GULF STATES UTILITIES COMPANY
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January 31, 1985
RBG-20026
File Nos. G9.5,
G9.19.2

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

River Bend Station-Unit 1
Docket No. 50-458

Enclosed is Gulf States Utilities Company's partial response to River Bend Station Safety Evaluation Report Outstanding Issue No. 3. This submittal provides the details of subcompartment analyses of high energy line breaks necessary for the Staff to perform an independent verification analysis.

Sincerely,

Eddie R Grant

for J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

JEB/RJK/kt

Attachments

B001

1/28

ANALYSIS OF HIGH ENERGY LINE BREAKS IN SECONDARY CONTAINMENT FOR EQUIPMENT QUALIFICATION

C4/12210/460/4YH

The high energy line breaks (HELBs) considered for River Bend Station (RBS) in the secondary containment are summarized in Table 1. The blowdown mass and energy release transients for each postulated pipe break are provided in Tables 2 through 6.

The pressure and temperature response analyses were performed with the SWEC THREED Computer Code. This code is described in FSAR Section 3B.4.1.

Structural components were selected as the node boundaries. The nodalization for the auxiliary building consists of 20 volumes with interconnections as shown in Figure 2. The nodalization for the steam tunnel consists of six volumes and seven junctions as shown in Figure 3. The vent paths are described in Tables 7 and 8. The subcompartment nodalization data, consisting of the nodal free volumes, heights, floor areas, and initial conditions, are provided in Tables 9 and 10.

The initial conditions selected for each volume are such that the resulting temperature after the break is maximized. The initial condition for pressure is 14.7 psia and relative humidity is 100 percent. The initial temperature used is equal to the calculated normal maximum temperature with the worst case heat load conditions.

In addition to the assumptions described in Appendix 3B of RBS FSAR, the following assumptions are made:

- The blowdown from the 3-in. and 6-in. reactor water cleanup (RWCU) line breaks is assumed to be frictionless moody flow.
- Credit for friction in the line is considered in the 4-in. reactor core isolation cooling (RCIC) line break blowdown. In this case, moody flow with friction is assumed with an f L/D = 5 which considers only the 4-in. diameter portion of the flow path to the break (see FSAR Figure 3.6A-19).
- Credit for heat transfer to heat sinks is taken using conservative Uchida heat transfer coefficients.

The pressure and temperature transients for the HELBs considered are provided in Figures 4 through 47. The relative humidity is not explicitly calculated. However, the relative humidity specified is 100 percent throughout the transient until the pressure and temperature return to normal conditions. The relative humidity specified is 90 percent after normal conditions are reached.

TABLE 1

SUBCOMPARTMENT ANALYSIS SUMMARY FOR HELBs

INSIDE SECONDARY CONTAINMENT

Subcompartment	Break	Table	Figure
RWCU pumprooms A and B, el 95 ft	3-in. RWCU pump discharge DER	2, 7, 9	1, 2, 4 through 43
Room in front of RWCU pumprooms el 95 ft	6-in. RWCU pump discharge DER	3, 7, 9	1, 2, 4 through 43
RCIC pumproom	4-in. RCIC steam line DER	4, 7, 9	2, 4 through 43
Main steam tunnel inside jet impingement wall	24-in. main steam line SER	5, 8, 10	2, 44 through 47
Main steam tunnel outside jet impingement wall	24-in. main steam line DER	6, 8, 10	3, 44 through 47

TABLE 2

BLOWDOWN

3-IN. RWCU LINE DER IN RWCU PUMPROOM

Time (sec)	Downstream Flow LBM/sec	Upstream Flow LBM/sec	Total Flow LBM/sec	Enthalpy Btu/LBM	Total Energy Btu/sec
0	0	0	0	0	0
0.001	348	174	522	530	2.77×10^5
2.12	348(3)	174	522	530	2.77×10^5
2.121	320(4)	174	494	530	2.62×10^5
4.15	320	174	494	530	2.62×10^5
4.151	250(5)	104(1)	354	530	1.88×10^5
6.94	250	104	354	530	1.88×10^5
8.0	151	104	255	530	1.35×10^5
8.5	104(6)	104	208	530	1.1×10^5
19.81	104	104(2)	208	530	1.1×10^5
22.0	0	0	0	0	0

NOTES

(1) Upstream inventory (i.e., flow restrictor to break) is depleted and steady flow continues at 104 LBM/sec.

(2) Isolation valve (MOV-F001) area is equal to the flow restrictor area at 19.81 sec and reduces to zero flow area at 22 sec.

(3) Downstream flow has two paths. Path A from heat exchanger side and Path B through RWCU pump side. Combined flow is 348 LBM/sec.

(4) The isolation valve (MOV-F053) closes to the flow restrictor area, and the choked flow through the restrictor is 146 LBM/sec. The combined flow from downstream side is 320 LBM/sec.

(5) The flow from Path A is 146 LBM/sec and from Path B is 104 LBM/sec. Total flow from downstream of break is 250 LBM/sec.

(6) MOV-F053 is closed and flow from Path A is zero.

TABLE 3

BLOWDOWN

6-IN. RWCU LINE DER IN RWCU PUMPROOM

Time (sec)	Downstream Flow LBM/sec	Upstream Flow LBM/sec	Total Flow LBM/sec	Enthalpy Btu/LBM	Total Energy Btu/sec
0	0	0	0	0	0
0.001	687	687	1374	530	7.28×10^5
1.0(1)	687	687	1374	530	7.28×10^5
1.001	0	687	687	530	3.64×10^5
1.17(2)	0	687	687	530	3.64×10^5
1.71	0	208	208	530	1.1×10^5
19.81(3)	0	208	208	530	1.1×10^5
22	0	0	0	0	0

NOTES

(1) Inventory from downstream (i.e., from check valves on the discharge side of pumps to the break) is depleted.

(2) Inventory from upstream (i.e., from flow restrictor to the break) is depleted.

(3) Steady flow continues 208 LBM/sec until this time, and the valve closes to the flow restrictor area at this time. From 19.81 sec to 22 sec the valve closes to zero flow area.

TABLE 4

BLOWDOWN

4-IN. RCIC STEAM LINE DER IN RCIC PUMPROOM

Time (sec)	LBM/sec(4)	Btu/LBM	Btu/sec
0	0	0	0
0.001	53.86	1190.6	64,126
0.082(1)	53.86	1190.6	64,126
0.083	71.82	1190.6	85,509
10.971(2)	71.82	1190.6	85,509
12.738(3)	71.82	1190.6	85,509
13.768	0	0	0

NOTES

(1) Upstream inventory period.

(2) Time for the isolation valve flow area to attain the choked flow area (includes 2-sec time delay).

(3) Inventory depleted and the valve begins to close from choked flow area to zero flow condition.

(4) Moody flow with friction f L/D = 5.0

TABLE 5

BLOWDOWN

24-IN. MAIN STEAM LINE SER IN STEAM TUNNEL
INSIDE JET IMPINGEMENT WALL

Time (sec)	Downstream Flow LBM/sec	Upstream Flow LBM/sec	Total Flow LBM/sec	Enthalpy Btu/LBM	Total Energy Btu/sec
0	0	0	0	0	0
0.001	1947	1947	3894	1193	4.65×10^6
0.116	1947	1947	3894	1193	4.65×10^6
0.117	1947	1389	3336	1193	3.98×10^6
0.219	1947	1389	3336	1193	3.98×10^6
0.220	2596	1389	3985	1193	4.76×10^6
7.83	2596	1389	3985	1193	4.76×10^6
8.84	2596	863	3432	1193	4.09×10^6
10.5(1)	0	0	0	0	0

NOTES

(1) Isolation valve closure time of 10.0-sec plus 0.5-sec time delay is assumed.

TABLE 6

BLOWDOWN

24-IN. MAIN STEAM LINE DER IN STEAM TUNNEL
OUTSIDE JET IMPINGEMENT WALL

Time (sec)	Downstream Flow LBM/sec	Upstream Flow LBM/sec	Total Flow LBM/sec	Enthalpy Btu/LBM	Total Energy Btu/sec
0	0	0	0	0	0
0.001	3894	3894	7788	1193	9.3×10^6
0.122	3894	3894	7788	1193	9.3×10^6
0.123	3894	1389	5283	1193	6.31×10^6
0.219	3894	1389	5283	1193	6.31×10^6
0.220	4166	1389	5555	1193	6.63×10^6
7.83	4166	1389	5555	1193	6.63×10^6
10.5(1)	0	0	0	0	0

NOTES

(1) Isolation valve closure time of 10.0-sec plus 0.5-sec time delay is assumed.

TABLE 7

VENT PATH DESCRIPTION
AUXILIARY BUILDING

Vent Path No.	From Vol No.	To Vol No.	Vent Description	Vent Area Ft^2	Geom Inertia (L/A)	Total Fwd (K_F)	Loss Coef Reverse (K_R)	Vent Elev Ft
J1	23a	23c	Open entrance to RWCU pumproom	21.0	0.204	1.724	1.345	95.75
J2	23b	23c	Open entrance to RWCU pumproom	21.0	0.204	1.724	1.345	95.75
J3	23c	12	Wire mesh door	15.75	0.156	1.724	1.611	95.75
J4	12	15	Fire door	26.2	0.272	1.67	1.669	95.75
J5	11	12	Open passage	57.0	0.176	0.474	0.765	95.75
J6	12	14	Closed louvered* door (set to open)	21.0	0.208	2.13	2.132	95.75
J7	12	14	Opening in louvers**	3.0	0.779	1.657	1.658	95.75
J8	12	13	Closed louvered* door (set to open)	21.0	0.494	2.329	2.432	95.75
J9	12	13	Opening in louvers**	3.0	3.223	2.45	3.366	95.75
J10	11	13	Open passage	92.29	0.169	0.578	0.701	95.75
J11	10	11	Fire door	21.5	0.402	1.471	1.115	95.75
J12	4	[illegible]	Hoist opening	105.0	0.091	1.333	0.968	95.75
J13	5	13	Grating and mesh door	114.75	0.059	1.365	1.328	95.75
J14	4	5	Water tight door*	23.83	0.104	2.411	2.411	70
J15	1	10	Grating	271.3	0.019	1.673	1.544	95.75
J16	1	15	Hoist opening	115.0	0.032	2.492	2.400	95.75
J17	10	56	Grating	272.4	0.018	1.703	1.553	114
J18	15	55	Hoist opening	115.0	0.031	2.510	2.406	114
J19	55	57	Hoist opening	115.0	0.027	2.641	2.606	141
J20	56	57	Hoist opening	391.0	0.012	2.473	2.360	141
J21	44	45	Open passage	203.2	0.0563	0.2942	0.3732	175
J22	45	57	Stair well	21.0	0.0415	1.4422	1.3213	175
J23	44	46	Open passage	146.62	0.0566	0.4608	0.6421	175
J24	46	47	Door	21.0	0.0832	1.0804	1.2168	175
J25	46	48	Door	21.0	0.0652	1.2912	1.2785	175
J26	48	49	Open passage	207.0	0.0592	0.2251	0.2160	175
J27	47	ATM	Door	21.0	0.0498	1.396	1.1274	175
J28	57	44	Elevator shaft	35.0	0.0315	1.3507	1.4430	175

NOTES

* Closed door modeled to open at 3.5 psid to provide tabulated flow area with associated coefficients.

** Louvered opening in door modeled to close at 3.5 psid when door opens.

TABLE 8

VENT PATH DESCRIPTION
STEAM TUNNEL

Vent Path No.	From Vol No.	To Vol No.	Vent Description	Vent Area Ft^2	Geom Inertia (L/A)	Total Fwd (K_F)	Loss Coef Reverse (K_R)	Vent Elev Ft
J1	1	2	Opening in bottom of JISW	151	.017	2.215	2.182	114
J2	1	2	Openings in top of JISW	41	.172	4.001	1.651	114
J3	2	3	Entrance to steam header area from loop bay	297	.049	0.481	0.856	109.5
J4	2	4	Louvered blowout panels	138*	.01	5.651	7.244	171.5
J5	5	6		119	.041	2.506	2.36	95
J6	3	5	Opening from steam header to stop valve area	213	.073	0.545	0.422	109.5
J7	5	6	Opening from tunnel to turbine building	442	.029	1.000	0.5	95

NOTES

*Six louvered panels modeled to open at 3.5 psid with 0.3-sec time delay (actual is 3.25 psid but 3.5 psid is conservatively used).

TABLE 9

SUBCOMPARTMENT NODALIZATION DATA
AUXILIARY BUILDING

Volume No.	Net Volume (Ft^3)	Height (Ft)	Gross Floor Area (Ft^2)	Initial Conditions		
				Temp (°F)	Pressure (psia)	Rel Humidity (%)
1	71,439	25.75	3205	122	14.7	100
4	9,685	25.75	431	122	14.7	100
5	12,524	25.75	553	122	14.7	100
10	22,845	16.25	1489	122	14.7	100
11	1,181	14.25	86	122	14.7	100
12	4,980	14.25	377	122	14.7	100
13	6,453	14.25	687	122	14.7	100
14	2,535	14.25	187	122	14.7	100
15	21,864	16.25	1403	122	14.7	100
23a	627	7.0	99	122	14.7	100
23b	627	7.0	99	122	14.7	100
23c	313	7.0	46	122	14.7	100
55	86,570	27.0	3663	115.6	14.7	100
56	90,157	27.0	4458	112.2	14.7	100
57	212,931	29.0	8806	111.8	14.7	100
44	10,084	11.75	1000	118	14.7	100
45	3,443	11.75	190	118	14.7	100
46	3,336	11.75	306	113	14.7	100
47	1,015	11.75	89	122	14.7	100
48	3,922	11.75	440	118	14.7	100
49	6,040	11.75	631	122	14.7	100
50 (Atmosphere)	1.E12	1.E12	0.0	122	14.7	100

TABLE 10

SUBCOMPARTMENT NODALIZATION DATA
STEAM TUNNEL

Volume No.	Net Volume (Ft^3)	Height (Ft)	Gross Floor Area (Ft^2)	Initial Conditions		
				Temp (°F)	Pressure (psia)	Rel Humidity (%)
1	26,775	23	1256	122	14.7	100
2	118,157	41.25	2954	122	14.7	100
3	10,310	10	1180	122	14.7	100
4	$1E10^{12}$	185	5×10^9	93	14.7	58
5	38,203	24.5	1833	122	14.7	100
6	6×10^8	101.00	6×10^6	122	14.7	100

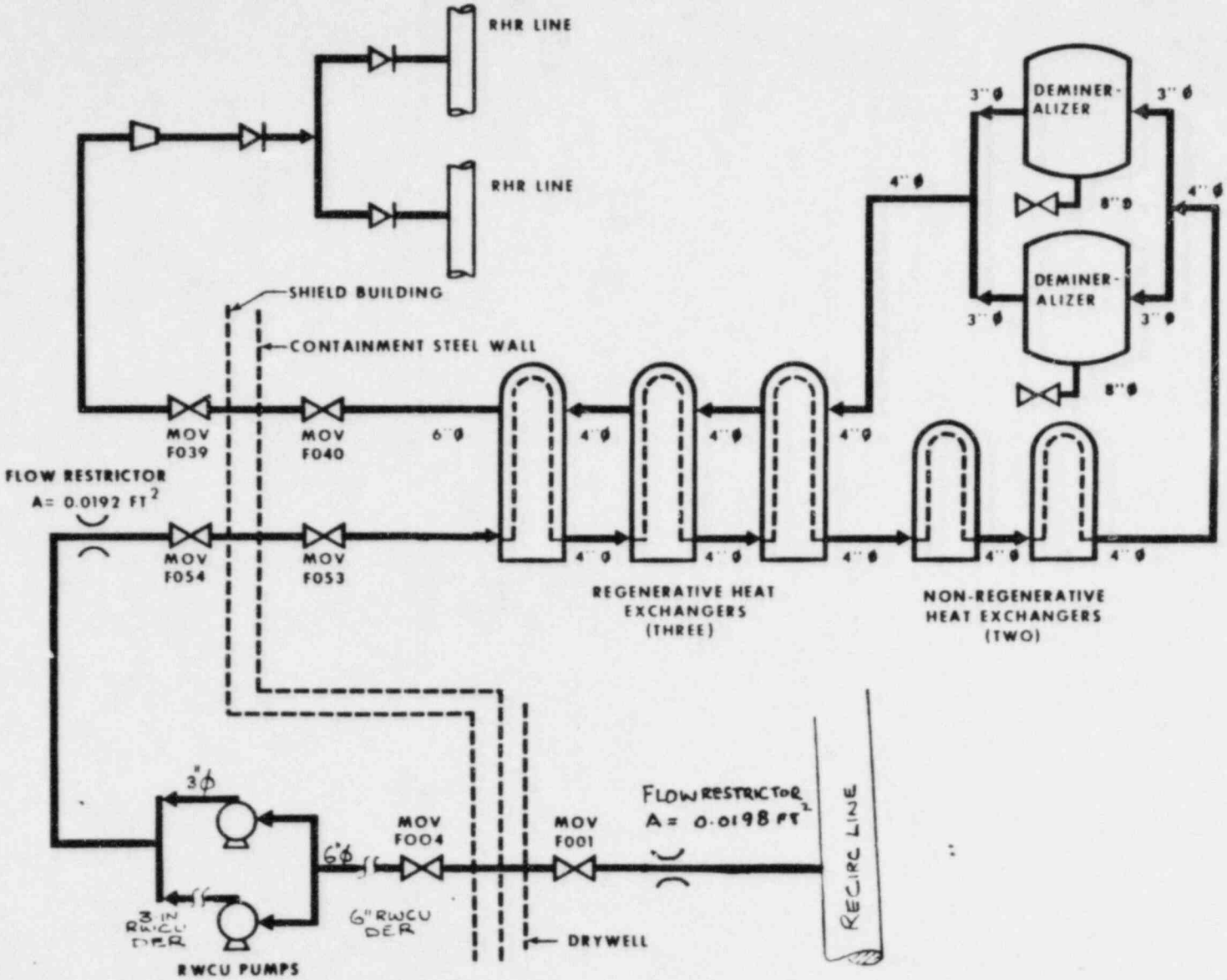
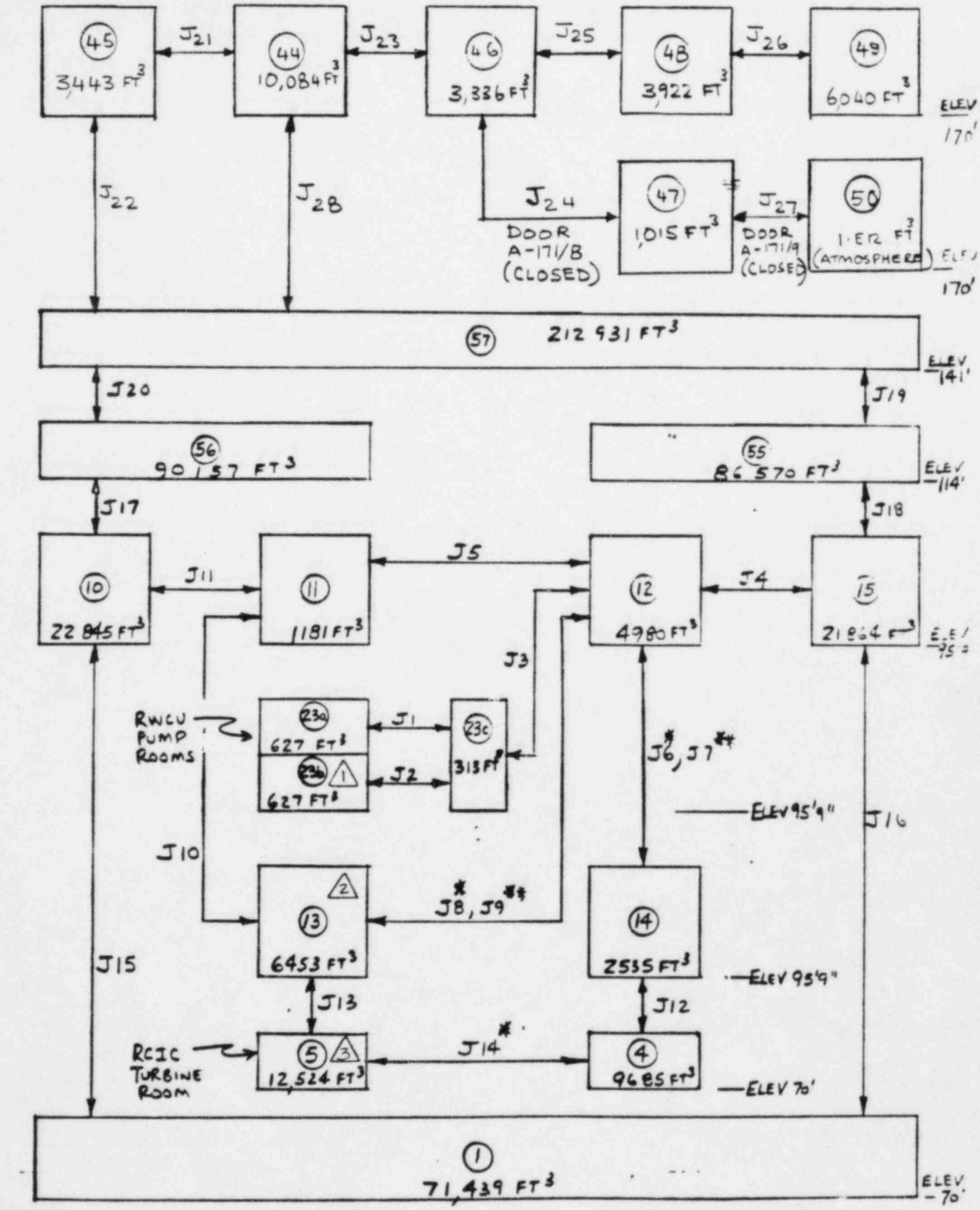


FIGURE 1

LOCATION OF 3-IN AND 6-IN RWCU BREAKS IN THE AUXILIARY BUILDING



NOTES:

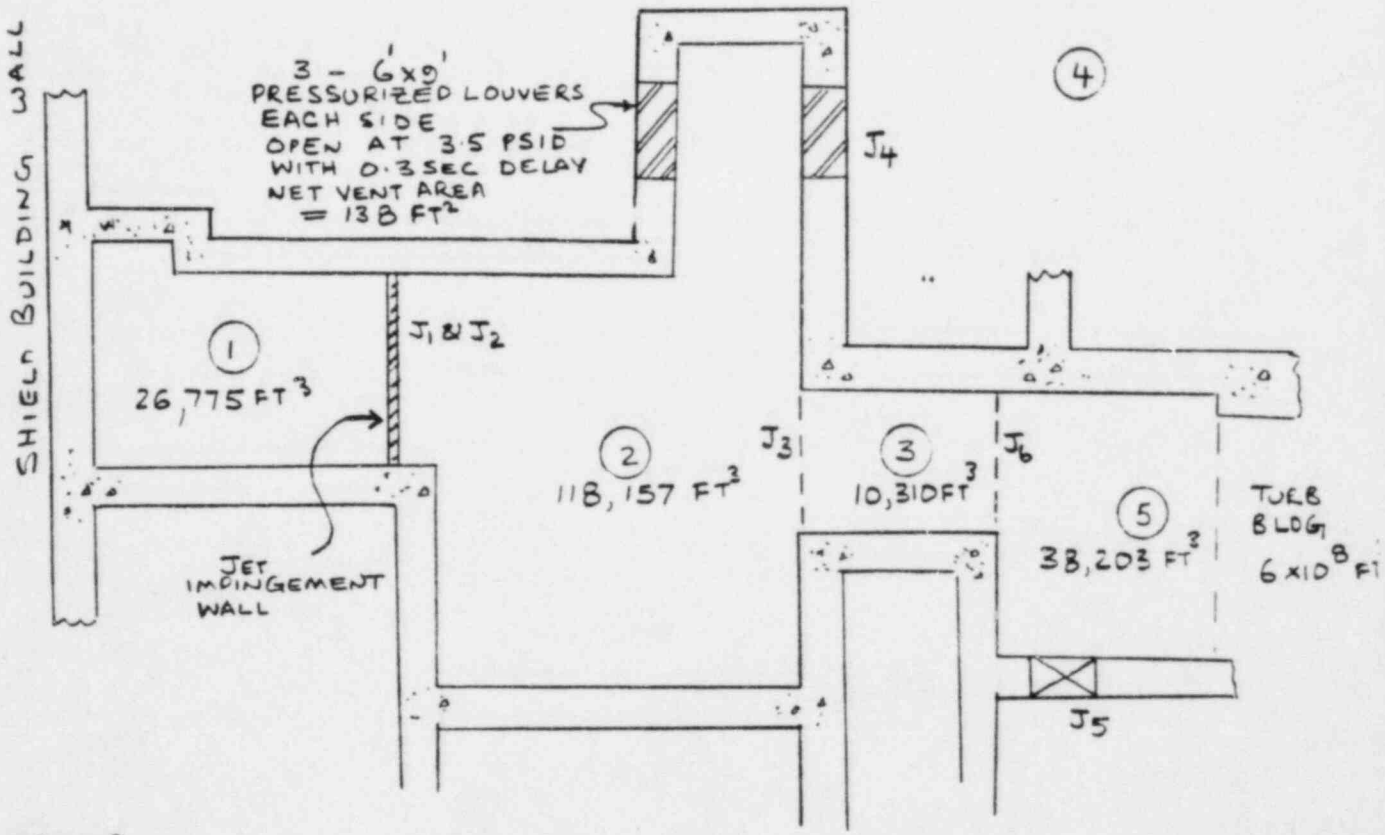
* CLOSED DOOR MODELED TO OPEN UNDER $\Delta P = 3.5$ PSI

** LOUVERS IN DOOR MODELED TO CLOSE UNDER $\Delta P = 3.5$ PSI WHEN FULL DOOR OPENS

○ VOLUME NUMBER, J_ = VENT PATH NO.

△1 2-IN RWCU BREAK, △2 6-IN RWCU BREAK, △3 4-IN RCIC BREAK

FIGURE 2
NODALIZATION DIAGRAM
AUXILIARY BUILDING



NOTES

○ REPRESENTS VOLUME NUMBER

FIGURE 3 NODALIZATION DIAGRAM FOR STEAM TUNNEL

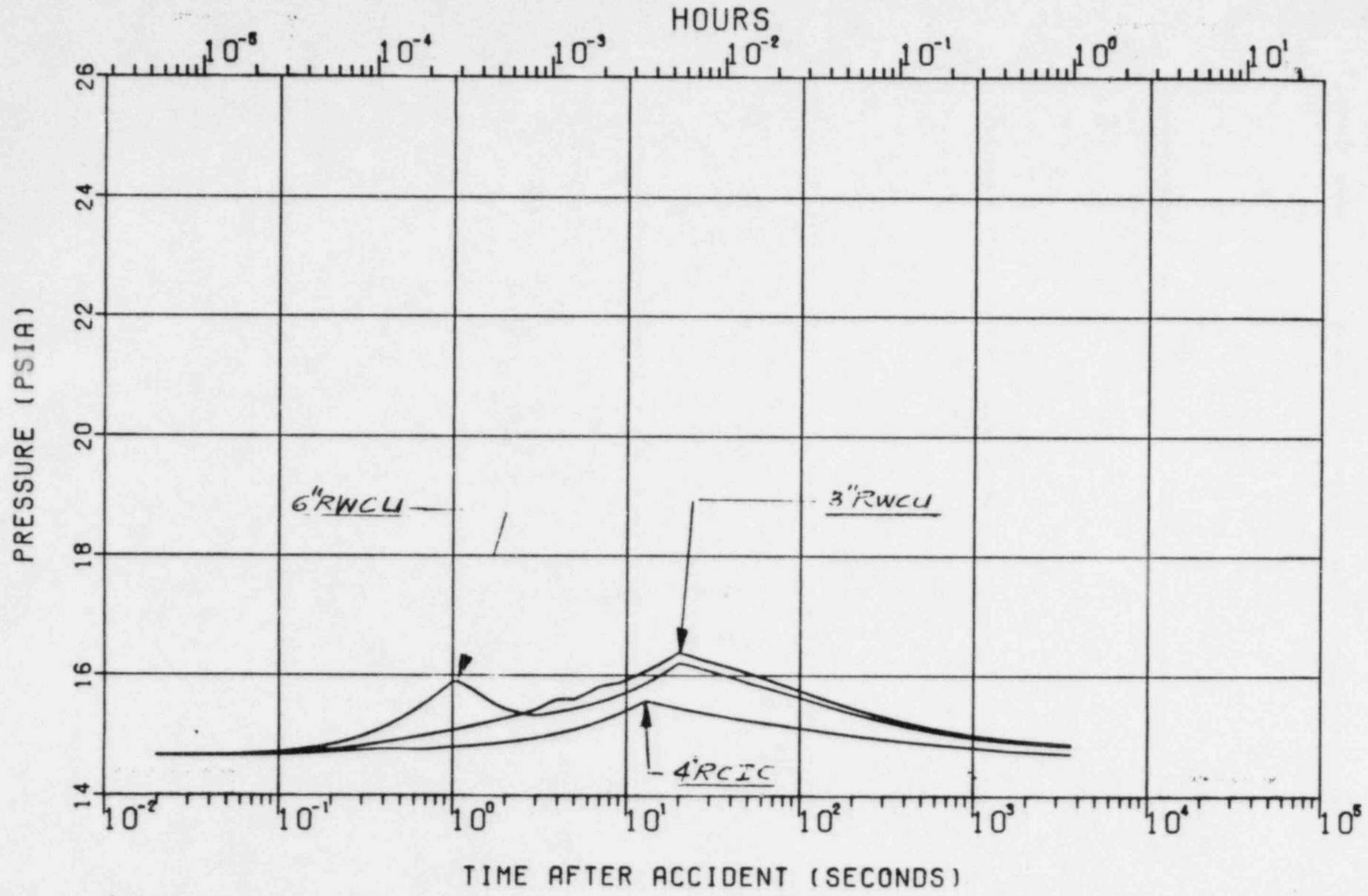


FIGURE - 4

PRESSURE TRANSIENTS IN NODE 1 / VOLUME 4
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF IE EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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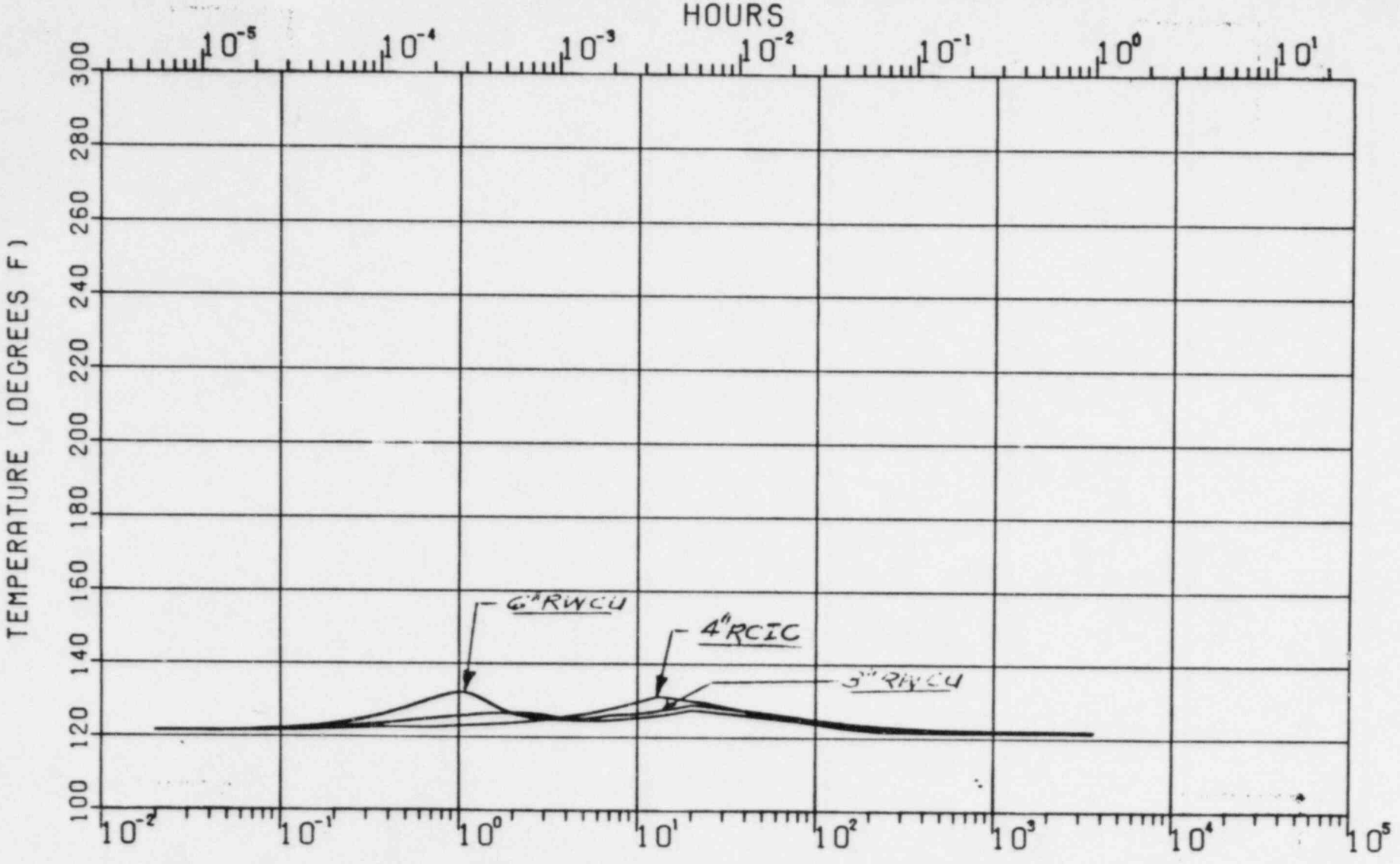

FIGURE - 5

TEMPERATURE TRANSIENTS IN NODE 1/VOLUME 4
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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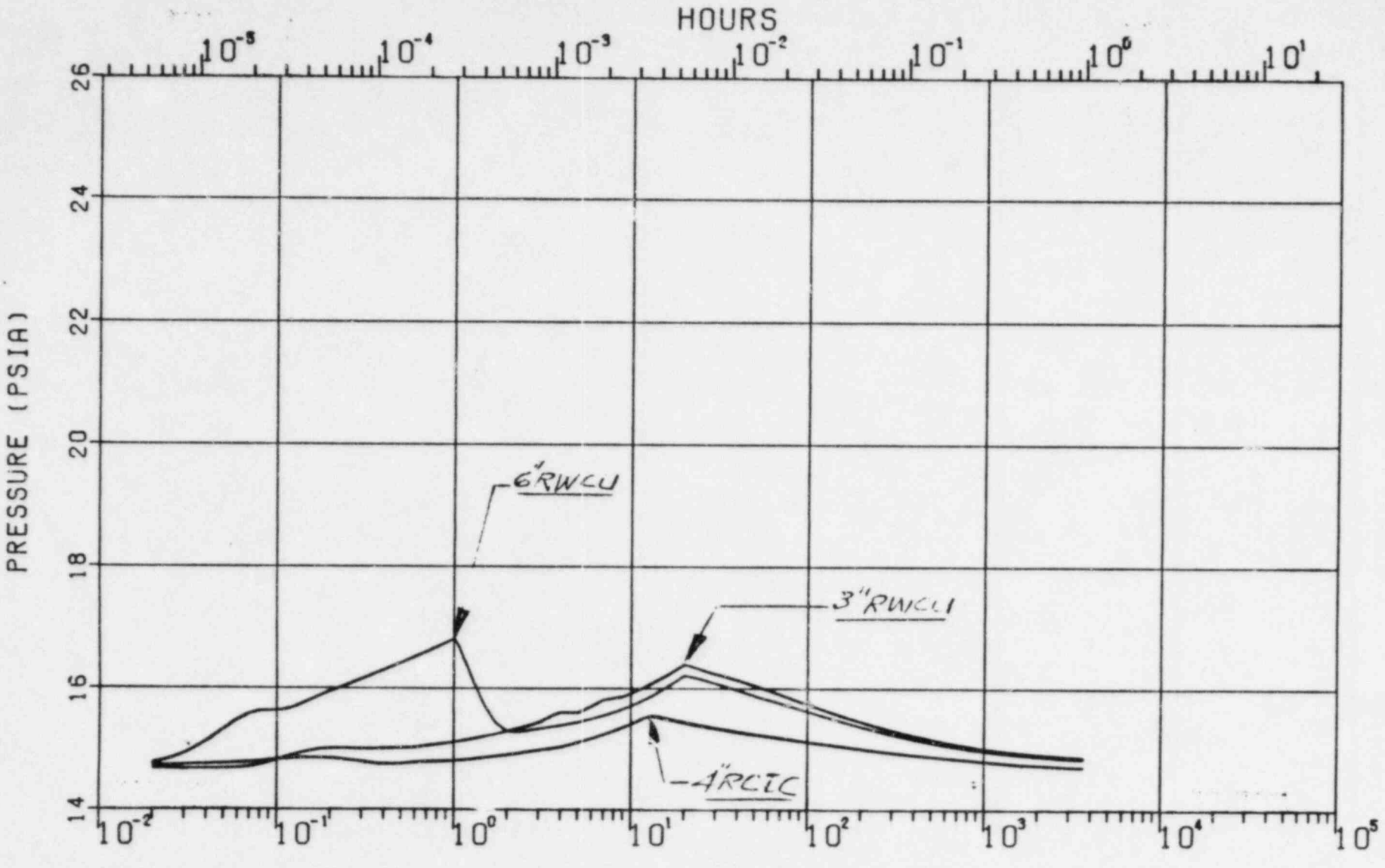

FIGURE-5

PRESSURE TRANSIENTS IN NODE 2/VOLUME 5
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

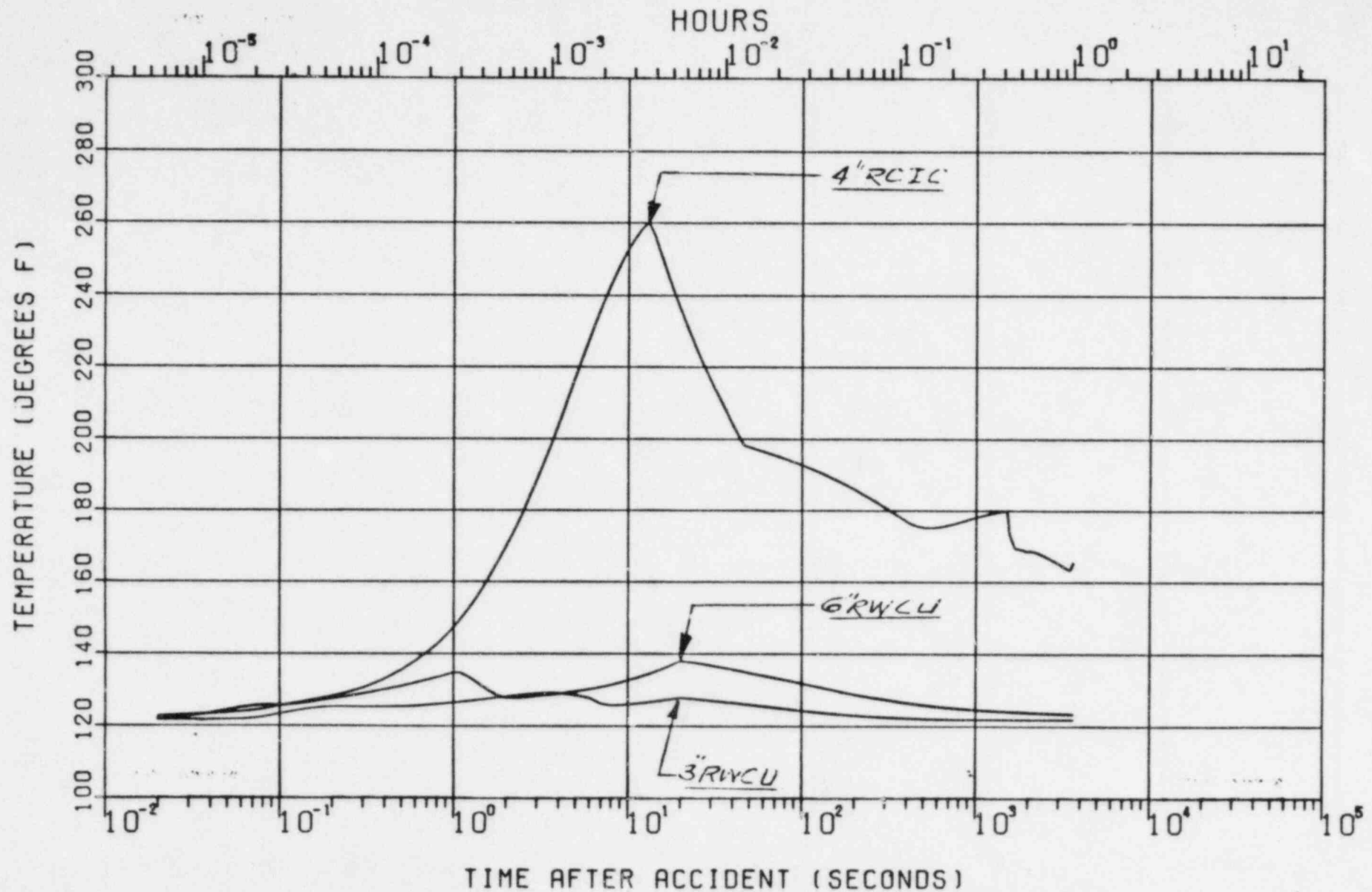

FIGURE -7

TEMPERATURE TRANSIENTS IN NODE 2 / VOLUME 5
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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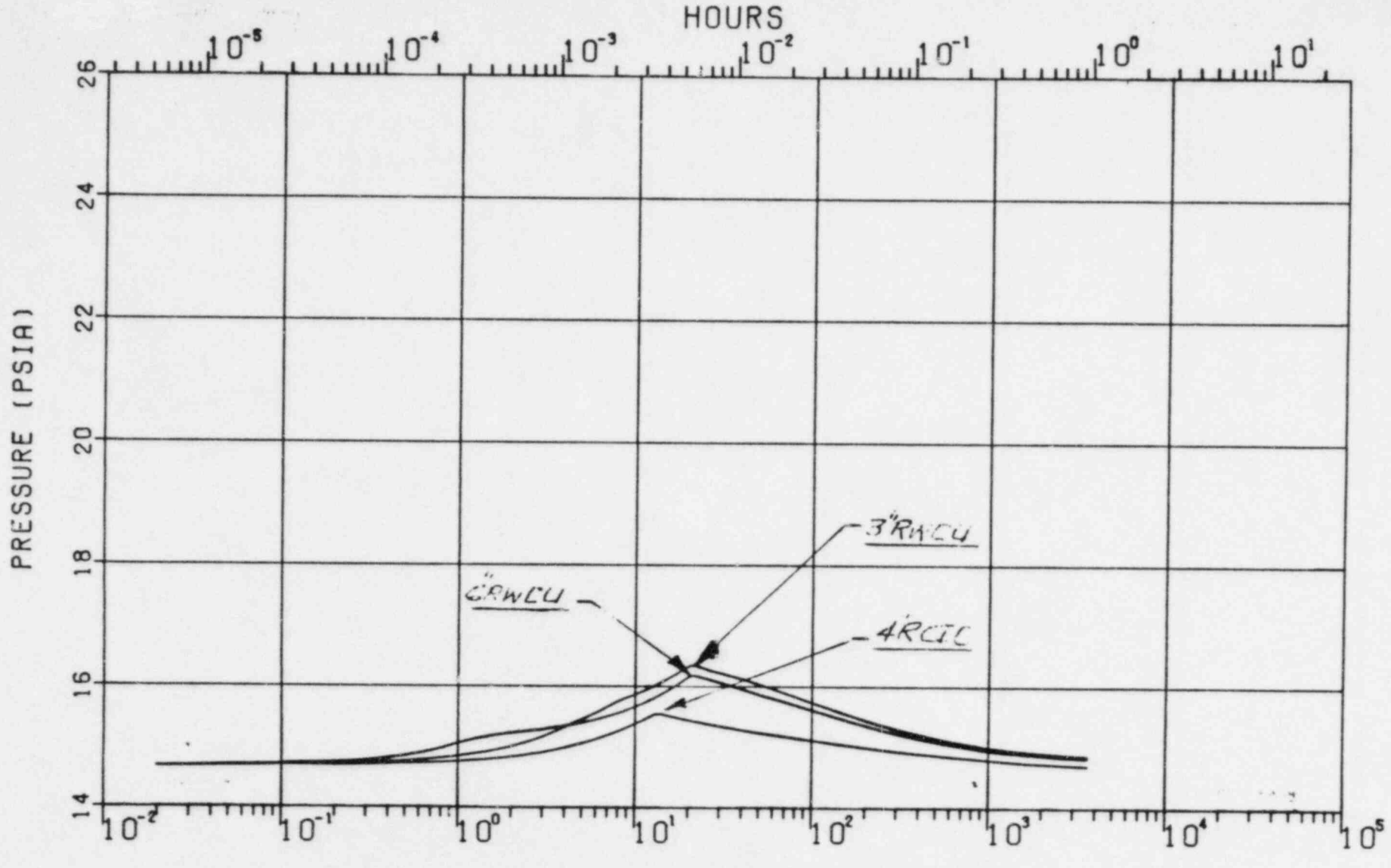

FIGURE - 8

PRESSURE TRANSIENTS IN NODE 3 / VOLUME 10
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

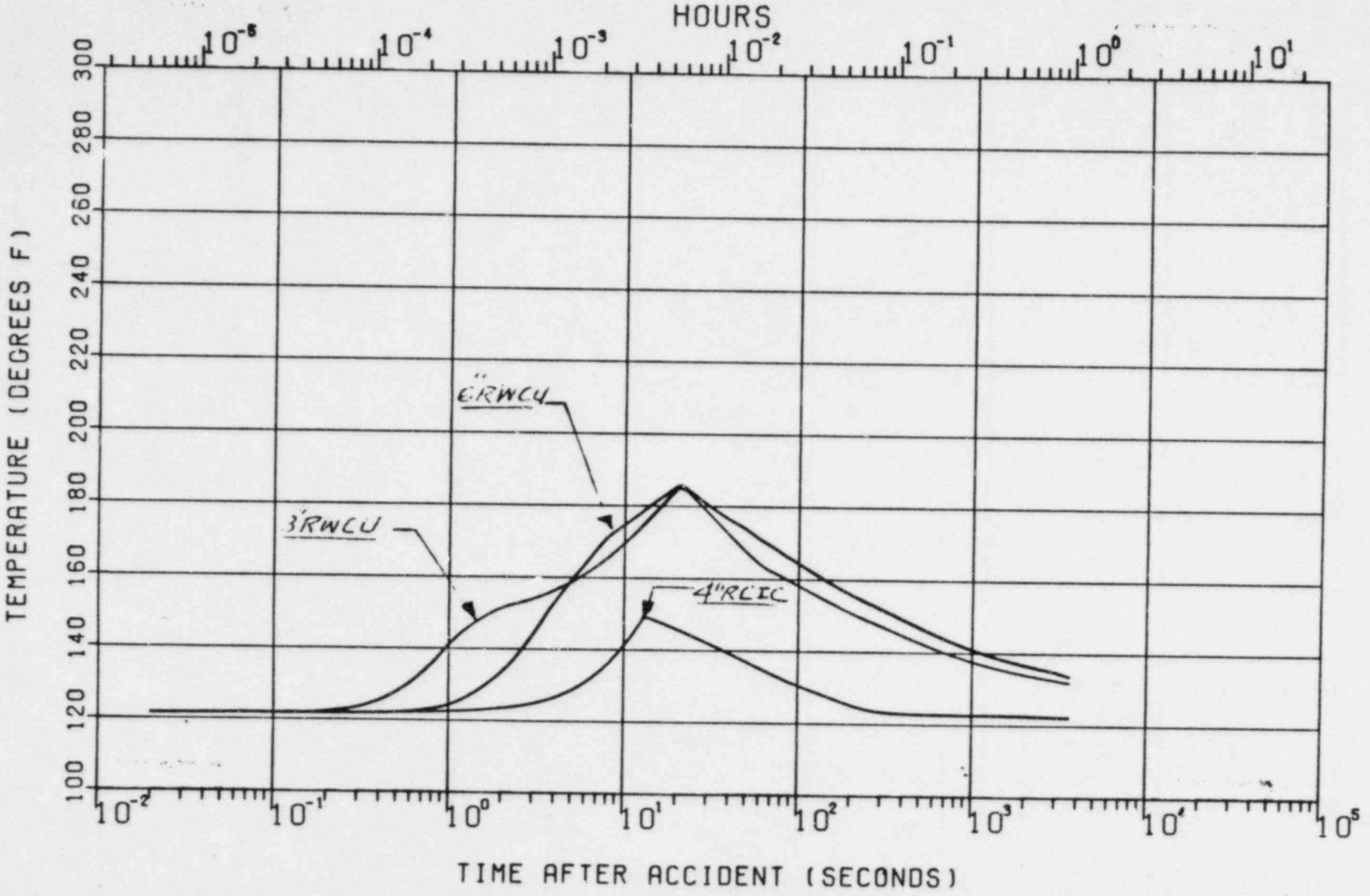

FIGURE 9

TEMPERATURE TRANSIENTS IN NODE 3/VOLUME 10
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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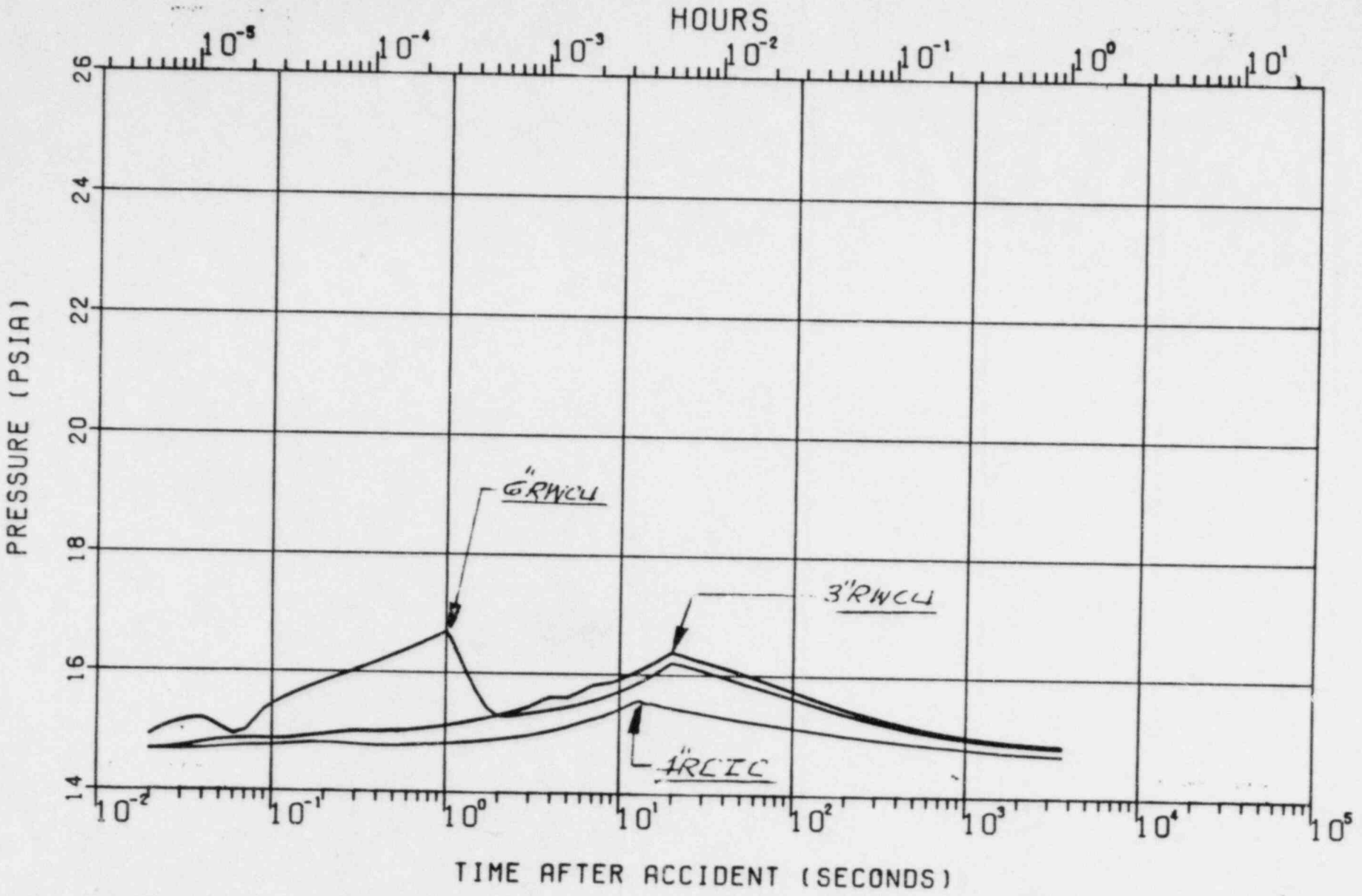

FIGURE - 10

PRESSURE TRANSIENTS IN NODE 4 / VOLUME 11
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

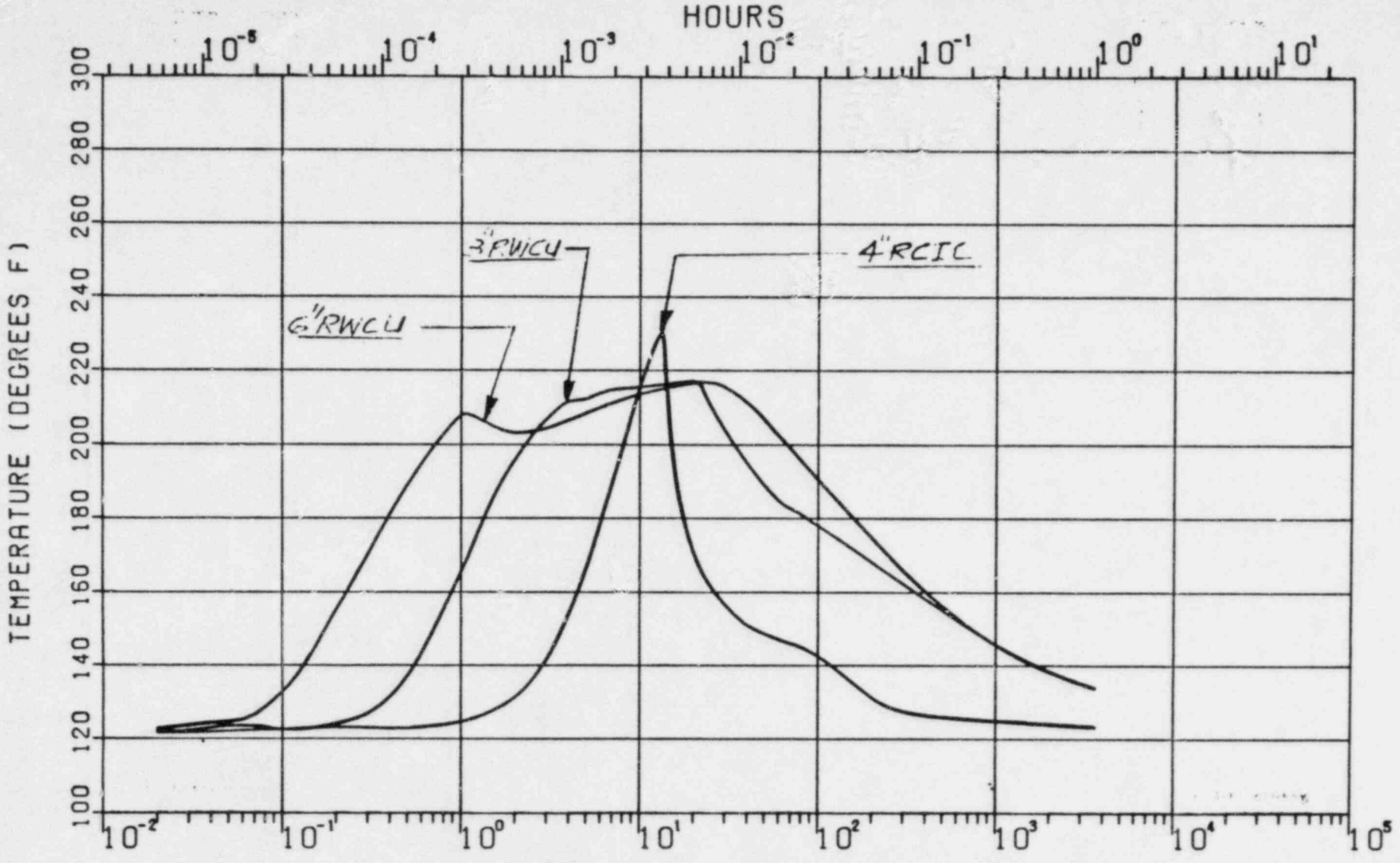

FIGURE -11

TEMPERATURE TRANSIENTS IN NODE 4 / VOLUME 11
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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Page 4

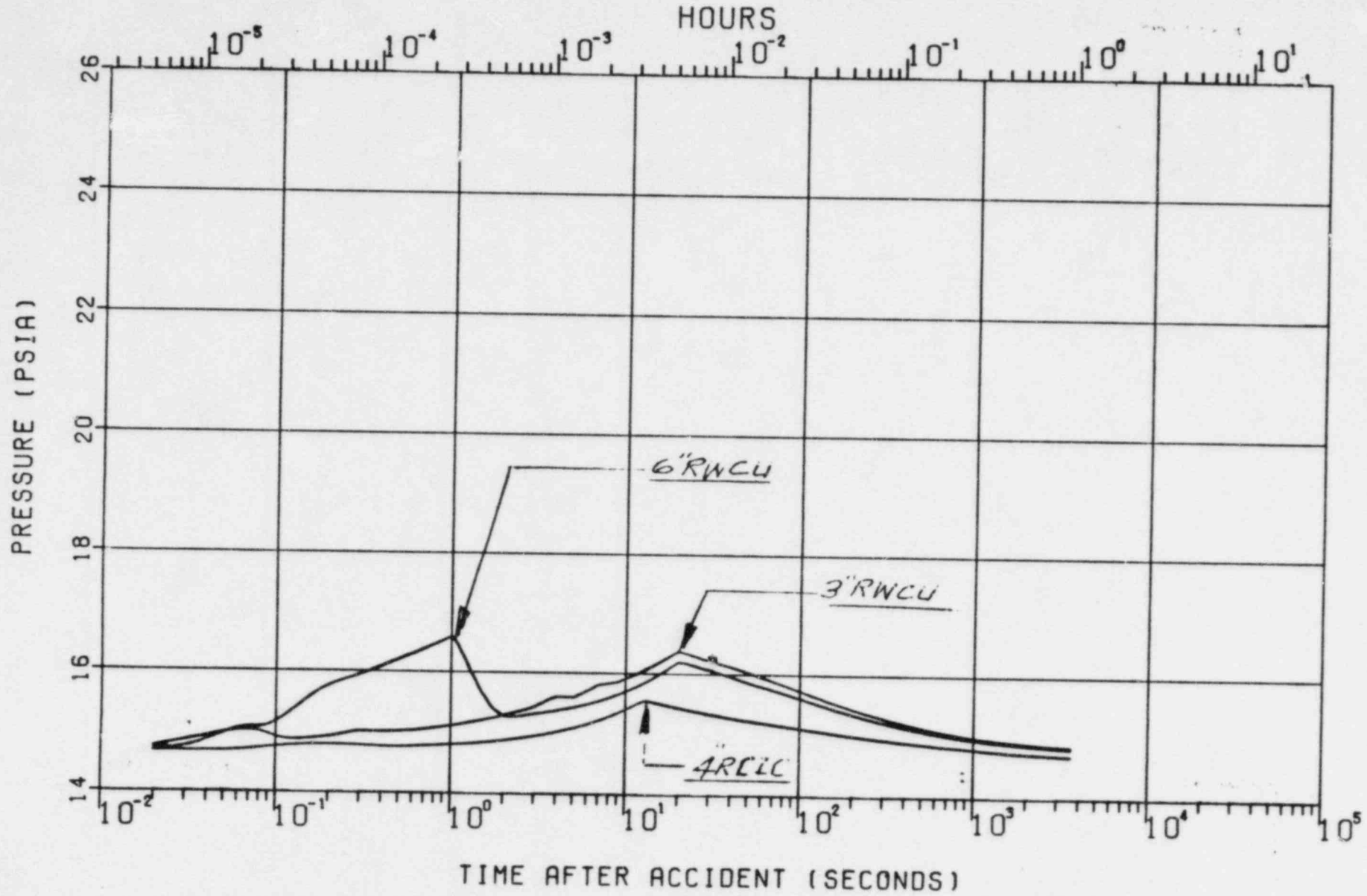

FIGURE - 12

PRESSURE TRANSIENTS IN NODE 5 / VOLUME 12
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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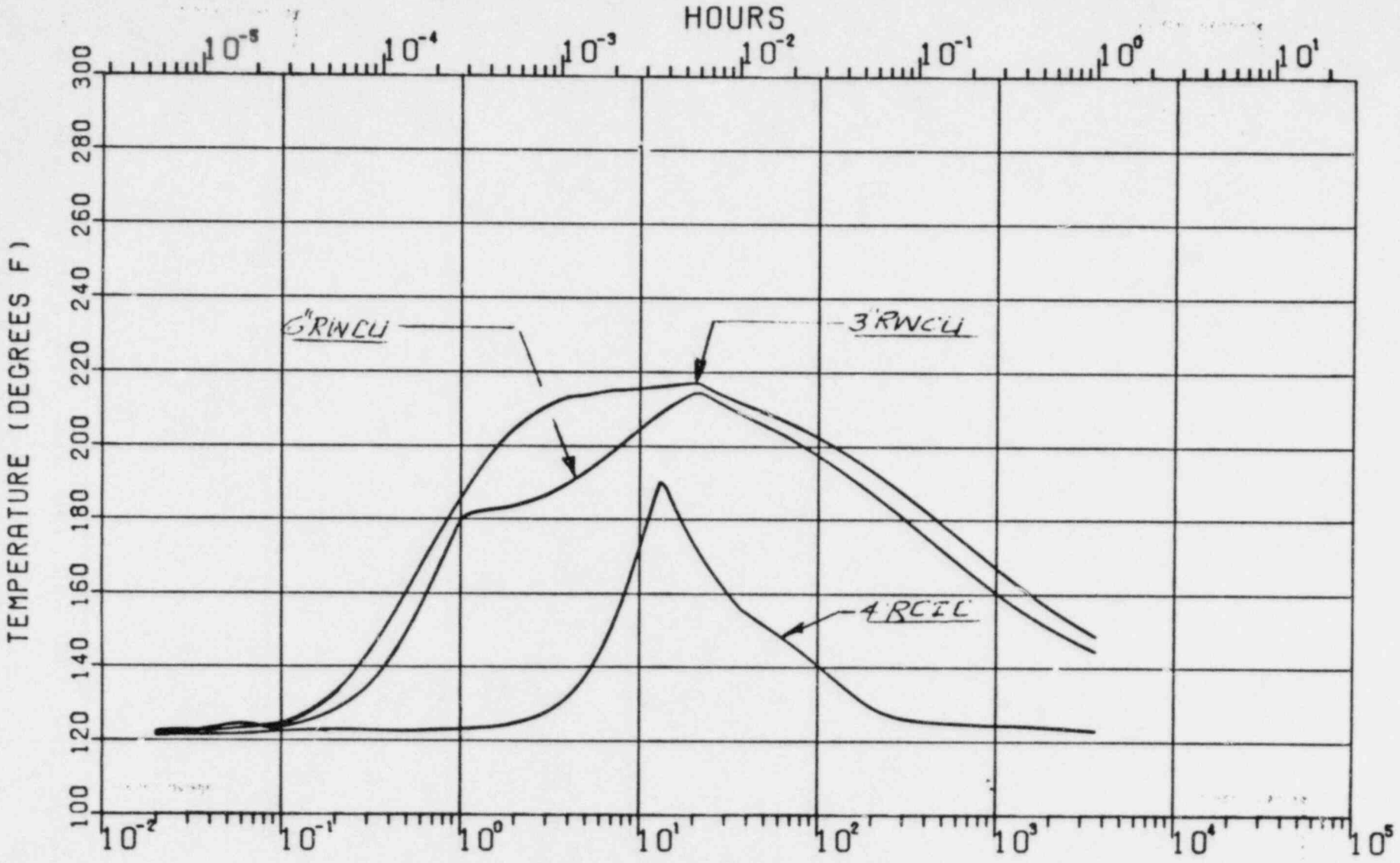

FIGURE-13

TEMPERATURE TRANSIENTS IN NODE 5/VOLUME 12
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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1992-1

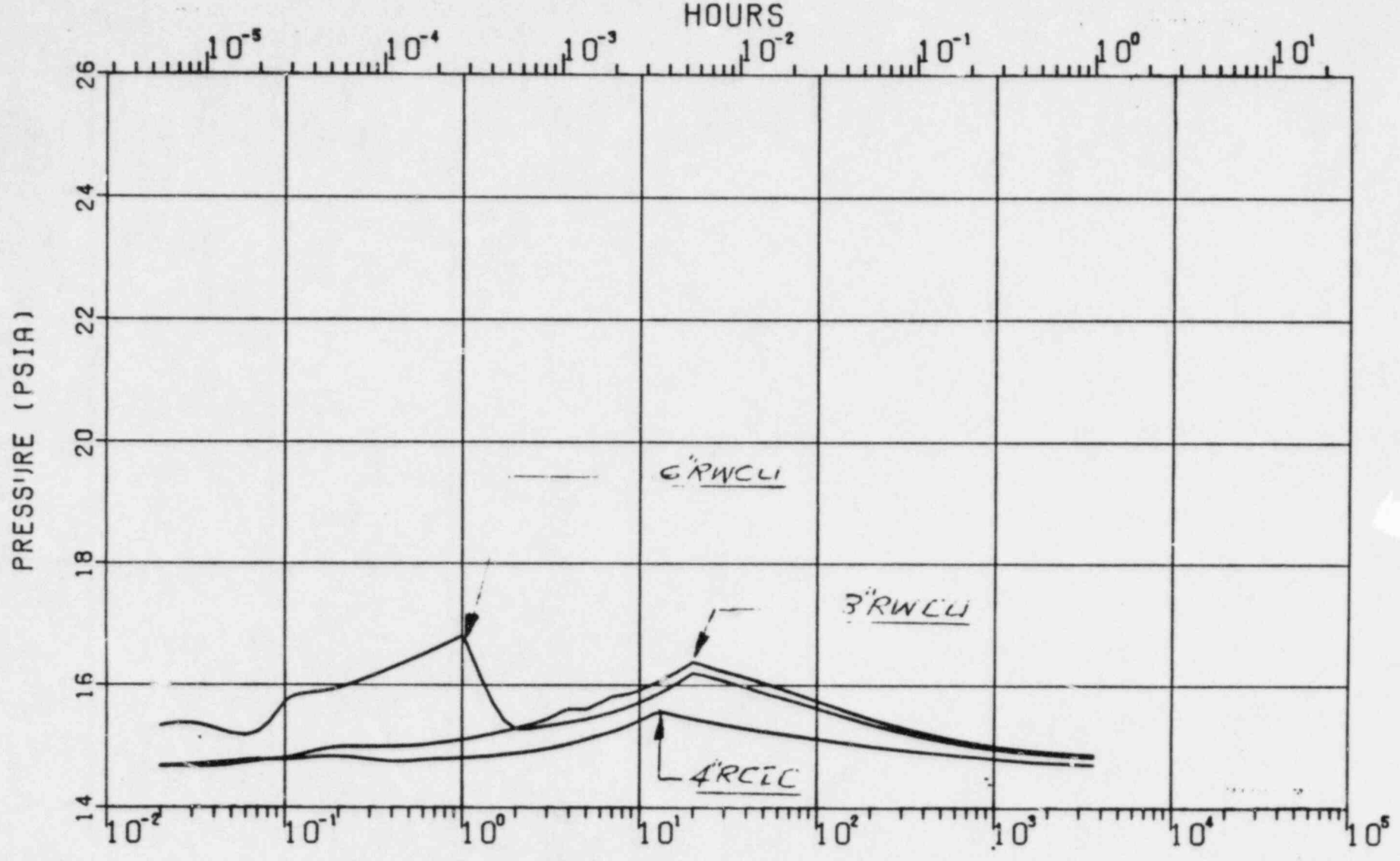

FIGURE-14

PRESSURE TRANSIENTS IN NODE 6/VOLUME 13
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

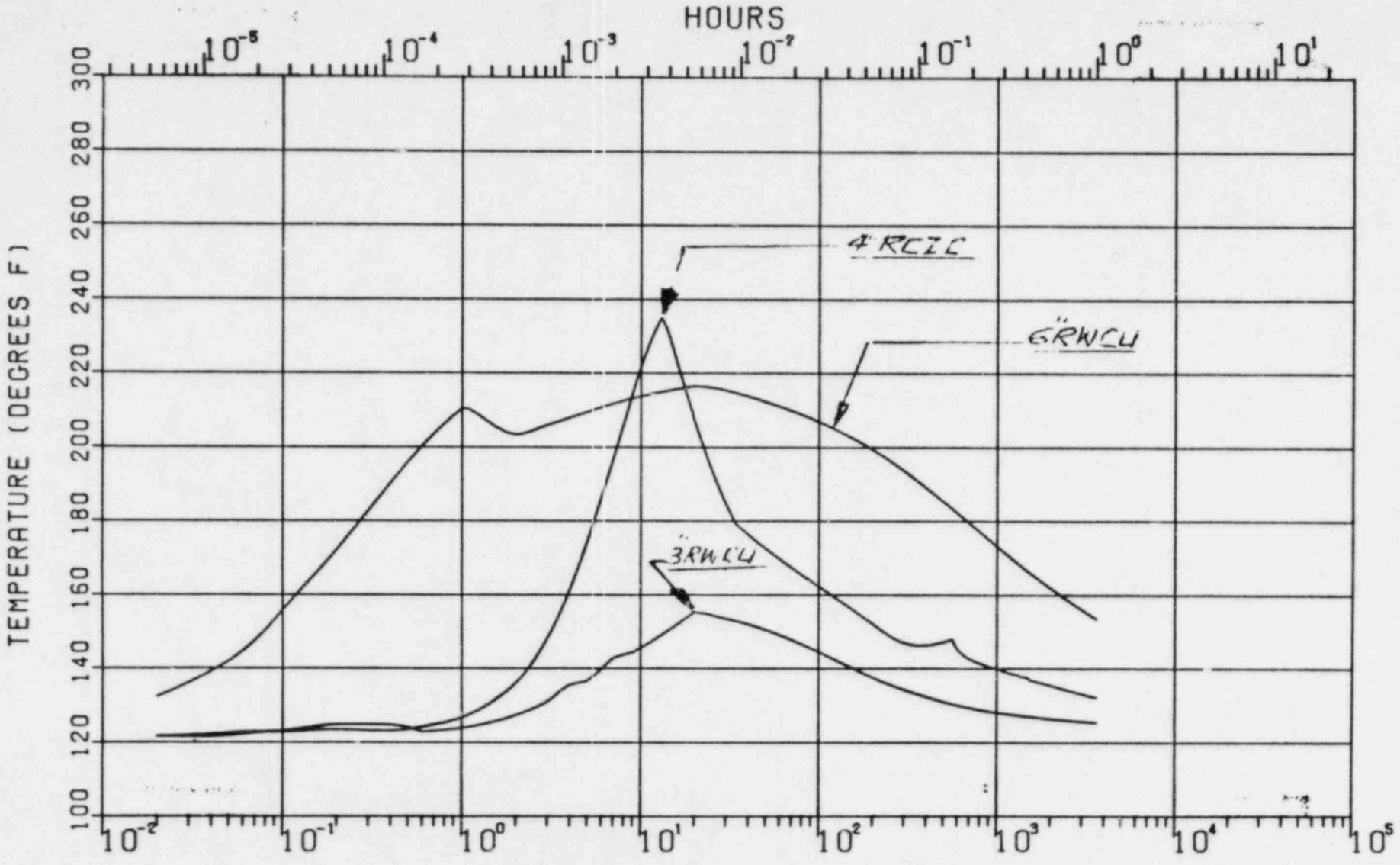

FIGURE-15

TEMPERATURE TRANSIENTS IN NODE 6/VOLUME 13
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF IE EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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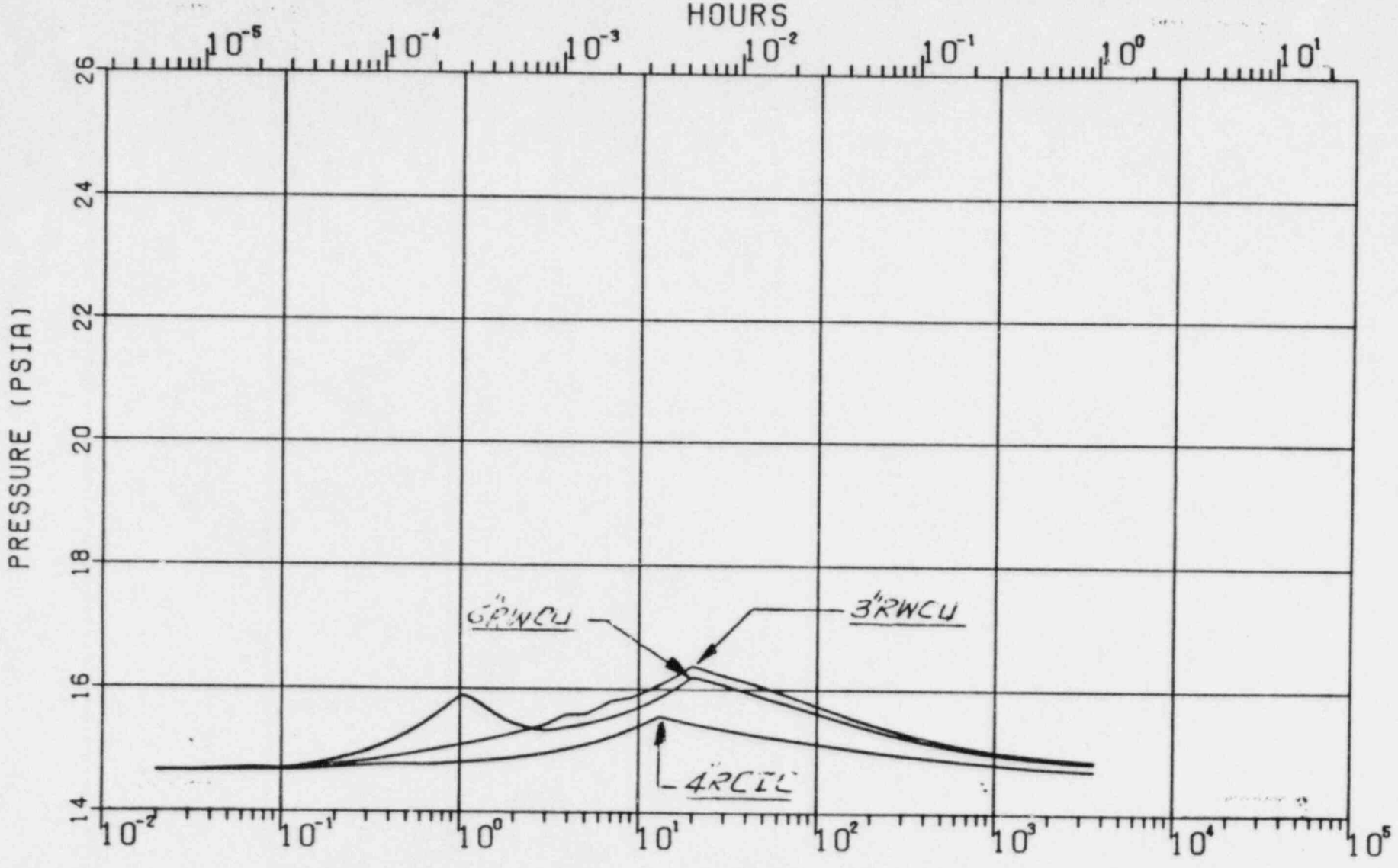

FIGURE-16

PRESSURE TRANSIENTS IN NODE 7 / VOLUME 14
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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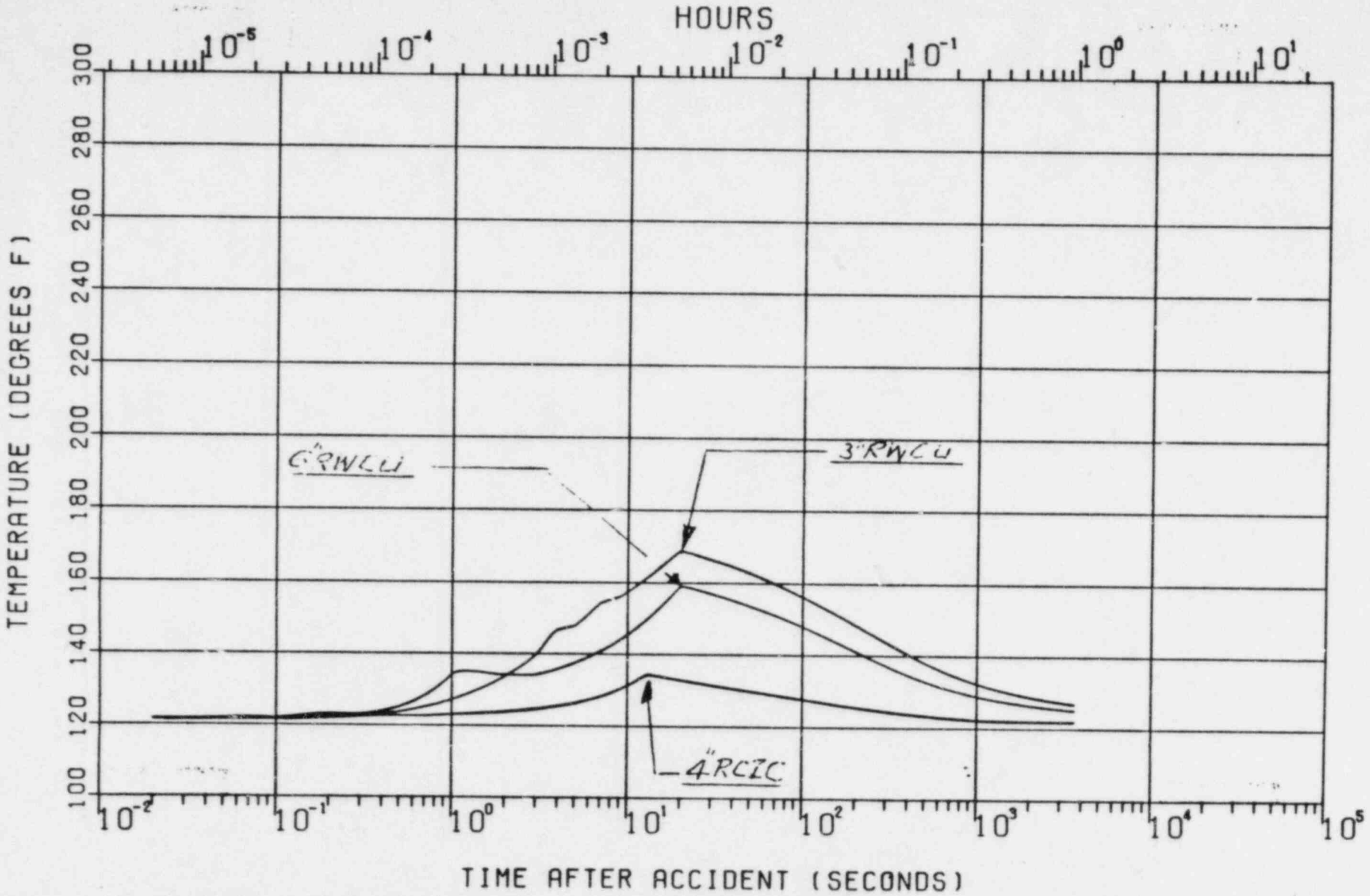

FIGURE-17

TEMPERATURE TRANSIENTS IN NODE 7/VOLUME 14
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

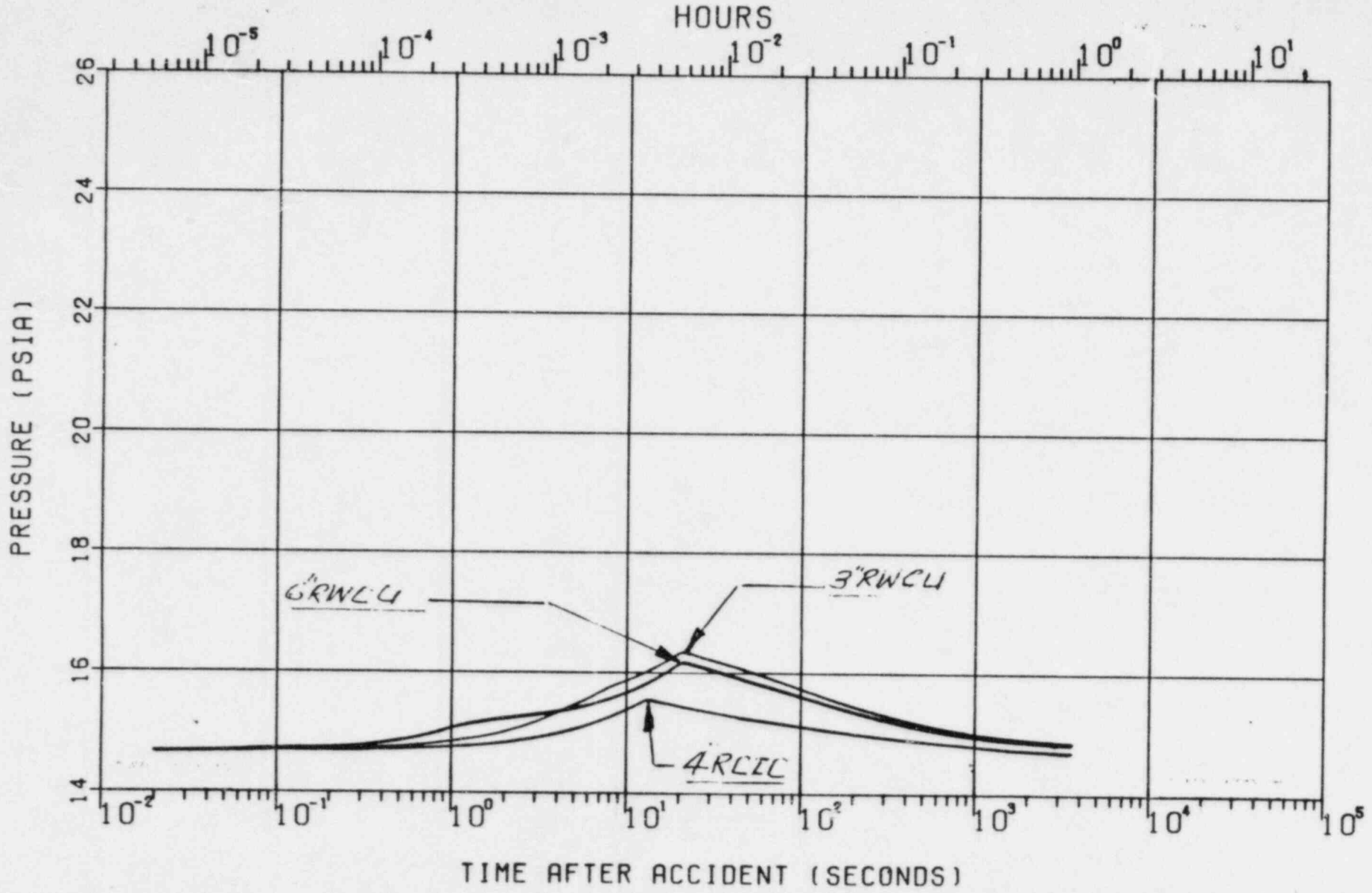

FIGURE-18

PRESSURE TRANSIENTS IN NODE 8/VOLUME 15
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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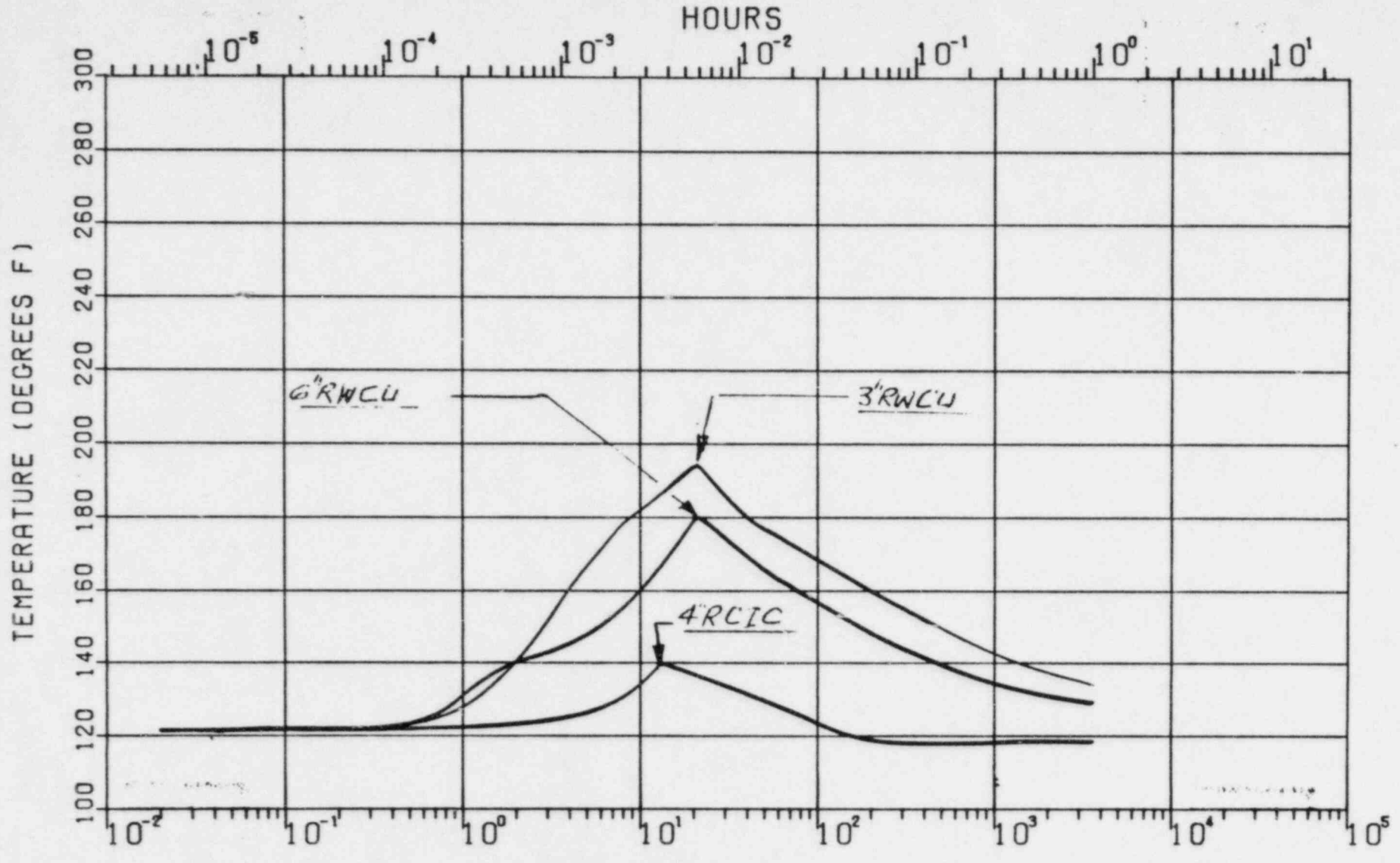

FIGURE -19

TEMPERATURE TRANSIENTS IN NODE 8/VOLUME 15
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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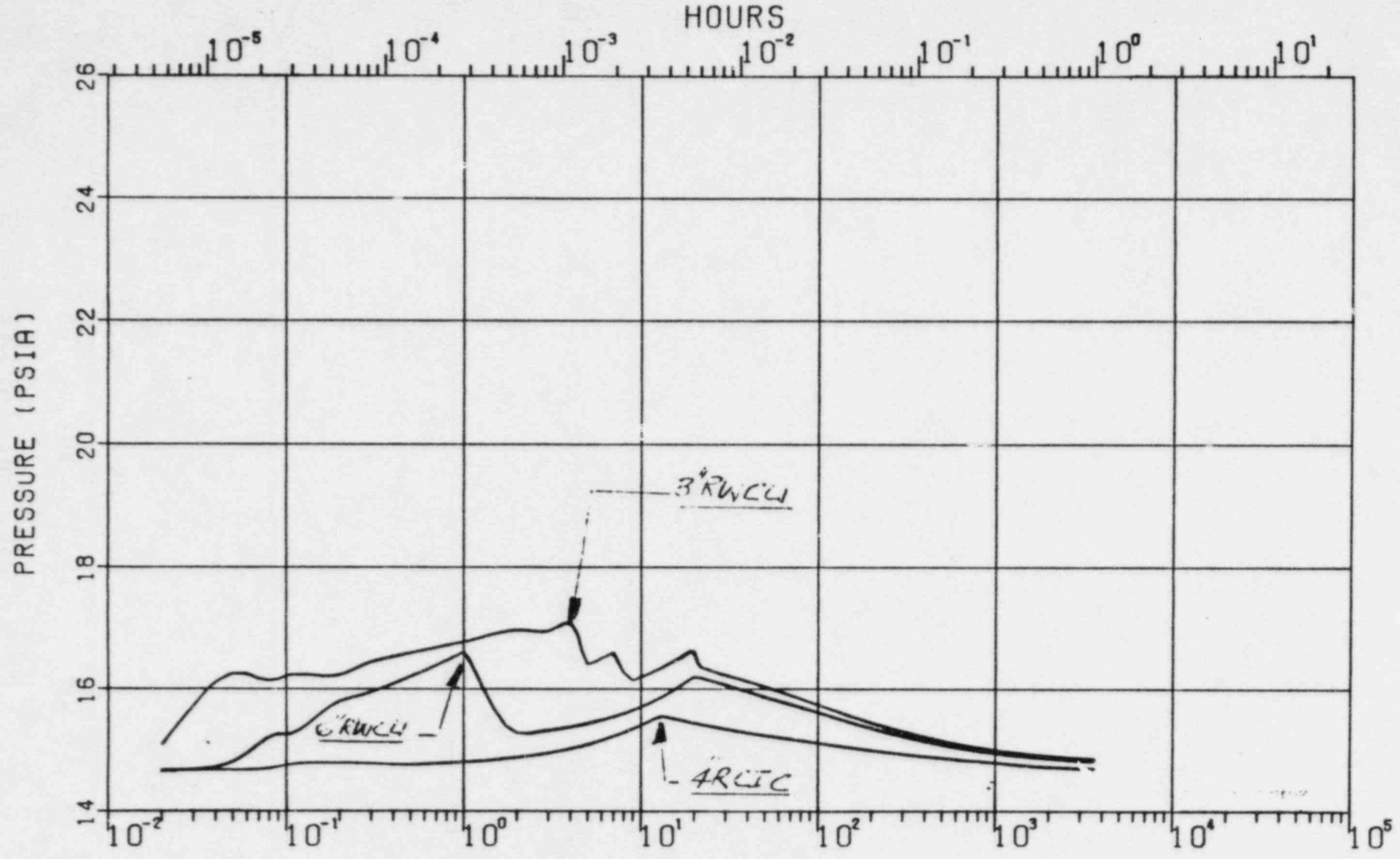

FIGURE-20

PRESSURE TRANSIENTS IN NODE 9 / VOLUME 23a
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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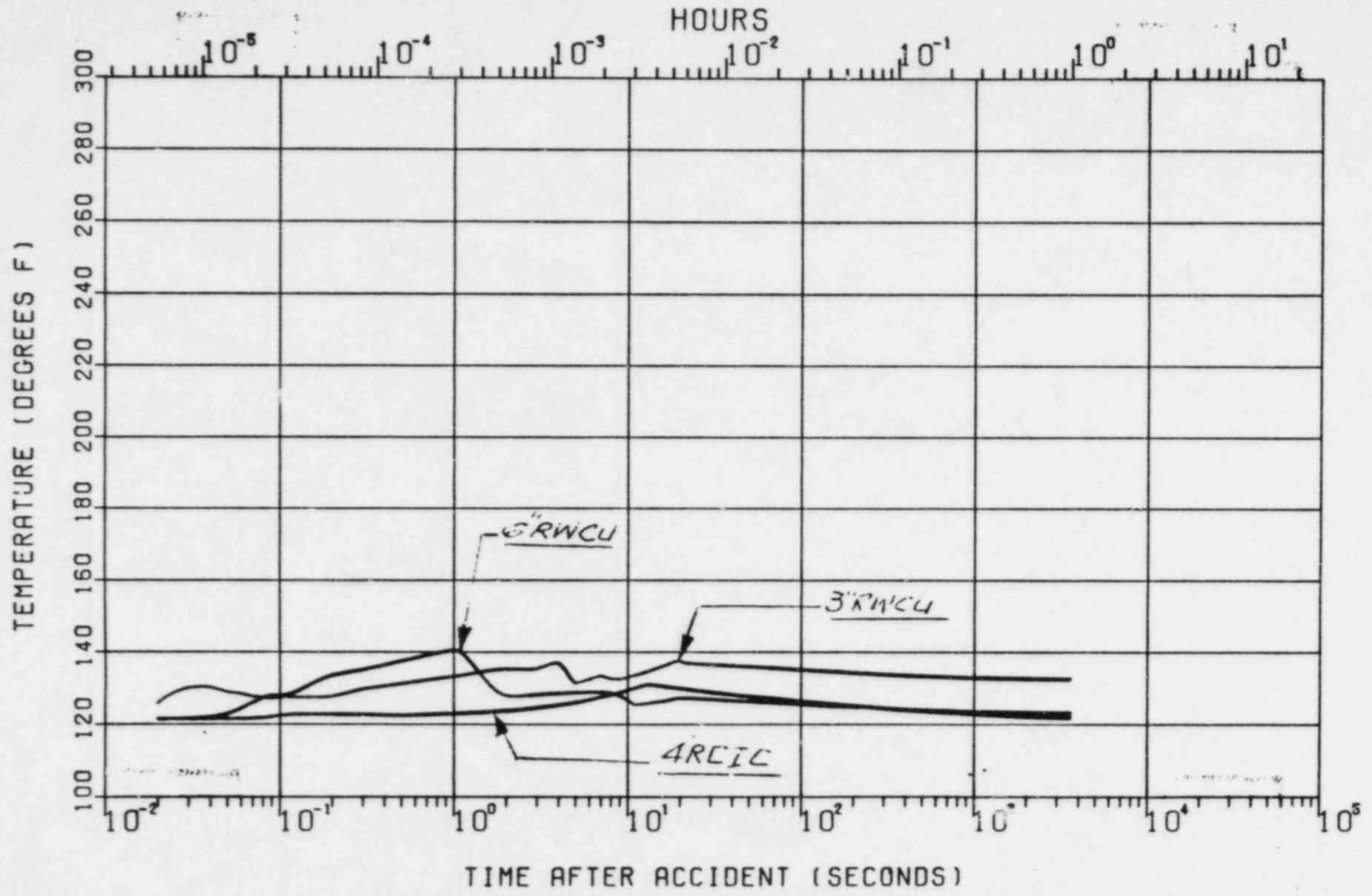

FIGURE-21

TEMPERATURE TRANSIENTS IN NODE 9/VOLUME 23a
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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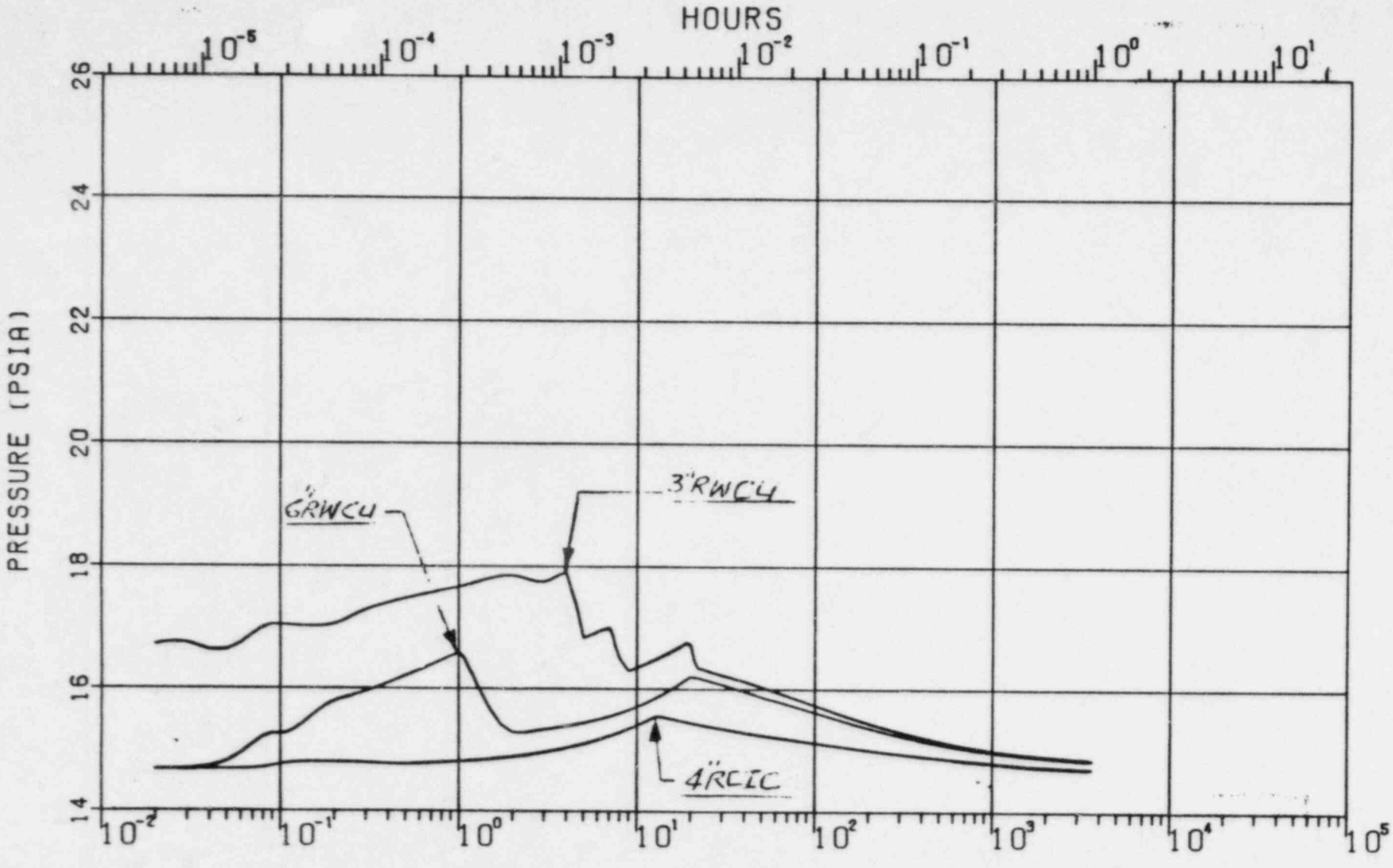

FIGURE-22

PRESSURE TRANSIENTS IN NODE 10/VOLUME 23b
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

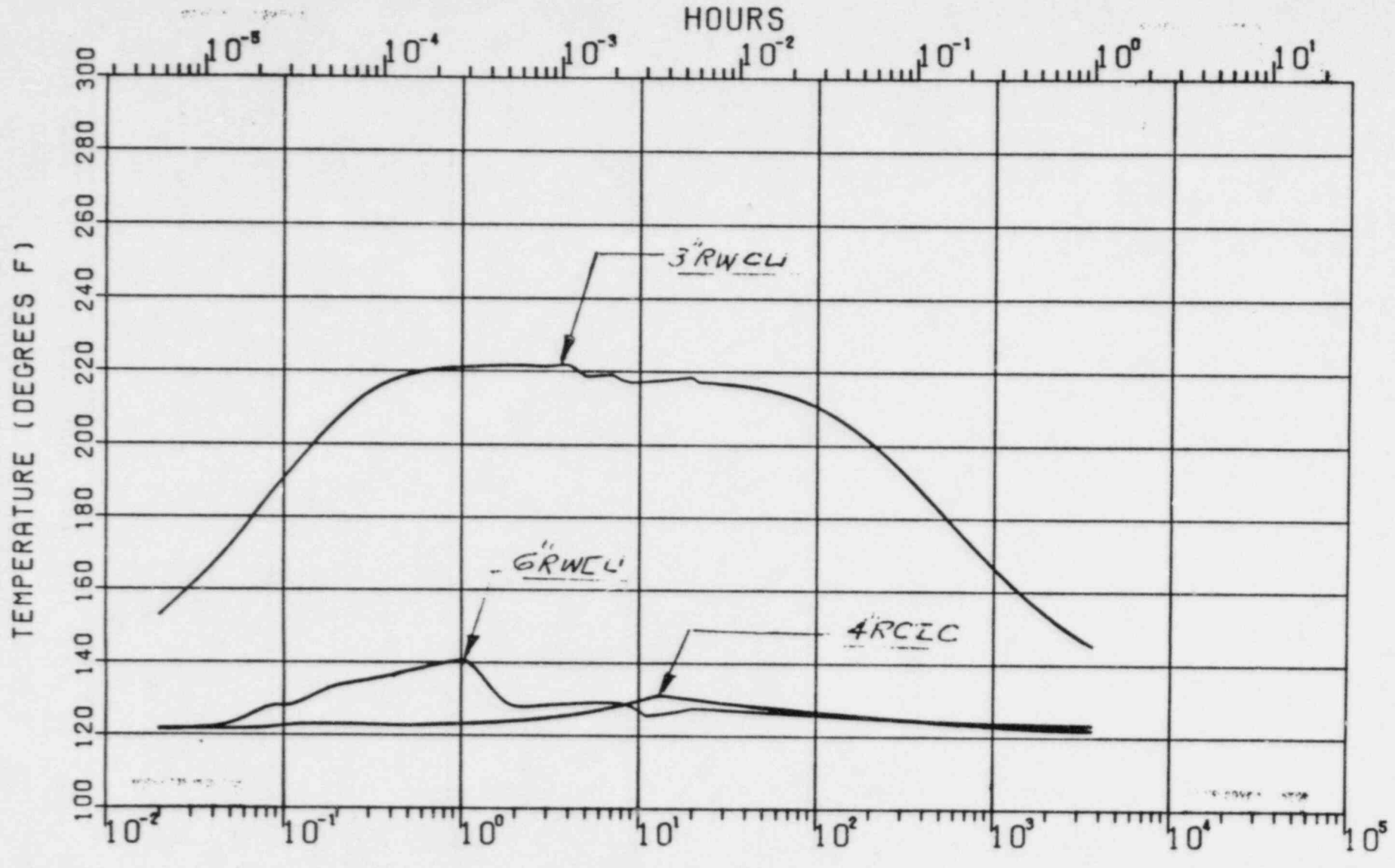

FIGURE-23

TEMPERATURE TRANSIENTS IN NODE 10/VOLUME 23b
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

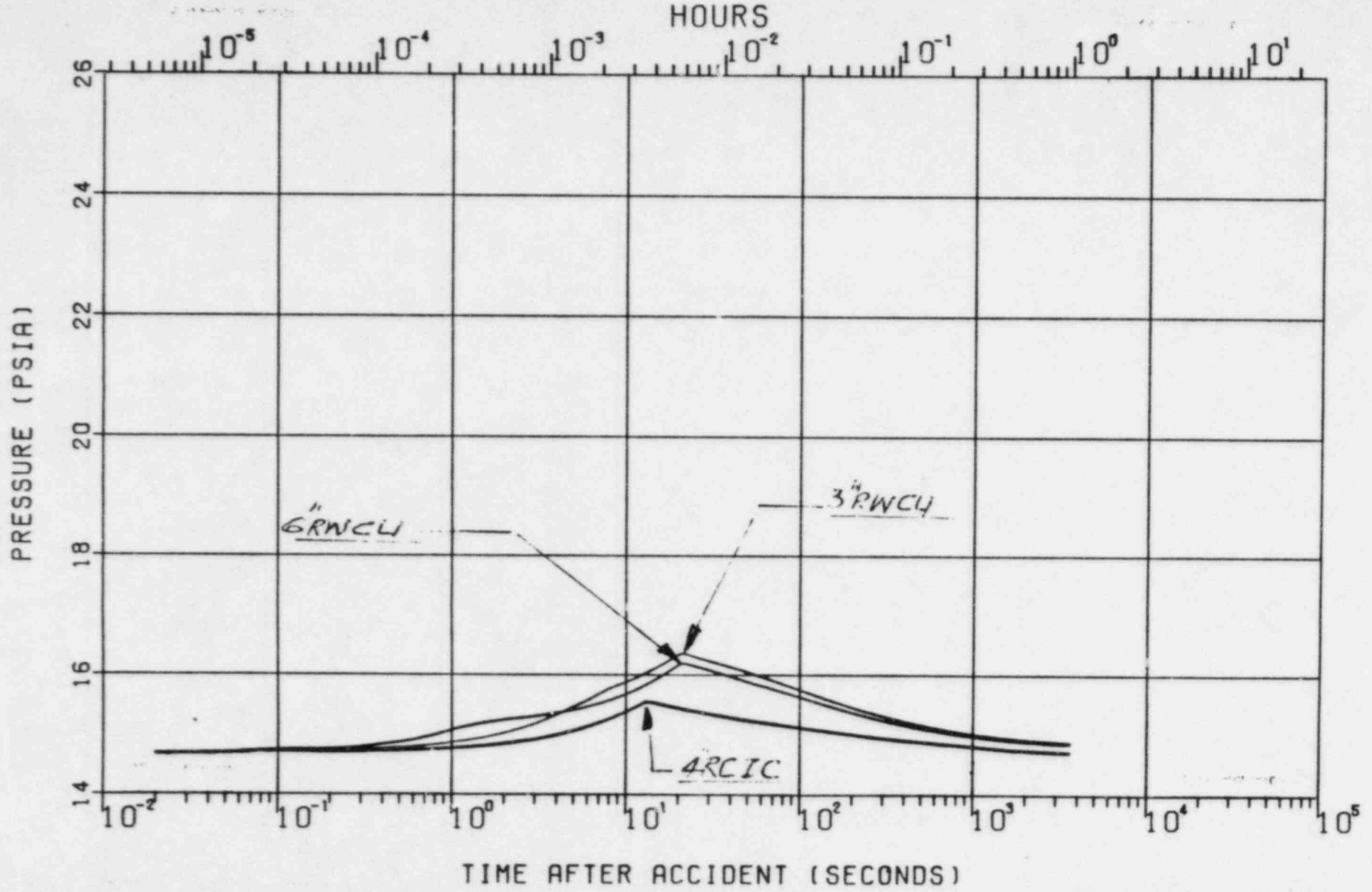

FIGURE - 24

PRESSURE TRANSIENTS IN NODE 11 / VOLUME 1
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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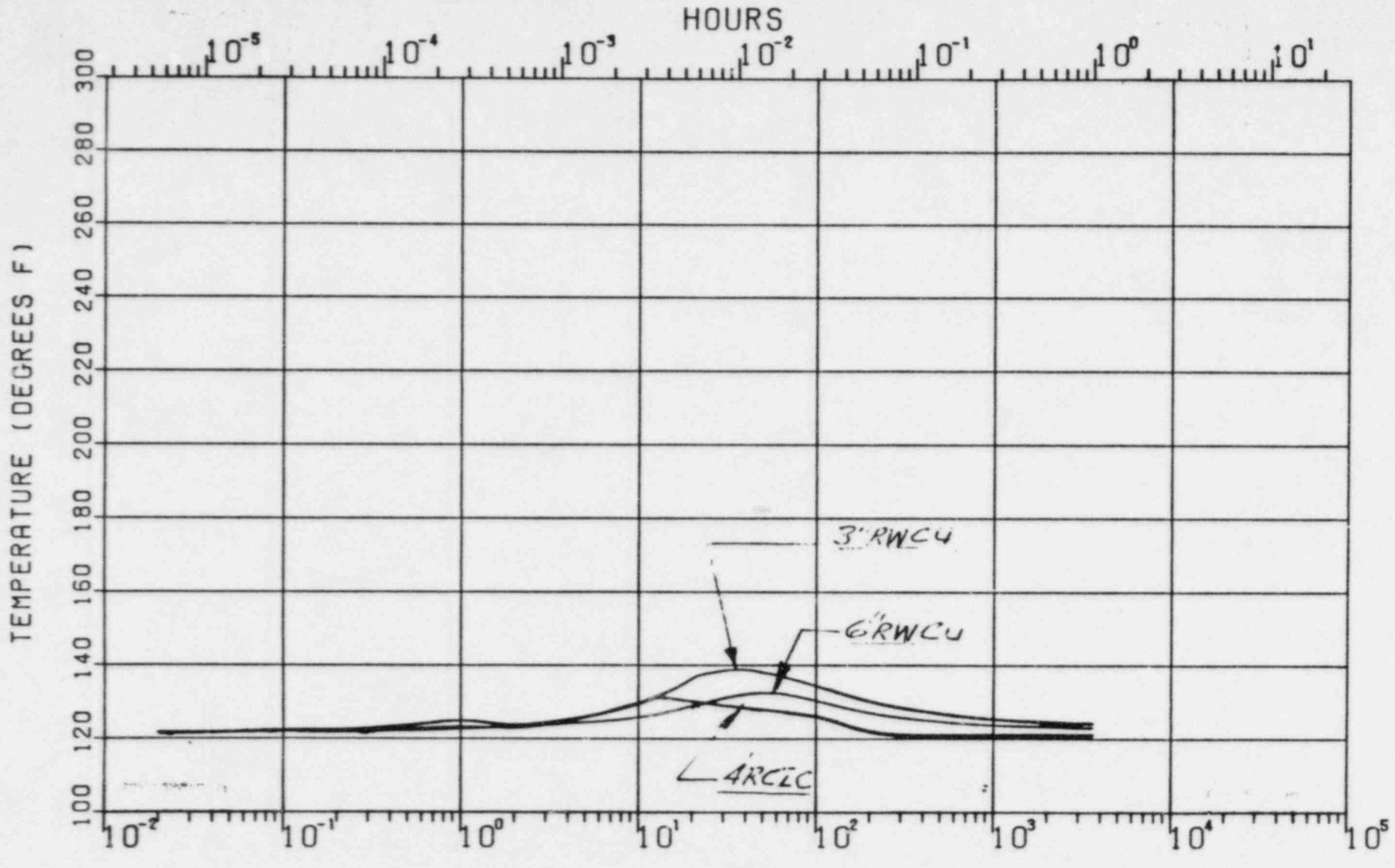

FIGURE - 25

TEMPERATURE TRANSIENTS IN NODE 11/VOLUME 1
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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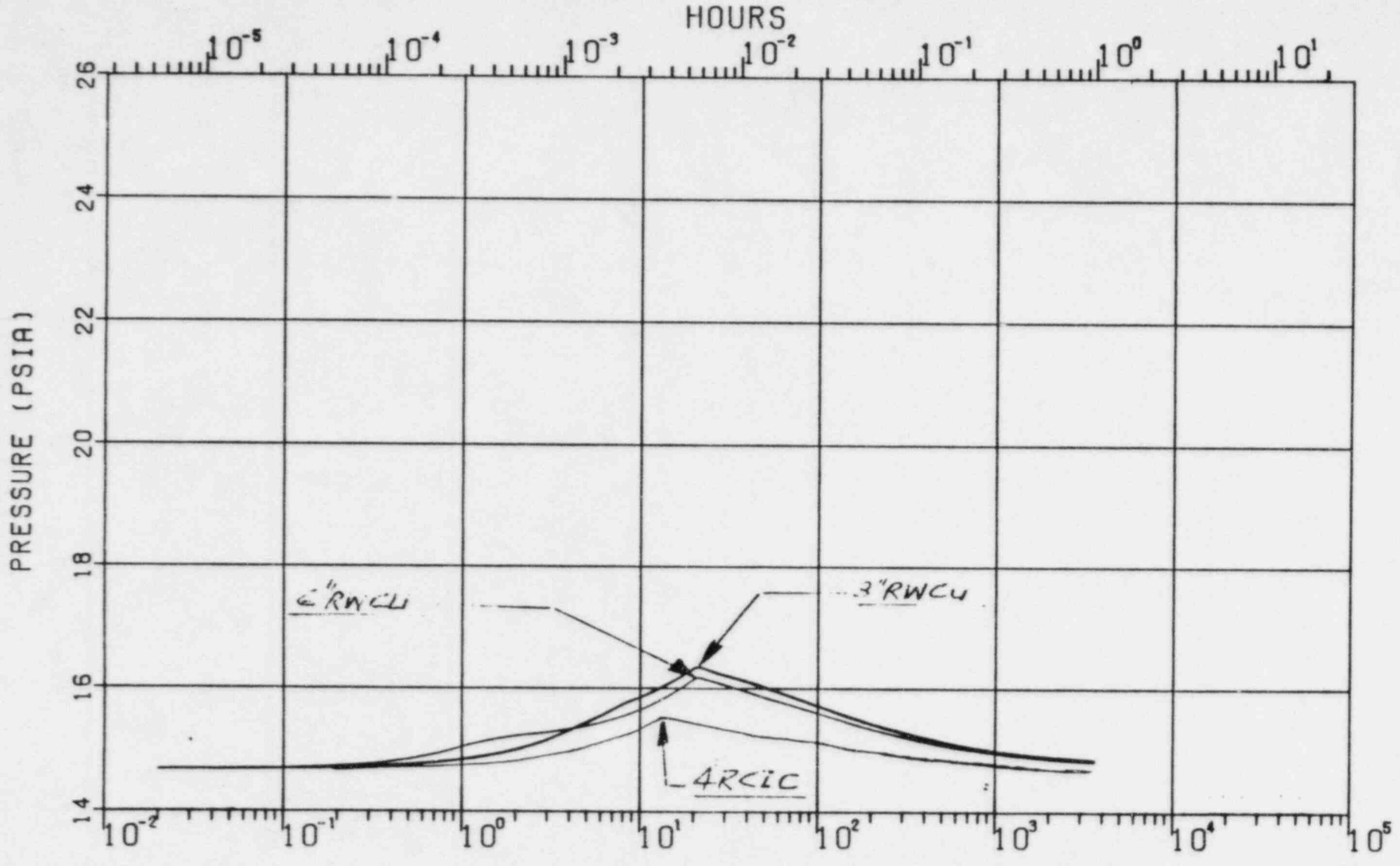

FIGURE-26

PRESSURE TRANSIENTS IN NODE 12 /VOLUME 55
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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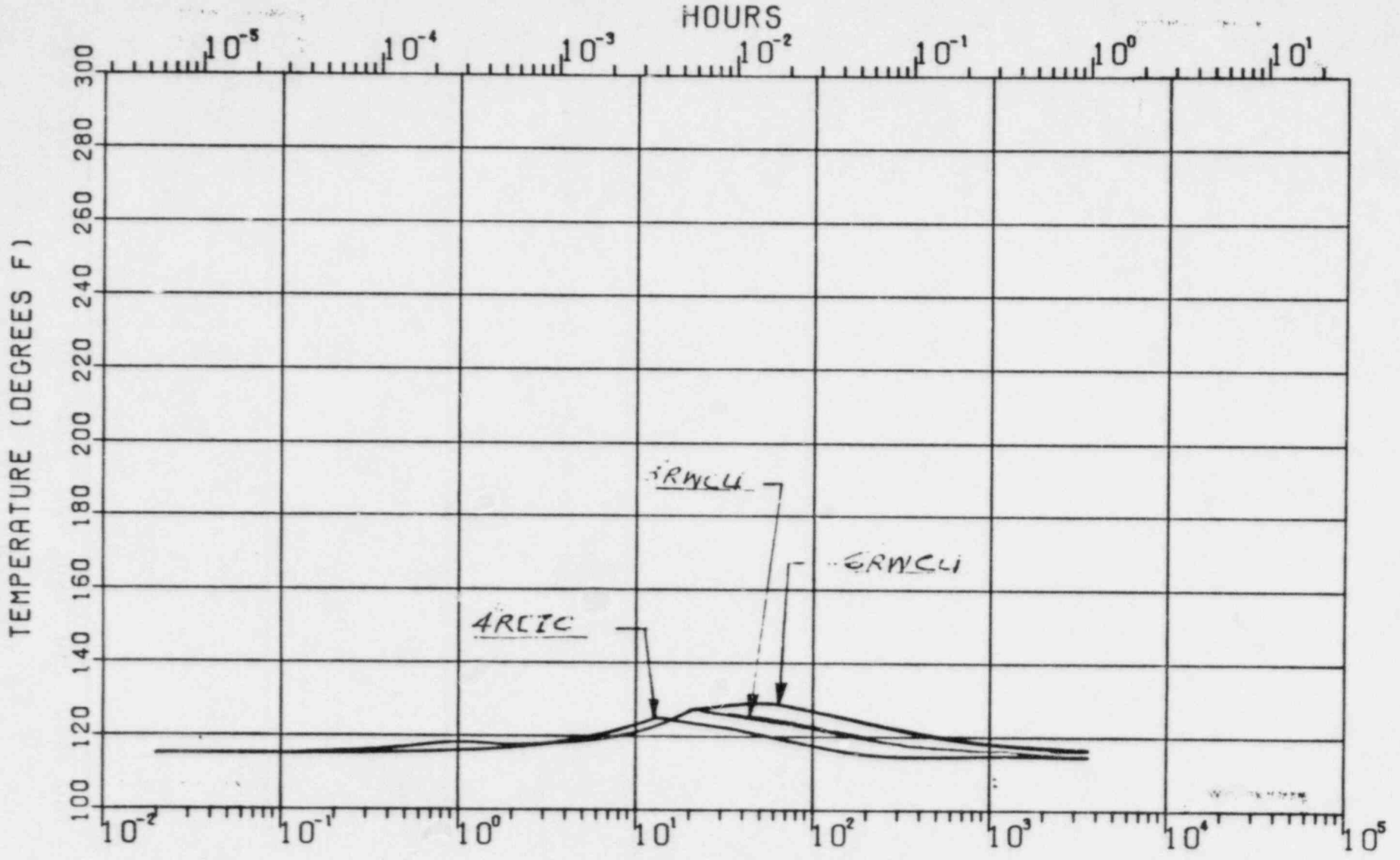

FIGURE-27

TEMPERATURE TRANSIENTS IN NODE 12 / VOLUME 55
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF IE EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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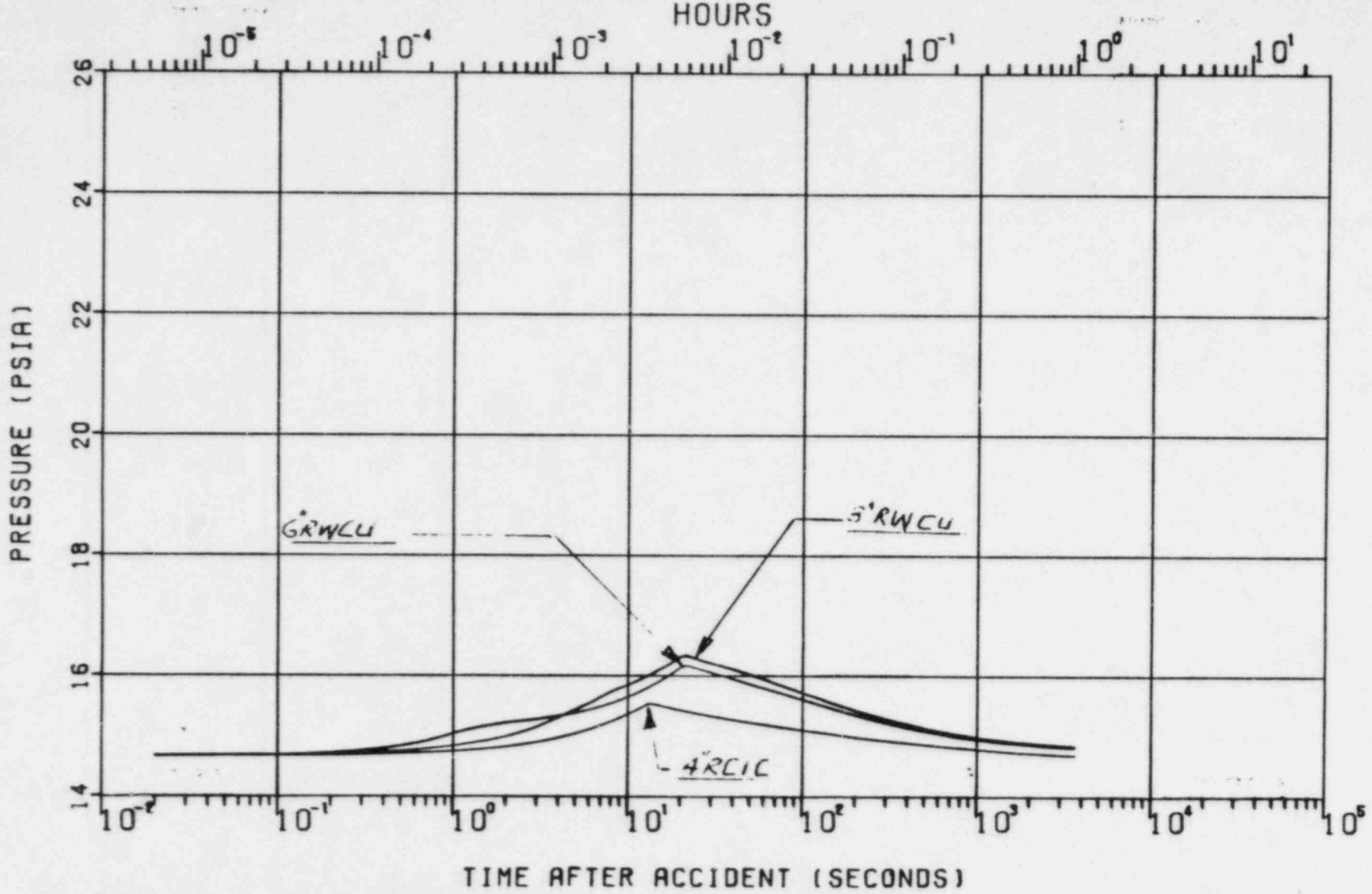

FIGURE -28

PRESSURE TRANSIENTS IN NODE 13 / VOLUME 56
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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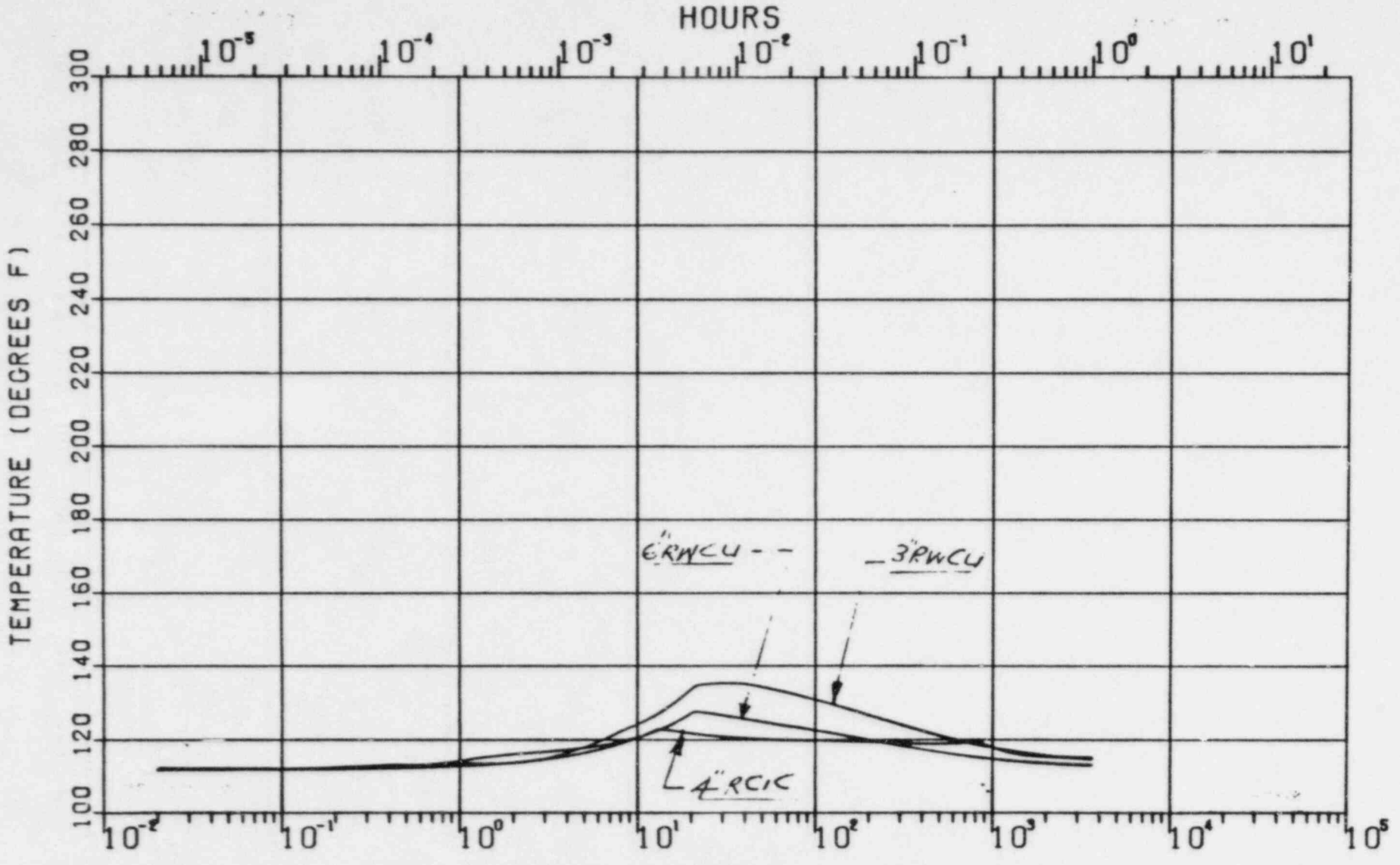

FIGURE - 29

TEMPERATURE TRANSIENTS IN NODE 13 / VOLUME 56
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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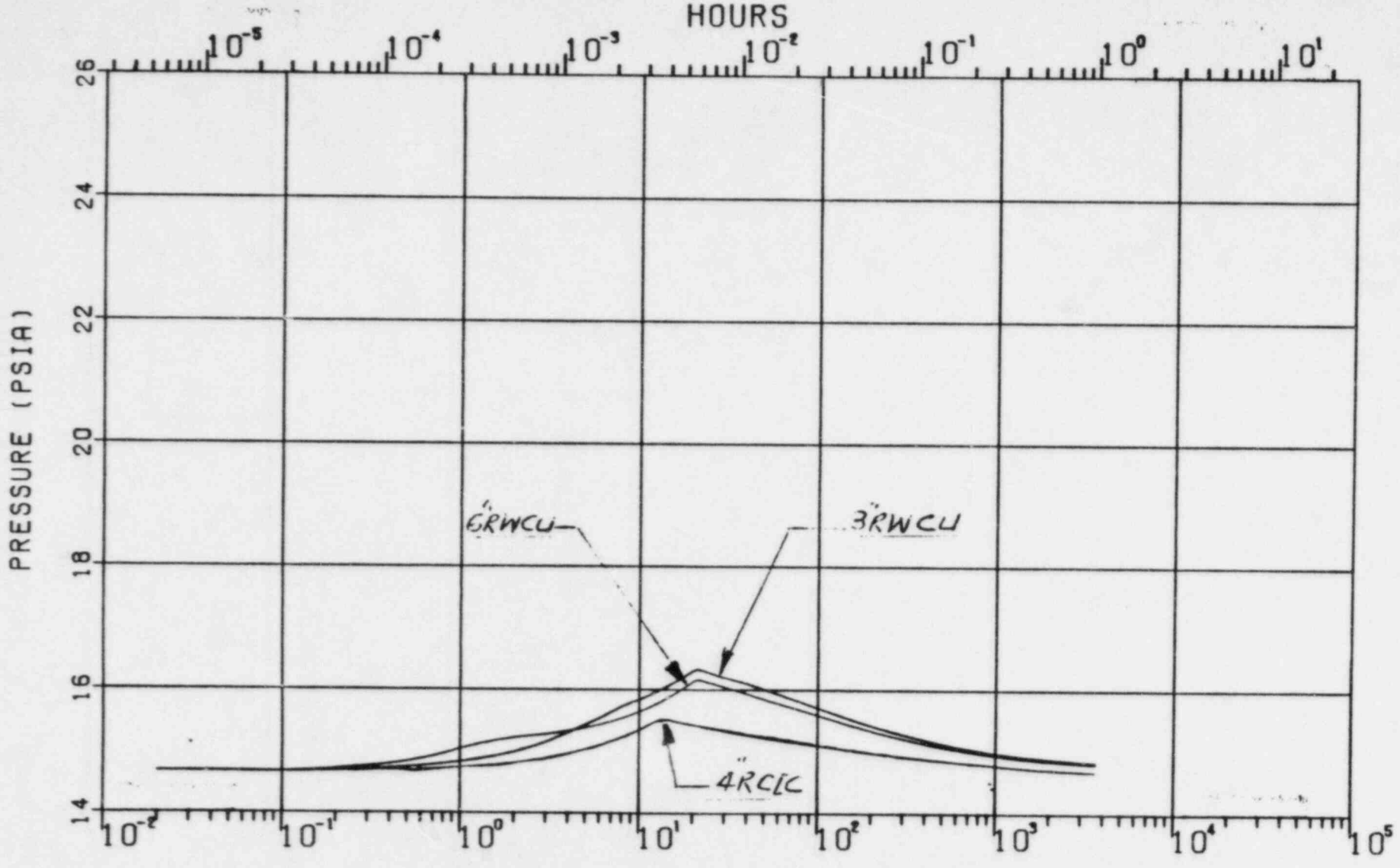

FIGURE-30

PRESSURE TRANSIENTS IN NODE 14 / VOLUME 57
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF IE EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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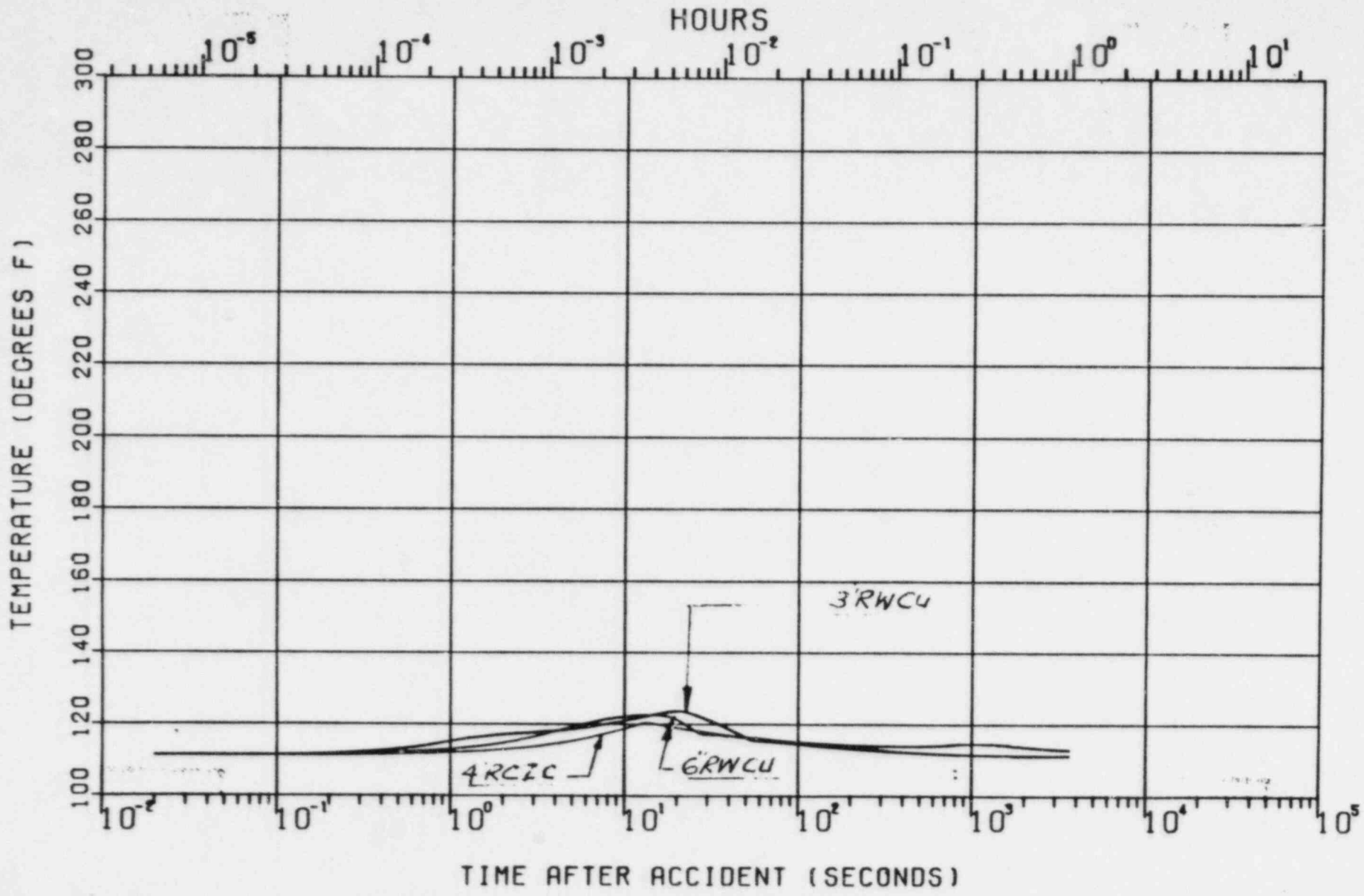

FIGURE-31

TEMPERATURE TRANSIENTS IN NODE 14 /VOLUME 57
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

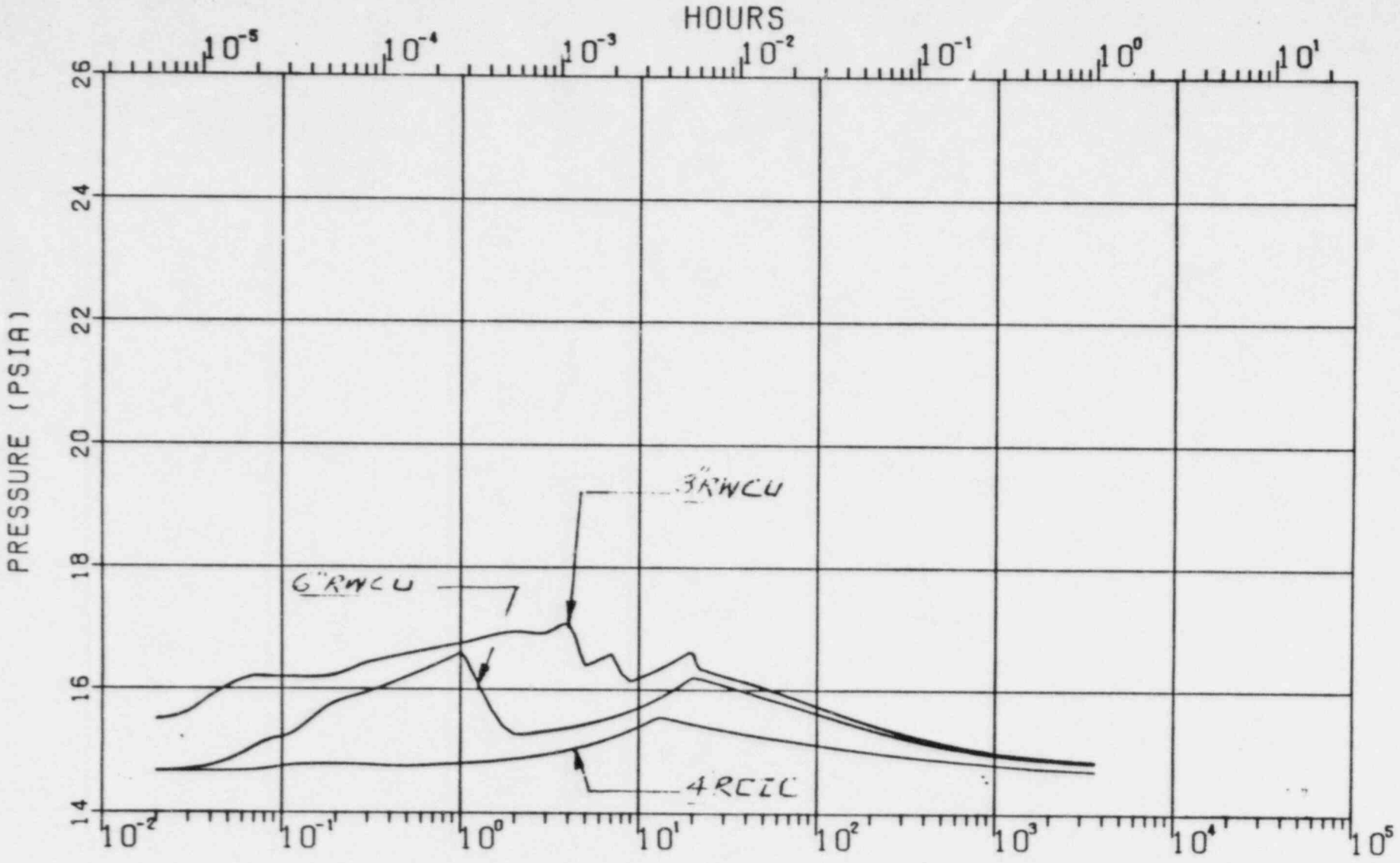

FIGURE-32

PRESSURE TRANSIENTS IN NODE 15 / VOLUME 23C
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

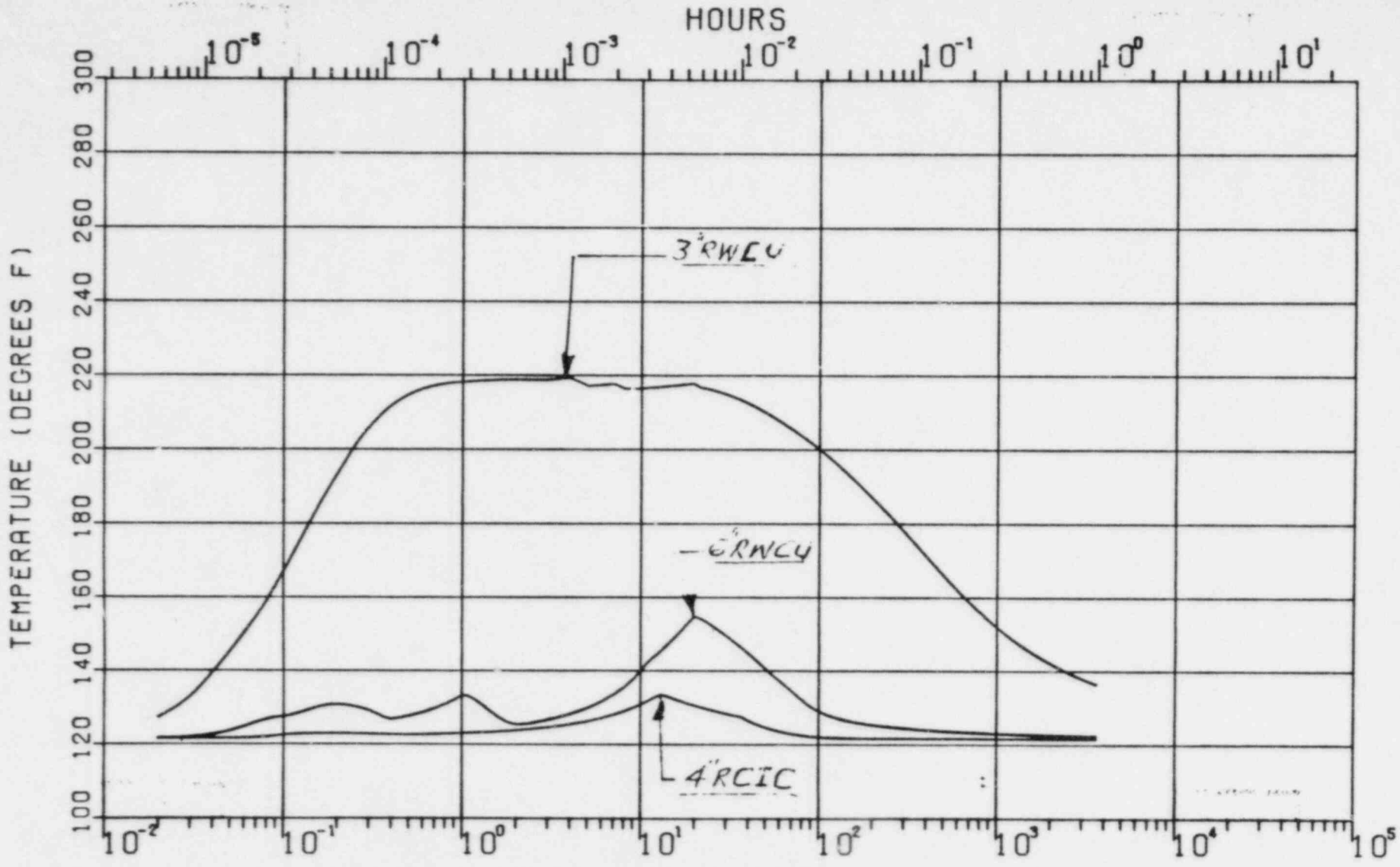

FIGURE-33

TEMPERATURE TRANSIENTS IN NODE 15 / VOLUME 23C
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

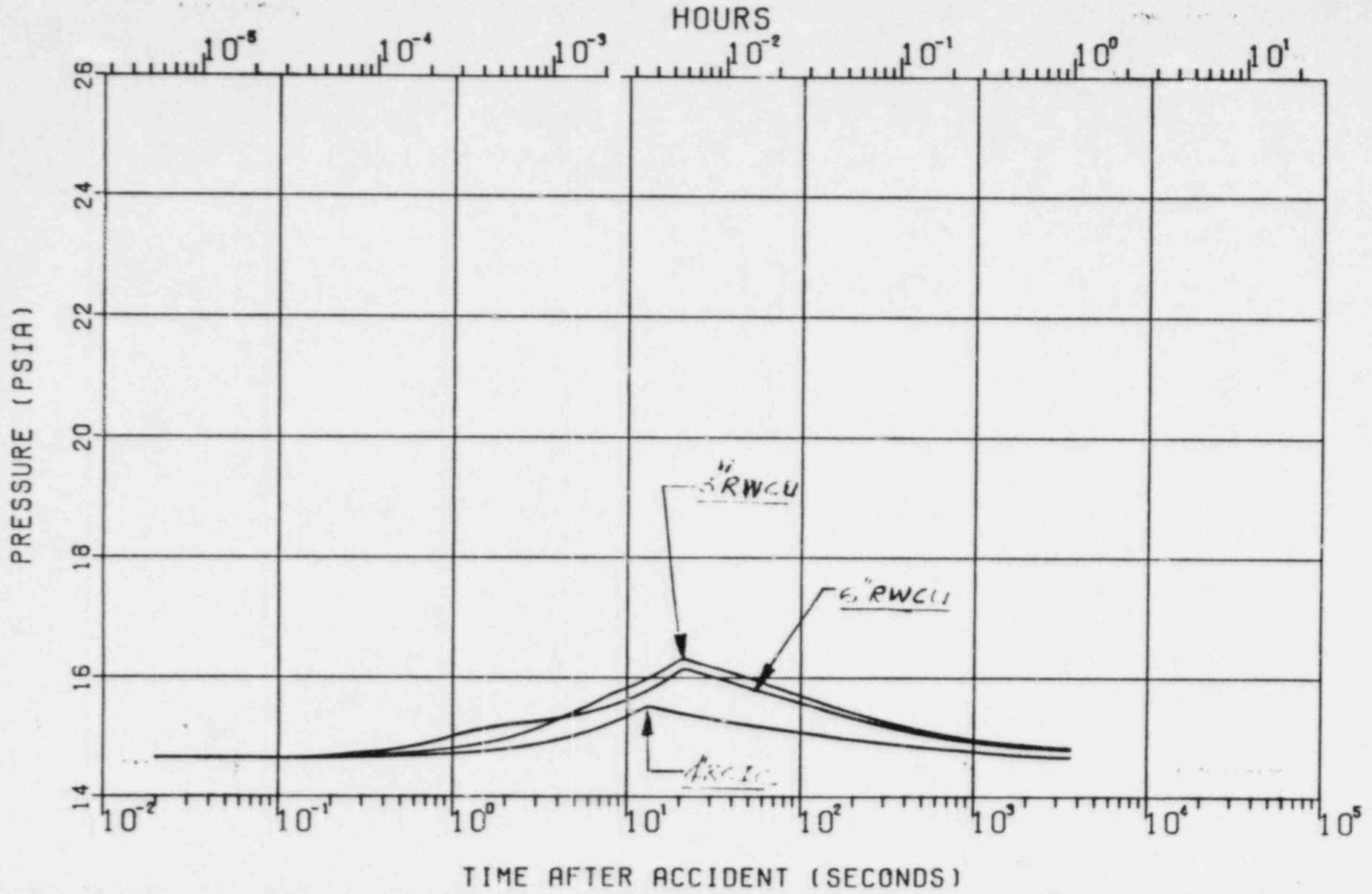

FIGURE-34

PRESSURE TRANSIENTS IN NODE 16 / VOLUME 44
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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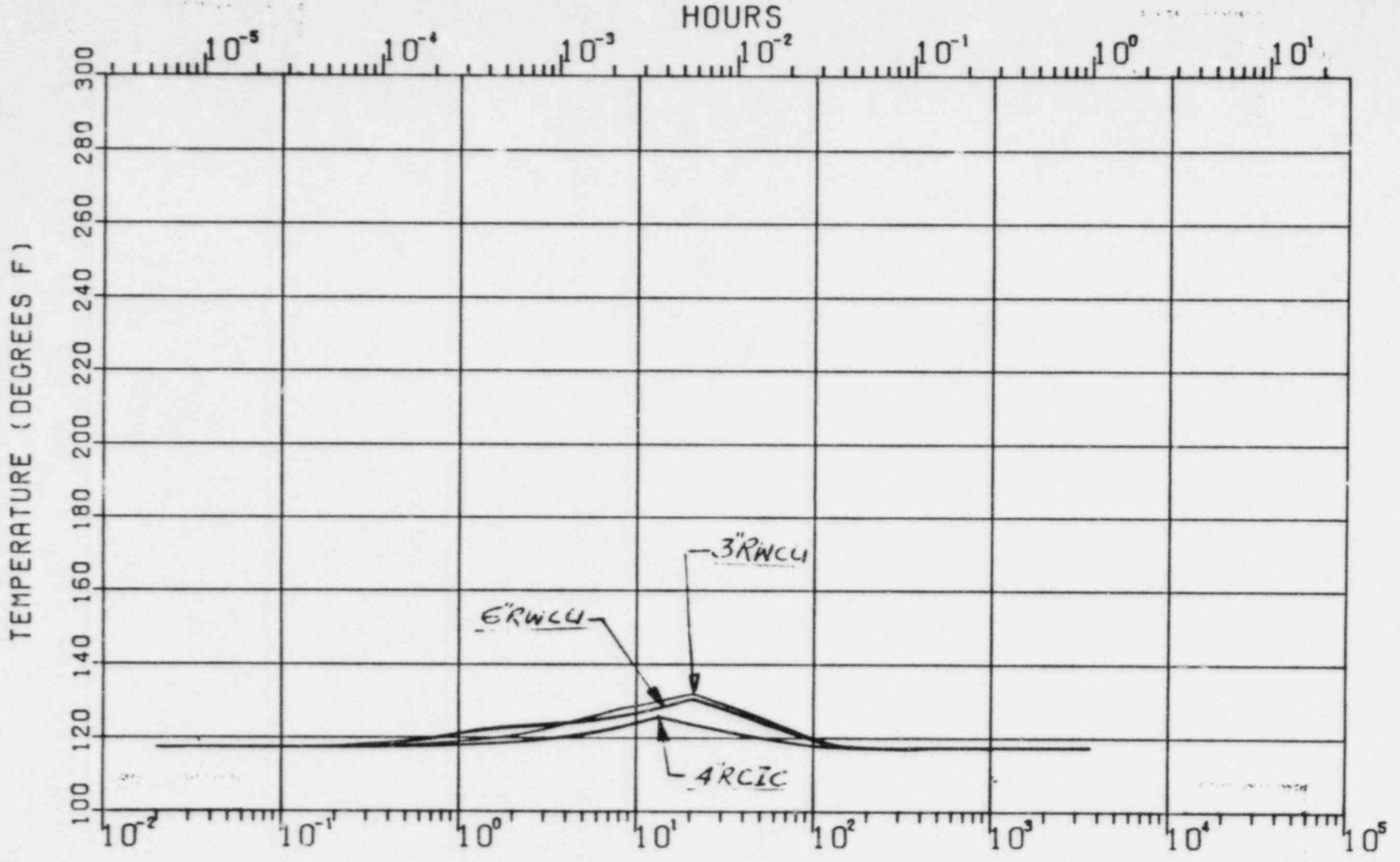

FIGURE -35

TEMPERATURE TRANSIENTS IN NODE 16/VOLUME 44
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF IE EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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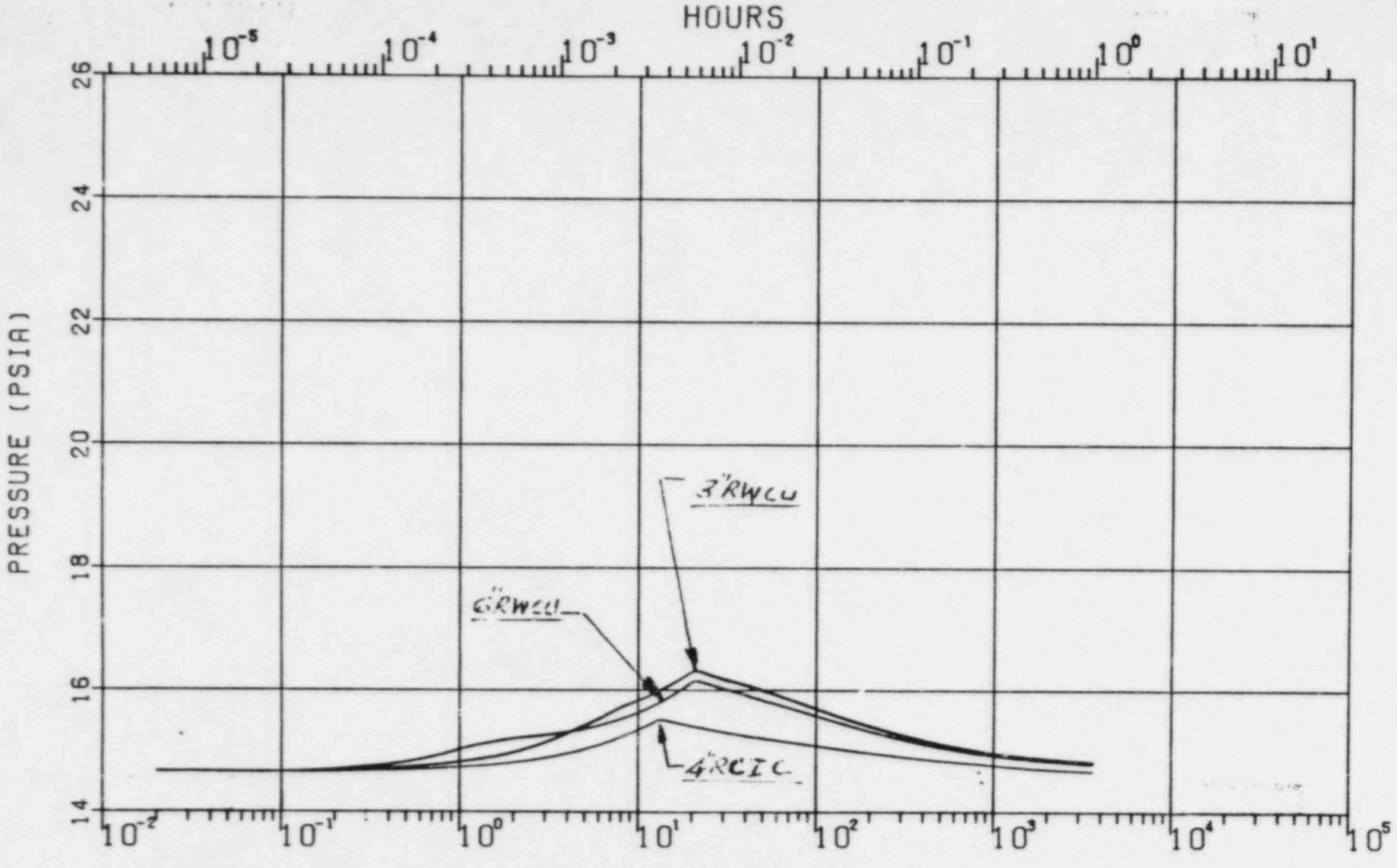

FIGURE -36

PRESSURE TRANSIENTS IN NODE 17/VOLUME 45
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

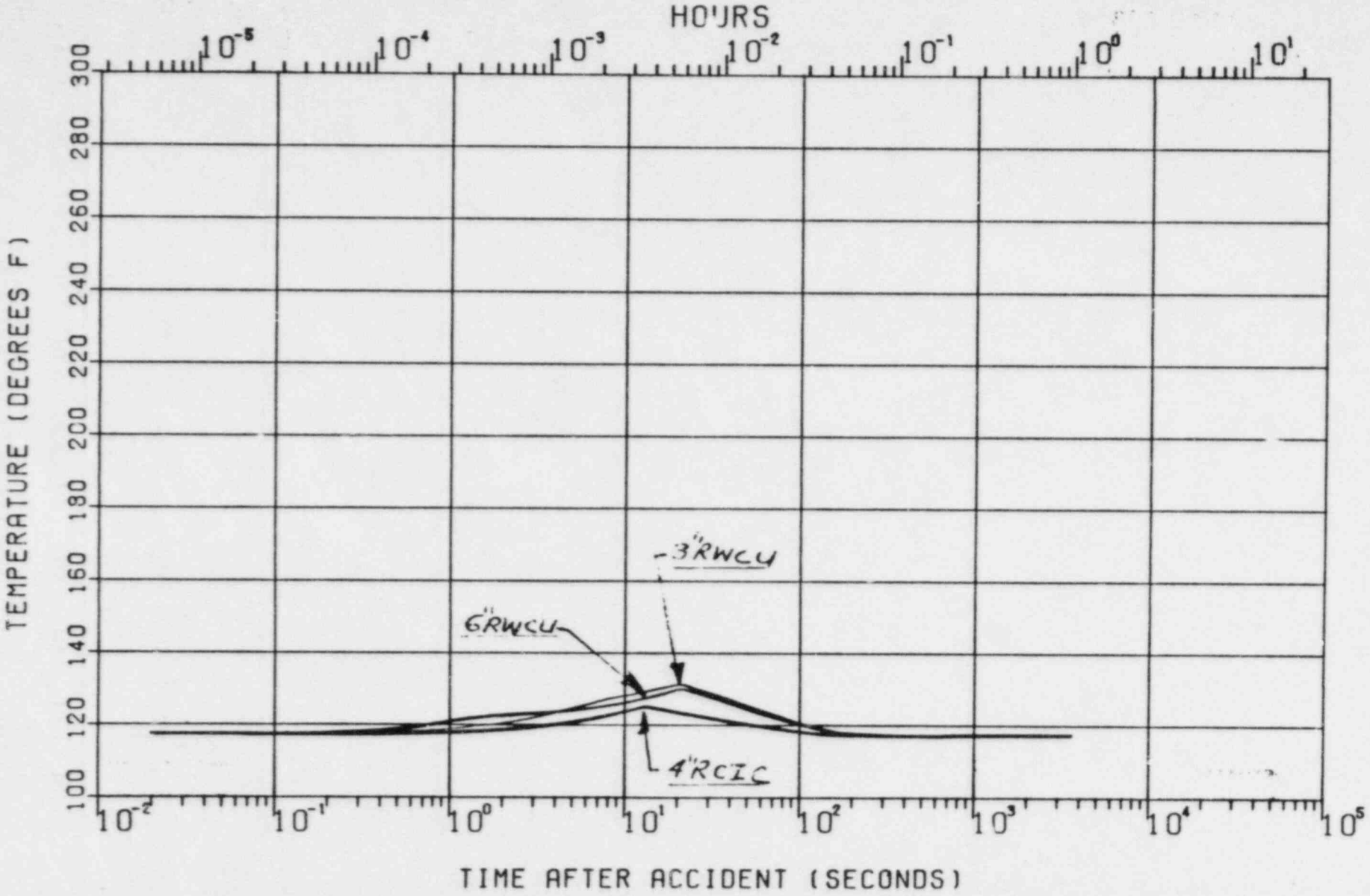

FIGURE - 37

TEMPERATURE TRANSIENTS IN NODE 17/VOLUME 45
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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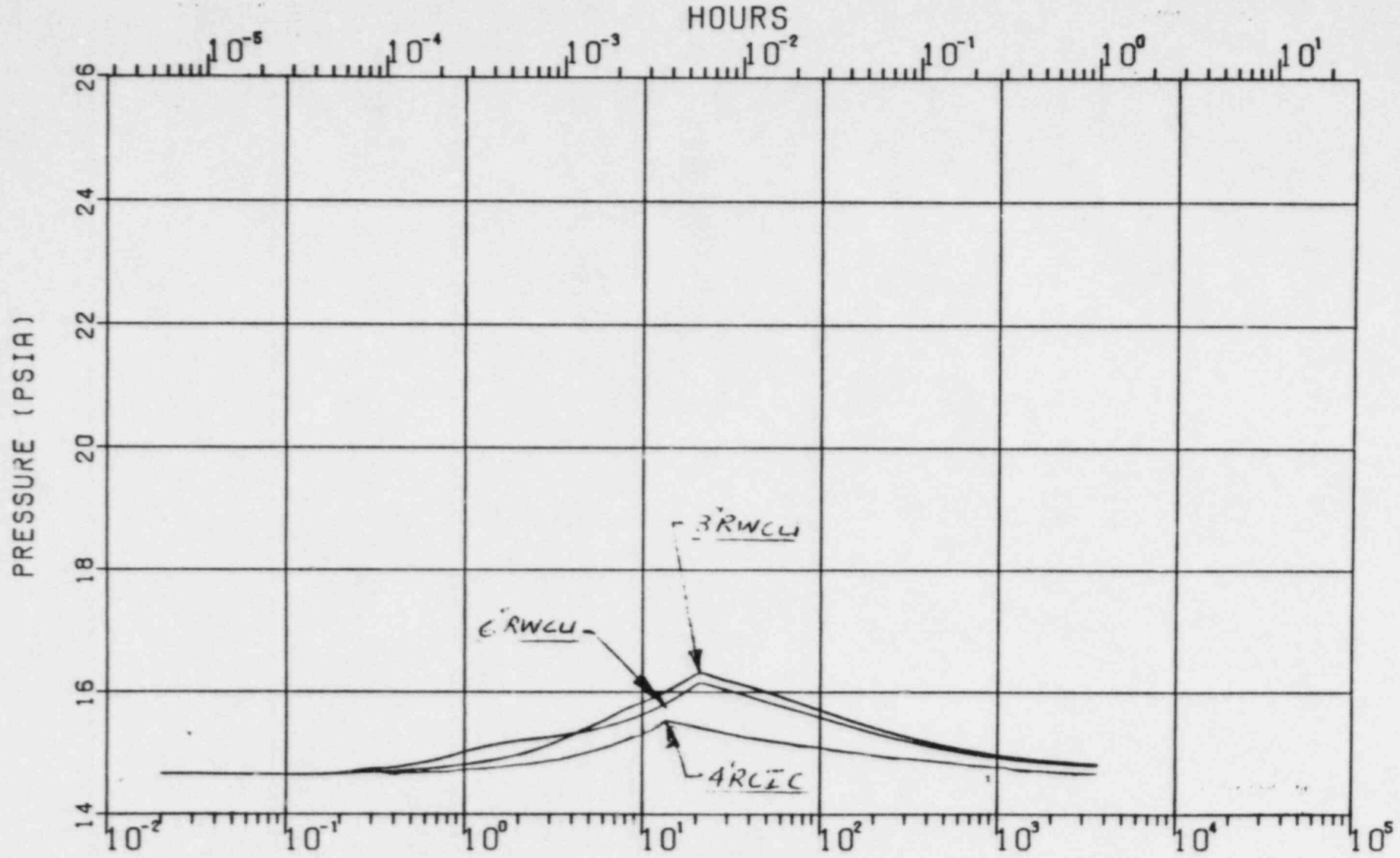

FIGURE-38

PRESSURE TRANSIENTS IN NODE 18/VOLUME 46
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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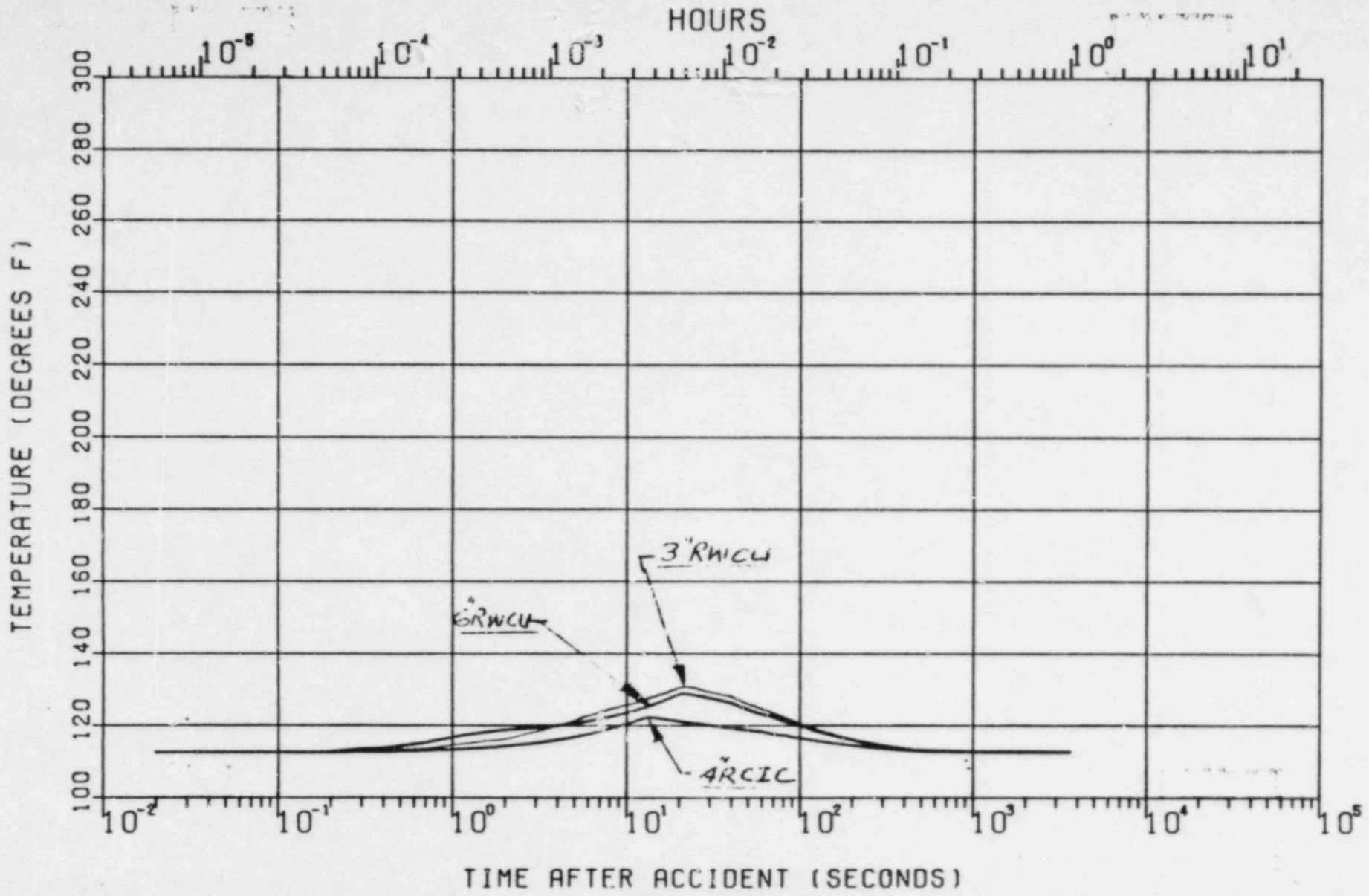

FIGURE-39

TEMPERATURE TRANSIENTS IN NODE 18/VOLUME 46
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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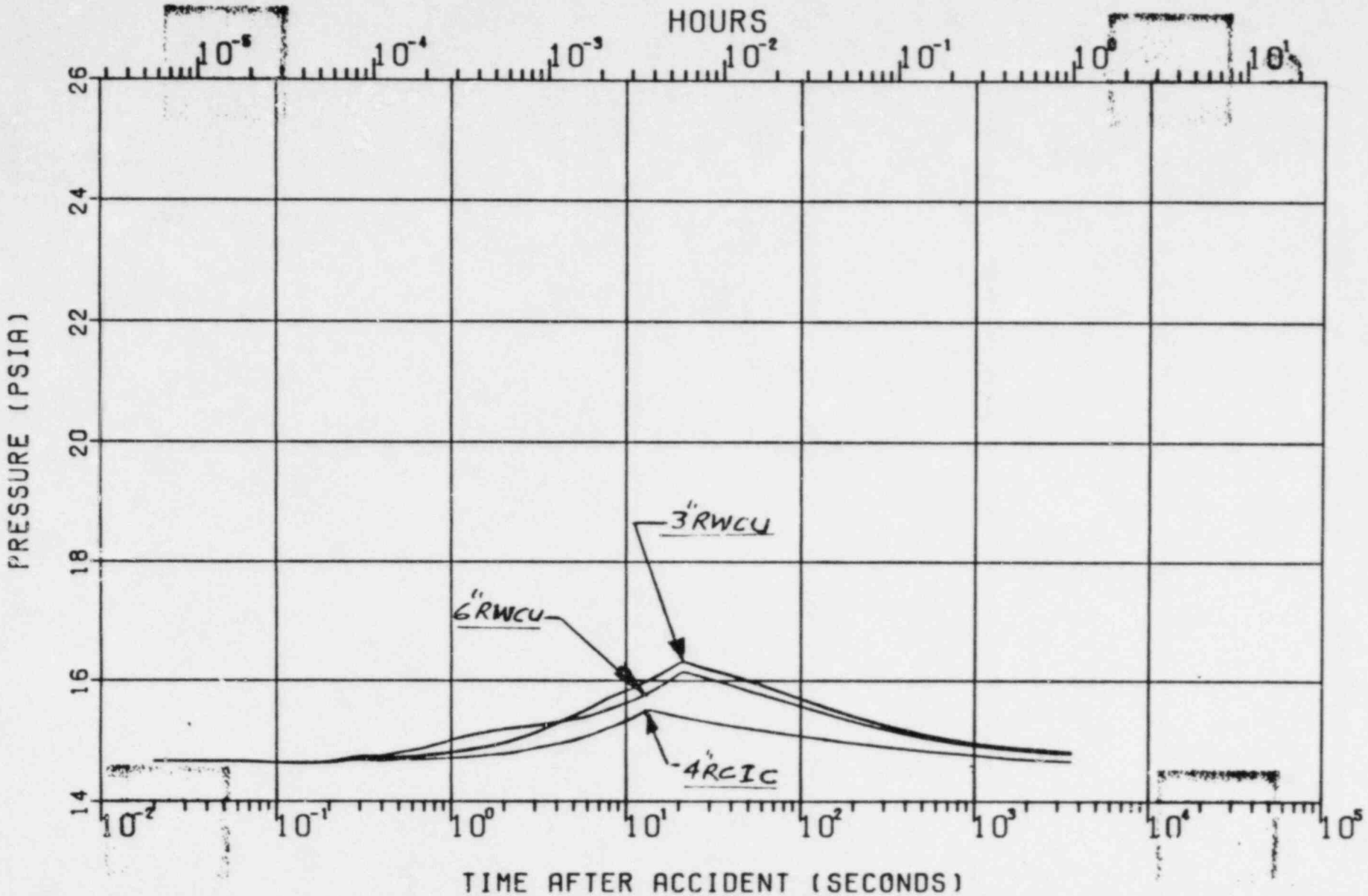

FIGURE -40

PRESSURE TRANSIENTS IN NODE 19/VOLUME-49
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

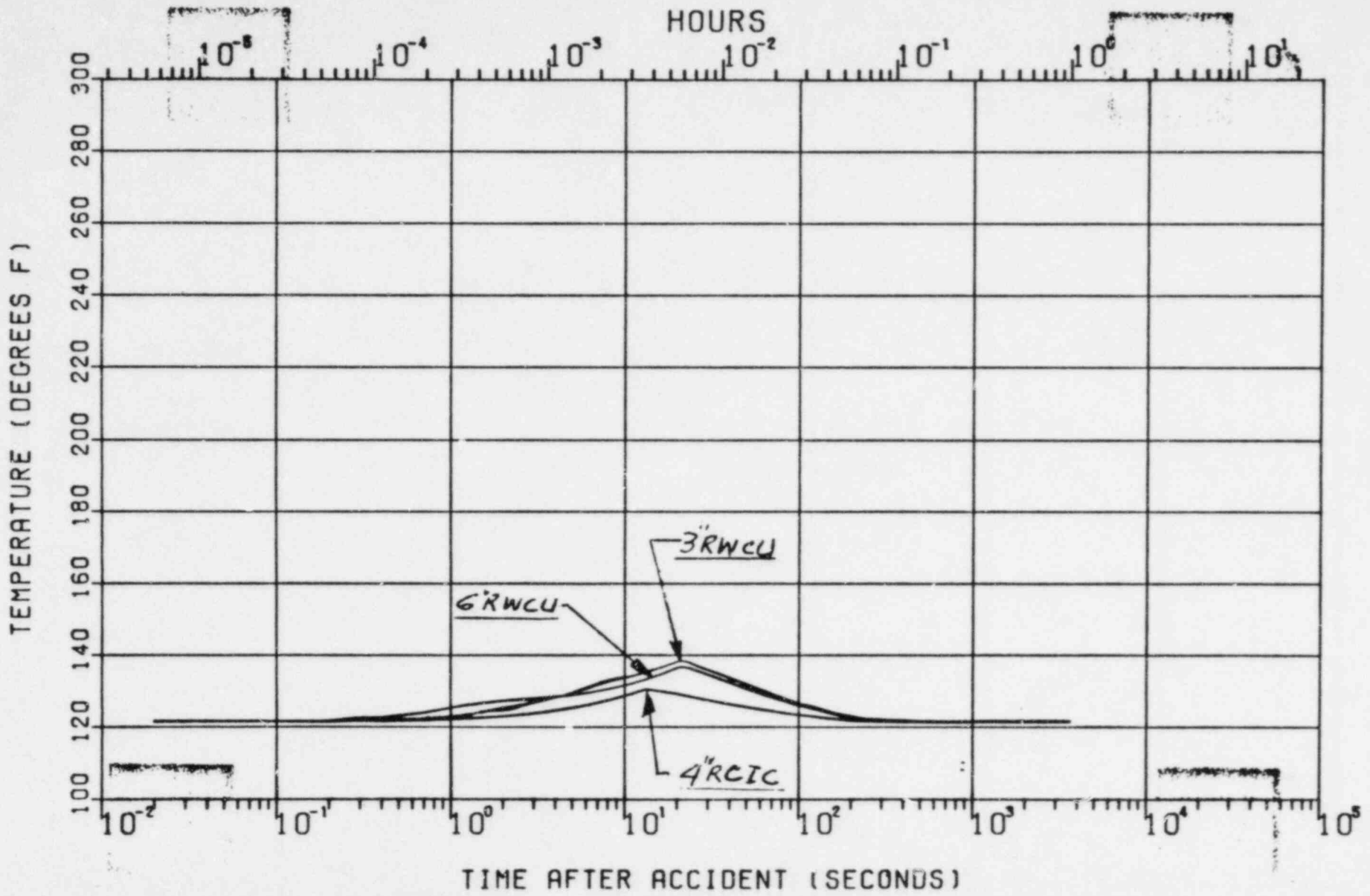

FIGURE-41

TEMPERATURE TRANSIENTS IN NODE 19/VOLUME 43
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

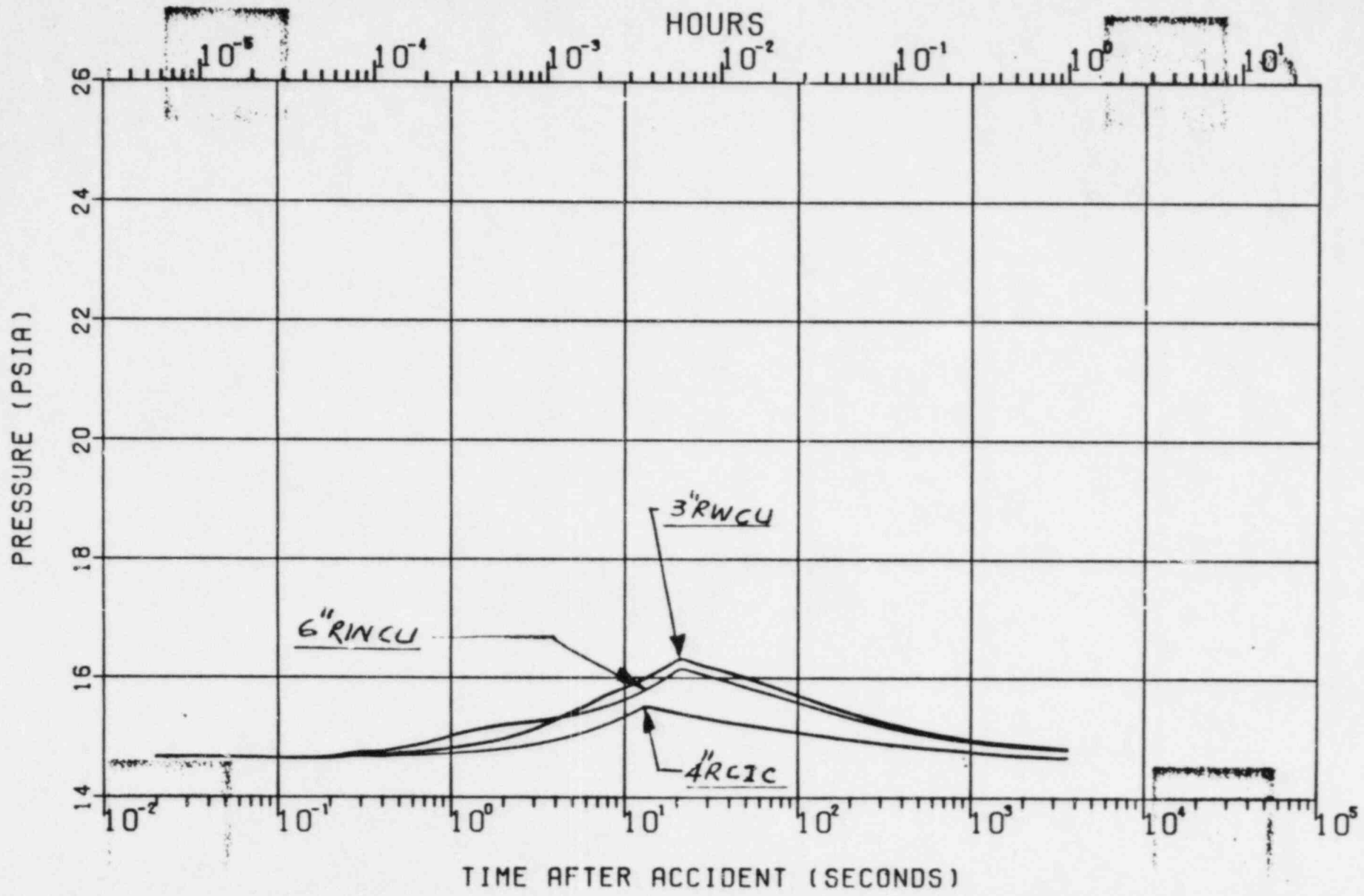

FIGURE-42

PRESSURE TRANSIENTS IN NODE 20/VOLUME 48
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

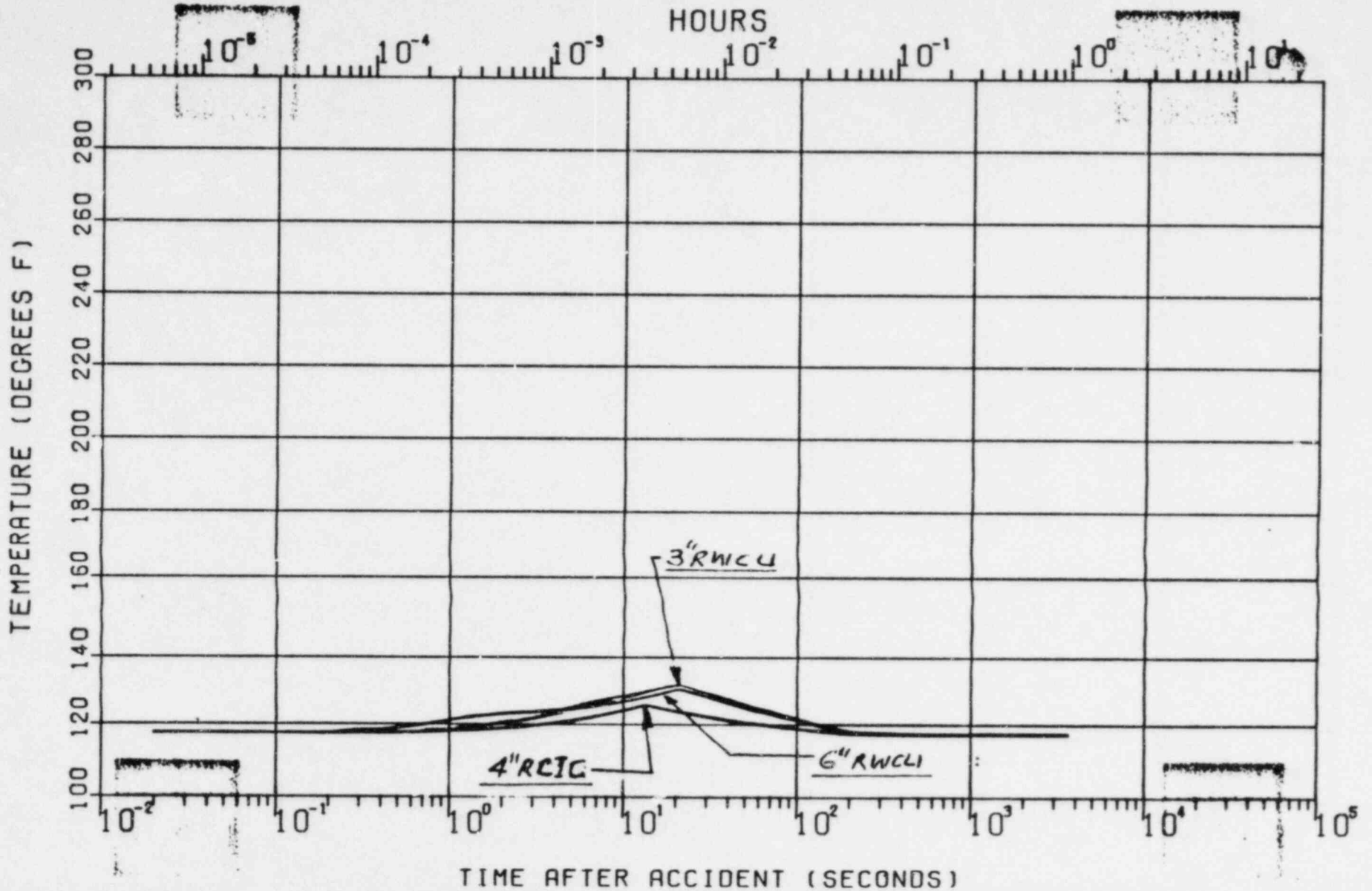

FIGURE -43

TEMPERATURE TRANSIENTS IN NODE 20 / VOLUME 48
HIGH ENERGY LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN AB
RIVER BEND NUCLEAR POWER PLANT

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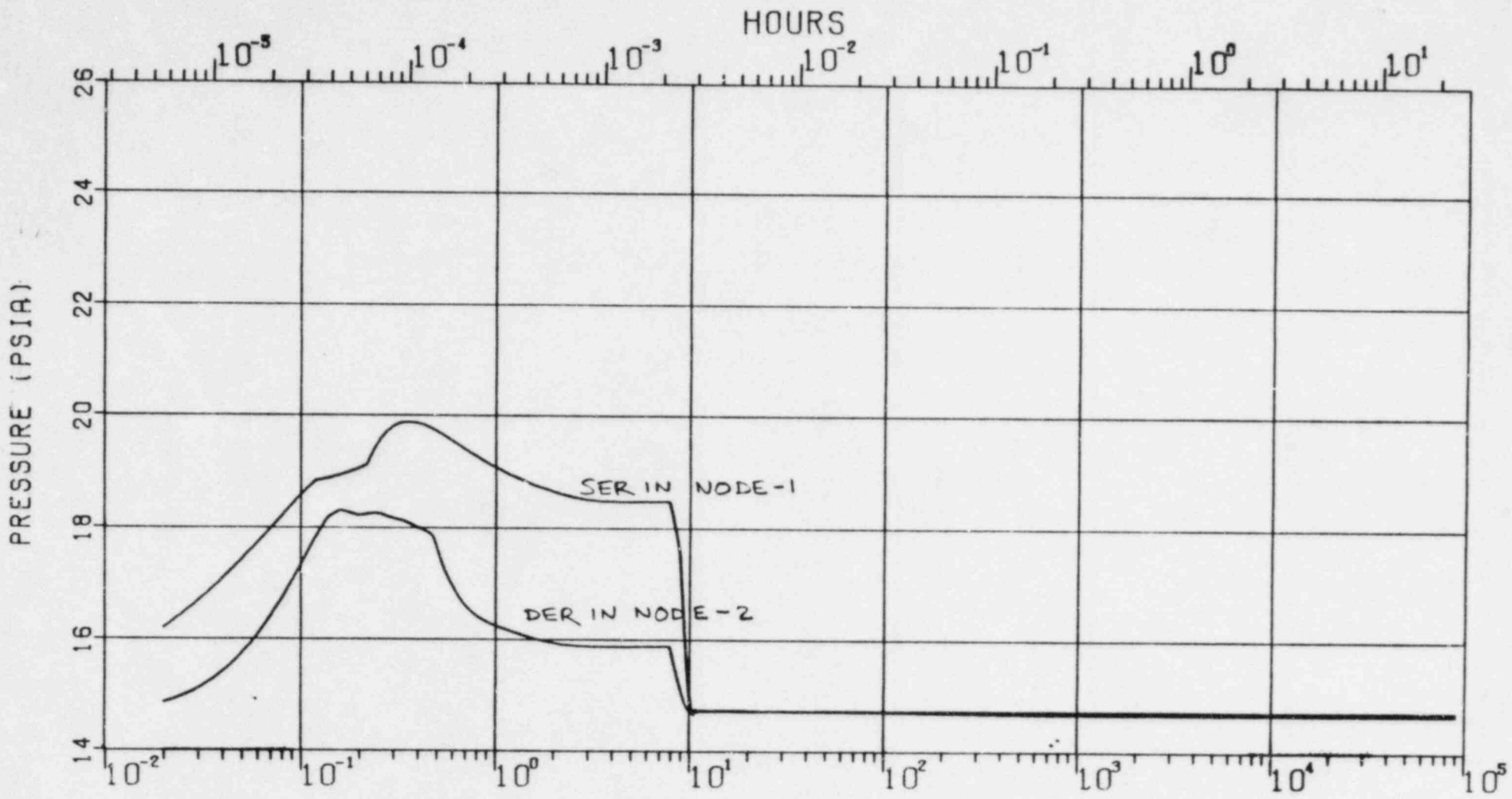

FIGURE -44

PRESSURE TRANSIENTS IN NODE 1
MAIN STEAM LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN STM
.TUNNEL RB NUCLEAR POWER PLANT

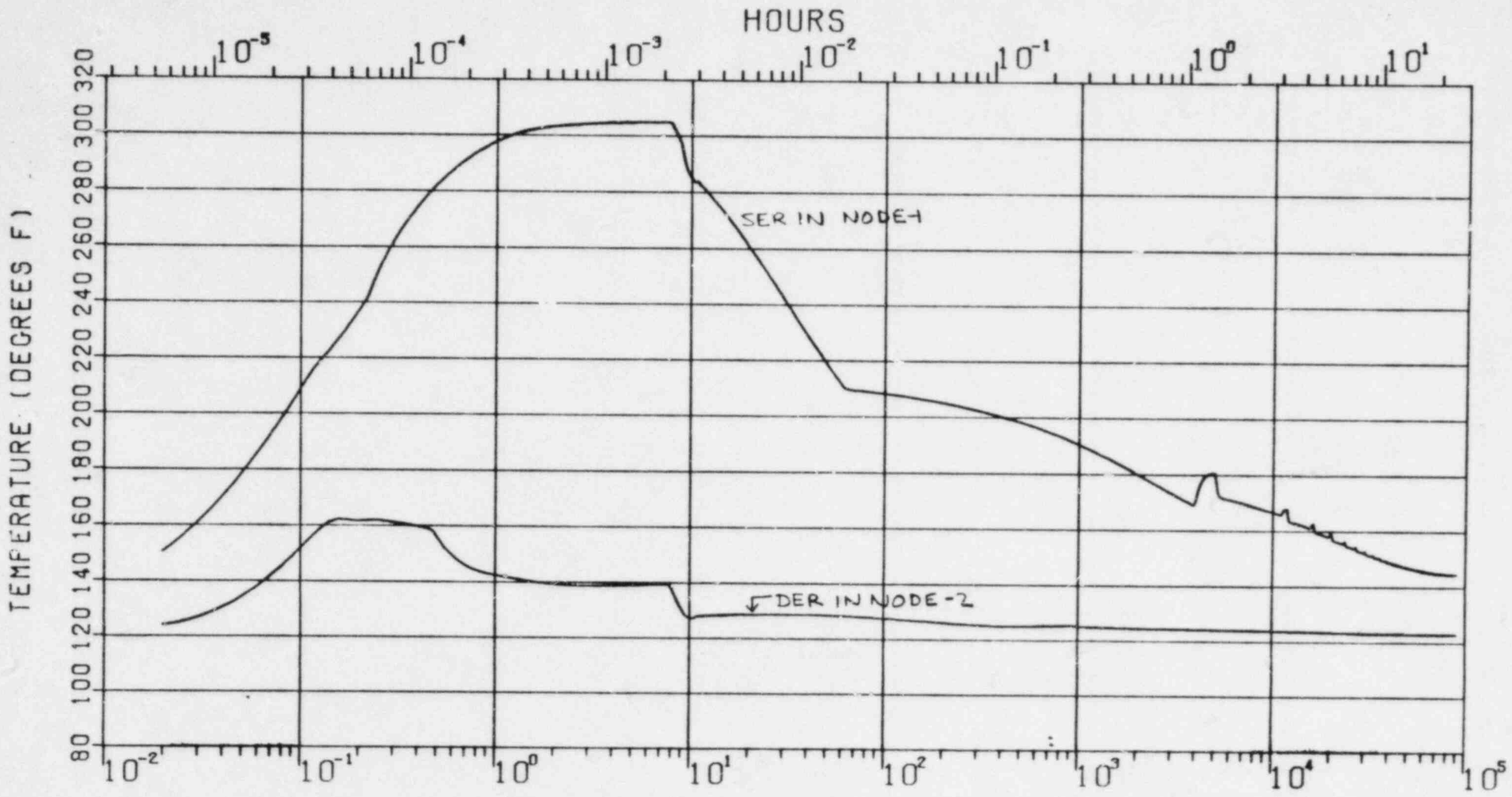

FIGURE-45

TEMPERATURE TRANSIENTS IN NODE 1
MAIN STEAM LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN STM
.TUNNEL RB NUCLEAR POWER PLANT

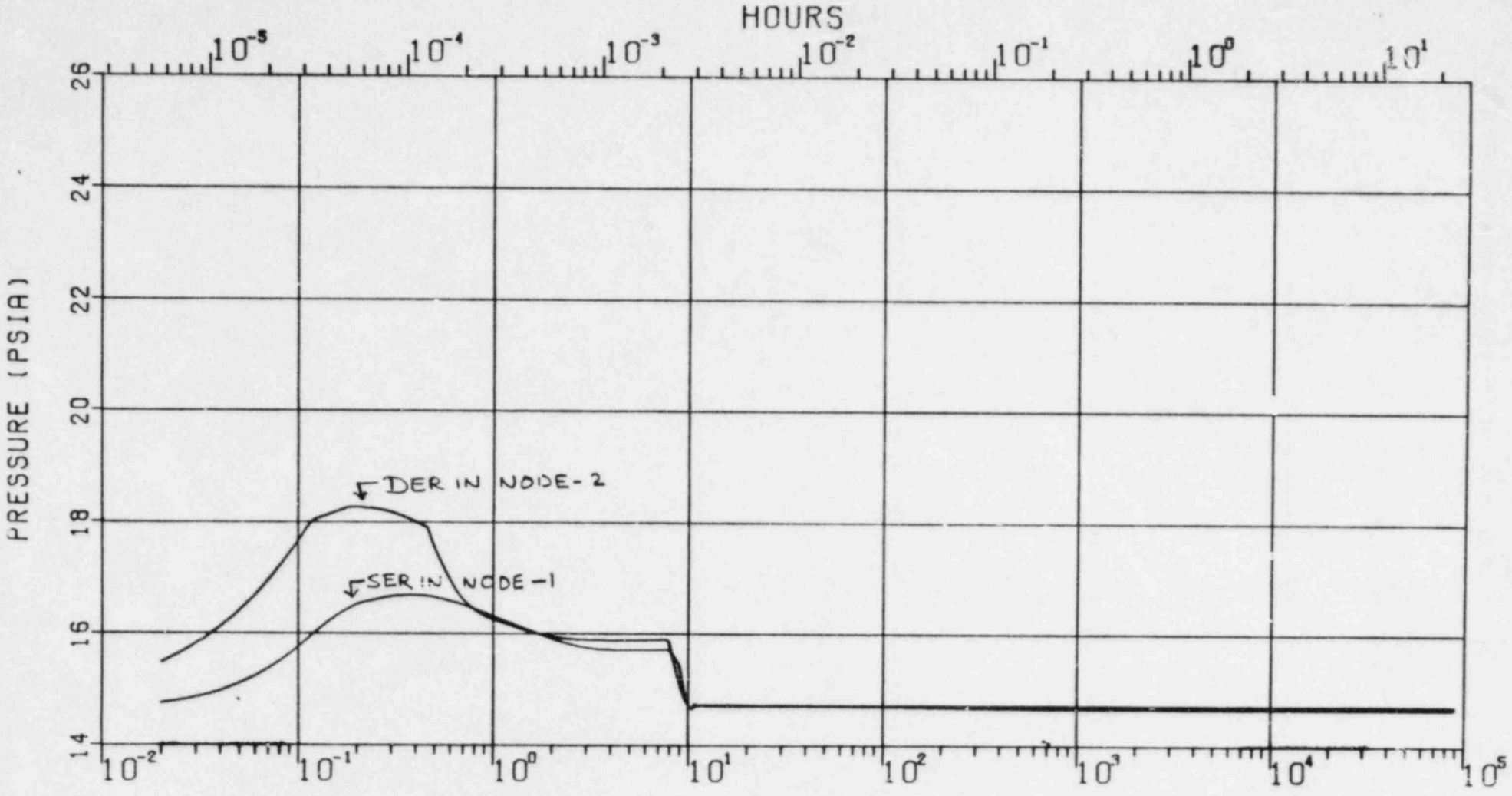

FIGURE -46

PRESSURE TRANSIENTS IN NODE 2
MAIN STEAM LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN STM
.TUNNEL RB NUCLEAR POWER PLANT

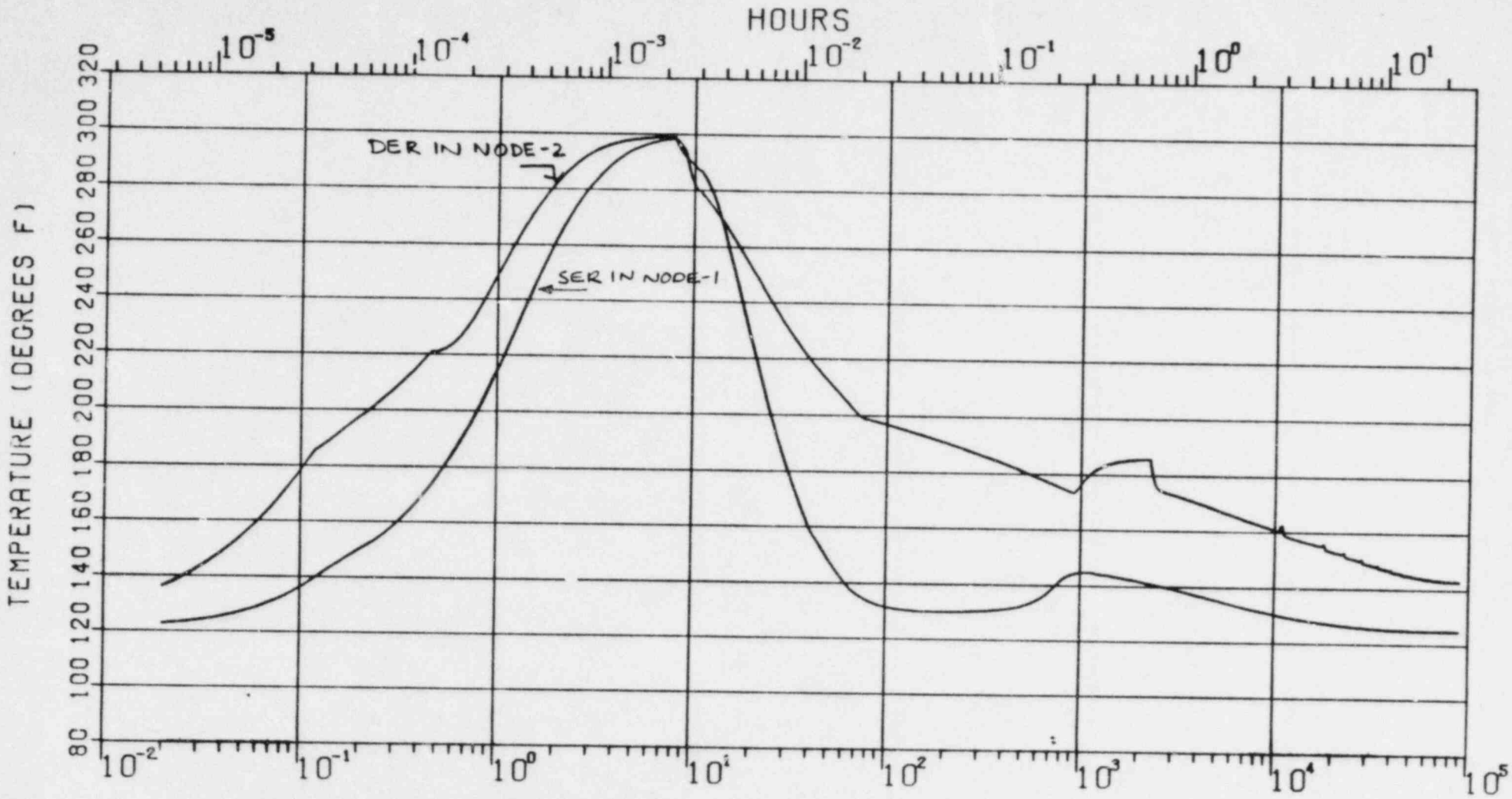

FIGURE-47

TEMPERATURE TRANSIENTS IN NODE 2
MAIN STEAM LINE BREAK ANALYSIS
FOR QUALIFICATION OF 1E EQUIPMENT IN STM
.TUNNEL RB NUCLEAR POWER PLANT