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U. S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Attention: Mr. W. H. Swenson, Project Manager
Project Directorate III - 3

Gentlemen:

DOCKET 50-266
REACTOR PRESSURE VESSEL FLAW
POINT BEACH NUCLEAR PLANT, UNIT 1

During the 1987 inservice inspection of the Point Beach Nuclear Plant Unit 1 reactor pressure vessel, Wisconsin Electric Power Company detected a flaw during ultrasonic inspection techniques. This flaw was sized in accordance with ASME Code Section XI methods and analyzed by the procedure provided in IWB-3600. These analyses were reviewed by your office, as stated in Mr. D. H. Wagner's letter to Mr. C. W. Fay dated July 9, 1987. That letter further requires Wisconsin Electric to provide a detailed plan of the next inspection for review six months prior to the scheduled outage.

The next inspection is scheduled for the spring 1990 refueling outage. The date for the examination of the flaw is anticipated to be between April 14 and April 20, 1990.

Attached is a description of our planned examination. If more details are required, please contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Attachment

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

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PLAN FOR THE EXAMINATION OF POINT BEACH NUCLEAR PLANT UNIT 1 SAFETY INJECTION NOZZLE TO SHELL WELD 687-01-A at 288.5°

INTRODUCTION

On June 2, 1987, Wisconsin Electric Power Company submitted to the U. S. Nuclear Regulatory Commission an evaluation of a flaw identified in the safety injection nozzle-to-shell weld at 288.5° in the Point Beach Nuclear Plant Unit 1 reactor pressure vessel. This evaluation was performed according to the guidelines of ASME Code Section XI article IWB-3600.

The flaw which required evaluation was identified during the reactor pressure vessel examination required by the ASME Code Section XI. The examination was performed in accordance with ASME Code Section XI, 1977 edition with addenda through Summer 1979 and the additional guidance of Regulatory Guide 1.150, Revision 1.

In 1987, the method used to determine the flaw size was to measure the ultrasonic transducer positional displacement that produced a response equal to 50% of the calibration amplitude. The transducers produced 0° and 10° refracted longitudinal waves to examine the nozzle-to-shell weld from the nozzle bore. The transducers were 1/2" diameter with a nominal frequency of 2.25 MHz. The ultrasonic beam size at the flaw depth was subtracted as a size correction during the evaluation of the flaw.

The evaluation concluded that the flaw would not propagate during the 40-year service life of the reactor.

DESCRIPTION OF SYSTEM

Southwest Research Institute (SWRI) will be the organization that performs the examination and sizes the safety injection nozzle-to-shell weld flaw. SWRI utilizes a system comprised of three parts: (1) a remote transducer positioner and manipulator called the Fast PaR device, (2) an ultrasonic instrument with remote pulsers, and (3) an electronic data acquisition and analysis system called EDAS. This system is the same as SWRI used at Rochester Gas and Electric's Ginna Plant during their spring 1989 inspection and will be used during our Unit 2 reactor vessel examination in the fall of 1989.

The Fast PaR device is computer controlled to position and manipulate the ultrasonic transducer module required to scan the vessel weld volumes. A digital output signal is provided which accurately identifies the transducer location at all times. These signals are displayed on monitors and utilized by EDAS. The Fast PaR is also designed to permit calibration of an ultrasonic transducer module while scanning with a second transducer module.

The ultrasonic instruments are Sonic FTS Mark II or Sonic UWA Mark III. These instruments perform the functions of displaying transducer wave forms, triggering the pulsers, adjusting gain to calibrated settings, and supplying signals to EDAS. These instruments are similar to ultrasonic instruments commonly used in the industry.

EDAS is the SWRI data acquisition system. This system receives the signal from the Fast PaR and ultrasonic instruments and converts them to a digital format. These signals are then stored on optical disc to preserve the raw data for further evaluation. Other features of the EDAS are the color displays, ability to compile multiple scan lines data on a single display, ability to construct cross-sectional displays, and artificially gate the signals at various amplitudes. This data manipulation is accomplished by the EDAS without changing any information stored on the optical disc (i.e., raw data remains untouched).

DESCRIPTION OF THE EXAMINATIONS

The examination of the safety injection nozzle-to-shell weld will be conducted in two parts. The first portion will be performed utilizing procedures and techniques consistent with ASME Code Section XI, 1977 Edition with addenda through Summer 1979 and Regulatory Guide 1.150, Revision 1. The second portion will utilize procedures and techniques to accurately size the flaw. The sizing portion is based on the results of the 1988 joint flaw sizing efforts of Southwest Research Institute, EPRI, Rochester Gas & Electric, and WE. These are the same techniques demonstrated to NRC representatives at SWRI on January 10, 1989.

The initial scans of the safety injection nozzle-to-shell weld will confirm the presence of the previously identified (i.e., 1987) flaws and will yield size data for comparison to the 1987 data. The scan will be conducted from the nozzle bore. The transducers will produce longitudinal waves at 0° and a 10° refracted angle. Size limits will be established at a signal response of 50% of calibration amplitude.

The sizing portion will be performed as a separate, series of scans using ultrasonic transducers optimized for the purpose of defining flaw edges. The techniques that are planned for sizing the safety injection nozzle-to-shell weld flaw include focus transducers and tip diffraction signal analysis. Both methods have been demonstrated to produce flaw dimensions which closely reflect actual flaw dimensions.

Focused transducers are designed with a curved face which acts as a lense. The ultrasonic energy is concentrated into a small region of the material which contains the flaw. Flaw limits are established by the transducer positions that produce a signal amplitude of 25% of the maximum flaw amplitude. No corrections are used or required to account for the transducer size or the beam profile. The 25% of maximum flaw amplitude has consistently produced conservative (slight over-sizing) size measurements of flaws in the EPRI safety injection nozzle blocks and the full scale nozzle configuration block fabricated for the 1988 joint flaw sizing effort.

Tip diffraction technique have proven to be the most accurate sizing techniques. The technique is dependent on the flaw producing diffracted signals and the ability of the transducers to detect these signals. The 1988 joint flaw sizing effort showed that planer flaws with sharp edges could be sized in a configuration similar to the safety injection nozzle.

Focused transducer and tip diffraction techniques used in conjunction with the EDAS display capability provide reliable flaw sizing. These will be used to size the safety injection nozzle-to-shell weld flaw in 1990.