WOLF CREEK
NUCLEAR OPERATING CORPORATION

Matthew W. Sunseri
President and Chief Executive Officer

August 26, 2010

WM 10-0022

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

Reference:
1) Letter ET 09-0030, dated December 16, 2009, from T. J. Garrett, WCNOC to USNRC

2) Letter dated July 30, 2010, from B. K. Singal, USNRC, to M. W. Sunseri, WCNOC, "Wolf Creek Generating Station – Request for Additional Information Regarding License Amendment Request to Revise Technical Specification 3.8.4, "DC Sources Operating," Surveillance Requirements 3.8.4.2 and 3.8.4.5 (TAC NO. ME2965)"

Subject: Docket No. 50-482: Response to Request for Additional Information Regarding License Amendment Request to Revise Technical Specification 3.8.4, "DC Sources – Operating," Surveillance Requirements 3.8.4.2 and 3.8.4.5

Gentlemen:

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specification (TS) 3.8.4, "DC Sources – Operating," to revise the battery acceptance criteria in Surveillance Requirement (SR) 3.8.4.2 and SR 3.8.4.5. Reference 2 provided a request for additional information related to the application. Attachment I provides a response to the request for additional information. Attachment 2 provides changes to the TSs as discussed in the response to question 3. Attachment 3 provides revised TS Bases changes for information only.

The proposed additional acceptance criteria for provisional battery configurations expands the description of the amendment request noticed in the Federal Register (75 FR 17448). The conclusions reached in the basis for proposed no significant hazards determination are not impacted by the additional information provided in this response. Attachment IV provides the revised Significant Hazards Consideration.

A001
NRR

The Plant Safety Review Committee has reviewed the proposed changes SR 3.8.4.2 and SR 3.8.4.5. In accordance with 10 CFR 50.91, 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) 364-4008, or Mr. Richard D. Flannigan at (620) 364-4117.

Sincerely,

M W Sunseri

Matthew W. Sunseri

MWS/rlt

Attachment: I Response to Request for Additional Information
II Revised Technical Specification Markups
III Revised Technical Specification Bases (for information only)
IV Revised Significant Hazards Consideration

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

STATE OF KANSAS)
) SS
COUNTY OF COFFEY)

Matthew W. Sunseri, of lawful age, being first duly sworn upon oath says that he is President and Chief Executive 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 M W Sunseri
Matthew W. Sunseri
President and Chief Executive Officer

SUBSCRIBED and sworn to before me this 26th day of August, 2010.

NOTARY PUBLIC STATE OF KANSAS
CINDY NOVINGER
My Appt. Exp. 7/8/2014

Cindy Novinger
Notary Public

Expiration Date 7/8/2014

Response to Request for Additional Information

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specification (TS) 3.8.4, "DC Sources – Operating," to revise the battery acceptance criteria in Surveillance Requirement (SR) 3.8.4.2 and SR 3.8.4.5. Reference 2 provided a request for additional information related to the application. The specific NRC question is provided in italics.

1. *Regarding Calculation Change Notice 007 to Calculation No. NK-E-002, "Class 1E Battery Sizing," please provide a summary of changes that were made to the battery sizing calculation to support this license amendment request (LAR).*

Response: The TS value of ≤ 150E-6 ohm for the battery connection resistance is the value that the plant was originally licensed to with the issuance of the TSs. This number appears to be based on a nominal value that was in NUREG-0452, Rev. 5, Westinghouse Standard Technical Specifications. Calculation NK-E-002 did not provide a basis for the battery connection resistance. As a result of the June-July 2007 NRC Component Design Basis Inspection, Calculation Change Notice (CN) 007 was initiated to NK-E-002-004 to provide a basis for the battery connection resistance acceptance limit specified in the TSs. The response to question 2 provides the summary of calculation NK-E-002-004-CN007.

2. *In the LAR, the licensee stated that calculation No. NK-E-002-004-CN007 established 48 micro ohms as the suitable battery "individual inter-cell connection resistance" design value. Please provide a summary of this calculation to show how the 48 micro ohm inter-cell connector resistance design limit was derived.*

Response: The NK-11, NK-12, NK-13 and NK-14 batteries are installed with cell-cell (inter-cell) connections designed for a nominal 19μΩ connection resistance. An administrative limit of 23μΩ was established to assess degradation and initiate corrective action. The 23μΩ administrative limit was established based on the guidance in IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations," Appendix D, Section D.2, that specifies that inter-cell and terminal connection detail resistance measurements which are more than 20% above the installation values are cause for concern and should be corrected. Using this value of 23μΩ as a TS SR acceptance limit for operability, along with the difficulty in establishing conditions that allow effective corrective action, could result in a battery being frequently inoperable. Since it is likely that the actual connection resistance value will vary somewhat from time to time and cell to cell, a higher value was needed to reasonably allow maintaining operability.

The battery manufacturer supplied rating curves based on 31μΩ and 48μΩ cell connections. WCNOC had an independent laboratory develop rating curves based on the 19μΩ cell connections. For computation simplicity, a maximum value of 48μΩ inter-cell connection resistance was arbitrarily selected for all cells. Battery inter-tier and inter-bank connection cables were not included at this point in the computations. This value was selected for computation purposes only and was not intended to be indicative of the TS surveillance acceptance limit, but was merely a step in the process of determining those limits.

The battery capacity was computed based upon this inter-cell connection resistance value applied to each cell interconnect. IEEE Std 485-1997, "IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications," provided the methodology which uses as inputs, the cumulative/total ampere loading of all of the individual design bases loads that are "on" for a given period of the battery duty cycle. Also input to the computation was the vendor published cell discharge capacity corrected as needed for the 48μΩ inter-cell connection resistance.

The computation results determined that the existing batteries are adequate with the 48μΩ inter-cell connection resistance on every cell to support their respective design bases loads with considerable margin. The response to question 3.a further describes the calculation of the TS acceptance limit.

3. *The following questions pertain to the Basic Engineering Disposition (BED), "Administrative/Procedural Control Limits for NK Battery Connections," that was provided in the LAR:*

   a. *Please provide the technical basis for subtracting the combined inter-tier, interbank, and terminal connections to determine the inter-cell connection resistance limit of 33 micro ohms.*

   Response: Calculation NK-E-002-004-CN007 determined the maximum calculated total battery resistance for a 60-cell normal battery configuration. Calculation NK-E-002-004-CN007 did not include the 4 inter-tier, 1 inter-bank and 2 terminal (field cable lugs) connection resistances. This is accounted for simply by determining the equivalent series string connection resistance (assuming all inter-cell connections are 48μΩ with no cable resistance), then subtracting the limiting values of the cables connection resistance. The results were then divided by the actual number of inter-cell connections (54) to determine the maximum allowed inter-cell resistance (on a per inter-cell connection basis).

   59connections x 48μΩ/connection = 2832μΩ
   Less 7 cables x 150μΩ/cable = 1050μΩ
   Total allowable inter-cell connection resistance = 1782μΩ

   Maximum allowed Inter-cell connection resistance

   $$= \frac{1782\mu\Omega}{54 connections}$$

   =33μΩ/connection

   Thus, the inter-cell connection resistance limit is reduced to account for the inter-tier, inter-bank, and terminal connection resistance. Under limiting conditions, the equivalent series connection resistance is not exceeded, even with all connections at the proposed TS limit. The limiting condition becomes 33μΩ per inter-cell connection for a 60 cell normal battery configuration. The limiting condition for the inter-tier, inter-bank, and terminal connection is 150μΩ.

b. *Table B1 of Attachment 1 of the LAR (page 14 of 16), "Individual Resistance Design Limit of Vendor-provided Battery Inter-Cell Connector," identifies 48 micro ohms as the individual resistance design limit of vendor provided battery inter-cell connectors. Table B5 of Attachment 1 of the LAR (page 14 of 16), "60-cell battery system Administrative Control limit for Resistance of Individual Vendor provided Battery Inter-cell Connector," shows how the licensee determined the inter-cell connection resistance limit of 33 micro ohms. Please provide a detailed technical discussion on the two different resistance values for the same individual inter-cell connector.*

Response: See response to questions 2 and 3.a above.

c. *The proposed TS limits on battery resistance do not bound the 'provisional' configurations that are identified in the BED. Please explain how the proposed TS limits address permissible battery configurations.*

Response: Reference 1 did not propose TS surveillance acceptance criteria for the provisional configurations of a 59 or 58 cell battery configuration. After further consideration, Attachment II provides proposed changes to SR 3.8.4.2 and SR 3.8.4.5 that address the provisional configurations.

4. *In the LAR, the licensee stated that for a normal 60-cell Battery System configuration, calculation No. NK-E-002-005 determined a maximum design value of 2,880 micro ohms (= 60 Inter-cell connections x 48 micro ohms) for the "Maximum Calculated Total Battery Connection Resistance"; however, Reference 5 was not issued as of the date of issuance of this BED. Is this calculation complete? If so, please provide a summary of this calculation.*

Response: At the time of submittal of Reference 1, calculation NK-E-002-005 was intended to incorporate into base calculation NK-E-002-004, "Class 1E Battery Sizing," the approved calculation change notices, including CN007. Calculation NK-E-002-005 was going to utilize a maximum design value of 2,880μΩ (60 cells X 48μΩ/connection). Subsequently, WCNOC decided to not release NK-E-002-005 and utilize the conservative maximum design value of 2,832μΩ per CN007.

5. *In the LAR, the licensee stated that the review of the STS MT-020 NK battery connection resistance readings performed during three recent refueling outages via the sub-work orders (SWO's) listed in Reference 2 determined that the highest single value recorded for each of the terminal, inter-tier, and inter-bank connections is 98, 97, and 107 micro ohms, respectively. Please confirm that each battery passed every service test during this period.*

Response: TS SR 3.8.4.7 requires verifying battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test with a specified Frequency of 18 months. Note 1 indicates that the modified performance discharge test in SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7. Procedure STS MT-021, "Service Test for 125 VDC Class 1E Batteries," and STS MT-058, "Modified Performance Test for 125 VDC Class 1E Batteries," are utilized to perform SR 3.8.4.7 and SR 3.8.4.8. The highest single connection resistance values recorded for terminal, inter-tier, and inter-bank connections were within the proposed acceptance criteria and did not impact the results of the service tests. The Class 1E batteries

successfully passed the service tests and modified performance discharge tests, as appropriate, during the prior three refueling outages.

6. *Please provide an executive summary of the calculation that demonstrates that the proposed TS changes will result in the battery being able to provide the minimum required voltages to the downstream loads during the worst-case scenario.*

Response: Calculation NK-E-001-002, "Class 1E DC Voltage Drop," established that the design bases loads powered from the Class 1E DC Buses, which are fed from the safety related NK batteries, have adequate/sufficient terminal voltages to operate under worst case minimum voltage conditions associated with an station blackout (SBO) event or a loss-of-offsite power (LOOP) concurrent with a loss-of-coolant accident (LOCA) event. This calculation established the minimum Volts-Per-Cell (VPC) values/results for the NK batteries consistent with the methodology in IEEE Std 485-1983, "IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications."

Calculation NK-E-002-004, "Class 1E Battery Sizing," and CCN007 utilized, in the determination of the calculated battery capacity discharge amperes, the minimum VPC values/results from calculation NK-E-001-002 "Class 1E DC Voltage Drop." These calculations confirm, based upon the projected load for these events, the minimum voltage requirements, and including the battery connections resistances discussed above, that the Class 1E batteries have sufficient capacity with margin to perform their specified safety function.

References:

1. WCNOC letter ET 09-0030, "Application to Revise Technical Specification 3.8.4, "DC Sources – Operating," Surveillance Requirements (SR) 3.8.4.2 and SR 3.8.4.5," December 16, 2009.

Revised Technical Specification Markups

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.4.2	Verify no visible corrosion at battery terminals and connectors. OR Verify battery connection resistance is ≤ 150E-6 ohm for inter-cell connections and ≤ 150E-6 ohm for terminal connections.	92 days
SR 3.8.4.3	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	18 months
SR 3.8.4.4	Remove visible terminal corrosion, verify battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	18 months
SR 3.8.4.5	Verify battery connection resistance is ≤ 150E-6 ohm for inter-cell connections and ≤ 150E-6 ohm for terminal connections.	18 months
SR 3.8.4.6	Verify each battery charger supplies ≥ 300 amps at ≥ 128.4 V for ≥ 1 hour.	18 months

(continued)

Connections	60 cells	59 cells	58 cells
inter-cell	≤ 33 E-6 ohms	≤ 36 E-6 ohms	≤ 27 E-6 ohms
inter-tier, inter-bank, terminal	≤ 150 E-6 ohms	≤ 150 E-6 ohms	≤ 150 E-6 ohms
field jumper	NA	≤ 150 E-6 ohms	≤ 150 E-6 ohms

Revised Technical Specification Bases (for information only)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1 (continued)

charger is supplying the continuous charge required to overcome the internal losses of a battery (or battery cell) and maintain the battery (or a battery cell) in a fully charged state. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the initial voltages assumed in the battery sizing calculations. The 7 day Frequency is consistent with IEEE-450 (Ref. 9). This SR applies only to those chargers connected to a battery bank and bus. (Ref. 12)

SR 3.8.4.2

Visual inspection to detect corrosion of the battery cells and connections, or measurement of the resistance of each intercell, and terminal connection, provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The visual inspection is to detect corrosion in cell post connection area; corrosion outside the connection area is not an OPERABILITY concern and would not require measuring resistance.

The Surveillance Frequency for these inspections, which can detect conditions that can cause power losses due to resistance heating, is 92 days. This Frequency is considered acceptable based on operating experience related to detecting corrosion trends.

SR 3.8.4.3

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The presence of physical damage or deterioration does not necessarily represent a failure of this SR, provided an evaluation determines that the physical damage or deterioration does not affect the OPERABILITY of the battery (its ability to perform its design function.)

The 18 month Frequency for this SR is based on operational experience.

SR 3.8.4.4 and SR 3.8.4.5

Visual inspection and resistance measurements of ~~intercell, and terminal~~ connections provide an indication of physical damage or abnormal deterioration that could indicate degraded battery condition. The

Revised Significant Hazards Consideration

4.2 Significant Hazards Consideration

The amendment request involves changes to the Wolf Creek Generating Station (WCGS) Technical Specifications (TS) that revises the TS 3.8.4, "DC Sources – Operating," Surveillance Requirements (SR) 3.8.4.2 and SR 3.8.4.5 battery connection resistance acceptance criteria. WCNOC is proposing to revise the battery connection resistance acceptance criteria by providing limits for inter-cell ,inter-tier, inter-bank, and terminal connections for a 60-cell, 59-cell and 58-cell configuration.

WCNOC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, Issuance of Amendment:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed changes to revise the SR 3.8.4.2 and SR 3.8.4.5 acceptance criteria for battery connection resistance will not challenge the ability of the safety-related batteries to perform their safety function. Appropriate monitoring and maintenance will continue to be performed on the safety related batteries. Current TS testing and monitoring requirements will not be altered.

   The proposed change does not involve a physical change to the batteries, nor does it change the safety function of the batteries. The proposed TS revision involves no significant changes to the operation of any systems or components in normal and accident operating conditions and no changes to existing structures, systems or components.

   Therefore, this change will not increase the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any previously evaluated?

   Response: No

   The proposed changes to revise the SR 3.8.4.2 and SR 3.8.4.5 acceptance criteria for battery connection resistance is an increase in conservatism, without a change in system testing methods, operation, or control. Safety related batteries installed in the plant will be required to meet criteria more restrictive and conservative than current acceptance criteria and standards. The proposed change does not affect the manner in which the batteries are tested and maintained, thus there are no new failure mechanisms for the system.

   Therefore, this change will not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. The proposed changes will not adversely affect operation of plant equipment, as the changes being made are more restrictive. These changes will not result in a change to the setpoints at which protective actions are initiated. Sufficient DC capacity to support operation of mitigation equipment is ensured. The changes associated with the new battery maintenance and monitoring program will ensure that the station batteries are maintained in a highly reliable manner. The equipment fed by the DC electrical sources will continue to provide adequate power to safety related loads in accordance with analysis assumptions.

Therefore, this change does not involve a significant reduction in the margin of safety.