Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

November 17, 1997

Generic Letter 87-02

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to Request for Additional Information on the Prairie Island Nuclear Generating Plant, Units 1 and 2, Resolution of Unresolved Safety Issue A-46
(TAC Nos. M69474 and M69475)

By letter dated September 16, 1997, NRC requested additional information regarding our November 20, 1995 response to Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, USI A-46." Our response to that request is enclosed as Attachments 1 through 5 to this letter. This response contains no new NRC commitments, nor does it modify any prior commitments, though some actions are being completed early.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this letter.

Joel P. Sorensen

Joel P Sorensen
Plant Manager

A025 1/1

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
Kris Sanda, State of MN
J E Silberg

Attachments:

Affidavit
1. Response to NRC Request for Additional Information
2. Equipment Outlier Resolutions
3. Relay Outlier Resolutions
4. ANCHOR Software Evaluations
5. Calculations/SEWS

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT DOCKET NO. 50-282
50-306

Response to Request for Additional Information on the Prairie Island Nuclear Generating Plant, Units 1 and 2, Resolution of Unresolved Safety Issue A-46

Northern States Power Company, a Minnesota corporation, with this letter is submitting information requested by NRC Request for Additional Information regarding Generic Letter 87-02.

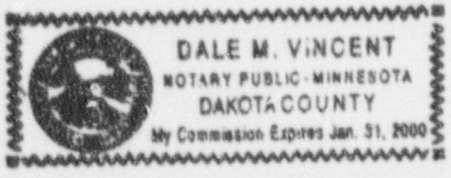
This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

BY Joel P. Sorensen
Joel P Sorensen
Plant Manager
Prairie Island Nuclear Generating Plant

On this 17th day of November 1997 before me, a notary public in and for said County, personally appeared Joel P Sorensen, Plant Manager, Prairie Island Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

Dale M. Vincent



Attachment 1

Response to NRC Request for Additional Information - USI A-46
Prairie Island Nuclear Generating Plant

1. In the letter of Reference 1, the licensee indicates its intent to apply the USI A-46 methodology to future verification of seismic adequacy of any new or replacement equipment or parts, which may also imply to include equipment identified as part of Regulatory Guide (RG) 1.97 or TMI Action Plan item II.F.2. However, the staff position in Item 2 of Section I.2.3 of the supplemental safety evaluation report (SSER)-2, which clarifies Section 2.3.3 of the generic implementation procedure (GIP)-2 regarding revision of plant licensing bases, is that any previous licensing commitments, such as for RG 1.97 and TMI Action Plan item II.F.2, are not superseded by the resolution methods of the GIP. Clarify your commitment with regard to the applicability of the A-46 methodology to new and replacement Category 1 equipment included in the SSEL [safe-shutdown equipment list] that are associated with RG 1.97 or TMI Action Plan item II.F.2.

   Response:

   We did not intend "...any new or replacement equipment..." to include superseding the conditions of SSER-2. We take no exception to Item 2 of Section I.2.3 of the supplemental safety evaluation report (SSER) -2 clarifying Section 2.3.3 of GIP-2. In complying with RG 1.97 and TMI Action Plan item II.F.2, the seismic qualification requirements are identified in the USAR. For Category 1 equipment included in the SSEL that are associated with RG 1.97 or TMI Action Plan item II.F.2, new and replacement equipment will continue to comply with the USAR.

2. Referring to the in-structure response spectra (ISRS) provided in your 120-day-response to the NRC's request in Supplement No. 1 to Generic Letter 87-02, the following information is requested:

   a. Identify structure(s) that have ISRS with 5% critical damping for elevations within 40-feet above the effective grade, which are higher in amplitude than 1.5 times the SQUG [Seismic Qualification Utilities Group] Bounding Spectrum.

   Response:

   Prairie Island is a relatively deep soil site. As such, the response is strongly influenced by the soil stiffness. The floor response spectra for the auxiliary-reactor-turbine building complex peak at about 3 Hz. Above about 3 Hz,

none of the floor spectra exceed 1.5 times the SQUG Bounding Spectrum (1.5BS). As none of the Class of Twenty equipment was adjudged to have fundamental frequencies near or below 3 Hz, the answer to this question is that no structures have ISRS (5% damped) above 1.5BS for elevation within 40' above effective grade above about 3 Hz.

b. With respect to the comparison of equipment seismic capacity and seismic demand, indicate which method in Table 4-1 of GIP-2 was used to evaluate the seismic adequacy for equipment installed on the corresponding floors in the structure(s) identified in Item (a) above. If you have elected to use method A in Table 4-1 of the GIP-2, provide a technical justification for not using the ISRS provided in your 120-day response.

Response:

As noted above, since none of the equipment is adjudged to have a fundamental frequency as low as 3 Hz, no equipment falls into this category.

c. It appears that some A-46 licensees are making an incorrect comparison between their plant's safe shutdown earthquake (SSE) ground motion response spectrum and the SQUG Bounding Spectrum. The SSE ground motion response spectrum for most nuclear power plants is defined at the plant foundation level. The SQUG Bounding Spectrum is defined at the free field ground surface. For plants located at deep soil or rock sites, there may not be a significant difference between the ground motion amplitudes at the foundation level and those at the ground surface. However, for sites where a structure is founded on shallow soil, the amplification of the ground motion from the foundation level to the ground surface may be significant. Clarify appropriateness of a direction comparison of the SQUG Bounding Spectrum with the Prairie Island plant ground motion spectrum.

Response:

The Prairie Island site is not a shallow soil site. The site is underlain by approximately 158'-185' of sandy alluvial soil over a 180' thick layer of competent sandstone of the Franconia Formation. The sandstone is underlain by other older sedimentary rocks. The Prairie Island maximum credible earthquake design spectrum anchored at 0.12g peak ground acceleration (PGA) is referred to throughout the Updated Safety Analysis Report (USAR) as ground acceleration design spectrum. As such, it is has been consistently interpreted as the free field ground surface spectrum. Conservatively, this ground motion has been used as the input to the foundation level of the building mathematical models for both the structural stress and response spectrum analyses. Similarly, the Regulatory Guide 1.60 motion (0.12g PGA) was also conservatively input at the foundation level for the seismic analyses of the recently constructed D5/D6 Building.

d. For the structure(s) identified in Item (a) above, provide the ISRS designated according to the height above the effective grade. If the ISRS identified in the 120-day response to Supplement No. 1 to Generic Letter 87-02 was not used, provide the response spectra that were actually used to verify the seismic adequacy of equipment within the structures identified in Item (a) above. Also, provide a comparison of these spectra to 1.5 times the Bounding Spectrum.

Response:

As noted in a.) above, no ISRS exceed 1.5BS above approximately 3 Hz within 40' above effective grade.

3. In the letter of Reference 2, the licensee submitted its updated commitment regarding the outlier resolution schedule. The proposed time frame to complete all outlier resolution actions ranges from the end of 1996 to the spring of 1999, depending on the determination whether a specific outlier will be resolved by analysis or by modification with or without plant outage. In addition, although 96 outlier equipment and 49 outlier relays were identified in the Summary Report and the Relay Evaluation Report of Reference 1, information regarding their resolution is not included in the reports. Elaborate on your plans for scheduling the resolution of identified outliers, and your evaluation in support of the conclusion that the licensing bases for the plant will not be affected by the outliers resolution schedule. A number of safety-related components in the safe shutdown path have been identified as outliers -- thus rendering their seismic adequacy questionable and their conformance to the licensing bases uncertain. Provide justification of your continued operation without immediately undertaking remedial action.

Response:

GIP Part I, Section 2.2.5 describes in detail the guidelines used by Prairie Island in implementing its responsibility to reporting under the USI A-46 program.

> GIP Part I, Section 2.2.5 states: *"Failure of equipment to meet GIP initial screening or outlier resolution guidelines does not, of itself, give rise to a need for the licensee to consider a JCO or reporting under applicable reporting requirements unless the plant has modified its commitments to adopt the USI A-46 (GIP) methodology as its licensing basis for verifying the seismic adequacy of electrical and mechanical equipment, as set forth in Paragraph 2.3.3 below. If a determination is made that equipment failing to meet the GIP initial screening or outlier resolution guidelines does not meet the existing plant licensing or design bases, including specific plant commitments and requirements, the licensee must consider reportability and operability implications pursuant to Technical specifications and*

10CFR50.72, 50.73 and 50.9, among others as appropriate, including the need for JCO. Non-safety grade equipment selected for use in A-46 is not exempt from reporting requirements.

There is no independent requirement to notify the Staff when an outlier or equipment deficient against A-46 criteria, which is not a deficiency against the plant's licensing or design basis, will not be modified to conform to the A-46 guidelines. However, licensees will report unresolved A-46 outliers or equipment deficient against A-46 criteria to the NRC Staff in their final summary reports. These reports will include an explanation of the safety implications of not modifying the outliers or equipment deficient against A-46 criteria. The Staff will justify any requirement to modify these outliers under 10CFR50.109 as stated in Section 2.3.1 below."

The GIP methodology screens out equipment which passes a set of conservative, generic, seismic adequacy criteria. Equipment which does not pass this screen is identified as an outlier and either is resolved to be consistent with the GIP or may be left as an unresolved outlier. The GIP-2 screening criteria are not part of the licensing basis at Prairie Island; therefore, not meeting the GIP-2 screening criteria does not, of itself, give rise to an operability or safety concern. The Seismic Review Team (SRT) determined there was no reason to believe that the equipment that was classified as an outlier, as a result of the GIP-2 screening process, did not meet the plant licensing or design basis.

Equipment outlier resolution schedules are shown on Attachment 2. Relay outlier resolution schedules are shown on Attachment 3.

4. Describe the extent to which the seismic margin methodology, described in the report EPRI NP-6041 ("A Methodology for Assessment of Nuclear Power Plant Seismic Margin"), was used in the Prairie Island A-46 program, including outlier resolutions. Since this methodology is known to yield analytical results that are not as conservative as what might be obtained by following the GIP-2 guidelines, it is generally not acceptable for the A-46 program. Therefore, for each deviation from the GIP-2 guidelines, in situations where the margin methodology is utilized, identify the nature and the extent of the deviation, and provide the justification for its acceptance.

Response:

The seismic margin methodology has not been used in any manner in the conduct of the Prairie Island A-46 assessment.

5. Section 3.4 of the Summary Report states that one horizontal ISRS was used for both (North-South and East-West) directions. Indicate whether the horizontal ISRS used for the USI A-46 program envelop both horizontal ISRS provided in the NSPC's 120-day response to Supplement No. 1 to Generic Letter 87-02. If not, provide the technical bases that supports the validity of such an assumption and an explanation of how the results of the A-46 review with such an assumption are still adequate.

Response:

The horizontal ISRS used for the A-46 program are the spectra submitted in NSPC's 120-day response to Supplement No. 1 to Generic Letter 87-02 (120-day letter). As stated in Attachment 4[1] to NSPC's 120-day response,

"The response acceleration spectra obtained at various points in the structure showed that the response is primarily due to deformation of the foundations and that the responses due to earthquakes acting in the north-south and east-west directions were not significantly different. Therefore, the spectra were combined for the two earthquake directions to facilitate their application in the seismic design and analysis of critical equipment and piping."

The spectra were converted from the 1/2% and 1% damped curves to 5% damped curves in order to make appropriate comparisons to the 5% bounding spectrum.

6. Section 3.4 of the Summary Report also states that two-thirds of the Housner ground response spectra with peak ground acceleration of 0.04g and 0.08g for OBE [operating-basis earthquake] and SSE, respectively, were used as the vertical ISRS regardless of location. Indicate whether the vertical ISRS used for the USI A-46 program envelop the vertical ISRS provided in the NSPC's 120-day-response. If not, provide the technical bases that support the validity of such an assumption and an explanation of how the results of the A-46 review are still adequate.

Response:

The vertical ISRS used for the A-46 program are the spectra submitted in NSPC's 120-day response to Supplement No. 1 to Generic Letter 87-02 (120-day letter). The spectra were converted from the 1/2% and 1% damped curves to 5% damped curves for purposes of seismic analysis.

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[1] 1 Page 3, JAB-PS-04, Pioneer Service & Engineering Company, *Prairie Island Nuclear Generating Plant Earthquake Analysis: Reactor-Auxiliary-Turbine Building Response Acceleration Spectra, Revised* February 16, 1971.

7. Discuss key examples of so-called "rigorously analyzed anchorages," as indicated on page 4-3 of the Summary Report, using hand calculations and the ANCHOR software package, and provide copies of the engineering calculations. Also discuss a few example cases of anchorage verification based on results of tug tests conducted and provide a description of the tests and applicable engineering justification for such an approach.

Response:

Sample ANCHOR software evaluations for equipment MCC 2K1 (Motor Control Center 2K, Bus 1) and 145-201 (11 Turbine Driven Auxiliary Feedwater Pump) are included in Attachment 4. The ANCHOR calculations themselves are self-explanatory. As brief ANCHOR code background, the USNRC and its subcontractor Dr. James Unruh of Southwest Research Institute thoroughly reviewed the ANCHOR code and found it acceptable for use in the A-46 equipment anchorage evaluations. Briefly, ANCHOR performs a three-dimensional, SRSS-like (actually combines loads by 100-40-40 rule) maximum capacity calculation and determines a factor of safety with respect to the demand accelerations. All of the allowables and reduction factors are directly from Appendix C of the GIP.

Manual calculations are reserved for situations where the ANCHOR code is not suitable or for which existing calculations are adequate. Two sample SEWS evaluations for tank 053-381 and the Diesel Generator Panel (55300) are provided in Attachment 5.

Tank 053-381 is the control room chilled water expansion tank. It is anchored with concrete expansion anchors. A manual calculation was performed to evalauate the anchorage. The Diesel Generator Eng/Gen Panel (55300) is bolted and shimmed. Since the bolts are thus subject to some bending, the methodology from Case 1 of EPRI Report TR-103960 was used to assess anchorage adequacy. This calculation is incorporated in the SEWS for the Diesel Generator Panel (55300).

The engineering justification used for a tug test on a small component is that the applied load is larger than any credible seismic demand, or, the small component is clearly ruggedly anchored and the tug test verifies no gross installation defects. One example case of a tug test anchorage verification is PNL 132, which is a small wall-mounted panel. It is 26 inches wide by 45 inches high by 6.5" in depth and is anchored to the wall with 8 - 3/8" concrete expansion anchors. The item was pull tested to greater than 75 pounds (conservative estimate) with no looseness detected and thus was judged acceptable for anchorage (documented in a SEWS provided in Attachment 5). As noted in the SEWS, the anchorage was not accessible as it was behind the panel. An example of a small, ruggedly anchored item is panel

PNL 113. The item is a wall-mounted panel, 20 inches wide, 36 inches high, and 6 inches deep. It is anchored to a reinforced concrete wall with four 1/2" anchor bolts. The item was pull tested to greater than 75 pounds and no looseness was detected. The anchorage was adjudged acceptable because the anchorage was clearly rugged since there were no gross installation defects and the capacity obviously far exceeds demand. The SCE judgments were documented in the SEWS provided in Attachment 5.

8. With respect to Section 4.1.3 of the Summary Report, the second paragraph of page 4-7 reads: "Wall mounted equipment was excluded as allowed by the GIP ...." Identify the specific provision of GIP-2 that allows such an exemption from performing the needed tightness check.

Response:

The tightness check is used to detect gross installations errors that would leave the anchor loose in the hole. Per Section 4.4.1 of the GIP anchors loaded in tension due to dead weight need not be tightness checked since the anchor set is effectively proof tested by the dead weight loading. Wall mounted panels often presented a case of inaccessible anchors, because wall anchors were hidden behind the panel, and only disassembly of the panel would gain access to the anchors. In that case, the SCE relied on the dead load proof testing for upper anchors and tug testing at the bottom and sides to verify no gross installation defects. In all cases, wall mounted panels were small enough such that the tug test was a meaningful exercise in verifying no gross installation defects.

9. The fourth item in Table 5-1 of the Summary Report consists of the licensee's interpretation on meeting the intent of caveats for a group of small solenoid valves mounted on small piping and tubing (<l"). It indicated that the Seismic Review Team accepted the seismic ruggedness of these valves by a tug test for meeting the intent of Bounding Spectrum Caveats 4 and 5 for Class 8. The staff notes that, as stated in GIP-2 page B.8-3, the earthquake experience data for equipment Class #8 are limited to valves mounted on piping at least 1" in diameter, and the only suggested option by GIP-2 for meeting the intent of the Caveats 4 and 5 is by analysis.' Provide an explanation on how the "tug test" can ensure seismic adequacy of the valves and their connected pipe or tubing.

Response:

Per GIP Appendix B, the intent of the FOV/BS Caveat 4 is to assure that pipe stresses associated with eccentric valve loads are not excessive. In this case, although the line was less than 1", the valve was very much smaller than that allowed for a 1" line; thus, rendering the need to perform a stress analysis an unnecessary measure in the view of the SRT. The assessment

of the 3/4" line deviation is performed by estimating the potential increase in stress relative to that considered acceptable under the GIP for a 1" line. As noted, in this case, the conclusion could be obtained through engineering judgment in lieu of stress analysis.

With regard to the tug test, an example is SV-37460 for which the SEWS is provided in Attachment 5. The solenoid valve is mounted to a steel plate. The free span of the attached tubing is only approximately 18" long (see photograph). A tug test with an estimated force of 20 pounds far exceeds any seismic inertial forces that would occur in a seismic event. SV-37022 is listed in Table 5-1 but was subsequently removed from the final SSEL. However the SEWS of record still serves as an example for tug tests. SV-37022 is anchored to a concrete wall with screws using unknown inserts. See the SEWS for this item (Attachment 5) - specifically, the photograph. The item in question is quite small, with each estimated to weigh less than 1 pound. The 3/4" tubing between the wall-mounted solenoid valves is less than 12" long which provides no significant stresses to the solenoid valve body. The items were tug tested by the Seismic Capability Engineers (SCE) to an estimated 20 pounds and the anchorage was judged to be acceptable.

10. The sixth item in the same Table 5-1 indicated that the piping loads applied to the cast-iron body of a group of solenoid valves are low and that they meet the intent of Bounding Spectrum Caveat 2 for Class 8 equipment, based solely on the judgement of the Seismic Review Team. Provide more explanation to assure that, without analysis, the seismic stresses in the valve body due to piping loads are within established acceptable limit, such as less than 20% of the minimum ultimate tensile strength of the valve body material as suggested in GIP-2.

Response:

The valves in question, SV-33133 & SV-33134, have a cast iron body. The valve is a 2.5" diameter valve with a solenoid actuator which is estimated to weigh less than 1 pound. As such, the actuator will not contribute in any significant manner to the valve body stress. The adjacent supports are approximately 4 feet c/c with the valve located at about mid-span. The valve and pipe can be calculated to respond in the rigid range; thus, using the zero period acceleration for the Screenhouse at Elev. 695' (0.3g), the resulting seismic plus gravity stress is 1.35 ksi. Assuming the worst grade of cast iron, the ultimate tensile capacity is about 20 ksi. Using 20% of the ultimate tensile capacity as an allowable stress still provides a generous margin for this valve. We consider that this foregoing numerical evaluation substantiates the veracity of the engineering judgment originally rendered.

11. With respect to Table 5-1 of the Summary Report, deviations were made to meet the GIP requirements. Provide the anchorage analysis calculations for the racks and panels (ID IB1, 2R1), charging pumps (ID 145-041), feedwater pumps (ID 145-201) and main control panels (ID B-1).

Response:

Calculations are provided for rack/panels 1B1 and 2R1, charging pumps 145-041, feedwater pumps 145-201 and main control board B-1 in Attachment 5.

12. Section 6.1 of the Summary Report in Reference 1 states that some deviations and technical justifications were developed for the review of the tanks and heat exchangers. Provide a sample evaluation for each of the vertical tanks (flat bottom as well as supported on skirts and structural legs, if any) and the horizontal tanks. The evaluation of the anchors that restrain the tank movement should also be provided. If NSPC used the seismic margin methodology described in the report EPRI NP-6041 for the tank evaluations, identify the nature and the extent of the deviation from GIP-2 guidelines, and provide the justification for its acceptance. Also, provide calculations for determining the seismic adequacy of the tanks (ID 053-251, 135-021, 153-021 and 253-021) using the methodology described in Section 7 of the GIP-2.

Response:

Calculations are provided for 135-021 (RCP Seal Water Return Heat Exchanger), 153-021 (Volume Control Tank), and 253-021 (Volume Control Tank) in Attachment 5. Tank 053-251 is a buried tank for which no evaluation was performed but the SEWS is provided in Attachment 5.

There are no freestanding, flat-bottom vertical tanks at Prairie Island on the SSEL. The RWST, a flat-bottom vertical tank, is not freestanding. It is a concrete tank with a steel liner and is an integral compartment of the Auxiliary building. As previously noted, the seismic margin method was not used for the Prairie Island A-46 assessment.

As previously noted, Tank 053-251 is a buried tank for which no evaluation was performed. This tank was declared an outlier because the flexibility of the buried piping could not be determined from available documentation. Heat Exchanger 135-021 is an example of a vertical heat exchanger. Tanks 153-021 and 253-021, the volume control tanks, are examples of tanks on legs.

Regarding NRC's request for additional sample evaluations of other tank and heat exchanger design types, Tank 053-381, the control room chilled water expansion tank, is an example of a skirt supported vertical tank provided in Attachment 5. Tank 153-011, the pressurizer relief tank, is an example of a saddle supported horizontal tank provided in Attachment 5.

13. Table 7-3 of the Summary Report provides a summary of the limited analytical reviews (LARs) for the selected cable and conduit raceways. Provide copies of the calculations of the analyses for LAR Numbers 005 and 010.

Response:

Calculations are provided for LAR Numbers 005 and 010 as requested in Attachment 5.

14. Discuss the issue described in Information Notice 95-49 ("Seismic Adequacy of Thermo-Lag Panels") regarding Thermo-Lag panels, in particular, the issue regarding seismic resistance capability of the cable tray and its support when appropriate weight and modulus of the Thermo-Lag are included in the analysis.

Response:

Thermo-Lag panels were included in the LAR calculations when present. They were considered as adding mass (weight), but not stiffness. The connection stiffnesses are not sufficient to consider significant added stiffness due to the Thermo-Lag panels. As an update, Thermo-Lag is being removed.

15. Table 8-1 of the Summary Report listed 96 outliers found in 20 classes of equipment during licensee's USI A-46 walkdowns. However, no resolution of these outliers was provided in the report; neither were there methods proposed to resolve these outliers. Provide a brief description of implemented resolution, or as a minimum, provide a proposed method to be implemented for resolution, for each outlier listed in Table 8-1.

Response:

The methods used to resolve outliers along with descriptions of implemented resolutions for equipment outliers are shown in Attachment 2.

16. Table 8-1 of the Summary Report does not show any safe-shutdown items (i.e., equipment, tanks, heat exchangers. cable trays or conduit raceways) as outliers because they are located above Elevation (EL) 755 feet. However, the screen verification data sheets in Appendix C of the Summary Report do show several items located more than 40 feet above the effective grade (or above Elevation 755 feet), and these item were considered "OK" in meeting the seismic demand and caveats. Clarify whether any safety equipment is located above Elevation 755 feet and provide the bases for its acceptance.

Response:

Equipment located more than 40' above grade can be screened out by a favorable comparison of the appropriate floor response spectrum to 1.3 times the bounding spectrum (1.5BS). This was done for the equipment located on or above elevation 755' and is referred to as ABS (represents 1.5BS) vs. CRS (conservative floor response spectrum) in the Screening Verification Data Sheets (SVDS). As an added point, tanks and raceways are not subject to elevation restrictions such as the 40' rule since they are not "capacity screened" in the manner that the GIP identified Class of Twenty equipment is.

17. Regarding the tightness check of expansion anchors performed on a representative number of mechanical and electrical components, state whether the representative number meets the sample size for expansion anchor tightness check as listed on Table C.2-4 of the GIP.

Response:

The sampling procedure, as discussed in the GIP, was not used at Prairie Island. All accessible expansion anchors in floor-mounted equipment were checked for tightness. Only anchors that were not accessible due to physical encumbrances were not tightness checked. As the GIP allows, inaccessible anchors for which extraordinary measures or disassembly of the equipment would be required need not be tightness checked.

18. The Relay Evaluation Report in Reference 1 identified 49 outlier relays. However, no resolution of these outliers was provided in the report; neither were there proposed methods to resolve these outliers. Provide a brief description of implemented resolution, or as a minimum, provide a proposed method to be implemented for resolution, of each outlier relay listed in Appendix I of the report.

Response:

The methods used to resolve outliers along with descriptions of implemented resolutions for relay outliers are shown in Attachment 3.

ATTACHMENT 2

EQUIPMENT OUTLIER RESOLUTIONS

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A01	MCC 1AB1	The anchorage has insufficient capacity to resist the seismic demand.	Resolved by analysis of actual installation. In-structure seismic demand is less than anchorage capacity.	Analysis	Completed
A01	MCC 1AB2	The anchorage has insufficient capacity to resist the seismic demand.	Resolved by analysis of actual installation. In-structure seismic demand is less than anchorage capacity.	Analysis	Completed
A01	MCC 2R1	The anchorage has insufficient capacity to resist the seismic demand.	Resolved by analysis of actual installation. In-structure seismic demand is less than anchorage capacity.	Analysis	Completed
A01	MCC 2S1	The anchorage has insufficient capacity to resist the seismic demand.	Resolved by analysis of actual installation. In-structure seismic demand is less than anchorage capacity.	Analysis	Completed
A02	MCC 1K1	The RHR Bluck Lifting Fixtures stored nearby present an interaction hazard to the MCC.	Relolved by analysis of actual installation. Acceleration levels less than required to slide and unhook lifting fixture.	Analysis	Completed
A03	MCC 1TA1	The MCC's rest on 6 sets of 2 "shims" (7/8"thick) causing bending in the anchor bolts.	Resolved by analysis of actual installation. Anchorage acceptable with 2.75" shims.	Analysis	Completed
A03	MCC 1TA2	The MCC's rest on 6 sets of 2 "shims" (7/8"thick) causing bending in the anchor bolts.	Resolved by analysis of actual installation. Anchorage acceptable with 2.75" shims.	Analysis	Completed
A04	MCC 1L2	These MCC's contain essential relays and have potential seismic interactions from nearby piping.	Performed an analysis of actual installation. For MCC 1L2, additional supports are necessary for the 1 1/2" line and the two 4" lines. Installing new supports 1 1/2" and 4" lines.	Analysis & Modification	Dec 97
A04	MCC 2K2	These MCC's contain essential relays and have potential seismic interactions from nearby piping.	Resolved by analysis of actual installation. For MCC 2K2, displacement is less than gap.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A05	MCC 2LA2	The SRT observed that this MCC rocks about its weak axis when bumped, making the welding at the base suspect.	Resolved by analysis of actual installation. Anchorage is acceptable. However, additional welds (or equivalent) between MCC/SHIM/EMBED as recommended will be implemented where possible.	Analysis & Modification	Completed; Welds U2 Outage Dec 98
A06	2-52/RTA	An unbraced overhead room chiller supported on rod hangers may swing and break nearby water piping which would spray the room. Also, a unit heater hung on 10 ft long rods could swing and break its steam heating piping.	Performed an analysis of actual installation for 21 ROD DRIVE ROOM FAN COIL UNIT, 274-021. Additional restraints are necessary. Restraints are being added.	Analysis & Modification	Dec 97
A06	2-52/RTB	An unbraced overhead room chiller supported on rod hangers may swing and break nearby water piping which would spray the room. Also, a unit heater hung on 10 ft long rods could swing and break its steam heating piping.	Performed an analysis of actual installation for 21 ROD DRIVE ROOM FAN COIL UNIT, 274-021. Additional restraints are necessary. Restraints are being added.	Analysis & Modification	Dec 97
A07	2PZRHTRA/X FMR	A rod hung unit heater could swing and break its piping spraying the area.	Unit heater is not required and is being removed.	Modification	Dec 97
A08	045-271	Submersible pumps are not part of GIP's earthquake experience data base.	Resolved by review of seismic qualification documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. A certificate of conformance is on file.	Documentation Review	Completed
A08	045-273	Submersible pumps are not part of GIP's earthquake experience data base.	Resolved by review of seismic qualification documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. A certificate of conformance is on file.	Documentation Review	Completed
A08	045-301	Submersible pumps are not part of GIP's earthquake experience data base.	Resolved by review of seismic qualification documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. A certificate of conformance is on file.	Documentation Review	Completed
A08	045-302	Submersible pumps are not part of GIP's earthquake experience data base.	Resolved by review of seismic qualification documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. A certificate of conformance is on file.	Documentation Review	Completed
A09	145-392	Anchor bolts for these pumps do not meet the least acceptable edge distance (4D). Also, the vertical shaft length exceeds the maximum length in the bounding spectrum caveat.	Resolved by analysis of actual installation and review vendor analysis. Anchorage and shaft stresses are acceptable.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A09	245-392	Anchor bolts for these pumps do not meet the least acceptable edge distance (4D). Also, the vertical shaft length exceeds the maximum length in the bounding spectrum caveat.	Resolved by analysis of actual installation and review vendor analysis. Anchorage and shaft stresses are acceptable.	Analysis	Completed
A10	2RC-10-1	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review vendor specifications which called for 3g in the horizontal direction and 2g in the vertical direction. This capacity is greater than the demand at this elevation.	Documentation Review	Completed
A10	2RC-10-2	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review vendor specifications which called for 3g in the horizontal direction and 2g in the vertical direction. This capacity is greater than the demand at this elevation.	Documentation Review	Completed
A10	RC-10-1	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review vendor specifications which called for 3g in the horizontal direction and 2g in the vertical direction. This capacity is greater than the demand at this elevation.	Documentation Review	Completed
A10	RC-10-2	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review vendor specifications which called for 3g in the horizontal direction and 2g in the vertical direction. This capacity is greater than the demand at this elevation.	Documentation Review	Completed
A11	CV-39401	Contact with conduits could break the solenoid tap connection for these valves.	Conduit for valve will be rerouted to maintain 2" minimum clearance between conduits and valve.	Modification	U1 Outage May 99
A11	CV-39409	Contact with conduits could break the solenoid tap connection for these valves.	Air line to solenoid valve will be rerouted to maintain 2" minimum clearance between conduits and valve.	Modification	U1 Outage May 99
A12	CV-39421	Contact between the valve diaphragm housing and a 1" conduit could cause chatter of the limit switches in the solenoid valve	Conduit for valve will be rerouted to maintain 2" minimum clearance between conduits and valve.	Modification	U2 Outage Dec 98
A13	CV-39405	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review of documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. Vendor Seismic Qualification Report supports capacity.	Documentation Review	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A13	CV-39417	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review of documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. Vendor Seismic Qualification Report supports capacity.	Documentation Review	Completed
A13	CV-39419	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by review of documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. Vendor Seismic Qualification Report supports capacity.	Documentation Review	Completed
A14	132-281	The seismic demand exceeds the seismic capacity. Also, the anchorage details for these fans could not be determined.	Resolved by analysis of the actual installation. Natural frequency is > 10 Hz and capacity is greater than demand. Anchorage is OK. Vendor Seismic Qualification Report supports capacity.	Analysis	Completed
A14	232-281	The seismic demand exceeds the seismic capacity. Also, the anchorage details for these fans could not be determined.	Resolved by analysis of the actual installation. Natural frequency is > 10 Hz and capacity is greater than demand. Anchorage is OK. Vendor Seismic Qualification Report supports capacity.	Analysis	Completed
A15	SV-33498	This valve has a potential for differential displacement between the wall and ductwork that supports the valve's tubing.	Resolved by analysis of the actual installation. Stresses in copper tubing is acceptable.	Analysis	Completed
A16	SV-37467	Seismic demand based on floor response spectra exceeds seismic demand based on 1.5 times the bounding spectra.	Resolved by review of documentation which shows that seismic design criteria consistent with our licensing basis was part of the procurement specification. A certificate of conformance for 15g capacity is on file.	Documentation Review	Completed
A17	074-031	Anchorage capacity of the FCU's could not be established.	Resolved by analysis of actual installation. Restraints determined to be rigid. Seismic forces acceptable. No interaction from displacement.	Analysis	Completed
A17	074-032	Anchorage capacity of the FCU's could not be established.	Resolved by analysis of actual installation. Restraints determined to be rigid. Seismic forces acceptable. No interaction from displacement.	Analysis	Completed
A17	074-033	Anchorage capacity of the FCU's could not be established.	Resolved by analysis of actual installation. Restraints determined to be rigid. Seismic forces acceptable. No interaction from displacement.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A17	074-034	Anchorage capacity of the FCU's could not be established.	Resolved by analysis of actual installation. Restraints determined to be rigid. Seismic forces acceptable. No interaction from displacement.	Analysis	Completed
A18	174-051	Anchorage capacity of the FCU's could not be established. Also, a potential seismic interaction exists for 174-051 with a ceiling mounted multi-tier conduit.	Resolved by analysis of actual installation. Original support and anchorage calculations reviewed. Supports are adequate and relative displacement is less than observed gap.	Analysis	Completed
A18	274-051	Anchorage capacity of the FCU's could not be established. Also, a potential seismic interaction exists for 174-051 with a ceiling mounted multi-tier conduit.	Resolved by analysis of actual installation. Original support and anchorage calculations reviewed. Supports are adequate and relative displacement is less than observed gap.	Analysis	Completed
A19	174-013	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation. Recently revised FCU yields lower natural frequency of 9.59Hz. Vendor design report for FCU shows capacity of 1.5g which is larger than demand at 9 Hz.	Analysis	Completed
A20	CD-34076	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34077	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34078	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34079	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34084	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A20	CD-34085	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34086	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A20	CD-34087	The floor response spectra (demand) exceeds the capacity spectra of 1.5 times the bounding spectrum.	Resolved by analysis of actual installation and review of vendor supplied seismic qualification reports using plant specific in-structure demand at 755'.	Analysis	Completed
A21	075-011	These chillers have unconfined steel isolator springs in the base support.	Plates to be installed around springs to limit movement.	Modification	Dec 97
A21	075-012	These chillers have unconfined steel isolator springs in the base support.	Plates to be installed around springs to limit movement.	Modification	Dec 97
A22	PNL 11	The panels base is elevated above the floor subjecting the anchorage to bending stresses	Resolved by analysis of the actual installation. Stresses in anchorage is acceptable even with gap.	Analysis	Completed
A22	PNL 12	The panels base is elevated above the floor subjecting the anchorage to bending stresses	Resolved by analysis of the actual installation. Stresses in anchorage is acceptable even with gap.	Analysis	Completed
A22	PNL 21	The panels base is elevated above the floor subjecting the anchorage to bending stresses	Resolved by analysis of the actual installation. Stresses in anchorage is acceptable even with gap.	Analysis	Completed
A22	PNL 22	The panels base is elevated above the floor subjecting the anchorage to bending stresses	Resolved by analysis of the actual installation. Stresses in anchorage is acceptable even with gap.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A23A	21 BATT	The ... ss are over 10 years old.	Resolved by installation of new batteries.	Replacement	Completed
A23B	11 BATT	The battery is over 10 years old.	Resolved by review of vendor documentation on qualified service life of 20 years.	Documentation Review	Completed
A24	12 BATT	Foam plastic spacers are not installed between battery cells at locations where there are cell clamp locations.	Resolved by review of Exide Assembly Instruction Section 58.10 paragraph 5, foam spacers are not required at cell clamp locations.	Documentation Review	Completed
A24	22 BATT	Foam plastic spacers are not installed between battery cells at locations where there are cell clamp locations.	Resolved by review of Exide Assembly Instruction Section 58.10 paragraph 5, foam spacers are not required at cell clamp locations.	Documentation Review	Completed
A25A	11 BATT CHG	The cabinet bases are elevated above the floor subjecting the anchorage to bending stresses.	Resolved by new charger installation. Gap no longer an issue.	Replacement	Completed
A25A	12 BATT CHG	The cabinet bases are elevated above the floor subjecting the anchorage to bending stresses.	Resolved by new charger installation. Gap no longer an issue.	Replacement	Completed
A25B	22 BATT CHG	The cabinet bases are elevated above the floor subjecting the anchorage to bending stresses. There are sliding door counter weights which could swing into 12/22 Battery Charger associated panels.	Resolved by new charger installation. Gap no longer an issue. Resolved door counter weight by review of existing analysis.	Replacement & Documentation Review	Completed
A26	034-011	A local control panel mounted on the DG skid is supported on very flexible (wobbly) steel springs.	Angle iron clips being installed around springs to limit movement.	Modification	Dec 97
A26	034-021	A local control panel mounted on the DG skid is supported on very flexible (wobbly) steel springs.	Angle iron clips being installed around springs to limit movement.	Modification	Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A27	14MR	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	1NR3	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	1NR4	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	2NR3	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	2NR4	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	A	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	B-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	B-2	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	C-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A27	C-2	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	D-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	D-2	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	E-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	E-2	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	F-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	F-2	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A27	G-1	Aluminum diffussers in the control room ceiling pose a personnel hazard.	Flexible cord with hooks will be installed to secure diffusers to ceiling grid.	Work Request	Dec 97
A28	D5/RTU	A computer table with a loose computer CRT and printer sits adjacent to the RTU cabinets presenting a seismic interaction hazard.	A cabinet will be installed to house this equipment to preclude interaction.	Modification	Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
A28	D6/RTU	A computer table with a loose computer CRT and printer sits adjacent to the RTU cabinets presenting a seismic interaction hazard.	A cabinet will be installed to house this equipment to preclude interaction.	Modification	Dec 97
T1	053-221	Outlier. The flexibility of buried piping could not be determined from available documentation	Resolved by evaluation of buried piping between tank and AUX Building. Stresses due to seismic effects are acceptable.	Analysis	Completed
T1	053-223	Outlier. The flexibility of buried piping could not be determined from available documentation	Resolved by evaluation of buried piping between tank and AUX Building. Stresses due to seismic effects are acceptable.	Analysis	Completed
T1	053-251	Outlier. The flexibility of buried piping could not be determined from available documentation	Resolved by evaluation of buried piping between tank and AUX Building. Stresses due to seismic effects are acceptable.	Analysis	Completed
T1	053-252	Outlier. The flexibility of buried piping could not be determined from available documentation	Resolved by evaluation of buried piping between tank and AUX Building. Stresses due to seismic effects are acceptable.	Analysis	Completed
T2	135-021	Outlier - The stress in the supports exceed GIP allowables	Resolved by review of existing analysis.	Documentation Review	Completed
T2	235-131	Outlier - The stress in the supports exceed GIP allowables	Resolved by review of existing analysis.	Documentation Review	Completed
T3	135-101	Outlier - This HX is an outlier because it is not secured to the pedestals (mounting cradles are secured to the pedestals but HX is not attached to the cradles). Further both cradles have slotted mounting holes which further makes this comp. an outlier.	Resolved by analysis of maximum seismic acceleration compared to restraining forces due to the coefficient of friction. Low level of acceleration will not overcome friction.	Analysis	Completed
T3	235-081	Outlier - This HX is an outlier because it is not secured to the pedestals (mounting cradles are secured to the pedestals but HX is not attached to the cradles). Further both cradles have slotted mounting holes which further makes this comp. an outlier.	Resolved by analysis of maximum seismic acceleration compared to restraining forces due to the coefficient of friction. Low level of acceleration will not overcome friction.	Analysis	Completed

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
T4	153-011	Outlier - The tank is an outlier due to the slotting of holes in both support plates	Resolved by analysis. Seismic acceleration is less than one half of frictional resistance. However as an extra measure of conservatism, all 4 bolts on any one saddle will be re-torqued.	Analysis	Completed; Re-torque U1 Outage Dec 97
T4	253-011	Outlier - The tank is an outlier due to the slotting of holes in both support plates	Resolved by analysis. Seismic acceleration is less than one half of frictional resistance. However as an extra measure of conservatism, all 4 bolts on any one saddle will be re-torqued.	Analysis	Completed
Trays	Ops Lounge	Outlier - Cable Tray Interaction with Exercise Equipment	Guard to be installed around the cable tray and conduits to protect the components.	Modification	Dec 97

ATTACHMENT 3

RELAY OUTLIER RESOLUTIONS

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
R01	1LC-427B-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 1AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	1LC-428B-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 1AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	1LC-428D-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 1AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	1PC-431E-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 1AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	2LC-427B-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 2AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	2LC-428B-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 2AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	2LC-428D-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 2AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	2PC-431E-X	MOST CONSERVATIVE CAPACITY ASSIGNED FROM GERS. GERS SHAPE.	Resolved by analysis. Cabinet 2AMR1 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R02	26X/112G-1A	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	26X/112G-1C	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	4X/112G-1	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	63X/112G-1	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	26X/122G-1A	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
R02	26X/122G-1C	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	4X/122G-1	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	63X/122G-1	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R03	67X/D1	MODEL NUMBER UNAVAILABLE FOR RELAY, THEREFORE OUTLIER CLASSIFICATION ASSIGNED.	Resolved by similarity analysis to 4U3 and 4U8.	Analysis	Completed
R04	86/D1	NO APPLICABLE GERS.	Resolved by similarity analysis of HEA63 to HEA61.	Analysis	Completed
R05	43IX/D1	ANSI SHAPE.	Resolved by analysis. Cabinet 55410 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R05	43IXX/D1	ANSI SHAPE.	Resolved by analysis. Cabinet 55410 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R05	43IXXX/D1	ANSI SHAPE.	Resolved by analysis. Cabinet 55410 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R03	67X/D2	MODEL NUMBER UNAVAILABLE FOR RELAY, THEREFORE OUTLIER CLASSIFICATION ASSIGNED.	Resolved by similarity analysis to 4U3 and 4U8.	Analysis	Completed
R04	86/D2	NO APPLICABLE GERS.	Resolved by similarity analysis of HEA63 to HEA61.	Analysis	Completed
R02	5730303	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730304	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730305	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
R02	5730315	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730403	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730404	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730405	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R02	5730411	NO APPLICABLE GERS.	This relay is associated with the control room chiller. The resolution for these outliers is to have Operations restart the Control Room chillers after the seismic event if necessary. Procedures to be revised.	Procedure Revision	Dec 97
R03	15X/12CLP	NO APPLICABLE GERS.	Resolved by similarity analysis to 4U3 and 4U8. Panalarm has been replaced by Clark 4U4.	Analysis	Completed
R03	15X/22CLP	NO APPLICABLE GERS.	Resolved by similarity analysis to 4U3 and 4U8. Panalarm has been replaced by Clark 4U4.	Analysis	Completed
R03	86/112C	NO APPLICABLE GERS.	Resolved by similarity analysis to 4U3 and 4U8. ABB RXMS1 replaced by Clark 4U4.	Analysis	Completed
R03	86/122C	NO APPLICABLE GERS.	Resolved by similarity analysis to 4U3 and 4U8. ABB RXMS1 replaced by Clark 4U4.	Analysis	Completed
R03	4/DG1-15	NO APPLICABLE GERS.	Resolved by similarity analysis to 4U3 and 4U8.	Analysis	Completed
R06	50G/15-2	THIS IS A LOW RUGGEDNESS RELAY PER EPRI NP-7148-SL, APPENDIX E.	Replace with ABB Type 50H solid state relays	Modification	U1 Outage Dec 97
R06	50G/16-3	THIS IS A LOW RUGGEDNESS RELAY PER EPRI NP-7148-SL, APPENDIX E.	Replace with ABB Type 50H solid state relays.	Modification	U1 Outage Dec 97
R06	50G/16-9	THIS IS A LOW RUGGEDNESS RELAY PER EPRI NP-7148-SL, APPENDIX E.	Replace with ABB Type 50H solid state relays.	Modification	U1 Outage Dec 97

Cat	ID	Outlier Finding	Resolution Description	Method	Resolution by
R07	1X/111J-1	NO APPLICABLE GERS.	Resolved by similarity analysis of KAP-11AG to KAP-11AY.	Analysis	Completed
R07	1X/121J-1	NO APPLICABLE GERS.	Resolved by similarity analysis of KAP-11AG to KAP-11AY.	Analysis	Completed
R08	BKR 112G-6	MODEL NUMBER UNAVAILABLE FOR MOTOR STARTER, THEREFORE OUTLIER CLASSIFICATION IS ASSIGNED.	MV-32016 is being repowered by a motor starter located within 40' above grade whose capacity exceeds demand.	Modification	U1 Outage Dec 97
R08	BKR 212G-3	MODEL NUMBER UNAVAILABLE FOR MOTOR STARTER, THEREFORE OUTLIER CLASSIFICATION ASSIGNED.	MV-32019 has been repowered by a motor starter located within 40' above grade whose capacity exceeds demand.	Modification	Completed
R08	BKR 122G-6	MODEL NUMBER UNAVAILABLE FOR MOTOR STARTER, THEREFORE OUTLIER CLASSIFICATION ASSIGNED.	MV-32017 is being repowered by a motor starter located within 40' above grade whose capacity exceeds demand.	Modification	U1 Outage Dec 97
R08	BKR 222G-3	MODEL NUMBER UNAVAILABLE FOR MOTOR STARTER, THEREFORE OUTLIER CLASSIFICATION ASSIGNED.	MV-32020 has been repowered by a motor starter located within 40' above grade whose capacity exceeds demand.	Modification	Completed
R07	1X/211J-1	NO APPLICABLE GERS.	Resolved by similarity analysis of KAP-11AG to KAP-11AY.	Analysis	Completed
R07	1X/221J-1	NO APPLICABLE GERS.	Resolved by similarity analysis of KAP-11AC to KAP-11AY.	Analysis	Completed
R01	LPT/31998	ANSI SHAPE.	Resolved by analysis. TB A1640 has been re-analyzed for in cabinet demand. New demand is now less than relay capacity.	Analysis	Completed
R01	LPT/31999	ANSI SHAPE.	Resolved by analysis. TB 2209 has been re-analyzed for in cabinet demand after installing shims to eliminate gap at anchorage. New demand is now less than relay capacity.	Analysis	Completed

ATTACHMENT 4

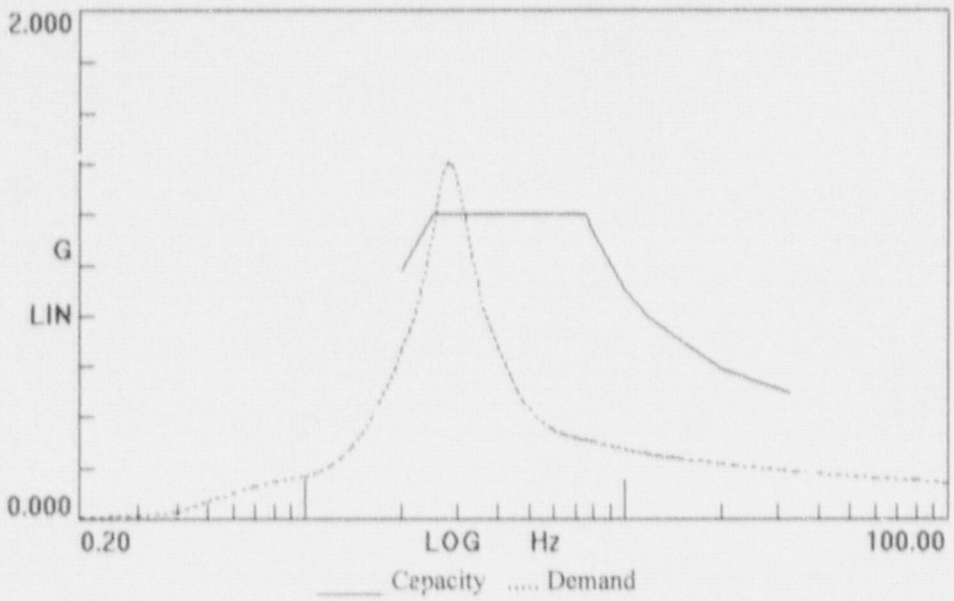
ANCHOR SOFTWARE EVALUATIONS

MCC 2K1
145-201

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.? NEAR RHR PIT
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	N/A
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 5.00)	N/A
4.	Capacity based on: 1.50 * Bounding Spectrum	
5.	Demand based on: 1.00 * Conservative Design Floor Response Spectra	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	BUILDING|RB/AB/TB|ELEVATION|695.00|DIRECTION|HORIZONTAL|MASS POINTS|20, 20A, 32, 42|RADIAL DIST|100
Demand 2	H:\GIP\PROJ0040\spectra.des	BUILDING|RB/AB/TB|ELEVATION|695.00|DIRECTION|HORIZONTAL|MASS POINTS|20, 20A, 32, 42|RADIAL DIST|100

Does capacity exceed demand? Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

MCC/BS Caveat 1 - Earthquake Experience Data Base.	Yes
MCC/BS Caveat 2 - Rating of 600 V or Less.	Yes
MCC/BS Caveat 3 - Adjacent Cabinets Bolted Together.	Yes
MCC/BS Caveat 4 - Attached Weight of 100 Pounds or Less.	Yes
MCC/BS Caveat 5 - Externally Attached Items Rigidly Anchored.	Yes
MCC/BS Caveat 6 - General Configuration Similar to NEMA Standards.	Yes
MCC/BS Caveat 7 - Cutouts Not Large.	Yes
MCC/BS Caveat 8 - Doors/Buckets Secured.	Yes
MCC/BS Caveat 9 - Natural Frequency Relative to 8 Hz Limit Considered.	Yes
MCC/BS Caveat 10 - Adequate Anchorage.	Yes
MCC/BS Caveat 11 - Potential Chatter of Essential Relays Evaluated.	Yes
MCC/BS Caveat 12 - No Other Concerns	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	Yes
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	Yes
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	Yes
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? Yes

COMMENTS

SRT: F. Stille (S&A) and G. Gore (NSP) - 7/27/95.

REF: Pioneer Dwg. NF-39203 Rev. AB, NF-38298-8 Rev. T and NF-38298-9 Rev. AB

Capacity vs. Demand
The seismic demand exceeds the capacity at a low frequency (approx. 3 Hz), but it is acceptable because the demand is enveloped at and above the estimated frequency (5 Hz).

Anchorage:
MCC 2K1 is a 7 unit floor mounted assembly 90" high, 140" wide and 20" deep. The MCC is anchored by 14 - 1/2" Phillip shell (ref.), one bolt centered in the front and back of each unit, spaced 15.75" apart. All of the bolt nuts were tightness checked and judged O.K.

The anchorage analysis considered the anchorage capacity of 2 units as being representative of the 7 unit MCC line. Also, the analysis uses the GIP typical maximum mass of 800 lbs per cabinet for MCCs (GIP table C.1-1).

Evaluated by: Gerry Gore Date:

Frank Stille

Attachment: Pictures
Attachment: ANCHOR Report

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

PICTURES

MCC 2K1

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 5 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

ANCHOR Report

Earthquake :
Response Spectrum : Instructure Conservative
Frequency : User - 5.00
Percent Damping : User - 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.432
East - West	0.432
Vertical	0.132

Angle (N-S Direction makes with the X Axis) : 0.00
Combination Criteria : SRSS

Weights :
Number of Weights : 2

No	Weight	X	Y	Z
1	800.00	10.000	10.000	45.000
2	800.00	30.000	10.000	45.000

Forces :
Number of External Forces : 0

Moments :
Number of External Moments : 0

Allowables :
Anchor :
Number of Anchor types : 1

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	1/2	Phillips	Self Drilling (S)	2290.00	2380.00	1.00	0.30	1.00

Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 6 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

Allowable Stress : 30600 psi.

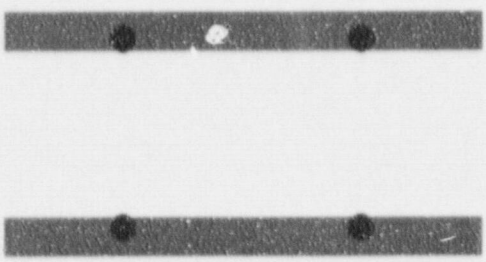
Surfaces :

Number of Surfaces : 1

Surface Orientation

	Direction Comp	Direction Comp	Direction Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Anchor Bolts :

Concrete Lines :

Concrete Points :

Weld Lines :

Geometry :

Anchor :

Number of Anchors : 4

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 7 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	10.000	2.125	0.000	1
2	1	30.000	2.125	0.000	1
3	1	30.000	17.875	0.000	1
4	1	10.000	17.875	0.000	1

Concrete Lines :
# of elements per line : 5
Number of Concrete Lines : 2

No	Start X-Coord	Start Y-Coord	Start Z-Coord	End X-Coord	End Y-Coord	End Z-Coord	S' Id	Line Width
1	0.000	1.500	0.000	40.000	1.500	0.000	1	3.000
2	0.000	18.500	0.000	40.000	18.500	0.000	1	3.000

Concrete Points :
Number of Concrete Points : 0

Weld Lines :
# of elements per line : 4
Number of Weld Lines : 0

Determination of Reduction Factors :
Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (2.03 in. Min Reqd. to achieve full capacity) := 2.03 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 3.13 in.
Crack Size : 0.000 in. - Cracks Affect <= 50% Bolts
Essential Relays in Cabinet : Yes
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes
Embedment Length : (2.03 in. Min Reqd. to achieve full capacity) := 2.03 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 3.13 in.
Crack Size : 0.000 in. - Cracks Affect <= 50% Bolts
Essential Relays in Cabinet : Yes
Adequate Equipment Base Strength and Structural Load Path : Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 8 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (2.03 in. Min Reqd. to achieve full capacity) := 2.03 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 3.13 in.
Crack Size : 0.000 in. - Cracks Affect <= 50% Bolts
Essential Relays in Cabinet : Yes
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (2.03 in. Min Reqd. to achieve full capacity) := 2.03 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 3.13 in.
Crack Size : 0.000 in. - Cracks Affect <= 50% Bolts
Essential Relays in Cabinet : Yes
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factors Data Current : Yes

No	Anc Id	Pall/ Vall	Pallr/ Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	805.08	N/A	1.00	1.00	1.00	1.00	1.00	0.63	0.75	1.00	0.75	1.00	1.00	1.00
		837.88	N/A	1.00	1.00	1.00	1.00	1.00	0.49	0.95	1.00	0.75	1.00	1.00	1.00
2	1	805.08	N/A	1.00	1.00	1.00	1.00	1.00	0.63	0.75	1.00	0.75	1.00	1.00	1.00
		837.88	N/A	1.00	1.00	1.00	1.00	1.00	0.49	0.95	1.00	0.75	1.00	1.00	1.00
3	1	805.08	N/A	1.00	1.00	1.00	1.00	1.00	0.63	0.75	1.00	0.75	1.00	1.00	1.00
		837.88	N/A	1.00	1.00	1.00	1.00	1.00	0.49	0.95	1.00	0.75	1.00	1.00	1.00
4	1	805.08	N/A	1.00	1.00	1.00	1.00	1.00	0.63	0.75	1.00	0.75	1.00	1.00	1.00
		837.88	N/A	1.00	1.00	1.00	1.00	1.00	0.49	0.95	1.00	0.75	1.00	1.00	1.00

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 9 of 9
ID : MCC 2K1 (Rev. 0)	Class : 1. Motor Control Centers	
Description : MOTOR CONTROL CENTER 2K BUS 1		
Building : AUX	Floor El. : 695.00	Room, Row/Col : G.2/12.2 NEAR RHR PIT
Manufacturer, Model, Etc. :		

RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.432	0.173	0.053	2.187
2	-0.432	-0.173	-0.053	2.349
3	-0.432	0.173	0.053	2.187
4	0.432	-0.173	-0.053	2.349
5	0.432	-0.173	0.053	2.187
6	-0.432	0.173	-0.053	2.349
7	0.432	0.173	-0.053	2.349
8	-0.432	-0.173	0.053	2.187
9	0.173	0.432	0.053	1.288
10	-0.173	-0.432	-0.053	1.348
11	0.173	-0.432	0.053	1.288
12	-0.173	0.432	-0.053	1.348
13	-0.173	0.432	0.053	1.288
14	0.173	-0.432	-0.053	1.348
15	0.173	0.432	-0.053	1.348
16	-0.173	-0.432	0.053	1.288
17	0.173	0.173	0.132	2.873
18	-0.173	-0.173	-0.132	3.814
19	0.173	0.173	-0.132	3.814
20	-0.173	-0.173	0.132	2.873
21	-0.173	0.173	0.132	2.873
22	0.173	-0.173	-0.132	3.814
23	0.173	-0.173	0.132	2.873
24	-0.173	0.173	-0.132	3.814

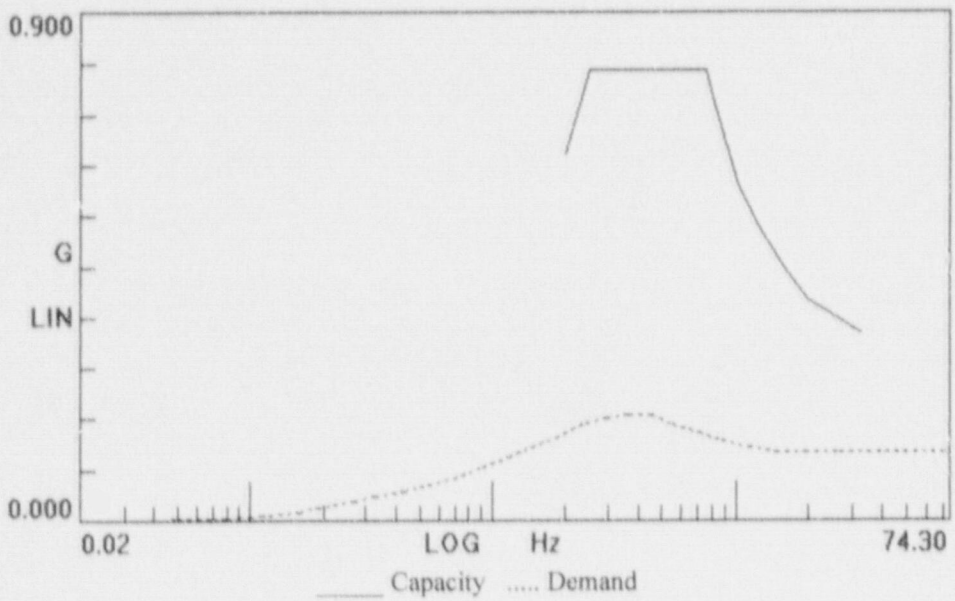
Minimum Safety Factor : 1.288

The anchorage can withstand 1.288 times greater seismic demand

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 33.00)	Yes
4.	Capacity based on:	1.00 * Bounding Spectrum
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

HP/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
HP/BS Caveat 2 - Driver and Pump on Rigid Skid.	Yes
HP/BS Caveat 3 - Thrust Bearings in Both Axial Directions.	Yes
HP/BS Caveat 4 - Check of Long Unsupported Piping.	Yes
HP/BS Caveat 5 - Base Vibration Isolation System Checked.	Yes
HP/BS Caveat 6 - Sufficient Slack and Flexibility of Attached Lines.	Yes
HP/BS Caveat 7 - Adequate Anchorage.	Yes
HP/BS Caveat 8 - Potential Chatter of Essential Relays Evaluated.	N/A
HP/BS Caveat 9 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	Yes
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A), M. McKeown (NSP), F. Stille (S&A) and G. Gore (NSP) - 11/21/93.

REF: Dresser Ind. (Pacific Pumps) Dwgs 46580, Pioneer Dwgs NF-38221-6, NF-38221-4, NF-38221-9

Anchorage:
The pump is anchored onto a concrete pad (3'-6" wide x 14'-4" long x 20" high) by 8 - 3/4" J-Bolts (4 per side) and the pad is dowelled into the concrete foundation slab. The J-bolts have a short side edge distance of 4-1/8" and long side edge distance of 10" on 3" high grout pad. The pump assembly's weights are: Pump 4150 lbs, Turbine: 1585 lbs, Skid 1650 lbs and Oil Cooler 120 lbs.

Also, the J-bolt are embedded 8.5" which is less than the minimum allowable embedment of 12" (18D); nowever the anchor analysis conservatively uses a smaller J-bolt (1/2") thereby meeting the intent of the this caveat.

The piping nozzle loads used in the anchorage analysis were developed in calculation 93C2807-C-016. This analysis is conservative and demonstrates that the anchorage meets the intent of the GIP.

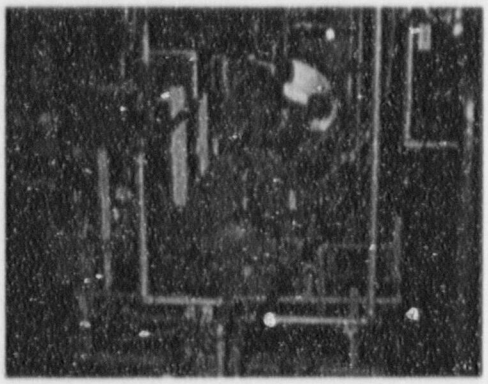
Evaluated by: Gerry Gore Date:

Walter Djordjevic

Attachment: Pictures
Attachment: ANCHOR Report

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

PICTURES



Steam Driven Auxiliary Feedwater Pump (145-201)

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 5 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

ANCHOR Report

Earthquake :
Response Spectrum : SSE
Frequency : GIP - Rigid
Percent Damping : GIP 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.225
East - West	0.225
Vertical	0.150

Angle (N-S Direction makes with the X Axis) : 180.00
Combination Criteria : SRSS

Weights :
Number of Weights : 4

No	Weight	X	Y	Z
1	4150.00	63.000	19.880	20.000
2	1585.00	120.000	19.875	20.000
3	1650.00	76.500	19.875	2.500
4	120.00	54.000	31.000	8.000

Forces :
Number of External Forces : 4

No	Fx	Fy	Fz	X	Y	Z
1	1.10E+001	2.82E+002	-9.10E+001	17.000	53.000	18.000
2	1.63E+003	5.58E+002	-3.33E+003	21.000	5.000	18.000
3	1.35E+002	-7.40E-001	-2.22E+002	74.000	18.000	37.000
4	1.20E+002	-6.90E+001	-2.94E+002	110.000	18.000	37.000

Moments :
Number of External Moments : 4

No	Mx	My	Mz
1	-2.40E+001	-3.60E+001	7.48E+003
2	-3.80E+004	1.61E+005	3.33E+004
3	4.68E+003	3.18E+003	1.98E+003
4	1.63E+003	3.23E+003	1.32E+003

Allowables :

Anchor :
Number of Anchor types : 1

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	1/2	Other	J-Bolt (90 deg)	6660.00	3330.00	1.00	0.30	1.00

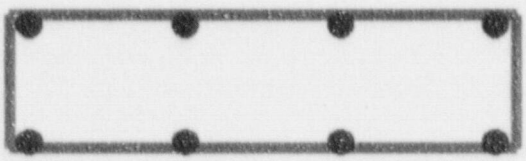
Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :
Allowable Stress : 30600 psi.

Surfaces :
Number of Surfaces : 1
Surface Orientation

	Direction	Direction	Direction
	Comp	Comp	Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 7 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

Anchor Bolts : [redacted]

Concrete Lines : [redacted]

Concrete Points : [redacted]

Weld Lines : [redacted]

Geometry :

Anchor :

Number of Anchors : 8

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	6.000	1.500	0.000	1
2	1	53.000	1.500	0.000	1
3	1	100.000	1.500	0.000	1
4	1	147.000	1.500	0.000	1
5	1	147.000	36.750	0.000	1
6	1	100.000	36.750	0.000	1
7	1	53.000	36.750	0.000	1
8	1	6.000	36.750	0.000	1

Concrete Lines :

# of elements per line : 10

Number of Concrete Lines : 4

No	Start X-Coord	Start Y-Coord	Start Z-Coord	End X-Coord	End Y-Coord	End Z-Coord	Sf Id	Line Width
1	0.000	0.000	0.000	153.000	0.000	0.000	1	3.000
2	153.000	0.000	0.000	153.000	39.750	0.000	1	3.000
3	153.000	39.750	0.000	0.000	39.750	0.000	1	3.000
4	0.000	39.750	0.000	0.000	0.000	0.000	1	3.000

Concrete Points :

Number of Concrete Points : 0

Weld Lines :

# of elements per line : 4

Number of Weld Lines : 0

Determination of Reduction Factors :

Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 5

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.

Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 6

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 7

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 8

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factors Data Current : Yes

	Anc	Pall/	Pallr/												
No	Id	Vall	Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
2	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
3	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00

		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
4	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
5	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
6	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
7	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
8	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment
RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.225	0.090	0.060	12.065
2	-0.225	-0.090	-0.060	10.065
3	-0.225	0.090	0.060	10.358
4	0.225	-0.090	-0.060	11.986
5	0.225	-0.090	0.060	11.948
6	-0.225	0.090	-0.060	10.358
7	0.225	0.090	-0.060	12.279
8	-0.225	-0.090	0.060	10.065

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 11 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

9	0.090	0.225	0.060	10.084
10	-0.090	-0.225	-0.060	10.420
11	0.090	-0.225	0.060	9.739
12	-0.090	0.225	-0.060	11.128
13	-0.090	0.225	0.060	9.544
14	0.090	-0.225	-0.060	11.216
15	0.090	0.225	-0.060	11.924
16	-0.090	-0.225	0.060	9.191
17	0.090	0.090	0.150	15.632
18	-0.090	-0.090	-0.150	20.740
19	0.090	0.090	-0.150	24.571
20	-0.090	-0.090	0.150	14.415
21	-0.090	0.090	0.150	14.385
22	0.090	-0.090	-0.150	23.112
23	0.090	-0.090	0.150	15.617
24	-0.090	0.090	-0.150	21.344

Minimum Safety Factor : 9.191

The anchorage can withstand 9.191 times greater seismic demand

ATTACHMENT 5

CALCULATIONS / SEWS

053-381
55300
PNL 132
PNL 113
SV-37460
SV-37022
1B1
2R1
145-041
145-201
B-1
135-021
153-021
253-021
053-251
153-011
LAR 005
LAR 010

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 3
ID : 053-381 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 121 CONTROL ROOM CHILLED WATER EXPANSION TANK		
Building : AUX	Floor El. : 755.00	Room, Row/Col :
Manufacturer, Model, Etc. :		

BASIS : External analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	Yes
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	N/A
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: F. Stille (S&A) and G. Gore (NSP) - 10/11/95

Vertically mounted ASME tank with elliptical heads and mounting skirt. Skirt bolted to floor with steel angles and 1/2" shell anchors. See document for configuration and anchorage evaluation.

Interaction: No potential interactions were observed.

Evaluated by: Date:

Frank B. Stille 10/30/95

G Gore 11/8/95

Attachment: Pictures
Attachment: Anchorage Analysis of 053-381 and 053-382

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 3
ID : 053-381 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 121 CONTROL ROOM CHILLED WATER EXPANSION TANK		
Building : AUX	Floor El. : 755.00	Room, Row/Col :
Manufacturer, Model, Etc. :		

PICTURES

053-381

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 3
ID : 053-381 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 121 CONTROL ROOM CHILLED WATER EXPANSION TANK		
Building : AUX	Floor El. : 755.00	Room, Row/Col :
Manufacturer, Model, Etc. :		

Anchorage Analysis of 053-381 and 053-382

S&A

Client: NSP Job No. 95C2807 Sheet 1 of 1

Subject: Prairie Island A-46

Anchorage Evaluation of Control Room Chilled Water Expansion Tanks 053-381 and 053-382

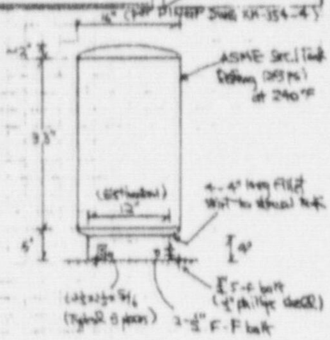
Conservative Assumptions:

① Tank Thickness = 1/4"

② Tank is full of water.

③ Tank frequencies are estimated above 8 Hz in horizontal and rigid in vertical.

④ Fillet welding 1/8" in size.



Estimated Weight

W = 0.25 · (π·16·37 + π 8²/2) · 0.286 + π 8² · 37 · 62.4/1728 ≈ 430 lbs

Spectral Acceleration

(FRS at Auxiliary Building, Elev. 755', 100' off floor mass center and 4% damping)

S_{ah} = 0.58 and S_{av} = 0.08 g (ground vertical PGA)

Anchorage Capacity

1/2" ϕ Phillips shell (GIP Table C.2-1 and reduction due to concrete strength)

P_u = 2.29 × ... = 1.72 kips ; V_u = 2.38 × (...) = 2.26 kips

4" long Fillet

P_u = 0.707 × 4 × 1/8 × ... = 10.8 kips - only 1/2" ϕ Phillips shell in control

Seismic Demand in Bolts

Tension due to horizontal earthquake in one direction (ignore weight and only one bolt is active).

T = ... / 12 = 385 lbs << P_u = 1.72 kips

Shear demand

V = ... = 1.5 × 0.5 × 430 = ... lbs << 3V_u = 6.78 kips

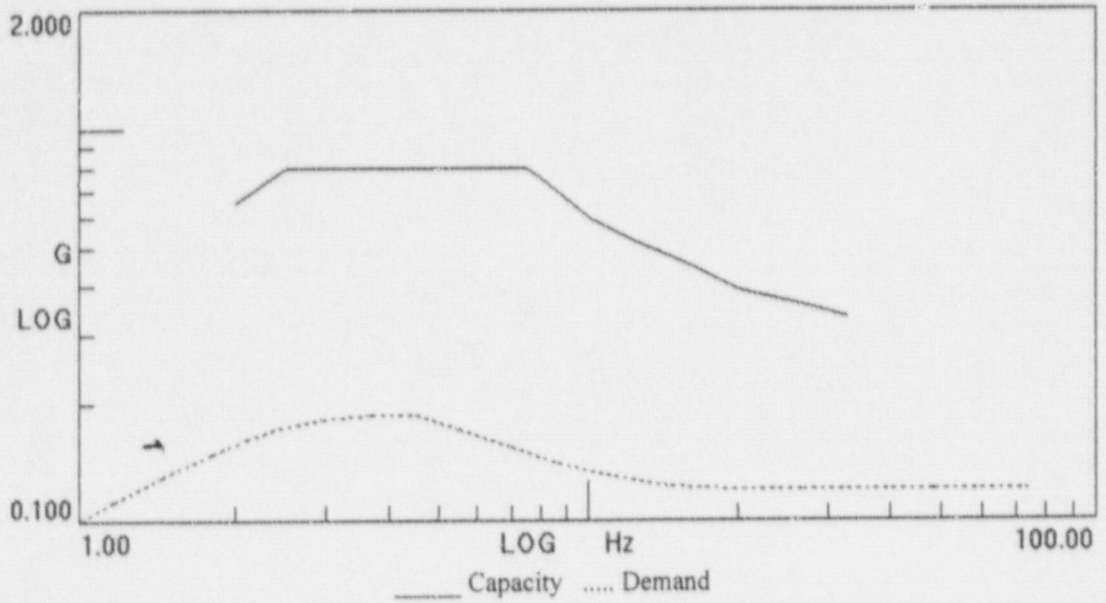
Conclusion: Anchorage of 053-381 and 053-382 are adequate.

1/1

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 5
ID : 55300 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : D1 DSL GEN ENG/GEN PANEL (EGP)		
Building : TURB	Floor El. : 695.00	Room, Row/Col : KA.4/2.8
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 8.00)	Yes
4.	Capacity based on:	1.00 * Bounding Spectrum
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

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Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev. 2, Corrected, 2/14/92 Status Yes Sheet 2 of 5
ID : 55300 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : D1 DSL GEN ENG/GEN PANEL (EGP)		
Building : TURB	Floor El. : 695.00	Room, Row/Col : KA.4/2.8
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

I&C/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
I&C/BS Caveat 2 - Computers and Programmable Controllers Evaluated Separately.	N/A
I&C/BS Caveat 3 - Strip Chart Recorders Evaluated.	N/A
I&C/BS Caveat 4 - Structural Adequate.	Yes
I&C/BS Caveat 5 - Adjacent Cabinets or Panels Bolted Together.	Yes
I&C/BS Caveat 6 - Drawers or Equipment on Slides Restrained.	Yes
I&C/BS Caveat 7 - Doors Secured.	Yes
I&C/BS Caveat 8 - Sufficient Slack and Flexibility of Attached Lines.	Yes
I&C/BS Caveat 9 - Adequate Anchorage.	Yes
I&C/BS Caveat 10 - Potential Chatter of Essential Relays Evaluated.	Yes
I&C/BS Caveat 11 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes*
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	Yes
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	Yes
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 5
ID : 55300 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : D1 DSL GEN ENG/GEN PANEL (EGP)		
Building : TURB	Floor El. : 695.00	Room, Row/Col : KA.4/2.8
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	Yes
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A) and G. Gore (NSP) -11/1/95.

REF: NF-38298-10 Rev. AH, NF-38312-5 Rev. C and NF-38313-1 Rev. HH

Anchorage:
The panel, 106" x 30" x 90" high, is anchored to a 2' deep concrete pad by 12 - 1/2" J-Bolts (AB-51). Also, the cabinet base is shimed 1.25" with no grout pad. Since the base is properly shimed, the intent of the 0.25" gap is met, but the anchors will be subjected to some bending, hence, it is conservative to use the methodogy set forth in EPRI TR-103960 ("Recommend Approaches for Resolving Anchorage Outliers") to analyze the anchorage.

The attached anchorage evaluation use the methodology of EPRI TR-103960 to show that the cabinets are adequately anchored.

Evaluated by: _____ Date: 11/15/95

_____ 11/16/95

Attachment: Pictures
Attachment: Anchorage Evaluation

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 5
ID : 55300 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : D1 DSL GEN ENG/GEN PANEL (EGP)		
Building : TURB	Floor El. : 695.00	Room, Row/Col : KA.4/2.8
Manufacturer, Model, Etc. :		

PICTURES

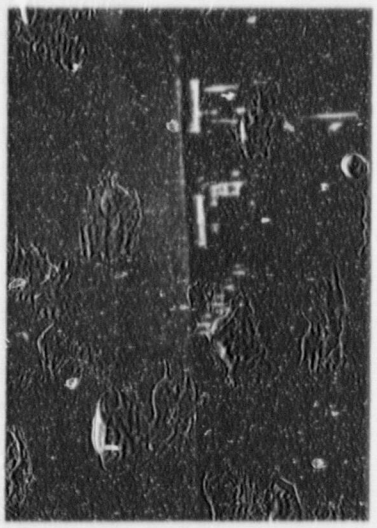


Fig.1: 55300

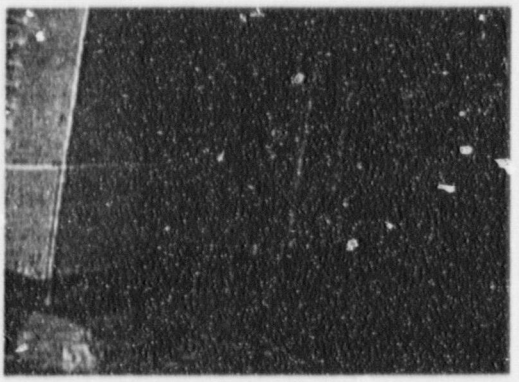
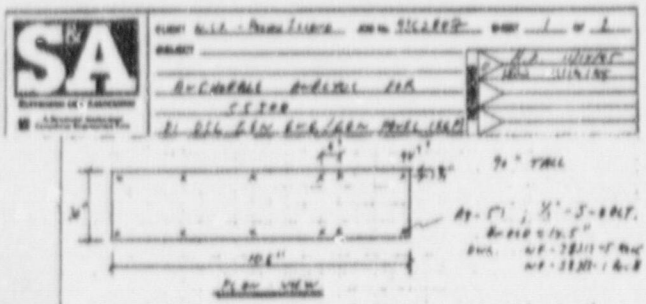
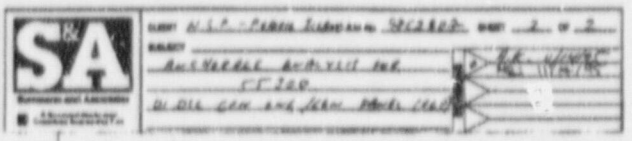


Fig.2: 55300 - Anchorage

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 5 of 5
ID : 55300 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : D1 DSL GEN ENG/GEN PANEL (EGP)		
Building : TURB	Floor El. : 695.00	Room, Row/Col : KA.4/2.8
Manufacturer, Model, Etc. :		

Anchorage Evaluation





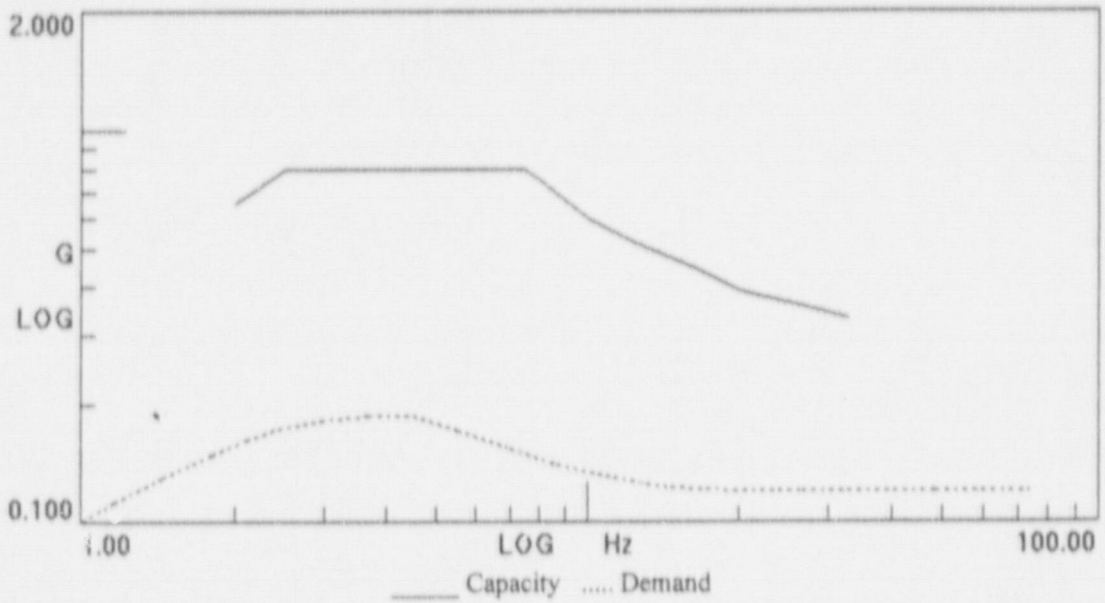
1/2

2/2

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 4
ID : PNL 132 (Rev. 0)	Class : 14. Distribution Panels	
Description : AC DISTRIBUTION PANEL 132		
Building : TURB	Floor El. : 695.00	Room, Row/Col : E.8/9.1 NEAR 123 AIR COMPR
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 11.00)	Yes
4.	Capacity based on:	1.00 * Bounding Spectrum
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 4
ID : PNL :32 (Rev. 0)	Class : 14. Distribution Panels	
Description : AC DISTRIBUTION PANEL 132		
Building : TURB	Floor El. : 695.00	Room, Row/Col : E.8/9.1 NEAR 123 AIR COMPR
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

DP/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
DP/BS Caveat 2 - Contains only Circuit Breakers and Switches.	Yes
DP/BS Caveat 3 - Doors Secured.	Yes
DP/BS Caveat 4 - Adjacent Cabinets Bolted Together.	N/A
DP/BS Caveat 5 - General Configuration Similar to NEMA Standards.	Yes
DP/BS Caveat 6 - Adequate Anchorage.	Yes
DP/BS Caveat 7 - Potential Chatter of Essential Relays Evaluated.	N/A
DP/BS Caveat 8 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	N/A
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		CAP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 4
ID : PNL 132 (Rev. 0)	Class : 14. Distribution Panels	
Description : AC DISTRIBUTION PANEL 132		
Building : TURB	Floor El. : 695.00	Room, Row/Col : E.8/9.1 NEAR 123 AIR COMPR
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT. W. Djordjevic (S&A) and G. Gore (NSP) -11/1/95.

This is a wall mounted panel of dimension 26"Wx45"Hx6.5"D and anchored on a R/C wall by 8 - 3/8" CEAs. The panel was tug tested and judged to be OK. Photo: F1-16

Evaluated by: WDJ 11/15/95

GJ Gore 11/16/95

Attachment: Pictures

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 4
ID : PNL 132 (Rev. 0)	Class : 14. Distribution Panels	
Description : AC DISTRIBUTION PANEL 132		
Building : TURB	Floor El. : 695.00	Room, Row/Col : E.8/9.1 NEAR 123 AIR COMPR
Manufacturer, Model, Etc. :		

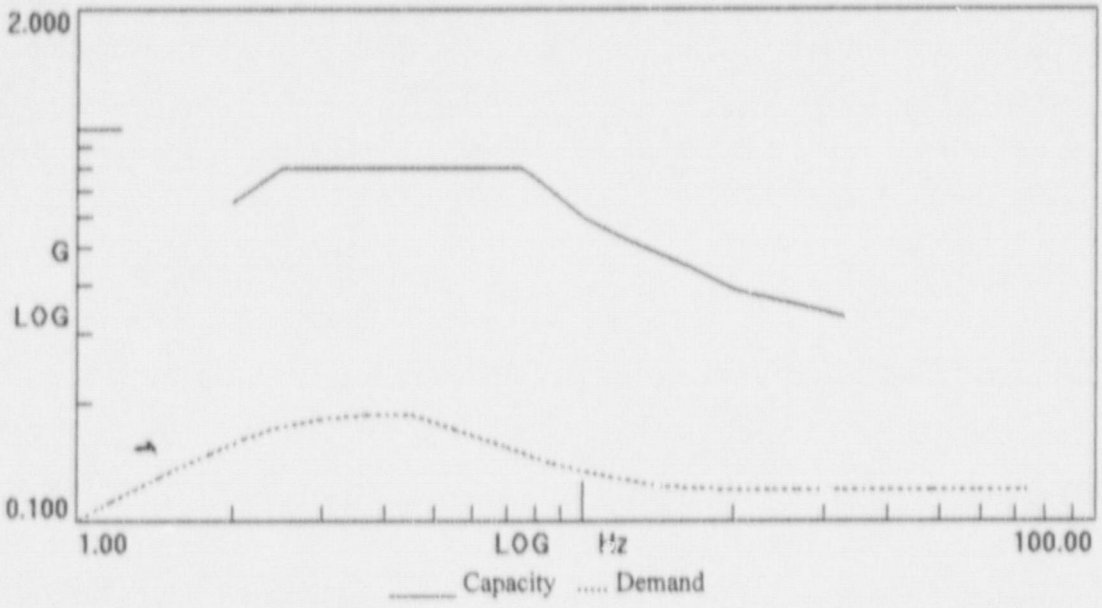
PICTURES

PNL 132

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 4
ID : PNL 113 (Rev. 0)	Class : 14. Distribution Panels	
Description : INSTR BUS III PANEL (BLUE) 113		
Building : TURB	Floor El. : 715.00	Room, Row/Col : G.1/8.0
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	715.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 11.00)	Yes
4.	Capacity based on:	1.00 * Bounding Spectrum
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 4
ID : PNL 113 (Rev. 0)	Class : 14. Distribution Panels	
Description : INSTR BUS III PANEL (BLUE) 113		
Building : TURB	Floor El. : 715.00	Room, Row/Col : G.1/8.0
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

DP/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
DP/BS Caveat 2 - Contains only Circuit Breakers and Switches.	Yes
DP/BS Caveat 3 - Doors Secured.	Yes
DP/BS Caveat 4 - Adjacent Cabinets Bolted Together.	N/A
DP/BS Caveat 5 - General Configuration Similar to NEMA Standards.	Yes
DP/BS Caveat 6 - Adequate Anchorage.	Yes
DP/BS Caveat 7 - Essential Chatter of Essential Relays Evaluated.	N/A
DP/BS Caveat 8 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	N/A
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 4
ID : PNL 113 (Rev. 0)	Class : 14. Distribution Panels	
Description : INSTR BUS III PANEL (BLUE) 113		
Building : TURB	Floor El. : 715.00	Room, Row/Col : G.1/8.0
Manufacturer, Model, Etc. :		

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A) and G. Ridder (WPS) - 5/23/94.

Anchorage:
Panel is wall mounted. The panel dimensions are: 20Wx36Hx6D. Anchored by 4 - 1/2" CEA into R/C wall. Tug tested and judged to be OK.

No seismic interactions.

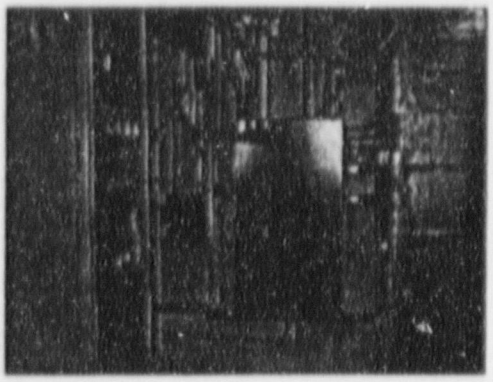
Evaluated by: _____ Date: 10/5/95

_____ 10-19-95

Attachment: Pictures

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 4
ID : PNL 113 (Rev. 0)	Class : 14. Distribution Panels	
Description : INSTR BUS III PANEL (BLUE) 113		
Building : TURB	Floor El. : 715.00	Room, Row/Col : G.1/8.0
Manufacturer, Model, Etc. :		

PICTURES

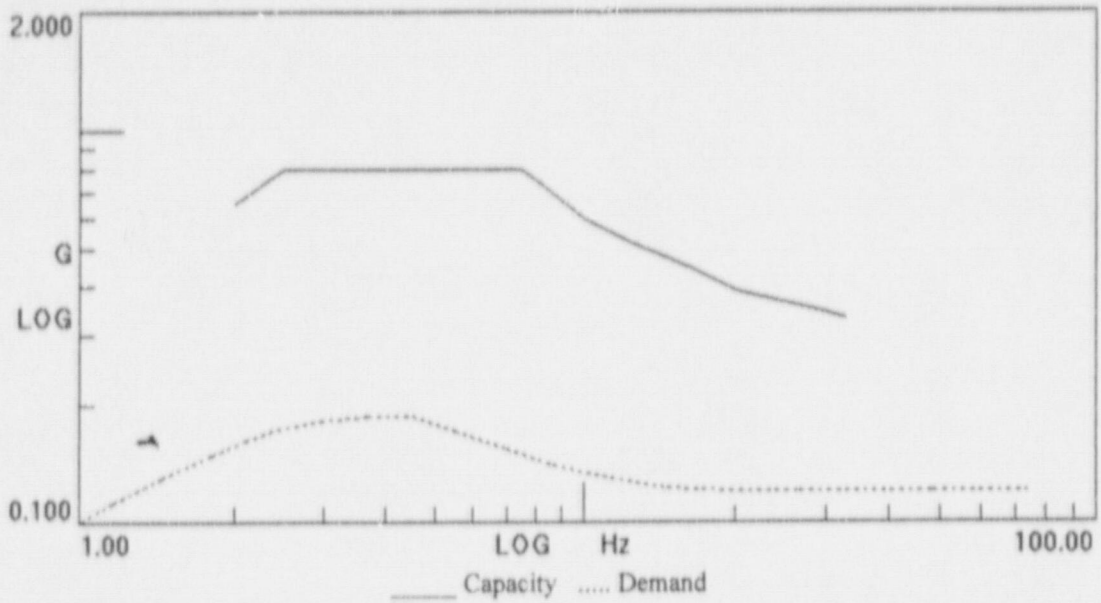


PNL 113

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 4
ID : SV-37460 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : UNIT 1 TRAIN A CHILL WTR/CLG WTR ISOL SV		
Building : CNTMT	Floor El. : 749.00	Room, Row/Col : 13/330
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	733.75
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency =)	N/A
4.	Capacity based on:	1.00 * Bounding Spectrum
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 4
ID : SV-37460 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : UNIT 1 TRAIN A CHILL WTR/CLG WTR ISOL SV		
Building : CNTMT	Floor El. : 749.00	Room, Row/Col : 13/330
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

MOV/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
MOV/BS Caveat 2 - Valve Body Not of Cast Iron.	Yes
MOV/BS Caveat 3 - Valve Yoke Not of Cast Iron.	N/A
MOV/BS Caveat 4 - Mounted on 1-Inch Diameter Pipe Line or Greater.	N/A
MOV/BS Caveat 5 - Valve Operator Cantilever Length for Motor-Operated Valves.	N/A
MOV/BS Caveat 6 - Actuator and Yoke Not Independently Braced.	Yes
MOV/BS Caveat 7 - Sufficient Slack and Flexibility of Attached Lines.	Yes
MOV/BS Caveat 8 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: M. McKeown (NSP) and G. Gore (NSP) - 10/23/95.

Capacity:
BSCav.2: Data was not available for this valve, but its body is not suspected to be cast iron.
BSCav.4&5: This small solenoid valve is rigidly attached to a well supported steel structure which is made of plates, angles and channels weilded together. The soleniod was tug tested and judged seismically rugged by SRT.

Interaction:
No potential interactions were observed.

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 4
ID : SV-37460 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : UNIT 1 TRAIN A CHILL WTR/CLG WTR ISOL SV		
Building : CNTMT	Floor El. : 749.00	Room, Row/Col : 13/330
Manufacturer, Model, Etc. :		

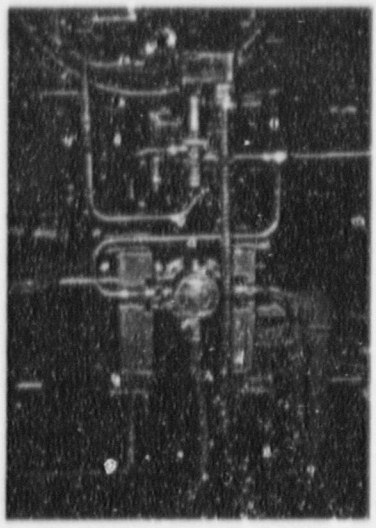
Evaluated by: [signature] Date: 11/14/95

[signature] 11/13/95

Attachment: Pictures

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 4
ID : SV-37460 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : UNIT 1 TRAIN A CHILL WTR/CLG WTR ISOL SV		
Building : CNTMT	Floor El. : 749.00	Room, Row/Col : 13/330
Manufacturer, Model, Etc. :		

PICTURES

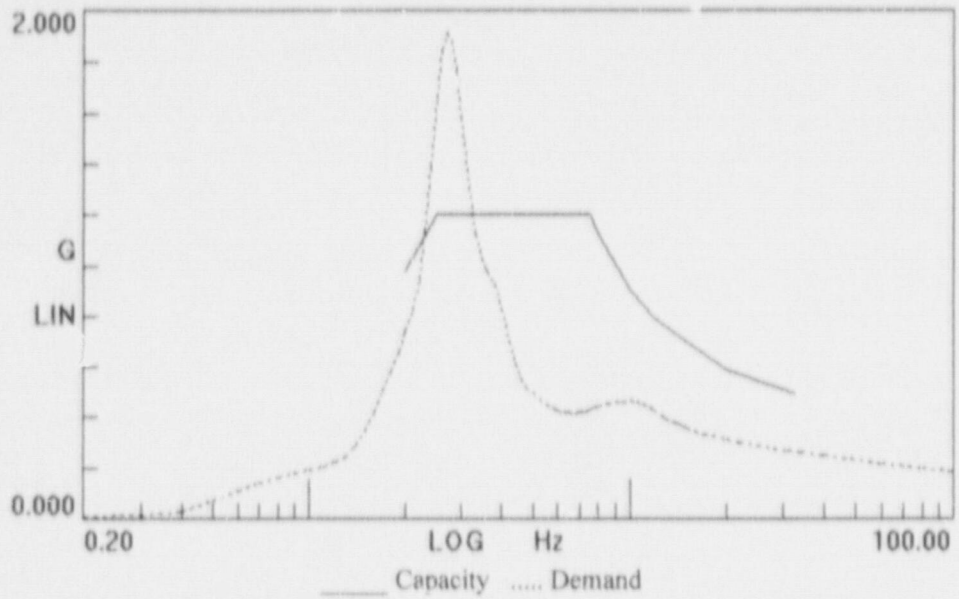


SV-37460

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 4
ID : SV-37022 (Rev. 0)	Class : 6. Motor-Operated and Solenoid-Operated Valves	
Description : 121 CONT RM HNDLR OA SPLY STM EXCL B SV		
Building : AUX	Floor El. : 761.00	Room, Row/Col : ON W SIDE WALL G.5/7.3
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	755.00
2.	Elevation of seismic input below about 40' from grade (grade = 693.00)	N/A
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 0.00)	N/A
4.	Capacity based on: 1.50 * Bounding Spectrum	
5.	Demand based on: 1.00 * Conservative Design Floor Response Spectra	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Rounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	BUILDING|Auxiliary Concrete|ELEVATION|755.00|DIRECTION|HORIZONTAL|MASS POINTS|29|RADIAL DIST|100
Demand 2	H:\GIP\PROJ0040\spectra.des	BUILDING|Auxiliary Concrete|ELEVATION|755.00|DIRECTION|HORIZONTAL|MASS POINTS|29|RADIAL DIST|100

Does capacity exceed demand? Yes

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 4
ID : SV-37022 / Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : 121 CONT RM HNDLR OA SPLY STM EXCL B SV		
Building : AUX	Floor El. : 761.00	Room, Row/Col : ON W SIDE WALL G.5/7.3
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

MOV/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
MOV/BS Caveat 2 - Valve Body Not of Cast Iron.	Yes
MOV/BS Caveat 3 - Valve Yoke Not of Cast Iron.	N/A
MOV/BS Caveat 4 - Mounted on 1-Inch Diameter Pipe Line or Greater.	N/A
MOV/BS Caveat 5 - Valve Operator Cantilever Length for Motor-Operated Valves.	N/A
MOV/BS Caveat 6 - Actuator and Yoke Not Independently Braced.	Yes
MOV/BS Caveat 7 - Sufficient Slack and Flexibility of Attached Lines.	Yes
MOV/BS Caveat 8 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? Yes

COMMENTS

SRT: W. Djordjevic (S&A), M. McKeown (NSP) and G. Ridder (WPS) - 5/26/94

Capacity vs. Demand
The seismic demand exceeds the capacity at a low frequency, but it is acceptable because the SV unit is mounted to the concrete wall and the seismic demand is enveloped at and above the building frequency.

Capacity:
BSCav.2: Data was not available for this valve, but its body is not suspected to be cast iron.
BSCav.4&5: The wall mounted SV unit was tug tested and judged acceptable.

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 4
ID : SV-37022 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : 121 CONT RM HNDLR OA SPLY STM EXCL B SV		
Building : AUX	Floor El. : 761.00	Room, Row/Col : ON W SIDE WALL G.5/7.3
Manufacturer, Model, Etc. :		

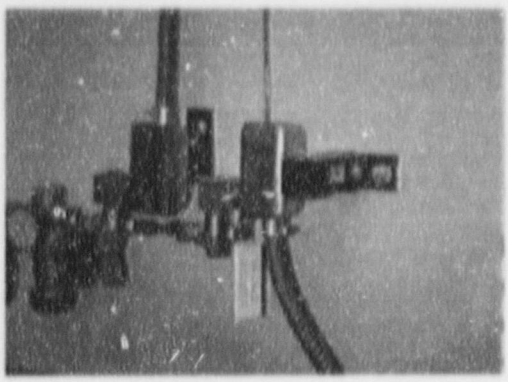
Evaluated by: Mark McKeown Date:

Walter Djordjevic

Attachment: Pictures

Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 4
ID : SV-37022 (Rev. 0)	Class : 8. Motor-Operated and Solenoid-Operated Valves	
Description : 121 CONT RM HNDLR OA SPLY STM EXCL B SV		
Building : AUX	Floor El. : 761.00	Room, Row/Col : ON W SIDE WALL G.5/7.3
Manufacturer, Model, Etc :		

PICTURES

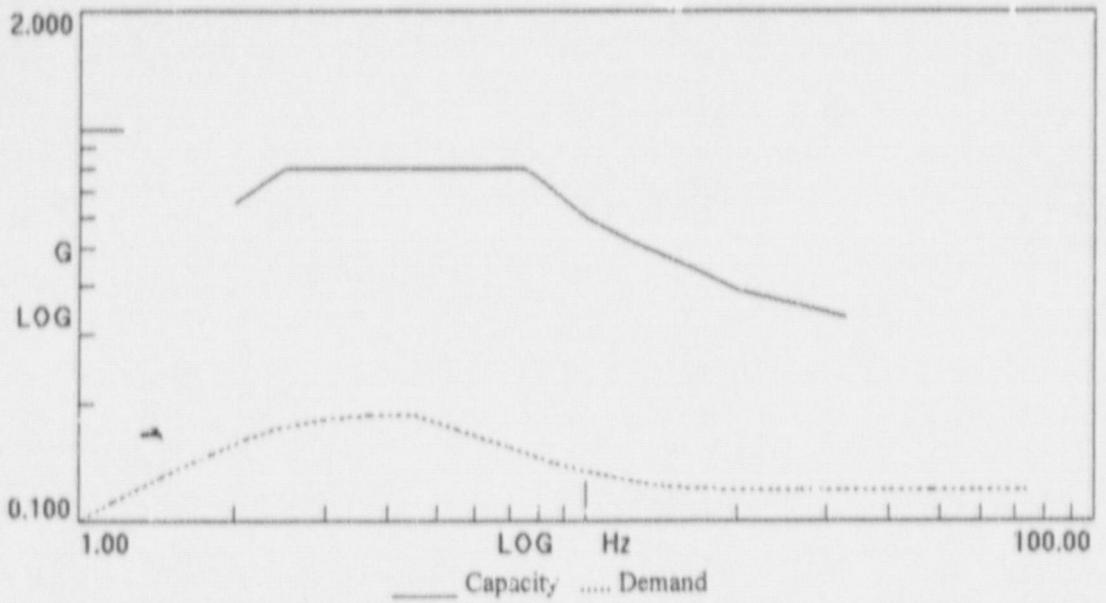


SV-37022

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 11
ID : 1B1 (Rev. 0)	Class : 20 Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	735.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 11.00)	Yes
4.	Capacity based on: 1.00 * Bounding Spectrum	
5.	Demand based on: 1.00 * Design Basis Ground Response Spectrum	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 11
ID : 1B1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

I&C/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
I&C/BS Caveat 2 - Computers and Programmable Controllers Evaluated Separately.	N/A
I&C/BS Caveat 3 - Strip Chart Recorders Evaluated.	N/A
I&C/BS Caveat 4 - Structural Adequate.	Yes
I&C/BS Caveat 5 - Adjacent Cabinets or Panels Bolted Together.	Yes
I&C/BS Caveat 6 - Drawers or Equipment on Slides Restrained.	Yes
I&C/BS Caveat 7 - Doors Secured.	Yes
I&C/BS Caveat 8 - Sufficient Slack and Flexibility of Attached Lines.	Yes
I&C/BS Caveat 9 - Adequate Anchorage.	Yes
I&C/BS Caveat 10 - Potential Chatter of Essential Relays Evaluated.	N/A
I&C/BS Caveat 11 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	N/A
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 11
ID : 1B1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A) and G. Ridder (WPS) - 5/23/94.

REF: NSP Dwg. NF-38300-27 Rev. H, NF-38315-9 Rev. H, NF-38313-1 Rev. HH & NF-39750 Rev. S

Anchorage:
Connected in a 4-unit line-up of 1W1, 1W2, 1B1 and 1B2. Panels themselves are 90" tall, 22"/unit wide, and 30" deep. Each panel is anchored to a structural steel platform by 4 - 3/4" steel bolts inset 2" typ. from corners. The platform is 17" high welded steel angle frame (MK-ICS-1, ref.) anchored to floor by a 5/8" J-bolt at each post (AB-C8). The frame support all four units and consists of 4x3x3/8" angle around the perimeter and 8 - 4x4x3/8" angle posts. All cabinets are interconnected by internal bolting.

According to GIP table C.1-1 and assuming the panels are 1/8" steel plate, the typical maximum mass per panel is, 3 x [2 x (90x22 + 22x30 + 30x90) x 1/8 / 12^3] x 490 = 1140 lbs per panel.

Check support steel platform:
From SEWS 14MR, each post can resist a horizontal load of 2.1 kips when analyzed as a 17" long cantilever. Since the platform has 8 legs, it can resist a horizontal seismic load of 8 x 2.1 = 16.8 kip, which is applied due to a seismic acceleration of, 16800 / (4 x 1140) = 3.68 G.
Given the applied spectral acceleration of 0.349 G in each horizontal direction and the SRSS rule of combining seismic loading, the platform's safety factor = 3.68 / (2^0.5 x 0.349) = 7.5.

Since, the capacity of the 3/4" steel to steel bolting (4 per panel) is greater than the capacity of the 5/8" J-bolt anchorage to concrete (total of 8 for the platform), the anchorage evaluation will consider the J-bolt anchorage. Also, the J-bolts are embedded 9.5" which is < 16D = 10" and according to GIP the J-bolts have no tensile capacity, but there is an overturn moment, hence the anchorage analysis will consider a 1/2" J-bolt instead of 5/8", thereby meeting the intent of this anchorage caveat.

The attached anchorage evaluation show the J-bolts are adequate with a safety factor which is less than that of the platform, therefore the anchorage safety factor is govern by the J-bolts.

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 11
ID : 1B1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Seismic Interaction:
A generic issue at Prairie Island with open S-hooks throughout plant for hung overhead florescent lights. This should be dealt with on a plant-wide basis. Work Order #9510032 was initiated to crimp the S-hooks on overhead light fixtures.

Also, seismic housekeeping in control room was found to be adequate.

Evaluated by: _____ Date: 11/9/95

_____ 11-10-95

Attachment: ANCHOR Report

ANCHOR Report

Earthquake :
Response Spectrum : SSE
Frequency : GIP - Flexible
Percent Damping : GIP - 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.349
East - West	0.349
Vertical	0.150

Angle (N-S Direction makes with the X Axis) : 0.00
Combination Criteria : SRSS

Weights :
Number of Weights : 4

No	Weight	X	Y	Z
1	1140.00	9.000	12.500	62.000
2	1140.00	31.000	12.500	62.000
3	1140.00	53.000	12.500	62.000
4	1140.00	75.000	12.500	62.000

Forces :
Number of External Forces : 0

Moments :
Number of External Moments : 0

Allowables :
Anchor :
Number of Anchor types : 1

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	1/2	Other	J-Bolt (90 deg)	6660.00	3330.00	1.00	0.30	1.00

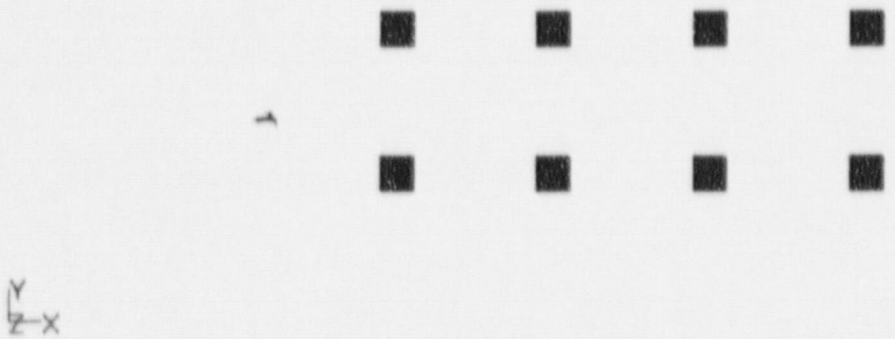
Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :
Allowable Stress : 30600 psi.

Surfaces :
Number of Surfaces : 1
Surface Orientation

	Direction Comp	Direction Comp	Direction Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Anchor Bolts :
Concrete Lines :
Concrete Points :
Weld Lines :

Geometry :
Anchor :
Number of Anchors : 8

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 7 of 11
ID : 1B1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	0.000	0.000	0.000	1
2	1	28.000	0.000	0.000	1
3	1	56.000	0.000	0.000	1
4	1	84.000	0.000	0.000	1
5	1	84.000	25.250	0.000	1
6	1	56.000	25.250	0.000	1
7	1	28.000	25.250	0.000	1
8	1	0.000	25.250	0.000	1

Concrete Lines :
# of elements per line : 4
Number of Concrete Lines : 0

Concrete Points :
Number of Concrete Points : 8

No.	X Coord	Y Coord	Z Coord	Surf Id	Conc-Pt Area
1	0.000	0.000	0.000	1	36.000
2	28.000	0.000	0.000	1	36.000
3	56.000	0.000	0.000	1	36.000
4	84.000	0.000	0.000	1	36.000
5	84.000	25.250	0.000	1	36.000
6	56.000	25.250	0.000	1	36.000
7	28.000	25.250	0.000	1	36.000
8	0.000	25.250	0.000	1	36.000

Weld Lines :
# of elements per line : 4
Number of Weld Lines : 0

Determination of Reduction Factors :
Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) = 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 5

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 6

Adequately Installed : Yes

Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 7

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 8

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor := 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factors Data Current : Yes

No	Anc Id	Pall/ Vall	Pallr/ Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
2	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
3	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
4	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
5	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
6	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
7	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
8	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 10 of 11
ID : 1B1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment
RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.349	0.140	0.060	7.615
2	-0.349	-0.140	-0.060	8.483
3	-0.349	0.140	0.060	7.615
4	0.349	-0.140	-0.060	8.483
5	0.349	-0.140	0.060	7.607
6	-0.349	0.140	-0.060	8.497
7	0.349	0.140	-0.060	8.497
8	-0.349	-0.140	0.060	7.607
9	0.140	0.349	0.060	3.205
10	-0.140	-0.349	-0.060	3.426
11	0.140	-0.349	0.060	3.196
12	-0.140	0.349	-0.060	3.440
13	-0.140	0.349	0.060	3.205
14	0.140	-0.349	-0.060	3.426
15	0.140	0.349	-0.060	3.440
16	-0.140	-0.349	0.060	3.196
17	0.140	0.140	0.150	6.793
18	-0.140	-0.140	-0.150	10.556

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**			GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 11 of 11
ID : 1B1 (Rev. 0)		Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 1B1			
Building : AUX	Floor El. : 735.00		Room, Row/Col : Control Room
Manufacturer, Model, Etc. :			

19	0.140	0.140	-0.150	10.652
20	-0.140	-0.140	0.150	6.793
21	-0.140	0.140	0.150	6.793
22	0.140	-0.140	-0.150	10.556
23	0.140	-0.140	0.150	6.793
24	-0.140	0.140	-0.150	10.652

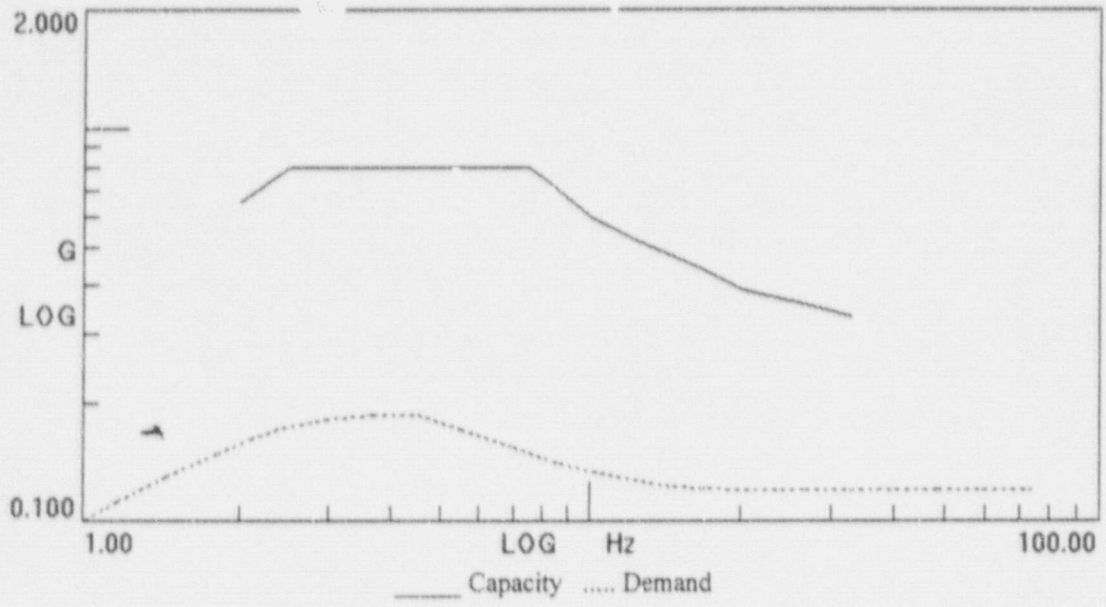
Minimum Safety Factor : 3.196

The anchorage can withstand 3.196 times greater seismic demand

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 4
ID : 2R1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 2R1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input		735.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)		Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 11.00)		Yes
4.	Capacity based on:	1.00 * Bounding Spectrum	
5.	Demand based on:	1.00 * Design Basis Ground Response Spectrum	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 4
ID : 2R1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 2R1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

I&C/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
I&C/BS Caveat 2 - Computers and Programmable Controllers Evaluated Separately.	N/A
I&C/BS Caveat 3 - Strip Chart Recorders Evaluated.	N/A
I&C/BS Caveat 4 - Structural Adequate.	Yes
I&C/BS Caveat 5 - Adjacent Cabinets or Panels Bolted Together.	Yes
I&C/BS Caveat 6 - Drawers or Equipment on Slides Restrained.	Yes
I&C/BS Caveat 7 - Doors Secured.	Yes
I&C/BS Caveat 8 - Sufficient Slack and Flexibility of Attached Lines.	Yes
I&C/BS Caveat 9 - Adequate Anchorage.	Yes
I&C/BS Caveat 10 - Potential Chatter of Essential Relays Evaluated.	N/A
I&C/BS Caveat 11 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	N/A
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 4
ID : 2R1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 2R1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacture , Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: F. Stille (S&A) and G. Gore (NSP) - 8/23/95.

REF: NSP Dwg. NF-38300-27 Rev. H, NF-38315-9 Rev. H, NF-38313-1 Rev. HH & NF-39750 Rev. S

Anchorage:
Connected in a 4-unit line-up of 2Y1, 2Y2, 2R1 and 2R2. The panels themselves are 90" tall, 22"/unit wide, and 30" deep. Each panel is anchored to a structural steel platform by 4 bolts, one per corner.
The platform is 17" high welded steel angle frame (MK-ICS-1, ref.) anchored to floor by a 5/8" J-bolt at each post (AB-C8). The frame supports all four units and consists of 4x3x3/8" angle around the perimeter and 8 - 4x4x3/8" angle posts. All cabinets are interconnected by internal bolting.

This line-up is the same as the line-up which contains panel 1B1, therefore for additional notes and anchorage evaluation see the SEWS for 1B1. Also, for photos see the SEWS for 2R2.

Seismic Interaction:
There is a generic issue at Prairie Island with open S-hooks throughout plant for hung overhead florescent lights. This should be dealt with on a plant-wide basis. Work Order #9510032 was initiated to crimp the S-hooks on overhead light fixtures.

Also, there is a fire extinguisher on a small shallow hook in close proximity to units, but it is far enough from unit 2R1 to be of no consequence.

Evaluated by: Date:

Frank B. Stille 11/8/95

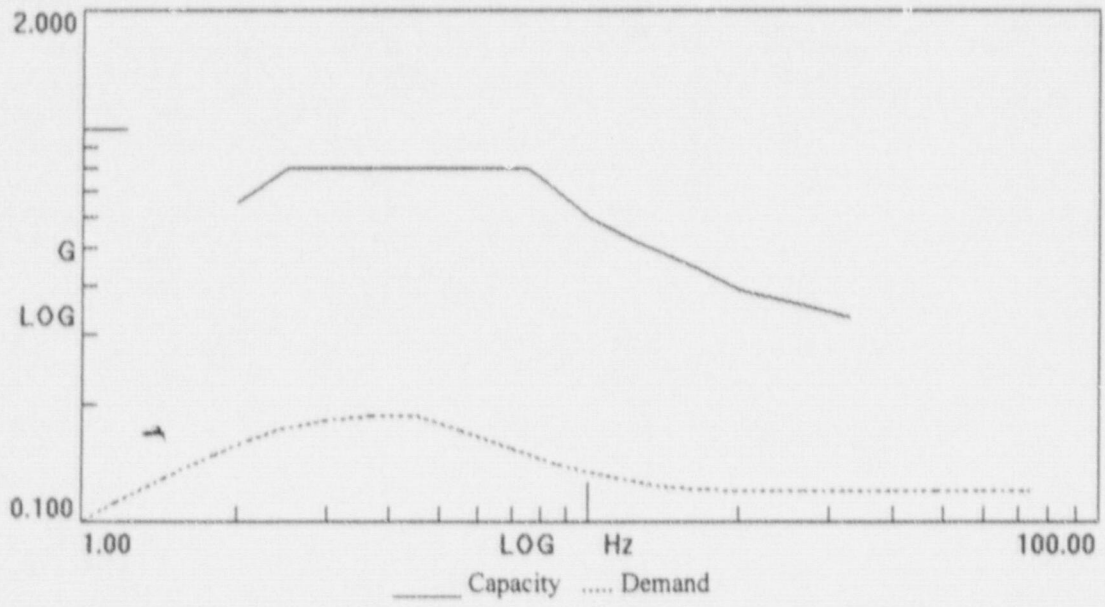
G Gore 11/13/95

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 4
ID : 2R1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : PROCESS PROTECTION RACK 2R1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 33.00)	Yes
4.	Capacity based on: 1.00 * Bounding Spectrum	
5.	Demand based on: 1.00 * Design Basis Ground Response Spectrum	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

5

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

HP/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
HP/BS Caveat 2 - Driver and Pump on Rigid Skid.	Yes
HP/BS Caveat 3 - Thrust Bearings in Both Axial Directions.	Yes
HP/BS Caveat 4 - Check of Long Unsupported Piping.	Yes
HP/BS Caveat 5 - Base Vibration Isolation System Checked.	N/A
HP/BS Caveat 6 - Sufficient Slack and Flexibility of Attached Lines.	Yes
HP/BS Caveat 7 - Adequate Anchorage.	Yes
HP/BS Caveat 8 - Potential Chatter of Essential Relays Evaluated.	N/A
HP/BS Caveat 9 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	Yes
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A) and G. Ridder (WPS) - 5/26/94.

REF: Ajax Dwg No. 2553 (NSP Dwg. X-HIAW-1-49, Rev. A.); Pioneer Dwgs: NF-38313-1HH, NF-38308-1, NF-38308-2

Anchorage:
The charging pump is anchored onto a concrete pad (4'-8" wide x 13'-0" long x 26" high) by 8 - 1-1/8" J-Bolts (4 per side). The pad is dowelled into the concrete foundation slab which is at elevation 673'-0". The motor unit is anchored by shear blocks instead of alignment pins which is judged to be acceptable. The pump assembly weights are; Pump 4700 #, Vari Drive 3225 #, Motor 500#, and skid 1200#.

The J-bolt have an edge distance of 3-1/4" which is less than the minimum allowable distance of 4.5" (4D); however the anchor analysis conservatively uses a smaller J-bolt (3/4") thereby meeting the intent of the this caveat.

This Anchor analysis used an enveloping set of Suction and Discharge Nozzle loads which were tabulated (see attachment). This analysis is conservative and demonstrates that the anchorage meets the intent of the GIP. The weights used in the anchor analysis are; Pump 4700 #, Vari Drive 3225 #, Motor 500#, and skid 1200#.

Evaluated by: _____ Date: 11/15/95

_____ 11-16-95

Attachment: Pictures
Attachment: Nozzle Load Summary
Attachment: ANCHOR Report

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

PICTURES

Fig.1: Charging Pump (145-041)

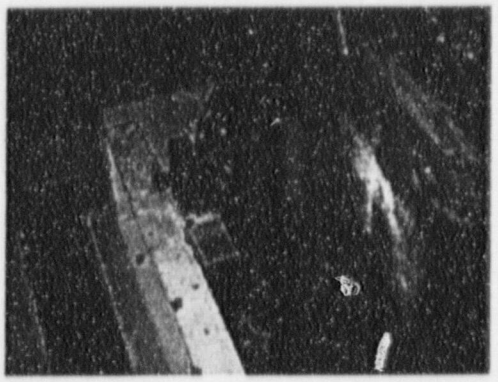


Fig.2: Charging Pump (145-041) Detail

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**	GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 5 of 12

ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

Nozzle Load Summary

Charging Pump Nozzle Loads
Ref. Vendor Document, SA Doc # 93C2807-DC-0008

		11 Charging Pump		12 Charging Pump		21 Charging Pump		22 Charging Pump		Maximums	
		Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Fx	lbs	133	165	136	248	372	287	171	-195	372	297
Fy	lbs	-203	283	-145	743	176	243	187	-360	-203	743
Fz	lbs	92	431	221	29	125	254	252	-466	252	-466
Mx	in-lbs	7824	3684	6586	33864	8132	6354	8335	-10452	7824	33864
My	in-lbs	6584	6444	-6432	21288	14280	3528	5584	-10452	14280	21288
Mz	in-lbs	936	2832	518	4844	[illegible]	1766	708	-5784	1152	-5784

Co-ordinate System : +X = East , +Y = Up , +Z = South (for the Loads)
Anchor to Global : +x (anc) = +Z ; +y (anc) = +X ; +z (anc) = +Y

Orig.: T.M. [signature] 10/24/95
Ch'ed: [signature] 10/31/95

These are the Nozzle Loads input into the Anchor Analyses (Per Ref #1)

1/1

ANCHOR Report

Earthquake :
Response Spectrum : SSE
Frequency : GIP - Rigid
Percent Damping : GIP - 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.225
East - West	0.225
Vertical	0.150

Angle (N-S Direction makes with the X Axis) : 0.00
Combination Criteria : SRSS

Weights :
Number of Weights : 4

No	Weight	X	Y	Z
1	3225.00	130.000	33.000	50.000
2	500.00	24.500	18.250	23.500
3	1200.00	75.500	25.750	4.000
4	4700.00	60.000	19.000	47.000

Forces :
Number of External Forces : 2

No	Fx	Fy	Fz	X	Y	Z
1	2.32E+002	3.72E+002	-2.03E+002	145.000	26.000	50.000
2	-4.66E+002	2.87E+002	7.43E+002	145.000	42.500	50.000

Moments :
Number of External Moments : 2

No	Mx	My	Mz
1	1.15E+003	7.82E+003	1.43E+004
2	-5.78E+003	3.40E+004	2.13E+004

Allowables :
Anchor :
Number of Anchor types : 1

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 7 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	3/4	Other	J-Bolt (90 deg)	15030.00	7510.00	1.00	0.30	1.00

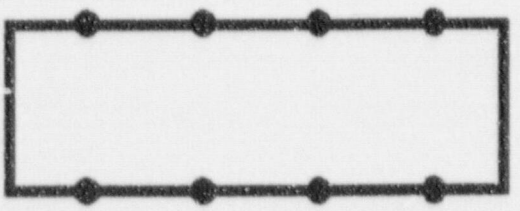
Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :
Allowable Stress : 30600 psi.

Surfaces :
Number of Surfaces : 1
Surface Orientation

	Direction	Direction	Direction
	Comp	Comp	Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Northern States Power Company - Prairie Island Nuclear Generating Plant SCREENING EVALUATION WORK SHEET (SEWS)		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 8 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

Anchor Bolts : [redacted]

Concrete Lines : [redacted]

Concrete Points : [redacted]

Weld Lines : [redacted]

Geometry :

Anchor :

Number of Anchors : 8

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	24.500	1.063	0.000	1
2	1	59.000	1.063	0.000	1
3	1	94.000	1.063	0.000	1
4	1	129.000	1.063	0.000	1
5	1	129.000	50.437	0.000	1
6	1	94.000	50.437	0.000	1
7	1	59.000	50.437	0.000	1
8	1	24.500	50.437	0.000	1

Concrete Lines :

# of elements per line : 5

Number of Concrete Lines : 4

No	Start X-Coord	Start Y-Coord	Start Z-Coord	End X-Coord	End Y-Coord	End Z-Coord	Sf Id	Line Width
1	0.000	1.500	0.000	151.000	1.500	0.000	1	3.000
2	0.000	50.000	0.000	151.000	50.000	0.000	1	3.000
3	1.500	3.000	0.000	1.500	48.500	0.000	1	3.000
4	149.500	3.000	0.000	149.500	48.500	0.000	1	3.000

Concrete Points :

Number of Concrete Points : 0

Weld Lines :

# of elements per line : 5

Number of Weld Lines : 0

Determination of Reduction Factors :

Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 5

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.

Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 6

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 7

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factor Input for Anchor # 8

Adequately Installed : Yes
Embedment Length : (40.88 in. Min Reqd. to achieve full capacity) :=22.00 in.
Gap at Threaded Anchor : 0.13 in.
Edge Distance - Edge 1 : 3.25 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Not Applicable

Reduction Factors Data Current : Yes

No	Anc Id	Pall/ Vall	Pallr/ Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
2	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
3	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00

		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
4	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
5	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
6	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
7	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00
8	1	5126.94	N/A	1.00	1.00	0.60	1.00	1.00	0.62	0.93	1.00	1.00	1.00	1.00	1.00
		1710.34	N/A	1.00	1.00	1.00	1.00	1.00	0.25	0.93	1.00	1.00	1.00	1.00	1.00

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment
RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.225	0.090	0.060	5.283
2	-0.225	-0.090	-0.060	5.436
3	-0.225	0.090	0.060	5.121
4	0.225	-0.090	-0.060	5.621
5	0.225	-0.090	0.060	5.510
6	-0.225	0.090	-0.060	5.219
7	0.225	0.090	-0.060	5.405
8	-0.225	-0.090	0.060	5.375

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 12 of 12
ID : 145-041 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 CHG PUMP		
Building : AUX	Floor El. : 695.00	Room, Row/Col : H.5/6.6
Manufacturer, Model, Etc. :		

9	0.090	0.225	0.060	4.577
10	-0.090	-0.225	-0.060	5.316
11	0.090	-0.225	0.060	5.157
12	-0.090	0.225	-0.060	4.828
13	-0.090	0.225	0.060	4.603
14	0.090	-0.225	-0.060	5.393
15	0.090	0.225	-0.060	4.741
16	-0.090	-0.225	0.060	5.093
17	0.090	0.090	0.150	8.382
18	-0.090	-0.090	-0.150	11.201
19	0.090	0.090	-0.150	9.834
20	-0.090	-0.090	0.150	9.542
21	-0.090	0.090	0.150	8.454
22	0.090	-0.090	-0.150	11.501
23	0.090	-0.090	0.150	9.843
24	-0.090	0.090	-0.150	9.769

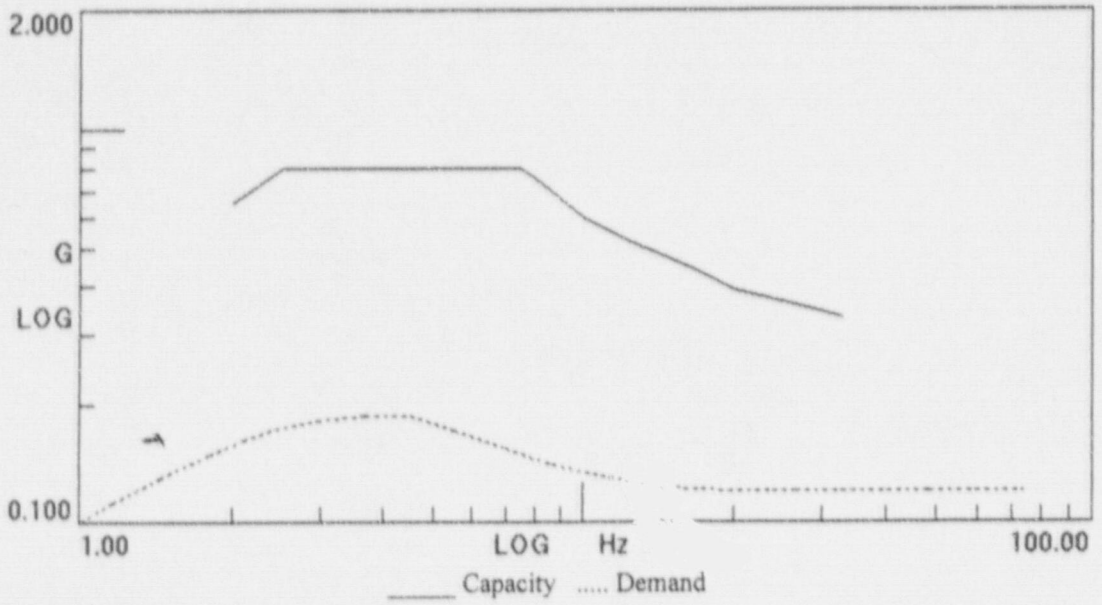
Minimum Safety Factor : 4.577

The anchorage can withstand 4.577 times greater seismic demand

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	695.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 33.00)	Yes
4.	Capacity based on: 1.00 * Bounding Spectrum	
5.	Demand based on: 1.00 * Design Basis Ground Response Spectrum	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

HP/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
HP/BS Caveat 2 - Driver and Pump on Rigid Skid.	Yes
HP/BS Caveat 3 - Thrust Bearings in Both Axial Directions.	Yes
HP/BS Caveat 4 - Check of Long Unsupported Piping.	Yes
HP/BS Caveat 5 - Base Vibration Isolation System Checked.	Yes
HP/BS Caveat 6 - Sufficient Slack and Flexibility of Attached Lines.	Yes
HP/BS Caveat 7 - Adequate Anchorage.	Yes
HP/BS Caveat 8 - Potential Chatter of Essential Relays Evaluated.	N/A
HP/BS Caveat 9 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	Yes
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 3 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	Yes
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? Yes

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: W. Djordjevic (S&A), M. McKeown (NSP), F. Stille (S&A) and G. Gore (NSP) - 11/21/93.

REF: Dresser Ind. (Pacific Pumps) Dwgs 46580, Pioneer Dwgs NF-38221-6, NF-38221-4, NF-38221-9

Anchorage:
The pump is anchored onto a concrete pad (3'-6" wide x 14'-4" long x 20" high) by 8 - 3/4" J-Bolts (4 per side) and the pad is dowelled into the concrete foundation slab. The J-boits have a short side edge distance of 4-1/8" and long side edge distance of 10" on 3" high grout pad. The pump assembly's weights are: Pump 4150 lbs, Turbine: 1585 lbs, Skid 1650 lbs and Oil Cooler 120 lbs.

Also, the J-bolt are embedded 8.5" which is less than the minimum allowable embedment of 12" (16D); however the anchor analysis conservatively uses a smaller J-bolt (1/2") thereby meeting the intent of the this caveat.

The piping nozzle loads used in the anchorage analysis were developed in calculation 93C2807-C-016. This analysis is conservative and demonstrates that the anchorage meets the intent of the GIP.

Evaluated by: Date:

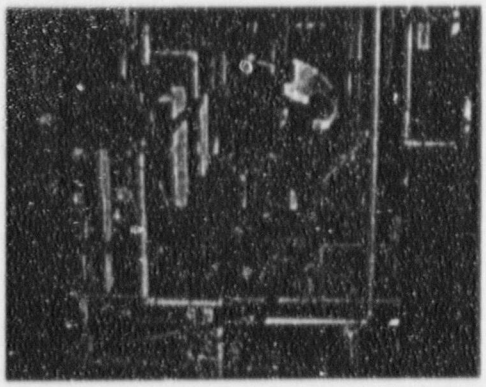
11/15/95

11/16/95

Attachment: Pictures
Attachment: ANCHOR Report

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 4 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

PICTURES



Steam Driven Auxiliary Feedwater Pump (145-201)

ANCHOR Report

Earthquake :
Response Spectrum : SSE
Frequency : GIP - Rigid
Percent Damping : GIP - 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.225
East - West	0.225
Vertical	0.150

Angle (N-S Direction makes with the X Axis) : 180.00
Combination Criteria : SRSS

Weights :
Number of Weights : 4

No	Weight	X	Y	Z
1	4150.00	63.000	19.880	20.000
2	1585.00	120.000	19.875	20.000
3	1650.00	-76.500	19.875	2.500
4	120.00	54.000	31.000	8.000

Forces :
Number of External Forces : 4

No	Fx	Fy	Fz	X	Y	Z
1	1.10E+001	2.32E+002	-9.10E+001	17.000	53.000	18.000
2	1.63E+003	5.58E+002	-3.33E+003	21.000	5.000	18.000
3	1.35E+002	-7.40E+001	-2.22E+002	74.000	18.000	37.000
4	1.20E+002	-6.90E+001	-2.94E+002	110.000	18.000	37.000

Moments :
Number of External Moments : 4

No	Mx	My	Mz
1	-2.40E+001	-3.60E+001	7.48E+003
2	-3.80E+004	1.61E+005	3.33E+004
3	4.68E+003	3.18E+003	1.98E+003
4	1.63E+003	3.23E+003	1.32E+003

Allowables :

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 6 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

Anchor :
Number of Anchor types : 1

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	1/2	Other	J-Bolt (90 deg)	6660.00	3330.00	1.00	0.30	1.00

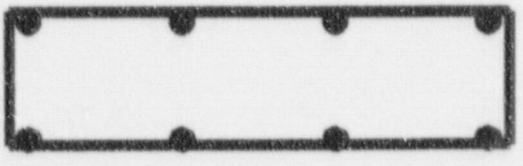
Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :
Allowable Stress : 30600 psi.

Surfaces :
Number of Surfaces : 1
Surface Orientation

	Direction	Direction	Direction
	Comp	Comp	Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 7 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

Anchor Bolts : [redacted]

Concrete Lines : [redacted]

Concrete Points : [redacted]

Weld Lines : [redacted]

Geometry :

Anchor :

Number of Anchors : 8

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	6.000	1.500	0.000	1
2	1	53.000	1.500	0.000	1
3	1	100.000	1.500	0.000	1
4	1	147.000	1.500	0.000	1
5	1	147.000	36.750	0.000	1
6	1	100.000	36.750	0.000	1
7	1	53.000	36.750	0.000	1
8	1	6.000	36.750	0.000	1

Concrete Lines :

# of elements per line : 10

Number of Concrete Lines : 4

No	Start X-Coord	Start Y-Coord	Start Z-Coord	End X-Coord	End Y-Coord	End Z-Coord	Sf Id	Line Width
1	0.000	0.000	0.000	153.000	0.000	0.000	1	3.000
2	153.000	0.000	0.000	153.000	39.750	0.000	1	3.000
3	153.000	39.750	0.000	0.000	39.750	0.000	1	3.000
4	0.000	39.750	0.000	0.000	0.000	0.000	1	3.000

Concrete Points :

Number of Concrete Points : 0

Weld Lines :

# of elements per line : 4

Number of Weld Lines : 0

Determination of Reduction Factors :

Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 5

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.

Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 6

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 7

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 8

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 8.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.13 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factors Data Current : Yes

	Anc	Pall/	Pallr/												
No	Id	Vall	Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
2	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
3	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00

		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
4	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
5	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
6	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
7	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00
8	1	2026.03	N/A	1.00	1.00	0.40	1.00	1.00	0.82	0.93	1.00	1.00	1.00	1.00	1.00
		2748.84	N/A	1.00	1.00	1.00	1.00	1.00	0.89	0.93	1.00	1.00	1.00	1.00	1.00

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment
RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.225	0.090	0.060	12.065
2	-0.225	-0.090	-0.060	10.065
3	-0.225	0.090	0.060	10.358
4	0.225	-0.090	-0.060	11.986
5	0.225	-0.090	0.060	11.948
6	-0.225	0.090	-0.060	10.358
7	0.225	0.090	-0.060	12.279
8	-0.225	-0.090	0.060	10.065

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 11 of 11
ID : 145-201 (Rev. 0)	Class : 5. Horizontal Pumps	
Description : 11 TD AFW PUMP		
Building : TURB	Floor El. : 695.00	Room, Row/Col : F.5/8.3
Manufacturer, Model, Etc. :		

9	0.090	0.225	0.060	10.084
10	-0.090	-0.225	-0.060	10.420
11	0.090	-0.225	0.060	9.739
12	-0.090	0.225	-0.060	11.128
13	-0.090	0.225	0.060	9.544
14	0.090	-0.225	-0.060	11.216
15	0.090	0.225	-0.060	11.924
16	-0.090	-0.225	0.060	9.191
17	0.090	0.090	0.150	15.632
18	-0.090	-0.090	-0.150	20.740
19	0.090	0.090	-0.150	24.571
20	-0.090	-0.090	0.150	14.415
21	-0.090	0.090	0.150	14.385
22	0.090	-0.090	-0.150	23.112
23	0.090	-0.090	0.150	15.617
24	-0.090	0.090	-0.150	21.344

Minimum Safety Factor : 9.191

The anchorage can withstand 9.191 times greater seismic demand

Northern States Power Company - Prairie Island Nuclear Generating Plant **OUTLIER SEISMIC VERIFICATION SHEET (OSVS)**		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room

1. OUTLIER ISSUE DEFINITION - Mechanical and Electrical Equipment

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Capacity vs. Demand	
Caveats	
Anchorage	
Seismic Interaction	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The control room ceiling is an outlier due to the aluminum diffussers which pose a personnel hazard.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Tie wrap (plastic lines) are a reasonable fix for this situation.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy.

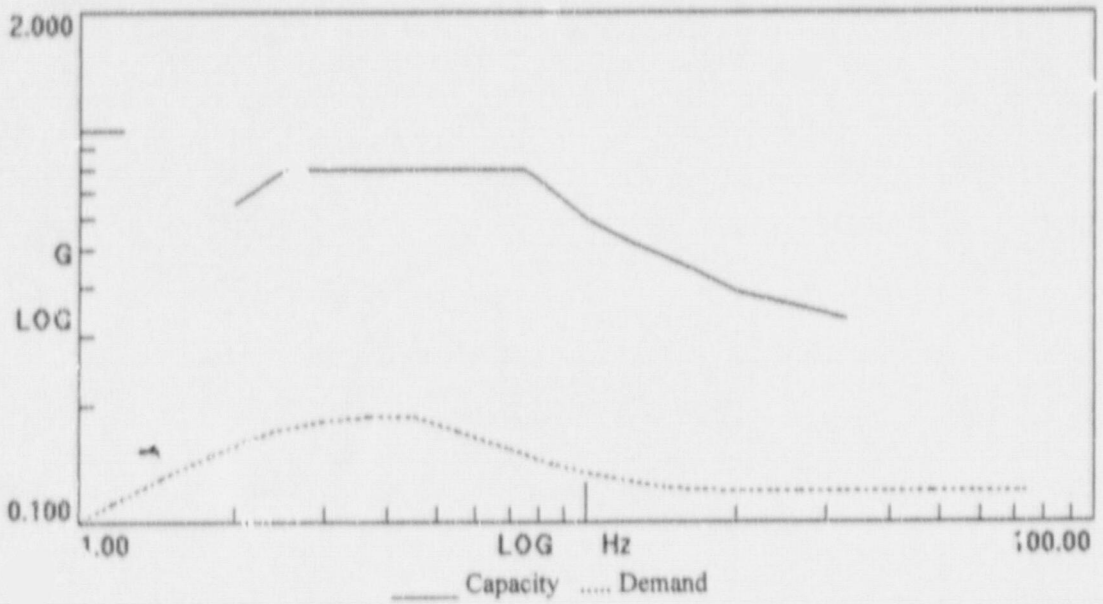
Approved by: _____ Date: 11/7/95

_____ 11-10-95

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 1 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

SEISMIC CAPACITY VS DEMAND

1.	Elevation where equipment receives seismic input	735.00
2.	Elevation of seismic input below about 40' from grade (grade = 695.00)	Yes
3.	Equipment has fundamental frequency above about 8 Hz (est. frequency = 11.00)	Yes
4.	Capacity based on: 1.00 * Bounding Spectrum	
5.	Demand based on: 1.00 * Design Basis Ground Response Spectrum	



	File	Record
Capacity	H:\GIP\GIP\spectra.des	Label|Bounding Spectrum
Demand 1	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00
Demand 2	H:\GIP\PROJ0040\spectra.des	MASS POINTS|N/A|BUILDING|GROUND|DIRECTION|HORIZONTAL|RADIAL DIST|N/A|ELEVATION|695.00

Does capacity exceed demand? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 2 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

CAVEATS - BOUNDING SPECTRUM

I&C/BS Caveat 1 - Earthquake Experience Equipment Class.	Yes
I&C/BS Caveat 2 - Computers and Programmable Controllers Evaluated Separately.	Yes
I&C/BS Caveat 3 - Strip Chart Recorders Evaluated.	Yes
I&C/BS Caveat 4 - Structural Adequate.	Yes
I&C/BS Caveat 5 - Adjacent Cabinets or Panels Bolted Together.	Yes
I&C/BS Caveat 6 - Drawers or Equipment on Slides Restrained.	Yes
I&C/BS Caveat 7 - Doors Secured.	Yes
I&C/BS Caveat 8 - Sufficient Slack and Flexibility of Attached Lines.	Yes
I&C/BS Caveat 9 - Adequate Anchorage.	Yes
I&C/BS Caveat 10 - Potential Chatter of Essential Relays Evaluated.	N/A
I&C/BS Caveat 11 - No Other Concerns.	Yes

Is the intent of all the caveats met for Bounding Spectrum? Yes

ANCHORAGE

1. The sizes and locations of anchors have been determined.	Yes
2. Appropriate equipment characteristics have been determined (mass, CG, natural freq., damping, center of rotation).	Yes
3. The type of anchorage is covered by the GIP.	Yes
4. The adequacy of the anchorage installation has been evaluated (weld quality and length, nuts and washers, expansion anchor tightness, etc.)	Yes
5. Factors affecting anchorage capacity or margin of safety have been considered: embedment length, anchor spacing, free-edge distance, concrete strength/condition, and concrete cracking.	Yes*
6. For bolted anchorages, any gaps under the base are less than 1/4 .	Yes
7. Factors affecting essential relays have been considered: gaps under the base, capacity reduction for expansion anchors.	N/A
8. The base has adequate stiffness and the effect of prying action on anchors has been considered.	Yes
9. The strength of the equipment base and the load path to the CG is adequate.	Yes
10. The adequacy of embedded steel, grout pads or large concrete pads have been evaluated.	N/A
11. The anchorage capacity exceeds the demand.	Yes

Are anchorage requirements met? Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCRELNING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 3 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

INTERACTION EFFECTS

1. Soft targets are free from impact by nearby equipment or structures.	Yes
2. If the equipment contains sensitive relays, it is free from all impact by nearby equipment or structures.	N/A
3. Attached lines have adequate flexibility.	Yes
4. Overhead equipment or distribution systems are not likely to collapse.	No
5. No other adverse concerns were found.	Yes

Is equipment free of interaction effects? No

IS EQUIPMENT SEISMICALLY ADEQUATE? **No**

COMMENTS

SRT: W. Djordjevic (S&A) and G. Ridder (WPS) - 5/23/94.

REF: NSP Dwg. NF-38313-1 Rev. HH, NF-39750 Rev. S & NF-38300-27 Rev. H.

Capacity:
Benchboard instrumentation was spot-checked and found to be properly installed.
BSCav.5: All cabinets are interconnected by internal bolting.

Anchorage:
Panel B-1 is part of the the Main Control benchboard "A"- "F". The panels, 124" tall, are anchored to structural steel platforms by 6 - 3/8" steel bolts (3 on front and 3 on back) per bay. The platforms, 17" high welded steel angle frames, are welded by 1/4" fillets 2" long and 12" on center to steel floor plate which runs along the front and rear of the benchboard. The steel floor plate, 1/2" thick by 4.5" wide, is anchored into the concrete floor by 5/8" J-bolts (AB-C8) 12" on center. Also, the center benchboard posts (the posts which support the face of the benchboards) are weld to local floor plates which are anchored to the concrete floor by 2 - 1/2" cinch anchors (one on each side of the post).

Each bay is approximately 60" wide, therefore, according to GIP table C.1-1 the typical maximum mass is 3300 lbs (see SEWS for panel A).

The attached anchorage analysis considers the anchorage between the supporting platform and the concrete floor (i.e. 5/8" bolts) of one bay as representative of the complete beachboard. Also, the J-bolts are embedded 9.5" which is < 18D = 10", hence the anchorage analysis will consider a 1/2" J-bolt instead of 5/8", thereby meeting the intent of this anchorage caveat.

For the capacity evaluations of the support platform, platform welding to plate and plate capacity and the anchorage between the benchboard and the support platform see the SEWS for panel A.

The anchorage evaluation concludes that the benchboard is adequately anchored with a significant safety factor which is governed by the anchorage between the benchboard and the supporting platform.

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 4 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Seismic Interaction:
The control room ceiling is an outlier due to Aluminum diffussers which pose personnel hazard. Tie wrap (plastic lines) are a reasonable fix for this situation.

Also, there is a generic issue at Prairie Island with open S-hooks throughout plant for hung overhead florescent lights. This should be dealt with on a plant-wide basis. Work Order #9510032 was initiated to crimp the S-hooks on overhead light fixtures.

Finally, seismic housekeeping in the control room was found to be adequate.

Evaluated by: _____ Date: 11/7/95

_____ 11-10-95

Attachment: Pictures
Attachment: ANCHOR Report

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 5 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

PICTURES

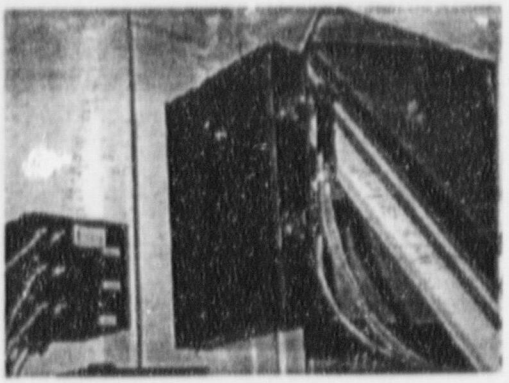


Fig.1: Instruments Mounted on A-F Panels

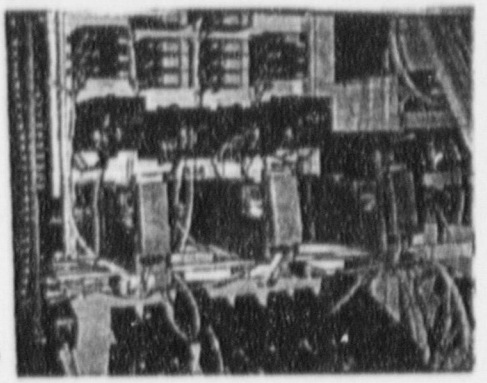


Fig.2: Instruments Mounted on A-F Panels

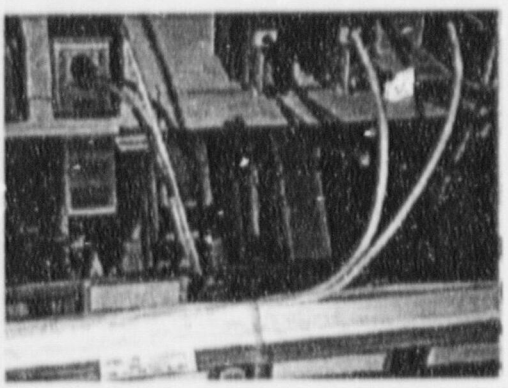


Fig.3: Instruments Mounted on A-F Panels

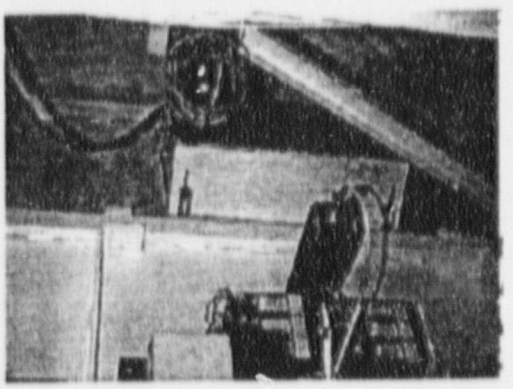


Fig.4: Instruments Mounted on A-F Panels

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 6 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

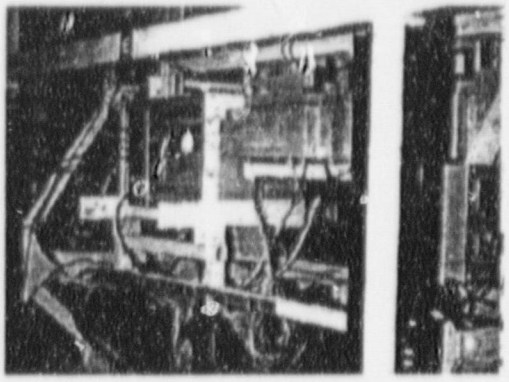


Fig.5: Instruments Mounted on A-F Panels

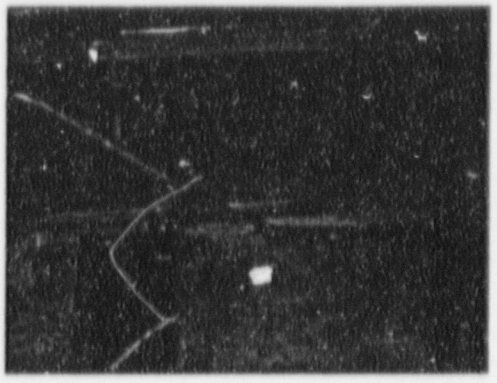


Fig.6: Panels A-F

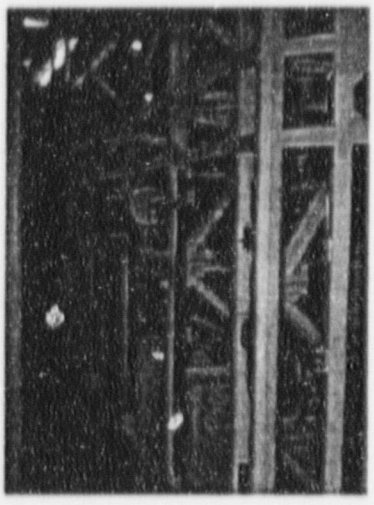


Fig.7: Panels A-F

ANCHOR Report

Earthquake :
Response Spectrum : SSE
Frequency : GIP - Flexible
Percent Damping : GIP - 5.00

Spectral Values :

Direction	Acceleration (g's)
North - South	0.349
East - West	0.349
Vertical	0.150

Angle (N-S Direction makes with the X Axis) : 0.00
Combination Criteria : SRSS

Weights :
Number of Weights : 1

No	Weight	X	Y	Z
1	3300.00	30.000	24.500	79.000

Forces :
Number of External Forces : 0

Moments :
Number of External Moments : 0

Allowables :
Anchor :
Number of Anchor types : 1

						Tension	Shear	
				Ultimate	Ultimate	Inter	Inter	Saf
No.	Dia	Manufact	Product	Tension	Shear	Coeff	Coeff	Fact
1	1/2	Other	J-Bolt (90 deg)	6660.00	3330.00	1.00	0.30	1.00

Concrete :
Ultimate Stress : 3000.00 psi.
Reduction Factor : 0.85

Weld :
Allowable Stress : 30600 psi.

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 8 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

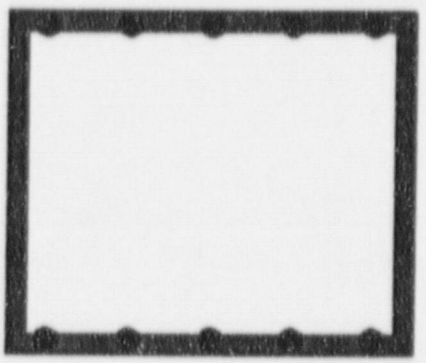
Surfaces :

Number of Surfaces : 1

Surface Orientation

	Direction Comp	Direction Comp	Direction Comp
No	Nx	Ny	Nz
1	0.000	0.000	1.000

Anchor Pattern for Surface # 1



Legend for Anchor Patterns

Anchor Bolts :

Concrete Lines :

Concrete Points :

Weld Lines :

Geometry :

Anchor :

Number of Anchors : 10

No.	Anch Id	X Coord	Y Coord	Z Coord	Surf Id
1	1	6.000	2.000	0.000	1
2	1	18.000	2.000	0.000	1
3	1	30.000	2.000	0.000	1
4	1	42.000	2.000	0.000	1
5	1	54.000	2.000	0.000	1
6	1	54.000	47.000	0.000	1
7	1	42.000	47.000	0.000	1
8	1	30.000	47.000	0.000	1
9	1	18.000	47.000	0.000	1
10	1	6.000	47.000	0.000	1

Concrete Lines :
# of elements per line : 5
Number of Concrete Lines : 4

No	Start X-Coord	Start Y-Coord	Start Z-Coord	End X-Coord	End Y-Coord	End Z-Coord	Sf Id	Line Width
1	0.000	1.500	0.000	60.000	1.500	0.000	1	3.000
2	58.500	0.000	0.000	58.500	49.000	0.000	1	3.000
3	60.000	47.500	0.000	0.000	47.500	0.000	1	3.000
4	1.500	49.000	0.000	1.500	0.000	0.000	1	3.000

Concrete Points :
Number of Concrete Points : 0

Weld Lines :
# of elements per line : 4
Number of Weld Lines : 0

Determination of Reduction Factors :
Reduction Factor Input for Anchor # 1

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 2

Adequately Installed : Yes

Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 3

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 4

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 5

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 6

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation

Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 7

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 8

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 9

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in. - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Reduction Factor Input for Anchor # 10

Adequately Installed : Yes
Embedment Length : (27.25 in. Min Reqd. to achieve full capacity) := 9.50 in.
Gap at Threaded Anchor : 0.00 in.
Edge Distance - Edge 1 : 4.38 in.
Crack Size : 0.000 in - Cracks traverses thru Installation
Essential Relays in Cabinet : No
Adequate Equipment Base Strength and Structural Load Path : Yes
Embedment Steel and Pads Adequately Installed : Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 12 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Reduction Factors Data Current : Yes

No	Anc Id	Pall/ Vall	Pallr/ Vallr	RT	RN	RL	RG	RS	RE	RF	RC	RR	RP	RB	RM
1	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
2	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
3	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
4	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
5	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
6	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
7	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
8	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
9	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
10	1	2663.70	N/A	1.00	1.00	0.43	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00
		3082.98	N/A	1.00	1.00	1.00	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00

Legend :

N/A	= Not Applicable
Pall	= Allowable Pull without Reduced Inspection
Vall	= Allowable Shear without Reduced Inspection
Pallr	= Allowable Pull with Reduced Inspection
Vallr	= Allowable Shear with Reduced Inspection
*	= Outlier
X	= Reduction Factor Not Used
RT	= Reduction Factor for Type of Anchorage
RN	= Reduction Factor for Installation Adequacy
RL	= Reduction Factor for Embedment
RG	= Reduction Factor for Gap at Anchors
RS	= Reduction Factor for Spacing
RE	= Reduction Factor for Edge Distance
RF	= Reduction Factor for Concrete Strength
RC	= Reduction Factor for Concrete Cracks
RR	= Reduction Factor for Essential Relays
RP	= Reduction Factor for Base Stiffness and Prying Action
RB	= Reduction Factor for Base Strength and Load Path
RM	= Reduction Factor for Embed. Steel and Pads

Analysis Results :

Analysis Performed : Yes

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 13 of 13
ID : B-1 (Rev. 0)	Class : 20. Instrumentation and Control Panels and Cabinets	
Description : CONTROL PANEL B-1		
Building : AUX	Floor El. : 735.00	Room, Row/Col : Control Room
Manufacturer, Model, Etc. :		

Type of Analysis : Regular

	Spectral Accelerations (G's)			
No	N-S	E-W	Vertical	Safety Factor
1	0.349	0.140	0.060	8.696
2	-0.349	-0.140	-0.060	9.755
3	-0.349	0.140	0.060	8.696
4	0.349	-0.140	-0.060	9.755
5	0.349	-0.140	0.060	8.696
6	-0.349	0.140	-0.060	9.755
7	0.349	0.140	-0.060	9.755
8	-0.349	-0.140	0.060	8.696
9	0.140	0.349	0.060	7.209
10	-0.140	-0.349	-0.060	7.963
11	0.140	-0.349	0.060	7.209
12	-0.140	0.349	-0.060	7.963
13	-0.140	0.349	0.060	7.209
14	0.140	-0.349	-0.060	7.963
15	0.140	0.349	-0.060	7.963
16	-0.140	-0.349	0.060	7.209
17	0.140	0.140	0.150	14.416
18	-0.140	-0.140	-0.150	25.313
19	0.140	0.140	-0.150	25.313
20	-0.140	-0.140	0.150	14.416
21	-0.140	0.140	0.150	14.416
22	0.140	-0.140	-0.150	25.313
23	0.140	-0.140	0.150	14.416
24	-0.140	0.140	-0.150	25.313

Minimum Safety Factor : 7.209

The anchorage can withstand 7.209 times greater seismic demand

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 2
ID : 135-021 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 RCP SEAL WATER RETURN HEAT EXCHANGER		
Building : AUX	Floor El. : 715.00	Room, Row/Col : K.3/8.0
Manufacturer, Model, Etc. :		

BASIS : External analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	Yes
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	Yes
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: F. Stille(S&A) and G. Gore (NSP) 4/21/95

REF: Atlas Dwg D-2092-3, (XH-1001-14), Pioneer Dwgs NF-38313-1HH, NF-38299-27F, NF-38299-2, Tech. Manual XH-1-1783

The vertical heat exchanger (126" high) is mounted on a 15" high Pedestal and is anchored with 1-3/8" J-Bolts. The HX's seismic capacity was evaluated by calculation 93C2807-C-005. The calculation shows that the HX has adequate seismic capacity.

There are no spatial Interaction issues.

Evaluated by: Date:

Fred B. Stille 11/16/95

G Gore 11/20/95

Attachment: Pictures

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 2
ID : 135-021 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 RCP SEAL WATER RETURN HEAT EXCHANGER		
Building : AUX	Floor El. : 715.00	Room, Row/Col : K.3/8.0
Manufacturer, Model, Etc. :		

PICTURES

Fig.1: RCP Seal Water Return HX (135-021) Support

Fig.2: Seal Water Return HX (135-021)

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 2
ID : 153-021 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 VOLUME CONTROL TANK		
Building : AUX	Floor El. : 715.00	Room, Row/Col : H.7/6.9
Manufacturer, Model, Etc. :		

BASIS : External analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	Yes
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	Yes
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRTs are Djordjevic and Ridder - 5/25/94

REF: Westinghouse Drawing 685J503, (NSP Dwg. XH-1-65) shts. 1,2 ; Pioneer Drawings: NF-38309-1B, NF-38309-2B, NF-38313-1~~HH~~, NF-38200-C.

This is an elevated tank mounted on 4 5WF31 legs. Each leg anchored to the reinforced concrete floor by 2 - 1" cast-in-place anchors. Tank and anchorage evaluation was done dy alternate calculations (93C2807-C-004) and included an evaluation of any potenital spatial interactions of the attached level monitoring pipe which has only a 1" clearance to wall. This check was done at the top of the tank and it was determined that the piping will not impact the wall. There are no other seismic interaction issues. This calculation also demonstrated that the anchorage and load path capacity exceed demand. The tank weight used in the analysis was 17320 lbs. Also the evaluation opf the applied piping nozzle loads was done in the referenced calculation.

Evaluated by: Date:

11/8/95

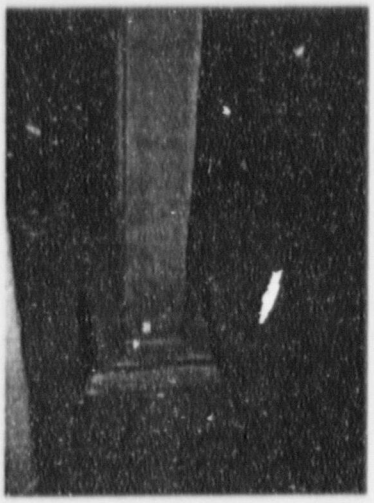
11-10-95

Attachment: Pictures

13

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 2 of 2
ID : 153-021 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 VOLUME CONTROL TANK		
Building : AUX	Floor El. : 715.00	Room, Row/Col : H.7/6.9
Manufacturer, Model, Etc. :		

PICTURES



Volume Control Tank (153-021) Leg Anchorage Detail

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: Yes Sheet 1 of 1
ID : 253-021 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 21 VOLUME CONTROL TANK		
Building : AUX	Floor El. : 715.00	Room, Row/Col : H.7/11.1/
Manufacturer, Model, Etc. :		

BASIS : External analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	Yes
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	Yes
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **Yes**

COMMENTS

SRT: F. Stille (S&A) and G. Gore (NSP) - 5/30/95.

REF: Westinghouse Drawing 685J503, (NSP Dwgs. XH-1-65) shts. 1,2; Pioneer Drawings NF-38309-3B and -4A, NF-38313-1HH, NF-38200-C.

Elevated tank mounted on 4 5WF31 legs. Each leg anchored to reinforced concrete floor by 2 - 1" cast-in-place anchors. There are no potential seismic interactions observed. This tank , the anchorage and the seismic input for this component is identical to that for component ID# 153-021. The actual tank evaluation analysis was done in calculation 93C2807-C-004. This calculation demonstrated that the anchorage and load path capacity exceeded demand. The tank weight used in the analysis was 17320 lbs. The calculation also evaluated the applied piping nozzle loads.

Evaluated by: Date:

Fred B. Stille 11/9/95

G Gore 11/16/95

Northern States Power Company - Prairie Island Nuclear Generating Plant **OUTLIER SEISMIC VERIFICATION SHEET (OSVS)**		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : 053-251 (Rev. 0)	Class : 21. Tanks and Heat Exchangers	
Description : 121 COOLING WATER PUMP DIESEL OIL STORAGE TANK		
Building : SSCRN	Floor El. : 695.00	Room, Row/Col : C1/51.5

1. OUTLIER ISSUE DEFINITION - Tanks and Heat Exchangers

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Shell Buckling	
Anchor Bolts and Embedment	
Anchorage Connections	
Flexibility of Attached Piping	X
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The tanks are an outliers because the necessary fuel buried piping between the tanks and the screenhouse must be demonstrated to be able to withstand the potential seismic differential anchor motions which could occur during an earthquake event.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

Detailed analysis of the buried piping including sufficient soil structure interaction analysis for the screenhouse and the tank slab to accurately determine the potential seismic anchor motions between these two structures.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: _____ Date: 11/8/95

_____ 11-10-95

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 1 of 1
ID : 053-251 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 121 COOLING WATER PUMP DIESEL OIL STORAGE TANK		
Building : SSCRN	Floor El. : 695.00	Room, Row/Col : C1/51.5
Manufacturer, Model, Etc. :		

BASIS : External analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	Yes
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	No
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **No**

COMMENTS

SRT: Djordjevic and Ridder - 5/17/94

REF: Pioneer Drawings NF-39287-5M, NF-39260-1, NF-38229, National Valve Dwg # A-6720, A-6722, A-67??, Morehead Dwg # D-69070

The cooling water diesel oil storage tank is buried in a vault (pit) covered by a manhole cover cannot fall in the pit. Per the referenced dwgs the tank is mounted on a concrete slab which is 1' thick and is anchored to the slab by 5 holdown straps which surround the tank and are then embedded into the concrete. In addition lean concrete wedges are poured in place at the base of the tank and then the entire tank is buried with backfill up to about the tank centerline and then gravel appears to place from that point to grade. Therefore the tank is judged to have adequete seismic capacity. The tank slabs are independent and are not tied into the screenhouse foundation. There is significant buried piping between the tanks and the screenhouse building which provides fuel oil to the screenhouse cooling water diesal pumps. Because the tanks are on a seperate slab from the building this buried piping could be subjected to significant differential displacemental motion during an earthquake event and this type of large differential motion is a known earthquake failure mode for buried piping. Therefore tanks are an outliers because the necessary fuel piping must be demonstrated to be able to withstand the potential seismic differential anchor motions which could occur during an earthquake event.

Evaluated by: _____ Date: 11/8/95

_____ 11-10-95

Northern States Power Company - Prairie Island Nuclear Generating Plant **OUTLIER SEISMIC VERIFICATION SHEET (OSVS)**		GIP Rev 2, Corrected 2/14/92 Sheet 1 of 1
ID : 153-011 (Rev. 0)	Class : 21 Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95

1. OUTLIER ISSUE DEFINITION - Tanks and Heat Exchangers

a. Identify all the screening guidelines which are not met. (Check more than one if several guidelines could not be satisfied.)

Shell Buckling	
Anchor Bolts and Embedment	
Anchorage Connections	X
Flexibility of Attached Piping	
Other	

b. Describe all the reasons for the outlier (i.e., if all the listed outlier issues were resolved, then the signatories would consider this item of equipment to be verified for seismic adequacy).

The Tank has two gusset support plates and both plates have Slotted Holes in the axial direction.

2. PROPOSED METHOD OF OUTLIER RESOLUTION (Optional)

a. Defined proposed method(s) for resolving outlier.

(1) A Plate could be welded to over the holes on one of the support plates to eliminate the axial support gaps.

b. Provide information needed to implement proposed method(s) for resolving outlier (e.g., estimate of fundamental frequency).

4. CERTIFICATION:

The information on this OSVS is, to the best of our knowledge and belief, correct and accurate, and resolution of the outlier issues listed on the previous page will satisfy the requirements for this item of equipment to be verified for seismic adequacy:

Approved by: _____ Date: 11/8/95

_____ 11-10-95

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 1 of 7
ID : 153-011 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95
Manufacturer, Model, Etc. :		

BASIS : Horizontal TANK analysis

1. The buckling capacity of the shell of a large, flat-bottom, vertical tank is equal to or greater than the demand.	N/A
2. The capacity of the anchor bolts and their embedments is equal to or greater than the demand.	Yes
3. The capacity of connections between the anchor bolts and the tank shell is equal to or greater than the demand.	No
4. Attached piping has adequate flexibility to accommodate the motion of a large, flat-bottom, vertical tank.	Yes
5. A ring-type foundation is not used to support a large, flat-bottom, vertical tank.	N/A

IS EQUIPMENT SEISMICALLY ADEQUATE? **No**

COMMENTS

SRTs are Djordjevic and Ridder - 5/24/94

REF: Tank Drawings: W 685J487 (XH-1-127); Anchorage: Pioneer Dwg# NF-38405P

Horizontal tank mounted on 2 saddles with 3 gussets on each side of a center plate. Per the Referenced Pioneer drawings each saddle is anchored by 4 - 1" 90 degeree J Bolt anchors - 2 on either side of center plate. Unit Embedment length was 33". Tank Materials, Dimensions, etc. were taken from the referenced Westinghouse Drawing.

An Initial Analysis was done using the GIP Horizontial Tank evaluation methodology but the Tank didn't meet two cavaets for application of this evaluation approach:

(a) Both Base Plates were slotted
(b) Tank Density was > 75 lbf/ft^3

For Item (b) the calculated tank density was based on the assumption that the tank was completely flooded and was determined as: (62960 lbs/800 ft^3) = 78.7 lbs/ft^3 which exceeds the GIP Guideline by only 4%. In the general operation of the plant this tank is more a convience then a requirement in that it is used to contain normal operating discharges form the Pressurizier PORVs and Code SRVs. It is equiped with a rupture disk should prolonged valve operation fill the tank. Therefore the assumption of a completely flooded tank is very conservative. Therefore since this is a conservative assumption and the the value is only 4% above the the GIP maximum the tank analysis was run with a value of tank density of 74.99 lbs/ft^3.

For Item (a) the Tank will evaluated as if one set of gaps were zero to determine the anchorage capacity and develop suggested fixes for the Outlier resolution sheet.

The Tank Analysis showed a frequency of 22.6 hz and therfore used the peak g's for evaluation of the anchorage which showed that capacity was less than demand. The frequency of 22.6 hz is significantly above the spectral

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 2 of 7
ID : 153-011 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95
Manufacturer, Model, Etc. :		

peaks anf therefore by reviewing the spectral curves a g level of .22g can be used for the tank evaluation. With this g level the anchorage margin is .494g/.22g = 2.29 therfore capacity exceeds demand. Hand Calculations (93C2807-C-012) were done to determine the Tank analysis input parameters and evaluate the support load path and the applied piping nozzle loads.

The tank is an outlier due to the slotting of holes in both support plates and an OSVS was generated.

Evaluated by: _____ Date: 11/8/95

_____ 11-10-95

Attachment: Pictures
Attachment: TANK Analysis Results

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 3 of 7
ID : 153-011 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95
Manufacturer, Model, Etc. :		

PICTURES

Fig.1: Pressurizier Relief Tank (153-011) Axial View

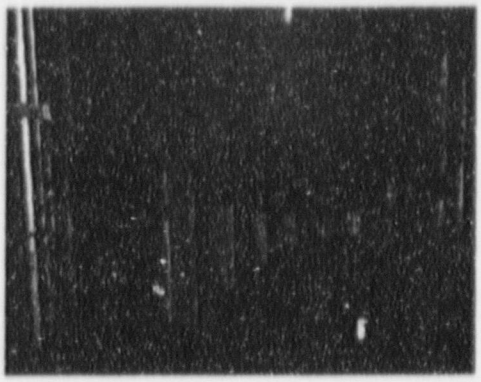


Fig.2: Pressurizier Releif Tank (153-011) Anchorage and Support Saddle Detai

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 4 of 7
ID : 153-011 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95
Manufacturer, Model, Etc. :		

TANK Analysis Results

Step 1 -- Input Data

a) Assumptions

1. Tank is cylindrical, horizontally oriented and supported on saddles.	Yes
2. Tank and saddles are made of carbon steel.	Yes
3. Saddles are uniformly spaced.	Yes
4. Saddles overhang is less than spacing / 2.	Yes
5. Base plates have slotted anchor bolt holes for thermal growth except for the base plate under the fixed saddle	Yes
6. Imposed nozzle loads are not significant.	Yes
7. The tank foundation is adequate.	Yes
8. Anchor bolts are cast in place or expansion type.	Yes

b) Materials

Weight of Tank + Fluid	62.92 kips
Weight Density of Tank + Fluid	74.99 lbs/ft^3
Saddle Elastic Modulus	29000.0 ksi
Saddle Shear Modulus	11500.0 ksi
Base Plate Yield Strength	30.0 ksi
Anchor Type	1 in 90 deg. J-Bolts

c) Dimensions

Tank Diameter, D	8.0 ft
Tank Length, L	17.58 ft
Tank Thickness, t	0.437 in
Height of Tank + Fluid C.G., Hcg	5.38 ft
Number of Saddles	2
Saddle Spacing, S	9.33 ft
Saddle Height, h	15.0 in
Saddle Shear cross-sectional area	64.71 in^2
Saddle Weak Axis Moment of Interia	134.0 in^4
Number of Bolt Locations / Saddle	2
Number of Bolts / Bolting Location	2
Extreme Bolt Spacing, D'	5.22 ft
Anchor Bolt Eccentricity, e	2.25 in
Weld Thickness	0.38 in
Base Plate Thickness	0.625 in

d) Anchor Bolts

Type = 90 Deg J-Bolt	Diameter = 1 in
Manufacturer =	Product Name =

	Pullout	Shear
Nominal Capacity	26.69 kips	13.35 kips

Concrete Compression Strength, fc' = 3000.0 psi

Reduction Parameters

Label	Check	Condition	Capacity Reduction Factor	
			Pullout	Shear
1. Type of Anchorage	Yes		1.0	1.0
2. Installation Adequacy	Yes	Installation is adequate	1.0	1.0
3. Embedment Length	Yes	Embedment Length = 42.0 in	0.8	1.0
4. Gap at Threaded Anchors	Yes	Gap size = 0.0 in	1.0	1.0
5. Spacing between Anchorages	Yes		1.0	1.0
6. Edge Distance	Yes	Edge Distance = 8.75 in	1.0	1.0
7. Concrete Strength and Condition	Yes		0.93	0.93
8. Concrete Crack Location and Size	Yes	Crack Size = 0.0 in	1.0	1.0
9. Essential Relays in Cabinets	Yes	Essential relays are not present	1.0	1.0
10. Base Stiffness and Prying Action	Yes		1.0	1.0
11. Equipment Base Strength and Structural Load Path	Yes	Base strength and load path are O.K.	1.0	1.0
12. Embedment Steel and Pads	Yes	Installation is not applicable	1.0	1.0

Does the tank satisfy all the assumptions and is within the applicable range of parameters? Yes

Step 2 -- The allowable bolt loads

Allowable Tension Load, Pu'	19.768 kips
Allowable Shear Load, Vu'	12.36 kips

Step 3 -- Determine base plate bending strength reduction factor

RB	0.1976

Step 4 -- Determine base plate weld strength reduction factor

RW	1.8717

Step 5 -- Determine the anchorage tension and shear allowable loads

Allowable Anchorage Tension Load, Pu	3.906 kips
Allowable Anchorage Shear Load, Vu	12.36 kips

Step 6 -- Calculate the ratios and values

alpha (Pu/Vu)	0.32
Wb	7.87 kips/bolt
Vu / Wb	1.57
Hcg / D'	1.031
Hcg / S	0.577
F1	2.236
F2	2.454

Step 7 -- Determine the acceleration capacity of the tank anchorage

lamoda_1	0.703 G
lambda_u	0.494 G
Anchor Acceleration capacity, lambda	0.494 G

Step 8 -- Determine the maximum saddle spacing for transverse and vertical rigid frequency response

Maximum Saddle Spacing, Sc	21.07 ft

Step 9 -- Compute the resonant frequency of the tank in the longitudinal direction

Saddle Stiffness, Ks	3229.373 kips/in
Resonant Frequency of Tank in Longitudinal Direction	22.4 Hz

Northern States Power Company - Prairie Island Nuclear Generating Plant **SCREENING EVALUATION WORK SHEET (SEWS)**		GIP Rev 2, Corrected, 2/14/92 Status: No Sheet 7 of 7
ID : 153-011 (Rev. 0)	Class : 21 - Tanks and Heat Exchangers	
Description : 11 PRESSURIZER RELIEF TANK		
Building : CNTMT	Floor El. : 695.00	Room, Row/Col : 15/95
Manufacturer, Model, Etc. :		

Step 10 -- Determine the seismic demand acceleration

Peak Spectral Acceleration, SPA (g)	1.589 /4.0% damping/

Tank is flexible in one of the three directions (transverse, vertical or, longitudnal).
Tank is an outlier because anchorage acceleration capacity is less than SPA

Step 11 -- Check the saddle stresses

The program does not check the saddle stresses
Check the saddle stresses by an independent calculation

Summary

IS EQUIPMENT SEISMICALLY ADEQUATE? **No**

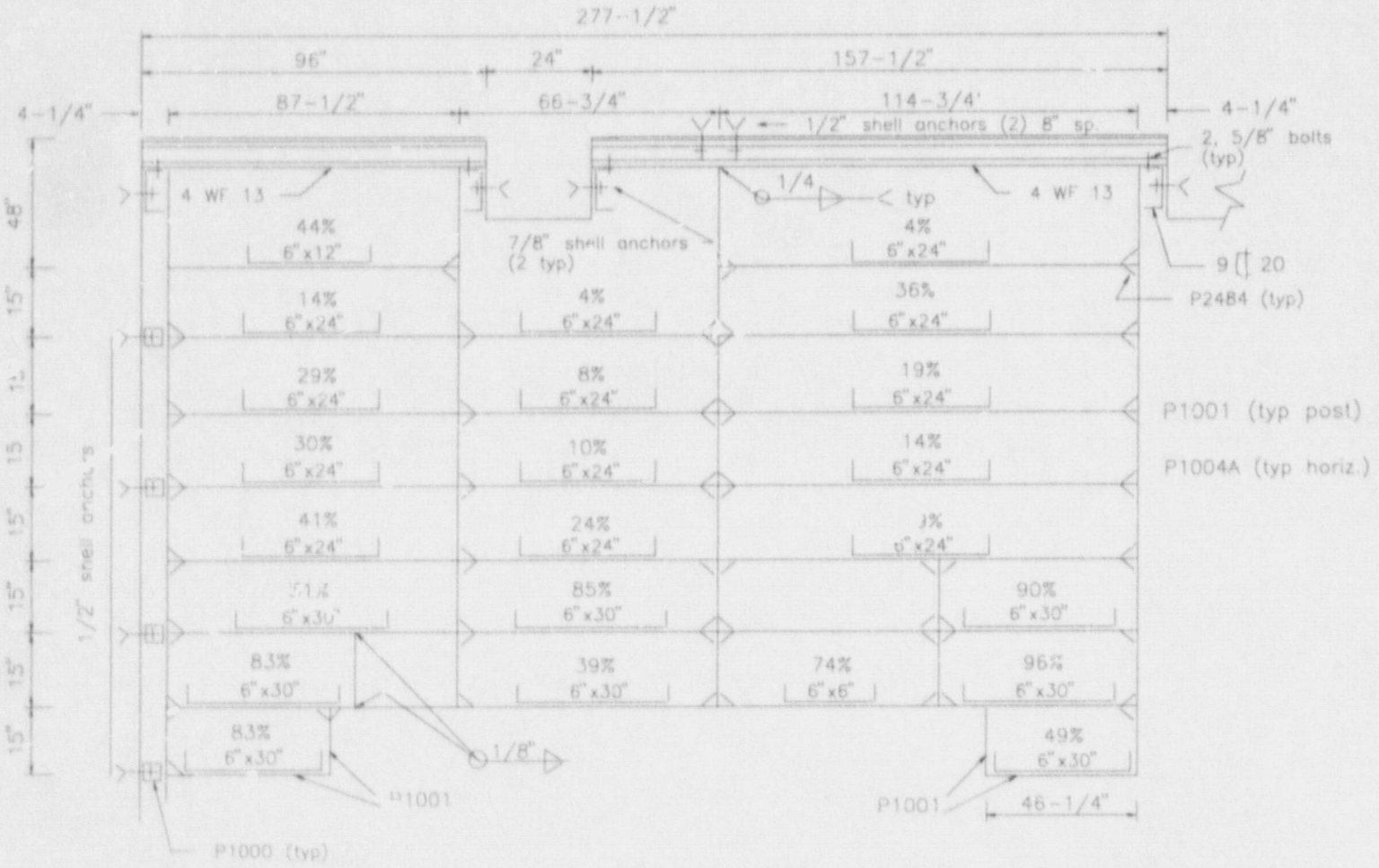
The tank is an outlier because of
-- anchorage acceleration capacity is less than SPA

CALC. 93C2807-C-011

SH. 1/8

LAR 005

Tributary length = 7'



RELAY ROOM EL. 715.00

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CLIENT NSP/PINGP JOB No. 93C2807 SHEET 2 OF 8
SUBJECT LAR 005 CALC. C-011
PASS ID : RELAYROOM
RELAY ROOM EL. 715

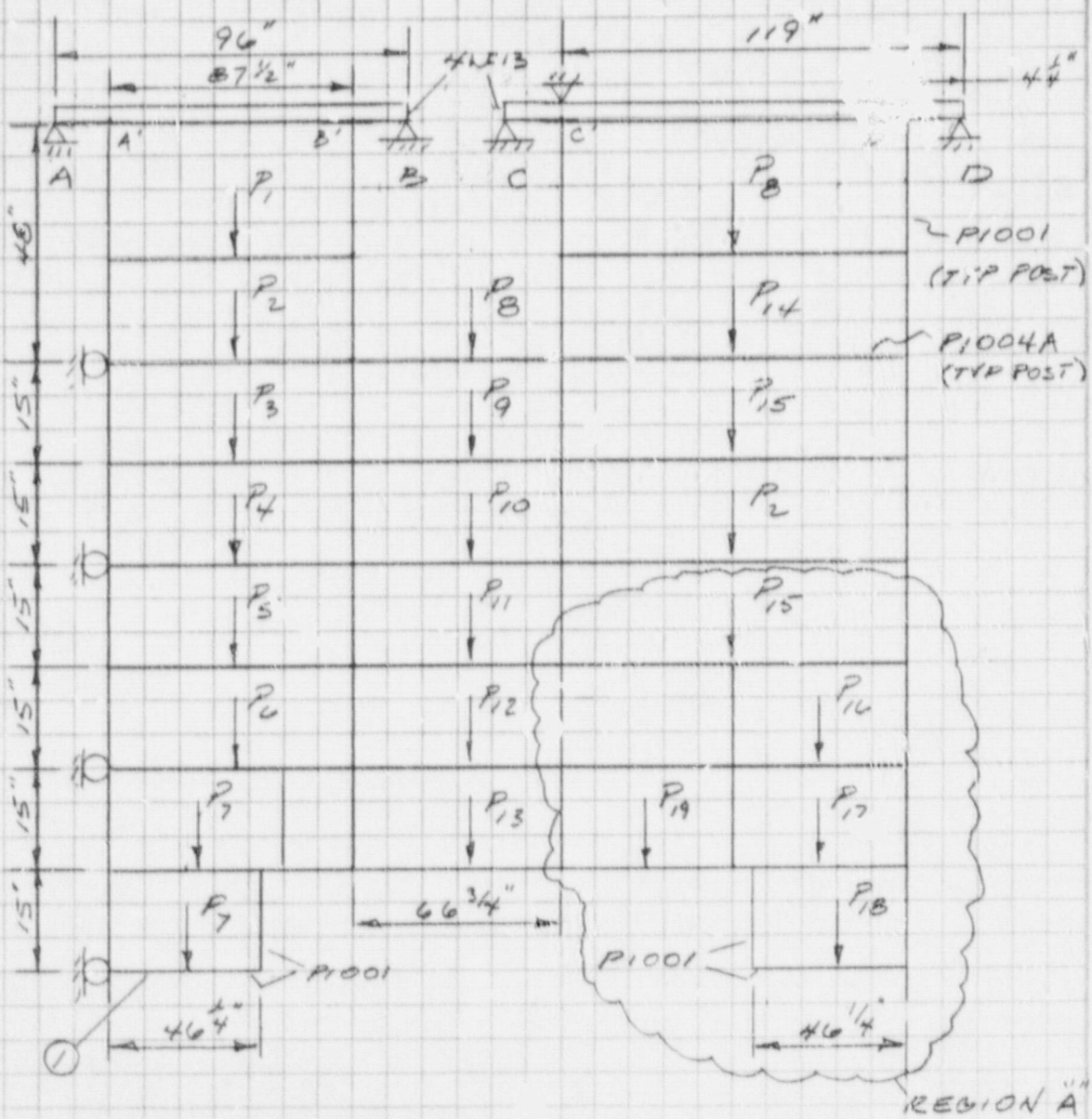
REVISIONS
0 PB 10/21/95
A.F. 10/25/95

REF

PASS

LOADING DIAGRAM

TRIBUTARY LENGTH = 7'



6.4 SECT. B.3.9

$P_1 = 25PSF \times \frac{6"}{4'} \times .44 \times 7' = 116^{\#}$

$P_2 = 25PSF \times \frac{6"}{4'} \times \frac{24"}{12"/1'} \times .14 \times 7' = 74^{\#}$

$P_3 = 25PSF \times \frac{6"}{4'} \times \frac{24"}{12"/1'} \times .29 \times 7' = 153^{\#}$

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CLIENT NSP/PINGP JOB No. 93C2807 SHEET 3 OF 8
SUBJECT LAR 005 CALC. C-011
PASS ID: RELAYROOM
RELAY ROOM EL. 715

REVISIONS
0 TBD 10/22/95
A.K. 10/25/95

REF

$P_4 = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.30 \times 7' = 158^{\#}$

$P_5 = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.41 \times 7' = 215^{\#}$

$P_6 = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.31 \times 7' = 203^{\#}$

$P_7 = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.83 \times 7' = 545^{\#}$

$P_8 = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.04 \times 7' = 21^{\#}$

$P_9 = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.08 \times 7' = 42^{\#}$

$P_{10} = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.10 \times 7' = 53^{\#}$

$P_{11} = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.24 \times 7' = 126^{\#}$

$P_{12} = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.85 \times 7' = 558^{\#}$

$P_{13} = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.39 \times 7' = 256^{\#}$

$P_{14} = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.36 \times 7' = 189^{\#}$

$P_{15} = 25\,PSF \times \frac{6"}{4"} \times \frac{24"}{12"/1'} \times 0.19 \times 7' = 100^{\#}$

$P_{16} = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.90 \times 7' = 591^{\#}$

$P_{17} = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.96 \times 7' = 630^{\#}$

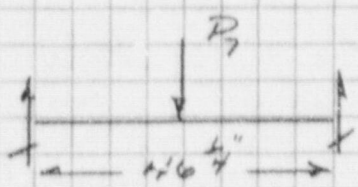
$P_{18} = 25\,PSF \times \frac{6"}{4"} \times \frac{30"}{12"/1'} \times 0.49 \times 7' = 322^{\#}$

REF $P_{19} = 25\,PSF \times \frac{6"}{7'} \times \frac{6"}{12"} \times 0.74 \times 7' = 97^{\#}$

DEAD LOAD CHECK

CK WORST CASE BENDING P1001 (ITEM ①):

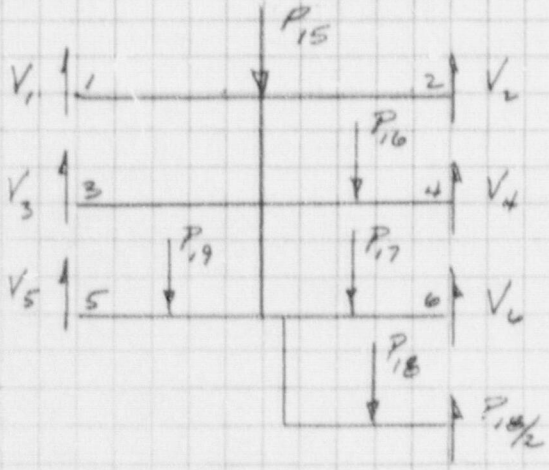
CONSERVATIVELY ASSUME POINT LOAD @ S.S. BEAM:



6.3 $I.R. = \frac{M}{M_{ALLOW}} = \frac{P_7 \times 4'6\frac{1}{4}"/4}{14{,}390\ "\#} = 0.47$

CK WORST CASE BENDING P1007A IN REGION "A":

{NOTE: CONSERVATIVELY ASSUME ALL LOADING IS CARRIED BY MEMBER 1-2.}



$V_1 = \frac{P_{15}}{2} + \frac{P_{16} + P_{17} + P_{19}}{2 \times 2} + \frac{P_{18} \times 4'6\frac{1}{4}}{2 \times 11'4\frac{3}{4}} = 445^{\#}$

$V_4 = \frac{P_{16}}{2} = 29\frac{1}{2}^{\#}$

$V_5 = P_{19}/2 = 49^{\#}$

$V_6 = \frac{P_{17}}{2} + \frac{P_{18}}{2}\left(\frac{11'\frac{1}{8}"}{57'\frac{3}{8}"}\right) = 346^{\#}$

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CLIENT NSP/PINGP JOB No. 93C2807 SHEET 5 OF 8
SUBJECT LAR 005 CALC. C-011
PASS ID: RELAYROOM
RELAY ROOM EL. 715

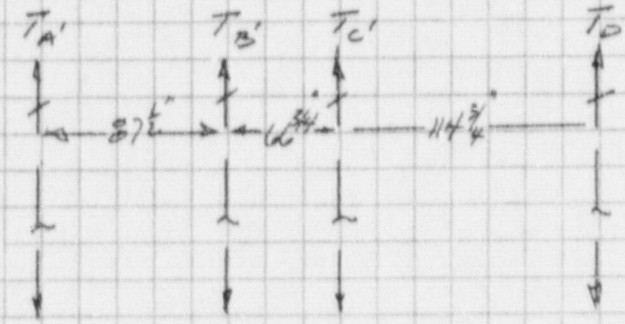
REVISIONS
0 FJA 10/22/95
A.K. 10/25/95

REF

WORST CASE BENDING OCCURS IN CHORD 1-2:

6.3 $$I.R. = \frac{M}{M_{ALLOW}} = \frac{V_1 \times \frac{114.74"}{2}}{42080\ \#} = 0.61$$

CK ANCHORAGE:



$$T_{A'} = \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6}{2} + \left(\frac{62\frac{1}{2}"}{87\frac{1}{2}"} + \frac{64\frac{1}{2}"}{87\frac{1}{2}"}\right) P_7 = 1251\ \#$$

$$T_{B'} = \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + P_8 + P_9 + P_{10} + P_{11} + P_{12} + P_{13}}{2} + P_7\left(\frac{25" + 23"}{87\frac{1}{2}"}\right) = 1282\ \#$$

$$T_{C'} = \frac{P_2 + 2 \times P_8 + P_9 + P_{10} + P_{11} + P_{12} + P_{13} + P_{14} + P_{15}}{2} + V_1 + V_5 = 1213\ \#$$

$$T_{D'} = \frac{P_2 + P_8 + P_{14} + P_{15}}{2} + V_2 + V_4 + V_6 + \frac{P_{16}}{2} = 1440\ \#$$

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CLIENT N2P / PINGP JOB No. 93C2807 SHEET 6 OF 8
SUBJECT LAR 005 CALC. C-011
PASS ID: RELAYROOM
RELAY ROOM EL. 715

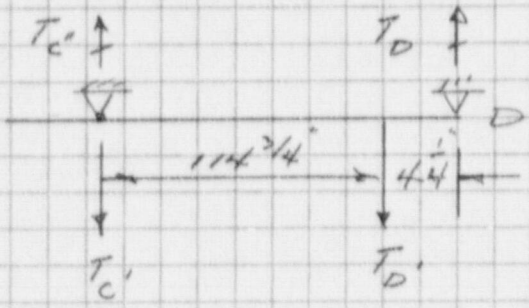
REVISIONS
0 ABJ 10/23/95
H.K. 10/25/95

REF WORST CASE POST TO 4WF13 WELD ($\frac{1}{4}$"):

$$I.R. = \frac{T_D'}{T_{D_{ALLOW}}} = \frac{1440^{\#}}{2 \times 3" \times .105 \times .3 \times 60000} = 0.13$$

(.105 ← EFFECTIVE THROAT)

WORST CASE BENDING IN 4WF13:



$S_{4WF13} = 5.461 IN^3$

6.1 $$I.R. = \frac{M}{M_{ALLOW}} = \frac{T_D' \times 4\frac{1}{4}" \times 114\frac{3}{4}"}{S \times .60 F_y} = 0.05$$

$\frac{1}{2}$" SHELL ANCHORS AT "C":

$$T_C'' = T_C' + \frac{4\frac{1}{4}"}{119"} \times T_D' = 1265^{\#}$$

$$I.R. = \frac{T_C''}{T_{ALLOW}} = \frac{1265^{\#}}{2 \times 1718^{\#}} = 0.37$$

$\frac{7}{8}$" ϕ SHELL ANCHORS AT "D":

$$T_D = 114\frac{3}{4}"/119" \times T_D' = 1389^{\#}$$

REF $I.R. = \frac{T_D}{V_{ALLOW}} = \frac{1389^{\#}}{2 \times 7515^{\#}} = 0.10$

CONCLUSION

THE SUPPORT MEETS THE DEAD LOAD CK REQUIREMENTS OF SECTION 8.3.1 OF THE GIP.

VERTICAL CAPACITY CHECK

CL $\frac{1}{2}$" ϕ SHELL ANCHORS AT "C":

$I.R. \quad \frac{3 \times T_C}{T_{ALLOW}} = \frac{3 \times 1265^{\#}}{2 \times 1718^{\#}} = 1.10 > 1.0$

THE ANCHORAGE HAS A VERTICAL CAPACITY = 2.71 X DL WHICH IS CONSIDERED, IN THIS CASE, TO BE SUFFICIENT SINCE THE SUPPORT SYSTEM TO THE W13 IS REDUNDANT. FAILURE OF THE ANCHORAGE AT C' WOULD SHIFT THE SUPPORT LOAD TO C. A VERTICAL CAPACITY > DL MAY BE SHOWN FOR BOTH THE W13 AND THE $\frac{7}{8}$" ϕ ANCHOR BOLTS AT C + D IN THE EVENT OF FAILURE OF THE $\frac{1}{2}$" ϕ ANCHOR BOLTS AT C'.

REF

CONCLUSION

THE SUPPORT MEETS THE VERTICAL CAPACITY CL REQUIREMENTS OF SECTION 8.3.2 OF THE GIP.

DUCTILITY CHECK

THE EFFECTIVE THROAT THICKNESS OF THE $\frac{1}{4}$" WELD IS > THAN THAT OF THE POST (0.105") AND THUS THE POST CONNECTION TO THE HWF13 MAY BE CONSIDERED DUCTILE THEREFORE MEETING THE REQUIREMENTS OF SECTION 8.3.3 OF THE GIP.

OVERALL CONCLUSION

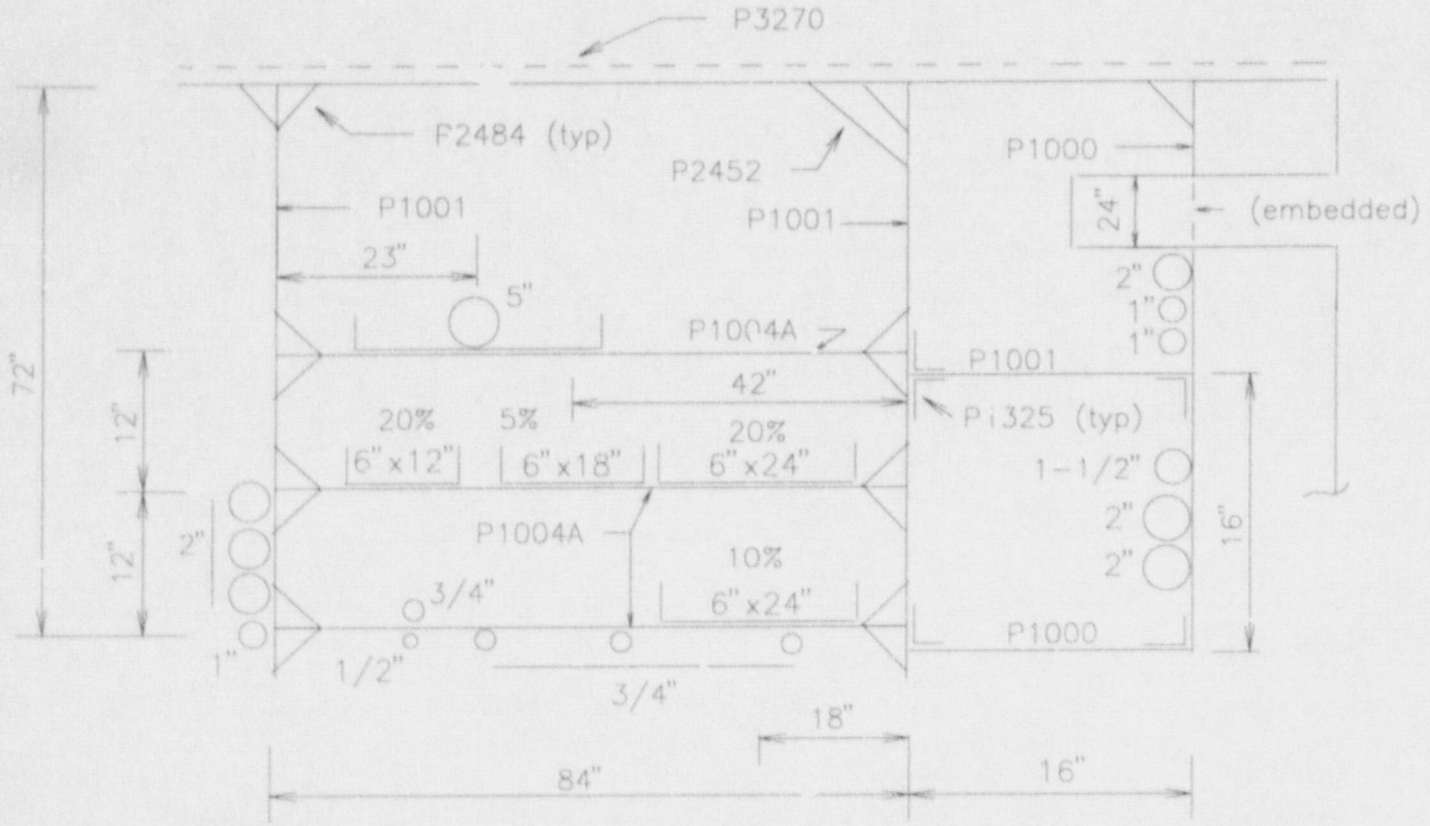
THE SUPPORT, HAVING MET THE REQUIREMENTS OF SECTIONS 8.3.1, 8.3.2 & 8.3.3 MEETS THE OVERALL REQUIREMENTS OF SECTION 8.3 OF THE GIP.

CALC. 93C 2807-C-011

SH. 1/6

LAR 010

Tributary length = 9'



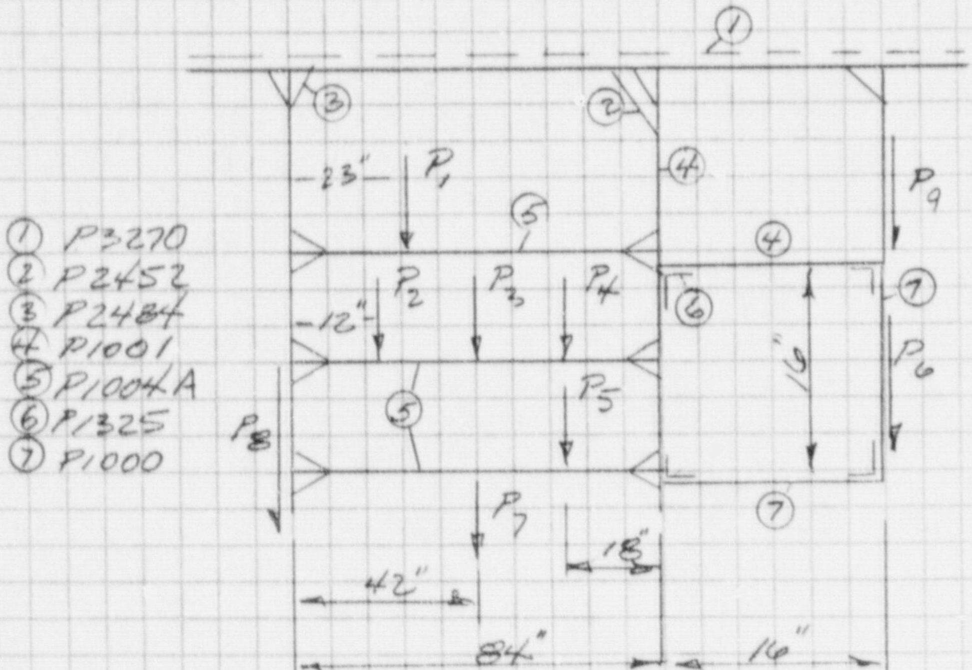
AUXHALL VAY EL. 695.00

REF

PASS

LOADING DIAGRAM

TRIBUTARY LENGTH = 9'



6.4 SECT. 8.3.9

$P_1 = 23^{\#/'} \times 9' = \underline{207^{\#}}$

$P_2 = 25PSF \times \frac{6''}{4''} \times 0.2 \times 9' = \underline{68^{\#}}$

$P_3 = 25PSF \times \frac{6''}{4''} \times \frac{18''}{12''/'} \times 0.05 \times 9' = \underline{25^{\#}}$

$P_4 = 25PSF \times \frac{6''}{4''} \times \frac{24''}{12''/'} \times 0.2 \times 9' = \underline{135^{\#}}$

$P_5 = 25PSF \times \frac{6''}{4''} \times \frac{24''}{12''/'} \times 0.1 \times 9' = \underline{68^{\#}}$

$P_6 = (2 \times 5.1^{\#/'} + 3.6^{\#/'})9' = \underline{124^{\#}}$, $P_7 = (4 \times 1.4^{\#/'} + 1^{\#/'})9' = \underline{59^{\#}}$

$P_8 = (3 \times 5.1^{\#} + 2.2^{\#/'})9' = \underline{158^{\#}}$, $P_9 = (5.1^{\#/'} + 2 \times 2.2^{\#/'})9' = \underline{86^{\#}}$

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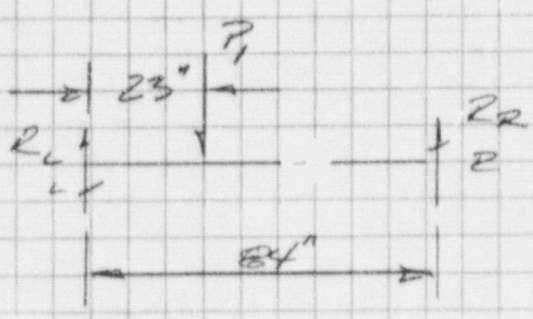
CLIENT NSP/PWGP JOB No. 93C2807 SHEET 3 OF 6
SUBJECT CAR 010 CALC. C-011
PASS ID: AUXHALLWAY
AUXHALLWAY EL. 695

REVISIONS
0 RBd 10/5/95
A.K. 11/9/95

REF

DEAD LOAD CHECK

CK WORST CASE ITEM ⑤:



$R_L = \frac{6" \times P_1}{84"} = 150^{\#}$, $R_R = P_1 - R_L = 57^{\#}$

MAX M = $23" \times R_L = 3450^{"\#}$

6.3 $I.R = \frac{M}{M_{ALLOW}} = \frac{3450^{"\#}}{42080^{"\#}} = 0.08$

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CLIENT NSP/PWSP JOB No. 93C2807 SHEET 4 OF 6
SUBJECT CAR 010 CALC. C-011
PASS ID: AUXHALLWAY
AUXHALLWAY EL 695

REVISIONS
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A.K 11/7/95

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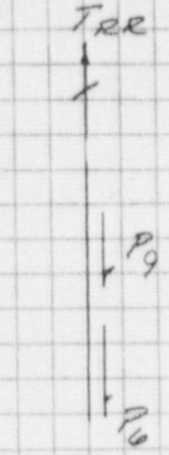
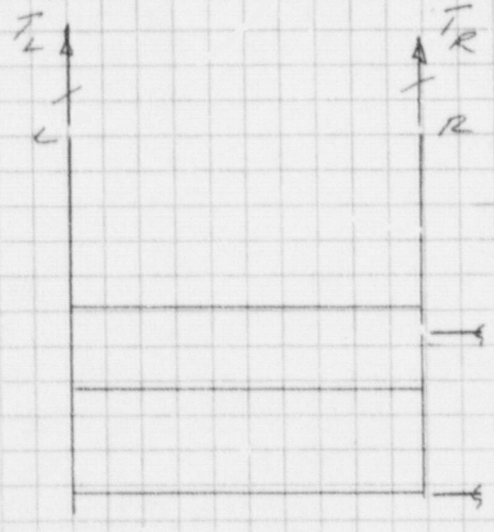


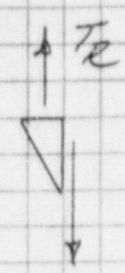
$T_{RR} = P_6 + P_9 = \underline{310^{\#}}$



$\curvearrowleft + \Sigma M_L = 0 = -84'' \times T_R + 66''(P_4 + P_5) + 42''(P_3 + P_7) + 23'' \times P_1 + 12'' \times P_2$.

$T_R = \underline{268^{\#}}$ $T_L = P_1 + P_2 + P_3 + P_4 + P_5 + P_7 + P_8 - T_R = \underline{452^{\#}}$.

REF. CL ANCHORAGE :



P2434 BOLT SLIP —

6.3 $IR = \frac{T_R/2}{SUP\ ALLOW} = \frac{268^{\#}/2}{1500^{\#}} = 0.07$

P3270 EMBEDDED STRUT —

6.3 $IE = \frac{T_L}{P_{ALLOW}} = \frac{452^{\#}}{2000^{\#}} = 0.23$

CONCLUSION

SUPPORT MEETS THE DEAD LOAD CHECK REQUIREMENT OF SECTION 8.3.1 OF THE G.P.

VERTICAL CAPACITY CHECK

L.: ANCHORAGE (EMBEDDED STRUT)

6.3 $I.R = \frac{3 \times T_L}{P_{ALLOW}} = \frac{3 \times 452^{\#}}{2000^{\#}} = 0.67$

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	SUBJECT LAR 010 CALC. C-011
	PASS ID: AUXHALLWAY
	AUXHALLWAY EL. 695
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CONCLUSION

THE SUPPORT MEETS THE VERTICAL CAPACITY CHECK REQUIREMENT OF SECTION 8.3.2 OF THE GIP.

DUCTILITY CHECK

THE LOAD CAPACITY OF THE P3270 EMBEDDED STRUT = 2000# > T_R + VERTICAL COMPONENT OF THE P2452 BRACE = 268# + 1.7 X 0.707 X 1200# = 1710# THUS ALLOWING THE ANCHORAGE TO BEHAVE IN A DUCTILE MANNER SUBSEQUENT TO BRACE BUCKLING AND CONSEQUENTLY SATISFYING THE REQUIREMENTS OF SECTION 8.3.3 OF THE GIP.

OVERALL CONCLUSION

THE SUPPORT, HAVING MET THE REQUIREMENTS OF SECTIONS 8.3.1, 8.3.2 AND 8.3.3 MEETS THE OVERALL REQUIREMENTS OF SECTION 8.3 OF THE GIP.