

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. Rockury Janny C. M. Manua 31 REVIEWED BY/DATE: APPROVED BY/DATE: laz

9402040115 940127 PDR ADOCK 05000366 P PDR

> EQE ENGINEERING CONSULTANTS A Division of EQE International

March 17, 1993 Page 2 of 23

TABLE OF REVISIONS

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

TABLE OF CONTENTS

	TABLE OF REVISIONS	Page 2
1.	SCOPE	4
2.	RESPONSIBILITIES	5
3.	DEFINITIONS	6
4.	METHODOLOGY	7
5.	PROCEDURE 5.1 Piping, Tubing and Supports 5.2 Anchorage 5.3 Equipment Verification	9 9 11
6.	, SEISMIC INTERACTION REVIEW	20
7.	REQUIRED DOCUMENTATION	21
8.	QUALITY ASSURANCE	22
9	REFERENCES	23

ATTACHMENTS

A.	TRAINING VERIFICATION SHEET
B.	SEISMIC REVIEW TEAM MEMBER QUALIFICATION
	SHEET B-1 to B-2
C.	WALKDOWN DATA SHEETS

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 in sluded 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.

March 17, 1993 Page 7 of 23

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 oetter 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::

- 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 flexiblysupported (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

50108-P-001 Revision 0 March 17, 1993 Page 11 of 23

514 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 conside: 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	Allow. Bolt
Diametor	Projection
(Inches)	(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.

Kevision 0 March 17, 1993 Page 15 of 23

TABLE 5-1

NOMINAL SUGGESTED SPANS PER ANSI B31.1

Nominal Suggested Maximum Span (ft).

Nominal Pipe Size 1	Ou ^r side Pipe L iameter <u>(in.)</u> 1.315	Water <u>Service</u> 7	Steam, Gas or Air <u>Service</u> 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.



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

March 17, 1993 Page 18 of 23

ES



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.

Haton 2/pro

March 17, 1993 Page 19 of 23



Various Ranges of Pipe Diameter

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

50108-P-001 Revision 0 March 17, 1993 Page 20 of 23

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 blacing 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.

Kevision 0 March 17, 1993 Page 22 of 23

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).



Kevision 0 March 17, 1993 Page 23 of 23

9. REFERENCES

- EQE QAM, "Quality Assurance Manual," EQE Engineering Consultants, Revision 2, November 15, 1991.
- 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.
- 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.
- BWR Owner's Group Report NEDC-31858P, Appendix D, "Performance of Condensers," Prepared by EQE, Inc., Revision 0, September 1990.
- Hatch 2, MSIV Boundary Description P&IDs.

March 17,1993 Page A-1 of 2

ATTACHMENT A TRAINING VERIFICATION SHEET

. . .

March 17, 1993 Page A-2 of 2



TRAINING SESSIONS RECORDS

Description of Session Topic(s):

Instructor:

Print or TypeName	initial"	Signature	Date
			-
			The studies of the second second second
			that we could prove the accuracy have be
signature/initials attest to my presen of the subject matter. As of now, any n answered to my satisfaction.	ce during the prescribe questions I might have	d training session and gener had regarding session subj	al understan ect matter ha

12312-01/Training (1/82)

March 17, 1993 Page B-1 of 2

ATTACHMENT B SEISMIC REVIEW TEAM MEMBER QUALIFICATION SHEET

Seismic Review Team Qualification Sheet

1.0	Nam	e:					
2.0	Com	Company:					
3.0	Posit	ion:					
4.0	Educ	ation:					
5.0	Profe	essional engineers registration:					
6.0	Engi	neering discipline:					
7.0	Area	s 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	Train	ing courses:					
9.0	Other	r qualifications:					

Signature

1. 1. 1.

March 17, 1993 Page C-1 of 12

ATTACHMENT C WALKDOWN DATA SHEETS

de.

. . .

j,

IVINI	644	11		4.5	7	23
Pag	e C	-2	0	f	1	2

WALKDOWN DATA SHEET

	SHEET OF				
Sys	stern				
Ec	uip. Class <u>Piping and Tubing Systems</u> Line Identifier				
Bld	ig Floor I 1				
P&	ID No Spec. No				
Iso	metric No.				
Pip	e/Tubing O.D Wall Thickness				
Ma	terial				
Inst	ulation Type/Thickness				
Pip	ing System Boundary				
Des	cription				
or in sector of					
-					
Fun	ctionality Requirement				
1.	Pressure Boundary Integrity	Y	N		N/A
Rev	new 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	Y	N	U	N/A
e	piping, 6'-0" max. for tubing)				
а. К	No unusual pipe of tubing attachments	Y	N	U	N/A
7	Does the mining configuration at building joints arrest to home data pipes	Y	N	U	N.A
	flexibility to accommodate seismic induced differential momental	Y	N	0	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 publing	v	N	17	NZA
11	No large eccentric masses	v	N	U	N/A
12.	No other concerns (if no, comment on separate sheets and attach)	Ŷ	N	U	14173
ALC: NOT THE OWNER.			100		

50108-P-01 Revision 0 March 17, 1993 Page C-3 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

Syst	em Equip (lass Piping and	Tubin	g Svs	tems
Line	Identifier				
Rev	iew Criteria - Supports				
1.	No seismically vulnerable supports details:	Y	N	U	N/A
	One-way stanchions, brackets, etc. allowing piping to slide off				
	Friction beam clamps without restraining straps				
	Short fixed end threaded rods				
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 inadeo	uate Y	N	U	N/A
5.	Free of support details which appear to have been inappropriately altered	d 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	Y	N	U	N/A
	(Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc	a			
9	Does the load nath appear adequate	Y	N	U	N/A
10.	No additional concerns (If no, document comments on separate sheet an	d attach) Y	N		
Are	the above criteria met?	Y	N	U	
Inte	raction Effects				
1.	Vulnerable pressure boundary appurtenances free from damaging impac	n by nearby Y	N	U	N/A
	equipment, structures, etc.		195		
2.	No collapse of overhead equipment, distribution systems, or masonry with	alls Y	N	U	N/A
3.	No other concerns	Y	N	U	N/A
ls eq	nuipment free of interaction effects?	Y	N	U	
Is th	e piping/tubing system seismically adequate?	Y	N	U	
	bit will strong a strong and				
Con	unents	u lan is too organis a topo of the constraints			
Defe	rence Photos: Poll Frames				
NGI	A DEFAULT F ENDERNY, FADER AND A SERVICES AND				
All :	aspects of the equipment's seismic adequacy have been addressed.				
Eva	uated by: Date:				
Fua	Date:		-		

Page C-4 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

System	Equip. Class Piping and Tubing Systems
Line Identifier	
Comments/Outliers	
	ne and a second s
	n maarina maarina ahaa ka k

Page C-5 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

System

1

1. 1.

.

Equip. Class Piping and Tubing Systems

Line Identifier

Comments/Outliers

Revision 0 March 17, 1993 Page C-6 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

System	P&ID No				
Valve. ID No.	Active Valves				
Valve Description					
Valve Location: Bldg.	Floor El.	Room, P	low/C	01	
Manufacturer, Model, Etc.					
Drawing No.					
Functionalify Requirement					
1. Valve state change required		Y	N	U	
Review Criteria					
 Does valve operator meet pipe centerline dimension i Do valve power and control utilities have adequate sl Valve operator is not supported independently of pipe Are the criteria met? 	restriction ack e	Y Y Y Y	アススス	U U U U	N/A N/A N/A
Interaction Effects					
 Vulnerable valve components free from impact by ne No collapse of overhead equipment, distribution syste Are any required electrical controls free of water spra No other concerns 	arby equipment or structures ems, or masonry walls by interactions	Y Y Y Y	バババ	บ บ บ	N/A N/A N/A 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 a	addressed.				
Evaluated by:	Date				
Evaluated by:	Date				

			Page	C-7 of 12
	WALKDOWN DATA SHEET			
	SHEET OF			
System				
Valve ID No.		Fauin	Class	Active Values
Comments/Outliers		_ Equip.	C1635	ALLINE Y dIVES
Constitution O Man (13				
				an an bhaile a chuir le chuir air an tha ann an bhail
				ne in the office of the second se
				Names 1 (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	antor state and a state and a state of the	NG1 partition reasons to	George and an other state	
		-		

EU Mo

Revision 0 March 17, 1993 Page C-8 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

Рил	ıp. ID No.		Equip	Class	Pl	imp	
Pur	p Description						
Pun	p Location: Bldg.	Floor El.	Room,	Row/Co	1		
Fun	ctionality Requirement						
1.	Function vired			Y	N	U	
Rev	iew Criteria						
1.	Is pump of good seismic design for functi shaft restraint, pozzle loadings, utility lit	on above(driver/pump on con	imon base,	Y	N	U	N/A
2.	No other concerns			Y	N		
Are	the criteria met?			Y	Ν	U	N/A
Inte	raction Effects						
1.	Valnerable pump components free from i	mpact by nearby equipment o	r structures	Y	N	U	N/A
2.	No collapse of overhead equipment, distr	ibution systems, or masonry w	rails	Y	N	U	N/A
3.	Are any required electrical controls free of	of water spray interactions		Y	N	U	N/A
4.	No other concerns			Y	N	U	
Is ea	upment free of interaction effects?			Y	N	U	N/A
Ang	horage						
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		
Але	anchorages adequate based on judgement?			Y	N	U	
Con	iments						
							-
-							
Reie	rence Photos: Roll Frames	방송의 영화가 영					
All	aspects of the equipment's seismic adequacy	y have been addressed.					
Eva	uated by:	Date:					
Eva	usted by	Date					



			-	- 74	(****)					*
Ph.			100		10		de	14	-	
pre-	9 O	10	£	2	Q	~	e .	х	7	
ē. 1	ee.go,	Ser .	met	- 5	2	10	а.,	. 8.	de	ε.

B

WALKDOWN DATA SHEET

SHEET __ OF ___

Support/Anchorage Sketch	
Equip. ID No.	Equip. Class
Equipment Description	
Equipment Location: Bldg Floor E	Room, Row/Col.

Sketch By:	 Date:	
Verified By:	 Date:	
Page C-10 of 12

B

WALKDOWN DATA SHEET

. . .

Ves	sel ID No Equip.	Class .	Ногі	zonta	J Vessels
Ves	sel Description			THE PERSON AND	
Ves	sel Location: Bldg Floor El	Roo	m, Ro	w/Co	1
Ma	nufact ver, Model, Etc.				
Dra	wing No.				
Fun	ctionality Requirement				
1,	Pressure Boundary Integrity	Y	N	U	
Rev	iew 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 conce. us	Y	N		
Are	the criteria met?	Y	N	U	N/A
Anc	horage				
1. 2. 3. 4.	Does strength appear adequate Does load path appear adequate No other concerns Prepare and attach a sketch	Y Y Y Y	NNNN	U U	N/A N/A N/A
Are	anchorages adequate based on judgement	Y	N	U	
Laig	action Effects				
1.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A
2. 3.	No collapse of overhead equipment, distribution systems, or masonr, walls No other concerns	Y Y	N N	U	N/A
ls eq	uipment free of interaction effects?	Y	N	U	
Com	ments				
		and the party of t			
Refe	rence Photos: Roll Frames				
All a	spects of the equipment's seismic adequacy have been addressed.				
Eval	ualed by: Date:				
Eval	uated by: Date:				

Page C-11 of 12

WALKDOWN DATA SHEET

SHEET __ OF ___

Cabinet ID No.	Equi	p. Class	Cabi	nets	
Cabinet Descriptio					
Cabinet Location:	Bldg Floor El	Root	m, Ro	w/Co	1
Manufacturer, Mo	iel, Rtc.				
Drawing No.					
Functionality Requ	iremeru				
1. Function Rec	puired	Y	N	U	
Review Criteria					
1. Is cabinet of cabinet cut o	good seismic design for function above (mounting details, load pat nts, cabinet stiffness, etc.)	hs, Y	N	U	N/A
2. No other cab	ine: concerns	Y	N		
Are the criteria me	(?	Y	N	U	N/A
Anchorage					
 Does strength Does stiffness No other const Prepare and r 	appear adequate appear adequate cerns utach a sketch	Y Y Y Y	NNNN	UU	N/A N/A N/A
Are anchorages ade	quate based on judgement	Y	N	U	
Interaction Effects					
 Vulnerable consequipment, st No collapse of the consequence of	omponents free from damaging impact by nearby ructures, etc. f overhead equipment, distribution systems, or masonry walls zrns	Y Y Y	N N N	U U	N/A N/A
ls equipment free a	f interaction effects?	Y	N	U	
Comments					
Reference Photos:	Roll Frames				
All senerts of the se	minment's seismic ademacy have been addressed				
Fundamental bar	Inchange a personal anertime a marc occu and cases.				
we wanted and the second					

Page C-12 of 12

WALKDOWN DATA SHEET

get an apagons	Agrice angers	while dance
N hai ha	pea .	(1)6
134 444	about de	VI.

Equipment ID No Equipment ID No.	ip. 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					
 Does strength appear adequate Does stiffness appear adequate No other concerns Prepare and attach a sketch 	Y Y Y Y	NNNN	U	N/A N/A N/A	
Are anchorages adequate based on judgement	Y	N	U		
Interaction Effects					
 Vulnerable components free from damaging impact by nearby the ipment, structures, etc. 	Y	N	υ	N/A	
 No other concerns 	Y Y	N N	U	N/A	
Is equipment free of interaction effects?	Y	N	U		
Comments					
	Rent Pringt Housened are a series				
Reference Photos: Roll Frames				tres rold in sources	
All aspects of the equipment's seismic adequacy have been addressed.					
Evaluated by: Date:					
Evaluated by: Date:					

Revision 0 March 17, 1993 Page C-2 of 7

WALKDOWN DATA SHEET

AL 10 10	Service Services		1000.000	
1.14	der der 1		135	
31.1	A started		UR I	
		- distantion	10000	_

Syst	m Main Steam				3
Eq	uip. Class Piping and Tubing Systems Line Identifier Main 5te	am	dr	21	n
+	o windenser				
Bld	E Turbine Building Floor El 112:3, 1	30-0	ę	14	7-0"
P&1	DNO. H-31031(H-8), H-26000(EII)Spec. No. 2N22-E	EE			
Isor	netric No. 2N22-162, 2N22-163, 2N22-164	, ŧ	21	12.	2-165
Pipe	Tubing O.D. 3" nominal Wall Thickness . 343	1			
Mat	erial A 106 Gr B 5ML5				
Insu	lation Type/Thickness (insulated)				
Pipi	ng System Boundary -(2NGI-8001B)				
Des	cription 3" pipe from Condenser connec	tion	#	51	to
R	B*2 penetration (running to MO-FORI) wh	ich	15	weater
PI	Col. Line RA, 3'-6" N. of T15 @ EL 149 -1 pe is mostly supports by rods. ctionality Requirement	01/4".	5	uk	oj <u>ec</u> t
1.	Pressure Boundary Integrity	\odot	N		N/A
Rev	iew Criteria - Piping and Tubing				
1.	No visible damage	0	N	U	N/A
2.	No significant visible rust/corrosion deterioration	0	N	U	N/A
3.	No potentially brittle connections (threaded joints, expansion joints, etc.)	0	N	U	N/A
4.	Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) - 5 2 2 Comment * 1.	~D	N	U	N/A
5.	No unusual pipe or tubing attachments	0	N	U	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	0	N	U	N/A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement (see, com	Y mart 2	B	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	0	N	U	N/A
9.	No stiff branch piping attached to the main line with potentially	Ŷ	N	U	N/A
10	No excessive sagging, crimping or damage to tubing	Ø	N	U	N/A
11	No large eccentric masses	D	N	U	N/A
12.	No other concerns (if no, comment on separate sheets and attach)	0	N	U	

March 17, 1993 Page C-3 of 7

WALKDOWN DATA SHEET

. . .

Syst	m Main Steam Heater Drains Equip. Class Pipine	and T	ubing	Syste	ms
ine	Identifier Main steam drain to condense	r	_		
Revi	ew Criteria - Supports				
	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps	\odot	N	U	N/A
	Short fixed end threaded rods	N	N	17	NI/A
	No visible rust/corrosion deterioration	X	N	U	N/A
÷	No unusual design	N	N	U	N/A
6	No customized parts used in place of calalog parts, which appear concernate	XX	N	U	N/A
	Free of support details which appear to have been mapping shows and but	X	N	U	N/A
č.	No visible dallage	00	N	U	N/A
* 7	Do concrete anchors appear to be ademate	Y	N	D	N/A
9. I	(Bolt centerline distance to: edges, adjacent holts, shandoned holes, etc.) - (Sol	e out	1:0-	- # 1)
	Does the load nath appear adequate	0	N	U	N/A
0.	No additional concerns (If no, document comments on separa' sheet and attach)		N		
ле	the above criteria met? (Pending on # B)	Y	N	U	
nte	action Effects				
	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment structures, etc. $(5ee$ Comment # 3)	\odot	N	U	N/A
	No collapse of overhead equipment, distribution systems, or masonry walls	Q	N	U	N/A
	No other concerns	D	N	U	N/A
ec	uipment free of interaction effects?	Ý	N	U	
s th	e piping/tubing system seismically adequate?	Ŷ	N	υ	
on	ments All interactions are non-dama	gi	na	4	ype
P. 400 (1000)					
left	rence Photos: Roll Frames				
.11	spects of the equipment's seismic adequacy have been addressed.				
			0-		
Eval	uated by: Janny ("M-Manus Date: 3-2	0 -	93		
va	uated by: Stark P. Harne Dar 3-	20 -	93		

Revision 0 March 17, 1993 Page C-4 of 7

WALKDOWN DATA SHEET

System Moin Steam Heater Drains Equip. Class Piping and Tubing Systems
Line Identifie: Main steam drain to condenser
Comments/Outliers <u>Comment</u> "1: There are cases where
the spans exceeded the ANSI 031-1 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
lino privetrates T.B. at Colmin T-14 in structure 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.
<u>Comment * 3: There are many interactions between</u>
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 nits duct support rods. Photo 3-3
(2) other pipes hit subject pipe support's rods.
(3) Subject 3" pipe interacts with 2-2" p and 1.1" pipes.
(A) Subject 3" pipe touches Clevis assembly of al Monas
Small bore pipe. This is not a concern since this
scovs at a hard point (support) on subject pipe.
pipe of similar diameter. PLot 2-1

March 17, 1993 Page C-5 of 7

WALKDOWN DATA SHEET

System	Main	Stear	n Hez	ater D	rains	Equip.	Class Pipin	g and Tu	bing Systems
Line Identifier	Ma	in s	team	dra	in to	s co	nden	ser	
Comments	The	Figi	RE	below	îs_	for	outli	ier	# 1.



	March 17, 19 Page C-2 of 7	93	1
WALKDOWN DATA SHEET			
SUPER OF 5			
IL SHEET OF			
ysteral HETEDINTO EJEE (In P. 7	NIFOR	fiter "	17 11
Equip. Class <u>Piping and Tubing Systems</u> Line Identifier <u>ZNU-6¹⁷E</u>	EE		
		~	
rioor El.			
&ID No. 5760054 5750757 Spec. No. 6 EE	E		-
ometric No. [X] = = = = = X.72 = X.22=2 [e 1	c.	
pe/Tubing O.D Wall Thickness			
aterial			
isulation Type/Thickness			
ning System Roundary			
LUTITE ATT STRUCT LUTITET AND ATTACKS T			
THE STATEM DUTING	from the second		1
Description Frei US ICA 60- TO - =.	ECIN	=?'	\
Pescription Frei US INS A 60- TO - 3.	Ecilia E F	= ? '	1
escription Freis NE IS A 60- TO TE	E.e.I.	=?'	<u>\</u>
escription Freis NE IS A GC- TO FE	E.C.I.	=?'	
escription Frei NEITE A 60-76-3 101025 ZIMI-FOORI-SE FOORA IETE MONTO unctionality Requirement	E.C.I.	=?'	N - 12 - 12 - 12
escription Frei VEIRE A 60-76 - 31 1/2/200 ZINIL-FOREL-EFOR PA VEIFF MARKEN	EC:1-	=?'	
escription <u>FTER NEAGE TO FE</u> <u>I ANGE ZIMI-FORGI-SE</u> <u>FTC9A</u> <u>I E T F TO A</u> <u>unctionality Requirement</u> Pressure Boundary Integrity	YN	=?' ?_:C N/	A NA
escription <u>Frein NEINE A 60-76 - 30</u> <u>- 101025</u> <u>ZDUI-FOORI-6F. FOORA</u> <u>IETT + MEDICA</u> <u>unctionality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u>	YN	=?' ?_:C N/	
escription <u>Frei/NE/A66-T6</u> <u>I/A/RES ZIAIL-FORMI-EE FORMA</u> <u>IETT + MARKE</u> <u>unctionality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u>	YN VN	=?' ?_:C N/	
escription <u>FERINE NEAGETS</u> <u>Includes</u> <u>ZIMI-ECCEL-EFFC9A</u> <u>IEEE FOO9A</u> <u>Inclinality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible damage	Eleitor F	=?' ?_:C N/ U N/	
escription <u>Trend ME in C. A. 60-75-55</u> <u>Includes ZIMI-FORELSE For 9A</u> <u>Inclinality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible damage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints expansion joints etc.)	(Y) N NNN	= ? ¹ N/ U N/ U N/ U N/ U N/	
escription <u>TERM NEME A 66-T6</u> <u>Includes ZNU-FOREEF FOR 9A</u> <u>IETH MARKED</u> <u>Inclinality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible damage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints, expansion joints, etc.) Do the support spans appear to follow requirements (ANSI B31.1 for	ECT: F (Y) (Y)(Y)(Y)	E 2 1 C N/ U N/ U N/ U N/ U N/ U N/	
escription <u>FTER NEACCESEE</u> <u>includes</u> <u>ZNIE A 665555555555555555555555555555555555</u>	E C F (Y) (Y) (Y) (Y) (Y) (Y) (Y) (Y) (Y) (Y)	E 2 1 C_:C N/ U N/ U N/ U N/ U N/ U N/	
escription <u>Frei/ US IIE A 6657555</u> <u>Incline Strick DE IE A 66575555</u> <u>Incline ZDUI-France IEE - Frange</u> <u>Inclinality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible damage No visible damage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints, expansion joints, etc.) Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) No unusual pipe or tubing attachments	E C F N N NNN N		
escription <u>Treil NE trei A (C T6 T5</u> <u>inctionality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible damage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints, expansion joints, etc.) Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) No unusual pipe or tubing attachments No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	E C F (Y)	E 2 1 C _ C _ C _ C _ C _ C _ C _ C _ C _ C _	
escription <u>Freil</u> <u>MELTE</u> <u>A</u>	E C F (r) (r) (r) (r)		A A A A A A A A A A A A A A A A A A A
escription <u>Fred</u> <u>NETRE</u> <u>A</u>	E C F (r)	E 2 1 C N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/	A AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
escription <u>Freil VE TE A 66576</u> <u>inctionality Requirement</u> Pressure Boundary Integrity <u>eview Criteria - Piping and Tubing</u> No visible danage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints, expansion joints, etc.) Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) No unusual pipe or tubing attachments No heavy valves, flanges etc. supported by small bore vent and/or drain pipes Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement No fittings (bellows, flexible hoses, etc.) which can be adversely	E C F () () () () () () () () () () () () ()		A AAAA AAAA A
escription <u>Fred</u> <u>PEACE</u> <u>A</u>	E C F (Y)	U N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/	A AAAA AAAA A
escription <u>Freil PErres A 66556</u> escription <u>Freil PErres A 66556</u> <u>escription Freil PErres A 66556</u> <u>escription Freils A 665566</u> <u>escription Freils A 6655666</u> <u>escription Freils A 6655666</u> <u>escription Freils A 6655666</u> <u>escription Freils A 6655666</u> <u>escription Freils A 66556666</u> <u>escription Freils A 66556666</u> <u>escription Freils A 665566666666666666666666666666666666</u>	E C F () (YOF) () () () () () () () () () () () () ()	E 2 1 C N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/ U N/	A AAAA A AAAA A AAAAAAAAAAAAAAAAAAAAAA
escription <u>Freil VE TE A 66555</u> escription <u>Freil VE TE A 66555</u> <u>Inctionality Requirement</u> Pressure Boundary Integrity eview Criteria - Piping and Tubing No visible damage No significant visible rust/corrosion deterioration No potentially brittle connections (threaded joints, expansion joints, etc.) Do the support spans appear to follow requirements (ANSI B31.1 for piping, 6'-0" max. for tubing) No unusual pipe or tubing attachments No heavy valves, flanges etc. supported by small bore vent and/or drain pipes Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements No stiff branch piping attached to the main line with potentially significant movements No stiff branch piping attached to the main line with potentially significant movements	E C F (Y)	E 2 /	A AAAA A AAAA A AAAAAAAAAAAAAAAAAAAAAA
escription <u>TERM VENCE A 6655555</u> escription <u>TERM VENCE A 665555555555555555555555555555555555</u>	E C F (Y)	U N/. U N/.	A AAAA A AAAA A AAAAAAAAAAAAAAAAAAAAAA
escription <u>Frei/NEMEA</u> <u>A</u>	E F (r)	E 2 1 C _ C _ C _ C _ C _ C _ C _ C _ C _ C _	A AAAA A AAAAAAAAAAAAAAAAAAAAAAAAAAAAA
escription <u>Trei/ VE VE A 665555555555555555555555555555555555</u>	E F (P)	E 2 1 C N/ U N/ U U N/ U	A AAAA AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Marc	h	17.	1993	
Page	C	.3 1	of 7	

517 A T	VTYTY	TATES	273 A 199 A	And A subscription where
WAL	KUN	W N	DAIA	SHEET

.ind	: Identifier				
lev	iew Criteria - Supports				F
	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps	Y	N	U	N/A (
	Short lixed end inicated roas	T	N	**	ATLA
	No unucual design	K	N	U	N/A
	No customized nexts used in place of catalog parts which sweets inclosure	to	N	U	N/A
	Free of support details which arrear to have been inampropriately altered	V	N	TI	NI/A
	No visible damage	v	IN	U	DU/Ph
	No inappropriate support settings (bottomed spring hangers etc.)	â	N	II	NIA
	Do concrete anchors appear to be adequate	-	N	II	N/A
	(Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.)			~	THIN
	Does the load path appear adequate	V	N	17	N/A
0.	No additional concerns (If no, document comments on separate sheet and attach)	Y	N	~	19175
re	the above criteria met?	v	5	11	
		1	"	U	
<u>)10</u>	action Effects		~		
	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc.	Y	N	U	N/A 4
	No collapse of overhead equipment, distribution systems, or masonry walls	Y	(N)	U	N/A
	No other concerns	Y)	N	U	N/A
	the second s	The second			
cq	uipiment tree of interaction effects?	Y	N	0	
th	e piping/tubing system seismically adequate?	(Y)	N	υ	
om	ments Everen colon - A contract of the	-	- 1		
1	de minor minite a main				
hourses and		The	(Enc	6	1
-	princtes a latora timita i latora en visa	4	100	1 -	afranceira (* 1
efe	rence Photos: Roll Frames (See Commen	+	65		
ll a	spects of the equipment's seismic adequacy have been addressed				
	C+ P	10-	(

Revision 0 March 17, 1993 Page C-4 of 7

WALKDOWN DATA SHEET

SHEET 3 OF 5

Equip Class Piping and Tubing Systems Line Identifier ZN(1-6 EEE Comments/Outliers AURIDE ELS 11410 # 10 12 14 1 1 2 2 2 hand - OT r. 11 VIVO 5:11 21000 2 P1 147 J.PTM Na iva PHOTO 4-1 4-3 -: Siler SUCT (01) 151105 10 35 0 5 va: pac DER about NA 101 PI Co 21 MOU V damaaina 161 14 Ipv line dirain NOPO 11 ale 12 4-5 Pac 250 nIN IN 12 DW 10 nd

March 17, 1993 Page C-4 of 12 4

WALKDOWN DATA SHEET
SHEET 4 OF 2
System HP Stean to SIAE Equip. Class Piping and Tubing Systems
Line Identifier 2A)11-6° FEE
Comments/Outliers
Connert 5: Interaction 15 ed with
valve 2N33-FOOR - Non-damaira.
Commento: 8" Fire Protection line locital
above live, The Comment 3, parkage
(1" Trais from SJAF Supply to 12" - PIER /
PHOTO 4-2
Donner TI Portor & the garage see
not merrectable
· - For enerry mostelloon M'9" cont
OF C.L. TI ='6' cost of CLTIG
Elev 157'51/2" allow western wall voti
to EW run at Cit. TIS due
to accest
· along EW run at CL TI5 due
to atcass and corportion.
There Se Marine and the second
+j, 12 10 1 - 12 - 12

×X

E

Revision 0 March 17, 1993 Page C-6 of 12

-

WALKDOWN DATA SHEET

SHEET OF				
ystem <u>SJAE</u> P&ID No. <u>H</u>	-21	26	66	
Valve. ID No FOOSA - 009A, -044A Equip. Class	Active	Valv	es	
Valve Description PRESS, CONTROL VLV Isometric No.	4-21	13	2	
Valve Location: Bldg. TURBINE BLDE Floor EL 112 R	oom, Ra	w/Co	<u>S</u> 10	TAE R.
Ianufacturer, Model, Etc.				
Prawing No				
unctionality Requirement				
Valve state change required	Ŷ	N	U	
eview Criteria				
Does valve operator meet pipe centerline dimension restriction	X	N	U	N/A
Valve operator is not supported independently of pipe	S	N	U	N/A N/A
se the criteria met?	Y	N	U	
iteraction Effects				
Vulnerable valve components free from impact by nearby equipment or structures	X	N	U	N/A
Are any required electrical controls free of water spray interactions	S	N	U	N/A N/A
No other concerns	Y	N		N/A
equipment free of interaction effects?	Ð	N	U	
equipment seismically adequate?	Y	N	U	
comments				
			alt.a	
eference Distant Doll Frames				
elerence Photos. Roll Planes				
all aspects of the equipment's seismic adequacy have been addressed.	100			
valuated by: Cader & - 200 Brian Date: 3/24/	2.2			
	and the second se			

Revision 0 March 17, 1993 Page C-6 of 12

4

WALKDOWN DATA SHEET

4

SHEET OF				
iystem <u>SJAE</u> P&ID No. <u>H</u>	-21	05	6	-
Valve ID No. 2NII-FOOBB, FOO9B, FO44B Equip. Class_	Active	: Valv	es	nik silan telebahan nemagai
Valve Description PRESS, CONTROL VLV Isometric No. 1	4-21	13	2	
Valve Location: Bldg. TURBINE Floor El. 112 Re	oom, R	ow/Co	R	r B
Manufacturer, Model, Etc.				
Drawing No				
unctionality Requirement				
. Valve state change required	Y	N	U	
leview Criteria				
Does valve operator meet pipe centerline dimension restriction Do valve power and control utilities have adequate slack Valve operator is not supported independently of pipe are the criteria met?	3399	ZZZZ	U U U U	N/A N/A N/A
nteraction Effects				
 Vulnerable valve components free from impact by nearby equipment or structures No collapse of overhead equipment, distribution systems, or masonry walls Are any required electrical controls free of water spray interactions No other concerns 	SBB+	zzzz	U U U	N/A N/A N/A N/A
s equipment free of interaction effects?	Y	N	U	
s equipment seismically adequate?	Y	N	U	
Comments				
		_		
teference Photos: Roll Frames				
All aspects of the equipment's seismic adequacy have been addressed.				
valuated by Robert D. Hooteway Date: 3/24	193	3		
valuated by A annu OM - Manuz Date: 3/24/	93			

Page C-7 of 12

WALKDOWN DATA SHEET

SHEET & OF 2

System SJAE Valve. ID No. 2N/1 - FOOBB FOOBB FOO44 B Equip. Class Active Valves Comments/Outliers OUTLIER #1 VLV OPERATOR TROXIMITY INTERATE SU ON ALL THEER ILVS. THERE IS A COMMODING (3" PIFE/ FLANGE) WITHIN APPROX 3" OF THE VLV. OPERATIL DIAPHRAGMS THE 3" & LINE IS ROD HUNG. THIS POTENTIAL INTERACTION REQUIRES FURTHER EVALATIN TO DETERMINE THE CREDIBILITY INTERACTION AND THE TO DETERMINE THE EFFECT OF AU MARTIN DIS THE VALVE. ST. 4-1

Page C-12 of 12

WALKDOWN DATA SHEET

. 4

3.

3

. •

699.9	ingenerations angen	1. 194.10	a 12
20	per per	/ []}	6 21
Bar 6. 4	followither do	the mark	CPR.

Equipment ID No.	Equip. Class RACK
Equipment Description INSTRUMENT RACK (FOR SJ	AE INSTRUMENTS)
Equipment Location: Bldg. TURBINE (TG-T21/22)Floor	EL 1/2 Room, Row/Col
Manufacturer, Model, Etc PS N313, FT 315,	PT 319, PT 329 ANB
Drawing No.	
Functionality Requirement	
1. Function Required(Specify)	Y (N) U
Review Criteria	
1. Is component of good seismic design for function above	Ŷ N U N/A
(speci/y)	
Are the criteria met?	Y N U N/A
Anchorage	
 Does strength appear adequate Does stiffness appear adequate No other concerns 	Y N U N/A N U N/A
4. Prepare and attach a sketch	Y N SEE SKETCH
Are anchorages adequate based on judgement	Y N DARLERI
Interaction Effects	
 Vulnerable components free from damaging impact by nearby equipment structures, etc. 	Y N U N/A
 No collapse of overhead equipment, distribution systems, or masonry wal No other concerns 	lls Y N U N/A
Is equipment free of interaction effects?	Y N U
Comments OUTLIER 1: ONE ANCHOR BOLT IS	MISSING. AN
EVALVATION 13 REQUIRED. SEE SKE	TCH & PHOTOS 4-12415
Reference Photos: Roll Frames	(
All aspects of the equipment's seismic adequacy have been addressed.	
Evaluated by: Royard D. Hookway Date:	3/25/93
Evaluated by: Danny C. M. Manus Date: 3	125193
	E®



T

Page C-12 of 12

6

WALKDOWN DATA SHEET

. . . .

Commence in				
CTI	officers where the states		1272	A
3 1-1	and her 1	1	1 1 1 1	aller .
100.00	bothetidad de	- sectors -	749 A.	

and the descention of the manufacture of the manufacture of the manufacture of the manufacture of the second secon	11
Equipment ID No Equ	uip. Class <u>EXCHANCER</u>
Equipment Description STEAM JET AIR EJECTLE	
Equipment Location: Bldg TURBINE Floor EL	122 Room, Row/Col SJAC
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	YN U N/A
(specify)	
Are the criteria met?	Y N U N/A
Anchorage	
1. Does strength appear adequate	Y N W N/A
 Does stillness appear adequate No other concerns. 	Q N U N/A
NO OLLET COLCETIS Prepare and attach a sketch	X N N/A
Erepare and andren a section	N DEETLH
Are anchorages adequate based on judgement	Y N USEC
Interaction Effects	
1. Vulnerable components free from damaging impact by nearby	Ŷ N U N/A
2 No collarge of overhead emirgrant distribution externs on measure and	W AT I W OUTC
3. No other concerns	Y N U NA Z
ls equipment free of interaction effects?	Y N U
Comments SEE PHOTUS 4-6 THRU 4-9	
Reference Photos: Roll Frames	
All aspects of the equipment's seismic adequacy have been addressed.	,
Evaluated by: Report & - Hookuray Date: 3/2	5/93
Evaluated by: January M. Manun Date: 3/25	5/93
0	R

WALKDOWN DATA SHEET

SHEET 2 OF 4

System _____SJAE HEAT EX Equip. Class Active Values--Velve ID No. Comments/Outliers OUTLIER 1 A DETRICED ANCHORAGE EVALUATION IS REQUIRED. SEE ATTACHED SKETCH OUTLIER 2 A BLOCK WALL EXISTS AT THE ENTRY ENO OF THE ROOM, AN EVALUATION S REQUIRED TO QUALIFY THIS WALL SPE 17-10 4-14

UU



JOB HATCH IT MISIK JOBNO. ROF SUBJECT SJAK ANCHURAGE SKETCH CALCNO. BY CON DATE 3/24/93 CHKD S. M. Manue DATE 3/24/93 SHEET NO 4 OF 4





March 17, 1993	6-2
Page C-2 of 12	

WALKDOWN DATA SHEET

States in the second states in the	- V	other second
the second second	- 7	C
Sec. 1. 1		5 38"
254. Belleviller A		~~ F.

Syst	em MAIN STEARN & MIS LIKAN				
Equ	tip. Class Piping and Tubing Systems Line Identifier 2321-03/3-3	2112	dan ar	523	5 - 3 -
2	3-21-24" 383-1"				
Bldg	PLAST BUILDING STAN FLOOR EL & 130 C	olms RA	-12	46	5 7 - Z
P&I	D No H - 26000 Spec. No.				
Ison	netric No. 21321 - F 10, 11, 12, 8, 15, 17, 18, 19, 20				
2	122- F15, 121, 161, 162 TYPICALS OF AL	4 TRA	ins		
Pipe	/Tubing O.D. 24", 3', 2", 1", 3/4 Wall Thickness				
Mate	erial				
Insu	lation Type/Thickness VES				
Pipi	ng System Boundary				
Desc	miption SYSTEM NOLUDET ATTUE VALUES FORIS	FOZ	e		
N	(TRAN KANTANA	diard	CA	pris	
2K	FIND CONDENSER & CROSSOLERS				-
Fund	tionality Requirement				
1.	Pressure Boundary Integrity	Y	N		N/A
Revi	ew Criteria - Piping and Tubing				
1.	No visible damage	Ý	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	I	IN	U	N/A
5	No unusual nine 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	Ū	N/A
7.	Does the piping configuration at building joints appear to have adequate flexibility to accommodate seismic induced differential movement	T	N	U	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely affected by seismic induced differential movements	D	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	X	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)	Ŷ	N	U	
Are	the criteria met?	Y)	N	U	

Are the criteria met?

1

B

50108-P-01 Revision 0 March 17, 1993 Page C-3 of 12 2>

00

WALKDOWN DATA SHEET

SHEET ZOF

Syst	em MS + MS DPA Equip. Class Piping	and T	ubing	<u>rs</u>	ems	
Line	Idemaisier 23-2 \$ 2N22					
Revi	ew Criteria - Supports					
1.	No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps	Ŷ	N	U	N/A	
2. 3. 4. 5. 6. 7. 8.	No visible rust/corrosion deterioration No unusual design No customized parts used in place of catalog parts, which appear inadequate Free of support details which appear to have been inappropriately altered No visible damage No inappropriate support settings (bottomed spring hangers, etc.) Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.)	× ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	ZZZZZZZ	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	N/A N/A N/A N/A N/A N/A	
9. 10.	Does the load path appear adequate No additional concerns (If no, document comments on separate sheet and attach)	YY	N	U	N/A	
Are	the above criteria met?	Y	N	U		
Inte	raction Effects					
1. 2. 3.	Vulnerable pressure boundary appurtenances free from damaging impact by nearby equipment, structures, etc. No collapse of overhead equipment, distribution systems, or masonry walls No other concerns	Y) (2)(2)	N N N	U U U	N/A N/A N/A	र्षेण्ट ११
Is e	quipment free of interaction effects?	Ŷ	N	U		
Is th	e pipping/tubing system seismically adequate?	Ý	N	U		
Cor	AMERICAN MEDI RESTRAINED WITH BICLATERAS	Y PRO	12 -	50	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
AL	- PUNS.					
-						
Ref	erence Photos: Roll Frames					
All	aspects of the equipment's seismic adequacy have been addressed.					
Eva	Justed by S- Pthe Date: 5-54	1-9:	3			
Eva	Justed by: Punt Marpul Date: 3-2	4-	93	3		

March 17, 1993 (2) Page C-4 of 12

EG

WALKDOWN DATA SHEET

SHEET 2 OF ____

System MS & MS DRAN	Equip. Class Piping and Tubing Systems
Line Identifier 2821 \$ 2N22	
Comments/Outliers	
TOMMONT I VALVE HANDLES DI	N 2E 32 = 3005
ARE IS PROXIMINY TO PIPE	SUPPORT STRUT
CERRANCE IS APPROXIMATELY I	INCH. ALL COMPONENT
PIPE & VALVES AND STRUT ARE	- SUPPORTED CLOSE
TO THE COMPONENTS MUD TO THE S	AME STRUCTURAL
SISTEM, PROVINITY CONDITION	1 15 5201.00
ALTPITLE SEE PHO 23-	1
CHAMOUT 2 3"HIGH POINT JENT .	INTUE FU-007 SHOWN ON
IN22 - FIZI & 161 NEAR TB POVE	RATION IS IN
PREAMITY TO ANOTHER PIPE RUNNIN	A HORIZONTAL
(CET PHOTO 23-2), HGH POINT VON	TISON MS DRAIN
VERY CLOSE TO TB PERU. OTHER	LINE IS LATERALY
SUPPORTO N DIRECTION OF PROD	KINITY COND. TON
LINE DISPLACEMENTS WERE JUD	RED SMALL IN
RELATION TO CLEARANCE.	
	A CONTRACTOR OF A CONTRACTOR O

50108-P-01 Revision 0 March 17, 1993 Page C-6 of 12

11

ES

WALKDOWN DATA SHEET

System MS DRAIN PO	LID No.	1-26	000	>	
Valve. ID No. 2821 - FO21 E	quip. Class	Active	Valve:		
Valve Description GATE VALUE - MO Isc	ometric No.	282	1-1	7	
Valve Location: Bldg. CB. STEAM CHASE Floor EL & M	30	Room, Ro	w/Col	LA	1819
Manufacturer, Model, Etc.					
Drawing No.					
Functionality Requirement					
1. Valve state change required		Ŷ	N	U	
Review Criteria					
 Does valve operator meet pipe centerline dimension restriction Do valve power and control utilities have adequate slack Valve operator is not supported independently of pipe Are the criteria met? 		YYYYYY	(z z z z	U U U U	N/A N/A N/A
Interaction Effects					
 Vulnerable valve components free from impact by nearby equipment No collapse of overhead equipment, distribution systems, or masonry Are any required electrical controls free of water spray interactions No other concerns 	t or structure y walls	r ypp	ZZZZ	บ บ บ	N/A N/A N/A N/A
Is equipment free of interaction effects?		Y	N	U	
Is equipment seismically adequate? Officers PALVE IS SMIB-00 APPROX	WT =	¥ 185-1	N 200	10) # 7	> /00*
MOV TOP TO PIPE & IS 34 INCH	EST	300 #			
EVALVE IS CLOSE TO 3"D T.S LOL	UMN,	CLEM	RAT.	ICE	
TO TUBE STEEL IS 3/8/WKH, SEE PHO	10 23	-3.			
Reference Photos: Roll Frames					
All aspects of the equipment's seismic adequacy have been addressed.					
Evaluated by: Strangettes Date	3.	-24-	93		
Evaluated by: Security Maynes Date:		- 1-4-	27		

24	-			0	
K	evi	isic	m	0	
M	lar	ch	17	. 1	993
-		1	16	-	230

23

100

WALKDOWN DATA SHEET

SHEET OF

SI Links I man			
System MAIN STEAM	_P&ID No	4-2600	0
Valve. ID No. 2321 - FO28 A, B, C, D	Equip. Class	Active Valves	i
Valve Description MS ISOLATION VALUE	_lsometric No.		
Valve Location: Bldg. R.B. STOAM CHASE Floor EL	130 Fr 1	Room, Row/Col	RA-RB/R 17-2
Manufacturer, Model, Etc. $A \neq M$			-
Drawing No.			
Functionality Requirement			
1. Valve state change required		Y N	U
Review Criteria			
 Does valve operator meet pipe centerline dimension restriction Do valve power and control utilities have adequate slack Valve operator is not supported independently of pipe Are the criteria met? 		YYYYY	U N/A U N/A U N/A
Interaction Effects			
 Vulnerable valve components free from impact by nearby equipring. No collapse of overhead equipment, distribution systems, or mass Are any required electrical controls free of water spray interaction No other concerns 	nent or structures onry walls ons	2 Z Z Z	U N/A U N/A U N/A N/A
Is equipment free of interaction effects?		N N	U
Is equipment seismically adequate?		Y N	U
Comments MSIV PHYSICAL DIMENSION	5 ARE O	UTSIDE	
THE SCREENING (RITERIA. THE	VALVE	15 SAFE	TT/
RELATED AND MUALIZED WITH	THE M.	ANN STR	421
5./5TEM.			
Reference Photos: Roll Frames			
All aspects of the equipment's seismic adequacy have been addressed.	7-7	1100	
Evaluated by:	Date:	1-92	
Evaluated by: Selling Main D)aie:	+ 22	

ENCLOSURE 4



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

Job No. 50108	HATCH MSIV LEAKAGE ISSUE	By	SPH	Date	7-6-93
	MAIN STEAM DRAIN LINE MARGINS	Ck'd	DI Da	ne 1-11	1-94
Calculation 50108-C-0	Rev. 0	No. of Concession, Name	Sheet	2 of	10

TABLE OF REVISIONS

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

R
 1

HATCH MSIV LEAKAGE ISSUE By SPH Date 7-6-93 MAIN STEAM DRAIN LINE MARGINS Ck'd DI Date 1-11-94

Calculation 50108-C-01 Rev. 0

TABLE OF CONTENTS

1.0	Purpose	4
2.0	Methodology	4
3.0	Piping System Response Estimation	5
4.0	Seismic Demand	5
5.0	Pipe Support Component Capacities	6
6.0	Evaluate Capacity vs Demand Ratios for Support Items	8
7.0	Calculate High Confidence Low Probability of Failure	8
8.0	Summary and Conclusions	8
9.0	References	9
Figure	1 Component Standard Support Items	7
Attach	iment	A-

Job No. 50108

Calculation 50108-C-01 Rev. 0

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.

Job No. 50108	HATCH MSIV LEAKAGE ISSUE	By	SPH	Date 7-6-93	
	MAIN STEAM DRAIN LINE MARGINS	Ck'd	DI Da	ate 1-11-94	
Calculation 50108-C-01	Rev. 0		Sheet	5 of 10	

3.0 Piping System Response Estimation

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

Component Standard Supports Designed by Load Rating

. 승규는 것 같은 것을 가려면 이 것 같아요.

Loading Combination

Operating Mechanical Loads + Dead weight + Seismic

TL x 0.7 Su S.,*

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:

Job No. 50108	HATCH MSIV L MAIN STEAM DRA	EAKAGE ISSUE IN LINE MARGE	By SPH Date 7-6-93 NS Ck'd DI Date 1-11-94
Calculation 50108-	C-01 Rev. 0		Sheet 6 of 10
2	Sabadala 160 pipe	Pine	14.30 #/8
3 inch φ	schedule 100 pipe	Water	2.34 #/ft

Insulation

Total

4.75 #/ft (2 1/2 " C.S.est.)

Use

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 #

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 i 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.

Job No. 50108 Calculation 50108-C-	HATCH MS MAIN STEAM 01 Rev. 0	IV LFAKAGE ISSUE DRAIN LINE MARGIN	By SPH Date 7-6-93 S Ck'd DI Date 1-11-94 Sheet 7 of 10
	Componen	Figure 1	port Items
Item			Load Rating
 Concrete Attac Capacity Lug and Clevis 	chment with	H K. J	Use EPRI NP-5228 Bott 1/2" Phillips Wedge 4 Ksi Cont P _C = 6,870 lbs/bott
2. Threaded Rod		Д	Catalog Rating = 1130 lbs C = TL x 0.7 = 1130 # x 5 x .7 C= 3955
3. Steel Tumbuc	kie		Catalog Rating = 1130 lbs C = TL x 0.7 = 1130 # x 5 x .7 C= 3955
4. Steel Weldles	s Eye Nut		Catalog Rating = 1130 lbs C = TL x 0.7 = 1130 # x 5 x .

5. Steel Double Bolt Pipe Clamp

1



Catalog Rating = 1500 lbs C = TL x 0.7 = 1500 # x 5 x .7 C= 5250

Job No. 50108	HATCH MSIV LEAKAGE ISSUE	By	SPH	Date 7-6-93	Contraction and
	MAIN STEAM DRAIN LINE MARGINS	Ck'd	DI D	ate 1-11-94	
Calculation 50108-C-01	Rev. 0		Sheet	8 of 10	

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.

 $P_c = 2 \text{ bolts x } 6,870^1 \text{ } \# \text{ bolt x } 0.8^2 / 4.0^3 = 2,748$ 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 ≥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

Job No. 50108	HATCH MSIV LEAKAGE ISSUE	By	SPH	Date 7-6-93	
	MAIN STEAM DRAIN LINE MARGINS	Ck'd	DI D	ate 1-11-94	
Calculation 50108-C-01	Rev. 0		Sheet	9 of 10	-

9.0 References

- 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.
- EPRI NP 6041, A Methodology for Assessment of Nuclear Power Plant Seismic Margin(Revision 1). August 1991.
- EPRI NP 5228, Seismic Verification of Nuclear Plant Equipment Anchorage(Revision 1) Volume 1. June 1991.
- Newmark, N. M., W. J. Hall. Development of Criteria for Seismic Review of Selected Nuclear Power Plants. NUREG/CR - 0098. May 1978.
- Nuclear Regulatory Commission. Procedure and Submittal Guidance for the Individual Plant Examination of External Events for Severe Accident Vulnerabilities. NUREG - 1407. April 1991
- EQE Draft Report. "Hatch Unit 2 MSIV Seismic Verification Walkdown Report. May 14, 1993.
- 7. Bergen-Patterson Pipe Support Catalog 82-R. 1985

Job No. 50108

4

Calculation 50108-C-01 Rev. 0

APPENDIX

EXCERPTED DOCUMENTS

9 Pages

Attachment to EQE Calculation 50108-C-06. July 6, 1993 Page 1 of 9

Elevation (Ft.)	Direction	Freq. of Peak (Hz)	Factor	Factored Acceleration (Gs)	Factored Displacement (in)
112	NS	2.05	0.81	0.67	1.58
	EW	2.75	0.54	0.46	1.49
	Vort.	2.20	0.57	0.38	0.76
130	NS	2.25	0.61	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 Page				
50106-C-001 WAI KDOWN DATA SHEET				
Page 3 of 9				
SHEET OF				
System Main Steam Heater Drains Equip Class Piping	and T	ubing	Syste	:ms
Line Identifier Main Steam drain to condense	r			
Review Criteria - Supports				
 No seismically vulnerable supports details: One-way stanchions, brackets, etc. allowing piping to slide off Friction beam clamps without restraining straps Short ford and threaded rade 	Ø	N	U	N/A
2 No visible rust/corrosion deterioration	Ø	N	U	N/A
3. No unusual design	2	N	U	N/A
No customized parts used in place of catalog parts, which appear inadequate	R	N	U	N/A
Free of support details which appear to have been inappropriately altered	XS	N	U	N/A N/A
6. No visible damage	To	N	U	N/A
7. No inappropriate support settings (bolionico spring mangers, etc.)	Y	N	D	N/A
6. Do concrete anchors appear to be adequate (Bolt centerline distance to: edges, adjacent bolts, abandoned holes, etc.) - (5e)	2 00	Hier	# {)
9. Does the load path appear adequate	Q	N	U	N/A
10. No additional concerns (If no, document comments on separate sheet and attach)	0	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		N	U	N/A
equipment, structures, etc. (See Comment # 3)	3	N	IT	NZA
 No collapse of overhead equipment, distribution systems, or masonry waits 	X	N	U	N/A
3. No other concerns	-		Ĭ	
Is equipment free of interaction effects?	Y	N	U	
Is the nining/tubing system seismically adequate?	3	N	U	
NU la true me non dama	01	~~	1	TIMPE
Comments All Interections are Twill- Comme	5	C		Abra.
		V		
	anis ina manina ina		-	
Reference Photos: Roll Frames				
All aspects of the equipment's seismic adequacy have been addressed.				
An AMPHAN 20	0-	93		
Evaluated by: Date: Date:	~	10		Constant and the second se
Evaluated by: Stand P. Hang Date: 3	10 -	93		
2 Phase-cold Conservation and a service and the service of the ser				

a.	- FOF Coloriation	farch 17. age C-2	, 1993 of 7	3	
Tachment (WALKDOWN DATA SHEET				
106-0-001					
ge 4 of 9	SHEET OF			1	3
System	Main Steam				
Equip	Class Piping and Tubing Systems Line Identifier Main Ste	am	dra	211	\
to	undenser	ale accession of a system of state			
Bidg.	Turbine Building Floor El. 112:3, 13	30'-0,	ų.	14	<u>1- 0''</u>
P&ID	No. H-21031(H-8), H-26000(EII)Spec. No. 2N22-E	EE			
Isome	Dic No. 2N22-162, 2N22-163, 2N22-164	, 	21	22	-165
Pipe/1	ubing O.D. 3" nominal Wall Thickness . 343	1			
Mater	A 106 Gr B. SMLS				
	in The Thistopres (insulated)				
Insuia	non Type Turcaness Start Start Start				
Pipin	System Boundary (2NGI - BOO1B)	1. S. S. S.			
Dence	and a " o pipe from condenser connes	tion	44 5	1	to
RR	*2 constration (running to MO-FOR1) whi	ch	15	Loca
	- personal and a second and a	-4.0	5	. 1	test
at	Col. Line RA, 3-6" N. of 715 @ EL 149-1	014 .		uc	fee
P / f Funct	ionality Requirement supports by rods.				
1.	Pressure Boundary Integrity	Y	N		N/A
Revie	w Criteria - Piping and Tubing				
	No visible damage	Ø	N	U	N/A
2	No significant visible rust/corrosion deterioration	Ø	N	U	N/A
3	No potentially brittle connections (threaded joints, expansion joints, etc.)	Sin	N	U	N/A
4	Do the support spans appear to follow requirements (ANSI B31.1 for	0	N	U	N/A
	piping 6'-0" max for tubing) - See Comment 1.	(The		**	37/4
-5.	No umusual pipe or tubing attachments	A	N	11	N/A
6.	No heavy valves, flanges etc. supported by small bore vent and/or drain pipes	ų	R	TT	N/A
7.	Does the piping configuration at building joints appear to have acequate		New .		100
	flexibility to accommodate seismic induced differential movement (See Con	im on i s	N	IJ	N/A
8.	No fittings (bellows, flexible hoses, etc.) which can be adversely	-			
	affected by seismic induced differential movements	R	N	U	N/A
9.	No star orance piping attached to the main the with potentially	-			
	significant indventents	(B)	M	1.16.10	
	a service and a service of damage to hiking	- der	2.4	U	N/A
10.	No excessive sagging, crimping or damage to tubing	Ì	N	U	N/A N/A
10.	No excessive sagging, crimping or damage to tubing No large eccentric masses	B	NN	UUU	N/A N/A
10. 11. 12.	No excessive sagging, crimping or damage to tubing No large eccentric masses No other concerns (if no, comment on separate sheets and attach)	B	X X I	U U U	N/A N/A

CARAMERS W

Attachment to EQE Calculation 50108-C-001 July 6, 1993 Page 5 of 9

WALKDOWN DATA SHEET

SHEET __ OF ___

System Mein 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 031-1 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 lows (not at elbow and is vented to the condenser). commont #2: This piping is mostly supported by rods; Drain lino penetrates T.B. at Colmn T-14 in structure | joint - See Photo 3-1 There was an archor bolt spacing violation Dutlier 1: This needs further evaluation. See Figure TOR additional details & Photo 3-2. commont # 3: There are many interactions between the subject pipe and other P.S. rods as well other pipes of similar diameter. These 25 indeed acceptable-as-is since are are non-damaging type interactions. few as follows: To name a Subject pipe hits duct support rods. Photo 3-3 (1)Other pipes hit subject pipe support (2) Subject 3" pipe interacts with 2-2" and - 12 pipes (3)Subject 3" pipe touched Clevis assembly of a (4) Small bore pipe. This is not a concern since this occors at a hard point (support) on subject pipe On riser @ condenser subject pipe interacts will another pipe of similar diameter. Photo 3-6 (5)

Revision 0 March 17, 1993 Page C-4 of 7



FIGURE 00>3P

(on ceiling)

Attachment to EQE Calculation
 50108-C-001
 July 6, 1993
 Page 7 of 9

No.

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 f't	Strength (ksi)	(kips)
3/8	P V	<u>2.0</u> 2.20 3.61	<u>2.5</u> 2.74 3.83	<u>3.0</u> 3.29 4.04	<u>3.5</u> 3.84 4.25	<u>≥4.0</u> 4.39 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

Attachment to EQE Calculation 50108-C-001 July 6, 1993 Page 8 of 9

Table 0-2

RECOMMENDED EXPANSION BOLT SAFETY FACTORS TO BE USED IN CDFM EVALUATION

Shear: $F_s = 2.0$

Tension:

		ts				
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)

- ·

Attachment to EQE Calculation 50108-C-001 July 6, 1993 Page 9 of 9

(Real	A STATE	POAT				7.53	
1925	Som.	[** 8.3415 ***	THELDING CLEVIS ATTACAMENT	A State	ing - games	alarecommetelsignee	
	FE	- Although and	Marchine autorite and a state of the state o	Branna Bengh	n	an - (Same and	1. 32
	1.1	TIBBA	12" \$ 2 0'-2" LA . ROD 7 + 6" . TE + 6" LH.	1. 197. 1	e	12 3m2	-
photos	I	188 .	1/7" X G" F.S. TURNPLICKLE	17 wine-	-tablinduran		- came la
6	1	1.92A	1/1" " & Z '- 0" LO, WELDED EVE ROD THD. " To"	-		Conservation on the	a man abelia
16	1 1	1704	3 MPE CLAMP	1	19.0 m		· construct
17 -7	r	CS	ANUL "BY OHIN SHAR HALES AFF D NOT	B ~	P. P. A		ay- and the
Fia	17	1 - 1	1/4" & DULLIDE WEDEE ALCHAD	BU I	P (Tribe		- TAN
Fredding .	1 .		THE CHECKE AND THE AND	01	TEL		ppa
-	1			Conversion Constant			
there are	1. F	TOWA					ver
Presson and	1	AST				and a second second second	
personan .	1010	111	The The The The State of the St	-	d		77 300
11	AP 19	1	a provide the state of the stat	1.1.	1. 1	the my diff	
TT	F-1	1 .	1 Note and a start of the	TRO NO	ZNZ	2-123	4.25
Landa	17	1 5-	A manual Participation of the second se	BOHRE 1100	n fa	2 4 4 4	SARS
121	1	NY NY	L	FRUB. IN	h	1	Em
1-1-	10	1	+ Run	ISS. NO.		1. 6 16 2.	- Laker
1.1.	Im		PEDETAIL (2)	DATA PT	1 4	55 1	1520
1.	17					TEN!	
and a	1	1		1. 2.4	1.15	11.44	- property
14	08	1. 1. 1.			1 2 - 2	1 - 1	林调
	NU		EL 159-0"5"TI- T.	EIGHT	323	1	San .
hint :	in X		THERMAN	LOAD _	0	1	1211
ET.	AN	1. 1. 1.	SEISMIC	LD. (OBE			上在中心
1-1-	4	1 101	(2) MECH. L	DAD	1 200	一世生	日本
r	101		TOTAL L	DAD	315	1. THE	THE
	1.1		3 ALLOW I	CAO	1700	- tot	- wheel
51	1al				ar en a construction decision - 1	traine (Th	A Barry
11	10	in the	* TE LH		1	* - DE:	
	121	1	N (A)	and the second	1.5	- 1 ANOTES	-
	13		W	())	- 11	(11)
	DA		THOT	T	mahan	Y	Fired
1	4 100		(B) (B))		Hennessen .	
-	RY 85				NA.	4	
	k		이 물건 집에 감독했다. 이 것 않아야 하는 것 같다.			1	13
	20	1.11	# @ 1	1		1.00	TIL
	e i		the and	. 5	EE A	NALYS	15 24
	3		I (IY Y	111	SO. FOI	ALOC.	1 1
	10	1.1	EL. 149-642"			1	
1	2 401	1.00	ŦŦ (1.		1.40-	1.2
	3 4		2' DIDE EIVE			2.75	
	SS	1.000	FIFE SIZE		1.1	And the second second	100
	27	12.00	ELEV. LOOKING. EAST	1.2	LOCATI	ON PLAN	
	*	1.1.1.1	5	504	E-2	I don 10	1-1-0-40
	2			-	LOAD:	3154	TIM
	4	THE	M. W. KELLOGG CO P. O. # N - 7602 - 501 PIPING SYSTEM H	EATER	DRAINS	5	1.00
1	EN	SOL	THERN SERVICES, INC. AND REPERENCE DWG. H	-21148	3-2 (P:	ipe)	
	1		AN I HATT'H MINY FAD IN ANT, INIT 4 2		Q		1 .
14	ž1	CONSUME	MARE NO CNZZ-HD	- M13	MO. R	189'D.	
	2		RERGEN, PATERSON PIPESUPPORT CORP.	DRAWM	CHE D.	APPYS.	BA TE
1.1	110	TR		PW	RR	HIT	8-51-7
-	The second	AP/	D BRETTER, MARS. PETDER, N.S. C BAR PEAR DEC. GRAPP. 1 200	.00 804	72 Z	3.23	
11		Y	and the second	DWC NO	78179 9"	Tri Th 5	0