

1400MWe PWR

*, ,

150

103-16

1962

TID-14844

NRC

TID-14844

NUREG-1465

40

1400MWe 가

NUREG-1465

30

, Xe

I/Cs/Te/Ba

NUREG-1465

MELCOR1.8.4

1400MWe

가

Abstract

TID-14844, which was issued in 1962, has been used for regulatory applications of source term under design basis accidents. But recently, USNRC issued NUREG-1465 for regulatory purposes, which represented more realistic source term than TID-14844 did. NUREG-1465 was based upon research results and insights for accident source terms obtained over 40 years in PWRs. In order to keep up with these trends, in-containment source term calculations for LLOCA (Large Loss of Coolant Accident) at 1400MWe PWRs is calculated and compared with NUREG-1465 source term. According to the results, in case of emergency safety injection recovery at 30 minutes into the accident, maximum atmospheric concentration of I/Cs/Te/Ba radionuclide groups appeared to be a little larger than NUREG-1465 source term while Xe is smaller. This study provides not only new source term data using MELCOR1.8.4 and its state-of-the-art models but also evaluating basis for mitigation capability under severe accidents at 1400MWe PWR.

1.

TMI 가
(PHEBUS [1], ISP44 [2])
가 (:
MELCOR 1.8.5 RN)
MELCOR
가
, NRC
(10CFR50) (Revised or New Source Term)
Regulatory Guide 1.183 [3] , NRC
(Arg. 1986; 51FR28044)
(2000.7)
가 /
1400MWe 가 가
(Large Loss of Coolant Accident : LLOCA)
2 MELCOR [4] State-of-the-Art
(1.8.4)
2.
(+ + +)
가 가
가 (Success Criteria) 4
(SIP) 2 (= 140 kg/) 가 30
가 IRWST
(In-Containment Refueling Water Storage Tank)

Term)

(Bounding Calculation)

가 .

3.

< .1>

< .1> < .5>

	[]
	100
	100
	100.14
	101.17
	109.46
(Ring2/Ring1/Ring3) (cell ≥ (=1173K))	122/139/1113
	302
(Ring1/Ring2/Ring3) (UO ₂)	1399/1407/1446
	1899

.1

100 (steady-state)

100 (guillotine break) 0.9116 m² (=

21 x) 2

가 (MSIV)가

가 (cavitation)

(< .1>) 10 (= 610 Psia) 4 (=

200) (SIT) 가 (< .2>). SIT

가

(< .3>). 가 (1/2)

가 1173 K (< .4>) 122 139

(gap release) (3)

(SIP) 가 (=

1825 Psia)

(safety Injection Actuation Signal)

SIP가
 30 SIP가
 가 (< .5 >). < .1> 3
 . SIT SIP < .3>
 SIP
 1300 1800 UO₂
 (fuel release) . SIP
 . SIP 가 IRWST

4.

3800) 30 (=)
 (pool) (deposition) (settlement)
 (*.AT)
 TID-14844 NUREG-1465 [5]
 (pool) (*.PL)
 (*.TOT)

CCI (Corium Concrete Interaction)

< .2>
 () NUREG-1465 (=)
 (early in-vessel release) MELCOR
 NUREG-1465 cell 가 (=1173K) (puff-
 type) cell radial ring
 . NUREG-1465 16 MELCOR
 9 MAAP (mapping) . Xe CsI
 < .6> < .7>

(Xe) 80%가 가
 CsI 80%가
 50%가
 가 . Cs Te CsI ,
 MELCOR 3가 (CORSOR, CORSOR-M, CORSOR-
 BOOTH)
 ([6])
 CORSOR-M CORSOR
 Te 50% 10%
 < .8> Ba (Sr) 10% 가
 22.5% . NUREG-
 1465 (Low Zr Oxidation case < 50%)
 NUREG-1465 (High Zr Oxidation case > 50%)
 가 가 가

* :

			*
/	LLOCA	300 /~5	900 /~15
	N-1465	NA/~30	NA/~1.3
Xe(1)	LLOCA	0.05	0.8
	N-1465		1.0
CsI(16)	LLOCA	0.05	0.5
	N-1465		0.40
Cs(2)	LLOCA	0.05	0.5
	N-1465		0.30
Te(5)+Cd(11)	LLOCA	0.0	0.1** (0.5)
	N-1465 (N-5747)		0.05 (0.15)
Ba(3)	LLOCA	0.0	0.08
	N-1465(Mean/Median/75 th)		0.02 (0.04/0.003/0.009)

.2 NUREG-1465

5.

** CORSOR

MELCOR1.8.4

()

30

가

30

가

15 () NUREG-1465

1/5 (Xe) 80%가

NUREG-1465 100% , Xe

I/Cs/Te/Ba NUREG-1465

15 Xe/I/Cs/Te/Ba

5%

TID-14844 NUREG-1465

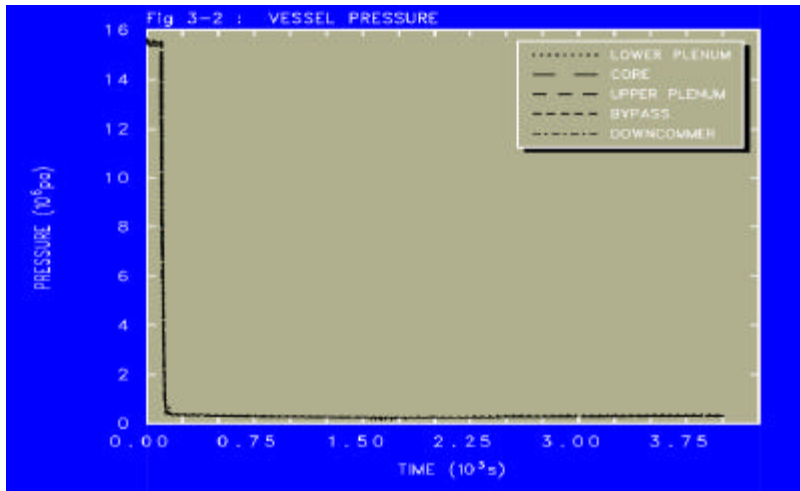
15 가 30

MELCOR1.8.4

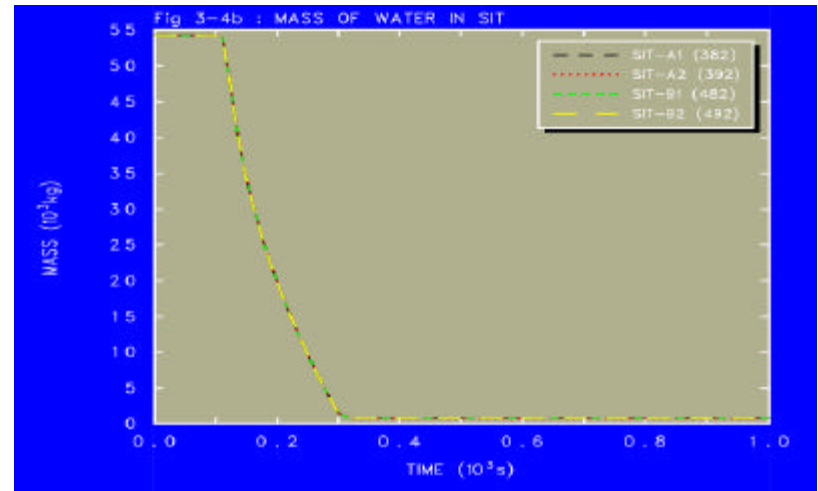
1400MWe

가

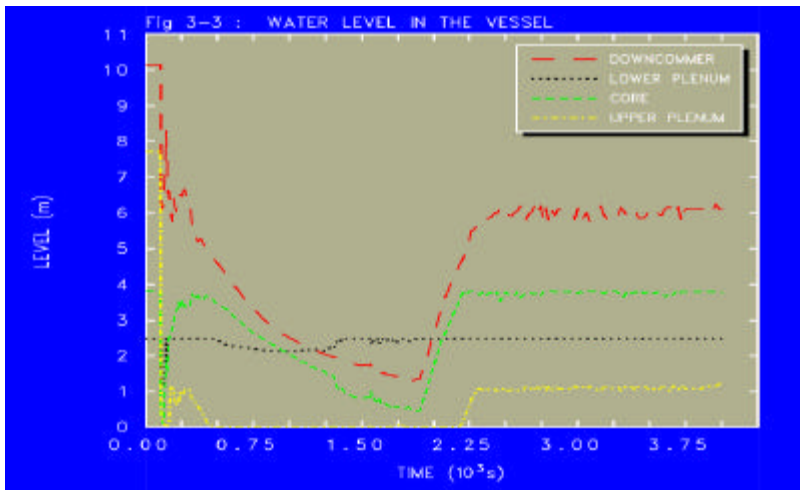
1. W.Krischer and M.C.Rubinstein (1992), "The PHEBUS Fission Product Project", Elsevier Applied Science
2. Y.M.Song (2001), MELCOR 1.8.4 KAEVER
- ISP44, Proceedings of the KNS '2001 Spring Meeting.
3. USNRC (2000), Regulatory Guide 1.183: Alternative Radiological Source Term for Evaluating Design Basis Accidents at Nuclear Power Reactors.
4. SNL (1990), MELCOR Computer Code Manuals, NUREG/CR -6119, SAND97-2398.
5. USNRC (1995), Accident Source Terms for Light Water Nuclear Power Plants, NUREG-1465.
6. KAERI (1998), MELCOR1.8.4 PHEBUS FPT1 , KAERI/TR-989/98.



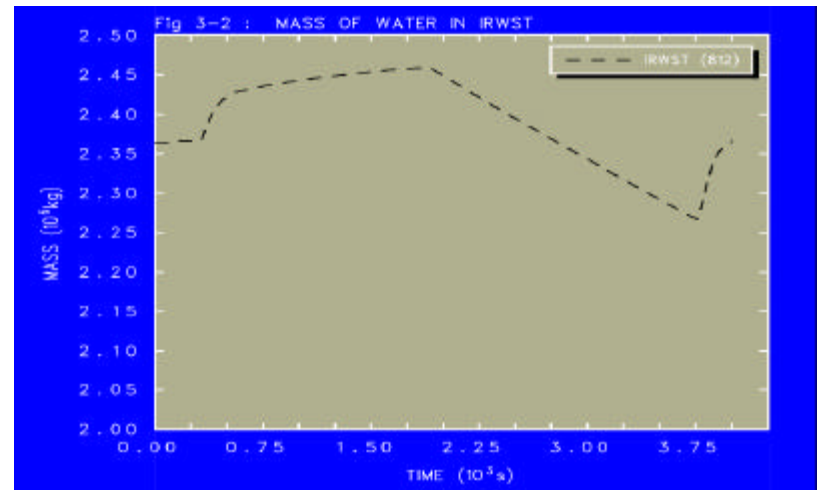
.1



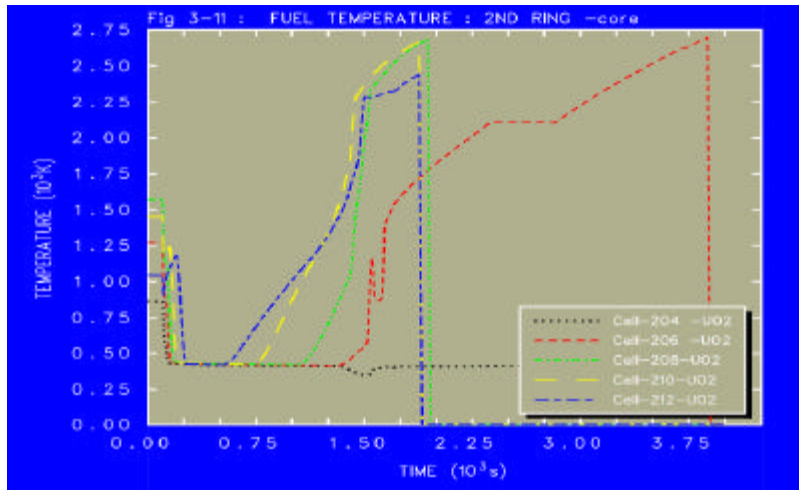
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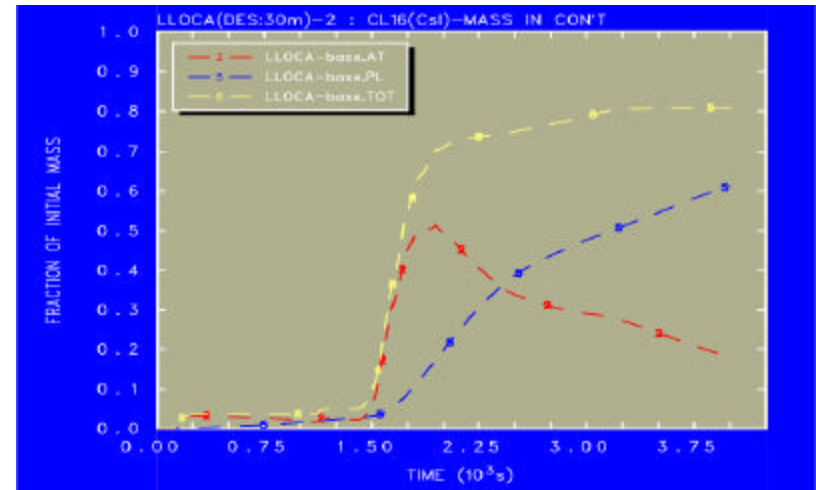
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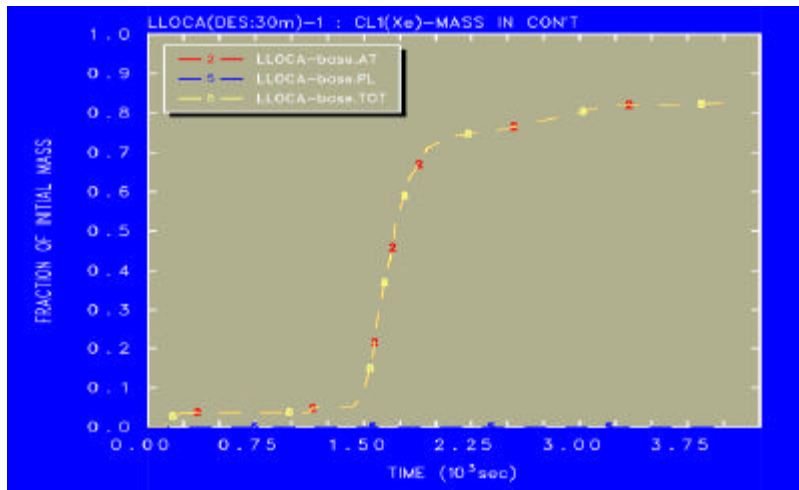
.4 IRWST



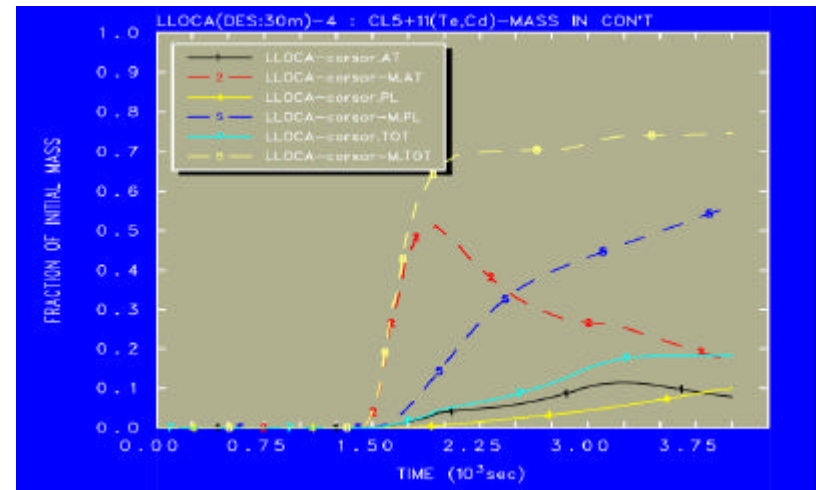
.5 (2)



.7 CsI



.6 Xe



.8 Te