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Docket No. 50-537

APR 07 1982

MEMORANDUM FOR: Paul S. Check, Program Director
Clinch River Breeder Reactor Program

FROM: R. Wayne Houston, Assistant Director
for Radiation Protection, DSI

SUBJECT: UPDATED CRBRP FINAL ENVIRONMENTAL STATEMENT: SUMMARY OF RADIOLOGICAL CONSEQUENCES OF POSTULATED ACCIDENTS

Enclosed is a marked copy of Table 7.2 of the Clinch River Breeder Reactor Plant Final Environmental Statement. The table has been revised to reflect the differences in the current site atmospheric dispersion values from the regulatory guide values used for original FES calculations.

This input was prepared by Mohan Thadani (X28941), of the Accident Evaluation Branch.

Original signed by
R. Wayne Houston

R. Wayne Houston, Assistant Director
for Radiation Protection
Division of Systems Integration

Enclosure:
As stated

cc: R. Mattson
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DATE	4/5/82	4/5/82	4/5/82	4/6/82			

NRC FORM 318 (10-80) NRCM 0240 OFFICIAL RECORD COPY USGPO: 1981—335-96

TABLE 7.2

SUMMARY OF RADIOLOGICAL CONSEQUENCES OF POSTULATED ACCIDENTS[1]

CLASS	EVENT	ESTIMATED DOSE AT SITE BOUNDARY (REM) IN 2 HR.	ESTIMATED DOSE TO POPULATION IN 50 MILE RADIUS (MAN-REM) (DURATION OF ACCIDENT)
1.0	Trivial Incidents	[2]	[2]
2.0	Small releases outside containment	[2]	[2]
3.0			
3.1	Failure of liquid waste storage tank	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
3.2	Rupture of RAPS surge and delay tank[3]	~~0.2~~ 0.11	~~32~~ 1.0
4.0	Events that release radioactivity into the primary system[4]	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
5.0	Events that release radioactivity into secondary system	~~0.001~~ 5.2×10^{-4} (thyroid)	~~0.08~~ 3.2×10^{-3}
6.0	Refueling accidents inside containment		
6.1	Inadvertent floor valve opening reactor port plug removed[5]	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
6.2	Drop of fuel assembly in loaded position[6]	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
7.0	Accidents to spent fuel outside containment		
7.1	Loss of Forced Cooling to EVTM[7]	~~0.012~~ 6.3×10^{-3} (thyroid)	~~1.8~~ 0.04
7.2	EVST pipe rupture @ pump suction[8]	~~0.5~~ 1.26 (whole body) ~~0.25~~ 0.31 (thyroid)	~~18~~ 0.6 ~~14~~ 0.4
7.3	Shipping cask drop	~~0.007~~ 3.7×10^{-3} (thyroid)	~~2.6~~ 0.08
8.0	Accident initiation events considered in design basis evaluation in the SAR	~~0.007~~ 3.7×10^{-3} (thyroid)	~~2.6~~ 0.08
8.1	Steam-Generator tube rupture	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
8.2	Steam line break	~~0.001~~ 5.2×10^{-4}	~~0.04~~ 1.6×10^{-3}
8.3	Large primary system rupture (does not result in core disruption)	~~0.005~~ 2.6×10^{-3} (whole body) ~~0.002~~ (thyroid) ~~0.020~~ 1.1×10^{-2} (bone)	~~0.6~~ 0.02 (whole body) ~~0.2~~ 0.01 (thyroid) ~~2.4~~ 0.13 (bone)
8.4	Sodium cold trap fire[9]	~~0.035~~ 1.6×10^{-3} (bone)	~~2.6~~ 0.8
8.5	Site suitability source term[10]	~~0.2~~ 5.2×10^{-2} (whole body) ~~2.8~~ 0.57 (thyroid) ~~1.2~~ 0.67 (bone) ~~0.2~~ 0.11 (lung)	~~28~~ 0.9 ~~185~~ 5.7 ~~239~~ 8.7 ~~37~~ 1.2
9.0	Hypothetical sequence of failures more severe than class 8[11]	~~0.17~~ 0.1 (whole body) ~~0.76~~ 0.31 (thyroid) ~~0.35~~ 0.2 (bone) ~~0.17~~ 0.2 (lung)	~~5.4×10^4~~ 1.8×10^3 ~~1.0×10^7~~ 3.1×10^5 ~~6.5×10^6~~ 2.0×10^5 ~~1.6×10^7~~ 5.0×10^5

Footnotes to Table 7.2 (Continued)

The choice of this source term is discussed in the site suitability report.

[10]The source term inside containment is assumed to consist of 100% of the noble gases, 25% of the halogens, 1% of the solid fission product inventory and 1% of the core plutonium inventory. This source term is judged to be suitably conservative for purposes of site evaluation, in accordance with the requirements of 10 CFR 100. The RCB is assumed to leak at a rate of 0.032% per day. The χ/Q value used was determined from onsite meteorological data at the 50% probability level. Plutonium dose factors were taken from Regulatory Guide 1.109.

[11]This category generally applies to accidents which have a lower probability of occurrence than design-basis accidents. The applicant and the staff have independently examined a spectrum of possible events leading to core disruption (see Section 7.1.3). Both have analyzed a range of consequences that might be associated with such events. The staff concluded that subsequent release of radioactive materials could be that resulting from long-term melt through (no large initial source) as well as from energetic disassembly of the core (large initial source). The event analyzed herein is one which involves a very large initial release. Specifically, an accident is postulated which results in a core release of 100% of the noble gases and volatiles, 10% of the solid fission product inventory, and 10% of the plutonium inventory. In this scenario, the volatiles, including halogens, are reduced to 10% of the core inventory and the solid fission products and fuel are reduced to 1% of the core inventory during passage out of the reactor vessel and into the outer containment building. Containment leakage is taken as proportional to the square root of the pressure for 24 hours, at which time containment integrity is assumed to be lost and all airborne material released to the environment. No air cleanup systems are assumed to operate during this period, but aerosol depletion due to fallout is assumed to occur. Consistent with the scenario, plutonium dose factors for a 0.5 μ particle size are used during the 2-hour exposure following the accident, but dose factors for 5.0 μ particle size are used for the release after containment failure at 24 hours. These particle sizes are derived from the HAARM-2 fallout calculations. Note that the cited site boundary doses are for the first two hours after core disruption. It is presumed that protective measures could be taken on behalf of individuals at that location prior to the release that was assumed to occur 24 hours after core disruption.