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LD-90-060

Project No. 675

Mr. Thomas V. Wambach
Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Licensing Review Basis for the System 80+™ Standard Design

Reference: Letter LD-90-005, A. E. Scherer (C-E) to R. Singh (NRC), dated January 22, 1990

Dear Mr. Wambach:

Enclosed are proposed changes to the System 80+™ Liscensing Review Basis document (submitted by the reference letter) which we expect to include in the next revision. We are providing this information at this time to facilitate your review. If you have any questions on the enclosed revisions, please call me or Mr. S. E. Ritterbusch at (203) 285-5206.

Very truly yours,

COMBUSTION ENGINEERING, INC.

E. H. Kennedy
Manager
Nuclear Systems Licensing

EHK:lw

Enclosure: As Stated

cc: C. Miller (NRC)
W. Miller (NRC)
F. Ross (DOE-Germantown)

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- ~~For hydrogen generation and control inside containment, the assumed extent of metal water reaction (75%) and the maximum allowable hydrogen concentration (13%) are different than those specified by 10 CFR 50.34(f) (LRB Section 7.15).~~

The requirements for requesting exemptions from current regulations (10 CFR 50.12) will be applied where appropriate.

1.2.2 Design Features and Methods which May Involve Questions of Commission Policy

- The need for, and formulation of, a goal for expected containment performance (Section 6.5.3)

- The degree to which, if any, new design features are required to improve protection against sabotage (Section 7.2)

- The degree to which, if any, new design features are required for improved fire protection (Section 7.9)

- The degree to which realistic source terms can be used for PRA and severe accident evaluations (Section 7.12)

- Whether there is a need for containment venting capability for severe accident mitigation beyond that required by current regulations (Section 7.16)

- Whether proposed design features for prevention and mitigation of degraded core conditions are adequate (Section 7.21)

7.13 Operating Basis Earthquake

The NRC staff agrees that the OBE should not necessarily control the design of safety systems, which now occurs when the criteria of 10 CFR, Part 100, Appendix A, are applied. The System 80+ design will be consistent with the EPRI ALWR Requirements Document with respect to definition of OBE, SSE, and analysis methodology. It is expected that the OBE will be less than one-half of the SSE, which is a departure from 10 CFR, Part 100, Appendix A. The NRC staff will review the OBE design basis and will consider C-E's request to decouple the OBE from the SSE, subject to Commission approval.

7.14 Type C Containment Leak Rate

Containment leakage is acknowledged by the NRC staff as being a function of containment pressure. This pressure dependence will be reflected in predictions of leak rate for the System 80+ containment.

7.15 Hydrogen Generation

The System 80+ design includes a hydrogen igniter system (control grade) to assure compliance with 10 CFR 50.34(f).

C-E will provide information to justify a System 80+ containment design consistent with the EPRI ALWR Requirements Document and NRC staff review thereof. ~~This information will include justification for the assumed extent of metal-water reaction (75%) and the maximum allowable hydrogen concentration (15%).~~

7.16 Severe Accident Containment Vents

~~C-E will propose that~~ The System 80+ containment design ~~includes~~ (A) the capability to add a containment penetration and vent at a future time. This approach is in compliance with 50.34(f)(3)(iv). NRC staff will review System 80+ severe accident issues including containment overpressure analysis and, subject to Commission approval, will determine if there is a need ~~for special~~ to add a containment vent to address severe accident issues.

INSERT A

has a dual containment system. The steel containment pressure boundary is surrounded by a concrete shield building, with an annulus in between. Such a design presents no significant problems to the addition of a large (three-foot diameter) containment penetration in the future. Therefore, the System 80+ design has

Regarding EPRI requirements directed at improved plant performance and operation (and not required for regulatory compliance), C-E has chosen to address selected design attributes in a manner that differs from specific EPRI requirements. Such differences are based on C-E's own evaluation of the desirability, effectiveness, and commercial viability of the feature as it pertains specifically to the System 80+ design. A current list of System 80+ design features which deviate from EPRI requirements is provided below.

- o System 80+ reactor coolant hot leg temperature will be reduced to 615°F (versus 600°F).

- o Skirt-type supports will be used for the System 80+ pressurizer and steam generators (versus pedestal or open-frame supports).

- o System 80+ steam generators will have handholes at the bottom, tubesheet elevation of the secondary side (versus every U-tube support elevation).

- o System 80+ Control Element Drive Mechanisms will not have anti-ejection latches.

- o The System 80+ Emergency Feedwater System will have a cross-connect between the two independent trains.

- o The System 80+ design will retain redundant feedwater isolation valves (versus a using the feedwater control valve for isolation).

- ~~o The System 80+ main feedwater pumps will be turbine driven (versus motor driven).~~

- o The System 80+ design will not include the main steam isolation signal on pressure rate-of-change.

~~o The System 80+ sensor and cable failures may not meet the time to detect and repair criterion of eight hours in all cases.~~

o The System 80+ design will include some polyvinyl choloride and neoprene insulation.

~~o The System 80+ alternate AC power source (a combustion turbine) will not meet IEEE Standard 387 (diesel generators).~~

o The System 80+ design includes the Reactor Vessel Level Measurement System. Compliance with the EPRI requirement to not have such a system would lead to a non-compliance with 10 CFR 50.34(f)(2)(xxviii).

~~o The System 80+ emergency diesel generators will automatically start but not load on loss of offsite power without turbine generator trip (versus automatic start and load).~~

o The System 80+ design has a spherical (versus cylindrical) steel dual containment.

o The System 80+ nuclear steam supply system will not be significantly offset from the center of the containment due to the enlarged workspace provided by the spherical geometry of the containment (versus a 15-20 foot offset in a cylindrical containment).

o The System 80+ containment equipment hatch will be at the operating floor level (versus grade level).

- System 80+ safety analysis will be completed using the conservative source term of TID 14844 (versus an EPRI-proposed "realistic" source term).

- System 80+ safety analysis will demonstrate that 10 CFR 100 limits can be met with a containment design leak rate of 0.3 wt% per day (versus 0.5).

  wt%

- System 80+ will employ alloy 690 in the pressurizer heater sleeves and instrument wells (versus restricting use to steam generator tubes).

- For a loss of all feedwater, core uncovery would occur in approximately 1 hour and 45 minutes without operator action (versus 2 hours).

- System 80+ containment purge valves require closure in 15 seconds (versus 30 seconds).

- System 80+ minimum diesel start and load sequence time is 20 seconds (versus 40 seconds).

- The System 80+ design places only the first stage of low pressure feedwater heaters in the condenser neck (versus all low pressure heaters).

- The System 80+ turbine exhaust to condenser inlet connection uses either a rubber flexible seal or a ~~ridged~~ rigid seal with spring mounted condenser (versus stainless steel flexible seal).

- System 80+ uses 6 stages of feedwater re-heating in the reference design with the actual number to be determined by the site specific heat balance (versus 7 stages).

- The System 80+ atmospheric dump valves [redacted] are manually operated (versus pressure actuated with variable setpoint).

- The third main feedwater pump and booster pump are normally in standby (versus normally operating).

- The replacement of System 80+ pressurizer heater sleeves requires cutting and welding (versus no cutting or welding).

- Initiation of Feed and bleed decay heat removal on System 80+ can be delayed for up to 30 minutes following steam generator dry out (versus 60 minutes).

- The System 80+ control room pressure boundary will include fans and filters (versus excluding HVAC equipment).

- The System 80+ Advanced Control Complex (called Nuplex 80+) integrates spatially dedicated display and control with compact work stations (versus exclusive use of redundant, compact work stations).

- System 80+ point-to-point communication is by sound powered phones (versus a wireless system).

- System 80+ arrangements locate kitchen and restroom facilities convenient to, but outside, the Main Control Room area (versus inside Main Control Room area).

- System 80+ uses separate standby-source transformers for inverters (versus common transformer).

- System 80+ interfaces do not require separate switchyard for main and reserve offsite circuits (versus separate switchyards).