Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, Tennessee 37402

Preston D. Swafford
Executive Vice President and Chief Nuclear Officer

June 2, 2011

10 CFR 2.201

Mr. Victor M. McCree
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Avenue, NE, Suite 1200
Atlanta, Georgia 30303-1257

Browns Ferry Nuclear Plant, Unit 1
Facility Operating License No. DPR-33
NRC Docket No. 50-259

Subject: **Request for Regulatory Conference or Public Management Meeting**

References:
1) Letter from NRC to TVA, "NRC Report 05000259/2010005, 05000260/2010005, and 05000296/2010005; Preliminary Greater Than Green Finding Browns Ferry Nuclear Plant," dated March 2, 2011

2) Letter from NRC to TVA, "Final Significance Determination of a Red Finding, Notice of Violation, and Assessment Follow-up Letter (NRC Inspection Report No. 05000259/2011008) Browns Ferry Nuclear Plant," dated May 9, 2011

Reference 1 identified that the Browns Ferry Nuclear Plant (BFN), Unit 1 low pressure coolant injection/residual heat removal (RHR) outboard injection valve 1-FCV-74-66 failed to open on October 23, 2010, when operators attempted to place RHR Shutdown Cooling loop II in service to support the Unit 1 cycle eight refueling outage activities. The NRC letter identified the performance deficiency as the failure to establish adequate design control and perform adequate maintenance on the valve,

which resulted in the valve being left in a significantly degraded condition and RHR loop II unable to fulfill its safety function.

Tennessee Valley Authority (TVA) attended a Regulatory Conference on April 4, 2011, to discuss TVA's views on the issue of the performance deficiency as well as other issues. During this meeting, TVA provided information, contained in the enclosed presentation (Enclosure 1), that detailed our findings with regard to the performance deficiency based on the results of our root cause analysis (RCA) of the valve failure. As can be seen in the enclosed presentation, TVA explained that the valve failure was due to an original manufacturing defect (i.e., undersized threads) and not inadequate design control or inadequate maintenance on the part of TVA. In-service Testing (IST) of valve 1-FCV-74-66 in accordance with the applicable American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants (i.e., OM Code), as reflected in the BFN IST Program, was not discussed in TVA's April 4, 2011 presentation and the NRC's explanation of the performance deficiency in Reference 1 did not include any discussion of the IST Program.

On May 9, 2011, the NRC issued its final significance determination letter (Reference 2). Given the results of the TVA RCA, and that the IST Program was not explicitly identified as the subject of the original performance deficiency stated in Reference 1, the BFN IST Program was not addressed at the Regulatory Conference. However, the NRC stated in Reference 2 its conclusion that TVA's IST Program inadequacy represents a performance deficiency.

TVA takes this issue regarding the IST Program very seriously and is taking actions to address any potential noncompliance. TVA has entered this issue into its Corrective Action Program and will be performing an RCA. TVA has also hired industry-recognized IST experts as well as the principal author of the NRC's NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, to review BFN's IST Program and its implementation for compliance and performance issues. TVA expects that additional corrective action may be identified once the RCA is completed and approved.

Because TVA did not have an opportunity to discuss the BFN IST Program during the April 4, 2011 Regulatory Conference and for the additional reasons delineated below, TVA requests that another Regulatory Conference be held to allow TVA to discuss its views on the performance deficiency identified in the May 9, 2011 NRC letter. If our request for another Regulatory Conference cannot be granted, TVA requests a public management meeting with the NRC so that we can present pertinent information not previously provided regarding this performance deficiency. TVA further requests that the 30-day period from the May 9, 2011 letter for responding to the Notice of Violation and to appeal the significance determination be held in abeyance pending a Regulatory Conference or public management meeting.

During the period leading up to the April 4, 2011 Regulatory Conference, and for a number of weeks after the Regulatory Conference, TVA responded to 52 questions from the NRC. Of those 52 questions, TVA received only one question that concerned the BFN IST Program. Specifically, Question No. 2 of the third round of NRC questions dealt with Section ISTC 4.2 of the applicable OM Code. TVA provided a written answer on April 14, 2011. No further questions or comments on this issue were received from the NRC until Friday, April 29, 2011, when TVA was informed by NRC Region II management during a conference call that the BFN IST Program was not in compliance with the applicable OM Code, specifically Section ISTC 4.1. During that conference call, NRC Region II management also pointed out the need for TVA to review the BFN IST Program for similar instances of noncompliance. At that time, TVA stated that it would enter the issue into its Corrective Action Program.

Before taking additional time to research this issue, TVA quickly provided a written description of how the BFN IST Program complies with Section ISTC 4.1 of the applicable OM Code to the NRC on the following Monday, May 2, 2011 (Enclosure 2), and held a conference call to discuss this information with representatives of the NRC on Tuesday, May 3, 2011. No further questions or comments regarding this issue were received from the NRC until the following Monday, May 9, 2011, when the NRC issued its final determination letter identifying the inadequacy of the BFN IST Program as the performance deficiency. While the NRC may have determined that it has all the information it needed to reach this conclusion, TVA has assembled considerably more information regarding the BFN IST Program as well as pertinent industry information than was provided to the NRC in writing or verbally on May 2 and 3, 2011. Accordingly, TVA considers that it would be in the best interest of both the NRC and TVA to present this new information at a Regulatory Conference or public management meeting. TVA considers that the additional information is essential for an accurate assessment of the regulatory issues related to the failure of valve 1-FCV-74-66 and the outcome of the NRC's deliberations, as well as the adequacy of the BFN IST Program more broadly.

Since the statement of the performance deficiency changed significantly, then as a matter of law and fairness, the NRC must give notice of the change and an opportunity to address the new performance deficiency prior to the NRC making its final determination. It is well established that a licensee facing a potential enforcement action must be given notice of the alleged deficiency and afforded an opportunity to be heard before the agency finalizes the action. For instance, in *Board of Regents v. Roth*, 408 U.S. 564, 569-70, and 573 (1972) the Supreme Court held that procedural due process requires adequate notice and an opportunity to be heard where governmental action might seriously damage reputation. In a case involving TVA in particular, the NRC has stated, "[b]asic principles of fairness . . . require that the licensee in an enforcement action know the bases underlying the Staff's finding(s) of violation." *Tennessee Valley Authority* (Watts Bar Nuclear Plant, Unit 1; Sequoyah Nuclear Plant, Units 1 and 2; Browns Ferry Nuclear Plant, Units 1, 2, and 3), CLI-04-24, 60 NRC 160, 202 (2004). The requirement for prior notice and an opportunity to

respond holds true if the agency afforded a prior opportunity, but subsequently changes or amends the bases for the violation. See CLI-04-24, 60 NRC at 203, 205. Manual Chapter 0609, 2.d.2(c), states in this regard that "[t]he Preliminary Determination letter will . . . provide sufficient information to allow the licensee to reasonably understand the staff's position and allow them to develop further information, as needed . . . [and] must clearly identify to the licensee the basis for the staff's preliminary significance determination . . ." Manual Chapter 0609, 2.a(1), also contemplates that the statement of the performance deficiency will be clearly established prior to the Regulatory Conference.

Therefore, for the reasons stated above, TVA respectfully requests that another Regulatory Conference or a public management meeting be held to discuss the performance deficiency documented in the Reference 2 letter. TVA further requests that the 30-day period from the May 9, 2011 letter for responding to the Notice of Violation and to appeal the significance determination be held in abeyance pending a Regulatory Conference or public management meeting.

There are no new regulatory commitments as a result of this correspondence. Should you have any questions concerning this submittal, please contact Rod M. Krich at (423) 751-3628.

Respectfully,

Preston D. Swafford

Enclosures: 1) April 4, 2011 Regulatory Conference TVA Presentation
2) Description of Browns Ferry Nuclear Plant IST Program Compliance with OM Code ISTC 4.1

cc (Enclosures):

NRC Document Control Desk
NRC Director, Office of Enforcement
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

ENCLOSURE 1

Browns Ferry Nuclear Plant
Unit 1

April 4, 2011 Regulatory Conference TVA Presentation

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNIT 1

Regulatory Conference

Low Pressure Coolant Injection Valve
1-FCV-74-66

Atlanta, Georgia

April 4, 2011

Agenda

• Introduction	Preston Swafford
• Background	Rob Whalen
• Root Cause/Engineering Analyses	Rob Whalen
• Significance Determination	James Emens
• Performance Deficiency	James Emens
• Corrective Actions	Rob Whalen
• Long-Term Fire Strategies	Rob Whalen
• Closing Remarks	Preston Swafford

Introduction

- On October 23, 2010, Residual Heat Removal (RHR) Loop II Injection Valve, 1-FCV-74-66, did not pass flow while operations was aligning shutdown cooling at the beginning of a refueling outage
- Disassembly of the valve revealed the disc separated from the stem and lodged in the seat
- The disc separation from the stem resulted from an original manufacturing defect, undersized threads in the disc skirt/disc assembly
  - Preliminary root cause was thought to be lack of skirt key caused disc separation, which was basis for apparent violation
  - Final root cause shows that the cause of the disc separation is not a licensee performance deficiency
- Based on results of extensive forensic examination, analysis, and laboratory mockup tests, we have shown conclusively that the disc would have released within an acceptable time with an RHR pump running (due to friction reduction from pressure pulsations), allowing the valve to provide functional flow
- TVA is taking steps to significantly reduce risk due to fire at the Browns Ferry Nuclear Plant
  - Reducing instances of Self-Induced Station Blackout (SISBO) actions
  - Accelerating plant changes identified as part of NFPA 805 transition
  - Changing the Safe Shutdown Instructions (SSIs) to allow the use of alternate shutdown paths

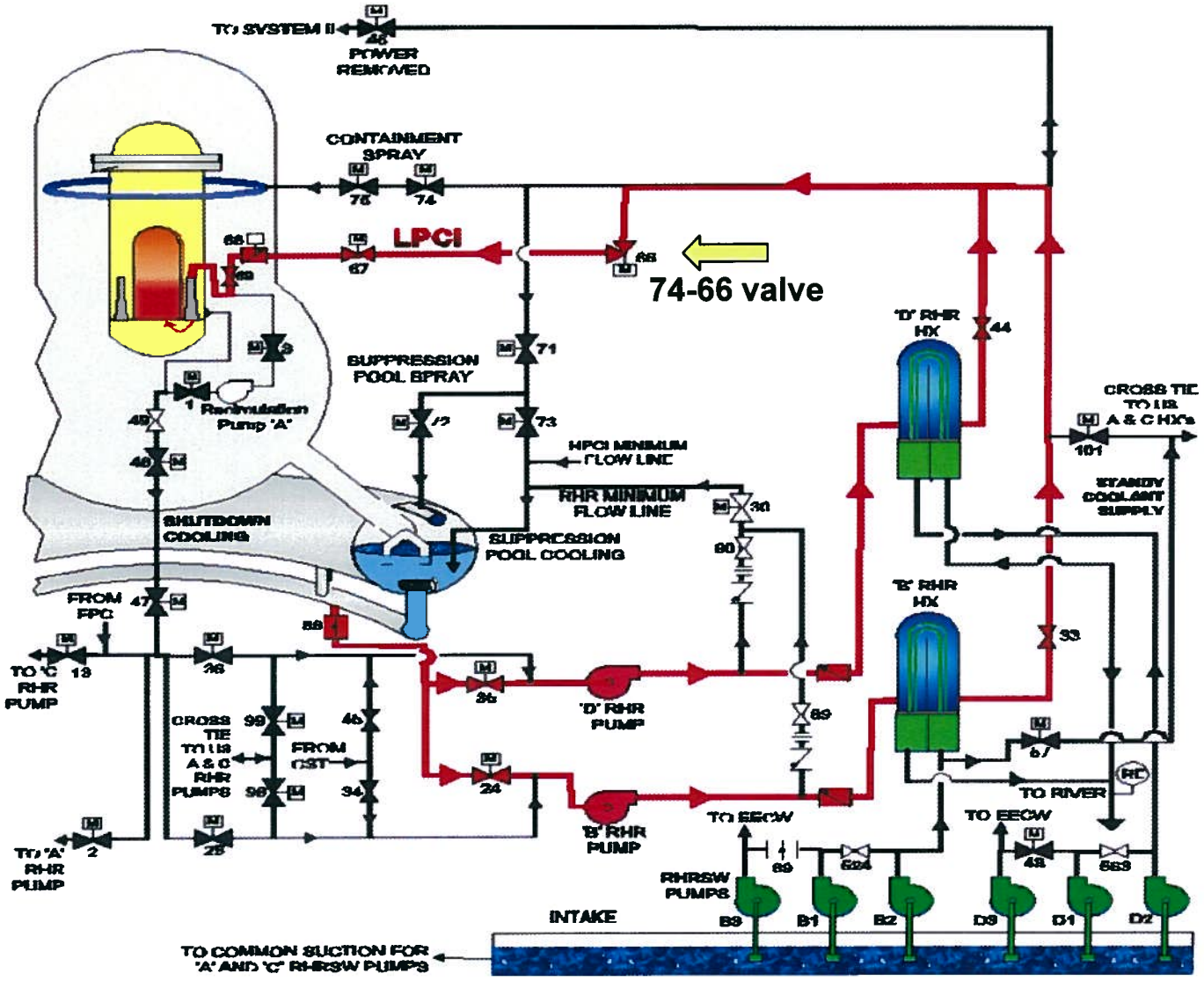
Background – Assessment Approach

- Root cause team was assembled including site and corporate expertise
- Comprehensive forensics were performed to determine root cause
  - Southwest Research Laboratory (weld examinations)
  - Westinghouse Laboratory (valve component forensics)
  - Structural Integrity (thread strength analysis, sensitivity study)
  - Independent Burns & Roe metallurgist (aggregate review of forensics reports)
- Performance Improvement International (PII) performed detailed analysis and laboratory testing to determine the valve's capability to function in its as-found state of separation

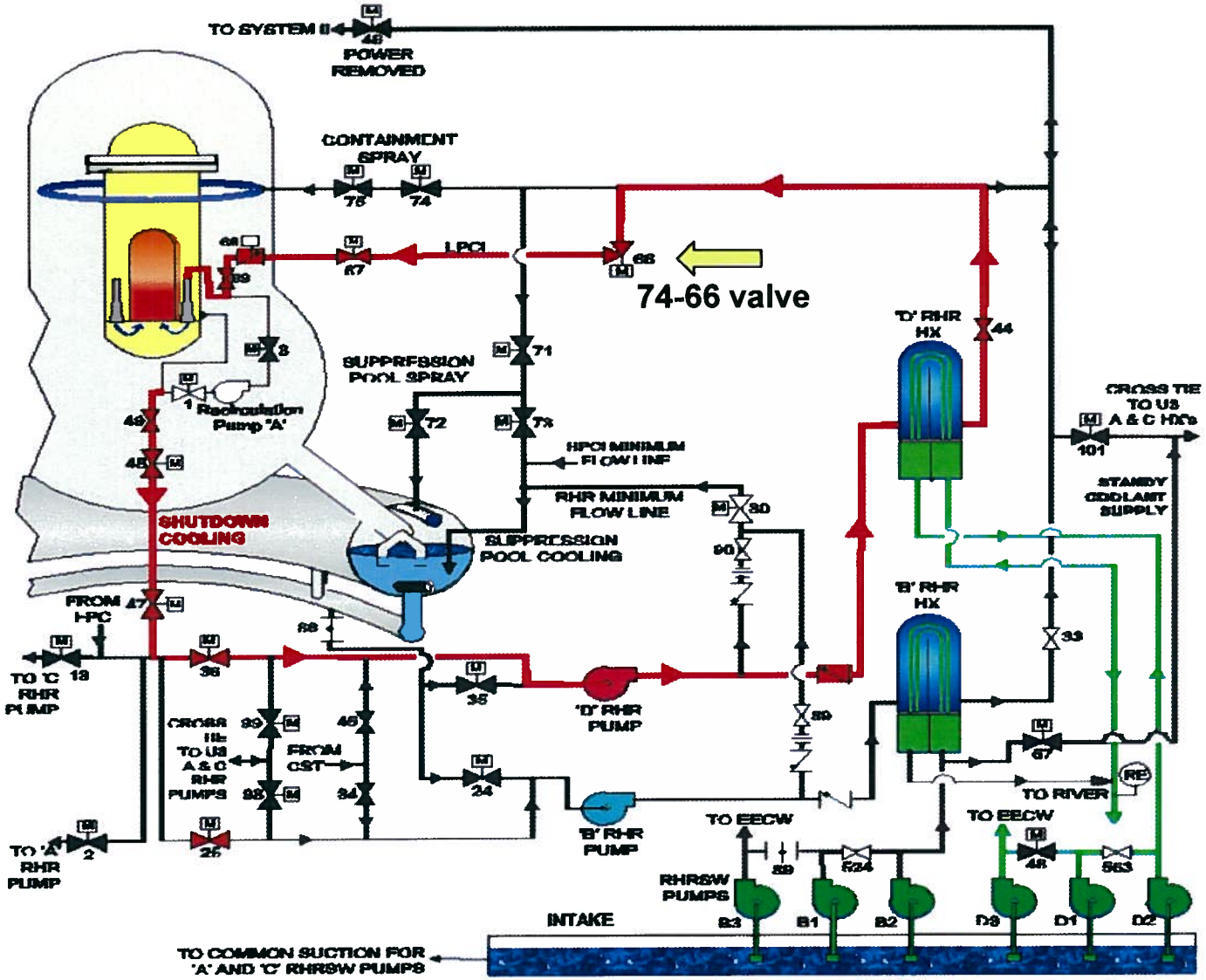
Background – Timeline

Timeline	
1968	Walworth valve purchased as an assembly from General Electric for construction of Browns Ferry Nuclear Plant (BFN), Unit 1
December 1974	Separation/loosening of discs due to flow-induced vibration
1983	Installed modified disc with "V" notch trim (skirt reused)
June 2006	Replaced stem prior to BFN, Unit 1, restart due to observed stem nut damage
2007 to October 2010	Satisfactory quarterly valve stroke times based on limit switch indication, not torque
March 2009	Initiated shutdown cooling passing 7,000 gpm flow through valve
October 2010	Initiated shutdown cooling with no observed flow (terminated pump operation after 110 seconds)

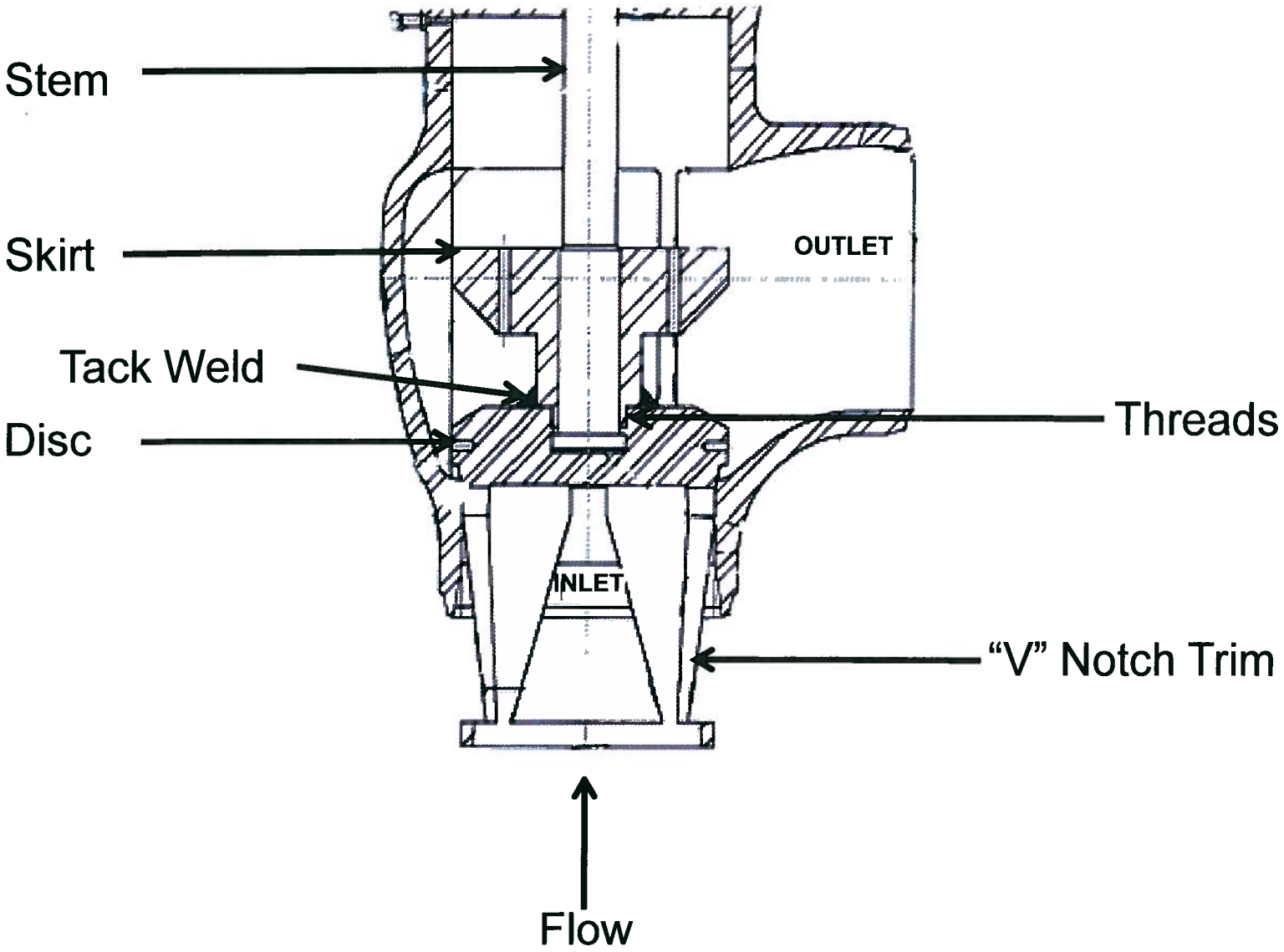
Background –
RHR Low Pressure Coolant Injection (LPCI) System Overview



Background –
RHR Shutdown Cooling Overview

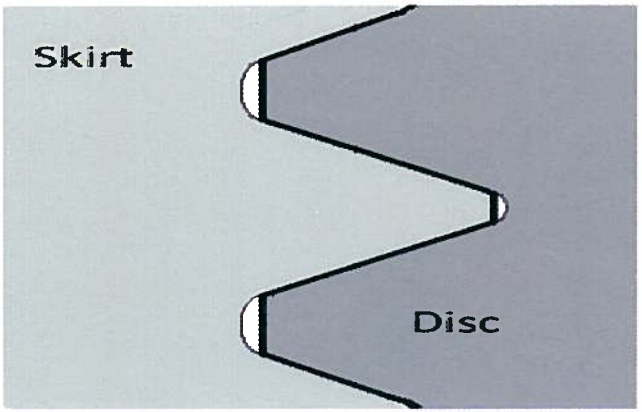


Root Cause –
RHR Valve Cross Section

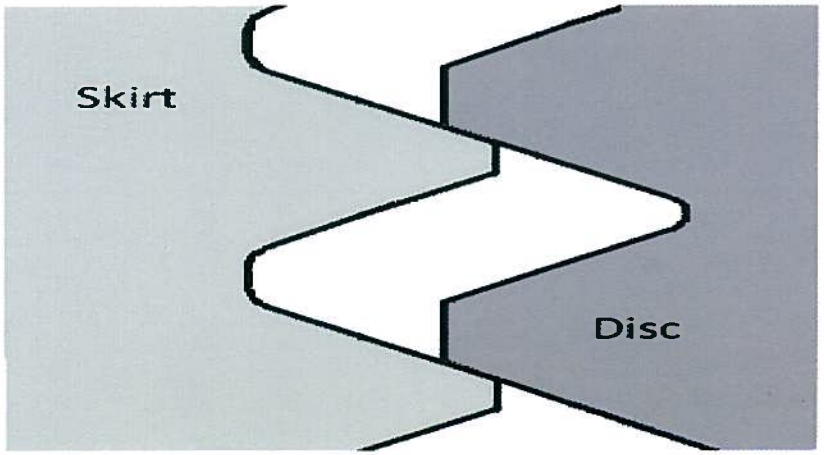


Root Cause –
Disc Separation Forensics (Disc/Skirt Threads)

As-Designed Thread

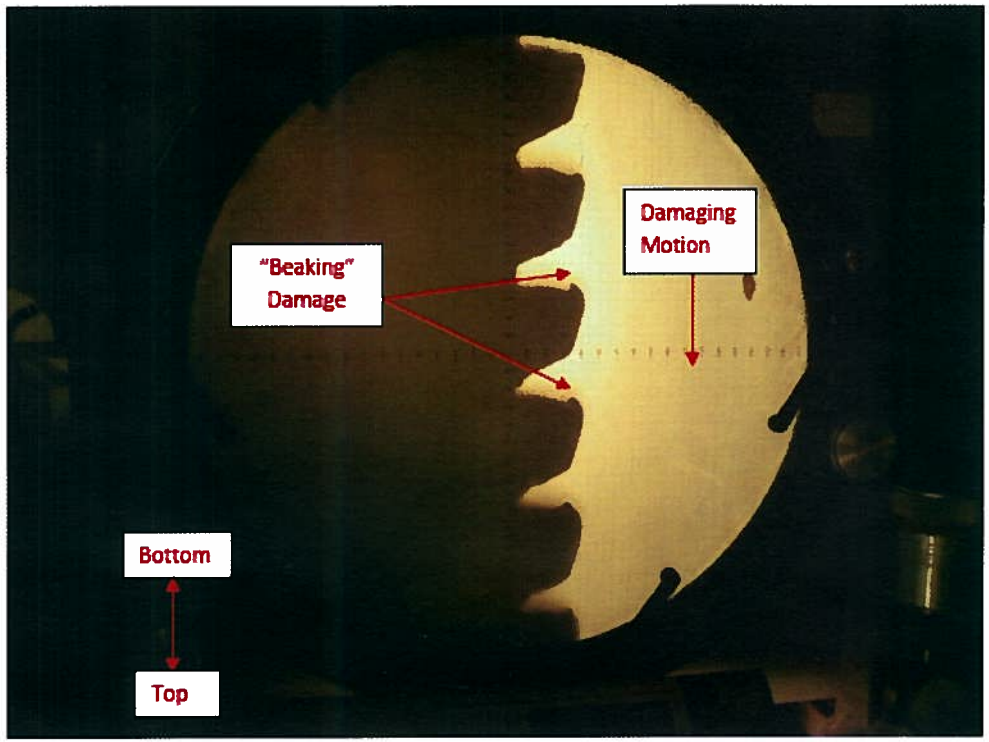


As-Found Thread



Root Cause –
Disc Separation Forensics *(continued)*

Forensic examination found axial damage on the threaded connection between disc and skirt



Optical Comparator Image of Damaged Threads

Root Cause Results

- The manufacturer supplied an undersized skirt to disc connection male thread diameter under a 10 CFR 50, Appendix B program (Part 21 report submitted via revision to Licensee Event Report on April 1, 2011)
- The valve was purchased as an assembly that would not be taken apart to perform receipt inspections
  - Undersized skirt thread diameter caused the threaded connection between disc and skirt to be 38 percent of design strength
  - Pressure on skirt/stem side of disc due to downstream check valve leakage and surveillance testing configuration
  - Tack welds designed to prevent rotational, not axial separation
  - Stem and skirt pulled away from disc in open direction
- Disc was initially separated from stem/skirt before November 2008, based on Motor-Operated Valve Actuator Testing (MOVAT) data review and forensic examination
  - This indicates that the valve passed normal shutdown cooling flow in a separated condition in March 2009

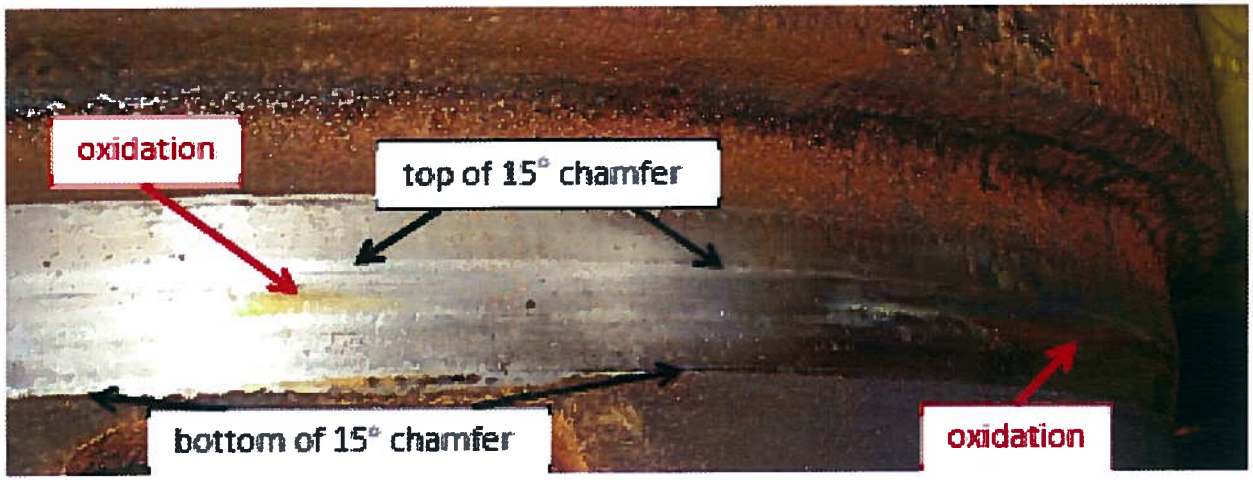
Root Cause Summary

- NRC Inspection Report 2010-05 noted ". . . the licensee's failure to establish adequate design control and perform adequate maintenance on the Unit 1 outboard LPCI injection valve, 1-FCV-74-66, which resulted in the valve being left in a significantly degraded condition and RHR loop II unable to fulfill its safety function, was a performance deficiency."
- Root cause analysis determined that no licensee performance deficiency existed
  - No reasonable basis existed to examine threads and identify the undersized thread condition
- Corrective actions discussed later in this presentation
- No other root or contributing cause was identified
- We will show that the valve, while being degraded, would have performed its fire safe shutdown safety function

Functionality Analysis

- Industry research shows that pump-induced vibrations dramatically reduce frictional forces
- Idaho National Laboratory research shows static coefficient of friction behavior for stellite valve seating surfaces

74-66 valve disc contacting surface immediately after removal (11/2/10)

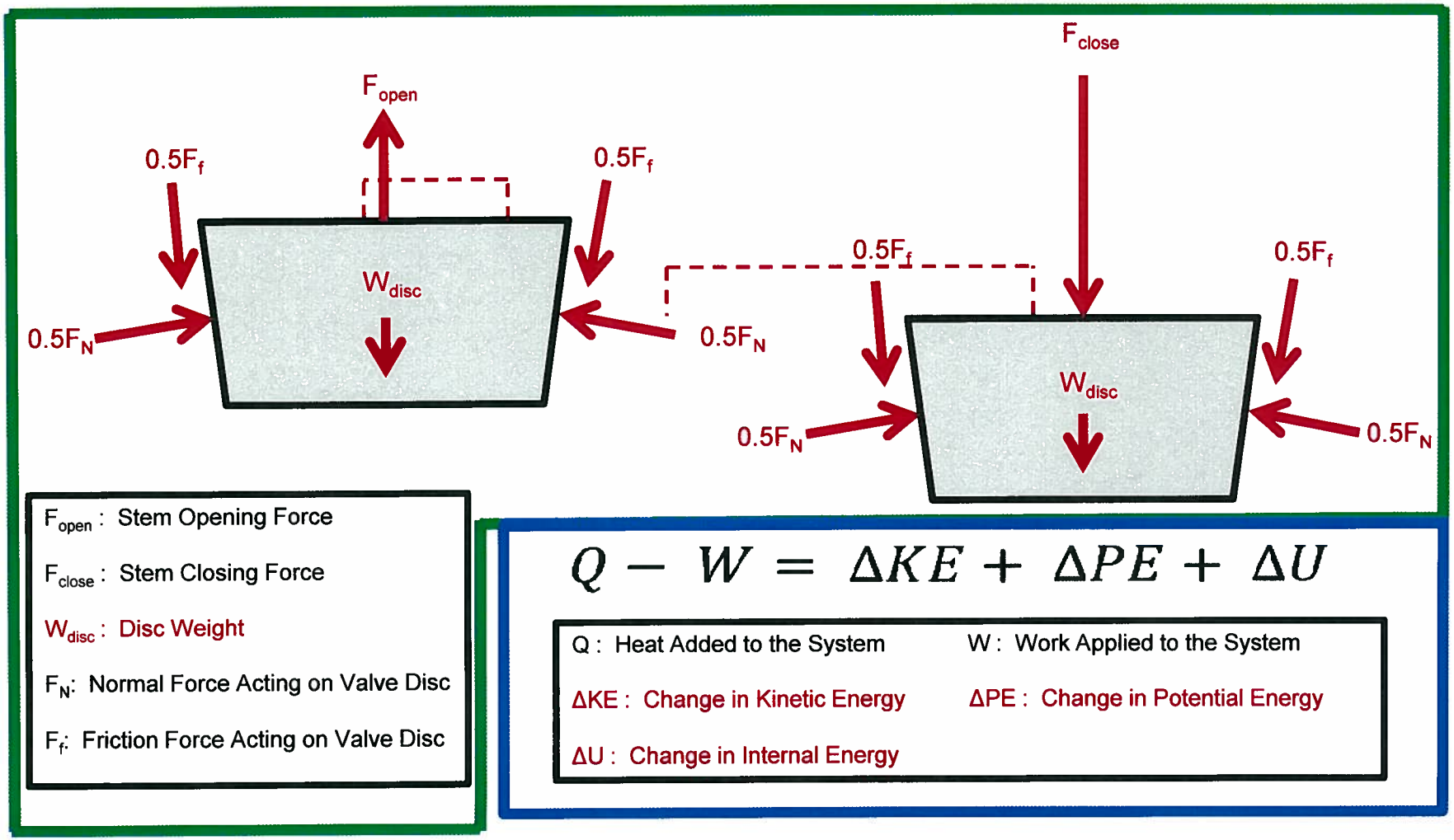


Analysis of Force Balance and Coefficient of Friction Significance

- A two-dimensional static analysis was performed to determine the normal force and coefficient of friction
- The calculated coefficient of friction was well aligned with the method discussed in Idaho National Laboratory stellite aging research[1]
- An energy balance approach was used to determine the energy applied by the disc to the valve body and associated deflection from each stem stroke

[1] Idaho National Engineering and Environmental Laboratory Document, INEEL/EXT-02-01021, "Results of NRC-Sponsored Stellite 6 Aging and Friction Testing," October 2002.

Analysis of Force Balance and Coefficient of Friction Significance *(continued)*



F_{open} : Stem Opening Force

F_{close} : Stem Closing Force

W_{disc} : Disc Weight

F_N: Normal Force Acting on Valve Disc

F_f: Friction Force Acting on Valve Disc

$$Q - W = \Delta KE + \Delta PE + \Delta U$$

Q : Heat Added to the System

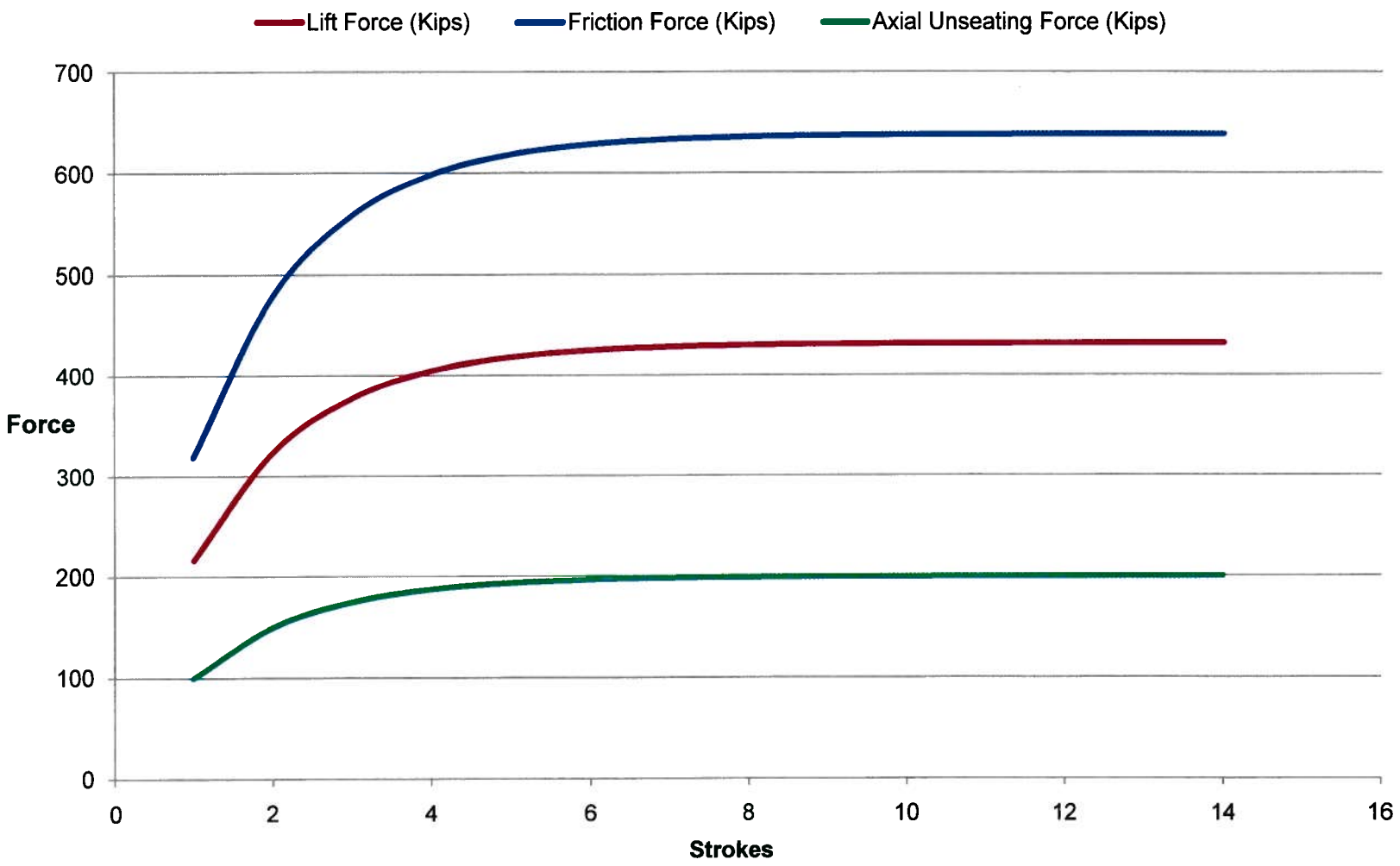
W : Work Applied to the System

ΔKE : Change in Kinetic Energy

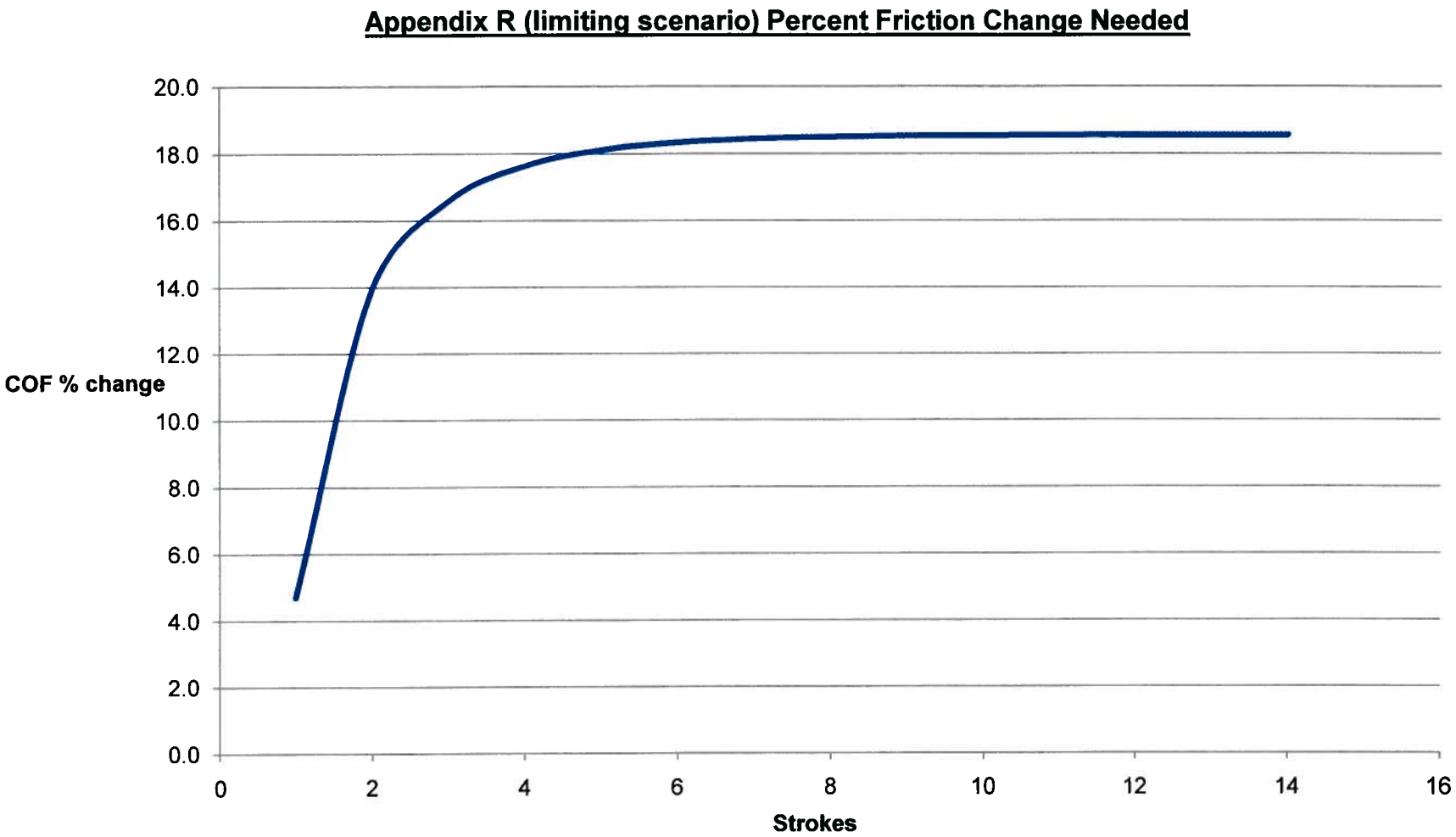
ΔPE : Change in Potential Energy

ΔU : Change in Internal Energy

Analysis of Force Balance and Coefficient of Friction Significance *(continued)*



Analysis of Force Balance and Coefficient of Friction Significance *(continued)*

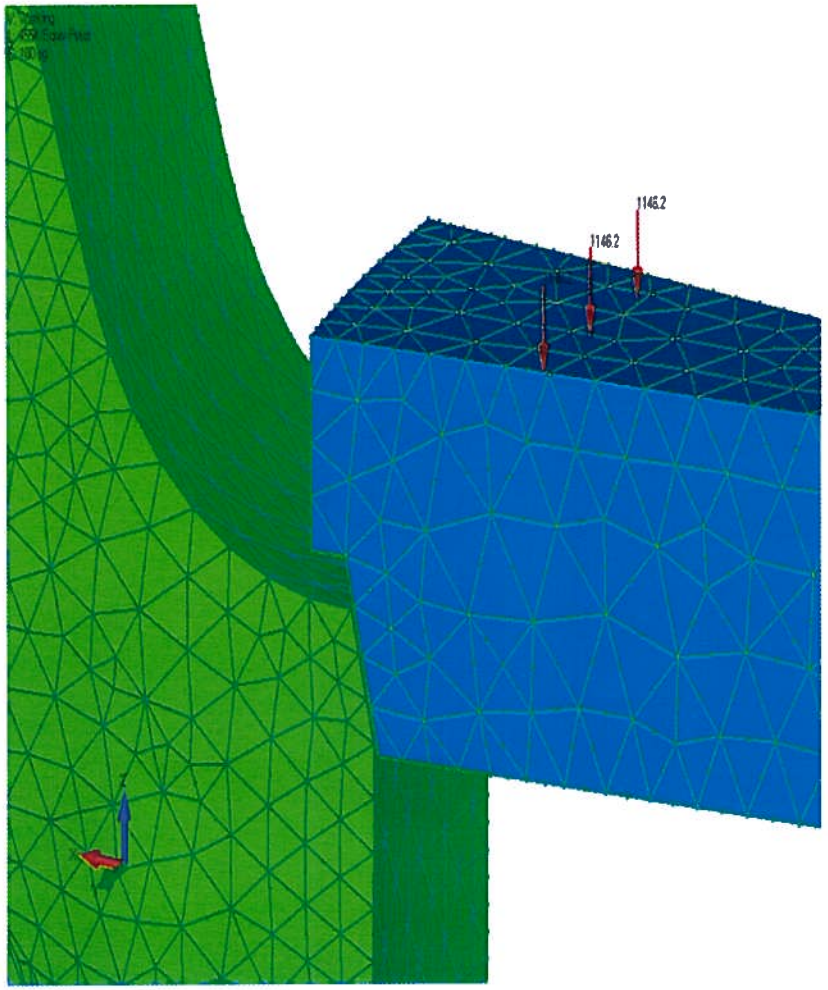


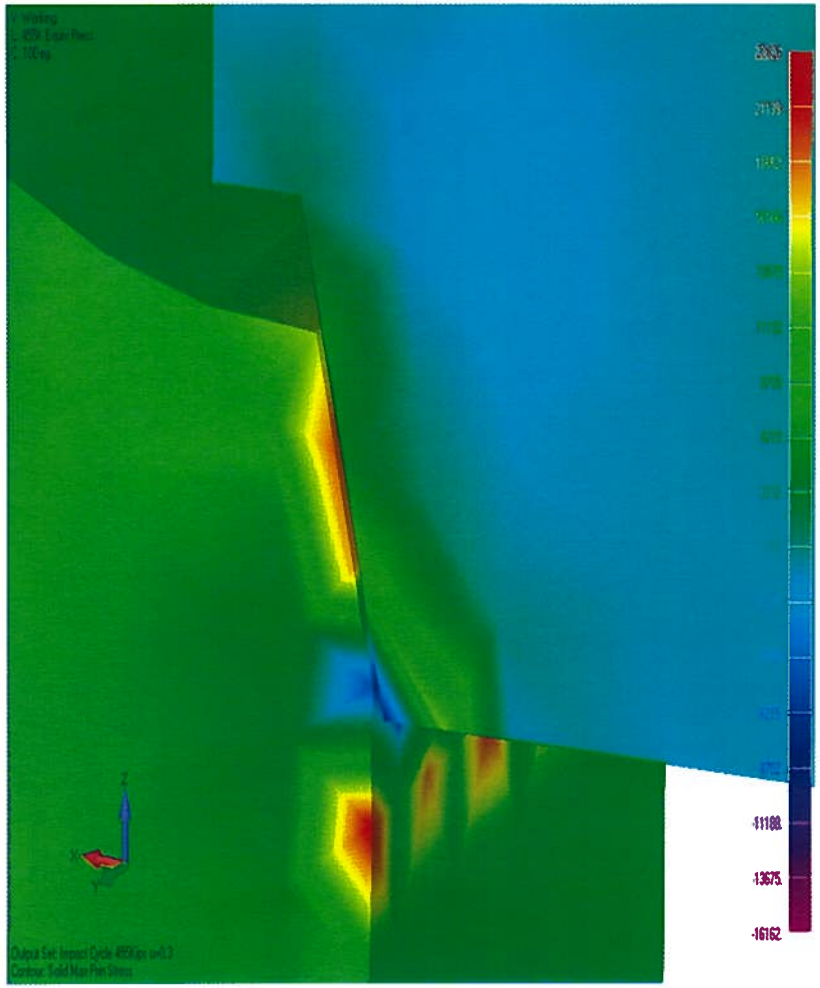
Analysis of Force Balance and Coefficient of Friction Significance *(continued)*

A finite element analysis showed:

- Close correlation with the simplified Roark stiffness used in the work energy approach
- Slight plastic deformation limited the axial deflection suggesting the simplified linear elastic approach produces a conservative frictional force

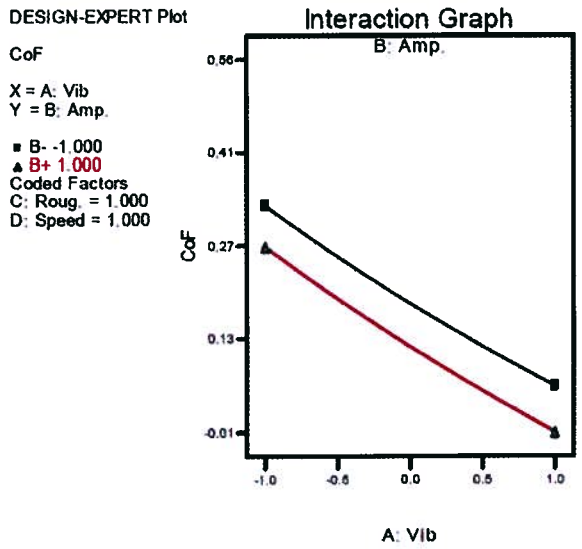
Analysis of Force Balance and Coefficient of Friction Significance *(continued)*





Vibration Effect on Coefficient of Friction Theory

- A very similar experiment conducted by researchers concludes that vibrations greatly reduce the coefficient of friction.
- The coefficient of friction is most reduced by vibration frequency and amplitude, surface roughness, speed, and quadratic terms of the surface roughness and speed.



Steel C1020 with a surface roughness and speed of 2.5 µm and 1.2 m/s; respectively

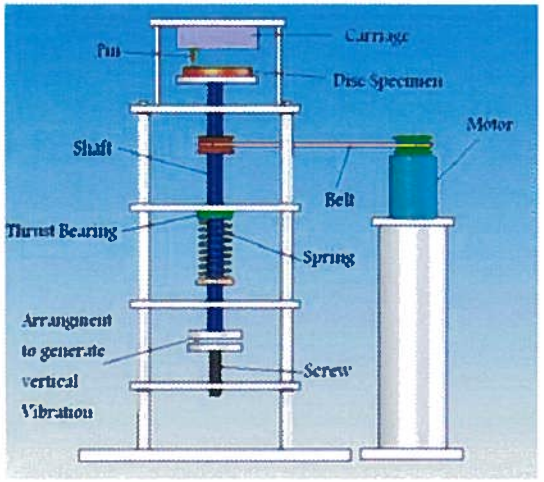


Image taken from "The Effect if Frequency and Amplitude of Vibration on the Coefficient of Friction for Metals" by Jamil Abdo and Mahmoud Tahat, Issue 7, Volume 3, July 2008. ISSN 1991-8747.

Image taken from "The Effect if Frequency and Amplitude of Vibration on the Coefficient of Friction for Metal" by Jamil Abdo and Mahmoud Tahat, Issue 7, Volume 3, July 2008. ISSN 1991-8747.

The coefficient of friction is predicted by

$$\mu = 0.313 - 0.142A - 0.0356B - 0.0458C - 0.1210D - 0.0822C^2 + 0.0561D^2$$

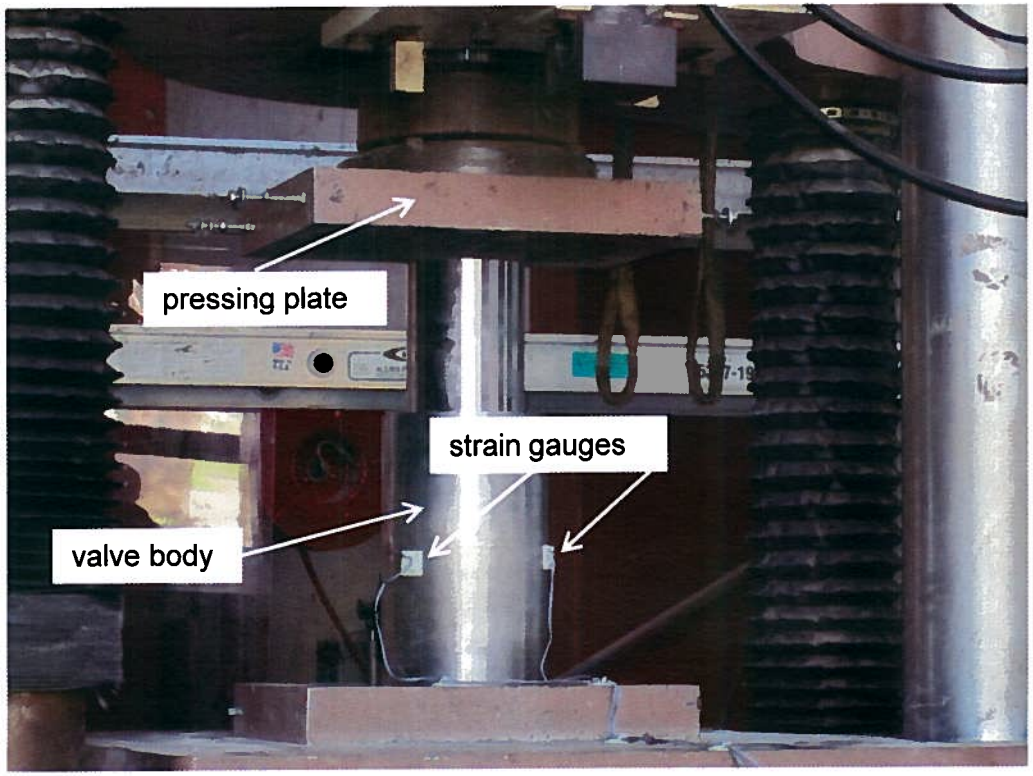
where

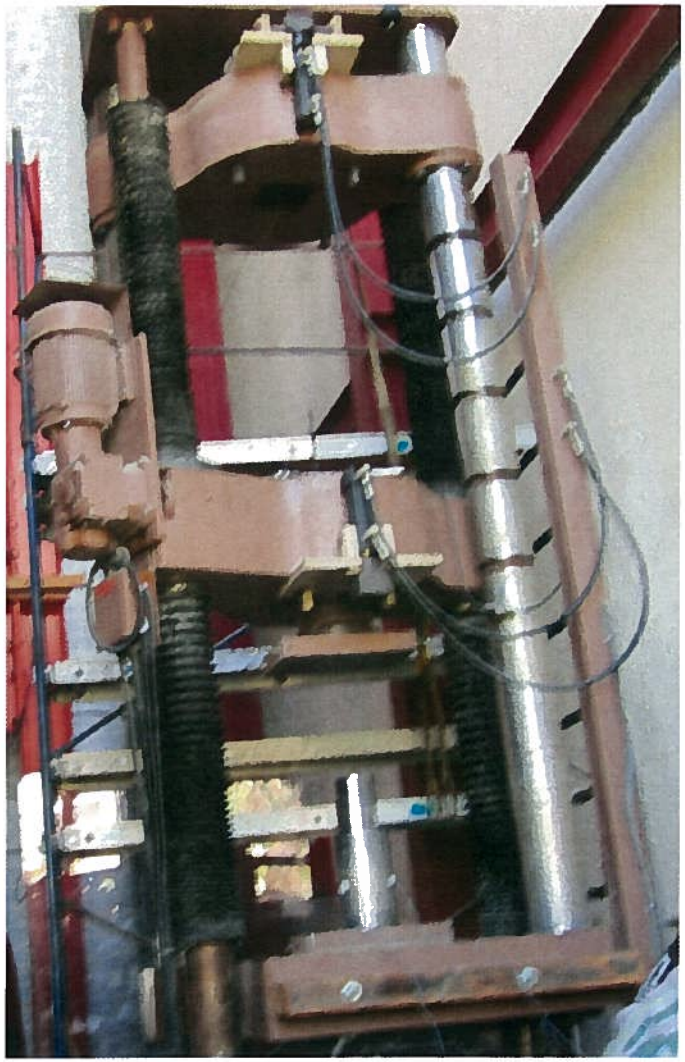
µ: Coefficient of Friction A: Vibration Frequency B: Vibration Amplitude

C: Surface Roughness D: Speed

Vibration Effect on Coefficient of Friction Testing

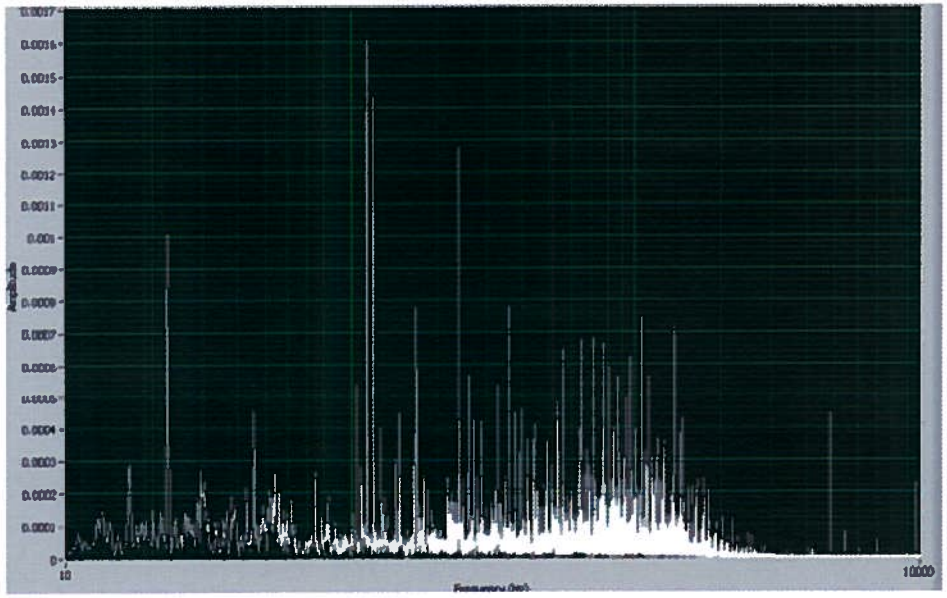
- The valve disc was compressed into the valve body by a hydraulic press.
- Strain gauges were positioned on the outside of the valve body.
- Vibrations were applied to the disc modeled on the plant configuration.





Vibration Effect on Coefficient of Friction Testing
(continued)

- Pressure amplitude and frequency data were measured at Browns Ferry Nuclear Plant using a high-speed recorder with the RHR pump running
- Fast-Fourier Transform was performed and utilized in laboratory mockup testing

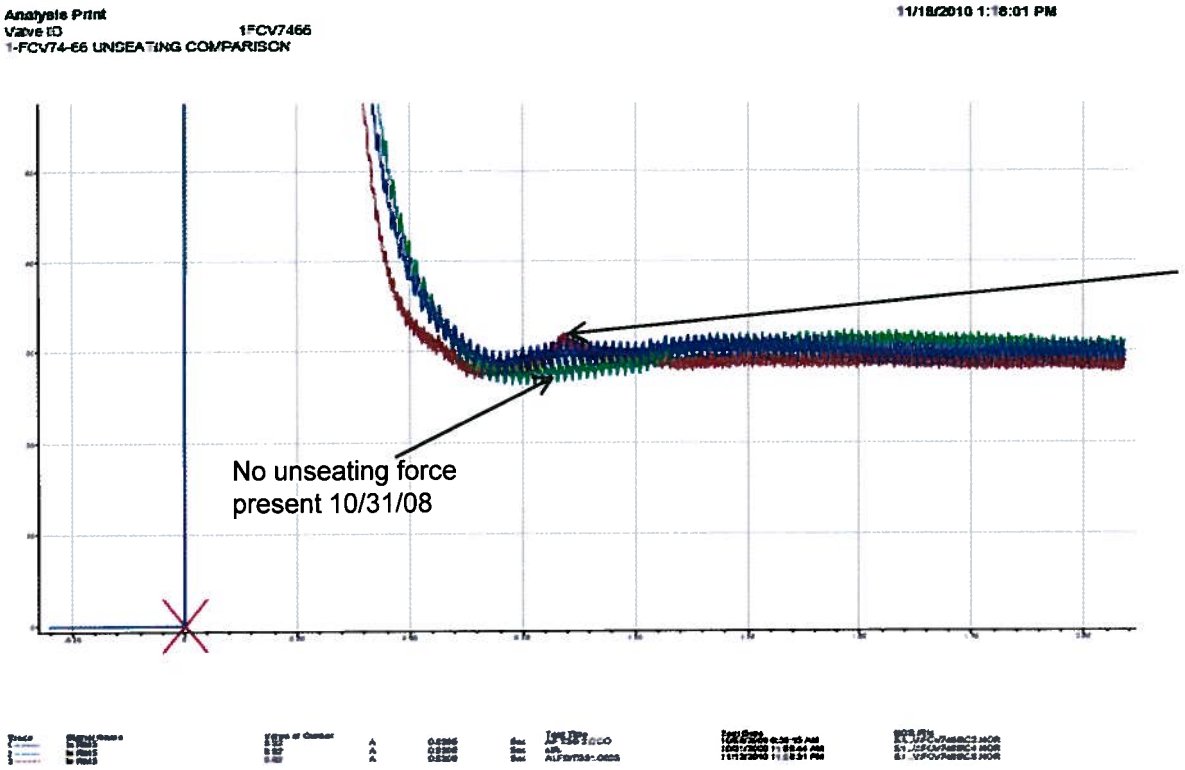


Vibration Effect on Coefficient of Friction Testing
(continued)

- Multiple laboratory mockup tests concluded:
  - During multiple valve stroke surveillances, the free end of the stem "hammered" the disc into the seat
  - Disc loosens promptly with seats in clean unoxidized condition
  - Disc loosens within seven minutes with seating surfaces in roughened condition
  - System differential pressure would lift the disc, allowing proper flow as required by Safe Shutdown Analysis (SSA) for Appendix R fire (highest risk event)

Vibration Effect on Coefficient of Friction Testing
(continued)

Review of MOVAT testing data, combined with stellite aging research, strongly indicates that the disc separated prior to November 2008



Note: Blue trace is 2006 data for newly lapped seating surfaces – no aged stellite.

Vibration Effect on Coefficient of Friction Testing
(continued)

- Analysis concludes that four impacts of the separated stem into the disc accomplishes 94 percent of the maximum possible unseating force
- Review of plant data shows that a minimum of four impacts occurred before March 2009 when the disc lifted from the seat (operated as a check valve)
- MOVAT data (supported by stellite aging research, forensics, and the fact that unseating trace is evident following repair) indicates that the disc separated prior to November 2008
- This is strong supporting evidence that the valve loosened and operated as a check valve in March 2009

Root Cause/Engineering Analyses Conclusions

- Root cause of separation was clearly the undersized disc to skirt threads
  - This was a manufacturing deficiency and has been reported under 10 CFR 21
  - No reasonable basis existed to examine threads and identify the undersized thread condition
  - No other root or contributing cause was identified
  - There was no licensee performance deficiency
- The disc would have released and provided proper flow within seven minutes, fully supporting the limiting Appendix R fire event
  - Industry experts performed extensive analysis and laboratory testing
  - *"As a result, PII has **very high** confidence in the credibility of its findings."* [1]
  - This confidence is supported by the conclusion that valve was functional in March 2009, even though the disc was separated from the stem

[1] Performance Improvement International Report, "TVA Browns Ferry Nuclear Plant, Analysis of the October 23, 2010, BFN-1-FCV-076-066 Shutdown Cooling Event," dated March 22, 2011.

Significance Determination

TVA performed significance determination using Inspection Manual Chapter 0609, Appendix M versus Appendix F

- Appendix F does not allow quantification of defense-in-depth features
- NRC significance determination using Appendix F dominated by fire probabilistic risk assessment assumptions and conservatisms
  - Recognized by industry as overestimating baseline risk
  - Calculated fire risk conservative by factor of 5 to 10, or higher
  - Results do not conform with operating experience
- Associated RHR Loop II would have been able to fulfill fire safe shutdown function

Conclusion

- Appendix M methodology is appropriate for evaluating risk associated with failure of valve 1-FCV-74-66
- We will show that the results of Significance Determination Process evaluation should conclude that this situation is of "Very Low Safety Significance"

Significance Determination *(continued)*

Defense-in-depth associated with fire protection and fire safe shutdown

- Administrative controls to prevent fires
- Fire Protection Systems and features (including walkdowns and fire watches) to detect rapidly, control, and extinguish promptly any fires
  - Fire detection
  - Fire suppression
  - Fire barriers between fire areas
  - Dedicated onsite fire department
  - Weekly fire operations walkdowns
  - Hourly roving fire watches
  - Normal personnel traffic

Significance Determination *(continued)*

Ability of valve 1-FCV-74-66 to fulfill fire safe shutdown function

- Based on results of testing and analyses
- Results indicate valve disc freed within seven minutes
  - Would perform as check valve
  - Injection flow would be established
- Passing flow within seven-minute time period fully complies with 10 CFR 50 Appendix R SSIs and the SSA
- Operators would continue to run RHR pump to establish flow during an Appendix R event
  - Consistent with SSIs caution note to prevent exceeding pump design temperature limits

Significance Determination *(continued)*

Alternate flow paths available to support fire safe shutdown if valve 1-FCV-74-66 failed to pass flow

- Makeup to support fire safe shutdown (not specified in SSIs)
  - Condensate System (except for Turbine Building fire areas)
  - Core Spray System
  - High Pressure Coolant Injection System and/or Reactor Core Isolation Cooling System
- Long-term decay heat removal available
  - RHR Suppression Pool Cooling

Significance Determination *(continued)*

Defense-in-depth associated with design basis accidents if valve 1-FCV-74-66 failed to pass flow

- Remaining Emergency Core Cooling System subsystems available
  - LPCI associated with RHR Loop I
  - Two Core Spray Subsystems
  - High Pressure Coolant Injection System
  - Automatic Depressurization System
- Long-term decay heat removal available
  - RHR Suppression Pool Cooling

Significance determination shows that, regardless of whether valve 1-FCV-74-66 is assumed to pass flow or not, this condition was of "Very Low Safety Significance"

Performance Deficiency

Root cause of valve failure was manufacturing defect

- Preliminary cause of valve failure, identified as performance deficiency, was subsequently determined to not be the root cause
- Original manufacturer's design requirements not met
  - Undersized disc skirt threads at disc connection
- Disc skirt part of original valve assembly installed during construction in 1968-69 timeframe
- No receipt inspection of a valve assembly of this nature and classification required
  - Manufacturer provided certification documentation

Performance Deficiency *(continued)*

- Reviewed valve maintenance history
  - Valve skirt part of original valve assembly and not replaced prior to failure
  - No work performed that required measuring/confirming disc skirt thread size
- Cause is a manufacturing defect
  - Not reasonably within TVA ability to foresee and correct to prevent valve failure
- Condition should not be considered a licensee performance deficiency

Corrective Actions

- Short-term corrective actions
  - Repaired valve 1-FCV-74-66
  - Verified discs attached in all like valves, with tack welds intact and in good condition
  - Implemented controls limiting back-pressure on valves
- Long-term corrective actions
  - Restore or repair valve skirts to address potential undersized thread issue

Long-Term Fire Strategies

- Operator Manual Action (OMA) reduction
- SSI revisions
- Proactive installation of NFPA 805 transition modifications
- Driving down risk impacts utilizing NRC risk methodology

SSI Revision Goals

- Reduce plant risk in serious fire events
  - Reduce instances of SISBO actions
- Add branching steps to SSIs
  - Entry conditions would remain unchanged
  - Operator would be directed to use alternate safe shutdown methods if the SSI cannot be executed
    - Alternate paths include Condensate System, Core Spray System, High Pressure Coolant Injection System, and/or Reactor Core Isolation Cooling System

SSI Revision Goals *(continued)*

- Address Appendix R compliance
  - Reduce (but not eliminate) number of OMAs
- Reduce complexity of SSIs
- Support of NFPA 805 implementation
  - Implement post-transition shutdown strategies and procedures in advance
  - Implement modifications proactively

SSI Revision Plan

Phase I – Turbine Building and Intake

- Complete most risk sensitive area (planned for July 2011)
- Use upgraded SSA currently in progress for NFPA 805 transition
- Risk map (using conservative NRC approach) shows significant OMA issue risk reduction in July 2011
- Independent team established to execute this in parallel with NFPA 805 transition
- Utilizes plant recently completed modifications
  - Turbine Building/Intake Structure fire barrier
  - Cable tray covers
  - Incipient detection

SSI Revision Plan *(continued)*

Phase I – Turbine Building Specifics

- New fire barrier completed
  - Separate Turbine Building from intake
  - 3-hour rated
  - Allows a separate SSA for the Turbine Building
  - One train free of fire damage
- Symptom-based procedure
  - Essentially eliminates SISBO for this fire area
  - Allows use of available equipment
  - Additional precautions and instructions specific to the fire area
  - Protection of the credited train

SSI Revision Plan (Current Schedule) *(continued)*

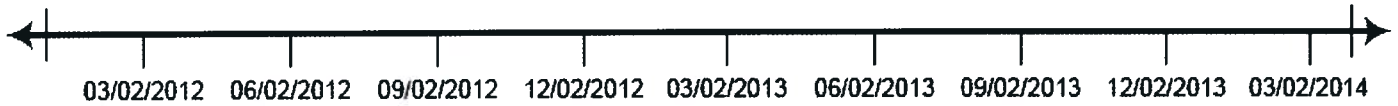
First Phase (Turbine Building Fire Area Separation: 25 and 26)

04/04/2011 07/29/2011

Second Phase (Fire Areas with CDF > 1E-6: 5, 6, 3-3, 3-4, 1-5, 2-3, 9, 12, 22, 23)

08/08/2011 12/30/2011

Third Phase of SSI Revision (All Fire Areas Between LAR and 6 months afer SER Date, Assume 18 month NRC review)



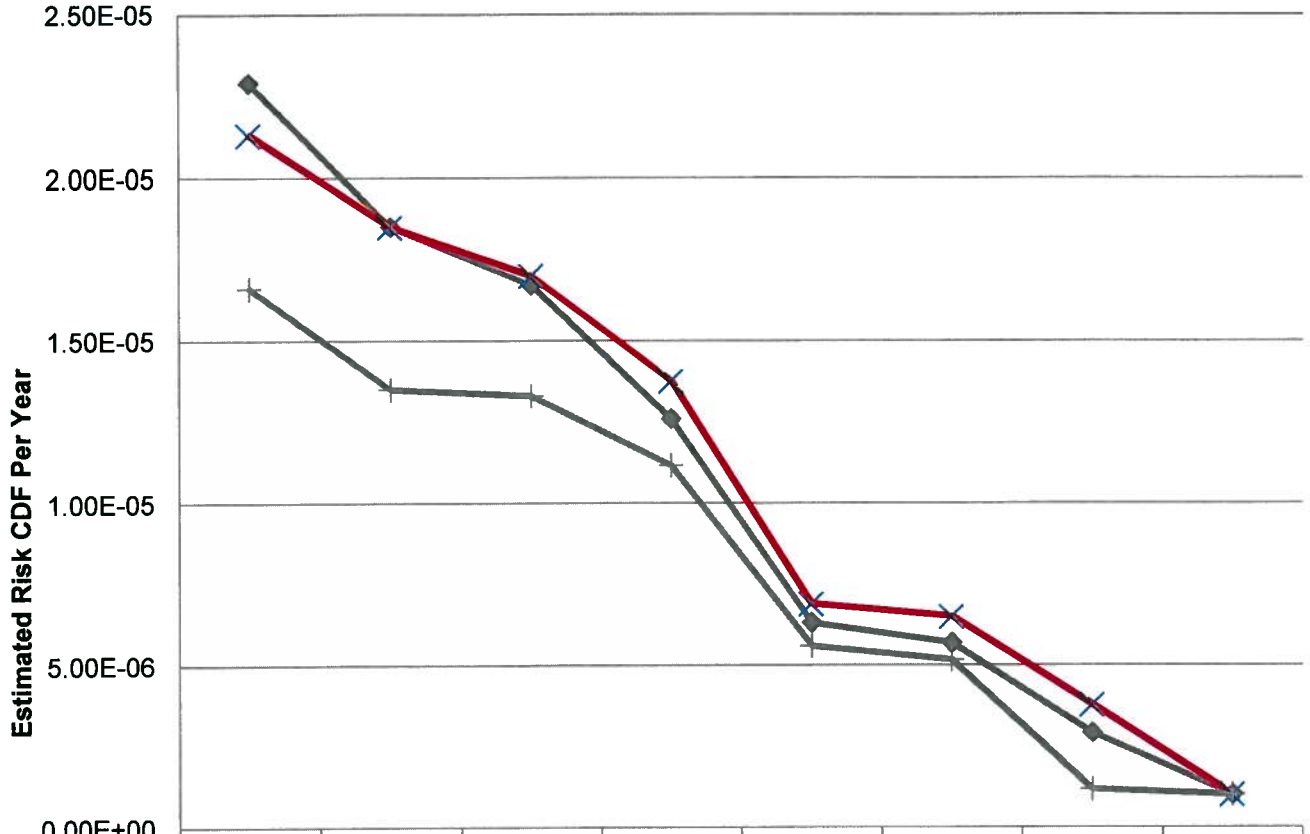
01/02/2012 03/28/2014

Extrapolated SDP Risk Estimates (Current Schedule)

(1.0E-5,1.0E-4)

(1.0E-6, 1.0E-5)

(CDF < 1.0E-6)



	SDP Original Value	Pull-Forward As Currently Scoped (Oct 2010)	Incipient Fire Detection SDB (Q1 2011)	Provide Divisional Tray Protection (Q1 2011)	SSI With Alternate Safe Shutdown Path (Q2 2011)	SSI Revision (Phase 1, FA 25, 26)	SSI Revision (Phase 2, FAs CDF > 1E-6)	NFPA 805 Based SSI (2012)
Extrapolated SDP Risk for Unit 1	2.29E-05	1.85E-05	1.67E-05	1.26E-05	6.30E-06	5.68E-06	2.89E-06	1.00E-06
Extrapolated SDP Risk for Unit 2	2.13E-05	1.85E-05	1.70E-05	1.38E-05	6.88E-06	6.49E-06	3.76E-06	1.00E-06
Extrapolated SDP Risk for Unit 3	1.66E-05	1.35E-05	1.33E-05	1.12E-05	5.58E-06	5.15E-06	1.16E-06	1.00E-06

SSI Revision Plan *(continued)*

Phases II and III – Additional High Risk Fire Areas

- Utilize advantages gained from upgraded SSA
- Improve shutdown strategy and procedures, if possible under Appendix R deterministic requirements
- Plant modifications, if feasible
- Will require completion of cable routing and analysis for affected areas

SSI Revision Team Approach

- Team managed from TVA corporate offices with work being performed in Chattanooga and vendor locations
- Team composition
  - Browns Ferry Nuclear Plant operations procedure writer and operations trainer
  - TVA corporate engineering manager for technical direction and oversight
  - Vendor engineers (2) for SSA support
  - Vendor engineers (3) for engineering design change development and support

Risk Reduction Summary

- TVA remains firmly committed to NFPA 805 transition
- Strong management support and oversight
  - Detailed transition schedule
  - Extensive resources onsite and at corporate office
  - Regular progress meetings with senior leadership
- Modifications and safe shutdown procedure improvements are continuing aggressively
- High focus is maintained on fire protection system health

Closing Remarks

TVA has shown conclusively that:

- There was no licensee performance deficiency
- LPCI valve 1-FCV-74-66 would have performed its safety function under Appendix R fire conditions
- Significance determination results in a finding of "Very Low Safety Significance"

TVA has also shown how accelerating some actions from the transition to NFPA 805 will quickly reduce fire risk at the Browns Ferry Nuclear Plant

- Changing SSIs to allow use of alternate safe shutdown paths
- Reducing the number of times that SISBO actions are taken
- Completed plant modifications such as incipient detection and cable tray covers

ENCLOSURE 2

Browns Ferry Nuclear Plant
Unit 1

Description of Browns Ferry Nuclear Plant IST Program Compliance with OM Code ISTC 4.1

Inservice Testing (IST) of FCV-74-52 and FCV-74-66

Question:

On the afternoon of Friday 04/29/2011, the NRC questioned Browns Ferry Nuclear Plant (BFN) Inservice Testing (IST) Program compliance with American Society of Mechanical Engineers (ASME) Operations and Maintenance (OM) Code, Subsection ISTC 4.1 (reference SR 362156). This document was written to establish the basis for compliance.

TVA Response:

During the Unit 1 Cycle 8 refueling outage on October 23, 2010, 1-FCV-74-66 did not open while attempting to place RHR Loop 2 in service. Lights indicated open but pump discharge pressure was at maximum and no flow was indicated in the loop. This condition and the root cause are documented in PER 271338.

The BFN IST Program is implemented in accordance with ASME OM Code 1995 Edition with 1996 Addenda (1995 OMa 1996). 1995 OMa 1996, Subsection ISTC 4.1, specifies the requirements for valve position verification as follows:

> *"Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flowmeters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation."*

The BFN IST Program is described in BFN Technical Instruction (TI) 0-TI-362, "Inservice Testing of Pumps and Valves." This TI lists in tabular form the ASME Class, Category, Normal and Safety Position, Surveillance Procedures, and Surveillance Frequencies. The configuration and testing of valves 1-FCV-74-52 and 1-FCV-74-66 (FCV-74-52/66) is typical for all three Units. These valves are classified as Category B valves with an active safety function. FCV-74-52/66 are normally open valves with an open safety position; however, these valves may be throttled and are therefore considered active in the IST Program. In accordance with the Code ISTC Table 3.6-1, Category B, active valves require exercising, stroke timing, and position indication verification. Exercising and stroke timing is conducted quarterly and position indication verification is conducted once per 2 years. In addition, remote position indication verification includes direct observation of stem movement.

NUREG-1482, Revision 1, "Guideline for Inservice Testing at Nuclear Power Plants," was used to develop the BFN IST Program. No specific additional guidance is provided for verification of remote position indication other than Section 4.2.7, Verification of Remote Position Indication for Valves by Methods Other Direct Observation. NRC recommendations related to this section contain some guidance applicable to FCV-74-52/66:

"For certain types of valves that can be observed locally, but for which stem travel does not ensure that the stem is attached to the disk, the local observation should be supplemented by observing an operating parameter as required by Subsections ISTC 4.1, 4.2, and 4.5."

Note that ISTC Subsections 4.2 and 4.5 are not applicable to remote position indication as described by Subsection 4.1.

Neither the OM Code nor NUREG-1482 requires the use of supplemental parameters in conjunction with position verification. ASME OM Code Interpretation 99-9 confirms that it is not the intent of the ASME OM Code to require observation of stem movement to be supplemented by other indications to verify obturator position regardless of practicability.

"Interpretation: 99-9

Subject: ASME/ANSI OMa-1988, Part 10, para. 4.1 and equivalent subsequent editions and addenda

Date Issued: December 23, 1998

File: OMI-98-20

Question: If it is practicable, is it a requirement of OMa-1988, Part 10, para. 4.1 that local observation of stem movement be supplemented by other indication to verify obturator position?

Reply: No."

Contact with an OM Code committee member identified that the committee did not intend supplemental verification be performed on all IST valves during position indication testing. This position is consistent with OM Code and NUREG guidance. Therefore, supplemental verification of the position of valves FCV-74-52 and FCV-74-66 has not been required for implementation of the OM Code at BFN, based on the OM Code itself, NUREG-1482, and Code Interpretation 99-9.

However, even though supplemental verification is not a Code requirement, it should be noted that exercise of CKV-74-68 and CKV-74-54 during performance of the surveillance procedures identified in Table 3 (see References below) provides indication that FCV-74-52 and FCV-74-66 are in the open position and passing flow. If flow was not observed during performance of these surveillance procedures, the surveillance acceptance criteria would not be met and investigation would determine any blockage of FCV-74-52 or FCV-74-66.

The requirements of the ASME OM Code are fulfilled through 0-TI-362 and the surveillance procedures listed in Appendices H, I, and J of 0-TI-362. In accordance with ISTC Table 3.6-1, Category B, active valves require exercising and position indication verification.

Exercising of FCV-74-52/66 is conducted quarterly in accordance with the surveillance procedures listed in Table 1 (see References below). Position indication is conducted once every two years in accordance with the procedures listed in Table 2 (see References below).

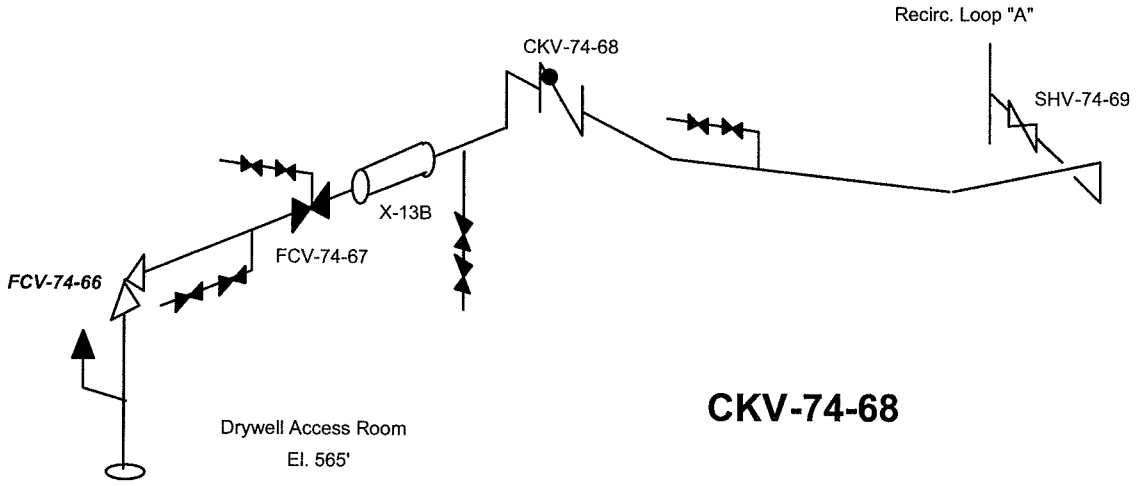


Figure 1

The configuration for RHR Loop II shown in Figure 1above illustrates the location of FCV-74-66 in relation to other IST Program valves (FCV-74-67 and CKV-74-68). RHR Loop I containing FCV-74-52 is similarly configured as shown in Figure 2 below.

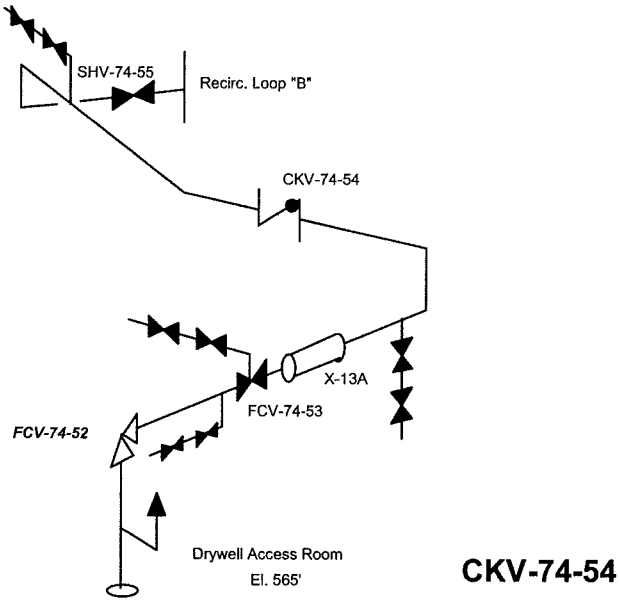


Figure 2

FCV-74-66 is normally open and is required to be open to provide flow to the reactor vessel.

IST Program implementing procedures, shown in Table 3, exercise CKV-74-68 to the open position using Shutdown Cooling flow of greater than or equal to 9000 gpm at a frequency of once per operating cycle in accordance with the BFN Condition Monitoring Program as described in 0-TI-443, "Condition Monitoring of Check Valves." This check valve test provides supplemental indication that FCV-74-66 is in the open position. Although not specifically documented in the check valve exercise test, supplemental indication that FCV-74-66 is open is provided when the check valve exercise test is performed.

1-SI-3.2.21(II) was scheduled to be performed at Cold Shutdown during U1R8. However, upon initiation of Shutdown Cooling, no flow was observed and the issue with 1-FCV-74-66 was identified, which precluded performance of the surveillance procedure.

Conclusion:

The BFN IST Program testing specified for FCV-74-52 and FCV-74-66 is in compliance with ASME OM Code, Code Interpretation 99-9, and the guidance provided in NUREG-1482, including verification of position indication. Although supplemental position indication verification is not required by the Code or NUREG-1482 for all IST valves subject to position verification requirements, verification of flow through CKV-74-54/CKV-74-68 at BFN does provide the recommended supplemental indication as discussed in the ASME OM Code and NUREG-1482.

References:

- ASME OM Code 1995 Edition 1996 Addenda
- 0-TI-362, Inservice Testing of Pumps and Valves
- NUREG-1482, Revision 1, Guideline for Inservice Testing at Nuclear Power Plants
- ASME OM Code Interpretation 99-9, Dated December 23, 1998 (OMI-98-20)
- BFN Surveillance Procedures:

Table 1: Quarterly Exercise of FCV-74-52/66

1-SR-3.6.1.3.5(RHR I)	2-SR-3.6.1.3.5(RHR I)	3-SR-3.6.1.3.5(RHR I)
1-SR-3.6.1.3.5(RHR II)	2-SR-3.6.1.3.5(RHR II)	3-SR-3.6.1.3.5(RHR II)

Table 2: Position Indication of FCV-74-52/66

1-SI-3.6.1.3.5(H I)	2-SI-3.6.1.3.5(H I)	3-SI-3.6.1.3.5(H I)
1-SI-3.6.1.3.5(H II)	2-SI-3.6.1.3.5(HII)	3-SI-3.6.1.3.5(H II)

Table 3: Exercise of CKV-74-68

1-SI-3.2.21(I)	2-SI-3.2.21(I)	3-SI-3.2.21(I)
1-SI-3.2.21(II)	2-SI-3.2.21(II)	3-SI-3.2.21(II)

SUPPORTING DOCUMENTATION

1. **0-TI-362 Appendix H**
   Showing matrix of Unit 1 IST valves

2. **Completed 1-SI-3.2.21(II) Package (2007)**
   Showing completion of Cold Shutdown Testing of 1-CKV-74-68

3. **Completed 1-SI-3.2.21(II) Package (2008)**
   Showing completion of Cold Shutdown Testing of 1-CKV-74-68

0-TI-362 Appendix H

Appendix H
(Page 1 of 14)
U1 Valve Matrix

VALVE ID	FUNCTION	ASME CLASS	DWG/DWG COORDINATES	CATEGORY	SIZE	VLV TYPE	ACTUATOR	NORM POS	SAFE POS	TEST REQD	RR/ RO/CSDJ	SI/SR NUMBER	SI/SR DESCRIPTION	SI/SR FREQ
1-PCV-01-0004	MS LN A RLF	1	1-47E801-1/B-3	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0005	MS LN A RLF	1	1-47E801-1/B-5	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-FCV-01-0014	MS LN A INBD ISOL	1	1-47E801-1/B-6	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	RO-01	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(A)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q RFO RFO O/OC
1-FCV-01-0015	MS LN A OUTBD ISOL	1	1-47E801-1/B-7	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	CSDJ-04	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(A)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q CSD CSD O/OC
1-PCV-01-0018	MS LN B RLF	1	1-47E801-1/C-1	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0019	MS LN B RLF	1	1-47E801-1/C-2	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0022	MS LN B RLF	1	1-47E801-1/C-3	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0023	MS LN B RLF	1	1-47E801-1/C-4	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-FCV-01-0026	MS LN B INBD ISOL	1	1-47E801-1/C-6	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	RO-01	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(B)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q RFO RFO O/OC
1-FCV-01-0027	MS LN B OUTBD ISOL	1	1-47E801-1/C-7	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	CSDJ-04	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(B)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q CSD CSD O/OC
1-PCV-01-0030	MS LN C RLF	1	1-47E801-1/E-1	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0031	MS LN C RLF	1	1-47E801-1/E-2	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0034	MS LN C RLF	1	1-47E801-1/E-4	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-FCV-01-0037	MS LN C INBD ISOL	1	1-47E801-1/E-6	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	RO-01	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(C)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q RFO RFO O/OC
1-FCV-01-0038	MS LN C OUTBD ISOL	1	1-47E801-1/E-7	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	CSDJ-04	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(C)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q CSD CSD O/OC
1-PCV-01-0041	MS LN D RLF	1	1-47E801-1/F-3	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-PCV-01-0042	MS LN D RLF	1	1-47E801-1/F-4	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-FCV-01-0051	MS LN D INBD ISOL	1	1-47E801-1/F-6	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	RO-01	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(D)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q RFO RFO O/OC

Appendix H
(Page 2 of 14)
U1 Valve Matrix

1-FCV-01-0052	MS LN D OUTBD ISOL	1	1-47E801-1/E-7	A	26	GL	AO	O	C	Q Q/VRPIL FS LT	CSDJ-04	1-SR-3.3.1.1.8(5) 1-SR-3.6.1.3.6 1-SI-3.2.12 1-SR-3.6.1.3.10(D)	PART STROKE TIME VLV/VRPIL FAIL SAFE LEAK TEST	Q CSD CSD O/OC
1-FCV-01-0055	MS DRN LN INBD ISOL	1	1-47E801-1/D-6	A	3	GA	MO	C	C	Q VRPIL LT	N/A	1-SR-3.6.1.3.5 1-SR-3.3.3.1.4(A) 1-SI-4.7.A.2.g-3/1e	TIME VLV VRPIL LEAK TEST	Q O/2YR O/OC
1-FCV-01-0056	MS DRN LN OUTBD ISOL	1	1-47E801-1/D-7	A	3	GA	MO	C	C	Q VRPIL LT	N/A	1-SR-3.6.1.3.5 1-SR-3.3.3.1.4(A) 1-SI-4.7.A.2.g-3/1e	TIME VLV VRPIL LEAK TEST	Q O/2YR O/OC
1-FCV-01-0058	MS DRN TO COND ISOL	2	1-47E801-1/F-3	B	3	GL	MO	C	O	Q VRPIL	N/A	1-SR-3.6.1.3.5 1-SR-3.3.3.1.4(A)	TIME VLV VRPIL	Q O/2YR
1-FCV-01-0059	MS DRN TO COND ISOL	2	1-47E801-1/F-2	B	4	GA	MO	C	O	Q VRPIL	N/A	1-SR-3.6.1.3.5 1-SR-3.3.3.1.4(A)	TIME VLV VRPIL	Q O/2YR
1-FCV-01-0127	RFPT 1A HP STOP VLV	2	1-47E801-2/B-7	B	4	GA	HYD	O	C	Q VRPIL	N/A	1-SI-3.2.29 1-SR-3.3.3.1.4(A)	TIME VLV VRPIL	Q O/2YR
1-FCV-01-0135	RFPT 1B HP STOP VLV	2	1-47E801-2/B-6	B	4	GA	HYD	O	C	Q VRPIL	N/A	1-SI-3.2.29 1-SR-3.3.3.1.4(A)	TIME VLV VRPIL	Q O/2YR
1-FCV-01-0143	RFPT 1C HP STOP VLV	2	1-47E801-2/B-5	B	4	GA	HYD	O	C	Q VRPIL	N/A	1-SI-3.2.29 1-SR-3.3.3.1.4(A)	TIME VLV VRPIL	Q O/2YR
1-PCV-01-0147	MS STM SEAL ISOL	2	1-47E807-2/D-6	B	4	AN	AO	C	C	Q/FS/VRPIL	CSDJ-05	1-SI-3.2.30	TIME VLV/FS/VRPIL	CSD
1-PCV-01-0151	SJAE 1A STG 1/2 REG	2	1-47E801-2/B-4	B	1-1/2	GA	AO	O	C	Q/FS/VRPIL	CSDJ-06	1-SI-3.2.30	TIME VLV/FS/VRPIL	CSD
1-PCV-01-0153	SJAE 1B STG 1/2 REG	2	1-47E801-2/B-3	B	1-1/2	GA	AO	O	C	Q/FS/VRPIL	CSDJ-06	1-SI-3.2.30	TIME VLV/FS/VRPIL	CSD
1-PCV-01-0166	SJAE 1A STG 3 REG	2	1-47E801-2/B-4	B	1-1/2	GA	AO	O	C	Q/FS/VRPIL	CSDJ-06	1-SI-3.2.30	TIME VLV/FS/VRPIL	CSD
1-PCV-01-0167	SJAE 1A STG 3 REG	2	1-47E801-2/B-3	B	1-1/2	GA	AO	O	C	Q/FS/VRPIL	CSDJ-06	1-SI-3.2.30	TIME VLV/FS/VRPIL	CSD
1-PCV-01-0179	MS LN A RLF	1	1-47E801-1/B-4	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC
1-PCV-01-0180	MS LN D RLF	1	1-47E801-1/E-4	C	6	RV	AO/SELF	C	O	RV	N/A	0-SR-3.4.3.1.a & b 1-SR-3.4.3.2	BENCH TEST CYCLE/VRPIL	O/OC O/OC
1-CKV-01-0742	OG PREHTR 1A SPLY	2	1-47E801-2/D-2	C	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3	COND MON	CM
1-CKV-01-0744	OG PREHTR 1B SPLY	2	1-47E801-2/C-2	C	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3	COND MON	CM
1-CKV-03-0554	FDWTR LN A OUTBD ISOL	1	1-47E803-1/G-6	AC	24	CK	SELF	O	C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/3a	COND MON	CM
1-CKV-03-0558	FDWTR LN A INBD ISOL	1	1-47E803-1/G-7	AC	24	CK	SELF	O	O/C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/3a	COND MON	CM
1-CKV-03-0568	FDWTR LN B OUTBD ISOL	1	1-47E803-1/F-6	AC	24	CK	SELF	O	C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/3b	COND MON	CM
1-CKV-03-0572	FDWTR LN B INBD ISOL	1	1-47E803-1/F-6	AC	24	CK	SELF	O	O/C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/3b	COND MON	CM
1-CKV-06-0822	SJAE 1B COND DRN	2	1-47E805-3/G-7	C	1/2	CK	SELF	O	C	CM	N/A	1-SI-3.2.3	COND MON	CM
1-CKV-06-0826	SJAE 1A COND DRN	2	1-47E805-3/G-6	C	1/2	CK	SELF	O	C	CM	N/A	1-SI-3.2.3	COND MON	CM
1-CKV-10-0506	MSRV TL PIPE A VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0507	MSRV TL PIPE B VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0508	MSRV TL PIPE C VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0509	MSRV TL PIPE D VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0510	MSRV TL PIPE E VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0511	MSRV TL PIPE F VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0512	MSRV TL PIPE G VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0513	MSRV TL PIPE H VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0514	MSRV TL PIPE J VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM

Appendix H
(Page 3 of 14)

U1 Valve Matrix

1-CKV-10-0515	MSRV TL PIPE K VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0516	MSRV TL PIPE L VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0519	MSRV TL PIPE M VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0520	MSRV TL PIPE N VC RLF	2	1-47E817-1/C-3	C	2.5	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0521	MSRV TL PIPE A VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0522	MSRV TL PIPE B VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0523	MSRV TL PIPE C VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0524	MSRV TL PIPE D VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0525	MSRV TL PIPE E VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0526	MSRV TL PIPE F VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0527	MSRV TL PIPE G VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0528	MSRV TL PIPE H VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0529	MSRV TL PIPE J VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0530	MSRV TL PIPE K VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0531	MSRV TL PIPE L VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0532	MSRV TL PIPE M VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-CKV-10-0533	MSRV TL PIPE N VC RLF	2	1-47E817-1/C-3	C	10	CK	SELF	C	O	CM	N/A	1-SI-3.2.11	COND MON	CM
1-FCV-23-0034	RHR HTX A OUTLT	3	1-47E858-1/F-8	B	16	GL	MO	C	O	Q/VRPIL	N/A	1-SI-4.5.C.1(3)	TIME VLV/VRPIL	Q
1-FCV-23-0040	RHR HTX C OUTLT	3	1-47E858-1/H-8	B	16	GL	MO	C	O	Q/VRPIL	N/A	1-SI-4.5.C.1(3)	TIME VLV/VRPIL	Q
1-FCV-23-0046	RHR HTX B OUTLT	3	1-47E858-1/F-5	B	16	GL	MO	C	O	Q/VRPIL	N/A	1-SI-4.5.C.1(3)	TIME VLV/VRPIL	Q
1-FCV-23-0052	RHR HTX D OUTLT	3	1-47E858-1/H-5	B	16	GL	MO	C	O	Q/VRPIL	N/A	1-SI-4.5.C.1(3)	TIME VLV/VRPIL	Q
0-CKV-23-0502	RHRSW A1 PMP DISCH CKV	3	1-47E858-1/B-5	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
0-HCV-23-0504	RHRSW A1-A2 PMP XTIE	3	1-47E858-1/B-5	B	18	GA	H	O	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-CKV-23-0506	RHRSW A2 PMP DISCH CKV	3	1-47E858-1/B-5	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
1-RFV-23-0509	RHR HTX A SPLY RLF	3	1-47E858-1/E-7	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-23-0510	RHR HTX A INLT CKV	3	1-47E858-1/E-7	C	16	CK	SELF	C	O	CM	N/A	1-SI-4.5.C.1(3)	COND MON	CM
1-RFV-23-0516	RHR HTX A TUBE RLF	3	1-47E858-1/F-7	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
0-CKV-23-0522	RHRSW B1 PMP DISCH CKV	3	1-47E858-1/B-4	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
0-HCV-23-0524	RHRSW B1-B2 PMP XTIE	3	1-47E858-1/B-4	B	18	GA	H	O	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-CKV-23-0526	RHRSW B2 PMP DISCH CKV	3	1-47E858-1/B-4	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
1-RFV-23-0529	RHR HTX B SPLY RLF	3	1-47E858-1/E-5	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-23-0530	RHR HTX B INLT CKV	3	1-47E858-1/E-5	C	16	CK	SELF	C	O	CM	N/A	1-SI-4.5.C.1(3)	COND MON	CM
1-RFV-23-0536	RHR HTX B TUBE RLF	3	1-47E858-1/F-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
0-CKV-23-0542	RHRSW C2 PMP DISCH CKV	3	1-47E858-1/B-4	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
0-HCV-23-0544	RHRSW C1-C2 PMP XTIE	3	1-47E858-1/B-3	B	18	GA	H	O	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-CKV-23-0546	RHRSW C1 PMP DISCH CKV	3	1-47E858-1/B-3	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
1-RFV-23-0549	RHR HTX C SPLY RLF	3	1-47E858-1/E-8	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-23-0550	RHR HTX C INLT CKV	3	1-47E858-1/E-8	C	16	CK	SELF	C	O	CM	N/A	1-SI-4.5.C.1(3)	COND MON	CM
1-RFV-23-0555	RHR HTX C TUBE RLF	3	1-47E858-1/H-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
0-CKV-23-0561	RHRSW D2 PMP DISCH CKV	3	1-47E858-1/B-3	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
0-HCV-23-0563	RHRSW D1-D2 PMP XTIE	3	1-47E858-1/B-3	B	18	GA	H	O	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-CKV-23-0565	RHRSW D1 PMP DISCH CKV	3	1-47E858-1/B-3	C	18	CK	SELF	C	O/C	CV	N/A	2-SI-4.5.C.1(3)	FLOW/NO FLOW	Q
1-RFV-23-0568	RHR HTX D SPLY RLF	3	1-47E858-1/E-5	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-23-0569	RHR HTX D INLT CKV	3	1-47E858-1/E-5	C	16	CK	SELF	C	O	CM	N/A	1-SI-4.5.C.1(3)	COND MON	CM
1-RFV-23-0574	RHR HTX D TUBE RLF	3	1-47E858-1/H-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
0-CKV-23-0588	RHRSW A3 PMP DISCH CKV	3	1-47E858-1/B-5	C	18	CK	SELF	C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-23-0591	RHRSW B3 PMP DISCH CKV	3	1-47E858-1/B-4	C	18	CK	SELF	C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-23-0594	RHRSW C3 PMP DISCH CKV	3	1-47E858-1/B-3	C	18	CK	SELF	C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q

Appendix H
(Page 4 of 14)
U1 Valve Matrix

0-CKV-23-0597	RHRSW D3 PMP DISCH CKV	3	1-47E858-1/B-2	C	18	CK	SELF	C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-23-0601	RHRSW HDR C KP FILL	3	1-47E858-1/E-4	C	1.5	CK	SELF	O	C	CM	N/A	2-SI-3.2.3 and 2-SI-3.2.31	COND MON	CM
0-CKV-23-0603	RHRSW HDR A KP FILL	3	1-47E858-1/E-4	C	1.5	CK	SELF	O	C	CM	N/A	2-SI-3.2.3 and 2-SI-3.2.31	COND MON	CM
0-CKV-23-0605	RHRSW HDR B KP FILL	3	1-47E858-1/E-3	C	1.5	CK	SELF	O	C	CM	N/A	2-SI-3.2.3 and 2-SI-3.2.31	COND MON	CM
0-CKV-23-0607	RHRSW HDR D KP FILL	3	1-47E858-1/E-3	C	1.5	CK	SELF	O	C	CM	N/A	2-SI-3.2.3 and 2-SI-3.2.31	COND MON	CM
1-CKV-32-0336	DW CTRL AIR CNTMT ISOL	2	1-47E1847-6/E-3	AC	1	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/32b	COND MON	CM
1-CKV-32-0915	DW CTRL AIR CNTMT ISOL	2	1-47E1847-10/D-5	AC	1	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/32b	COND MON	CM
1-CKV-32-2516	DW CTRL AIR CNTMT ISOL	2	1-47E1847-10/B-7	AC	3/4	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/32c	COND MON	CM
1-CKV-32-2521	DW CTRL AIR CNTMT ISOL	2	1-47E1847-6/D-3	AC	3/4	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/32c	COND MON	CM
1-FCV-43-0013	RECIRC CNTMT ISOL	1	1-47E610-43-1/H-4	A	3/4	GL	AO	C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/43a 1-SR-3.3.3.1.4(L)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-43-0014	RECIRC CNTMT ISOL	1	1-47E610-43-1/G-4	A	3/4	GL	AO	C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/43a 1-SR-3.3.3.1.4(L)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-63-0008A	SLC PMP A INJ	2	1-47E854-1/F-6	D	1.5	GA	X	C	O	DT	N/A	1-SR-3.1.7.7	EXPLOSIVE TEST	E/RO
1-FCV-63-0008B	SLC PMP B INJ	2	1-47E854-1/E-6	D	1.5	GA	X	C	O	DT	N/A	1-SR-3.1.7.7	EXPLOSIVE TEST	E/RO
1-RFV-63-0512	SLC PMP A RLF	2	1-47E854-1/E-5	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	O/OC
1-RFV-63-0513	SLC PMP B RLF	2	1-47E854-1/E-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	O/OC
1-CKV-63-0514	SLC PMP A DISCH CKV	2	1-47E854-1/E-5	C	1.5	CK	SELF	C	O	CM	N/A	1-SI-4.4.A.1 or 1-SR-3.1.7.7 1-SI-3.2.3	COND MON	CM
1-CKV-63-0516	SLC PMP B DISCH CKV	2	1-47E854-1/E-4	C	1.5	CK	SELF	C	O	CM	N/A	1-SI-4.4.A.1 or 1-SR-3.1.7.7 1-SI-3.2.3	COND MON	CM
1-CKV-63-0525	SLC CNTMT ISOL	1	1-47E854-1/E-7	C	1.5	CK	SELF	C	O/C	CM	N/A	1-SR-3.1.7.7 1-SI-3.2.3	COND MON	CM
1-CKV-63-0526	SLC CNTMT ISOL	1	1-47E854-1/D-7	C	1.5	CK	SELF	C	O/C	CM	N/A	1-SR-3.1.7.7 1-SI-3.2.3	COND MON	CM
1-FCV-64-0020	PSC VC RLF ISOL	2	1-47E865-1/C-5	A	20	BF	AO	C	O	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64b 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0021	PSC VC RLF ISOL	2	1-47E865-1/B-5	A	20	BF	AO	C	O	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64c 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0031	DW SBGT INBD CNTMT ISOL	2	1-47E865-1/F-3	A	2	BF	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64e 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0034	PSC SBGT OUTBD CNTMT ISOL	2	1-47E865-1/C-2	A	2	BF	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64e 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0139	DCA CMP SUCT CNTMT ISOL	2	1-47E610-64-2/F-3	A	3	GL	AO	O/C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64e 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0140	DCA CMP DISCH CNTMT ISOL	2	1-47E610-64-2/F-4	A	3	GL	AO	O/C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64e 1-SR-3.3.3.1.4(M)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-64-0221	PSC VENT TO PLANT STACK ISOL	2	1-47E2865-12/A-8	A	14	BF	AO	C	O/C	Q/FS LT	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64f	TIME VLV/FS LEAK TEST	Q O/OC

Appendix H
(Page 5 of 14)
U1 Valve Matrix

1-FCV-64-0222	PSC VENT TO PLANT STACK ISOL	2	1-47E2865-12/A-8	A	14	BF	AO	C	O/C	VRPIL Q/FS LT VRPIL	N/A	1-SR-3.3.3.1.4(M) 1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64f 1-SR-3.3.3.1.4(M)	VRPIL TIME VLV/FS LEAK TEST VRPIL	O/2YR Q O/OC O/2YR
1-CKV-64-0800	PSC VAC RLF CKV	2	1-47E865-1/C-5	AC	20	CK	SELF	C	O C	CM	N/A	1-SR-3.6.1.5.2 1-SI-4.7.A.2.g-3/64b	COND MON	CM
1-CKV-64-0801	PSC VAC RLF CKV	2	1-47E865-1/C-5	AC	20	CK	SELF	C	O C	CM	N/A	1-SR-3.6.1.5.2 1-SI-4.7.A.2.g-3/64c	COND MON	CM
0-FCV-67-0001	EECW HDR A STR BKWSH	3	1-47E859-1/A-5	B	1.25	BA	MO	O/C	O	Q/VRPIL	N/A	3-SI-4.5.C.1(2)	TIME VLV/VRPIL	Q
0-FCV-67-0005	EECW HDR B STR BKWSH	3	1-47E859-1/B-5	B	1.25	BA	MO	O/C	O	Q/VRPIL	N/A	3-SI-4.5.C.1(2)	TIME VLV/VRPIL	Q
0-FCV-67-0008	EECW HDR C STR BKWSH	3	1-47E859-1/D-2	B	1.25	BA	MO	O/C	O	Q/VRPIL	N/A	3-SI-4.5.C.1(2)	TIME VLV/VRPIL	Q
0-FCV-67-0011	EECW HDR D STR BKWSH	3	1-47E859-1/C-2	B	14	BA	MO	O/C	O	Q/VRPIL	N/A	3-SI-4.5.C.1(2)	TIME VLV/VRPIL	Q
1-FCV-67-0050	EECW N HDR TO RBCCW HTX	3	1-47E859-1/E-5	B	8	BA	AO	C	C	Q VRPIL	N/A	0-SI-4.5.C.1(1) 1-SI-3.2.10.C	TIME VLV VRPIL	Q O/2YR
1-FCV-67-0051	EECW S HDR TO RBCCW HTX	3	1-47E859-1/C-5	B	8	BA	AO	C	C	Q VRPIL	N/A	0-SI-4.5.C.1(1) 1-SI-3.2.10.C	TIME VLV VRPIL	Q O/2YR
0-FCV-67-0053	EECW N HDR TO AIR CMPSR	3	1-47E859-1/G-6	B	4	BA	AO	C	C	Q VRPIL	N/A	0-SI-4.5.C.1(1) 2-SI-3.2.10.C	TIME VLV VRPIL	Q O/2YR
0-SHV-67-0088	EECW/RHRSW XTIE	3	1-47E859-1/B-4	B	14	BF	H	C	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-SHV-67-0089	EECW/RHRSW XTIE	3	1-47E859-1/B-4	B	14	BF	H	C	O/C	Q	N/A	3-SI-4.5.C.1(2)	MANUAL CYCLE	Q
0-CKV-67-0502	SOUTH HDR CKV	3	1-47E859-1/B-8	C	18	CK	SELF	O/C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-67-0507	1D DG CLR S HDR CKV	3	1-47E859-1/C-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG D) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0508	1D DG CLR S HDR CKV	3	1-47E859-1/C-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG D) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0514	1C DG CLR S HDR CKV	3	1-47E859-1/D-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG C) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0515	1C DG CLR S HDR CKV	3	1-47E859-1/D-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG C) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0521	1B DG CLR S HDR CKV	3	1-47E859-1/F-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG B) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0522	1B DG CLR S HDR CKV	3	1-47E859-1/F-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG B) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0528	1A DG CLR S HDR CKV	3	1-47E859-1/G-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG A) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0529	1A DG CLR S HDR CKV	3	1-47E859-1/G-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG A) 2-SI-3.2.3	COND MON	CM
1-CKV-67-0541	CS I RM CLR S HDR SPLY	3	1-47E859-1/F-7	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0542	CS I RM CLR S HDR SPLY	3	1-47E859-1/F-7	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0558	RHR I RM CLR S HDR SPLY	3	1-47E859-1/C-6	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0559	RHR I RM CLR S HDR SPLY	3	1-47E859-1/C-6	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0584	CS II RM CLR S HDR SPLY	3	1-47E859-1/F-5	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS II) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0585	CS II RM CLR S HDR SPLY	3	1-47E859-1/F-5	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS II) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0600	RHR II RM CLR S HDR SPLY	3	1-47E859-1/C-4	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR II) 1-SI-3.2.3	COND MON	CM

Appendix H
(Page 6 of 14)

U1 Valve Matrix

1-CKV-67-0601	RHR II RM CLR S HDR SPLY	3	1-47E859-1/C-4	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR II) 1-SI-3.2.3	COND MON	CM
0-CKV-67-0619	SOUTH HDR CKV	3	1-47E859-1/C-1	C	18	CK	SELF	O/C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-67-0622	NORTH HDR CKV	3	1-47E859-1/E-8	C	18	CK	SELF	O/C	O/C	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
0-CKV-67-0624	1C DG CLR N HDR CKV	3	1-47E859-1/D-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG C) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0625	1C DG CLR N HDR CKV	3	1-47E859-1/D-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG C) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0627	1D DG CLR N HDR CKV	3	1-47E859-1/C-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG D) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0628	1D DG CLR N HDR CKV	3	1-47E859-1/C-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG D) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0630	1B DG CLR N HDR CKV	3	1-47E859-1/F-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG B) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0631	1B DG CLR N HDR CKV	3	1-47E859-1/F-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG B) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0634	1A DG CLR N HDR CKV	3	1-47E859-1/G-7	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG A) 2-SI-3.2.3	COND MON	CM
0-CKV-67-0635	1A DG CLR N HDR CKV	3	1-47E859-1/G-8	C	4	CK	SELF	O/C	O/C	CM	N/A	0-SI-3.2.4(DG A) 2-SI-3.2.3	COND MON	CM
1-CKV-67-0638	RHR I RM CLR N HDR SPLY	3	1-47E859-1/F-6	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0639	RHR I RM CLR N HDR SPLY	3	1-47E859-1/C-6	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0648	CS I RM CLR N HDR SPLY	3	1-47E859-1/F-6	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0649	CS I RM CLR N HDR SPLY	3	1-47E859-1/F-6	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS I) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0656	CS II RM CLR N HDR SPLY	3	1-47E859-1/F-4	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS II) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0657	CS II RM CLR N HDR SPLY	3	1-47E859-1/F-4	C	2.5	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(CS II) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0659	RHR II RM CLR N HDR SPLY	3	1-47E859-1/F-4	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR II) 1-SI-3.2.3	COND MON	CM
1-CKV-67-0660	RHR II RM CLR N HDR SPLY	3	1-47E859-1/C-4	C	3	CK	SELF	O/C	O/C	CM	N/A	1-SI-3.2.4(RHR II) 1-SI-3.2.3	COND MON	CM
0-CKV-67-0671	NORTH HDR CKV	3	1-47E859-1/E-1	C	18	CK	SELF	O/C	O	CV	N/A	3-SI-4.5.C.1(2)	FLOW/NO FLOW	Q
1-FCV-68-0003	RECIRC PMP A DISCH	1	1-47E817-1/D-6	B	28	GA	MO	O	C	Q VRPIL	CSDJ-01	1-SR-3.5.1.5 1-SI-3.2.10.D	TIME VLV VRPIL	CSD O/2YR
1-FCV-68-0079	RECIRC PMP B DISCH	1	1-47E817-1/C-4	B	28	GA	MO	O	C	Q VRPIL	CSDJ-01	1-SR-3.5.1.5 1-SI-3.2.10.D	TIME VLV VRPIL	CSD O/2YR
1-CKV-68-0508	RECIRC PMP SEAL ISOL	1	1-47E817-1/A-6	AC	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/68a	COND MON	CM
1-CKV-68-0523	RECIRC PMP SEAL ISOL	1	1-47E817-1/A-4	AC	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/68b	COND MON	CM
1-CKV-68-0550	RECIRC PMP SEAL ISOL	1	1-47E817-1/A-7	AC	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/68a	COND MON	CM
1-CKV-68-0555	RECIRC PMP SEAL ISOL	1	1-47E817-1/A-3	AC	3/4	CK	SELF	O	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/68b	COND MON	CM
1-FCV-69-0001	RWCU INBD CNTMT ISOL	1	1-47E810-1/G-7	A	6	GA	MO	O	C	Q LT	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/69	TIME VLV LEAK TEST	Q O/OC

Appendix H
(Page 7 of 14)
U1 Valve Matrix

										VRPIL		1-SR-3.3.3.1.4(E)	VRPIL	O/2YR
1-FCV-69-0002	RWCU OUTBD CNTMT ISOL	1	1-47E810-1/G-6	A	6	GA	MO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/69 1-SR-3.3.3.1.4(E)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-CKV-69-0629	RWCU TO FDWTR ISOL	1	1-47E810-1/E-6	AC	4	CK	SELF	O	C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/3b	COND MON	CM
1-FCV-70-0047	RBCCW RTN CNTMT ISOL	2	1-47E822-1/G-2	A	8	GA	MO	O	C	Q LT VRPIL	CSDJ-02	1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/70 1-SI-3.2.10.N	TIME VLV LEAK TEST VRPIL	CSD O/OC O/2YR
1-CKV-70-0506	RBCCW SPLY CNTMT ISOL	2	1-47E822-1/G-2	AC	8	CK	SELF	O	C	CM	N/A	1-SI-3.2.31 1-SI-4.7.A.2.g-3/70	COND MON	CM
1-FCV-71-0002	RCIC STM LN INBD CNTMT ISOL	1	1-47E813-1/G-7	A	3	GA	MO	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SI-4.7.A.2.g-3/71a 1-SR-3.3.3.1.4(F)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-71-0003	RCIC STM LN OUTBD CNTMT ISOL	1	1-47E813-1/G-6	A	3	GA	MO	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SI-4.7.A.2.g-3/71a 1-SR-3.3.3.1.4(F)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-71-0006A	RCIC STM LN TO COND DRN	2	1-47E813-1/E-1	B	1	GA	AO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0006B	RCIC STM LN TO COND DRN	2	1-47E813-1/E-1	B	1	GA	AO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0007A	RCIC CND PMP DISCH ISOL	2	1-47E813-1/A-3	B	1	GA	AO	C	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0008	RCIC TRB STM SPLY	2	1-47E813-1/F-1	B	4	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0009	RCIC TRB STOP VLV	2	1-47E813-1/F-2	B	3	GA	MO	O	O/C	SKID	N/A	1-SR-3.5.3.3	RCIC Pump Test	Q
1-RPD-71-0011A	RCIC TRB EXH RPD	2	1-47E813-1/E-3	D	8	RD	SELF	C	O	VI	N/A	1-SI-3.2.19	INSPECTION	O/5YR
1-SHV-71-0014	RCIC TRB EXH VLV	2	1-47E813-1/D-7	AC	8	SC	H/SELF	O	O/C	CM VRPIL	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD) 1-SR-3.5.3.3 1-SI-4.7.A.2.g-3/71b	COND MON VRPIL	CM O/2YR
1-RFV-71-0019	RCIC PMP SUCT RLF	2	1-47E813-1/G-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-FCV-71-0025	RCIC LUBE OIL CLG WTR	2	1-47E813-1/B-4	B	2	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-SHV-71-0032	RCIC COND VC PMP DISCH	2	1-47E813-1/D-7	C	2	SC	H/SELF	C	C	CM VRPIL	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON VRPIL	CM O/2YR
1-FCV-71-0034	RCIC PMP MIN FLOW	2	1-47E813-1/E-5	B	2	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0038	RCIC PMP TEST RTN TO CST	2	1-47E813-1/G-5	B	4	GL	MO	C	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0039	RCIC INJ INBD ISOL	2	1-47E813-1/F-6	B	6	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RCIC) 1-SR-3.3.3.1.4(F)	TIME VLV VRPIL	Q O/2YR
1-FCV-71-0040	RCIC TESTABLE CKV	1	1-47E813-1/F-6	AC	6	CK	AO/SELF	C	O/C	CM VRPIL	N/A	1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/3b	COND MON VRPIL	CM O/2YR
1-CKV-71-0499	CST TO RCIC PMP INLT	2	1-47E813-1/G-4	C	6	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.3.3	COND MON	CM
1-CKV-71-0508	PSC TO RCIC PMP INLT	2	1-47E813-1/B-6	C	6	CK	SELF	C	O	CM	N/A	1-SI-3.2.3	COND MON	CM
1-RFV-71-0543	RCIC COND CLG WTR	2	1-47E813-1/B-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-71-0547	RCIC PMP MIN FLOW	2	1-47E813-1/E-5	C	2	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.3.3	COND MON	CM

Appendix H
(Page 8 of 14)
U1 Valve Matrix

												1-SR-3.6.1.3.5(SD)		
1-CKV-71-0580	RCIC TRB EXH CKV	2	1-47E813-1/E-7	AC	10	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.3.3 1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/71b	COND MON	CM
1-CKV-71-0589	RCIC COND PMP CKV	2	1-47E813-1/A-3	C	2	CK	SELF	C	C	CM	N/A	1-SI-3.2.3 1-SR-3.5.3.3	COND MON	CM
1-CKV-71-0592	RCIC VC PMP DISCH	2	1-47E813-1/D-5	C	2	CK	SELF	C	C	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-CKV-71-0597	RCIC TRB EXH VC RLF	2	1-47E813-1/E-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-CKV-71-0598	RCIC TRB EXH VC RLF	2	1-47E813-1/E-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-CKV-71-0599	RCIC TRB EXH VC RLF	2	1-47E813-1/D-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-CKV-71-0600	RCIC TRB EXH VC RLF	2	1-47E813-1/D-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-FCV-73-0002	HPCI STM LN INBD ISOL	1	1-47E812-1/G-7	A	10	GA	MO	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SI-4.7.A.2.g-3/73a 1-SR-3.3.3.1.4(G)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-73-0003	HPCI STM LN OUTBD ISOL	1	1-47E812-1/G-6	A	10	GA	MO	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SI-4.7.A.2.g-3/73a 1-SR-3.3.3.1.4(G)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-73-0006A	HPCI STM LN TO COND DRN	2	1-47E812-1/E-2	B	1	GA	AO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0006B	HPCI STM LN TO COND DRN	2	1-47E812-1/E-2	B	1	GA	AO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0016	HPCI TRB STM SPLY VLV	2	1-47E812-1/G-3	B	10	GA	MO	C	O	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0018	HPCI TRB STOP VLV	2	1-47E812-1/G-3	B	10	GA	E/H	C	O	SKID	N/A	1-SR-3.5.1.7	HPCI Pump Test	Q
1-SHV-73-0023	HPCI TRB EXH VLV	2	1-47E812-1/D-7	AC	16	SC	H/SELF	O	O/C	CM VRPIL	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD) 1-SR-3.5.1.7 1-SI-4.7.A.2.g-3/73b	COND MON VRPIL	CM O/2YR
1-SHV-73-0024	HPCI TRB EXH COND POT DISCH	2	1-47E812-1/D-6	C	2	SC	H/SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-FCV-73-0026	PSC TO HPCI INBD ISOL	2	1-47E812-1/B-6	B	16	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0027	PSC TO HPCI OUTBD ISOL	2	1-47E812-1/G-5	B	16	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0030	HPCI PMP MIN FLOW	2	1-47E812-1/D-5	B	4	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0035	HPCI PMP TEST RTN TO CST	2	1-47E812-1/F-6	B	10	GL	MO	C	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0040	HPCI PMP SUCTION ISOL	2	1-47E812-1/H-5	B	14	GA	MO	O	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0044	HPCI INJ INBD ISOL	2	1-47E812-1/F-6	B	14	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(HPCI) 1-SR-3.3.3.1.4(G)	TIME VLV VRPIL	Q O/2YR
1-FCV-73-0045	HPCI TESTABLE CKV	1	1-47E812-1/E-6	AC	14	CK	AO/SELF	C	O/C	CM VRPIL	N/A	1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/3a	COND MON VRPIL	CM O/2YR
1-FCV-73-0081	1-FCV-73-3 BYPASS	1	1-47E812-1/G-6	A	1	GL	MO	O	C	Q	N/A	1-SR-3.6.1.3.5(HPCI)	TIME VLV	Q

Appendix H
(Page 9 of 14)
U1 Valve Matrix

										LT VRPIL		1-SI-4.7.A.2.g-3/73a 1-SR-3.3.3.1.4(G)	LEAK TEST VRPIL	O/OC O/2YR
1-CKV-73-0505	CST TO HPCI PMP INLT	2	1-47E812-1/H-5	C	14	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.7	COND MON	CM
1-RFV-73-0506	HPCI PMP SUCT RLF	2	1-47E812-1/G-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-73-0517	PSC TO HPCI PMP INLT	2	1-47E812-1/B-6	C	16	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(HPCI)	COND MON	CM
1-CKV-73-0559	HPCI PMP MIN FLOW CHECK	2	1-47E812-1/D-5	C	4	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.7 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-RFV-73-0574	HPCI PMP GLND SL COND	2	1-47E812-1/C-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-73-0603	HPCI TRB EXH CHECK	2	1-47E812-1/D-7	AC	20	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.7 1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/73b	COND MON	CM
1-CKV-73-0609	HPCI TRB EXH DRN CHECK	2	1-47E812-1/D-6	C	2	CK	SELF	C	C	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-CKV-73-0625	HPCI PMP GLND SL RTN	2	1-47E812-1/B-4	C	2	CK	SELF	C	C	CM	N/A	1-SI-3.2.3/1-SR-3.5.1.7	COND MON	CM
1-RFV-73-0633	HPCI TRB EXH VC RLF	2	1-47E812-1/D-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-RFV-73-0634	HPCI TRB EXH VC RLF	2	1-47E812-1/D-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-RFV-73-0635	HPCI TRB EXH VC RLF	2	1-47E812-1/E-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-RFV-73-0636	HPCI TRB EXH VC RLF	2	1-47E812-1/E-7	C	2	CK	SELF	C	O	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD)	COND MON	CM
1-RPD-73-0713	HPCI TRB EXH RPD	2	1-47E812-1/D-4	D	16	RD	SELF	C	O	VI	N/A	1-SI-3.2.19	INSPECTION	O/5YR
1-FCV-74-0007	RHR LP I MIN FLOW	2	1-47E811-1/D-6	B	4	GA	MO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0030	RHR LP II MIN FLOW	2	1-47E811-1/D-3	B	4	GA	MO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H II)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0047	RHR SD CLG OUTBD ISOL	1	1-47E811-1/E-5	A	20	GA	MO	C	O/C	Q LT VRPIL	CSDJ-03	1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/74g 1-SI-3.2.10.H(SDC)	TIME VLV LEAK TEST VRPIL	CSD O/OC O/2YR
1-FCV-74-0048	RHR SD CLG INBD ISOL	1	1-47E811-1/E-5	A	20	GA	MO	C	O/C	Q LT VRPIL	CSDJ-03	1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/74g 1-SI-3.2.10.H(SDC)	TIME VLV LEAK TEST VRPIL	CSD O/OC O/2YR
1-FCV-74-0052	RHR LP I THROTTLE	2	1-47E811-1/F-7	B	24	AN	MO	O	O	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0053	RHR LP I INJ	1	1-47E811-1/F-6	A	24	GA	MO	C	O/C	Q LTP VRPIL	CSDJ-07	1-SR-3.6.1.3.5(SD) 1-SI-3.2.74(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV LEAK TEST (PIV) VRPIL	CSD O/2YR O/2YR
1-CKV-74-0054	RHR LP I CKV	1	1-47E811-1/F-6	AC	24	CK	SELF	C	O/C	CM LTP	N/A	1-SI-3.2.21(I) 1-SI-3.2.74(RHR I)	COND MON LEAK TEST (PIV)	CM O/2YR
1-FCV-74-0057	RHR LP I PSC RTN	2	1-47E811-1/G-8	B	18	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0058	RHR LP I PSC SPRAY	2	1-47E811-1/F-8	B	4	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0059	RHR LP I PMP TEST RTN	2	1-47E811-1/F-8	B	12	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0060	RHR LP I CNTMT SPRAY	2	1-47E811-1/G-6	B	12	GA	MO	C	O/C	Q	N/A	1-SR-3.6.1.3.5(RHR I)	TIME VLV	Q

Appendix H
(Page 10 of 14)
U1 Valve Matrix

	OUTBD ISOL									VRPIL		1-SR-3.3.3.1.4(H I)	VRPIL	O/2YR
1-FCV-74-0061	RHR LP I CNTMT SPRAY INBD ISOL	2	1-47E811-1/G-5	B	12	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR I) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0066	RHR LP II THROTTLE	2	1-47E811-1/F-3	B	24	AN	MO	O	O	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0067	RHR LP II INJ	1	1-47E811-1/F-4	A	24	GA	MO	C	O/C	Q LTP VRPIL	CDSJ-07	1-SR-3.6.1.3.5(SD) 1-SI-3.2.74(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV LEAK TEST (PIV) VRPIL	CSD O/2YR O/2YR
1-CKV-74-0068	RHR LP II CKV	1	1-47E811-1/F-4	AC	24	CK	SELF	C	O/C	CM LTP	N/A	1-SI-3.2.21(II) 1-SI-3.2.74(RHR II)	COND MON LEAK TEST (PIV)	CM O/2YR
1-FCV-74-0071	RHR LP II PSC RTN	2	1-47E811-1/G-2	B	18	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0072	RHR LP II PSC SPRAY	2	1-47E811-1/F-2	B	4	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 11-SR-3.3.3.1.4(H I))	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0073	RHR LP II PMP TEST RTN	2	1-47E811-1/F-2	B	12	GL	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0074	RHR LP II CNTMT SPRAY OUTBD ISOL	2	1-47E811-1/G-4	B	12	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-FCV-74-0075	RHR LP II CNTMT SPRAY INBD ISOL	2	1-47E811-1/G-5	B	12	GA	MO	C	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(RHR II) 1-SR-3.3.3.1.4(H I)	TIME VLV VRPIL	Q O/2YR
1-RFV-74-0509A	RHR PMP A SUCT RLF	2	1-47E811-1/B-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0509B	RHR PMP B SUCT RLF	2	1-47E811-1/D-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0509C	RHR PMP C SUCT RLF	2	1-47E811-1/D-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0509D	RHR PMP D SUCT RLF	2	1-47E811-1/B-3	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-74-0559A	RHR PMP A DISCH CKV	2	1-47E811-1/B-7	C	20	CK	SELF	C	O/C	CV	N/A	1-SR-3.5.1.6(RHR I)	FLOW/NO FLOW	Q
1-CKV-74-0559B	RHR PMP B DISCH CKV	2	1-47E811-1/D-3	C	20	CK	SELF	C	O/C	CV	N/A	1-SR-3.5.1.6(RHR II)	FLOW/NO FLOW	Q
1-CKV-74-0559C	RHR PMP C DISCH CKV	2	1-47E811-1/C-7	C	20	CK	SELF	C	O/C	CV	N/A	1-SR-3.5.1.6(RHR I)	FLOW/NO FLOW	Q
1-CKV-74-0559D	RHR PMP D DISCH CKV	2	1-47E811-1/B-3	C	20	CK	SELF	C	O/C	CV	N/A	1-SR-3.5.1.6(RHR II)	FLOW/NO FLOW	Q
1-CKV-74-0560A	RHR PMP A MIN FLOW	2	1-47E811-1/B-6	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(RHR I)	COND MON	CM
1-CKV-74-0560B	RHR PMP A MIN FLOW	2	1-47E811-1/D-3	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(RHR II)	COND MON	CM
1-CKV-74-0560C	RHR PMP A MIN FLOW	2	1-47E811-1/D-6	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(RHR I)	COND MON	CM
1-CKV-74-0560D	RHR PMP A MIN FLOW	2	1-47E811-1/B-3	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(RHR II)	COND MON	CM
1-RFV-74-0578A	RHR HTX A RLF	2	1-47E811-1/B-7	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0578B	RHR HTX B RLF	2	1-47E811-1/C-2	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0578C	RHR HTX C RLF	2	1-47E811-1/C-8	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0578D	RHR HTX D RLF	2	1-47E811-1/B-2	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0587A	RHR LP I DISCH HDR RLF	2	1-47E811-1/G-7	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0587B	RHR LP II DISCH HDR RLF	2	1-47E811-1/G-3	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-74-0659	RHR SD CLG SPLY RLF	2	1-47E811-1/E-5	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-74-0661	RHR THERMAL RLF	1	1-47E811-1/F-5	AC	3/4	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/74g	COND MON	CM
1-CKV-74-0662	RHR THERMAL RLF	1	1-47E811-1/F-5	AC	3/4	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.6.1.3.5(SD) 1-SI-4.7.A.2.g-3/74g	COND MON	CM
1-CKV-74-0792	RHR LP I KP FILL	2	1-47E811-1/H-6	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31	COND MON	CM

Appendix H
(Page 11 of 14)
U1 Valve Matrix

												OR1-SI-3.2.14		
1-CKV-74-0802	RHR LP II KP FILL	2	1-47E811-1/H-3	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR1-SI-3.2.14	COND MON	CM
1-CKV-74-0803	RHR LP II KP FILL	2	1-47E811-1/H-3	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR1-SI-3.2.14	COND MON	CM
1-CKV-74-0804	RHR LP I KP FILL	2	1-47E811-1/H-6	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR1-SI-3.2.14	COND MON	CM
1-FCV-75-0009	CS LP I MIN FLOW	2	1-47E814-1/F-5	B	3	GA	MO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(CS I) 1-SR-3.3.3.1.4(I/1)	TIME VLV VRPIL	Q O/2YR
1-FCV-75-0022	CS LP I PMP TEST	2	1-47E814-1/F-5	B	10	GL	MO	C	C	Q VRPIL	N/A	1-SR-3.5.1.6(CS I) 1-SR-3.3.3.1.4(I/1)	TIME VLV VRPIL	Q O/2YR
1-FCV-75-0025	CS LP I INJ	1	1-47E814-1/F-6	A	12	GA	MO	C	O	Q LTP VRPIL	CSDJ-07	1-SR-3.6.1.3.5(SD) 1-SI-3.2.75(CS I) 1-SR-3.3.3.1.4(I/1)	TIME VLV LEAK TEST (PIV) VRPIL	CSD O/2YR O/2YR
1-CKV-75-0026	CS LP I CKV	1	1-47E814-1/F-7	AC	12	CK	SELF	C	O/C	CM LTP	N/A	1-SI-3.2.27(I) 1-SI-3.2.75(CS I)	COND MON LEAK TEST (PIV)	CM O/2YR
1-FCV-75-0037	CS LP II MIN FLOW	2	1-47E814-1/F-4	B	3	GA	MO	O	O/C	Q VRPIL	N/A	1-SR-3.6.1.3.5(CS II) 1-SR-3.3.3.1.4(I/2)	TIME VLV VRPIL	Q O/2YR
1-FCV-75-0050	CS LP II PMP TEST	2	1-47E814-1/F-4	B	10	GL	MO	C	C	Q VRPIL	N/A	1-SR-3.5.1.6(CS II) 1-SR-3.3.3.1.4(I/2)	TIME VLV VRPIL	Q O/2YR
1-FCV-75-0053	CS LP II INJ	1	1-47E814-1/G-6	A	12	GA	MO	C	O	Q LTP VRPIL	CSDJ-07	1-SR-3.6.1.3.5(SD) 1-SI-3.2.75(CS II) 1-SR-3.3.3.1.4(I/2)	TIME VLV LEAK TEST (PIV) VRPIL	CSD O/2YR O/2YR
1-CKV-75-0054	CS LP II CKV	1	1-47E814-1/G-7	AC	12	CK	SELF	C	O/C	CM LTP	N/A	1-SI-3.2.27(II) 1-SI-3.2.75(CS II)	COND MON LEAK TEST (PIV)	CM O/2YR
1-FCV-75-0057	CS DRN PMP A INBD ISOL	2	1-47E814-1/B-4	B	3	GL	AO	O	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(CS I) 1-SR-3.3.3.1.4(I/1)	TIME VLV VRPIL	Q O/2YR
1-FCV-75-0058	CS DRN PMP A OUTBD ISOL	2	1-47E814-1/B-5	B	3	GL	AO	O	C	Q VRPIL	N/A	1-SR-3.6.1.3.5(CS I) 1-SR-3.3.3.1.4(I/1)	TIME VLV VRPIL	Q O/2YR
1-RFV-75-0507A	CS PMP A SUCT RLF	2	1-47E814-1/C-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-75-0507B	CS PMP B SUCT RLF	2	1-47E814-1/C-2	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-75-0507C	CS PMP C SUCT RLF	2	1-47E814-1/C-6	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-75-0507D	CS PMP D SUCT RLF	2	1-47E814-1/C-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-75-0537A	CS PMP A DISCH CKV	2	1-47E814-1/D-4	C	12	CK	SELF	C	O	CV	N/A	1-SR-3.5.1.6(CS I)	CYCLE VLV	Q
1-CKV-75-0537B	CS PMP B DISCH CKV	2	1-47E814-1/D-3	C	12	CK	SELF	C	O	CV	N/A	1-SR-3.5.1.6(CS II)	CYCLE VLV	Q
1-CKV-75-0537C	CS PMP C DISCH CKV	2	1-47E814-1/D-6	C	12	CK	SELF	C	O	CV	N/A	1-SR-3.5.1.6(CS I)	CYCLE VLV	Q
1-CKV-75-0537D	CS PMP D DISCH CKV	2	1-47E814-1/D-4	C	12	CK	SELF	C	O	CV	N/A	1-SR-3.5.1.6(CS II)	CYCLE VLV	Q
1-RFV-75-0543A	CS LP I DISCH RLF	2	1-47E814-1/F-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-RFV-75-0543B	CS LP II DISCH RLF	2	1-47E814-1/E-4	C	1	RV	SELF	C	O	RV	N/A	1-SI-3.2.9	BENCH TEST	COND
1-CKV-75-0570A	CS PMP A MIN FLW	2	1-47E814-1/D-5	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(CS I)	COND MON	CM
1-CKV-75-0570B	CS PMP B MIN FLW	2	1-47E814-1/D-2	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(CS II)	COND MON	CM
1-CKV-75-0570C	CS PMP C MIN FLW	2	1-47E814-1/D-6	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(CS I)	COND MON	CM
1-CKV-75-0570D	CS PMP D MIN FLW	2	1-47E814-1/D-4	C	3	CK	SELF	C	O/C	CM	N/A	1-SI-3.2.3 1-SR-3.5.1.6(CS II)	COND MON	CM
1-CKV-75-0606	CS LP I KP FILL CKV	2	1-47E814-1/F-5	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR 1-SI-3.2.15	COND MON	CM
1-CKV-75-0607	CS LP I KP FILL CKV	2	1-47E814-1/F-5	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR 1-SI-3.2.15	COND MON	CM

Appendix H
(Page 12 of 14)
U1 Valve Matrix

1-CKV-75-0609	CS LP II KP FILL CKV	2	1-47E814-1/H-4	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR 1-SI-3.2.15	COND MON	CM
1-CKV-75-0610	CS LP II KP FILL CKV	2	1-47E814-1/H-4	C	2	CK	SELF	O/C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 OR 1-SI-3.2.15	COND MON	CM
1-FCV-76-0017	DW N2 MKUP OUTBD ISOL	2	1-47E860-1/C-6	A	2	BF	CYL	O/C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/76k 1-SR-3.3.3.1.4(O)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-76-0018	DW N2 MKUP INBD ISOL	2	1-47E860-1/C-6	A	2	BF	CYL	O/C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/76k 1-SR-3.3.3.1.4(O)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-76-0019	PSC N2 MKUP INBD ISOL	2	1-47E860-1/B-5	A	2	BF	CYL	O/C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/76k 1-SR-3.3.3.1.4(O)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-76-0024	DW N2 PURGE OUTBD ISOL	2	1-47E860-1/C-5	A	10	BF	CYL	C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/64a 1-SR-3.3.3.1.4(O)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-76-0049	DW H2 ANLYZR A INBD ISOL	2	1-47E1610-76-3/D-7	A	1/2	GA	S	O/C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76a	TIME VLV LEAK TEST	Q O/OC
1-FSV-76-0050	DW H2 ANLYZR A OUTBD ISOL	2	1-47E1610-76-3/D-7	A	1/2	GA	S	O/C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76a	TIME VLV LEAK TEST	Q O/OC
1-FSV-76-0055	PSC H2 ANLYZR A INBD ISOL	2	1-47E1610-76-3/E-7	A	1/2	GA	S	O/C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76d	TIME VLV LEAK TEST	Q O/OC
1-FSV-76-0056	PSC H2 ANLYZR A OUTBD ISOL	2	1-47E1610-76-3/E-7	A	1/2	GA	S	O/C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76d	TIME VLV LEAK TEST	Q O/OC
1-FSV-76-0057	PSC RTN INBD ISOL	2	1-47E1610-76-3/E-7	A	1/2	GA	S	O	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76e	TIME VLV LEAK TEST	Q O/OC
1-FSV-76-0058	PSC RTN OUTBD ISOL	2	1-47E1610-76-3/E-7	A	1/2	GA	S	O	O/C	Q LT	N/A	1-SR-3.6.1.3.5(76) 1-SI-4.7.A.2.g-3/76e	TIME VLV LEAK TEST	Q O/OC
1-CKV-76-0653	TIP INDEXER PURGE	2	1-47E600-14/B-5	AC	1/4	CK	SELF	C	C	CM	N/A	1-SI-3.2.3 and 1-SI-3.2.31 1-SI-4.7.A.2.g-3/94b	COND MON	CM
1-FCV-77-0002A	DW FLR DRN SUMP INBD ISOL	2	1-47E852-1/C-4	A	3	BA	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/77a 1-SR-3.3.3.1.4(J)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-77-0002B	DW FLR DRN SUMP OUTBD ISOL	2	1-47E852-1/C-4	A	3	BA	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/77a 1-SR-3.3.3.1.4(J)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-77-0015A	DW EQ DRN SUMP INBD ISOL	2	1-47E852-2/D-3	A	3	BA	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/77b 1-SR-3.3.3.1.4(J)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-77-0015B	DW EQ DRN SUMP OUTBD ISOL	2	1-47E852-2/D-3	A	3	BA	AO	O	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/77b 1-SR-3.3.3.1.4(J)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-84-0008A	DW N2 SPLY TRN A	2	1-47E862-1/E-7	A	2	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/84a 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-84-0008B	PSC N2 SPLY TRN A	2	1-47E862-1/E-5	A	2	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/84b 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-84-0008C	PSC N2 SPLY TRN B	2	1-47E862-1/E-5	A	2	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/84c 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR

Appendix H
(Page 13 of 14)
U1 Valve Matrix

1-FSV-84-0008D	DW N2 SPLY TRN B	2	1-47E862-1/E-5	A	2	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/84d 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-84-0019	DW/PSC DISCH TO SBGT	2	1-47E862-1/E-2	A	2	GL	AO	C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/64d 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-84-0020	DW/PSC DISCH TO SBGT	2	1-47E862-1/G-2	A	2	GL	AO	C	C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/64e 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-84-0048	CAD XTIE TO DW CONT AIR ISOL	2	1-47E862-1/F-8	A	1	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/32c 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-84-0049	CAD XTIE TO DW CONT AIR ISOL	2	1-47E862-1/F-4	A	1	GL	S	C	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/32b 1-SR-3.3.3.1.4(Q)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-CKV-84-0600	DW SPLY CHECK A	2	1-47E862-1/E-7	AC	2	CK	SELF	C	O/C	CM	N/A	1-SI-4.7.G.1.a-3 1-SI-4.7.A.2.g-3/84a	COND MON	CM
1-CKV-84-0601	PSC SPLY CHECK A	2	1-47E862-1/E-7	AC	2	CK	SELF	C	O/C	CM	N/A	1-SI-4.7.G.1.a-3 1-SI-4.7.A.2.g-3/84b	COND MON	CM
1-CKV-84-0602	DW SPLY CHECK B	2	1-47E862-1/F-8	AC	2	CK	SELF	C	O/C	CM	N/A	1-SI-4.7.G.1.a-3 1-SI-4.7.A.2.g-3/84d	COND MON	CM
1-CKV-84-0603	PSC SPLY CHECK B	2	1-47E862-1/F-4	AC	2	CK	SELF	C	O/C	CM	N/A	1-SI-4.7.G.1.a-3 1-SI-4.7.A.2.g-3/84c	COND MON	CM
1-SHV-84-0683	1-FSV-84-48 BYPASS	2	1-47E862-1/E-5	A	1	GA	H	C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/32c	TIME VLV LEAK TEST	Q O/OC
1-SHV-84-0686	1-FSV-84-49 BYPASS	2	1-47E862-1/E-5	A	1	GA	H	C	O/C	Q LT	N/A	1-SR-3.6.1.3.5(CAD) 1-SI-4.7.A.2.g-3/32b	TIME VLV LEAK TEST	Q O/OC
1-FCV-85-0037C	SDIV DRN ISOL WEST	2	1-47E820-6/B-6	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0037D	SDIV DRN ISOL WEST	N	1-47E820-6/B-5	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0037E	SDIV DRN ISOL EAST	2	1-47E820-6/B-3	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0037F	SDIV DRN ISOL EAST	N	1-47E820-6/B-3	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0039A	SCRM INLT (185 TOTAL)	1	1-47E820-2/F-3	B	1	GL	AO	C	O	Q/FS	PV-2	1-SR-3.1.4.1	FLW TST/FAIL SAFE	O/16W
1-FCV-85-0039B	SCRM OUTLT (185 TOTAL)	1	1-47E820-2/F-4	B	3/4	GL	AO	C	O	Q/FS	PV-2	1-SR-3.1.4.1	FLW TST/FAIL SAFE	O/16W
1-FCV-85-0082	SCRM DISCH HDR VT W	N	1-47E820-6/G-7	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0082A	SCRM DISCH HDR VT W	2	1-47E820-6/G-7	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0083	SCRM DISCH HDR VT E	N	1-47E820-6/G-3	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-FCV-85-0083A	SCRM DISCH HDR VT E	2	1-47E820-6/G-3	B	2	GL	AO	O	C	Q/FS VRPIL	N/A	1-SR-3.1.8.2 1-SI-3.2.10.R	TIME VLV/FAIL SAFE VRPIL	Q O/2YR
1-CKV-85-0589	CHGING WTR (185 TOTAL)	2	1-47E820-2/F-3	C	1/2	CK	SELF	C	O/C	CM	N/A	1-SR-3.1.4.1 1-SI-3.2.18	COND MON	CM
1-CKV-85-0597	CLG WTR (185 TOTAL)	1	1-47E820-2/G-3	C	1/2	CK	SELF	O	C	CM	N/A	1-SR-3.1.4.1	COND MON	CM
1-CKV-85-0616	SCRM OUTLT (185 TOTAL)	2	1-47E820-2/E-4	C	3/4	CK	SELF	C	O	CM	N/A	1-SR-3.1.4.1	COND MON	CM
1-FSV-90-0254A	DW LEAK DET ISOL	2	1-47E610-90-1/G-2	A	1	GA	S	O	O/C	Q LT	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/90	TIME VLV LEAK TEST	Q O/OC

Appendix H
(Page 14 of 14)
U1 Valve Matrix

										VRPIL		1-SR-3.3.3.1.4(S)	VRPIL	O/2YR
1-FSV-90-0254B	DW LEAK DET ISOL	2	1-47E610-90-1/G-1	A	1	GA	S	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/90 1-SR-3.3.3.1.4(S)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-90-0255	DW LEAK DET ISOL	2	1-47E610-90-1/G-2	A	1	GA	S	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/90 1-SR-3.3.3.1.4(S)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-90-0257A	DW LEAK DET ISOL	2	1-47E610-90-1/H-2	A	1	GA	S	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/90 1-SR-3.3.3.1.4(S)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FSV-90-0257B	DW LEAK DET ISOL	2	1-47E610-90-1/H-2	A	1	GA	S	O	O/C	Q LT VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/90 1-SR-3.3.3.1.4(S)	TIME VLV LEAK TEST VRPIL	Q O/OC O/2YR
1-FCV-94-0501	TIP INDEXER BALL VLV	2	1-47E600-14/B-8	A	3/8	BA	S	C	C	Q LT/VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/94a	TIME VLV LEAK TEST/VRPIL	Q O/OC
1-FCV-94-0502	TIP INDEXER BALL VLV	2	1-47E600-14/A-8	A	3/8	BA	S	C	C	Q LT/VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/94a	TIME VLV LEAK TEST/VRPIL	Q O/OC
1-FCV-94-0503	TIP INDEXER BALL VLV	2	1-47E600-14/A-8	A	3/8	BA	S	C	C	Q LT/VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/94a	TIME VLV LEAK TEST/VRPIL	Q O/OC
1-FCV-94-0504	TIP INDEXER BALL VLV	2	1-47E600-14/A-8	A	3/8	BA	S	C	C	Q LT/VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/94a	TIME VLV LEAK TEST/VRPIL	Q O/OC
1-FCV-94-0505	TIP INDEXER BALL VLV	2	1-47E600-14/A-8	A	3/8	BA	S	C	C	Q LT/VRPIL	N/A	1-SR-3.6.1.3.5 1-SI-4.7.A.2.g-3/94a	TIME VLV LEAK TEST/VRPIL	Q O/OC

Completed 1-SI-3.2.21(II) Package (2007)

Browns Ferry Nuclear Plant

Unit 1

Surveillance Instruction

1-SI-3.2.21(II)

Cold Shutdown Testing of 1-CKV-74-68

Revision 0000

Quality Related

Level of Use: Continuous Use

Effective Date: 10-04-2006

Responsible Organization: OPS, Operations

Prepared By: H D Sawyer

Approved By: Robert Moll

4.0 PREREQUISITES

[1] **VERIFY** this copy of the Surveillance Instruction is the current revision. O

[2] **CHECK** the Unit is in the process of shutting down or is at Cold Shutdown (Mode 4 or 5). O

[3] **VERFIY** the personnel listed below are available to perform this test. O

UO: 1 AUO: 1

[4] **VERFIY** Radiation Protection has been contacted to coordinate support required for the performance of this SI (**N/A** if not required.). O

5.0 SPECIAL TOOLS AND EQUIPMENT RECOMMENDED

Drain Hose (if performing the closure check)

6.0 ACCEPTANCE CRITERIA

A. Responses which fail to meet the Acceptance Criteria constitute unsatisfactory Surveillance Instruction results and require immediate notification of the Unit Supervisor (US) at the time of failure.

B. Steps which verify the following Acceptance Criteria are designated by (AC) next to the initials blank.

1. RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, shall cycle full open and full closed using shutdown cooling flow (9000 gpm minimum).

2. 1-CKV-074-0068 shall close to prevent backflow from the Reactor Vessel.

Date 1/5/07

7.0 PROCEDURE STEPS

7.1 Initial Conditions

[1] **VERIFY** that the following Initial Conditions are satisfied:

- Precautions and Limitations in Section 3.0 have been reviewed. O
- Prerequisites in Section 4.0 have been met. O

[2] **OBTAIN** permission from Unit Supervisor to perform this test. US

[3] [NRC/C] **NOTIFY** the Unit 1 Operator (UO) that this test is commencing. [RPT 82-16, LER 259/82032] O

[4] **RECORD** the start date, start time, reason for test, plant conditions, and any pre-test remarks on Attachment 1, Surveillance Instruction Review Form. O

Date 1/5/07

7.2 Test Steps

NOTE

Steps 7.2[1] and 7.2[2] are stand-alone sections. The preferred test sequence is to perform Step 7.2[1] prior to Step 7.2[2] but it is not mandatory to do so if plant/system operating conditions prevent testing in that sequence. Step 7.2[2] is not required if an LLRT of 1-CKV-074-0068 is performed during the current Reactor shutdown.

[1] **PERFORM** the following steps to check RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, is OPEN using Shutdown Cooling flow (**N/A** this section (7.2[1]) if open position testing is not required at this time.):

[1.1] **IF** RHR System II is in Shutdown Cooling, **THEN**

RECORD RHR System II flow below for the indicator used (Otherwise **N/A**): 1/5/07

Flow N/A ~~NOTE 2~~ NOTE 1 gpm U1 ICS display

Flow 7100 gpm 1-FI-74-64 on Panel 1-9-3.

[1.2] **IF** RHR System II is **NOT** in Shutdown Cooling, **THEN**

INITIATE Shutdown Cooling per 1-OI-74 (Otherwise **N/A**). N/A

[1.3] **THROTTLE** RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A on Panel 1-9-3 to obtain a minimum RHR System II flow rate of 9000 gpm on either of the following and **MARK** which indicator is used:

☐ U1 ICS display

☑ 1-FI-74-64 on Panel 1-9-3.

(AC)

Date 1/5/07

7.2 Test Steps (continued)

[1.4] **CHECK** a Containment Spray flow reading of approximately zero on either of the following and **MARK** which indicator is used:

☐ U1 ICS display

☑ 1-FI-74-70 on Panel 1-9-3.

0 (AC)

[1.5] **IF** RHR System II was initially in Shutdown Cooling, **THEN**

RESTORE the RHR System II system flow to approximately the flow recorded in Step 7.2[1.1] or as directed by the US using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A (Otherwise **N/A**). 0

[1.6] **IF** RHR System II Shutdown Cooling was initiated in Step 7.2[1.2], **THEN**

PERFORM the following as directed by the Unit Supervisor (Otherwise **N/A**):

[1.6.1] **REMOVE** RHR System II from service per 1-OI-74 (**N/A** if RHR System I will remain in service.). N/A

[1.6.2] **IF** RHR System II will remain in service, **THEN**

ADJUST Flow per 1-OI-74 to achieve the desired Shutdown Cooling flow (Otherwise **N/A**). 0

Date 1/5/07

7.2 Test Steps (continued)

[2] **PERFORM** steps 7.2[2.1] to 7.2[2.14] to check RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, is CLOSED using backflow testing (**N/A** if closed position testing is not required at this time. Closure testing is not required if an LLRT is performed for this valve during the current Reactor shutdown.):

[2.1] **IF** RHR System II is in Shutdown Cooling, **THEN**

PERFORM the following (Otherwise **N/A**):

[2.1.1] **RECORD** RHR System II flow below for the indicator used (Otherwise **N/A**):

Flow _____ gpm U1 ICS display

Flow _____ gpm 1-FI-74-64 on Panel 1-9-3.

N/A

[2.1.2] **REMOVE** RHR System II from Shutdown Cooling per 1-OI-74.

[2.2] **CHECK** RHR System II Shutdown Cooling flow rate is approximately zero.

[2.3] **CLOSE** RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A on Panel 1-9-3.

[2.4] **OPEN** RHR SYS II LPCI INBD INJECT VALVE, 1-FCV-074-0067, using RHR SYS II LPCI INBD INJECT VALVE, 1-HS-74-67A on Panel 1-9-3.

[2.5] **CONNECT** drain hose to test connection at RHR/SDC RETURN HDR TEST, 1-TV-074-0630B (DW Access, El. 565) and **ROUTE** hose to nearest floor drain.

[2.6] **OPEN** RHR/SDC RETURN HDR TEST, 1-SHV-074-0629B (DW Access, El. 565).

Date 1/5/07

7.2 Test Steps (continued)

NOTE

An initial stream of water may be observed in Step 7.2[2.7]. This is expected and should subside rapidly.

N/A

[2.7] **OPEN** 1-TV-074-0630B.

[2.8] **CHECK** that no pressurized solid stream of water is observed from the drain hose (checks that 1-CKV-074-0068 is CLOSED). (AC)

[2.9] **CLOSE** 1-TV-074-0630B.

[2.10] **CLOSE** 1-SHV-074-0629B.

[2.11] **CLOSE** 1-FCV-074-0067 using RHR SYSTEM II LPCI INBD INJECT VALVE, 1-HS-74-67A.

[2.12] **OPEN** 1-FCV-074-0066 using RHR SYS II OUTBD INJECT VALVE, 1-HS-74-66A.

[2.13] **REMOVE** drain hose from test connection at 1-TV-074-0630B.

[2.14] **IF** RHR System II was initially in Shutdown Cooling, in Step 7.2[2.1] and it is desired to return RHR System II to Shutdown Cooling, **THEN**

PERFORM the following as directed by the Unit Supervisor (Otherwise **N/A**):

- **PLACE** the RHR System II in Shutdown Cooling per 1-OI-74 and **ESTABLISH** the desired Shutdown Cooling flow (**N/A** if RHR System II will not be placed in service.).

Date 1/5/07

7.3 Restoration

NOTES

1) The Independent Verifications of the following steps may be performed in any order.
2) If a deficiency is identified during the performance of the Independent Verifications in the next steps, the Independent Verifier shall stop and notify the Unit Supervisor immediately for further instructions prior to correcting the deficient condition(s).

[1] On Panel 1-9-3, **INDEPENDENTLY VERIFY** the following:

- RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, is THROTTLED for desired Shutdown Cooling flow. — a / IV
- RHR SYSTEM II LPCI INBD INJECT VALVE, 1-FCV-074-0067, is in the OPEN position. — a / IV

[2] At DW Access, El. 565, **INDEPENDENTLY VERIFY** the following (**N/A** if Step 7.2[2] was not performed):

- RHR/SDC RETURN HDR TEST, 1-SHV-074-0629B, is in the CLOSED posiiton. — N/A / IV
- RHR/SDC RETURN HDR TEST, 1-TV-074-0630B, is in the CLOSED position. — ↓ / IV

[3] **VERIFY** that the work area is clean. — U

[4] **COMPLETE** Attachment 1, Surveillance Instruction Review Form, through Unit Supervisor review. — U

[5] **NOTIFY** the Unit 1 Operator that this Surveillance Instruction is complete. — U

[6] **NOTIFY** the Unit Supervisor that this Surveillance Instruction is complete and **PROVIDE** status of any test deficiencies or unsatisfactory test results. — U

[7] **COMPLETE** Attachment 2, ASME OM Code Inservice Testing Review Form. — U

8.0 ILLUSTRATIONS/ATTACHMENTS

Attachment 1, Surveillance Instruction Review Form

Attachment 2, ASME OM Code Inservice Testing Review Form

Attachment 1
(Page 1 of 1)

Surveillance Instruction Review Form

REASON FOR TEST:
- ☐ Scheduled Surveillance
- ☐ System Inoperable (Explain in Remarks)
- ☐ Maintenance (WO No. _____)
- ☑ Other (Explain in Remarks)

DATE/TIME STARTED 1/5/07 0800
DATE/TIME COMPLETED 1/5/07 0830
PLANT CONDITIONS Mode 5

PRE-TEST REMARKS: UNIT 1 RESTART
SGE CTL a 1/5/07

PERFORMED BY:

Initials	Name (Print)	Name (Signature)
a	Allen Smith	Allen Smith
a	Douglas Watson	

Delays or Problems (If yes, explain in post-test remarks)? ☐Yes ☑No
Acceptance Criteria Satisfied? ☑Yes ☐No
If the above answer is no, the Unit Supervisor shall determine if an LCO exists. LCO ☐Yes ☑No

UNIT SUPERVISOR R Womack Date 1/5/07
SECTION REVIEWER S. R Gray Date 1/5/07
INDEPENDENT REVIEWER Charles Driskell Date 1/9/07
SCHEDULING COORDINATOR J M. Barnett Date 1/23/07

POST-TEST REMARKS: SGE CTL a 1/5/07

1045F

Attachment 2
(Page 1 of 1)

ASME OM Code Inservice Testing Review Form

Component Tested	Fully Acceptable	Not Acceptable	N/A or Not Tested
1-CKV-074-0068 (Open, Step 7.2[1])	☑	☐	☐
1-CKV-074-0068 (Closed, Step 7.2[2])	☐	☐	☑

ASME OM Code Reviewer Charles Dishell Date 1/9/07

ASME OM Code data enter in SI(s) 1-SI-3.2.1

ANII Reviewer Harold Emel Date 01-20-07

REMARKS:

TEST DIRECTOR ASSIGNMENT SHEET
Page 1 of 1

TEST DIRECTOR ASSIGNMENT SHEET
Page 1 of 1

Data Package Page 1 of 2

Procedure No. 1-SI-3.2.21(II) Rev. 6

The responsible supervisor will answer the following three questions:

Chronological Test Log (CTL) Required?(1) Yes ☑ No ☐

Pre Test Formal Briefing Required? (2) Yes ☑ No ☐

Is this test a CIPTE?(3) Yes ☐ No ☑

When more than one test director is designated, indicate the current test director in the CTL.

CAUTION: THE RESPONSIBLE SUPERVISOR DESIGNATES THE TEST DIRECTOR AND IS RESPONSIBLE FOR DESIGNATING A QUALIFIED PERSON.

Designated Test Director Printed Name	Designated Test Director Signature (4)	Responsible Supervisor Signature (5)	Date
D Watson			1/5/07

(1) Form SPP-8.1-2 should be used as specified in section 3.4.

(2) The pretest formal briefing should be performed as specified in section 3.2.

(3) Determine if CIPTE as stated in Section 3.1.A.

(4) Signature attests to the requirements in Section 3.1.C.

(5) Signature attests to the requirements in Section 3.1.B.

CHRONOLOGICAL TEST LOG (CTL)
Page 1 of 1

CHRONOLOGICAL TEST LOG (CTL)

Data Package Page 2 of 2

Procedure No. 1-SI-3.2.21(II) Rev. 0

Date[3]/Time[1]	Narrative	Initials
1/5/07 0600	OPS STARTING 1-SI-3.2.21(II) FOR SECTION 7.2[1], SDC CHECK VALVE OPEN TESTING. BACK FLOW TESTING IAW SECTION 7.2[2] WILL BE PERFORMED WHEN SDC IS SECURED. R.SWAFFORD, A.SMITH, G.SMITH & D.WINDOM ATTENDED PRE-JOB BRIEF.	O
0630	OPS COMPLETE SAT 1-SI-3.2.21(II), SECTION 7.2[1]. NOTE 1 RESETS ID ICS POINT CALL R27 WHICH DID NOT INDICATE FLOW WITH SYSTEM IN SERVICE. SYSTEM ENGINEER NOTIFIED	O

Log entries have been reviewed and items are appropriately addressed.

Test Director[2] 1/5/07 Date

[1]Use 24 hour clock for each entry.
[2]Test Director signature only required on last sheet of CTL. The other review blanks can be marked N/A.
[3]The Date column needs to be filled in for the first entry on the CTL and for the first entry after each date change.

PRE-TEST BRIEFING CHECKLIST
Page 1 of 2

PRE-TEST BRIEFING CHECK LIST

Page 1 of 2

TEST PROCEDURE NUMBER 1-SI-3.2.21(II)
TEST PROCEDURE TITLE Cold Shutdown Boron of 1-CKV-74-68
ASSIGNED TEST DIRECTOR DWilson

		Complete	N/A
1.0	**BRIEFINGS WILL INCLUDE AS A MINIMUM THE FOLLOWING: PART I** The level of detail and applicability of the following items is dependent on the complexity of the test to be performed.		
1.1	Discuss scope, objectives, and expected results.	☑	☐
1.2	General personnel safety and equipment protection.	☑	☐
1.3	Major precautions of test.	☑	☐
1.4	Prepare test schedule (prerequisites, initial conditions, test performance and post test recovery).	☑	☐
1.5	Responsibilities and specific tasks of test personnel.	☑	☐
1.6	Locations of and communications with test support personnel.	☑	☐
1.7	Interfaces: a. Reporting/notification requirements b. Support organization requirements	☐	☑
1.8	Discussion of critical steps as defined in SPP-2.2 **NOTE** Critical steps shall be flagged (via designated stamp or equivalent marking) for review at the pre-test briefing.	☐	☑
1.9	Impact of the test on plant equipment and operations.	☑	☐
1.10	Effect on reactor core reactivity or nuclear fuel storage reactivity, or Independent Spent Fuel Storage Installation activities.	☑	☐
1.11	Expected and unexpected plant responses.	☑	☐
1.12	Potential problems and contingencies.	☑	☐
1.13	Differences between normal and test plant conditions.	☑	☐
1.14	Criteria for aborting the test.	☑	☐
1.15	Emphasis on quality over schedule.	☑	☐
1.16	Emphasis on Self-Checking.	☑	☐

PRE-TEST BRIEFING CHECKLIST
Page 2 of 2

PRE-TEST BRIEFING CHECK LIST

Page 2 of 2

		Complete	N/A
2.0	**CIPTEs WILL ALSO INCLUDE AS A MINIMUM THE FOLLOWING: PART II** In addition to PART I above CIPTEs will include the following items as applicable:		
2.1	State the need for exercising cautions and conservatism during the test, particularly when uncertainties are encountered.	☐	☑
2.2	Ensure responsibilities have been clearly assigned, especially those that are different from normal duties and accountabilities.	☐	☑
2.3	State the lessons learned from pertinent in-house and industry experience.	☐	☑
2.4	State the need to take proper actions when unexpected conditions arise or unexpected plant behavior is experienced. These actions could include stopping the test, stopping power ascension, decreasing power, or shutting down the unit.	☐	☑
2.5	Emphasize maintaining the highest margin of safety to place proper perspective on any sense of urgency that may otherwise prevail.	☐	☑
2.6	State the need for open communication.	☐	☑

Completed 1-SI-3.2.21(II) Package (2008)

1/14

TVA

Browns Ferry Nuclear Plant

Unit 1

Surveillance Instruction

1-SI-3.2.21(II)

Cold Shutdown Testing of 1-CKV-74-68

Revision 0000

Quality Related

Level of Use: Continuous Use

Effective Date: 10-04-2006

Responsible Organization: OPS, Operations

Prepared By: H D Sawyer

Approved By: Robert Moll

1.0 INTRODUCTION

1.1 Purpose

This Surveillance Instruction (SI) provides a method to test RHR SYSTEM II CHECK VLV, 1-CKV-074-0068.

1.2 Scope

This SI will test RHR SYSTEM II CHECK VLV, 1-CKV-074-0068. Testing will consist of valve cycling using Shutdown Cooling flow. This will satisfy ASME OM Code and Technical Specification 5.5.6 requirements.

1.3 Frequency

Valve cycling is conditional in accordance with the BFN Condition Monitoring Program.

2.0 REFERENCES

2.1 Technical Specifications

Section 5.5.6, Inservice Testing Program

2.2 Final Safety Analysis Report

A. Chapter 6.0, Emergency Core Cooling Systems

B. Chapter 6.6, Inspection and Testing

C. Chapter 7.3, Primary Containment Isolation System

D. Chapter 7.4, Emergency Core Cooling Control and Instrumentation

E. Figure 7.4-6a, Residual Heat Removal System Flow Diagram

F. Chapter 13.0, Conduct of Operations

2.3 Plant Instructions

A. 0-GOI-300-3, General Valve Operations

B. 1-OI-74, Residual Heat Removal System

2.3 Plant Instructions (continued)

C. 1-SI-3.2.1, Inservice Testing and Augmented Inservice Testing Valve Performance

D. 0-TI-362, Inservice Testing of Pumps and Valves

E. 0-TI-443, Condition Monitoring of Check Valves

F. SPP-8.1, Conduct of Testing

G. SPP-10.3, Verification Program

2.4 Plant Drawings

1-47E811-1, Flow Diagram Residual Heat Removal System

2.5 Miscellaneous Documents

INPO SER 4-89, Loss of Coolant Transient from Response to Open Check Valve

3.0 PRECAUTIONS AND LIMITATIONS

A. If maintenance other than what is provided for in this instruction becomes necessary, a separate Work Order (WO) must be initiated.

B. When testing the RHR System components without Shutdown Cooling flow, maintain awareness of the Reactor water temperature. Termination of this test and return to Shutdown Cooling will be necessary should the moderator temperature approach 212° Fahrenheit.

C. Prior to using the drain hose, the hose should be inspected for cuts, damaged fittings, etc., to determine suitability for safe use. If hose is questionable or needs replacing, contact Mechanical Maintenance.

D. This SI checks that RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, is closed by demonstrating there is no pressurized backflow from the primary coolant system past 1-CKV-074-0068. INPO SER 4-89 documents problems encountered when attempting to seat check valves using backflow from the primary coolant system during operation. Backflow testing specified in this SI should only be used to check that 1-CKV-074-0068 is already seated and only during Cold Shutdown (Mode 4 or 5) conditions.

Date 11-14-06

4.0 PREREQUISITES

[1] **VERIFY** this copy of the Surveillance Instruction is the current revision. CP

[2] **CHECK** the Unit is in the process of shutting down or is at Cold Shutdown (Mode 4 or 5). CP

[3] **VERFIY** the personnel listed below are available to perform this test.

UO: 1 AUO: 1 CP

[4] **VERFIY** Radiation Protection has been contacted to coordinate support required for the performance of this SI (**N/A** if not required.). CP

5.0 SPECIAL TOOLS AND EQUIPMENT RECOMMENDED

Drain Hose (if performing the closure check)

6.0 ACCEPTANCE CRITERIA

A. Responses which fail to meet the Acceptance Criteria constitute unsatisfactory Surveillance Instruction results and require immediate notification of the Unit Supervisor (US) at the time of failure.

B. Steps which verify the following Acceptance Criteria are designated by (AC) next to the initials blank.

1. RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, shall cycle full open and full closed using shutdown cooling flow (9000 gpm minimum).

2. 1-CKV-074-0068 shall close to prevent backflow from the Reactor Vessel.

Date 11/14/08

7.0 PROCEDURE STEPS

7.1 Initial Conditions

[1] **VERIFY** that the following Initial Conditions are satisfied:

- Precautions and Limitations in Section 3.0 have been reviewed. CO
- Prerequisites in Section 4.0 have been met. CO

[2] **OBTAIN** permission from Unit Supervisor to perform this test. US

[3] [NRC/C] **NOTIFY** the Unit 1 Operator (UO) that this test is commencing. [RPT 82-16, LER 259/82032] CO

[4] **RECORD** the start date, start time, reason for test, plant conditions, and any pre-test remarks on Attachment 1, Surveillance Instruction Review Form. CO

Date 11/14/98

7.2 Test Steps

NOTE

Steps 7.2[1] and 7.2[2] are stand-alone sections. The preferred test sequence is to perform Step 7.2[1] prior to Step 7.2[2] but it is not mandatory to do so if plant/system operating conditions prevent testing in that sequence. Step 7.2[2] is not required if an LLRT of 1-CKV-074-0068 is performed during the current Reactor shutdown.

[1] **PERFORM** the following steps to check RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, is OPEN using Shutdown Cooling flow (**N/A** this section (7.2[1]) if open position testing is not required at this time.):

[1.1] **IF** RHR System II is in Shutdown Cooling, **THEN**

RECORD RHR System II flow below for the indicator used (Otherwise **N/A**):

Flow 7032 gpm U1 ICS display

Flow 7000 gpm 1-FI-74-64 on Panel 1-9-3.

CO

[1.2] **IF** RHR System II is **NOT** in Shutdown Cooling, **THEN**

INITIATE Shutdown Cooling per 1-OI-74 (Otherwise **N/A**). N/A

[1.3] **THROTTLE** RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A on Panel 1-9-3 to obtain a minimum RHR System II flow rate of 9000 gpm on either of the following and **MARK** which indicator is used:

☐ U1 ICS display

☑ 1-FI-74-64 on Panel 1-9-3.

G (AC)

Date 11/14/18

7.2 Test Steps (continued)

[1.4] **CHECK** a Containment Spray flow reading of approximately zero on either of the following and **MARK** which indicator is used:

☐ U1 ICS display

☑ 1-FI-74-70 on Panel 1-9-3.

6 (AC)

[1.5] **IF** RHR System II was initially in Shutdown Cooling, **THEN**

RESTORE the RHR System II system flow to approximately the flow recorded in Step 7.2[1.1] or as directed by the US using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A (Otherwise **N/A**). 6

[1.6] **IF** RHR System II Shutdown Cooling was initiated in Step 7.2[1.2], **THEN**

PERFORM the following as directed by the Unit Supervisor (Otherwise **N/A**):

[1.6.1] **REMOVE** RHR System II from service per 1-OI-74 (**N/A** if RHR System I will remain in service.). N/A

[1.6.2] **IF** RHR System II will remain in service, **THEN**

ADJUST Flow per 1-OI-74 to achieve the desired Shutdown Cooling flow (Otherwise **N/A**). ↓

Date 11/14/06

7.2 Test Steps (continued)

[2] **PERFORM** steps 7.2[2.1] to 7.2[2.14] to check RHR SYSTEM II CHECK VLV, 1-CKV-074-0068, is CLOSED using backflow testing (**N/A** if closed position testing is not required at this time. Closure testing is not required if an LLRT is performed for this valve during the current Reactor shutdown.):

[2.1] **IF** RHR System II is in Shutdown Cooling, **THEN**

PERFORM the following (Otherwise **N/A**):

[2.1.1] **RECORD** RHR System II flow below for the indicator used (Otherwise **N/A**):

Flow N/A gpm U1 ICS display

Flow N/A gpm 1-FI-74-64 on Panel 1-9-3.

N/A (NOTE 1)

[2.1.2] **REMOVE** RHR System II from Shutdown Cooling per 1-OI-74.

[2.2] **CHECK** RHR System II Shutdown Cooling flow rate is approximately zero.

[2.3] **CLOSE** RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, using RHR SYS II LPCI OUTBD INJECT VALVE, 1-HS-74-66A on Panel 1-9-3.

[2.4] **OPEN** RHR SYS II LPCI INBD INJECT VALVE, 1-FCV-074-0067, using RHR SYS II LPCI INBD INJECT VALVE, 1-HS-74-67A on Panel 1-9-3.

[2.5] **CONNECT** drain hose to test connection at RHR/SDC RETURN HDR TEST, 1-TV-074-0630B (DW Access, El. 565) and **ROUTE** hose to nearest floor drain.

[2.6] **OPEN** RHR/SDC RETURN HDR TEST, 1-SHV-074-0629B (DW Access, El. 565).

Date 11/14/08

7.2 Test Steps (continued)

NOTE

An initial stream of water may be observed in Step 7.2[2.7]. This is expected and should subside rapidly.

[2.7] **OPEN** 1-TV-074-0630B. N/A

[2.8] **CHECK** that no pressurized solid stream of water is observed from the drain hose (checks that 1-CKV-074-0068 is CLOSED). (AC)

[2.9] **CLOSE** 1-TV-074-0630B.

[2.10] **CLOSE** 1-SHV-074-0629B.

[2.11] **CLOSE** 1-FCV-074-0067 using RHR SYSTEM II LPCI INBD INJECT VALVE, 1-HS-74-67A.

[2.12] **OPEN** 1-FCV-074-0066 using RHR SYS II OUTBD INJECT VALVE, 1-HS-74-66A.

[2.13] **REMOVE** drain hose from test connection at 1-TV-074-0630B.

[2.14] **IF** RHR System II was initially in Shutdown Cooling, in Step 7.2[2.1] and it is desired to return RHR System II to Shutdown Cooling, **THEN**

PERFORM the following as directed by the Unit Supervisor (Otherwise **N/A**):

- **PLACE** the RHR System II in Shutdown Cooling per 1-OI-74 and **ESTABLISH** the desired Shutdown Cooling flow (**N/A** if RHR System II will not be placed in service.).

Date 11/4/08

7.3 Restoration

NOTES

1) The Independent Verifications of the following steps may be performed in any order.
2) If a deficiency is identified during the performance of the Independent Verifications in the next steps, the Independent Verifier shall stop and notify the Unit Supervisor immediately for further instructions prior to correcting the deficient condition(s).

[1] On Panel 1-9-3, **INDEPENDENTLY VERIFY** the following:

- RHR SYS II LPCI OUTBD INJECT VALVE, 1-FCV-074-0066, is THROTTLED for desired Shutdown Cooling flow. — 3 / IV
- RHR SYSTEM II LPCI INBD INJECT VALVE, 1-FCV-074-0067, is in the OPEN position. — 3 / IV

[2] At DW Access, El. 565, **INDEPENDENTLY VERIFY** the following (**N/A** if Step 7.2[2] was not performed):

- RHR/SDC RETURN HDR TEST, 1-SHV-074-0629B, is in the CLOSED posiiton. — N/A / IV
- RHR/SDC RETURN HDR TEST, 1-TV-074-0630B, is in the CLOSED position. — N/A / IV

[3] **VERIFY** that the work area is clean. — 6

[4] **COMPLETE** Attachment 1, Surveillance Instruction Review Form, through Unit Supervisor review. — 6

[5] **NOTIFY** the Unit 1 Operator that this Surveillance Instruction is complete. — 6

[6] **NOTIFY** the Unit Supervisor that this Surveillance Instruction is complete and **PROVIDE** status of any test deficiencies or unsatisfactory test results. — 6

[7] **COMPLETE** Attachment 2, ASME OM Code Inservice Testing Review Form. — 6

8.0 ILLUSTRATIONS/ATTACHMENTS

Attachment 1, Surveillance Instruction Review Form

Attachment 2, ASME OM Code Inservice Testing Review Form

Attachment 1
(Page 1 of 1)

Surveillance Instruction Review Form

REASON FOR TEST:
☒ Scheduled Surveillance
☐ System Inoperable (Explain in Remarks)
☐ Maintenance (WO No. _____)
☐ Other (Explain in Remarks)

DATE/TIME STARTED 11/14/08 0423
DATE/TIME COMPLETED 11/14/08 0430
PLANT CONDITIONS MODE 5

PRE-TEST REMARKS: NOTE 1: STEP [2] IS N/A; 1-CKV-074-0068 WAS TESTED CLOSED USING LLRT PROCEDURE 1-SI-4.7.A.2.G-3/74 D DURING THE CURRENT REACTOR SHUTDOWN (TESTED 10-29-08) JJ 11-12-08

PERFORMED BY:

Initials	Name (Print)	Name (Signature)
JJ	Sean K. Bradford	Sean K. Bradford
CO	TRON GILLIAM	Tron Gilliam

Delays or Problems (If yes, explain in post-test remarks)? ☐ Yes ☒ ~~No~~
Acceptance Criteria Satisfied? ☒ ~~Yes~~ ☐ No
If the above answer is no, the Unit Supervisor shall determine if an LCO exists. LCO ☐ Yes ☐ No

UNIT SUPERVISOR Kent W Bradford Date 11-14-08
SECTION REVIEWER _____ Date 11-19-08
INDEPENDENT REVIEWER _____ Date 11-17-08
SCHEDULING COORDINATOR J M. Hamett Date 1/8/9

POST-TEST REMARKS: _____

1045F

Attachment 2
(Page 1 of 1)

ASME OM Code Inservice Testing Review Form

Component Tested	Fully Acceptable	Not Acceptable	N/A or Not Tested
1-CKV-074-0068 (Open, Step 7.2[1])	☑	☐	☐
1-CKV-074-0068 (Closed, Step 7.2[2])	☐	☐	☑

ASME OM Code Reviewer Charles Duskell Date 11/19/08

ASME OM Code data enter in SI(s) 1-SI-3.2.1

ANII Reviewer [signature] Date 12/9/08

REMARKS: 1-CKV-074-0068 TESTED CLOSED USING LLRT PROCEDURE 1-SI-4.7.A.2.G-3/74D ON 10-29-2008 11-12-08

1-FCV-74-67
1-FCV-74-68

14

BFN Unit 1	Primary Containment Local Leak Rate Test RHR Shutdown Cooling Return: Penetration X-13B	1-SI-4.7.A.2.G-3/74D Rev. 0002 Page 19 of 30

Attachment 1
(Page 1 of 1)

Surveillance Instruction Review Form

REASON FOR TEST:
- ☑ Scheduled Surveillance
- ☐ System Inoperable (Explain in Remarks)
- ☐ Maintenance (WO No. _____)
- ☐ Other (Explain in Remarks)

DATE/TIME STARTED 10/27/08 / 2115
DATE/TIME COMPLETED 11/1/2008 1023
PLANT CONDITIONS MODE 5

PRE-TEST REMARKS: _____

PERFORMED BY:

Initials	Name (Print)	Name (Signature)
JAR	JA Rickard	
[illegible]	[illegible]	
MH	Mark Hollaway	
MOH	MICHAEL O HUNTER	
[illegible]	[illegible]	
SC	Seth Crews	
WH	WAYLON HARRIS	
TB	TIMOTHY A. BUTLER	

Delays or Problems (If yes, explain in post-test remarks)? ☐Yes ☑~~No~~
Acceptance Criteria Satisfied? ☑Yes ☐No
If the above answer is no, the Unit Supervisor shall determine if an LCO exists. LCO ☐Yes ☑~~No~~

UNIT SUPERVISOR _____ Date 11/1/2008

SECTION REVIEWER (MM) _____ Date 11.1.08

Signature attests that I understand the scope and purpose of this instruction and that, to the best of my knowledge, it was properly performed in accordance with instruction in that: the recording, reduction, and evaluation of data is complete and correct; acceptance criteria is met or justification for exceptions is provided; portions of test performed were appropriate for specified test conditions or reasons for test; deficiencies were evaluated and dispositioned; reportability was evaluated; marginal results were evaluated with respect to potential for future problems based on operating experience and regulatory requirements; and instruction was complete except as noted in post-test remarks.

INDEPENDENT REVIEWER _____ Date _____

SCHEDULING COORDINATOR _____ Date _____

POST-TEST REMARKS: _____