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Docket No. 50-423
B15462

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 3
Revised Repair Plan for Check Valve - 3RCS*V146

Introduction

The purpose of this submittal is to provide the NRC Staff with a revised repair plan regarding a check valve (3RCS*V146). Specifically, this submittal replaces the original repair plan proposed by Northeast Nuclear Energy Company (NNECO) on November 27, 1995.(1) This submittal also documents information relevant to the discussions that took place in conference calls between NNECO and the NRC Staff on November 21, 22, and 28, 1995. This plan provides for a reduction in reactor power to facilitate a containment entry and examination of the valve for the purpose of validating the source of leakage and NNECO's conclusions relative to the environment surrounding the body-to-bonnet studs. If upon examination, all information gathered supports continued plant operation without seal weld repairs, NNECO would then return the plant to full power. Otherwise, the plant will be brought to Mode 4 (or 5) to perform a repair.

Background

On August 21, 1995, the "D" reactor coolant pump (RCP) motor stator temperature started to increase approximately 10°F per month. On September 6, 1995, there was a slight increase in containment activity, indicating a very small leak in the reactor coolant system (RCS). Radionuclide sampling of the containment atmosphere characterized the leak as being very small. Subsequent monitoring of the leak showed a slight decrease in the leak rate. On or about September 12, 1995, the "C" RCP motor stator temperature started to increase approximately 4°F per month. It was postulated that the RCP stator temperature increases could be the result of boric acid deposition on the stator air cooling paths.

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(1) J. F. Opeka letter to the U.S. Nuclear Regulatory Commission, "Leak Repair Plan for Check Valve - 3RCS*V146," dated November 27, 1995.

On October 11, 1995, the "D" and "C" RCP loop areas were inspected from the operating floor (51'6" level) of the containment, using binoculars. The "D" RCP motor cubicle (24'6" level) was also entered to look through the view-port between the motor stator and the motor air discharge cooler. These inspections did not identify any apparent boron accumulation.

On November 7, 1995, a cross discipline group reviewed the data associated with the rising RCP stator temperature. Due to a lack of any other evidence or apparent cause to the contrary, the conclusion was that the most likely cause of the increases was boric acid deposition. Action items were assigned, including a closer inspection of the "D" loop area during the monthly containment entry, at that time, scheduled for November 28, 1995.

On November 9, 1995, a containment entry was made to determine the source of the suspected leakage observed earlier that day in the "D" RCS loop using a containment video camera. Dry boric acid was found on the insulation for a check valve 3RCS*V146. Pipes and components within six feet of the check valve were also partially coated (dusted) with boric acid.

The most likely source of the leakage and resultant boric acid deposition is a body-to-bonnet leak on 3RCS*V146. Less likely sources include cracks in the valve body or bonnet. These less likely sources were ruled out because the plant has not experienced significant thermal cycling, water hammer or any other significant upset condition during the current operating cycle which would typically cause this type of problem. Additionally, this 10" safety injection line was determined not to be susceptible to thermal stratification concerns outlined in NRC Bulletin 88-08. This valve experienced a body-to-bonnet leak in June 1995, during the startup from the last refueling outage. The leak was stopped by re-tightening the bonnet studs to the maximum torque allowed by the valve vendor.

Based on the November 9, 1995, observations, it appears that the leak has recurred. As stated above, the current leak was discovered by a visual inspection. Since the discovery of this condition, the leak rate has been well within our technical specification allowed unidentified leak rate limit of one gallon per minute (gpm) and has not changed appreciably. Both identified and unidentified leakage presently total approximately 0.2 gpm. Further, degradation of a leaking mechanical joint of this type would not result in a catastrophic failure. An operability determination was performed which concluded that there would be ample warning for the unit to take action to prevent exceeding the allowed leak rate. Additional actions were initiated to make preparations for a repair plan to stop the leak and to prepare a means of preventing the boric acid from reaching the RCP motors while the repair plan was under development. The NRC Staff has been kept informed of this situation on a frequent basis.

Discussion

As discussed with the NRC Staff on November 28, 1995, NNECO plans to bring the plant to Mode 3 conditions on November 30, 1995. This will facilitate a containment entry and examination of the check valve for purposes of validating the source of leakage and NNECO's conclusions relative to the environment surrounding the body-to-bonnet studs.

A summary of the examination plans and data collection activities is provided in Attachment 1 and described below. The activities that NNECO and its consultant will perform while the plant remains in Mode 3 include but are not limited to:

- Entering containment and removing the insulation on the check valve,
- Immediately recording valve body and body-to-bonnet stud temperatures,
- Identify the source of leakage and qualitatively quantifying the extent of the leakage,
- Characterizing the environment on, and immediately surrounding the body-to-bonnet studs,
- Inspecting and evaluating the material condition of other equipment potentially impacted by any leakage,
- Removing boron dust/accumulation in the vicinity of the studs and the joints to the extent necessary to facilitate the above step, if so required, but not before an assessment of the bolt environment is made,
- Exiting the containment,
- Analyzing the data and making a determination as to the appropriate course of action (i.e., return to power or proceed on to Mode 4 or 5 to perform repair). NNECO expects to make this decision by early Friday morning, plant conditions permitting, and
- If it is acceptable to return to power, then the basis for that determination and justification for continued operation will be discussed with the NRC prior to resumption of power

operation. Specifically, NNECO will include a discussion on the basis for ascertaining the "dryness" of the studs (dryness in the past and the dryness observed during the inspection). NNECO will also discuss the method to be used to verify the dryness of the studs in the future or the basis for not verifying the dryness of the studs.

Option 1 - Return to Power

If it has been shown that it is safe to return the plant to power operation, the following measures (some of which are already in place at this time) will be in place to monitor any change in the check valve leakage.

- The operating crews in the control room have been and will continue to be sensitized to this situation and the leak will continue to be closely monitored,
- A containment video camera will be used to periodically check for any visible signs of leakage,
- Visual inspection of the check valve will be conducted to assess the condition of the valve during a monthly containment entry,
- The containment airborne particulate and gaseous radioactivity monitors will continue to monitor the atmosphere and will immediately respond to any significant increase in airborne radioactivity resulting from the reactor coolant pressure boundary leakage, and
- Containment drain sump pumps run times will provide an indication of an increase in the RCS leakage.

The above measures will continue to be used until a permanent repair is made to the check valve. During this period, if there is an indication of a sustained increase in RCS leakage, NNECO will take actions to shutdown the plant.

In addition to the above measures, temporary ventilation equipment will be installed to prevent the dry boric acid from reaching the RCP motors. A blower/filter along with flexible hose and a hood will be positioned over 3RCS*V146 to collect boron crystals emanating from the valve. The installation will include a 2000 CFM HEPA blower, a stainless steel hood fitted to cover the valve and approximately 65 feet of flexible hose. The blower will be positioned on the 51 foot level of containment with the flexible hose extending to the check valve hood. The HEPA blower assembly contains a differential pressure gauge to measure the differential pressure across the HEPA filter. NNECO is also considering adding a temperature indicator in this line. A remote camera will be positioned so that the differential pressure can be monitored for filter change out. The blower and flex hose will be restrained to preclude it from becoming a potential missile hazard and a potential source for sump blockage.

Option 2 - Perform Check Valve Seal Weld Repair

If NNECO determines that a seal weld to the valve is required, the plant will be brought to a lower Mode (i.e., Mode 4 or Mode 5) to perform a seal weld repair to the check valve. This will be based on the evaluation of the data gathered during Mode 3 conditions.

From a personnel safety and nuclear safety perspective, NNECO has concluded that the repair plan should not be performed at power and/or normal operating pressure/normal operating temperature. The seal weld to the valve will be performed at the low end of Mode 4 or in Mode 5. The intended repair plan specifies adding seal welds to the valve body to bonnet joint. The original valve design drawings provide details (including weld thickness) for the option of seal welding. Stud replacements and seal welds will be implemented in accordance with applicable portions of Section XI of the ASME Code. The preliminary information from Westinghouse indicates that the seal weld is intended as a leakage seal and is not considered an engineered code pressure boundary. Preliminary reviews of the intended repair plan indicate that there are no personnel safety or public safety issues associated with the repair plan or the seal weld evolution as planned. Preliminary calculations indicate that leak tightness would be maintained with as many as six of the 18 studs removed from the valve at 400 psia. However, NNECO has conservatively decided to remove only two studs at a time. Each set of studs removed will be diametrically opposed to provide the maximum level of safety and leak tightness. NNECO notes however, that some of the subject valve studs have galled on removal during previous refueling outages. If valve body threads become damaged or if repair or replacement of the valve should become necessary, then a midloop repair may become necessary. A midloop operation is a less desirable condition for the plant to be placed in, considering the energy level of the fuel (i.e., due to the decay heat available since the plant has been operating for 175 days at about 100% power).

The details of the repair plan will be provided to the Millstone Senior Resident Inspector by November 30, 1995.

Summary

On November 30, 1995, NNECO plans to bring the plant to Mode 3 to facilitate a containment entry and examination of the valve for the purpose of validating the source of leakage and NNECO's conclusions relative to the environment surrounding the body-to-bonnet studs. If upon examination, all information gathered supports continued plant operation without a seal weld repair, NNECO would then return the plant to full power. Otherwise, the plant will either be brought to Mode 4 or Mode 5 to perform a repair.

Commitments

The following are NNECO's commitments contained within this letter:

B15462-1 On November 30, 1995, NNECO will bring Millstone Unit No. 3 to a Mode 3 condition to perform an inspection related to valve leakage.

If NNECO is able to return the plant to power operation after the Mode 3 inspection, NNECO will take the following actions:

B15462-2 - If it is acceptable to return to power, then the basis for that determination and justification for continued operation will be discussed with the NRC prior to resumption of power operation. Specifically, NNECO will include a discussion on the basis for ascertaining the "dryness" of the studs (dryness in the past and the dryness observed during the inspection). NNECO will also discuss the method to be used to verify the dryness of the studs in the future or the basis for not verifying the dryness of the studs.

B15462-3 The operating crews in the control room have been and will continue to be sensitized to this situation and the leak will continue to be closely monitored.

B15462-4 A containment video camera will be used to periodically check for any visible signs of leakage.

B15462-5 Visual inspection of the check valve will be conducted to assess the condition of the plant during a monthly containment entry.

B15462-6 Temporary ventilation equipment will be installed to prevent the dry boric acid from reaching the RCP motors.

B15462-7 During the plant operation, if there is an indication of a sustained increase in RCS leakage, NNECO will take action to shutdown the plant.

If NNECO is unable to return the plant to power after the Mode 3 inspection, then:

B15462-8 NNECO will bring Millstone Unit No. 3 to Mode 4 or Mode 5 to make repairs.

If the NRC Staff should have any questions or comments regarding this letter, please contact Mr. Ravi Joshi at (860) 440-2080.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: J. F. Opeka
Executive Vice President

BY: E. A. DeBarba
E. A. DeBarba
Vice President

cc: T. T. Martin, Region I Administrator
V. L. Rooney, NRC Project Manager, Millstone Unit No. 3
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3
R. W. Cooper, Region I, Director, Division of Projects

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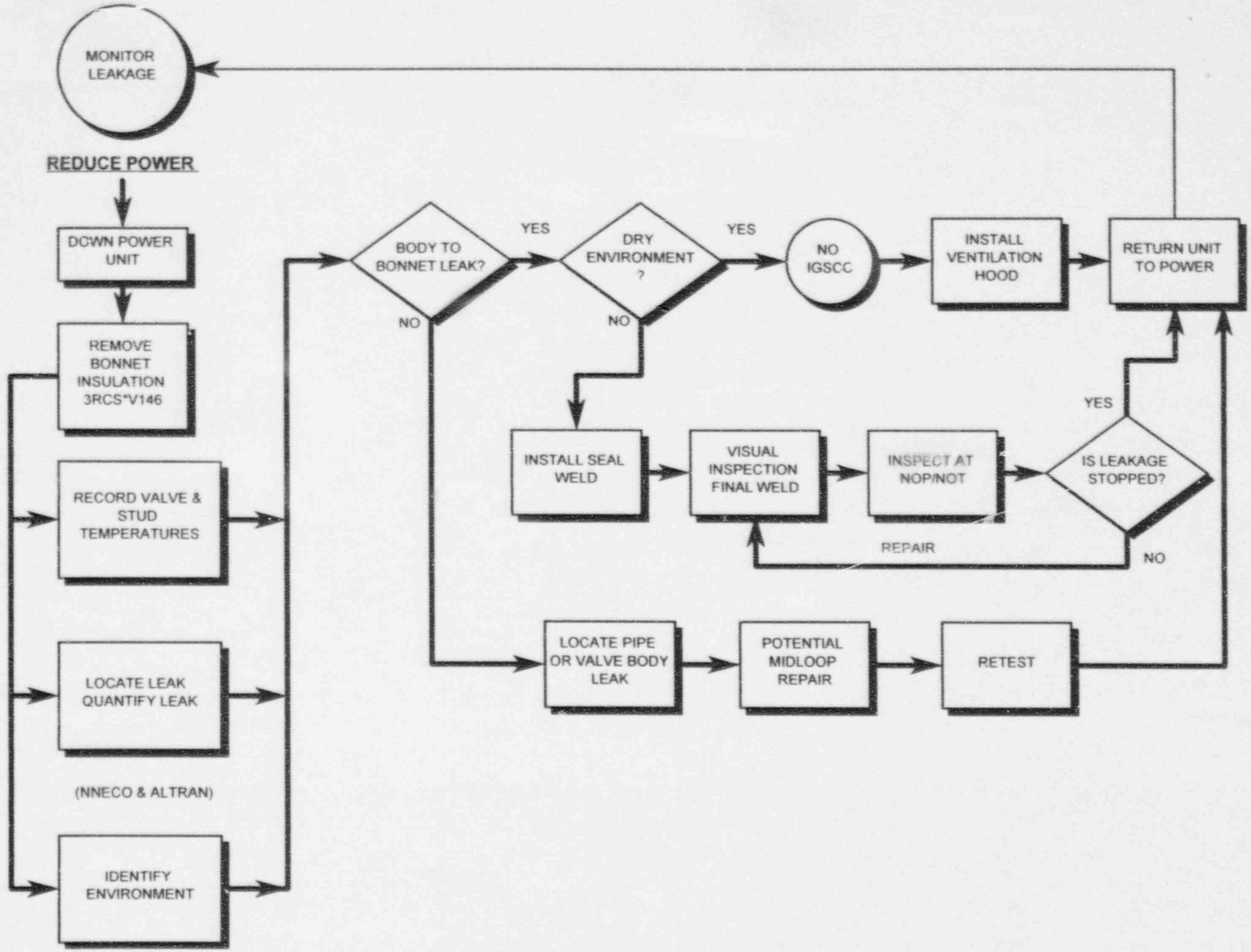
Attachment 1

Millstone Nuclear Power Station, Unit No. 3

Revised Repair Plan for Check Valve - 3RCS*V146

November 1995


MONITOR LEAKAGE
REDUCE POWER
DOWN POWER UNIT
REMOVE BONNET INSULATION 3RCS*V146
RECORD VALVE & STUD TEMPERATURES
LOCATE LEAK QUANTIFY LEAK
(NNECO & ALTRAN)
IDENTIFY ENVIRONMENT
BODY TO BONNET LEAK?
YES
NO
DRY ENVIRONMENT ?
YES
NO
NO IGSCC
INSTALL VENTILATION HOOD
RETURN UNIT TO POWER
INSTALL SEAL WELD
VISUAL INSPECTION FINAL WELD
INSPECT AT NOP/NOT
IS LEAKAGE STOPPED?
YES
NO
REPAIR
LOCATE PIPE OR VALVE BODY LEAK
POTENTIAL MIDLOOP REPAIR
RETEST