

# BWR Vessel and Internals Project

## Internal Core Spray Piping and Sparger Repair Design Criteria (BWRVIP-19)

Prepared by  
BWRVIP Repair Committee  
and  
GE Nuclear Energy

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# REPORT SUMMARY

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## **BWRVIP Vessel and Internals Project**

Internal Core Spray Piping and Sparger Repair Design Criteria (BWRVIP-19)

The Boiling Water Reactor Vessel and Internals Project (BWRVIP), formed in June, 1994, is an association of utilities focused exclusively on BWR vessel and internals issues. This BWRVIP report documents criteria which can be used to design a repair for cracks which have been known to occur in BWR core spray piping.

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### **INTEREST CATEGORIES**

Piping, reactor, vessel &  
internals  
Licensing and safety  
assessment

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### **KEYWORDS**

Boiling water reactor  
Core spray  
Repair  
Stress corrosion cracking  
Vessel and internals

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**BACKGROUND** A number of BWR plants have experienced stress corrosion cracking in the core spray piping which is located internal to the reactor pressure vessel. A variety of mechanical and welded techniques have been proposed to repair the cracks. Since a large number of concerns need to be addressed in designing such a repair, it is useful to have these criteria set down in a comprehensive document.

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**OBJECTIVE** To compile a core spray piping and sparger repair design criteria that can be used to perform repair design and that can be submitted to the appropriate regulatory agencies for approval of a generic design process.

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**APPROACH** The project team assembled a draft document that discussed all elements which need to be considered in designing a repair to the core spray piping or spargers. These items include: design objectives; structural evaluation; system evaluation; materials, fabrication and installation considerations; and, required inspection and testing. The draft was then reviewed in depth by BWRVIP utility representatives as well as third party contractors. The final report incorporates comments received during that review.

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**RESULTS** The document provides general design acceptance criteria for the temporary or permanent repair of core spray piping and spargers. Repairs designed to meet these criteria will maintain the structural integrity of the core spray system under normal operation as well as under postulated transient and design basis accident conditions.

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**EPRI PERSPECTIVE** The criteria listed in the report define a standard set of considerations which are important in designing a core spray piping repair. It is intended that these criteria will be submitted to the USNRC and, possibly, non-US regulators, for their approval. Regulatory acceptance of these generic criteria will significantly reduce the utility effort required to obtain approval for plant-specific repairs.

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**PROJECT**

WOB501

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Nuclear Power Group

Contractor: General Electric

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Research Project B501

Final Report, September, 1996

Prepared by:

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## **EPRI PROPRIETARY**

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## ABSTRACT

The Boiling Water Reactor Vessel and Internals Project (BWRVIP) was formed in June 1994 as a utility-directed initiative to address BWR vessel and internals issues. This criteria document was developed by the Repair Technical Subcommittee of the BWRVIP.

This document provides the general design acceptance criteria for temporary and permanent repair of internal core spray piping and spargers. It is provided to assist BWR owners in designing repairs which maintain the structural integrity of the internal core spray piping and spargers during normal operation and under postulated transient and design basis accident conditions for the remaining plant life or other service life as specified by the plant owner.

Issuance of this document is not intended to imply that repair of internal core spray piping and spargers is the only viable method for resolving cracking in internal core spray piping and spargers. Due to variation in the material, fabrication, environment and as-found condition of individual internal core spray piping and spargers, repair is only one of several options that are available. The action to be taken for individual plants will be determined by the plant licensee.

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## ABOUT BWRVIP

The BWR Vessel and Internals Project (BWRVIP) is an association of utilities owning and operating boiling water reactors. The project is focused exclusively on reactor vessel and vessel internals issues in operating plants. Objectives of the BWRVIP are to lead the BWR industry toward generic resolution of vessel and internals integrity and operability issues; to identify or develop generic, cost-effective strategies from which each operating plant will select the most appropriate alternative; to serve as the focal point for the regulatory interface with the industry on BWR vessel and internals integrity and operability issues; and to share information among members. EPRI manages the technical program on behalf of the utility members of the BWRVIP.

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