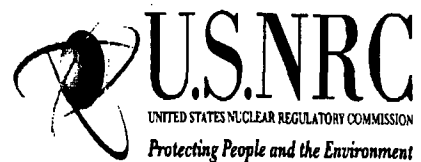


Oconee Nuclear Station

Standby Shutdown Facility (SSF)

Flood Barrier Breach Violation

informal reassessment

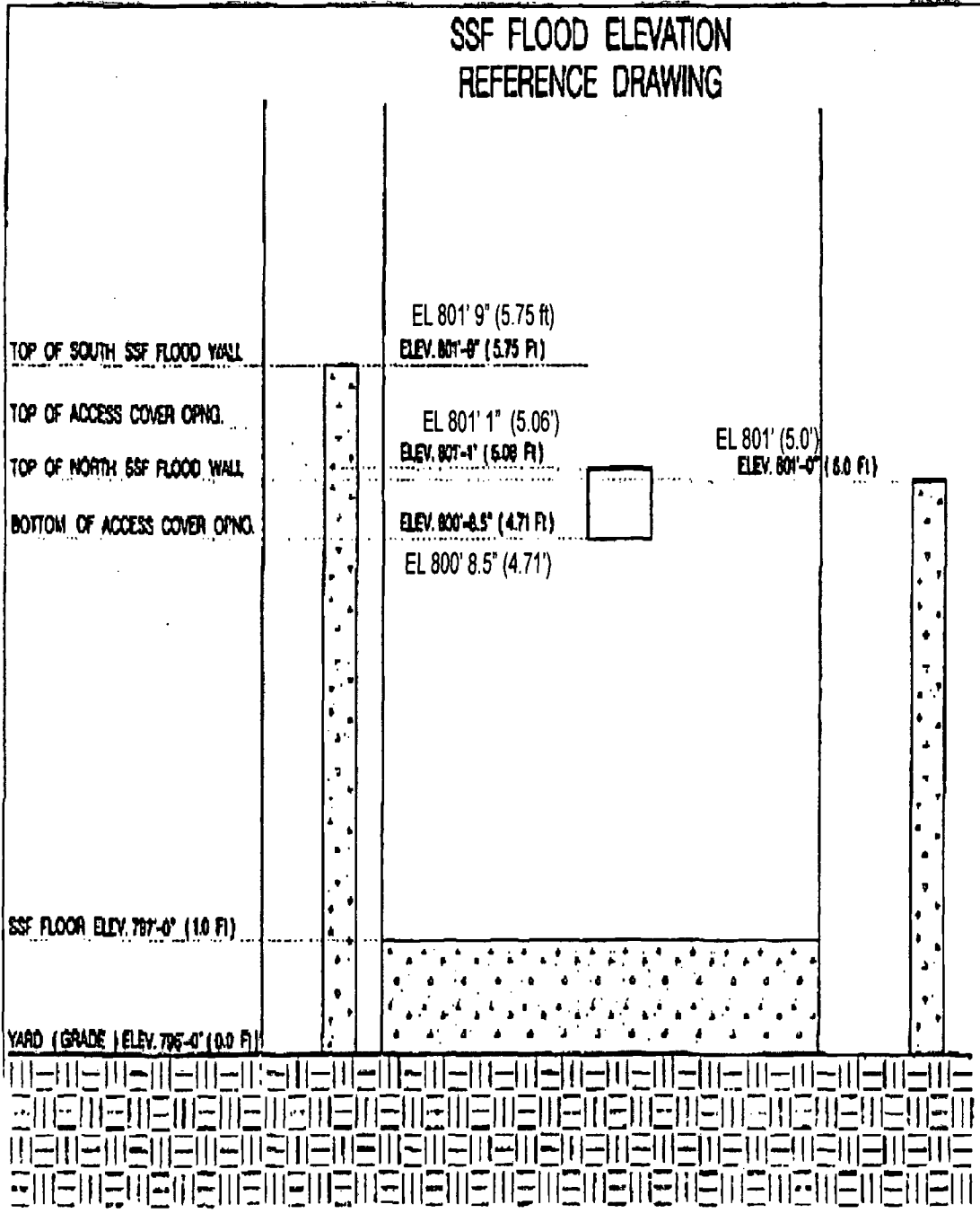


D 2

Why is the SSF wall is needed?

- Two flood studies show the Oconee site vulnerable to flooding from a Jocassee dam failure
 - 1982 flood study showed the need to protect from flooding up to 4.71 feet on the SSF
 - 1992 FERC study showed that flooding could occur at 12 to 16 feet.
- Oconee decided to protect from “the most likely flood scenarios” by building a 5-foot wall in 1988
 - wall will protect against 80% of floods based on engineering judgment – no technical basis
- The probability that a flood will occur due to a failure of the Jocassee Dam contains large uncertainty.

SSF Wall Relative Heights of Flood Barriers and Penetration



Nature of Violation/Performance Deficiency and SDP

- Open penetration access cover in the SSF exterior wall for approximately 2 years.
- No 50.65(a)(4) evaluation done by licensee.
- Opening below 5-ft max. flood height identified by licensee in IPEEE.
- Susceptible to site flooding from rupture of Jocassee Dam 11-miles upriver.
- Region II SRA performed analysis based on information from the licensee and apportioned flood height based on split fractions to arrive at a quantitative WHITE finding.

Jocassee Dam Failure Mode	Increase in CDF (per Reactor-Year)
Random	1.84×10^{-6}
Seismic	1.44×10^{-6}
Total	3.28×10^{-6}

Summary Timeline

- August 17, 2006 - SERP meeting assessed as preliminary WHITE based primarily on qualitative aspects (pre-MC 0609 App M)
- August 31, 2006 - Choice letter sent to licensee.
- October 5, 2006 – OCO provides written response choice letter to waived regulatory conference.
- Nov. 22, 2006 - FSD issued. WHITE based primarily on qualitative erosion of defense-in-depth, but includes quantitative CDF.
- December 20, 2006 - OCO appeals the FSD. Requests NRC to accept incomplete, un-docketed, Jocassee fragility study
- January 9, 2007 - Appeal panel convened
- February 5, 2007 - OCO sends completed seismic fragility analysis of Jocassee to NRC.
- March 1, 2007 – Appeal panel upholds White finding
- May 3, 2007 – OCO requests “reassessment of FSD”
- June 28, 2007 - Follow up telecom with OCO after seismic fragility analysis was evaluated.
- July 17, 2007 - OCO response to analysis questions by email.
- June 22, 2007 – Reassessment of FSD assigned to RII
- August 27, 2007 – OCO 95002 inspection – Emergency AC White MSPI, U3 sump debris, SSF flood barrier breach white finding
- September 20, 2007 – RII reassessment results due to Oconee (90 days from June 22)

Reassessment Team Evaluation

- Seismic fragility review did not endorse licensee's conclusions completely
- NRC agreed that the seismic frequencies were sufficiently "low" to be insignificant. Therefore, only random dam failures were considered.
- Epistemic uncertainty in Jocassee rupture frequency
 - Licensee and NRC cannot resolve resultant flood height fractions resulting from below opening to 5-ft.
- Assume that mean dam rupture frequency producing a 4.71-ft flood identical to a mean frequency producing a 5-ft flood;
 - *in other words* there is no probability distribution for floods of various heights, **floods at any height on the 5-foot wall are equally likely**
- Using licensee's minimal IPEEE SSF failure cutsets with OCO revised flooding frequency results in Δ CDF of 8.22×10^{-6} per year.

Jocassee Dam Random Failure

- Licensee computed random failure frequency based on operating industry history of failures for rockfill dams of over 50-ft in height
- Discrepancy exists on counting the denominator of total operating dam-years.
 - Licensee included operating years of other dam types in denominator, but did not count their corresponding failures in the numerator.
- NRC performed independent random dam failure analysis for rockfill dams >5 yrs old and >50 feet in height
- Random frequency could be higher which might offset any uncertainty in the resultant flood height difference between the bottom of the opening and the 5-ft height of the wall.
- Resultant Δ CDF could range from WHITE to RED in severity.

Risk-informed Regulation and Defense in Depth

- Used as a way to account for uncertainties in equipment and human performance.
- The independence of barriers have been degraded.
- Licensee has an exclusive reliance upon the SSF to prevent core damage without redundancy or diversity of mitigation.
 - Any functional degradation of the SSF flood barrier from these initiating events directly increased the failure probability of the SSF and therefore, increased the likelihood of core damage.
- Using a blended qualitative and quantitative perspective, the NRC's final Significance Determination remains low to moderate (White)".

Judgment needed

- Does a 3.5-inch change in flood wall height that last for longer than a year result in an increase in core damage frequency greater than $1E-6$?

OR

- *Should the NRC conduct additional inspection to determine why a licensee did not assess the maintenance risk of a small breach in the only barrier between flooding and core damage and allow it to exist for two years?*