Group M

FOIA/PA NO: 2012-0325

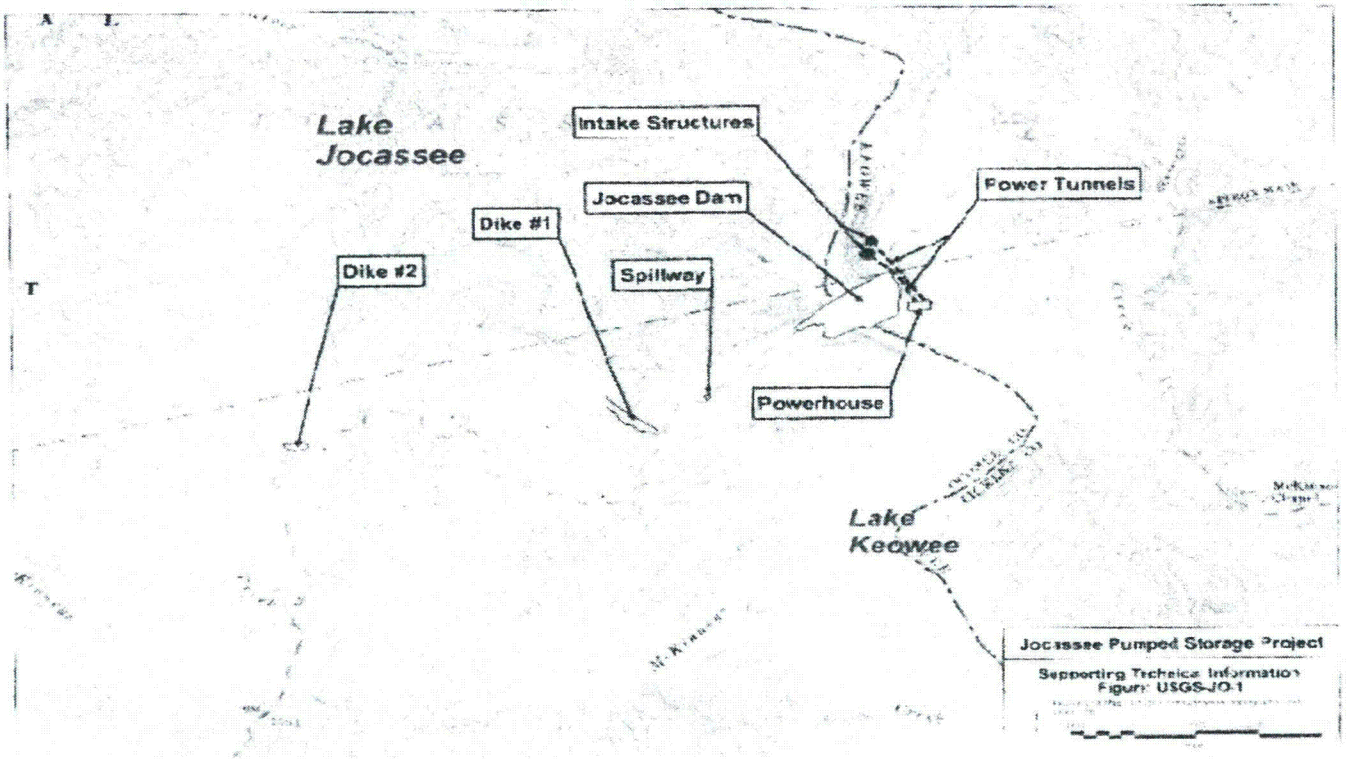
RECORDS BEING RELEASED IN PART

The following types of information are being withheld:

Ex. 1: ☐ Records properly classified pursuant to Executive Order 13526
Ex. 2: ☐ Records regarding personnel rules and/or human capital administration
Ex. 3: ☐ Information about the design, manufacture, or utilization of nuclear weapons
☐ Information about the protection or security of reactors and nuclear materials
☐ Contractor proposals not incorporated into a final contract with the NRC
☐ Other _____
Ex. 4: ☐ Proprietary information provided by a submitter to the NRC
☐ Other _____
Ex. 5: ☐ Draft documents or other pre-decisional deliberative documents (D.P. Privilege)
☐ Records prepared by counsel in anticipation of litigation (A.W.P. Privilege)
☐ Privileged communications between counsel and a client (A.C. Privilege)
☐ Other _____
Ex. 6: ☑ Agency employee PII, including SSN, contact information, birthdates, etc.
☐ Third party PII, including names, phone numbers, or other personal information
Ex. 7(A): ☐ Copies of ongoing investigation case files, exhibits, notes, ROI's, etc.
☐ Records that reference or are related to a separate ongoing investigation(s)
Ex. 7(C): ☐ Special Agent or other law enforcement PII
☐ PII of third parties referenced in records compiled for law enforcement purposes
Ex. 7(D): ☐ Witnesses' and Allegers' PII in law enforcement records
☐ Confidential Informant or law enforcement information provided by other entity
Ex. 7(E): ☐ Law Enforcement Technique/Procedure used for criminal investigations
☐ Technique or procedure used for security or prevention of criminal activity
Ex. 7(F): ☑ Information that could aid a terrorist or compromise security

Other/Comments: Certain portions are outside of scope

Jocassee Description



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Jocassee Description

- Full pond elevation 1110 ft.msl
- Maximum licensed drawdown elevation 1080 ft.msl
- Main Dam design: Earthen core contained by rockfill shells, crest elevation 1125 ft.msl, height- 385 feet.
- Production Details: 4 turbines providing approximately 610 MW
- Minimum intake elevation 1043 ft.msl
- Spillway independent of main dam, constructed in a bedrock excavation. Spillway contains two flood gates. The elevation of the top of the flood gates is 1110 ft.msl

Jocassee Description

(b)(7)(F)

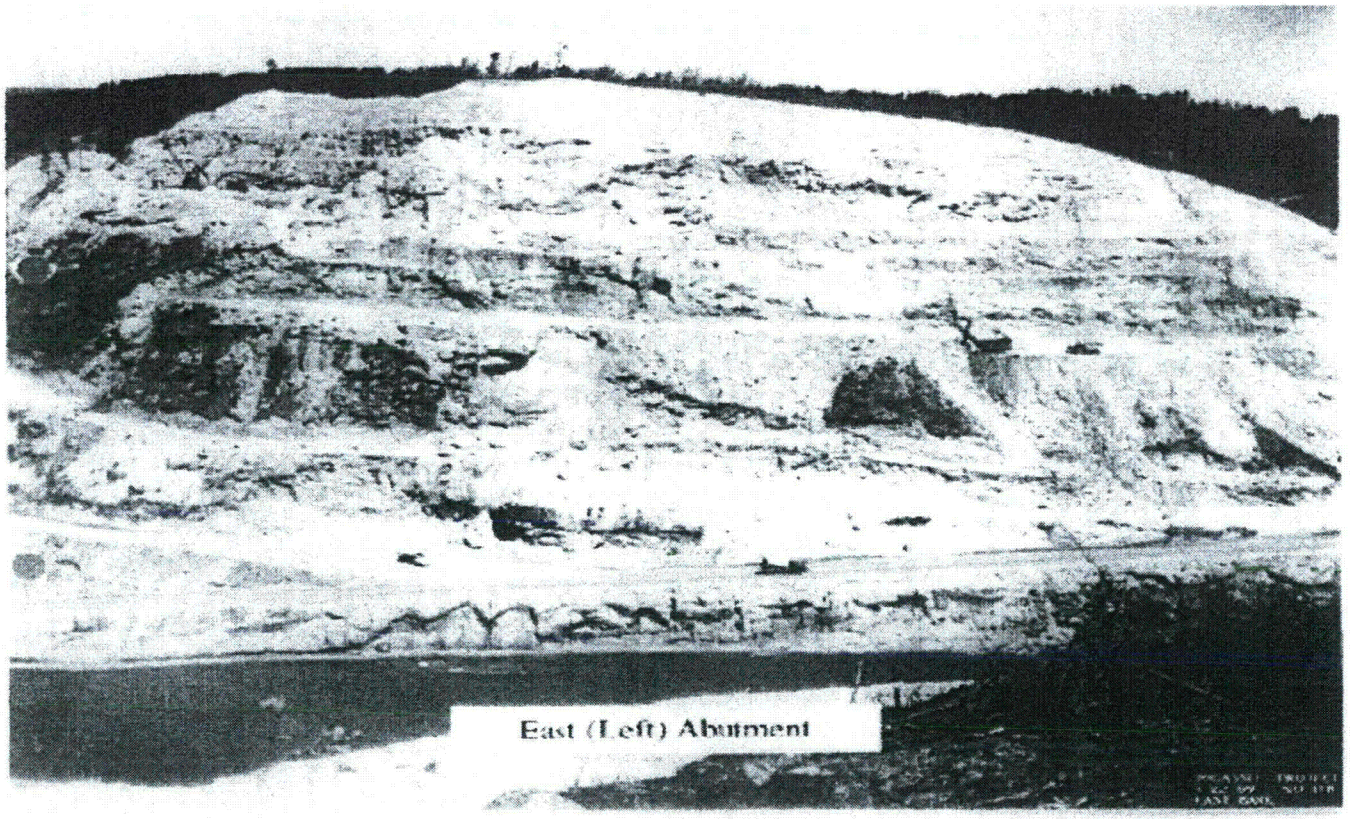
~~Withhold from public disclosure under 10 CFR 2.390~~

Jocassee Description

(b)(7)(F)

~~Withhold from public disclosure under 10 CFR 2.390~~

Jocassee Description



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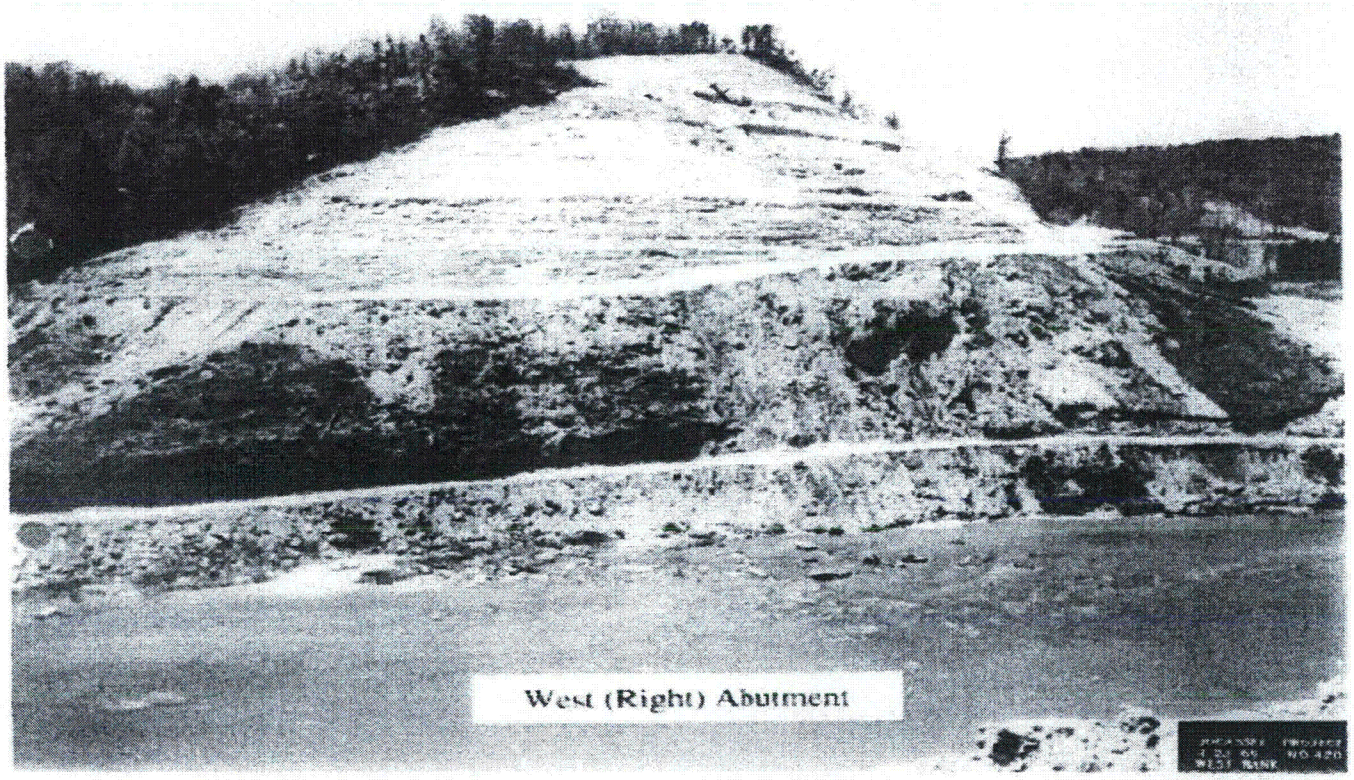
Jocassee Description



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Jocassee Description

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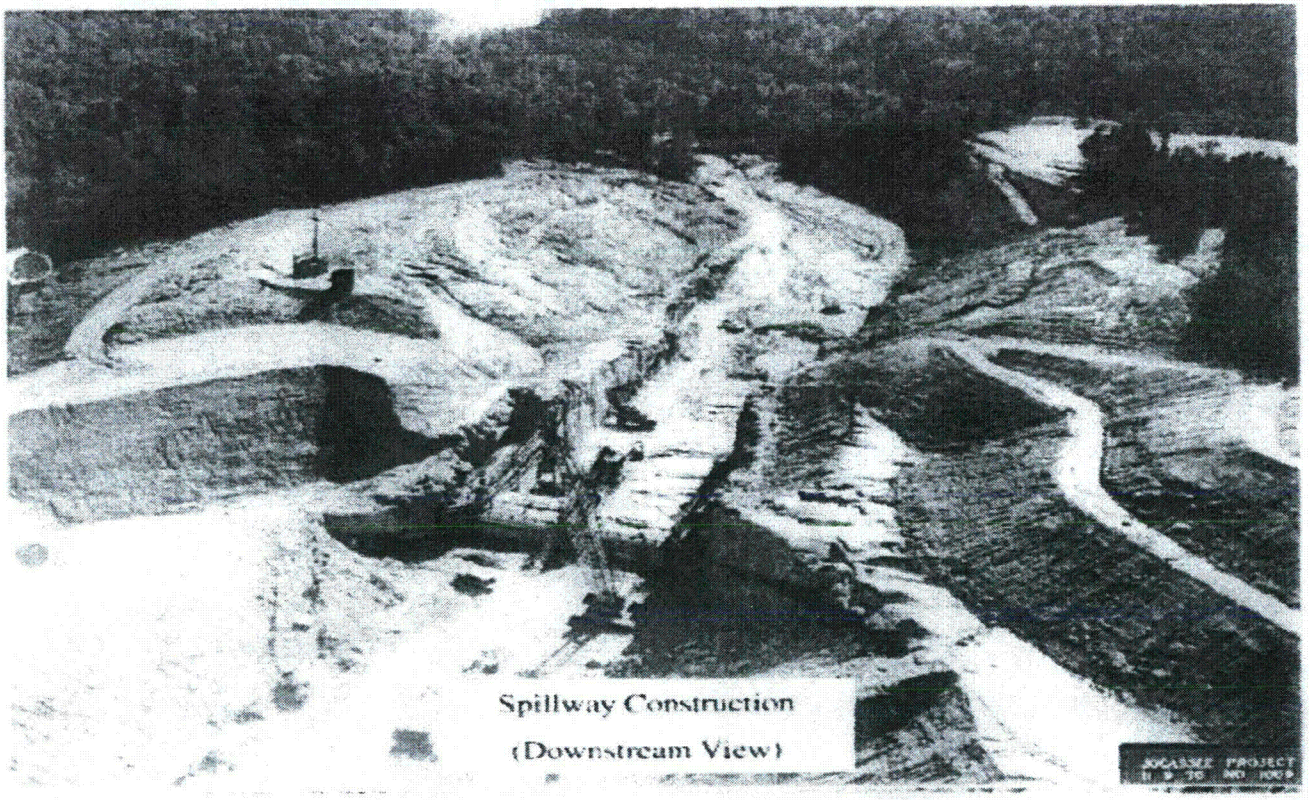
Jocassee Description



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Jocassee Description

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Jocassee Description

~~Withhold from public disclosure under 10 CFR 2.390~~

Jocassee Description

~~Withhold from public disclosure under 10 CFR 2.390~~

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Jocassee Description

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Current Flood Licensing Basis

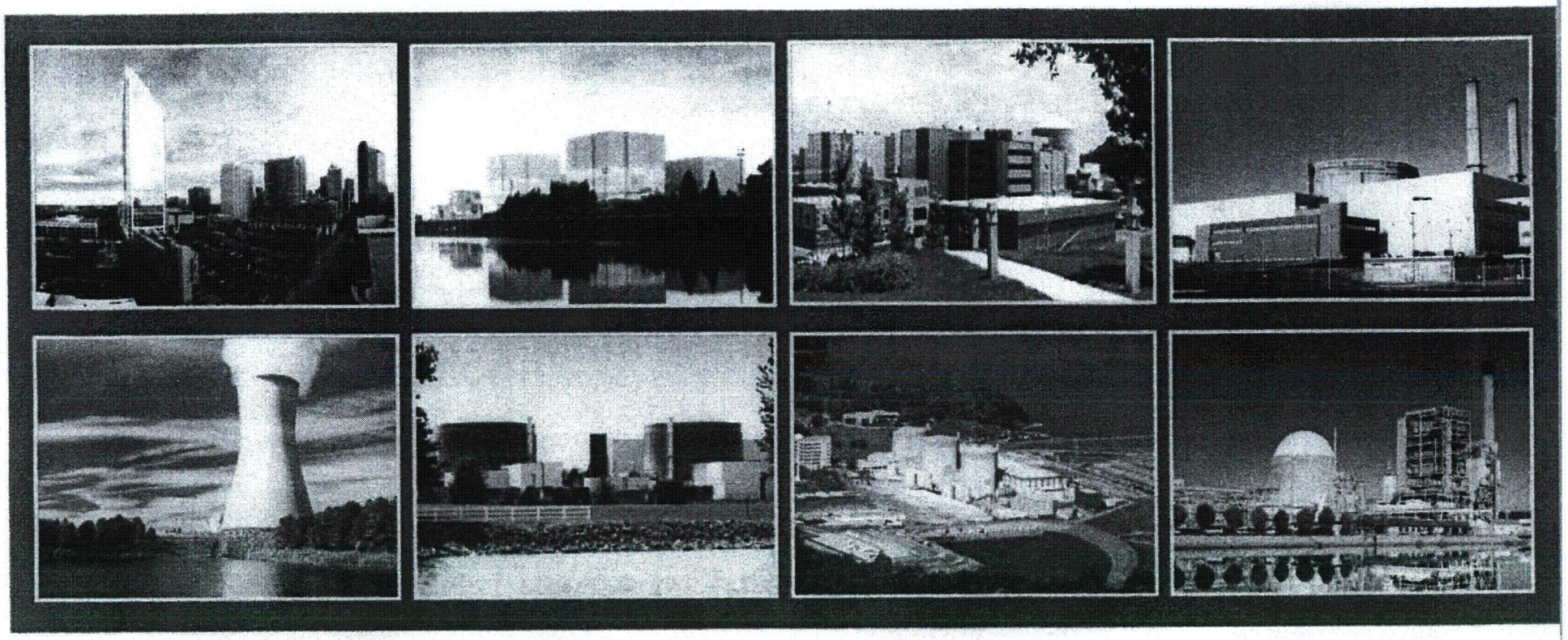
- The Oconee flood CLB is based on a PMP event directly applicable to the site.
- The SSF is credited to mitigate the effects of the failure of a CCW expansion joint in the Turbine Building.
- Since Jocassee is seismically designed and was constructed to high standards, upstream dam failures were not considered in determining external flood threats to the Oconee site.
- Current SSF flood protection is provided as a PRA enhancement as stated in UFSAR 9.6.3.1.
- Random or "sunny day" dam failures are not addressed in the Oconee CLB.

Seismic & Civil / Structural Analyses

- Seismic Capacity
  - Duke submitted the revised Jocassee seismic fragility evaluation to the NRC by letter dated 2/5/07.
  - The evaluation was performed by Applied Research & Engineering Sciences (ARES) Corp., formerly EQE, a respected consulting firm in the area of seismic fragility.
  - The combination of the updated seismic fragility with the seismic hazard curve results in a negligible risk contribution from seismic events.
  - The NRC has previously agreed with the negligible risk characterization in a letter dated 11/20/07.

Seismic & Civil / Structural Analyses

- Seismic Capacity / cont.
  - The Jocassee main dam is designed to a .12 g horizontal ground acceleration
  - Jocassee Dam included in seismic model of Oconee PRA.
  - PRA seismic capacity with regard to failure (based on ARES Report):
  - Median centered fragility value for dam failure is 1.640 g.
  - Equivalent HCLPF value (95% confidence) 0.305 g.



NRC Commission Drop In

August 7, 2012

Dhiaa Jamil – Chief Nuclear Officer

Bob Duncan – Senior VP Operations

Chris Nolan – Regulatory Affairs Director

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Agenda

Outside of Scope

- Plant Statuses and Items of Interest

Duke Energy at a Glance

Outside of Scope

Top Tier Leaders of Duke Energy

Outside of Scope

Nuclear Generation Leadership

Outside of Scope

Nuclear Vision

Outside of Scope

ROP Status

- Operator Reactor Assessment Program
  - Outside of Scope
  - Oconee Units 1, 2 & 3 – Licensee Response Column
  - Outside of Scope
- Outside of Scope

Crystal River 3

Outside of Scope

Catawba

Outside of Scope

Harris

Outside of Scope

Robinson 2 - Substantive Cross-Cutting Issue

Outside of Scope

Oconee

- Standby Shutdown Facility
  - Pressurizer Heater Breakers classified as "Old Design Issue"
    - 95002 Inspection scheduled to start August 27, 2012
  - Confirmatory Action Letter Activities:
    - SSF Design Review
    - Main Feeder Bus Arcing Faults – Risk Reduction Study
    - External Flooding – evaluating impacts from Fukushima

Oconee Major Project Activities

- Completed Activities:
  - Natural Phenomena Barrier System
  - RPS/ES completed for Units 1 & 3
- Ongoing Activities:
  - Protected Service Water (PSW)
  - NFPA 805 Transition
  - Tornado / HELB
  - Main Steam Isolation valves
    - License Amendment Request Required
    - Implementation Schedule
      - Unit 1 – Fall 2014
      - Unit 2 – Fall 2015
      - Unit 3 – Fall 2016

OCONEE NUCLEAR STATION

MEASURES TO ADDRESS EXTERNAL FLOODING

BACKGROUND

Vulnerabilities to external flooding resulting from a failure of the Jocasse Dam located upstream of the Oconee Nuclear Station on Lake Keowee were identified and have been the subject of discussions between the licensee and the NRC for several years. The licensee contracted with Utah State University to perform an inundation study to determine what the predicted water levels would be on-site following an upstream "sunny day" dam break and then use that information to develop actions – both interim and permanent – to protect the site for such an event.

The Jocasse Dam project was completed in 1972 and commercial operation of the power plant began in 1975. The project was designed for seismic ground acceleration greater to that used in the design of the Oconee Nuclear Station (0.12g versus 0.10g). Reanalysis of the dam's design was performed in 1990 and again in 1994 and verified that the structure had safety factors that exceeded the required values as defined by FERC for both seismic and Predicted Maximum Precipitation (PMP) events.

IPEEE HCLPF is 0.29g

CURRENT INSPECTIONS / PROTECTIVE MEASURES

The following routine inspections are performed on the Jocasse Dam Project. To date, no performance issues have been identified nor have any major remedial projects been required.

- The licensee visually inspects the dam and spillway bi-weekly and following a 2-inch rainfall or seismic event
- The licensee's personnel assigned to the Jocasse Dam Project routinely observe the dam on a daily basis as part of the ongoing maintenance program
- Annual inspections are performed by FERC inspectors
- Five year dam inspections are performed by independent consultants under the auspices of FERC
- Underwater inspections are performed every five years

The Jocasse Dam Project is heavily instrumented to allow personnel assigned to the dam as well as Hydro personnel in the General Office to monitor the dam on a regular basis. The monitoring provided includes the following:

- Inspection and data collection points to check for seepage through the dam structure including:
    - 10 observation wells monitored monthly for changes in water quality
    - 12 seepage collection points monitored monthly for changes in flow and turbidity
    - 17 surface monuments surveyed annually for changes in vertical or horizontal displacement of the dam and abutments

M/3

- Video monitoring of the dam forebay area and the reservoir level fed to the Jocasse control room and the Hydro office in Charlotte
- Strong motion accelerometers that record seismic activity. **NOTE**: Following any seismic activity, inspections are performed on all observation wells and seepage collection points

Emergency Procedures have been developed for use in the event any degradation of the Jocasse Dam is noted. These procedures are in-place at Jocasse per FERC regulations and at the Oconee Nuclear Station based on NRC regulations. In addition to the procedures, training is provided to all personnel associated with the implementation of these procedures on an on-going basis. All actions at the dam or the Oconee site are based on the Condition that has been identified. Condition A means that a failure of the dam has occurred or is imminent while Condition B means that a potentially hazardous situation is developing.

The worst case scenario in terms of impact to the Oconee Nuclear Station has been determined to the "sunny day" failure of the dam where notifications associated with Condition A are made at the time the dam fails. The actions taken at Oconee would have all three reactors off-line within one (1) hour. The flood waters are predicted to crest at the station approximately 2.5 to 3 hours following the dam failure. Due to the impact the flood waters would have on equipment such as the Standby Shutdown Facility (SSF), actions were implemented to provide interim protection from the flood waters until a permanent solution could be developed and implemented. The actions taken to-date and proposed are described below.

INTERIM COMPENSATORY MEASURES

Following the licensee's identification of the potential impact a failure of the Jocasse Dam could have on the Oconee Nuclear Station, a number of interim compensatory measures were developed and implemented. They include the following:

- Complete an enhanced hydrologic evaluation of the impact a dam break would have on the station to determine what level of water would be expected on-site
- Review and revise the Hydro Department water management plan to ensure there was margin available to address storm water buildup in Lake Jocasse
- Implement and maintain an enhanced monitoring program of the Jocasse Dam project (as described above)
- Install additional monitoring equipment at the Jocasse Dam project for condition monitoring
- Install and maintain forebay and tailrace level alarms to ensure timely detection of a developing dam failure is provided
- Provide additional backup equipment including a compressor, tools and a portable generator to be used to open the spillway gate if required
- Conduct Jocasse Dam failure table top drills to improve response performance and procedures
- Enhance the video monitoring locations on the dam and adjacent areas for timely identification and assessment of degrading conditions

- Erection of walls on the intake canal berm (south end of the plant site) and the swale north end of the plant site) to keep excessive water from reaching the west side of the plant which is where the SSF is located

The NRC (Region II) conducted an inspection in 2010 to verify that the interim compensatory measures proposed by the licensee had been fully implemented or were scheduled to be implemented in accordance with the commitments made in January 2010. The results were documented in Inspection Report 05000269/270/2872010006 with no findings identified.

PROPOSED PERMANENT MEASURES

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The licensee is finalizing the design plans for the wall and will be submitting them to FERC for approval prior to the start of construction as part of the wall is on areas that will require FERC approval to construct.

Many of the interim compensatory measures will be retained after the flood wall has been constructed; i.e., additional monitoring of the Jocasse Dam project, emergency procedures, training, periodic drills, staging of backup equipment at the dam site, etc.

(b)(7)(F)

Ferrante, Fernando

From: Mitman, Jeffrey
Sent: Wednesday, October 20, 2010 2:41 PM
To: Ferrante, Fernando
Subject: FW: ~~OUO/SRI~~ - FW: Information for phone call from Bob Meixell
Attachments: Oconee_Intake Dike Breach.pdf; Case100W.pdf; KEO3 Main Dam Breach Pattern.pdf

FYI

From: Khanna, Meena
Sent: Friday, October 08, 2010 7:12 PM
To: Mitman, Jeffrey
Subject: FW: ~~OUO/SRI~~ FW: Information for phone call from Bob Meixell

Fyi...

From: Wescott, Rex
Sent: Tuesday, October 05, 2010 10:46 AM
To: Khanna, Meena
Subject: FW: ~~OUO/SRI~~ FW: Information for phone call from Bob Meixell

Is this what you wanted? I will also send their earlier response.

From: Khanna, Meena
Sent: Thursday, September 16, 2010 12:26 PM
To: Coleman, Neil; Wescott, Rex; Wilson, George
Cc: Kulesa, Gloria
Subject: ~~OUO/SRI~~ FW: Information for phone call from Bob Meixell

For today's call...I will try to make copies if possible..thanks

---

From: Sabisch, Andrew
Sent: Thursday, September 16, 2010 11:59 AM
To: Stang, John; Khanna, Meena
Subject: Information for phone call from Bob Meixell

Here is the information for the call

Note: Documents are stamped SECURITY-SENSITIVE and FOR INFORMATION ONLY

Please confirm that this message was received and the attachments were readable

Andy

==========

Andrew T. Sabisch
U.S. Nuclear Regulatory Commission
Senior Resident Inspector
Oconee Nuclear Station
Seneca, SC 29678
(O) 864-882-6927/6928
(F) 864-882-0189

M/4

(C) (b)(6)

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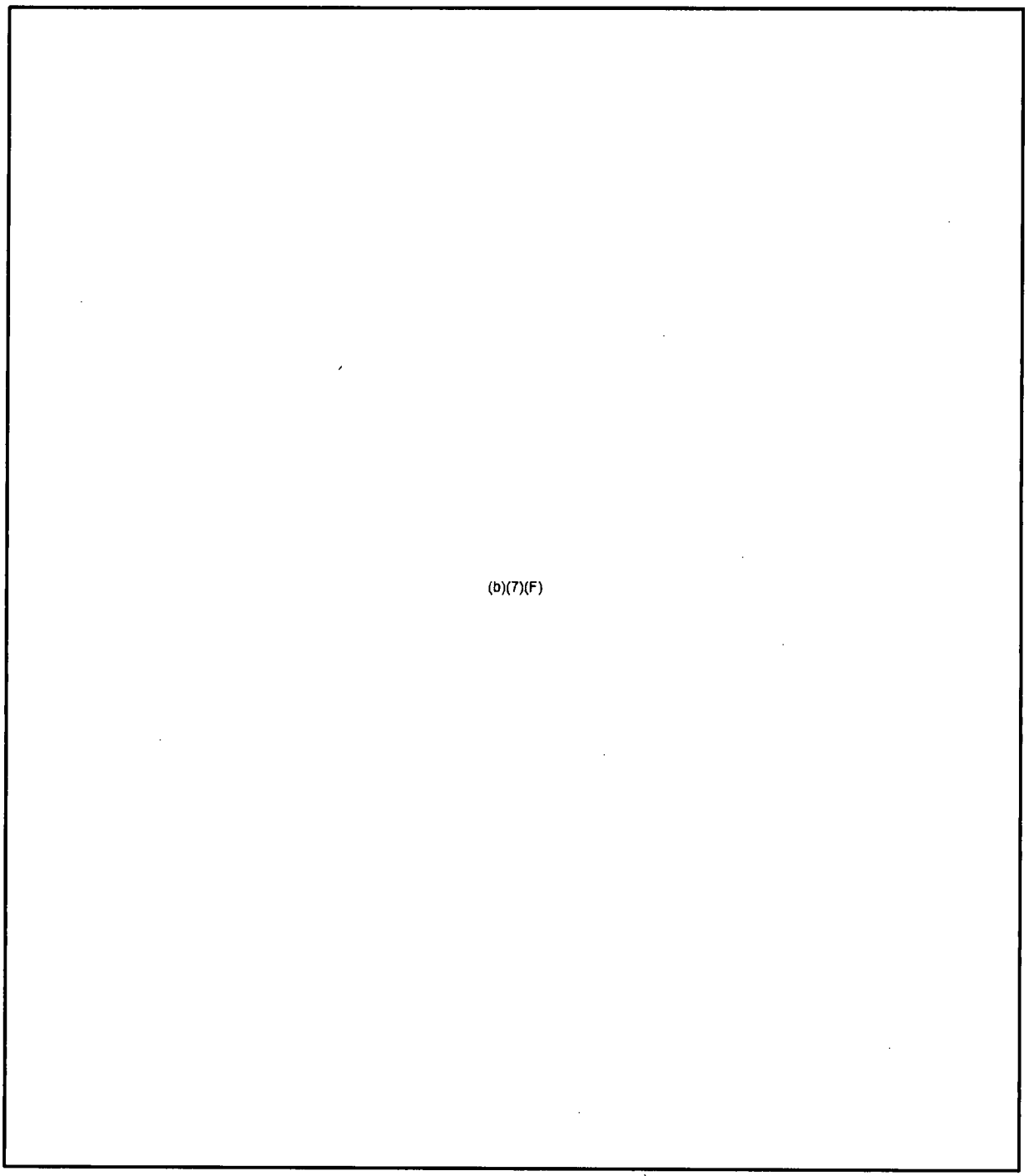
MAP OF OCONEE INTAKE DIKE 2D
MODEL BREACH AREA CASE 2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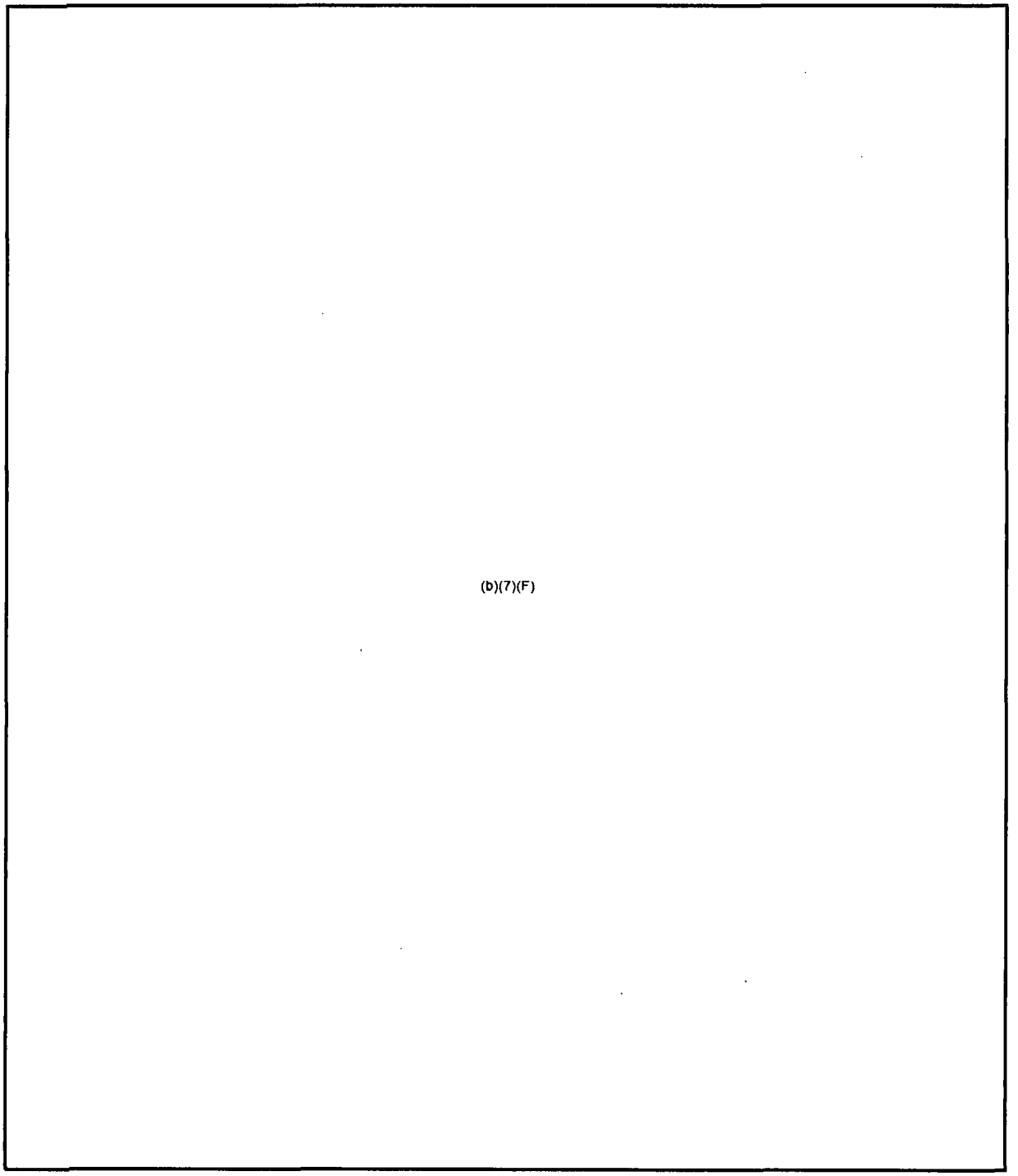
Information Only
September 16, 2010
Oconee Regulatory Compliance



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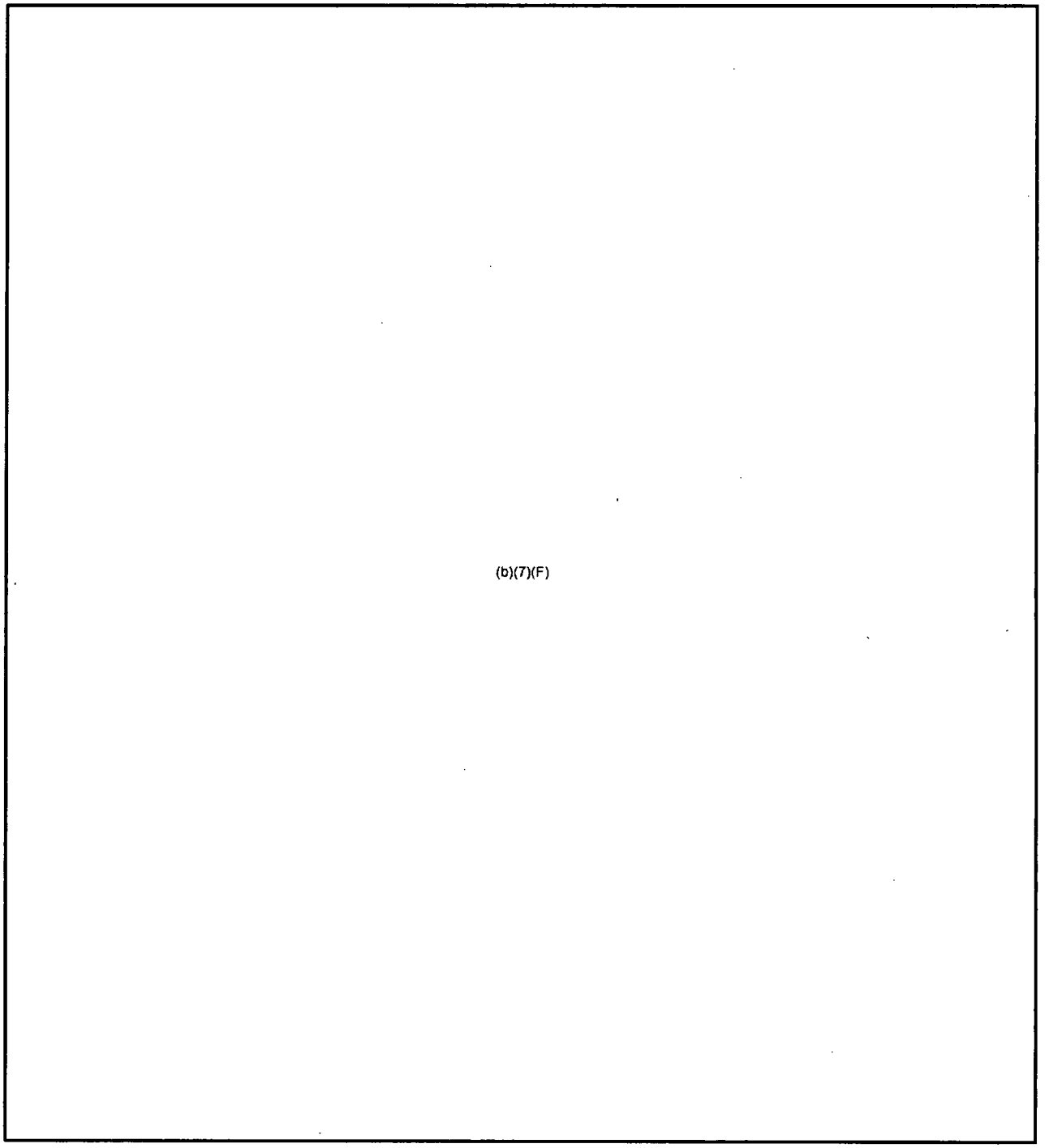
Information Only
September 16, 2010
Oconee Regulatory Compliance



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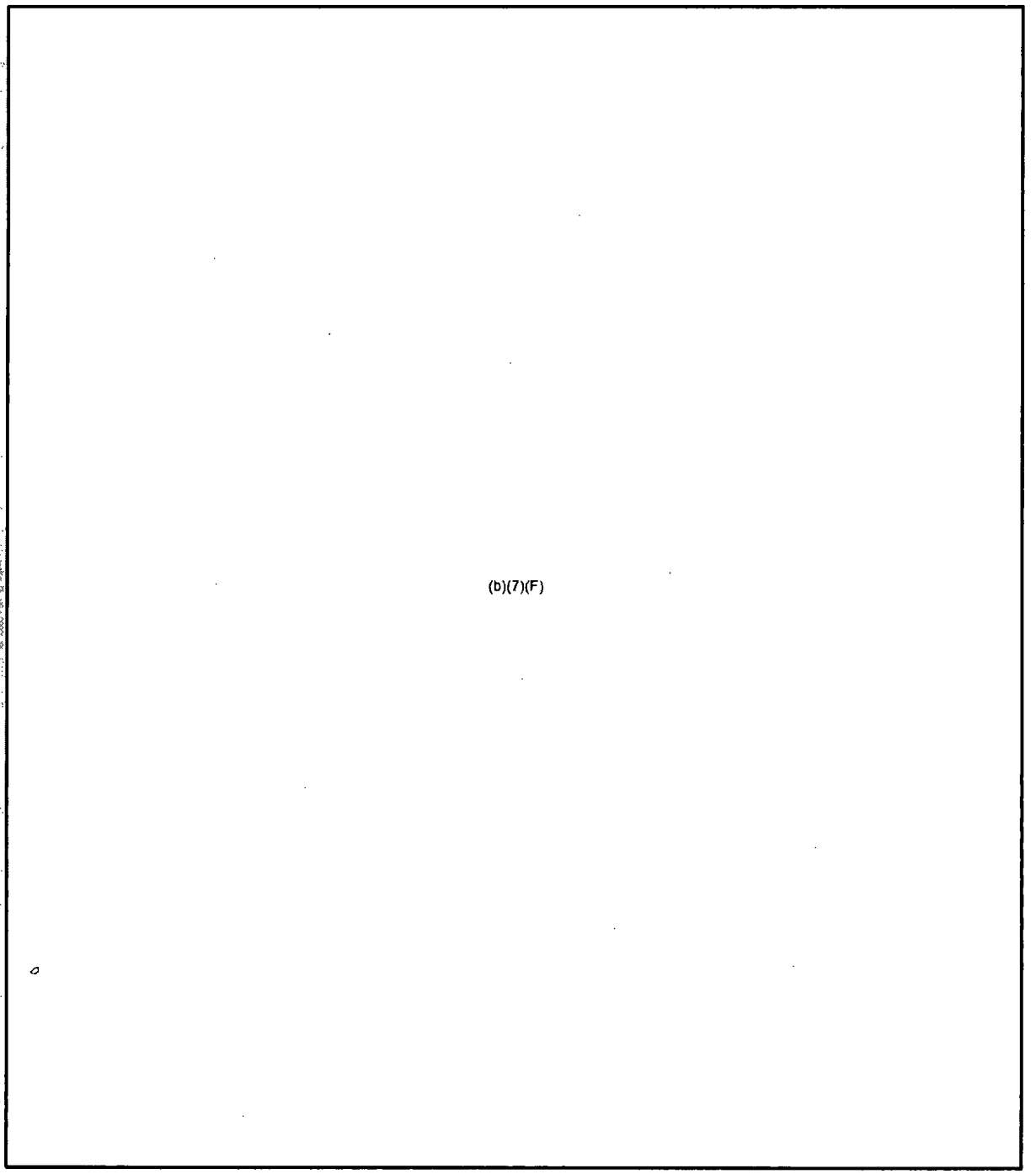
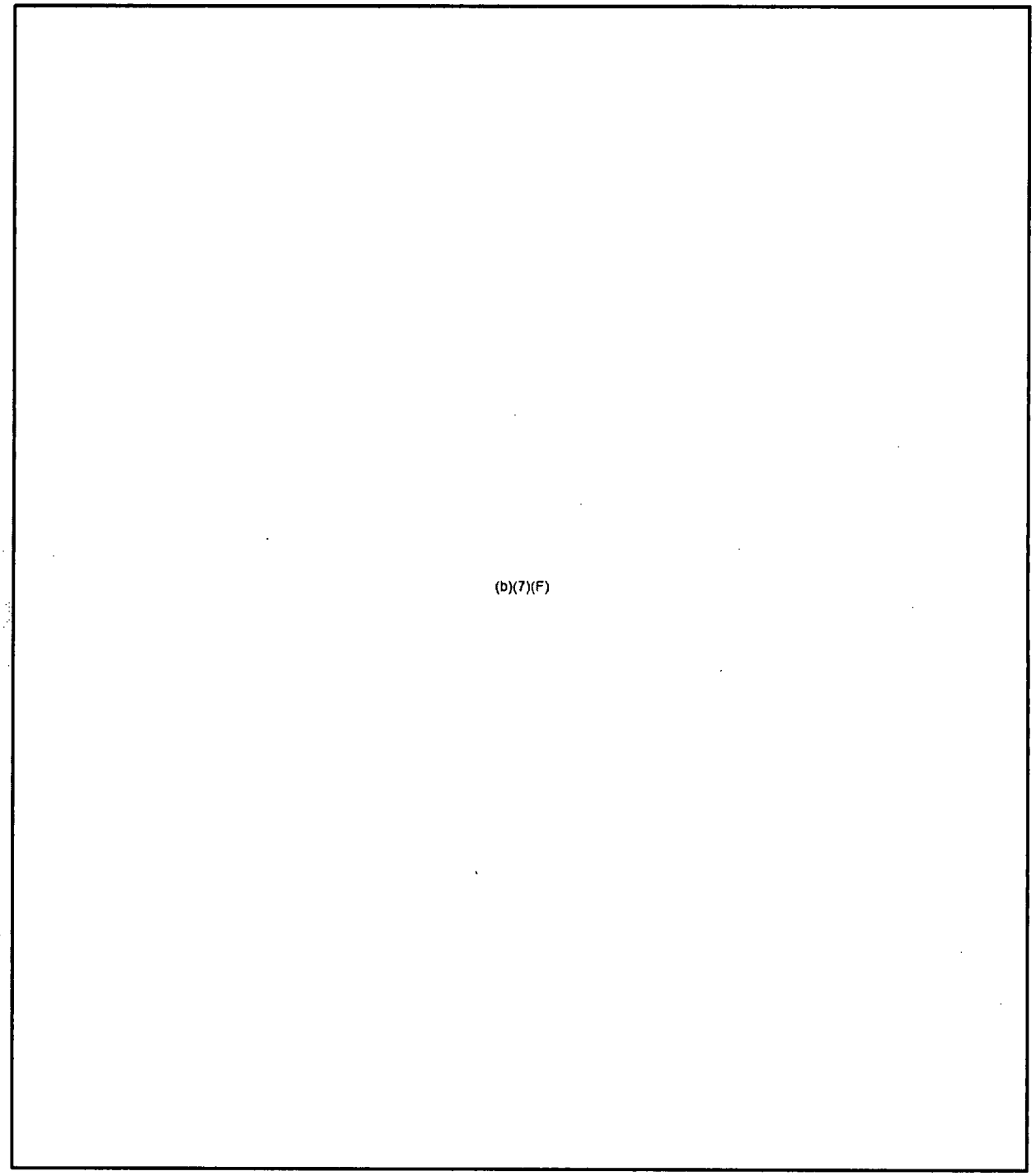
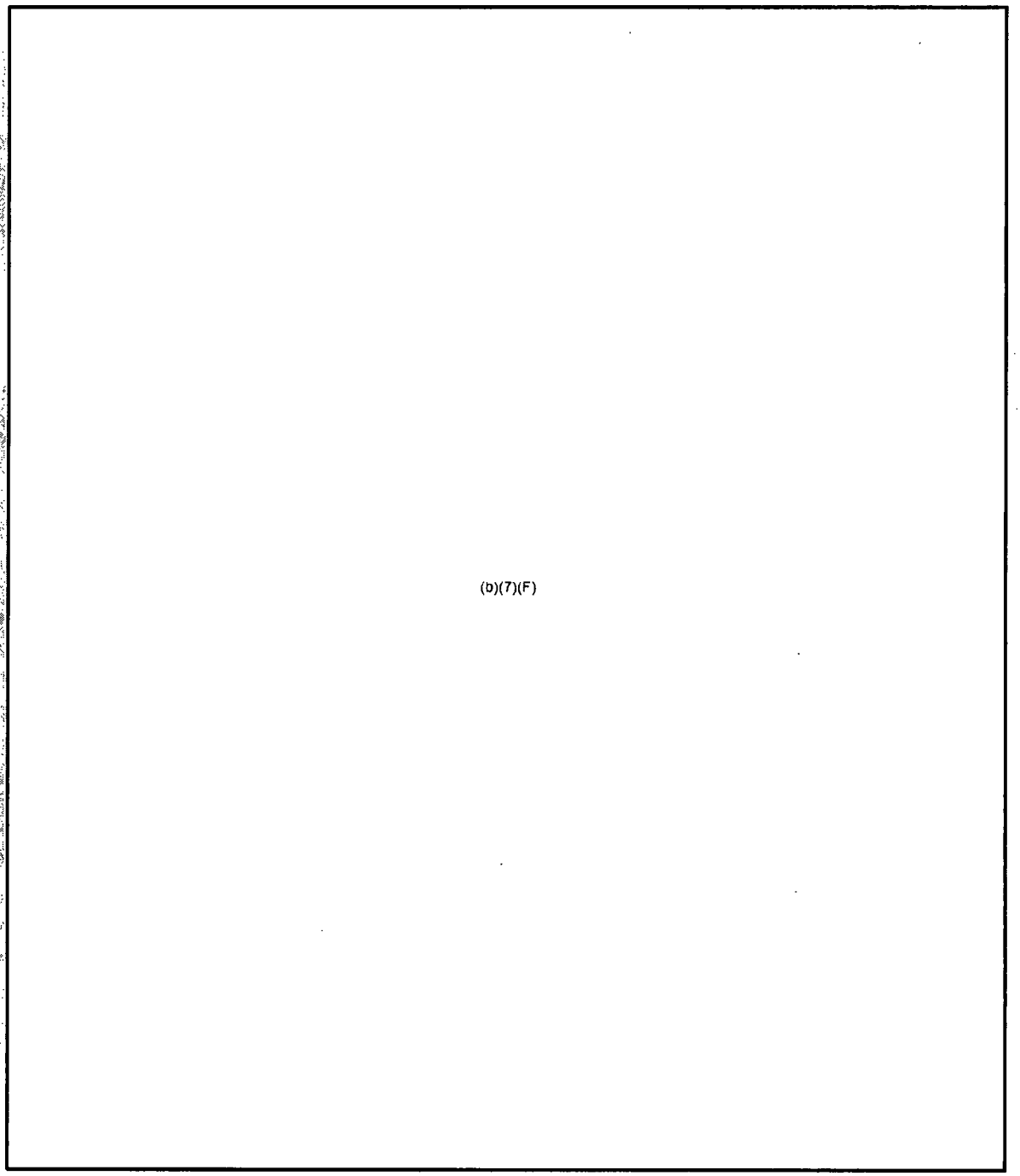
Information Only
September 16, 2010
Oconee Regulatory Compliance



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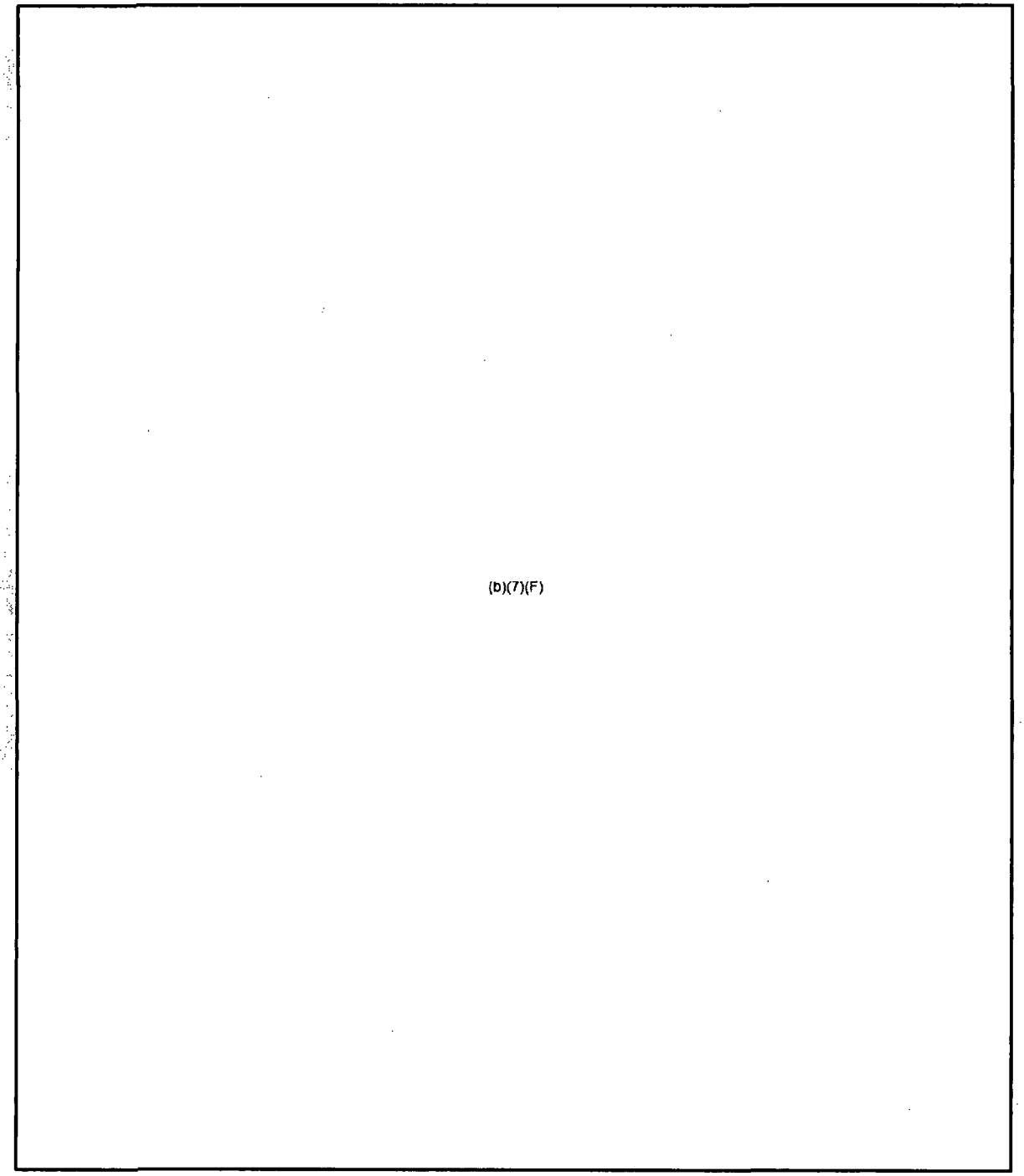

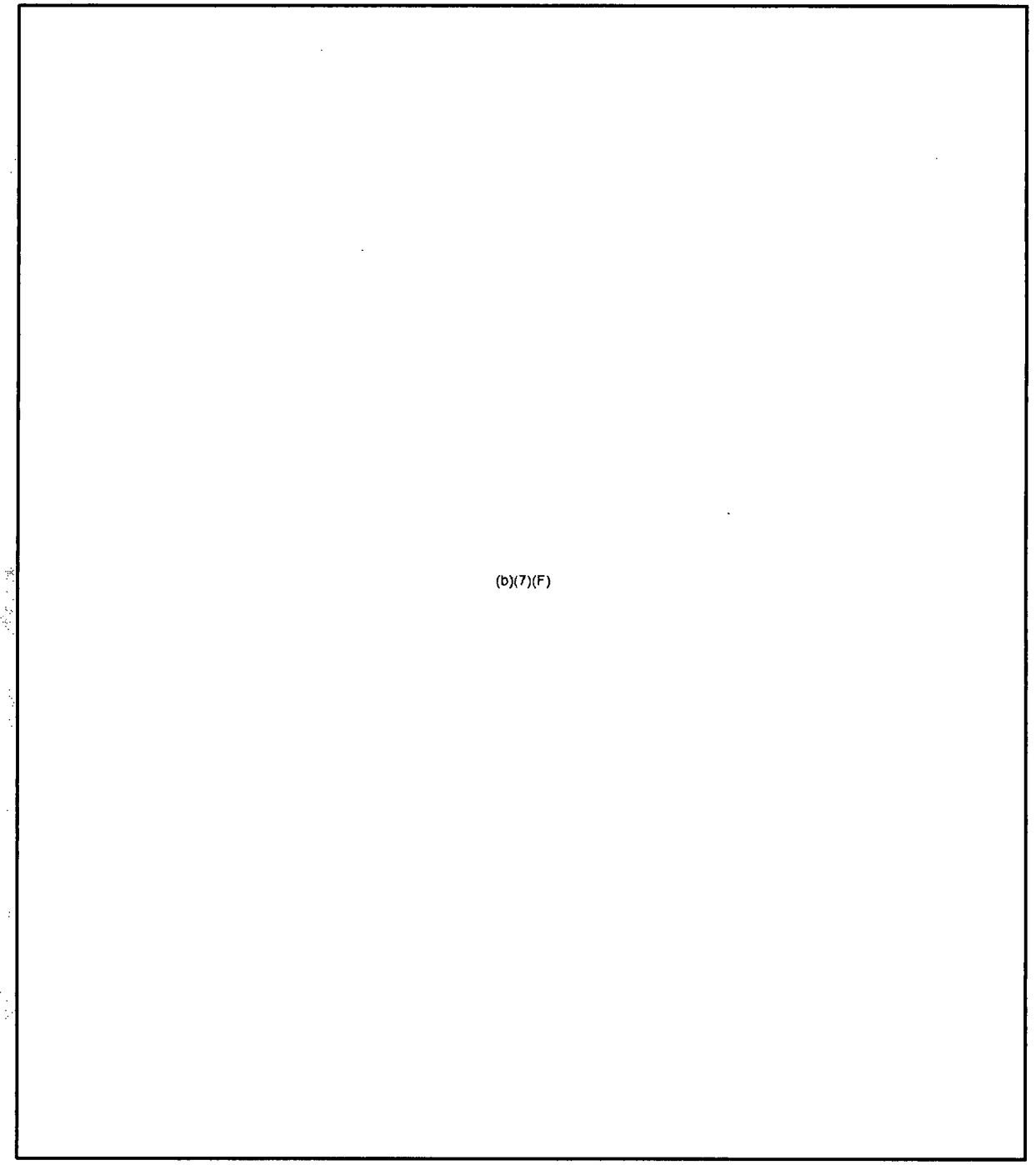
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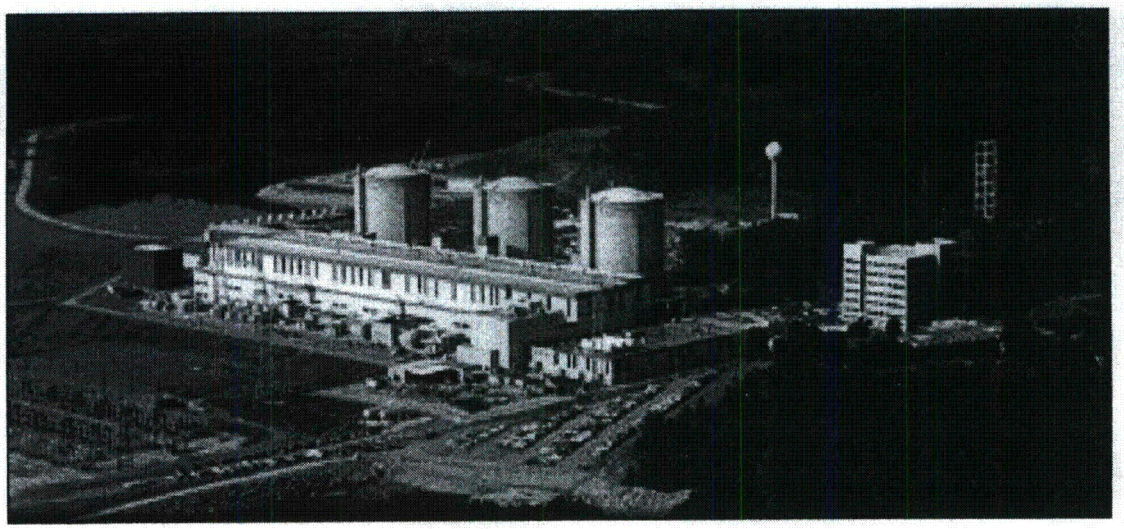
OCONEE NUCLEAR STATION



Duke Energy Carolinas, LLC

Seneca, SC

Duke Energy®

Commissioner George Apostolakis

Site Visit: September 13, 2011

M/5

Agenda for Commissioner George Apostolakis Visit to Oconee Nuclear Station – September 13, 2011

September 12, 2011

Travel from Washington D.C. to Clemson, SC

September 13, 2011

7:30 a.m.	Leave the hotel for Oconee Nuclear Station. (See map and directions in Tab 2)
8:00 a.m.	Arrive at the World of Energy visitors center for overview discussion of the Keowee-Toxaway Project
8:15 a.m.	Depart the World of Energy for the Jocasse Hydro-Electric Facility
9:00 a.m.	Arrive at the Jocasse Hydro-Electric Facility for tour of powerhouse and dam structure
10:45 a.m.	Depart the Jocasse Hydro-Electric Facility for the Oconee Nuclear Station
11:30 a.m.	Arrive at Oconee Nuclear Station and the tour the current / planned external flood protection modifications
12:00 pm	Process into the Protected Area (Note: The Senior Resident Inspector will be the assigned escort)
12:15 p.m.	Working lunch with the station staff
1:30 p.m.	Tour of the Protected Area
3:00 p.m.	Meeting with the Duke management team & supervisors on industry and regulatory issues
4:00 p.m.	Tour the Keowee Hydro Facility
5:00 p.m.	Depart for Greenville-Spartanburg airport
7:50 p.m.	Greenville-Spartanburg Airport
9:30 p.m.	Arrive at Washington Dulles Airport

PROTECTED AREA TOUR ROUTE

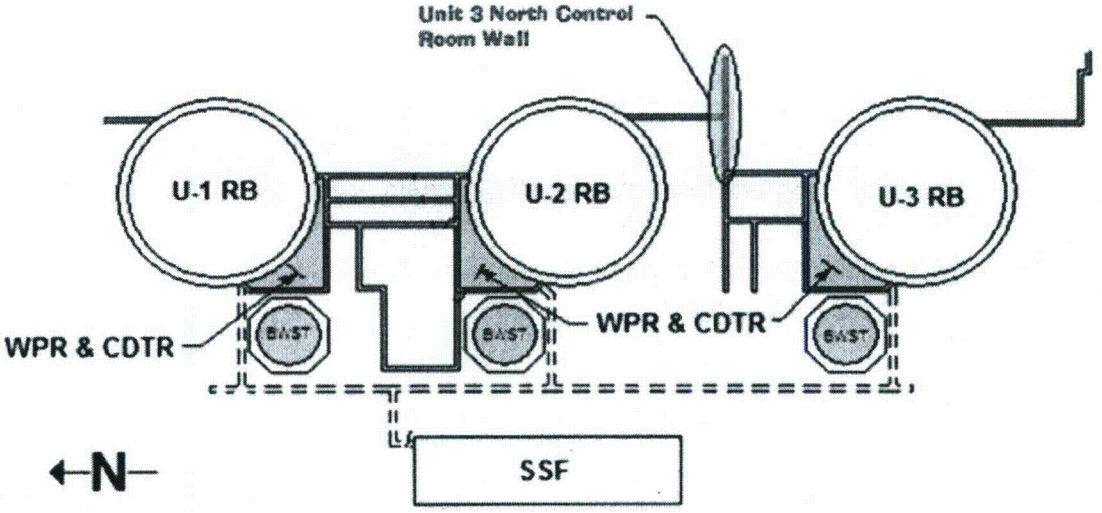
- Depart RI Office
- Go to the 7th floor of the OOB for an overview of the site
- Discuss the pending MSIV modification using the north end of Unit 1 for visualization
- Enter the north end of the Standby Shutdown Facility (SSF) building, through the SSF DG room and up to the SSF control room. Discuss the function of the portable pump and cable reel.
- Discuss the Unit 2 BWST Natural Phenomena Barrier System project and the work that was done (FiberWrap, siding, steel plating, etc.)
- Walk through the PSW building and explain function
- Walk to the southeast corner of the PA and overlook the OCA and discuss the tritium situation
- Enter the Turbine Building on the south end and walk to the Unit 3 4160V switchgear to show the vulnerability from a HELB
- Walk to the stairs on the east side of the building and go up to the operating deck
- Tour the Unit 1 / 2 main control room to include a board walkdown, TSC walkthrough and discussion of the new RPS/ES system
- Return to the Station Conference room for meeting with the management team

OCONEE NUCLEAR STATION

1. ..... Power Block (turbine building, auxiliary building, reactor buildings)
2. ..... Keowee Hydro Station (emergency AC power for the station)
3. ..... Training Center and World of Energy visitors center
4. ..... ISFSI
5. ..... Circulating Water intake structure
6. ..... Switchyards
7. ..... Security Training Facility & Firing Range
8. ..... Complex – contains warehousing, engineering and admin support
9. ..... Standby Shutdown Facility (SSF)
10. ... New Protected Service Water building
11. ... Mausoleum containing the original steam generators & reactor heads

Natural Phenomena Barrier System (NPBS)

- Designed to protect plant safe shutdown equipment and structures from the effects of tornado wind, differential pressure, and missile loads.
- Cask Decon Tank Room (CDTR) and West Penetration Room (WPR) walls will be protected with steel plate, Fiber Reinforced Polymer and heavy gauge metal siding.
- Borated Water Storage Tanks (BWSTs) will be protected with steel plate.
- Protects BWST instruments and piping from possible tornado missiles
- BWST Superstructure consists of steel plating and beams using 4500 linear feet of QA-1 welds and 4800 QA-1 bolted connections
- Eliminates reliance on the Spent Fuel Pool- to-High Pressure Injection flow path.



PROTECTED SERVICE WATER

- Provides a protected means of supplying water to fully pressurized steam generators for decay heat removal (both steam generators on all three units at the same time)
- System electrical power provided by 100 KV Fant Line from the Lee Combustion Turbine facility (Normal) and underground path from Keowee Hydro (Emergency).
- The new equipment building is designed to resist a tornado event and will contain new electrical distribution equipment for the PSW system.
- Replicates many functions of the Standby Shutdown Facility (SSF) for Tornado/HELB events providing increased reliability and eliminates single-train vulnerabilities

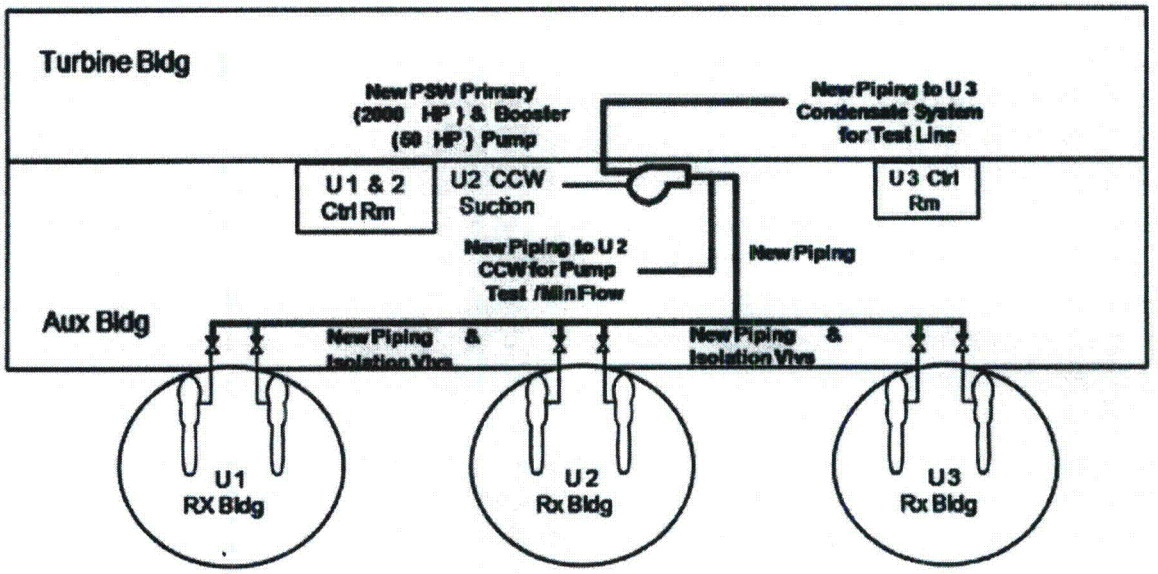
Mechanical Features:

- HELB and Tornado protected system capable of being promptly aligned and operated from each Unit's control room.
- System will be capable of simultaneously feeding the six pressurized steam generators (2 SGs per unit).
- The PSW system replaces the current low-head pump with a booster pump and a high-head pump. All of the system piping and valves necessary for a high head system will be replaced.

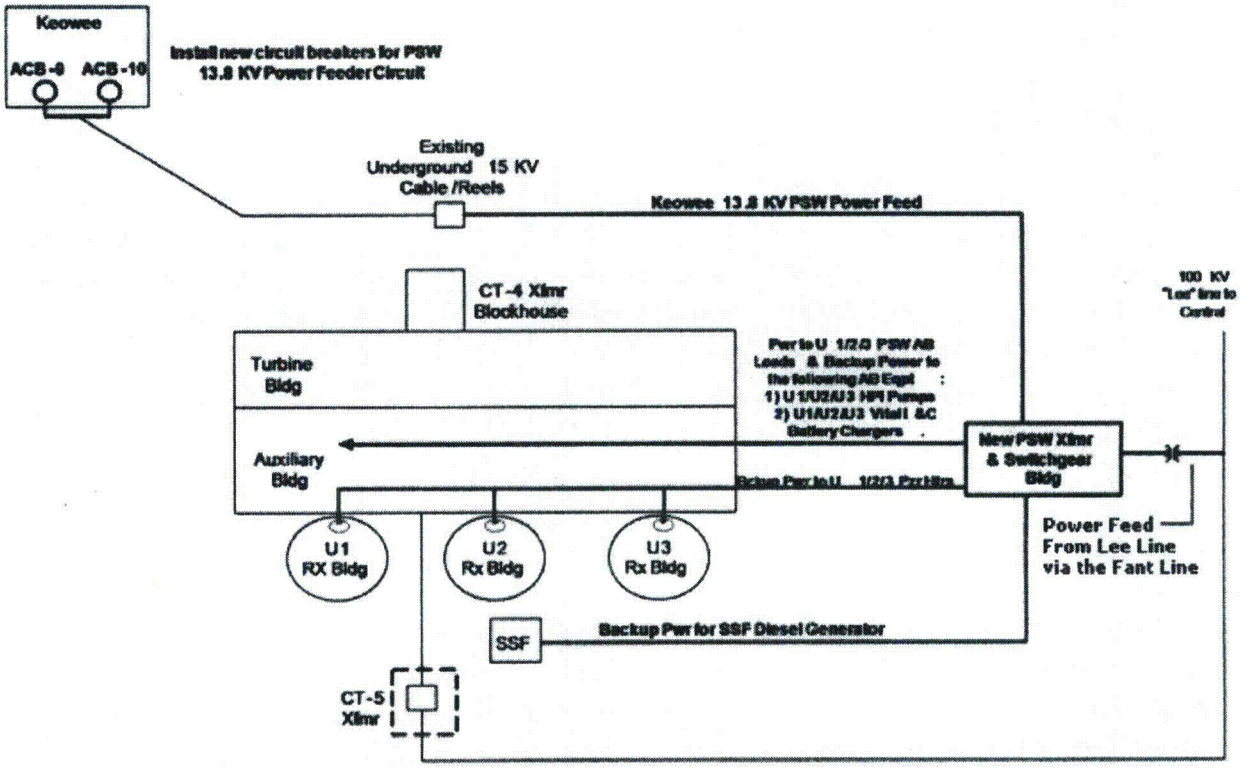
Electrical Features:

- Supplies a train of alternate, protected power to the following loads:
  - New PSW Switchgear (located in the PSW Building)
  - One HPI train per unit
  - Pressurizer Heaters for each unit
  - Vital I&C battery chargers
  - SSF
  - RCS vents for each unit

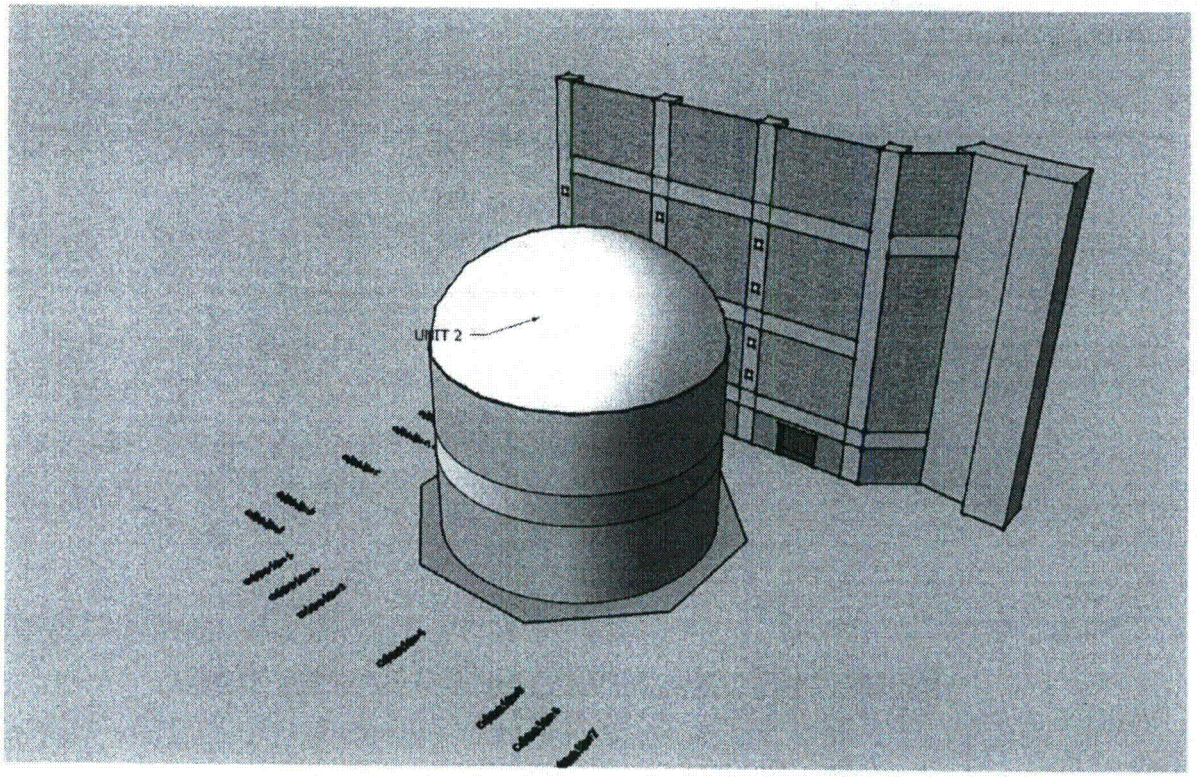
Mechanical Portions of Protected Service Water:

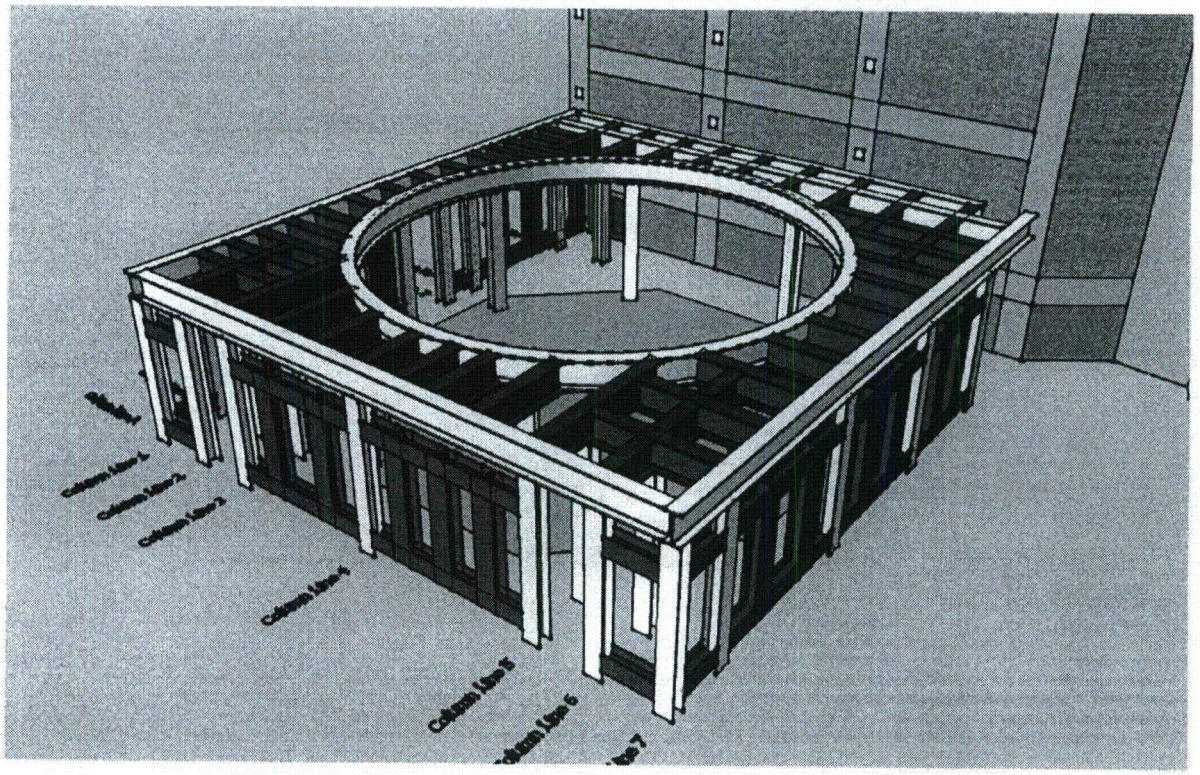


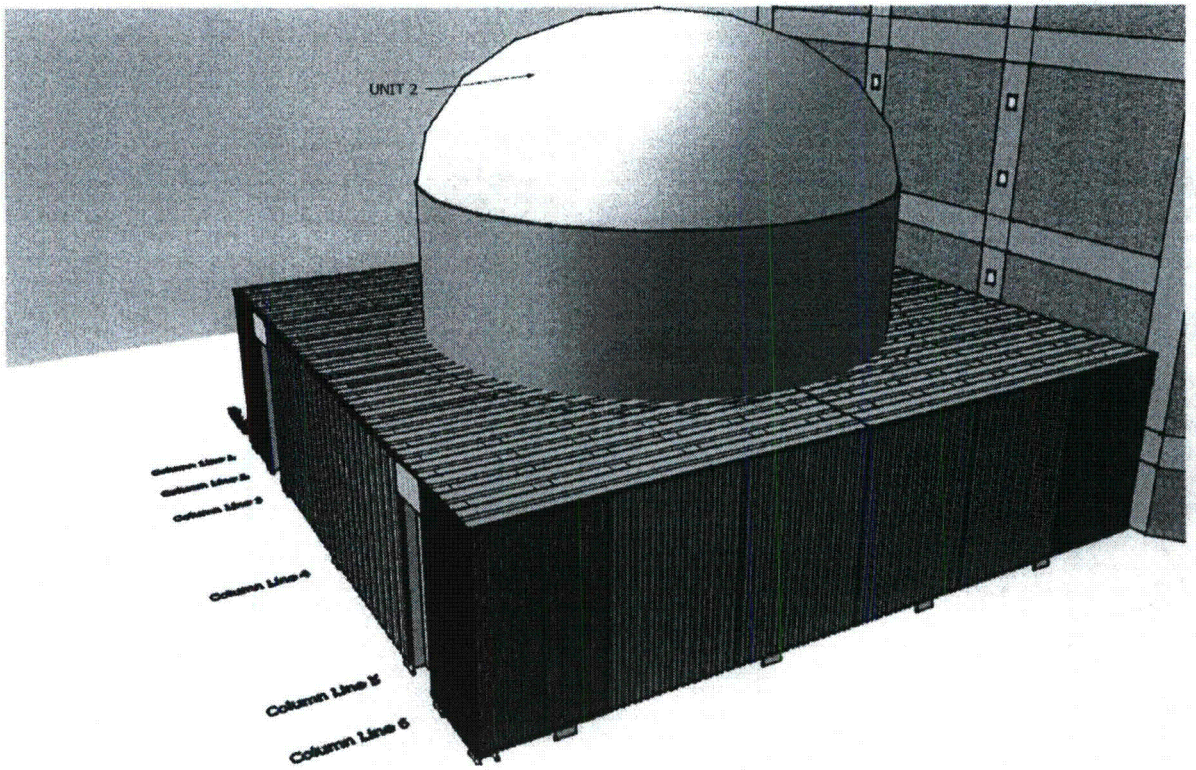
Electrical Portions of Protected Service Water:



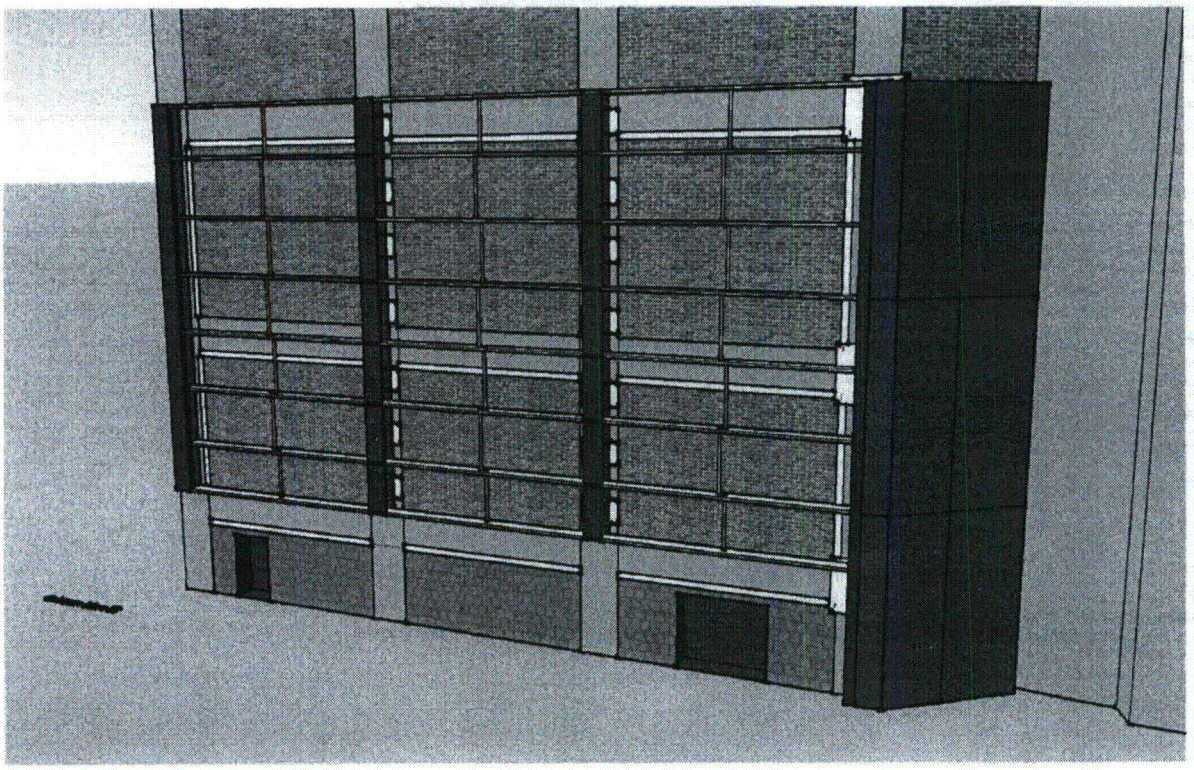
BWST SUPER STRUCTURE





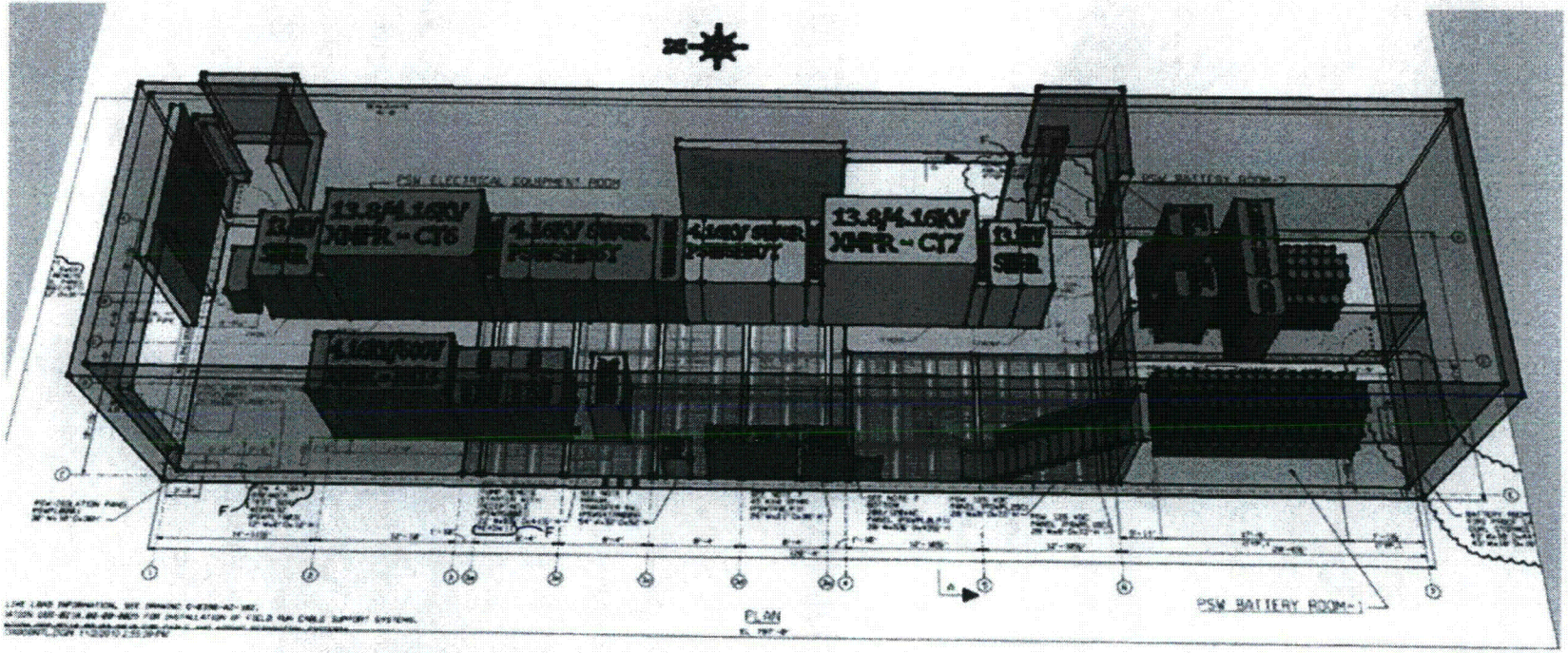


WALL SIDING & GIRT REINFORCEMENT PROJECT



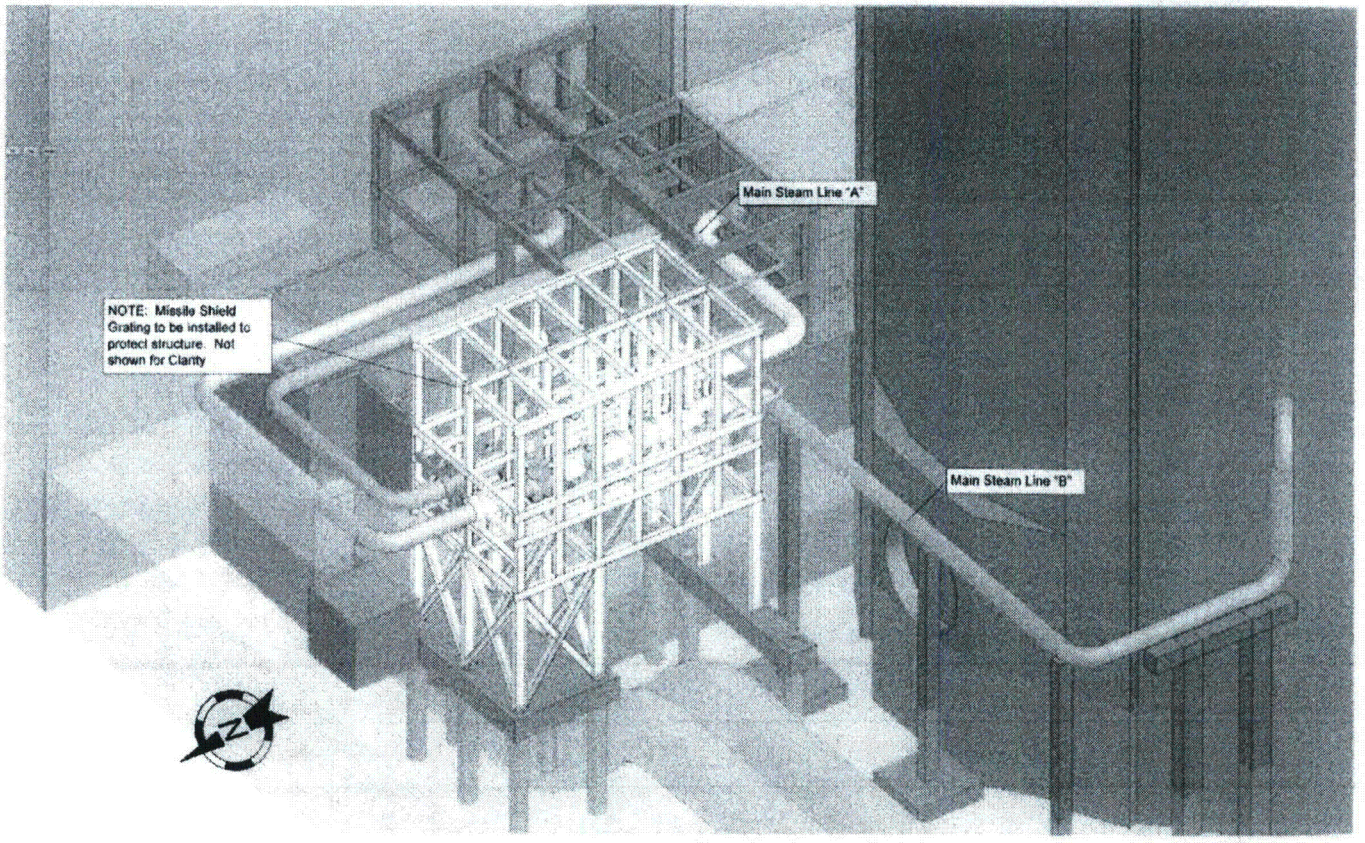
PROTECTED SERVICE WATER BUILDING

This is a new QA-1 structure being constructed on the South end of the protected area to house the electrical equipment needed to support the Protected Service Water project. It consists of a large open room containing switchgear and motor control centers, two separate battery rooms and a sub-basement containing the cabling coming from the Keowee power feed and offsite Fant line and going to the SSF and Auxiliary Building.



MAIN STEAM ISOLATION VALVE BACKFIT PROJECT

Following a 1998 self-assessment of Oconee's licensing basis for HELB events outside containment, the licensee notified the NRC in January 1999, that it was initiating a project to reconstitute the design and licensing basis for HELBs outside the reactor building. As part of this project, the licensee is developing a modification to install Main Steam Isolation Valves on the steam lines between the reactor building and the turbine building. Currently, the steam lines exit the reactor building and have no protection or isolation capabilities up through the stop valves prior to the steam entering the high pressure turbine. The following figure shows the proposed structure that will contain the MSIV's. Installation of the MSIV modification is scheduled for 2014 on Unit 1, 2015 on Unit 2 and 2015 on Unit 3. Core bore preparations are currently underway to support these dates.



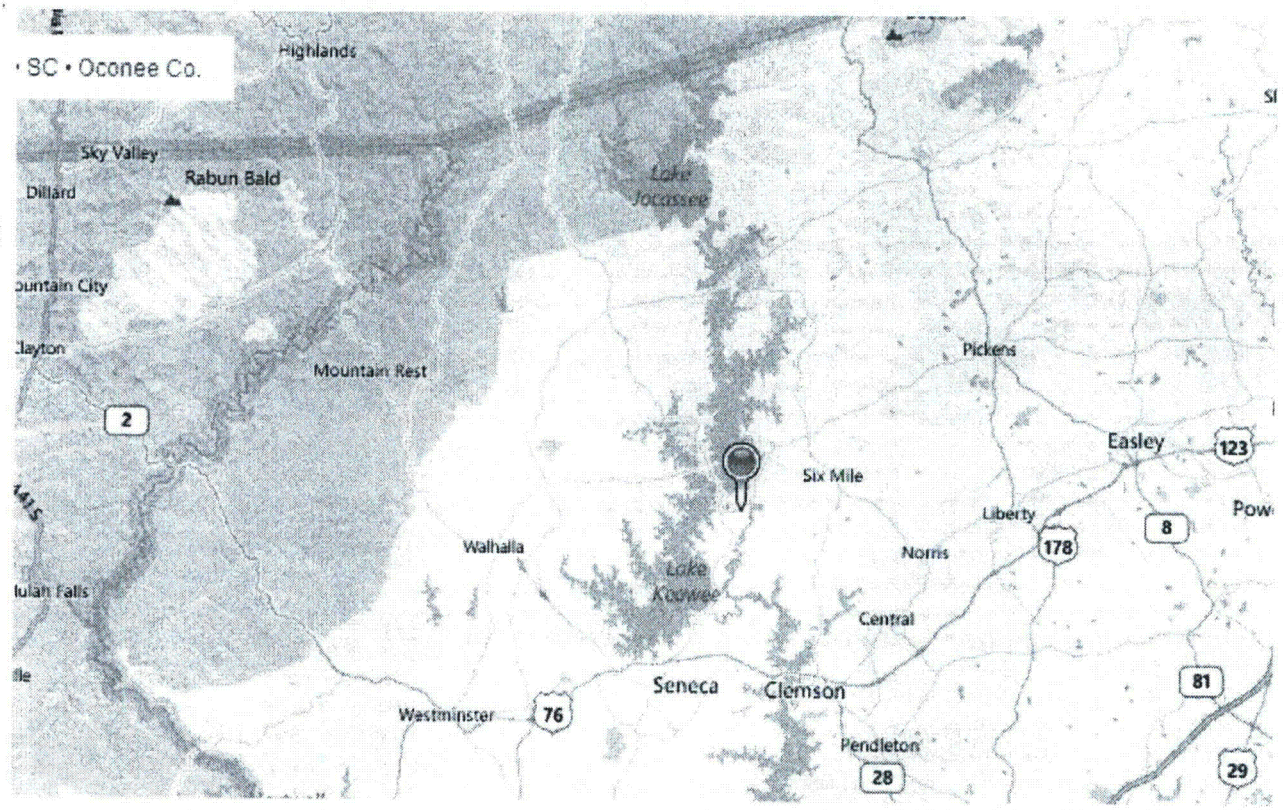
Unit 1 Conceptual MSIV Design (8/18/11)

KEOWEE-TOXAWAY HYDRO-ELECTRIC PROJECT

Duke Energy Carolinas, LLC owns and operates the Keowee-Toxaway Hydroelectric Project, located on the Keowee and Little Rivers. The Project was developed by Duke to generate electricity. The Project consists of two hydroelectric developments: Keowee Hydro Facility with Lake Keowee and Jocassee Pumped Storage Facility with Lake Jocassee. The Project provides 868 megawatts (MW) of power. The Project was initially licensed by the Federal Energy Regulatory Commission (FERC) in 1966 and the current FERC operating license for the Project expires in 2016.

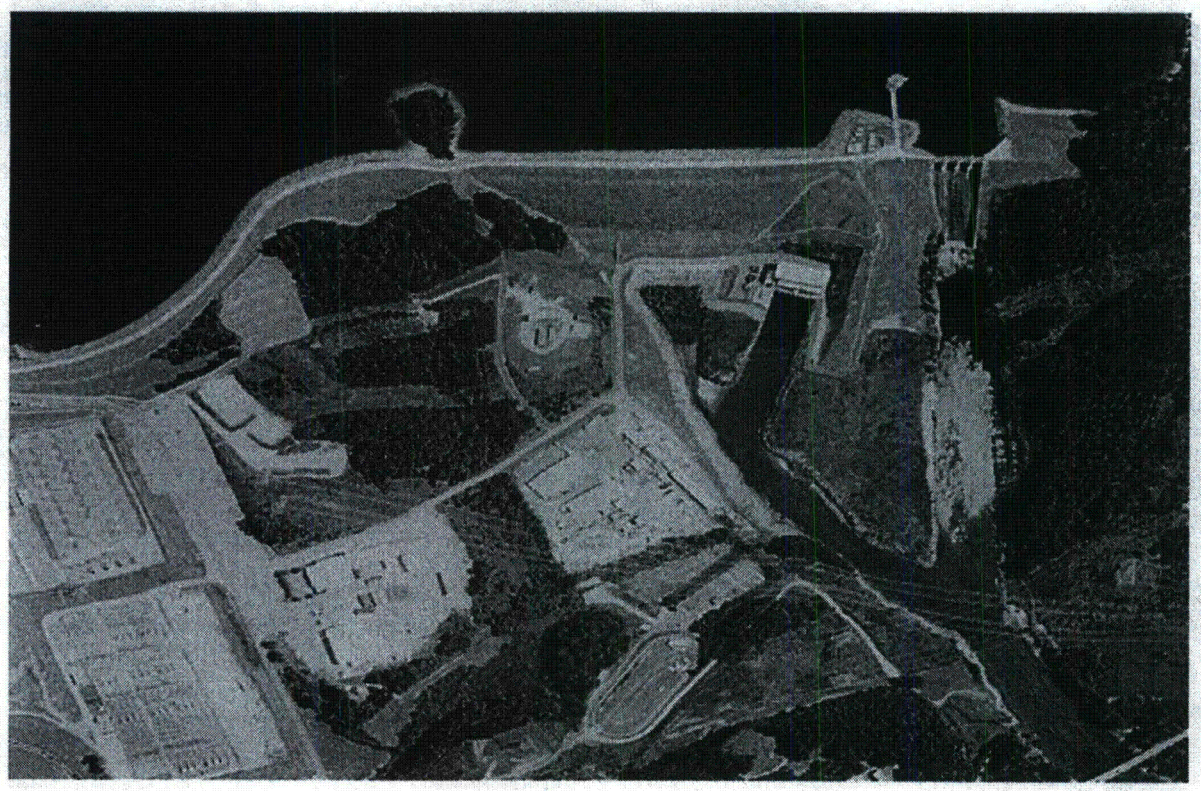
Roughly 11 miles as the crow flies north of Keowee Dam located on the Oconee site is the Jocassee Dam. The Jocassee Dam is a zoned earth and rockfill structure approximately 385 feet high and 1,800 feet in length. The dam includes two circular structures with eight openings that direct water to the generating units. This dam impounds the 7980 acre Lake Jocassee with 92 miles of shoreline, at the confluence of the Whitewater, Thompson, Toxaway, and Horsepasture Rivers, and numerous creeks. The lake is about 340+ feet deep at the dam. The Jocassee project – which is a pumped-storage hydro plant - includes 4 turbines that produce 710 MWe in total.

Lake Jocassee also serves as the lower reservoir for the Bad Creek Pumped Storage Facility. When electricity is being generated at the Bad Creek Pumped Storage Facility, water stored in the upper Bad Creek reservoir is released into Lake Jocassee. During the refilling of the upper Bad Creek reservoir, the Bad Creek Pumped Storage Facility turbines are reversed to pump water back from Lake Jocassee into the upper Bad Creek reservoir. Bad Creek Pumped Storage Facility began operating in 1991 and its FERC license expires in 2027.



The Oconee Nuclear Station is shown at the pushpin icon and is located on Lake Keowee. Lake Jocasse is located due north of the plant site.

KEOWEE HYDRO STATION



The Keowee Hydro Station supplies emergency power to Oconee upon an Engineered Safeguards actuation or a loss of power. It is also able to supply peaking power to system grid. It consists of two units designated KHU-1 and KHU-2 that generate at 13.8 KV and produce a maximum output of 87 MWe per unit.

It can supply emergency power to Oconee through two power paths designated the Underground and the Overhead Power Paths.

- The Underground Power Path consists of a 4000 ft underground feeder to CT-4 to Standby Buses to Main Feeder Buses in the plant. It is rated to carry the full Engineered Safeguards loading of one Oconee unit plus the auxiliaries needed to maintain Hot Shutdown on the other two Oconee units.
- The Overhead Power Path goes through one of two circuits breakers to the Keowee Main Step-Up Transformer (13.8 to 230 KV) through the isolated 230 KV Yellow Bus to the Startup transformer of each Oconee nuclear unit.

There are Keowee Emergency Start switches in the shared Unit 1 / Unit 2 control room as well as the Unit 3 control room. A signal from either location sends signals to Emergency Start BOTH Keowee Hydro units.

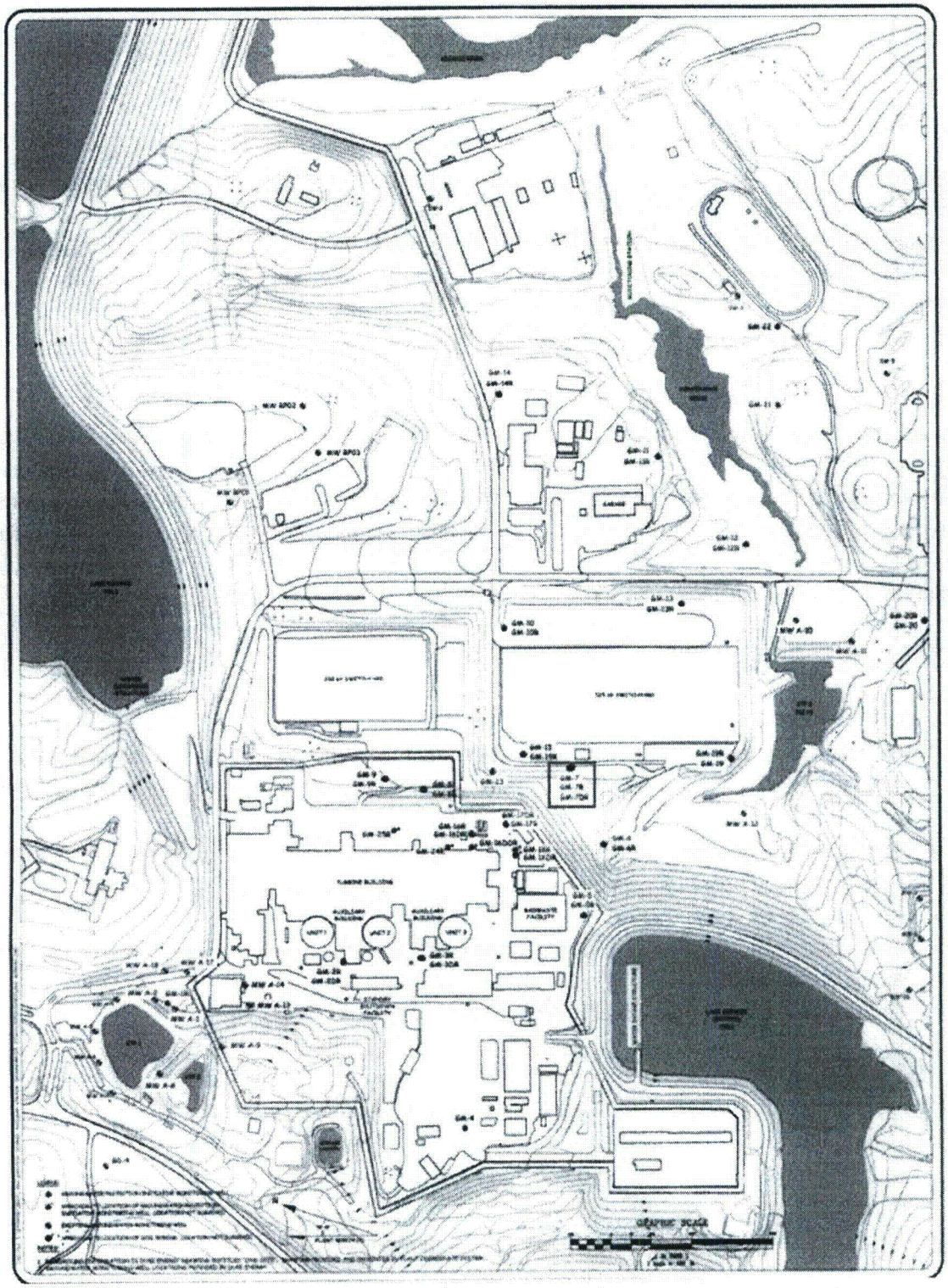
TRITIUM IN GROUNDWATER AT OCONEE

Oconee detected levels of tritium in excess of the 20,000 pCi/l threshold in one (1) on-site sampling well and initiated the industry communication protocol in response to the identified levels. There are several possibilities for the source of the tritium and the licensee has not confirmed any source yet. Initially it was believed that the Radwaste discharge line (from the plant to the tail race below the Keowee dam) could have been the source but after digging numerous hand wells in the area of the piping as it leaves the protected area towards the nearby river, they have not found any indication of tritium that could explain the levels they had seen in the one well that was indicating above the 20,000 level prior to the last quarterly sample. The licensee is continuing to investigate the issue and is working on identifying the source of the tritium. Additionally, the licensee has installed a recovery well near the well with the elevated levels of tritium in Feb. 2011, in order to determine if the elevated levels were caused by a historical leak, and to ensure the tritium is being released via a monitored pathway. This recovery well has decreased the concentration at this well to back below the 20,000 pCi/l threshold as of the 3Q 2011 sampling. At this point, no tritium has been found offsite through sampling conducted by the South Carolina Department of Health and Environmental Control (offsite sampling was performed around all South Carolina nuclear plants in 2008 – 2009).

A total of 66 ground monitoring wells are currently installed at Oconee including 18 new wells installed since October 2009 to aid in quantifying the tritium plume on-site and aid in determining the source of the contamination. Most of the samples from monitoring wells are at or below the Minimum Detectable Activity (MDA) levels.

The location of the well that exceeded the 20,000 pCi/l value is indicated by the red dot below. The activity in Well 7R as of the 3rd Quarter 2011 sampling was 19,400 pCi/l which is down from the previous reading of 45,000 pCi/l.

Monitoring wells installed at the Oconee Nuclear Station



- Monitoring wells are indicated by dots -

OCONEE NUCLEAR STATION

MEASURES TO ADDRESS EXTERNAL FLOODING

BACKGROUND

Vulnerabilities to external flooding resulting from a failure of the Jocasse Dam located upstream of the Oconee Nuclear Station on Lake Keowee were identified and have been the subject of discussions between the licensee and the NRC for several years. The licensee contracted with Utah State University to perform an inundation study to determine what the predicted water levels would be on-site following an upstream "sunny day" dam break and then use that information to develop actions – both interim and permanent – to protect the site for such an event.

The Jocasse Dam project was completed in 1972 and commercial operation of the power plant began in 1975. The project was designed for seismic ground acceleration greater to that used in the design of the Oconee Nuclear Station (0.12g versus 0.10g). Reanalysis of the dam's design was performed in 1990 and again in 1994 and verified that the structure had safety factors that exceeded the required values as defined by FERC for both seismic and Predicted Maximum Precipitation (PMP) events.

IPEEE HCLPF is 0.29g

CURRENT INSPECTIONS / PROTECTIVE MEASURES

The following routine inspections are performed on the Jocasse Dam Project. To date, no performance issues have been identified nor have any major remedial projects been required.

- The licensee visually inspects the dam and spillway bi-weekly and following a 2-inch rainfall or seismic event
- The licensee's personnel assigned to the Jocasse Dam Project routinely observe the dam on a daily basis as part of the ongoing maintenance program
- Annual inspections are performed by FERC inspectors
- Five year dam inspections are performed by independent consultants under the auspices of FERC
- Underwater inspections are performed every five years

The Jocasse Dam Project is heavily instrumented to allow personnel assigned to the dam as well as Hydro personnel in the General Office to monitor the dam on a regular basis. The monitoring provided includes the following:

- Inspection and data collection points to check for seepage through the dam structure including:
    - 10 observation wells monitored monthly for changes in water quality
    - 12 seepage collection points monitored monthly for changes in flow and turbidity
    - 17 surface monuments surveyed annually for changes in vertical or horizontal displacement of the dam and abutments

- Video monitoring of the dam forebay area and the reservoir level fed to the Jocasse control room and the Hydro office in Charlotte
- Strong motion accelerometers that record seismic activity. **NOTE**: Following any seismic activity, inspections are performed on all observation wells and seepage collection points

Emergency Procedures have been developed for use in the event any degradation of the Jocasse Dam is noted. These procedures are in-place at Jocasse per FERC regulations and at the Oconee Nuclear Station based on NRC regulations. In addition to the procedures, training is provided to all personnel associated with the implementation of these procedures on an on-going basis. All actions at the dam or the Oconee site are based on the Condition that has been identified. Condition A means that a failure of the dam has occurred or is imminent while Condition B means that a potentially hazardous situation is developing.

The worst case scenario in terms of impact to the Oconee Nuclear Station has been determined to the "sunny day" failure of the dam where notifications associated with Condition A are made at the time the dam fails. The actions taken at Oconee would have all three reactors off-line within one (1) hour. The flood waters are predicted to crest at the station approximately 2.5 to 3 hours following the dam failure. Due to the impact the flood waters would have on equipment such as the Standby Shutdown Facility (SSF), actions were implemented to provide interim protection from the flood waters until a permanent solution could be developed and implemented. The actions taken to-date and proposed are described below.

INTERIM COMPENSATORY MEASURES

Following the licensee's identification of the potential impact a failure of the Jocasse Dam could have on the Oconee Nuclear Station, a number of interim compensatory measures were developed and implemented. They include the following:

- Complete an enhanced hydrologic evaluation of the impact a dam break would have on the station to determine what level of water would be expected on-site
- Review and revise the Hydro Department water management plan to ensure there was margin available to address storm water buildup in Lake Jocasse
- Implement and maintain an enhanced monitoring program of the Jocasse Dam project (as described above)
- Install additional monitoring equipment at the Jocasse Dam project for condition monitoring
- Install and maintain forebay and tailrace level alarms to ensure timely detection of a developing dam failure is provided
- Provide additional backup equipment including a compressor, tools and a portable generator to be used to open the spillway gate if required
- Conduct Jocasse Dam failure table top drills to improve response performance and procedures
- Enhance the video monitoring locations on the dam and adjacent areas for timely identification and assessment of degrading conditions

- Erection of walls on the intake canal berm (south end of the plant site) and the swale north end of the plant site) to keep excessive water from reaching the west side of the plant which is where the SSF is located

The NRC (Region II) conducted an inspection in 2010 to verify that the interim compensatory measures proposed by the licensee had been fully implemented or were scheduled to be implemented in accordance with the commitments made in January 2010. The results were documented in Inspection Report 05000269/270/2872010006 with no findings identified.

PROPOSED PERMANENT MEASURES

(b)(7)(F)

The licensee is finalizing the design plans for the wall and will be submitting them to FERC for approval prior to the start of construction as part of the wall is on areas that will require FERC approval to construct.

Many of the interim compensatory measures will be retained after the flood wall has been constructed; i.e., additional monitoring of the Jocasse Dam project, emergency procedures, training, periodic drills, staging of backup equipment at the dam site, etc.

(b)(7)(F)

OCONEE NUCLEAR STATION

SEISMIC DESIGN

BACKGROUND

UFSAR Chapter 3, Section 3.2.1 covers the seismic classification of SSC's at Oconee. According to this section, the Design Basis Earthquake ground acceleration at the Oconee Nuclear Station site is 0.05g. The maximum hypothetical earthquake ground acceleration is 0.10g for SSC's found on bedrock and 0.15g for SSC's found on overburden.

- Bedrock Foundation Structures: Reactor buildings, auxiliary buildings, turbine buildings, the Standby Shutdown Facility (SSF) building and the Keowee powerhouse
- Overburden Foundation Structures: The borated water storage tanks, condenser circulating water components outside of the turbine building, SSF cooling water lines outside the SSF structure, the radwaste facility and the Independent Spent Fuel Storage Facility

All plant structures are classified as Class 1, Class 2 or Class 3 with Class 3 being any SSC that is not classified as one of the other two classes. The breakdown of the first two groups is:

- Class 1: Those SSC's which prevent the uncontrolled release of radioactivity and are designed to withstand all loadings without any loss of function and include portions of the Aux Building that house ES systems, the control rooms, and spent fuel pools, reactor buildings and associated penetrations, CT4 transformer and blockhouse, unit vents, and the SSF.
- Class 2: Those SSC's whose limited damage would not result in a release of radioactivity and would permit a controlled plant shutdown but could interrupt power generation and include the intake structure, turbine building and areas of the auxiliary building not considered to be Class 1, intake canal, Keowee hydroelectric facility, circulating water piping, Little River dam and Essential Siphon Water systems.
- From a licensee renewal perspective, Class 1 and Class 2 structures are included in the scope for licensee renewal commitments.

UFSAR Chapter 3, Section 3.7 covers the Seismic Design of the station.

- The design is based on the time history record using the vertical and north-south horizontal components of the May 1940 El Centro earthquake.
- The NRC determined that it is not feasible to require older operating plants to meet new licensing requirements that were not in use when plants were licensed. Therefore, an alternative method was selected to verify the seismic capability of equipment. This alternative method used a compilation of existing earthquake experience data supplemented by test data as the basis to verify the seismic capability of equipment. Generic Letter 87-02 allowed the seismic verification to be accomplished by utilities through a generic program, and the Seismic Qualification Utility Group (SQUG) was formed. The SQUG developed a Generic Implementation Procedure (GIP) that documents the seismic verification process, procedures, and methodologies for verifying the seismic qualification of equipment and resolving USI A-46. Supplement 1 of Generic Letter 87-02 Oconee performed the seismic qualification process in accordance with the NRC

endorsed methodology. In a Safety Evaluation Report, the NRC concluded that Oconee met the purpose and intent of the seismic qualification process and that the corrective actions and modifications provide sufficient basis to close the USI A-46 review at Oconee.

The Oconee Design Basis Document (DBD), sections 3.1.1 and 7.1.1 address the Design Basis Event encompassing an Earthquake event.

Regional Geology: The regional structure at the plant site is typical of the southern Piedmont and Blue Ridge. The Blue Ridge uplift was the climax of the geological folding that occurs in this region and was accompanied by major faulting along a line stretching northeast through Atlanta and Gainesville, Georgia and across South Carolina, 11 miles northwest of the site. This has been termed the Brevard Fault and is the closest seismic fault to the Oconee Nuclear Station.

A considerable number of lesser earthquakes have been felt in the region. However, most of these shocks resulted in a little or no damage.

The largest earthquakes close to the site occurred near Charleston in August, 1886, some 200 miles from the site.

There have been two moderate earthquakes in the immediate vicinity of the plant since construction began.

- In 1971, an earthquake occurred near Seneca, South Carolina at 07:42 (EST) on July 13, 1971.
- On August 25, 1979 (9:31 PM EDST, Aug. 26) a magnitude 3.7 earthquake occurred in the vicinity of Lake Jocassee, South Carolina.

The following faults exist within the regional area of the Oconee Nuclear Station as documented in Chapter 2 of the UFSAR:

Name	Distance-Direction From Site
Brevard Fault	11 Miles NW 260
Dahlonega Fault	40 Miles W 260
Whitestone Fault	47 Miles NW 260
Towaliga Fault	90 Miles S 260
Cartersville Fault	104 Miles W 260
Gold Hill Fault	115 Miles E 260
Goat Rock Fault	140 Miles SW 260
Triassic, Deep River Basin,	140 Miles E 200
Triassic, Danville Basin, N.C.	145 Miles NE 200
Crisp and Dooly Counties, Ga.	190 Miles SW 12 to 70
Probable Triassic Basin Charleston	200 Miles SE

STATION GUIDANCE / PROCEDURES

AP/0/A/1700/005; Earthquake: This is the Abnormal Operating Procedure for an earthquake detected on-site. The procedure is entered on the following events:

1) Statalarm: SEISMIC TRIGGER (1SA-9, E-1) and/or (3SA-9, E-1) received
2) Computer Alarm: SEISMIC RECORDER (O1D0201) on Unit 1 received
3) Seismic Tremor felt at Oconee Nuclear Station or Keowee Hydro Station.

The Strong motion accelerometer (SMA-3) begins recording at sensed acceleration magnitudes of > 0.01g. (Unit 1 only). Entry into this procedure directs the control room personnel to instruct the Keowee Hydro staff to enter the AP for Natural Disaster and contact the corporate hydro department. Enclosures to the procedure are used to perform detailed walk downs of the plant to determine if any damage occurred.

NOTE: The station entered this procedure following the Mineral, VA earthquake based on reported tremors felt on-site. No alarms were received based on acceleration and no issues were found following plant walk downs conducted after the AP was entered.

AM/1/A/0125/007 (Earthquake Response Data Collection and Verification For Strong Motion Accelerometer (SMA-3) Recorders): This procedure provides instructions for processing Strong Motion Accelerograph Recorder (SMA-3) tapes after a seismic event has occurred.

NOTE: Since the tape recorder and scratch plate device did not actuate following the Mineral, VA earthquake, the tape and plate were not removed for analysis (no data would have been recorded since the equipment never actuated).

RP/0/B/1000/001 (Emergency Classification) uses the Strong Motion Accelerograph computer alarm and Seismic Trigger statalarm as inputs to the classification. Contingency Plan Information from Emergency Planning is provided to the OSM in order to make E-plan classification if either of these systems is out of service for maintenance.

NOTE: Since the Strong Motion Accelerograph did not actuate and the Seismic Trigger statalarm was not received following the Mineral, VA earthquake, the Emergency Plan was not entered although it was reviewed by station personnel.