

Central Files

SEP 18 1974

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POTENTIAL EFFECTS ON BWR PRESSURE SUPPRESSION CONTAINMENTS DUE TO
REGULATORY GUIDE 1.7 REVISION (August 14, 1974)

A series of analyses were performed to determine the potential effects on BWR pressure suppression containments due to several proposed revisions to Regulatory Guide 1.7 dated August 14, 1974. The revisions that were considered include (1) a uniform metal-water reaction of all the metal in the outside surfaces of the cladding cylinders surrounding the fuel to a depth of 0.00023 inches and (2) consideration of either 4 v/o or 6 v/o as the hydrogen concentration limit in the containment volume. This study is a followup to that reported in an earlier memorandum dated January 28, 1974 (R. Cudlin to R. Tedesco) which used as a basis 1% of the mass of fuel cladding for the assumed extent of metal-water reaction.

The analysis performed was a boundary type since it was assumed that all the hydrogen evolved from metal-water reaction would remain in the drywell without mixing in the wetwell volume. In addition, the total surface area of active fuel cladding in each core was computed on the basis of 8 x 8 fuel assemblies (total surface area per assembly of 100.3 ft²) which are planned as reload fuel for those plants currently operating with 7 x 7 fuel (86.7 ft²) assemblies. The results of these analyses are listed in the attached table.

Inspection of the table indicates that all BWR plants would have initial hydrogen concentrations below 4 v/o following an assumed 3.23 mil corewide average metal-water reaction. In addition, all plants would have at a minimum, approximately two hours to initiate hydrogen control systems before reaching a hydrogen concentration of 4 v/o in the drywell. This time period is probably reasonable to allow currently installed containment atmosphere dilution (CAD) systems to be activated or, in the case of Mark III containments, to initiate drywell to containment mixing systems. Thus using these assumptions and assuming conformance with 50.46 BWR's may not require inerting of the containment.

If a hydrogen concentration limit of 6 v/o is observed, then certain BWR plants could have as long as approximately five days to initiate hydrogen control systems. Such justification would have to include the effects of incremental hydrogen burning. For the first two groups of plants (i.e., Oyster Creek through Shoreham), which had notices for CP issued prior to

R10-9
Containment
XIP-11

SEP 18 1974

November 5, 1970, the option could exist to rely on purging of the containment to maintain concentrations less than 6 v/o. This would be a function of radiological dose calculations performed for the individual plant and site.

/s/
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Directorate of Licensing

Enclosure:
As stated
cc: w/encl.
J. Glynn
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L - Reading
CSB - Reading
Subject File ✓

OFFICE	L:CSB <i>[Signature]</i>	JW:CSB <i>[Signature]</i>			
SURNAM	Cudlin:lt	GCLeinas			
DATE	9/18/74	9/18/74			

BWR HYDROGEN CAPABILITY STUDY

(0.23 mil corewide average reaction)

Plant	Power Level (MWt)	Drywell Volume (ft ³)	Active Fuel Clr. Surface Area (ft ²)*	Mass of Zr (lbs)	Initial H ₂ concentration in drywell (v/o)	Time to reach indicated flammability limit of H ₂ in drywell due to radiolysis per Reg. Guide 1.7**
Cyster Creek	1600	180,000	56,160	60,054	2.24	1.56 days
Nine Mile Point 1	1538	180,000	53,352	57,052	2.13	4.92 days
Dresden 2,3	2527	158,000	72,606	77,642	3.26	1.80 days
Millstone 1	2011	147,000	58,165	62,199	2.82	3.8 hrs.
Quad Cities 1,2	2511	158,000	72,606	77,642	3.26	10.2 hrs.
Brown's Ferry 1,2,3	3460	159,000	76,618	81,931	3.42	2.08 days
Monticello	1670	134,000	48,538	51,904	2.59	1.35 days
Vermont Yankee	1665	134,000	36,905	39,464	1.98	18.7 hrs.
Peach Bottom 2,3	3440	159,000	76,618	81,931	3.42	2.61 days
Cooper	2500	145,000	54,956	58,768	2.71	3.33 days
Pilgrim 1	1998	147,000	58,165	62,199	2.82	18.7 hrs.
Hatch 1	2537	146,000	56,160	60,054	2.75	1.56 days
Brunswick 1,2	2537	164,000	56,160	60,054	2.45	10.4 hrs.
Fitzpatrick	2535	150,000	56,160	60,054	2.58	7.5 hrs.
Duane Arnold	1658	109,000	36,905	39,464	2.43	13.2 hrs.
Shoreham	2435	192,000	56,160	60,054	2.10	8.7 hrs.
Fermi 2	3428	164,000	76,618	81,931	3.32	14.0 hrs.
Zimmer	2550	184,000	56,160	60,054	2.19	1.03 days
Hatch 2	2537	169,000	56,160	60,054	2.69	2.3 hrs.
Hanford 2	3459	202,000	76,618	81,931	2.71	20.9 hrs.
Hope Creek 1,2	3440	169,000	76,618	81,931	3.22	2.70 days
Limerick 1,2	3440	235,000	76,618	81,931	2.34	1.60 days
Bailey 1	2028	161,000	44,527	47,615	1.99	1.58 days
LaSalle	3440	209,000	76,618	81,931	2.62	23.0 hrs.
Susquehanna 1,2	3460	234,000	76,618	81,931	2.35	16.1 hrs.
Nine Mile Point 2	3489	230,000	76,618	81,931	2.39	1.13 days
Grand Gulf	4025	200,000	78,623	84,076	2.02	9.8 hrs.
GESSAR	3579	274,500	73,409	78,502	1.93	15.9 hrs.
						21.6 hrs.
						2.7 days
						3.2 days

* 8x8 fuel array assumed to give maximum H₂ release

** If a positive means of mixing the drywell and wetwell volumes were provided, the times to reach the hydrogen flammability limit would be increased. Mark III containments (e.g., Grand Gulf and GESSAR) are proposing such systems.