

July 19, 2001

Mr. Douglas E. Cooper
Site Vice President
Palisades Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES PLANT - REVISED VALVE RELIEF REQUEST NO. 7 FOR THE
THIRD 10-YEAR INSERVICE TESTING INTERVAL
(TAC NO. MB1768)

Dear Mr. Cooper:

By letter dated April 23, 2001, Consumers Energy Company (CEC) requested a revision to Valve Relief Request No. 7 (VRR-7) related to the third 10-year interval inservice testing (IST) program for pumps and valves at the Palisades Plant. The proposed revision would reinstate check valve CK-ES3240, which is one of two swing check valves located in the outlet piping from the safety injection refueling water (SIRW) tank. The Nuclear Regulatory Commission (NRC) staff had initially authorized alternative testing in accordance with VRR-7 for both CK-ES3240 and its companion valve, CK-ES3239, by letter and safety evaluation dated August 30, 1996. However, in a subsequent letter dated July 9, 1998, CEC informed the NRC that CK-ES3240 was being removed from the scope of VRR-7 because the results of non-intrusive testing (NIT) showed that CK-ES3240 could be successfully tested using those alternate test methods. Revision to VRR-7 to reinstate CK-ES3240 is now proposed because NIT performed on both CK-ES3239 and CK-ES3240 during Palisades' 2001 refueling outage (and reexamination of data from NIT on CK-ES3240 in 1996, 1997, and 1999) has not conclusively demonstrated that CK-ES3240 was moving to its full-open position.

Since submitting its letter of April 23, 2001, CEC has been succeeded by Nuclear Management Company, LLC (NMC) as the licensed operator of the Palisades Plant. By letter dated May 17, 2001, NMC requested that the Commission continue to process and disposition licensing actions previously docketed and requested by CEC.

The enclosure is our safety evaluation of the revised VRR-7. In the enclosure, the NRC staff authorizes alternative testing for SIRW tank outlet check valves CK-ES3239 and CK-ES3240 for Palisades' current 10-year IST interval pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis of our determination that compliance with the exercise requirements of the American Society of Mechanical Engineers/American National Standards Institute, Operations and Maintenance Standard, part 10, "Inservice Testing at Nuclear Power Plants," paragraph 4.3.2.2(e), would result in a hardship without a compensating increase in the level of quality and safety.

Your letter dated April 23, 2001, also expanded the discussion of the inspection results and maintenance performed on the valves during the 1995 refueling outage, and corrected certain inconsistencies that you have recently identified in the revision of VRR-7 forwarded by your letter dated July 9, 1998. Your correction regarding CK-ES3239 indicates that the hinge pin,

D. Cooper

- 2 -

rather than its bushing, was replaced because of extensive wear/erosion. The replacement pin was made of a material (17-4PH, A-564 Grade 630) that is galvanically compatible with the other stainless steel valve components. Your correction regarding CK-ES3240 similarly indicates that its hinge pin was also replaced as a precautionary measure in conjunction with that inspection. As noted in your letter of April 23, 2001, the performance history of these valves has been acceptable. The NRC staff finds that its determination to authorize the previous revision to VRR-7 is not changed by these corrections.

If you have any questions concerning this action, please call Mr. D. Hood of my staff at (301) 415-3049.

Sincerely,

/RA/

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure: Safety Evaluation

cc w/encl: See next page

D. Cooper

- 2 -

rather than its bushing, was replaced because of extensive wear/erosion. The replacement pin was made of a material (17-4PH, A-564 Grade 630) that is galvanically compatible with the other stainless steel valve components. Your correction regarding CK-ES3240 similarly indicates that its hinge pin was also replaced as a precautionary measure in conjunction with that inspection. As noted in your letter of April 23, 2001, the performance history of these valves has been acceptable. The NRC staff finds that its determination to authorize the previous revision to VRR-7 is not changed by these corrections.

If you have any questions concerning this action, please call Mr. D. Hood of my staff at (301) 415-3049.

Sincerely,

/RA/

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure: Safety Evaluation

cc w/encl: See next page

DISTRIBUTION:

PUBLIC	CCraig	DTerao
PD III-1 Reading	OGC	JColaccino
DHood	RBouling	ACRS
AVegel, RIII	GHill(2)	

*No significant changes to SE

OFFICE	PDIII-1/PM	PDIII-1/LA	EMCB/SC*	OGC	PDIII-1/SC
NAME	DHood	THarris for RBouling	DTerao	SUttal	CCraig
DATE	7/13/01	7/13/01	06/11/01	7/16/01	7/18/01

ACCESSION NO. ML011930365

OFFICIAL RECORD COPY

Palisades Plant

cc:

Mr. Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
212 West Michigan Avenue
Jackson, MI 49201

Arunas T. Udryns, Esquire
Consumers Energy Company
212 West Michigan Avenue
Jackson, MI 49201

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Supervisor
Covert Township
P. O. Box 35
Covert, MI 49043

Office of the Governor
P. O. Box 30013
Lansing, MI 48909

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Palisades Plant
27782 Blue Star Memorial Highway
Covert, MI 49043

Drinking Water and Radiological
Protection Division
Michigan Department of
Environmental Quality
3423 N. Martin Luther King Jr Blvd
P. O. Box 30630 CPH Mailroom
Lansing, MI 48909-8130

Michigan Department of Attorney General
Special Litigation Division
630 Law Building
P.O. Box 30212
Lansing, MI 48909

Mr. Roy A. Anderson
Executive Vice President and
Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Director
Licensing and Performance Assessment
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Steven T. Wawro
Nuclear Asset Director
Consumers Energy Company
Palisades Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

Mr. John Paul Cowan
Senior Vice President
Palisades Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE INSERVICE TESTING PROGRAM, THIRD 10-YEAR INTERVAL
REVISED VALVE RELIEF REQUEST NO. 7

PALISADES PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME code requirements upon making the necessary findings. Nuclear Regulatory Commission (NRC) guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

By letter dated April 23, 2001, Consumers Energy Company, who at that time was the licensee,¹ submitted a revision to Valve Relief Request No. 7 (VRR-7) for the Palisades Plant IST program for pumps and valves. The revision requests that safety injection refueling water (SIRW) tank outlet check valve CK-ES3240 be included in VRR-7. The alternative testing in VRR-7 was authorized previously for both SIRW tank outlet check valves CK-ES3239 and CK-ES3240 in an NRC staff safety evaluation dated August 30, 1996. Subsequently, the licensee informed the NRC staff in a letter dated July 9, 1998, that check valve CK-ES3240 was being removed from VRR-7. The licensee stated that the results of non-intrusive testing (NIT) demonstrated that this check valve could be tested using these alternate test methods.

¹ Since submitting its letter of April 23, 2001, Consumers Energy Company (CEC) has been succeeded by Nuclear Management Company, LLC (NMC) as the licensed operator of the Palisades Plant. By letter dated May 17, 2001, NMC requested that the Commission continue to process and disposition licensing actions previously docketed and requested by CEC.

In the evaluation of NIT results from the most recent Palisades refueling outage, the licensee concluded on March 31, 2001, that the NIT results did not conclusively demonstrate that check valve CK-ES3240 was moving to its full-open position. Data from NIT on this valve in 1996, 1997, and 1999, were also determined to not provide conclusive evidence that the valve was moving to its full-open position. The licensee requests that VRR-7 be revised to include both check valves CK-ES3239 and CK-ES3240. The NRC staff's evaluation of the proposed alternative is provided below.

The Palisades IST program was developed in accordance with the requirements of the 1989 Edition of the ASME Code by implementation of the 1987 ASME/ANSI *Operations and Maintenance (OM) Standards*, Part 1, Part 6, and Part 10 (OM-1, OM-6, and OM-10) for IST of safety and relief devices, pumps, and valves respectively.

2.0 VALVE RELIEF REQUEST VRR-7

The licensee has requested relief from the Code exercise requirements of OM-10, Paragraph 4.3.2.2(e) for the SIRW tank outlet check valves CK-ES3239 and CK-ES3240. The licensee has proposed to disassemble and inspect both check valves during the 10-year reactor vessel weld inspection when the core is off loaded. The licensee has stated that these check valves require a full core off load to perform a disassemble and inspection activity.

2.1 Licensee's Basis for Requesting Relief

In its letter dated April 23, 2001, the licensee explains why the revision to VRR-7 is being requested :

Background

On August 30, 1996, the NRC staff issued a Safety Evaluation Report (SER) concerning the third 120-month Interval IST Program for the Palisades Plant. In this SER, the NRC staff approved VRR No. 7 on the condition that two actions be completed. In addition, the NRC staff requested that Consumers explore the use of NIT methods. On August 29, 1997, Consumers confirmed that the requested actions were complete, and made the following commitment:

NIT techniques shall be attempted on valves CK-ES3239 and CK-ES3240. If this technique can successfully verify the full-stroke exercise, VRR No.7 shall be deleted and a cold shutdown testing basis shall be submitted.

The NRC staff accepted this response and approved Valve Relief Request (VRR) No.7 on March 6, 1998. On July 9, 1998, Consumers submitted a change to this commitment to both remove SIRW Tank Outlet Check Valve CK-ES3240 from VRR No.7, and to establish a Cold Shutdown Testing Basis for it. The basis for the change at that time stated that NIT results showed that CK-ES3240 could be successfully tested using the technique developed. However, the reliability of NIT techniques for CK-ES3239 was inconclusive and we retained the commitment in VRR No.7 to continue to attempt to develop a reliable NIT technique for this valve.

Current Conditions

NIT performed on both CK-ES3239 and CK-ES3240 during the current refueling outage has not resulted in conclusive valve performance data as expected. In particular, we have determined, contrary to what was previously believed, that acoustic data to confirm full valve open impacts is, in fact, inconclusive. When these results were obtained on March 31, 2001, previous data was examined back to 1996. The review consisted of 4 sets of open and closed NIT data for single Low Pressure Safety Injection pump flow. The 1996 and 1997 data utilized acoustic methodology only, and the 1999 and 2001 data utilized both acoustic and magnetic methodologies. The 4 sets of NIT data were overlaid for each valve, revealing no conclusive open or closed impacts, but did reveal steady-state values that showed smooth disc motion, with no evidence of degradation via loose parts or binding internals.

Neither past nor current testing provided a sufficient acoustic signature to clearly define open impacts. This is attributed to the relatively low flow rates available during the test condition, which has resulted in valve movement (full or partial-stroke), but without sufficient force to cause definitive open or closed impact signals. However, the magnetic data from this testing does indicate smooth valve motion and does not indicate any degradation compared to past data. It is therefore concluded that NIT can be used for general condition monitoring and trending, but not to verify open and closed disk impacts. Accordingly, VRR No.7 is being revised to incorporate CK-ES3240 back into the scope of this request.

BASIS:

Relief is requested in accordance with 10 CFR 50.55a(f)(5)(iii) on the basis that compliance with the code requirements is impractical. Exercising these valves to the open position required to fulfill their safety function, within allowed frequencies, is impractical based on the following:

1. The plant is not configured to allow testing of these check valves by passing either the design accident flow nor the flow required to cause the disk/hinge arm to reach the backstop.
2. There are no indication devices built into these check valves to monitor disk position, if flow sufficient to achieve a full stroke of these valves was attainable.
3. Acoustic and magnetic NIT techniques have been unsuccessful in identifying full open impacts during various testing configurations attempted.
4. It is not prudent to perform disassembly and inspection activities to manually full-stroke the disk at times other than during a full core offload, for the following reasons:
 - a. The SIRWT (T-58) is unisolable to either CK-ES3239 or CK-ES3240 without first draining sufficient inventory from the tank to uncover the emergency core cooling outlet standpipes, which rise 4 inches from the bottom of the tank.

- b. With the reactor cavity filled, the SIRWT retains approximately 45,000 gallons of borated water, on standby to gravity drain into the primary coolant system, independent of any AC power source. This is regarded as a significant line of defense for shutdown risk management in the event of loss of cavity inventory or extended station blackout.
- c. There are other valves between the shutdown cooling (SDC) portion of the system and the SIRWT discharge check valves, to provide barrier isolation. However, in the event any isolation valve failed to perform its function, there is approximately 64 feet of driving head that would divert SDC flow from the core into the Engineering Safeguard Rooms.
- d. The SIRWT is aluminum. Past problems with nozzle leakage from the bottom of the tank have been attributed to the tank flexing during drain and fill cycles. To minimize damage and costly repairs, draining the tank is a limited activity and not a routine outage evolution.

During the 1995 Refueling Outage, the reactor was fully offloaded and both check valves were disassembled. This was the first time the valve internals were disassembled for inspections and repairs. The inspection results were as follows:

CK-ES3239:

1. The disc's free movement to both the open and closed positions was demonstrated.
2. The general condition and body internals were satisfactory with no corrosion/erosion.
3. The disk to hinge arm connection was in satisfactory condition and no loose parts were identified.
4. The disk hanger arm bushing areas were satisfactory with little to no wear.
5. The hinge pin was unsatisfactory due to extensive wear/erosion and was replaced. (The extensive wear/erosion was determined to be caused by galvanic corrosion of the Hastelloy B hinge pin material. The hinge pin was replaced with a 17-PH, A-564 Grade 630, material that was determined to be galvanically compatible with the other stainless steel valve components. The as-left seat blue check was satisfactory, the as-found was unsatisfactory).

CK-ES3240:

1. The disc's free movement to both the open and closed positions was demonstrated.
2. The general condition and body internals were satisfactory.

3. The disk to hinge arm connection was in satisfactory condition and no loose parts were identified.
4. The disk hanger arm bushing areas had some minor wear but were satisfactory.
5. The hinge pin was in satisfactory condition, but was replaced as a precautionary measure due to the galvanic corrosion issue with CK-ES3239. The as-left seat blue check was satisfactory, the as-found was unsatisfactory.

Since both CK-ES3239 and CK-ES3240 were able to freely stroke to the full open and close positions after nearly twenty five years of service, it is reasonable to expect that these valves will remain in satisfactory condition for a 10-year inspection interval. Added assurance is provided since the hinge pin corrosion phenomena was addressed by the material change out.

Several industry failures were identified in searching the Institute of Nuclear Power Operations web page and the Nuclear Industry Check Valve Group database. The majority of the failures that were reported are due to wear and age of the disk and seating surface. The failure mode for these valves appears to be gross internal leakage caused by wear. Again, the disassembly and inspection of CK-ES3239 and CK-ES3240, which occurred after nearly 25 years of service, provides assurance that these valves are not subject to failure due to wear or age.

2.2 Licensee's Proposed Alternate Testing

The licensee proposes the following alternate testing and acceptance criteria:

ALTERNATE TESTING:

1. CK-ES3239 and CK-ES3240 will be partial-stroke tested open by passing flow on a quarterly basis.
2. CK-ES3239 and CK-ES3240 will be partial-stroke tested open by passing flow, incorporating nonintrusive technologies, during each refueling outage. Nonintrusive data will be trended to monitor the general health of the valves.
3. CK-ES3239 and CK-E3240 will be tested close using a differential pressure test each refueling outage.
4. CK-ES3239 and CK-ES3240 will be disassembled and inspected (including a manual full-stroke exercise) on a 10-year interval, which corresponds with the full core offload frequency for inservice reactor vessel examinations. This method is not in full compliance with the frequency requirements of GL 89-04, Position 2, for the reasons stated in the basis.

The alternate testing proposed will effectively monitor both condition and performance of these check valves. The combined testing will ensure that the valves will perform their safety functions and that they are maintained in a state of operational readiness.

ACCEPTANCE CRITERIA:

Observed test flow rates in the acceptable range constitutes an acceptable partial-stroke test for the SIRW Tank discharge check valves.

NIT results will be evaluated and trended to monitor for loose internal parts, binding and general condition. Close impacts obtained during testing may be used for an acceptable valve closure.

Observed differential pressures in the acceptable range constitutes an acceptable valve closure for the SIRW tank discharge check valves.

At each disassembly, the valves will be manually exercised to verify full-stroke capability. The valves will be inspected to ensure that the internals are structurally sound (no loose, damaged or corroded parts).

3.0 NRC STAFF'S EVALUATION

The Code requires that check valves be exercised either quarterly or during shutdowns where practical. As an alternative, GL 89-04, Position 2, "Back Flow Testing of Check Valves," provides guidance for establishing a sample disassembly and inspection program for groups of check valves in which the size, manufacturer, model, and service conditions are the same. Once the grouping is established in accordance with the guidance in Position 2, one check valve in the group may be disassembled and inspected each refueling outage. If the check valve being disassembled fails the inspection, the guidance specifies that the remaining check valves in the group shall be disassembled and inspected. Relief is required to implement this guidance. Deviations from the guidance, such as performing the disassembly and inspection outside of refueling outages, have been previously authorized by the NRC staff.

SIRW tank outlet check valves CK-ES3239 and CK-ES3240 have a safety function to open to supply suction to the safety injection pumps and the containment spray pumps. They also have a safety function to close to prevent backflow of containment sump water into the tank when operating the safety injection system in the recirculation mode during post-accident conditions. Closure of these check valves is verified using a differential pressure test each refueling outage. The licensee states that exercising these check valves to their full open safety position is impractical because the system design does not provide the ability to exercise these check valves with the design flow. In addition, these valves are not equipped with position indication devices. The licensee has also attempted to perform NIT of these valves and concluded that the test to exercise the valve disk to its full-open position cannot be verified by acoustic and magnetic NIT techniques.

As stated above, Position 2 of GL 89-04 provides guidance on a sample disassembly and inspection frequency for check valves, which cannot be exercised to meet the Code requirements. This proposed alternative is routinely authorized when it is determined that meeting the Code requirements is a hardship. The ASME OM Code-1995, Subsection ISTC 4.5.4(c), adopts the sample disassembly and inspection guidance. According to the licensee's submittal, in order to perform the inspection in accordance with the guidance in the GL, the SIRW tank would have to be drained each refueling outage, which the licensee states is a "significant line of defense for shutdown risk management in the event of loss of cavity

inventory or extended station blackout.” Position 2 anticipated such extreme hardships and stated that the sample disassembly frequency could be extended to every other refueling outage.

The licensee states that disassembly of check valves CK-ES3239 and CK-ES3240 can be performed during core offloads which routinely occur every 10 years to facilitate reactor vessel weld inspection. In addition, the licensee has proposed to perform partial-stroke open testing quarterly, as well as NIT and differential pressure testing each refueling outage. The NRC staff authorized a similar proposed alternative for these valves in a letter and safety evaluation dated August 30, 1996, subject to the provision that when the plant is in the appropriate condition (i.e., core offloaded), both valves must be disassembled, even if this condition should occur more often than once every 10 years. The licensee revised its relief request in a letter dated August 29, 1997, and stated that “...Disassembly will occur at each full core offload and when fuel pool cooling loads are acceptable, nominally once per ten years...” In a letter dated July 9, 1998, the licensee stated that it was removing check valve CK-ES3240 from VRR-7 because it had determined that this valve could be tested using NIT techniques.

The alternative proposed in the revised relief request is not consistent with the proposed alternative that the NRC staff authorized for both check valves in the August 30, 1996, letter and safety evaluation. However, the NRC staff recognizes that there is a low probability that the core will be offloaded prior to the next reactor vessel weld inspection in 2005. The licensee has proposed that the alternate inspection interval be 10-years. The next disassembly and inspection of both check valves will occur during the next reactor vessel weld inspection. In addition, the licensee has proposed to partial-stroke exercise these valves in the open direction quarterly, and to perform NIT each refueling outage to assess and trend the condition of the valve. These valves are also tested with a differential pressure across the valve to verify the valve’s closing safety function and tested for leakage rate in accordance with the Code. The proposed alternative testing provides reasonable assurance of operational readiness because the testing and examination activities are comprehensive and assure that the valves are capable of performing their safety functions and that sub-component degradation previously noted, should it reoccur, would be identified during the disassembly and inspection of both check valves during the next core offload.

4.0 NRC STAFF’S CONCLUSION

The proposed alternative for SIRW tank outlet check valves CK-ES3239 and CK-ES3240, is authorized for the current ten-year interval pursuant to 10 CFR 50.55a(a)(3)(ii) based upon the determination that compliance with the Code exercise requirements of OM-10, Paragraph 4.3.2.2(e), results in a hardship without a compensating increase in the level of quality and safety.

Principal Contributor: Joseph Colaccino

Date: July 19, 2001