WOLF CREEK
NUCLEAR OPERATING CORPORATION

Russell A. Smith
Site Vice President and Chief Nuclear Operating Officer

December 7, 2012
WO 12-0074

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

Reference: 1) Letter WO 11-0086, dated November 30, 2011, from S. E. Hedges, WCNOC, to USNRC

2) Electronic Mail dated June 14, 2012, from T. A. Beltz, USNRC, to S. G. Wideman, WCNOC

3) Letter MO 12-0002, dated August 16, 2012, from R. P. Clemens, WCNOC, to USNRC

4) Electronic Mail dated October 9, 2012, from B. J. Benney, USNRC, to S. G. Wideman, WCNOC

Subject: Docket No. 50-482: Response to Supplemental Question Concerning a Request for Additional Information Regarding License Amendment Request to Revise Technical Specification (TS) 3.8.1, "AC Sources - Operating"

Gentlemen:

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specifications (TS) 3.8.1, "AC Sources - Operating," Surveillance Requirements (SR) related to Diesel Generator (DG) test loads, voltage, and frequency in SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.7, SR 3.8.1.10, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.14, SR 3.8.1.15, SR 3.8.1.19, and SR 3.8.1.20. Reference 2 provided a request for additional information related to the application. Reference 2 was supplemented by electronic mail on June 25, 2012. Reference 3 provided WCNOC's response to the request for additional information. Reference 4 provided a supplemental question related to Question 2.a. of Reference 3. Attachment I provides WCNOC's response to the supplemental question.

The additional information does not expand the scope of the application as originally noticed, and does not impact the conclusions of the Nuclear Regulatory Commission (NRC) staff's originally proposed no significant hazards consideration determination as published in the Federal Register (77 FR 35078).

ADD!
NRR

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," a copy of this 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) 364-4156, or Mr. Michael J. Westman at (620) 364-8831, ext. 4009.

Sincerely,

Russell A. Smith

RAS/rlt

Attachment - Response to Supplemental Question

cc: E. E. Collins (NRC), w/a
T. A. Conley (KDHE), w/a
C. F. Lyon, (NRC), w/a
N. F. O'Keefe (NRC), w/a
Senior Resident Inspector (NRC), w/a

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Russell A. Smith, of lawful age, being first duly sworn upon oath says that he is Site Vice President and Chief Nuclear Operating Officer 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 _____
Russell A. Smith
Site Vice President and Chief Nuclear Operating Officer

SUBSCRIBED and sworn to before me this 7th day of December, 2012.

Kelly Marie Ledom
Notary Public

Expiration Date 4-14-2014

KELLY MARIE LEDOM
Notary Public, State of Kansas
My Appointment Expires
4-14-2014

Response to Supplemental Question

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specifications (TS) 3.8.1, "AC Sources - Operating," Surveillance Requirements (SR) related to Diesel Generator (DG) test loads, voltage, and frequency in SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.7, SR 3.8.1.10, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.14, SR 3.8.1.15, SR 3.8.1.19, and SR 3.8.1.20. Reference 2 provided a Nuclear Regulatory Commission (NRC) Electrical Engineering Branch request for additional information related to the application. Reference 2 was supplemented by electronic mail on June 25, 2012. Reference 3 provided WCNOC's response to the request for additional information. Reference 4 provided a supplemental question related to Question 2.a. of Reference 3. The specific NRC question is provided in italics.

1. *RAI question 2a requested information about motor operated valve (MOV) performance (accident analyses) with EDG operation at the lower end of the steady state TS allowable frequency coupled with the frequency and voltage variations allowed in RG 1.9 Rev. 3 during load sequencing. The licensee has indicated that the voltage and frequency variations may (emphasis added) have been included in the accident analysis performed using computer codes.*

   The nuclear steam supply system (NSSS) at WCNOC was provided by Westinghouse. As part of a PWR Owners Group initiative, Westinghouse has submitted a report "Treatment of Diesel Generator (DG) Technical Specification Frequency and Voltage Tolerances" dated April 2012. This report is being reviewed by NRC staff. The report states that historically, the DG frequency and voltage tolerances are not considered in the development of NSSS component performance and MOV stroke times.

   In response to Generic Letter (GL) 89-10 "Safety-Related Motor Operated Valve Testing and Surveillance" licensees evaluated MOV performance under degraded voltage conditions with worst case differential pressure across the critical valves. Most licensees did not evaluate MOV performance under varying frequency conditions. Based on the evaluations performed for critical MOVs identified in response to GL 89-10, provide details on the change in stroke time as a consequence of EDG operation at the lower end of the allowable frequency. Include the impact of frequency transients during EDG load sequencing.

Response:

The first paragraph of the supplemental question states: "The licensee has indicated that the voltage and frequency variations may (emphasis added) have been included in the accident analysis performed using computer codes." The WCNOC response to Question 2.a. states, in part:

> Within the analysis, the computer codes are used to model various thermal-hydraulic processes to predict transient and accident events. These models simulate the primary and secondary conditions for postulated events and compare predicted plant performance to applicable regulatory criteria. Fluctuations of voltage and frequency accompanying the DG may have been taken into account for the operability of the individual components in the failure mode and effect analysis and incorporated into single active failure assumption. However, the accident analysis does not attempt to model the performance of the electrically operated components such as motor operated valves (MOVs) under various voltage and frequency conditions.

This is being emphasized to clarify that there is a difference between the failure modes and effects analysis and the accident analysis.

Procedure AP 23D-001, "Motor Operated Valve Program," defines the WCGS motor operated valve program in response to Generic Letter 89-10. The program provides the framework to ensure that design, testing, maintenance, and trending controls are systematically implemented to maintain a high level of MOV reliability. There are 142 MOVs included in the program. From drawing E-11005A, "Emergency Diesel Generator Loading Data," there are 64 MOVs that are automatically connected to the diesel generators (DG). Further review of the accident analysis and calculation SA-91-018, Revision 2, "Updated RETRAN Base Deck," was performed to determine specifically where the analysis models the Emergency Core Cooling System (ECCS) and Auxiliary Feedwater (AFW) System suction and discharge flow paths necessary during a design basis accident. Based on this review, WCNOC determined that the MOVs listed in Table 1 are critical from an accident analyses perspective.

Table 1: Critical MOVs

Valve	Function
ALHV0030	Essential Service Water supply to Motor Driven Aux Feed Water Pump
ALHV0031	Essential Service Water supply to Motor Driven Aux Feed Water Pump
ALHV0032	Essential Service Water supply to Turbine Driven Aux Feed Water Pump
ALHV0033	Essential Service Water supply to Turbine Driven Aux Feed Water Pump
ALHV0034	Condensate Storage Tank supply to Motor Driven Aux Feed Water Pump
ALHV0035	Condensate Storage Tank supply to Motor Driven Aux Feed Water Pump
ALHV0036	Condensate Storage Tank supply to Turbine Driven Aux Feed Water Pump
BGLCV112B	Volume Control Tank Isolation Valve
BGLCV112C	Volume Control Tank Isolation Valve
BNLCV112D	Charging pump suction from Refueling Water Storage Tank
BNLCV112E	Charging pump suction from Refueling Water Storage Tank
BNHV8812A	Residual Heat Removal Pump Suction from Refueling Water Storage Tank
BNHV8812B	Residual Heat Removal Pump Suction from Refueling Water Storage Tank
EJHV8811A	Residual Heat Removal Pump Suction from Containment Sump
EJHV8811B	Residual Heat Removal Pump Suction from Containment Sump
EMHV8801A	Boron Injection Tank Outlet Isolation Valve
EMHV8801B	Boron Injection Tank Outlet Isolation Valve
EMHV8803A	Charging pump discharge to Boron Injection Tank
EMHV8803B	Charging pump discharge to Boron Injection Tank

The WCGS DGs are required to achieve rated voltage and frequency within 12 seconds before engineered safety features (ESF) electrical loads are automatically connected to the DGs. From drawing E-11005, Revision 36, "List of Loads Supplied by Emergency Diesel Generator," MOVs are automatically connected at 12 seconds (this includes DG start time).

Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electrical Power Systems at Nuclear Power Plants," specifies that the DG unit design should be such that at no time during the loading sequence should the frequency decrease to less than 95% of nominal nor the voltage decrease to less than 75 percent of nominal. However, the DG does not typically operate at 95% of nominal frequency for the duration of the stroke time. The critical MOVs identified in Table 1 were reviewed to determine the impact on stroke time as a consequence of DG operation at the lower end of the allowable frequency including frequency decrease during the loading sequence as described in Regulatory Guide 1.9, Revision 3.

ALHV0030, ALHV0031, ALHV0032, ALHV0033, ALHV0034, ALHV0035, and ALHV0036

From drawing E-11005A, valves ALHV0030, ALHV0031, ALHV0032, ALHV0033, ALHV0034, ALHV0035, and ALHV0036 are actuated on a low pressure signal in the AFW pump suction line. The valves are associated with the operation of the motor driven and turbine driven AFW pumps. The motor driven AFW pumps are sequenced onto the ESF bus at 42 seconds (this includes DG start time). The purpose of actuating these valves is to transfer the AFW pump's suction source from the condensate storage tank (CST) to the Essential Service Water (ESW) System to protect the AFW pumps against a loss of the normal supply of water (i.e., the CST). The accident analysis models AFW delivery and credits its actuation on a loss of offsite power signal. A delay of not more than 60 seconds has been modeled in the analysis to account for the time between the AFW actuation signal and the time at which the turbine driven AFW pump is at full flow (References 5 and 6). This carries the implicit function that should the CST supply be or become unavailable, the low suction pressure transfer to the ESW System will occur. Calculation AL-30-WC-003, CN001, "AFW System Setpoints: Pump Suction Pressure; Automatic ESW Switchover, and CST Low Level," documents that the total delay time for automatic suction transfer from the CST to ESW, including a 22 second valve stroke time, is 34 seconds. Valves ALHV0030, ALHV0031, ALHV0032, and ALHV0033 (suction isolation valves for the AFW pumps from the ESW System) have a maximum stroke time of 22 seconds. Valves ALHV0034, ALHV0035, and ALHV0036 (suction isolation valves for the AFW pumps from the CST) have a maximum stroke time of 30 seconds. If this time is increased with a 5% decrease in DG frequency (1.7 seconds rounded to 2 seconds), the total delay time automatic suction transfer from the CST to ESW is within the implicit delay time of 60 seconds.

The pressure conditions for the CST suction valves (ALHV0034, ALHV0035, and ALHV0036) are based upon tank levels and the ESW suction supply valves (ALHV0030, ALHV0031, ALHV0032, and ALHV0033) have been reviewed at differential pressure conditions that exceed the capabilities of the ESW pumps.

The MOVs are capable of performing their specified function with the times assumed in the accident analysis with DG operation at the lower end of the allowable frequency.

BGLCV0112B, BGLCV0112C, BNLCV0112D, and BNLCV0112E

Valves BGLCV0112B, BGLCV0112C, BNLCV0112D, and BNLCV0112E are used to align the ECCS centrifugal charging pumps to the refueling water storage tank (RWST). The valves are associated with the operation of the ECCS centrifugal charging pumps that are sequenced onto the ESF bus at 12 seconds (this includes DG start time). At the onset of an event, valves BNLCV0112D and BNLCV0112E (suction valves to RWST) open first. The maximum stroke time for these valves from drawing E-025-00007, "MOV Design Configuration Document," is 15 seconds. After valves BNLCV0112D and BNLCV0112E are open, valves BGLCV0112B and BGLCV0112C (volume control tank (VCT) isolation valves) are closed. The maximum stroke time for these valves from

drawing E-025-00007 is 10 seconds. Section 4.8 of calculation SA-91-018 Revision 2, indicates that a delay of 39 seconds is assumed for loss of offsite power. This time includes 25 seconds for valve stroke time (15 seconds for the suction valves to the RWST and 10 seconds for the VCT isolation valves), 2 seconds for signal processing, and 12 seconds for the DG start time.

Reducing the allowed stroke time by 5%, to compensate for the worst-case condition of 57 Hz frequency for the entire valve stroke limits the 60 Hz stroke time to 9.5 sec (for the 10 sec MOV's) and 14.25 sec (for the 15 sec MOV's). The current recorded stroke times for these valves are less than the reduced (57 Hz) limitation. The most recent stroke time performance test of these valves satisfies the criteria of 39 seconds assumed in the accident analysis if the stroke time is adjusted to account for a 5% decrease in DG frequency.

The MOVs are capable of performing their specified function with the times assumed in the accident analysis with DG operation at the lower end of the allowable frequency.

EMHV8801A, EMHV8801B, EMHV8803A, and EMHV8803B

Valves EMHV8803A and EMHV8803B are isolation valves on the discharge of the ECCS centrifugal charging pumps to the boron injection tank (BIT). Valves EMHV8801A and EMHV8801B are isolation valves on the outlet of the BIT. The BIT is connected to the discharge of the centrifugal charging pumps. Upon actuation by a safety injection signal, the isolation valves associated with the BIT open automatically, and the centrifugal charging pumps inject the boric acid solution from the RWST into the Reactor Coolant System (RCS).

The maximum stroke time for Valves EMHV8803A and EMHV8801B from drawing E-025-00007, "MOV Design Configuration Document," is 10 seconds. The maximum stroke time for valves EMHV8803B and EMHV8801A from drawing E-025-00007 is 20 seconds. As discussed above, the safety analyses (calculation SA-91-018, Revision 2) assume a 25-second stroke time for the alignment of the ECCS centrifugal charging pumps to the RWST. Thus, the discharge valves, EMHV8801A, EMHV8801B, EMHV8803A, and EMHV8803B, will be open several seconds prior to being credited in the analysis. An increased stroke time associated with a 5% DG frequency decrease would still meet the times assumed in the accident analysis.

These gate valves are configured to open under the dynamic conditions of the ECCS centrifugal charging pumps starting. The pressure locking evaluation for these valves analyzed the capability of the valves withstanding approximately 6 seconds of locked rotor torque to allow relief of trapped bonnet pressure (calculation EM-E-001, Revision 0, "Verification of the capability of the motors on valves EMHV8801A, EMHV8801V, EMHV8803A, and EMHV8803B to withstand locked rotor currents for finite increments of time (approximately six seconds)"). The safety analysis assumption of a 25-second valve stroke time for the alignment of the ECCS centrifugal charging pumps to the RWST would be satisfied with a 5% DG frequency decrease and the full allowance of six second operation under locked rotor condition addressed in the pressure locking evaluation for these valves.

The MOVs are capable of performing their specified function with the times assumed in the accident analysis with DG operation at the lower end of the allowable frequency.

BNHV8812A, BNHV8812B, EJHV8811A and EJHV8811B

Valves BNHV8812A and BNHV8812B are the suction isolation valves from the RWST to the Residual Heat Removal (RHR) pumps. Valves EJHV8811A and EJHV8811B are the suction isolation valves from the containment recirculation sumps to the RHR pumps. The suction valves

(EJHV8811A and EJHV8811B) in the line from the containment recirculation sumps to the RHR pumps open when two out of four level transmitters indicate a low-low-1 level in the RWST in conjunction with a safety injection signal. The valves (BNHV8812A and BNHV8812B) from the RWST to the RHR suction close automatically after the sump suction valves are open. Following the automatic and manual switchover sequence, the two RHR pumps take suction from the containment sump and deliver borated water directly to the RCS cold legs.

A DG frequency in the low end of the band has the potential to delay the closing of valves BNHV8812A and BNHV8812B resulting in a reduction in RWST volume and thereby decreasing the time available for manual switchover of the suction for ECCS centrifugal charging pumps and safety injection pumps from the RWST to the recirculation sumps. Calculation BN-M-013, Revision 2, "Time Available for Injection, ECCS, and Containment Spray Pumps Transfer and Evaluation of Air Entrainment at EMPTY Alarm," determined the RWST draw down time during the ECCS pumps and the Containment Spray pumps suction switchover from the RWST to the recirculation sumps. From Section 3.A.f of the calculation, the flow rate through valves BNHV8812A and BNHV8812B is 800 gpm apiece, or 1600 gpm total. The maximum valve stroke times from drawing E-025-00007 for valves EJHV8811A and B is 17 seconds and for valves BNHV8812A and B is 25 seconds. Thus, the automatic switchover of the RHR pumps from the RWST to the recirculation sumps is a maximum of 42 seconds. If this time is increased with a 5% reduction in DG frequency (2.1 seconds) there will be an additional 56 gallons reduction from the RWST available volume due to 1600 gpm flowing to the suction of the RHR pumps. However, since the RWST flow rate is greater than 7000 gpm during draw down, the 56 gallons is negligible since this volume of water accounts for less than half a second and there is over eight minutes to perform the manual switchover actions.

EJHV8811A and EJHV8811B are capable of opening under conditions that are limited by the RHR suction relief valve set point. That pressure limitation is not affected by DG frequency performance. These valves are analyzed for opening at over 400 psid. The analysis assumes pressurization to the relief valve set point, any differential pressure affect would dissipate quickly and valve repositioning would effectively become a static stroke after pressure is relieved.

The assumptions in the accident analysis are still met if the MOV stroke times are increased with DG operation at the lower end of the allowable frequency.

References:

1. WCNOC letter WO 11-0086, "Application to Revise Technical Specification (TS) 3.8.1, "AC Sources – Operating"," November 30, 2011. ADAMS Accession No. ML11340A033.

2. Electronic Mail dated June 14, 2012, from T. A. Beltz, USNRC, to S. G. Wideman, WCNOC. ADAMS Accession No. ML12166A404.

3. WCNOC letter MO 12-0002, "Response to Request for Additional Information Regarding License Amendment Request to Revise Technical Specification (TS) 3.8.1, "AC Sources - Operating"," August 16, 2012. ADAMS Accession No. ML12237A298.

4. Electronic Mail dated October 9, 2012, from B. J. Benney, USNRC, to S. G. Wideman, WCNOC. ADAMS Accession No. ML12283A256.

5. WCNOC letter ET 00-0041, "Revision to Technical Specification 3.3.2, "Engineered Safety Features Actuation System (ESFAS) Instrumentation," December 7, 2000. ADAMS Accession No. ML003776342.

6. NRC letter, "Wolf Creek Generating Station – Issuance of Amendment Re: Table 3.3.2-1, "Engineered Safety Feature Actuation System Instrumentation" (TAC NO. MB0675)," February 6, 2001. ADAMS Accession No. ML010390359.