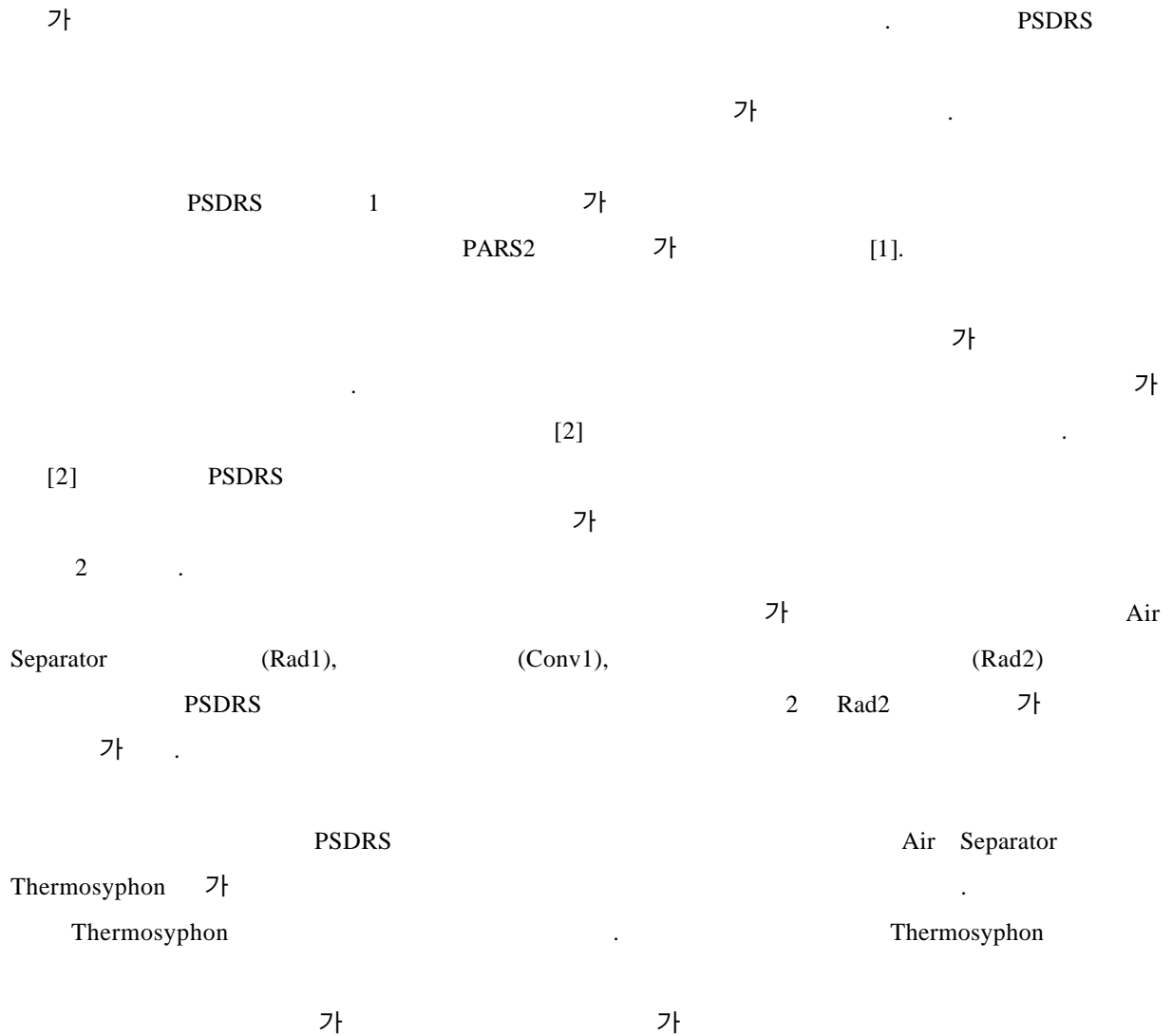


region. The total heat transfer rate by the modified case showed about 20~40% increase relative to the reference one.

1.

KALIMER

PSDRS (Passive Safety Decay Heat Removal System)



2.

Thermosyphon

PSDRS

2.1 Thermosyphon

Themosyphon Heat Pipe , 가

. Thermosyphon Heat Pipe

. , Heat Pipe

Wick

Heat Pipe

가

Thermosyphon Wick

가

PSDRS

가

Heat Pipe

Thermosyphon

, Heat Pipe

3 MWe

(Dry Cooling System)

[3]가

Heat Pipe

[3]

5cm

22.9m

Heat Pipe 140,000

-60 ~100

[4].

Heat Pipe

Wick

[4].

Wick

d_{pore}

$$d_{pore} = \frac{4s \cos \theta}{rgh}$$

(1)

100

5 m

가

~ 5 mm

Thermosyphon Heat Pipe

가

o

o

o

o

o

()

()가

가

가

compact

Thermosyphon Heat Pipe

-200 ~2000

30 ~200

가

[4].

3 Thermosyphon

- (Two-Phase Closed)

Thermosyphon

가

45:55 10%

Thermosyphon

7 8

1

65:35 가

Thermosyphon 가

40% 9 가

Thermosyphon (10

10%)

(1).

()가 가

Thermosyphon 가 125 133

Thermosyphon 가

Thermosyphon

가 20% 40% PSDRS가 Thermosyphon

PSDRS 가

Thermosyphon () 가

가 PSDRS

가 가

Churchill&Chu [8] 10m, 50

5 W/m² 2 5MW 가 , ,

가 8m, 8m, 10m 가 [3]

3.

Thermosyphon(Heat Pipe)

Thermosyphon Heat Pipe

Thermosyphon 가

Thermosyphon 20~40%

PSDRS Thermosyphon

가 PARS2

Thermosyphon
 Thermosyphon 가
 가 10
 Thermosyphon
 Thermosyphon 가 가

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2. Y.S. Sim et al., Heat Transfer Enhancement by Radiation Structures for An Air Channel of LMR Decay Heat Removal, Nuclear Engineering and Design, 199, pp. 167-186, 2000
3. A.S. Robertson and E.C. Cady, Heat Pipe Dry Cooling for Electrical Generating Stations, Proceedings of the 4th Int. Heat Pipe Conf., 7-10 Sep. 1981, London, UK, pp. 745-758
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5. Y. Lee and U. Mital, A Two-Phase Closed Thermosyphon, Int. J. Heat Mass Transfer, Vol. 15, pp. 1695-1707, 1972
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8. Adrian Bejan, Convection Heat Transfer, John Wiley & Sons, 1984

Nomenclature

Notations

d : [m]
 g : 가 [m/s²]
 \dot{m} : [kg/s]
 Q : [MW]
 T : []

TS: thermosyphon

s : [N/m]

r : [kg/m³]

q : [degree]

Subscripts

air:

avg:

conv1: (convection)

in:

pore: Wick() ()

rad: (radiation)

total: ()

1 PSDRS Thermosyphon PSDRS 가

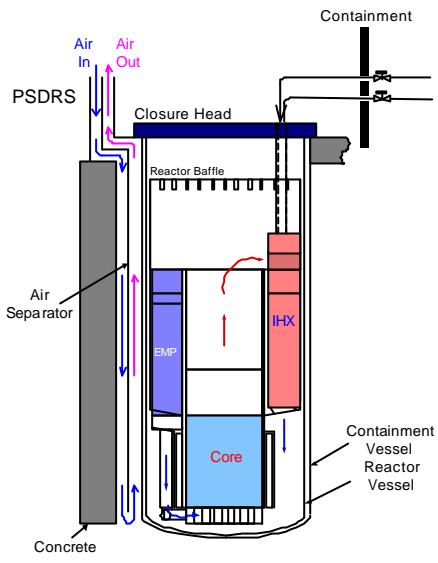
Case	T _{avg} (°C)			Q _{rad}		Q _{conv1}		Q _{total} (MW)	Air				Remark
	Na	Wall ¹⁾	Air ²⁾	MW	%	MW	%		T _{out} (°C)	n&	Q _{air} (MW)	$\frac{Q_{air}}{Q_{total}}$	
PSDRS	515	288	40	.947	44.2	1.196	55.8	2.143	139	22	2.143	1.0	
	710	462	40	1.835	47.6	2.023	52.4	3.858	160	23	3.858	1.0	
PSDRS using Thermosyphon	515	150	40	1.525	60.0	1.016	40.0	2.541	128	21	1.311	.52	
	515	125	40	1.580	61.3	.997	38.7	2.577	127	21	1.184	.46	
	710	125	40	3.856	71.5	1.538	28.5	5.394	133	21	1.712	.32	

1) PSDRS Air Separator Thermosyphon Thermosyphon
2)

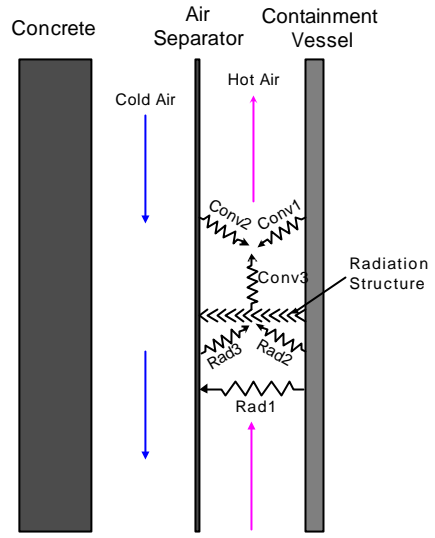
2 가

		1)					
5MW	10m	50°C	2.5cm	5cm	2×10 ⁴ m ²	25,460	640m ³ (8m×8m× 10m)

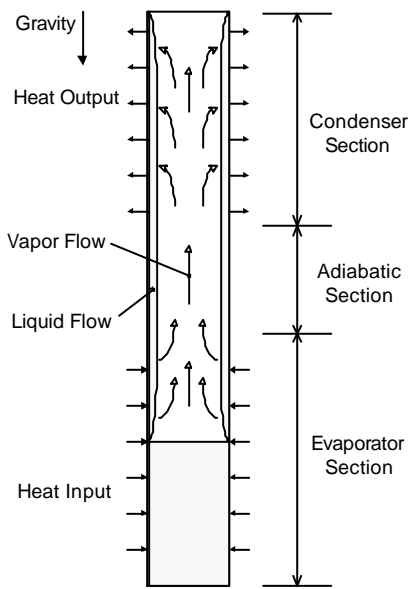
1) Thermosyphon



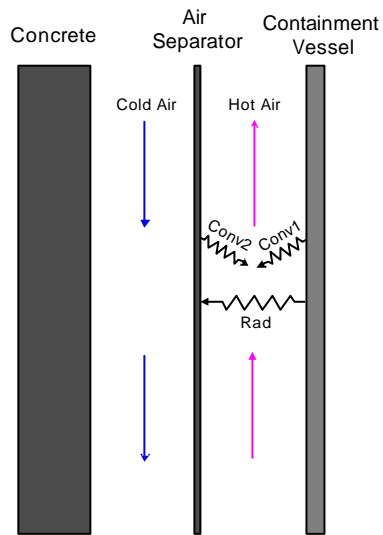
1 PSDRS



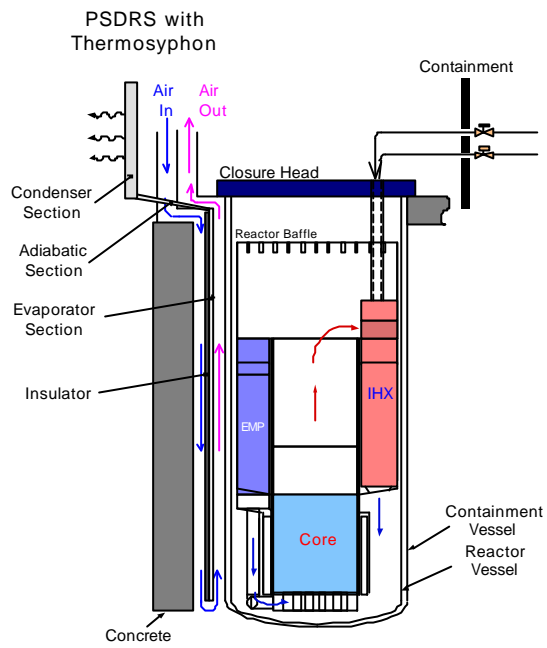
2 PSDRS



3 - Thermosyphon

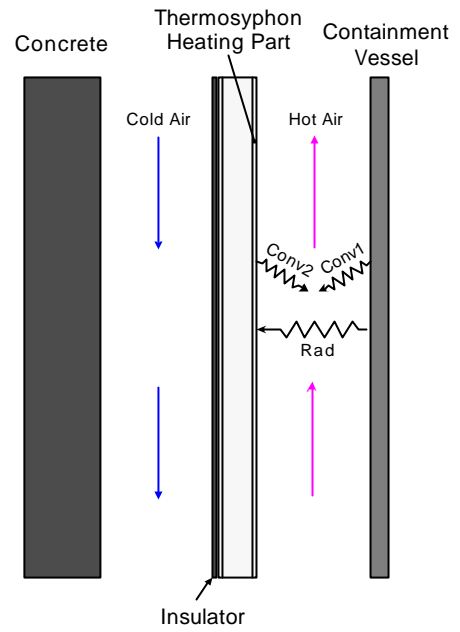


4 PSDRS



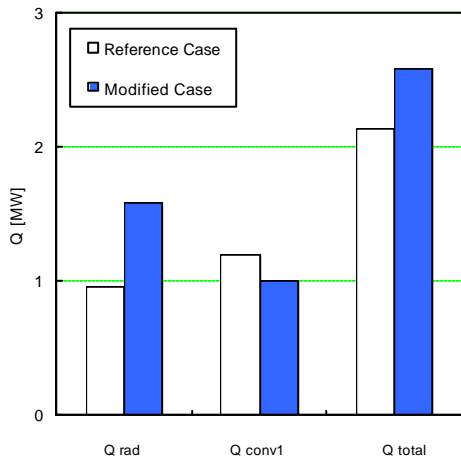
5 Thermosyphon

PSDRS



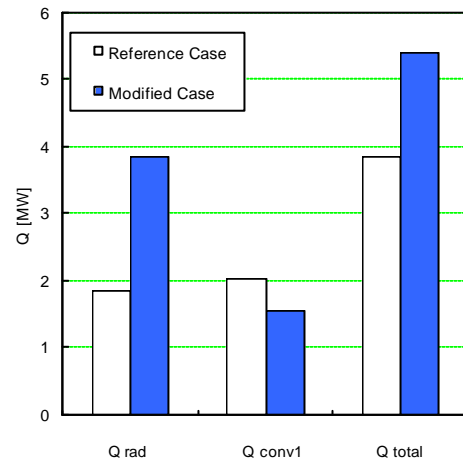
6 Thermosyphon

PSDRS



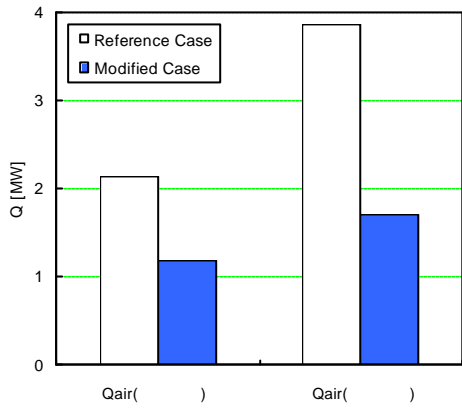
7

PSDRS

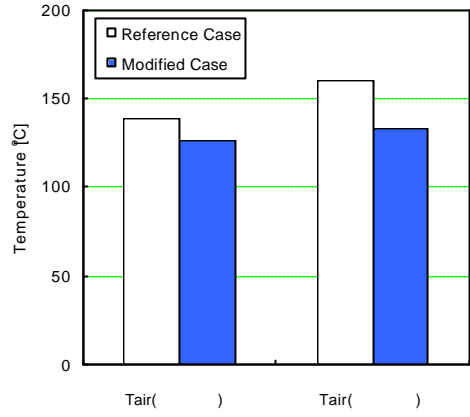


8

PSDRS



9 PSDRS



10 PSDRS