



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF FROM SECTION XI OF THE ASME CODE

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

INTRODUCTION

By letter dated March 22, 1988, the Wolf Creek Nuclear Operating Corporation (WCNOC) submitted two requests for relief from requirements of Section XI of the ASME Boiler & Pressure Vessel Code (Code) for its Wolf Creek Generating Station (Wolf Creek). The requests concern replacement parts on two Code classed components. Should reliefs be granted, Wolf Creek intends to operate until next refueling outage to correct the situation.

DESCRIPTION AND DISCUSSION

The relief requests delineated in the March 22, 1988 letter asked permission to use non-Code construction parts to replace Code construction parts in two Code classed components on an interim basis. A detailed description follows:

Relief Request

1. The licensee has requested that a non-Code construction stem/disc assembly be used as an interim replacement for the required Code construction stem/disc assembly in the Code Class 2 reactor coolant pump seal water injection throttling valve BG-V200.
2. The licensee has requested that a non-Code construction packing box assembly be used as an interim replacement for the required Code construction packing box assembly in the Code Class 1 pressurizer spray valve BB PCV 455B.

Code Requirements

Technical Specifications 4.0.5 of Facility Operating License No. NPF-29 for Wolf Creek requires the implementation of the surveillance requirements in Section XI of the Code during its operating life. Article IWA-7210 of Section XI states, in part: "Replacements shall meet the requirements of the edition of the construction Code to which the original component or part was constructed...". The components in question, seal water injection throttling valve BG-V200 and pressurizer spray valve BB PCV 455B were constructed according to Class 2 and 1 requirements of Section III of the Code, 1974 Edition and Addendum through Summer 1975, respectively. Replacements for the components or parts, therefore, should also be Code constructed.

## Licensee's Basis for Requesting Relief

### 1. Reactor Coolant Pump Seal Water Injection Throttling Valve

Upon discovery of the code noncompliance, a detailed review of the documentation provided with the stem/disc assembly was performed. This review revealed that the design requirements for the stem/disc assembly are correct and the material met the code requirements. In addition, the documentation showed that the welds were NDE examined and accepted.

This failure to meet the code requirements is considered to be a documentation problem and WCNOG does not have any technical concerns with this issue. As such, continued operation of the plant is considered acceptable with relief from this code requirement. However, to restore this component to compliance with the ASME code requirements, the stem/disc assembly shall be replaced at the next outage of sufficient duration at proper plant conditions. In any case, this assembly will be replaced no later than startup following the next refueling outage.

### 2. Pressurizer Spray Valve

Because packing box assemblies were intended to be ASME Code pressure boundary parts, they should have been classified and procured by Westinghouse as "QA Code A." Instead, Westinghouse incorrectly designated the procurement as "QA Code D." This ultimately resulted in the incorrect parts being provided to WCNOG.

WCNOG has dispatched two Supplier Quality Representatives to Westinghouse to investigate this programmatic issue and ensure that adequate corrective actions are taken. This will include determination of extent of the problem, root cause analysis and appropriate remedial and preventative actions.

On March 19, 1988, a WCNOG Supplier Quality Representative was dispatched to the Fisher Valve, Mansfield, Ohio facility. This is the non-nuclear facility that fabricated the replacement packing box assemblies. On-site investigation there has determined that both packing box assemblies received at Wolf Creek were fabricated from the same heat of Type 316 SS annealed material manufactured by Carpenter Technology Corporation. Discussions with Carpenter Technology on March 21, 1988, provided three additional pieces of information: 1) although not stated on the Carpenter CMTR, the material meets ASTM A-276, 2) the 8½" diameter round bar was made from a billet which was rotary forged and then rough turned and, 3) non-nuclear work is processed through the Carpenter facility in the same way as nuclear work, except for the retention of documentation. Further investigation at Fisher's Mansfield facility revealed the following:

- a. The replacement packing box assemblies were machined using the same drawing used by Fisher's Marshalltown, Iowa, nuclear facility (original manufacturer of the nuclear valve), thereby providing interchangeability of the parts.
- b. Welding of the pipe nipple to the packing box was performed using welding procedures qualified by Fisher Marshalltown in accordance with ASME Section IX.
- c. Welding was performed by a welder who was originally qualified to ASME Section IX, but for whom required documentation has not been kept to show current compliance with Section IX. Subsequent review of the welder's qualification test report also shows he was not specifically qualified for the diameter of pipe weld required for this work since he qualified on a larger diameter pipe.

On March 18, 1988, the second packing box assembly, which was in the WCNOG warehouse, was sent to METLAB Testing Laboratories in Tulsa, Oklahoma. METLAB is qualified by WCNOG to perform testing and analysis services. This packing box assembly was destructively tested by METLAB to determine conformance with ASME SA-182-F316. Chemical analysis, mechanical testing, and metalurgical analysis were performed on a section removed from the packing box assembly. Since the material was thought to be bar stock instead of forging, mechanical tests were performed parallel and transverse to the longitudinal axis of the original bar stock. Results of this testing and analysis are presented in the engineering evaluation section.

METLAB also performed chemical analysis of the pipe nipple welded to the packing box. The chemical analysis was in conformance with the ASME SA-312-TP316 required by the valve design drawing. Mechanical tests could not be performed due to the small diameter and thickness of the pipe.

On March 21, 1988, the installed valve was closed and allowed to cool down. An ASME Section XI VT-1 visual examination was completed on March 22, 1988, and found acceptable and is being submitted as an alternative to the Section III required surface examination of the packing box and pipe nipple to packing box weld. In addition, an ultrasonic examination of the flange connecting the packing box to the valve body will be performed and will provide an additional alternative to the required surface examination.

#### EVALUATION

1. Since the discovery of the missing Code required N-2 Manufacturer Partial Data Report for the stem/disc assembly which caused the inadvertent use of a non-Code replacement in the Code class 1 reactor

coolant pump seal water injection throttling valve BG-V200, the licensee has performed a detailed review on the material and fabrication record for the stem/disc assembly and found that the assembly in doubt was manufactured according to the Code requirements in every detail. The manufacturer failed to provide the N-2 Report. The documentation deficiency did exist. However, the quality of the stem/disc assembly meets the Code requirements.

2. A detailed investigation was performed on the material and fabrication records for the replacement packing box as soon as the replacement was found to be non-Code constructed. The error was caused by the valve vendor when they ordered the item from another vendor by an incorrect code number. It was also identified that the item was designed to meet the ANSI B16.34 pressure/temperature application requirements, which is the same as those required by NB-3513 of the Code. Differences of Code requirements versus the true construction of the item are as follows:

- The item was fabricated from ASTM A-276 type 316 SS bar instead of the required ASME SA-182-F316 forging for the box body and some unknown material which may not be in conformance with the required ASME SA 312 TP 316 for the leak off pipe nipple connection.
- The welder who performed the welding work on the item did not have the necessary ASME qualification since he was working in a non N-stamp facility.
- No non-destructive examinations, neither volumetric nor surface, were performed on the completed packing box assembly as required by the Code.

The licensee, however, performed the following to verify the adequacy of this item:

- Destructive testing of an identical packing box assembly made from materials of the same heats as the one installed proved that chemical composition, mechanical properties (packing box body only, pipe nipple size did not permit mechanical testings performed), and metallurgical structures (packing box body only) all meet the Code requirements.
- A stress analysis was performed using the thickwall cylinder analogy and taking into consideration the internal pressure, the seismic loading, the dead weight, and the thermal loadings. The resulting stress level met the limits imposed by Subsection NB of the Code.
- A fracture mechanics evaluation was performed assuming the existence of circumferential through-wall flaws. The results indicated that the loadings caused by normal operation would not be sufficiently large to cause a calculable leak rate.

- Results of an operational evaluation indicated that: (1) functional redundancy is provided by valve BB PCV 455C, and (2) if the valve fails open, or fails in a manner to induce a reactor coolant system (RCS) leak, it will cause lower RCS pressure and eventually will trip the reactor at 1835 psi, and (3) in the unlikely case of a catastrophic failure, the core is not expected to be uncovered.

### CONCLUSION

Based on the evaluation discussed above, the staff concludes that:

1. For the stem/disc assembly presently used as a replacement part in the Code Class 2 reactor coolant pump seal water injection throttling valve BG-V200, it has been established that the assembly is built with acceptable quality, and satisfactory service can be anticipated. Compliance with the documentation requirements of IWA-7210 would require a shutdown until a replacement could be effected and would result in hardship for the licensee without a compensating increase in the level of quality and safety. Therefore, the requested relief may be granted.
2. For the packing box assembly presently installed in the Code Class 1 pressurizer spray valve BB PCV 455B, the staff agrees that actions taken by the licensee adequately verified that the assembly will provide an acceptable level of safety for the plant operation. Compliance with the Code Class 1 requirements of IWA-7210 would require a shutdown until a replacement could be effected and would result in hardship for the licensee without a compensating increase in the level of quality and safety. Therefore, the requested relief may be granted.

Pursuant to 10 CFR 50.55a(a)(3)(ii), the staff finds the proposed alternative acceptable.

The licensee is permitted to operate the plant with presently installed parts in the above described Class 1 and 2 valves, with the understanding that they will be replaced in the next refueling outage by Code construction parts.

Principal Contributor: H. K. Shaw

Dated: May 2, 1988