EQE
ENGINEERING
CONSULTANTS

WALKDOWN PROCEDURE

SEISMIC ADEQUACY REVIEW

OF MSIV LEAKAGE PATH

PIPING, TUBING AND EQUIPMENT

Project Performed For:

Georgia Power Company

Hatch 2

PROCEDURE NO.: 50108-P-001

REVISION NO.: 0

DATE: March 17, 1993

PREPARED BY/DATE: Robert D. Hookway 3/17/93

REVIEWED BY/DATE: Danny C. McManus 3/17/93

APPROVED BY/DATE: Steven P. Harris 3/17/93

TABLE OF REVISIONS

Revision	Description of Revision	Date
0	Original Issue	March 17, 1993

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ATTACHMENTS

1. SCOPE

This procedure describes the requirements for implementation of a data gathering walkdown for seismic adequacy review of the MSIV leakage path piping, tubing, and equipment at the Hatch 2 Nuclear Plant. This review primarily concerns the condenser, main steam piping and main steam branch lines connecting downstream of the MSIV's. The scope includes piping which will provide the alternate path for MSIV leakage to reach the condenser.

The purpose of this activity is to gather and document the information required to verify that pressure and functional integrity of this piping and equipment will be maintained during a seismic event.

All work performed for this walkdown will be done in accordance with this procedure. Document control and maintenance will be in accordance with the latest revision of the EQE Quality Assurance Manual (Reference 1).

2. RESPONSIBILITIES

The project manager shall be responsible for ensuring the implementation of this procedure.

The project manager shall be responsible for ensuring that the seismic review team members are trained in accordance with this procedure prior to performing the walkdown. This will be documented on training verification forms included as Attachment A to this procedure.

The project manager shall be responsible for organizing and directing the walkdowns in accordance with this procedure. The individual seismic review team members shall be responsible for the actual performance of the walkdowns and documentation of the results.

3. DEFINITIONS

A. Seismic Review Team

The Seismic Review Team (SRT) engineers performing the walkdown, evaluation, and analysis must be degreed engineers, with considerable experience in systems, structural and/or earthquake engineering applicable to nuclear power plants. The SRT engineers shall successfully complete a training course on the background for, the philosophy behind, and the use of these seismic evaluation guidelines. At least two SRT engineers shall comprise a walkdown team of which at least one shall be a licensed professional engineer.

As a walkdown group, the SRT shall possess knowledge in the performance of equipment, systems, and structures during strong-motion earthquakes in industrial process and power plants. They shall also understand conduct of nuclear plant walkdowns; nuclear design codes and standards; and seismic design, analysis, and test qualification practices for nuclear power plants.

Each SRT engineer involved in the walkdown or evaluation shall submit a resume of qualifications and experience per Attachment B. In addition, documentation of having completed the required training shall also be on file.

B. Evaluation

An assessment of the seismic adequacy of the as-installed piping, tubing, and equipment shall be performed and documented using Walkdown Data Sheets similar to those shown in Attachment C. The Walkdown Data Sheets were developed based on the observed failure modes of piping and equipment in power and industrial facilities resulting from actual strong motion earthquakes.

C. Outliers

As-installed piping and equipment that does not meet the review criteria contained herein shall be documented as outliers. Outliers may require further detailed evaluation using analysis, seismic experience data, testing or other methods.

4. METHODOLOGY

Very few components of nuclear plant systems are unique to nuclear facilities. Nuclear plant systems include electrical panels and switchgear, piping, tubing, conduit, and many other items that are common components of conventional power plants and industrial facilities. The seismic experience data based methods were developed to address the problem of seismic qualification for equipment which was purchased as common 'off the shelf" items or for commodities which require an upgrade in seismic classification. By reviewing the performance of facilities that contain equipment similar to that found in nuclear plants, conclusions can be drawn about the performance of nuclear plant equipment during and after a design basis earthquake. Typical sources of seismic damage for different classes of equipment and piping have been obtained and are explained in detail in References 2 and 3.

A review of seismic demand must be performed in order to compare the potential performance of equipment at nuclear plants with the actual performance of similar equipment. Seismic experience data base earthquake levels should exceed the nuclear plant design basis earthquake levels at the approximate frequency of vibration of the equipment and at all greater frequencies (also referred to as the frequency range of interest). In Reference 4 a comparison of the free-field ground motion response spectrum for various data base facilities was made with the Hatch 2 Design Basis Earthquake free-field spectra. The Hatch 2 spectra is enveloped by the data base spectrum over the entire frequency range. The seismic demand review in Reference 4 shows the comparison of main steam and condenser piping and equipment at the Hatch 2 plant with similar equipment at data base facilities is appropriate.

The field walkdown performed by the seismic review team will review the installed equipment, piping, and tubing to ensure that it meets restrictions on the use of the earthquake experience data methods. The SRT will perform the following during the field walkdown:

- Review the equipment, piping, and tubing for representation by the EQE earthquake experience data base.
- Review piping for known seismic vulnerabilities such as seismic anchor movement, support failure and falling of non-seismically designed plant features, and proximity impact.
- Check for unusual or non-typical arrangements not covered in the data base.
- Check for adequate anchorage of the components to the building structure.

- Review the area around the components for potential interaction hazards and sources of impact.

The field walkdown review will utilize existing plant documentation as available including:

- System P&IDs identifying piping, equipment, and active component review scope provided by plant personnel (Reference 5).
- Piping isometric drawings when available.
- Piping support sketches and piping layout drawings as needed.

This walkdown review of piping and supports will be primarily visual for qualitative attributes of the systems. Only physical system attributes which may be visually verified with available access, and without system disassembly will be reviewed. Portions of systems which are not readily accessible and are not reviewed will be documented in field walkdown notes. Where indicated, additional details of system design, installation and construction may be collected. Such data collection will be documented in walkdown field notes as appropriate.

5. PROCEDURE

5.1 Equipment, Piping, Tubing and Supports

Equipment, piping and tubing systems in the seismic experience data base have performed very well in earthquakes, even though they were typically designed for deadweight and operating loads only, with little or no consideration for seismic loads (Reference 3). Earthquake experience data base methods provide the basis for review of the main steam piping and equipment.

Application of earthquake experience data for evaluation of piping and equipment must demonstrate: (1) data base representation, and (2) components must be free of known seismic vulnerabilities. Earthquake experience has identified conditions that have resulted in failure of piping and tubing systems and components. The conditions evaluated in this walkdown review include:

- Seismic Anchor Motion
- Weak piping Joints
- Multiple Progressive Piping Support Failure
- Design Attributes for Active Valves
- Seismic Interaction Hazards
- Other Unique Vulnerabilities

Note that piping collapse due to inertia loading has not been demonstrated as a cause of failure. Inertia failures of piping are not credible as long as standard industrial or better design practices are employed. Thus, many attributes of these conditions, that have resulted in past piping failures, can be identified by field walkdown and design document review as opposed to detailed seismic analysis.

5.1.1 Data Base Representation of Piping

Earthquake experience data base representation of the piping and tubing systems, requires demonstration of the following design and installation attributes::

(1) Piping and tubing installations are in conformance with industry-standard practices (e.g., ANSI B31.1 spans for piping, standard industrial supports for piping and tubing).

(2) The piping or tubing system does not display known seismic vulnerabilities or employ seismically sensitive characteristics.

5.1.2 Seismic Anchor Movement

The experience data base includes several instances of seismic damage to piping, tubing and supports that were attributed to seismic anchor movement. Damage was the result of excessive movement of terminal end equipment, differential movement between supports in adjacent buildings, and excessive movements imposed on branch lines by flexible headers.

As a result of these instances of damage, the following attributes must be evaluated by the seismic review team during their piping walkdown:

- System configurations at building joints and between buildings should have adequate flexibility to accommodate seismically-induced differential building movement.

- Fittings which can be adversely affected by seismically-induced differential movement (e.g., bellows) should be evaluated for adequate flexibility. This includes conditions with rigid connections at both structures.

- Piping attached to unanchored or poorly anchored equipment should be considered an outlier. Stiff piping attached to flexible equipment should be evaluated to verify that the piping will not act as an equipment anchorage..

- Conditions where stiffly supported branch lines are attached to flexibly-supported (e.g., rod-hung) mainlines or headers should be considered as potential outliers (see Figure 5-1). The seismic review team should evaluate this configuration for potential damage due to seismically-induced differential movement.

A review was performed of the Turbine Building, Control Building and Reactor Building Response Spectra of Record and of the "best estimate" Control Building soil structure interaction analysis. Based on this review, a conservative estimate of the maximum expected relative displacements between structures at the elevations below 164 feet was established at 0.25 inches. This relative displacement value shall be used for screening evaluation of structural induced differential displacements.

Additionally, maximum pseudo-spectral displacements for very low frequency systems are in the order of 6 inches. These values may be used for screening evaluation of differential displacements between very flexible piping systems and branch lines attached to structure as well as potential proximity impact conditions. Screening estimates of relative displacements for systems with frequencies in the 1.5 to 2 ertz range of the soil-Turbine Building structure system fundamental response are in the order of 4 inches.

5.1.3 Weak Piping Joints

Threaded piping connections, unsupported bellows or expansion joints and mechanical joints (e.g., victaulic type couplings, bell and spigot joints) have been observed to be more vulnerable to seismic loads than welded piping joints. The SRT should closely review piping that is not well supported and contains weak or brittle joints. Bolted flange connections have performed well and are not considered to be weak or vulnerable to seismic loads

5.1.4 Piping Support Failure

The SRT should review the piping and tubing systems for conditions which could result in support failure. Support failure usually does not result in piping failure unless multiple supports fail. Supports types which have demonstrated poor seismic performance include:

- Bracket or stanchion supports that could allow pipe to slide off and fall.
- Supports attached by beam clamps without restraining straps.
- Short threaded rods that are fixed against rotation (Figure 5-2). These are vulnerable to low cycle fatigue.
- Other significant issues such as damaged, deteriorated or altered parts resulting in non-ductile behavior or significant weakness in the load path.

Rod hangers that act as pinned members and welded structural steel pipe supports have not been observed in seismic events to be particularly vulnerable unless there are major design or construction flaws in their attachment to the supporting structure.

5.1.5 Active Valves

Screening guidelines for valves which are required to function to establish pressure boundaries are provided. Guidelines are included for air-operated diaphragm valves, spring-operated pressure relief valves and piston-operated valves of light-weight construction in Figure 5-3. Screening guidelines for motor-operated valves and substantial piston-operated valves are provided in Figure 5-4. Evaluation of active valves should include review of all power and control utilities to insure adequate slack is provided to accommodate anticipated seismic motions. Supports located on the valve operator should be accompanied by supports on the valve body or piping adjacent to the valve body. The valve body and operator should be supported by a common structure to prevent differential displacement. Piping or tubing less than 1 inch in diameter with in-line eccentric masses such as motor or air operated valves should be supported at or near the valve.

5.1.6 Other Potential Vulnerabilities

Piping and tubing may also be susceptible to seismic damage if the following conditions exist.

- Piping with inadequately supported expansion joints.
- Piping with dead weight support spacing greatly in excess of ANSI/ ASME B31.1 suggested spans (Table 5-1). Tubing with excessive sagging or support spans greatly in excess of 6'-0".
- Heavy in-line masses (e.g., accumulators, filters, strainers).
- Piping constructed of non-ductile materials such as cast iron or PVC.

- Non-standard fittings, such as mitered elbows or unreinforced branch connections, or unusual attachments that could cause excessive localized stresses.

- Presence of severe corrosion.

5.2 Anchorage

Anchorage of equipment and supports shall be checked for adequacy based on visual review. Sufficient details of equipment anchorage shall be documented in the walkdown notes to allow further analytical review.

5.2.1 Expansion Anchor Bolts Inspection Guidelines

Visual review of expansion anchor bolts should consider the following:

- A washer is installed between the equipment base and the bolt head or nut. If the equipment base is made of structural steel plate, then a washer is not needed if the bolt-hole diameter in the structural steel plate appears to be no greater than the nominal bolt diameter plus 1/16 inch.

- The concrete is sound with no significant cracks in the vicinity of the anchor bolt.

- The gap between the equipment base and the concrete surface is less than or equal to 1/4 inch.

- The bolt spacing is greater than about 10 times the bolt diameter.

- The distance between the bolt and any free concrete surface is greater than approximately 10 times the bolt diameter.

- The bolt is installed with at least the minimum embedment.

For shell type anchors, the minimum embedment is ensured if the shell does not protrude above the surface of the concrete. For non-shell type anchors, the minimum embedment is ensured if the projection of the bolt above the surface conforms with the following:

Bolt Diameter (Inches)	Allow. Bolt Projection (Inches)
3/8	1/2
1/2	5/8
5/8	7/8
3/4	1-1/2
1	1-1/2

5.2.2 Cast-In-Place Anchor Bolts Inspection Guidelines

Cast-in-place bolts shall be evaluated in the plant to ensure that proper installation has been obtained. This visual review shall include the following:

- A washer is installed between the equipment base and the bolt head or nut. If the equipment base is made of structural steel plate, then a washer is not needed if the bolt-hole diameter in the structural steel plate appears to be no greater than the nominal bolt diameter plus 1/16 inch.
- The concrete is sound with no significant cracks in the vicinity of the anchor bolt.
- The gap between the equipment base and the concrete surface is less than or equal to 1/4 inch.
- The bolt spacing is greater than about 10 times the bolt diameter.
- The distance between the bolt and any free concrete surface is greater than approximately 10 times the bolt diameter.

5.2.3 Welded Anchorages Inspection Guidelines

Welded anchorages shall be evaluated in the plant to ensure that proper installation has been obtained. This visual review shall include the following:

- Check for weld burn-through on thin sections.
- Limit weld thickness, t, to thickness of thinner part being connected.
- If plug welds are found and required to take tension loads, they are to be considered as an outlier.

5.3 Equipment Verification

The equipment which requires seismic verification includes the main condenser and equipment within the pressure boundary of the piping and tubing being reviewed. This includes equipment which acts as terminal anchor points, heat exchangers, transmitters, gauges and measuring instrumentation. This type of equipment shall be reviewed using the following general procedure:

- Establish the functional requirements for the component being evaluated. Required function may be pressure boundary retention, active change of state, structural integrity, etc. This determination will be based on the scope definition provided in Reference 5.

- Review the equipment to establish representation in the earthquake experience data base. This includes a check that equipment is typical of industrial and power applications.

- Review the equipment for know failure modes and sources of seismic damage which may affect the functional requirement established for the equipment and subcomponents.

- Check for unusual or non typical arrangements of the devices within the equipment or of items external to the equipment.

- Assess the anchorage and presence of an adequate load path. Where judged appropriate, prepare field data on component anchorage.

- Check for seismic interaction hazards (such as proximity impact, failure and falling of components and unreinforced block walls) in the vicinity of the equipment.

The details of the procedure vary according to the type of equipment and location within the plant. The extent of review and information gathering for active components, pressure boundary components and equipment required for structural integrity shall be determined based on the judgment and experience of the SRT.

TABLE 5-1

NOMINAL SUGGESTED SPANS PER ANSI B31.1

Nominal Pipe Size (in.)	Outside Pipe Diameter (in.)	Nominal Suggested Maximum Span (ft) Water Service	Steam, Gas or Air Service
1	1.315	7	9
2	2.375	10	13
3	3.500	12	15
4	4.500	14	17
6	6.625	17	21
8	8.625	19	24
10	10.75	21	26
12	12.75	23	30
16	16.00	27	35
20	20.00	30	39
24	24.00	32	42
30	30.00	33	44

Note: Does not apply where there are concentrated loads between supports such as flanges, valves, etc.

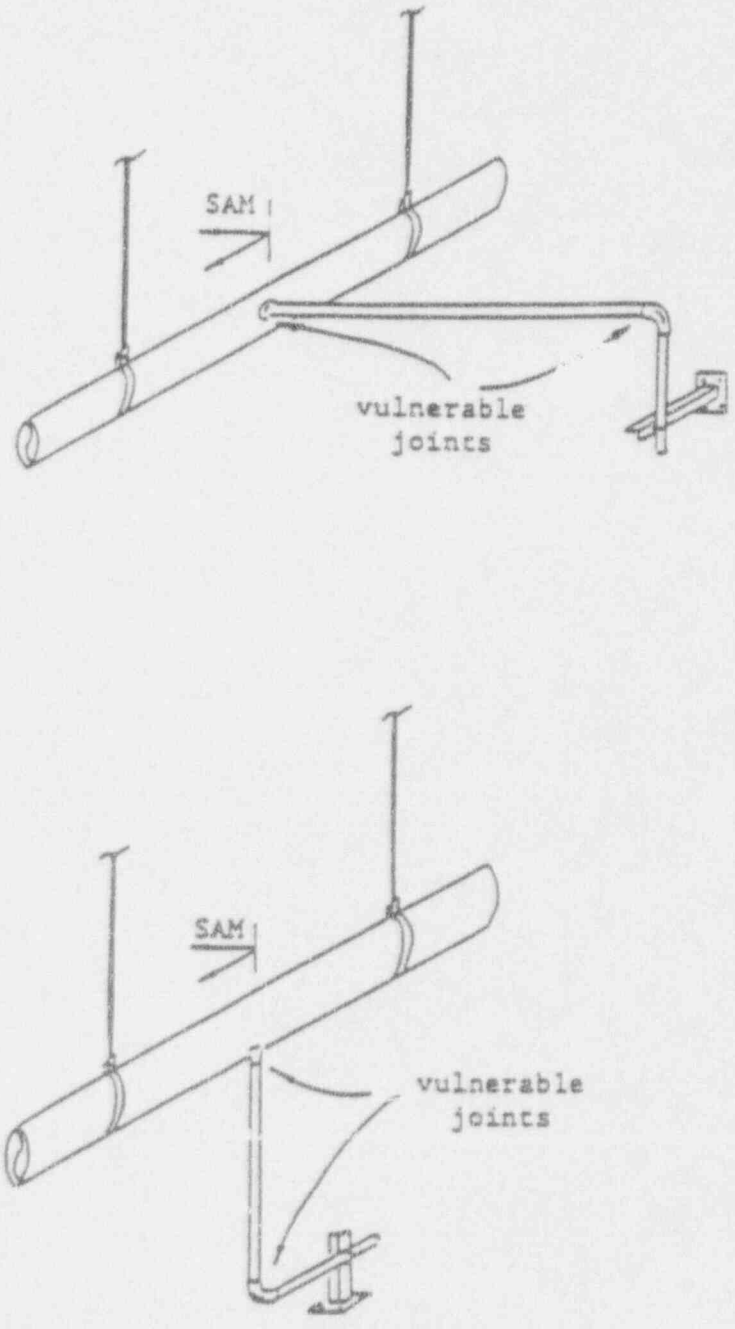
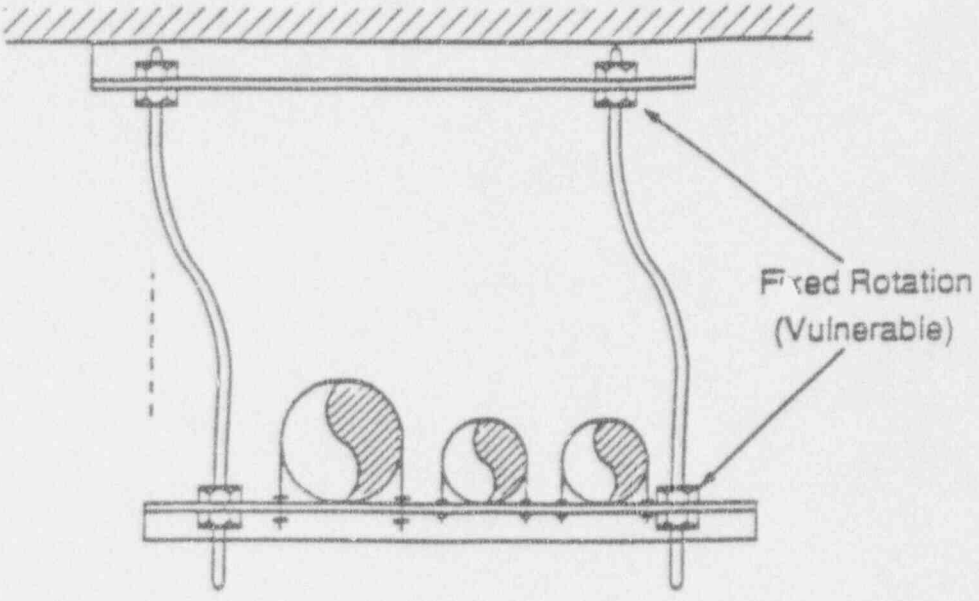
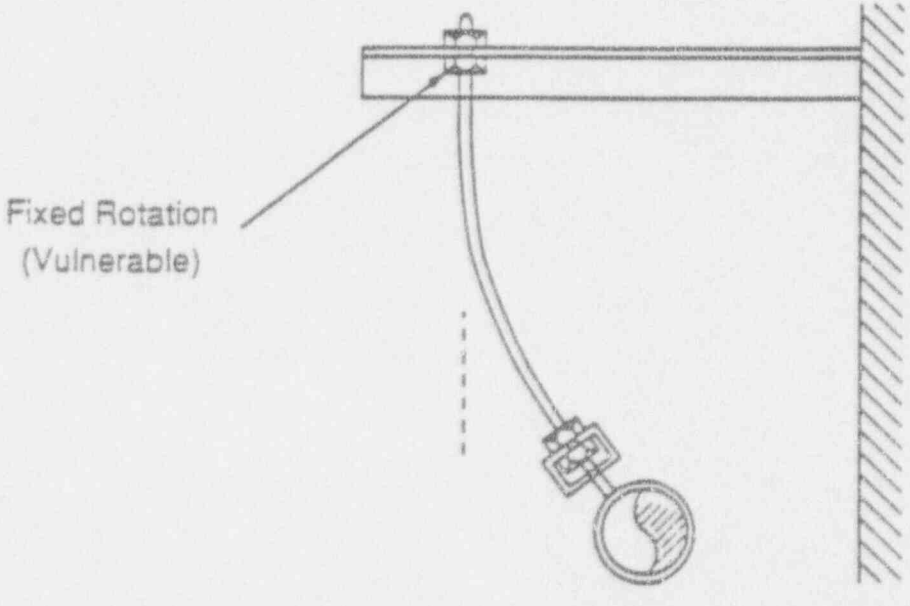


Figure 5-1: Example seismic anchor movement hazards to branch lines of large flexible header lines.



"Fixed-Fixed" Rod



"Fixed-Free" Rod

Figure 5-2: Deflected shapes of "fixed-fixed" and "fixed-free" rod hanger piping supports showing seismically vulnerable locations.

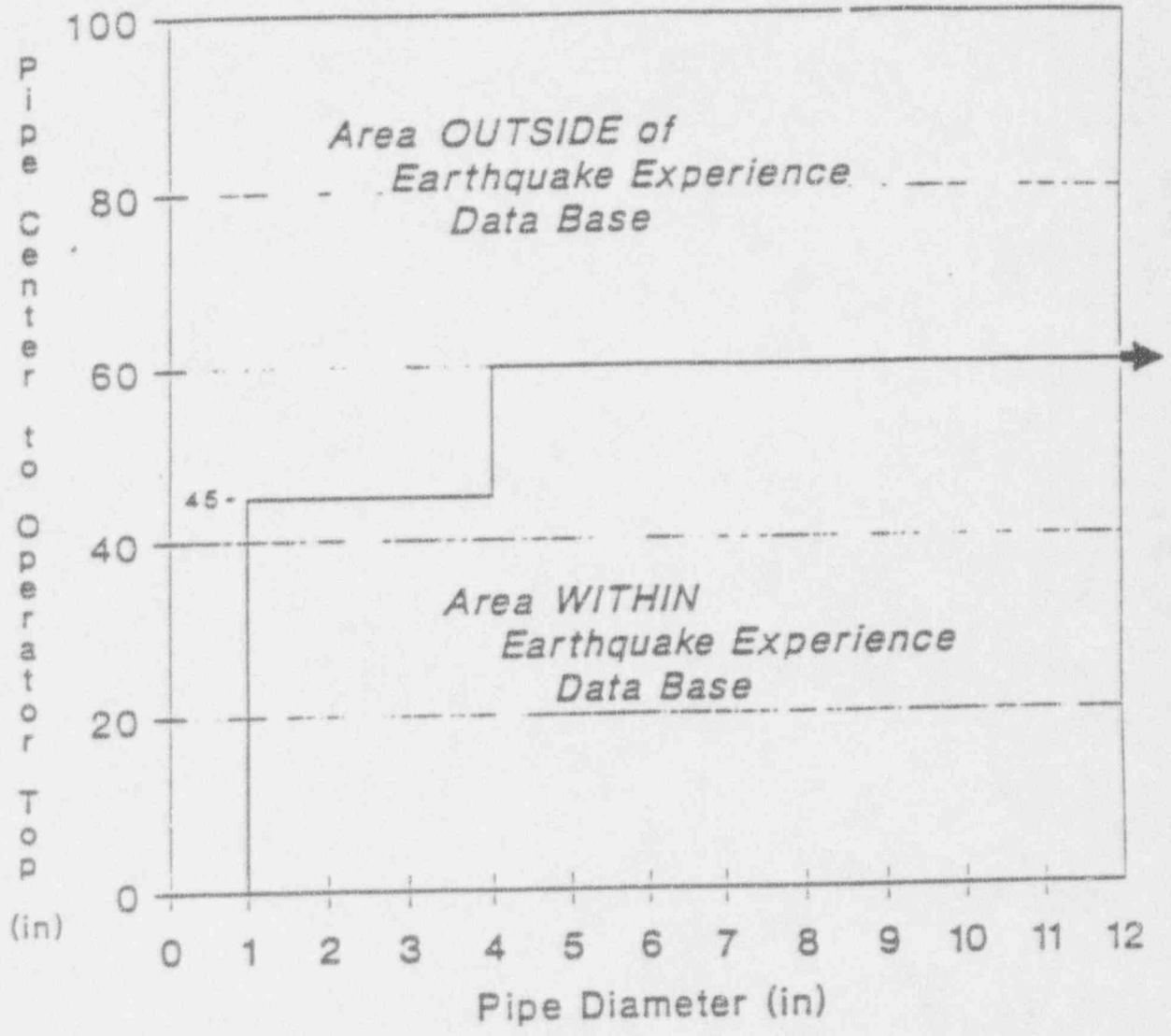
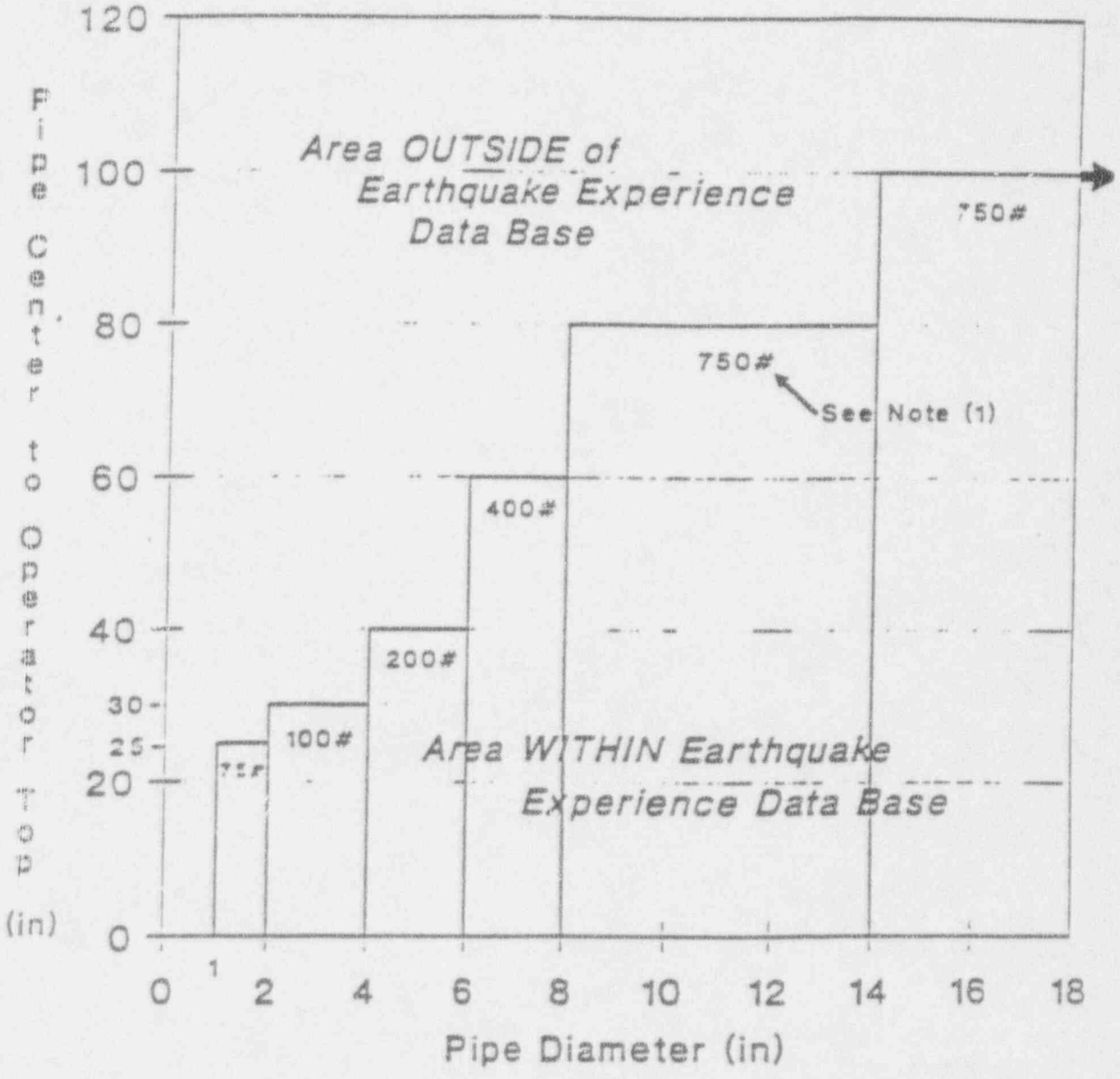


Figure 5-3: Limits of experience data for air-operated diaphragm valves, spring-operated pressure relief valves and piston-operated valves of light-weight construction.



(1) Approximate Maximum Operator Weights Given for Various Ranges of Pipe Diameter

Figure 5-4: Guidelines for motor-operated valves and substantial piston-operated valves.

6. SEISMIC INTERACTION REVIEW

The seismic interaction review is a visual inspection of structures, piping, or equipment adjacent to the components under evaluation. The seismic interaction review identifies seismically induced failures or displacements of any adjacent structures, piping, or equipment that could adversely affect the pressure integrity or required function of the system and components under consideration.

The review team should identify and evaluate all credible and significant interaction hazards in the immediate vicinity of the item being evaluated. Evaluation of interaction effects shall consider detrimental effects on the capability of equipment and systems to function, taking into account equipment attributes such as mass, size, support configuration, and material hardness in conjunction with the physical relationships of interacting equipment, systems, and structures. In the evaluation of proximity effects and overhead or adjacent equipment failure and interactions, the effects of intervening structures and equipment which would preclude impact should be considered.

Damage from interaction in earthquakes results from unusual circumstances or from generic, simple details that allow interactions to occur. In the interaction review, the SRT should look for (1) unusual impact situations, and (2) lack of proper anchorage or bracing of adjacent equipment.

The review team should identify and evaluate all credible interactions that may result in damage to pressure boundary components and result in loss of function of the piping, tubing and equipment under review.

7. REQUIRED DOCUMENTATION

The walkdown shall be documented by notes and observations recorded on the Walkdown Data Sheets similar to those shown in Attachment C. The Walkdown Data Sheets shall be signed and dated by all members of the SRT.

The type of documentation may be adapted to suit field conditions, based on the experience and judgment of the SRT.

Conditions which do not conform with the screening guidelines or which are judged by the SRT to require further review shall be documented on Outlier Data Sheets from Attachment C. Photographs may be taken for information only.

The qualification and training of the individual seismic review team members shall be documented on Attachments A and B.

8. QUALITY ASSURANCE

All work performed for this walkdown will be done in accordance with this procedure. Document control and maintenance will be in accordance with the latest revision of the EQE Quality Assurance Manual (Reference 1).

9. REFERENCES

1. EQE QAM, "Quality Assurance Manual," EQE Engineering Consultants, Revision 2, November 15, 1991.

2. EPRI Report NP-7149, "Summary of the Seismic Adequacy of Twenty Classes of Equipment Required for Safe Shutdown of Nuclear Plants," Electric Power Research Institute, Palo Alto, CA, prepared by EQE Inc., March 1991.

3. EPRI Report RP-2635-1, "Piping Seismic Adequacy Criteria Recommendation Based on Performance During and After Earthquakes," 2 Volumes. Prepared by EQE, Inc., February 1987.

4. BWR Owner's Group Report NEDC-31858P, Appendix D, "Performance of Condensers," Prepared by EQE, Inc., Revision 0, September 1990.

5. Hatch 2, MSIV Boundary Description P&IDs.

ATTACHMENT A
TRAINING VERIFICATION SHEET

EQE
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TRAINING SESSIONS RECORDS

Description of Session Topic(s):

Instructor:

DESIGNATED ATTENDEES

Print or TypeName	Initial*	Signature*	Date

*My signature/initials attest to my presence during the prescribed training session and general understanding of the subject matter. As of now, any questions I might have had regarding session subject matter have been answered to my satisfaction.

ATTACHMENT B

SEISMIC REVIEW TEAM MEMBER QUALIFICATION SHEET

Seismic Review Team Qualification Sheet

1.0 Name: _____

2.0 Company: _____

3.0 Position: _____

4.0 Education: _____

5.0 Professional engineers registration: _____

6.0 Engineering discipline: _____

7.0 Areas of expertise

	Experience	Years Experience
7.1	Knowledge of failure modes	_____
7.2	Knowledge of nuclear design STDs & nuclear seismic design practice	_____
7.3	Seismic capability evaluations	_____
7.4	Knowledge of equipment	
	- Nuclear	_____
	- Heavy industrial process plants	_____
	- Fossil fuel power plants	_____
7.5	Conduit/Cable tray evaluations	_____

8.0 Training courses: _____

9.0 Other qualifications: _____

_____

Signature _____ Date _____

ATTACHMENT C

WALKDOWN DATA SHEETS

WALKDOWN DATA SHEET

SHEET __ OF __

System _____

Equip. Class Piping and Tubing Systems Line Identifier _____

_____

Bldg. _____ Floor El. _____

P&ID No. _____ Spec. No. _____

Isometric No. _____

_____

Pipe/Tubing O.D. _____ Wall Thickness _____

Material _____

Insulation Type/Thickness _____

Piping System Boundary

Description _____

_____

_____

Functionality Requirement

1.	Pressure Boundary Integrity	Y	N	N/A

Review Criteria - Piping and Tubing

1.	No visible damage	Y	N	U	N/A
2.	No significant visible rust/corrosion deterioration	Y	N	U	N/A
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	Y	N	U	N/A
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing)	Y	N	U	N/A
5.	No unusual pipe or tubing attachments	Y	N	U	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	Y	N	U	N.A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement	Y	N	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	Y	N	U	N/A
9.	No stiff branch piping attached to the main line with potentially significant movements	Y	N	U	N/A
10.	No excessive sagging, crimping or damage to tubing	Y	N	U	N/A
11.	No large eccentric masses	Y	N	U	N/A
12.	No other concerns (if no, comment on separate sheets and attach)	Y	N	U	

Are the criteria met? Y N U

WALKDOWN DATA SHEET

SHEET __ OF __

System _____ Equip. Class Piping and Tubing Systems

Line Identifier _____

Review Criteria - Supports

1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short fixed end threaded rods	Y	N	U	N/A
2.	No visible rust/corrosion deterioration	Y	N	U	N/A
3.	No unusual design	Y	N	U	N/A
4.	No customized parts used in place of catalog parts, which appear inadequate	Y	N	U	N/A
5.	Free of support details which appear to have been inappropriately altered	Y	N	U	N/A
6.	No visible damage	Y	N	U	N/A
7.	No inappropriate support settings (bottomed spring hangers, etc.)	Y	N	U	N/A
8.	Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.)	Y	N	U	N/A
9.	Does the load path appear adequate	Y	N	U	N/A
10.	No additional concerns (If no, document comments on separate sheet and attach)	Y	N		

Are the above criteria met? Y N U

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3.	No other concerns	Y	N	U	N/A

Is equipment free of interaction effects? Y N U

Is the piping/tubing system seismically adequate? Y N U

Comments _____

_____

_____

_____

Reference Photos: Roll _____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

System _____ Equip. Class Piping and Tubing Systems

Line Identifier _____

Comments/Outliers _____

WALKDOWN DATA SHEET

SHEET __ OF __

System _____ Equip. Class Piping and Tubing Systems

Line Identifier _____

Comments/Outliers _____

WALKDOWN DATA SHEET

SHEET __ OF __

System _____ P&ID No. _____

Valve. ID No. _____ Equip. Class Active Valves

Valve Description _____ Isometric No. _____

Valve Location: Bldg. _____ Floor El. _____ Room, Row/Col _____

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1. Valve state change required	Y	N	U	

Review Criteria

1. Does valve operator meet pipe centerline dimension restriction	Y	N	U	N/A
2. Do valve power and control utilities have adequate slack	Y	N	U	N/A
3. Valve operator is not supported independently of pipe	Y	N	U	N/A
Are the criteria met?	Y	N	U	

Interaction Effects

1. Vulnerable valve components free from impact by nearby equipment or structures	Y	N	U	N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3. Are any required electrical controls free of water spray interactions	Y	N	U	N/A
4. No other concerns	Y	N		N/A
Is equipment free of interaction effects?	Y	N	U	
Is equipment seismically adequate?	Y	N	U	

Comments _____

_____

_____

_____

_____

Reference Photos: Roll ____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

System _____

Valve. ID No. _____ Equip. Class Active Valves

Comments/Outliers _____

WALKDOWN DATA SHEET

SHEET __ OF __

Pump. ID No. _____ Equip. Class Pump

Pump Description _____

Pump Location: Bldg. _____ Floor El. _____ Room, Row/Col. _____

Functionality Requirement

1.	Function required	Y	N	U

Review Criteria

1.	Is pump of good seismic design for function above(driver/pump on common base, shaft restraint, nozzle loadings, utility line slack etc.)	Y	N	U	N/A
2.	No other concerns	Y	N		

Are the criteria met? Y N U N/A

Interaction Effects

1.	Vulnerable pump components free from impact by nearby equipment or structures	Y	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3.	Are any required electrical controls free of water spray interactions	Y	N	U	N/A
4.	No other concerns	Y	N	U	

Is equipment free of interaction effects? Y N U N/A

Anchorage

1.	Does strength appear adequate	Y	N	U	N/A
2.	No vibration isolators	Y	N	U	N/A
3.	Does load path appear adequate	Y	N	U	N/A
4.	No other concerns	Y	N		
5.	Prepare and attach a sketch.	Y	N		

Are anchorages adequate based on judgement? Y N U

Comments _____

_____

_____

_____

Reference Photos: Roll ____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

Support/Anchorage Sketch _____

Equip. ID No. _____ Equip. Class _____

Equipment Description _____

Equipment Location: Bldg. _____ Floor El. _____ Room, Row/Col. _____

Sketch By: _____ Date: _____

Verified By: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

Vessel ID No. _____ Equip. Class Horizontal Vessels

Vessel Description _____

Vessel Location: Bldg. _____ Floor El. _____ Room, Row/Col _____

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1.	Pressure Boundary Integrity	Y	N	U	

Review Criteria

1.	Is vessel of good seismic design for function above (Vessel to support connections, support system design, differential story support etc.)	Y	N	U	N/A
2.	No other vessel concerns	Y	N		
	Are the criteria met?	Y	N	U	N/A

Anchorage

1.	Does strength appear adequate	Y	N	U	N/A
2.	Does load path appear adequate	Y	N	U	N/A
3.	No other concerns	Y	N		N/A
4.	Prepare and attach a sketch	Y	N		
	Are anchorages adequate based on judgement	Y	N	U	

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3.	No other concerns	Y	N		
	Is equipment free of interaction effects?	Y	N	U	

Comments _____

_____

_____

Reference Photos: Roll ____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

Cabinet ID No. _____ Equip. Class Cabinets

Cabinet Description _____

Cabinet Location: Bldg. _____ Floor El. _____ Room, Row/Col _____

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1.	Function Required	Y	N	U	

Review Criteria

1.	Is cabinet of good seismic design for function above (mounting details, load paths, cabinet cut outs, cabinet stiffness, etc.)	Y	N	U	N/A
2.	No other cabinet concerns	Y	N		
	Are the criteria met?	Y	N	U	N/A

Anchorage

1.	Does strength appear adequate	Y	N	U	N/A
2.	Does stiffness appear adequate	Y	N	U	N/A
3.	No other concerns	Y	N		N/A
4.	Prepare and attach a sketch	Y	N		
	Are anchorages adequate based on judgement	Y	N	U	

Interaction Effects

1.	Vulnerable components free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3.	No other concerns	Y	N		
	Is equipment free of interaction effects?	Y	N	U	

Comments _____

_____

_____

Reference Photos: Roll ____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

Equipment ID No. _____ Equip. Class _____

Equipment Description _____

Equipment Location: Bldg. _____ Floor El. _____ Room, Row/Col _____

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1.	Function Required(Specify)_____	Y	N	U	

Review Criteria

1.	Is component of good seismic design for function above	Y	N	U	N/A
	(specify)_____				
	Are the criteria met?	Y	N	U	N/A

Anchorage

1.	Does strength appear adequate	Y	N	U	N/A
2.	Does stiffness appear adequate	Y	N	U	N/A
3.	No other concerns	Y	N		N/A
4.	Prepare and attach a sketch	Y	N		
	Are anchorages adequate based on judgement	Y	N	U	

Interaction Effects

1.	Vulnerable components free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A
3.	No other concerns	Y	N		
	Is equipment free of interaction effects?	Y	N	U	

Comments _____

_____

_____

Reference Photos: Roll ____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: _____

Evaluated by: _____ Date: _____

WALKDOWN DATA SHEET

SHEET __ OF __

3

System Main Steam

Equip. Class Piping and Tubing Systems Line Identifier Main Steam drain to condenser

Bldg. Turbine Building Floor El. 112'-3, 130'-0, & 147'-0"

P&ID No. H-21031(H-8), H-26000(E11) Spec. No. 2N22-EEE

Isometric No. 2N22-162, 2N22-163, 2N22-164, & 2N22-165

Pipe/Tubing O.D. 3" nominal Wall Thickness .343'

Material A 106 Gr B SMLS

Insulation Type/Thickness (insulated)

Piping System Boundary

Description 3"Ø pipe from (2N61-8001B) condenser connection #51 to RB#2 penetration (running to MO-F021) which is located at Col. line RA, 3'-6" N. of T15 @ EL 149'-10¼". Subject pipe is mostly supports by rods.

Functionality Requirement

1.	Pressure Boundary Integrity	(Y)	N		N/A

Review Criteria - Piping and Tubing

1.	No visible damage	(Y)	N	U	N/A
2.	No significant visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	(Y)	N	U	N/A
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) → See Comment #1.	(Y)	N	U	N/A
5.	No unusual pipe or tubing attachments	(Y)	N	U	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	(Y)	N	U	N/A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement (see comment 2)	Y	(N)	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	(Y)	N	U	N/A
9.	No stiff branch piping attached to the main line with potentially significant movements	(Y)	N	U	N/A
10.	No excessive sagging, crimping or damage to tubing	(Y)	N	U	N/A
11.	No large eccentric masses	(Y)	N	U	N/A
12.	No other concerns (if no, comment on separate sheets and attach)	(Y)	N	U	

Are the criteria met? Y (N) U

WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier Main Steam drain to condenser

Review Criteria - Supports

1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short fixed end threaded rods	(Y)	N	U	N/A
2.	No visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No unusual design	(Y)	N	U	N/A
4.	No customized parts used in place of catalog parts, which appear inadequate	(Y)	N	U	N/A
5.	Free of support details which appear to have been inappropriately altered	(Y)	N	U	N/A
6.	No visible damage	(Y)	N	U	N/A
7.	No inappropriate suppor: settings (bottomed spring hangers, etc.)	(Y)	N	U	N/A
8.	Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.) ← (see outlier # 1)	Y	N	(U)	N/A
9.	Does the load path appear adequate	(Y)	N	U	N/A
10.	No additional concerns (If no, document comments on separate sheet and attach)	(Y)	N		

Are the above criteria met? (Pending on # 8) Y N (U)

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc. (see comment # 3)	(Y)	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A
3.	No other concerns	(Y)	N	U	N/A

Is equipment free of interaction effects? (Y) N U

Is the piping/tubing system seismically adequate? (Y) N U

Comments All interactions are non-damaging types.

Reference Photos: Roll ____ Frames ____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Danny C. McManus Date: 3-20-93

Evaluated by: Stanley P. Harris Date: 3-20-93

WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier: Main steam drain to condenser

Comments/Outliers Comment #1: There are cases where the spans exceeded the ANSI B31.1 spans, for example, there are 2 cases on isometric 2N22-162 where the spans of ~ 14'-6 & 15'-6" exceed the B31.1 span of 12'-0. This is classified as acceptable-as-is since the pressure and/or thermal stress are very low (not at elbow and is vented to the condenser).

Outlier #2: This piping is mostly supported by rods; Drain line penetrates T.B. at Column T-14 in structural joint - See Photo 3-1

Outlier #1: There was an anchor bolt spacing violation. This needs further evaluation. See FIGURE #1 for additional details & Photo 3-2.

Comment #3: There are many interactions between the subject pipe and other P.S. rods as well as other pipes of similar diameter. These are judged acceptable-as-is since they are non-damaging type interactions.

To name a few as follows:

(1) Subject pipe hits duct support rods. Photo 3-3

(2) Other pipes hit subject pipe support's rods.

(3) Subject 3"ø pipe interacts with 2-2"ø and 1-1½" pipes. Photo 3-4

(4) Subject 3"ø pipe touches Clevis assembly of a (Photo 3-5 small bore pipe. This is not a concern since this occurs at a hard point (support) on subject pipe.

(5) On riser @ condenser subject pipe interacts will another pipe of similar diameter. Photo 3-6

WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier Main steam drain to condenser

Comments The FIGURE below is for outlier #1.

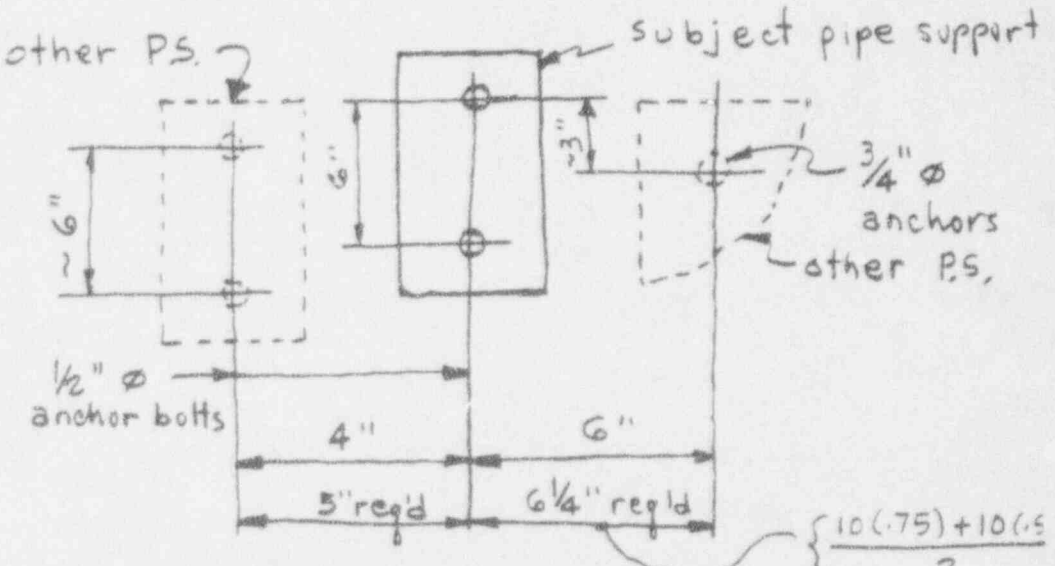


FIGURE 1
(on ceiling)

WALKDOWN DATA SHEET

SHEET 1 OF 5

System 6" HPCI FROM TO STEAM LINE FROM [illegible]

Equip. Class Piping and Tubing Systems Line Identifier 2N11-6"EEE

Bldg. [illegible] Floor El. 150 - 120

P&ID No. [illegible] Spec. No. 6" EEE

Isometric No. [illegible]

Pipe/Tubing O.D. [illegible] Wall Thickness [illegible]

Material [illegible]

Insulation Type/Thickness NC

Piping System Boundary

Description FROM [illegible] TO [illegible] VALVES 2N11-F002 & F, FROM [illegible] TO [illegible]

Functionality Requirement

1.	Pressure Boundary Integrity	(Y)	N		N/A

Review Criteria - Piping and Tubing

1.	No visible damage	(Y)	N	U	N/A	
2.	No significant visible rust/corrosion deterioration	(Y)	N	U	N/A	
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	(Y)	N	U	N/A	
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing)	(Y)	N	U	N/A	(1)
5.	No unusual pipe or tubing attachments	(Y)	N	U	N/A	
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	(Y)	N	U	N/A	
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement	(Y)	N	U	N/A	
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	(Y)	N	U	N/A	
9.	No stiff branch piping attached to the main line with potentially significant movements	(Y)	N	U	N/A	
10.	No excessive sagging, crimping or damage to tubing	(Y)	N	U	N/A	
11.	No large eccentric masses	(Y)	N	U	N/A	
12.	No other concerns (if no, comment on separate sheets and attach)	(Y)	N	U		

Are the criteria met? (Y) N U

 4

WALKDOWN DATA SHEET

SHEET 2 OF 5

System 6" HP Steam to STAE Equip. Class Piping and Tubing Systems

Line Identifier _____

Review Criteria - Supports

1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short fixed end threaded rods	Y	N	U	N/A	(2)
2.	No visible rust/corrosion deterioration	Y	N	U	N/A	
3.	No unusual design	Y	N	U	N/A	
4.	No customized parts used in place of catalog parts, which appear inadequate	Y	N	U	N/A	
5.	Free of support details which appear to have been inappropriately altered	Y	N	U	N/A	
6.	No visible damage	Y	N	U	N/A	(3)
7.	No inappropriate support settings (bottomed spring hangers, etc.)	Y	N	U	N/A	
8.	Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.)	Y	N	U	N/A	
9.	Does the load path appear adequate	Y	N	U	N/A	
10.	No additional concerns (If no, document comments on separate sheet and attach)	Y	N			

Are the above criteria met? Y N U

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A	(4, 5)
2.	No collapse of overhead equipment, distribution systems, or masonry walls	Y	N	U	N/A	(6)
3.	No other concerns	Y	N	U	N/A	

Is equipment free of interaction effects? Y N U

Is the piping/tubing system seismically adequate? Y N U

Comments [illegible] (see Comment 6)

Reference Photos: Roll _____ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Steven P [illegible] Date: 3/20/93

Evaluated by: [illegible] Date: 3/20/93

4

WALKDOWN DATA SHEET

SHEET 3 OF 5

System [illegible] Equip Class Piping and Tubing Systems

Line Identifier 2N11-2"EEE

Comments/Outliers

Comment 1: Average span is [illegible] ANSI B31.1 is 21' for 2" steam [illegible].

Outlier 2: Spring support at elbow above vertical riser (Elev. 142'3", 3' east of C.L. T1 [illegible] has no travel [illegible]. The pipe could [illegible] PHOTO 4-1 & 4-3

Outlier 3: Box support near elbow appears to have anchors pulled out by thermal. Located about 4' east of CL. T2, 10'6" South of C.L. T13, elev. 157" 10¼" (about 5' from 2N11FO5 MOV).

Outlier 4: Potentially damaging interaction between drain line and casing (see photo 4-5 and in package 13 (1" Drain line from STAE supply to 12" HF Drain Line - old.)

4

WALKDOWN DATA SHEET

SHEET 4 OF 5

System HP Steam to SJAE Equip. Class Piping and Tubing Systems

Line Identifier 2N11-6" FFE

Comments/Outliers

Comment 5: Interaction noted with valve 2N33-F009 — non-damaging.

Comment 6: 8" Fire Protection line located above line, see Comment 3, package 1" run is from SJAE Supply to 12" - FP13, PHOTO 4-2

Comment 7: Portion of the system not inspectable

- run enters west elbow 11'9" east of C.L. T1, 2'6" south of C.L. T16, Elev. 157'5½" allows western wall view to EW run at C.L. T15 due to access
- along EW run at CL T15 due to access and congestion.

X

WALKDOWN DATA SHEET

SHEET 1 OF 1

System SJAE P&ID No. H-21056

Valve. ID No. 2N11-F009A-009A,-049A Equip. Class Active Valves

Valve Description PRESS. CONTROL VLV Isometric No. H-21137

Valve Location: Bldg. TURBINE BLDG Floor El. 112' Room, Row/Col SJAE Rm 4

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1. Valve state change required	(Y)	N	U	

Review Criteria

1. Does valve operator meet pipe centerline dimension restriction	(Y)	N	U	N/A
2. Do valve power and control utilities have adequate slack	(Y)	N	U	N/A
3. Valve operator is not supported independently of pipe	(Y)	N	U	N/A
Are the criteria met?	(Y)	N	U	

Interaction Effects

1. Vulnerable valve components free from impact by nearby equipment or structures	(Y)	N	U	N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A
3. Are any required electrical controls free of water spray interactions	(Y)	N	U	N/A
4. No other concerns	(Y)	N		N/A
Is equipment free of interaction effects?	(Y)	N	U	
Is equipment seismically adequate?	(Y)	N	U	

Comments _____

Reference Photos: Roll ___ Frames ___

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Robert L. Hathaway Date: 3/24/93

Evaluated by: Danny C. McManus Date: 3/24/93

4

WALKDOWN DATA SHEET

SHEET 1 OF 2

System SJAE P&ID No. H-21056

Valve ID No. 2N11-F008B, F009B, F044B Equip. Class Active Valves

Valve Description PRESS. CONTROL VLV Isometric No. H-21137

Valve Location: Bldg. TURBINE Floor El. 112' Room, Row/Col SJAE Rm B

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1. Valve state change required	(Y)	N	U	

Review Criteria

1. Does valve operator meet pipe centerline dimension restriction	(Y)	N	U	N/A
2. Do valve power and control utilities have adequate slack	(Y)	N	U	N/A
3. Valve operator is not supported independently of pipe	(Y)	N	U	N/A
Are the criteria met?	(Y)	N	U	

Interaction Effects

1. Vulnerable valve components free from impact by nearby equipment or structures	Y	(N)	U	N/A SEE ATT. ETC.
2. No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A
3. Are any required electrical controls free of water spray interactions	(Y)	N	U	N/A
4. No other concerns	(Y)	N		N/A
Is equipment free of interaction effects?	Y	(N)	U	
Is equipment seismically adequate?	Y	N	(U)	

Comments _____

Reference Photos: Roll ___ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Robert D. Hathaway Date: 3/24/93

Evaluated by: Danny C. McManus Date: 3/24/93

WALKDOWN DATA SHEET

SHEET 2 OF 2

System SSAF

Valve. ID No. 2N11-F008B, F009B, F044B Equip. Class Active Valves

Comments/Outliers OUTLIER #1 VLV OPERATR PROXIMITY INTERACTION
@ ALL THREE VLVS. THERE IS A COMMODITY (3" ϕ PIPE/
FLANGE) WITHIN APPROX 3" OF THE VLV. OPERATR
DIAPHRAGMS. THE 3" ϕ LINE IS ROD HUNG. THIS
POTENTIAL INTERACTION REQUIRES FURTHER EVALUATION
TO DETERMINE THE CREDIBILITY OF THE INTERACTION AND
THEN TO DETERMINE THE EFFECT OF AN
INTERACTION ON THE VALVE.

WALKDOWN DATA SHEET

SHEET 1 OF 2

Equipment ID No. _____ Equip. Class INSTRUMENT RACK

Equipment Description INSTRUMENT RACK (FOR SJAE INSTRUMENTS)

Equipment Location: Bldg. TURBINE (TG-T21/22) Floor El. 112' Room, Row/Col _____

Manufacturer, Model, Etc. — PS N313, FT 315, PT 319, PT 329 A&B

Drawing No. _____

Functionality Requirement

1. Function Required(Specify)_____ Y (N) U

Review Criteria

1. Is component of good seismic design for function above (Y) N U N/A

(specify)_____

Are the criteria met? (Y) N U N/A

Anchorage

1. Does strength appear adequate Y N (U) N/A
2. Does stiffness appear adequate (Y) N U N/A
3. No other concerns (Y) N N/A
4. Prepare and attach a sketch (Y) N SEE SKETCH

Are anchorages adequate based on judgement Y N (U) SEE OUTLIER 1

Interaction Effects

1. Vulnerable components free from damaging impact by nearby equipment, structures, etc. (Y) N U N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls Y (N) U N/A
3. No other concerns (Y) N

Is equipment free of interaction effects? Y (N) U

Comments OUTLIER 1: ONE ANCHOR BOLT IS MISSING. AN EVALUATION IS REQUIRED. SEE SKETCH & PHOTOS 4-12&15

OUTLIER 2: VERIFY NO INTERACTION EFFECTS OR [illegible]

Reference Photos: Roll ___ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Robert O. Hookway Date: 3/25/93

Evaluated by: Danny C. McMartin Date: 3/25/93

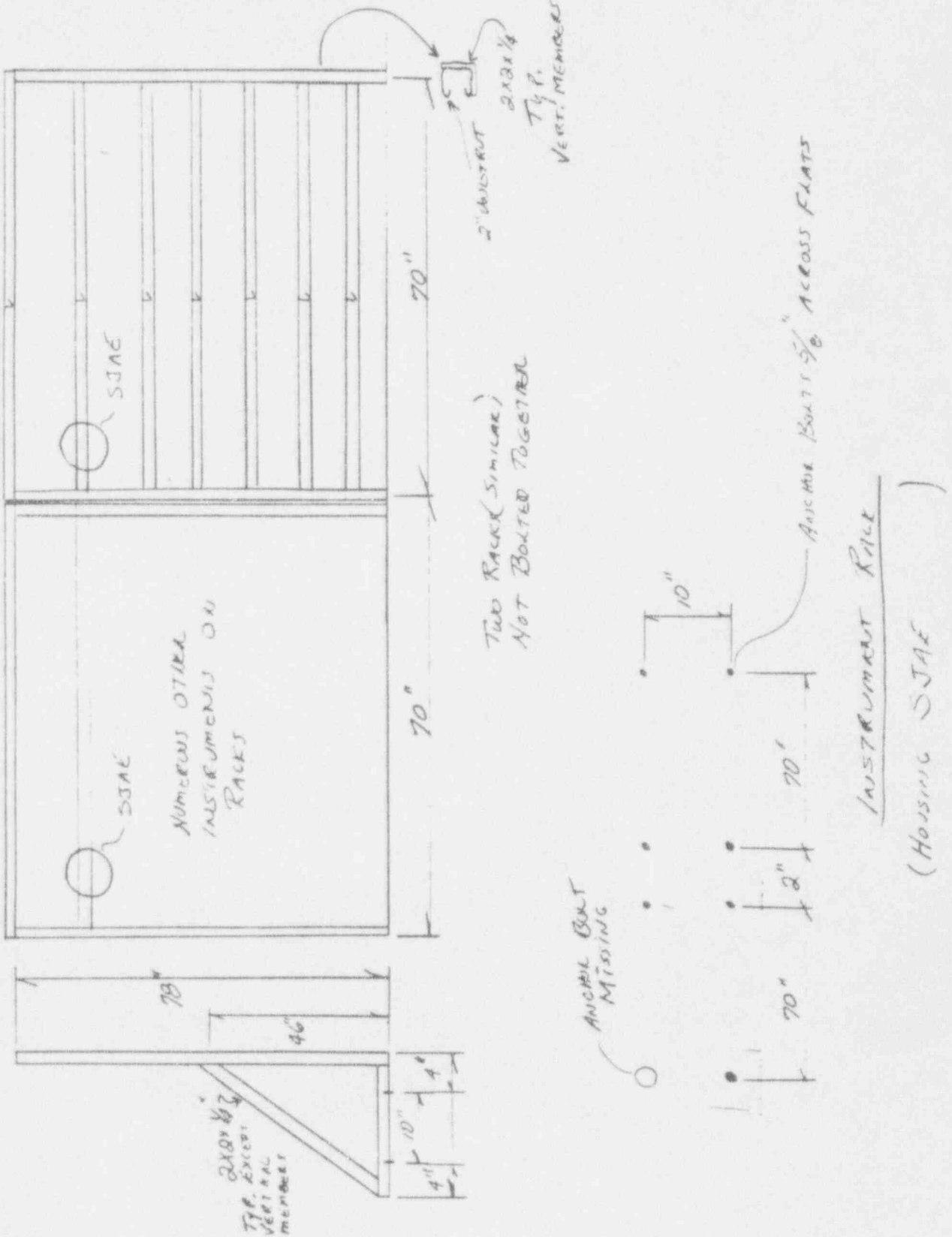
EQ

EQE

JOB _____ JOB NO. _____

SUBJECT _____ CALC NO. _____

BY RDH DATE 3/24/93 CHK'D A. N. Mann DATE 3/24/93 SHEET NO. 2 OF 2



4

WALKDOWN DATA SHEET

SHEET 1 OF 4

Equipment ID No. _____ Equip. Class HEAT EXCHANGER

Equipment Description STEAM JET AIR EJECTR

Equipment Location: Bldg. TURBINE Floor El. 112' Room, Row/Col STAE

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1. Function Required(Specify)_____ Y (N) U

Review Criteria

1. Is component of good seismic design for function above (Y) N U N/A

(specify)_____

Are the criteria met? (Y) N U N/A

Anchorage

1. Does strength appear adequate Y N (U) N/A
2. Does stiffness appear adequate (Y) N U N/A
3. No other concerns (Y) N N/A
4. Prepare and attach a sketch (Y) N SEE SKETCH

Are anchorages adequate based on judgement Y N (U) SEE OUTLIER 1

Interaction Effects

1. Vulnerable components free from damaging impact by nearby equipment, structures, etc. (Y) N U N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls Y (N) U N/A OUTLIER 2
3. No other concerns (Y) N

Is equipment free of interaction effects? Y (N) U

Comments SEE PHOTOS 4-6 THRU 4-9

Reference Photos: Roll ___ Frames ___

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Robert L. Hookway Date: 3/25/93

Evaluated by: Larry G. McManus Date: 3/25/93

EQ

WALKDOWN DATA SHEET

SHEET 2 OF 4

System SJAE

~~Valve~~ ID No. _____ Equip. Class HEAT EX ~~Active Valves~~

Comments/Outliers OUTLIER 1 A DETAILED ANCHORAGE EVALUATION IS REQUIRED. SEE ATTACHED SKETCH

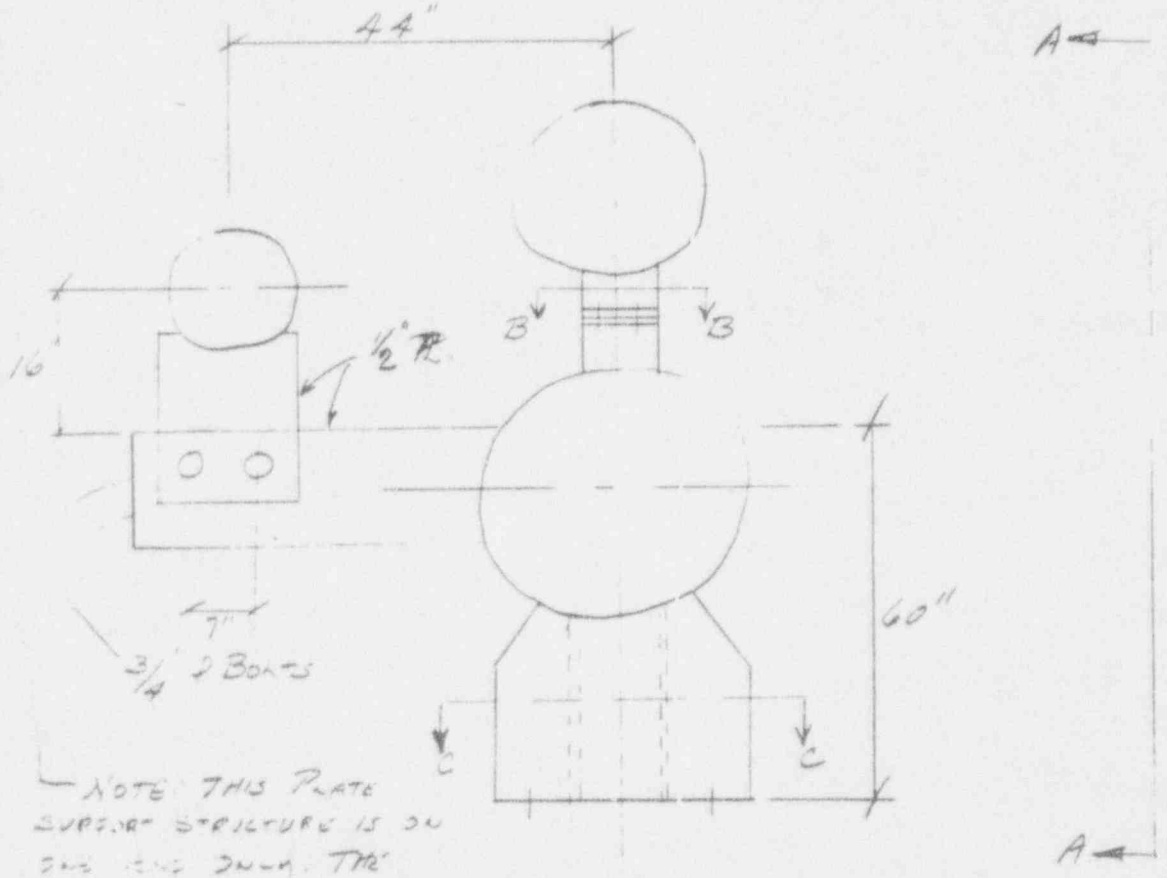
OUTLIER 2 A BLOCK WALL EXISTS AT THE ENTRY END OF THE ROOM. AN EVALUATION IS REQUIRED TO QUALIFY THIS WALL. (SEE DWG 4-14)

EQE

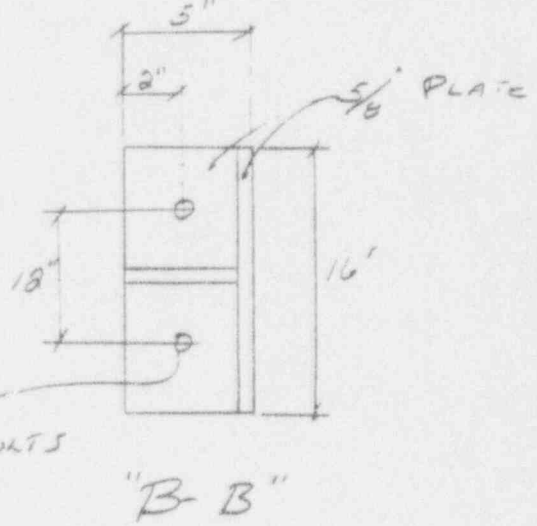
JOB HATCH II MSIV LCS JOB NO.

SUBJECT SJAE ANCHORAGE SKETCH CALC NO.

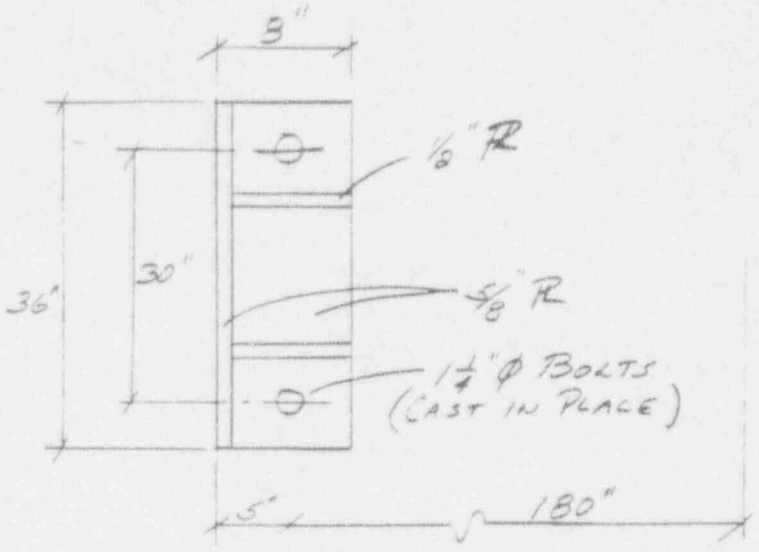
BY [illegible] DATE 3/24/93 CHK'D [illegible] DATE 3/24/93 SHEET NO. 3 OF 4



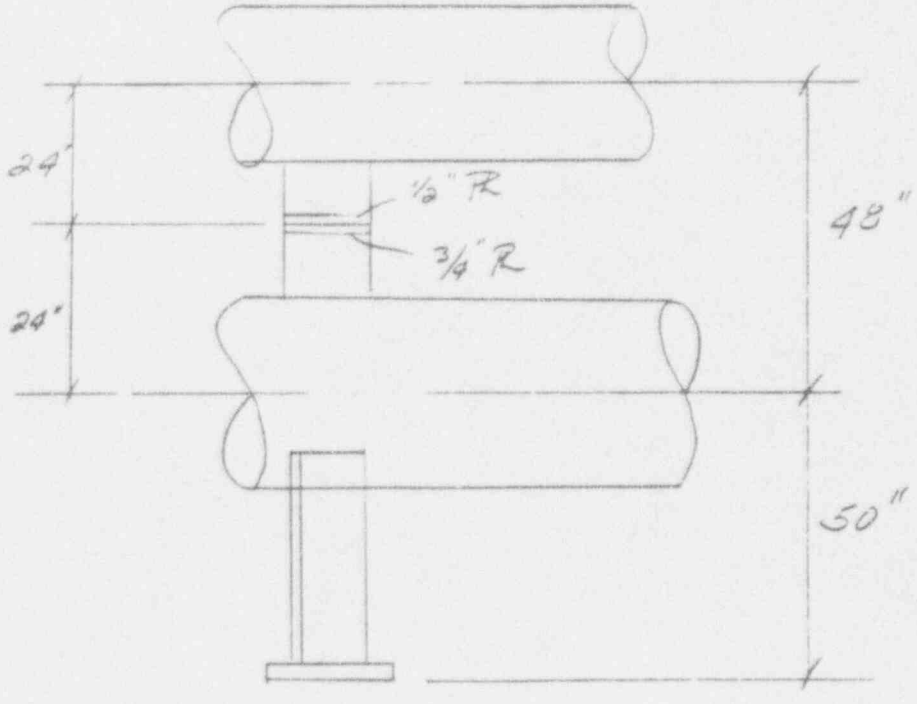
NOTE: THIS PLATE SUPPORT STRUCTURE IS ON ONE END ONLY. THE OTHER END IS SUPPORTED BY A LARGE ϕ PIPE



"B-B"



"C-C"



A-A

WALKDOWN DATA SHEET

SHEET 1 OF __

System MAIN STEAM & MS DRAIN

Equip. Class Piping and Tubing Systems Line Identifier 2B21-DBB-3" 2N22-EBE-3"

2B-21-24" DBB-1"

Bldg. PLANT BUILDING STEAM VAULT Floor El. ℄ 130 COLMS RA-R3 & E 7-21

P&ID No. 2-26000 Spec. No. _____

Isometric No. 2B21-F10,11,12,13,15,17,18,19,20

2N22-F15, 121, 161, 162 TYPICALS OF ALL 4 TRAINS

Pipe/Tubing O.D. 24", 3", 2", 1", 3/4" Wall Thickness _____

Material _____

Insulation Type/Thickness YES

Piping System Boundary

Description SYSTEM INCLUDES ACTIVE VALVES FO21 & FO22 NEXT FROM CONTAINMENT TO T-3 PENETRATION, MAIN STEAM DRAIN TO CONDENSER & CROSSOVERS

Functionality Requirement

1.	Pressure Boundary Integrity	(Y)	N		N/A

Review Criteria - Piping and Tubing

1.	No visible damage	(Y)	N	U	N/A
2.	No significant visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	(Y)	N	U	N/A
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing)	(Y)	N	U	N/A
5.	No unusual pipe or tubing attachments	(Y)	N	U	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	(Y)	N	U	N/A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement	(Y)	N	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	(Y)	N	U	N/A
9.	No stiff branch piping attached to the main line with potentially significant movements	(Y)	N	U	N/A
10.	No excessive sagging, crimping or damage to tubing	(Y)	N	U	N/A
11.	No large eccentric masses	(Y)	N	U	N/A
12.	No other concerns (if no, comment on separate sheets and attach)	(Y)	N	U	

Are the criteria met? (Y) N U

C-3

WALKDOWN DATA SHEET

SHEET 2 OF ___

System MS & MS DRAIN Equip. Class Piping and Tubing Systems

Line Identifier 23-2 & 2N22

Review Criteria - Supports

1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short fixed end threaded rods	(Y)	N	U	N/A
2.	No visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No unusual design	(Y)	N	U	N/A
4.	No customized parts used in place of catalog parts, which appear inadequate	(Y)	N	U	N/A
5.	Free of support details which appear to have been inappropriately altered	(Y)	N	U	N/A
6.	No visible damage	(Y)	N	U	N/A
7.	No inappropriate support settings (bottomed spring hangers, etc.)	(Y)	N	U	N/A
8.	Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.)	(Y)	N	U	N/A
9.	Does the load path appear adequate	(Y)	N	U	N/A
10.	No additional concerns (If no, document comments on separate sheet and attach)	(Y)	N		

Are the above criteria met? (Y) N U

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	(Y)	N	U	N/A	NOTE #2
2.	No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A	
3.	No other concerns	(Y)	N	U	N/A	

Is equipment free of interaction effects? (Y) N U

Is the piping/tubing system seismically adequate? (Y) N U

Comments MS & MS DRAIN APPEAR TO BE SEISMICLY ADEQUATE. LINES ARE WELL RESTRAINED WITH BI-LATERAL SUPPORTS ON ALL RUNS.

Reference Photos: Roll ____ Frames ____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: [signature] Date: 3-24-93

Evaluated by: [signature] Date: 3-24-93

WALKDOWN DATA SHEET

SHEET 2 OF __

System MS & MS DRAIN Equip. Class Piping and Tubing Systems

Line Identifier 2B21 & 2N22

Comments/Outliers

COMMENT 1: VALVE HANDLES ON 2E 32 E3005 ARE IN PROXIMITY TO PIPE SUPPORT STRUT CLEARANCE IS APPROXIMATELY 1 INCH. ALL COMPONENTS, PIPE & VALVES AND STRUT ARE SUPPORTED CLOSE TO THE COMPONENTS AND TO THE SAME STRUCTURAL SYSTEM. PROXIMITY CONDITION IS JUDGED ACCEPTABLE. SEE PHOTO 23-1.

COMMENT 2: 3/4" HIGH POINT VENT VALVE FV-007 SHOWN ON 2N22-E121 & 161 NEAR TB PENETRATION IS IN PROXIMITY TO ANOTHER PIPE RUNNING HORIZONTAL (SEE PHOTO 23-2). HIGH POINT VENT IS ON MS DRAIN VERY CLOSE TO TB PEN. OTHER LINE IS LATERALLY SUPPORTED IN DIRECTION OF PROXIMITY CONDITION LINE DISPLACEMENTS WERE JUDGED SMALL IN RELATION TO CLEARANCE.

WALKDOWN DATA SHEET

SHEET __ OF __

System MS DRAIN P&ID No. H-26000

Valve. ID No. 2B21 - F021 Equip. Class Active Valves

Valve Description GATE VALVE - MO Isometric No. 2B21-17

Valve Location: Bldg. RB- STEAM CHASE Floor El. @ 130 Room, Row/Col RA/R19

Manufacturer, Model, Etc. _____

Drawing No. _____

Functionality Requirement

1. Valve state change required	(Y)	N	U	

Review Criteria

1. Does valve operator meet pipe centerline dimension restriction	Y	(N)	U	N/A
2. Do valve power and control utilities have adequate slack	(Y)	N	U	N/A
3. Valve operator is not supported independently of pipe	(Y)	N	U	N/A
Are the criteria met?	Y	(N)	U	

Interaction Effects

1. Vulnerable valve components free from impact by nearby equipment or structures	Y	(N)	U	N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A
3. Are any required electrical controls free of water spray interactions	(Y)	N	U	N/A
4. No other concerns	(Y)	N		N/A
Is equipment free of interaction effects?	Y	(N)	U	
Is equipment seismically adequate?	Y	N	(U)	

Outliers Comments: (1) VALVE IS SMB-00 APPROX WT = 185-200# > 100#
MOV TOP TO PIPE ℄ IS 34 INCHES > 300#.
(2) VALVE IS CLOSE TO 3" □ T.S COLUMN, CLEARANCE
TO TUBE STEEL IS 3/8 INCH, SEE PHOTO 23-3.

Reference Photos: Roll ___ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: 3-24-93

Evaluated by: _____ Date: 3-24-93

23

WALKDOWN DATA SHEET

SHEET __ OF __

System MAIN STEAM P&ID No. H-26000

Valve. ID No. 2B21-F028 A, B, C, D Equip. Class Active Valves

Valve Description MS ISOLATION VALVE Isometric No. _____

Valve Location: Bldg. RB STEAM CHASE Floor El. 130 FT Room, Row/Col RA-RB/R17-21

Manufacturer, Model, Etc. A&M

Drawing No. _____

Functionality Requirement

1. Valve state change required (Y) N U

Review Criteria

1. Does valve operator meet pipe centerline dimension restriction Y N U (N/A)
2. Do valve power and control utilities have adequate slack (Y) N U N/A
3. Valve operator is not supported independently of pipe (Y) N U N/A

Are the criteria met? Y N (U)

Interaction Effects

1. Vulnerable valve components free from impact by nearby equipment or structures (Y) N U N/A
2. No collapse of overhead equipment, distribution systems, or masonry walls (Y) N U N/A
3. Are any required electrical controls free of water spray interactions (Y) N U N/A
4. No other concerns (Y) N N/A

Is equipment free of interaction effects? (Y) N U

Is equipment seismically adequate? Y N (U)

Comments MSIV PHYSICAL DIMENSIONS ARE OUTSIDE THE SCREENING CRITERIA. THE VALVE IS SAFETY RELATED AND ANALYZED WITH THE MAIN STEAM SYSTEM.

Reference Photos: Roll ___ Frames _____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: _____ Date: 3-24-93

Evaluated by: _____ Date: 3-24-93

EQE
ENGINEERING
CONSULTANTS

HATCH UNIT 2

MAIN STEAM DRAIN LINE

SEISMIC MARGINS EVALUATION

CALCULATION 50108-C-01

July 6, 1993

Prepared for:

SOUTHERN COMPANY SERVICES, INC
Post Office Box 2625
Birmingham, Alabama

TABLE OF REVISIONS

Rev No.	Sheets	Revision Description	Revision Date
0	N/A	Original Issue	July 6, 1993

TABLE OF CONTENTS

HATCH MAIN STEAM DRAIN LINE

1.0 Purpose

This assessment is to demonstrate that the Main Steam Drain Line design provides adequate margins when subject to weight and seismic load to provide a reasonable assurance that position retention of the line will be maintained. This margins assessment in conjunction with the design basis review and field verification performed in accordance with Reference 1 has provided assurance that:

- Adequate commercial codes, standards, and practices have been employed.
- Lines are free of known seismic hazards and supports will behave in a ductile manner
- Support components and anchorages have adequate seismic margins

These steps provide adequate assurance that Hatch designs will perform in a manner similar to piping and supports which have observed good seismic performance in past strong ground motion earthquakes.

2.0 Methodology

The methodology utilized to demonstrate the margins inherent in the piping support designs is the Conservative Deterministic Failure Margin(CDFM) Seismic Margins. This methodology is a deterministic approach to margins assessment and utilizes the following procedure:

- The Earthquake Response Spectrum is Conservatively Defined as 84% Non-Exceedance
- The Estimated Structural and Piping Response is Median Centered
- The Component Support Capacity is Conservatively Estimated

This combination of conservatively defined seismic demand, median centered response to the seismic demand and conservative estimate of capacity is considered to result in a High Confidence of a Low Probability of Failure(HCLPF) which provides the reasonable assurance of performance desired.

3.0 Piping System Response Estimation

The system response estimation is a median centered best estimate of the appropriate loadings:

Loading Combination	Component Standard Supports Designed by Load Rating
Operating Mechanical Loads + Dead weight + Seismic	TL x 0.7 S_u / S_u*

Where:

TL = Support test load equal to or less than load under which support fails to perform its intended function
S_u = Material ultimate strength at temperature
S_u* = Material ultimate strength at test temperature

Operating mechanical loads for this system are thermal expansion loads. Piping systems designed utilizing rod support typically do not impose constraints on thermal expansion and no thermal loads are identified in the support designs. Design dead weight support loads are consistent with tributary area weight procedures.

The seismic response of the line is median centered and utilizes a factored load coefficient methodology to determine seismic loads. The load coefficient utilized is a factor of one(1) times the peak vertical spectral response acceleration.

4.0 Seismic Demand

Seismic demand is estimated based on scaling of the Hatch median centered margins earthquake response of the Control Building to the Turbine Building performed by Southern Companies engineering staff. The resulting estimated maximum vertical floor spectral response for the 0.15g Design Basis Level ground motion is **0.75g at 5% damping** (See Attachment).

Dead Weight

Estimate pipe support weight on the most critical hanger. From the seismic verification walkdown screening of piping attributes, spans of 14' 6" to 15'6" for the 3 inch diameter Main Steam Drain Line was identified on isometric 2N22-162 (See Attachment). This span exceeds the 12' B31.1 suggested span for water systems. The support dead weight is estimated as follows:

3 inch ϕ Schedule 160 pipe	Pipe	14.30 #/ft
	Water	2.34 #/ft
	Insulation	4.75 #/ft (2 1/2 " C.S.est.)
	Total	21.39 #/ft

Assuming a maximum span on the line of 15'6" and that the line is full of water (this is believed to be conservative, as the condenser is open to atmosphere and would not be full), the dead load is:

Dead Load = 21.39 #/ft x 15.5 ft = 332 #

The design Load on the support from Hanger Drawing HD 138 is **323 #** **Use**

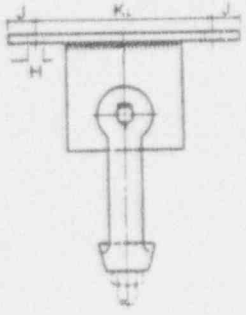
Support Load = (1 ± 0.75g) x 323 # = **565 #** **Use**

5.0 Pipe Support Component Capacities

The supplemental field verification determined that all the supports are considered to have good seismic performance. The system is predominantly supported utilizing dead load rods. These designs are constructed from standard support catalogue items and typically consist of clamps, threaded rod, weldless eye nuts, turnbuckles, clevis and ided lug attachments to either concrete or to steel structures. A typical pipe supp load path is shown in Figure 1. This type of support is designed to resist vertical load in tension and the design capacities are provided by manufacturers load capacity ratings.

Load Capacity ratings for component standard supports are typically based on test and utilize a factor of safety of 5 in accordance with MSSP-58. The load on which the load capacity data(LCD) is based is therefore a factor of five higher than the catalog load rating. The margins capacities for the component standard support items are taken as the LCD rating x 5 x 0.7.

Figure 1
Component Standard Support Items

Item		Load Rating
1. Concrete Attachment with Capacity Lug and Clevis		Use EPRI NP-5228 Bolt 1/2" Phillips Wedge 4 Ksi Conc. P_C = 6,870 lbs/bolt

2. Threaded Rod		Catalog Rating = 1130 lbs
		C = TL x 0.7 = 1130 # x 5 x .7
		C= 3955

3. Steel Turnbuckle		Catalog Rating = 1130 lbs
		C = TL x 0.7 = 1130 # x 5 x .7
		C= 3955

4. Steel Weldless Eye Nut		Catalog Rating = 1130 lbs
		C = TL x 0.7 = 1130 # x 5 x .7
		C= 3955

5. Steel Double Bolt Pipe Clamp		Catalog Rating = 1500 lbs
		C = TL x 0.7 = 1500 # x 5 x .7
		C= 5250

6.0 Evaluate Capacity vs Demand Ratios for Support Items

Items 2,3 and 4 have capacities C = 3,955 # Gross Demand is 565 # C/D = 7.0

Item 5 has a capacity of 5,250 # Gross Demand is 565 # C/D = 9.3

Item 1 Evaluation of bolted anchorages to concrete follow the procedures established in the Margins Methodology report EPRI NP-6041. Concrete anchor bolts are evaluated using data from the EPRI NP-5228.

P_C = 2 bolts x 6,870[1] #/ bolt x 0.8^2 / 4.0^3 = 2,748
Gross Demand is 565 # **C/D = 4.9 Controls**

7.0 Calculate High Confidence Low Probability of Failure (HCLPF)

HCLPF = a
where: (1 + 0.75 a / 0.15g) x 323# = 2,748 #

HCLPF $\geq$1.5g

8.0 Summary and Conclusions

The HCLPF value calculated for a typical pipe support component and anchorage is 1.5 g or 10 times the Hatch DBE. Typical values for the system would be greater than this value. Based on this seismic margins evaluation we conclude that the systems designs have adequate margin to insure position retention. Furthermore, based on the supplemental field walkdown inspection, the piping systems and their supports are similar to piping system and support designs which have experienced strong ground motion and demonstrated good seismic performance.

---

[1] Bolt capacity for Expansion Anchors - Table 2.6 from EPRI NP 5228
[2] Reduction factor for closely spaced bolts - Figure 2.13 from EPRI NP 5228
[3] Safety Factor for bolts from Table O-2 of EPRI NP 6041

9.0 References

1. General Electric BWR Owners Group Report for Increasing MSIV Leakage Rate Limits and Elimination of Leakage Control Systems, GE NEDC-31858P Revision 2. September 1993.

2. EPRI NP - 6041, A Methodology for Assessment of Nuclear Power Plant Seismic Margin(Revision 1). August 1991.

3. EPRI NP - 5228, Seismic Verification of Nuclear Plant Equipment Anchorage(Revision 1) Volume 1. June 1991.

4. Newmark, N. M., W. J. Hall. Development of Criteria for Seismic Review of Selected Nuclear Power Plants. NUREG/CR - 0098. May 1978.

5. Nuclear Regulatory Commission. Procedure and Submittal Guidance for the Individual Plant Examination of External Events for Severe Accident Vulnerabilities. NUREG - 1407. April 1991

6. EQE Draft Report. " Hatch Unit 2 MSIV Seismic Verification Walkdown Report. May 14, 1993.

7. Bergen-Patterson Pipe Support Catalog 82-R. 1985

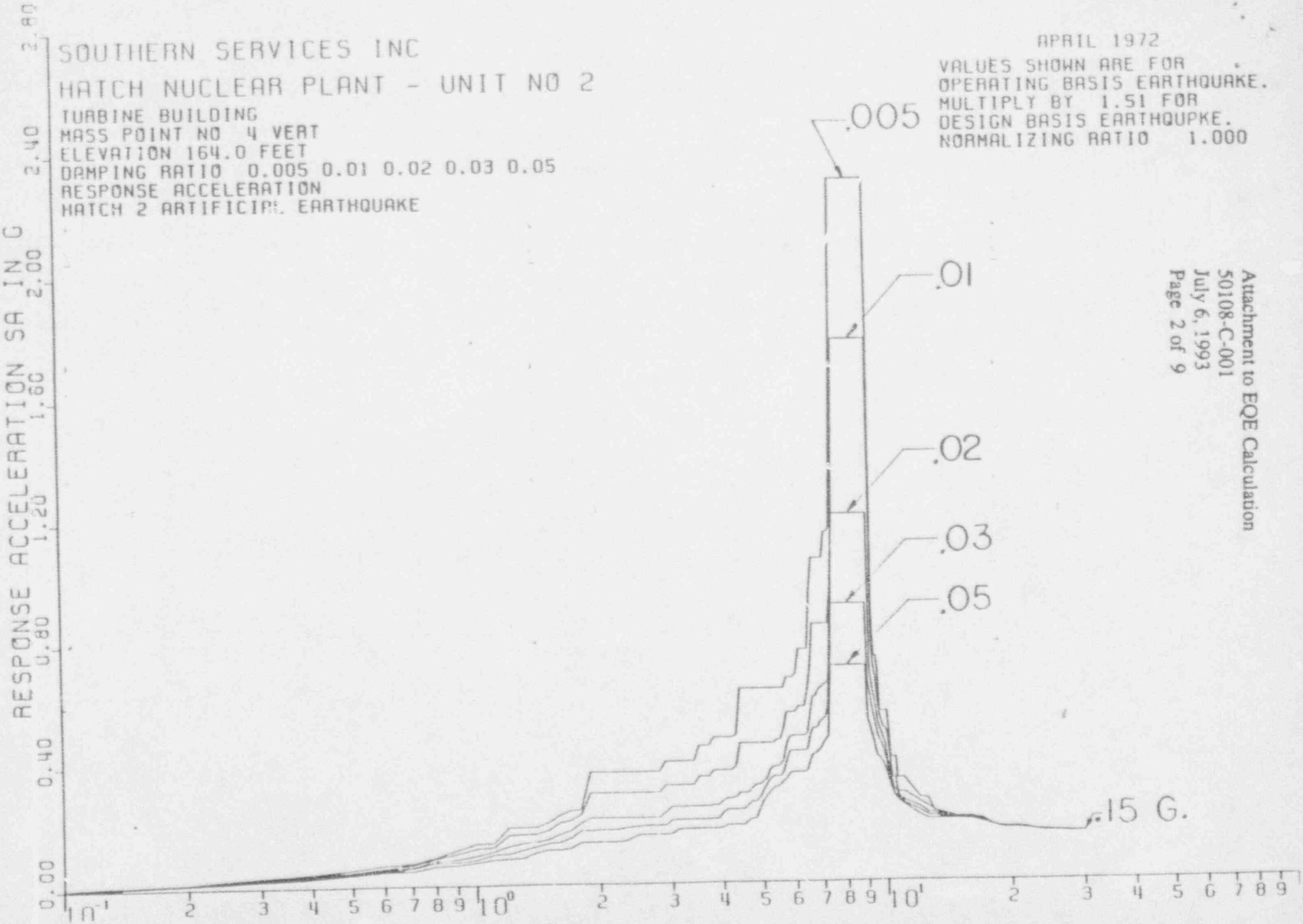
APPENDIX

EXCERPTED DOCUMENTS

9 Pages

Elevation (Ft.)	Direction	Freq. of Peak (Hz)	Factor	Factored Acceleration (Gs)	Factored Displacement (in)
112	NS	2.05	0.81	0.67	1.56
	EW	2.75	0.54	0.46	1.49
	Vert.	2.20	0.57	0.38	0.76
130	NS	2.25	0.81	0.57	1.10
	EW	2.70	0.50	0.47	1.35
	Vert.	2.30	0.53	0.35	0.66
142	NS	1.80	0.50	0.51	1.55
	EW	2.75	0.50	0.50	1.38
	Vert.	2.25	0.53	0.66	0.66
164	NS	1.80	0.50	0.58	1.76
	EW	2.70	0.54	0.58	1.46
	Vert.	2.35	0.66	0.75	0.75

Table 1: Factored Maximum acceleration and displacement values for Frequencies Above the Peak of the SME Response Spectrum (note: factors may be used for all SME response spectra amplitudes)



Attachment to EQE Calculation
50108-C-001
July 6, 1993
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WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier Main Steam drain to condenser

Review Criteria - Supports

1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short fixed end threaded rods	(Y)	N	U	N/A
2.	No visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No unusual design	(Y)	N	U	N/A
4.	No customized parts used in place of catalog parts, which appear inadequate	(Y)	N	U	N/A
5.	Free of support details which appear to have been inappropriately altered	(Y)	N	U	N/A
6.	No visible damage	(Y)	N	U	N/A
7.	No inappropriate support settings (bottomed spring hangers, etc.)	(Y)	N	U	N/A
8.	Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.) ← (see outlier # 1)	Y	N	(U)	N/A
9.	Does the load path appear adequate	(Y)	N	U	N/A
10.	No additional concerns (If no, document comments on separate sheet and attach)	(Y)	N		

Are the above criteria met? (Pending on # 8) Y N (U)

Interaction Effects

1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc. (see Comment # 3)	(Y)	N	U	N/A
2.	No collapse of overhead equipment, distribution systems, or masonry walls	(Y)	N	U	N/A
3.	No other concerns	(Y)	N	U	N/A

Is equipment free of interaction effects? (Y) N U

Is the piping/tubing system seismically adequate? (Y) N U

Comments All interactions are non-damaging types.

Reference Photos: Roll ____ Frames ____

All aspects of the equipment's seismic adequacy have been addressed.

Evaluated by: Danny C. McManus Date: 3-20-93

Evaluated by: Stanley P. Harris Date: 3-20-93

Attachment to EQE Calculation
50108-C-001
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WALKDOWN DATA SHEET

SHEET __ OF __

3

System Main Steam

Equip. Class Piping and Tubing Systems Line Identifier Main Steam drain to condenser

Bldg. Turbine Building Floor El. 112'-3, 130'-0, & 147'-0"

P&ID No. H-21031(H-8), H-26000(E11) Spec. No. 2N22-EEE

Isometric No. 2N22-162, 2N22-163, 2N22-164, & 2N22-165

Pipe/Tubing O.D. 3" nominal Wall Thickness .343'

Material A 106 Gr B SMLS

Insulation Type/Thickness (insulated)

Piping System Boundary

Description 3"ø pipe from condenser connection #51 (2N61-8001B) to RB*2 penetration (running to MO-F021) which is located at Col. Line RA, 3'-6" N. of T15 @ EL 149 ± 10¼". Subject pipe is mostly supports by rods.

Functionality Requirement

1.	Pressure Boundary Integrity	(Y)	N	N/A

Review Criteria - Piping and Tubing

1.	No visible damage	(Y)	N	U	N/A
2.	No significant visible rust/corrosion deterioration	(Y)	N	U	N/A
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	(Y)	N	U	N/A
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) → See Comment *1.	(Y)	N	U	N/A
5.	No unusual pipe or tubing attachments	(Y)	N	U	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	(Y)	N	U	N/A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement (see comment 2)	Y	(N)	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	(Y)	N	U	N/A
9.	No stiff branch piping attached to the main line with potentially significant movements	(Y)	N	U	N/A
10.	No excessive sagging, crimping or damage to tubing	(Y)	N	U	N/A
11.	No large eccentric masses	(Y)	N	U	
12.	No other concerns (if no, comment on separate sheets and attach)	(Y)	N	U	

Are the criteria met? Y (N) U

WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier Main steam drain to condenser

Comments/Outliers Comment #1: There are cases where the spans exceeded the ANSI B31.1 spans, for example, there are 2 cases on isometric 2N22-162 where the spans of ~ 14'-6 & 15'-6" exceed the B31.1 span of 12'-0. This is classified as acceptable-as-is since the pressure and/or thermal stress are very low (not at elbow and is vented to the condenser).

Comment #2: This piping is mostly supported by rods: Drain line penetrates T.B. at Colmn T-14 in structural joint - See Photo 3-1

Outlier #1: There was an anchor bolt spacing violation This needs further evaluation. See FIGURE #1 for additional details & Photo 3-2.

Comment #3: There are many interactions between the subject pipe and other P.S. rods as well as other pipes of similar diameter. These are judged acceptable-as-is since they are non-damaging type interactions.

To name a few as follows:

(1) Subject pipe hits duct support rods. Photo 3-3

(2) Other pipes hit subject pipe support's rods.

(3) Subject 3"ø pipe interacts with 2-2"ø and 1-1"ø pipes Photo 3-4

(4) Subject 3"ø pipe touches clevis assembly of a (Photo 3-5 small bore pipe. This is not a concern since this occurs at a hard point (support) on subject pipe

(5) On riser @ condenser subject pipe interacts will another pipe of similar diameter. Photo 3-6

WALKDOWN DATA SHEET

SHEET __ OF __

System Main Steam Heater Drains Equip. Class Piping and Tubing Systems

Line Identifier Main steam drain to condenser

Comments The FIGURE below is for outlier #1

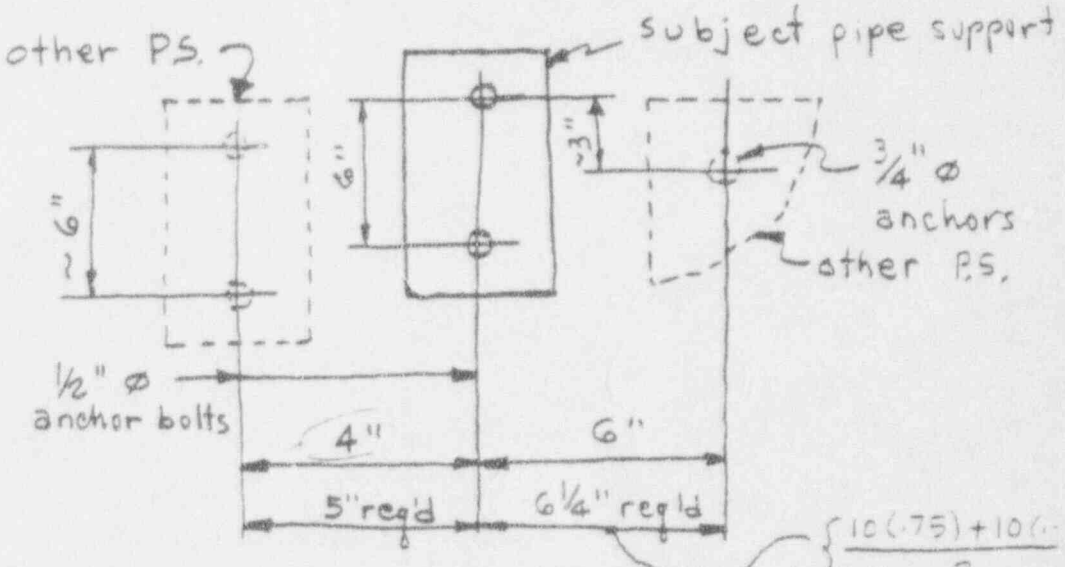

FIGURE 1
(on ceiling)

OD > 3D

Table 2.6

MEAN STRENGTHS OF EXPANSION ANCHOR BOLTS
AS A FUNCTION OF CONCRETE STRENGTH

Bolt Dia D (in)	Pullout P Shear V	Mean Anchor Strength (kips) f'_c (ksi)				
		2.0	2.5	3.0	3.5	≥4.0
3/8	P	2.20	2.74	3.29	3.84	4.39
	V	3.61	3.83	4.04	4.25	4.25
1/2	P	3.44	4.29	5.15	6.01	6.87
	V	6.07	6.43	6.78	7.14	7.14
5/8	P	4.76	5.94	7.13	8.32	9.51
	V	9.66	10.23	10.80	11.37	11.37
3/4	P	7.04	8.79	10.55	12.31	14.07
	V	13.98	14.81	15.63	16.45	16.45
7/8	P	9.14	11.43	13.71	16.00	18.28
	V	19.64	20.80	21.95	23.11	23.11
1	P	10.43	13.03	15.64	18.24	20.85
	V	24.29	25.72	27.15	28.58	28.58

Table O-2

RECOMMENDED EXPANSION BOLT SAFETY FACTORS TO BE USED IN CDFM EVALUATION

Shear: $F_s = 2.0$

Tension:

	F_s	
Concrete Condition	Single Bolt	Two or More Bolts
No Cracks	2.4	2.4
Hairline Crack Unlikely	3.0	2.8
Hairline Crack Likely Small Crack Unlikely	3.6	3.2
Small Crack Likely	4.0	3.6

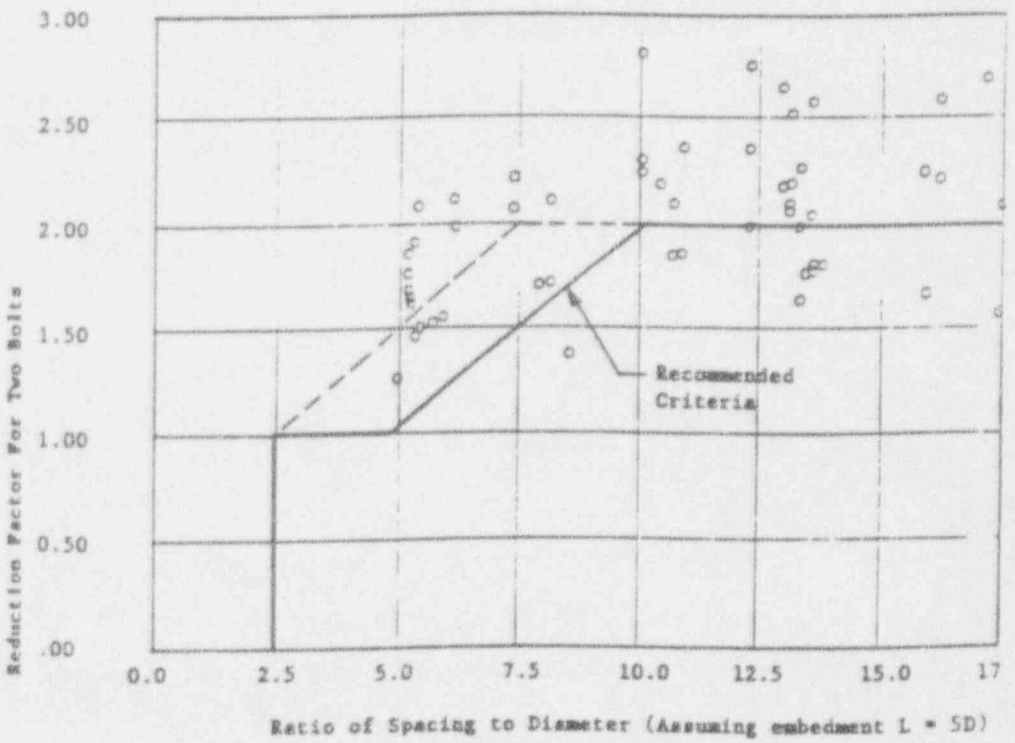

Figure 2.13 Recommended Tension Reduction for Closely Spaced Bolts (From Reference 20)

			WELDING CLEVIS ATTACHMENT
			1/2" ø ANN NUT
	1	108A	1/2" ø x 0'-4" LG. ROD T1 = 6", T2 = 6" L.H.
	1	108	1/2" x 6" F.B. TURNBUCKLE
	1	92A	1/2" ø x 2'-0" LG. WELDED EYE ROD THD. = 6"
	1	304	3" PIPE CLAMP
	1	CS	4" x 1/2" R x R" LG W/(2) 5/8" ø HOLES (SEE R DET)
	2	—	1/2" ø PHILLIPS WEDGE ANCHOR
	1	CHA	
	1	BST	

R DETAIL

EL 159'-0" 5/8

EL. 149'-6 1/2"

3" PIPE SIZE

ELEV. LOOKING EAST

BID. NO. 2NZ2-103-
PROB. NO. 1-34
ISS. NO. 1
DATA PT 155

DEAD WEIGHT	323 #
THERMAL LOAD	0 #
SEISMIC LD. (OBE)	—
MECH. LOAD	—
TOTAL LOAD	315 #
ALLOW LOAD	1100 #

SEE ANALYSIS
FOR LOC.

LOCATION PLAN
E-212
LOAD: 315#

1	17-14-90	DW	RR	WJT	8-5-91
REV	DATE	DRAWN	CHK'D	APPVD.	DATE

REV PER FIELD SURVEILLANCE

THE M. W. KELLOGG CO. - P. O. # M-7602-501
OWNER: SOUTHERN SERVICES, INC.
ENGINEER: EDWIN I. HATCH NUCLEAR PLANT - UNIT # 2
CONSUMER

PIPING SYSTEM: HEATER DRAINS
REFERENCE DWG: H-21148-2 (Pipe), H-22009-2 (Str'l)
MARK NO. 2NZ2-HD-H138 NO. REQ'D. 1

BERGEN-PATERSON PIPESUPPORT CORP.
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