Public Service
Electric and Gas
Company

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December 18, 1985

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20814

Attention: Ms. Elinor Adensam, Director
Project Directorate 3
Division of BWR Licensing

Dear Ms. Adensam:

ELIMINATION OF ARBITRARY INTERMEDIATE PIPE BREAKS
HOPE CREEK GENERATING STATION
DOCKET NO. 50-354

Public Service Electric and Gas Company (PSE&G) requests approval for the Hope Creek Generating Station (HCGS) to eliminate the postulation of intermediate pipe breaks as specified by Standard Review Plan (SRP) 3.6.2 Sections II.1 and II.2 for the Main Steam system and Reactor Water Cleanup (RWCU) system inside containment unless such locations exceed the stress and usage factor threshold levels provided in Branch Technical Position (BTP) MEB 3-1 or are located in the proximity of welded pipe attachments.

This transmittal supersedes the PSE&G to NRC letter dated November 15, 1985 (R.L. Mittl, PSE&G to W. Butler, NRC) as a result of discussions between members of the NRC Staff and PSE&G on December 11, 1985. The following information is provided in accordance with your letter of September 20, 1985 (W. Butler, NRC to R.L. Mittl, PSE&G).

1. Provide a short discussion of the technical justification for elimination of arbitrary intermediate breaks.

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1/1

ADD.

EB (LIAW)
PSB (L. HULMAN)
EICSB (SRINIVASAN)
RSB (ACTING)
FOB (VASSALLO)
AD - G. Lainas (Ltr only)

RESPONSE

The technical justification for elimination of arbitrary intermediate breaks is as follows.

A. Deletion of whip restraints will improve access for operation, inservice inspection, and maintenance.

B. Occupational radiation exposure during inspection, maintenance, and repair will be reduced over the life of the plant.

C. The additional accessibility to the piping systems may improve the efficiency of inservice inspections.

D. Postulating arbitrary intermediate breaks provides only additional conservatism with no physical basis.

E. Deletion of arbitrary intermediate break locations will not impact the environmental qualification of safety related equipment and components since the harsh environment conditions have already been defined and will not be revised.

F. The NRC has accepted a similar position for other piping systems on the HCGS.

G. For pipe whip restraints which are currently installed, but not required based on the elimination of arbitrary intermediate breaks, the whip restraints may be retained. However, substantial cost savings will occur since notching of insulation around shimpacs is not required, resulting in reduced heat loss to the containment and ease of insulation installation, and removal.

H. The option exists to remove unnecessary existing pipe whip restraints if maintenance/inspection operations could be simplified by enhanced accessibility.

2. Provide a table or summary which includes the following information.

A. Identification of all affected piping systems

B. Pipe diameter and material of each system in (A)

C. Estimated number of breaks eliminated in each system in (A)

D. Estimated number of rupture restraints and jet deflectors eliminated in each system in (A)

RESPONSE

A summary table of the affected system is provided as follows.

Pipe System	Pipe Material	Nom. Pipe Dia.	Arb. Interim. Breaks Elimin.[b,d]	Pipe Whip Restraints Elimin.[a]	Jet Deflectors Eliminated
Inside Containment					
Main Steam	CS	26"	8	0	0
RWCU	CS/SS	4"/6"	3	0	0

NOTES:

a. The quantities listed are those restraints which have not yet been installed. Those restraints which have been installed may remain, however several restraint shimpacs may not be required.

b. Welded piping attachments are not located in the proximity of any eliminated arbitrary intermediate breaks and no such welded attachments are expected to be added in the future.

c. Deleted

d. All eliminated arbitrary intermediate breaks in the RWCU system are on carbon steel piping.

3. Provide a detailed discussion to justify why the systems identified in 2(A) are not susceptible to the following.

   A. IGSCC

   B. Water/Steam hammer effects

   C. Thermal fatigue and mixing

RESPONSE

The above systems are not susceptible to intergranular stress corrosion cracking (IGSCC), steam/water hammer effects, or thermal fatigue and mixing due to the following.

A. Industry experience has shown per NUREG-1061 that IGSCC can occur when the following conditions exist simultaneously: high tensile stresses, piping material susceptible to cracking, and a corrosive environment.

Although any stainless or carbon steel piping will exhibit some degree of residual stresses and be exposed to tensile stresses, the potential of IGSCC is minimized by choosing piping material with low susceptibility to stress corrosion and by ensuring that a corrosive environment does not exist. The likelihood of IGSCC in stainless steel increases with carbon content. Therefore, only a low carbon content stainless steel has been used (304L) in the portion of the 6-inch transition piece connecting the RWCU system to the recirculation system. The remainder of the affected system piping is ferritic carbon steel which has been found not to be susceptible to IGSCC.

The existence of a corrosive environment is minimized by specifying stringent criteria for internal and external cleaning and by following water chemistry guidelines during power ascension and normal operation.

B. The steam/water hammer potential discussed in the Catawba position are specific to PWR plants and do not apply to the HCGS BWR design. Steam hammer loads are anticipated for the Main Steam system and are included in the design as discussed in FSAR Section 3.9.1. Analyses have been performed for these loadings and the Main Steam system has been designed to accommodate and minimize effects of these loadings. The RWCU system is continuously in operation to purify the reactor water, and the lines will be filled, thus minimizing the potential for water hammer.

C. As required by ASME B&PV Code Section III, a detailed fatigue analysis is performed on all Class 1 piping systems. Such analyses have been performed for the Main Steam and RWCU systems. For ASME B&PV Class 1 lines, conservatism is allowed for fatigue failure. The ASME Code limit for the Cumulative Usage Factor (CUP) is 1.0 to assure that pipe fatigue failure will not occur. The pipe break postulation limit is 10 percent of this number, and all of the Class 1 arbitrary intermediate break locations involve CUPs below this limit.

Based on the system design and layout which minimizes thermal stratification and cyclical stresses, and the analyses performed to verify the piping will experience no fatigue failure, the Main Steam and RWCU systems are not susceptible to thermal fatigue due to mixing.

4. Provide a commitment that all systems in 2(A) will be included in the preoperational piping testing program.

RESPONSE

The Main Steam and RWCU systems are within the scope of the piping startup testing program. Each system will be tested to verify that steady state vibratory levels are within acceptable limits for operating conditions anticipated during service.

5. Provide a commitment that all safety related equipment in the vicinity of the eliminated breaks has been environmentally qualified to withstand the effects of a non-mechanistic break.

RESPONSE

Elimination of arbitrary intermediate breaks will not affect the environmental qualification of safety related equipment in the vicinity of the arbitrary intermediate break locations. The break locations for defining the worst case harsh environment conditions for all safety related equipment have been evaluated, which include the arbitrary intermediate break locations, and the results documented in the FSAR. These worst case conditions will not be revised based upon elimination of the arbitrary intermediate break locations.

In addition to the above information, attached for your review are proposed FSAR changes to Section 3.6 eliminating the postulation of arbitrary pipe break locations. These changes will be incorporated upon approval of the above request.

Should you have any questions in this regard, please contact us.

Sincerely,

Attachment

C D.H. Wagner
USNRC Licensing Project Manager

R.W. Borchardt
USNRC Senior Resident Inspector

TABLE 3.6-2

FINAL ~~PRELIMINARY~~ MAIN STEAM SYSTEM PIPING STRESS LEVELS AND PIPE BREAK DATA (PORTION INSIDE PRIMARY CONTAINMENT)

DELETE AND REPLACE WITH INSERT A

Node Point[1]	Node Type[2]	Stress By EQ. 10 (ksi)	Cumulative Usage Factor	Pipe Break Stress Limit 2.4 Sm (ksi)	Break Type[3]	Basis for Break Selection[4]
Lines A & D						
61	TTJ	30.63	0.0067	42.5	C	TE
200N	EL	43.50	0.0158	42.5	C	SFL
200F	EL	41.18	0.0139	42.5	C	MBL
300N	EL	37.57	0.0106	42.5	C	MBL
300F	EL	34.93	0.0089	42.5	C	MBL
013	EL	28.81	0.0025	42.5	C	TE
400F	EL	26.40	0.0037	42.5	C	TE
Lines B & C						
192	TTJ	33.28	0.0071	42.5	C	TE
188N	EL	48.19	0.0169	42.5	C	SFL
188F	EL	42.54	0.0126	42.5	C	SFL
151N	EL	40.46	0.0117	42.5	C	MBL
151F	EL	42.05	0.0128	42.5	C	MBL
116	EL	28.91	0.0050	42.5	C	TE
112F	EL	30.31	0.0053	42.5	C	TE

(1) Locations of the nodes are shown in Figure 3.6-2

(2) Symbols used to denote the node type are as follows:
TTJ - Tapered transition joint
EL - Elbow
~~TEE - Tee~~
~~BW - Butt weld~~
~~RED - Reducer~~
SWP - SWEEPOLET

(3) Break types are indicated as follows:
C - Circumferential
L - LONGITUDINAL

(4) Symbols used to denote the basis for break selection are as follows:
TE - Terminal end
~~MBL - Intermediate break locations selected to satisfy the requirements for a minimum number of break locations.~~
SFL - Stress and fatigue limits established in Section 3.6.2.1.1.3 are not met.

INSERT A

Line A

1	TTJ	29.94	0.010	42.5	C	TE
45	EL	62.07*	0.02*	42.5	C	TE

Line B

1	TTJ	24.95	0.000	42.5	C	TE
49	EL	53.61*	0.02*	42.5	C	TE

Line C

1	TTJ	28.41	0.010	42.5	C	TE
42	EL	54.58*	0.010	42.5	C	TE

Line D

1	TTJ	27.9	0.010	42.5	C	TE
39	EL	61.95*	0.020*	42.5	C	TE

*Based on Final GE Stress Report

TABLE 3.6-10

~~PRELIMINARY~~ FINAL RWCU SYSTEM PIPING STRESS LEVELS AND PIPE BREAK DATA
(PORTION INSIDE PRIMARY CONTAINMENT)

DELETE AND REPLACE WITH INSERT B

Node Point[1]	Node Type[2]	Stress By EQ. 10 (ksi)	Cumulative Usage Factor	Pipe Break Stress Limit 2.4 Sm (ksi)	Break Type[3]	Basis for Break Selection[4]
95	BW	16.82	0.0003	42.86	C	TE
100	TTJ	44.161	0.0179	42.86	C	SFL
230	TEE	43.99	0.0326	42.86	C	SFL
490	BW	16.69	0.0002	42.86	C	TE
518	BW	15.51	0.0002	42.86	C	TE
765	RED	47.64	0.0121	42.86	C	SFL
800	TTJ	24.99	0.0029	42.86	C	TE

(1) Locations of the nodes are shown in Figure 3.6-15

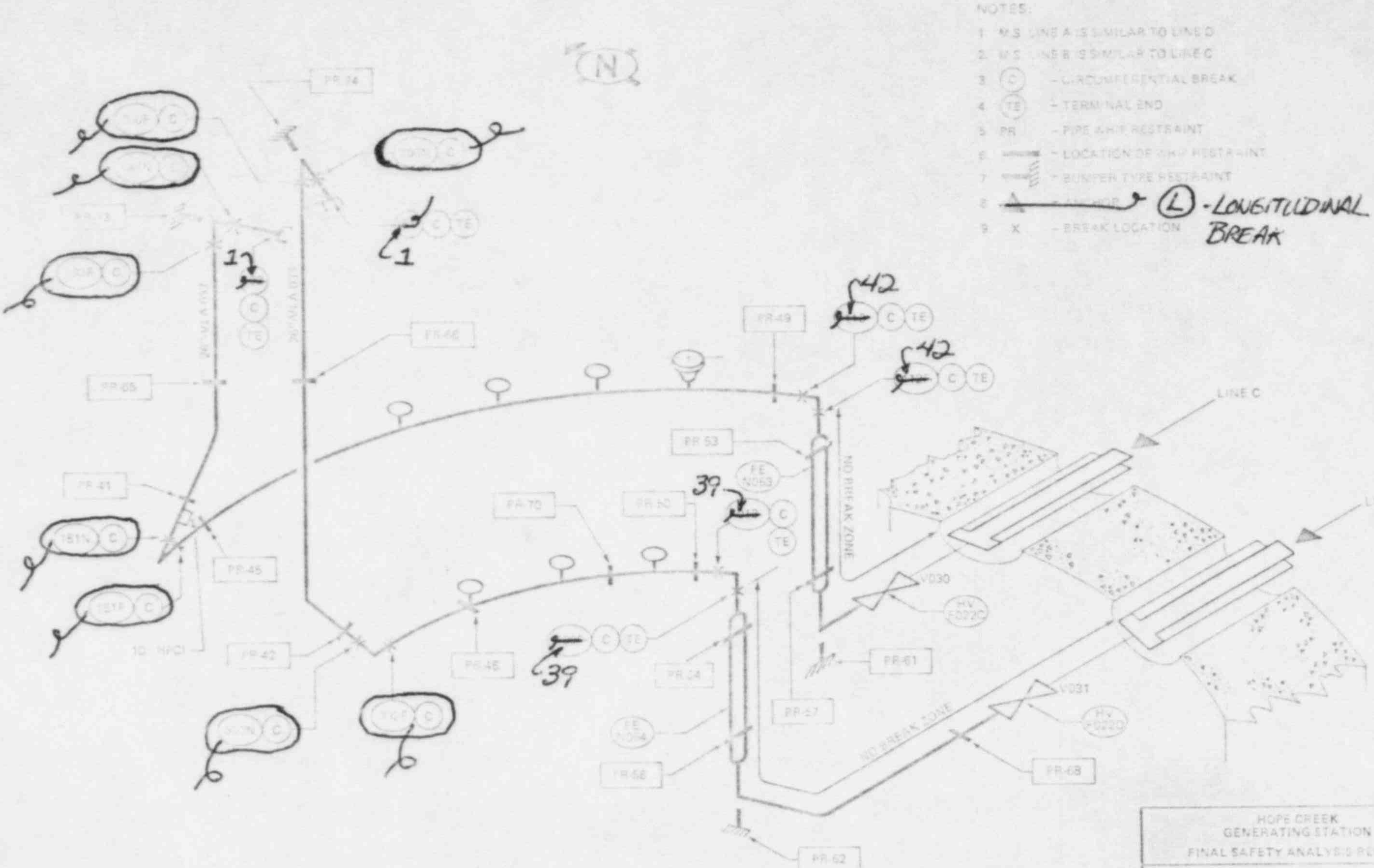
(2) Symbols used to denote the node type are as follows:
TTJ - Tapered transition joint
~~EL - Elbow~~
~~TEE - Tee~~
BW - Butt weld
RED - Reducer
SW - SOCKET WELD

(3) Break types are indicated as follows:
C - Circumferential
L - LONGITUDINAL

(4) Symbols used to denote the basis for break selection are as follows:
TE - Terminal end
~~MBL - Intermediate break locations selected to satisfy the requirements for a minimum number of break locations.~~
SFL - Stress and fatigue limits established in Section 3.6.2.1.1.3 are not met.

INSERT B

90	BW	14.227	0.0001	43.60	C	TE
101	BW	68.251	0.8853	43.60	C&L	SFL
480	BW	10.344	0.0000	43.60	C	TE
518	BW	10.332	0.0000	43.60	C	TE
760	RED	65.771	0.125	43.60	C	SFL
800	BW	10.357	0.0002	43.60	C	TE
108	TTJ	76.297	0.5401	43.60	C&L	SFL
109	DSW	52.044	0.1346	43.60	C&L	SFL
570	SW	64.676	0.6697	43.60	C	SFL
575	SW	61.147	0.5535	43.60	C	SFL
819	SW	22.763	0.004	43.60	C	TE
705	TTJ	49.52	0.0139	34.64	C	TE
710	TTJ	75.508	0.862	34.64	C&L	SFL
910	RED	48.52	0.0152	43.60	C	SFL
920	SW	8.93	0.0003	43.60	C	TE
855	BW	12.67	0.0000	43.60	C	TE
902	TTJ	45.5	0.0085	34.64	C	TE
905	TTJ	78.52	0.921	34.64	C&L	SFL
984	RED	48.52	0.0152	43.60	C	SFL
988	SW	9.01	0.0003	43.60	C	TE
968	BW	10.10	0.0000	43.60	C	TE

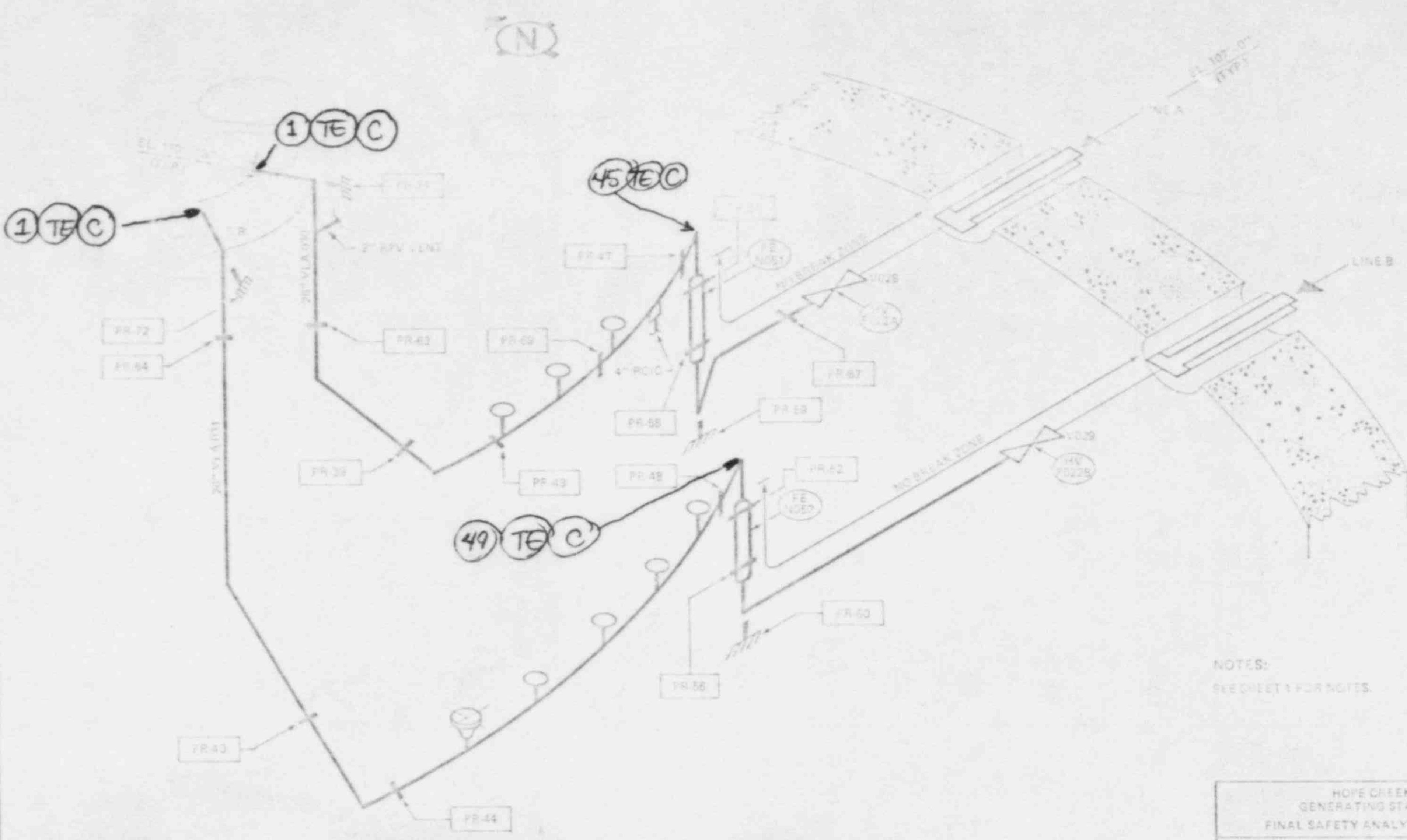


HOPE CREEK GENERATING STATION
FINAL SAFETY ANALYSIS REPORT

MAIN STEAM PIPING ISOMETRIC (PORTION INSIDE PRIMARY CONTAINMENT)

FIGURE 3.6-2
SHEET 1 OF 2

AMENDMENT 6, 06/84



NOTES:

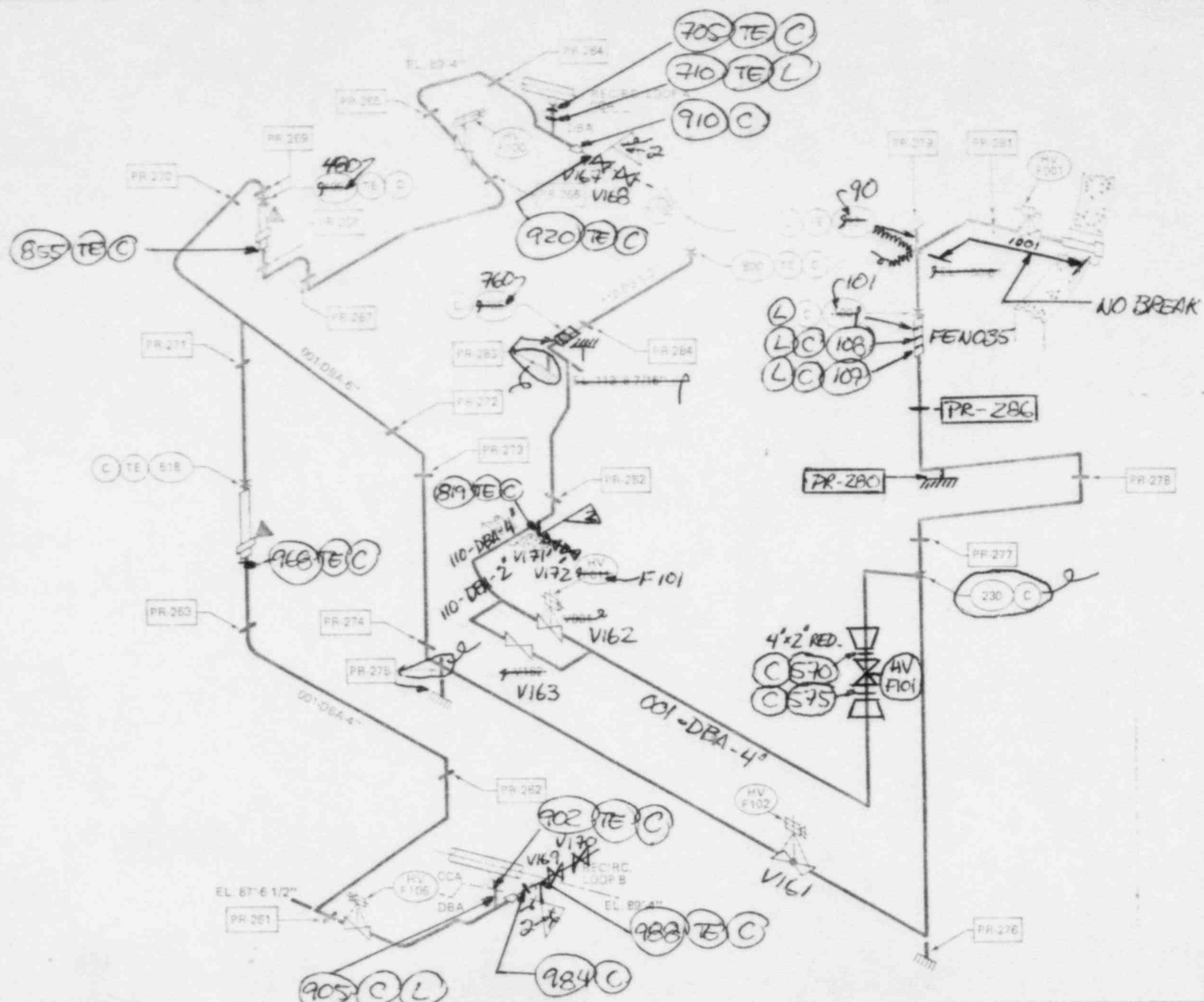
SEE SHEET 1 FOR NOTES.

HOPE CREEK
GENERATING STATION
FINAL SAFETY ANALYSIS REPORT

MAIN STEAM PIPING
ISOMETRIC (PORTION INSIDE
PRIMARY CONTAINMENT)

FIGURE 3.6-2
SHEET 2 OF 2

AMENDMENT 6, 06/84



NOTES:

1. NODE POINTS (800) AND 760 12" DBA 110) ARE PART OF THE REACTOR VESSEL DRAIN.
2. (C) - CIRCUMFERENTIAL BREAK
3. (TE) - TERMINAL END
4. PR - PIPE WHIP RESTRAINT
5. - LOCATION OF WHIP RESTRAINT
6. - BUMPER TYPE RESTRAINT
7. ▲ - ANCHOR
8. X - BREAK LOCATION
9. (1) - PIPING BEYOND THIS POINT IS 1" NOMINAL DIAMETER
10. (2) - PIPING BEYOND THIS POINT IS MODERATE ENERGY
11. (L) - LONGITUDINAL BREAK

HOPE CREEK GENERATING STATION
FINAL SAFETY ANALYSIS REPORT

RWCU PIPING ISOMETRIC (PORTION INSIDE PRIMARY CONTAINMENT)

FIGURE 3.6-15 AMENDMENT 6, 06/84