NORTHEAST UTILITIES

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NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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November 30, 1984

Docket No. 50-423
B11375

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Reference: (1) W. G. Counsil letter to B. J. Youngblood, Millstone Nuclear Power Station, Unit No. 3, Transmittal of Amendment 7 to the FSAR and Responses to Selected Requests for Additional Information, dated March 9, 1984.

(2) B. J. Youngblood letter to W. G. Counsil, Issuance of Safety Evaluation Report - NUREG 1031 - Millstone Nuclear Power Station, Unit No. 3, dated August 2, 1984.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Revised Response to Question 480.9

Attached is Northeast Nuclear Energy Company's (NNECO) revised response to Question 480.9 in which NNECO was requested to provide the results of a nodalization sensitivity study for the pressurizer and steam generator subcompartments. In our original response to Question 480.9, which was submitted as part of Reference (1), NNECO committed to perform a nodalization sensitivity study for the pressurizer subcompartment analysis. As discussed in the attached response, NNECO has concluded that a nodalization sensitivity study is not necessary to justify the design of the pressurizer subcompartment. However, a reanalysis of the pressurizer subcompartment has been performed using a revised nodal model. The results of this analysis are provided in revised FSAR Section 6.2.1.2 which is attached.

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Please note that this information also addresses SER Open Item 10 which was contained in Reference (2). If there are any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

W. G. Counsil

W. G. Counsil
Senior Vice President

CSears

By: C. F. Sears
Vice President

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me C. F. Sears, who being duly sworn, did state that he is Vice President of Northeast Nuclear Energy Company, an Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Jennifer Flowers

Notary Public
My Commission Expires March 31, 1989

NRC Letter: January 16, 1984

Question No. Q480.9 (Section 6.2.1)

Provide the results of a nodalization sensitivity study for the pressurizer and steam generator compartments.

Response:

A nodalization sensitivity study for the steam generator and pressurizer subcompartments is not necessary since the primary consideration in developing the nodal model was that there would be no pressure gradient due to geometry changes within a node. The model was constructed using the guidelines and recommendations of NUREG/CR-1199, Subcompartment Analysis Procedures, which discuss nodal complexity, or fineness, and its effect on analysis results. The fineness of the nodalization is dictated by the location of major equipment and structural elements, or physical boundaries, which provide the locations for junctions between nodes. This approach provides adequate nodal fineness, as further refinement would add junctions at locations other than at significant flow influencing geometry. This is not good practice because it artifically adds a pressure drop where it would not be expected.

A nodalization sensitivity study was performed on the upper reactor cavity model and is discussed in FSAR Section 6.2.1.2. The results verify that adding junctions at locations where a pressure drop is not expected does not significantly affect the results. The steam generator and pressurizer subcompartment models are similar in fineness and were constructed in accordance with the same general guidelines as the limiting reactor cavity model. Therefore, further refinement of these models would not significantly change the results of the analyses.

liner temperature. The containment liner temperature does not exceed 1.11
the containment liner design temperature of 280°F, while the 1.12
containment temperature reaches 336°F. For this accident, the peak 1.15
calculated containment liner is 236.3°F. The liner temperature shown 1.16
is the inside surface temperature.

The qualification of safety related equipment inside the containment 1.17
to the pressure and temperature resulting from a steam line break is 1.18
discussed in Section 3.11.

A chronology of events for the limiting containment pressure and 1.19
temperature cases is given in Tables 6.2-24 and 6.2-25, respectively. 1.20

6.2.1.1.3.8 Feedwater Pipe Break Results 1.22

The feedwater pipe break is not as severe as the main steam pipe 1.23
break, since the break effluent is at a lower specific enthalpy. The 1.26
feedwater pipe break analysis is, therefore, not analyzed.

6.2.1.2 Containment Subcompartments 1.29

6.2.1.2.1 Design Basis 1.30

The containment subcompartments are designed in accordance with 1.31
General Design Criteria 4 and 50.

Break locations and types (Section 3.6.2) are chosen as follows for 1.33
the various subcompartments:

1. Upper pressurizer cubicle - Spray line doubled ended rupture 1.35
(DER) in the upper pressurizer cubicle is the largest break 1.36
that can occur in the upper pressurizer cubicle.
Section 6.2.1.2.3 describes the break types. 1.37

2. Lower pressurizer cubicle - A surge line limited 1.38
displacement rupture (LDR) of one pipe cross-section area is
the largest break which can occur within the pressurizer 1.39 480.9
cubicle. However, the full DER is chosen as the design 1.40
basis.

3. Lower steam generator subcompartments - Reactor coolant 1.41
system (RCS) 707 sq in. hot leg intrados split break in the 1.42
lower steam generator subcompartment. This is the largest 1.43
area break which can occur in the steam generator
subcompartment.

4. Upper steam generator subcompartments - A feedwater line 1.44 480.37
DER.

5. Upper reactor cavity - RCS 100 sq in. cold leg limited 1.45
displacement break inside the upper reactor cavity. This 1.46
break area exceeds the maximum which can occur inside the
upper reactor cavity.

Additional smaller breaks used for the major component support evaluation are identified in the discussion of the results in Section 6.2.1.2.3. 480.37

A full power condition with hot leg equal to 616.4°F and cold leg equal to 555.9°F yields the maximum mass and energy release rates.

The RCS mass and energy release rates are computed by SATAN V Program (Section 6.2.1.5.1). For subcompartment analysis, 110 percent of the SATAN V mass and energy release rates is used for all cases except the pressurizer subcompartment. The 10 percent margin was not included in the mass and energy release for the pressurizer surge line DER. The additional margin is not required since the mechanical analysis shows that a full DER cannot occur due to the design of the pipe restraints. Use of the conservative calculated releases for a full DER provides more than sufficient margin as the LDR releases of one cross sectional pipe area would be significantly less.

The initial containment conditions selected for the subcompartment analyses are as follows.

<u>Pressurizer Subcompartment</u>

1. Temperature 100°F
2. Air partial pressure 8.9 psia 480.9
3. Relative humidity 10 percent

<u>Steam Generator and Upper Reactor Cavity Subcompartments</u>

1. Temperature 120°F
2. Air partial pressure 9.0 psia
3. Relative humidity 50 percent

The initial conditions used for the pressurizer subcompartment analysis maximize the calculated pressures. The differences in the initial conditions used for the other subcompartment analyses are not signficant with respect to the results of those analyses.

Subcompartment nodalization schemes are chosen to provide a conservative load and moment on a given component and structure. All vent flow paths used in the analysis are unobstructed by moveable objects throughout the transient. These flow path areas are conservatively calculated. Nominal reductions to the net vent areas are typically made to account for building tolerances and blockages that may occur from insulation displaced from the ruptured pipe. Insulation and associated materials are the only moveable obstructions to flow. Vent areas in the steam generator and pressurizer subcompartments are relatively large, and accordingly, the likelihood of significant blockage by displaced insulation is remote. Vent areas local to the break location in the upper reactor 480.37

cavity subcompartment are, in general, significantly smaller than in other subcompartments and are, therefore, more susceptible to blockage. According to the Subcompartment Analysis Procedures (Gido 1979), it is conservative to assume blockage of some vent areas local to the break. However, it is unlikely that the blockage will sustain itself because the high local pressures would immediately dislodge the debris.

480.37

The flows through all flow paths with the nodalized subcompartment model are based on a homogeneous mixture in thermal equilibrium with the assumption of 100 percent liquid carryover (Section 6.2.1.2.3.3).

Table 6.2-43 shows that the subcompartments design differential pressures are, in all cases, greater than the calculated differential pressures. Multinode schemes providing a conservative load and moment on a given component and structure are considered in the subcompartment design.

480.9

6.2.1.2.2 Design Features

Figures 3.8-59 and 3.8-60 provide detailed plan and section drawings of the containment subcompartments. They show the arrangement of structures and components within the containment. Views of the subcompartment are shown on Figures 6.2-17 and 6.2-18, 6.2-18A through 6.2-18D, 6.2-19 through 6.2-22, and 6.2-23 for the upper and lower pressurizer cubicle, the most limiting steam generator subcompartment, and the upper reactor cavity. Schematic nodalization models of the upper and lower pressurizer cubicle, the most limiting steam generator subcompartment, and the upper reactor cavity are given on Figures 6.2-24, 6.2-25, and 6.2-23, respectively. The corresponding subcompartment vent path and nodal descriptions are given in Tables 6.2-27 through 6.2-30.

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6.2.1.2.3 Design Evaluation

Conditions considered in the subcompartment analyses are the development of pressure gradients across the walls, major equipment, and supports. The resulting asymmetric pressures are used to calculate loads and moments applied to the equipment and its supports. The maximum differential pressure across the walls is used as the design basis for the subcompartment structures.

The volume of the subcompartment is divided into a series of nodes with as many connecting vents as there are significant flow resistances. A model that provides a conservative load and moment on the given component and structure is used.

Break Type Definitions and Areas

Two types of breaks are used to analyze containment subcompartments. The first is a guillotine break. A guillotine break, which results in a break flow area of two pipe cross sections, is called a double-ended rupture (DER). In some subcompartments, pipe restraints limit the displacement of the two broken ends of the pipe so that the break flow area is less than two pipe cross-sectional areas. This type break is called a limited displacement rupture (LDR). The special case of a LDR of one pipe cross-sectional area is called a single ended rupture (SER).

The second type of break is a longitudinal split which is equivalent to a hole in the wall of the pipe. A split which results in a break flow area of one pipe cross section is called a single ended split (SES).

The containment subcompartment analysis results describe all breaks analyzed within a particular subcompartment. Pipe restraints are provided to limit the break areas to those analyzed.

480.9

Breaks with less than two cross-sectional flow areas are used in the analysis for the reactor cavity and steam generator subcompartment. The mechanical piping analysis shows that one surge line cross-sectional area is the maximum achievable break area in the pressurizer cubicle. However, the full DER mass and energy releases are used in the subcompartment pressure analysis. The analytical model used for predicting the mass and energy release rates for the primary coolant system breaks is given in WCAP-8264-P-A (1975) and WCAP-8312-A, Revision 2 (1975).

480.9

The mass and energy releases for the feedwater line full DER (Table 6.2-36A) were determined by a manual calculation using the frictionless Moody correlation for a saturated liquid. The initial temperature and pressure of the feedwater were taken at 102 percent reactor power with valves wide open (Figure 10.1-3). These conditions produce the limiting releases for this break. As the reactor power decreases, the pressure and temperature of the steam generator inventory increases slightly. However, the pressure and temperature of the feedwater line inventory decreases significantly. Accordingly, the total calculated release is maximum at the 102 percent reactor power level.

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Vent Loss Coefficient

The vent loss coefficients used in the subcompartment analyses depend on the geometry of the particular vent. The basis for the coefficients is the Handbook of Hydraulic Resistance (Idelchik 1960). Tables 6.2-27, thru 6.2-30 give the values of the loss coefficients utilized in subcompartment analyses.

Subcompartment Analytical Model

1. Functional Description of THREED Code

The THREED computer program is used to calculate the transient conditions of pressure, temperature, and humidity in various subcompartments following a postulated rupture in a moderate or high energy pipeline. The results obtained from such an analysis are used to calculate loads on structures and to define environmental conditions for equipment qualification.

The THREED computer program is similar to RELAP4 (Aerojet Nuclear Company 1976; Moore and Rettig 1974) and will give the same results as RELAP4 if similar options are chosen. THREED performs subcompartment analyses with capabilities and options extended beyond those available in RELAP4. A significant improvement in THREED is that the homogeneous equilibrium mode (HEM) has been extended to include two-phase, two-component flow which is encountered in subcompartment analysis.

The current THREED computer program was put into use in October 1978, and has been used in the design of Beaver Valley Power Station Unit 2, River Bend Station, and Nine Mile Point Nuclear Station Unit 2.

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2. Description of the Model

The THREED computer code can be viewed as a numerical integrator for the macroscopic form of the basic field equations describing the conservation of mass, energy, and momentum. The conservation equations, along with the equation of state for the fluid, give a complete solution to the fluid flow phenomena. THREED solves a stream tube form of the field equations based on the assumptions of one-dimensional, homogeneous, thermal-equilibrium flow. Although THREED does not prohibit the use of multidimensional flow paths, the flow paths are modeled to approximate a one-dimensional equation. Subcompartments are modeled in THREED as a hydraulic network which consists of a series of interconnecting user defined nodes (mass and energy control volumes). Nodes are connected by internal junctions (momentum control volumes) with the internodal flow rates being determined by the solution of the momentum equation. An internal junction control volume is defined as the composite volume between the centers of adjacent nodes. This inconsistency in control volumes (different control volume for momentum than for mass and energy) is illustrated on Figure 6.2-26. This "staggered mesh" approximation is necessary for purposes of solving the equations.

Fill junctions are dissimilar to internal junctions in that they have no initial node and their flow rate is dependent only on the junction area and time. These junctions are used to simulate flow originating external to the network (blowdown). Mathematically, they are treated as boundary conditions.

THREED numerically solves finite difference equations which account for mass and energy flows into and out of a node. Figure 6.2-27 summarizes the computational approach used in THREED.

The fluid conservation equations used by THREED can be 4.47
obtained by integrating the stream tube equations over a
fixed volume, V. The mass and energy equations are 4.49
developed for the generalized i^{th} node, while the momentum —
equation is developed for the generalized j^{th} internal ~~4.50~~
junction connecting nodes K and L. Neglecting kinetic 4.51
energy affects the resulting equations as follows:

7. Incompressible form of the momentum equation.

8. Kinetic energy effects are neglected.

9. For the choked flow models, the static properties in the nodes are considered to be stagnation properties.

10. Valves open/close instantaneously.

Containment Subcompartment Analysis Results

1. Pressurizer Cubicle

The pressurizer cubicle is analyzed according to the nodalization diagram of Figure 6.2-24. The nodal complexity is consistent with recommendations of NUREG/CR-1199 (Gido 1979) and is discussed in detail in the response to NRC Question 480.9.

480.9

A spray line DER in the upper cubicle and a surge line DER in the lower cubicle are considered for the pressurizer cubicle analysis. The break locations are shown on Figure 3.6-14. The pressurizer is supported from the floor at elevation 51 ft-4 in. which defines the boundary between the upper and lower cubicles.

480.9

The mass and energy release for a spray line DER are given in Table 6.2-31 and for a surge line DER in Table 6.2-32.

Pressurizer cubicle subcompartment nodal volumes, vent areas, K-factors, and inertias for the THREED analysis are listed in Table 6.2-27.

The pressure response for the pressurizer cubicle (maximum pressure differential across the pressurizer and pressurizer cubicle walls) is shown on Figures 6.2-28, 6.2-28A, 6.2-29, and 6.2-29A for both the spray line and surge line DER, respectively. The pressurizer subcompartment pressures are significantly overpredicted since the maximum achievable surge line break is a one cross-section area LDR. A full DER is used as the design basis break.

480.9

The peak calculated differential pressures between contiguous nodes for the pressurizer cubicle are given in Table 6.2-33. The time of peak differential pressure is given with the peak calculated differential pressure.

A sensitivity study was conducted regarding the initial conditions used in the analysis. The variation of the initial temperature, pressure, and relative humidity within the operating range did not result in a significant increase in peak pressure difference.

480.9

2. Steam Generator Compartment

The nodalization schematic used in the steam generator compartment analysis is shown on Figure 6.2-25. Seven postulated breaks are considered for the steam generator analysis. They are as follows. 480.37

1. Steam generator inlet nozzle with a 196.6 sq in. LDR (Break 3).
2. Pressurizer surge line with a 196.6 sq in. LDR (Break 11). 480.37
3. Residual heat removal line with 196.6 sq in. LDR (Break 9).

TABLE 6.2-27

THREED INPUT FOR ANALYSIS AT PRESSURIZER CUBICLE

Node No.	Node Vol. (ft^3)	Vent Path No.	Vent Path Area (ft^2)	Vent Path Connecting Node From	To	Forward K-factor f L/D	Reverse K-factor f L/D	Inertia (ft^{-1})
1	2,685	1	108.	1	21	2.25	1.73	0.049
2	639	2	22.1	1	21	2.12	1.71	0.323
3	641	3	22.1	1	21	2.17	1.83	0.273
4	1,860	4	11.4	2	1	1.69	1.84	0.379
5	1,480	5	56.2	5	1	1.31	1.40	0.119
6	789	6	78.9	4	1	1.30	1.32	0.088
7	2,222	7	19.7	3	1	0.84	1.12	0.454
8	2,911	8	108.7	2	3	0.17	0.11	0.049
9	919	9	68.7	2	5	0.30	0.29	0.116
10	659	10	134.9	4	5	0.23	0.22	0.063
11	2,534	11	97.1	3	4	0.24	0.34	0.091
12	3,890	12	27.1	2	6	0.43	0.51	0.383
13	810	13	91.8	5	7	0.23	0.23	0.148
14	367	14	116.6	4	8	0.27	0.27	0.109
15	1,204	15	36.5	3	9	0.28	0.29	0.347
16	1,840	16	55.1	6	7	0.91	0.78	0.066
17	415	17	135.5	7	8	0.63	0.59	0.039
18	1,764	18	69.1	8	9	0.68	0.87	0.058
19	1,191	19	105.3	6	9	0.41	0.40	0.039
20	89	20	1.3	6	10	1.63	1.64	4.371
21	2.3E6(1)	21	2.3	7	11	1.65	1.65	2.258
		22	2.5	8	12	1.42	1.40	2.882
		23	20.5	8	12	1.69	1.66	0.356
		24	1.2	9	13	1.69	1.70	4.434
		25	16.6	12	21	3.01	2.94	0.017
		26	81.9	10	11	0.72	0.59	0.055
		27	177.8	11	12	0.55	0.50	0.038
		28	124.8	12	13	0.46	0.59	0.043
		29	81.9	10	13	0.43	0.44	0.055
		30	23.6	10	14	0.72	0.68	0.493
		31	86.1	11	[illegible]	0.67	0.65	0.134
		32	135.3	12	16	0.64	0.63	0.088
		33	27.5	13	17	0.72	0.69	0.409
		34	59.9	14	15	0.28	0.28	0.115
		35	97.9	15	16	0.28	0.27	0.089

480.9

TABLE 6.2-27 (Cont)

Node No.	Node Vol. (ft^3)	Vent Path No.	Vent Path Area (ft^2)	Vent Path Connecting Node From	Vent Path Connecting Node To	Forward K-factor f L/D	Reverse K-factor f L/D	Inertia (ft^{-1})		
		36	78.5	16	17	0.28	0.27	0.093	2.25	
		37	59.9	14	17	0.09	0.07	0.097	2.26	
		38	40.3	14	18	0.09	0.09	0.221	2.27	
		39	40.8	15	18	0.41	0.57	0.145	2.28	
		40	62.7	16	18	0.41	0.56	0.095	2.29	
		41	45.1	17	18	0.09	0.09	0.198	2.33	
		42	146.1	18	19	0.47	0.38	0.068	2.34	480.9
		43	30.3	19	21	1.80	1.04	0.397	2.35	
		44	38.7	19	21	1.63	0.81	0.396	2.36	
		45	85.8	19	21	1.06	0.53	0.049	2.37	
		46	6.3	20	2	0.88	0.51	0.319	2.41	
		47	10.0	20	5	0.94	0.52	0.182	2.42	
		48	11.3	20	4	0.95	0.53	0.158	2.43	
		49	6.1	20	3	0.88	0.51	0.332	2.44	

NOTE: 2.48

1. Node No. 21 = Remainder of Containment 2.50

TABLE 6.2-32

MASS AND ENERGY RELEASE RATES FOR A SURGE LINE DER IN THE PRESSURIZER CUBICLE

Time (sec)	Mass (lb/sec)	Energy (Btu/sec)
0.0	0.0	0.0
0.00251	15,164.7	10,269,098
0.00501	15,051.2	10,192,780
0.00752	15,180.9	10,275,452
0.01002	17,303.2	11,663,642
0.01250	20,081.2	13,480,238
0.01501	19,680.8	13,212,662
0.02002	18,605.3	12,501,938
0.02505	18,223.7	12,642,937
0.03001	19,089.6	12,814,743
0.04009	19,147.5	12,849,352
0.05009	19,151.8	12,849,991
0.06003	18,967.0	12,727,371
0.07002	18,562.2	12,461,849
0.08008	18,625.6	12,503,014
0.09006	18,295.3	12,286,100
0.10011	18,354.6	12,324,934
0.12009	18,538.3	12,443,001
0.14000	17,263.2	11,608,039
0.16005	16,841.7	11,333,006
0.18004	16,007.0	10,788,306
0.20000	15,593.9	10,519,302
0.22518	15,549.2	10,490,028
0.25000	15,228.2	10,318,798
0.27509	14,778.1	9,986,148
0.30009	14,371.4	9,721,007
0.32509	14,302.4	9,675,107
0.35025	14,271.5	9,654,451
0.37504	14,239.5	9,632,169
0.40004	14,217.7	9,617,037
0.42502	14,211.3	9,612,011
0.45018	14,210.3	9,610,557
0.47503	14,194.2	9,598,949
0.50029	14,171.2	9,582,836
0.60013	14,123.4	9,547,638

480.9

TABLE 6.2-32 (Cont)

Time (sec)	Mass (lb/sec)	Energy (Btu/sec)
0.80022	14,059.8	9,496,561
1.00924	13,955.3	9,418,416
1.20066	13,859.1	9,346,006
1.60001	13,687.5	9,215,194
2.00032	13,474.4	9,056,500

480.9

TABLE 6.2-33

PRESSURIZER CUBICLE PEAK DIFFERENTIAL PRESSURES

Vent Path (No.)	Vent Path Connecting Nodes From	To	Spray Line Break in Node 15 Pressure (psid)	Time (sec)	Surge Line Break in Node 5 Pressure (psid)	Time (sec)	Surge Line Break in Node 20 Pressure (psid)	Time (sec
1	1	21	0.22	0.132	13.96	0.185	13.93	0.193
2	1	21	0.22	0.132	13.96	0.185	13.93	0.193
3	1	21	0.22	0.132	13.96	0.185	13.93	0.193
4	2	1	0.23	0.072	7.58	0.074	7.31	0.082
5	5	1	0.20	0.110	13.11	0.010	7.22	0.082
6	4	1	0.22	0.080	7.48	0.071	7.18	0.081
7	3	1	0.22	0.073	7.67	0.081	7.28	0.082
8	2	3	-0.02	0.163	3.10	0.012	0.43	0.022
9	2	5	-0.04	0.197	-10.97	0.008	1.80	0.016
10	4	5	0.10	0.161	-11.72	0.008	-0.37	0.015
11	3	4	-0.07	0.100	-2.71	0.012	1.91	0.015
12	2	6	-0.25	0.120	7.09	0.016	8.18	0.018
13	5	7	-0.30	0.103	13.11	0.010	6.99	0.019
14	4	8	-0.23	0.048	7.80	0.019	6.76	0.019
15	3	9	-0.21	0.099	10.13	0.022	7.92	0.017
16	6	7	0.07	0.123	-2.97	0.052	-0.74	0.037
17	7	8	0.18	0.104	2.93	0.052	0.17	0.048
18	8	9	0.14	0.086	-1.23	0.034	0.68	0.039
19	6	9	0.06	0.105	-2.13	0.033	-0.19	0.033
20	6	10	-4.37	0.057	18.74	0.212	18.81	0.265
21	7	11	-4.40	0.058	18.81	0.205	18.80	0.263
22	8	12	-3.90	0.074	18.70	0.218	18.77	0.267
23	8	12	-3.90	0.074	18.70	0.218	18.77	0.267
24	9	13	-3.71	0.063	18.73	0.214	18.80	0.266
25	12	21	4.37	0.074	1.85	0.127	1.83	0.137
26	10	11	-0.95	0.200	0.09	0.095	-0.29	0.082
27	11	12	1.57	0.058	0.29	0.070	-0.34	0.054
28	12	13	-0.72	0.060	0.25	0.050	0.27	0.052
29	10	13	-1.21	0.041	0.19	0.067	0.18	0.075
30	10	14	-3.83	0.015	0.57	0.066	0.53	0.067
31	11	15	-5.91	0.010	0.49	0.066	0.37	0.068
32	12	16	-3.00	0.023	0.44	0.054	0.49	0.055
33	13	17	-4.20	0.022	0.46	0.126	0.59	0.064
34	14	15	-4.85	0.007	-0.09	0.080	-0.19	0.142
35	15	16	5.80	0.009	-0.22	0.100	-0.25	0.102

480.

TABLE 6.2-33 (Cont)

Vent Path (No.)	Vent Path Connecting Nodes From	Vent Path Connecting Nodes To	Spray Line Break in Node 15 Pressure (psid)	Spray Line Break in Node 15 Time (sec)	Surge Line Break in Node 5 Pressure (psid)	Surge Line Break in Node 5 Time (sec)	Surge Line Break in Node 20 Pressure (psid)	Surge Line Break in Node 20 Time (sec)	
36	16	17	1.68	0.032	0.19	0.101	0.17	0.102	2.13
37	14	17	-3.01	0.024	-0.06	0.103	0.11	0.128	2.14
38	14	18	2.95	0.013	0.32	0.133	0.33	0.128	2.15
39	15	18	5.90	0.010	0.36	0.132	0.34	0.116	2.16
40	16	18	1.69	0.057	0.47	0.102	0.49	0.103	2.17
41	17	18	-1.85	0.033	0.37	0.133	0.32	0.104	2.21
42	18	19	2.51	0.024	0.67	0.145	0.63	0.147	2.22
43	19	21	2.55	0.107	1.12	0.164	1.12	0.166	2.23
44	19	21	2.55	0.107	1.12	0.164	1.12	0.166	2.24
45	19	21	2.55	0.107	1.12	0.164	1.12	0.166	2.25
46	20	2	0.05	0.520	2.82	0.007	167.11	0.044	2.29
47	20	5	0.05	0.520	-9.65	0.012	167.07	0.045	2.30
48	20	4	-0.06	0.159	3.46	0.008	167.03	0.045	2.31
49	20	3	0.05	0.520	4.42	0.009	167.01	0.044	2.32

480

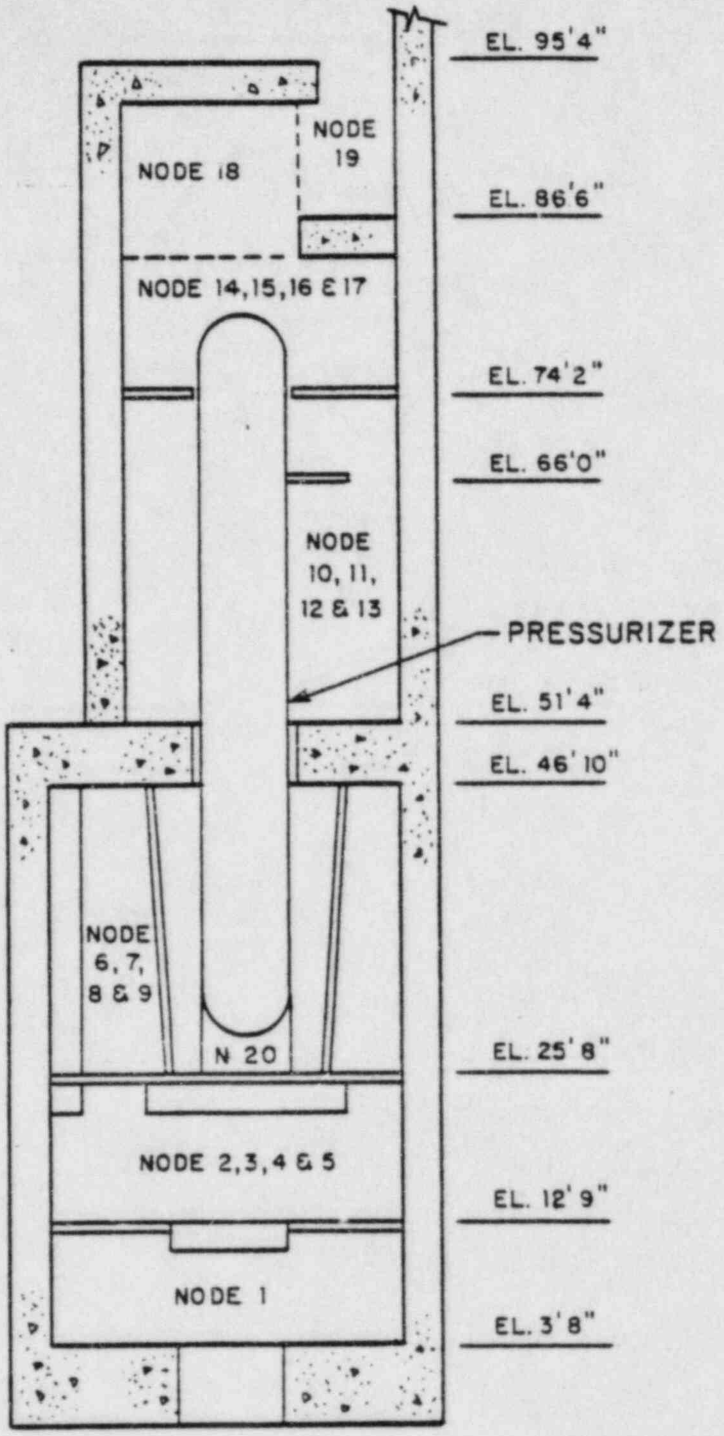
TABLE 6.2-43

SUBCOMPARTMENT DESIGN AND MAXIMUM CALCULATED DIFFERENTIAL PRESSURES

Compartment	Design Pressure (psid, uniform)	Maximum Calculated Pressure (psid, local)
Refueling Cavity	4.2 (4.6 local)	4.59
Upper Reactor Cavity	120.0	70.94
Lower Pressurizer Cubicle	20.5	20.31
Upper Pressurizer Cubicle	7.7	5.83
Steam Generator Cubicle	21.7	19.37
Steam Generator Enclosure above Operating Floor	9.2	6.78

480.9

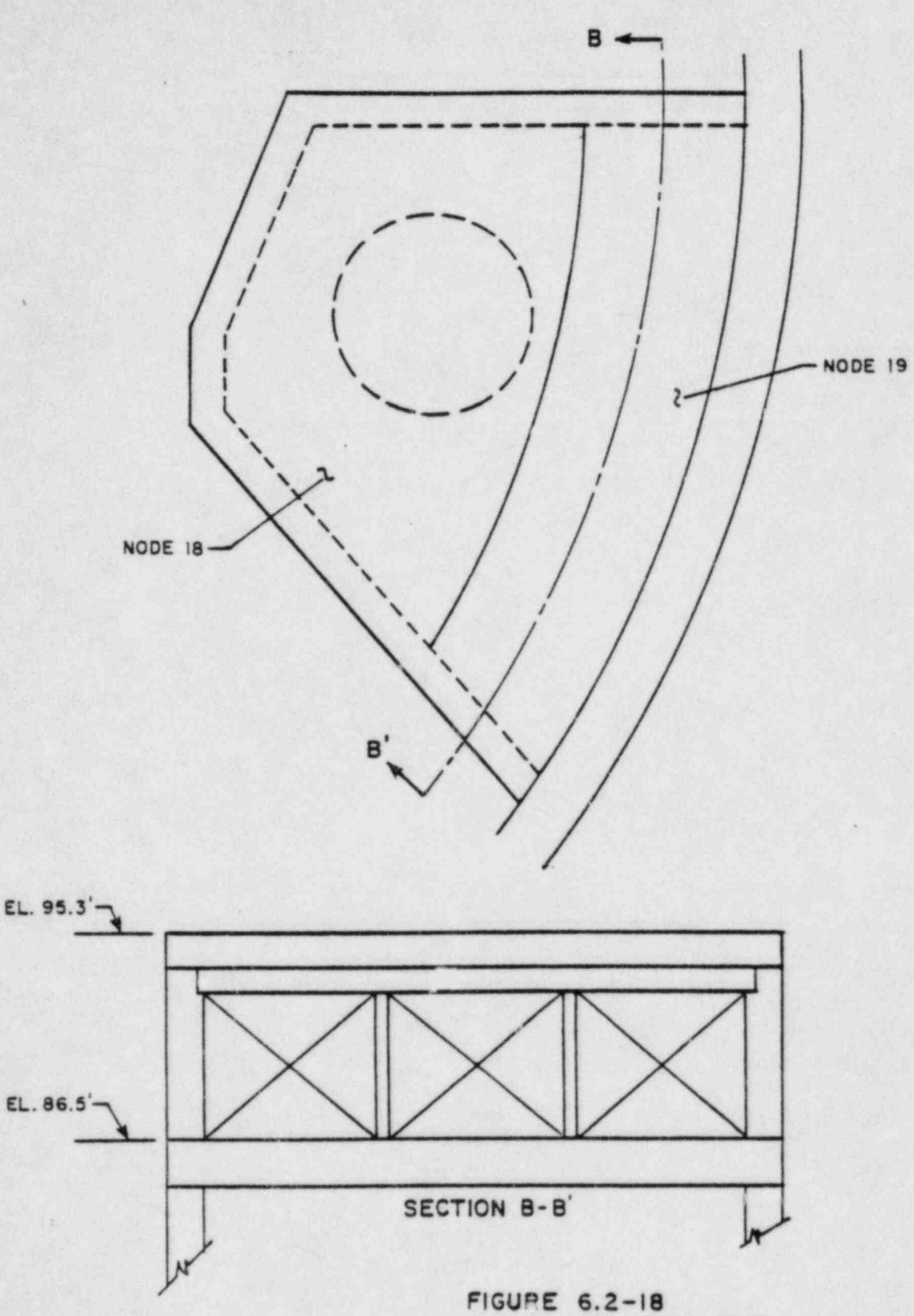
480.9



NOTE:

NODE 21 = REMAINDER OF CONTAINMENT

FIGURE 6.2-17
PRESSURIZER SUBCOMPARTMENT
ELEVATION VIEW WITH
NODAL ARRANGEMENT
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



SECTION B-B'

FIGURE 6.2-18
PLAN VIEW FOR THE
PRESSURIZER SUBCOMPARTMENT
ELEVATION 95.3'
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

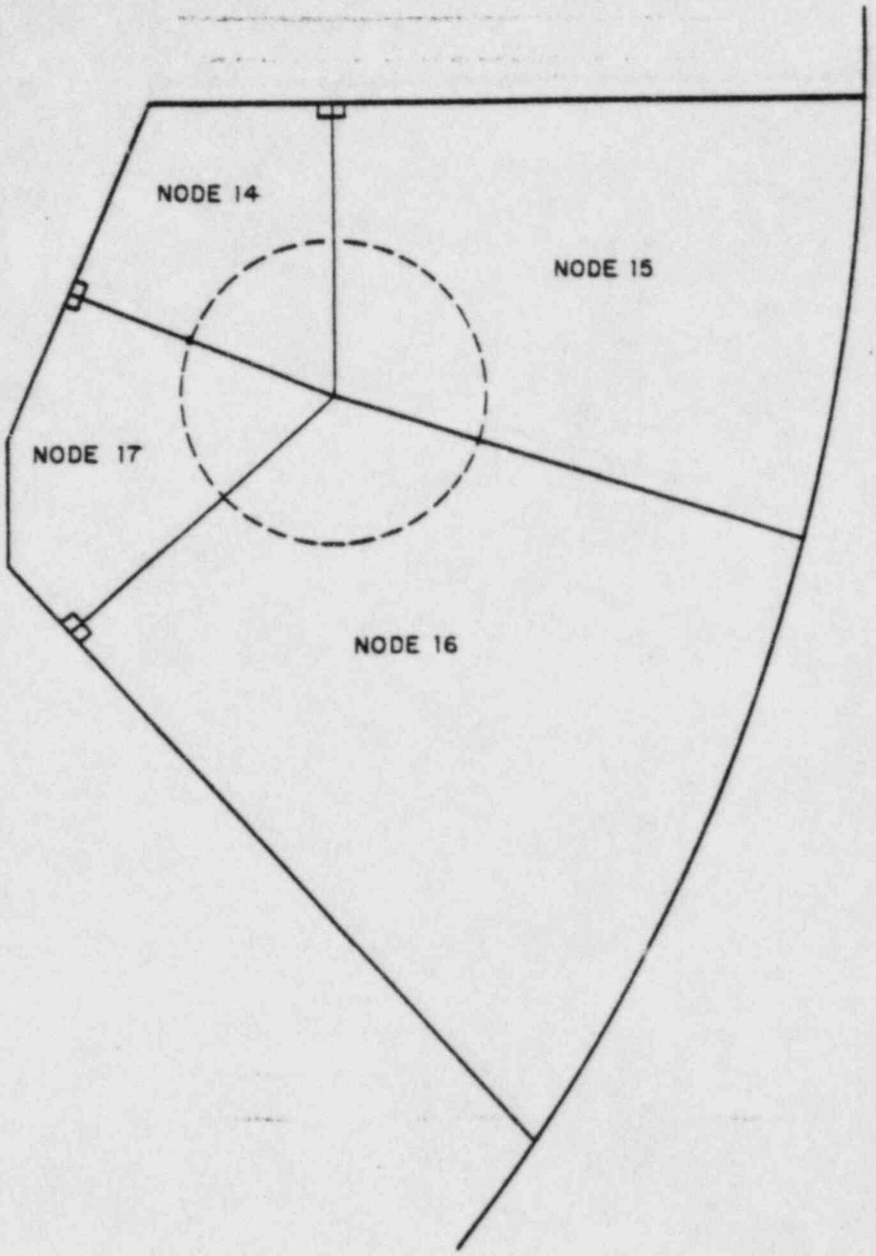


FIGURE 6.2-18A
PLAN VIEW FOR THE
PRESSURIZER SUBCOMPARTMENT
ELEVATION 74.2'
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

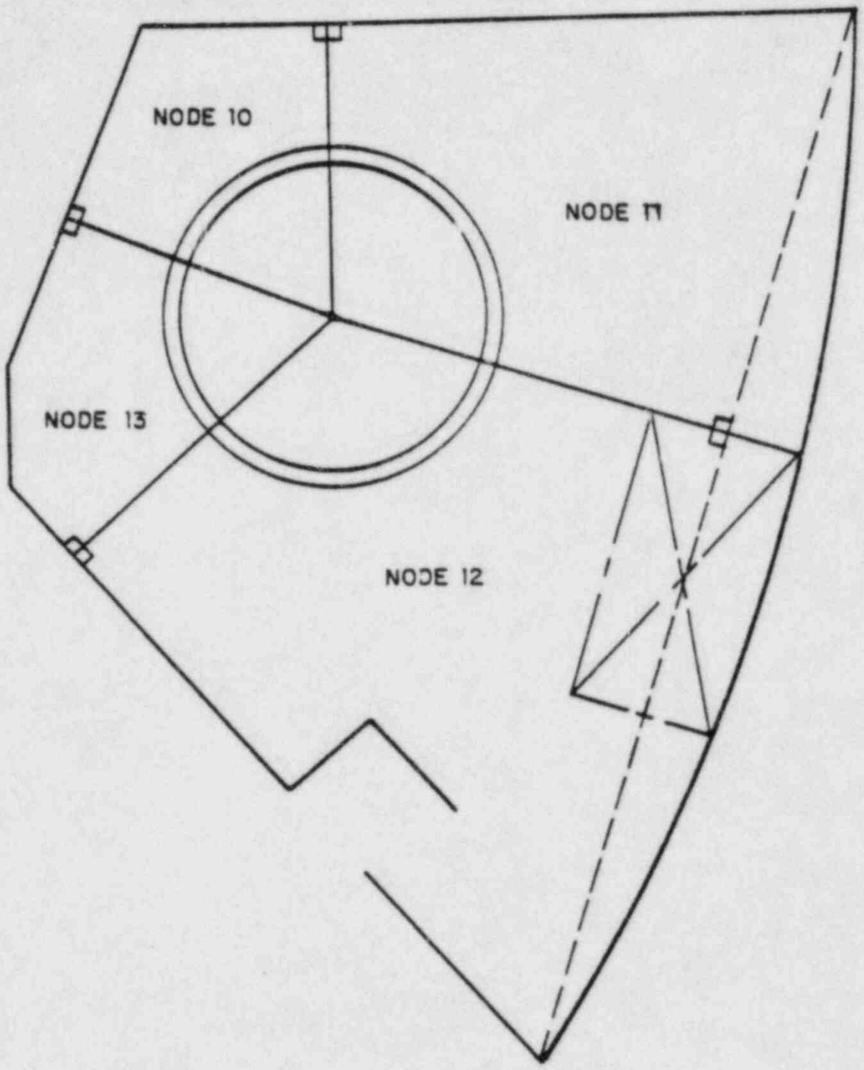


FIGURE 6.2-188
PLAN VIEW FOR THE
PRESSURIZER SUBCOMPARTMENT
ELEVATION 51.3'
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

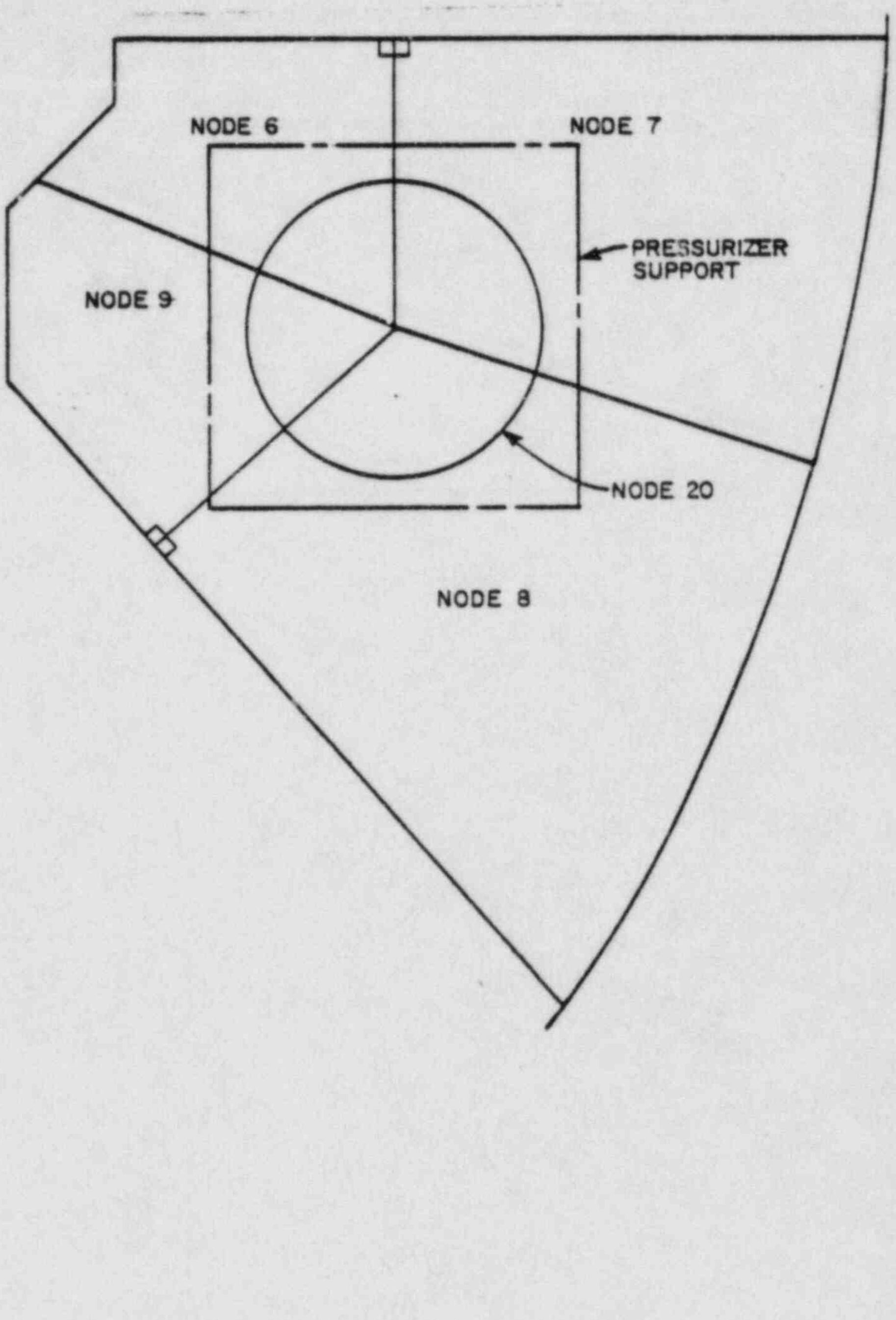


FIGURE 6.2-18C

PLAN VIEW FOR THE PRESSURIZER SUBCOMPARTMENT ELEVATION 25.7'

MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

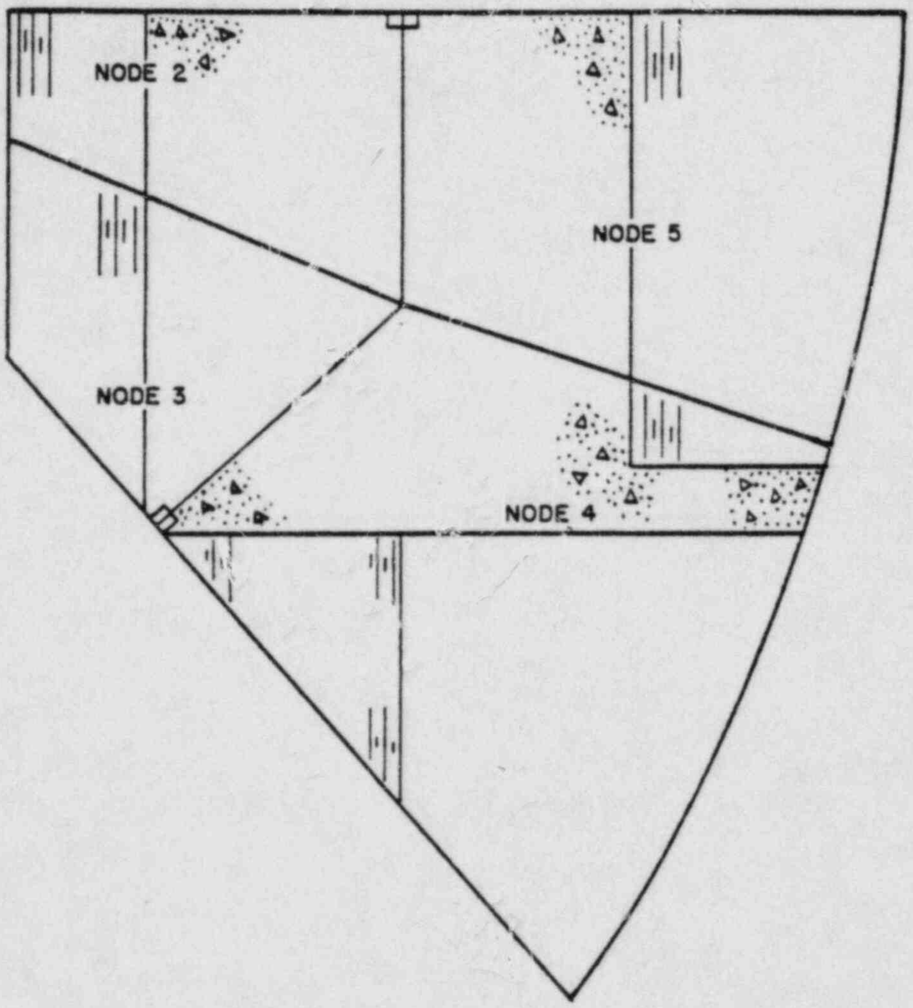
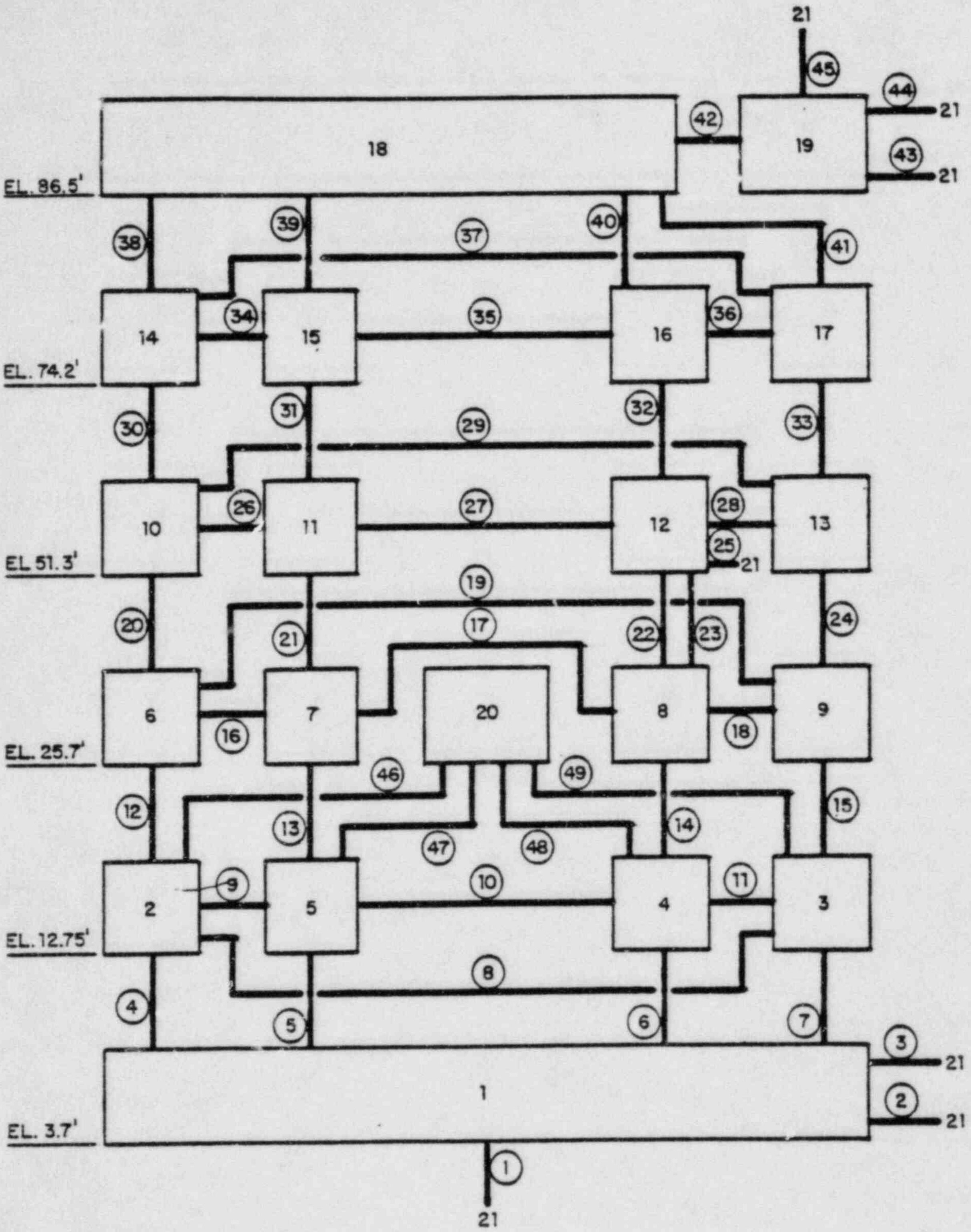
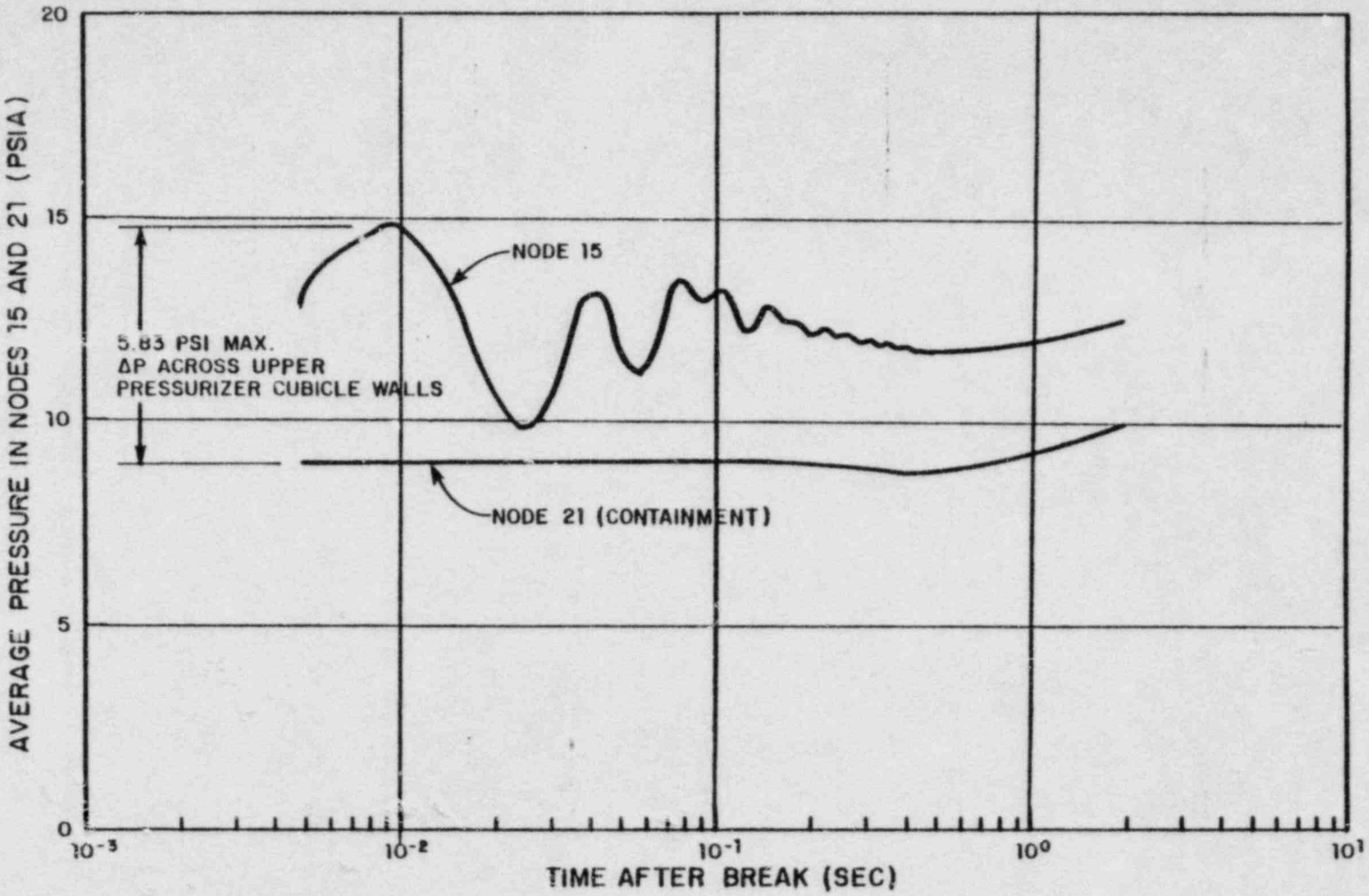


FIGURE 6.2-18D
PLAN VIEW FOR THE
PRESSURIZER SUBCOMPARTMENT
ELEVATION 12.75'
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



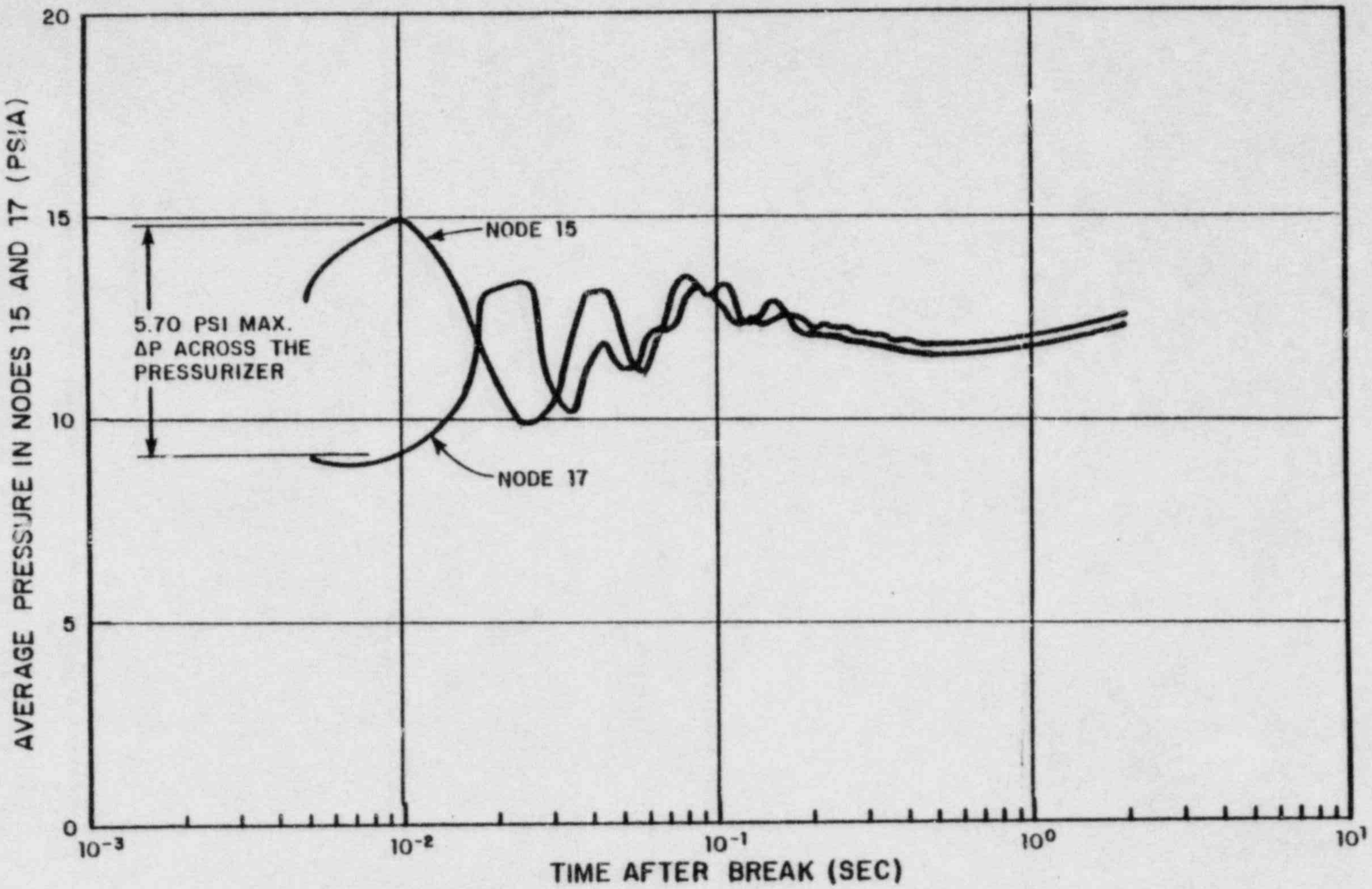
NOTE:
CIRCLED NUMBERS REPRESENT
JUNCTIONS BETWEEN NODES

FIGURE 6.2-24
PRESSURIZER SUBCOMPARTMENT
NODALIZATION DIAGRAM
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



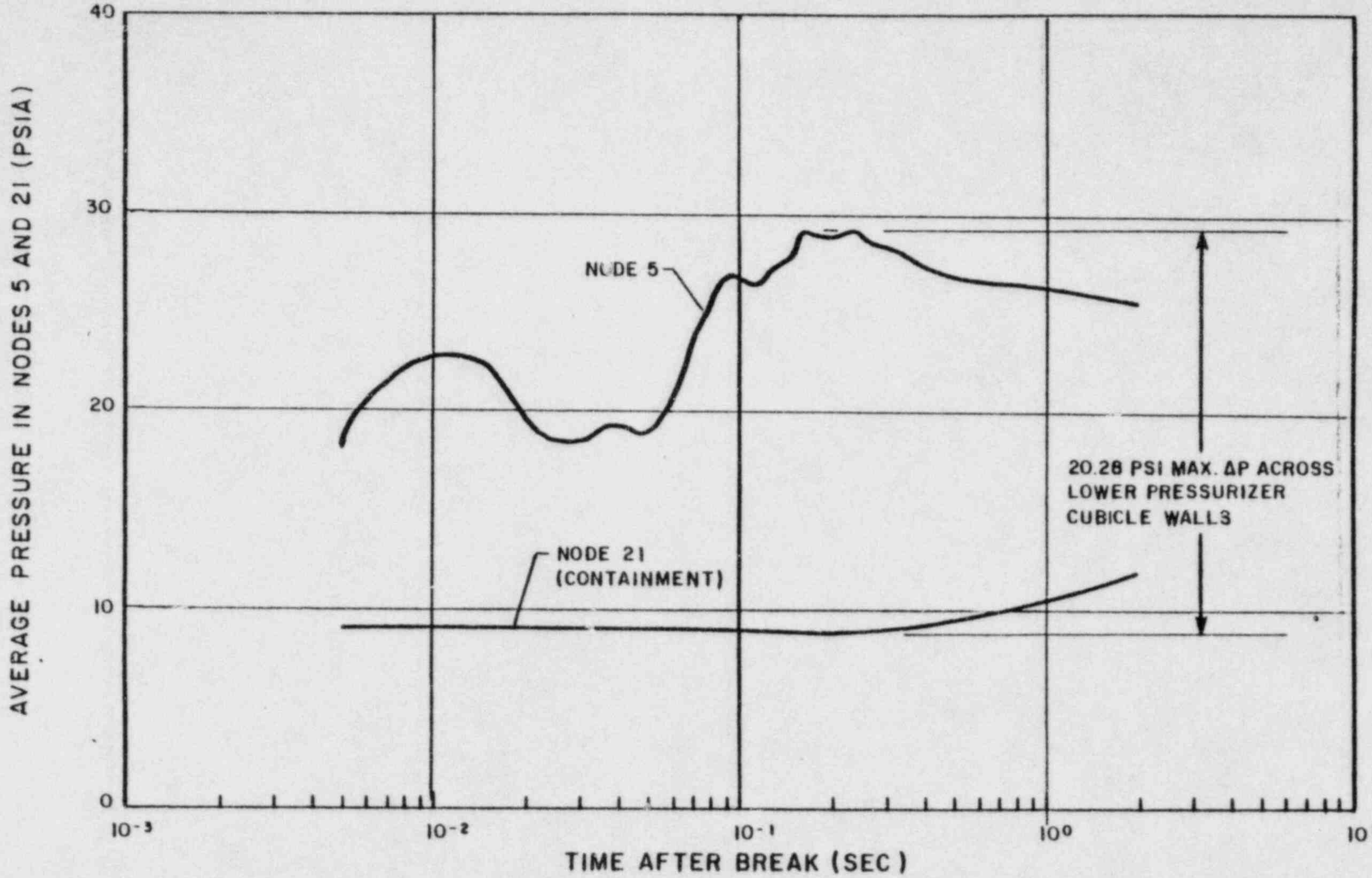
NOTE:
SPRAY LINE BREAK IN NODE 15

FIGURE 6.2-28
PRESSURE RESPONSE
PRESSURIZER CUBICLE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



NOTE:
SPRAY LINE BREAK IN NODE 15

FIGURE 6.2-28A
PRESSURE RESPONSE
PRESSURIZER CUBICLE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



NOTE:
SURGE LINE BREAK IN NODE 5

FIGURE 6.2-29
PRESSURE RESPONSE
PRESSURIZER CUBICLE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

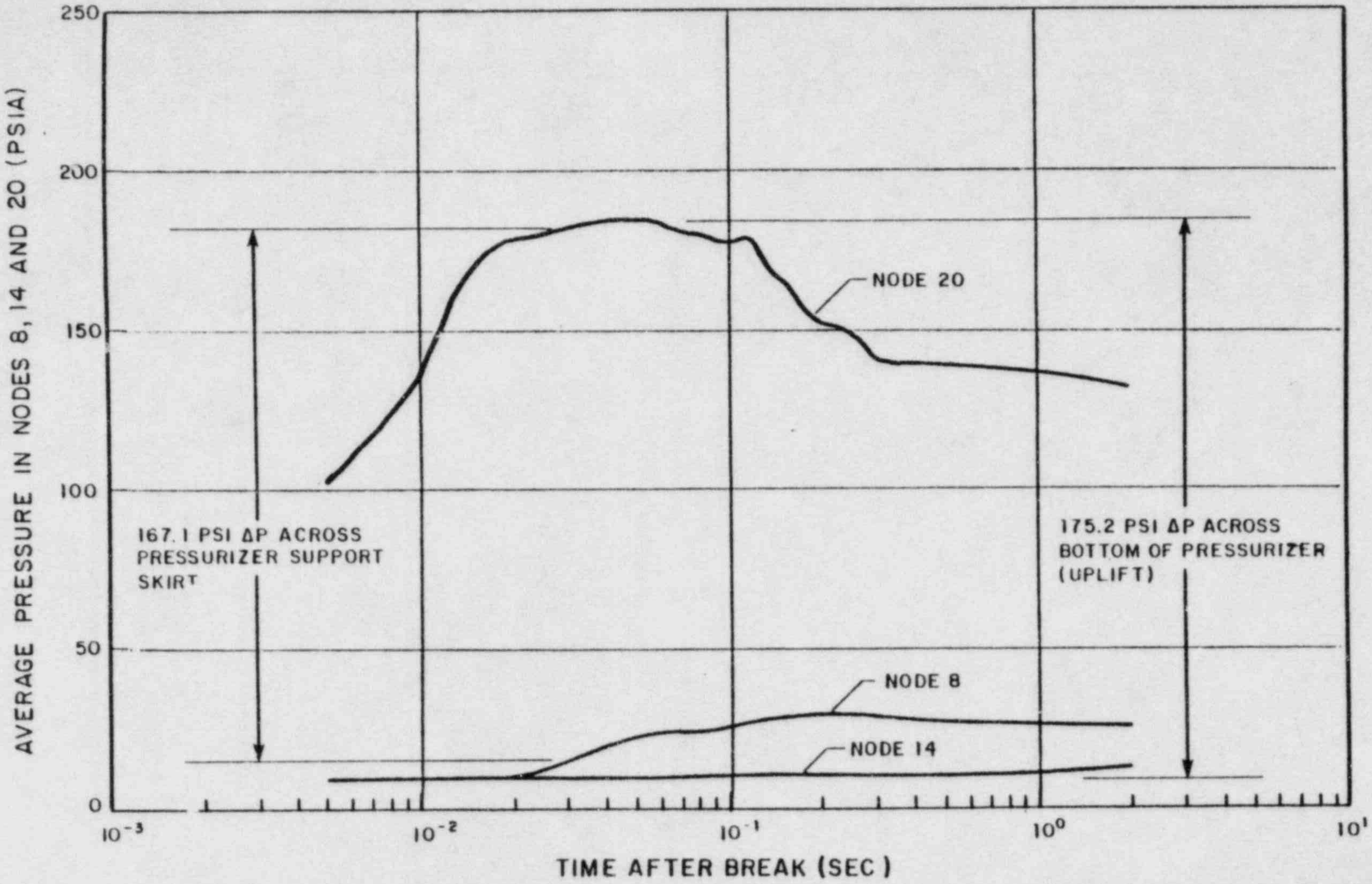


FIGURE 6.2-29A
PRESSURE RESPONSE
PRESSURIZER CUBICLE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

NOTE:
SURGE LINE BREAK IN NODE 20