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Oconee SSF Flood Barrier Breach SDP – Lessons Learned

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NRR/DRA/APOB

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Purpose

- To brief the RMT of the lessons learned from the disposition of the Oconee Standby Shutdown Facility (SSF) wall SDP finding.
- To discuss potential regulatory actions considered to ensure safety.

Discussion Topics

- Background of finding.
- Technical lessons learned.
- Process lessons learned.
- Actions taken to date.
- Considered draft action plan.

Importance of the SSF at Oconee

- The SSF contains the only means to shut all three units down following a station blackout induced by catastrophic flood, fire, or other external events.
- The Oconee site does not have emergency diesel generators.
 - On-site emergency ac power is provided by two hydro-electric generators at the Keowee dam.
- Catastrophic flooding to the site can render all the switchyards and Keowee dam unavailable thus blacking out all three units.
 - Under these conditions, the additional failure of the SSF function results in core damage.

Aerial View Showing The Relationship of the Oconee Site Environment and Lake Keowee



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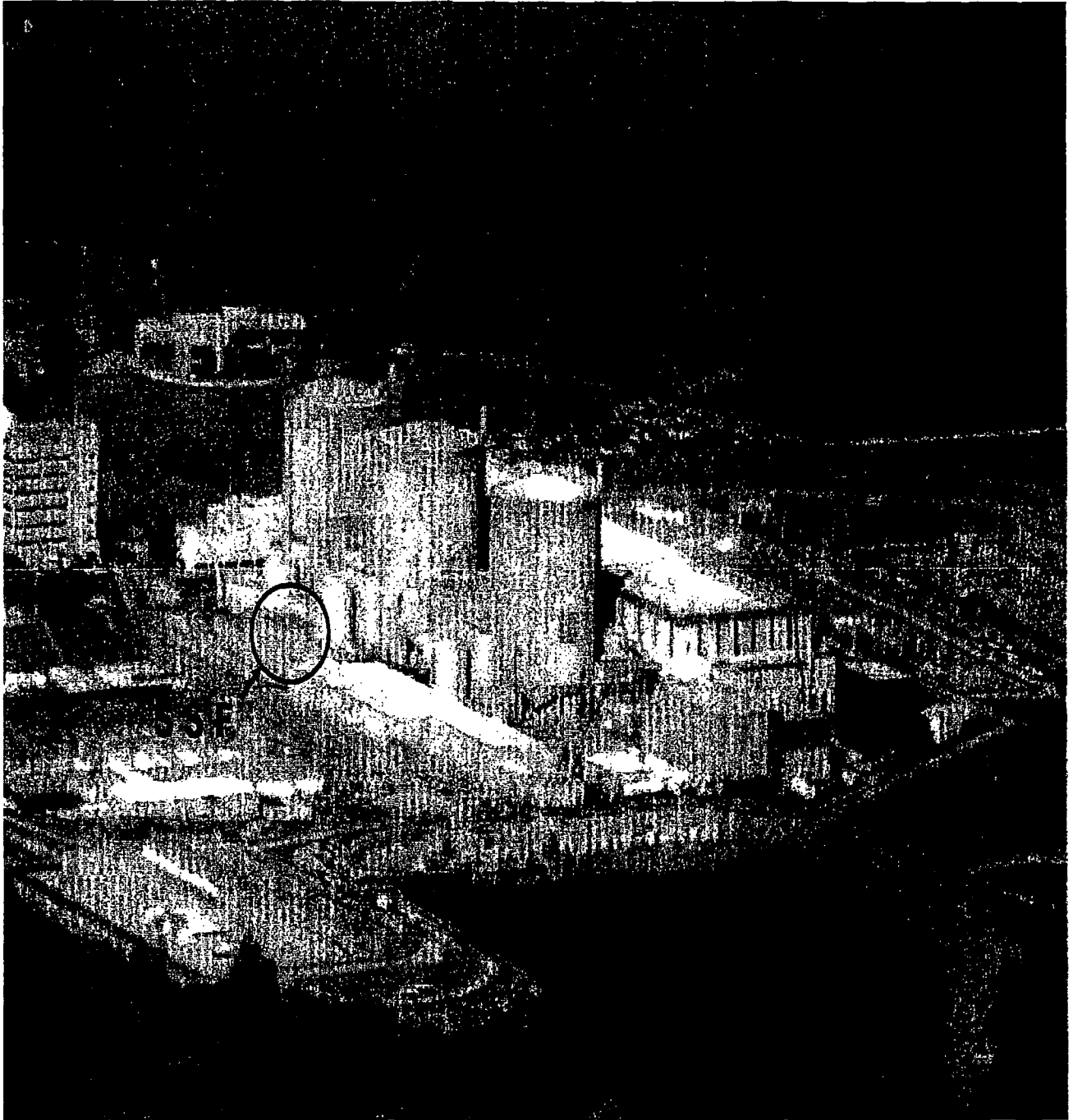
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Aerial View of the Oconee Site

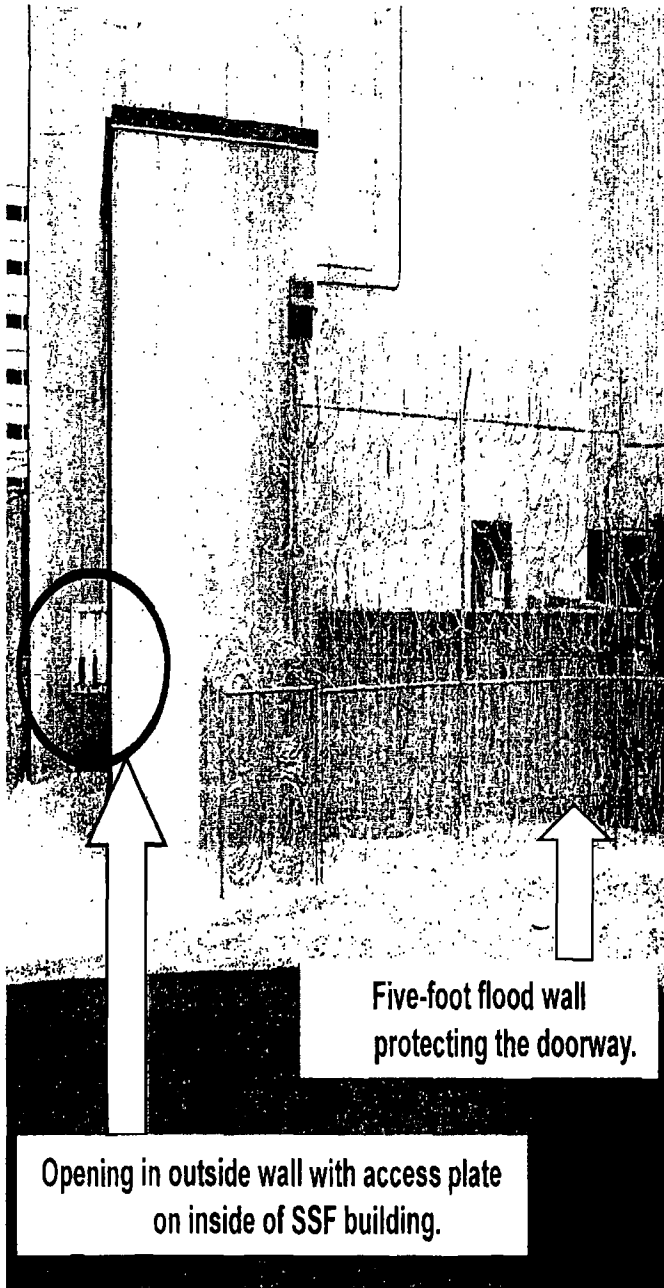


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The Flood Barrier Finding

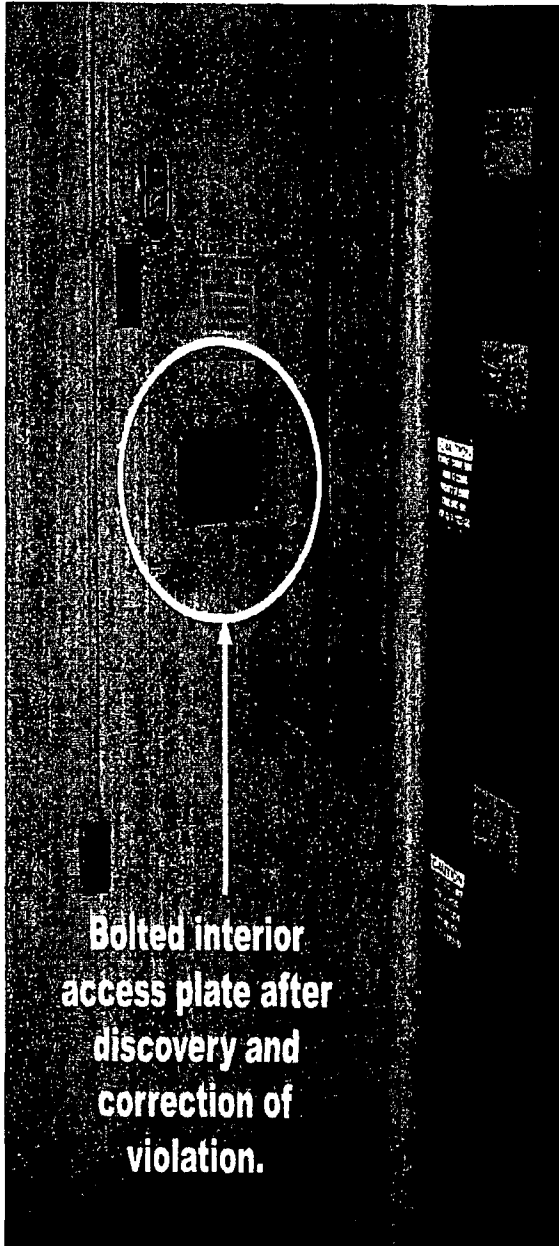


- Licensee opened an access cover uncovering a previously cut hole in the wall on August 13, 2003.
 - Should have done a 10CFR50.65 (a)(4) assessment immediately.
 - Should have done a 10CFR50.59 evaluation after 90 days.
- Licensee opportunities to identify issue
 - June 2, 2005 NRC inspectors notified the licensee of condition. Licensee issued PIP (condition report in their corrective action system). Corrective action not taken.
 - August 3, 2005 NRC inspectors questioned lack of corrective action and licensee issued a further PIP.
- Opening sealed on August 3, 2005.

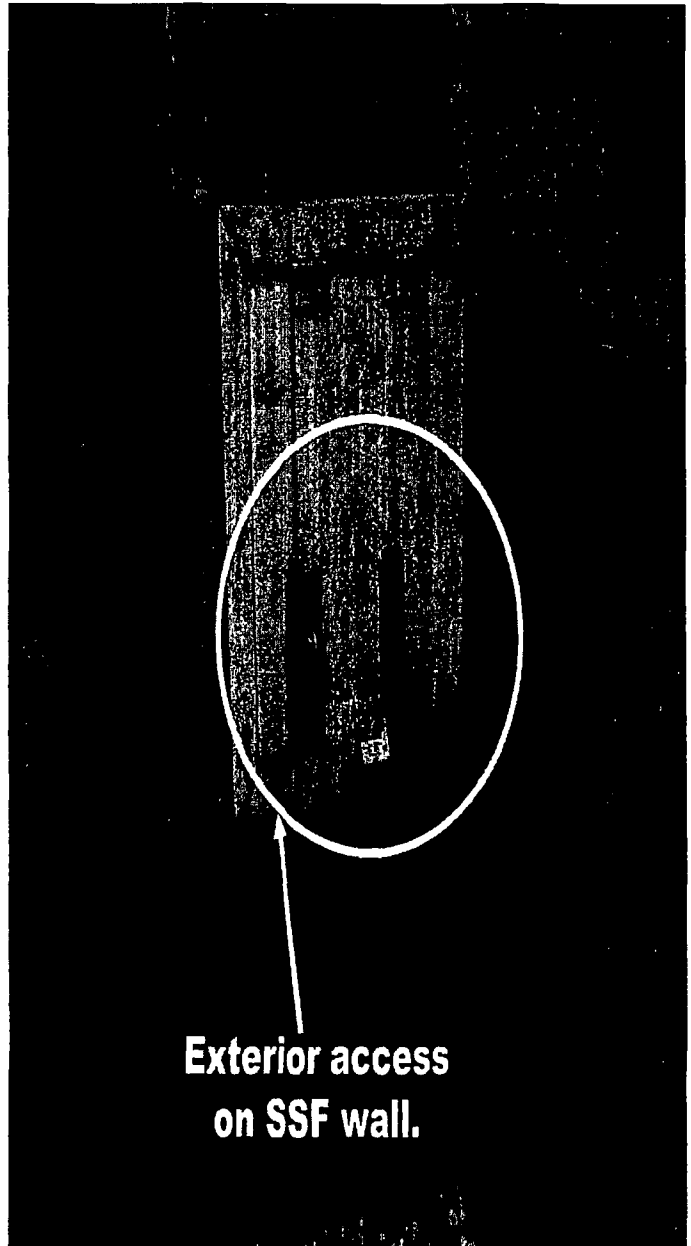
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Interior and Exterior Walls of SSF



**Bolted interior
access plate after
discovery and
correction of
violation.**

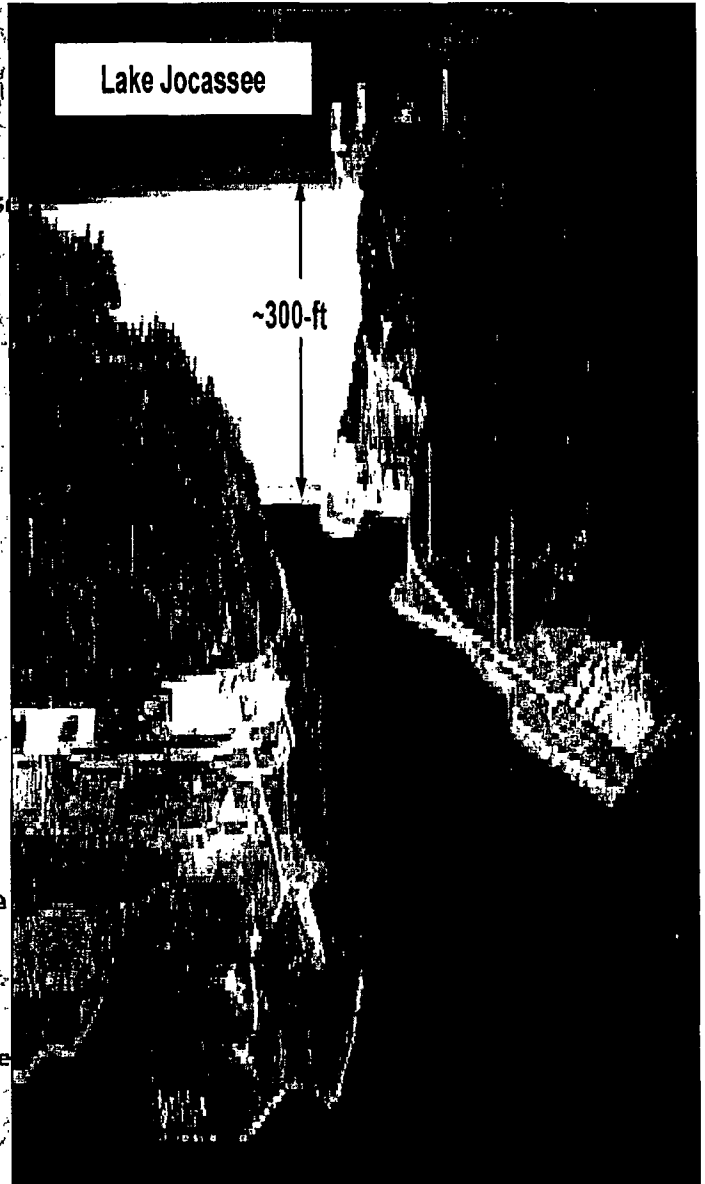
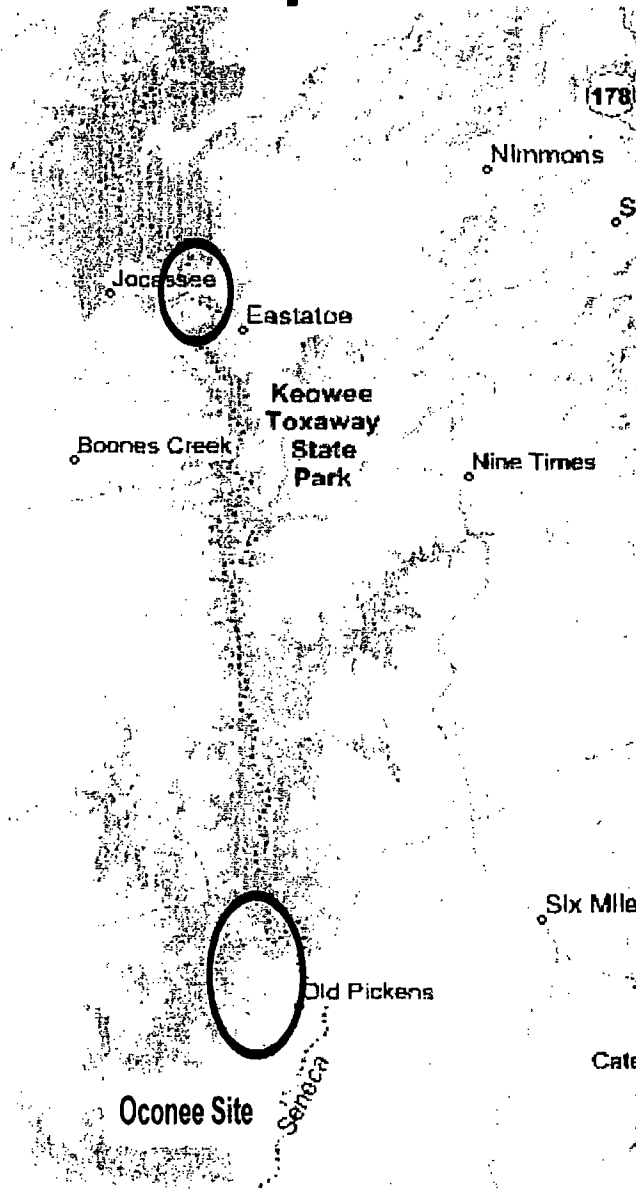


**Exterior access
on SSF wall.**

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The Flood Scenario

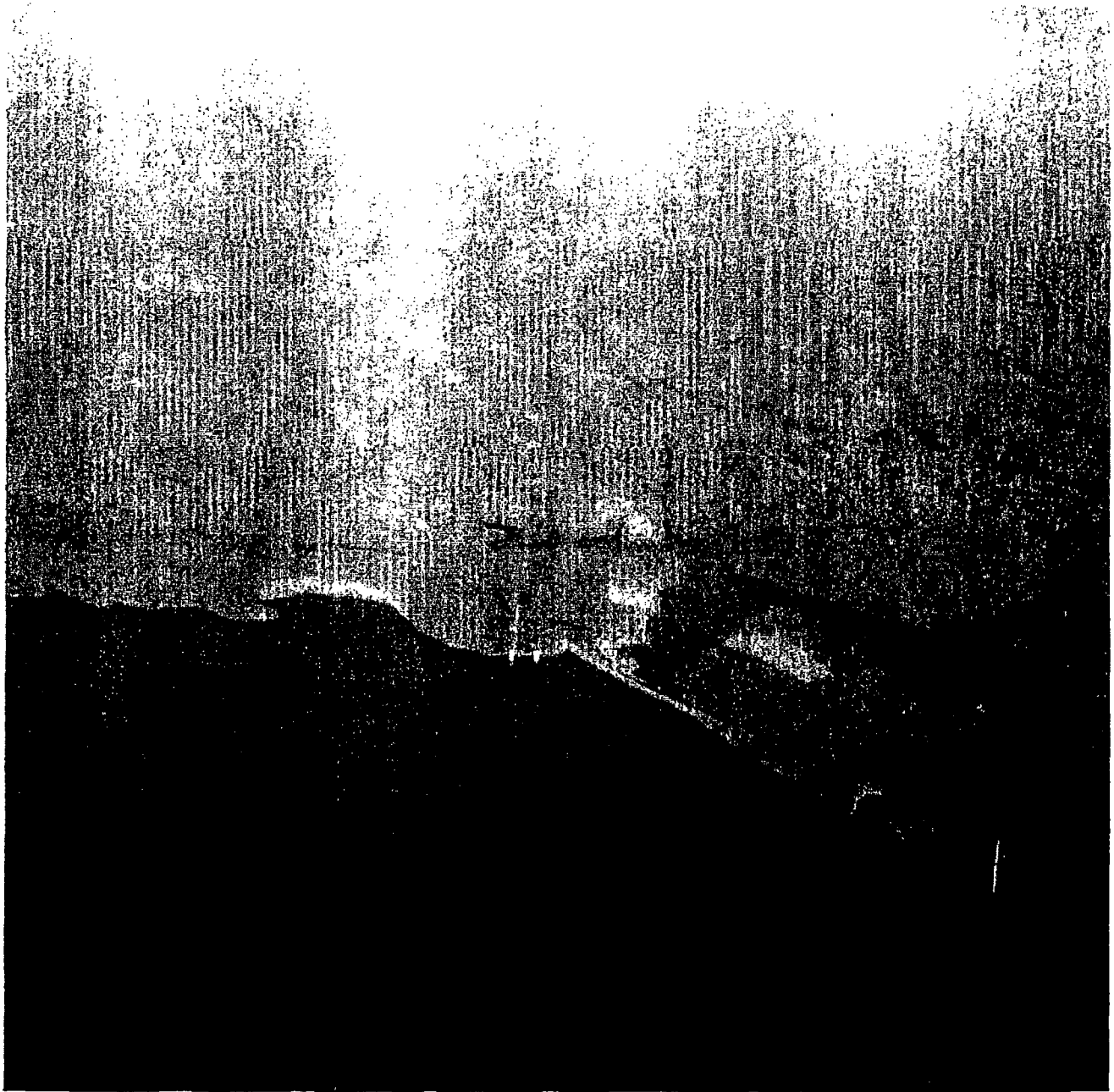
Rupture of Jocassee Dam



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Aerial View of Jocassee Dam - Upstream of the Oconee Site



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SSF Catastrophic Flood Heights Given Rupture of Jocassee Dam

- Licensee study in 1980s established a resultant flood height of approximately 5 feet.
 - Justification for erection of the 5-ft wall around the doorway.
 - Study is unavailable.
 - Flood height almost matches that of overtopping of Keowee dam.
- Licensee commissioned additional study by FERC in 1992.
 - Established a higher resultant flood height range of 12-16 feet.
 - Licensee still used the 5-ft height for their IPEEE submittal developing a 20% split fraction apportioning the Jocassee Dam rupture frequencies to account for these higher FERC flood heights.

Background Summary

- August 17, 2006 - SERP meeting assessed as preliminary WHITE based on a blended qualitative and quantitative risk-informed approach (pre-IMC 0609 App M).
- August 31, 2006 - Choice letter sent to licensee.
- October 5, 2006 – Licensee provided written response to choice letter and waived regulatory conference.
- Nov. 22, 2006 - Final significance determination issued. WHITE based on qualitative erosion of defense-in-depth, but includes quantitative CDF based on apportioning flood frequency to flood height.
- December 20, 2006 - Licensee appeals the final significance determination. Requests NRC to accept incomplete, un-docketed new information on Jocassee dam seismic failure.
- Appeal panel convened on January 9, 2007.
- Licensee contractor seismic fragility analysis of Jocassee issued January 29, 2007.
- March 1, 2007 – Appeal panel upheld the WHITE finding.
- May 3, 2007 – Licensee requests reassessment of final significance determination.
- June, 2007 – Assembled a team to review new information. Flooding expert review of data on random dam failure.
- June 28, 2007 - Follow up telecom with Licensee on dam failure questions and comments.
- July 17, 2007 - Licensee response to analysis questions by email.
- September 5, 2007 – Final SERP split vote forces upper management resolution.
- November 20, 2007 - Final determination letter released to licensee.

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Jocassee Dam Random Failure Frequency

- Licensee developed random dam failure frequency for IPEEE submittal based on rockfill dam failures per population of earthen, rockfill, and composite dams.
 - Severely underestimated frequency by an order of magnitude at $1.4E-5$ per year.
- As part of the second appeal, James Vail of NRR/DRA/APOB investigated the derivation of this frequency.

– (b)(7)(F)

Process Lessons Learned

- Process did not account for situations where licensee did not communicate to the regional office and waived participation in a regulatory conference.
- Process did not accept new information prior to final determination.
- Without a regulatory conference, communication was impacted to program office and regional management of potential greater-than-green SDP findings.

Actions Taken

- IMC0609 in draft revision to account for:
 - Licensees may present new information provided that they informed the agency either during a regulatory conference or in writing before the final significance determination is made.
 - New information has to be submitted within the 30-day appeal period.
 - Using best available information to determine final significance in a timely manner.
 - NRR concurrence with regional management on accepting an appeal.

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Actions Taken (cont'd)

- Training conducted to regional Senior Reactor Analysts (SRAs) in October 2007 counterparts meeting.
- Met with NSIR to inform DHS on potential dam and other outside infrastructure vulnerability.

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Draft Action Plan to Consider Future Actions

- NRR Program Office Director and/or Deputy Director should be informed of all greater-than-green findings.
- Exploration of licensing and potential backfit requirement for protection against most likely flood.
- Generic communication to licensees on flooding.

Draft Action Plan to Consider Future Actions (Cont'd)

- Update of RASP manual for additional external flood guidance.
- Consider an update to NUREG/CR-6928 to include rupture frequencies.
- NRO Licensing and Design Bases Review for New Reactor Licensing to incorporate lessons learned on new applications.
- Develop a Temporary Instruction to assess licensee performance in this area.