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Benard C. Rusche	1 Signed			XXX	XXXX

CLASS	UNCLASS	PROP INFO	INPUT	NO CYS REC'D	DOCKET NO:
	XXXX			1	50-400/401/402/403

DESCRIPTION:

Ltr. trans the following.....

Rec'd 1 cy. ltr. & 3 cys. Encl.)

PLANT NAME: Shearin Harris 1-4

ENCLOSURES:

Minutes of the NRC/CP&L/Ebasco meeting held 8/5/75, regarding pipe rupture design criteria inside & outside containment for the Shearin Harris Nucl Plant....W/3 cys of the isometric drawing of the main steam & feedwater piping in the tunnel area, dated 7-25-75... DO NOT REMOVE

* drawings ACKNOWLEDGED

distr. Ms Rushbrook Clutchin

FOR ACTION/INFORMATION

VCR 10-14-75

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CP&L

Carolina Power & Light Company

September 26, 1975

Mr. Benard C. Rusche, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, D. C. 20555

RE: DOCKET NOS: 50-400, 50-401, 50-402 AND 50-403

Dear Mr. Rusche:

Enclosed are the minutes of the NRC/CP&L/Ebasco meeting held on August 5, 1975, regarding pipe rupture design criteria inside and outside containment for the Shearon Harris Nuclear Power Plant (SHNPP). We have also enclosed three copies of the isometric drawing of the main steam and feedwater piping in the tunnel area, Drawing No. SK-M-321 dated July 25, 1975, in which we have incorporated the information as discussed and referenced in the meeting minutes.

As recorded in the minutes of the meeting, the stress limits of MEB 3-1 Section B.1.b(1) apply to extruded relief valve nozzle connections during valve operation for "super pipe" qualification (see Item 2). In order to explore the use of alternate, conservative qualification of these branch connections, CP&L requests the opportunity for further discussion with the NRC staff in the near future.

The enclosed minutes of the meeting will be used as a general pipe rupture design criteria for SHNPP after they have been approved by the NRC. We will not proceed with design on a large scale until we have received your response to these minutes. Your earliest response will be appreciated.

Yours very truly,

J. A. Jones
Executive Vice President
Engineering, Construction & Operation

JAJ/jdc

Enclosure

10291

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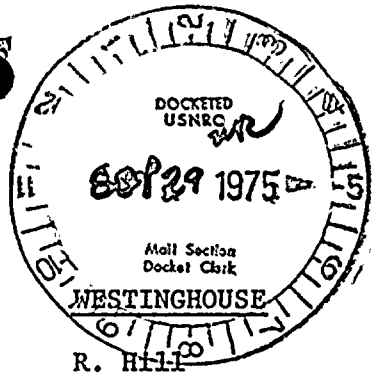


SHEARON HARRIS NUCLEAR POWER PLANT
MEETING MINUTES NRC/CP&L/EBASCO
BETHESDA, MD.
AUGUST 5, 1975

NRC	CP&L	EBASCO	WESTINGHOUSE
H. L. Brammer	W. McArthur	A. Cagnetta	R. Hill
M. Cutchin	C. Moseley	A. Chen	L. Vota
M. C. Hearn		A. Crisler	
J. Knight		M. Gagliardi	
J. Kovacs		E. Mirsky	
F. P. Schauer		M. Noronha	
J. Slider		F. Sweeney	

General Commitments

The purpose of the meeting was to discuss the implementation of Branch Technical Positions APCSB 3-1, March, 1975, and MEB 3-1, March, 1975, to Shearon Harris Nuclear Power Plant Units 1, 2, 3 and 4.

Carolina Power & Light indicated that it has elected to implement these branch positions for pipe rupture considerations outside and inside containment subject to agreements on specific criteria interpretation applicable to SHNPP. Implementation of these branch positions is consistent with BTP APCSB 3-1, Section B.4.C. This was satisfactory to the Regulatory Staff. The PSAR will be amended to reflect adoption of the BTP's as these BTP's have been interpretated in the minutes of this meeting.

Since the latest BTP's only require submittal of pipe rupture analysis at the FSAR stage, CP&L will not be required to provide a pipe rupture report prior to pipe fabrication or installation. Carolina Power & Light will continue to apprise the staff of any significant changes in design criteria applicable to pipe rupture which are implemented for the Shearon Harris project.

Specific Points of Agreement

1. Applicability of MEB 3-1 Inside Containment

   a. The BTP's represent the most current criteria applicable to design for pipe rupture and MEB 3-1 is far more definitive than Regulatory Guide 1.46 for postulating pipe break locations. MEB 3-1 may, therefore, be used inside containment for ASME Code Class 2 and 3 piping without having to specifically demonstrate the impracticality of applying Regulatory Guide 1.46.

   b. For dual purpose fluid systems inside containment which qualify as high-energy fluid systems for only short operational periods (about two percent of the time that the system operates) but qualify as moderate energy fluid systems for the major operational period, through-wall leakage cracks instead of breaks may be postulated. This is in accordance with BTP MEB 3-1 Section B.2.e.

c. In accordance with MEB 3-1, Section B.3.b (2)(b), longitudinal breaks need not be postulated at intermediate locations where the criterion for a minimum number of breaks is used to select the break points inside containment.

d. Based upon the applicability of MEB 3-1 for fluid system piping inside containment (Item 1 (a) above), breaks were shown to be postulated in the Main Steam System at the following locations:

1. the steam generator outlet nozzle (terminal end)

2. a point where the highest relative stresses exist, since there were no high stress points, i.e., greater than $0.8\ (1.2S_h + S_A)$

3. a point separated by a change in direction of the pipe run, since the stresses differed by less than 10%.

In addition, only circumferential breaks were postulated to occur at these locations. The basis for this assumption is the terminal end contains no longitudinal welds and break points 2 and 3 are intermediate locations where the criterion for a minimum number of break locations must be satisfied. This is consistent with MEB 3-1, Section B.3.b (2) (a) and (b).

2. Piping Between Containment Isolation Valves (MEB 3-1 Section B.1.b APCSB 3-1 Section B.2.c)

a. Terminal End: The point just outside the pipe rupture restraint system (moment and torsional restraint) both inside and outside the containment is not considered a terminal end. Therefore, an arbitrary, non-mechanistic pipe break need only be postulated at a point in the piping run where other portions of the criteria require breaks (e.g., change in seismic category, fittings, etc.). This applies to all high energy lines penetrating containment.

b. Stress Limits between Isolation Valve & Rupture Restraint System: Stresses in Non-Nuclear Safety piping between the isolation valves and the pipe rupture restraint system outside Containment (pipe break exclusion area) should comply with code limits. The following criteria must be satisfied under faulted conditions:

1. formation of a plastic hinge must be prevented, and

2. valve operability must be assured.

In addition, welded attachments in this area of piping shall be avoided to the degree practicable.

c. Stress Limits During Relief Valve Operation: Stress limits of MEB 3-1 Section B.1.b (1) apply to branch connections to the main run of pipe up to the relief valve. These stress limits also apply to the extruded relief valve nozzle connections and must be met during relief valve operation. The NRC staff was reluctant to give relief on this position without further information from CP&L. Carolina Power & Light wishes to keep this item open and pursue an alternate resolution at a future date.

d. SHNPP Units 1-4 Break Exclusion Region for Main Steam Piping between Isolation Valve and Pipe Rupture Restraint System: Carolina Power & Light indicated that, on the basis of the following design considerations, the pipe rupture restraint system has been located at the discharge of the main steam header at El.310 adjacent to the Auxiliary Building roof (see attached Sketch SK-M-321, 7/25/75).

1. Ability of the present structure in that area to be designed to sustain faulted condition loads (bending and torsion loads resulting from pipe rupture),

2. A design contingency is necessary for final selection of isolation valve configuration,

3. Space required for pipe hangers and seismic restraints in the pipe tunnel,

4. Access for valve maintenance and removal, inservice inspection, and general personnel access is required, and

5. The major detailed design effort for this area has been completed.

NRC agreed that the following criteria could be applied for piping from the isolation valve to the end of the pipe rupture restraint system, which extends just downstream of the main steam header:

1. Piping may be classified as non-Nuclear Safety/Seismic Category I.

2. Code stress limits may be applied provided the requirements of 2(b) above, are met.

e. Branch Lines:

1. The design criteria for MEB 3-1, Section B.1.b apply to branch lines (e.g., auxiliary feedwater and main steam line to auxiliary turbine) up to the end of the pipe rupture restraint system as in the case of main runs.

2. Localized stresses at the branch connection to the main run must meet MEB 3-1, Section B.1.b(1) stress limits.

f. Applicability of APCSB 3-1, Section B.2.c(1) for all High Energy Systems:

All high energy fluid system piping between isolation valves of a single barrier containment structure that connect, on a continuous or intermittent basis, to the reactor coolant pressure boundary, and the steam and feedwater systems of PWR plants, should be designed to the stress limits specified in B.1.b or B.2.b of BTP, MEB 3-1.

3. Postulation of Break Points in Main Steam Piping

The main steam lines are classified as Safety Class 2/Seismic Category I from the steam generators inside containment up to and including the main steam isolation valve on each line. From this point, running downstream horizontally to the end of the pipe tunnel, through a 90° vertical elbow, through risers into the main steam header, to the end of the pipe rupture restraint system, the piping is classified non-Nuclear Safety/Seismic Category I. This piping must meet 10CFR50 Appendix B Quality Assurance requirements. The piping described above (between the pipe rupture restraint system inside and outside containment) is not subject to postulation of pipe breaks for design purposes.

The piping downstream of the pipe rupture restraint system is presently classified as non-Nuclear Safety/Seismic Category I and designed to appropriate code stress limits and 10CFR50 Appendix B QA requirements. The location of the first main steam line break in this section of piping is postulated at the elbow in the Turbine Generator Building (adjacent to the Auxiliary Building) where the steam lines are declassified to non-Seismic Category I. Should CP&L elect to classify the main steam piping downstream of the pipe rupture restraint system as Non-Seismic Category I, then the requirements of BTP APCSB 3-1, Section B.3.d must be met. The attached figure illustrates the present classification of the various portions of main steam piping and the extent of the region not subject to postulation of pipe break.

4. Postulation of Break Points in Feedwater Piping

This item was not discussed in detail but it was agreed that the principles developed above for main steam piping are applicable to feedwater piping. On this basis, CP&L is proceeding with design as follows:

The feedwater piping is classified as Safety Class 2/Seismic Category I from the steam generators inside containment up to and including the feedwater isolation valve outside containment. Stresses in the region beyond the isolation valves to the end of the pipe rupture restraint system will be maintained within code requirements and the criteria of 2(b) above will be met. The piping passes through the pipe tunnel, (each feedwater line routed below is corresponding main steam line) without any fittings. The piping continues through the Auxiliary Building with only large radius changes in direction (greater than 5 diameters) and with no fitings, until column line B (see attached Sketch SK-M-321, 7/25/75) which is the boundary of the Auxiliary Building. The portion of piping from the isolation valve up to the boundary of the Auxiliary Building is classified

as non-Nuclear Safety/Seismic Category I (with 10CFR50, Appendix B QA Program being applied). The balance of piping up to the steam generator feed pumps is routed in the Turbine Building and is classified as non-Nuclear Safety/non-Seismic Category I.

The piping between the pipe rupture restraints inside and outside containment is not subject to postulation of pipe breaks in accordance with the BTP's and points of agreement noted in previous items. However, in accordance with the BTP's and considering the clarifications above, the location of the first postulated piping failure is at the fitting in the Turbine Building. No breaks need be postulated in the Auxiliary Building because feedwater piping is Seismic Category I and incorporates no fittings or welded attachments.

5. Miscellaneous

a. Circumferential Pipe Break

1. MEB 3-1, Section B.3 (a) (3)
Displacement of the end of a postulated circumferential pipe break need not be one pipe diameter for pipe whip analysis or impingement analysis purposes providing that a sufficiently detailed analysis demonstrates this displacement to be other than one pipe diameter.

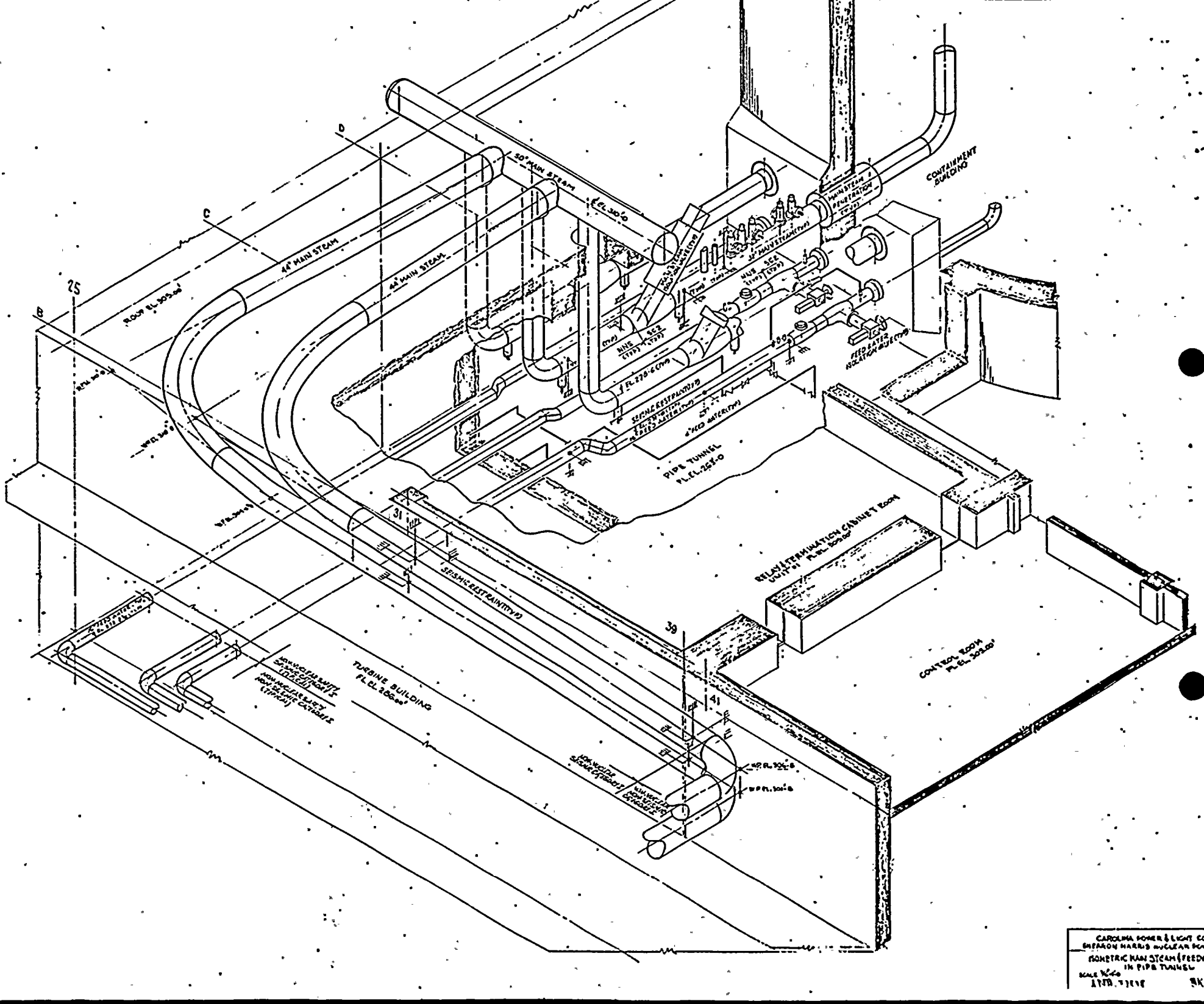
2. MEB 3-1, Section B.3 (a) (5)
Pipe whipping should be assumed to occur in directions determined by an analysis of piping stiffness, orientations, boundary conditions and loads.

b. Slot Breaks

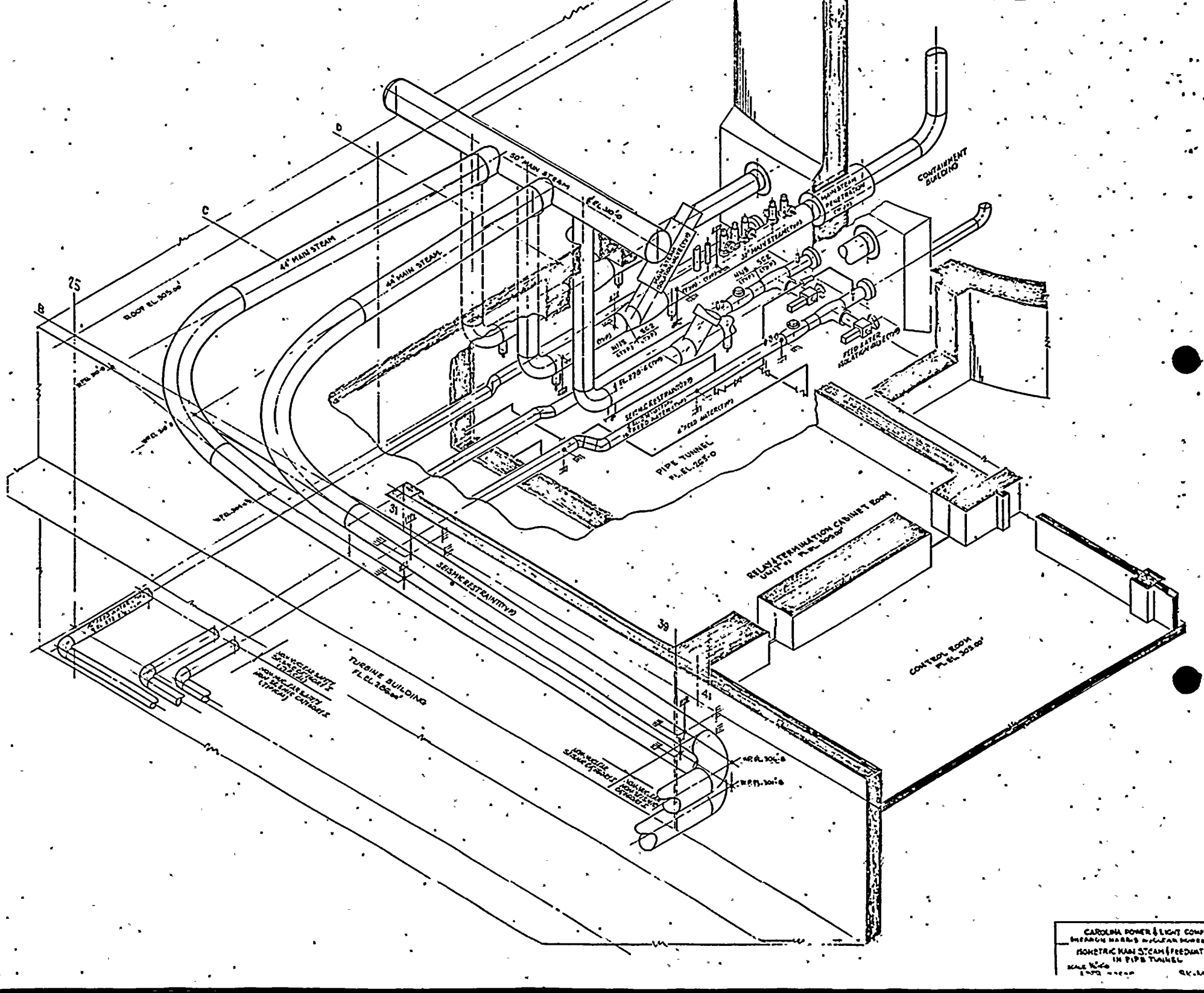
1. MEB 3-1, Section B.3.b (2) (b)
Longitudinal breaks need not be postulated at intermediate locations where the criterion for a minimum number of breaks is used to select the break points outside or inside containment. This does not apply to non-Nuclear Safety piping.

c. Postulating Breaks in Fittings (Elbows)
Where the criteria requires a break to be postulated at a fitting, breaks need not be postulated to occur in the fitting, rather breaks need only be postulated to occur in the piping at the higher stressed end of the fitting as determined by analysis.

d. Crushable Materials
There is no proscription against the use of crushable materials as part of a pipe rupture restraint system. The 50% ultimate strain design limit is not applicable to crushable material. Use of this material will require analytical or empirical substantiation of its adequacy.



CAROLINA POWER & LIGHT COMPANY
SHEARON HARRIS NUCLEAR POWER PLANT
ISOMETRIC MAIN STEAM/FEEDWATER PIPING
IN PIPE TUNNEL
SCALE: NONE



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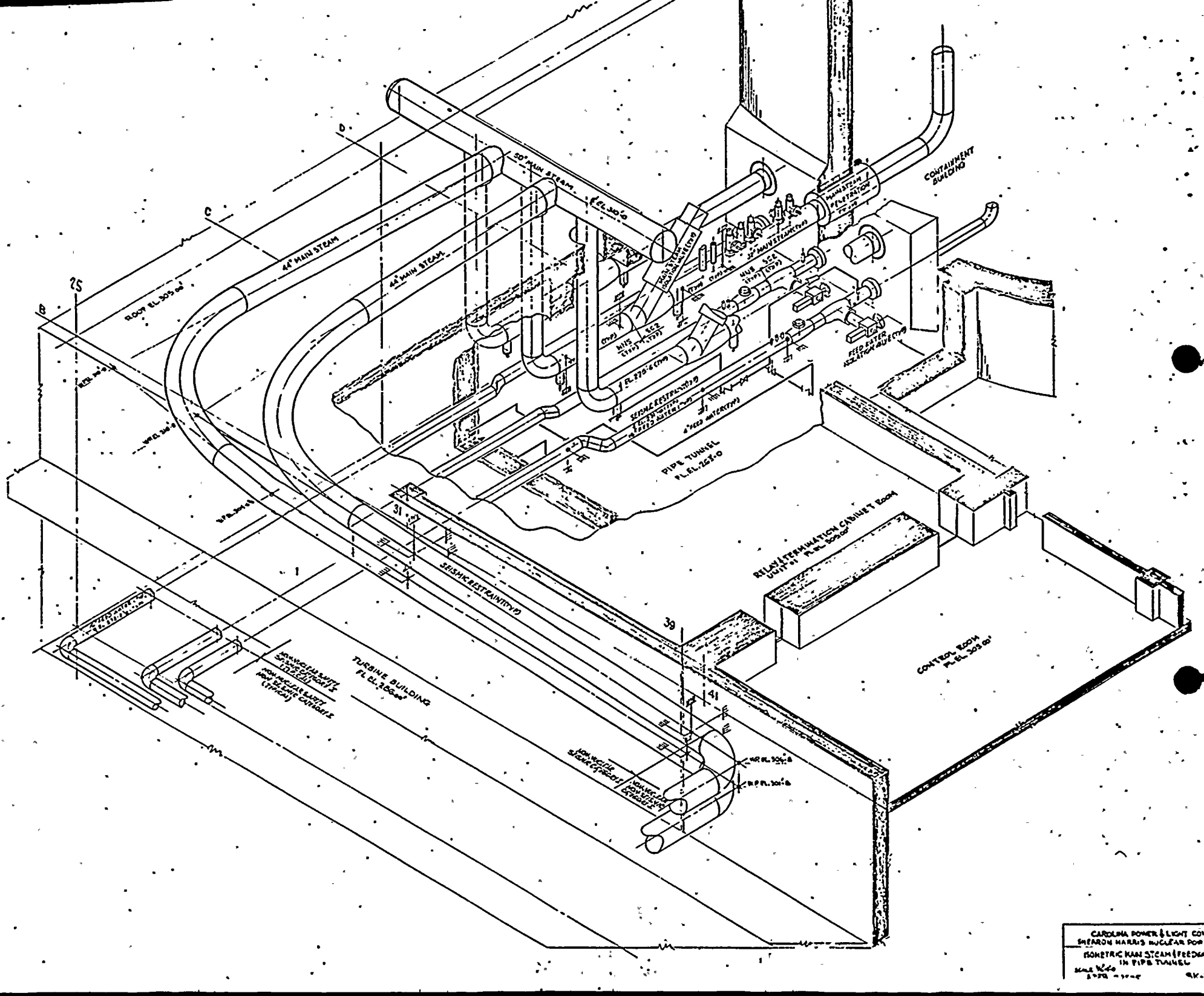
SHEARON HARRIS NUCLEAR POWER PLANT
ISOMETRIC MAIN STEAM & FEEDWATER PIPING IN PIPE TUNNEL



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SHEARON HARRIS NUCLEAR POWER PLAN
ISOMETRIC MAIN STEAM/FEEDWATER PO
IN PIPE TUNNEL

3 m/c for load then Reprod