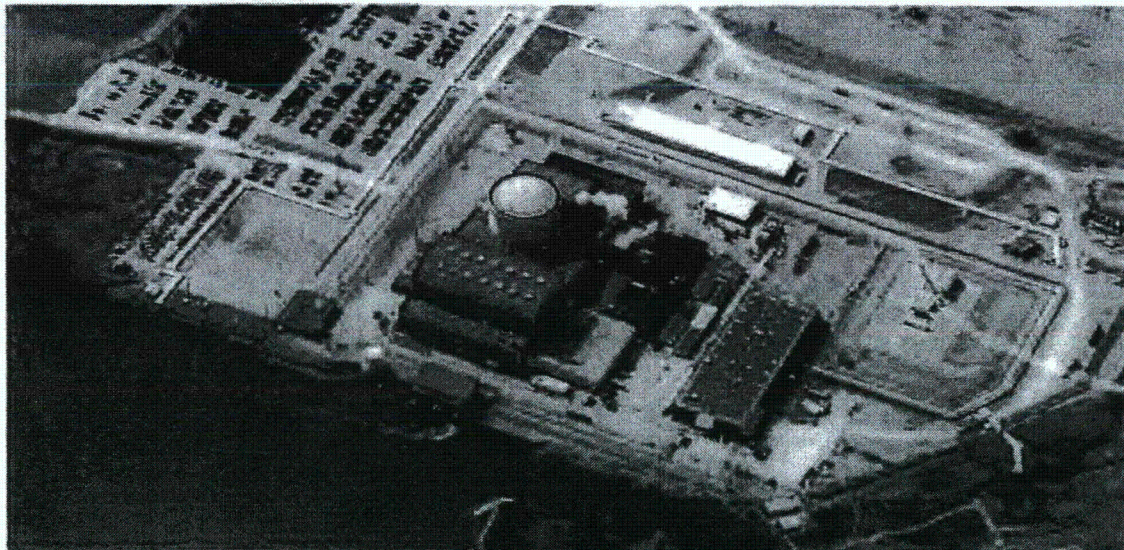


Elements of the Screening Analysis

Background on Fort Calhoun Station and Oconee Nuclear Station

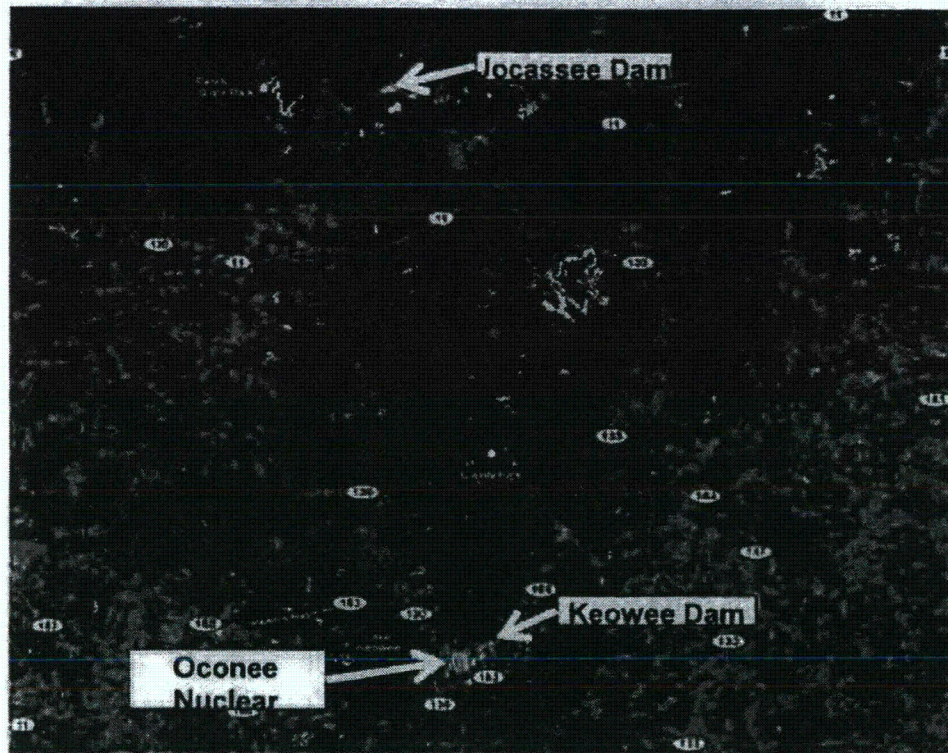


Insufficient
Procedures

Flood Barrier
Penetrations



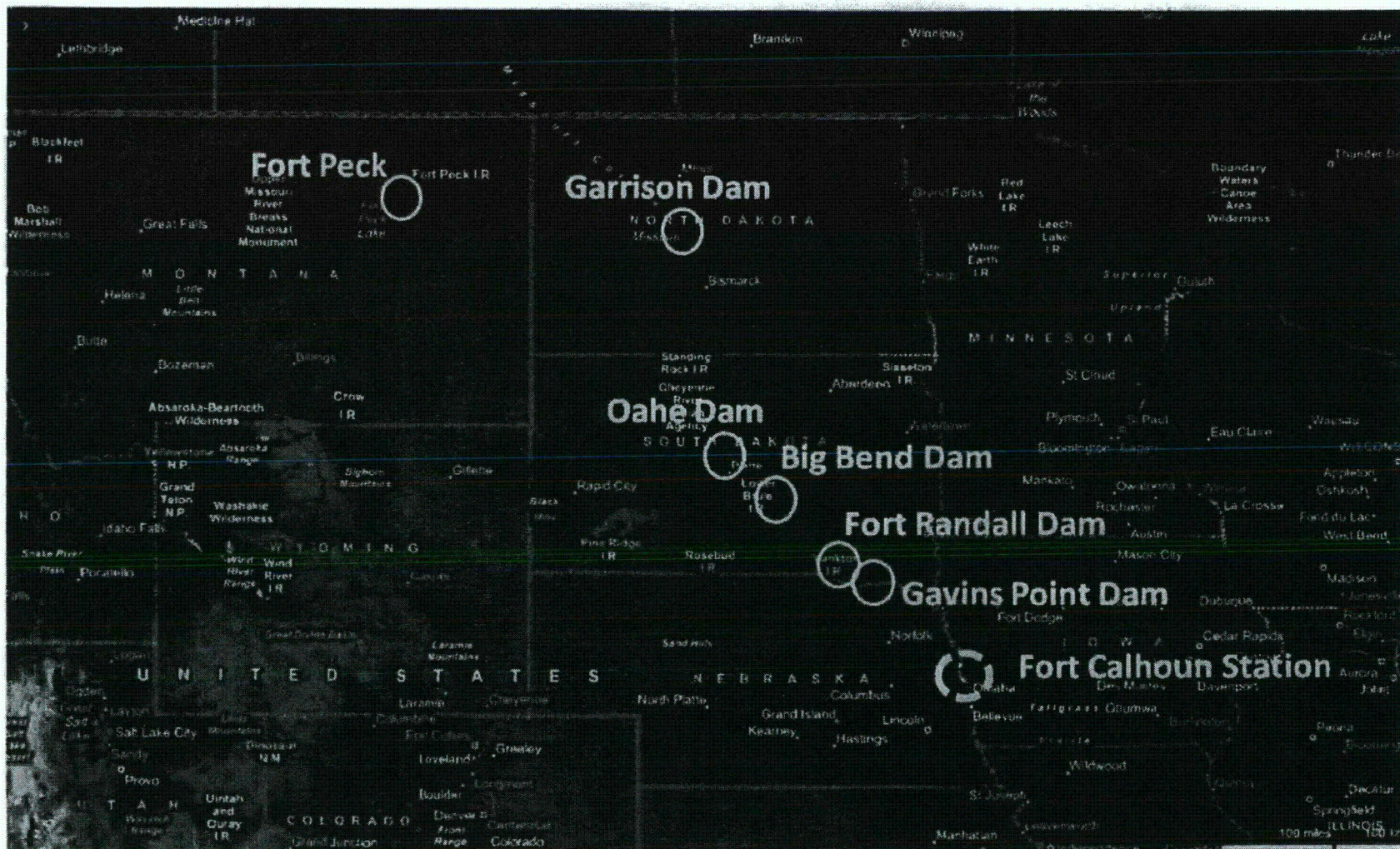
Oconee Nuclear Station



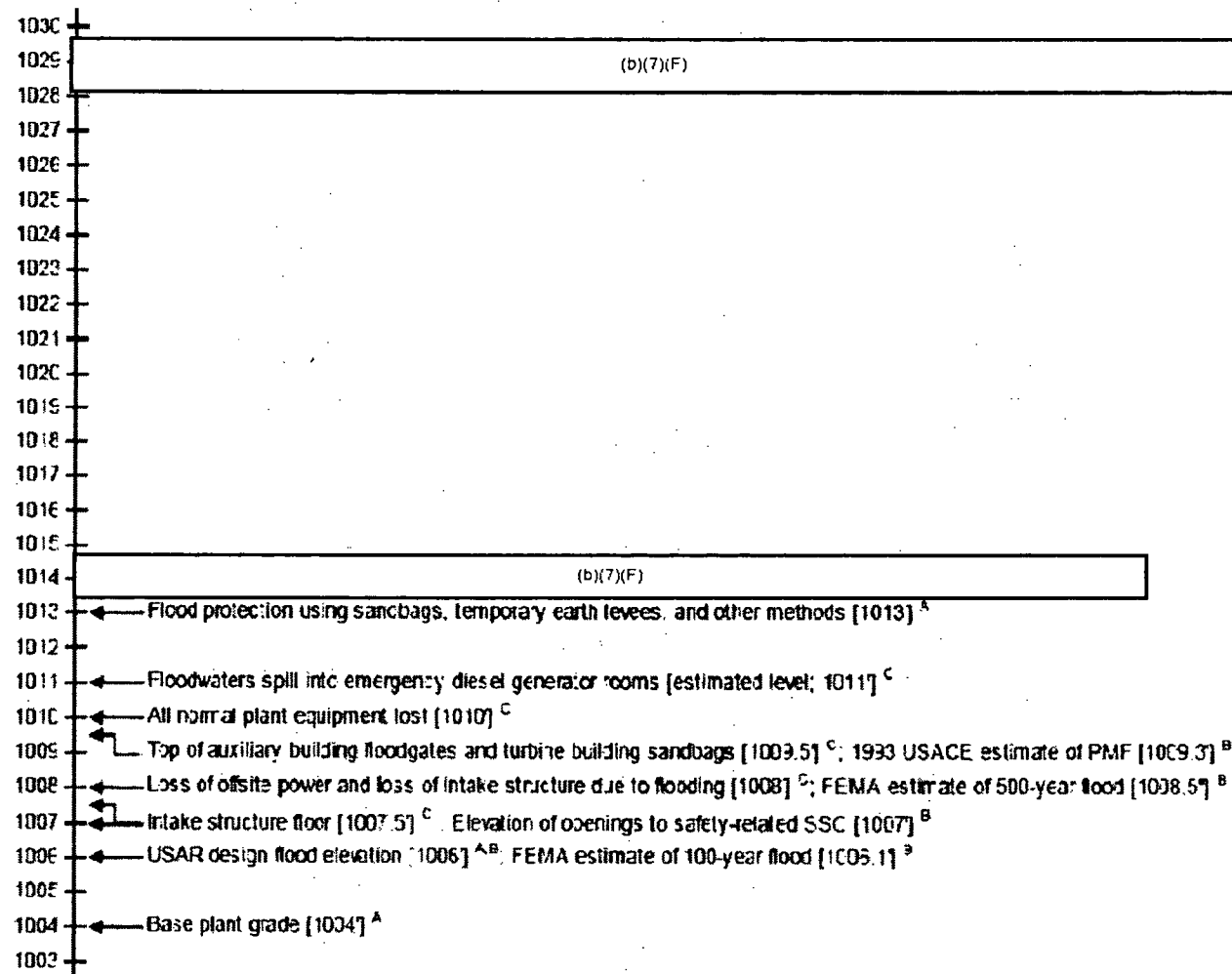
Given catastrophic dam failure, containment failure appeared likely

- LOOP
 - SSF Failure
 - Failure of Keowee Dam
- } → Degradation Timeline

Fort Calhoun Station Upstream Dams



Fort Calhoun Station Flood Levels



Applicability to Multiple Plants?

Clear identification of the issue at ONS and FCS

- For all other sites, is there a clear indicator?

Difficulty stating a generic class of applicable plants.

- FSAR and IPEEE did not necessarily reveal an issue
- Lack of (identified) *readily available* conclusive information

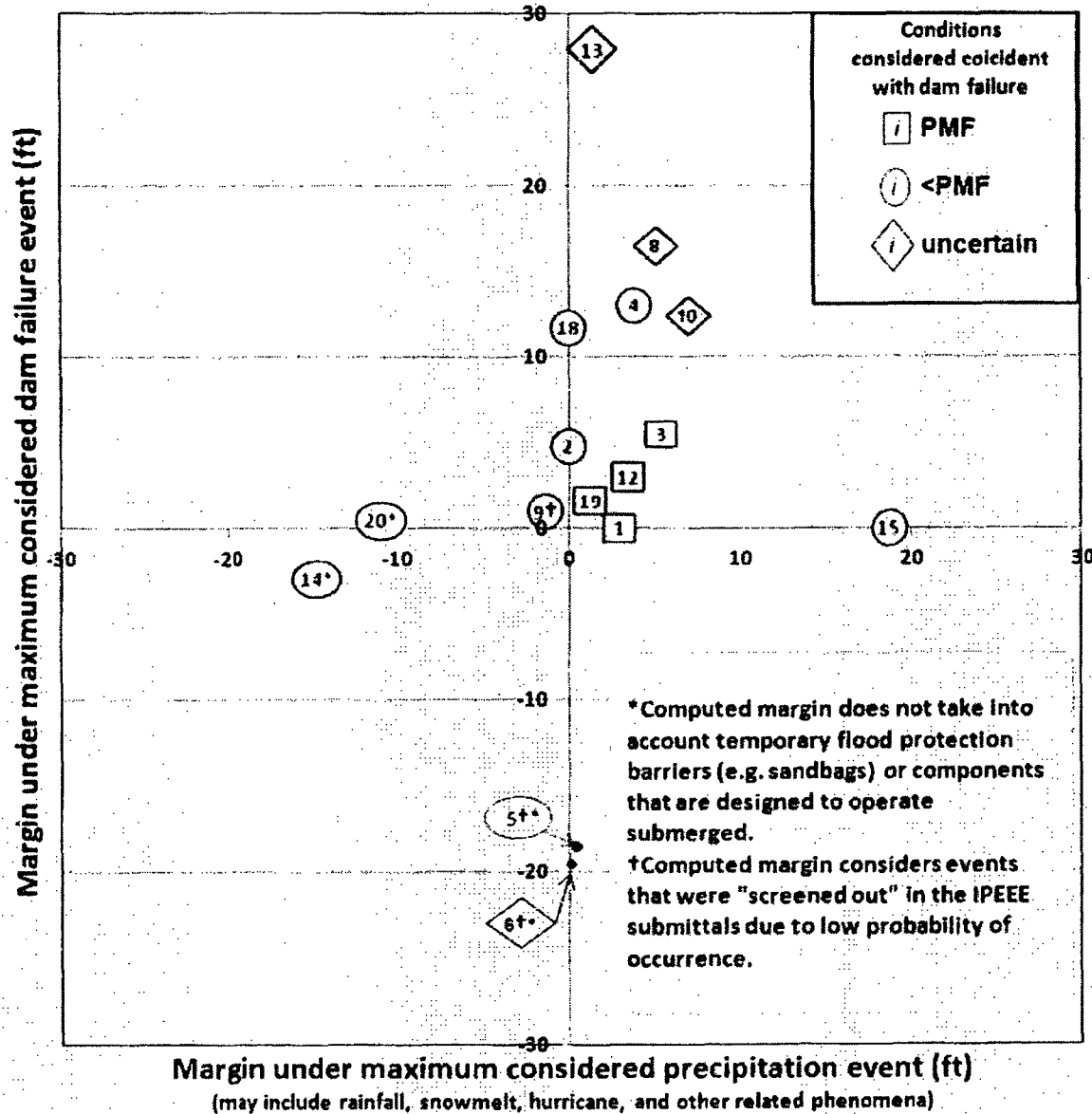
Use of “signature characteristics”

- Reliance on the placement of temporary barriers
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- Limited time window for response
- Small or negative margins under less than ideal circumstances
- Significant events “screened out” where reconsideration may be appropriate
- Evaluation coincident with less than PMF

Timeline of Plan Operating License Issuance vs. Publication Dates

U.D. Robinson 2	1970	
	1971	10 CFR 50, Appendix A, GDC-2
Vermont Yankee, Surry 1	1972	
Fort Calhoun, Oconee 1-2, Browns Ferry 1, Peach Bottom 2, Indian Point 2, Surry 2	1973	Regulatory Guide 1.59
Arkansas Nuclear 1, Oconee 3, Browns Ferry 2, Cooper, Peach Bottom 3, Three Mile Island 1, Prairie Island 1-2	1974	
Indian Point 3	1975	Regulatory Guide 1.102; NUREG-75/087, Standard Review Plan
Beaver Valley 1, Browns Ferry 3, Salem 1	1976	ANSI Standard N170-1976/ANS 2.8; Regulatory Guide 1.59 (Revision 1); Regulatory Guide 1.102 (Revision 1)
	1977	Regulatory Guide 1.59 (Revision 2)
Arkansas Nuclear 2	1978	NUREG-75/087, Standard Review Plan (Revision 1 to Sections 2.4.2-2.4.4)
	1979	
Sequoyah 1	1980	Regulatory Guide 1.59 (Enacts to Revision 2)
McGuire 1, Sequoyah 2, Salem 2	1981	NUREG-0800, formerly NUREG-75/087, Standard Review Plan (Revision 2 to Sections 2.4.2-2.4.4)
	1982	
McGuire 2	1983	
Columbia	1984	
Waterford 3	1985	
Hipe Creek 1	1986	
Beaver Valley 2	1987	
South Texas 1	1988	
South Texas 2	1989	NUREG-0800, Standard Review Plan (Revision 3 to Sections 2.4.2-2.4.3)
	1990	
	1991	NUREG-1407
	1992	American National Standard ANSI/ANS-2.8-1992
Watts Bar 1	1996	
	2002	NUREG-1742
	2007	NUREG-0800, Standard Review Plan (Revision 4 to Sections 2.4.2-2.4.3, Revision 3 to Section 2.4.4)

Margin under maximum considered precipitation event



GI-204 Communication Plan

KEY MESSAGES – BACKGROUND – Q&As

You can use this document as a basis for communication with the public

- Widely coordinated throughout NRC
- Represents a coordinated, approved agency opinion

Update Strategy

- Expected to change as our knowledge changes
- Expected to change as the status changes
- We hope to receive comments from the community
- If there is a tough question we have not answered, please let us know

Please review the questions in the Q&A section

The communication plan is not a public document

- Internal coordination tool
- Not a decision document

Anticipated Near Term Activities

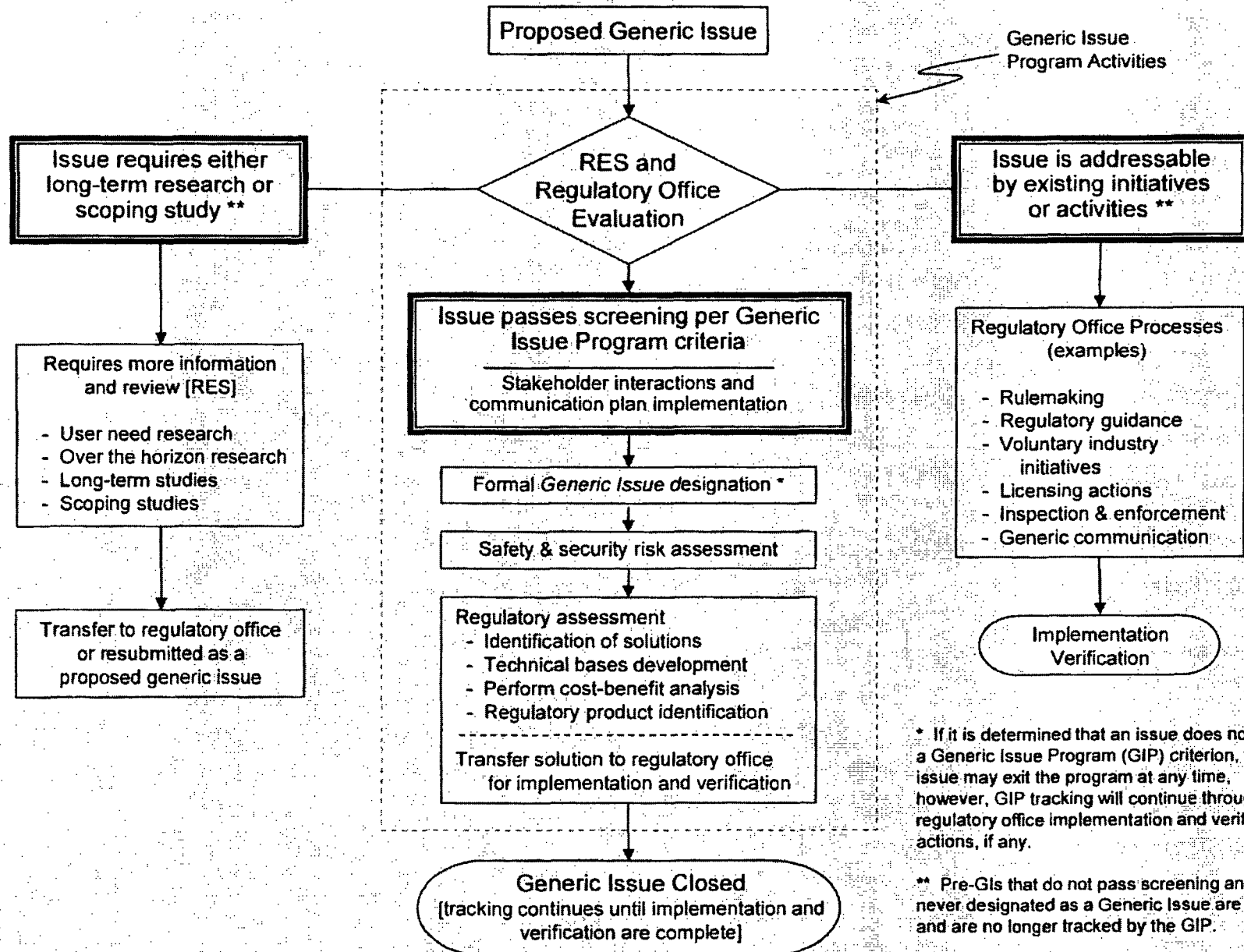
- Staff response (SECY-11-0137) to Fukushima Near Term Task Force recommendations:
 - Interact with stakeholders to inform NRC's process for defining guidelines for the application of present-day regulatory guidance and methodologies being used for early site permit and combined license reviews to the reevaluation of flooding hazards at operating reactors.
 - Develop and issue a request for information to licensees pursuant to 10 CFR 50.54(f) to (1) reevaluate site-specific flooding hazards using the methodology discussed above, and (2) identify actions that have been taken or are planned to address plant-specific issues associated with the updated flooding hazards (including potential changes to the licensing or design basis of a plant).
- Normal Generic Issues Program Process Next Steps
 - Conduct a public meeting
 - Perform the Safety/Risk Assessment

Information and Documents

- **Generic Issues Internal Website**
<http://www.internal.nrc.gov/RES/projects/GIP/index.html>
- **Generic Issues Public Website**
<http://www.nrc.gov/about-nrc/regulatory/gen-issues.html>
- **Generic Issue 204**
Screening Package (ML110740482)
Recommendation Memorandum (ML111890588)
Communication Plan (ML112220477)
Project Manager—Richard Perkins 301-251-7479
- **Generic Issues Program**
Branch Chief—Ben Beasley 301-251-7676
Program Manager—John Kauffman 301-251-7465
- **Program Guidance**
Management Directive 6.4
RES Office Instruction TEC-002
- **Knowledge Management**
NUREG-0933

Backup Slides

Generic Issue Program in Perspective With Other Regulatory Programs and Processes



The Generic Issue Criteria:

- 1 – The issue affects public health and safety, the common defense and security, or the environment**
- 2 – The issue applies to two or more facilities and/or licensees/certificate holders, or holders of other regulatory approvals**
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Generic Issues Criteria

Richard Perkins

**Office of Nuclear Regulatory Research
Division of Risk Analysis
Generic Issues and Operational Experience Branch**

Visit our intranet website at
<http://www.internal.nrc.gov/RES/projects/GIP>

The Generic Issues Program is a Congressionally mandated, agency-wide program to address issues that have significant generic implications related to safety or security which cannot be more effectively resolved by other regulatory programs or processes

Visit our intranet website at
<http://www.internal.nrc.gov/RES/projects/GIP>

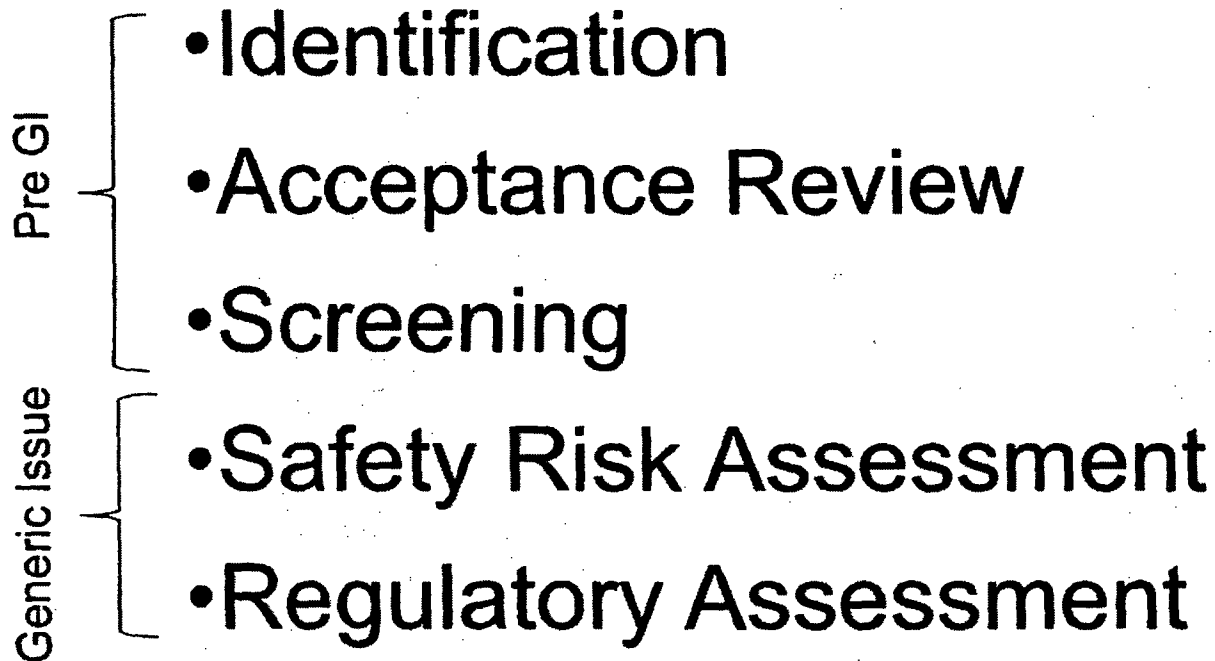
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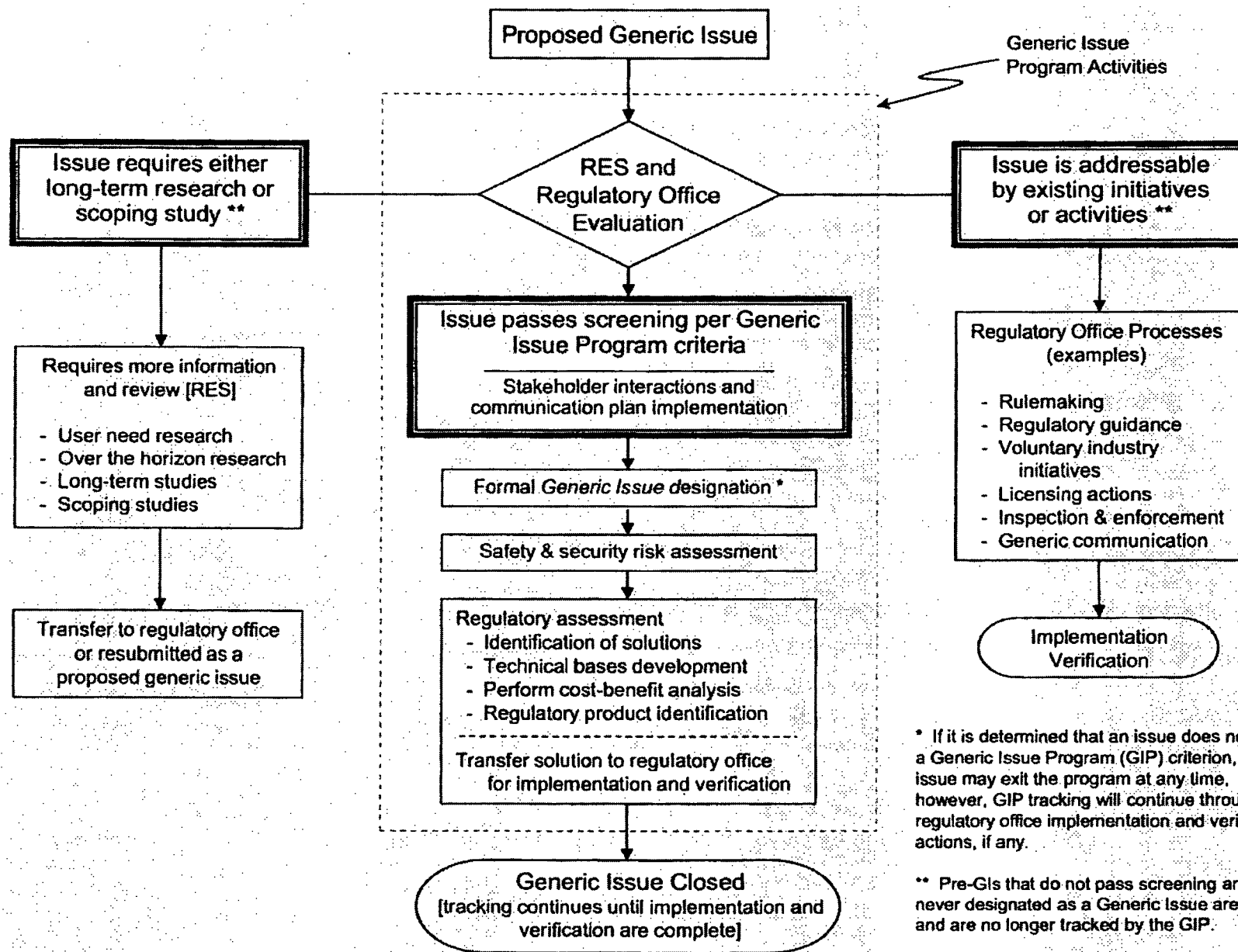
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- The issue description and its progress will be documented in NUREG 0933 – the purpose of which is to drive “... the timely and efficient allocation of NRC resources for the resolution of those safety issues...”
- The status of all active Generic Issues is provided in a report to Congress every six months
- The status of all active Generic Issues is reported in a public document every 90 days.
- 10CFR52.47(a)(21) requires license applications to address (propose a technical resolution for) any issue that has been listed in NUREG 0933 for more than 6 months prior to the docket date of the application and which are technically relevant to the design.
- Visibility and regular reporting requirements make resolution of the issue extremely likely.

Stages



Generic Issue Program in Perspective With Other Regulatory Programs and Processes



Generic Issue #204
Flooding of Nuclear Power Plant Sites
Following Upstream Dam Failure

Richard Perkins
Michelle Bensi

Office of Nuclear Regulatory Research
Division of Risk Analysis
Operating Experience and Generic Issues Branch

Visit our intranet website at
<http://www.internal.nrc.gov/RES/projects/GIP>

Objectives of presentation

- ✓ Review coordination activities (past & ongoing)
- ✓ Provide high-level overview of topic
- ✓ Describe content of screening analysis

Part 1:

Coordination and Planning

Major Phases of GI-204 Coordination

- Screening analysis development
- Generic Issue Review Panel briefings
(with inter-office discussion)
- Formal Inter-office coordination of
recommendation memorandum
- Community development of communication plan
- Formal coordination of the communication plan
- Upper-level final planning meetings
- Rollout

Phases of GI-204 Coordination (cont.)

Objectives & Coordination during the Screening Analysis Development

- Obtain information**
- Increase staff awareness**
- Research and formulation**
- Engagement of NRC community**
- Develop agency consensus**

Phases of GI-204 Coordination (cont.)

- Early inter-office coordination occurs during the
Generic Issue Review Panel briefings
- Formal coordination of the
GI Review Panel recommendation

Phases of GI-204 Coordination (cont.)

- Community development of the **Communication Plan**

- Goals, key messages, background/overview, recognize stakeholders
- Establishment of inter-office Communication Team
- Q&A development, community editing, and coordination
- Rollout plan development (including press release)
- Living document (keeps discussion going, comments encouraged, “community owned”)

- Formal Coordination of the Communication Plan

- Issued by memorandum
- Broad concurrence across NRC

Phases of GI-204 Coordination (cont.)

- **Pre-release Activities**

- Briefings and conferences with regions/offices
- Routine communication team updates
- Upper-level final planning meetings
- Rollout execution (pending)

See declaration timeline (next slide)

GI-204 Declaration Timeline – Internal Information – ~~Not for Public Release~~

12/14/11

Documents Required for GI Declaration:

Recommendation Memo from GI Review Panel

Communication Plan (non public)

Screening Analysis Report (enclosure)

OPA Press Release

Status

Approved by GI Review Panel.

Approved and available for use

Completed and final (not released)

Approved by Chairman's Office – awaiting release
Subject to continuing edits in real time

Significant Critical Path Tasks:

With RES Director for review and consideration for approval

Sequence and Timeline: [Organization responsible for action]

- Formal coordination of **Communication Plan** is completed
- RES Director: Signs out **Communication Plan** (non public)
- Approved **Communication Plan** is distributed to communication team [RES]
- 3 work days RES Director: Approves **GI Recommendation Memo** (release clock begins)
- 3 work days Public release day (not Friday) and time is selected with OPA [OPA & RES]
- 3 work days 'Heads up' notification to Regional State Liaison Officers (RSLOs) and OCA [RES]
- 2 work days Communication Team is notified of release day and time [RES]
- 2 work days Communication Team notifies internal stakeholders [Communication Team Members]
- As appropriate RSLO actions and communications with States [RSLOs]
- 0 time **OPA Press Release** [OPA]
- +1 hour **Recommendation Memo** and **Screening Analysis Report** become publicly available in ADAMS [RES]
- +1 hour Communication Team is notified of press release and document status [RES]

POC: Richard Perkins,
NRC/RES/DRA/OEGIB
richard.perkins@nrc.gov
301-251-7479

Part 2:

High-level overview of topic

Key Messages

- No immediate safety concerns were identified
- Screening analysis was completed before events at Fukushima and Fort Calhoun Station
- The screening analysis was a limited scope assessment
- Reevaluation of the effect of dam failures is appropriate based on new information
- Evaluation of the issue will continue to the next stage of the Generic Issues Program

Scope

- Generic Issue #204 applies to:
 - Operating nuclear power plants
 - Spent fuel pools
 - Sites undergoing decommissioning with spent fuel still in the spent fuel pools
- Related technical issues addressed as separately proposed Generic Issues:
 - Effect of downstream dam failures on availability of cooling water
 - Proposed & accepted (PreGI-011) – currently undergoing screening
 - Effect of upstream dam failures on fuel facilities
 - Issue has been proposed – currently undergoing acceptance review
 - Effect of external flooding on ISFSIs
 - Proposal is drafted but not yet submitted to Generic Issues Program

Potential sensitivities

- Report is expected to draw attention to several plants:
 - Oconee
 - Fort Calhoun
 - Other plants listed in the report (to a lesser extent)
 - Public-availability
 - Report will be released publically with one paragraph redacted
 - Report references documents that are not publically available
 - For some plants, the screening analysis calculated low or negative margin under certain flood events when using prescribed assumptions
 - Additional details about analysis provided later in presentation
-

Plant names appearing in screening analysis

- **Region 1**

- Beaver Valley
- Hope Creek
- Indian Point
- Peach Bottom
- Three-Mile Island
- Vermont Yankee

- **Region III**

- Prairie Island

- **Region II**

- Browns Ferry
- McGuire
- Oconee
- H.B. Robinson
- Sequoyah
- Surry
- Waterford
- Watts Bar

- **Region IV**

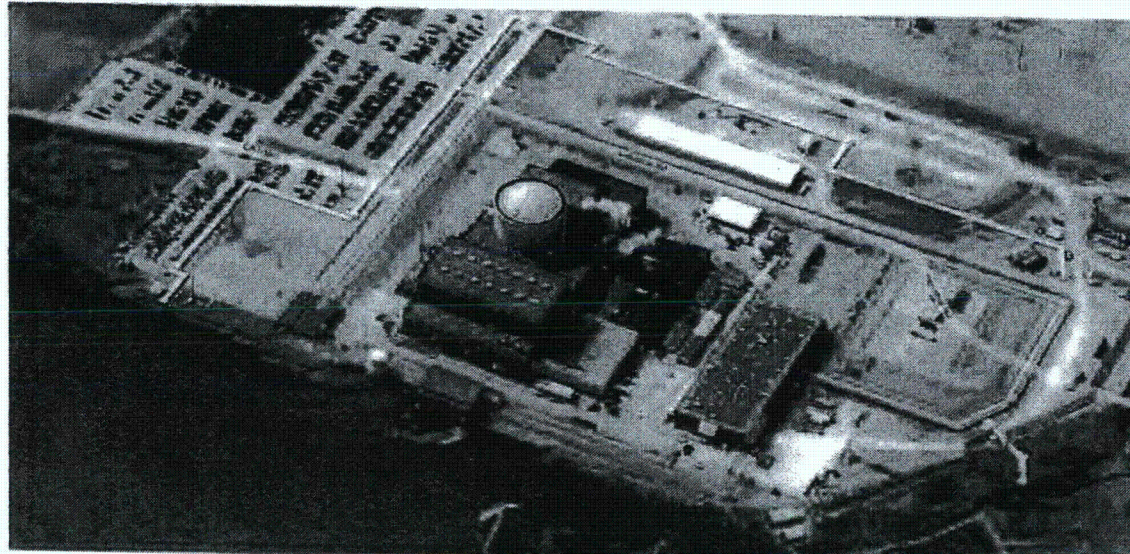
- Arkansas Nuclear
- Columbia
- Cooper
- South Texas
- Fort Calhoun

Draft CA note

Add here if desired

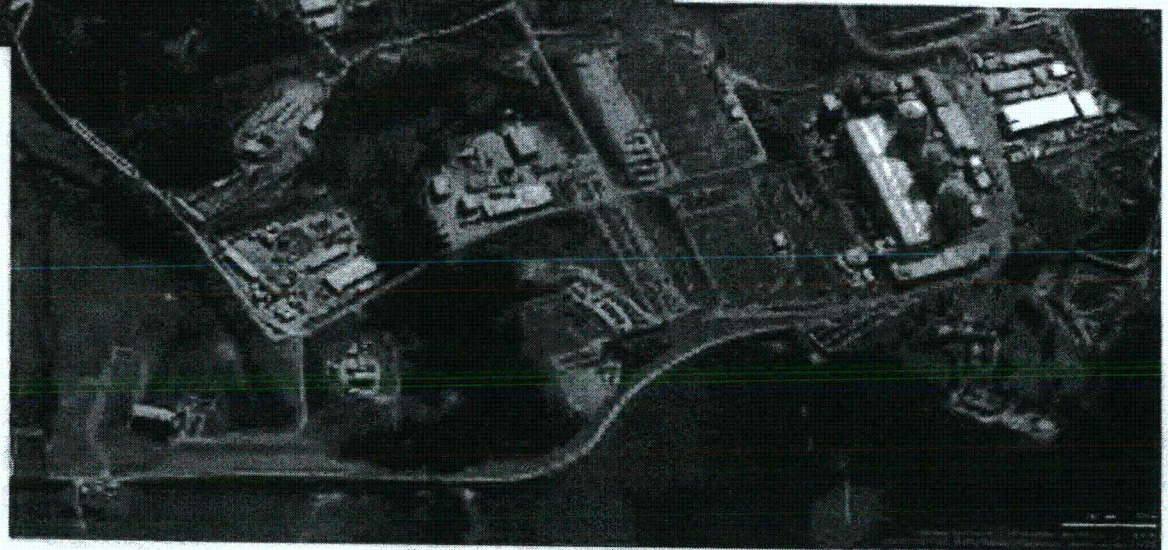
Part 3:
**Overview of screening
assessment**

Precursor Events: Background on Fort Calhoun and Oconee

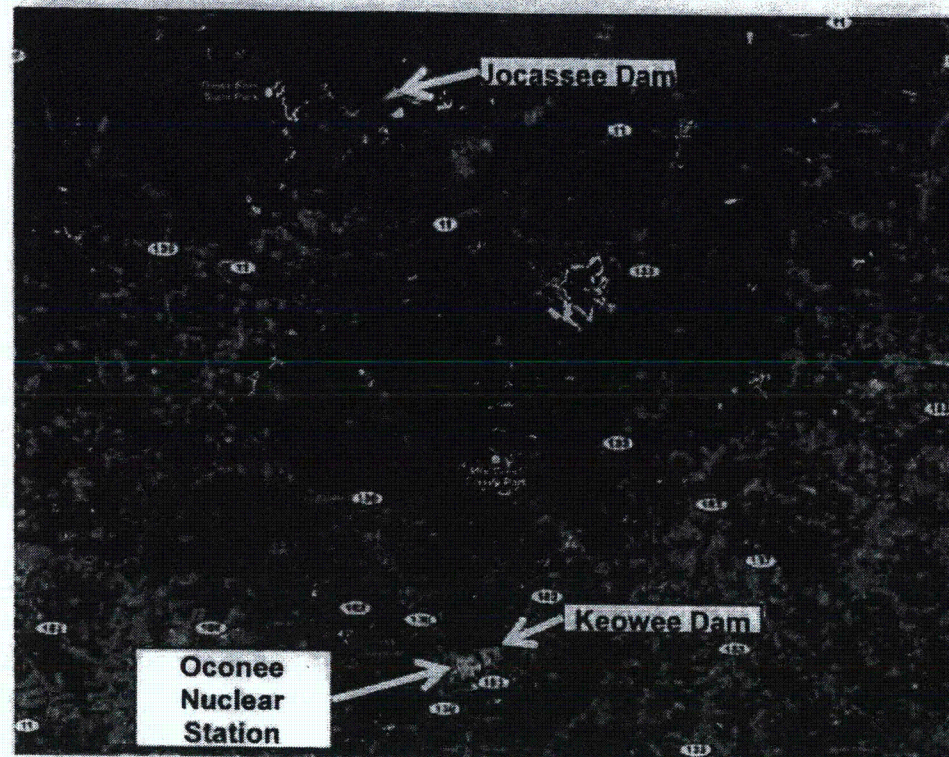


Insufficient
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Flood Barrier
Penetrations



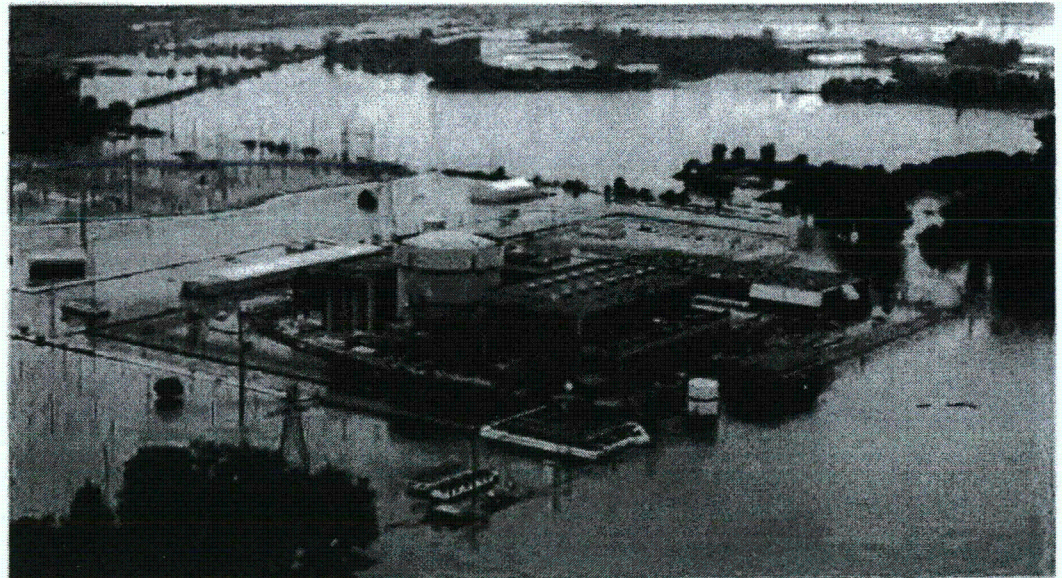
Precursor events con'd: Experience at Oconee Nuclear Station



Given catastrophic dam failure, containment failure appeared likely

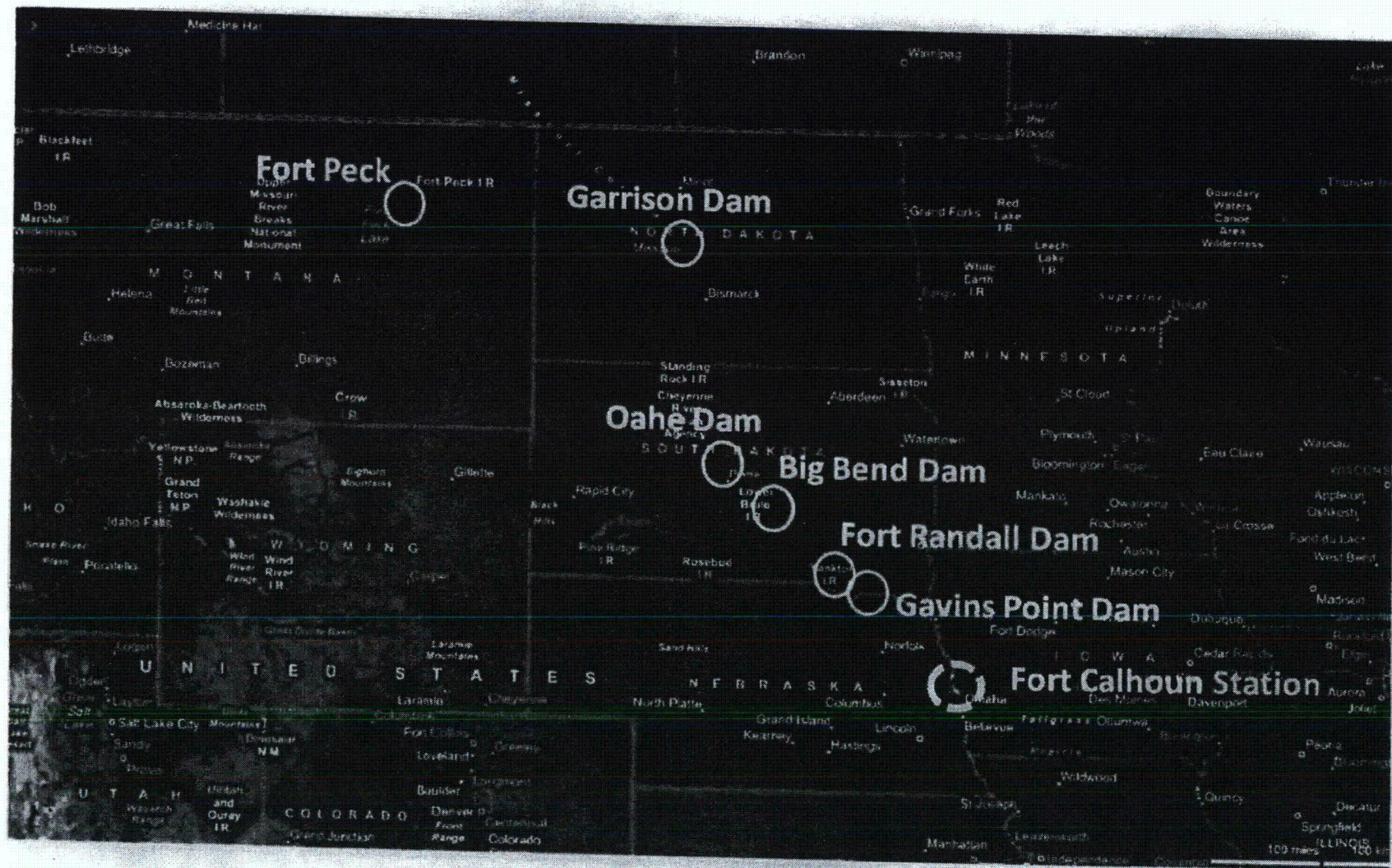
- LOOP
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 - Failure of Keowee Dam
- } → Degradation Timeline

Precursor events con'd: Recent experience at Fort Calhoun

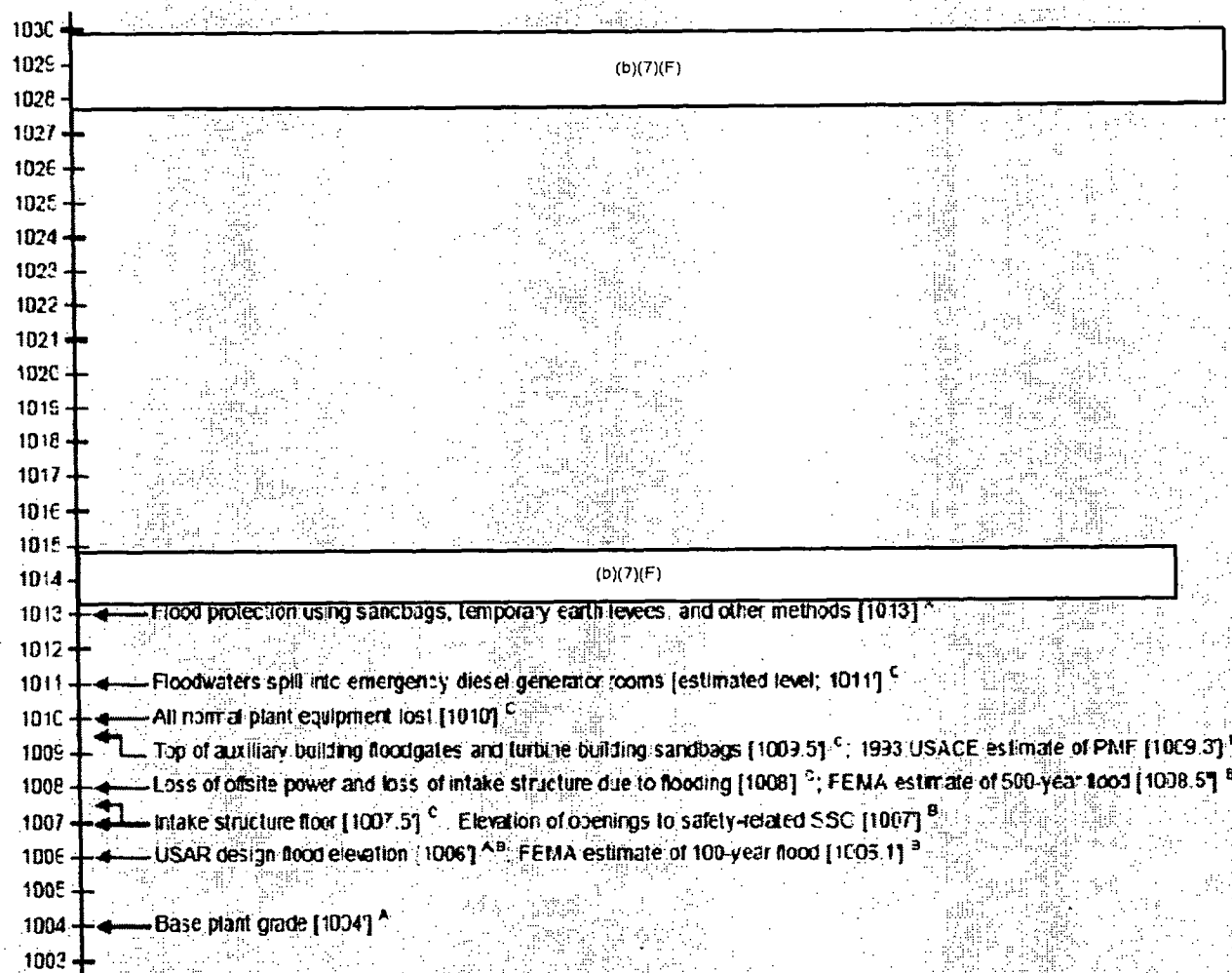


Insert picture here

Precursor events con'd: Fort Calhoun Station Upstream Dams



Precursor events con'd: Fort Calhoun Station Flood Levels



Examination of applicability to multiple plants: General approach

Clear identification of the issue at ONS and FCS

Difficulty stating a generic class of applicable plants.

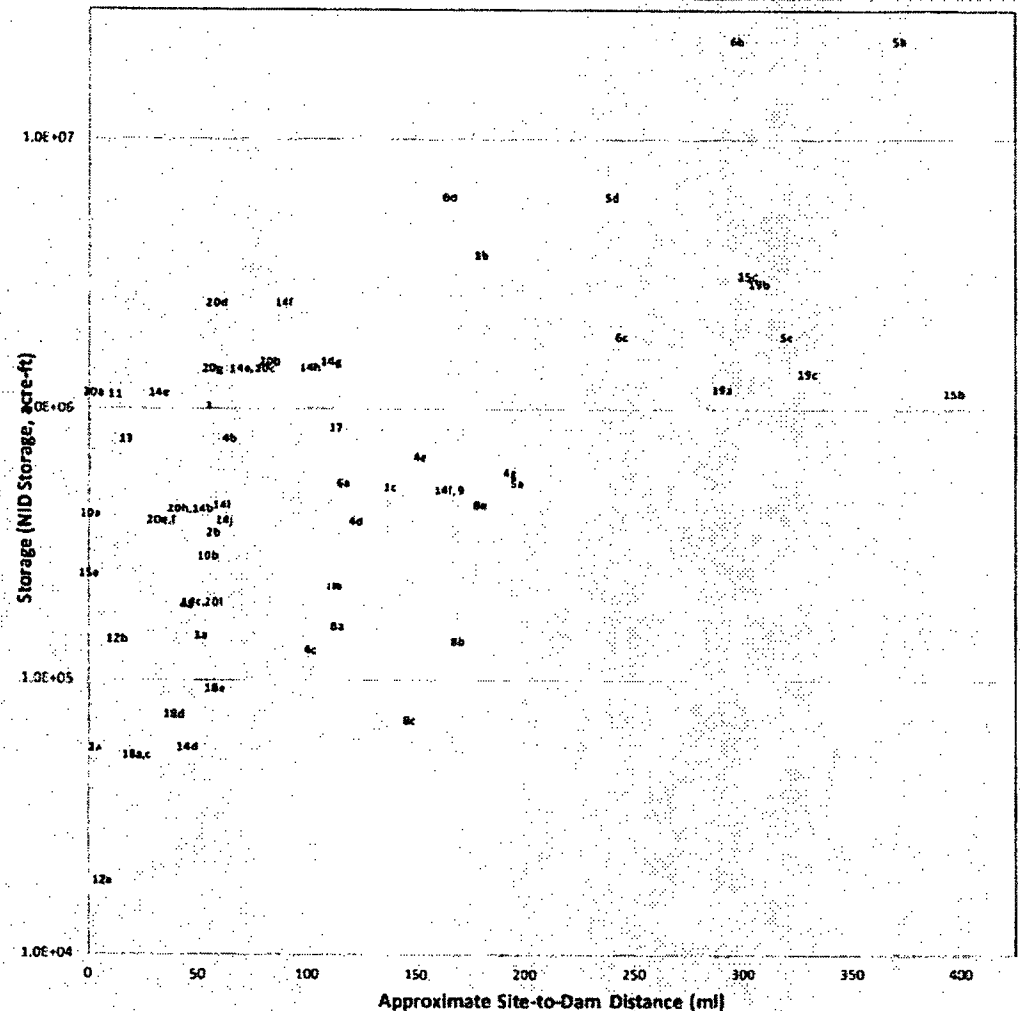
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Use of “signature characteristics”

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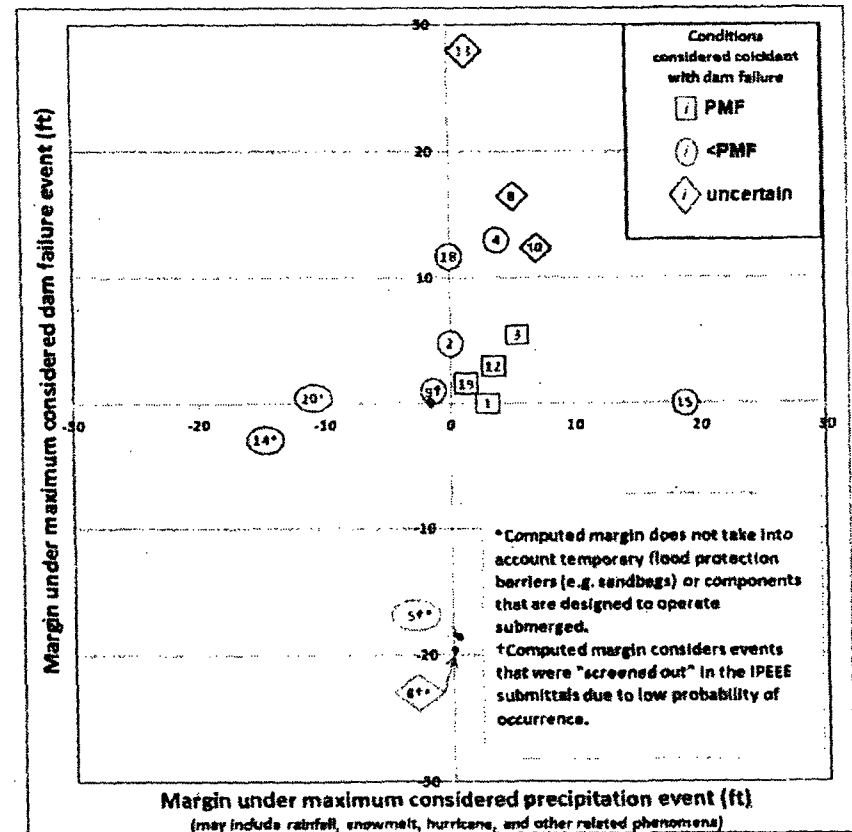
Examination of applicability to multiple plants: Location of dams relative to NPP sites

- In the Generic Issue Proposal, 20 plants were identified
- Plant-specific documents were reviewed along with data from the National Inventory of Dams
- Key observations:
 - Many nuclear power plants are located downstream of dams
 - Dams upstream of plants have varying characteristics, sizes, capacities, purposes, and are regulated by different agencies



Examination of applicability to multiple plants: Margin under precipitation and dam failure events

- Calculated margin is based on several prescribed assumptions:
 - Considers largest flood elevation and smallest flood protection elevation available in reviewed NRC documents
 - Not limited to design basis events
 - Does not account for temporary protective measures or operation of submerged components
- Prescribed assumptions are based on observations about Oconee and Fort Calhoun:
 - Reliance on temporary barriers
 - Revised flood estimates that are larger than older estimates
 - Increased estimates of dam failure frequency



This figure answers the question:

What is the "margin" between the highest flood level referred to in available documents and the plant's flood protection level, when not accounting for certain measures that may have been approved during licensing?

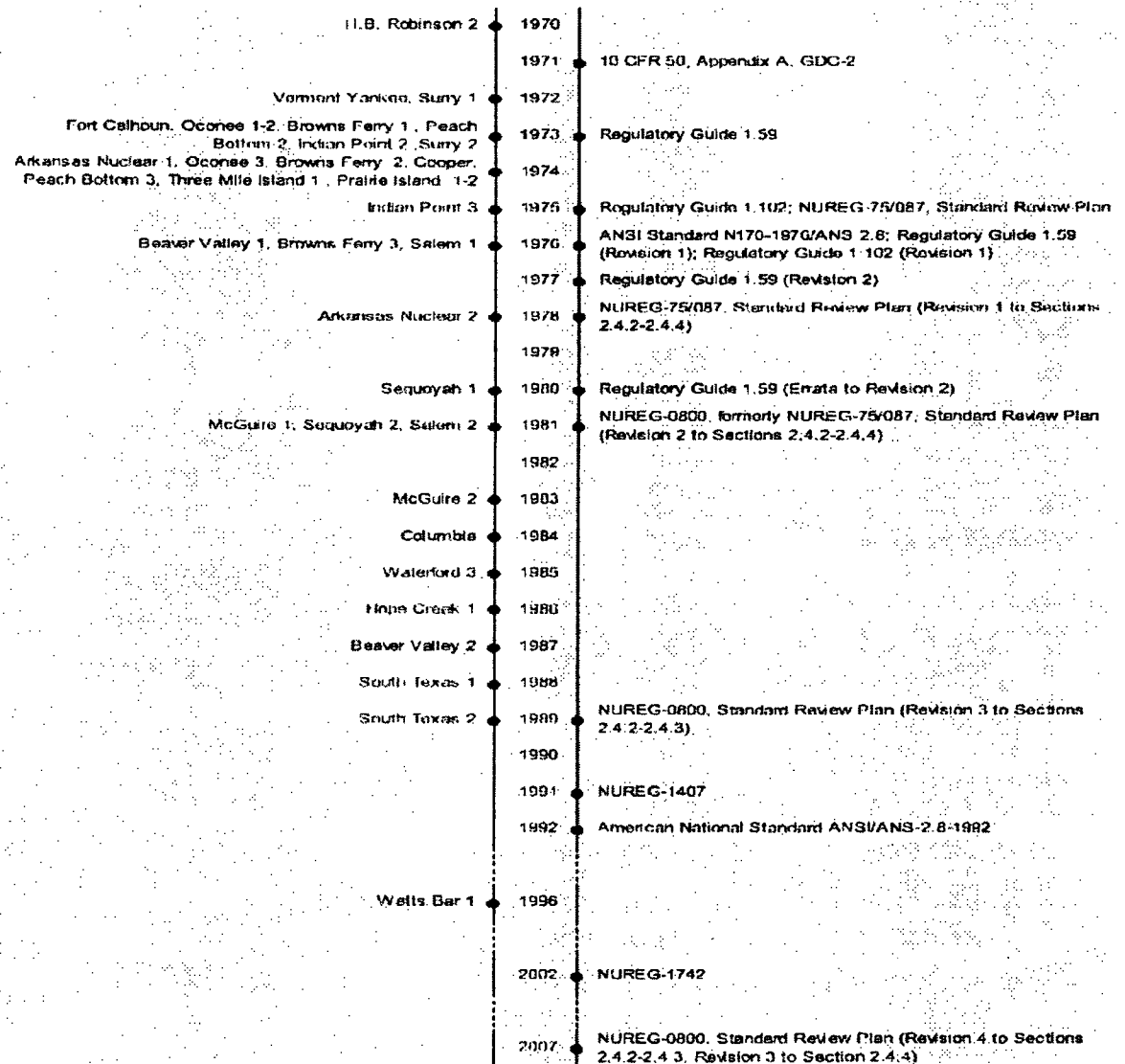
Examination of regulatory history: Operating License Issuance vs. Publication Dates

Key observations:

Some plants licensed before key regulatory guidance.

Regulatory guidance related to dam failures has evolved over time.

There is no regulatory requirement to re-assess plants under new/revised guidance.

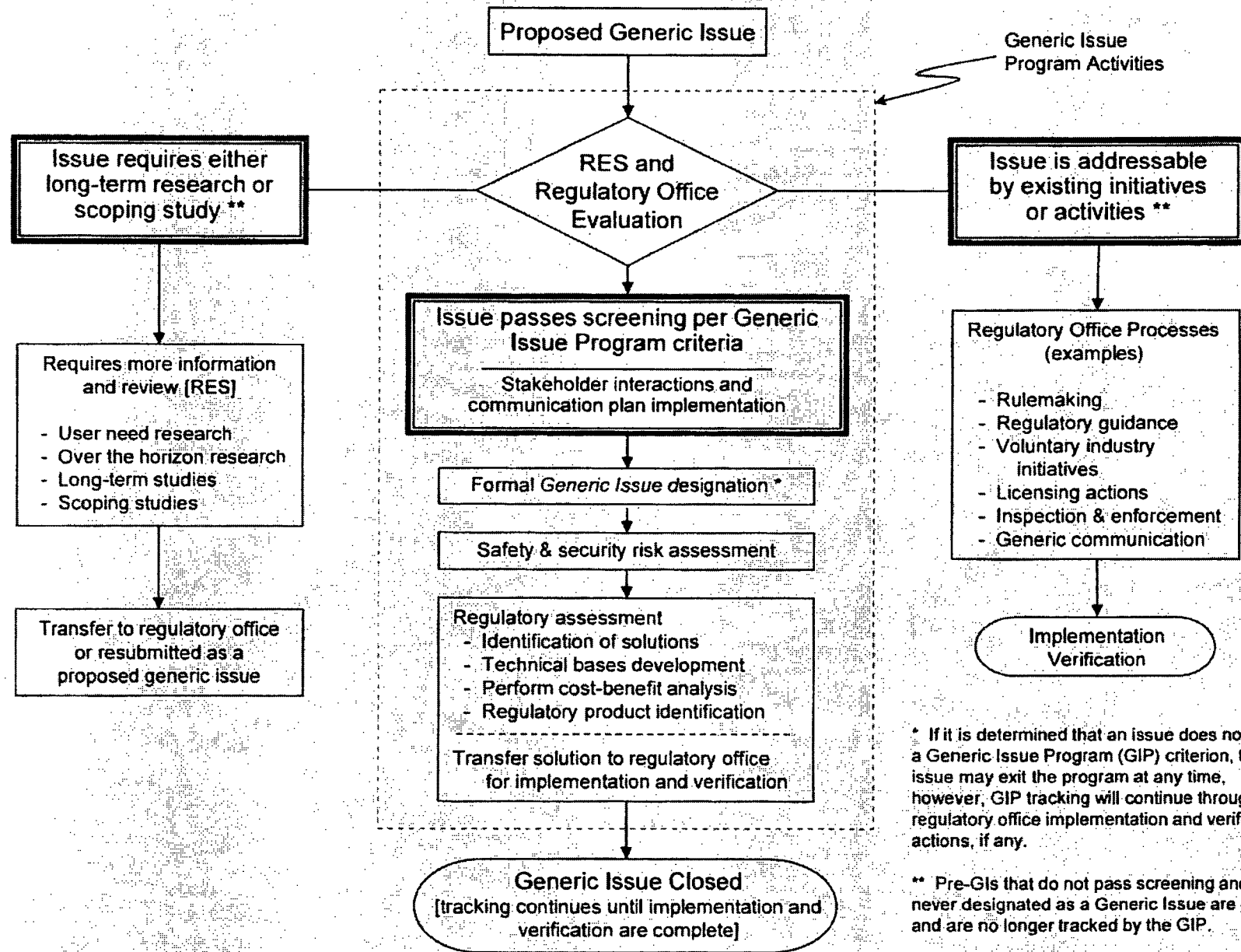


Current and Future Activities

- Next steps:
 - Continue coordination with NRC Offices and Regions
 - Hold a public meeting
 - Perform Safety/Risk Assessment
- Preliminary activities for the safety/risk assessment have commenced:
 - Multiple “brainstorming” and planning sessions have been held
 - A preliminary project team with necessary technical expertise has been assembled
 - Statistical work has begun to develop defensible dam failure frequency estimates
 - Coordination with JLD is underway
- **Have Ben add more here**

Backup Slides

Generic Issue Program in Perspective With Other Regulatory Programs and Processes



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-

GI-204 Communication Plan

KEY MESSAGES – BACKGROUND – Q&As

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Please review the questions in the Q&A section

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- Internal coordination tool
- Many communication plans do become public information eventually

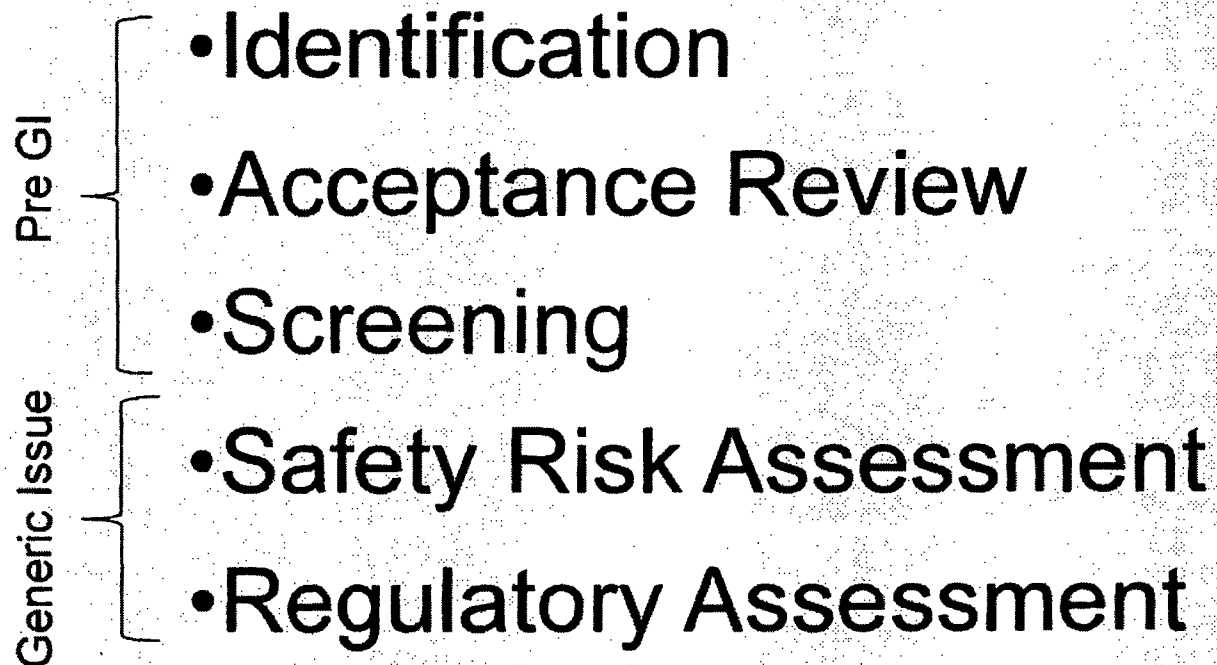
Analysis of the Proposed Generic Issue on Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures

Richard Perkins

**Office of Nuclear Regulatory Research
Division of Risk Analysis
Generic Issues and Operational Experience Branch**

Visit our intranet website at
<http://www.internal.nrc.gov/RES/projects/GIP>

STAGES



WHAT IS SPECIAL ABOUT A GENERIC ISSUE?

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NATURE OF A SCREENING ANALYSIS

- The strategy of the approach may vary depending on the character of the proposed issue
- The analysis is necessarily and appropriately abridged at the screening stage
- The depth and the direction of the analysis can be driven by the availability of data
- The quality of the data is “best available”
- Judgment is used in the interpretation of data
- Data is utilized if it is considered representative
- Analysis shall not be stymied by missing, unavailable, or conflicting data

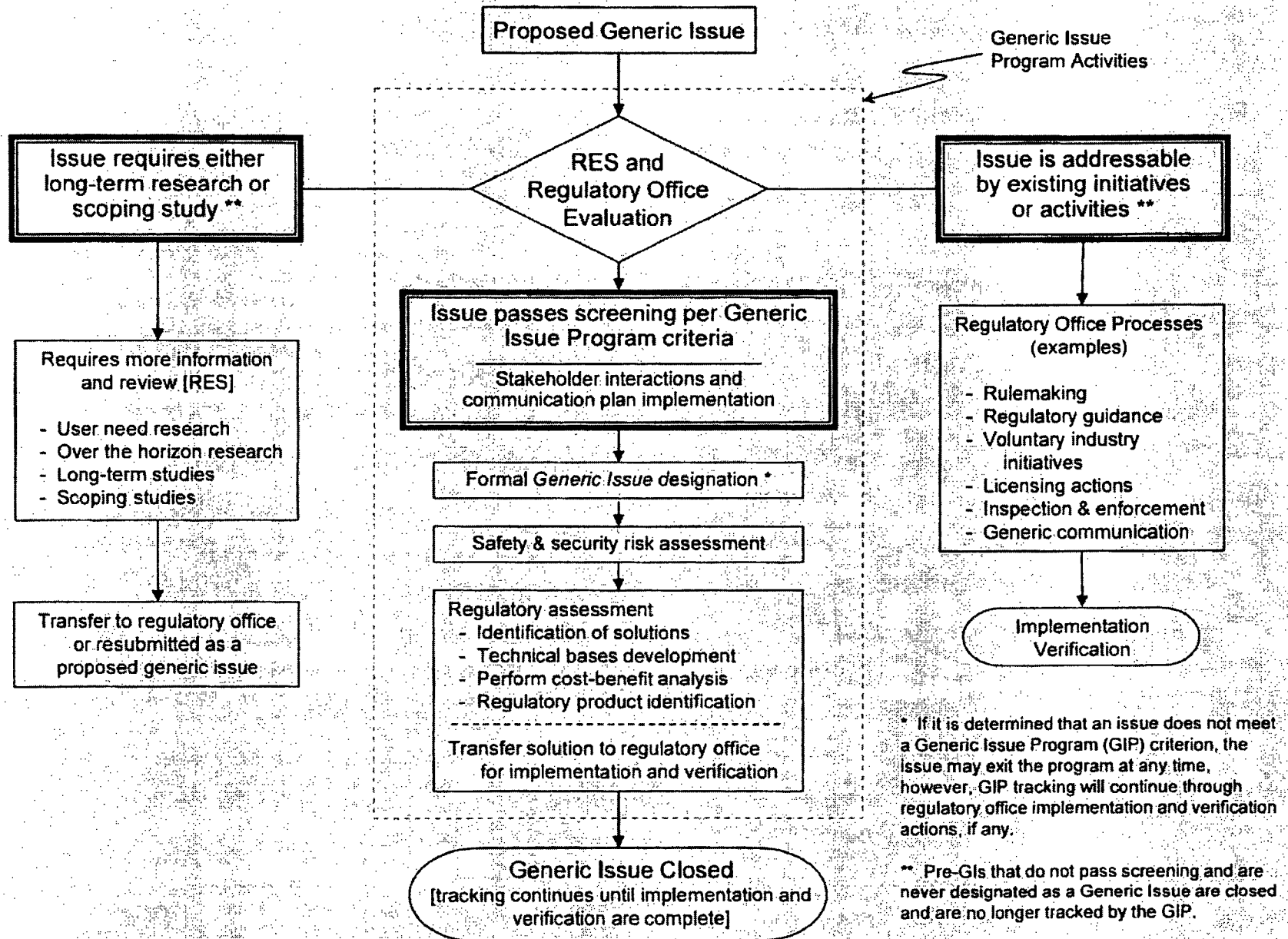
NOT IN SCOPE

- Downstream dam failures as the initiating event

WITHIN SCOPE BUT NOT SIGNIFICANTLY ADDRESSED IN THE SCREENING ANALYSIS

- Silting
- Debris
- Dynamic water
- Physical strength of flood barriers
- Flood barrier integrity/porosity

Generic Issue Program in Perspective With Other Regulatory Programs and Processes



What Happens Next?

- A consensus decision is preferred
- Screening analysis report will become final
- Additional meetings and coordination as required
- RES/OEGIB can provide support in developing a transmittal memorandum
- Screening is complete

From: Perkins, Richard
Sent: Thursday, December 06, 2012 5:15 PM
To: Criscione, Lawrence
Subject: FW: National Dam Safety Program's Technical Seminar No. 20 Overtopping Protection for Dams
Attachments: ATT00002.txt

From: Perkins, Richard
Sent: Friday, November 02, 2012 9:08 AM
To: Philip, Jacob; Nicholson, Thomas; Beasley, Benjamin; Bensl, Michelle; Sancaktar, Selim; Kanney, Joseph
Subject: FW: National Dam Safety Program's Technical Seminar No. 20 Overtopping Protection for Dams

FYI

From: Manos, Jordan [<mailto:Jordan.Manos@fema.dhs.gov>]
Sent: Friday, November 02, 2012 8:15 AM
To: [REDACTED] (b)(6)

(b)(6)

(b)(6)

Cc: Manos, Jordan

Subject: National Dam Safety Program's Technical Seminar No. 20 Overtopping Protection for Dams

http://www.damsafety.org/media/Documents/DownloadableDocuments/ResourcesByTopic/EMI_TS20_2013/PRESENTATION09.pdf

National Dam Safety Program's Technical Seminar No. 20 Overtopping Protection for Dams

The National Dam Safety Review Board – Work Group on Dam Safety Training is pleased to announce the Twentieth Annual National Dam Safety Program Technical Seminar, "Overtopping Protection for Dams". The seminar will take place **February 20-21, 2013**, on the campus of the National Emergency Training Center (NETC) in **Emmitsburg, Maryland**.

Registration and additional information can be found on the Technical Seminar Website.

A new FEMA Technical Manual titled "Overtopping Protection for Dams" is currently under development by the Bureau of Reclamations. This seminar coincides with this effort and will include presentations by individuals involved with the preparation and review of the manual, in addition to presentations on related topics not covered in the manual.

Some areas that will be addressed include:

- Design floods, including discussion of the use of probabilistic loadings versus the Probable Maximum Flood (PMF), or percentages of the PMF
- Investigations, analyses, and design considerations regarding accommodating floods
- Potential failure modes and risk analysis regarding dam overtopping potential failure modes
- Modeling overtopping and protection methods, both with computer software and hydraulic models
- Overtopping protection options for embankment and concrete dams, including turf reinforcement mats, reinforced rock fill, precast concrete blocks, roller-compacted concrete (RCC), conventional concrete, rock reinforcement, plunge pools, etc
- Deciding between overtopping protection options, including consideration of costs, use of risk analysis, and use of modeling test results

The seminar is intended for dam safety professionals, bringing together inspectors, designers, consultants, owners, contractors, and regulators for two days of dynamic presentations and in-depth discussions. It will include presentations from representatives of local, state, federal government organizations, as well as experts from the private sector and dam owners. Many presentations will center on case histories and "lessons learned". The seminar will conclude with an open discussion period with a panel of experts in the field. Take advantage of this FREE worthwhile training and plan now to attend! Please feel free to forward this email to those who you think may be interested in attending.

Sincerely,

Jordan T. Manos, P.E., S.E., PMP
FEMA | EMI | Mitigation Branch (EM-MT)
Training Specialist
16825 S. Seton Avenue | Building N | N419
Emmitsburg, MD 21727 | USA
(W) 301.447.1356 | (BB) (b)(6)
(F) 301.447.1598

(b)(6)

From: Herr, Linda
Sent: Tuesday, January 08, 2013 2:35 PM
To: Criscione, Lawrence
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Perfect, thank you for your patience!

-----Original Message-----

From: Criscione, Lawrence
Sent: Tuesday, January 08, 2013 1:14 PM
To: Herr, Linda
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Thanks. The 13th is a good day. I will put it on my calendar.

-----Original Message-----

From: Herr, Linda
Sent: Tuesday, January 08, 2013 9:01 AM
To: Criscione, Lawrence
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff
Importance: High

Hi Larry:

I have scheduled Feb 13, 2013 from 9:30-10:00am - although I was able to look at your calendar, the entire month of February is marked "tentative," so if the 13th doesn't work for you we'll try again.)

Thank you!!
Linda

-----Original Message-----

From: Criscione, Lawrence
Sent: Friday, January 04, 2013 11:54 AM
To: Herr, Linda
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

I'll be in Illinois on January 22 and 23rd. I am next back in Rockville on January 30th. I've sent you a sharing invitation for my Outlook Calendar. It is up to date through the end of February.

Thanks,
Larry

-----Original Message-----

From: Herr, Linda
Sent: Thursday, January 03, 2013 1:35 PM
To: Criscione, Lawrence
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff
Importance: High

Hi Larry:

I know we've played with your meeting a couple of times already and I apologize - Cmr. Ostendorff will now be on travel the week of 1/14 thru 1/18 so may I ask your indulgence and move you one more time? Are you available on Jan 22 at 9:30am; 1:30pm or 3:00pm or on Jan 23 at 9:30am or 1:30pm? If not, please suggest days/times you are available so we can reschedule Jan 17th.

Thank you - again, I apologize.

Regards,
Linda

-----Original Message-----

From: Criscione, Lawrence

Sent: Monday, December 31, 2012 9:30 AM

To: Herr, Linda

Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Linda,

The later time works for me. Should I plan on meeting with the Commissioner from 1:30 to 2:00pm?

Larry

-----Original Message-----

From: Herr, Linda

Sent: Friday, December 21, 2012 11:03 AM

To: Criscione, Lawrence

Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Morning Lawrence:

Could I request that we moved your meeting to 1:30-2:00pm on the 17th? If that doesn't work for you, we'll leave it at the time it currently is scheduled 1:00-1:30pm.

Thank you for your consideration.

Happy Holidays!!
Linda

-----Original Message-----

From: Criscione, Lawrence

Sent: Wednesday, December 19, 2012 1:20 PM

To: Herr, Linda

Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Thank you

From: Herr, Linda

Sent: Wednesday, December 19, 2012 1:19 PM

To: Criscione, Lawrence

Cc: Tappert, John

Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Perfect, have scheduled you from 1:00-1:30pm on Cmr. Ostendorff's calendar in his office OWFN-18 G1.

-----Original Message-----

From: Criscione, Lawrence
Sent: Wednesday, December 19, 2012 1:16 PM
To: Herr, Linda
Cc: Tappert, John
Subject: RE: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Yes it would.

From: Herr, Linda
Sent: Wednesday, December 19, 2012 12:14 PM
To: Criscione, Lawrence
Cc: Tappert, John
Subject: Meeting re: Flooding at Oconee from Jocassee Dam w/Cmr. Ostendorff

Good Afternoon Lawrence:

Would January 17th from 1:00-1:30pm work for you?

Thank you,
Linda
301-415-1759

From: Tappert, John
Sent: Wednesday, December 12, 2012 2:36 PM
To: Herr, Linda
Subject: FW: Your Meeting Today Concerning Flooding at Oconee from Jocassee Dam

Linda

Please arrange for a meeting in early January. Thanks

John R. Tappert, P.E.
Chief of Staff
Office of Commissioner William C. Ostendorff U.S. Nuclear Regulatory Commission
(301) 415-1811 (office)
(b)(6) (mobile)
(301) 415-1757 (fax)

From: Tappert, John
Sent: Wednesday, December 12, 2012 10:17 AM
To: Criscione, Lawrence
Cc: Herr, Linda
Subject: RE: Your Meeting Today Concerning Flooding at Oconee from Jocassee Dam

Larry,

Sounds good. I will ask Linda to look for an opportunity in the New Year and we will confirm with you. Thanks

John

John R. Tappert, P.E.
Chief of Staff
Office of Commissioner William C. Ostendorff U.S. Nuclear Regulatory Commission
(301) 415-1811 (office)
(b)(6) (mobile)
(301) 415-1757 (fax)

From: Criscione, Lawrence
Sent: Tuesday, December 11, 2012 4:41 PM
To: Tappert, John
Subject: RE: Your Meeting Today Concerning Flooding at Oconee from Jocassee Dam

John,

Thank you for the invitation. Unfortunately I leave tonight for Illinois and will not be returning until January 8th. If the Commissioner would be willing to meet with me in January, I would like to meet with him. My Outlook Calendar is up to date through Easter. If you or Linda could put me on the Commissioner's schedule in January, I would appreciate it.

Larry

From: Tappert, John
Sent: Tuesday, December 11, 2012 3:07 PM
To: Criscione, Lawrence
Cc: Herr, Linda
Subject: RE: Your Meeting Today Concerning Flooding at Oconee from Jocassee Dam

Larry

Thank you for your email. The Commissioner received a briefing yesterday that was based on the first attachment of your email. Consistent with his open door policy, he would be happy to meet with you if you would like. He has some open time on his calendar at the end of next week – Thursday afternoon or Friday – or Linda Herr, our senior administrative assistant, can arrange for another time. Please let us know. Thanks.

John

John R. Tappert, P.E.
Chief of Staff
Office of Commissioner William C. Ostendorff U.S. Nuclear Regulatory Commission
(301) 415-1811 (office)
(b)(6) (mobile)
(301) 415-1757 (fax)

From: Criscione, Lawrence
Sent: Monday, December 10, 2012 6:53 PM
To: Ostendorff, William; Magwood, William
Cc: Boska, John; Hiland, Patrick; Evans, Michele; Pascarelli, Robert; Wilson, George; Bartley, Jonathan; Cook, Christopher; Miller, Ed; Cheok, Michael; Chen, Yen-Ju; Beasley, Benjamin; Merzke, Daniel; Coffin, Stephanie; Skeen, David; See, Kenneth; Monninger, John; Perkins, Richard; Bensi, Michelle; Philip, Jacob; Sancaktar, Selim; Galloway, Melanie; Mitman, Jeffrey; Ferrante, Fernando; Bubar, Patrice; Tappert, John
Subject: Your Meeting Today Concerning Flooding at Oconee from Jocassee Dam

Commissioner Ostendorff,

It came to my attention today that you and Commissioner Magwood were being briefed by NRR on the flooding vulnerabilities posed to the reactors at Oconee from a catastrophic failure of Jocassee Dam. Attached to this email are the "Commissioner Briefing Notes" prepared by NRR. Also attached are a 2012-11-14 letter from me to the Senate Committee on the Environment & Public Works (E&PW) and an April 6, 2009 Non-Concurrence Form which a Deputy Division Director at NRR/DRA (Melanie Galloway) submitted against NRR's pusillanimous treatment of the Oconee/Jocassee concerns.

2009 Non-Concurrence Form is publicly available as
ML091170104

I do not know exactly what you were told during your briefing today, but if it was limited to the "Commissioner Briefing Notes" then you did not receive all the pertinent facts.

A major concern of mine, which I addressed in my attached letter to the E&PW, is that, in all the internal documents I have uncovered regarding NRR briefings of the Commissioners on the Jocassee/Oconee flooding issue, the actual risk numbers calculated by NRR/DRA are never mentioned and neither is the 2008-09-26 Duke Energy timeline concerning the predicted failure sequence which would occur at Oconee following a catastrophic failure of the Lake Jocassee Dam (for the context of the quote below, see p. 10 of Attachment 2 of ML082750106):

The following flood timeline is based on the results of the 1992 Inundation Study. In this scenario the dam is assumed to fail at time zero. Notification from Jocassee would occur before a total failure of the dam; however, for purposes of this timeline, notification is assumed to be at the same time the dam fails. Following notification from Jocassee, the reactor(s) are shutdown within approximately 1 hour. The predicted flood would reach ONS in approximately 5 hours, at which time the SSF walls are overtopped. The SSF is assumed to fail, with no time delay, following the flood level exceeding the height of the SSF wall. The failure scenario results are predicted such that core damage occurs in about 8 to 9 hours following the dam break and containment failure in about 59 to 68 hours. When containment failure occurs, significant dose to the public would result.

Hopefully you recognize that the above scenario is very similar to what occurred at Fukushima when a tsunami overtopped their inadequately sized flood wall and disabled their standby shutdown equipment. Why the above scenario does not ever appear in Commissioner briefing packages, I do not understand. This seems to me like something you would want to know.

Another thing you should know is the annual probability of failure calculated by NRR/DRA for Jocassee Dam. That number is $2.8E-4$ /year, which is of the same order of magnitude of a 49 foot tsunami striking the Japanese coast at Fukushima. Given this calculated probability of dam failure and the Duke Energy timeline quoted above, it appears that the inadequately sized flood wall at Oconee presents a very similar hazard to the American public as the inadequately sized flood wall at Fukushima presented to the Japanese public. Is this not something of which NRR should be informing the Commissioners?

As noted by Dr. Ferrante in the email trail below, NRR is not a monolithic institution. Specifically, NRR/DRA has a very different position on the Jocassee/Oconee issue as NRR/DORL. See the attached Non-Concurrence from Melanie Galloway as an example.

I do not know who was at your briefing today, but from the invitation attached to this letter it appears that neither were the key personnel from NRR/DRA (Galloway, Mitman, Ferrante) nor were the authors of the GI-204 Screening Report (Perkins, Bensi, Philip, Sancaktar) invited to attend. It might be helpful to your understanding of the Jocassee/Oconee issue if you were to speak to Ms. Galloway regarding her 2009-04-06 Non-Concurrence, Dr. Ferrante and Mr. Mitman regarding their 2010-03-15 Generic Failure Rate Evaluation for Jocassee Dam, and Richard Perkins regarding his ordeal in routing and releasing the screening analysis for GI-204 on flooding due to upstream dam failures.

After over 60 years of military service, Admiral Rickover noted:

A major flaw in our system of government, and even in industry, is the latitude to do less than is necessary. Too often officials are willing to accept and adapt to situations they know to be wrong. The tendency is to downplay problems instead of actively trying to correct them.

The NRC first identified the undersized flood wall at Oconee Nuclear Station in March 1994. It is my concern that the reason this issue is taking more than two decades to address is that Division Directors at NRR have been willing to accept and adapt to situations they know to be wrong. As noticed by Ms. Galloway in April 2009, the tendency in NRR was to downplay the Jocassee/Oconee problem instead of actively trying to correct it. The public looks to the NRC Commissioners to curtail this "latitude to do less than is necessary" and to ensure the NRC staff transparently addresses concerns in a timely manner.

I appreciate you taking an interest in this issue and requesting a briefing by NRR. I am concerned, however, that your briefing might not have adequately detailed the vulnerabilities faced at Oconee.

V/r,

Larry
Lawrence S. Criscione
Reliability & Risk Analyst
RES/DRA/OEGIB

(b)(6)

If a subordinate always agrees with his superior, he is a useless part of the organization.

From: Ferrante, Fernando
Sent: Thursday, November 15, 2012 1:58 PM
To: Criscione, Lawrence
Cc: Mitman, Jeffrey
Subject: RE: Lack of Transparency Impeding Resolution of Flooding Concerns at Oconee

(b)(5)

From: Criscione, Lawrence
Sent: Thursday, November 15, 2012 11:42 AM
To: Ferrante, Fernando
Cc: Mitman, Jeffrey
Subject: RE: Lack of Transparency Impeding Resolution of Flooding Concerns at Oconee

Thanks Fernando. Jeff sent me the PSA and PSAM papers last month.

(b)(5)

From: Ferrante, Fernando
Sent: Thursday, November 15, 2012 8:04 AM
To: Criscione, Lawrence
Cc: Mitman, Jeffrey
Subject: RE: Lack of Transparency Impeding Resolution of Flooding Concerns at Oconee

Larry,

Thanks for the opportunity to review this letter. For the most part, the facts related to activities I am directly aware of are correct. Regarding the Information Notice (IN) that NRR authored on dam failure probabilities, I will give you some more background information that will hopefully help further clarify the discussion.

The IN came as a direct result of the Oconee/Jocassee issue. Jim Vail, a retired NRR/DRA/APOB staff, was in charge of developing it (with support from the NRR staff in charge of releasing generic communications in NRR/DPR/PGCB) under guidance from Melanie Galloway, then NRR/DRA Deputy Director. Sometime in 2009, I took over the responsibility of re-writing and issuing the IN (in the same manner I was tasked with rewriting NRR's original submittal to RES regarding the creation of what would eventually become GI-204).

(b)(5)

(b)(5)

Thank you,
Fernando Ferrante, Ph.D.
Office of Nuclear Reactor Regulation (NRR) Division of Risk Assessment (DRA) PRA Operational Support
Branch (APOB) Mail Stop: 0-10C15
Phone: 301-415-8385
Fax: 301-415-3577

From: Criscione, Lawrence
Sent: Wednesday, November 14, 2012 10:23 AM
To: Zimmerman, Jacob; Vrahoretis, Susan
Cc: Beasley, Benjamin; Coe, Doug; Correia, Richard; Galloway, Melanie; Mitman, Jeffrey; Ferrante, Fernando; Wilson, George; Leeds, Eric
Subject: FW: Lack of Transparency Impeding Resolution of Flooding Concerns at Oconee

Jacob/Susan: Please forward the attached letter to the Commission staff whom you believe should be aware of it.

I have copied on this email some of the NRR staff mentioned in the letter. Please let me know if I am misportraying any of your positions. Please feel free to forward this letter to whomever you believe needs to see it.

V/r,
Larry Criscione

(b)(6)

From: Criscione, Lawrence
Sent: Wednesday, November 14, 2012 9:15 AM
To: 'valerie_manak@epw.senate.gov'; 'nathan_mccray@epw.senate.gov'
Subject: Lack of Transparency Impeding Resolution of Flooding Concerns at Oconee

Please see the attached letter to the Senate Committee on the Environment & Public Works.

Crisclone, Lawrence

Subject: Commissioner briefing on Oconee external flood protection
Location: O-18B11

Start: Mon 12/10/2012 2:00 PM
End: Mon 12/10/2012 3:00 PM

Recurrence: (none)

Meeting Status: Accepted

Organizer: Boska, John
Required Attendees: Hiland, Patrick; Evans, Michele; Pascarelli, Robert; Wilson, George; Bartley, Jonathan; Cook, Christopher; Miller, Ed; Cheok, Michael; Chen, Yen-Ju; Beasley, Benjamin; Merzke, Daniel; Coffin, Stephanie; Skeen, David; See, Kenneth; DORLCAL Resource
Optional Attendees: Monninger, John

When: Monday, December 10, 2012 2:00 PM-3:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: O-18B11

Note: The GMT offset above does not reflect daylight saving time adjustments.

~~*~*~*~*~*~*~*~*

Updated on 12/6/12. The briefing handout is attached below. It is now revision 2, dated 12/6/12. The revision was to the section on NRC Interagency Work, to more accurately describe the NRC's interaction with other federal agencies (my thanks to George Wilson).

This briefing was requested by Commissioner Ostendorff. He may be joined by Commissioner Magwood. The briefing will provide information on the flood risk to Oconee from a failure of the Jocassee dam. In particular, it will cover the following:

- background with a summary timeline of the issue
- overview of the staff's efforts to resolve the issue
- summary of NRC interagency work (e.g., FERC, DHS)
- summary of the licensee actions including interim compensatory measures
- treatment as sensitive unclassified information
- NRC public communication efforts

John Boska will maintain the master copy of the presentation materials.
If you can't come to the conference room, you may participate by calling 800-619-7596, code 15183.

John Boska
Oconee Project Manager, NRR/DORL
U.S. Nuclear Regulatory Commission
301-415-2901
Email: john.boska@nrc.gov



2012-12-10
Commissioner Brief..

Commissioner Briefing Notes
Oconee Nuclear Station
External Flooding Concerns
Updated 12/6/12 by John Boska

Background:

In the early 1970's, Duke Energy constructed a large project for electricity generation in western South Carolina. This project involved the construction of two large dams and several smaller dams or dikes, three hydro stations, and the Oconee nuclear station with three reactors. These structures were built to similar seismic criteria. One aspect of the design was the use of pumped storage to make use of extra electricity from the nuclear station. The largest dam, Jocassee dam, is about 400 feet tall and impounds Lake Jocassee. Jocassee dam is about 11 miles upstream from Oconee. The 2nd largest dam, Keowee dam, is located next to Oconee and impounds Lake Keowee. Lake Keowee is the cooling water supply for Oconee. A smaller dam, Bad Creek dam, is located several miles upstream from Jocassee dam and impounds the Bad Creek reservoir. Hydro units are located next to these three dams. The Bad Creek and Jocassee hydro units can reverse to also function as pumped storage; the two Keowee hydro units (KHUs) cannot pump in reverse. These dams are licensed by FERC.

The two KHUs are the emergency power supply for Oconee. The only large diesel generator at Oconee is located in the Standby Shutdown facility (SSF), which provides a method for hot safe shutdown based on decay heat removal (by feeding the SGs) and RCP seal injection, which prevents RCS leakage, for all three reactors if other power supplies are lost. The SSF was built in 1983 to compensate for some of the vulnerabilities in the Oconee design.

The licensee has committed to make further improvements at Oconee. The project with the largest risk benefit is the new Protected Service Water (PSW) system. PSW will provide an alternate method of hot safe shutdown for all the reactors based on decay heat removal (by feeding the SGs), RCP seal injection, and RCS injection, separate from the SSF and independent of the turbine building, which is the largest vulnerability at Oconee. All 4kv safety buses are located in the turbine building (TB), and all could fail in a TB fire or high-energy line break. PSW will also be able to power the SSF if the SSF diesel fails.

The AEC issued the construction permit for Oconee in 1967, and the operating licenses in 1973 and 1974. The original FSAR and the AEC safety evaluations did not directly address external flooding from a failure of Jocassee dam. Flooding was only addressed for a maximum precipitation event. In 1995, Duke submitted the Oconee report on the Individual Plant Examination of External Events (IPEEE), which was designed to uncover vulnerabilities such as flooding. Their predicted failure probability for the Jocassee dam was low enough that no further action was recommended. In 2000 the NRC issued an evaluation report accepting the Oconee IPEEE report.

Summary Timeline:

Agency Actions

- **April 1983** – Based on RAI responses, NRC issues Standby Shutdown Facility (SSF) SE, which recognized turbine building flood as the only credible SSF flooding concern, not Jocassee Dam failure. (ML103370444)
- **March 1994** - NRC issued a Notice of Violation and Notice of Deviation (Report number 50-269,270,287 / 93-25) which included the identification of the inability of the SSF to mitigate the worst case Jocassee Dam failure per the recently completed FERC study; and the inaccurate IPE submittal, which stated that the SSF flood walls were 8 feet in height (at the time they were 5 feet, they are now 7.5 feet).
- **April 2006** – NRC inspectors, in documenting a breach of the SSF flood walls as a performance deficiency, also note the 1992 Jocassee Dam Inundation Study. Inspectors also identified a new flood flow path via the building's sanitary system. Both issues are documented as URIs in Oconee report 2006002.
- **November 2006** - Final significance determination of WHITE was issued for breached SSF Flood Barrier (Oconee report 2006017, ML063260282).
- **March 2007** – Appeal panel upheld the WHITE finding based on random dam failure alone.
- **July 2007** – Oconee report 2007003 (ML072120140) issued which closes Sanitary System URI with no enforcement action.
- **September 2007** – Final SERP concluded a WHITE finding for the breached SSF Flood barrier.
- **October 2007** – Associated IP95002 Supplemental Inspection (conducted in late August 2007) report issued.
- **November 2007** – November 20 letter to licensee regarding the Final Significance Determination of the SSF barrier white finding and communication of the NRC's analysis of the Jocassee Dam failure frequency (ML073241045).
- **December 2007** – NRC Region II communicated the NRC Jocassee Dam failure frequency computation to the licensee.
- **August 15, 2008** – 50.54(f) letter issued on flooding (ML081640244).
- **March 15, 2010** – NRR issues failure probability for Jocassee dam (ML100780084).
- **June 10, 2010** – Region II completed inspection of interim compensatory measures (ICMs).
- **June 22, 2010** – Region II issued Confirmatory Action Letter (CAL) (ML101730329). The CAL directed licensee to:
 - Implement ICMs as documented in the June 3, 2010 letter.
 - submit to the NRC by August 2, 2010, all documentation necessary to demonstrate to the NRC that the inundation of the Oconee site resulting from the failure of the Jocassee Dam has been bounded.
 - submit by November 30, 2010, a list of all modifications necessary to adequately mitigate the inundation.
 - make all necessary modifications by November 30, 2011.
- **July 7, 2010** – NRC Inspection Report for CAL ICMs, (ML101880768 non-public, ML101880769-public).
- **January 28, 2011** – NRR issues SE on Oconee inundation study, identifying the bounding flood heights (ML110280153).

- **September 20, 2012** – Staff issues letter endorsing use of FERC standards for flood walls and establishes timeline for completing flood modifications (ML12219A163).

Staff's Efforts to Resolve the Issue:

In 2006, after inspectors identified a small breach in the SSF flood wall, the NRC looked at the safety significance of a failure of the Jocassee dam. The PRA analysis is heavily dependent on the failure probability for the Jocassee dam. The NRC analysts disagreed with the failure probability presented by the licensee. This led to the issuance of a WHITE finding. The licensee appealed the WHITE finding, but in 2007 the appeal panel upheld it. This marked the beginning of concentrated efforts by the staff to have the licensee improve the ability to respond to external flooding. The staff held numerous meetings with the licensee. The issuance of an order was considered, but the licensee agreed to a Confirmatory Action Letter (CAL), which was issued in June 2010. The licensee identified the necessary modifications, including large flood walls, in a letter dated April 29, 2011 (ML111460063), and committed to a timeline of 30 months plus the regulatory review period after the NRC approves the use of FERC design standards for the flood walls. On September 20, 2012, the staff issued a letter (ML12219A163) approving the use of FERC standards for the flood walls. The staff had initiated Generic Issue-204 on dam failures, and that effort has been merged into the Fukushima response. Since Oconee's Fukushima flooding hazard report is due to the NRC on March 12, 2013, the licensee was given an option to initiate the timeline following the submittal of that report, with all modifications completed no later than June 2016. The following is a list of the modifications, which should result in maintaining the site "dry" and on grid power in the event of dam failure:

1. Perform necessary modifications to ensure a dedicated, flood protected power path from the Lee Steam Station combustion turbine via the 100kV (Fant) line to the CT5 Substation, which can power the plant safety buses.
2. Relocate or protect 100kV (Fant) line towers subject to inundation.
3. Modify the CT5 Substation to supply the standby bus and a new recovery equipment bus.
4. Install a new flood wall, 12-15 feet high, located on the east side of the Oconee site.
5. Install a new diversion wall, 12 feet high, along the northern side of the Oconee intake dike.
6. Install barriers to minimize flood waters from entering into the Turbine Building drains from rising waters in the tailrace area.
7. Install barriers to minimize flood waters from entering the site through yard drains.
8. Divert the SSF ASW minimum flow line to outside the SSF to supply water to the SFPs.
9. Install new SFP level instrumentation rated for post-flood conditions.

NRC Interagency Work:

The NRC's primary contact for dam safety issues is through the interactions with the Interagency Committee on Dam Safety (ICODS) members. ICODS consists of the 11 federal agencies that regulate dams. The NRC's Dam Safety Officer consults with these other agencies on a routine basis. The primary contacts in ICODS for the NRC are with FERC, the Bureau of Reclamation, and the Army Corps of Engineers. FERC and the Army Corp both regulate dams that could have a direct impact on nuclear sites regulated by the NRC. Some examples of these are the Jocassee Dam, which is regulated by FERC, and the Missouri River Basin Dams, which are regulated by the Army Corps. Both of those agencies have numerous

requirements for maintenance, monitoring, and inspection of their regulated facilities. The primary focus for both is the prevention of dam failure. The staff also consults with the Nuclear and Dam sectors of the Department of Homeland Security for the control and release of critical infrastructure information.

Summary of the Licensee's Actions:

The licensee continues to interact with the staff to resolve external flooding concerns. The licensee's efforts are currently directed at completing the Fukushima flooding hazard evaluation report, due March 12, 2013. That report will be reviewed by the NRC staff, and may result in some changes to the flooding protection strategies previously agreed upon. In 2010 the licensee committed to the following interim compensatory measures, which are still in effect:

NUMBER	COMPENSATORY MEASURES	IMPLEMENTATION STATUS
1	Perform flooding studies using the Hydrologic Engineering Center -- River Complete Analysis System (HEC-RAS) model for comparison with previous DAMBRK models to more accurately represent anticipated flood heights in the west yard following a postulated failure of the Jocassee Dam.	Complete
2	Maintain plans, procedures (Jocassee and Oconee) and guidance documents implemented (Oconee) to address mitigation of postulated flood events which could render the Standby Shutdown Facility inoperable and are consistent with current perspectives gained following the HEC-RAS sensitivity studies and the subsequent 2D inundation studies. To the extent practical, the mitigation strategy is similar to existing extensive plant damage scenario (B.5.b) equipment, methods and criteria.	Implemented
3	Duke Energy Hydro Generation will create a guidance document to consolidate river management and storm management processes. (Includes the Jocassee Development and the Keowee Development.)	Implemented
4	Maintain a dam safety inspection program that includes: (1) weekly dam safety inspections of the Jocassee Dam by Duke Energy personnel, (2) dam safety inspections following any 2-inch or greater rainfall or felt seismic event, (3) annual dam safety inspections by Duke Energy, (4) annual dam safety inspections by FERC representatives, (5) five year safety inspections by FERC approved consultants, and (6) five year underwater inspections.	Implemented
5	Maintain a monitoring program that includes: (1) continuous remote monitoring from the Hydro Central Operating Center in Charlotte, NC, (2) monthly monitoring of observation wells, (3) weekly monitoring of seepage monitoring points, and (4) annual surveys of displacement monuments.	Implemented
6	Assign an Oconee engineer as Jocassee Dam contact to heighten awareness of Jocassee status.	Implemented
7	Install ammeters and voltmeters on Keowee spillway gates for equipment condition monitoring.	Complete

NUMBER	COMPENSATORY MEASURES	IMPLEMENTATION STATUS
8	Ensure forebay and tailrace level alarms are provided for Jocassee to support timely detection of a developing dam failure.	Complete
9	Add a storage building adjacent to the Jocassee spillway to house the backup spillway gate operating equipment (e.g., compressor and air wrench).	Complete
10	Obtain and stage a portable generator and electric drive motor near the Jocassee spillway gates to serve as a second set of backup spillway gate operating equipment.	Complete
11	Conduct Jocassee Dam failure Table Top Exercise with Oconee participation to exercise and improve response procedures.	Complete
12	Instrument and alarm selected seepage monitoring locations for timely detection of degrading conditions.	Complete
13	Provide additional video monitoring of Jocassee Dam (e.g., dam toe, abutments, and groin areas) for timely assessment of degrading conditions.	Complete
14	Obtain and stage a second set of equipment (including a B.5.b-type pump) for implementation of the external flood mitigation guidance.	Complete
15	Conduct Jocassee Dam/Oconee Emergency Response Organization Drill to exercise and improve response procedures.	Complete

Treatment as Sensitive Unclassified Information:

In Regulatory Issue Summary (RIS) 2005-26, "Control Of Sensitive Unclassified NonSafeguards Information Related To Nuclear Power Reactors," the NRC requested that licensees mark sensitive information to be withheld from the public. This RIS is publicly available. The licensee continues to mark all documents related to a failure of Jocassee dam to be withheld under 10 CFR 2.390(d)(1) as discussed in this RIS, and the staff has concurred with the licensee's request.

NRC Public Communication Efforts:

Although the staff has held many meetings with the licensee on this topic, they have all been closed to the public, and the related correspondence is not publicly available. The 2006 WHITE finding resulted in some public information on the flooding hazard. The most recent source of public information is related to GI-204. There is a redacted screening analysis for GI-204 (ML113500495) which has been made public, which has some discussion of Oconee and the flooding hazard from a failure of the Jocassee dam.

Discuss the Safety Significance:

November 14, 2012

(b)(6)

Barbara Boxer, Chairman
US Senate Committee on the Environment & Public Works
410 Dirksen Senate Office Bldg.
Washington, DC 20510-6175

Dear Senator Boxer:

There are three reactors in Oconee County, South Carolina which face a risk of meltdown and containment failure that is highly similar to the accident which occurred in Japan in March 2011. The staff of the US Nuclear Regulatory Commission has known about these risks since 2007 but has yet to adequately address the issue. I am writing to you because the Commissioners of the NRC failed to bring up the three Oconee Nuclear Station reactors during their March 15, 2012 testimony at the US Senate Committee on the Environment & Public Works hearing and because it is unclear to me whether or not the Commissioners are fully aware of the vulnerabilities at Oconee.

The vulnerability posed to the reactors concerns a catastrophic failure of Jocassee Dam, which is upstream of the Oconee Nuclear Station. The NRC has known since 2006¹ that the flood wall at Oconee Nuclear Station is 7 to 12 feet too low to protect against the predicted flood height that would occur were Jocassee Dam to catastrophically fail. Like the reactors at Fukushima Dai-ichi, the reactors themselves at Oconee and their containment buildings are designed to survive earthquakes and flooding. However, their support systems – that is, the emergency standby equipment needed to safely shut them down and remove decay heat from their cores – are vulnerable to failure due to flooding which overtops their flood walls. The difference between Oconee and Fukushima is the source of the flood: a dam break instead of a tsunami. Aside from that difference, the predicted accidents are eerily similar in both their timing sequence and their probability of an unmitigated release of radioactivity to the surrounding countryside.

On September 18, 2012 I wrote a letter to NRC Chairman Macfarlane detailing my concerns regarding the vulnerability posed by Jocassee Dam to the Oconee reactors. Three days after sending my letter, I was informed by my branch chief that he was directed to fill out a NRC Form 183 on me for not adequately designating my letter as "Official Use Only – Security-Related Information". Four weeks after sending my letter I was informed by the Chairman's

¹ See pp. 5-9 of the "Oconee Nuclear Station Integrated Inspection Report 05000269/2006002, 05000270/200602, 05000287/2006002". This report is in the NRC's Agencywide Documents Access and Management System (ADAMS) under "Accession Number" ML061180451. Most of the documents I refer to in this letter are non-public and the most efficient way to request them from the NRC is to refer to the ADAMS Accession Number.

legal counsel that my letter had been referred to the NRC's Office of the Inspector General. Other than these two instances, I have not had any other discussions regarding my letter and am unsure if the Chairman or any of the other Commissioners have read my letter or are aware of the details of my concerns.

I have been directed by the NRC not to further distribute my 2012-09-18 letter because it is not properly designated. I have also been directed to no longer send NRC documents to Congressional staffers without going through my chain of command and the NRC's Office of Congressional Affairs. However, I did copy you on that 2012-09-18 letter, and Valerie Manak and Nathan McCray of the E&PW staff should have electronic copies of it.

Since becoming involved in the Jocassee/Oconee issue in 2007, the NRC's Office of Nuclear Reactor Regulation (NRR) has designated all internal and external correspondence regarding this issue as "Official Use Only – Security-Related Information". This designation not only prohibits the American public from knowing about the grave risks which Jocassee Dam poses to the reactors at Oconee, but, as I will explain below, this designation has also inhibited internal discussion of these concerns within the NRC.

In a September 26, 2008 letter to the US Nuclear Regulatory Commission (ML082750106), Duke Energy provided a harrowing timeline of what would occur at the Oconee Nuclear Station (ONS) were Jocassee Dam to catastrophically fail. Despite the fact that this time line appears in a Wikipedia article on Oconee Nuclear Station, since the NRC considers the Duke Energy letter to be "Official Use Only – Security-Related Information" I cannot quote the letter here. But the scenario provided in the 2008-09-26 Duke Energy letter is essentially the scenario that occurred at Fukushima Dai-ichi except, instead of a tsunami being the source of water overtopping the known inadequately sized flood wall, the source of water at ONS is a flood resulting from the failure of Jocassee Dam.

Prior to the 2011-03-11 tsunami, it was believed that the annual probability of a 45 foot tall tsunami reaching Fukushima Dai-ichi was on the order of once in every 100,000 years. It is now widely held that the annual probability is more likely around once in every 1,000 years.

In the 1980's it was believed the annual probability of Jocassee Dam failing was on the order of one chance in 100,000.² However, by 2007 the US NRC believed the actual number was more on the order of one chance in 10,000.³

When the five Commissioners testified before your committee on March 15, 2012, members of the staff at the US NRC believed that the three reactors at the Oconee Nuclear Station faced a risk eerily similar to what occurred at Fukushima Dai-ichi. Yet none of the Commissioners mentioned that fact when Senator Barrasso brought up the Union of Concerned Scientists'

² 1.3E-5/year was the failure frequency Duke Energy used in some of its risk assessments.

³ 2.9E-4/year is the failure rate the NRC has calculated for large rock-filled dams similar to Jocassee.

report on the vulnerability of US plants to Fukushima type disasters. Were the Commissioners withholding information from your committee? I don't believe so. I think what actually has happened is that crucial information has been withheld from them. They cannot testify before Congress about vulnerabilities of which they themselves have not been made fully aware.

To me, the most important tool the public has for ensuring good regulation and safety is accurate information. In a democratic republic such as ours, openness and transparency are essential in providing our citizens and their elected officials with the accurate information they need to make informed decisions.

To my knowledge, concerns that the flood wall at the Oconee Nuclear Station was too small first surfaced internally at Duke Energy in late 1993 and first made it to the NRC's attention in February 1994. The NRC dismissed the concerns in September 1994 as "not credible" because of an inappropriately low assumption regarding the failure rate of Jocassee Dam.

The issue regarding the inadequately sized flood wall resurfaced in March 2006. While attempting to defend a violation he had written against Duke Energy for inadequately controlling a two year breach in the flood wall (ML061180451), one of the NRC Resident Inspectors at Oconee Nuclear Station began researching the regulatory requirements for the flood wall.

In 2007 NRR's Division of Risk Assessment (NRR/DRA) determined that the annual failure probability of dams similar in construction to Jocassee is around $2.5E-4$ /year, which equates to a chance of once in every 4000 years (ML100780084).⁴ These might seem like good odds, but, given that a catastrophic failure of Jocassee Dam will lead to a Fukushima scenario in South Carolina, these odds make the risk of a significant accident and radiation release at Oconee Station about 100 times greater than the risks associated with a typical US commercial nuclear reactor.

In 2008 the NRC sent Duke Energy a 10CFR50.54(f) request (ML081640244) to obtain the necessary information to adequately determine if the risks posed to Oconee Nuclear Station by Jocassee Dam were acceptable. A 10CFR50.54(f) request is a rare occurrence and it undoubtedly got the attention of the Commissioners. However, because by this time the NRC was stamping all documents concerning Jocassee Dam as "Official Use Only - Security-Related Information" (OUO-SRI), it did not get the attention of the public.

My primary reason for bringing the Jocassee/Oconee issue to your attention is because, to me, it is an example of how lack of discipline regarding transparency has allowed a significant issue to go uncorrected for over six years and counting, with the current deadline for resolution still four years away. I believe that NRR's stamping of all documents concerning Jocassee Dam as

⁴ ML100780084 is dated 2010-03-15. This is the formalized version of research and calculations performed in 2007 by Ferrante and Mitman of NRR/DRA.

"OUO-SRI" has not only prevented the public scrutiny necessary for our democratic and republican institutions to properly function, but has also inhibited the internal flow of information within the NRC and thereby has been detrimental to both public safety and security.

Duke Energy's response to the NRC's 10CFR50.54(f) request was, like the original request, withheld from the public under the guise of security. This response is the document which contains the Fukushima-style timeline regarding what would occur to the three reactors at Oconee were Jocassee Dam to catastrophically fail.⁵ It is unclear to me whether or not any of the Commissioners reviewed this document. It is ludicrous to expect the Commissioners to review every piece of correspondence received by the NRC – they have a staff of over 4,000 federal employees to assist with that. But I would assume that all important issues make it to their attention during their periodic briefings. However, based on the documents I have reviewed, I question the exact level of detail which they have received regarding the Jocassee/Oconee issue during their briefings from NRR.

On February 3, 2009 Commissioner Peter Lyons traveled to South Carolina to tour Jocassee Dam and Oconee Nuclear Station. In the briefing book prepared from him by NRR (ML090280474) there is a 25-line summary detailing the flooding issues. The 2008-08-15 10CFR50.54(f) request is mentioned in this summary. However, what did not make it into this summary is NRR/DRA's estimate that the failure rate of Jocassee Dam is about $2.5E-4$ /year and that in their 2008-09-26 response to the 20CFR50.54(f) request Duke Energy admitted that a catastrophic failure of Jocassee Dam would likely lead to the meltdown of all three reactor cores at the Oconee Nuclear Station and possibly the failure of the containment structures.

On February 20, 2009 two engineers from NRR's Division of Risk Assessment, Fernando Ferrante and Jeffrey Mitman, began routing an Information Notice (IN 2012-02) concerning the risks posed to some nuclear reactor sites due to dam failures. The purpose of this information notice (ML090510269) was:

... to alert addressees of a potentially nonconservative screening value for dam failure frequency that originated in 1980's reference documents which may have been referenced by licensees in their probabilistic risk assessment (PRA) for external events. Using a nonconservative screening value for dam failure frequency to evaluate the need for an additional detailed analysis may result in underestimating the risks to the plant associated with external flooding or loss of heat sink from the failure of upstream and

⁵ I cannot quote from Duke Energy's 2008-09-26 letter without the NRC claiming that this letter to you is now "Official Use Only – Security-Related Information" which must only be provided through their Office of Congressional Affairs (NRC/OCA). I respectfully suggest that your staff request ML082750106 and ML112430114 from NRC/OCA. The Fukushima-style timeline appears on p. 10 of attachment 2 of ML082750106 and on pp. 8-9 of ML112430114. It is also quoted on the fourth page of my 2012-09-18 letter to NRC Chairman Macfarlane.

downstream dams or levees. The NRC expects that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems.

Please note that this Information Notice was being routed more than two years prior to Fukushima occurring. That is, two years prior to the 2011-03-11 flooding-induced triple reactor accident at Fukushima, the NRC was aware that certain US plants might face a similar scenario were dams upstream of them to fail. However, this information notice was not released until more than three years later (March 5, 2012 which was nearly a year after Fukushima). The reason this information notice took more than three years to route was because of the controversial nature of NRR's indecisiveness regarding how to address the flooding vulnerabilities at Oconee and also because of the debate over whether dam break effects on nuclear reactors is a security concern which needs to be withheld from the American public.

In the past year, I have encountered many people, both within the NRC and external, who are adamant that the vulnerability which a failure of Jocassee Dam poses to the reactors at Oconee is a security liability which must be kept from the public. Although I am sympathetic to the desire not to broadcast our security liabilities, I have no tolerance for using concerns over security as a pretext for withholding important safety vulnerabilities from the public. When the Jocassee/Oconee issue first came to light in an April 28, 2006 publicly available inspection report, the issue was not being withheld. At some point in 2007 the NRC, either at the request of Duke Energy or on their own accord, decided to begin withholding from the public all correspondence regarding the safety liability posed by a failure of Jocassee Dam.

Is Jocassee Dam a credible target for terrorists and/or saboteurs? I don't know. But it does make sense to me that, in 2007, the NRC might reasonably want to withhold information regarding Jocassee/Oconee while they determined whether or not a security vulnerability existed and whether or not security measures were required to be put into place to protect it. What does not make sense to me, however, is that in 2012 we are still withholding from the public information on a vital safety concern under the guise of "Security-Related Information". After five years, have we not addressed the security concerns?

It is unreasonable to me that a government agency is allowed to withhold a significant public safety concern from the public under the guise of security, yet then not, after 5 years, do any meaningful study of the issue to determine if, in fact, a security vulnerability does exist and what must be done to remove it. Is there a security concern or isn't there? If there is, why, after five years, has it not been addressed? If there is not, then why, after five years, are we still withholding vital information from the public under the guise of security?

In April 2009, NRR was in the process of responding to Duke Energy regarding resolution of the Jocassee/Oconee issue. As part of the routing of that response, NRR's Division of Risk Assessment was asked for their concurrence. The Deputy Director of NRR/DRA, Melanie Galloway, refused to initial her concurrence block and instead submitted a Non-Concurrence

form (ML09117010) on April 6, 2009. Like all documents regarding Jocassee/Oconee, Ms. Galloway's Non-Concurrence form is stamped "OUO-SRI" and I cannot quote from it. But a deputy division director submitting a Non-Concurrence is rare; this is a process that is mainly used by lower level staff, and even for them it is rare. Had Ms. Galloway's Non-Concurrence form – which in no way concerns security vulnerabilities – been publicly available, it would have likely gained the attention necessary to get the Jocassee/Oconee issue resolved in a timely manner.

Had intervenor groups such as the Union of Concerned Scientists been given access to Melanie Galloway's Non-Concurrence form via publicly available ADAMS, then they would have likely been able to counter the pressure which Duke Energy was placing on NRR. With dozens of their own engineers, lawyers and hired contractors, Duke Energy was able to convince NRR that, in order for improvements to Oconee's flooding defenses to be required, the NRC needed to probabilistically show that Jocassee Dam placed an inordinate risk upon the three reactors at Oconee. Pressure from the Union of Concerned Scientists and other intervenor groups, however, would have likely convinced NRR that, per Duke Energy's operating license for the Oconee reactors, in order for Duke Energy to be allowed to continue to operate the three reactors at Oconee they needed to deterministically show that these reactors were adequately protected from a catastrophic failure of Jocassee Dam.

On April 9, 2009 Chairman Jaczko was briefed by NRR on the Jocassee/Oconee issue. I don't exactly know what was said at this briefing. The briefing slides (ML091030172) mentioned that new calculations concerning the failure frequency of Jocassee Dam suggested that core damage frequency (i.e. the annual probability that a meltdown will occur) for the reactors at Oconee might be non-conservative by an order of magnitude. What is not mentioned in the slides is Duke Energy's Fukushima-style scenario (contained in their 2008-09-26 letter) of what would occur at Oconee Nuclear Station were Jocassee Dam to catastrophically fail.

On January 6, 2010 the leadership of NRR met to discuss the Jocassee/Oconee issue (ML100280954). The purpose of the meeting was whether NRR should issue an order to Oconee requiring them to, in a timely manner, mitigate the risks posed by a failure of Jocassee Dam, or whether NRR should merely issue another 10CFR50.54(f) request for information and potentially follow up with an order later. The "Cons" listed for the "10CFR50.54(f) option" were that it was not as enforceable as an order and that it had a slower response time for resolution of the external flooding issue. The "Cons" listed for the "order option" were that there was the potential for a public hearing and that an order required signature authority. In other words, to go the route of an order, the Commission and the public would need to be made aware of the risks which Jocassee Dam posed to Oconee. Despite the slower response time, NRR opted to go the route of the 10CFR50.54(f) letter and avoid the Commission and public scrutiny an order would entail.

In February 2010 – using information provided by Ferrante and Mitman of NRR/DRA – George Wilson submitted an informal memorandum to the NRC's Office of Nuclear Regulatory

Research (RES) requesting that a Generic Issue be assigned to investigate whether external flooding concerns, similar to those posed by Jocassee Dam to the three reactors at Oconee, existed elsewhere in our nation's fleet of 104 commercial reactor plants. George Wilson was the Dam Safety Officer in NRR's Division of Engineering (NRR/DE). At the time, we (i.e. RES/DRA/OEGIB) deemed Mr. Wilson's February 2010 memo to be too speculative and inflammatory to make it an official agency record; however, I have a copy of it if your committee staff requires it. This memo is an example of just how serious mid-level staffers in the various divisions of NRR viewed the Jocassee/Oconee issue. Keep in mind, this is over a year prior to the Fukushima accidents, yet the staff within NRR were presciently predicting the nuclear catastrophe that could occur were an inadequately sized flood wall to be overtopped allowing the flooding of the standby shutdown equipment necessary to remove decay heat from the reactor cores and containment buildings. Unfortunately it does not appear the managers at NRR were providing the Commissioners all the details of the NRR staff's concerns.

On June 22, 2010 NRR issued a Confirmatory Action Letter to Duke Energy (ML101730329) requiring them to (1) by August 2, 2010 provide an estimate of the volume of water impounded by the Lake Jocassee Dam to be used for flood height analyses at Oconee Nuclear Station, (2) by November 30, 2010 provide a list of modifications to be made at Oconee to adequately protect the plant from flooding due to a failure of the Lake Jocassee Dam, and (3) by November 30, 2011 have the provided modifications in place.

On July 19, 2010, NRR sent a formal memo to RES requesting a Generic Issue on flooding of nuclear power plant sites following upstream dam failures (ML101900305). In August 2010, the Operating Experience and Generic Branch (RES/DRA/OEGIB) of the Division of Risk Assessment in the NRC's Office of Nuclear Regulatory Research began working on a screening analysis report for what would become GI-204 (Generic Issue 204). In my opinion, the 2010-07-19 memo and the attendant screening report are evidence of the NRC staff identifying a significant vulnerability and striving to get it addressed. Please note that this issue was being forwarded without the hindsight of the Fukushima accident and entirely due to the analysis of the NRR staff and their determination to pro-actively address an issue significant to the safety of about a fifth of our nation's nuclear reactor plants.

On August 2, 2010, Duke Energy provided the NRC with an estimated volume of water to be assumed impounded by the Lake Jocassee Dam. Their estimate was a "sunny day" estimate. For reasons not understood by myself and other staff engineers at the NRC, Duke Energy believes that a failure of Jocassee Dam during an inordinately heavy rainfall (such as the one experienced in Senator Sanders' state in 2011 as the remnants of Hurricane Irene blew over parts of Vermont and New York) is not a credible scenario. In January 2011, Jeff Mitman of NRR/DRA challenged this assumption through the Non-concurrence process (ML110260443).

On November 29, 2010, Duke Energy informed the NRC that it was giving itself an additional 6 months to provide the list of modifications needed to protect the three reactors at Oconee from a failure of the Lake Jocassee Dam (ML103490330). Despite this issue being over four

years old in its current incarnation (and over 16½ years old from its 1994 incarnation), NRR did not object to Duke's 6 month extension.

By March 10, 2011 (the eve of the earthquake and tsunami in Japan), RES/DRA/OEGIB had drafted its screening analysis report for GI-204 and submitted it for routing. As you are well aware, on March 11, 2011 flooding induced from a tsunami disabled the emergency equipment at the Fukushima Dai-ichi reactors leading to the meltdowns of three reactor cores and the destruction of the buildings housing their containments. In the NRC's Office of Nuclear Regulatory Research, we assume that the accident in Japan would add a sense of urgency to the approval of GI-204 and the addressing of the flooding concerns at Oconee. Instead, it inordinately delayed both. I am in no position to completely understand what occurred, but from my second-hand vantage point it appears that the management at NRR viewed the true vulnerability exposed by Fukushima not to be the flooding issue at Oconee but rather their multi-year mismanagement of getting it addressed.

On April 29, 2011 Duke Energy provided the NRC the list of modifications it intended to do at Oconee to protect against a failure of Jocassee Dam (ML111460063). In this letter, Duke Energy extended the NRC's due date for implementation of the modifications from Nov. 30, 2011 to a nebulous commitment of 30 months after the approval of the modification plans by the NRC and FERC (the Federal Energy Regulatory Commission).

So, as of April 29, 2011 – seven weeks after the Fukushima accidents – the NRC's deadline for adequately protecting the Oconee reactors from a failure of Jocassee Dam had slid from November 30, 2011 to some indefinite time in roughly mid-2014.

As noted many times to your committee, the NRC has issued orders to all 104 reactor plants to make modifications based on the lessons learned from the Fukushima accident. What has likely not been noted to your committee is that the NRC has allowed Duke Energy to slide their mid-2014 due date for protecting Oconee from a Jocassee Dam failure to 2016 in order to conform with the Fukushima deadlines given to the other US reactor plants. But the three reactors at Oconee are different from the rest of the US fleet. Unlike the other 101 reactors, the three reactors at Oconee had a known external flooding concern that, over nine months prior to the Fukushima accident event occurring, had a November 30, 2011 deadline set (i.e. the 2011-11-30 deadline was established in a 2010-06-22 letter which was delivered to Duke Energy nearly 9 months prior to the 2011-03-11 tsunami occurring). The 2016 deadline is reasonable for the other 101 reactors because this was a new issue for them. But for the three reactors at Oconee, by the time the post-Fukushima orders came out they were already 5 years into the external flooding issue and had a deadline for modifications already set. Does it make sense that their already generous deadline be extended to match everyone else's?

The history I have provided you is little known within the NRC. Because of supposed security concerns, the Jocassee/Oconee issues are not discussed at All Hands Meetings. The issues are not discussed in sessions at the NRC's annual Regulatory Information Conference (RIC). The

issues do not appear in articles of Platts, or at American Nuclear Society conferences, or in online nuclear discussion groups, or in Union of Concerned Scientists blogs. Because of the OUO-SRI designation of all correspondence regarding this issue, there is virtually no internal oversight within the NRC to make sure NRR is properly handling this issue. And because of the OUO-SRI designations there was a strong push by NRR to force RES to remove all OUO-SRI material from the screening report for GI-204.

Like briefing packages for the Commissioners, Generic Issue screening reports are typically released to the public as part of the NRC's commitment to transparency. But it must be remembered that these reports are not written for public consumption – they are written for internal use. Briefing packages to the Commissioners are written to concisely inform the Commissioners of important points on key issues. Generic Issue screening reports are written to inform the screening panel members of the issues. Being that the Commissioners and the NRC staff are all authorized to view OUO-SRI documents, why would we water down our internal reports by removing all OUO-SRI material and thereby share less information with ourselves? I do not know the answer to that, but I have a suspicion.

When NRR knows a document – such as a Generic Issue screening report or a Commissioner briefing package – is going to eventually be released to the public, they prefer it be released without redactions. Redactions are a “red flag” for intervener groups like Greenpeace and the Union of Concerned Scientists. If the Fukushima-style timeline from Duke Energy's 2008-09-26 letter were to appear in a briefing book for Commissioner Apostolakis' trip to Oconee, then NRR knows that, when that briefing book is eventually released with a paragraph from the “External Flooding” section redacted, David Lochbaum will be asking his connections on Capitol Hill to request the redacted section. To avoid this, NRR essentially “pre-redacts” it by not even including it in the first place. Unfortunately, in doing this they keep the Commissioners from obtaining vital information that the Commission needs to know to make important decisions.

And likewise for the screening panel for Generic Issue 204. Richard Perkins, the lead author of the *“Screening Analysis Report for the Proposed Generic Issue on Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures”* (ML112430114), was under constant pressure from NRR to remove the 2008-09-26 Duke Energy timeline from his report (he has a foot tall stack of internal NRC email correspondence to document it). Richard Perkins came to the NRC from the Department of Energy where he worked on the annual certification process for assuring the safety and reliability of America's nuclear weapons. He is a graduate of the National War College and was used to working with Top Secret and Special Compartmentalized Information (TS-SCI) on a daily basis. To him, the notion that the screening panel for GI-204 did not have a “need to know” the accident timeline from Duke Energy's 2008-09-26 letter was absolutely ludicrous. He has rhetorically asked me on many occasions, “Why would we want to redact this information from our internal report?”

On September 14, 2012 Richard Perkins submitted a letter to the NRC's Inspector General alleging that the NRC had “intentionally mischaracterized relevant and noteworthy safety

information as sensitive, security information in an effort to conceal the information from the public." I assume the NRC's Office of the Inspector General (OIG) is investigating his complaint but am unaware of their findings. Given the NRC OIG's proclivity for narrowly focusing on procedural processes and not questioning the broader intent of those processes, I am doubtful that the OIG investigation will be conducted with a broad enough questioning attitude to adequately investigate Mr. Perkins' claims.

On September 12 & 13, 2011, Commissioner Apostolakis visited Jocassee Dam. In the NRR prepared briefing book for that visit (ML11244A024), the 25 line description of the External Flood section provided to Commissioner Lyons had shrunk to 9 lines. Although Commissioner Apostolakis' visit was a mere six months after Fukushima, no mention of Duke Energy's Fukushima-style timeline from their 2008-09-26 letter was made in the briefing book. Nor was there any mention of the failure probability of Jocassee Dam being in the same range as the probability of a 45 foot tsunami hitting the Fukushima Dai-ichi site.

On February 1, 2012 Commissioner Svinicki visited Jocassee Dam. NRR's briefing book for that visit (ML12026A549) contains a whole page on the External Flooding issue, yet does not mention the facts that (1) the issue has gone on for six years, (2) the Duke Energy accident timeline is very similar to Fukushima, (3) the flooding probability is similar to Fukushima, (4) NRR had assigned Duke Energy a 2011-11-30 deadline nine months prior to Fukushima, (5) seven weeks after Fukushima that 2011-11-30 deadline was extended by Duke Energy to mid-2014, and (6) the deadline for Duke Energy's propose modifications to their flooding defenses was later moved to 2016 to match the Fukushima action plan for all the plants without known flooding hazards. These are things that, were I Commissioner Svinicki, I would like to know before visiting Oconee – and, for that matter, before testifying before your committee on March 15, 2012.

On February 16, 2012 Duke Energy came to NRC headquarters for a "Drop-in Visit" with Bill Borchardt, the NRC's Executive Director for Operations (EDO). NRR's briefing book for that visit (ML12039A217) contains a page on the External Flooding issue which is similar to the one provided to Commissioner Svinicki. I do not know if Mr. Borchardt is aware of the true risk that Jocassee Dam poses to the three reactors at Oconee, but if all he knows is the summary in his briefing book, then there is much which he is unaware of yet needs to know.

On March 15 all five Commissioners testified before your committee at the Hearing on Post-Fukushima U.S. Reactor Safety. None of the Commissioners mentioned the fact that three reactors in Oconee County, South Carolina face a similar risk as was faced by the reactors at Fukushima Dai-ichi on March 11, 2011. I believe they did not mention it to your committee because it has been kept from them themselves.

On July 11, 2012 Duke Energy again visited Mr. Borchardt for a "Drop-in Visit" and on August 7, 2012 they dropped in on the Commissioners. As before, the briefing books supplied for these

visits ([ML12188A071](#) & [ML12206A325](#)) did not mention the true risks posed by Jocassee Dam or the delays in resolving these risks.

If you believe the issues I have brought forward in this letter are of interest to your committee, then I respectfully suggest your staff seek answers to the following:

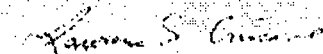
1. What is the official NRC determination as to the best estimate of the annual failure frequency of Jocassee Dam? How does this failure frequency compare to the annual frequency of a tsunami similar to the one in Japan on 2011-03-11 which caused the flooding induced nuclear accident at Fukushima Dai-ichi?
2. What is the official NRC position regarding whether or not a catastrophic failure of Jocassee Dam is a credible risk for which Duke Energy must deterministically show that the three reactors at Oconee Nuclear Station are adequately protected?
3. What is the official NRC position regarding whether or not the current flooding defenses at Oconee are adequate and what, if any, improvements need to be made?
4. What is the official NRC position regarding the most likely accident sequence at Oconee Nuclear Station were Jocassee Dam to catastrophically fail? How does this accident sequence compare to the March 2011 accident at Fukushima?
5. Assuming the catastrophic failure of Jocassee Dam, what is the NRC's best estimate of the likelihood that the operators at Oconee Nuclear Station would be able to restore cooling to the reactors prior to the containment buildings failing? What are the differences between the Oconee reactors and the Fukushima reactors that leads the NRC to believe the Oconee operators will be able to successfully restore cooling prior to containment failures? Has the NRC conducted any formal studies to estimate the success rate of Duke Energy's mitigation strategies to prevent containment failures in the event of a catastrophic failure of Jocassee Dam? If so, when were these studies conducted and what were the results?
6. Has the US NRC or any federal agency conducted an assessment to determine if Jocassee Dam is adequately protected from terrorist threats? If so, what were the results of the assessments? Is access to Jocassee Dam adequately guarded from terrorist attack? Are the employees at the Jocassee Hydro-Electric Facility screened for inside saboteurs to the same level at which nuclear workers at the Oconee reactors are screened? Is it necessary to continue to withhold from the public vital safety information concerning the risks which a failure of Jocassee Dam poses to the three reactors at the Oconee Nuclear Station?
7. Do the Commissioners believe that, prior to their March 15, 2012 testimony before the US Senate Committee on the Environment & Public Works, they were adequately informed of the vulnerability which Jocassee Dam poses to the reactors at the Oconee Nuclear Station?
8. When does the US NRC intend to release to the public their correspondence concerning Jocassee Dam and Oconee Nuclear Station? What is the justification for continuing to withhold this information from the American public and from public intervenor groups

such as the Union of Concerned Scientists? Does the NRC believe it would benefit from a review of its handling of the Jocassee/Oconee issue conducted by intervenor groups?

Enclosed with this letter is a list of NRC correspondence, memos and studies regarding the Jocassee/Oconee issue. As can be seen from the enclosed list, this issue has festered in its current incarnation since 2006 and was originally brought forward to the NRC in 1994. Please note that most of the documents on the enclosed list are being withheld from the American public.

Although I am convinced the risks of a nuclear accident at Oconee are at least an order of magnitude greater than at a typical US reactor plant, I am not yet convinced that these risks are unacceptable. And although I do not know enough about nuclear security to judge whether or not all the security issues have been adequately addressed, at this time I do not believe a credible security threat to Jocassee Dam exists. I am not appealing to your committee with safety or security concerns. My concern is transparency, and how the lack of it has not only impeded this issue from getting the public scrutiny which it requires but may also be impeding this issue from getting the appropriate scrutiny from the Commissioners of the US Nuclear Regulatory Commission.

Very respectfully,



Lawrence S. Criscione, PE
Reliability & Risk Engineer
Operating Experience & Generic Issues Branch
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US Nuclear Regulatory Commission

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Enclosure

Cc: Senator James Inhofe, Ranking Member, Committee on Environment & Public Works
Senator Thomas Carper, Chairman, E&PW Subcommittee on Clean Air & Nuclear Safety
Senator John Barrasso, Ranking Member, E&PW Subcom. on Clean Air & Nuclear Safety
Senator Sheldon Whitehouse, Chairman, E&PW Subcommittee on Oversight
Senator Mike Johanns, Ranking Member, E&PW Subcommittee on Oversight
Chairman Allison Macfarlane, US Nuclear Regulatory Commission

List of NRC Correspondence, Memos and Studies Regarding Failure of Jocassee Dam

Date	ADAMS	Title
1994-FEB-11		Letter from Albert F. Gibson, NRC, to J. W. Hampton, Duke, "Notice of Violation and Notice of Deviation (NRC Inspection Report Nos. 50-269/93-25, 50-270/93-25, and 50-287/93-25)," dated February 11, 1994
1994-MAR-14		Letter from J. W. Hampton, Duke, dated March 14, 1994
1994-OCT-6		Internal NRC memo documenting a meeting between Region II and NRR concerning a hypothetical Jocassee Dam failure.
1994-DEC-19		Letter from Albert F. Gibson, NRC, to J. W. Hampton, Duke, "Notice of Violation and Notice of Deviation (NRC Inspection Report Nos. 50-269/94-31, 50-270/94-31, and 50-287/94-31)," dated December 19, 1994
2000-MAR-15		Letter from David E. LaBarge, NRC, to W. R. McCollum, Jr., "Oconee Nuclear Station, Units 1, 2, and 3 Re: Review of Individual Plant Examination of External Events (TAC Nos. M83649, M83650, and M83651)," dated March 15, 2000
2006-APR-28	<u>ML061180451</u>	OCONEE NUCLEAR STATION - INTEGRATED INSPECTION REPORT O5000269/2006002, O5000270/200602, O5000287/2006002
2006-AUG-31	<u>ML080780143</u>	IR 05000269-06-016, IR 05000270-06-016, IR 05000287-06-016, on 03/31/2006, Oconee Nuclear Station - Preliminary White Finding
2006-OCT-5	<u>ML062890206</u>	Oconee, Units 1, 2 & 3 - Response to Preliminary White Finding
2006-NOV-22	<u>ML063260282</u>	IR 05000269-06-017, IR 05000270-06-017, IR 05000287-06-017, Final Significance Determination for a White Finding and Notice of Violation, Duke Energy Carolinas, LLC
2006-DEC-20	ML063620092	Oconee, Units 1, 2, & 3, Appeal of Final Significance Determination for White Finding and Reply to Notice of Violation; EA-06-199
2007-JAN-29	ML070440345	Summary of Revised Fragility Evaluation Results for Jocassee Dam
2007-FEB-5		Letter from Bruce H. Hamilton, Duke, to NRC, "Seismic Fragility Study"
2007-FEB-22	ML070590329	Manual Chapter 0609.02 Appeal Panel Recommendations (Oconee Reply to a Notice of Violation and White Finding (EA-06-199))
2007-MAR-1	ML070610460	Oconee Appeal Panel Review of Manual Chapter 0609.02 Appeal Panel Review of Oconee Standby Shutdown Facility White Finding (EA-06-199)
2007-MAY-3	ML072970510	Oconee, Units 1, 2 and 3 - Request for NRC to Review Appeal of Final Significance Determination for SSF Flood Barrier White Finding
2007-JUN-22	ML071580259	Consideration of New Information Associated with a Final Significance Determination for a White Finding - Oconee NS
2007-JUN-28		Phone call between the NRC and Duke Energy
2007-OCT-1	ML072770765	10/01/2007, Slides with Notes for Final Regulatory Assessment of Oconee Flood Barrier Issue
2007-OCT-1	ML072770775	Dam Failure Information
2007-OCT-1	ML072770777	Questions and Answers Related to Oconee Flood Barrier
2007-NOV-20	ML073241045	Reconsideration of Final Significance Determination Associated with Standby Shutdown Oconee Facility Flood Barrier White Finding
2008-MAY-19	ML081350689	Briefing Package For Drop-In Visit By Duke Energy Chief Nuclear Officer With Chairman Klein And Commissioner Jaczko On May 21, 2008
2008-JUN-23	ML082390669	Proposal for a Risk Analysis of the Failure of the Jocassee and Keowee Dams to Assess the Potential Effects on the Safe Shut Down Facility of the Oconee Nuclear Station, South Carolina
2008-JUL-28	ML082120390	Oconee Nuclear Station - Revisions to the Selected Licensee Commitments Manual (SLC)

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Date	ADAMS	Title
2008-AUG-15	ML081640244	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)
2008-AUG-26	ML082390690	Kick Off for Risk Analysis of the Failure of the Jocassee and Keowee Dams to Assess the Potential Effects on the Safe Shutdown Facility at the Oconee Nuclear Station
2008-AUG-28	ML083300427	08/28/2008 - Summary of Closed Meeting to with Duke Energy Carolinas, LLC to Discuss the August 15, 2008, 50.54(f) Letter on External Flooding (TAC Nos. MD8224, MD8225, and MD8226)
2008-AUG-28	ML082550290	Meeting with Duke Energy Carolinas, Oconee Flood Protection and the Jocassee Dam Hazard
2008-SEP-6	ML082250166	Oconee Nuclear Station - Communication Plan for Information Request Related to Failure Frequencies for the Jocassee Pumped Storage Dam (Jocassee Dam) at the Oconee Nuclear Station and Potential Generic Implications
2008-SEP-26	ML082750106	Oconee, Units 1, 2 and 3 - Response to 10 CFR 50.54(f) Request
2008-NOV-5	ML091060761	11/05/08 Summary of Closed Meeting with Duke on External Flooding Issues, including failure of the Jocassee Dam, at Oconee Nuclear Station, Units 1, 2, and 3
2008-NOV-5	ML083390650	11/05/2008 Meeting Slides, "Oconee Site Flood Protection," NRC Meeting with Duke Energy Carolinas, LLC
2008-DEC-4	ML091420319	12/04/2008 Meeting Summary, Meeting to Discuss External Flooding at Oconee Nuclear Station (Reissuance, with Error on Page 3 Corrected)
2008-DEC-4	ML090480044	Oconee Nuclear Station, External Flood NRR Meeting, Rockville, MD, December 4, 2008
2009-FEB-3	ML090280474	Briefing Package for Commissioner Lyons Visit to Oconee on February 4, 2009
2009-APR-6	ML091170104	Oconee Nuclear Station, Units 1, 2 And 3 - Non-concurrence on Evaluation of Duke Energy Carolinas, LLC September 26, 2008, Response to Nuclear Regulatory Commission Letter Dated August 15, 2008 Related to External Flooding
2009-APR-9	ML091030172	Oconee External Flooding Briefing for Commissioner Jaczko
2009-APR-30	ML090570779	Oconee Nuclear Station Units 1, 2, and 3, Evaluation of Duke Energy Carolinas September 26, 2008, Response to External Flooding, Including Failure of the Jocassee Dam
2009-MAY-11	ML092940769	05/11/2009 Summary of Closed Meeting with Duke Energy Carolinas, LLC, to Discuss Preliminary Results of the Recent Inundation and Sensitivity Studies Concerning Failure of the Jocassee Dam and Resultant Flooding at Oconee Nuclear Station, 1, 2, and 3
2009-MAY-11	ML090820470	5/11/2009 Notice of Forthcoming Closed Meeting with Duke Energy Carolinas, LLC, to Discuss Sensitivity Studies Concerning Failure of the Jocassee Dam & Resultant Flooding at the Oconee Nuclear Station, Unit 1, 2, & 3
2009-MAY-11	ML091380424	Oconee Nuclear Station, Slides for Closing Meeting May 11, 2009 with Duke on the Oconee Flooding Issue
2009-MAY-20	ML091470265	Oconee, Units 1, 2 & 3, Request for Extension of Duke Response Time to Referenced Letter
2009-MAY-26	ML091480116	E-mail re Briefing Package for Visit to Jocassee Dam on June 23, 2009
2009-JUN-1	ML091590046	Oconee, Units 1, 2, and 3, Request to Withhold Sensitive Information in Presentation Materials Left with Staff
2009-JUN-10	ML091680195	Oconee, Units 1, 2, and 3 - Interim 30-Day Response to Reference 2.

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Date	ADAMS	Title
2009-JUN-11	ML091620669	6/11/09 Summary of Closed Meeting with Duke Carolina to Discuss External Flooding at Oconee
2009-JUN-25	ML091760072	NRC Site Visit to the Oconee Nuclear Station on June 15, 2009
2009-JUL-9	ML092020480	Oconee, Units 1, 2, & 3, Final 60-Day Response to Reference 2
2009-JUL-28	ML092230608	Oconee, Submittal of Selected Licensee Commitments Manual SLC Revision
2009-AUG-12	ML090570117	Oconee Flood Protection and the Jocassee Dam Hazard Basis for NRC Allowing Continued Operation
2009-AUG-27	ML092380305	Oconee, Slides for Closed Meeting Regarding External Flood Technical Meeting On August 27, 2009
2009-SEP-25	ML092710344	Site Visit Observation on 09/25/2009 by Joel Munday for Oconee
2009-OCT-28	ML093080034	10/28/09 Slides for Oconee Nuclear Station, Units 1, 2, and 3 - Meeting Slides - External Flood NRC Technical Meeting
2009-NOV-30	ML093380701	Oconee Nuclear Station, Units 1, 2, and 3, Oconee External Flood Analyses and Associated Corrective Action Plan
2009-DEC-4	ML090680737	12/04/09 Summary of Closed Meeting to Discuss the Duke Energy Carolinas, LLC, 09/26/08 Response to NRC's August 15, 2008 50.54(f) Letter on External Flooding at Oconee
2010-JAN-6	ML100280954	01/06/2010 Briefing to the Executive Team on the Oconee Nuclear Station External Flooding Issue
2010-JAN-11	ML100150066	Request Additional Information Regarding the Oconee External Flooding Issue
2010-JAN-15	ML100210199	Oconee, Units 1, 2 and 3 - Additional Information Regarding Postulated External Flood Threat Issues
2010-JAN-29	ML100271591	Evaluation of Duke Energy Carolina, LLC (Duke), November 30, 2009, Response to Nuclear Regulatory Commission (NRC) Letter Dated April 30, 2009, Related to External Flooding At Oconee Nuclear Station, Units 1, 2, And 3 (Oconee)
2010-FEB-8	ML100470053	Oconee, Units 1, 2, & 3, External Flood, Response to Request for Additional Information
2010-FEB-26	ML100610674	Oconee, Units 1, 2, & 3, External Flood Revised Commitment Letter
2010-MAR-5	ML103430047	Oconee Nuclear Station, Units 1, 2, & 3, Letter From Duke Energy Carolinas, LLC Regarding External Flood, Response to Request For Additional Information
2010-MAR-15	ML100780084	Generic Failure Rate Evaluation for Jocassee Dam Risk Analysis
2010-MAR-18	ML100810388	Prepare Briefing Book and Material for Eric Leeds for the Duke Fleet Meeting on March 18, 2010
2010-APR-14	ML100760109	Generic Failure Rate Evaluation for Jocassee Dam
2010-MAY-27	ML101600468	Oconee, Units 1, 2 & 3, Response to Requested Information on the Protection Against External Flooding Including a Postulated Failure of the Jocassee Dam
2010-JUN-1	ML101750619	OUO - Communication Plan For Issuance of Confirmatory Action Letter To Duke For Oconee - External Flooding June 2010
2010-JUN-3	ML101610083	Oconee Nuclear Station, Units 1, 2, and 3, - External Flood Commitments
2010-JUN-22	ML101730329	Oconee, Units 1, 2 & 3, Confirmatory Action Letter (CAL 2-10-003), Commitments to Address External Flooding Concerns
2010-JUN-29	ML101890803	06/29/2010 Summary of Closed Meeting With Duke Energy Carolinas, LLC, to Discuss External Flooding at Oconee
2010-JUL-7	ML101880768	OUO - IR 05000269-10-002, 05000270-10-006, 05000287-10-006; 01/01/2010 - 03/31/2010; Oconee Nuclear Station Units 1, 2 and 3; Interim Compensatory Measures for External Flood
2010-JUL-19	ML101900305	Identification of a Generic External Flooding Issue Due to Potential Dam Failures

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Date	ADAMS	Title
2010-AUG-2	ML102170006	Oconee Units 1, 2, & 3, Response to Confirmatory Action Letter (CAL) 2-10-003
2010-OCT-20	ML102910480	NRC Assessment of Oconee External Flooding Issue (October 18, 2010)
2010-OCT-26	ML102990064	NRC Staff Assessment of Duke Energy Carolinas, LLC, Oconee External Flooding Issue (TAC NOS. ME4441, ME4442, and ME4443)
2010-NOV-29	ML103490330	Oconee Nuclear Site, Units 1, 2, and 3, Oconee Response to Confirmatory Action Letter (CAL) 2-10-003
2011-JAN-5	ML110180609	Enclosure 1, Oconee Nuclear Station, Major Project Plans
2011-JAN-10	ML110260443	Non-concurrence on Oconee Assessment Letter
2011-JAN-28	ML110280153	Staff Assessment of Duke's Response to Confirmatory Action Letter Regarding Duke's Commitments To Address External Flooding Concerns At The Oconee Nuclear Station, Units 1, 2, And 3 (ONS) (TAC NOS. ME3065, ME3066, and ME3067)
2011-MAR-5	ML103410042	Supplement to Technical Basis for Allowing Oconee Nuclear Station to Remain in Operation Through November 2011, Associated with the External Flooding Issues
2011-MAR-15	ML110740482	Analysis Report for the Proposed Generic Issue on Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures
2011-APR-29	ML111460063	Oconee Nuclear Site, Units 1, 2, and 3, Response to Confirmatory Action Letter (CAL) 2-10-003
2011-AUG-16	ML11229A710	E-mail re Briefing Package for Visit to Oconee Nuclear Power Plant on September 12-13, 2011
2011-AUG-18	ML11174A138	Oconee Nuclear Station, Units 1, 2, and 3, Assessment of Duke Energy Carolinas, LLC April 29, 2011, Response to Confirmatory Action Letter Regarding Modifications to Address External Flooding Concerns (TAC Nos. ME6133, ME6134, and ME6135)
2011-AUG-31	ML112430114	Screening Analysis Report for the Proposed Generic Issue on Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures
2011-SEP-1	ML11244A024	Briefing Package for Visit to Oconee Nuclear Power Plant on September 12-13, 2011
2011-OCT-3	ML11278A173	Oconee Nuclear Station (ONS), Units 1, 2, and 3, Response to Requests for Additional Information Regarding Necessary Modifications to Enhance the Capability of the ONS Site to Withstand the Postulated Failure of the Jocassee Dam
2011-OCT-17	ML11294A341	Oconee Nuclear Station (ONS), Units 1, 2, and 3, Response to Requests for Additional Information Regarding Necessary Modifications to Enhance the Capability of the ONS Site to Withstand the Postulated Failure of the Jocassee Dam
2011-DEC-16	ML113500495	Screening Analysis Report for the Proposed Generic Issue on Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures_redacted
2012-JAN-26	ML12026A549	Briefing Package for Commissioner Svinicki Visit to Oconee on February 1, 2012
2012-JAN-31	ML12026A254	Communication Plan for Oconee Nuclear Station (ONS) Following Issuance of GI-204
2012-FEB-3	ML12039A239	Oconee, Units 1, 2 and 3 - Request for Withholding from Public Disclosure Duke Energy Letter Dated May 20, 2009 Involving Postulated Failure of the Jocassee Dam
2012-FEB-9	ML12039A217	Briefing Package Request for Meeting with Duke Energy on February 16, 2012

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Date	ADAMS	Title
2012-FEB-17	ML12053A016	Duke Energy Carolinas, LLC - Recommended Revisions to the Oconee Nuclear Station Section of NRC's Screening Analysis Report for the Proposed Generic Issue on Flooding of Nuclear Plant Sites Following Upstream Dam Failure
2012-FEB-23	ML12058A236	02/23/12 Summary of a Teleconference between the US NRC and Duke Energy Regarding Comments made by Duke Energy Concerning the Issuance of the Screening Analysis Report for Generic Issue 204
2012-MAR-5	<u>ML090510269</u>	NRC Information Notice 2012-002 Potentially Nonconservative Screening Value For Dam Failure Frequency In Probabilistic Risk Assessments
2012-MAY-15	ML12129A186	Oconee Nuclear Station, Units 1, 2, and 3 - Request for Additional Information Regarding Modifications to Address the External Flooding Concerns (TAC NOS. ME7970, ME7971, AND ME7972)
2012-JUN-14	ML12167A372	Oconee, Units 1, 2, and 3, Response to Requests for Additional Information Regarding Modifications to Address External Flooding Concerns
2012-JUL-11	ML12215A327	07/11/2012 Licensee Non-Public Meeting Slides on Oconee External Flood Mitigation
2012-JUL-11	<u>ML12188A071</u>	Briefing Package for Meeting with Duke Energy on July 11, 2012
2012-AUG-7	<u>ML12206A325</u>	Briefing Book for Meeting with Duke Energy on August 7, 2012
2012-SEP-20	ML12268A404	Communication Plan for Flooding September 2012
2012-SEP-20	ML12219A163	Oconee Nuclear Station, Units 1, 2 and 3 - Response to Questions Regarding Modifications to Address External Flooding Hazards (TAC Nos. ME7970, ME7971, AND ME7972)