Poehler, Jeffrey

From: Griesbach, Timothy [Tgriesbach@Structint.com]
Sent: Sunday, January 13, 2013 10:43 AM
To: Dan Lamond; Bamford, Warren H.; Stevens, Gary
Subject: FW: URGENT - Need help this weekend!!!!! RE: P.004315-RPV Project for Tractebel-Doel 3 Review

Importance: High

Dan, Warren, Gary,

Do you recall if there was a technical basis document for Code Case N-498? If so, how can we retrieve it?

Thanks,

Tim

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To: valery.lacroix@gdfsuez.com; doug.scarth@kinectrics.com; Griesbach, Timothy; bamforwh@westinghouse.com; guy.deboo@exeloncorp.com; russell.cipolla@intertek.com; KeithWich
Cc: michele.auglaire@gdfsuez.com; Bud Brust; Gary Hattery
Subject: URGENT - Need help this weekend!!!!! RE: P.004315-RPV Project for Tractebel-Doel 3 Review
Importance: High

Doug, Tim, Warren, Guy, Russ, Keith;

Can any of you help with the below emergency request about info on arguments why hydrotesting can be avoided as per in N498 for RPVs? See below e-mail.

Please reply to Valery immediately.

Thanks

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Outside of Scope

Information Only ISI 93-15

INFO

ALTERNATIVE RULES FOR ASME SECTION XI INTERVAL PRESSURE TESTING FOR CLASS 3 COMPONENTS (REVISION TO CODE CASE N-498)

ABSTRACT

This document presents the argument for the deletion of the Class 3 Interval Hydrostatic Test, required by ASME, Boiler & Pressure Vessel Code, Section XI. This test is required to be performed at the end of each ten year interval. This is a stand alone document but the information presented is written to supplement the information provided in "Inservice Inspection Pressure Testing in Class 1, 2, and 3 Systems", December 10, 1990.

INTRODUCTION

In 1989 a Special Working Group was formed to evaluate the pressure testing requirements of Section XI. A Task Group (TG) was formed to review the Interval Hydrostatic Pressure Test (elevated pressure) of systems every ten years. The results of this group's effort is documented to "Inservice Inspection Pressure Testing in Class 1, 2, and 3 Systems", December 10, 1990, and Code Case N-498 was a product of the group's efforts. When N-498 was written only Class 1 and Class 2 systems were included. The TG had reservations about the inclusion of Class 3 systems into the case until certain issues could be resolved. A new TG was formed to work on those issues.

The new TG focused on four issues. The first two were added to provide background and continuity for this document. The last two, were the issues carried over from the first TG.

- Purpose of Interval Pressure Testing
- Class 3 System Classification (NRC Regulatory Guide 1.26)
- NDE and Impact Testing in Class 3 systems per Section III
- History of failures found during hydrostatic testing

PURPOSE OF INTERVAL PRESSURE TESTING

A pressure test is required to be performed on a system once a Period (3 years) with three Periods per Interval (10 Years). System leakage tests are preformed for the first two Periods with the system hydrostatic (elevated pressure) test being performed in the last or third Period. These tests provide the plant owner a systematic approach to locate leaks in system pressure boundaries.

INFO

The original philosophy and reasoning for the ASME, Section XI system hydrostatic pressure test was extracted from the paper titled "DEVELOPMENT OF INSERVICE INSPECTION SAFETY PHILOSOPHY FOR U.S. NUCLEAR PLANTS" written by S.H. Bush and R.R Maccary.

> *"The system hydrostatic test was originally designed to allow inspection for evidence of any leakage that might originate from through-wall cracks of the pressure boundary and to enhance the possibility of timely discovery of small through-wall flaws which, because of leak size, might not be readily detected by the installed leak detection systems. As stated in the referenced document the inservice system hydrostatic pressure test required by ASME Section XI Code reflects the acceptance of the pressure test as, primarily, a means to enhance leakage detection during the examination of components under pressure rather than solely as a measure to determine the structural integrity of the components".*

The focus of the Bush and Maccary paper is on the Class 1 System located in the Reactor Containment where leakage detection systems are used. The idea of performing hydrostatic tests to look for leaks was carried over to the Class 2 and 3 systems. Although the tests are called hydrostatic, the test conditions for Class 1 is different from those of Class 2 and 3.

The Class 1 test is temperature dependent on the nominal operating pressure (Reactor Power of 100%) vice the system design pressure for Class 2 and 3. This difference for Class 1 is due to the Reactor Vessel. Using nominal operating pressure, the vessel is maintained within it's brittle fracture prevention criteria. This difference in test pressure between design pressure and nominal operating pressure could set a precedent for performing the Class 2 and 3 tests at a lower pressure. But the standard argument against this, has been that the lower pressure is off set due to the scope of nondestructive examinations (NDE) required by both Section III and XI on Reactor Vessel and Class 1 systems. An NDE option will be discussed later.

The main point that the reader should get from this section is the pressure test is performed to find through-wall leaks.

CLASS 3 SYSTEM SAFETY CLASSIFICATION

Review of the Nuclear Regulatory Commission's (NRC), Regulatory Guide 1.26, "QUALITY GROUP CLASSIFICATIONS AND STANDARDS OF WATER, STEAM, AND RADIOACTIVE WASTE CONTAINING COMPONENTS OF NUCLEAR POWER PLANTS", Revision 3, 1976, and found plant systems are classified into four safety categories. This review was performed to get an idea of the types of systems that classified as Class 3. Most Class 3 (Category C) systems were found to be low temperature (<200^{0}F) and low pressure (<200 psi). The only exception would be auxiliary feedwater or injection type systems.

The Class 3 systems that have design temperatures under 200^0 F would require the hydrostatic test pressure to be only 10% over the Design Pressure. This category system

INFO

was the main concern of the first Task Group because there was such a difference between the design versa the operating pressure.

For example a Service Water System with a design pressure of 150 psi would require a hydrostatic test pressure of 165 psi, but operates a pressure of 80 psi (would be the inservice test pressure). This would be in contrast to a Class 2 system with a design pressure of 1500 psi and operates at 1300 psi.

Because of this difference in test pressure concern was expressed that the leakage would be hard to see. Attachment 1 provides the reader a comparison of the leakage flow rates at different test conditions, system pressure only increases the leakage flow rate.

The main point the reader should get out of this section is that the any thing the elevated test pressure provides is a greater leak rate if there is a through-wall flaw.

IMPACT TESTING AND ADDITIONAL NDE TESTING

One of the issues left from the first TG was how is the Class 3 system constructed, including materials and fabrication methods used. Particular concern was express about impact testing of materials. This concern was due to the very low temperatures encountered by some Class 3 system. In order to address this concern the TG reviewed past changes and current requirements of ND-2000 to access the current impact testing requirements and construction rules.

Attachment 2 presents the changes to Section III, ND-2300 and ND-2500 and ND-6000, from the 1972 Winter Addenda to the 1989 Edition of the Boiler and Pressure Vessel Code. From this review the Task Group concluded that no additional testing requirements were needed.

Next the construction codes were reviewed and found that the allowable stress used is temperature dependent for Section III this temperature collation goes down to "-20 - 100^{0}F which should be adequate for a Class 3 Service Water System. B 31.1 also had a methods which factored in a stress for a piping system that would see service at a low temperature.

The TG then reviewed Section XI requirements for Class 3 systems. This review focused on the possible additional of NDE for Class 3 systems as an alternative to performing the hydrostatic pressure test. The TG found that placing a NDE exam requirement on a Class 3 system as an option to the hydrostatic test would not be used by the Owner due to cost. While cost can not or should not be equated to safety. The cost involved with preparing welds and components for NDE examinations would be more than the hydrostatic pressure test. Because of this the addition of NDE was not pursued by the TG.

INFO

HISTORY OF FAILURES FOUND DURING HYDROSTATIC TESTING

The last issue to be reviewed was the review of failures (leaks) detected as a result of implementing current Code requirements. Searches were conducted to determine what information was available to build a database. After review of data from the NRC, INPO, and industry surveys the Task Group that there was no enough data to build this base.

Two of the searches produced some interesting results and are noted here. The first is a survey conducted by Mr. J. Leason (Northeast Utilities) and the second is from the INPO NPRDS data base.

In 1990, J. Leason (Northeast Utilities) conducted a Utility survey on various topics which involve hydrostatic pressure tests. The results of the 41 Utilities who responded found that only a very small percentage of these tests found leakage that would not have been found using the system leakage test. Presented as Attachment 3 the survey also addressed questions involving Repairs and Replacements.

There were several other surveys from utilities but trying to determine the type of pressure test used proved to be impossible. This was due to in most cases the pressure test being called a "hydrostatic test" when from the data an inservice test was run. This is especially true of the INPO data base.

The INPO data base identified 25 failures, not a great deal information, but in most cases identified all pressure tests as hydrostatic pressure tests. There was no way to determine if a leakage or hydrostatic test had been performed to find the leak. In some cases a pressure test was not used, the leaks were found by leak detection systems or radiation monitors. While the information selection and collection was not within scientific guidelines, it was interesting to note the components that were identified as having leaks.

CONCLUSION

The performance of the interval hydrostatic pressure test of Class 3 components places a requirement on the utilities with little benefit. It has been shown that a hydrostatic test only increases the leakage rate from that of a leakage test run nominal operating pressure. Review of industry data, material and construction requirements concerning Class 3 systems supports this position. Therefore, the alternative rules of Code Case N-498, revised to include Class 3, provide an option which provides a reasonable requirement that produces the desired results.