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Closeout of IE Bulletin 80-13: Cracking in Core Spray Spargers

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PARAMETER, Inc.

Prepared for
U.S. Nuclear Regulatory
Commission

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Closeout of IE Bulletin 80-13: Cracking in Core Spray Spargers

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ABSTRACT

Between late 1978 and early 1980, the licensees of Oyster Creek and Pilgrim nuclear power stations notified the NRC that cracks had been found in core spray spargers. In early 1979, General Electric (GE) requested licensees of boiling water reactors (BWRs) to inspect spargers for visual indications of cracking. In March 1980, representatives of GE and the NRC met to discuss sparger cracking. IE Bulletin 80-13 was issued May 12, 1980, to require more intensive inspection of these safety-related systems. Core spray spargers are provided as engineered safety features, for emergency core cooling. Licensees of operating BWRs were required to take four specific actions. Evaluation of licensees' responses and inservice inspection reports, NRC/IE inspection reports and NRC correspondence shows that the bulletin can be closed out for all of the 23 BWR operating facilities which were issued the bulletin for action. Examination of spargers at 22 operating BWRs is required every refueling outage. The licensees have incorporated this examination into their inservice inspection programs. Techniques for inspection of spargers have been improved during the period of bulletin activity. Generic Letter 84-11 establishes the requirement for an ongoing program for inspection of BWR stainless steel piping.

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CLOSEOUT OF IE BULLETIN 80-13: CRACKING IN CORE SPRAY SPARGERS

INTRODUCTION

In accordance with the Statement of Work in Task Order 006 under NRC Contract 05-85-157-02, this report provides documentation for the closeout status of IE Bulletin 80-13. Documentation is based on the records obtained from the IE file, the NRC Document Control System and the Technical Monitor's file.

IE Bulletin 80-13 was issued May 12, 1980 because of concern about cracking in core spray spargers at two facilities with operating BWRs. For Oyster Creek Unit 1, the NRC determined that temporary repairs would be adequate without inspection until the next refueling outage. For Pilgrim Unit 1, the licensee's evaluation indicated that the spargers would retain structural integrity throughout the next fueling cycle without repairs and that uniformity of distribution might be affected by cracking. The NRC staff concluded that improved inspection techniques should be developed for these safety-related components and that metallurgical examinations should be performed to determine the mode of failure. The NRC evaluation for Oyster Creek Unit 1 stated that an improved replacement system should be devised and installed to supersede the temporary repair measures. The licensee's evaluation for Pilgrim Unit 1 was being reviewed by the NRC.

For background information, IE Bulletin 80-13 and review of related documents are included in Appendix A. Evaluation of licensee responses and inservice inspection reports, NRC/IE inspection reports and NRC correspondence is documented in Appendix B as the basis for bulletin closeout. Also included in Appendix B are a tabulation of examination results and repairs, the status of BWR facilities under construction when the bulletin was released, and a synopsis of examinations, repairs and NRC evaluations. Abbreviations used in this report and associated documents are presented in Appendix C.

SUMMARY

1. The bulletin has been closed out for the following three facilities because they have been shut down indefinitely (Criterion 1):

Dresden 1	Humboldt Bay 3	La Crosse

2. The bulletin has been closed out for the following facility where core spray spargers were replaced with material less susceptible to IGSCC (Criterion 2):

Big Rock Point 1

3. The bulletin has been closed for the following 22 facilities, at which sparger examinations are to be continued every refueling outage (Criterion 3):

Browns Ferry 1,2,3	FitzPatrick	*Oyster Creek 1
*Brunswick 1,2	Hatch 1,2	*Peach Bottom 2,3
Cooper Station	*Millstone 1	Pilgrim 1
Dresden 2,3	Monticello	Quad Cities 1,2
Duane Arnold	Nine Mile Point 1	*Vermont Yankee 1

* Spargers at the following six facilities have been repaired by means of clamps or brackets:

Brunswick 2	Oyster Creek 1	Vermont Yankee 1
Millstone 1	Peach Bottom 2,3	

Note: Brackets were used at Peach Bottom 3, only. Clamps were used at the other five facilities listed.

4. At FitzPatrick, the "A" core spray piping was replaced with Type 316L stainless steel when IGSCC was discovered.

5. Table B.3 lists 12 facilities issued the bulletin for information only, for which there is a written response or an IR on the subject. Of these, one facility has been cancelled (Zimmer). Status is described by means of notes which summarize responses and inspection reports (see Page B-5).

CONCLUSIONS

1. As shown by review of utility responses and as called for in the bulletin, inspection techniques have been improved. At Oyster Creek 1, for example, possible cracks reported in 1980 were found in 1983 to be false indications.

2. The requirement for an ongoing program for inspection of BWR stainless steel piping was established by issuance of NRC Generic Letter 84-11 on April 19, 1984. Participation of the BWR Owners' Group and EPRI was encouraged. Refer to Page A-5.

3. As a result of the bulletin, licensees have either replaced the core spray spargers with material less susceptible to IGSCC, or have installed an inservice inspection program in accordance with bulletin requirements for examination of core spray spargers at every refueling outage.

CRITERIA FOR CLOSEOUT OF BULLETIN

The bulletin is closed out for facilities to which one of the following criteria applies:

1. The facility has been shut down indefinitely (SDI).

2. The licensee has replaced the core spray sparger piping and support assembly with materials, processing and testing conforming to the guidelines of NUREG-0313 Rev. 1 to mitigate IGSCC, the NRC has evaluated and approved this replacement, and an NRC/IE inspection report verifies the actions and closes the bulletin.

   Note: For documentation of evaluation and approval by NRC Headquarters, refer to the memorandum of January 9, 1981 for J. G. Keppler (RIII) from E. L. Jordan (IE/HQ) on the subject of Big Rock Point 1.

3. Documentation provided by licensee responses, licensee inservice inspection reports, NRC/IE inspection reports and NRC internal and external communications indicates that required bulletin actions have been performed satisfactorily and that they will be continued at every refueling outage.

APPENDIX A

Background Information

SSINS No.: 6820
Accession No.:
8002280661

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

May 12, 1980

IE Bulletin No. 80-13

CRACKING IN CORE SPRAY SPARGERS

Description of Circumstances:

Instances of cracking in core spray spargers have occurred at two BWR facilities. This trend indicates a need for more intensive inspection of these components during subsequent refueling outages.

Oyster Creek Nuclear Generating Station

Jersey Central Power and Light Company notified the NRC on October 18, 1978, that a crack had been found in Core Spray Sparger System II during remote visual inservice inspection at their Oyster Creek Nuclear Generating Station. The crack was located at 208° azimuth and extended at least 180° circumferentially around the sparger. An evaluation of the event by the licensee postulated that deformation of the sparger had occurred during fabrication and installation which led to cracking by Intergranular Stress Corrosion Cracking (IGSCC) during service in the BWR environment. A temporary repair was effected by installing a clamp assembly over the crack. The licensee's analysis indicated that the crack had relieved the stresses present and therefore precluded further cracking. The NRC safety evaluation permitted operation until the next refueling outage and required inspection of the sparger at that time.

The NRC was informed by the Jersey Central Power and Light Company on January 16, 1980 that further cracking was discovered in the core spray spargers during an inservice inspection conducted in conjunction with the refueling outage. A total of twenty-eight cracks 0.001 to 0.002 inches in width and of varying lengths were identified in both core spray spargers. The licensee stated that they believed the majority of additional cracks were present earlier and not discovered during the 1978 inspection due to inspection equipment limitations. Near term repair consisted of the application of nine additional clamp assemblies in areas of the spargers where cracks were visually observed on the accessible portion of the sparger and UT indications were present in the inaccessible portion of the sparger and in the junction box region. The licensee analyzed the flow characteristics of the spargers and determined that adequate flow distribution would be maintained if thru wall cracking .005 inches wide and 180° in length were present. The licensee stated that the installation of the clamps would assure the sparger would maintain its physical integrity and remain in place.

The repair measures proposed were determined by the NRC to be adequate until the following refueling outage. The NRC evaluation stated that actions should be taken to develop and install an improved replacement system at the following refueling outage.

Pilgrim Nuclear Power Station

On January 31, 1980 the Boston Edison Company (BECo) informed the NRC that five indications in the upper core spray sparger and two indications on the lower core spray sparger at the Pilgrim Nuclear Power Station were identified during remote visual inservice inspections. The indications were confirmed as cracks after hydrolasing and brush cleaning. The licensees evaluation indicated that the sparger will retain structural integrity throughout the next cycle, although core spray flow distribution may be affected due to through-wall cracks. However, core spray flow delivery to the shroud interior would not be expected to decrease. A loose parts analysis was presented which addressed (1) corrosion, (2) flow blockage, and (3) control rod interference.

To support power operation in Cycle 5 with the core spray sparger in its present condition, BECo has reanalyzed ECCS taking credit only for core spray reflood, taking no credit for core spray heat transfer. The submission by BECo is currently under review by the staff. The analysis is expected to cover a full spectrum of core spray failures. It is expected that the limiting condition will be the failure of recirculation suction line. A MAPLHGR limit reduction will likely be imposed during Cycle 5 to compensate for the assumption of no core spray heat transfer.

Based on results from other sparger inspections and previous pipe cracking experience, cold work and sensitization during fabrication and installation stresses are considered to be the major factors in causing the observed cracks at the Pilgrim Station. The cracks are hypothesized to be initiated and propagated by intergranular stress corrosion (IGSCC).

A meeting was held with representatives from GE in Bethesda, Maryland on March 13, 1980 to discuss core spray sparger cracking at BWRs. At the meeting GE provided the following information:

1. In February 1979, GE issued to BWR licensees Service Information Letter (SIL) No. 289 that recommended inspection of the core spray spargers for visual indications of cracking. To date, 19 of 21 plants inspected have no observed cracking. Cracks have been found at 2 facilities (Pilgrim and Oyster Creek).

2. The key contributors to IGSCC vary from plant-to-plant, although stresses from cold work and sensitization during fabrication and installation are considered prime factors leading to IGSCC at Pilgrim and Oyster Creek. Because the cause of cracking is not yet confirmed by metallurgical analysis, GE is developing tooling to extract sparger samples to verify the postulated cracking mechanism.

3. GE is evaluating methods of improving the sparger inspection techniques, and is considering a modification to the SIL, if warranted.

The staff agreed that improved inspection techniques should be developed and metallurgical examinations should be performed to determine the mode of failure. The staff asked GE to keep them informed of progress in these areas.

Actions to be Taken by Licensees:

For all boiling water power reactor facilities with an operating license:

1. At the next scheduled and each following refueling outage until further notice, perform a visual inspection of the Core Spray Spargers and the segment of piping between the inlet nozzle and the vessel shroud. Remote underwater TV examinations are acceptable if adequate resolution can be demonstrated. The viewing in situ of 0.001 in. diameter fine wires is considered as an acceptable means of demonstrating suitable resolution of the TV examinations. Such techniques as the use of oblique lighting, and the ability to light from each side independently are considered useful in enhancing the image of cracks to facilitate detection.

2. In the event cracks are identified during examination of the core spray sparger system, the location and extent of the indications shall be recorded and reported to the NRC. Supplementary examinations using volumetric methods may be performed to aid in characterizing the extent of cracking in nonvisible locations. An evaluation shall be submitted to NRR for review and approval prior to return to operation.

3. Any cracking identified in the core spray cooling system shall be reported to the Director of the appropriate NRC Regional Office within 24 hours of identification.

4. A written report of the results of the examinations including any corrective measures taken shall be submitted within 30 days of the completion of the examination to the Director of the NRC Regional Office with a copy to the NRC Office of Inspection and Enforcement, Division of Reactor Operations Inspection, Washington, D. C. 20555.

Approved by GAO, B180225 (R0072); clearance expires 7-31-80. Approval was given under a blanket clearance specifically for identified generic problems.

REVIEW OF RELATED GE AND NRC DOCUMENTS

1. GE SIL No. 289, Revision 1, May 2, 1980
Core Spray Sparger Visual Inspection

For background, cracked spargers at two facilities were described. The cracked components had been manufactured by different vendors. A total of 21 other spargers in operating BWRs had been inspected with no reported evidence of cracking.

A review of spargers in operating BWRs showed that types 304 or 304L stainless steel were used and there were no significant differences in design or manufacturing process. The two cracked spargers were made of Type 304 stainless steel.

Remote visual (TV) examinations of high quality at the next refueling outages were recommended. Ultrasonic examinations were suggested where possible.

2. NRC NUREG-0313, Rev. 1, July 1980
Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping

As stated in the Abstract, "This report sets forth the NRC staff's revised acceptable methods to reduce the intergranular stress corrosion cracking susceptibility of BWR ASME Code Class 1, 2 and 3 pressure boundary piping and safe ends. For plants that cannot fully comply with the material selection, testing and processing guidelines of this document, varying degrees of augmented inservice inspection and leak detection requirements are presented."

3. NRC Generic Letter 81-01, May 4, 1981
Qualification of Inspection, Examination, and Testing and Audit Personnel

Regulatory Guide 1.146 (August 1980) on Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants was included. All licensees and holders of construction permits were required to make commitments to meet regulatory positions (including Regulatory Guide 1.58, Revision 1) or to propose alternative methods of compliance.

4. NRC Generic Letter 84-11, April 19, 1984
Inspections of BWR Stainless Steel Piping

All licensees and holders of construction permits were informed that "a reinspection program of piping susceptible to IGSCC should be undertaken". The intended scope of reinspection was described, with emphasis on (1) leak detection and leakage limits and (2) crack evaluation and repair criteria. Large diameter recirculation and residual heat removal piping was addressed specifically. IEB 80-13 was not mentioned.

5. GE NEDO-22139, May 1982
Core Spray Sparger Crack Analysis at Peach Bottom Atomic Power Station, Unit 2

GE reviewed the 180 degree circumferentially oriented crack in the header to T-box weld heat-affected zone of the lower sparger and justified continued operation with or without the addition of a clamp. The report includes analysis of structural integrity, loose parts and the effect of a LOCA.

6. GE NEDO-30825, November 1984
Core Spray Sparger Crack Analysis for Edwin I. Hatch Nuclear Power Station, Unit 1

GE reviewed the 180 to 360 degree crack with maximum width of 10 mils in the heat-affected zone of the lower sparger to T-box weld and justified continued operation for all normal and injection conditions, with or without addition of a clamp. The report includes analysis of structural integrity, loose parts and the affect of a LOCA.

APPENDIX B

Documentation of Bulletin Closeout

TABLE B.1 BULLETIN CLOSEOUT STATUS

Facility	Utility	Docket	Facility Status	NRC Region	Utility Response Date	Inspection Report and Date	Closeout Status & Criterion
Big Rock Point 1	CPC	50-155	OL	III	10-01-80	80-19(01-27-81)	Closed 2
Browns Ferry 1	TVA	50-259	OL	II	05-22-81 07-08-83	80-07(02-21-80) 81-13(07-13-81) 84-16(06-01-84)	Closed 3
Browns Ferry 2	TVA	50-260	OL	II	10-15-80 01-24-83 01-29-85	80-28(10-14-80) 84-16(06-01-84)	Closed 3
Browns Ferry 3	TVA	50-296	OL	II	01-05-81 01-04-82 04-09-84	81-13(07-13-81) 84-16(06-01-84)	Closed 3
Brunswick 1	CP&L	50-325	OL	II	07-15-80 01-26-83 *01-27-86 *04-21-87	84-08(05-17-84)	Closed 3
Brunswick 2	CP&L	50-324	OL	II	07-15-80 06-18-82 05-09-84 *08-29-86	82-17(06-25-82) 82-23(07-15-82) 84-08(05-17-84)	Closed 3
Cooper Station	NPPD	50-298	OL	IV	05-31-80 +01-17-86	80-11(08-18-81) 82-16(08-09-82)	Closed 3
Dresden 1	CECO	50-010	SDI	III			Closed 1
Dresden 2	CECO	50-237	OL	III	01-23-81 05-04-82 03-25-83 *06-08-83	81-01(02-12-81) 83-11(07-06-83) 83-31(04-06-84) 84-03(04-10-84)	Closed 3
Dresden 3	CECO	50-249	OL	III	*07-10-80 05-04-82 03-25-83	83-09(07-06-83) 83-29(04-06-84) 84-02(04-10-84)	Closed 3
Duane Arnold	IELPCO	50-331	OL	III	05-19-81 05-09-83 08-02-85	81-06(06-02-81) 81-07(05-27-81) 81-09(06-18-81)	Closed 3
FitzPatrick	PASNY (NYPA)	50-333	OL	I	08-27-80 10-15-82 *02-07-84 *02-06-86	80-11(07-30-80) 81-07(07-28-81)	Closed 3
Hatch 1	GPC	50-321	OL	II	01-13-81 05-08-81 11-30-82 11-21-84 12-06-84 02-12-85 08-22-85 01-06-86 02-28-86	81-08(04-13-81) 81-23(10-16-81) 84-43(11-15-84) 84-44(11-29-84)	Closed 3

* Licensee Inservice Inspection (ISI) Report.
+ See Page B-9 for the description of this letter of commitment.
See other notes at end of table.

TABLE B.1 BULLETIN CLOSEOUT STATUS (contd)

Facility	Utility	Docket	Facility Status	NRC Region	Utility Response Date	Inspection Report and Date	Closeout Status & Criterion
Hatch 2	GPC	50-366	OL	II	01-13-81 05-08-81 04-22-82 06-24-83 05-07-84 01-23-87	81-23(10-16-81)	Closed 3
Humboldt Bay 3	PG&E	50-133	SDI	V			Closed 1
La Crosse	DPC	50-409	SDI	III	01-13-81 01-30-81	83-21(12-27-83)	Closed 1
Millstone 1	NNECO	50-245	OL	I	11-17-80 *02-15-83 *03-20-86	80-22(12-15-80) 80-24(01-27-81) 80-25(03-27-81) 82-22(12-09-82) 83-05(03-15-83) 84-11(06-20-84)	Closed 3
Monticello	NSP	50-263	OL	III	05-15-81 06-17-81 *05-18-81 *02-10-83 *03-27-85 *09-02-86	81-06(05-19-81) 81-23(11-23-81)	Closed 3
Nine Mile Point 1	NMP	50-220	OL	I	05-13-81 06-10-83 *10-31-83 05-31-84 05-16-86		Closed 3
Oyster Creek 1	JCP&L/ GPUN	50-219	OL	I	03-31-80 06-27-80 07-02-80 07-07-80 07-21-80 05-13-83	83-05(05-05-83) 85-19(07-24-85)	Closed 3
Peach Bottom 2	PECO	50-277	OL	I	06-13-80 04-29-82 05-11-82 06-04-82 *09-16-82	82-06(04-22-82) 83-37(01-19-84) 85-25(08-26-85)	Closed 3
Peach Bottom 3	PECO	50-278	OL	I	07-24-81 *12-31-81 07-28-83 08-16-83 *01-09-84 11-08-85 *03-24-86	83-35(01-19-84) 85-27(10-01-85) 85-33(12-18-85) 85-37(11-19-85)	Closed 3

* Licensee Inservice Inspection (ISI) Report.
See other notes at end of table.

TABLE B.1 BULLETIN CLOSEOUT STATUS (contd)

Facility	Utility	Docket	Facility Status	NRC Region	Utility Response Date	Inspection Report and Date	Closeout Status & Criterion
Pilgrim 1	BECO	50-293	OL	I	*Dec 1981 *May 1984 06-18-84 10-04-84 *03-28-85	82-25(10-05-82)	Closed 3
Quad Cities 1	CECO	50-254	OL	III	09-16-80 *08-18-82 10-28-82 *09-07-84	80-23(11-19-80)	Closed 3
Quad Cities 2	CECO	50-265	OL	III	12-16-81 *08-18-82 10-28-82 09-22-83 *09-07-84	80-25(11-19-80) 83-23(03-01-84)	Closed 3
Vermont Yankee 1	VYNP	50-271	OL	I	12-01-80 01-06-82 02-04-82 *09-14-83 09-03-85	80-15(12-04-80) 80-16(12-02-80) 80-17(02-20-81) 81-13(08-13-81) 85-40(02-20-86)	Closed 3

* Licensee Inservice Inspection (ISI) Report.

Notes for Table B.1:

1. Facility Status is based on Reference 1, Page B-19.

2. The following abbreviations apply to facility status:

   OL, Operating License;
   SDI, Shut Down Indefinitely.

3. Refer to Page 3 for Bulletin Closeout Criteria.

4. Refer to Page B-7 for a synopsis of examinations and repairs described by licensee responses and ISI reports; and of examinations, repairs and NRC evaluations described by NRC inspection reports and correspondence.

TABLE B.2 EXAMINATION RESULTS AND REPAIRS

Facility	Cracks?	Repairs?	Additional Cracking?	Inspection Method
Big Rock Point 1	No	Replaced	--	--
Browns Ferry 1,2,3	No	No	N/A	TV
Brunswick 1	No	No	N/A	TV
Brunswick 2	Yes	Yes	No	TV
Cooper Station	No	No	N/A	TV
Dresden 2,3	No	No	N/A	TV
Duane Arnold	No	No	N/A	TV
FitzPatrick	Yes	Partially Replaced	No	TV
Hatch 1	Yes	Yes	No	TV
Hatch 2	No	No	N/A	TV
La Crosse	No	No	N/A	TV, PT, Pressure/ Flow
Millstone 1	Yes	Yes	--	TV
Monticello	No	No	N/A	TV
Nine Mile Point 1	Yes (Minor)	No	No	TV
Oyster Creek 1	Yes	Yes	No	TV, UT, Air Test
Peach Bottom 2	Yes	Yes	--	TV
Peach Bottom 3	Yes	Yes	--	TV, Air Test
Pilgrim 1	Yes	No	No	TV
Quad Cities 1,2	No	No	N/A	TV
Vermont Yankee 1	Yes	Yes	No	TV, Air Test

TABLE B.3 PRESENT STATUS OF BWR FACILITIES UNDER CONSTRUCTION AT TIME OF BULLETIN RELEASE (See Note 1)

Facility	Utility	Docket	Facility Status	NRC Region	Utility Response Date	Inspection Report and Date	Note
Clinton 1	IP	50-461	LPTL	III		81-01(02-09-81) 83-11(08-08-83)	4
Fermi 2	DECO	50-341	OL	III		84-10(04-13-84)	5
Hope Creek 1	PSE&G	50-354	CP	I		82-01(02-11-82) 86-11(02-21-86)	11
LaSalle 1	CECO	50-373	OL	III		80-16(06-27-80) 80-56(01-19-81) 81-24(07-23-81) 81-36(11-03-81)	13
LaSalle 2	CECO	50-374	OL	III		84-04(03-14-83)	6
Limerick 1	PECO	50-352	OL	I		84-43(09-17-84) 85-47(01-08-86)	7
Limerick 2	PECO	50-353	CP	I		84-11(09-17-84)	7
Nine Mile Point 2	NMP	50-410	CP	I		86-01(03-24-86)	12
Shoreham	LILCO	50-322	LPTL	I		84-21(06-08-84)	8
Susquehanna 1	PP&L	50-387	OL	I	04-20-81	81-13(07-23-81) 81-25(11-25-81)	9
Susquehanna 2	PP&L	50-388	OL	I	04-20-81	81-25(11-25-81)	9
WNP 2	WPPSS	50-397	OL	V	05-01-86 05-20-87		14
Zimmer	CG&E	50-358	CD	III		83-23(11-21-83)	10

Notes for Table B.3

1. The bulletin was issued to these facilities for information, only. No action was required at that time.

2. Facility Status is based on references 1,2 and 3 (see Page B-19).

3. The following abbreviations apply to facility status:

   CD, Cancelled
   CP, Construction Permit
   LPTL, Low Power Testing License
   OL, Operating License

4. The NRC/IE inspector for Clinton 1 indicated that (1) the utility had reviewed the bulletin for applicability, (2) access for ISI had been provided in the design and (3) an ISI company was taking part in planning visual examination.

5. The NRC/IE inspector for Fermi 2 indicated that the utility had reviewed the bulletin for applicability.

6. The NRC/IE inspector for LaSalle 2 indicated that the utility was working on the bulletin.

7. According to IR 84-43/84-11 of 09-17-84, the NRC/IE inspector for Limerick 1,2 indicated that (1) GE determined that susceptibility to IGSCC had been lessened by using low carbon Type 304L material (with some Type 304ELC parts) rather than Type 304 material, (2) several mill certifications had been checked to make sure that Type 304L material had been used and (3) ISI requirements would be tracked.

   IR 352/85-47 of 01-08-86 for Limerick 1 indicated that a procedure had been developed for ISI/VT examination of spargers.

8. The NRC/IE inspector for Shoreham indicated that (1) he had reviewed the utility's letter of 02-22-33 to the NRC stating that bulletin requirements would be addressed in the ISI Plan, (2) Nuclear Energy Service, Inc. was preparing the ISI Plan and (3) the spargers were examined visually and ultrasonically before installation.

9. The utility response for Susquehanna 1,2 indicated that (1) they believed that exemption from bulletin requirements for inspection was warranted because of the use of low carbon Type 304L material and (2) a tee in the line leading from the inlet nozzle might have to be inspected per the bulletin.

   The NRC/IE inspector indicated that the utility requested NRC/NRR to exempt them from bulletin requirements for inspection, because low carbon Type 304L material with lessened susceptibility to IGSCC was used.

   Nuclear Reactor Regulation (NRR) reviewed PP&L's program of replacement of type 304 stainless steel, and concluded that this conformed to the requirements of NUREG-0313, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundry Piping."

10. The construction permit for the Zimmer facility has been cancelled.

11. According to IR 86-11 of 02-21-86 for Hope Creek 1, the licensee's commitment to IEB 80-13 is documented in M9-IAP-102 Revision 00 and will be included in the ISI Long Term Plan.

12. According to IR 86-01 of 03-24-86, GE feels that cracking problems of the spargers for Nine Mile Point 2 have been eliminated by incorporating changes in design and material.

13. According to IR 81-24 of 07-23-81 for LaSalle 1, the NRC/IE inspector took the position that insufficient justification had been presented to show that the upgraded requirements of IEB 80-13 would not apply after license issuance. He stated that this open item would be referred to headquarters for resolution. In IR 81-36 of 11-03-81, he reported this item had been closed.

14. The utility response for WNP 2 indicated that the utility performed a visual inspection of the core spray spargers during both the 1986 and 1987 refueling outages and no cracking or other relevant conditions were observed in the areas examined.

SYNOPSIS OF EXAMINATIONS, REPAIRS AND NRC EVALUATIONS

1. Big Rock Point 1

In the response of 10-01-80, CPC reported that the original sparger had been replaced during the last refueling outage in order to obtain a better spray pattern. No cracks were found in the original sparger when it was subjected to remote visual examination in the spent fuel pool during September 1980, after more than 17 years of service.

CPC also indicated in the above response that materials and fabrication methods of the new sparger had been selected to reduce susceptibility to IGSCC. The utility indicated that inspections every 40 months according to the requirements of Section XI of the ASME Code should suffice for the new spargers.

The memorandum of 01-09-81 for J. G. Keppler (RIII) from E. L. Jordan (IE/HQ) indicated that NRR concurred with the extension request and stated that "the plant's inservice inspection program should be amended to reflect the licensee's intended inspection schedule for the new sparger". IR 80-19 of 01-27-81 indicated that NRC/IE Headquarters accepted the response because of the selection of material for the new sparger and approved the extension of the examination interval to 40 months, in agreement with the ASME B&PV Code. Because of this evaluation by the NRC, the bulletin has been closed out per Criterion 2.

2. Browns Ferry 1

TVA reported 07-08-83 that no abnormalities were found during the visual inspection of 05-04-83.

The NRC/IE inspector reported in IR 84-16 of 06-01-84 that no cracks had been revealed by visual examination. The requirements of IEB 80-13 had been incorporated into a special TVA mechanical maintenance instruction. Because TVA was committed to following the requirements of IEB 80-13 until further notice by the NRC, the inspector called the bulletin closed for this facility.

3. Browns Ferry 2

TVA reported 01-29-85 that no unacceptable indications were found during the remote visual examination of 11-14-84.

The NRC/IE inspector's evaluation reported above for Unit 1 per IR 84-16 applies also to Unit 2.

4. Browns Ferry 3

TVA reported 04-09-84 that no abnormalities were found during the remote visual inspections performed in February and March of 1984.

The NRC/IE inspector's evaluation reported above for Unit 1 per IR 84-16 applies also to Unit 3.

5. Brunswick 1

CP&L reported 01-26-83 and 04-21-87 that no indication of cracking was noted during the visual inspections completed 01-15-83 and 03-22-87 using Periodic Test (PT) 90.1.

The licensee report dated 01-27-86 of the inservice inspection of 1985 indicated that the core spray spargers were examined by remote visual inspection and that no abnormal conditions were found.

The NRC/IE inspector reported in IR 84-08 of 05-17-84 that he had reviewed both the response of 01-26-83 and PT-90.1 and had found them to be satisfactory. On the basis of the inspectors' commitment to continue checking the licensee's actions, the inspector considered IEB 80-13 closed.

6. Brunswick 2

In the preliminary notification of 05-20-82 and the response of 06-18-82, CP&L reported a crack in the heat-affected zone of one sparger-to-junction box weld. The crack was 20 mils in width and 180 degrees in circumferential extent. Although continued operation without corrective action was judged to be safe, a clamp was installed over the cracked area as a precaution. IR 82-23 of 07-15-82 indicated that the repaired sparger was approved for operation until the next refueling outage.

The memorandum of 04-29-83 for Gus C. Lainas (DL) from William V. Johnston (DE) indicated that the cracked sparger discovered during May 1982 was restored to a fully operational state by installing a clamp over the crack. Further, it stated that "clamps of identical or similar

designs have been installed at Oyster Creek, Vermont Yankee, Millstone Unit No. 1 and Peach Bottom".

CP&L reported 05-09-84 that no indication of additional cracking was noted using PT-90.1 during the inspection completed 04-10-84. Further, the utility found that the previously installed sparger clamp was satisfactory.

The licensee report dated 08-29-86 of the inservice inspection of 1986 indicated that the reactor internals were examined by remote visual inspection. No abnormal conditions were reported regarding the core spray spargers.

On the basis of the following considerations, IEB 80-13 is considered closed for Unit 2:

(a) the inspectors' commitment mentioned in Summary Item 5 above.

(b) previous evaluation of the repaired sparger by William V. Johnston (DE) in the memorandum of 04-29-83 mentioned above.

(c) favorable results of the inservice inspection of 1986.

7. Cooper Station

NPPD reported 05-31-80 that no indications were observed using Special Procedure (SP) 80-11 during the 1980 refueling outage and during previous inspections in 1978 and 1979. The same camera with fine resolution was used for all of these inspections.

The NRC/IE inspector indicated in IR 82-16 of 08-09-82 that the "A" and "B" core spray systems inside the primary containment were operable and that Maintenance Work Request SP 81-7 for core spray sparger inspection was satisfactory.

The letter of 1-17-86 to the attention of D. R. Muller (NRR) from J. M. Pilant (Cooper) commits to perform visual examination each refueling outage according to the requirements of IE Bulletin 80-13.

8. Dresden 2

CECO reported 03-25-83 that no abnormalities were noted during the inspection of both upper and lower core spray spargers on 01-19-83. Because of two favorable inspections at Unit 2 and one at Unit 3, the utility requested permission to perform future inspections at reduced frequency in accordance with ASME Section XI.

Denial of the utility's request of 03-25-83 for reduced frequency of inspection was recommended by D. G. Eisenhut (NRR) in his memorandum of 08-30-83 for C. E. Norelius (RIII). NRR based its recommendation on metallurgical similarities of the CECO spargers and those which cracked at Oyster Creek 1. CECO was informed of this denial by the letter of 09-16-83 from C. E. Norelius (RIII).

According to the licensee report issued 06-08-83 of the inservice inspection of 1983, no reportable indications were found during general inspection of accessible reactor vessel internals.

The NRC/IE inspector reported in IR 84-03 of 04-10-84 that IEB 80-13 was considered closed. No details were provided. Based on the inspector's evaluation and on previous evaluation by NRR in 1983, it appears reasonable to conclude that CECO will continue to apply the requirements of IEB 80-13 and that the bulletin should be closed out for Unit 2.

9. Dresden 3

On 03-25-83 CECO requested permission to perform future inspections at reduced frequency in accordance with ASME Section XI. The licensee based this request on two favorable inspections at Unit 2 and one at Unit 3.

Denial of the utility's request of 03-25-83 for reduced frequency of inspection was recommended by D. G. Eisenhut (NRR) in his memorandum of 08-30-83 for C. E. Norelius (RIII). NRR based its recommendation on metallurgical similarities of the CECO spargers and those which cracked at Oyster Creek 1. CECO was informed of this denial by the letter of 09-16-83 from C. E. Norelius (RIII).

The NRC/IE inspector reported in IR 84-03 of 04-10-84 that IEB 80-13 was considered closed. No details were provided. Based on the inspector's evaluation and on previous evaluation by NRR in 1983, it appears reasonable to conclude that CECO will continue to apply the requirements of IEB 80-13 and that the bulletin should be closed out for Unit 3.

10. Duane Arnold

The utility reported 08-02-85 that no reportable indications of cracking or structural failure were discovered visually during the 1985 refueling outage. The following statement was included: "Consistent with our prior commitment, we plan to repeat this inspection again during the next refueling outage (Cycle 9)".

The NRC/IE inspector indicated in IR 81-09 of 06-18-81 that his observation of portions of sparger examinations and his review of the entire video tapes of the inspection were favorable. He called IEB 80-13 closed.

Based on the utility's commitment and plans and on the inspector's evaluation, it appears reasonable to close out the bulletin for this facility.

11. FitzPatrick

The utility reported 08-27-80 that no cracks were found in the core spray system, and that the NRC/IE inspector concurred that the resolution achieved was acceptable.

The NRC/IE inspector reported in IR 80-11 of 07-30-80 that he was advised prior to leaving the site that no cracking had been detected, and that a local pitting condition on the lower sparger would be evaluated by GE personnel in San Jose.

The NRC/IE inspector reported in IR 81-07 of 07-28-81 that he considered IEB 80-13 closed. No details were provided.

The utility reported in the response of 10-15-82 that IGSCC was discovered in the "A" core spray piping during the Winter 1981 - 1982 outage. This piping was replaced with nonsusceptible, conforming material (316L stainless steel). Subsequent metallurgical analysis revealed that the cracking was caused by fabrication-induced flaws.

According to the licensee ISI report issued 02-07-84 of the July 1983 outage, the results of visual inspection of the spargers were acceptable.

According to the licensee ISI report issued 02-06-86 of the Spring 1985 outage, no reportable conditions were found during inspection of the upper and lower spargers and brackets.

In view of the continuing inspections at specified intervals and the lack of additional cracking, closeout of IEB 80-13 for this facility is reasonable.

12. Hatch 1

In the response of 11-21-84, GPC reported that a crack approximately .010" in width and at least 180 degrees in circumferential extent was found in the heat-affected zone of the lower sparger to T-box weld. In IR 84-44 of 11-29-84, an NRC/IE inspector reported that he had observed

the video tape of the crack indication and mentioned that GE would fabricate a clamping device to repair the cracked sparger. With the response of 12-06-84, GPC included GE Report NEDO-30825 to justify continued safe operation with the crack, and stated their decision to repair the crack by means of a clamping device for added safety margin.

A Safety Evaluation by NRR was enclosed with the letter of 02-14-85 to J. T. Beckham, Jr. (GPC) from J. F. Stolz (DL). The repaired sparger was approved for continued operation of one fuel cycle of 18 months. Operation beyond the next fuel cycle was to be contingent upon reevaluation.

In the letter of 08-22-85 to J. F. Stolz (DL) from L. T. Gucwa, GPC requested permission to continue operation of Hatch Unit 1 for an unlimited number of fuel cycles with one or more cracked core spray spargers. Per the letter of 01-09-86 to J. T. Beckham, Jr. (GPC) from D. R. Muller (DL), this request was denied and continued inspection in accordance with IEB 80-13 was required.

GPC reported 02-28-86 in reply to a request for additional information that (a) there was no evidence of crack growth at the repair clamp, (b) no degradation of the clamp had occurred, (c) an analysis showed that continued safe operation was ensured even with a 360 degree through wall crack and without the clamp and (d) the expense of performing an air bubble test was not justifiable.

In view of the continuing program of inspections and of extensive evaluations by NRR and GPC, closeout of the bulletin is reasonable for this facility.

13. Hatch 2

GPC reported 01-23-87 that no cracking was observed during recent visual examinations of the spargers.

The NRC/IE inspector indicated in IR 81-23 of 10-16-81 that no problems were noted during visual examination of the spargers, and that the bulletin was closed.

Because of evidence that examinations are continuing and that no cracking has been found, it is reasonable to close out the bulletin for Hatch 2.

14. Millstone 1

The utility reported 11-17-80 that no cracks or adverse indications were observed in either the upper or lower spargers during the visual examination which was completed 10-17-80.

The licensee's report issued 02-15-83 of the 1982 inservice inspection indicated that there were cracks in the heat affected zone adjacent to the sparger segment-to-junction box welds of the "D" core spray sparger. A clamp was installed to ensure structural integrity.

In the letter of 11-18-82 for NNECO from J. J. Shea (DL), installation of a clamp to repair a significant crack near the sparger-to-junction box weld was accepted for the next refueling cycle. Further evaluation of the clamp was provided in the memorandum of 11-17-82 for G. C. Lainas (DL) from W. V. Johnston (DE) and in the licensee report of the inservice inspection of 1982.

The NRC/IE inspector reported in IR 84-11 of 06-20-84 that he had observed inspection of the spargers and installation of a clamp over a previously identified crack in one sparger pipe. The junction box areas similar to the area which showed crack indications during a preceding outage were found to be free of new indications.

The licensee report issued 03-20-86 of the inservice inspection of 1985 indicated the core spray spargers were examined by remote visual inspection. No further indications of cracking were reported.

Based on continued inspections and no evidence of new cracks, it appears reasonable to close out the bulletin for Millstone 1.

15. Monticello

The utility reported 05-15-81 and 06-17-81 that the visual examination of spargers in April 1981 revealed no apparent discontinuities.

The NRC/IE inspector reported in IR 81-06 of 05-19-81 and in IR 81-23 of 11-23-81 that he had reviewed the response of 05-15-81 and related actions. By closing an unresolved item of the earlier IR, he indicated that Region III had reviewed the response of 05-15-81.

The licensee's reports of the 1984 ISI (dated 03-27-85) and the 1986 ISI (dated 09-02-86) indicated that no abnormal conditions were observed during visual examination of the spargers.

The evidence of continuing examinations indicates that it is reasonable to close out the bulletin for Monticello.

16. Nine Mile Point 1

The utility reported 05-13-81 that two minor cracks were found at one location on the spargers during the 1981 refueling outage. Evaluation by the licensee indicated that no correctiove action was required at that time. One crack was 0.500" x 0.020"; the other was 0.250" x .003"/.001".

The memorandum of 06-02-81 for T. V. Novak (DL) from G. C. Lainas (DL) included an SER in which the response of 05-13-81 was reviewed. The conclusion of the SER was that the cracks had no appreciable effects on structural integrity or hydraulic performance. The SER pointed out that (1) the cracks were caused initially by self-relieving residual stresses and (2) the only significant service stresses were caused by low injection loading. Approval of restart was given in the letter of 06-02-81 for D. P. Dise (NMP) from T. A. Ippolito (DL).

The response of 06-10-83 indicated that no additional indications and no crack growth were found during the recent outage.

The response of 05-31-84 indicated that no additional indications and no crack growth were found during the 1984 outage. However, the two small cracks previously reported appeared to be one unique crack about 3/4" long.

The response of 05-16-86 indicated that no additional indications were found during the 1986 outage and that cracks found previously had not enlarged.

Because of the continuation of examinations and the favorable SER, it seems reasonable to close out IEB 80-13 for Nine Mile Point 1.

17. Oyster Creek 1

Technical Specification Change Request No. 83 pertaining to the core spray spargers was submitted by JCP&L on 03-31-80. In Repair Proposal No. 475-01 included in this request, discovery in Fall 1978 of a crack extending approximately

180 degrees circumferentially and through-wall for about 135 degrees was mentioned. The crack was repaired by means of a clamp, even though the unrepaired sparger was considered to be adequate for continued operation.

Also included in Repair Proposal No. 475-01 were results of Winter 1980 inspections and tests. The repair clamp attached in Fall 1978 had remained in place without any cracks. There was no cracking in the sparger adjacent to the repair clamp. A number of cracks which apparently occurred since Fall 1978 were discovered in the upper sparger.

In the responses of 06-27-80, 07-02-80 and 07-21-80, JCP&L reported two additional possible cracks in the core spray piping in the reactor vessel between the inlet nozzle and the vessel shroud. Justification was provided to Region I for continuing operation for the next fuel cycle without further repairs.

The JCP&L request for deferment of replacement is the subject of the memorandum of 03-30-82 for T. M. Novak (DL) from W. V. Johnston (DL). Tentative approval was based on anticipated inspection results and the use of computer enhancement techniques. Mr. Johnston noted that little, if any, further degradation had occurred since 1978.

Per the response of 05-13-83, an augmented inspection of the core spray system was performed in accordance with IEB 80-13 and the Technical Specifications. Visual, ultrasonic and air testing techniques were used. No recordable indications were found. The "number of" and "possible" cracks reported in 1980 were found to be false indications.

The foregoing examinations were reviewed and approved in IR 85-19 of 07-24-85, and the bulletin was called closed by the inspector.

Because of the following considerations, closeout of IEB 80-13 appears to be reasonable for Oyster Creek 1:

(a) the "possible" cracks reported in 1980 were found to be false indications when a more sensitive method of examination was used in 1983,

(b) the cracks repaired by clamping in 1980 did not grow, and the clamps showed no evidence of degradation, and

(c) examinations are continuing according to bulletin requirements.

18. Peach Bottom 2

Per the prompt notification of 03-30-82 and the response of 04-29-82, a 160 degree indication was found in the "B" core spray-to-header box weld. On 05-11-82, PECO reported that a clamp would be installed at the crack location, even though the pipe was considered to be satisfactory without repairing. The letter of 06-10-82 to E. G. Bauer, Jr. (PECO) from J. F. Stolz (DL) approved PECO's plan to clamp the cracked area.

Per the PECO response of 06-04-82, GE's Report NEDO-22139 was submitted in support of continued operation. GE reviewed the condition of the cracked sparger and provided conservative justification for operation without clamping. According to IR 83-37 of 01-19-84, PECO's repair by clamping and safety analysis were accepted by NRC/NRR prior to restart after the 1982 outage.

The NRC/IE inspector reported in IR 85-25 of 08-26-85 that the licensee was conducting the inspections required by IEB 80-13 in accordance with ST/ISI 10.156 dated 06-27-84. He called the bulletin closed on the basis of his review of the licensee's records and program.

There is sufficient evidence available to justify closing out IEB 80-13 for Peach Bottom 2.

19. Peach Bottom 3

According to LER 278/85-14 of 09-25-85 and the response of 11-08-85, two cracks were found in the piping-to-junction box weld heat-affected zone of the "A" core spray piping just inside the reactor vessel. Although the evaluation concluded that modifications are not required for safety, PECO installed two brackets at the crack location and similar brackets on the uncracked "B" core spray header. As indicated by IR 85-37 of 11-19-85, documentation of the modifications was satisfactory.

There is sufficient evidence available to justify closing out IEB 80-13 for Peach Bottom 3.

20. Pilgrim 1

The NRC/IE inspector stated in IR 82-25 of 10-05-82 that "the report issued by SWRI indicates that improved inspection techniques show that the majority of the indications found in 1980 and reported to the NRC are

non-relevant [and that] two indications of cracking were verified as exhibiting no change since the 1980 inspection". Further, he mentioned issuance of Amendment No. 54 to the Pilgrim operating license and a supporting safety evaluation by NRR. He called the bulletin closed.

According to the response of 06-18-84, the insignificant indications found in the 1981 examinations apparently had stabilized.

The memorandum of 10-24-84 for D. B. Vassallo (DL) from B. D. Liaw (DE), stated that "MTEB has reviewed this information and concludes that Pilgrim's 1984 core spray sparger visual examination was in compliance with IE Bulletin 80-13".

As indicated in the licensee's summary report issued 03-28-85 of the 1983/1984 ISI, the augmented remote visual examinations performed in accordance with IEB 80-13 revealed no flaw propagation since 1981.

Because of the following considerations, closeout of IEB 80-13 appears to be reasonable for Pilgrim 1:

(a) the insignificant indications found in 1981 apparently have stabilized,

(b) that examinations are being continued in compliance with the bulletin is indicated by an NRC/NRR memorandum, and

(c) the NRC/IE inspector called the bulletin closed.

21. Quad Cities 1

CECO reported 10-28-82 that no evidence of cracking was found during the visual inspection of 09-17-82. Because of three favorable inspections at the Quad Cities Station, the licensee requested reduction of the frequency of inspection and the requirement for visual resolution.

Denial of the utility's request of 03-25-83 for reduced frequency of inspection was recommended by D. G. Eisenhut (NRR) in his memorandum of 08-30-83 for C. E. Norelius (RIII). NRR based its recommendation on metallurgical similarities of the CECO spargers and those which cracked at Oyster Creek 1. CECO was informed of this denial by the letter of 09-16-83 from C. E. Norelius (RIII).

Because no cracks have been found and inspections every refueling outage are continuing, it appears reasonable to close out the bulletin for Quad Cities 1.

22. Quad Cities 2

On 10-28-82, CECO requested reduction of the frequency of inspection and the requirement for visual resolution. The licensee based this request on three favorable inspections at the Quad Cities Station.

Denial of the utility's request of 03-25-83 for reduced frequency of inspection was recommended by D. G. Eisenhut (NRR) in his memorandum of 08-30-83 for C. E. Norelius (RIII). NRR based its recommendation on metallurgical similarities of the CECO spargers and those which cracked at Oyster Creek 1. CECO was informed of this denial by the letter of 09-16-83 from C. E. Norelius (RIII).

The response of 09-22-83 indicated that no evidence of cracks was identified during the inspection of 09-10-83.

The NRC/IE inspector indicated in IR 83-23 of 03-01-84 that his review of the response of 09-22-83 was favorable. He called the bulletin open, presumably because he noted that bulletin requirements would apply to future inspections at each refueling outage.

Because no cracks have been found and a continuous program of inspections in accordance with bulletin requirements is assured, it appears reasonable to call IEB 80-13 closed for Quad Cities 2.

23. Vermont Yankee 1

According to the reportable occurrence report of 10-28-80 and the response of 12-01-80, a semi-circular crack was observed in the end cap of the junction box on the "C" Core Spray Sparger. The air test indicated that the crack was not through-wall. The crack was repaired by means of a clamp. IRs 80-15 (12-04-80) and 81-13 (08-13-81) substantiated the response of 12-01-80. The response of 01-06-82 indicated that the clamp remained intact and in position, and that no additional cracking occurred.

The licensee report issued 09-14-83 of the inservice inspection for 1983 indicated that reactor internals were examined by remote visual inspection. No further indications of cracking of the core spray spargers were reported.

The NRC/IE inspector reported in IR 85-40 of 02-20-86 that no degradation of the repair clamp had been observed during the refueling outages from 1980 to 1985.

In view of the following considerations, it appears reasonable to close out IEB 80-13 for Vermont Yankee 1:

(a) the licensee is continuing the program of inspections in accordance with bulletin requirements, and

(b) no additional cracking has occurred since 1980, and the repair clamp is intact and in position.

REFERENCES

1. United States Nuclear Regulatory Commission, Licensed Operating Reactors, Status Summary Report, Data as of 09-30-86, NUREG-0020, Volume 10, Number 10, October 1986.

2. United States Nuclear Regulatory Commission, Nuclear Power Plants, Construction Status Report, Data as of 06-30-82, NUREG-0030, Volume 6, Number 2, October 1982.

3. United States Nuclear Regulatory Commission, Listing of Inactive Current Holders of Construction Permits, Letter dated May 29, 1985, to Richard A. Lofy (Parameter, Inc.) from Robert L. Baer (NRC/IE HQ).

APPENDIX C

Abbreviations

ADS	Automatic Depressurization System
ALARA	As Low as Reasonably Attainable
ASME	American Society of Mechanical Engineers
BECO	Boston Edison Company
B&PV	Boiler and Pressure Vessel Code (ASME)
BWR	Boiling Water Reactor
CD	Cancelled
CECO	Commonwealth Edison Company
CG&E	Cincinnati Gas and Electric Company
CP	Construction Permit
CPC	Consumers Power Company
CP&L	Carolina Power and Light Company
CR	Contractor Report
DE	Division of Engineering (NRC)
DECO	Detroit Edison Company
DL	Division of Licensing (NRC)
DPC	Dairyland Power Cooperative
DSI	Division of Systems Integration (NRC)
ECCS	Emergency Core Cooling System
EPRI	Electric Power Research Institute
GAO	Government Accounting Office
GE	General Electric Company
GL	Generic Letter
GPC	Georgia Power Company
GPUN	GPU Nuclear Corporation
HAZ	Heat-Affected Zone
HQ	Headquarters
IE	(See NRC/IE)
IEB	Inspection and Enforcement Bulletin (NRC)
IELPCO	Iowa Electric Light and Power Company
IGSCC	Intergranular Stress Corrosion Cracking
IHSI	Induction Heating Stress Improvement
IP	Illinois Power Company
IR	Inspection Report (NRC/IE)
ISI	Inservice Inspection

JCP&L	Jersey Central Power and Light Company
LER	Licensee Event Report
LILCO	Long Island Lighting Company
LOCA	Loss of Cooling Accident
LPTL	Low Power Testing License
MAPLHGR	Maximum Planar Linear Heat Generation Rate
MTEB	Materials Engineering Branch (NRC)
NDE	Nondestructive Examination
NMP	Niagara Mohawk Power Company
NNECO	Northeast Nuclear Energy Company
NPPD	Nebraska Public Power District
NRC/IE	Nuclear Regulatory Commission/ Office of Inspection & Enforcement
NRR	Office of Nuclear Reactor Regulation (NRC)
NSP	Northern States Power Company
NYPA(PASNY)	New York Power Authority
NU	Northeast Utilities
OL	Operating License
PASNY (NYPA)	Power Authority of the State of New York
PECO	Philadelphia Electric Company
PG&E	Pacific Gas and Electric Company
PP&L	Pennsylvania Power and Light Company
PT	Dye Penetrant Examination
R	Region (NRC)
RPV	Reactor Pressure Vessel
SDI	Shut Down Indefinitely
SER	Safety Evaluation Report
SIL	Service Information Letter (GE)
SWRI	Southwest Research Institute
TV	Television
TVA	Tennessee Valley Authority
UT	Ultrasonic Examination
VYNP	Vermont Yankee Nuclear Power Corporation
VT	Visual Examination

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12. SUPPLEMENTARY NOTES

13. ABSTRACT (200 words or less)

Between late 1978 and early 1980, the licensees of Oyster Creek and Pilgrim nuclear power stations notified the NRC that cracks had been found in core spray spargers. In early 1979, General Electric (GE) requested licensees of boiling water reactors (BWRs) to inspect spargers for visual indications of cracking. In March 1980, representatives of GE and the NRC met to discuss sparger cracking. IE Bulletin 80-13 was issued May 12, 1980, to require more intensive inspection of these safety-related systems. Core spray spargers are provided as engineered safety features, for emergency core cooling. Licensees of operating BWRs were required to take four specific actions. Evaluation of licensees' responses and inservice inspection reports, NRC/IE inspection reports and NRC correspondence shows that the bulletin can be closed out for all of the 23 BWR operating facilities which were issued the bulletin for action. Examination of spargers at 22 operating BWRs is required every refueling outage. The licensees have incorporated this examination into their inservice inspection programs. Techniques for inspection of spargers have been improved during the period of bulletin activity. Generic Letter 84-11 establishes the requirement for an ongoing program for inspection of BWR stainless steel piping.

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