WOLF CREEK
NUCLEAR OPERATING CORPORATION

Terry J. Garrett
Vice President, Engineering

June 19, 2008

ET 08-0035

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

Reference:
1) Letter ET 07-0004, dated March 14, 2007, from T. J. Garrett, WCNOC, to USNRC
2) Letter dated December 7, 2007, from J. N. Donohew, USNRC, to R. A. Muench, WCNOC
3) Letter ET 08-0004, dated January 18, 2008, from T. J. Garrett, WCNOC, to USNRC
4) Letter ET 08-0017, dated March 14, 2008, from T. J. Garrett, WCNOC, to USNRC

Subject: Docket No. 50-482: Main Steam and Feedwater Isolation System (MSFIS) Controls Modification – Electromagnetic Compatibility Tests

Gentlemen:

Reference 1 provided a license amendment request that proposed revisions to Technical Specification (TS) 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," TS 3.7.2, "Main Steam Isolation Valves (MSIVs)," and TS 3.7.3, "Main Feedwater Isolation Valves (MFIVs)." Reference 1 proposed changes to these specifications based on a planned modification to replace the MSIVs and associated actuators, MFIVs and associated actuators, and replacement of the Main Steam and Feedwater Isolation System (MSFIS) controls.

Reference 3 indicated that to address question 11 provided in Reference 2, WCNOC would conduct additional electromagnetic compatibility (EMC) tests and the results of the testing would be provided by March 15, 2008. Reference 4 identified that the additional EMC tests would be completed by June 25, 2008. The Attachment provides a response to question 11 and the results of the additional testing.

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The information provided in the Attachment does not impact the conclusions of the No Significant Hazards Consideration provided in Reference 1. In accordance with 10 CFR 50.91, a copy of the submittal is being provided to the designated Kansas State official.

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4084, or Mr. Richard D. Flannigan at (620) 364-4117.

Sincerely,

Terry J. Garrett

TJG/rlt

Attachment

cc: E. E. Collins (NRC), w/a
T. A. Conley (KDHE), w/a
V. G. Gaddy (NRC), w/a
B. K. Singal (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Terry J. Garrett, of lawful age, being first duly sworn upon oath says that he is Vice President Engineering of Wolf Creek Nuclear Operating Corporation; that he has read the foregoing document and knows the contents thereof; that he has executed the same for and on behalf of said Corporation with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By _____
Terry J. Garrett
Vice President Engineering

SUBSCRIBED and sworn to before me this 19th day of June, 2008.

NOTARY PUBLIC OFFICIAL SEAL STATE OF KANSAS
RHONDA L. TIEMEYER
MY COMMISSION EXPIRES
January 11, 2010

Rhonda L. Tiemeyer
Notary Public

Expiration Date January 11, 2010

Response to Question 11 from NRC Letter of December 7, 2007

Reference 1 provided a request for additional information associated with the license amendment request for the replacement of the Main Steam and Feedwater Isolation System (MSFIS) controls. Reference 2 indicated that to address question 11, Wolf Creek Nuclear Operating Corporation (WCNOC) would conduct additional electromagnetic compatibility (EMC) tests and the results of the testing would be provided by March 15, 2008. Reference 3 identified that the additional EMC tests would be completed by June 25, 2008. Question 11 from Reference 1 and WCNOC's response is provided below.

11. Environmental Test Plans: The documents reviewed to determine the acceptability of the environmental test plans were the Nutherm, "Qualification Report for CS Innovations Replacement MSFIS System," Nutherm Document Number WCN-9715R, Rev. 0, dated February 16, 2007, including Appendix I, II, III, VI [IV], V, and VI, provided as Enclosure VI to letter dated April 18, 2007 (ET 07-0008); and Wolf Creek Generation Station Specification J-105A(Q), Revision 2, "Replacement MSFIS System," dated October 3, 2006, and provided as Enclosure 1 to letter dated April 18, 2007 (ET 07-0008). The combined requirements in these documents were compared to the requirements of IEEE Standard 323-1974/1983, IEEE Standard 344 1987, EPRI Report TR-102323, Military Standard MIL-STD-461E, and the International Electrotechnical Commission (IEC) 6100 series endorsed by RG 1.180, Revision 1, as discussed below:

    A) EMC Susceptibility Test NRC RG 1.180, Revision 1, specifies two test methods acceptable to the NRC staff in regard to susceptibility testing for safety related instrumentation and controls (I&C) systems in nuclear power plants, and lists the detailed tests of the two methods as Table 6 and Table 7 on page 19. These two methods are the following:

        1) EMI/RFI test methods in MIL-STD-461E.

        2) EMI/RFI test methods in IEC 61000-4

        RG 1.180, Rev.1, Section 4, page 18, also states: "It is intended that either set of test methods be applied in its entirety, without selective application of individual methods (i.e., no mixing and matching of test methods) for susceptibility testing." The test methods proposed, however, appear to mix and match test methods, in that the licensee provided an incomplete test set of IEC 6100-4 susceptibility tests, did not perform the tests of IEC 61000-4-9, 61000-4-10, and 61000-4-13, and did perform two additional MIL-STD-461E susceptibility tests, CS101 and RS101, from the other set. Provide justification for this. As stated above, the licensee can choose either test method MIL-STD-461E or IEC 61000-4, but it is requested that the licensee provide the entire set of test results of the selected method.

    B) The licensee quoted an excerpt of EPRI TR-10323 [102323], Rev. 2, Appendix D, "NRC Safety Evaluation Report," page D-16, as stated below:

        > The staff also disagreed with the Working Group not recommending a low frequency range (30 Hz to 50 kHz) radiated susceptibility test for equipment qualification because low frequency magnetic field in the equipment location can attenuate rapidly within a short distance. The staff believes that such a test would provide increased assurance that equipment is not susceptible to

radiated magnetic fields in the frequency range of 30 Hz to 50 kHz. In response, the Working Group agreed to revise TR-102323 to recommend a low frequency radiated susceptibility test limit consistent with Figure 5-4 of TR-102323. Licensees could, however, justify a less restrictive test limit under certain circumstances such as the presence of an equipment shield of ferrous metal or installing the new equipment at a substantial distance from potential sources.

The licensee then indicated that IEC 61000-4-9 and IEC 61000-4-10 were not included based on this evaluation. Since the waiver of these two EMC susceptibility tests is only allowed under special conditions, provide the justification why the tested equipment satisfied these special conditions.

C) Nutherm, on page 13 of WCN-9715R, stated that "The MSFIS system contains only DC power and signal lines, therefore susceptibility test 61000-4-13 is not applicable and will not be performed." Since the area in which the equipment will be located has AC power, and the DC power supply for the MSFIS is contained in the base of the cabinet, provide justification of why this test was not performed. This justification should include the distance to the nearest AC power lines and the expected signal strength.

Response: Reference 4 included the Nutherm Qualification Report, WCN-9715R. This report documents the results of the electromagnetic compatibility (EMC) testing of CS Innovations replacement MSFIS controls. As noted above the testing included a combination of IEC 61000-4 and MIL-STD-461E test methods. Provided below is the test methods conducted on the controls.

IEC 61000-4 Test Methods Conducted:

61000-4-3	Radiated, Radio-Rrequency, Electromagnetic Rield Immunity Test
61000-4-4	Electrically Fast Transient/Burst Immunity test
61000-4-5	Surge Immunity Test
61000-4-6	Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields
61000-4-8	Power Frequency Magnetic Field Immunity Test
61000-4-12	Oscillatory Waves Immunity Test
61000-4-16	Test for Immunity to Conducted, Common Mode Disturbances in the Frequency Range 0 Hz to 150 kHz

MIL-STD-461E Test Methods conducted:

CE101	Conducted emissions, power leads, 30 Hz to 10 kHz
CE102	Conducted emissions, power leads, 10 kHz to 10 MHz
CS101	Conducted susceptibility, power leads, 30 Hz to 50kHz
RE101	Radiated emissions, magnetic field, 30 Hz to 100 kHz
RE102	Radiated emissions, electric field, 10 kHz to 1 GHz
RS101	Radiated susceptibility, magnetic field, 30 Hz to 100 kHz

As a result of the RAI question, Reference 2 indicated that WCNOC would conduct the additional IEC tests that were not performed (specifically IEC 61000-4-9, IEC 61000-4-10, and IEC 61000-4-13).

On March 25, 2008, a teleconference between NRC, WCNOC, and CS Innovations personnel was held to discuss why IEC 61000-4-13, Immunity to Harmonics and Interharmonics, is not an applicable test for the MSFIS controls. IEC 61000-4-13 was developed to assess the performance of covering electrical and electronic equipment when it is subjected to conducted, differential-mode disturbances (harmonics and interharmonics) on low-voltage power mains. As described in NUREG/CR-6782, "Comparison of U. S. Military and International Electromagnetic Compatibility Guidance," this test does not apply to equipment operating on dc power. IEC 61000-4-13 was not performed on the equipment since the MSFIS controls are dc powered controls. This test involves applying a clipped AC power sinewave to the item under test to provide the desired harmonic content and distortion spectrum. As such, this test cannot be performed on dc powered equipment.

IEC 61000-4-9, Pulse Magnetic Field Immunity Test, and IEC 61000-4-10, Damped Oscillatory Magnetic Field Immunity Test, were performed on the MSFIS controls (Advanced Logic System (ALS) rack) equipment on March 28, 2008 by Elite Engineering and observed by CS Innovations.

Testing to IEC 61000-4-10 was done first with the multi turn Helmholtz coil (Elite Equipment ID NCE0). Two oscillation frequencies of 100kHz and 1MHz were done. The 100kHz magnetic oscillation was tested first to each axis with a function check of the ALS rack done before and after the test of each axis. The Elite Engineering test equipment was then recalibrated to perform IEC 61000-4-10 testing at 1MHz. Each axis was then tested. A functional check of the ALS rack was done before and after the test of each axis. The ALS rack worked through the test with no interruption or failure. IEC 61000-4-9 pulse testing applied 5 magnetic pulses to each axis in 20 second intervals using the single turn Helmholtz coil (Elite Equipment ID NCE1). Functional testing of the ALS rack was done before and after the pulse test of each axis. The ALS rack successfully passed pulse testing with no interruptions or failures.

The detailed test results were made available to the NRC technical branch reviewer at the CS Innovations offices during the week of May 12, 2008.

References:

1. Letter dated December 7, 2007, from J. N. Donohew, USNRC, to R. A. Muench, WCNOC

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