



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
1600 E LAMAR BLVD
ARLINGTON, TX 76011-4511

November 3, 2014

EA-14-090

Oscar A. Limpias, Vice President - Nuclear
and Chief Nuclear Officer
Nebraska Public Power District
Cooper Nuclear Station
P.O. Box 98
Brownville, NE 68321-0098

**SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION 05000298/2013005-01,
"FAILURE TO PROMPTLY IDENTIFY AND CORRECT A CONDITION
ADVERSE TO QUALITY"**

Dear Mr. Limpias:

In your letter of May 20, 2014, Nebraska Public Power District (NPPD) contests a Green NRC-identified violation that was dispositioned as a non-cited violation (NCV). Specifically, NPPD disputes the use of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," as the basis for the NCV. The NCV involved a failure to promptly identify and correct a condition adverse to quality involving an inadequate evaluation of the diesel generator fuel oil (DGFO) storage tank vents and their ability to perform the specified safety function in the event of a tornado missile impact.

On June 13, 2014, we acknowledged your letter and informed you that we would review your basis for contesting the NCV and provide the results of our evaluation by written response. The NRC performed a detailed review of the facts associated with this violation and the use of 10 CFR Part 50, Appendix B, Criterion XVI. In addition, we reviewed NPPD's engineering evaluation (EE), EE 10-060, "Evaluation of the Diesel Generator Fuel Oil Tank Vents After a Tornado Strike, Revision 0."

In your May 20 letter, you stated, in part, that the evaluation of the DGFO storage tank vent's ability to withstand a tornado missile strike was adequately resolved under Condition Report CR-CNS-2010-05211. This Condition Report CR referenced engineering evaluation EE 10-060 which validated that the DGFO storage tanks and vents would remain operable after a tornado missile strike to the vents. However, the NRC found that engineering evaluation EE 10-060 contains no definitive analytical basis to conclude that the vent lines would not be damaged by postulated tornado generated missiles and the requisite corrective and preventive measures failed to address the nonconforming design condition (see enclosure). Therefore, the NRC has concluded that the violation occurred as stated in the aforementioned inspection report and the NCV will stand.

O. Limpias

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Reading Room).

Sincerely,

/RA/

Troy W. Pruett, Acting Director
Division of Reactor Projects

Docket No.: 50-298
License No.: DPR-46

Enclosure:

1. NRC Evaluation and Conclusion

cc w/ enclosure:
Electronic Distribution for CNS

O. Limpias

- 2 -

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ADAMS ACCESSION NUMBER: ML14307B038

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Letter to Oscar A. Limpas from Troy W. Pruett dated November 3, 2014

SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION 05000298/2013005-01,
"FAILURE TO PROMPTLY IDENTIFY AND CORRECT A CONDITION
ADVERSE TO QUALITY"

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NRC EVALUATION AND CONCLUSION

Statement of Violation 05000298/2013005-01

As documented in NRC Inspection Report 05000298/2013005, the subject non-cited violation was described as follows:

Failure to Promptly Identify and Correct a Condition Adverse to Quality

Introduction. The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," associated with NPPD's failure to promptly identify and correct a condition adverse to quality. Specifically, from July 2010 to present, the licensee failed to properly evaluate the diesel generator fuel oil (DGFO) storage tank vents to demonstrate their ability to perform their specified safety function in the event of a tornado generated missile.

Description. While performing plant walk downs, the inspectors noted that the DGFO storage tank vent lines appeared to be susceptible to tornado missile impact. Specifically, the vent lines were approximately 1 foot apart, and the inspectors questioned whether a single tornado generated missile could render both vent lines incapable of performing their intended safety function. Based on the review of pertinent licensing basis documents, the inspectors determined that Appendix F of the USAR states, in part, that the licensee complies with Draft General Design Criteria GDC-2, published July 11, 1967, which requires that systems and components needed for accident mitigation remain fully functional before, during, and after a tornado event. It was also noted that Updated Safety Analysis Report (USAR) Chapter I-5, Section 5.2, defines Class I structures and equipment as, "Structures and equipment whose failure could cause significant release of radioactivity or which are vital to a safe shutdown of the plant and removal of decay and sensible heat." Additionally, USAR Chapter XII-2, Section 2.1.2.3, identifies the Standby Diesel Generator System and Auxiliaries as Seismic Class I equipment. However, based on the review of the licensee's design basis documents, the inspectors were unable to locate an evaluation of the safety-related vent lines that demonstrated their ability to withstand a tornado missile impact.

The inspectors also noted that Station Procedure 5.1 WEATHER, "Operations During Weather Watches and Warnings," Revision 12, Section 7.4, directed that, in the event of a tornado impact to the site, operators would inspect the vent lines, and if they were damaged, one of the diesel generator fuel oil tank fill lines was to be opened. The inspectors determined this to be a compensatory action, which brought into question whether the vent lines were adequately protected from tornado generated missiles.

In response to these issues, NPPD initiated Condition Report CR-CNS-2013-03720. As documented in this condition report, the licensee identified that during the 2010 NRC Component Design Basis Inspection (CDBI), NRC inspectors had similar questions and Condition Report CR-CNS-2010-05211 had been initiated to address these questions. However, the licensee subsequently closed Condition Report CR-CNS-2013-03720 with no explicit corrective actions specified.

Enclosure

Based on the review of Condition Report CR-CNS-2010-05211, it was noted that it had been initiated in response to questions regarding a statement in the licensee's design control document for the diesel generators which dealt with tornado missile protection for the DGFO storage tank vents.

Specifically, the design control document stated, in part, that "The vent pipe concerns were satisfactorily resolved during the 1991 EDSFI," and the inspectors had requested NPPD's evaluation for the DGFO storage tank vents and fill valves with respect to tornado missile protection. NPPD examined the basis for this statement and determined that it had been erroneously identified during their evaluation of a finding at another facility where the NRC had questioned the adequacy of fill and vent connections with respect to impact from a tornado generated missile. However, during their review, NPPD determined that a documented evaluation of the fill and vent line's ability to withstand a tornado missile impact could not be located.

The corrective actions specified in Condition Report CR-CNS-2010-05211 also included direction "to provide a formal analysis of the diesel generator fuel oil storage tank vent lines pertaining to tornado missile protection." In response to this action, NPPD developed EE 10-060, "Evaluation of the Diesel Generator Fuel Oil Tanks." The inspectors reviewed EE 10-060 and determined that it did not adequately evaluate the DGFO vent lines with regard to their ability to withstand tornado generated missiles. Alternatively, the EE assumed that the vents were short runs of pipe and if impacted by a missile there would be no damage to the fuel oil storage tank. The evaluation also discussed manual action condition reports that could be implemented if the vent lines were damaged by a tornado generated missile.

The inspectors determined that the assumptions associated with the vent line's ability to withstand a missile impact were inadequate and that NPPD had failed to correct a previously identified condition adverse to quality. Specifically, Condition Report CR-CNS-2010-05211 identified that NPPD did not have a documented evaluation that demonstrated the DGFO vent line's ability to withstand a tornado missile impact, and the corrective actions to address this condition were based on inadequate assumptions in the engineering evaluation.

Analysis. NPPD's failure to promptly identify and correct a condition adverse to quality was a performance deficiency. This performance deficiency is more than minor, and therefore a finding, because it is associated with the design control attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated July 1, 2012, inspectors determined this finding to have very low safety significance (Green) because it: (1) was not a deficiency affecting the design and qualification of a mitigating structure, system, or component, and did not result in a loss of operability or functionality; (2) did not represent a loss of system and/or function; (3) did not represent an actual loss of function of at least a single train for longer allowed outage time, or two separate safety systems out-of-service for longer than their technical specification allowed outage time; and (4) did not represent an actual loss of function of one or more nontechnical specification trains of equipment designated as high safety significance in accordance with the licensee's maintenance rule program. The finding has a cross-cutting aspect in the area of human performance associated with decision-making component because the licensee did not

ensure that the proposed action was safe in order to proceed, rather than unsafe to disapprove the action [H.1(b)].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected. Contrary to the above, from July 2010 to present, measures established by NPPD failed to assure that an identified condition adverse to quality was corrected. Specifically, NPPD failed to evaluate the lack of tornado missile protection for the DGFO storage tank vents and demonstrate their ability to perform their specified safety function in the event of a tornado missile impact. This violation is being treated as a non-cited violation, consistent with Section 2.3.2.a, of the Enforcement Policy. The violation was entered into NPPD's corrective action program as Condition Report CR-CNS-2014-00146. (NCV 05000298/2013005-01, "Failure to Promptly Identify and Correct a Condition Adverse to Quality").

Summary of NPPD's Response

In response to violation 05000298/2013005-01, NPPD provided a reply contained in a letter from O. Limpas to the NRC dated May 20, 2014, which disputes the use of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," as the basis for the Non-Cited Violation.

As stated in this letter, NPPD denied that a violation of NRC requirements had occurred, in that, NPPD had previously evaluated this condition as documented in Condition Report CR CNS-2010-05211, which was initiated in response to a question identified during the 2010 Component Design Basis Inspection (CDBI). NPPD also indicated that they had re-evaluated these results and concluded the original evaluation remained valid. Specifically, Engineering Evaluation (EE) 10-060, "Evaluation of the Diesel Generator Fuel Oil Tank Vents After a Tornado Strike," Revision 00, evaluated the DGFO storage tank design to satisfy the design basis events delineated in IEEE-308-1970, Table 1, consistent with the pre-General Design Criteria 2 requirements contained in Appendix F of OPPD's Updated Safety Analysis Report (USAR). As stated in your letter, EE-10-060 provided a technical basis on the location of the vents, how much of the vents are exposed to missile impacts, and also discussed that these vent lines are cast in place thus minimizing the amount of load transferred to the DGFO storage tanks by a missile strike. Therefore, the EE concluded that transfer of the minimal load would not damage any part of the tank below the fuel level, validating that the DGFO storage tanks and vents would remain operable after a tornado strike to the vents.

The method of evaluation for assessing the ruggedness of these structural components was based on guidance contained in USAR Appendix C, Section 3.1.2, "Components Designed Primarily by Empirical Methods," which contains provisions for component design primarily by empirical methods.

Additionally, NPPD indicated in its letter that EE-10-060 included a postulated impact to the DGFO storage tank vents after a design basis tornado and recommended a defense-in-depth action for the operations staff to visually check the DGFO storage tank vents for any obstructions. This information was provided to document the basis made in response to the 1991 Electrical Distribution System Functional Inspection (EDSFI) comment that Cooper

Nuclear Station (CNS) did not require any operator actions to ensure that the vent or fill lines were not obstructed as noted in the Diesel Generator Design Criteria Document material.

NPPD's letter also states that, during the 2013 fourth quarter inspection period, the NRC Resident Inspectors questioned the technical basis provided in EE-10-060. NPPD's letter further stated that, the original EE preparer and the responsible supervisor were no longer employed by NPPD. Accordingly, NPPD's Design Engineering staff completed a sensitivity calculation, NEDC 13-046, "DG Storage Tank Vent Line Tornado Missile Durability." This calculation utilized similar design inputs and basis from NEDC 11-077, "DG Day Tank Vent Line Missile Protection Evaluation," which addressed the previous question identified in the 2010 CDBI inspection.

As noted in NPPD's letter, the results of NEDC 13-046 are similar to NEDC 11-077, in that the vent line stays rigid and does not crimp or bend, thereby maintaining its venting capabilities. The letter indicated that the vent piping construction is also similar, in that, both the DGFO storage tank vents (2-inch diameter) and the Diesel Generator Day Tank vents (6-inch diameter) use schedule 40 steel pipe. In addition, the letter provided another comparison that if the larger vent is robust enough to handle a tornado missile, then the smaller pipe would be just as robust due to the similarity in pipe wall thickness. Furthermore, NPPD's letter stated that; NEDC 13-046 independently validated the technical adequacy of the conclusions from EE 10-060, that the DGFO storage tanks would remain operable after a tornado strike to the vents.

In conclusion, NPPD's violation denial letter stated that the previous NRC CDBI question related to the DGFO storage tank vent's ability to withstand a tornado missile strike was adequately resolved under Condition Report CR-CNS-2010-05211 and appropriately evaluated in a timely manner commensurate with 10 CFR 50, Appendix B, Criterion XVI.

NRC Analysis

Consistent with the guidance provided in Policy Guide 0560-6 "Region IV Enforcement Procedures," NRC staff performed an independent review of the documentation associated with this finding. Based on the results of this review, it was determined that the requirements of the Draft General Design Criteria, Criterion 2, published July 11, 1967, clearly establish the design function of systems and components of reactor facilities, which are essential to the prevention of accidents that could affect public health and safety or to mitigation of its consequences. These systems and components are required to be designed, fabricated, and erected to performance standards that will enable the facility to withstand, without loss of the capability to protect the public, the additional forces that might be imposed by natural phenomena such as tornados. Furthermore, the system design basis requirements contained in the Cooper Nuclear Station USAR, Chapter XII, Section 2.3.3.2.2, "Tornado Generated Missiles," specifies that all Seismic Class I Structures are designed to provide protection against the following tornado generated missiles;

- A 35-foot long utility pole with a 14-inch butt with an impact velocity of 200 miles per hour.
- A one-ton missile such as compact-type automobile with an impact velocity of 100 miles per hour and a contact area of 25 square feet.

- A two-inch extra heavy pipe, 12 feet long.
- Any other missile resulting from failure of a structure or component or one which has potential of being lifted from storage or working areas at the site.

Additionally, Cooper Nuclear Station's Design Basis for the DGFO system includes the following requirements;

- The standby diesel generator system must be capable of withstanding the most severe conditions anticipated at the location of the plant. As referenced in USAR, Chapter VIII, the design basis events are described in IEEE-308-1970, Table I. This table includes postulated earthquake, wind, hurricane, and tornado effects as natural phenomena design bases. Additionally, Table I of IEEE-308-1970 lists accident generated missiles as one of the events that the emergency diesel system must be designed to withstand.
- The fuel oil subsystem must provide sufficient fuel to operate the standby diesel generator under all postulated conditions.
- The safety classification of the essential emergency diesel system including the diesel fuel oil tank vents is Seismic Class 1.

The NRC concluded that the DGFO storage tank Seismic Class 1 vents were not assured to be designed, fabricated, and erected to withstand the additional forces imposed by natural phenomena such as tornados, as required by the licensing basis stated above. Specifically, the evaluation performed in accordance with CNS-CR-2010-05211 and the associated EE-10-060, did not adequately demonstrate that the DGFO storage tank vent lines would maintain its ability to withstand a postulated tornado missile impact without loss of function. Although the evaluation references the location of the vents, the area of exposure of the vents to missile impact, and generally discusses the material composition of the vents and the inferred minimal load transferred to the DGFO storage tanks, no definitive analytical basis was identified for concluding that the vent lines would not be damaged by the postulated tornado generated missile and they would remain functional. Although NPPD's compensatory actions dealt with the initial operability condition, the requisite corrective and preventive measures failed to address the nonconforming design condition, concerning the DGFO storage tank vents tornado missile protection, initially identified as a performance deficiency in NRC CDBI Report 05000298/2010007.

Based on the independent review of EE-10-060, it was determined that the document did not technically evaluate the DGFO vent lines with regard to its ability to withstand the full spectrum of tornado generated missiles described above. Specifically, EE-10-060 incorrectly assumed that the vents were low profile rigid sections of pipe and if impacted by a missile there would be no damage to the fuel oil storage tank. EE-10-060 further stated that "If both vents are clamped and the vents are not restored promptly, one or both of the fill caps can be opened to provide venting of the tank." However, this compensatory action failed to adequately address the dynamic effects of a postulated tornado missile impact on the DGFO vent lines. Furthermore, it was determined that although EE-10-060 identified that USAR Section 2.3.3.2.2 "Tornado Generated Missiles," requires that all Class I Structures are to provide protection against tornado generated missiles, no corresponding corrective actions were initiated to address this

documented design deficiency. Additionally, USAR Section 2.1.2.3 states that the Standby Diesel Generator System and Auxiliaries are Class I Equipment. However, EE-10-060 failed to identify any specific corrective measures to address this nonconforming condition.

As stated in Manual Chapter 0326, Section 07.02, "Timing of Corrective Actions," the NRC's expectations are that licensees establish a schedule for completing corrective actions when a structure, system, or component is determined to be degraded or nonconforming. This guidance further states that licensees should address any degraded or nonconforming condition in a timeframe commensurate with the safety significance of the condition. If the licensee does not resolve the degraded or nonconforming condition at the first available opportunity or does not appropriately justify a longer completion schedule, then the staff would conclude that corrective action has not been timely and would consider taking enforcement action.

Based on the guidance contained in Manual Chapter 0326, the unprotected DGFO storage tank vents represent a nonconforming condition. Specifically, the installed vents do not comply with the established design requirements of protecting Seismic Class I components from postulated tornado generated missiles and are, therefore, nonconforming. Additionally, the independent review of NPPD's violation denial, which relies on the postulated plastic deformation of the 2-inch carbon steel vent lines, is non-conservative, in that, it does not account for the worst case conditions and did not include the full spectrum of missile hazards specified in USAR Chapter XII, Section 2.3.3.2.2, "Tornado Generated Missiles."

Furthermore, as described in NPPD's violation denial letter, the method of evaluation for assessing the ruggedness of these structural components was predicated on guidance from USAR Appendix C, Section 3.1.2, "Components Designed Primarily by Empirical Methods." Based on the review of this methodology, it was determined that the guidance provided in Section 3.1.2 is limited to the use of testing and experienced-based seismic qualification of equipment for use in nuclear power plants. However, given the absence of explicit industry testing data and empirical experience related to missile strikes on piping, the use of this seismic qualification methodology to justify the nonconforming condition associated with protection of the DGFO storage tank vents from tornado generated missiles is inappropriate.

Additionally, as stated in NPPD's violation denial letter, the results of NEDC 13-046 are similar to NEDC 11-077, in that the vent line stays rigid and does not crimp or bend, thereby maintaining its venting capabilities. The letter also asserts that NEDC 13-046 independently validated the technical adequacy of the conclusions from EE-10-060, that the DGFO storage tanks would remain operable after a postulated tornado missile strike to the vents. However, during the independent review of NEDC 13-046 and NEDC 11-077, it was determined that both of these calculations erroneously classified the vent lines as non-Seismic Class1 components. Therefore, the DGFO vent lines appear to have been inappropriately evaluated against the tornado missile spectrum for non-Seismic Class1 equipment. It was also determined that NEDC 13-046 incorrectly references documents that are not part of CNS current licensing basis and that this calculation contains non-conservative assumptions (i.e. vents were low profile rigid sections of pipe) regarding the modeling of the vent lines. Therefore, the results of NEDC 13-046 and NEDC 11-077 were determined to be technically inaccurate and immaterial to the nonconforming condition associated with the DGFO storage tank vents.

NRC Conclusion

We have concluded that the finding and NCV for failing to assure that an identified condition adverse to quality was promptly corrected to meet the requirements in 10 CFR Part 50, Appendix B, Criterion XVI as documented in NRC Inspection Report 05000298/2013005 are valid. The failure to perform a proper engineering evaluation of the DGFO storage tank vents to demonstrate the ability to perform its specified safety function as required by the licensing bases in the event of a tornado generated missile has not been documented.