

# **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

## **Introduction**

Under some emergency and equipment failure and maintenance situations, certain license conditions may be impractical to meet or may need to be suspended or modified to avoid taking unnecessary risks. The purpose of this protocol is to define the most likely situations of this type for the East Fork Project (FERC # 2698) and the West Fork Project (FERC # 2686), identify the potentially impacted license conditions and outline the general approach that the Licensee will take to mitigate the impacts to license conditions and to communicate with the resource agencies and affected parties.

Note: Due to the potential variability of these abnormal situations, this protocol is not intended to give an exact step-by-step solution path. It will however provide basic expectations for the Licensee's approach to dealing with the situation. Specific details will vary and will be determined on a case-by-case basis as the protocol is being enacted.

## **Key Facts and Assumptions**

1. Minimum Flows in Bypassed Stream Reaches – Assume the new license for the East Fork Project will include the following normal requirements for minimum releases from hydro project works into the Wolf Creek Bypassed Reach to enhance water quality and/or aquatic species habitat:
  - a. Wolf Creek Bypassed Reach – 6 cfs continuous release from a valve to be installed at Wolf Creek Dam.
2. Minimum Flows in the Tuckasegee River Main Stem – Assume that the new licenses for the East Fork and West Fork projects will include the following minimum flow requirements for the main stem of the Tuckasegee River:
  - a. 30 cfs combined minimum flow from December 1 through June 30 (assuming inflow into Tuckasegee Lake is greater than or equal to 20 cfs) and provided by the same means as the existing provision:
    - 1) Continue existing minimum flow at Tuckasegee (20 cfs or inflow, whichever is less).
    - 2) Continue existing minimum flow at Cedar Cliff (10 cfs from a valve at the hydro station during non-generation hours only). When Cedar Cliff Powerhouse is generating, the minimum flow valve is turned off.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

- b. 55 cfs combined minimum flow from July 1 through November 30 (assuming inflow into Tuckasegee Lake is greater than or equal to 20 cfs) and provided by:
  - 1) Continue existing minimum flow at Tuckasegee (20 cfs or inflow, whichever is less).
  - 2) Increase the minimum flow valve capacity at Cedar Cliff and provide 35 cfs during non-generation hours only. When Cedar Cliff Powerhouse is generating, the minimum flow valve is turned off.
3. Generation Releases for Angling and Boating Recreation Flows – Assume the new licenses for the East Fork and West Fork projects will include the following Normal Generation Schedule to Support Recreation on the main stem of the Tuckasegee River from the Cedar Cliff and Thorpe / Tuckasegee Powerhouses, with all releases being at or above the Best Efficiency Flows for the subject hydro units:
  - a. Primary Angling Periods
    - 1) Defined - The first weekend after Labor Day through the last weekend of October and April 1st through the first weekend of June are defined as primary angling periods with actual flows at or below about 500 cfs being preferred (as measured at the reactivated or replaced USGS gage at Dillsboro).
    - 2) During part of this time period, boating release schedules overlap. During this overlap period (the Saturday that occurs nine days before Memorial Day through the first weekend of June and Saturdays in September and October), the Normal Generation Schedule to Support Recreation will be:
      - a) West Fork Release: Saturday and Sunday one week prior to Memorial Day weekend, Saturday and Monday of Memorial Day weekend and three of four Saturdays in September and October, plus Tuesday, Friday and Saturday for the period between Memorial Day weekend through the first weekend in June, each for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.
      - b) East Fork Release: Sunday of Memorial Day weekend plus Wednesday, Thursday and Sunday for the period between Memorial Day weekend through the first weekend in June and one of four Saturdays in September and October, each for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.

## Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects

### b. Primary Boating Periods

- 1) Defined – The period after the first weekend of June through Labor Day is defined as the primary boating period, with actual flows at about 800 cfs (as measured at the reactivated or replaced USGS gage at Dillsboro) being preferred.
  - 2) During this time period, the Normal Generation Schedule to Support Recreation for three out of four weeks will be:
    - a) West Fork Release: Tuesday, Friday and Sunday for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.
    - b) East Fork Release: Wednesday, Thursday and Saturday plus the Monday of Labor Day weekend for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.
  - 3) During this time period, the Normal Generation Schedule to Support Recreation for one out of four weeks will be:
    - a) West Fork Release: Tuesday, Friday and Saturday for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.
    - b) East Fork Release: Wednesday, Thursday and Sunday for six hours per day, timed to arrive at the reactivated or replaced USGS gage at Dillsboro at approximately 10:30 AM.
- c. Adjusting for Significant Baseline Flows – The Licensee will check the river flow daily at the reactivated Dillsboro USGS Gage #03510500 (or a suitable replacement gage in this vicinity as determined by USGS) and by doing so, the Licensee can project the expected river flow at the Dillsboro Gage during the next scheduled generation release to support recreation. When projected baseline river flow (i.e. the flow rate at the Dillsboro USGS gage without the Licensee making the scheduled generation release to support recreation) is expected to average more than 500 cfs over the period from 10:30 AM to 4:30 PM, specific recreation flow releases from the DPNA hydropower stations can be reduced or stopped.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

- d. Other Special Events - Other requests for special generation releases that require additional generation hours above the total number of hours in any given month in the Normal Generation Schedule to Support Recreation will be handled on a case-by-case basis. To the maximum practical extent, releases will be integrated with the normal release schedule so that additional release hours beyond the normal release schedule are not needed.
4. Bypass Flow Releases for Recreation – Assume the new license for the West Fork Project will include the following requirements for scheduled releases from Glenville Dam into the West Fork (Glenville) Bypassed Reach to enhance downstream recreation:
    - a. Release water for six hours per day for one weekend (Saturday and Sunday) per calendar year in April. Target flowrate will be approximately 250 cfs each day and releases made to arrive at the put-in point at 10:00 AM.
    - b. Provide five total weekend day releases per calendar year for six hrs each, scheduled on weekend days in the months of May through September. Target flowrate will be approximately 250 cfs each day and releases made to arrive at the put-in point at 10:00 AM.
    - c. Target Flowrates - The target flowrates stated above are for flowrates at the put-in point. Actual release amounts from the Tainter gate need to be large enough that when combined with other tributary and accretion flows, the total is as close as possible to the target flowrates.
  5. Normal Operating Range for Lake Levels – Assume the new licenses for the East Fork and West Fork projects will include the following requirements for Normal Operating Ranges of lake levels (Note: All lake levels are for the first day of the month. Levels for other days of the month can be determined by linear interpolation):

**Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

a. Lake Glenville – Maintain the following Normal Operating Range:

<b>Month</b>	<b>Normal Minimum Elevation (ft)</b>	<b>Normal Target Elevation (ft)</b>	<b>Normal Maximum Elevation (ft)</b>
Jan	85	90	94
Feb	85	90	94
Mar	88	91	94
Apr	90	93	96
May	95	97	99
Jun	95	97	99
Jul	95	97	99
Aug	93	95	98
Sep	90	93	94
Oct	90	93	94
Nov	86	90	94
Dec	85	90	94

b. Tanasee Creek & Wolf Creek Lakes – Maintain the following Normal Operating Range:

<b>Month</b>	<b>Normal Minimum Elevation (ft)</b>	<b>Normal Target Elevation (ft)</b>	<b>Normal Maximum Elevation (ft)</b>
Jan	83	85	92
Feb	83	85	92
Mar	83	85	92
Apr	86	88	96
May	90	93	100
Jun	90	93	100
Jul	90	93	100
Aug	90	93	100
Sep	90	93	100
Oct	90	93	100
Nov	86	88	96
Dec	83	85	92

**Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

- c. Bear Creek Lake – Maintain the following Normal Operating Range:

<b>Month</b>	<b>Normal Minimum Elevation (ft)</b>	<b>Normal Target Elevation (ft)</b>	<b>Normal Maximum Elevation (ft)</b>
Jan	91	93	98
Feb	91	93	98
Mar	91	93	98
Apr	92	95	98
May	92	98	100
Jun	92	98	100
Jul	92	98	100
Aug	92	98	100
Sep	92	98	100
Oct	92	96	98
Nov	92	95	98
Dec	92	94	98

- d. Cedar Cliff Lake – Maintain the following Normal Operating Range:

<b>Month</b>	<b>Normal Minimum Elevation (ft)</b>	<b>Normal Target Elevation (ft)</b>	<b>Normal Maximum Elevation (ft)</b>
Jan	96	98	100
Feb	96	98	100
Mar	96	98	100
Apr	96	98	100
May	96	98	100
Jun	96	98	100
Jul	96	98	100
Aug	96	98	100
Sep	96	98	100
Oct	96	98	100
Nov	96	98	100
Dec	96	98	100

- e. Tuckasegee Lake – Maintain lake level as needed to provide minimum flow.

6. Most Likely Situations - the following table identifies the assumed most likely situations when this protocol will be enacted and the license conditions that would most likely be impacted:

**Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

<u>Situation</u>	<u>Indications</u>	<u>Potentially Impacted License Conditions</u>			
		<u>Min. Flows in Bypassed Stream Reaches</u>	<u>Generation Releases for Recreation</u>	<u>Normal Operating Range for Lake Levels</u>	<u>Tainter Gate Releases for Recreation</u>
Hydro Unit Outage	Maintenance will require hydro unit shutdown.		X	X	
Outage of Spill Valve at Wolf Creek Dam, Spill Valve at Cedar Cliff Powerhouse or the Trash Sluice Gate at Tuckasegee Dam	Maintenance will require interruption of scheduled minimum releases from normal locations	X			
Outage of Tainter Gate at Glenville Dam	Maintenance will require rendering the Tainter gate inoperable.			X	X
Dam Safety Emergency	Condition A or B (i.e. dam failure has occurred, is imminent or a potentially hazardous situation exists) is declared per the Emergency Action Plan or other dam safety concern is identified.	X	X	X	X
Voltage or Capacity Emergency	Voltage or capacity conditions on the electric grid in the DPNA system	X		X	X

**Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

<u>Situation</u>	<u>Indications</u>	<u>Potentially Impacted License Conditions</u>			
		<u>Min. Flows in Bypassed Stream Reaches</u>	<u>Generation Releases for Recreation</u>	<u>Normal Operating Range for Lake Levels</u>	<u>Tainter Gate Releases for Recreation</u>
	or the larger regional electric grid cause instability and electric system failure has occurred or is imminent.				

7. Returning to Normal - All of the above situations can impact the Licensee’s ability to operate the hydro projects in their most efficient and safest manner for power production. The Licensee will therefore endeavor in good faith to repair existing hydro project equipment and facilities and return them to service within a reasonable period of time, commensurate with the severity of the equipment / facility repair requirements and provided that the repairs are economically justified and funds are available for the repairs.
  
8. Incidental Outages – outages of hydro project works that are very brief in nature or that require minimal if any deviation from normal license conditions. For the purposes of this protocol, outages of 48 hrs or less duration or that do not require deviation from any license conditions related to minimum flows in bypassed stream reaches or the main stem of the river, flow releases for whitewater recreation or the Normal Operating Ranges for lake levels are considered Incidental Outages and, except for the identified notifications for Incidental Outages that impact minimum flows, are exempt from the requirements of this protocol.
  
9. Notification Guidance
  - a. Planned Maintenance - once a likely maintenance schedule has been established, the Licensee will endeavor in good faith to provide as much advance notice as possible to the affected parties identified in this protocol.
  
  - b. Unplanned Maintenance and Emergencies - it is not possible for the Licensee to assure any level of advance notice. For these situations, the Licensee will endeavor in good faith to inform the affected parties identified in this protocol within some reasonable amount of time after the situation has been stabilized.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

10. Preparation for High Inflow Events – With modern forecasting, it is more possible than ever to see large precipitation events coming and to increase generation hours to reduce lake levels in order to mitigate the potential for spilling and downstream flooding. Typically, this type of advance action is taken from one to five days before the expected arrival of the storm. It is assumed that the Normal Operating Ranges of lake levels will include adequate flexibility (i.e. band width) to allow for this type of lake level reduction. If the final Normal Operating Ranges for lake levels do not provide adequate flexibility, this protocol will be revised to account for the high inflow event preparation situation.
  
11. Relationship Between this Protocol and the Low Inflow Protocol – The Low Inflow Protocol (LIP) provides for reductions in generation flows, minimum flows and recreation flow releases in bypassed stream reaches and modification of the Normal Operating Ranges for lake levels when water demands on the lakes substantially exceed net inflow. Except for an outage of one of the normal means of providing minimum flows or a stuck-open Tainter gate on a dam, lowering lake levels caused by situations addressed under this Hydro Project Maintenance & Emergency Protocol (HPMEP) will not invoke implementation of the LIP. Also, if the LIP has already been implemented at the time that a situation covered by this HPMEP is initiated, the Licensee will typically suspend implementation of the LIP until the HPMEP situation has been eliminated. The Licensee may however choose to continue with the LIP if desirable.
  
12. Peak Recreation Season – the portion of the year when boating and fishing levels are at their highest. For the purposes of this protocol, this season is defined as April through October.
  
13. Critical Commercial Whitewater Recreation Periods – the portions of the Peak Recreation Season that have the highest impact on the commercial whitewater industry that depends on these hydro projects. Loss of whitewater recreation flows for the duration of any of these periods could damage the stability of the whitewater recreation businesses that serve the area. For the purposes of this protocol, these periods are defined as any period of six or more consecutive scheduled whitewater releases as noted in the Primary Boating Periods section above.
  
14. Critical Flow Period for Stream Fish – the portion of the year when fish in the streams affected by the hydro projects most need minimum flows or can be most impacted by higher temperature water releases from the Tainter gates. For the purposes of this protocol, the Critical Flow Period for Stream Fish is defined as July 1 through November 30.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

15. Threshold Minimum Flows – the minimum flow release amounts from hydro project works that may be necessary to sustain aquatic communities consistent with the resource management goals and objectives for the affected stream reaches. Since the normal minimum flow releases are for water quality and / or aquatic species habitat enhancements, the Threshold Minimum Flows are related to and lower than the normal minimum flow releases required by the FERC license. For the purposes of this protocol, it is assumed that the Threshold Minimum Flows are as follows:
- a. Wolf Creek Bypassed Reach - 2 cfs or inflow into Wolf Creek Lake, whichever is less, released from Wolf Creek Dam into the Wolf Creek Bypassed Reach.
  - b. Main Stem of the Tuckasegee River – the normal minimum flow provided from Tuckasegee Dam (i.e. 20 cfs or inflow into Tuckasegee Lake, whichever is less) plus the following minimum flows provided from the Cedar Cliff Spill Valve during periods of non-generation from Cedar Cliff Hydro Station:
    - 1) From December 1 through June 30 – 6 cfs
    - 2) From July 1 through November 30 – 11 cfs.
16. Organizational abbreviations include the NC Division of Water Resources (NCDWR), NC Wildlife Resources Commission (NCWRC), United States Forest Service (USFS), United States Fish & Wildlife Service (USFWS), NC State Historic Preservation Office (NCSHPO), the Eastern Band of Cherokee Indians (EBCI), the Tuckasegee Gorge Association (TGA), United States Geological Survey (USGS) and the American Whitewater Affiliation (AW).
17. Voltage and Capacity Emergencies – The electric transmission system serving the project area is the Duke Power-Nantahala Area (DPNA) system. The DPNA system is connected to the larger regional electric grid by: (a) Santeetlah 161 kV line connecting to the Tennessee Valley Authority (TVA) system and (b) two, 230 kV lines connecting to the Duke Power system near Lake Jocassee. If any one of these three electric transmission lines fails or if a major interruption within the DPNA system occurs, the entire DPNA system can become unstable due to inadequate capacity or voltage to support system demands. The result can include brown-outs or black-outs of large blocks of electric customers served by the DPNA system. Also, since the Licensee’s hydro stations are the only electric generation sources that are directly tied to the DPNA system and they do not produce enough electric capacity to meet the DPNA system’s instantaneous load, transmission system failures and overloads on the larger regional electric grid can also cause brown-outs and

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

black-outs within the DPNA system. Therefore, for the purposes of this protocol, a voltage or capacity emergency shall exist when any of the following occur:

- a. The Santeetlah 161 kV line connecting the DPNA system to the TVA system is out of service
- b. Either of the two 230 kV lines connecting the DPNA system to the Duke Power system is out of service
- c. The DPNA system has been split by an internal system failure
- d. A voltage or capacity emergency is declared by Duke's System Operating Center (SOC) or Transmission Operating Center (TOC).

18. Safety and Electric System Integrity are of Utmost Importance – Nothing in this protocol will limit the Licensee's ability to take any and all lawful actions necessary at its hydro projects to protect human health and safety, protect its equipment from major damage and ensure the stability of the regional electric grid. It is recognized that the Licensee may take the steps that are necessary to protect these things without prior consultation or notification.

# Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects

## General Approach to Abnormal Situations

### A. Hydro Unit Outages

#### 1. Mitigating Actions

##### a. Planned Unit Outages

- 1) Scheduling - To the extent practical, the Licensee will avoid scheduling unit outages during the Peak Recreation Season (which also includes the Critical Commercial Whitewater Recreation Periods) and the Critical Flow Period for Stream Fish, unless it is likely that the equipment condition will cause a forced unit outage if repairs are delayed.
  
- 2) Replacing Generation Recreation Releases – If the outage cannot avoid the Critical Commercial Whitewater Recreation Periods, then the Licensee will endeavor in good faith to replace a portion of the missed generation flows that are normally scheduled for recreation. This can be accomplished by providing the normally scheduled release except by providing it from the other, non-outage hydro project (e.g. if Cedar Cliff Hydro was out of service, then the West Fork hydros could provide the scheduled release). If both the Cedar Cliff and the West Fork hydros are out of service simultaneously, then the Licensee will consider providing at least some releases from the Tainter gate at Cedar Cliff Hydro to replace the missed generation releases for recreation. Providing replacement releases from a Tainter gate at Glenville Dam would only be an option if one of the normally scheduled releases at Glenville Dam for whitewater recreation in the West Fork (Glenville) Bypassed Reach is occurring or if a Tainter gate release is needed anyway to control the level of Lake Glenville. If replacement releases will be provided from a Tainter gate at any of the dams and the water temperature in the subject lake at a depth corresponding to the Tainter gate sill is  $> 20^{\circ} \text{C}$ , the Licensee will:
  - a) Avoid scheduling replacement releases for more than two consecutive days.
  - b) Monitor temperatures and dissolved oxygen (DO) levels in any affected bypassed stream reach during the Tainter gate release.
  - c) Stop the releases if DO levels drop below 5 mg/l (i.e. the instantaneous minimum DO level specified by the NC State Water Quality Standards for trout waters) or if stressed or dead fish are observed.
  - d) Replace any aquatic species mortalities that are identified.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

- 3) Drawing Down the Affected Lake – To minimize the impacts to its electric customers, the Licensee may choose to draw down a lake using its hydro unit to a point where spillage from the dam is expected to be minimized during the outage.

### **b. Forced Unit Outages**

- 1) Replacing Generation Recreation Releases – If the outage impacts generation releases scheduled for recreation during the Critical Commercial Whitewater Recreation Periods, then the Licensee will endeavor in good faith to replace a portion of the missed generation flows that are normally scheduled for recreation. This can be accomplished by providing the normally scheduled release except by providing it from the other, non-outage hydro project (e.g. if Cedar Cliff Hydro was out of service, then the West Fork hydros could provide the scheduled release). If both the Cedar Cliff and the West Fork hydros are out of service simultaneously, then the Licensee will consider providing at least some releases from the Tainter gate at Cedar Cliff Hydro to replace the missed generation releases for recreation. Providing replacement releases from a Tainter gate at Glenville Dam would only be an option if one of the normally scheduled releases at Glenville Dam for whitewater recreation in the West Fork (Glenville) Bypassed Reach is occurring or if a Tainter gate release is needed anyway to control the level of Lake Glenville. If replacement releases will be provided from a Tainter gate at any of the dams and the water temperature in the subject lake at a depth corresponding to the Tainter gate sill is  $> 20^{\circ} \text{C}$ , the Licensee will:
  - a) Avoid scheduling replacement releases for more than two consecutive days.
  - b) Monitor temperatures and dissolved oxygen (DO) levels in any affected bypassed stream reach during the Tainter gate release.
  - c) Stop the releases if DO levels drop below 5 mg/l (i.e. the instantaneous minimum DO level specified by the NC State Water Quality Standards for trout waters) or if stressed or dead fish are observed.
  - d) Replace any aquatic species mortalities that are identified.

## **2. Communication with Resource Agencies and Affected Parties**

### **a. Planned Unit Outages**

- 1) Direct Consultation - The Licensee will consult with the NCDWR, USFWS and the NCWRC as soon as approximate schedule dates are determined, but at least 10 days prior to beginning any lake draw down or the unit outage (if a drawdown of the lake will not be performed). Add the TGA President

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

and AW if the outage will affect the Normal Generation Schedule to Support Recreation as noted above. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental, cultural and human needs relative to the hydro project.

- 2) General Notification – At least 10 days before beginning any lake draw down or the unit outage (if a drawdown of the lake will not be performed), the Licensee will add the appropriate messages to its public information website and/or its lake level phone system to inform the general public of the outage and draw down schedule.

### **b. Forced Unit Outages**

- 1) Direct Notification - The Licensee will notify the NCDWR, USFWS and the NCWRC as soon as possible after the forced outage begins, but no longer than five days afterwards. Add the TGA President and AW if the outage will affect the Normal Generation Schedule to Support Recreation as noted above.
- 2) General Notification – As soon as possible after the forced outage occurs but no longer than five days afterwards, the Licensee will add the appropriate messages to its public information website and/or its lake level phone system to inform the general public of the outage and draw down schedule.
- 3) Direct Consultation – The Licensee will consult with the NCDWR, USFWS and the NCWRC as soon as possible after the forced outage begins, but no longer than 10 days afterwards. Add the TGA President and AW if the outage will affect the Normal Generation Schedule to Support Recreation as noted above. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental, cultural and human needs relative to the hydro project.

## **B. Outages of the Normal Means of Providing Minimum Flows**

### **1. Mitigating Actions**

#### **a. Planned Outages**

- 1) Scheduling - To the extent practical, the Licensee will avoid scheduling outages during the Critical Flow Period for Stream Fish, unless it is likely that the equipment condition will cause a forced outage if repairs are delayed.

## Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects

- 2) Replacing Lost Minimum Flows - If the outage cannot avoid impacting minimum flows during the Critical Flow Period for Stream Fish, then the Licensee will endeavor in good faith to replace a portion of the missed minimum flows in the affected stream reaches. This can be accomplished by partially opening the Tainter gate at Wolf Creek Dam (if the outage will be for spill valve repairs at Wolf Creek Dam ----note that this is probably only a temporary replacement means, because repair of the valve will likely require drawdown of the lake below the Tainter gate sill), partially opening the Tainter gate at Cedar Cliff Dam or utilizing the larger, hand-controlled flashboard at Tuckasegee Dam. (Note: If minimum flows below Cedar Cliff are to be supplemented by partially opening a Tainter gate at Cedar Cliff Dam and the water temperature in Cedar Cliff Lake at a depth corresponding to the Tainter gate sill is  $> 20^{\circ}$  C, the Licensee will complete the Direct Notification of resource agencies identified in item B.2.b below before partially opening a Tainter gate).
- 3) Avoid Falling Below the Threshold Minimum Flows – To the extent practical, the Licensee will avoid falling below any of the Threshold Minimum Flows as noted above. If it is determined that 100% exceedance of the Threshold Minimum Flows cannot reasonably be achieved, the Licensee will work with the resource agencies to (a) monitor any potential aquatic species impacts in the affected stream segments and (b) replace any aquatic species mortalities that are identified.

### b. Forced Outages

- 1) Replacing Lost Minimum Flows - If the outage cannot avoid impacting minimum flows during the Critical Flow Period for Stream Fish, then the Licensee will endeavor in good faith to replace a portion of the missed minimum flows in the affected stream reaches. This can be accomplished by partially opening the Tainter gate at Wolf Creek Dam (if the outage will be for spill valve repairs at Wolf Creek Dam ----note that this is probably only a temporary replacement means, because repair of the valve will likely require drawdown of the lake below the Tainter gate sill), partially opening the Tainter gate at Cedar Cliff Dam or utilizing the larger, hand-controlled flashboard at Tuckasegee Dam. (Note: If minimum flows below Cedar Cliff are to be supplemented by partially opening a Tainter gate at Cedar Cliff Dam and the water temperature in Cedar Cliff Lake at a depth corresponding to the Tainter gate sill is  $> 20^{\circ}$  C, the Licensee will complete the Direct Notification of resource agencies identified in item B.2.b below before partially opening a Tainter gate).
- 2) Avoid Falling Below the Threshold Minimum Flows – To the extent practical, the Licensee will avoid falling below any of the Threshold Minimum Flows as noted above. If it is determined that 100% exceedance of the Threshold Minimum Flows cannot reasonably be achieved, the Licensee will work with the resource agencies to (a) monitor any potential aquatic species impacts in the affected stream segments and (b) replace any aquatic species mortalities that are identified.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

### 2. Communication with Resource Agencies and Affected Parties

#### a. Planned Outages

- 1) Direct Consultation – The Licensee will consult with the NCDWR, USFWS and the NCWRC as soon as approximate schedule dates are determined, but at least 10 days prior to beginning the outage. Add the USFS if the outage will affect the spill valve at Wolf Creek Dam. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental and human needs relative to the hydro project. (Note that this communication with resource agencies is also required for Incidental Outages (see definitions) that impact minimum flows).

#### b. Forced Outages

- 1) Direct Notification - The Licensee will notify the NCDWR, USFWS and the NCWRC as soon as possible after the forced outage begins, but no longer than five days afterwards. Add the USFS if the outage will affect the spill valve at Wolf Creek Dam. (Note that this communication with resource agencies is also required for Incidental Outages (see definitions) that impact minimum flows). If minimum flows below Cedar Cliff are to be supplemented by partially opening a Tainter gate at Cedar Cliff Dam and the water temperature in Cedar Cliff Lake at a depth corresponding to the Tainter gate sill is  $> 20^{\circ} \text{C}$ , the Licensee will include the following information in the Direct Notification:
  - a) The actual measured lake temperature at the depth corresponding to the Tainter gate sill
  - b) The approximate total average daily flow in the East Fork of the Tuckasegee River just upstream of its confluence with the West Fork of the Tuckasegee River
  - c) The targeted amount of the Tainter gate release.
- 2) Direct Consultation – The Licensee will consult with the NCDWR, USFWS and the NCWRC as soon as possible after the forced outage begins, but no longer than 10 days afterwards. Add the USFS if the outage will affect the spill valve at Wolf Creek Dam. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental and human needs relative to the hydro project.

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

### **C. Tainter Gate Outages**

#### 1. Mitigating Actions

##### a. Planned Outages

- 1) Scheduling – To the extent practical, the Licensee will avoid scheduling outages of the Tainter gate at Glenville Dam that conflict with dates scheduled for Tainter gate releases for whitewater boating in the West Fork (Glenville) Bypassed Reach, unless it is likely that the equipment condition will cause a forced outage if repairs are delayed.
- 2) Replacing Lost Whitewater Releases from the Tainter Gate – If the outage cannot avoid a loss of scheduled whitewater releases from the Tainter gate at Glenville Dam, then the Licensee will endeavor in good faith to reschedule the releases from the Tainter gate during the current Peak Recreation Season at Glenville Dam to replace the missed releases that are normally scheduled for recreation.
- 3) Drawing Down the Affected Lake – To minimize the impacts to its electric customers as well as to minimize the risk of performing the work, the Licensee may choose to draw down the affected lake using the hydro unit to a point where spillage from the dam is expected to be minimized during the outage.

##### b. Forced Outages

- 1) Replacing Lost Whitewater Releases from the Tainter Gate – If the outage will cause a loss of scheduled whitewater releases from the Tainter gate at Glenville Dam, then the Licensee will endeavor in good faith to reschedule the releases from the Tainter gate during the current Peak Recreation Season at Glenville Dam to replace the missed releases that are normally scheduled for recreation. (Note: If the rescheduled releases will occur during the Critical Flow Period for Stream Fish and the water temperature in Lake Glenville at a depth corresponding to the Tainter gate sill is  $> 20^{\circ}$  C, the Licensee will complete the Direct Notification of resource agencies identified in item C.2.b below before making the rescheduled Tainter gate release).
- 2) Drawing Down the Affected Lake – To minimize the impacts to its electric customers as well as to minimize the risk of performing the work, the Licensee may choose to draw down the affected lake using the hydro unit to a point where spillage from the dam is expected to be minimized during the outage.

## Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects

### 2. Communication with Resource Agencies and Affected Parties

#### a. Planned Outages

- 1) Direct Consultation - If the outage will impact scheduled releases from the Tainter gates for whitewater boating in the West Fork (Glenville) Bypassed Reach, the Licensee will consult with the NCDWR, NCWRC, USFWS, the President of the TGA and AW as soon as approximate schedule dates are determined, but at least 10 days prior to beginning the outage. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental, cultural and human needs relative to the hydro project.
- 2) General Notification – At least 10 days before beginning an outage that will cause a loss of scheduled whitewater releases from the Tainter gate, the Licensee will add the appropriate messages to its public information website and/or its lake level phone system to inform the general public of the outage and any rescheduled Tainter gate releases for whitewater recreation.

#### b. Forced Outages

- 1) Direct Notification - If the outage will impact scheduled releases from the Tainter gate for whitewater boating in the West Fork (Glenville) Bypassed Reach, the Licensee will notify the NCDWR, USFWS, NCWRC, the TGA President and AW as soon as possible after the forced outage begins, but no longer than five days afterwards. If the rescheduled Tainter gate releases will occur during the Critical Flow Period for Stream Fish and the water temperature in Lake Glenville at a depth corresponding to the Tainter gate sill is  $> 20^{\circ}\text{C}$ , the Licensee will include the following information in the Direct Notification:
  - a) The actual measured lake temperature at the depth corresponding to the Tainter gate sill
  - b) The approximate total average daily flow in the West Fork (Glenville) Bypassed Reach just upstream of its confluence with Tuckasegee Lake
  - c) The targeted amount (cfs), duration (hrs per day) and number of rescheduled days of the Tainter gate release.
- 2) General Notification – If the outage will impact scheduled releases from the Tainter gate for whitewater boating in the West Fork (Glenville) Bypassed Reach, within five days following the start of the outage, the Licensee will add the appropriate messages to its public information website and/or

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

its lake level phone system to inform the general public of the outage and any rescheduled Tainter gate releases for whitewater recreation.

- 3) Direct Consultation - If the outage will impact scheduled releases from the Tainter gate for whitewater boating in the West Fork (Glenville) Bypassed Reach, the Licensee will consult with the NCDWR, NCWRC, USFWS, the President of the TGA and AW as soon as possible after the outage occurs, but no longer than 10 days afterwards. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the outage on the environmental, cultural and human needs relative to the hydro project.

### **D. Dam Safety Emergency**

#### 1. Mitigating Actions

- a. Safety Must Come First – If a Condition A or B is declared per the Licensee’s Emergency Action Plan, or other dam safety concerns arise, the Licensee may modify or suspend any license conditions immediately and for as long as necessary to restore the dam to a safe condition.

#### 2. Communication with Resource Agencies and Affected Parties

- a. Direct Notification – Conducted strictly in accordance with the Licensee’s Emergency Action Plan. In cases where dam safety concerns arise that are not a Condition A or B per the Licensee’s Emergency Action Plan, consultation with resource agencies and affected parties will occur as soon as possible, after the dam safety concern arises.
- b. Once Dam Safety Conditions Have Stabilized – The Licensee will add the appropriate messages to its public information website and/or its lake level phone system to inform the general public of the situation and any expected return to normal operation.

### **E. Voltage and Capacity Emergencies**

#### 1. Mitigating Actions

- a. Suspension of the Normal Operating Range for Lake Levels – If a voltage or capacity emergency (as defined above) occurs, the Licensee may modify or suspend lake level operating limitations immediately

## **Attachment C - Hydro Project Maintenance & Emergency Protocol (HPMEP) for the West Fork and East Fork Projects**

and for as long as necessary if doing so would allow additional hydro station operation that is needed to restore the electric grid to a stable condition.

- b. Conserving Water for Power Generation - If a voltage or capacity emergency (as defined above) occurs and if it is expected to continue for an extended period of time (e.g. two weeks or more), the Licensee may reduce minimum flows to the Threshold Minimum Flows (as defined above) and may modify or suspend any scheduled Tainter gate releases to support whitewater recreation in the West Fork (Glenville) Bypassed Reach if taking those actions is necessary to maintain the water inventory in project reservoirs.
- c. Replacing Lost Whitewater Releases from the Tainter Gate – If scheduled whitewater releases from the Tainter gate at Glenville Dam are lost, then once the emergency is over, the Licensee will endeavor in good faith to reschedule the releases from the Tainter gate during the current Peak Recreation Season at Glenville Dam to replace the missed releases that are normally scheduled for recreation.

### **2. Communication with Resource Agencies and Affected Parties**

- a. Direct Notification - The Licensee will notify the NCDWR, USFWS and the NCWRC as soon as possible following a deviation from license conditions for voltage or capacity emergency reasons (add the TGA President and AW if Tainter gate releases for recreational purposes are impacted) (add the USFS if lake levels at Wolf Creek Lake or Tanasee Creek Lake or minimum flows from Wolf Creek Dam are affected), but no longer than five days afterwards.
- b. General Notification - Within five days following the start of the emergency deviation, the Licensee will add the appropriate messages to its public information website and/or its lake level phone system to inform the general public of the situation and any expected dates for return to normal operations.
- c. Direct Consultation – The Licensee will consult with the NCDWR, USFWS and the NCWRC as soon as possible following a deviation from license conditions for voltage or capacity emergency reasons (add the TGA President and AW if Tainter gate releases for recreational purposes are impacted) (add the USFS if lake levels at Wolf Creek Lake or Tanasee Creek Lake or minimum flows from Wolf Creek Dam are affected), but no longer than 10 days following such deviation. The Licensee will consider options suggested by the identified agencies and organizations that could lessen the impact of the emergency on the environmental, cultural and human needs relative to the hydro project.