

Establishment and Evaluation of Reactor Transient Analyzing System for Kori Unit 3/4



3/4

RETRAN-3D

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Abstract

The best-estimate(B-E) thermal-hydraulic programs, such as RETRAN, MARS and RELAP etc, are used only by a few experts due to the complexity involved in input preparation including control logic required for a realistic plant transient analysis. Korea Atomic Energy Research Institute has established "Reactor Transient Analyzing System (RTAS)" for the purpose of easy use of B-E codes and effective EOP analysis without an additional control input for manual operation. RTAS, with features of an interactive manual control function and a plant mimic window, has a capability to simulate Emergency Operating Procedure (EOP) for Loss-of-Coolant Accident (LOCA) and Non-LOCA transients using MARS and RETRAN, respectively. In this study, the generation of input and Steam Generator Tube Rupture (SGTR) simulation for Kori-3/4 units based on EOP have been performed to evaluate the capability of RTAS and it is found that the-state-of-art simulation for SGTR is possible in an effective manner, with the basic input of RTAS.

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	RETRAN-3D	MARS	
(Reactor Transi	ent Analyzing System)		
1. RETRAN-3D	MARS		
2. 가			editor
3.		가 가	visual & interactive control
window			
フト			
		가	
가			
			MARS
		Non LOCA	NSSS DETDAN
		NOII-LOCA	KEIKAN
	가	•	
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RETRAN-3D

RETRAN-3D	. RETRAN-3D

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2.1 RETRAN-3D

3/4 Westinghouse 3 loop (NSSS) BOP , 가 가 , 6 , 가 4가 1 8 2 10 . 1 2 (Inlet/Outlet Plenum) (Tube

(Crossover Leg) . 가 기

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Point Kinetics Model

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3/4

1.

nodalization

2.2 RETRAN-3D

가 , 가 , , Runback , , " 3/4 ", "Control Block Diagram", , ,, ,, " "Functional Diagram", " 5,6 . , Permissive/Control Interlock, 가 . , 가 , 가 가 가 a) , , c) 1/3 b) d) . . 가 2/3 • . 가 5 / • [1] RETRAN-3D . 3. 'S/G 3/4 (flow chart) 2 .

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RCS

3가



2. 3/4

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4.1

1.	3/4	(1000 null tr	ransient)	
				(%)
	(MWt)	2775.0	2774.5	0.0
가	(kg/cm²)	158.2	158.1	-0.1
가	(%)	58.0	58.0	0.0
	(kg/s)	4580.4 (x 3)	4580.4 (x 3)	0.0
	()	326.7	326.6	0.0
	()	291.7	292.1	0.1
	()	309.2	309.3	0.0
	(kg/cm²)	68.2	68.2	0.0
	(%)	50.0	50.0	0.0
	(kg/s)	516.2 (x 3)	516.2 (x 3)	0.0
	(kg/s)	516.2 (×3)	516.2 (×3)	0.0



3/4

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가 6 % . 가 RCS 가 RCS 가 1 가 5 % RTD RCS 11 가 RTD 77 kg 가 260 /cm² 가 13 가 가 • 650 3). 가 (가 가 가 1 · 가 가 . BIT P-11 0 SI manual block trip "ON" 가 . 가 가 1/2 가 가 • 가 가 • 1/2RCP RCP 1 2 RCP , 가 가 1 RCP , 'S/G 'S/G • ,

. 2		
()		
1.0	1 (3)	
9.6	가 'On'	
100.4	가 < P-11	
106.5	(7))	
108.1	(フト)	
120.7		
194.5	MSIV	
249.0 ~ 271.0	RCS ()	
664.0		
678.0	フト /	
722.6		
1417.0	1 RCP	
1600.0		
1778.0		
4500.0	(: 175)	

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4.2

nodalization 가 •

1 15 ~ 18 .

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NSSS .

, RETRAN-3D

가 5

가 가

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가

















































16. (175)





(175)

ect Ce	sicelat	CPU Tin tion Data System	n Mimic Nodalization T	psed Time : 1301.30 ip Messages / Interact	sec ive Control			•*
Trip Messages				Interactive Control				
ie(sec)	Ð	Trip condition	Description	Description	Value	Auto/Manual	Trip/Target	Setpoint/Rate
186E+2	45	F at 1.206E+2	PZR L-L PRES	SGTL BREAK	The	🗹 Auto 🗔 Manual	6	1.0
07E+2	338	F at 1.207E+2 F at 1.207E+2	EVIS ST/P-14	SALT BREAK	False	Auto T Manual	ø	1000000.0
07E+2	340	F at 1.207E+2	ST/NEWP THIP	PORV#1/3	0.0000	Auto Distanual	0.00	0.6
87E+2	341	F at 1.287E+2	SG1 HD	DB7 DODAH2	0.0000		0.00	0.el
07E+2	342	F at 1.20/E+2	562 MD 563 MD	PRE FURYAL	0.000		10.00	
6E+2	173	F at 1.216E+2	\$69 L-L LUL	SPRAYLOUPT	10.0000	🔲 Auto 🔀 Manual	1 10.00}	10.6
22E+2	172	F at 1.222E+2	SG2 L-L LUL	SPRAY LOOP2	10.0000	🔲 Auto 🗹 Manual	10.00	10.0
226+2	345	F at 1.222E-2	SS L-L LVL(2)	SG 1 PORV	0.0000	Auto 🛄 Manual	0.00	0.0
226+2	347	F at 1.222E+2	567 TB	56.2 PORV	0.0000	Auto C Manual	0.00	0.0
226+2	348	F at 1.222E-2	593 TD	36.3P08V	0.0000	Anton [] Married	0.00	0.0
23E+2	171	F at 1.223E+2	SG1 L-L LUL	and the second s	0.0000		0.00	20.6
07E+2	107	F at 1.307E+2	L0-19	14 31 4 1	ance	Aux Manual		20.0
SE+2	61	R at 6.145E-2	PZR 10 LUL R	NSIV.2	100.0000	🛄 Auto 🗹 Manual	100.00	6.6
15E+2	218	F.at 6.146E+2	PZR B/U HTR ON	E VIEN	100.0000	Auto Manual	100.00	0.6
38E+2	65	F at 6.638E+2	P28 LWL HI-D	TEN STOP VALVE	0.0000	Auto 🗖 Manual	0.00	0.0
26E+2	228	# at 7.226E+2		DUNPICOND 44(P)	1.0000	Auto Margari	1.00	-10
23E+2	171	R at 7.723E-2	SG1 L-L LUE R	CALL BREAK	0.0000		1 110	
85E+2		E at 9.405E+2	PZR LWL HI-D R	UL I BHEAK	ancee	💽 Auto 🛄 Manual	0.00	0.0
a1E+3		R at 1.141E+3	SG3 L-L LUL R	C/L 2 BREAK	0.0000	🛃 Auto 🛄 Manual	8.00	0.6





2. M. P. Paulsen et al., RETRAN 3D code manual, EPRI NP-7450 (Rev. 5), Electric Power Research Institute (2001).

3. 3/4 , (1994).