WOLF CREEK
NUCLEAR OPERATING CORPORATION

July 15, 2013

John P. Broschak
Vice President Engineering

ET 13-0024

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

Reference: 1) Letter ET 12-0018, dated September 19, 2012, from J. P. Broschak, WCNOC, to USNRC

2) Letter dated May 31, 2013, from C. F. Lyon, USNRC, to M. W. Sunseri, WCNOC, "Wolf Creek Generating Station – Request for Additional Information Re: Revision to Technical Specification 3.8.1, "AC Sources – Operating," Surveillance Requirement 3.8.1.10 (TAC NO. ME9603)"

Subject: Docket No. 50-482: Response to Request for Additional Information Regarding License Amendment Request to Revise Technical Specification (TS) 3.8.1, "AC Sources - Operating" Surveillance Requirement 3.8.1.10

Gentlemen:

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specification (TS) 3.8.1, "AC Sources - Operating," to increase the voltage limit for the diesel generator (DG) full load rejection test specified by Surveillance Requirement (SR) 3.8.1.10. Reference 2 provided a Nuclear Regulatory Commission (NRC) request for additional information related to the application. The Attachment provides WCNOC's response to the request for additional information.

The additional information does not expand the scope of the application as originally noticed, and does not impact the no significant hazards consideration determination presented in Reference 1.

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.

A001
KIRR

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-4085, or Mr. Michael J. Westman at (620) 364-4009.

Sincerely,

John P. Broschak

JPB/rlt

Attachment
Enclosure

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

**STATE OF KANSAS )**
**) SS**
**COUNTY OF COFFEY )**

John P. Broschak, 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 John P. Broschak
John P. Broschak
Vice President Engineering

SUBSCRIBED and sworn to before me this 15th day of July, 2013.

Gayle Shepheard
Notary Public

GAYLE SHEPHEARD
Notary Public - State of Kansas
My Appt. Expires 7/24/2015

Expiration Date 7/24/2015

**Response to Request for Additional Information**

Reference 1 provided Wolf Creek Nuclear Operating Corporation's (WCNOC) application to revise Technical Specification (TS) 3.8.1, "AC Sources - Operating," to increase the voltage limit for the diesel generator (DG) full load rejection test specified by Surveillance Requirement (SR) 3.8.1.10. Reference 2 provided a Nuclear Regulatory Commission (NRC) request for additional information related to the application. The specific NRC question is provided in italics.

1. *On page 4 of Attachment 1 of the LAR, the licensee states that the switchyard voltage varies throughout the day, resulting in voltages that are sometimes at nominal, sometimes less than nominal, and sometimes higher then nominal at the DG electrical terminals. Section 2.2, "Reason for Proposed Change," of the LAR provides tabulated data of historical bus voltage variation and corresponding "Initial to Peak Voltage Difference." This table indicates that the maximum observed initial to peak voltage difference was 580 Volts (V) for "A" DG and 545 V for "B" DG. Historical trends provide an indication of DG performance and the NRC staff recognizes that several factors impact the voltage difference during load rejection tests. The licensee proposes to raise the maximum allowable bus voltage to 4992 V during the load rejection test. This will provide a range of more than 1000 V if the test is performed at the minimum allowable bus voltage.*

   *Please provide details on the maximum allowable "Initial to Peak Voltage" difference that will be used to validate performance capabilities of the DG voltage regulator when compared with historical trends.*

**Response:** There is currently no procedurally established absolute value for peak voltage rise during a full-load rejection test for the purposes of historical trend comparisons. The full-load rejection test results are trended as a method of monitoring the performance of the DG voltage regulator as required by the site System Engineering Program. In this regard, the data is being used to confirm the voltage regulator is performing consistent with the prior successful test performances. WCNOC recognizes the surveillance criteria requirement as an absolute limit with variable acceptable initial conditions. Due to the allowed variance in the initial test conditions, variance in the resulting test data is expected. Factors such as the initial voltage, reactive power loading, real power loading, and voltage regulator constants and tuning contribute to variability of the peak voltage on full-load rejection; the former being subject to grid conditions from which the test is performed. The voltage rise, or initial to peak voltage, has been used to normalize the peak voltage to the initial voltage for the purposes of comparison. Increased reactive loading has been identified as contributing the most to variability in the resulting peak voltage, though no clear way to normalize the data has been identified for this factor. When comparing test performance data it is first reviewed on the voltage rise alone as compared to past data. If the rise is noted to be beyond the upper or lower range of the past data it is further reviewed for initial test conditions that may explain such differences. If the higher than historical voltage rise is explained by, for instance, higher than prior reactive loading, then it would be considered a new trending data point, but not necessarily a potential performance deficiency of the voltage regulator. If however, a voltage rise in excess of the past historical data occurred with no clearly linkable initial condition variance factor, then it would be considered to be a potential performance deficiency of the voltage regulator. In this case, the load acceptance test traces would be considered for any deviations as compared to prior traces to further support any conclusions of a performance decline of the voltage regulator. The load acceptance test is performed on an isolated bus with loads and sequencing with much less historical variance as compared to grid conditions affecting the full-load rejection test. In the

load sequence test the voltage regulator constants and tuning become a predominant factor such that any possible performance decline of the voltage regulator is more readily apparent.

Systems or components may have declining performance while still meeting TS surveillance requirements. As such, site personnel review the test results taking into consideration variances in the associated initial conditions and historical data to determine if there is a potential performance deficiency. Any performance deficiency is entered into the Corrective Action Program.

2. *The purpose of the full load rejection test is to verify and demonstrate the DG governor and the voltage regulator functional capabilities during system perturbations. The full load rejection test is generally simulated by opening the DG output breaker with the DG at full load and verifying that there is minimal impact on the DG and the safety buses. This test is intended to envelope the voltage and frequency variations that will be observed during a partial to full load rejection event with the DG connected to the safety buses.*

   *In the event that the DGs are supplying the safety-related buses and a large load rejection event occurs, please discuss how the operating equipment on the safety-related buses will not be degraded if the DG output voltage spikes to 4992 V.*

**Response:** The essential service water (ESW) pump motors are 1750 Hp and are the single largest load associated with the DG. License Amendment No. 101 (Reference 3) approved the deletion of the single-load rejection surveillance test. During the review of the license amendment request, WCNOC responded to a request for additional information (Reference 4) and provided information associated with the voltage swing during the single-load rejection test. From Reference 4, WCNOC concluded that the voltage and frequency swings for the single-load rejection test stay within steady state values during the transient. The Enclosure provides Figure 4 (from Reference 4) that shows a recording of voltage and frequency during a single-load rejection test (pump trip followed by a pump start). The NRC safety evaluation (Reference 3) concluded, in part:

> "Operation within the steady state criteria provides assurance of adequate voltages and frequencies for the continuous operation of the connected loads and specifically for induction motors."

The single-load rejection test has not been performed since implementation of License Amendment No. 101. However, in 2011, WCNOC performed a partial load rejection test on the 'A' DG from a grid load of 3450 kW. The initial bus voltage was 4095 V and the peak was 4384 V. The partial load rejection test was completed satisfactorily with no degradation to operating equipment.

For the Wolf Creek Generating Station (WCGS) electrical distribution system, overvoltage protection is provided by surge limiters that are installed on each phase of the 4.16kV switchgear breakers. The surge limiters have been sized to coordinate with the insulation levels of connected equipment and protect the plant equipment from damage caused by transient overvoltage conditions. Additionally, the generator, transformers, equipment cables and motors all have allowable overvoltage test values that exceed 5.5kV for a duration of over 10 seconds. The transient overvoltage from a load reject lasts only a fraction of a second. Therefore, a 4992V DG transient overvoltage spike would not degrade operating equipment.

**References:**

1. WCNOC Letter ET 12-0018, "License Amendment Request To Increase Voltage Limit for Diesel Generator Load Rejection Surveillance Requirement," September 19, 2012. ADAMS Accession No. ML12272A279.

2. Letter from C. F. Lyon, USNRC, to M. W. Sunseri, WCNOC, "Wolf Creek Generating Station – Request for Additional Information Re: Revision to Technical Specification 3.8.1, "AC Sources – Operating," Surveillance Requirement 3.8.1.10 (TAC NO. ME9603)," May 31, 2013. ADAMS Accession No. ML13149A160.

3. Letter from J. C. Stone, USNRC, to N. S. Carns, WCNOC, "Wolf Creek Generating Station – Amendment No. 101 to Facility Operating License No. NPF-42 (TAC NO. M89995)," August 9, 1996. ADAMS Accession No. ML022040294.

4. WCNOC Letter WO 96-0037, "Response to Request for Additional Information Concerning the Revision to Technical Specification 3/4.8.1, "Electrical Power Systems – A.C. Sources," March 8, 1996.

**Figure 4 from WCNOC Letter WO 96-0037 (Reference 4)**
**(1 page)**

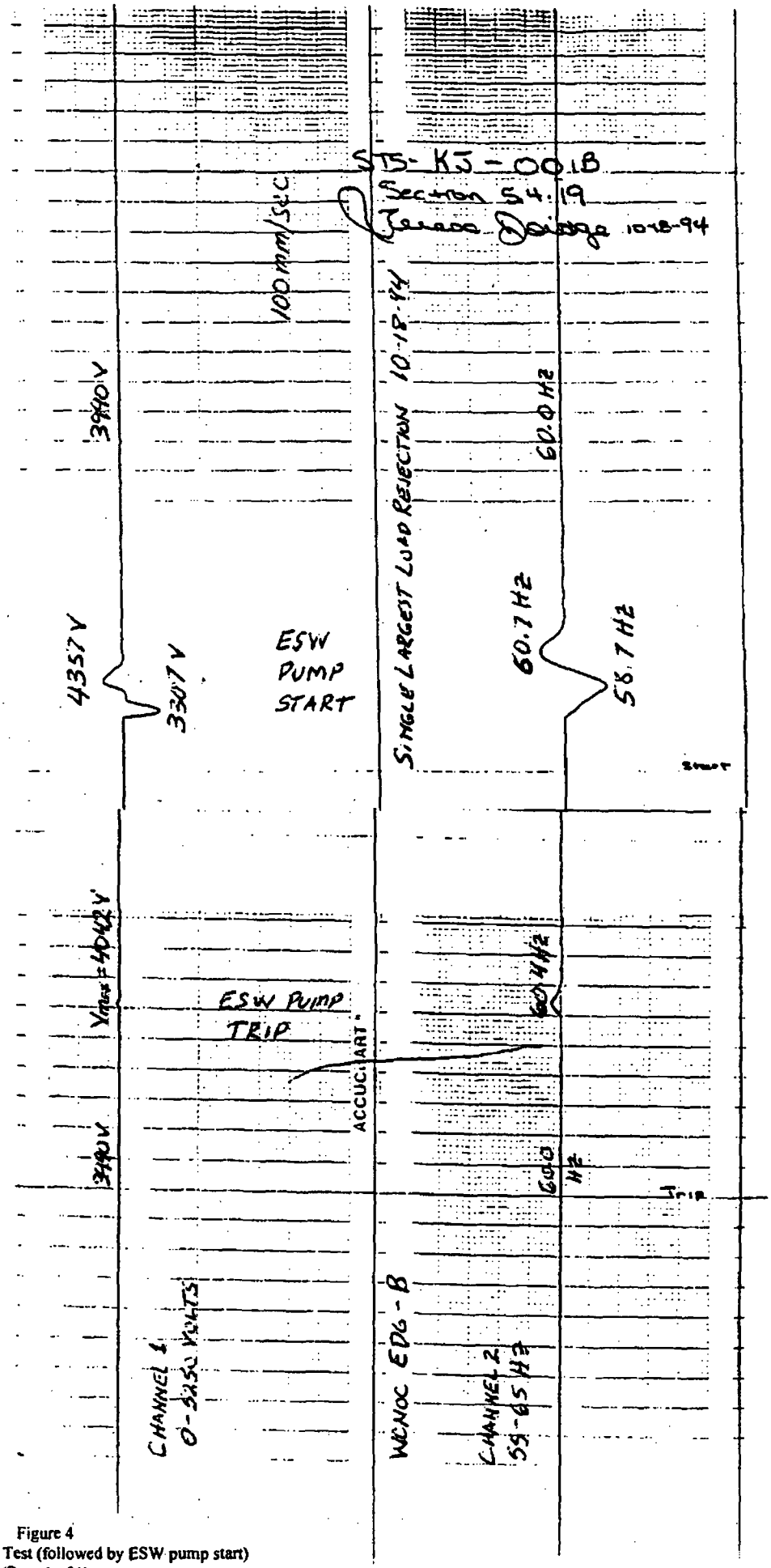


Figure 4
Single-Load Rejection Test (followed by ESW pump start)
(Page 1 of 1)