

KALIMER Preliminary KALIMER Containment Performance Analysis Under Sodium Spray Fire Conditions

105

KALIMER (Korea Advanced Liquid Metal Reactor)

75kg, 10, 60) CONTAIN-LMR, MACCS 가 (1, 60 가, 1, 10 가

Abstract

As a part of containment performance analyses for KALIMER (Korea Advanced Liquid Metal Reactor), which is under development at Korea Atomic Energy Research Institute (KAERI), a preliminary containment performance analysis under sodium spray fire accident conditions has been attempted. Sodium spray fires have a potential to increase containment pressure very rapidly. In this study, the containment performance has been analyzed assuming that 75kg of sodium is sprayed to containment dome due to the accident causing vessel head breach. The sodium spraying time (1sec, 10sec, 60sec) has been selected as sensitivity parameters for analysis with CONTAIN-LMR code. The exposure dose rate at the plant site boundary has been estimated with MACCS code based on the CONTAIN-LMR analysis results. Results show that the peak containment pressure increases with shorter sodium spraying time. However, the highest exposure dose rates occur when the spraying time is 60 sec, which is due to the combined effect of containment dome pressure and sodium spraying time.

I.

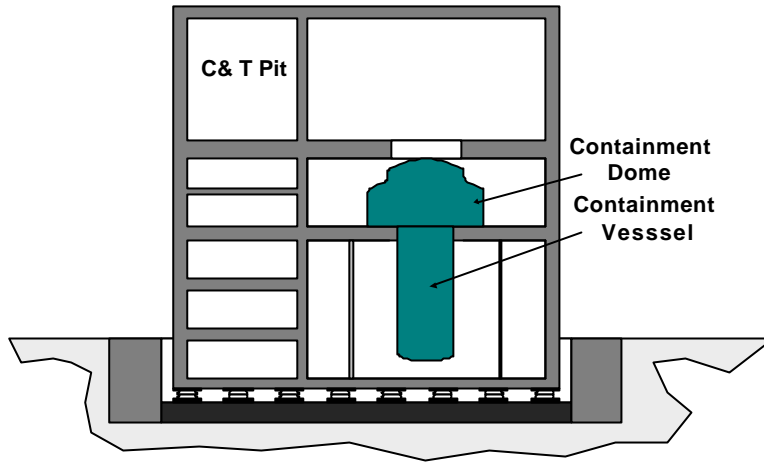
가

(Liquid Metal Reactor : LMR) 가 ,

LMR KALIMER[1] (

1) . LMR

가 [2,3,4],



1 KALIMER

. KALIMER

. , KALIMER

1

1 KALIMER

	1111.4m ³
	14.63m
	38°C
	0psig
	100%
	25psig
	1%(vol)/day
	421,000kg
	6.92m
	503°C
가	90.3m ³
	6.92m
	16.9psig
	503°C
	He
	25°C
	7cm ²

가

(Hypothetical Core Dis-

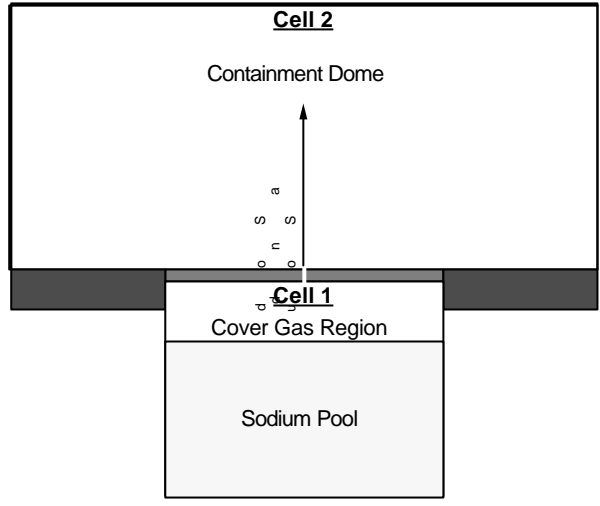
ruptive Accident : HCDA)가

HCDA

가

가

가



2

II.

HCDA 가 , 가 가
 가 , . 가
 1 가 , 2 .
 가 가 가 가 CONTAIN-
 LMR[5] 1 . 가
 54 , “ ”,

2

	(0~54sec)	(54sec~55sec)	(54sec~64sec)	(54sec~114sec)
		Case 1	Case 2	Case 3
Nobel gas (Xe, Kr)	100%		0%	
Halogens (Br, I)	0.1%		0.01785%	
Alkali metals (Cs, Rb)	0.1%		0.01785%	
Te, Ru	0.1%		0.01785%	
Sr, Ba	0.01%		0.01785%	
Fuel & other F/Ps	0.01%		0.01785%	
Na22, Na24	None		0.01785%	

가 가 가 0 54 .

75kg

“ ” KALIMER ALMR[6]

, “ ”

2 .

III.

CONTAIN LMR CON-

TAIN-LMR

2 Case 1, 2, 3
(3 ~ 9) .

3

가

3

4

5

가

(54)

가

가,

가

가

가

가

가

. (6)

가

가

0 .

6

가

가

300

Case

3

5

가

가

7

..

8

. 1000

가

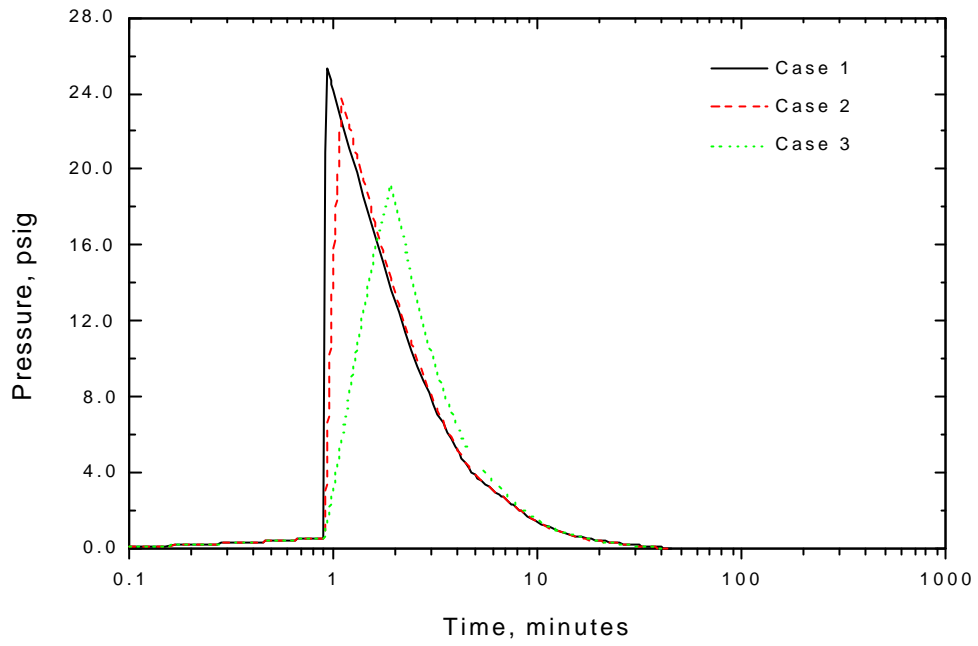
3 Case

	75kg		
		(psig)/ (min.)	(°F)/ (min.)
Case 1	1	25.3/0.93	1114.5/0.93
Case 2	10	23.7/1.1	1056.6/1.1
Case 3	60	19.18/1.92	886.62/1.92

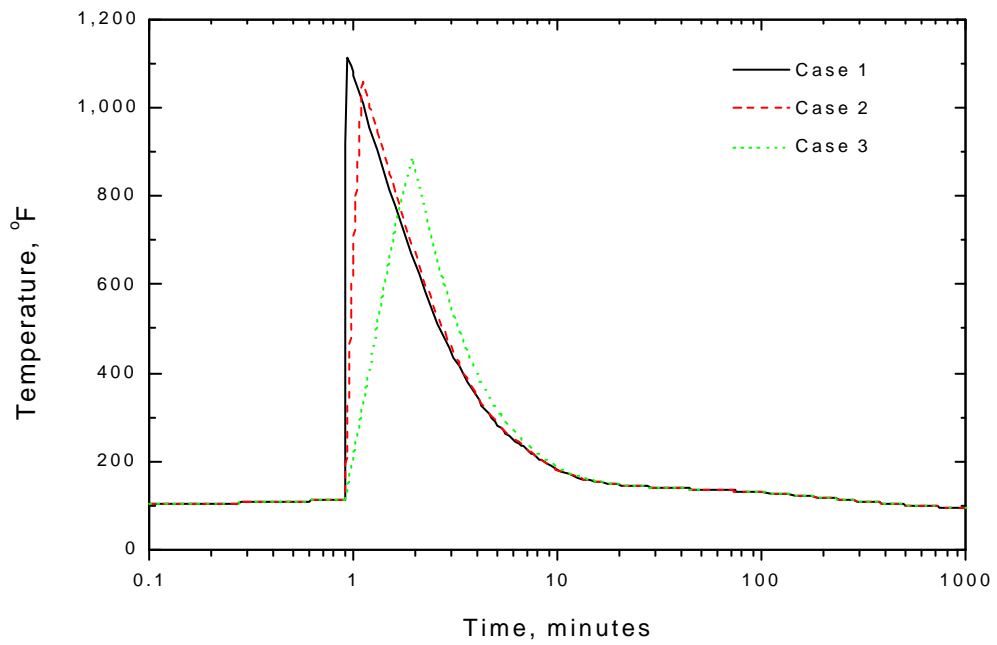
가 Case 3 가 가 9
 . 1000
 가 , . Case
 MACCS[7] . 가 .
 3/4 ..
 4 . Case 3 가
 가 Case 1, Case 2가 가
 ,
 Case 1 가
 가 , Case 3 가
 Case 1 1 가
 , 가 , 1
 Case 3 .
 Case 3 ,

4 (rem)

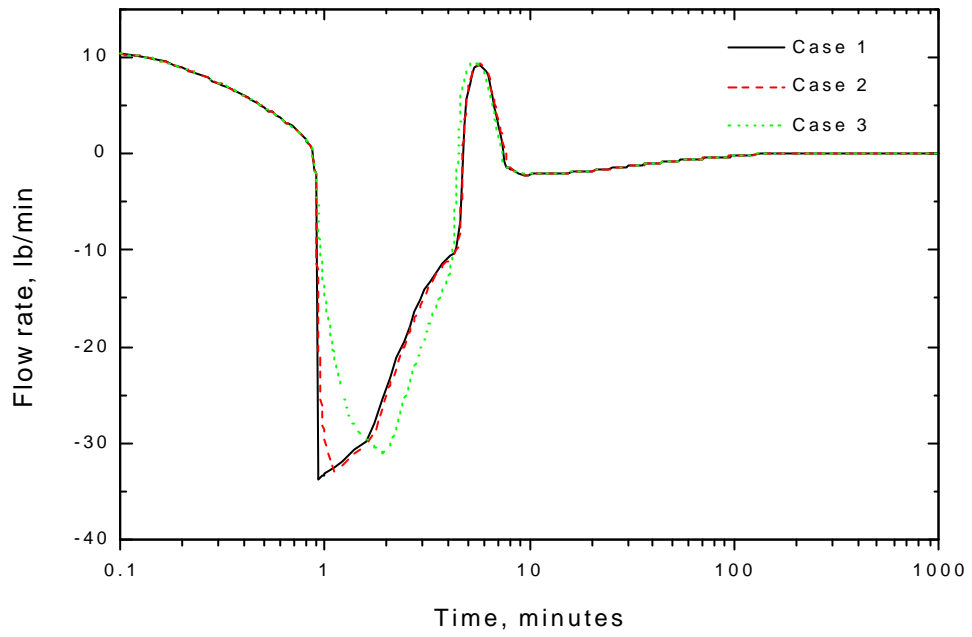
	Case 1	Case 2	Case 3	PAG
	0.023	0.022	0.023	1.0
	0.024	0.022	0.023	1.25
	0.031	0.030	0.031	1.25
	0.036	0.035	0.037	5.0



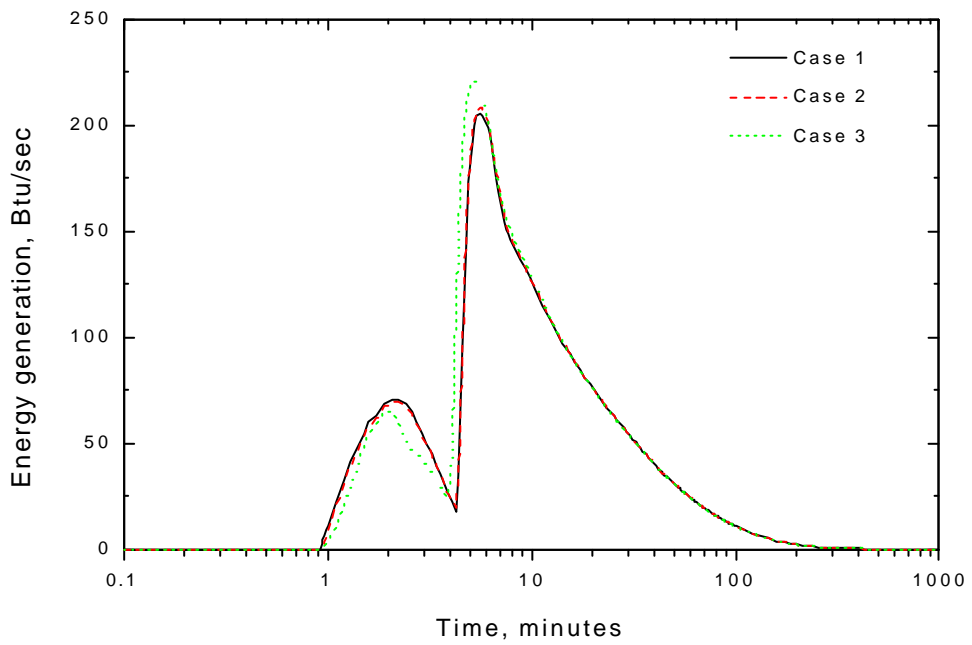
3



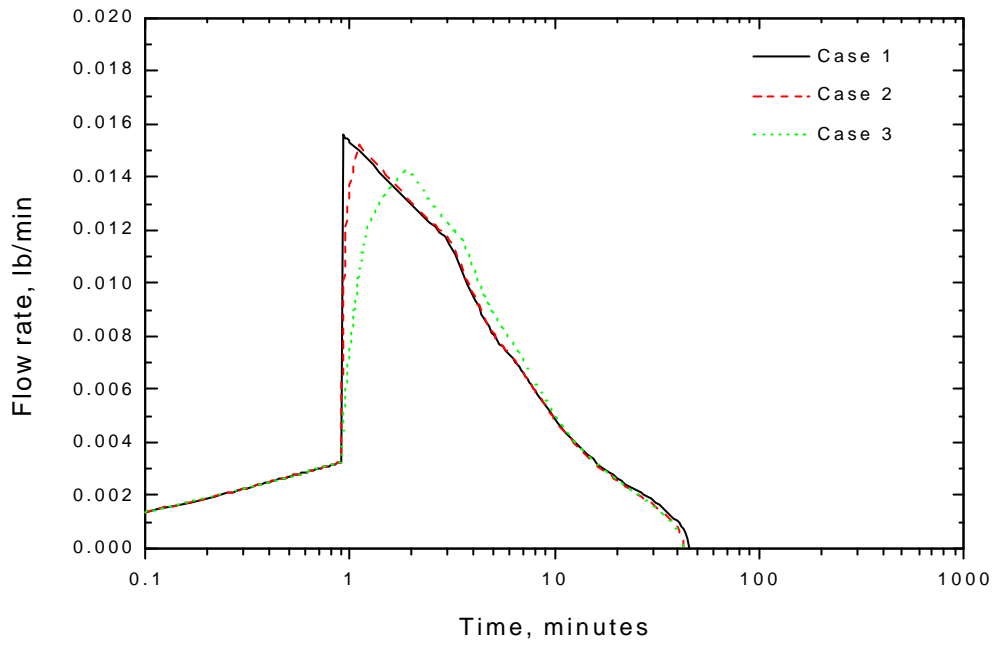
4



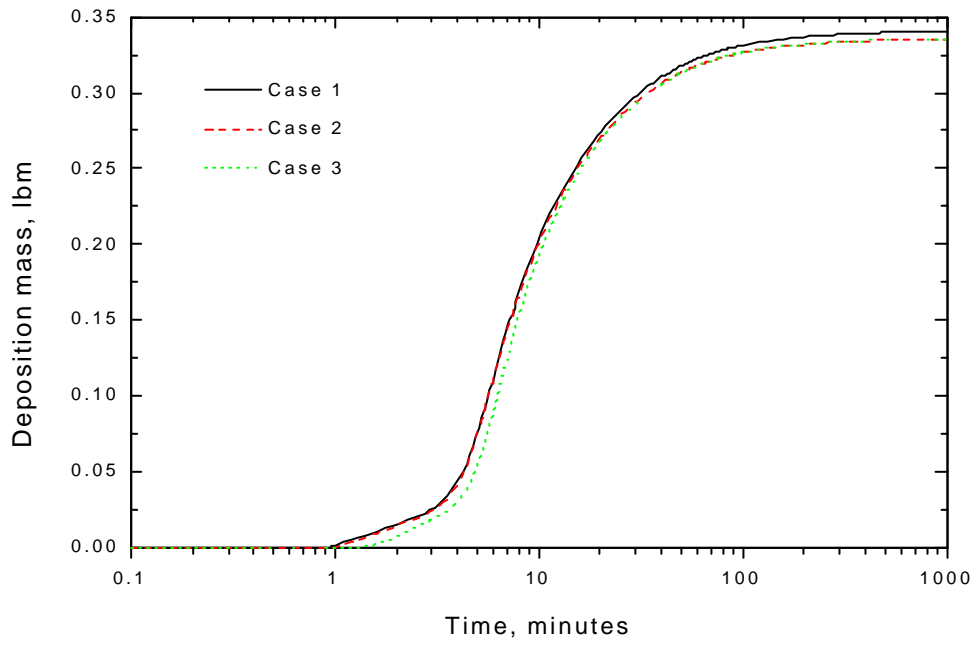
5 가



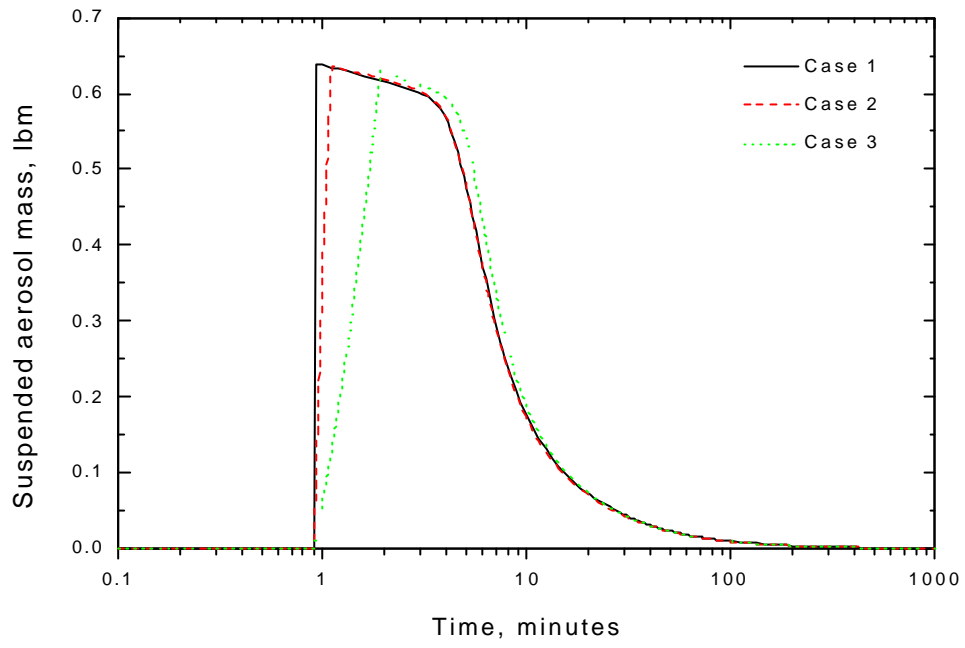
6 가



7



8



9

IV.

KALIMER

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KALIMER

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- [1] C.K. Park, et al., "KALIMER Design Concept", *KAERI/TR-888/97*.
- [2] S.W. Lee, et. al., "Preliminary Design Study of the KALIMER Containment Dome", *Proc. of KNS Atm. Meeting*, 1998.
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- [4] , "KALIMER ", *KAERI/TR-1240/99*, 1999.
- [5] K.K. Murata, et. al., "User's manual for contain 1.1, A Computer Code for Severe Nuclear Reactor Accident Containment Analysis", *NUREG/CR-5026 SAND87-2309*.
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