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RS-21-034 10 CFR 50.55a

March 7, 2021

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Unit 2
Renewed Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Relief Request I4R-12 Relief from Code Surface Examinations for 2B33-F060B Valve Repair

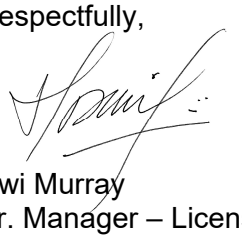
In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(2), Exelon Generation Company, LLC (EGC) requests NRC approval of the attached relief request associated with the fourth Inservice Inspection (ISI) interval for LaSalle County Station (LSCS), Unit 2. The fourth interval of the LSCS Unit 2 ISI Program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, 2007 Edition through 2008 Addenda. The fourth ISI interval at LSCS began on October 1, 2017 and is currently scheduled to end September 30, 2027.

The attached relief request, I4R-12, is associated with repair of the LSCS Unit 2 Reactor Recirculation flow control valve 2B33-F060B, which are currently in progress. Specifically, I4R-12 requests authorization of alternative requirements for the repair of the valve in accordance with ASME Section XI, paragraph IWA-4000.

EGC requests authorization of the proposed alternative by March 12, 2021.

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Mr. Jason Taken at (630) 657-3660.

Respectfully,



Dwi Murray
Sr. Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1. Relief Request I4R-12 Associated with Alternative Examination Requirements for Repair of Reactor Recirculation Flow Control Valve
2. Associated Figures

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector – LaSalle County Station
NRC Project Manager, NRR – LaSalle County Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1

Relief Request I4R-12 Associated with Alternative Examination Requirements for Repair of Reactor Recirculation Flow Control Valve

ATTACHMENT 1

10 CFR 50.55a Relief Request I4R-12
Alternative Examination Requirements for Repair of Reactor Recirculation Flow Control Valve in Accordance with 10 CFR 50.55a(z)(2)
--Hardship or Unusual Difficulty Without Compensating Increase in Level of Quality or Safety--

1. ASME Code Component(s) Affected

LaSalle County Station (LSCS), Unit 2 valve 2B33-F060B ("B" Reactor Recirculation System Flow Control Valve).

2B33-F060B valve is an ASME Section XI, Class 1 (Section III 1971 Edition, Summer 1972 Addenda) component, and the valve body is ASME SA-351 Grade CF8M material.

The design temperature of the valve is 575°F and the design pressure of the valve is 1675 psig. The design pressure of the attached system is 1650 psig. The maximum valve operating temperature is 550°F with a maximum operating pressure of 1260 psig.

2. Applicable Code Edition and Addenda

The Code of Construction is ASME Section III 1971 Edition, Summer 1972 Addenda.

For LaSalle County Station Unit 2, the Inservice Inspection Code of Record and Interval Dates are:

Interval	Section XI Edition/Addenda	Interval Start Date	Interval End Date
Fourth	2007 Edition, through 2008 Addenda	October 1, 2017	September 30, 2027

3. Applicable Code Requirement

ASME Section XI IWA-4411, "Welding, Brazing, Fabrication, and Installation," states in part:

> Welding brazing, fabrication, and installation shall be performed in accordance with the Owner's Requirements…and in accordance with the Construction Code of the item.

ASME Section III NB-2570, "Repair of Statically and Centrifugally Cast Products," for contains NB-2571 (Required Examinations) which states in part:

> In addition, all cast products shall be examined on all external surfaces and all accessible internal surfaces by either magnetic particle or liquid penetrant methods. Machined surfaces, except threaded surfaces, of a cast product shall be examined by either liquid penetrant of magnetic particle methods after machining.

ASME Section III NB-2578, "Elimination of Defects," states:

> Elimination of defects shall be in accordance with NB-2538.

ASME Section III NB-2579, "Repair by Welding," states in part:

> Repair by welding shall be in accordance with NB-2539.

ASME Section III NB-2538, "Elimination of Surface Defects," subparagraph (a)(3) states in part:

> After defect elimination, the area is reexamined by…the liquid penetrant method in accordance with NB-2546 to assure that the defect has been removed or the indication reduced to an acceptable size.

ASME Section III NB-2539, "Repair by Welding," contains NB-2539.4, “Examination of Repair Welds,” which states in part:

> Each repair weld shall be examined by…the liquid penetrant method in accordance with the requirements of NB-2546.

ASME Section III NB-2546, "Liquid Penetrant Examination," provides the requirements for conducting liquid penetrant examinations along with the Acceptance Standards.

4. Reason for Request

In accordance with 10 CFR 50.55a(z)(2), relief is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Background

In an effort to identify the source of the debris found in LSCS Unit 2 Reactor Pressure Vessel Jet Pumps during the previous refueling outage (L2R17) in February 2019, detailed inspections of the Reactor Recirculation (RR) system flow control valves were scheduled and performed during the current refueling outage (L2R18) in February 2021. Upon disassembly of the 2B33-F060B valve, damage to the valve internals and lower body was discovered. In order to restore the valve to an acceptable condition to allow the valve internals to fit into the valve body, activities in accordance with ASME Section III and ASME Section XI requirements will be employed.

Valve Details

Drawings of the valve are provided in Attachment 2 (Figures I4R-12-1 and I4R-12-2). Figure I4R-12-1 is the drawing of the entire valve assembly, including the actuator. Figure I4R-12-2 is close-up drawings of the area of the valve body in question. Figure I4R-12-2 is highlighted in orange for the lower guide plug, blue for the guide plug anti-rotation segment, and yellow as the estimated area of wear in the valve body where material is missing due to the lower guide plug impact on the valve body.

The drawings of the valve do not provide thickness dimensions of the valve body itself. At this point in the refueling outage, LSCS has been unsuccessful in obtaining direct thickness measurements of the valve body in its current condition. Valve body thickness measurements were taken and documented in 1976 by the valve manufacturer after the valve was cast. Ultrasonic (UT) measurements were taken in several locations in the pocket area at the bottom of the valve close to where the work is being performed. The average of the thickness readings from this report is 3.7 inches. This value is taken as the nominal sectional thickness of the valve body in this area. This same report documents the valve specified minimum sectional thickness as 2.418 inches.

LSCS has been unable to explicitly quantify or measure the material lost in the valve body. This is due to the limited space of a person getting into the valve body and the radiological dose exposure internal to the valve body. Measurements have been obtained through contour gauge readings. This was done by taking a reading in an area where there was limited material loss and comparing it to another reading in a corresponding area where there was wall loss. Comparison of those readings shows the point where the most wall loss occurred measures approximately 0.75 inches of material. These readings are compared to the nominal wall thickness to assess if the wall thickness had decreased below the minimum required wall thickness, and therefore into the required pressure boundary design area. Based on this approach, LSCS determined that the operational wear on the valve body did not result in wall thickness decreasing below the minimum wall thickness value.

However, during the maintenance activities to restore the valve to an acceptable condition, measurements determined that the maintenance performed on the valve body for surface conditioning encroached into minimum wall thickness of the valve. LSCS determined the surface conditioning resulted in going approximately 0.06 inches below minimum wall thickness. As a result, this is a defect that must be removed in accordance with NB-2538. NB-2538 requires a liquid penetrant (PT) examination to be performed following removal of the defect. After removal of the defect, weld buildup using the machine Gas Tungsten Arc Welding process will be performed in accordance with NB-2539 to restore the minimum wall thickness. Following weld build up and in accordance with NB-2539, a PT examination must be performed of the weld surface.

Therefore, to restore the internal structure of the valve body to greater than minimum wall thickness and to properly house the lower guide plug, PT examinations for valve 2B33-F060B repair are required by the ASME Code.

Radiological Hardship

During the L2R18 refueling outage, significant radiological dose rates are being experienced both internally to the valve and in the external area surrounding the valve. Therefore, LSCS is employing several approaches to limit the personnel exposure during the valve repair activities (e.g., automatic welding is being used).

The internal dose rate at the bottom of valve 2B33-F060B is 10 R/hour. The total combined exposure impact for performing surface examinations (PT) associated with valve's repair is estimated at approximately 5.8 person-Rem. This is based on realistic stay time estimates for examiners to appropriately perform PT examinations under the conditions described below. As a result of the significant dose rates, LSCS has evaluated alternatives to the required nondestructive examinations (NDE).

By comparison, performing the same examination scope using the proposed alternative of enhanced VT-1 visual examination (EVT-1) approach discussed in Section 5, "Proposed Alternative and Basis of Use," would result in an estimated total NDE examination dose of 0.6 person-Rem, which represents an approximate radiological dose savings of 5.2 person-Rem. This substantial radiological dose reduction is due to the EVT-1 examination requiring the NDE technicians to be inside the valve bodies for significantly less time when compared to the PT examination approach.

Physical Limitations Hardship

The area of repair inside valve 2B33-F060B is at the bottom of valve which is approximately 42 inches from the main flange on the top of the valve body. Additionally, the valve throat opening is 18 inches in diameter. To perform PT examinations, NDE technicians have limited remote options available to support performing the PT surface examinations. Technicians must clean the examination surface prior to applying the dye penetrant. Although penetrant dye may be applied using a brush with an attachment piece to limit entering the valve body, the technician must enter the valve body to adequately remove excessive dye penetrant and to apply and remove developer.

The high radiological dose and physical limitations associated with the PT examinations of 2B33-F060B in accordance with the ASME Code would be contrary to the as low as reasonably achievable (ALARA) radiological controls program.

5. Proposed Alternative and Basis for Use

In lieu of the surface examination requirements of ASME Section III 1971 Edition, Summer 1972 Addenda and/or ASME Section XI 2007 Edition with 2008 Addenda associated with repair activities on valve 2B33-F060B, EGC proposes to substitute the PT examinations with EVT-1.

The enhanced visual examination of the machined surfaces will be performed using methods and personnel qualified to the standards of ASME Section XI VT-1 visual examination requirements. The EVT-1 will be conducted using remote visual equipment such as a video probe or camera equipment.

EGC has performed a resolution demonstration, which is the process of demonstrating the ability of the remote visual examination equipment, equipment setup, inspection area environment, and inspection technique to resolve the appropriate 0.044-inch characters.

EGC has evaluated the resolution and examination capabilities of the EVT-1 and PT examination methods. A comparison between the two techniques demonstrates that the EVT-1 will provide the ability to detect a post-machining or post-welding flaw as the PT method with no loss of examination capability. Specifically:

- Liquid Penetrant (and Magnetic Particle) acceptance criteria is required to identify an indication with dimensions greater than 1/16 inch (0.0625 inches).

- Visual Examination, EVT-1 examination capabilities are demonstrated before and after the examination to dimensions down to 0.044-inch characters.

EVT-1 is a proven and accepted visual examination method and technique as described in Electric Power Research Institute (EPRI) Technical Report (TR) 3002007793, "Remote Visual Testing Round-Robin Study," published December 2, 2016 and NRC NUREG/CR 7246, PNNL-27003, "Reliability Assessment of Remote Visual Examination," published August 2018.

EPRI TR 3002007793 documented an approach that has been used throughout the nuclear industry for remote visual examination of various types of flaws, simulated cracks, electrical discharge machining (EDM) notches and actual cracks for its demonstration. In addition, EVT-1 examinations are routinely used for In Vessel Inspections (IVVI) under the boiling water reactors (BWR) Vessel and Internals Project (VIP) at BWR.

The NRC has approved EVT-1 as an acceptable alternative to PT examination previously as described in Section 7 below.

6. Duration of Proposed Alternative

Use of this proposed alternative is applicable only to L2R18 repair activities associated with 2B33-F060B valve.

7. Precedents

Braidwood Station, Units 1 and 2 – Relief from the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (EPID L-2018-LLR-0033), dated January 17, 2019 (ADAMS Accession No. ML18347B419).

ATTACHMENT 2

Associated Figures

Figure I4R-12-1

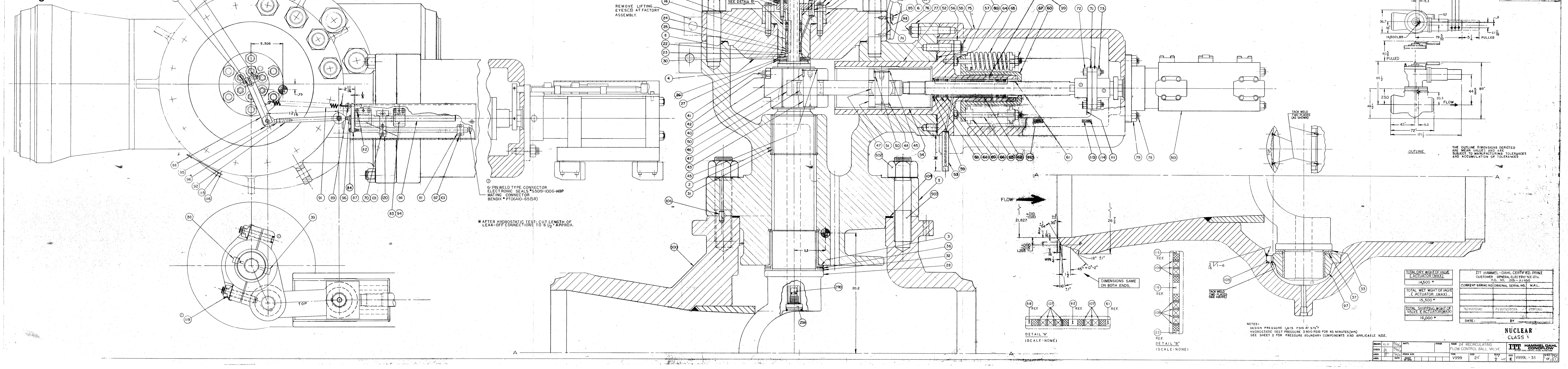


Figure I4R-12-2

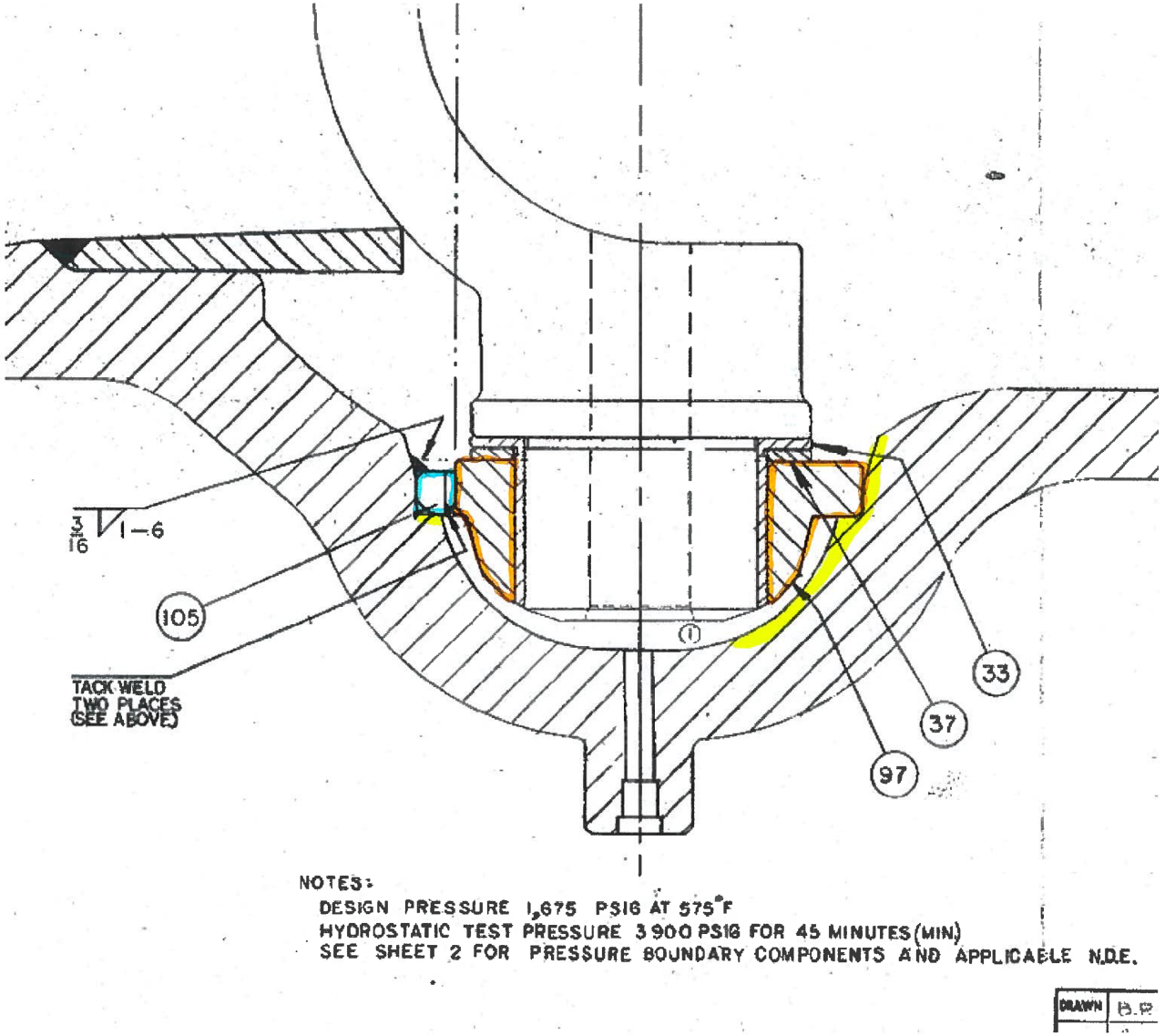


Figure I4R-12-2