ML13039A086 @ p.5

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RECENT EXPERIENCE

On April 28, 2006, NRC staff identified a performance deficiency involving the Oconee Nuclear Station (ONS) maintenance activities associated with the Standby Shutdown Facility (SSF) to facilitate installation of temporary electrical power cables. The importance of this finding is that (b)(7)(F)

ONS was issued operating licenses in 1973 (Units 1 and 2) and 1974 (Unit 3), prior to the publication of significant regulation (e.g., GDC 2) and guidance on external flooding hazards applicable to most of the industry. The licensing basis of ONS did not originally evaluate the consequences of a failure of the Jocassee Dam in the plant design flooding analysis. Flooding protection for the SSF was later added as a risk assessment enhancement obtained via insights the IPEEE submittal for ONS. However, after interactions with licensee, it was established that the original elevation (5 feet) to which the SSF flood protection was designed for would be exceeded based on more recent studies. These studies indicate that approximately 18.5 feet of water could occur at the site (b)(7)(F) after a breach of Jocassee Dam. In this case, the licensee has indicated that a loss of the switchyard, loss of the emergency power supply (hydro units), loss of the SSF, and the loss of other mitigation equipment would take place (ML082750106). (b)(7)(F) (b)(7)(F) (b)(7)(F) Hence, based on the varying plant configurations and the loss of the mitigating equipment listed above, the conditional core damage probability (CCDP) given a dam failure for ONS could be as high as 1. Given that ONS had originally used the NSAC-60 study which incorrectly derived a dam failure rate an order of magnitude lower than the NRR analysis indicates, additional reviews, analysis, and actions are expected to affect the licensee on this issue.

Additionally, an NRC inspection on March 2010 at the Fort Calhoun Station (FCS) identified an apparent violation for failure to maintain adequate procedures for flood protection at the site, as stated in its licensing basis (ML101670034). Since FCS is located in close proximity to the Missouri River, and its base plant elevation (1004 feet mean seal level (MSL)) is not far above the normal river levels, NRR is currently evaluating the flooding licensing basis with respect to severe precipitation events. Current NRC assessments of external flooding vulnerabilities indicates that all normal plant equipment fails when floods reach 1010 MSL, and that essential safety-related components fail between 1010 MSL and 1014 MSL. Review of flooding extrapolation updates performed by USACE for the FCS region indicate an increase in potential elevation for floods with a return period of up to 500 years, not previously considered by the licensee (ML101670034). FCS is also located downstream from several large dams, and its IPEEE submittal states that failure of the larger dam would cause a flood wave that would reach the site (b)(7)(F) Based on the increase in estimated flood levels, the use of NSAC-60 dam failure rates, and the recent experience with flood routing analysis in the ONS dam failure studies; a potential for an increase in risk due to this hazard is also expected at the FCS site (attenuated only by the distance to the set of dams located upstream). Furthermore, the original FSAR and IPEEE submittals for Cooper Nuclear Station (CNS) formed the basis for the external flooding analysis performed at FCS. As indicated above, CNS (which is further downstream from FCS) has also used NSAC-60 as a basis and screened this hazard as "not credible."

ML13106A168 e p.3

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4/6/2009

I am non-concurring on the NRC response letter entitled "Evaluation of Duke Energy Carolinas, LLC (Duke) September 26, 2008, Response to Nuclear Regulatory Commission (NRC) Letter Dated August 15, 2008, Related to External Flooding at Oconee Nuclear Station, Units 1, 2, and 3 (Oconee) (TAC Nos. MD8224, MD8225, and MD8226)" (ML090570779) for the following two overarching reasons:

(1) We do not require the licensee to perform its inundation analysis in a way that will allow the NRC to conclude with high confidence and sufficient safety margins that adequate protection is provided.
(2) As a result, the letter does not clearly define a success path to timely resolution consistent with the significance of the issue.

The adequate protection issue arises from no defense in depth should the Standby Shutdown Facility (SSF) be inundated—with resultant core damage, containment failure, and damage to fuel in the spent fuel pool—and the lack of safety margin in the licensee's current analyses.

Background and explanation of significance of the issue

- No other potential initiating event at Oconee is as risk significant. (b)(7)(F)

Thus, for a Jocassee Dam failure frequency of (b)(7)(F)

- For a Jocassee Dam failure, using potentially optimistic assumptions, Duke estimates that containment will fail approximately (b)(7)(F) hours after dam failure without mitigating actions.
- Under the dam break conditions, resultant flood waters and infrastructure damage would affect public evacuation and potentially affect Emergency Operations Facility response capability. Duke has not demonstrated that its radiological emergency plan actions can be adequately implemented under these conditions.
- To reduce risk from other, unrelated initiators, Duke is currently performing several modifications to the Oconee site. As the table below indicates, these modifications will improve risk less than improvements that would mitigate a Jocassee Dam failure.

ML12363A132 @ p. 1 and 2

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August 15, 2008

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

Information in this record was deleted in accordance with the Freedom of Information Act, Exemptions 7F, Outside Scope FOIA/PA 2012-0127

SUBJECT: INFORMATION REQUEST PURSUANT TO 10 CFR 50.54(f) RELATED TO EXTERNAL FLOODING, INCLUDING FAILURE OF THE JOCASSEE DAM, AT OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3, (TAC NOS. MD8224, MD8225, AND MD8226)

Dear Mr. Baxter:

This letter is being issued in accordance with the U.S. Nuclear Regulatory Commission's (NRC's) regulation in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.54(f). Pursuant to this regulation, you are required to provide further information regarding the consequences of external flooding, including failure of the Jocassee Dam, to enable us to determine whether the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee) licenses should be modified, suspended, or revoked.

After the resolution of the inspection finding on the (b)(7)(F) flood barrier, the NRC has further reviewed the facts and circumstances regarding overall adequacy of the flood protection of Oconee given the Jocassee Hydro Project, Dam Failure Inundation Study (Inundation Study, item 6 in the Enclosure. Specifically, the NRC is seeking information to determine whether (b)(7)(F) of the site exist relative to a Jocassee Dam failure, and whether Oconee (b)(7)(F) compensating engineering safeguards for such an event.

We note that Section 3.1 of the Oconee Updated Final Safety Analysis Report (UFSAR) states, "The principal design criteria for Oconee 1, 2 and 3 were developed in consideration of the seventy General Design Criteria for Nuclear Power Plant Construction Permits proposed by the AEC [Atomic Energy Commission] in a proposed rule-making published in 10CFR Part 50 in the Federal Register of July 11, 1967." Furthermore, Section 3.1.2 of the UFSAR, "Criterion 2 – Performance Standards (Category A)," states, "Those systems and components of reactor facilities which are essential to the prevention of accidents which could affect public health and safety or to mitigation of their consequences shall be designed, fabricated and erected to performance standards that will enable the facility to withstand, without loss of the capability to protect the public, the additional forces that might be imposed by natural phenomena such as earthquakes, tornadoes, flooding conditions, winds, ice, and other local site effects." The current UFSAR discusses (b)(7)(F). However, it does not include the effects of a Jocassee Dam failure, nor does it include the flood protection (b)(7)(F) We further note that in the mid-1990's, the UFSAR was revised removing the reference to the Jocassee Dam failure and postulated (b)(7)(F) at the Oconee site.

In addition to the UFSAR, the NRC staff has reviewed a number of other documents relevant to flooding due to failure of the Jocassee Dam (see Enclosure). From this review, the NRC staff concluded that (b)(7)(F)

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(b)(7)(F) However, the Inundation Study predicted that a failure of the Jocassee Dam could result in a (b)(7)(F) (b)(7)(F)

Therefore, the NRC staff seeks additional information regarding external flooding of the Oconee site, including the consequences of a Jocassee Dam failure. Pursuant to Section 161c, 161o, 182, and 186 of the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR 50.54(f), in order for the Commission to determine whether the licenses for Oconee should be modified, suspended, or revoked, you are required to provide information within 45 calendar days of receiving this letter that will demonstrate that the three Oconee units can be safely shut down and maintained in a safe shutdown condition, and that the two spent fuel pools can be maintained in a safe condition, in the event of external flooding, including a Jocassee Dam failure.

In your response, you shall address the following specific issues:

1) Explain the bounding external flood hazard at Oconee and the basis for excluding consideration of other external flood hazards, such as those described in the Inundation Study, as the bounding case.

2) Provide your assessment of the Inundation Study and why it does or does not represent the expected flood height following a Jocassee Dam failure.

3) Describe in detail the (b)(7)(F)

In answering these questions, please take appropriate measures in the development and handling of information regarding this issue, including consideration of the provisions of 10 CFR 2.390(d)(1). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

We recommend that your staff meet with the NRC staff within three weeks to discuss these issues and questions in order to ensure that your responses will have sufficient level of detail for the NRC staff to make an appropriate determination regarding this matter. If you have any questions on this matter, please contact Senior Project Manager, Leonard N. Olshan, of my staff at 301-415-1419.

Sincerely,

/RA/

Joseph G. Giitter, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287
Enclosure:
Documents Reviewed Related to Failure of
the Jocassee Dam at Oconee Nuclear Station,
Units 1, 2, and 3

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April 30, 2009

Information in this record was deleted in accordance with the Freedom of Information Act, Exemptions T Outside Scope FOIA/PA 2012-0027

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: EVALUATION OF DUKE ENERGY CAROLINAS, LLC (DUKE), SEPTEMBER 26, 2008, RESPONSE TO NUCLEAR REGULATORY COMMISSION (NRC) LETTER DATED AUGUST 15, 2008, RELATED TO EXTERNAL FLOODING AT OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (OCONEE) (TAC NOS. MD8224, MD8225, AND MD8226)

Dear Mr. Baxter:

On August 15, 2008, the NRC issued a request for information pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.54(f) regarding the protection against external flooding at Oconee including a postulated failure of the Jocassee Dam. Duke responded to the NRC letter on September 26, 2008. Based on the NRC staff's review of the information provided by Duke to date, the NRC staff (b)(7)(F) that Duke has not demonstrated that Oconee will be (b)(7)(F) from external flooding events. Specifically, Duke did not (1) provide an adequate inundation study, (2) provide a deterministic resolution of this matter, and (3) provide a schedule to resolve the external flooding issue in a timely manner. To resolve the issues identified in the August letter, Duke must provide appropriate technically-supported inundation studies with a sensitivity analysis. We have clarified these issues below.

At the time that the NRC issued the 50.54(f) letter, there were several factors that generated the NRC staff's concern regarding external flooding protection at Oconee:

- The plant equipment designed to provide the primary means to achieve and maintain a hot shutdown condition is not demonstrated to be protected from external flooding. Thus, the (b)(7)(F) was designed as the alternate means to provide safe shutdown during flooding scenarios. Should the (b)(7)(F) also become unavailable in a significant external flood, the ability to achieve and maintain safe shutdown would be compromised for all three units.
- The (b)(7)(F) (b)(7) Duke has been unable to retrieve the calculations performed in the early 1980's supporting the adequacy of that flood height protection.
- In 1992, Duke conducted a flood inundation study that predicted onsite flood heights ranging from approximately (b)(7)(F)

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B-3

- Duke did not perform further studies to rectify the disparity between the 1992 and early 1980's inundation studies.

- In late 2007, the NRC staff identified that the (b)(7)(F)

Because of the potential significance of this issue, the concern that resolution is needed in a timely manner, and the need to ensure that Oconee was adequately protected from external flooding, the NRC issued a request for information pursuant to 10 CFR 50.54(f) to formally resolve this issue.

The NRC staff and Duke met on August 28, 2008, to discuss the basis for the letter and scope of the requested information. Duke responded to the request on September 26, 2008. The NRC staff and Duke met again on November 5, 2008, to discuss the response. Further technical interactions were conducted over the following several months, including teleconferences and a meeting on December 4, 2008, to understand the details of Duke's response.

The NRC staff has concluded that at this time there is not a need to modify, suspend or revoke the Oconee licenses as stated by the NRC staff in the November 5, 2008, management meeting. Nonetheless, the NRC staff remains concerned that Duke has not demonstrated that the Oconee units will be adequately protected. Duke has not provided a (b)(7)(F) (b)(7)(F) of Oconee from offsite flooding. Duke's response indicates that the 1992 inundation study performed for the Federal Energy Regulatory Commission (FERC) predicts a bounding onsite flood height of (b)(7)(F) due to a (b)(7)(F) failure of the Jocassee Dam, and Duke states that the study results are not applicable to Oconee since the purpose of the study was to determine the scope of evacuation plans and not for determining credible flood heights at Oconee. However, the 1992 study is the only available external flooding analysis for the Oconee site.

The NRC staff's position is that a Jocassee Dam failure is a credible event and needs to be addressed deterministically. The NRC staff has assessed the potential failure likelihood of dams of similar construction and concluded that the (b)(7)(F) than the present screening criteria for concluding that an event is not credible. While the NRC staff recognizes that risk insights gained from probabilistic approaches could be of value to Duke in focusing and prioritizing modifications and testing and maintenance activities regarding the dam, the NRC staff believes that this approach will not demonstrate that the probability of a failure of the Jocassee Dam is so low that it does not need to be considered in Oconee's external flooding analyses.

In its response to the 50.54(f) letter, Duke stated that it would perform inundation studies and sensitivity analyses using the HEC-RAS model. The NRC staff agrees that a study with the more advanced model and sensitivity analyses would be beneficial because of the uncertainty involved in predicting dam failure and resultant flood levels at Oconee. Dam design operating

In the scenario involving a postulated total catastrophic and sudden failure of the Jocassee dam and the resultant loss of the SSF, remaining credited defense-in-depth for the ONS units includes the reactor containment(s) and Oconee Severe Accident Guideline (OSAG). Additionally, other recovery actions will be directed by the Emergency Response Organization (ERO).

(b)(7)(F)

The scenario description above does not acknowledge that the postulated flood arrives at the site and then recedes rather quickly. In the above scenario, ONS is no longer flooded approximately 5 hours after the onset of initial flooding (10 hours following failure of the dam). At this point, recovery actions can begin to mitigate the loss of AC power and thus extend the time to a potential containment breach.

Emergency Action Plan Scenario

Since Jocassee and Keowee Hydro Stations are FERC regulated and inspected, EAP(s) exist for both facilities. EAP(s) for both Jocassee and Keowee identify two conditions related to the status of the dams: Condition A – Failure is Imminent or Has Occurred; Condition B- Potentially Hazardous Situation is Developing. These conditions are determined and communicated by Area Hydro Group personnel. For the postulated Jocassee 'sunny day' break scenario, Condition A initiates a call tree that notifies offsite agencies to implement specific actions to protect/warn the public as well as notifications to the Operations Shift Manager (OSM) and Keowee Hydro Operator. If the Keowee Hydro Operator determines that the failure of the Keowee dam is imminent or has occurred, or potentially hazardous situation is developing, the determination of a Condition A or B for Keowee will be declared.

Once the OSM has been informed that a Condition A or B exists for the Keowee Hydro

ML12363A129 e p. 30

Attachments 1-4 contain confidential information
Withhold from public disclosure under 10 CFR 2.390

e) Initial lake levels were varied in both Keowee and Jocassee Lakes and resulting flood heights in the ONS yard were determined.

DAMBRK Analysis results are given below:

(b)(7)(F)

* Completed in September 2008

Result conclusions: For current lake levels, predicted flood level is below the height of SSF wall that can be extended short term (803.5 ft msl). See below for description of the short term modifications. For cases where the Jocassee reservoir elevation is 1090 ft msl, predicted flood level is slightly above height of SSF wall that can be extended short term. This is considered acceptable, given the very conservative breach size. Although the assumed reservoir level has some effect on the resulting flood levels, changes in the breach size has a pronounced effect (see sensitivity cases 3 and 4). This result supports the importance of the RAC work.

ML13099A247 p. 7 and 8

on SSCs identified for mitigation of accidents. As was the original site design for flooding conditions, these design criteria are to remain within the constraints of the PMF applicable to ONS which was analyzed based on the PMP. Therefore, the original PMF analysis will remain as the flood design criteria for the Essential SSCs.

A Jocassee Dam failure can subject the Oconee Nuclear Site to adverse conditions beyond the plant design basis. Specifically, the postulated failure of the Jocassee Dam could result in a loss of off-site and emergency power, loss of external water sources and inundation of a majority of the station's SSCs. As described and accepted within Reference 1, compensatory measures are in place to mitigate these potential adverse consequences. Modifications are planned and discussed in Attachment 2 to improve the capability to maintain the three Oconee units as well as both SFPs in a condition that adequately protects the fuel. Upon completion of these modifications and implementation of the mitigation strategy within station procedures and processes, the compensatory measures described within Reference 1 will no longer be required.

Flood barriers will be designed to protect the credited SSCs including the Turbine Building, Auxiliary Building and the SSF, and the surrounding yard (b)(7)(F) following the postulated Jocassee Dam failure (b)(7)(F) This ensures a dedicated flood protected power source for plant systems. The new flood protected power source would also allow the SSF to be powered without starting the SSF diesel generator, thus preserving CCW inventory. (b)(7)(F)

(b)(7)(F) Thus, mitigation of the Jocassee Dam failure would be limited by the loss of external water sources to ONS. The water inventory trapped in the CCW system piping system would be the credited source of water for core decay heat removal and SFP makeup.

The planned modifications have been assumed to be implemented in the mitigation strategy for establishing and maintaining the three Oconee units as well as both SFPs in a condition that adequately protects the fuel. The mitigation strategy for this scenario has been subdivided into the following phases:

- Phase 1: Reactor shutdown and establishment of Mode 3
- Phase 2: Initiation of Natural Circulation Cooldown of the Reactor Coolant System (RCS) to 250°F
- Phase 3: Maintain RCS at ≤250°F

Phase 1: Reactor shutdown and establishment of Mode 3

(b)(7)(F)

Actions are taken to establish the flood protective features, such as isolating Turbine Building and yard drain flowpaths and closing flood barrier access openings.

(b)(7)(F)

Following notification, the ONS Switchyards are assumed to remain available to each unit's startup transformer which provides power to normal and emergency systems.

The operators will take actions to shutdown the reactor(s) and establish Mode 3 with T_{ave} and RCS pressure at approximately 525°F and 2155 psig respectively, using normal plant systems. Operator actions will be undertaken to begin boration of the RCS for cold shutdown conditions. Normal secondary plant systems will remain in operation during this phase.

The operators will take actions to disable the Essential Siphon Vacuum System and vent it to prevent reverse siphon flow from the CCW inlet piping back to the Intake Canal when it is lost. The emergency CCW discharge flow path will be disabled by operators to prevent any loss of CCW. Actions will be taken to isolate the High Pressure Service Water (HPSW) outside of the flood protected area to ensure its capability to provide cooling water to the High Pressure Injection (HPI) pump motors.

Phase 2: Initiation of Natural Circulation Cooldown of the Reactor Coolant System to 250°F

(b)(7)(F)

This results in a momentary loss of power to each of the units. The Reactor Coolant Pumps (RCPs) are lost due to the loss of power to the startup transformers from the 230kV switchyard.

(b)(7)(F)

The SSF is normally powered from Unit 2's MFB, but it is load shed. Operator action will be taken to restore power to the SSF from Unit 2's MFB. Following reset of the load shed, power for the SSF would be provided from Unit 2's MFB to minimize any usage of the CCW inventory for SSF diesel operation.

The rising flood water in the ONS Intake Canal is postulated to result in failure of the Lake Keowee impoundment including the intake canal. This requires the shutdown of the Low Pressure Service Water (LPSW) pumps to conserve water inventory in the CCW piping.

... A24+ p. 14 and 15

Description of Modifications:

1-Dedicated, Flood Protected Power

In order to ensure an adequate dedicated power path to the Oconee site after a Jocassee Dam failure, the following modifications are required:

(b)(7)(F)

1B – CT5 Substation

(b)(7)(F) The Jocassee Dam failure requires modification of the CT5 Substation to add multiple power paths for mitigation. The initial function of the CT5 Substation will be to provide emergency power to loads required to mitigate the Jocassee Dam failure from the Oconee Standby Buses. Isolation for CT5 to the Standby Bus power path will be provided by a new breaker in the CT5 Substation. A secondary function of the CT5 Substation will be to provide an additional power path to temporary loads used for mitigation. These loads will be powered by a new recovery equipment bus designed for the CT5 Substation. This bus will provide power to portable distribution trailers at voltage levels of 4160V, 600V, 480V, 208V, and 120V for these temporary loads. Isolation/protection of this bus will be provided by a new breaker. Individual loads will be isolated/protected by load-specific fusible gang switches on the load side of this bus.

General Design Parameters:

Loading of CT5 transformer does not exceed the 12/16/20MVA rating consistent with UFSAR Section 8.2.1.4.

2-Protect Required SSCs and the Surrounding Yard

In order to prevent flood waters from flowing into the site from the Keowee impoundment failure and from rising waters in the tailrace area, the following modifications are required:

Based on the mitigation strategy discussed within Attachment 1, the following table identifies proposed modifications to mitigate site flooding following the postulated failure of the Jocassee Dam.

Specifically, modifications will be required to protect the required SSCs to meet the mitigation strategy and provide a dedicated flood protected power supply following a postulated Jocassee Dam failure. Protection of the credited SSCs including the Turbine Building, Auxiliary Building, SSF, and the surrounding yard (including CT5 Substation) will be accomplished with flood barriers and associated infrastructure.

(b)(7)(F)

No	Category	Description
1	(b)(7)(F)	(b)(7)(F)
1A	(b)(7)(F)	
1B	CT5 Substation	Modify CT5 Substation to supply the standby bus and a new recovery equipment bus.
2	**Protect Required SSCs and the Surrounding Yard**	**Protect required SSCs and the surrounding yard due to Keowee impoundment failures and rising waters in the tailrace area**
2A	Power Block Flood Wall	Install a new flood wall located on the east side of the Oconee site.
2B	Intake Dike Diversion Wall	Install a new diversion wall along the northern side of the ONS intake dike
2C	Turbine Building Drain Isolation	Install barriers to minimize flood waters from entering into the Turbine Building from rising waters in the tailrace area
2D	Yard Drain Isolation	Install barriers to minimize flood waters from entering the site
3	**SFP Makeup**	**Utilizes stored water inventory for makeup to the SFP**
3A	SSF Service Water Discharge Flow Path	SSF ASW minimum flow line diverted to outside SSF for transfer to SFP
3B	SFP Level Instrumentation	Install new SFP level instrumentation rated for post-flood conditions

2A - Power Block Flood Wall

The new Power Block Flood Wall will envelope the eastern side and the southern end of the ONS protected area. The wall is comprised of 3 sections: The Discharge Diversion Section, The East Wall, and the Intake Dike Tie Section. The wall will have at least one vehicular access and one personnel access located at the north road crossing, each of which will have flood protection capability.

General Design Parameters:

Classification: Class 3, consistent with UFSAR Section 3.2.1.1.3
Design Loadings:
Dead + Wind (UFSAR Section 3.3.2.4) or
Dead + Hydrodynamic (Flood) (Reference 2)

Additional Design Considerations: General erosion; flood scour; debris; leakage from access gates, expansion joints, and unidentified locations (details to be determined); site drainage; and soil exploration and characterization. Interactions of non-seismic SSCs with seismic SSCs will be addressed.

Discharge Diversion Section (approximately 300 ft long)

Wall Height: Top Elev. (b)(7)(F)
Protection Height Margin: Approximately 2 ft.
Wall Thickness: Material dependent
Design Codes: Similar to UFSAR Section 3.8.5.4.3
Design Methodology: UFSAR Section 3.8.5.4.3

East Wall Section (approximately 2000 ft. long)

Wall Height: Top Elev. (b)(7)(F)
Protection Height Margin: Approximately 2 ft.
Wall Thickness: Material dependent
Design Codes: Similar to UFSAR Section 3.8.5.4.3
Design Methodology: UFSAR Section 3.8.5.4.3

Access Barriers: Vehicular access closure is planned to be a gate (sliding or hinged, possibly designed with some mechanical sealing devices), or stop logs (concrete or steel), similar to standard flood gates or other similar barriers.

...A247 p. 12 and 13

Intake Dike Tie Section (approximately 160 ft. long)

Wall Height: Top Elev. (b)(7)(F) tapering to zero height
Protection Height Margin: Approximately 2 ft.
Wall Thickness: Material dependent. Wall is planned to be a combination of Power Block Wall transitioning to an embankment (compacted fill) wall tied to the existing Intake Canal Dike embankment.
Design Codes: Similar to UFSAR Section 3.8.5.4.3
Design Methodology: UFSAR Section 3.8.5.4.3

2B - Intake Dike Diversion Wall

This wall will prevent the rising waters on Lake Keowee, more specifically the Oconee Intake Canal, from flowing over the northern crest of the dike and directly into the yard. The wall will be located on the northern side of the dike crest, going from the northeast corner of the dike to the northwest corner of the dike where it will tie to higher ground. One access gate is planned for the existing roadway connecting the western portion of the nuclear site to the crest of the dike. Design parameters for the Intake Dike Diversion Wall are described below:

General Design Parameters

Classification: Class 3, consistent with UFSAR Section 3.2.1.1.3
Design Loadings:
Dead + Wind (UFSAR Section 3.3.2.4) or
Dead + Hydrodynamic (Flood) (Reference 2)

Additional Design Considerations: General erosion; flood scour; debris; leakage from access gates, expansion joints, and unidentified locations (details to be determined); and soil exploration and characterization. Interactions of non-seismic SSCs with seismic SSCs will be addressed.

Wall Height: Top Elev. (b)(7)(F)
Protection Height Margin: Approximately 2 ft.
Wall Thickness: Material dependent
Design Codes: Similar to UFSAR Section 3.8.5.4.3
Design Methodology: UFSAR Section 3.8.5.4.3

Access Barriers: Vehicular access closure is planned to be a gate or stop logs similar to standard flood gates or other similar barriers.