEP= .36	ITB= 4			
I= 30	X= 1.211	QIL= 100.	YIL= 1477.14	DEP= .35	ITB= 4			
I= 29	X= 1.178	QIL= 100.	YIL= 1477.49	DEP= .35	ITB= 4			
I= 28	X= 1.146	QIL= 100.	YIL= 1477.84	DEP= .34	ITB= 4			
I= 27	X= 1.114	QIL= 100.	YIL= 1478.20	DEP= .34	ITB= 4			
I= 26	X= 1.081	QIL= 100.	YIL= 1478.55	DEP= .34	ITB= 4			
I= 25	X= 1.049	QIL= 100.	YIL= 1478.90	DEP= .33	ITB= 4			
I= 24	X= 1.016	QIL= 100.	YIL= 1479.26	DEP= .33	ITB= 4			

I=	23	X=	.984	QIL=	100.	YIL=	1479.61	DEP=	.33	ITB=	4
I=	22	X=	.951	QIL=	100.	YIL=	1479.96	DEP=	.32	ITB=	4
I=	21	X=	.919	QIL=	100.	YIL=	1480.32	DEP=	.32	ITB=	4
I=	20	X=	.873	QIL=	100.	YIL=	1480.82	DEP=	.32	ITB=	5
I=	19	X=	.827	QIL=	100.	YIL=	1481.32	DEP=	.32	ITB=	5
I=	18	X=	.781	QIL=	100.	YIL=	1481.83	DEP=	.33	ITB=	5
I=	17	X=	.735	QIL=	100.	YIL=	1482.33	DEP=	.33	ITB=	5
I=	16	X=	.689	QIL=	100.	YIL=	1482.84	DEP=	.34	ITB=	5
I=	15	X=	.643	QIL=	100.	YIL=	1483.34	DEP=	.34	ITB=	5
I=	14	X=	.597	QIL=	100.	YIL=	1483.84	DEP=	.34	ITB=	5
I=	13	X=	.551	QIL=	100.	YIL=	1484.35	DEP=	.35	ITB=	5
I=	12	X=	.505	QIL=	100.	YIL=	1484.85	DEP=	.35	ITB=	5
I=	11	X=	.459	QIL=	100.	YIL=	1485.36	DEP=	.36	ITB=	5
I=	10	X=	.413	QIL=	100.	YIL=	1485.86	DEP=	.36	ITB=	5
I=	9	X=	.367	QIL=	100.	YIL=	1486.36	DEP=	.36	ITB=	5
I=	8	X=	.321	QIL=	100.	YIL=	1486.87	DEP=	.37	ITB=	5
I=	7	X=	.275	QIL=	100.	YIL=	1487.37	DEP=	.37	ITB=	4
I=	6	X=	.229	QIL=	100.	YIL=	1487.86	DEP=	.36	ITB=	5
I=	5	X=	.183	QIL=	100.	YIL=	1488.34	DEP=	.34	ITB=	5
I=	4	X=	.138	QIL=	100.	YIL=	1488.83	DEP=	.33	ITB=	5
I=	3	X=	.092	QIL=	100.	YIL=	1489.32	DEP=	.32	ITB=	5
I=	2	X=	.046	QIL=	100.	YIL=	1489.80	DEP=	.30	ITB=	5
I=	1	X=	.000	QIL=	100.	YIL=	1490.29	DEP=	.29	ITB=	5

INITIAL CONDITIONS

(QDI (I), I=1,N)

100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.
100.	100.	100.	100.	100.	100.	100.	100.

(YI (I), I=1,N)

1490.29	1489.80	1489.32	1488.83	1488.34	1487.86	1487.37	1486.87
1486.36	1485.86	1485.36	1484.85	1484.35	1483.84	1483.34	1482.84
1482.33	1481.83	1481.32	1480.82	1480.32	1479.96	1479.61	1479.26
1478.90	1478.55	1478.20	1477.84	1477.49	1477.14	1476.79	1476.43
1476.08	1475.73	1475.38					

ROUTING COMPLETED.

KTIME= 323 ALLOWABLE KTIME= 699 TT= 20.1

PROFILE OF CRESTS AND TIMES FOR New River  
 BELOW Glen Lyn Plant

DISTANCE FROM DAM MILE *****	MAX ELEV FEET *****	MAX FLOW CFS *****	TIME MAX ELEV-HRS *****	MAX VEL FPS *****	FLOOD ELEV FEET *****	TIME FLOOD ELEV-HRS *****
.000	1494.74	9155	.345	2.83	.00	.00
.046	1494.32	8773	.375	2.87	.00	.00
.092	1493.90	8434	.390	2.90	.00	.00
.138	1493.48	8131	.405	2.94	.00	.00
.183	1493.02	7907	.420	2.99	.00	.00
.229	1492.51	7749	.435	3.12	.00	.00
.275	1491.92	7617	.450	3.39	.00	.00
.321	1491.29	7492	.465	3.31	.00	.00
.367	1490.68	7372	.487	3.25	.00	.00
.413	1490.07	7260	.502	3.20	.00	.00
.459	1489.46	7146	.517	3.15	.00	.00
.505	1488.86	7036	.547	3.09	.00	.00
.551	1488.26	6930	.562	3.03	.00	.00
.597	1487.66	6822	.577	2.99	.00	.00
.643	1487.07	6715	.592	2.94	.00	.00
.689	1486.48	6603	.607	2.89	.00	.00
.735	1485.88	6487	.622	2.84	.00	.00
.781	1485.30	6365	.637	2.80	.00	.00
.827	1484.72	6231	.652	2.76	.00	.00
.873	1484.16	6084	.682	2.72	.00	.00
.919	1483.64	5920	.697	2.64	.00	.00
.951	1483.29	5804	.727	2.63	.00	.00
.984	1482.94	5688	.742	2.63	.00	.00
1.016	1482.59	5573	.757	2.62	.00	.00
1.049	1482.24	5458	.772	2.62	.00	.00
1.081	1481.90	5345	.787	2.61	.00	.00
1.114	1481.56	5232	.817	2.60	.00	.00
1.146	1481.23	5121	.832	2.59	.00	.00
1.178	1480.91	5010	.862	2.58	.00	.00
1.211	1480.60	4899	.877	2.57	.00	.00
1.243	1480.31	4784	.907	2.56	.00	.00
1.276	1480.03	4665	.938	2.55	.00	.00
1.308	1479.78	4540	.969	2.53	.00	.00
1.341	1479.54	4409	1.001	2.51	.00	.00
1.373	1479.32	4272	1.033	2.53	.00	.00

DISCHARGE HYDROGRAPH FOR New River  
 BELOW Glen Lyn Plant

... STATION NUMBER 1  
 AT MILE .00

GAGE ZERO = 1490.00 FEET      MAX ELEVATION REACHED BY FLOOD WAVE = 1494.74 FEET

FLOOD STAGE NOT AVAILABLE  
 MAX STAGE = 4.74 FEET      AT TIME = .345 HOURS  
 MAX FLOW = 9156 CFS      AT TIME = .300 HOURS

TIME HR	STAGE FEET	FLOW CFS	FLOW					
			0	2000	4000	6000	8000	10000
.00	.3	100	*	.	.	.	.	.
.02	.3	128	*	.	.	.	.	.
.04	.4	157	*	.	.	.	.	.
.06	.6	425	*	.	.	.	.	.
.08	.9	934	.	*	.	.	.	.
.10	1.3	1522	.	*	.	.	.	.
.12	1.7	2425	.	.	*	.	.	.
.14	2.1	3407	.	.	.	*	.	.
.16	2.5	4452	.	.	.	*	.	.
.18	3.0	5561	.	.	.	.	*	.
.20	3.4	6615	.	.	.	.	*	.
.22	3.7	7455	.	.	.	.	*	.
.24	4.0	8241	.	.	.	.	*	.
.26	4.3	8738	.	.	.	.	*	.
.28	4.5	8947	.	.	.	.	*	.
.30	4.6	9156	.	.	.	.	*	.
.32	4.7	8881	.	.	.	.	*	.
.34	4.7	8606	.	.	.	.	*	.
.36	4.7	8297	.	.	.	.	*	.
.38	4.7	7952	.	.	.	.	*	.
.40	4.7	7612	.	.	.	.	*	.
.42	4.6	7294	.	.	.	.	*	.
.44	4.5	6981	.	.	.	.	*	.
.46	4.4	6681	.	.	.	.	*	.
.48	4.4	6396	.	.	.	.	*	.
.50	4.2	5970	.	.	.	*	.	.
.52	3.9	4477	.	.	*	.	.	.
.54	3.5	2844	.	*	.	.	.	.
.56	3.1	1821	.	*	.	.	.	.
.58	2.7	1336	.	*	.	.	.	.
.60	2.4	930	.	*	.	.	.	.
.62	2.1	705	.	*	.	.	.	.
.64	1.8	536	.	*	.	.	.	.
.66	1.6	411	.	*	.	.	.	.
.68	1.3	335	.	*	.	.	.	.
.70	1.2	263	.	*	.	.	.	.
.72	1.0	220	.	*	.	.	.	.
.74	.9	181	.	*	.	.	.	.
.76	.7	162	.	*	.	.	.	.
.78	.6	162	.	*	.	.	.	.
.80	.6	162	.	*	.	.	.	.
.82	.5	162	.	*	.	.	.	.
.84	.5	162	.	*	.	.	.	.
.86	.4	162	.	*	.	.	.	.
.88	.4	162	.	*	.	.	.	.
.90	.4	162	.	*	.	.	.	.
.92	.4	162	.	*	.	.	.	.
.94	.4	162	.	*	.	.	.	.
.96	.4	162	.	*	.	.	.	.
.98	.4	162	.	*	.	.	.	.
1.00	.4	162	.	*	.	.	.	.

DISCHARGE HYDROGRAPH FOR New River  
 BELOW Glen Lyn Plant

... STATION NUMBER 20  
 AT MILE .87

GAGE ZERO = 1480.50 FEET MAX ELEVATION REACHED BY FLOOD WAVE = 1484.16 FEET

FLOOD STAGE NOT AVAILABLE  
 MAX STAGE = 3.66 FEET AT TIME = .682 HOURS  
 MAX FLOW = 6084 CFS AT TIME = .637 HOURS

TIME HR	STAGE FEET	FLOW							
		CFS	0	2000	4000	6000	8000	10000	
.0	.3	100	*	.	.	.	.	.	.
.5	1.9	2860	.	.	*	.	.	.	.
1.0	2.5	2638	.	.	*	.	.	.	.
1.5	1.1	671	.	*	.	.	.	.	.
2.0	.6	248	*	.	.	.	.	.	.
2.5	.4	168	*	.	.	.	.	.	.
3.0	.4	162	*	.	.	.	.	.	.
3.5	.4	162	*	.	.	.	.	.	.
4.0	.4	162	*	.	.	.	.	.	.
4.5	.4	162	*	.	.	.	.	.	.
5.0	.4	162	*	.	.	.	.	.	.
5.5	.4	162	*	.	.	.	.	.	.
6.0	.4	162	*	.	.	.	.	.	.
6.5	.4	162	*	.	.	.	.	.	.
7.0	.4	162	*	.	.	.	.	.	.
7.5	.4	162	*	.	.	.	.	.	.
8.0	.4	162	*	.	.	.	.	.	.
8.5	.4	162	*	.	.	.	.	.	.
9.0	.4	162	*	.	.	.	.	.	.
9.5	.4	162	*	.	.	.	.	.	.
10.0	.4	162	*	.	.	.	.	.	.
10.5	.4	162	*	.	.	.	.	.	.
11.0	.4	162	*	.	.	.	.	.	.
11.5	.4	162	*	.	.	.	.	.	.
12.0	.4	162	*	.	.	.	.	.	.
12.5	.4	162	*	.	.	.	.	.	.
13.0	.4	162	*	.	.	.	.	.	.
13.5	.4	162	*	.	.	.	.	.	.
14.0	.4	162	*	.	.	.	.	.	.
14.5	.4	162	*	.	.	.	.	.	.
15.0	.4	162	*	.	.	.	.	.	.
15.5	.4	162	*	.	.	.	.	.	.
16.0	.4	162	*	.	.	.	.	.	.
16.5	.4	162	*	.	.	.	.	.	.
17.0	.4	162	*	.	.	.	.	.	.
17.5	.4	162	*	.	.	.	.	.	.
18.0	.4	162	*	.	.	.	.	.	.
18.5	.4	162	*	.	.	.	.	.	.
19.0	.4	162	*	.	.	.	.	.	.
19.5	.4	162	*	.	.	.	.	.	.

DISCHARGE HYDROGRAPH FOR New River  
 BELOW Glen Lyn Plant

... STATION NUMBER 35  
 AT MILE 1.37

GAGE ZERO = 1475.00 FEET MAX ELEVATION REACHED BY FLOOD WAVE = 1479.32 FEET

FLOOD STAGE NOT AVAILABLE  
 MAX STAGE = 4.32 FEET AT TIME = 1.033 HOURS  
 MAX FLOW = 4272 CFS AT TIME = .877 HOURS

TIME	STAGE	FLOW	0	1000	2000	3000	4000	5000
HR	FEET	CFS						
.0	.4	100	.	.	.	.	.	.
.5	.4	101	.	.	.	.	.	.
1.0	4.3	3902	.	.	.	.	*	.
1.5	3.3	1783	.	.	*	.	.	.
2.0	1.7	755	.	*	.	.	.	.
2.5	.8	297	.	*	.	.	.	.
3.0	.6	184	.	*	.	.	.	.
3.5	.5	164	.	*	.	.	.	.
4.0	.5	163	.	*	.	.	.	.
4.5	.5	163	.	*	.	.	.	.
5.0	.5	162	.	*	.	.	.	.
5.5	.5	162	.	*	.	.	.	.
6.0	.5	162	.	*	.	.	.	.
6.5	.5	162	.	*	.	.	.	.
7.0	.5	162	.	*	.	.	.	.
7.5	.5	162	.	*	.	.	.	.
8.0	.5	162	.	*	.	.	.	.
8.5	.5	162	.	*	.	.	.	.
9.0	.5	162	.	*	.	.	.	.
9.5	.5	162	.	*	.	.	.	.
10.0	.5	162	.	*	.	.	.	.
10.5	.5	162	.	*	.	.	.	.
11.0	.5	162	.	*	.	.	.	.
11.5	.5	162	.	*	.	.	.	.
12.0	.5	162	.	*	.	.	.	.
12.5	.5	162	.	*	.	.	.	.
13.0	.5	162	.	*	.	.	.	.
13.5	.5	162	.	*	.	.	.	.
14.0	.5	162	.	*	.	.	.	.
14.5	.5	162	.	*	.	.	.	.
15.0	.5	162	.	*	.	.	.	.
15.5	.5	162	.	*	.	.	.	.
16.0	.5	162	.	*	.	.	.	.
16.5	.5	162	.	*	.	.	.	.
17.0	.5	162	.	*	.	.	.	.
17.5	.5	162	.	*	.	.	.	.
18.0	.5	162	.	*	.	.	.	.
18.5	.5	162	.	*	.	.	.	.
19.0	.5	162	.	*	.	.	.	.
19.5	.5	162	.	*	.	.	.	.

## **Appendix B – Plans for Training, Exercising, Updating, and Posting EAP**

A drill shall be conducted annually. The drill should include a face-to-face meeting with the Giles County Office of Emergency Management and any other local officials or agencies deemed necessary by the OES Director. A table-top exercise shall be conducted once every six years. Drills and table-top exercises for other structures at the Glen Lyn Plant may be performed in combination. Appalachian Power, or its representative, shall certify to the DCR that a drill, a table-top exercise, or both has been completed and provide any revisions or updates to the EAP or a statement that no revisions or updates are needed.

In accordance to the regulations of the state of Virginia, an EAP shall be submitted every six years. Additionally, this EAP shall be updated and resubmitted when there are necessary changes to keep the EAP workable.

This EAP, and subsequent updates, shall be submitted to local and state officials according to the distribution list included in Part I.

**Appendix C – Site-Specific Concerns and Supplemental Information**

None