

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-266/89004(DRS); 50-301/89004(DRS)

Docket Nos. 50-266; 50-301

Licenses No. DPR-24; DPR-27

Licensee: Wisconsin Electric Power Company
231 West Michigan Avenue
Milwaukee, WI 53201

Facility Name: Point Beach Nuclear Plant, Units 1 & 2

Inspection At: Point Beach Site, Two Rivers, Wisconsin and
Wisconsin Electric Power Engineering Office,
Milwaukee, Wisconsin

Inspection Conducted: January 23-27, May 8-11, 1989 at Point Beach Site,
February 14-15, 1989 at Milwaukee Engineering Office
and July 5, 1989 at the RIII office.

Inspector: *W. C. Liu*
W. C. Liu

07/06/89
Date

Approved By: *D. H. Danielson*
D. H. Danielson, Chief,
Materials and Processes Section

7/6/89
Date

Inspection Summary

Inspection from January 23 through July 5, 1989(Reports No. 50-266/89004(DRS)
and 50-301/89004(DRS)

Areas Inspected: Special safety inspection of licensee actions associated
with IE Bulletin 79-14, seismic analysis for as-built safety-related piping
systems (92703).

Results: Two apparent violations were identified; multiple examples of
inadequate design control-Paragraph 2.b; and lack of procedures-Paragraph 2.c.
During the course of the inspection, the following strengths and weaknesses of
the design function were noted:

Licensee Strengths

- The engineering staff appeared to be technically competent.

Licensee Weaknesses

- The design verification and checking efforts have failed to disclose inappropriate design methodologies and calculational errors.
- Procedures appeared to be lacking in the evaluation of integral lug attachments for the safety-related piping systems.
- The effectiveness of the controls for the mechanical design process is questionable.

DETAILS

1. Persons Contacted

Wisconsin Electric Power Company (WEPCo)

J. Zach, Plant Manager
*G. Frieling, Systems Engineering Superintendent
+S. Cartwright, Senior Project Engineer, Mechanical
+*B. Lunde, Specialist III
*J. Knorr, Regulatory Engineer
*R. Heiden, Superintendent, Nuclear QA
*G. Maxfield, General Superintendent-Operations
*F. Flentje, Specialist, Regulatory Service

NRC Resident Inspector

C. Vanderniet, Senior Resident Inspector
*R. Leemon, Resident Inspector

* Denotes those attending the exit interview at the Point Beach site on May 11, 1989

+ Denotes those contacted via telephone for the final exit on July 5, 1989

2. Licensee Action on IE Bulletin 79-14 (92703)

(Open) IEB 79-14 (266/79014-BB; 301/79014-BB; 266/79014-B1; 301/79014-B1; 266/79014-B2; 301/79014-B2; 266/79014-B3; 301/79014-B3): Seismic Analysis For As-Built Safety-Related Piping Systems.

a. General

During previous NRC inspections (NRC Inspection Reports No. 50-266/88011; 50-301/88010; 50-266/88015; No. 50-301/88013), the NRC inspector identified a number of discrepancies which did not meet the NRC Bulletin requirements. These discrepancies were subsequently evaluated by the licensee through the use of reanalysis or documented engineering judgement. It was noted that none of these discrepancies resulted in piping or pipe support stresses in excess of safety analysis allowables.

In an effort to ensure that the intent of the Bulletin was met, the licensee performed additional walkdowns with the following results:

<u>Isometric Drawing No.</u>	<u>Piping System</u>	<u>No. of Discrepancies/ Resolutions</u>
P-119	Safety injection	7
P-132, P-133	Residual Heat Removal	4
P-140, P-142	Emergency Feedwater	4
P-148	Auxiliary Coolant	0
P-215, P-238	Service Water	0
P-239, P-242	Emergency Feedwater	4
P-245	Pressurizer Surge Line	0
P-248	Auxiliary Coolant	0

Details of the above walkdown activities were documented in the licensee's letters of response, VPDP-88-139, 88-396, and 88-547, dated June 13, July 29, and November 9, 1988, respectively. The licensee summarized the results of the walkdowns as follows:

- (1) The original walkdown information was generally accurate and thorough.
- (2) The numbers and types of supports identified on the isometrics matched the as-built configurations.
- (3) Some dimensional discrepancies on support locations were identified and evaluated.
- (4) The analytical models for each subsystem were consistent with the isometric drawings.

The NRC inspector reviewed the relevant portions of the aforementioned walkdown documents and held discussions with licensee representatives pertaining to the resolutions of those discrepancies identified during the walkdown inspections. It was noted that in general, the original IEB 79-14 field walkdowns were accurately documented. However, not all of the field measurements were correctly translated into design documents by Bechtel. This was evidenced by reviewing the root cause of the discrepancies identified during the previous NRC inspections. The licensee representatives concurred with this assessment and subsequently committed to review six more subsystems to determine whether field measurements for the IEB 79-14 program were properly incorporated into analysis packages. Documentation for six subsystems was reviewed with the following results:

<u>Isometric Drawing No.</u>	<u>Calc. No.</u>	<u>Piping System</u>	<u>No. of Msrmts</u>	<u>No. of Discrepancies</u>
P-104	8-1	Safety Injection	23	0
P-204	8-4	Safety Injection	20	0
P-110	14-27	Component Cooling	87	1
P-231	15-1	Containment Spray	60	0
P-141/P-103	2-15	Auxiliary Feedwater	72	3
P-241	2-12	Auxiliary Feedwater	61	2

The above subsystems were evaluated by the licensee and were documented in the letter forwarded to Region III on March 10, 1989, from Wisconsin Electric Power Company (WEPCO). This letter states that WEPCO had evaluated the isometrics to verify that the analyses consistently modelled the as-built data collected during the original plant walkdowns. From this information, the licensee concluded that a good correlation between the walkdown information and the analysis input data exists.

The NRC inspector reviewed the relevant portions of isometrics P-141 and P-103 to verify the licensee's findings. It was noted that the piping stress analysis contained three input errors. The first error was an elevation discrepancy of 1'-0" for the pipe line. The second error was an elevation discrepancy of 2'-9 1/2" resulting from the valve location. The third error was an elevation discrepancy of 4'-7" due to valve position. The implication of these errors resulted in at least 28 data points with incorrect inputs in the stress analysis.

The NRC inspector also reviewed isometric P-241 and noted the following two input errors: First, the pipe segment between data point 88 and data point 90 in the stress analysis was different from the existing pipe segment by 7'-6". Second, a support was installed in the field which neither the stress analysis nor the as-built drawing identified. A review of the sister isometric P-240 also revealed that a similar support was installed in the field but was not identified on the as-built drawing nor included in the stress analysis.

The aforementioned discrepancies were discussed in detail with licensee representatives. Although no overstress condition is apparent, analysis will be rerun as required.

Based on the results of the above NRC review which were discussed with licensee representatives on May 15, 1989, it was determined that the conclusion delineated in the WEPCO letter, dated March 10, 1989, concerning the evaluation of the six isometrics, was not well founded. The NRC inspector requested that the licensee reevaluate its conclusion concerning the IEB 79-14 program as a

result of this and the previous NRC inspection findings pertaining to the Bulletin. Pending further review of the licensee's overall reevaluation, this Bulletin will remain open.

b. Review of Pipe Support/Restraint Design Calculations

The NRC inspector selected the following pipe supports/restraints for a verification review. This review was to determine whether the design calculations were performed in accordance with applicable procedures, codes, licensee commitments and NRC requirements.

<u>Isometric Number</u>	<u>Calculation Number</u>	<u>Support/Restraint Number</u>	<u>Piping System</u>
P-115	7-1	*HB-19-HB-4B	Service Water
P-119	15-15	SI-1501R-2-H15	Safety Injection
P-132	8-5	AC-601R-3-H5	Auxiliary Coolant
P-133	8-5	AC-601R-6-H201	RHR Heat Exchanger
P-140	2-16	*EB-10-A12	Emergency Feedwater
P-142	2-17	EB-10-R185	Emergency Feedwater
P-148	8-148W	AC-2501R-1-R47	Auxiliary Coolant
P-215	7-9	HB-19-2H-124	Service Water
P-242	2-14	EB-10-H-201	Emergency Feedwater
P-248	14-19	*AC-601R-2-R38	Auxiliary Coolant

* Indicates discrepancies were identified during the review.

The majority of the supports/restraints were found to be acceptable with the exception of the following:

AC-601R-2-R38:

The NRC inspector's review of the design calculation identified the following concerns:

- (1) There was no documentation in the calculations to demonstrate that the localized stresses induced into the pipe were considered.
- (2) There was no documentation to show that the structural lug attachment to the pipe was evaluated for the design loads and the temperature effects.
- (3) In the design calculation the two horizontal loads of 13,260 pounds and 3,910 pounds were acting in the wrong directions due to misinterpretation of coordinates. As a result, the design calculations were incorrect. This indicated that the design verification was inadequately performed.

Refer to Paragraph 2.d below for additional evaluations performed on this support.

EB-10-A12:

This anchor support was designed to withstand thermal and seismic loads. The NRC inspector's review of the design calculations identified the following concerns:

- (1) The hollow area of the structural member was used in the stress calculations for the stanchion. This is incorrect because the metal area of the member should have been used. As a result, both the axial stress, shear stress, and the combined stress were incorrectly calculated.
- (2) There was no documentation in the calculation to demonstrate that the localized stresses induced into the pipe were considered.
- (3) Since thermal loads were included in the design calculation, the stanchion evaluation should have addressed the temperature effects on the yield strength of the material.
- (4) Although the design calculations required a 3/8 inch fillet weld between the stanchion and the baseplate, the as-built drawing still showed a 1/4 inch fillet weld.
- (5) Section C-C of the as-built drawing was not consistent with the items shown on the bill of material list.

HB-19-HB-4B:

The location of this installed support was different from the location shown on the as-built drawing by 3'-3 1/2". The location on the as-built drawing was used in the stress analysis. There was no documentation in the calculation to show that this location discrepancy was evaluated in the accordance with IEB 79-14 requirements.

ANSI B31.1, 1967, Power Piping Code, as implemented by the licensee, specifies that consideration shall be given to the localized stresses induced into the piping component by lugs, cylindrical attachments, rings and etc. The Code further requires that temperature effects on piping material including structural supports be considered when allowable stresses are utilized in the design evaluations. ANSI N45.2.11, 1974, Quality Assurance Requirements for the Design of Nuclear Power Plants, specifies that design analysis shall be performed in a planned, controlled and correct manner. 10 CFR 50, Appendix B, Criterion III, requires that the design control measures shall provide for verifying or checking the adequacy of design.

Though the safety significance of the above concerns is minimal, the NRC inspector found that Bechtel's design review of the safety-related pipe support/restraint systems appeared to be inadequate in terms of meeting the applicable codes, licensee commitments and NRC requirements. The discrepancies identified in the above supports are multiple examples of a violation of 10 CFR 50, Appendix B, Criterion III, in that design control activities were inadequately performed (266/89004-01; 301/89004-01).

c. Review of Design Criteria and Design Guidelines

The NRC inspector reviewed the following design criteria and the design guidelines for conformance to the applicable codes, standards, licensee commitments and NRC requirements.

- Bechtel's Design Criteria Documents for "Pipe Supports, Hangers and Restraints for Seismic Category I Pipes," for Point Beach Nuclear Power Plant, Revision 3, June 22, 1982.
- Bechtel's "IE Bulletin 79-14 Phase 2 Piping Stress Analysis Guidelines," for Point Beach Nuclear Plant, Revision 1, February 14, 1980.

As a result of the review, it was noted that there were no documented procedures/instructions for the analysis of integral pipe attachments, nor were any references delineated in the above procedures to be used for such design activities. The applicable ANSI Code requires that consideration shall be given to the localized stresses induced into the piping component by the integral attachments. The NRC review of design calculations associated with the safety-related pipe support/restraint systems revealed that several integral attachments were not evaluated to any documented procedures contained in the Point Beach design documents. These are examples of a violation of 10 CFR 50, Appendix B, Criterion V, in that no documented procedures were established for the analysis of integral pipe attachments (266/89004-02; 301/89004-02).

Subsequent to the NRC inspection and the discussion, the licensee issued a letter, VPMPD-89-145; dated March 10, 1989 to NRC Region III proposing corrective action as follows:

- Perform ten (10) local pipe stress evaluations at integral attachments for which no previous evaluation exists and for which no Stress Intensification Factor (SIF) was incorporated into the piping analysis.
- Perform five (5) local pipe stress evaluations at integral attachments where manually generated SIF's were incorporated into the piping analysis results.

The above proposed sample program was considered to be acceptable by the NRC after reviewing WE's letter, VPMPD-89-252, dated

April 25, 1989. The NRC will follow up on the results of the program during a future routine inspection.

d. Review of Design Calculation for Support AC-601R-2-R38

This support for the Auxiliary Coolant system was located at the inside of the Containment. The NRC inspector reviewed this support for design adequacy. It was found that there was no documentation to show that the localized stresses induced into the pipe and the stresses in the integral attachment were analyzed. As a result, the integrity of the lug attachment and the pipe was not assured. The NRC inspector requested that the support be promptly analyzed to ensure that the existing support can perform its intended function as required by the piping stress analysis. Subsequent to the NRC request, the licensee instructed Bechtel to perform an analysis of the entire support.

Bechtel's calculation for this support was dated March 2, 1989. The NRC inspector performed an in-depth review of this calculation and questioned its overall validity. The analytical methodology, the material, the design temperature and several of the assumptions utilized in the calculation were either inaccurate or questionable in nature. These concerns were discussed with the licensee and a re-evaluation of the support was subsequently performed by Bechtel.

Bechtel's final calculation for this support is calculation No. AC-601R-2-R38, dated June 20, 1989. Based on this calculation the licensee concludes that piping stresses at this integral attachment location satisfy not only the operability consideration, but also the ASME Code compliance. The most significant change to the calculation pertaining to the reevaluation was subsequent lowering of the system design temperature from 610°F to 355°F. This greatly reduced the loads into the support. The NRC inspector concurred with the licensee's assessment that the operability concern does not exist. However, the analytical methodology and several of the assumptions used in the calculation need to be further clarified. These will be reviewed in conjunction with the licensee's corrective action associated with the aforementioned violations delineated in paragraphs 2.b and 2.c.

Within the areas inspected, two violations were identified.

3. Exit Interview

The inspector met with licensee representatives denoted in Paragraph 1 during and at the conclusion of the onsite inspection on May 11, 1989. The inspector also contacted licensee representatives via telephone denoted in Paragraph 1, on July 5, 1989 to discuss the submittal of revised calculation No. AC-601R-2-R38. The inspector summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.