

**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 <sub>2</sub> )	1399/1407/1446
	1899

.1

100 (steady-state)  
 100 (guillotine break) 0.9116 m<sup>2</sup> (= 21 x )  
 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 UO<sub>2</sub>  
 (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 <sup>th</sup> )		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

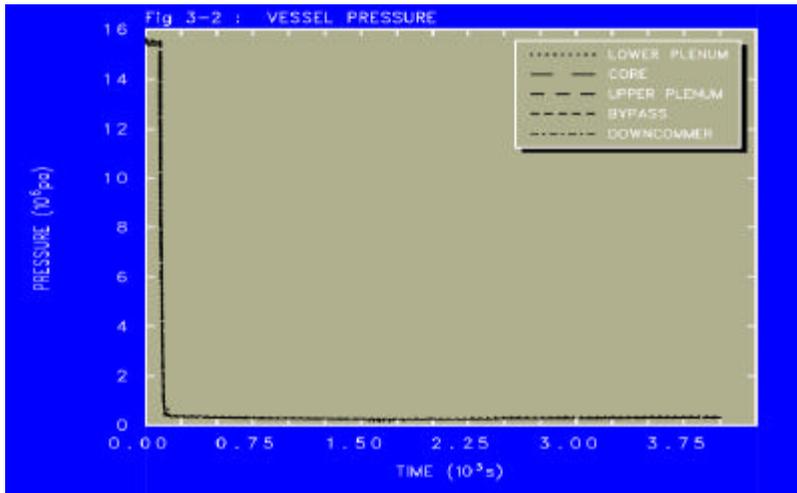
15 가 30

MELCOR1.8.4

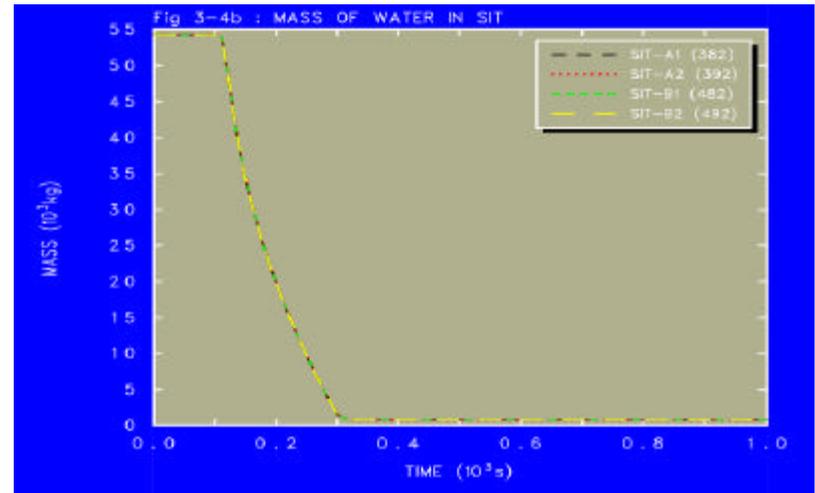
1400MWe

가

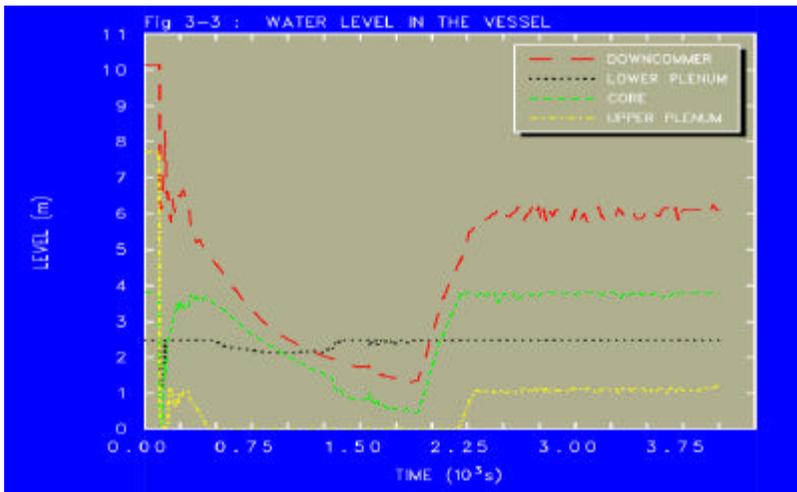
1. W.Krischer and M.C.Rubinstein (1992), "The PHEBUS Fission Product Project", Elsevier Applied Science
2. Y.M.Song (2001), MELCOR 1.8.4 KAEVER  
- ISP44, Proceedings of the KNS '2001 Spring Meeting.
3. USNRC (2000), Regulatory Guide 1.183: Alternative Radiological Source Term for Evaluating Design Basis 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.



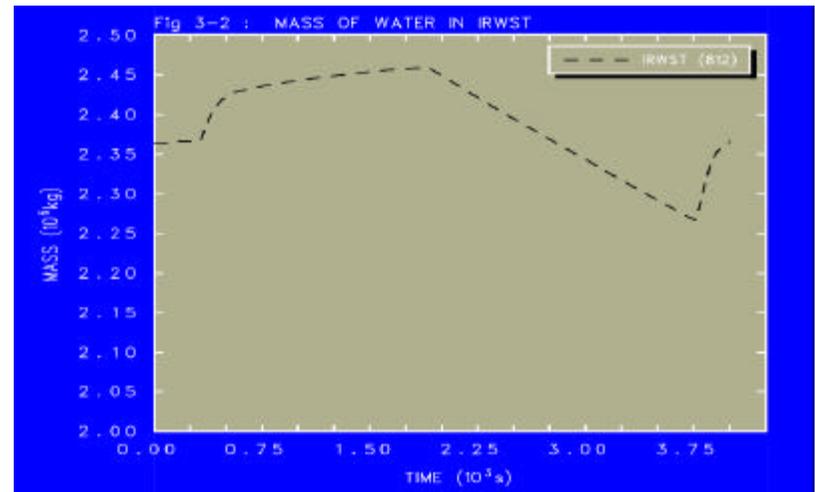
.1



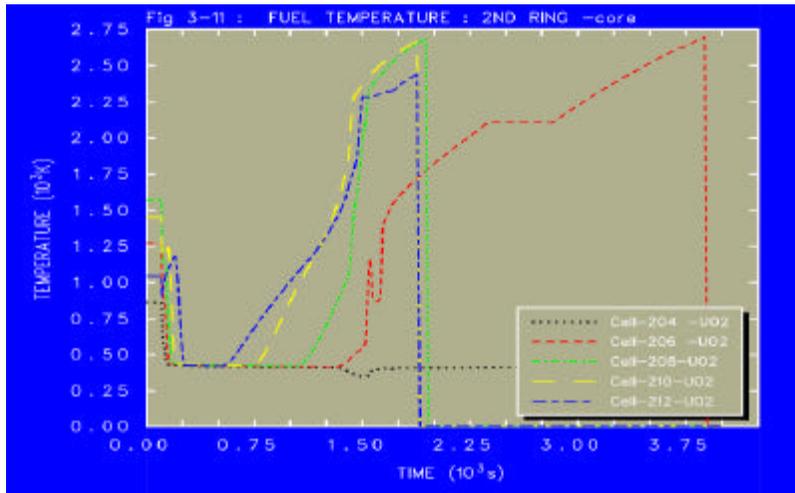
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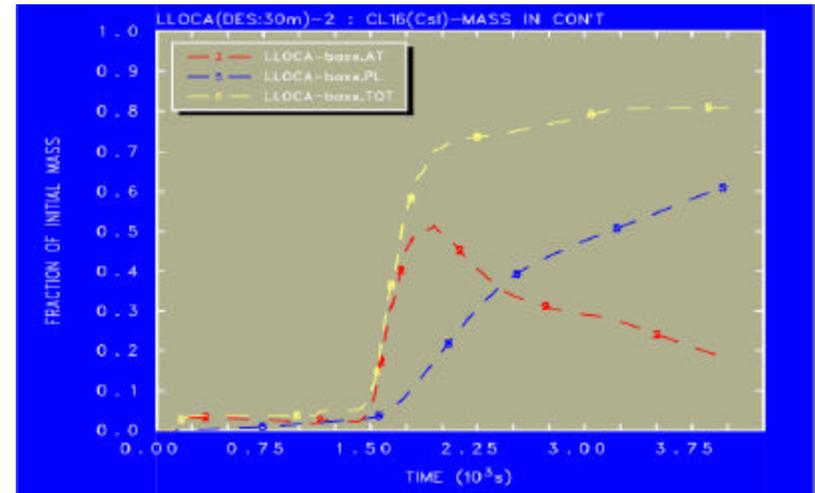
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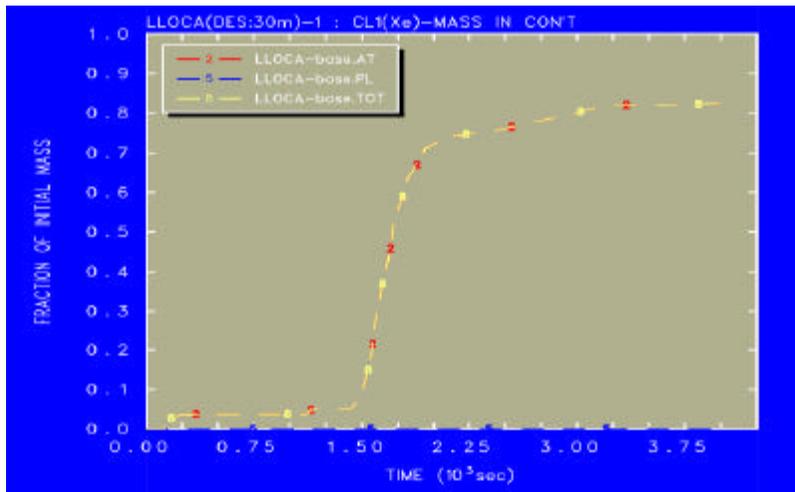
.4 IRWST



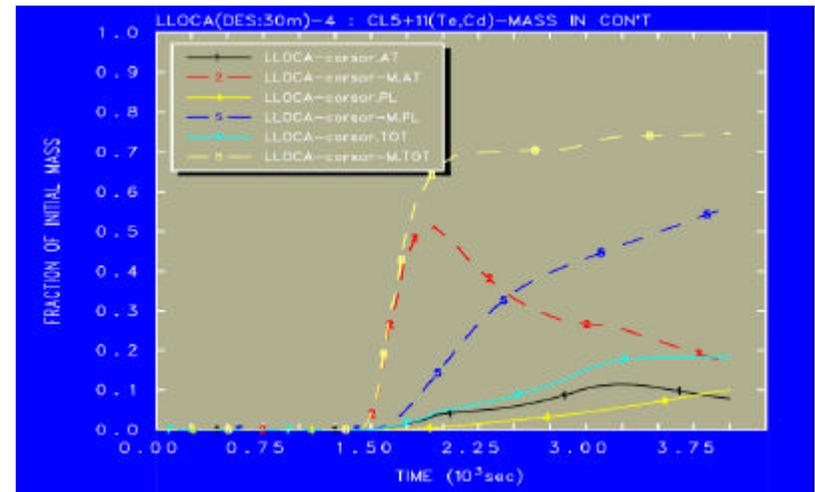
.5 (2 )



.7 CsI



.6 Xe



.8 Te