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 FACIL: 50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
 AUTH. NAME AUTHOR AFFILIATION
 WHITE, L.D. Rochester Gas & Electric Corp.
 RECIP. NAME RECIPIENT AFFILIATION
 CRUTCHFIELD, D. Operating Reactors Branch 5

SUBJECT: Forwards nonproprietary version of input listing of RELAP4-FLOOD input & nodalization diagram for RELAP4-FLOOD input re environ qualification of electrical equipment.

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LEON D. WHITE, JR.
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

September 25, 1980

Director of Nuclear Reactor Regulation
ATTN: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: SEP Topic III-12, Environmental Qualification
of Electrical Equipment
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

As was requested in a recent telephone conversation, RG&E is providing a copy of the nonproprietary version of the input listing of the RELAP4-FLOOD input for the Ginna reactor to your consultant, Mr. David Veeland of Lawrence Livermore Laboratories. Also, for clarity, a nodalization diagram for the RELAP4-FLOOD input, and a discussion of the data, is provided.

Very truly yours,

L. D. White, Jr.

xc: L. Tinkler - NRC
D. Veeland - LLL

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AttachmentRELAP4-FLOOD INFORMATION FOR R.E. GINNA

As requested, attached are a nodalization diagram and an input listing for the RELAP4-FLOOD calculation performed for R.E. Ginna. Input associated with proprietary Exxon Nuclear Co. (ENC) options has been deleted.

Those using this information should be advised that this input is for a specialized version of RELAP4 developed for LOCA ECCS reflood analysis by the USNRC and documented in NUREG-75/056 as RELAP4-FLOOD. RELAP4-FLOOD requires specialized input for both the system model and fluid conditions in order to perform the LOCA reflood calculation. Input to and results from RELAP4-FLOOD are intended to yield a conservative analysis with respect to LOCA ECCS criteria and may not be suitable for other purposes.

Note also that the ENC WREM IIA PWR ECCS evaluation model no longer uses RELAP4-FLOOD but instead uses an ENC developed reflood program (REFLEX).

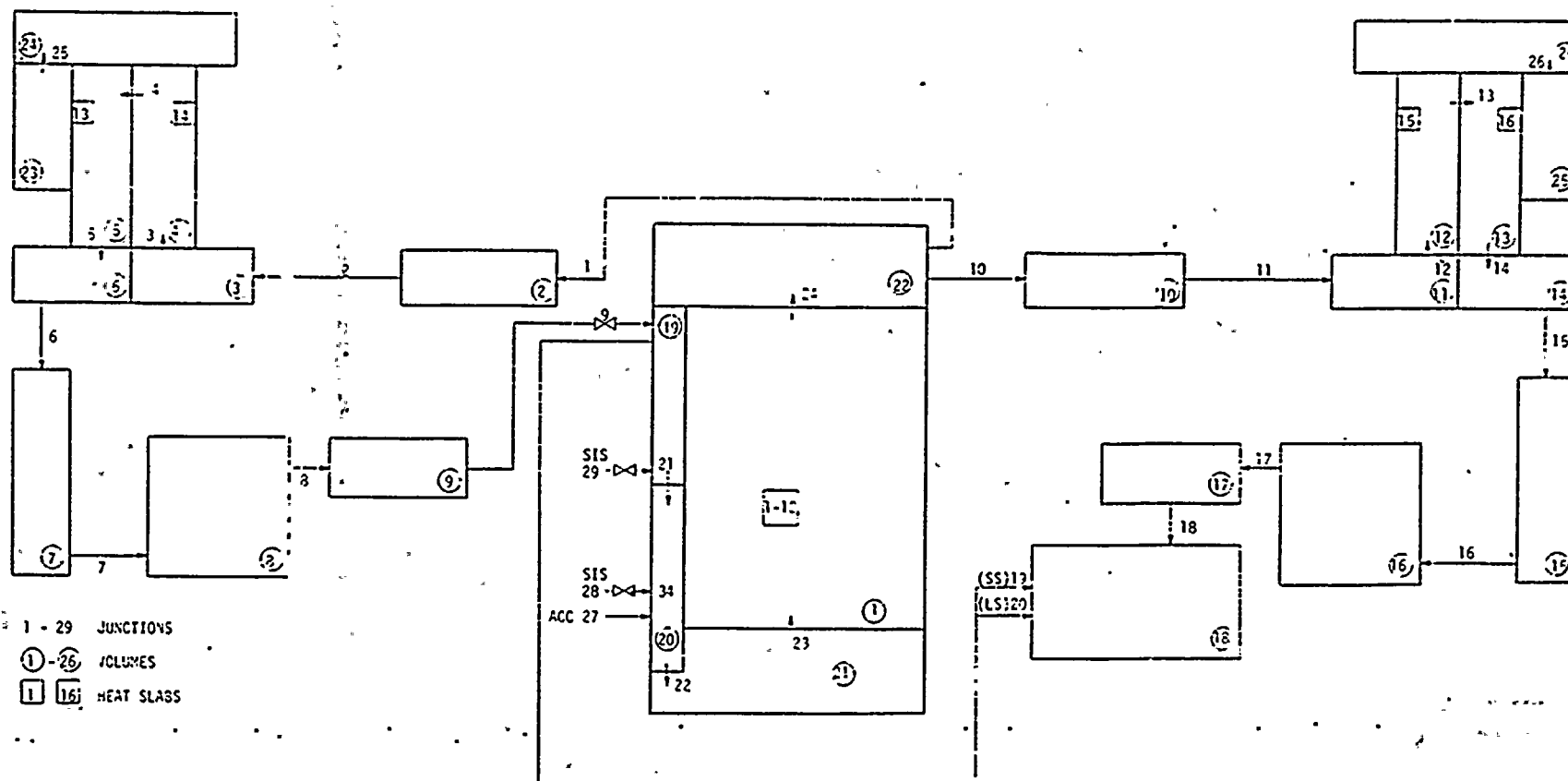


FIGURE 5.1 RELAP4-EM/FLOOD NODALIZATION DIAGRAM
 FOR WESTINGHOUSE 2-LOOP PWR

R E GINNA 0.4 DECLG REFLOOD

PROBLEM DIMENSIONS

	TAPE	ED	IS	TRP	VOL	BUB	TDV	JCT	PMP	VLV	LK	FL	SLB	GEO	MAT	COR	HX	OPT
010001	-2	9	3	6	26	1	1	29	2	3	0	3	16	2	6	12	0	2

PROBLEM CONSTANTS

	POWER	IMP-EXP
010002	133.29	1.

EDIT VARIABLES

	DL	1	ML	1	ML	20	JW	24	JW	19	JW	20	JW	21	JW	22	JW	23
020000	DL	1	ML	1	ML	19	ML	20	JW	19	JW	20	JW	21	JW	22	JW	29

TIME STEPS

	NMIN	NMAJ	NDMP	NCHK	DELTH	DTMIN	TLAST
030010	5	50	10	0	.002	.000	2.0
030020	10	50	10	0	.005	.0004	15.
030030	10	50	2	0	.01	.0004	400.

TRIP CONTROLS

	ITRP	IOSIG	IX1	IX2	SETPT	DELAY	
040010	1	1	0	0	175.	0.	* MAX PROBLEM TIME
040010	1	1	0	0	0.	0.	* MAX PROBLEM TIME
040020	2	1	0	0	0.	0.	* START ACCUM AND SIS FLOW (J27 AND J28)
040030	3	1	0	0	600.	0.	* PUMP TRIP
040040	1	6	1	0	11.5	0.	* HIGH CORE LIQUID LEVEL TRIP (VOL 1)
040050	4	11	9	0	0.	0.	* ACCEL TRIP, COLD LEG-VESSEL INLET (J 9)
040060	5	5	20	0	17.221	0.	* SIS TRIP FOR MIXING IN UPPER DC (J 9)
040060	5	5	20	0	17.221	1000.	* SIS TRIP FOR MIXING IN UPPER DC (J 9)

ENTRAINMENT CORRELATION DATA

FLECT HEAT TRANSFER CORRELATION DATA

	DTSUB	TINIT	QMAXFD	BFFF	HRAD	CORCHL	ISCFLG
400002	180.4	1820.4	.6918	0.	0.	11.833	0

JCT AND VOL NUMBERS

	JUNIN	JUNOUT	JUNWSL	JUNSSL	NCVOL	NUPVOL	NLPVOL	NOCVOL
400005	23	24	20	19	1	22	21	19

INITIAL HOT ASSEMBLY CLAD SURFACE TEMPERATURES

* CORE SLB	TEMP	* BOTTOM
400101	1270.9	
400102	1232.8	
400103	1386.5	
400104	1429.4	
400105	1510.6	
400106	1524.1	
400107	1524.1	
400108	1510.0	
400109	1454.4	
400110	1411.5	
400111	1357.8	
400112	1296.0	

SG SEC VOL CONNECTED TO PRI SIDE BY SG TUBES

	INTACT L	BROKEN L
400201	23 23	25 25

CONTROL VOLUME DATA

* B R	PRESS	TEMP	QUAL	VOLUME	ZVOL	ZMIX	JTP	FLOWA	DIAHV	ELEV
* UPPER PLENUM										
050221	0 0	45.32	519.5	2.	634.7	14.719	14.719	0	1000.	241.682
* HOT LEG (I)										
050021	0 0	45.32	519.5	2.	102.2	3.967	3.967	0	4.587	245.625
* SG INLET PLENUM (I)										
050031	0 0	45.32	519.5	2.	130.9	6.76	6.76	0	26.18	248.591
* SG TUBE 1 (I)										
050041	0 0	45.32	519.5	2.	285.92	29.75	29.75	0	9.611	255.351
* SG TUBE 2 (I)										
050051	0 0	45.32	519.5	2.	285.92	29.75	29.75	0	9.611	255.351
* SG OUTLET PLENUM (I)										
050061	0 0	45.32	519.5	2.	130.9	6.76	6.76	0	26.18	248.591
* PUMP SUCTION (I)										
050071	0 0	45.32	519.5	2.	148.38	12.592	12.592	0	5.241	237.000
* PUMP (I)										
050081	0 0	45.32	519.5	2.	192.	5.187	5.187	0	37.02	242.792
* COLD LEG (I)										
050091	0 0	45.32	519.5	2.	63.9	2.292	2.292	0	4.125	245.687
* HOT LEG (B)										
050101	0 0	45.32	519.5	2.	102.2	3.967	3.967	0	4.587	245.625
* SG INLET PLENUM (B)										
050111	0 0	45.32	519.5	2.	130.9	6.76	6.76	0	26.18	248.591
* SG TUBE 1 (B)										
050121	0 0	45.32	519.5	2.	285.92	29.75	29.75	0	9.611	255.351
* SG TUBE 2 (B)										
050131	0 0	45.32	519.5	2.	285.92	29.75	29.75	0	9.611	255.351
* SG OUTLET PLENUM (B)										
050141	0 0	45.32	519.5	2.	130.9	6.76	6.76	0	26.18	248.591
* PUMP SUCTION (B)										
050151	0 0	45.32	519.5	2.	148.38	12.592	12.592	0	5.241	237.000
* PUMP (B)										

050161 0 0 45.32 519.5 2. 192. 5.187 5.187 0 37.02 6.87 242.792
* COLD LEG (B)
050171 0 0 45.32 519.5 2. 63.9 2.292 2.292 0 4.125 2.292 245.687
* CONTAINMENT
050181 0 1 45.32 0. 1. 1.066E6 119.3 119.3 0 8659. 1.E10 210.
* UPPER DOWNCOMER
050191 1 0 45.32 519.5 2. 209.29 9.174 9.174 0 1000. 1.62 243.805
* LOWER DOWNCOMER
050201 1 0 45.9334 -1. 0. 436.12 17.222 3.267 0 25.84 .54 226.583
* LOWER PLENUM
050211 0 0 47.0100 272.9 -1. 456.39 8.395 8.395 0 1000. .5 221.468
* CORE
050011 1 0 45.32 396.2 2. 317.05 11.833 11.833 0 26.795 .03933 229.850
* SG SECONDARY-LIQ (I)
050231 0 0 809.8 -1. 0. 1754.2 25.85 25.85 0 67.86 .166 252.65
* SG SECONDARY-VAP (I)
050241 0 0 805.63624 -1. 1. 2824.8 41.63 41.63 0 67.86 .166 277.37
* SG SECONDARY-LIQ (R)
050251 0 0 809.8 -1. 0. 1754.2 25.85 25.85 0 67.86 .166 252.65
* SG SECONDARY-VAP (R)
050261 0 0 805.63624 -1. 1. 2824.8 41.63 41.63 0 67.86 .166 277.37
* B R PRESS TEMP QUAL VOLUME ZVOL ZHIX JTP FLOWA DIAMV ELEV

*
* BUBBLE RISE DATA
* ALPH VEUB060011 1. 2C.
**
* TIME DEPENDENT CONTAINMENT DATA

	NPT	TIME	PRESSURE	TEMP	QUALITY	MIXL
070101	12	2.36	45.09	0.	1.	119.3
070102		10.36	44.42	0.	1.	119.3
070103		20.36	43.70	0.	1.	119.3
070104		34.36	42.82	0.	1.	119.3
070105		60.36	41.40	0.	1.	119.3
070106		110.36	39.07	0.	1.	119.3
070107		160.36	37.00	0.	1.	119.3
070108		210.36	35.13	0.	1.	119.3
070109		260.36	33.42	0.	1.	119.3
070110		310.36	31.84	0.	1.	119.3
070111		362.36	30.40	0.	1.	119.3

*
* JUNCTION DATA - PART 1*
* V1 V2 IPUMP IVALVE FLOW-R AJUN ZJUN

* R VESSEL OUTLET(I1)
080011 22 2 0 0 0. 4.587 246.833
* HOT LEG-SGIP(I1)
080021 2 3 0 0 0. 4.587 249.592
* SG TUBE ENTR(I1)
080031 3 4 0 0 0. 9.611 255.351
* SG TUBE BEND(I1)
080041 4 5 0 0 0. 9.611 285.101
* SG TUBE EXIT(I1)
080051 5 6 0 0 0. 9.611 255.351
* SGOP-PUMP SUCTION(I1)

080061	6	7	0	0	0.	5.241	249.592
* PUMP INLET(I1)							
080071	7	8	-1	0	0.	2.621	242.792
* PUMP OUTLET(I1)							
080081	8	9	1	0	0.	2.621	246.833
* R-V INLET(I1)							
080091	9	19	0	1	0.	4.125	247.979
* R VESSEL OUTLET(B1)							
080101	22	10	0	0	0.	4.587	246.833
* HOT LEG-SGIP(B1)							
080111	10	11	0	0	0.	4.587	249.592
* SG TUBE ENTR(B1)							
080121	11	12	0	0	0.	9.611	255.351
* SG TUBE BEND(B1)							
080131	12	13	0	0	0.	9.611	285.101
* SG TUBE EXIT(B1)							
080141	13	14	0	0	0.	9.611	255.351
* SGOP-PUMP SUCTION(B1)							
080151	14	15	0	0	0.	5.241	249.592
* PUMP INLET(B1)							
080161	15	16	-2	0	0.	2.621	242.792
* PUMP OUTLET(B1)							
080171	16	17	2	0	0.	2.621	246.833
* COLD LEG-CONTAINMENT (B1)							
080181	17	18	0	0	0.	4.125	247.979
* STEAM SLIP JCT (B1)							
080191	19	18	0	0	0.	2.0625	247.979
* LIQUID SLIP JCT (B1)							
080201	19	18	0	0	0.	2.0625	245.688
* UPPER-LOWER DC							
080211	19	20	0	0	0.	22.71	243.805
* LOWER DC EXIT							
080221	20	21	0	0	0.	25.84	226.583
* CORE INLET							
080231	21	1	0	0	0.	26.795	229.850
* CORE OUTLET							
080241	1	22	0	0	0.	26.795	241.682
* SG SECONDARY S/L (I1)							
080251	23	24	0	0	0.	67.86	277.37
* SG SECONDARY S/L (B1)							
080261	25	26	0	0	0.	67.86	277.37
* ACCUM-DC INLET							
080271	0	20	1	0	1664.48	1.	226.6
* SIS-LOWER DC							
080281	0	20	2	2	183.63	1.	226.6
* SIS-UPPER DC							
080291	0	19	3	3	0.	1.	243.9
* V1 V2 IPUMP IVALVE FLOW-R AJUN ZJUN							

JUNCTION DATA - PART 2

	INERTA	FJUN	RJUN	VJ1	JC	CALI	MV	DIAMJ	CON	IC	IHQ
* R VESSEL OUTLET(I2)											
080012	2.52	.36	.72	2	0	0	0	0.	0.	11	0
* HOT LEG-SGIP(I2)											
080022	3.16	.68	.37	2	0	0	0	0.	0.	11	0
* SG TUBE ENTR(I2)											
080032	1.90	.28	.40	2	0	0	0	0.	0.	11	0

* SG TUBE BEND(I2)											
080042	3.10	.25	.25	2	0	0	0	0.	0.	11	0
* SG TUBE EXIT(I2)											
080052	1.90	.40	.28	2	0	0	0	0.	0.	11	0
* SGOP-PUMP SUCTION(I2)											
080062	3.99	.30	.60	2	0	0	0	0.	0.	11	0
* PUMP INLET(I2)											
080072	2.77	0.	0.	2	0	0	0	0.	0.	11	0
* PUMP OUTLET(I2)											
080082	1.95	0.	0.	2	0	0	0	0.	0.	11	0
* R-V INLET(I2)											
080092	2.06	1.10	.90	2	0	0	0	0.	0.	11	0
* R VESSEL OUTLET(B2)											
080102	2.52	.36	.72	2	0	0	0	0.	0.	11	0
* HOT LEG-SGIP(B2)											
080112	3.16	.68	.37	2	0	0	0	0.	0.	11	0
* SG TUBE ENTR(B2)											
080122	1.90	.28	.40	2	0	0	0	0.	0.	11	0
* SG TUBE BEND(B2)											
080132	3.10	.25	.25	2	0	0	0	0.	0.	11	0
* SG TUBE EXIT(B2)											
080142	1.90	.40	.28	2	0	0	0	0.	0.	11	0
* SGOP-PUMP SUCTION(B2)											
080152	3.99	.30	.60	2	0	0	0	0.	0.	11	0
* PUMP INLET(B2)											
080162	2.77	0.	0.	2	0	0	0	0.	0.	11	0
* PUMP OUTLET(B2)											
080172	1.95	0.	0.	2	0	0	0	0.	0.	11	0
* COLD LEG-CONTAINMENT (B2)											
080182	1.12	0.	0.	2	0	0	0	0.	1.	11	0
* STEAM SLIP JCT (B2)											
080192	1.12	1.1	.9	2	-1	0	0	0.	1.	11	0
* LIQUID SLIP JCT (B2)											
080202	1.12	1.1	.9	2	-1	0	0	0.	1.	11	0
* UPPER-LOWER DC											
080212	.51	0.	0.	2	0	0	0	0.	0.	11	0
* LOWER DC EXIT											
080222	.46	.9	.6	2	0	0	0	0.	0.	11	0
* CORE INLET											
080232	.36	7.08	7.08	2	0	0	0	0.	0.	11	0
* CORE OUTLET											
080242	.28	8.56	8.56	2	0	0	0	0.	0.	11	0
* SG SECONDARY S-L (I2)											
080252	0.	0.	0.	2	0	2	0	0.	0.	11	0
* SG SECONDARY S-L (B2)											
080262	0.	0.	0.	2	0	2	0	0.	0.	11	0
* ACCUM-DC INLET											
080272	0.	0.	0.	1	0	0	0	0.	0.	11	0
* SIS-LOWER DC											
080282	0.	0.	0.	1	0	0	0	0.	0.	11	0
* SIS-UPPER DC											
080292	0.	0.	0.	1	0	0	0	0.	0.	11	0
* INERTA FJUN RJUN VJI JC CALI NV DIAHJ CON IC IHQ											

PRIMARY PUMP DATA

* PUMP CURVE INDICATOR DATA
100000 0 0 0 0

* PUMP DESCRIPTION DATA

	CS	TRP	RI	2P	MT	RPM	ISR	FLOW	HEAD	TORQUE	INERTIA	DEN	FRIC	MT
090011	2	3	0	1	0	1189.	1.E-6	90000.	252.	19100.	80000.	46.38	1202.	0.
090021	2	3	0	1	0	1189.	1.E-6	90000.	252.	19100.	80000.	46.38	1202.	0.

* PUMP HEAD AND TORQUE MULTIPLIER

091001	11	0.0	0.0	0.1	0.0	0.15	0.05	0.24	0.80	0.30	0.96	0.40	0.98	* HEAD
091002		0.60	0.97	0.80	0.90	0.90	0.80	0.96	0.50	1.00	0.0			

092001	2	0.0	0.0	1.0	0.0									* TORQUE
--------	---	-----	-----	-----	-----	--	--	--	--	--	--	--	--	----------

* PUMP STOP DATA

095011	0.0	0.0	0.0
095021	0.0	0.0	0.0

* VALVE DATA

	TRIP	TAB	BP	CV1	CV2	CV3	
110010	-4	0	0.	0.	0.	0.	* START INTACT LOOP-DC FLOW (JCT 9)
110020	5	0	0.	0.	0.	0.	* STOPS LOWER DC SIS FLOW (JCT 28)
110030	-5	0	0.	0.	0.	0.	* START UPPER DC SIS FLOW (JCT 29)

* ACCUMULATOR FILL TABLE

	NPTS	TRP	IX	IY	PORX	TEMP	
130101	20	2	0	0	0.0	272.9	
	TIME		FLOW	TIME		FLOW	
130102	0.00		1664.48	2.00		1630.94	4.00 1600.92 6.00 1570.90
130103	8.00		1569.10	9.39		1569.10	9.40 0.00 38.01 0.00
130104	66.63		0.00	95.24		0.00	123.85 0.00 152.47 0.00
130105	181.08		0.00	209.69		0.00	238.31 0.00 266.92 0.00
130106	295.53		0.00	324.14		0.00	352.76 0.00 381.37 0.00

* SIS FILL TABLE TO LOWER DOWNCOMER

	NPTS	TRP	IX	IY	PORX	TEMP	
130201	20	2	0	0	0.0	60.	
	TIME		FLOW	TIME		FLOW	
130202	0.00		183.63	2.00		183.99	4.00 184.29 6.00 184.58
130203	8.00		185.65	9.39		186.46	9.40 186.46 38.01 189.86
130204	66.63		193.01	95.24		196.16	123.85 199.31 152.47 202.46
130205	181.08		205.61	209.69		208.76	238.31 211.91 266.92 215.06
130206	295.53		218.21	324.14		221.36	352.76 224.51 381.37 227.66

* SIS FILL TABLE TO UPPER DOWNCOMER

	NPTS	TRP	IX	IY	PORX	TEMP	
130301	20	2	0	0	0.0	60.0	
	TIME		FLOW	TIME		FLOW	
130302	0.00		183.63	2.00		183.99	4.00 184.29 6.00 184.58
130303	8.00		185.65	9.39		186.46	9.40 186.46 38.01 189.86
130304	66.63		193.01	95.24		196.16	123.85 199.31 152.47 202.46
130305	181.08		205.61	209.69		208.76	238.31 211.91 266.92 215.06
130306	295.53		218.21	324.14		221.36	352.76 224.51 381.37 227.66

*
*
* NEUTRONICS DATA

* KINETICS CONSTANTS

* PCI KMUL BOVL RHOIN UDUF
140000 0 0 0. 0. .617*
* REFLOOD RENORMALIZED POWER DECAY CURVE

	NPT	TRP	TIME	POWER	TIME	POWER	TIME	POWER	TIME	POWER
141001	17	2	0.	1.0	0.16	.99884	5.16	.97424	10.16	.95314
141002			20.16	.91095	30.16	.88373	40.16	.85689	50.16	.83702
141003			60.16	.81763	80.16	.78637	100.16	.75902	120.16	.73050
141004			140.16	.70594	160.16	.67889	210.16	.65220	260.16	.62834
141005			310.16	.60540						

*
* INITIAL HOT ASSEMBLY HEAT SLAB TEMPERATURES

* SLAB	TEMPL	TEMPR	* BOTTOM
150013	1270.9	1270.9	
150023	1232.8	1232.8	
150033	1386.5	1386.5	
150043	1429.4	1429.4	
150053	1510.6	1510.6	
150063	1524.1	1524.1	
150073	1524.1	1524.1	
150083	1510.0	1510.0	
150093	1454.4	1454.4	
150103	1411.5	1411.5	
150113	1357.8	1357.8	
150123	1296.0	1296.0	

*
* HEAT SLAB DATA

	V1	V2	GE	SI	HL	HR	AREAL	AREAR	SLBVOL	HDL	HDR	HEDL	HEDR	CHL	CHR
* CORE															
150011	0	1	1	0	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150021	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150031	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150041	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150051	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150061	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150071	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150081	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150091	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150101	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150111	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
150121	0	1	1	1	2	2	0.	3161.09	27.923	0.	.03933	0.	.0446	.9861	.9861
* SG TUBES (I)															
150131	4	23	2	0	2	2	17710.	20073.	81.4	.166	.0646	.166	.0646	29.8	29.8
150141	5	23	2	0	2	2	17710.	20073.	81.4	.166	.0646	.166	.0646	29.8	29.8
* SG TUBES (B)															
150151	12	25	2	0	2	2	17710.	20073.	81.4	.166	.0646	.166	.0646	29.8	29.8
150161	13	25	2	0	2	2	17710.	20073.	81.4	.166	.0646	.166	.0646	29.8	29.8

*
* CORE DATA

=R E GINNA 0.4 DECLG REFLOOD

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	SLB	NODE-TEMPS				CLAD TK	POWER
160010	1	7	9	17	.0025	.03613	
160020	2	7	9	17	.0025	.06016	
160030	3	7	9	17	.0025	.08108	
160040	4	7	9	17	.0025	.09779	
160050	5	7	9	17	.0025	.10943	
160060	6	7	9	17	.0025	.11541	
160070	7	7	9	17	.0025	.11541	
160080	8	7	9	17	.0025	.10943	
160090	9	7	9	17	.0025	.09779	
160100	10	7	9	17	.0025	.08108	
160110	11	7	9	17	.0025	.06016	
160120	12	7	9	17	.0025	.03613	

HEAT SLAB GEOMETRY DATA

	GEO	NR	MAT	SS	XRAD	WIDTH	PF	
170101	2	3	1	6	0.	.01485	1.	* CORE-FUEL
170102	1		5	2		3.125E-4	0.	* CORE-GAP
170103	0		2	8		.0025	0.	* CORE-CLADDING
170201	2	2	3	5	.03229	.004167	0.	* SG TUBES
170202	0		6	5		1.420-4	0.	* SG SEC TUBE SCALE

THERMAL CONDUCTIVITY TABLES

* UO2							
180100	20						
180101				200.0	4.060	650.0	2.971
180102	800.0	2.677		950.0	2.439	1100.0	2.242
180103	1250.0	2.078		1400.0	1.940	1550.0	1.823
180104	1700.0	1.724		1850.0	1.639	2000.0	1.568
180105	2150.0	1.507		2300.0	1.457	2450.0	1.415
180106	2600.0	1.382		3100.0	1.323	3600.0	1.333
180107	4100.0	1.406		4600.0	1.538	5100.0	1.730
* ZIRCALLOY							
180200	18						
180201	32.0	7.812		212.0	7.992	392.0	8.208
180202	572.0	8.784		752.0	9.540	932.0	10.404
180203	1112.0	11.268		1292.0	12.492	1472.0	13.176
180204	1652.0	13.968		1832.0	14.796	2012.0	16.128
180205	2192.0	17.784		2372.0	19.656	2552.0	21.780
180206	2732.0	24.048		3092.0	28.908	3360.0	33.120
* STNLESS STEEL 347							
180300	-3						
180301	0.0	9.000		200.0	9.000	1600.0	15.000
* STEEL							
180400	-2						
180401	0.0	25.000		2000.0	15.000		
* GAP							
180500	-5						
180501	0.0	0.100		330.0	0.118	900.0	0.275
180502	1200.0	0.400		2500.0	0.400		
* CONCRETE - SG TUBE SCALES							
180600	-2						
180601	90.0	0.9	1000.0	0.9			

VOLUMETRIC HEAT CAPACITY TABLES

* U02

190100	16				
190101	32.0	34.450	122.0	38.350	212.0 40.950
190102	392.0	43.550	752.0	46.800	2012.0 51.350
190103	2732.0	52.650	3092.0	56.550	3452.0 63.050
190104	3812.0	72.800	4352.0	89.700	4532.0 94.250
190105	4532.0	98.150	4892.0	100.100	5144.0 101.400
190106	8000.0	101.400			

* ZIRCALLOY

190200	5				
190201	0.0	28.392	1480.3	34.476	1675.0 85.176
190202	1787.5	34.476	3500.0	34.476	

* STNLESS STEEL 347

190300	-2				
190301	200.0	60.000	2200.0	80.000	

* STEEL

190400	-2				
190401	0.0	60.000	2000.0	80.000	

* GAP

190500	-2				
190501	0.0	0.000	2000.0	0.000	

* CONCRETE - SG TUBE SCALES

190600	-2				
190601	90.0	32.0	1000.0	32.9	

THERMAL EXPANSION TABLES

* U02

200100	-3					
200101	0.0	3.79E-6	2400.0	5.93E-6	4800.0	8.08E-6

* ZIRCALLOY

200200	-4					
200201	100.0	3.20E-6	1550.0	3.20E-6	1800.0	2.81E-6
200202	3000.0	3.83E-6				

* STNLESS STEEL 347

200300	-3					
200301	0.0	9.00E-6	1600.0	10.90E-6	2000.0	12.00E-6

* STEEL

200400	-3					
200401	0.0	6.30E-6	1100.0	8.50E-6	2000.0	9.00E-6

* GAP

200500	-2					
200501	0.0	0.0	2000.0	0.0		

* CONCRETE - SG TUBE SCALES

200600	-2					
200601	90.0	1.2E-5	1000.0	1.2E-5		

* PRESSURE PENALTY DATA

260011	9	27	28	29	-1.8	-0.8
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