Stephen L. Smith
Vice President Engineering

June 8, 2020
ET 20-0007

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

Subject: Docket No. 50-482: License Amendment Request for Replacement of Engineered Safety Features Transformers with New Transformers that have Active Automatic Load Tap Changers

Commissioners and Staff:

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Wolf Creek Nuclear Operating Corporation (WCNOC) hereby requests approval of an amendment to Renewed Facility Operating License No. NPF-42 for the Wolf Creek Generating Station (WCGS). The proposed amendment is in support of Updated Safety Analysis Report (USAR) changes describing the design and operation of replacement Engineered Safety Features (ESF) transformers that have active automatic load tap changers (LTCs).

Attachments I through III provide the evaluation, proposed USAR changes, and proposed Technical Specification (TS) Bases changes, respectively, in support of this amendment request. No changes to the TS are needed. Attachment III is provided for information only. The final TS Bases changes will be made pursuant to TS 5.5.14, “Technical Specification (TS) Bases Control Program,” at the time the amendment is implemented.

This amendment application does not involve a significant hazard consideration as determined by 10 CFR 50.92, “Issuance of amendment.” Pursuant to 10 CFR 51.22, “Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review,” Section (b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment.

This amendment application was reviewed by the Plant Safety Review Committee. In accordance with 10 CFR 50.91, “Notice for public comment; State consultation,” Section (b)(1), a copy of this amendment application, with Attachments I through III, is being provided to the designated Kansas State official.

WCNOC requests approval of this license amendment request (LAR) by May 14, 2021. It is anticipated that the ESF transformer replacements will be completed over two refueling outages, R24 and R25. Installation will begin with ESF transformer XNB02 during R24, in Spring 2021. Transformer XNB02 will be replaced with a transformer with an automatic load tap changer (LTC). If this LAR is not approved at that time, XNB02 will be operated in fixed (manual) mode until LAR approval is received. Replacement using fixed (manual) mode, if used, is considered a like-for-like replacement and does not require NRC approval. If installation occurs using the fixed (manual) mode, administrative controls will be put in place to ensure that the transformer is not operated in automatic LTC mode until this LAR is approved, with the exception of conducting post-installation tests which are performed in a condition where the ESF transformer is not required to be operable. ESF transformer XNB01 is expected to be replaced during R25 in Fall 2022.

The license amendment, as approved, will be effective upon issuance and will be implemented as discussed above.

There is one new commitment associated with this LAR:

1. If one or more replacement ESF transformers are installed and operated to satisfy technical specifications prior to LAR approval, controls will be put in place to ensure the transformers are operated in the fixed (manual) mode until this LAR is approved.

If you have any questions concerning this matter, please contact me at (620) 364-4156, or Ron Benham at (620) 364-4204.

Sincerely,

Stephen L. Smith

SLS/rlt

Attachments:
- I - Evaluation of Proposed Change
- II - Proposed USAR Changes (Mark-up)
- III - Proposed TS Bases Changes (For Information Only)
- IV - List of Regulatory Commitments

cc: S. A. Morris (NRC), w/a
N. O'Keefe (NRC), w/a
B. K. Singal (NRC), w/a
K. S. Steves (KDHE), w/a
Senior Resident Inspector (NRC), w/a

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

Stephen L. Smith, 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 [signature]
Stephen L. Smith
Vice President Engineering

Subscribed and sworn to me this 8TH day of June, 2020.

RHONDA L. TIEMEYER
Notary Public, State of Kansas
My Appointment Expires
January 11, 2022

Rhonda L. Tiemeyer
Notary Public

Expiration Date January 11, 2022

ATTACHMENT I

EVALUATION OF PROPOSED CHANGE

EVALUATION OF PROPOSED CHANGE

Subject: License Amendment Request for Replacement of Engineered Safety Features Transformers with New Transformers that have Active Automatic Load Tap Changers

EVALUATION OF PROPOSED CHANGE

1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Wolf Creek Nuclear Operating Corporation (WCNOC) hereby requests approval of an amendment to Renewed Facility Operating License No. NPF-42 for the Wolf Creek Generating Station (WCGS). The proposed amendment is in support of Updated Safety Analysis Report (USAR) changes describing the design and operation of replacement Engineered Safety Features (ESF) transformers that have active automatic load tap changers (LTCs). The use of automatic LTCs introduces active components that can increase the likelihood of occurrence of a malfunction of a system, structure or component (SSC) important to safety, and therefore, requires prior NRC approval.

2.0 DETAILED DESCRIPTION

2.1 System Design and Operation

2.1.1 Offsite Power System

The WCGS offsite Alternating Current (AC) power supply for station startup, normal operation, and safe shutdown is supplied from the transmission network. Electrical power from the power grid to the plant site is supplied by two physically independent circuits designed and located to minimize the likelihood of simultaneous failure. Each of these independent circuits has the capability to safely shut down the unit. Each offsite power circuit is designed to be available in sufficient time to ensure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded following a loss of all onsite power sources and the remaining offsite power circuit.

One circuit supplies power to ESF transformer XNB01, which supplies power to its associated 4.16 kilovolt (kV) Class 1E bus and has the capacity to supply all "A" train safety related loads.

The other circuit is connected to the startup transformer and has the capacity to supply the startup loads and all auxiliary loads of the unit. The secondary winding of the startup transformer feeds ESF transformer XNB02, which supplies power to its associated 4.16 kV Class 1E bus and has the capacity to supply all "B" train safety related loads.

Each offsite power circuit can be manually aligned to supply power to the opposite or both 4.16 kV Class 1E busses, if required.

ESF transformers XNB01 and XNB02 are separated by a 3-hour fire wall. The cables associated with each of these offsite power circuits are routed in separate and distinct raceways.

The offsite power circuits, including the transformers and cables, are sized to carry their anticipated loads continuously. Each ESF transformer is sized to carry its associated safety related load group continuously. The secondary feeder cables to the 4.16 kV Class 1E busses are sized in excess of that required to carry their maximum load continuously. The startup transformer is sized to carry its anticipated load continuously but may be slightly overloaded under certain abnormal conditions.

The two offsite power circuits are fully testable. Since they are continuously energized, they are continuously tested by their use. When one circuit is shutdown, relays, meters, and other instruments can be tested and calibrated as required.

Instrumentation associated with the offsite AC power system provides sufficient information to determine the system availability at any time.

2.1.2 Onsite Power Distribution System

The Onsite Power System is provided with preferred power from the offsite system through two independent and redundant sources of power. One preferred circuit from the switchyard supplies power to ESF transformer XNB01 and the second offsite preferred circuit supplies power to the startup transformer which feeds two medium-voltage 13.8 kV busses and ESF transformer XNB02. Each ESF transformer normally supplies its associated medium voltage 4.16 kV Class 1E bus.

The two 13.8 kV busses supply power to the non-safety related auxiliary loads of the unit. The 13.8 kV busses are also connected to a three-winding unit auxiliary transformer, in addition to the startup transformer. The unit auxiliary transformer is connected to the main generator through an isolated phase bus duct.

Two 4.16 kV non-Class 1E busses are supplied power from two 13.8 kV busses through two 13.8/4.16 kV station service transformers. Non-Class 1E low-voltage 480 volt (V) loads are supplied power from two 13.8 kV busses through 480 V load centers and 480 V motor control centers.

The onsite power system is divided into two separate load groups, each load group consisting of an arrangement of busses, transformers, switching equipment, and loads fed from a common power supply. Power is supplied to auxiliaries at 13.8 kV, 4.16 kV, 480 V, 480/277 V, 208/120 V, 120 VAC, 250 VDC, and 125 VDC.

The onsite standby power system includes the Class 1E alternating current (AC) and direct current (DC) power for equipment used to maintain cold shutdown of the plant and to mitigate the consequences of a design basis accident (DBA).

Class 1E AC system loads are separated into two load groups which are powered from separate ESF transformers or two independent diesel generators (DG) (one per load group). Each load group distributes power by a 4.16 kV bus, 480 V load centers, and 480 V motor control centers.

The Class 1E DC system provides four separate 125 VDC battery supplies for Class 1E controls, instrumentation, power, and control inverters.

A Station Blackout (SBO) DG system is provided for plant Mitigating Systems Performance Index (MSPI)/Probabilistic Risk Assessment (PRA) margin. This system has the capacity to supply either train of safety related loads.

2.1.3 Class 1E AC System

The Class 1E AC system distributes power at 4.16 kV, 480 V, 208/120 V, and 120 V to all safety related loads. The Class 1E AC system also supplies certain selected loads which are not safety related but are important to plant operation.

The Class 1E AC system contains standby emergency DGs which provide the power required for post-accident and post-fire safe shutdown in the event of a loss of the preferred power sources.

Features of the Class 1E systems include:

> Power Supply Feeders - Each 4.16 kV load group is supplied by two preferred power supply feeders and one DG (standby) supply feeder. Each 4.16 kV bus supplies motor loads and 4.0 kV/480 V load center transformers with their associated 480 V busses.
>
> Bus Arrangements - The Class 1E AC system is divided into two redundant load groups. Either one of the load groups is capable of providing power to safely reach cold shutdown. Each AC load group consists of a 4.16 kV bus, 480 V load centers, 480 V motor control centers, and lower voltage AC supplies.
>
> Manual and Automatic Interconnections Between Busses, Busses and Loads, and Busses and Supplies - No provisions exist for automatically connecting one Class 1E load group to another redundant Class 1E load group or for automatically transferring loads between load groups. The incoming preferred power supply associated with a load group can supply the 4.16 kV Class 1E bus of the other load group by manual operation of the requisite 4.16 kV circuit breakers when required.
>
> Interconnections Between Safety Related and Non-Safety Related Busses – No interconnections are provided between the safety related and non-safety related busses. The startup transformer supplies power through the same winding to a 13.8 kV bus and a 13.8/4.16 kV ESF transformer.
>
> Redundant Bus Separation - The Class 1E switchgear, load centers, and motor control centers for the redundant load groups are located in separate rooms of the control building and auxiliary building in such a way as to ensure physical separation.

2.2 Description of the Proposed Change

The ESF transformers, XNB01 and XNB02, will be replaced with new transformers that have automatic LTCs on the secondary side of the transformer. The LTCs can provide acceptable operating voltages to the safety related electrical distribution system under a wider range of offsite power system voltages.

2.2.1 Technical Specifications (TS)

The TS associated with the power distribution system are addressed in TS 3.8.1, AC Sources - Operating, TS 3.8.2, AC Sources - Shutdown, TS 3.8.9, Distribution Systems - Operating, and TS 3.8.10, Distribution Systems - Shutdown. These TS ensure that sufficient power will be available to supply the safety related equipment required for safe shutdown of the facility and mitigation and control of accident conditions within the facility.

WCGS has determined that there are no changes to the TS or surveillance requirements as a result of the ESF transformer replacement project.

2.2.2 Updated Safety Analysis Report (USAR)

The USAR will be updated to incorporate changes related to the ESF transformer replacement project. The proposed USAR changes are provided in Attachment II.

The changes to the USAR include:

- Utility transmission system voltage is noted as “nominal.”
- The offsite power circuits are no longer stated as “largely passive.”
- The ESF transformers are stated as equipped with LTCs.
- Credible failure mechanisms related to the use of the LTCs are added to USAR Table 8.3-4.
- Station drawings, including USAR figures or drawings, will be updated in accordance with the modification process. Cable routing drawings will be revised as necessary and the specific cable routing drawing references currently stated in the text in Section 8 are removed.

2.3 Reason for the Proposed Change

WCGS is systematically replacing the large, oil-filled ESF transformers to address aging concerns and voltage margin and is implementing design improvements in support of long term station operation. The currently installed transformers are approaching the end of their 40 year life and require replacement to support the continued operation of WCGS.

The replacement ESF transformers have automatic LTCs on their secondary windings. The new transformers with LTCs can provide acceptable operating voltages to the safety related electrical distribution system under a wider range of offsite power system voltages.

3.0 TECHNICAL EVALUATION

3.1 General Description

This license amendment request will revise the USAR to describe the design and operation of replacement ESF transformers, XNB01 and XNB02. The replacement transformers will have automatic LTCs on the transformer secondary windings to regulate voltage to provide acceptable voltages to the safety related electrical distribution system given a wider range of offsite power system voltages.

The current and replacement ESF transformers, XNB01 and XNB02, are nonsafety-related.

The basic design parameters of the replacement ESF transformers are provided in Table 1. The design parameters are essentially equivalent to the previous transformers, with the exception of the LTCs, oil volume, and weight.

Table 1

Replacement ESF Transformer Design Specifications	
Phases per transformer	3
Frequency	60 Hertz
Rating	12/16 MVA
13.8 kV winding	13.8 kV, Delta, 65°C rise
4.16 kV winding	4.16/2.4 kV, Grounded Wye, 65°C rise
Auxiliary Winding	437V Delta, Corner Grounded
Cooling	Oil-Air/Forced Air (OA/FA)
Neutral Grounding Resistor	6 Ω
Fixed Taps (13.8 kV Winding)	±2 @ 2.5% steps
Load Tap Changer (4.16 kV Winding)	Reinhausen RMV-II ±16 @ 0.625% steps
Impedance (@ 12 MVA Base)	4.48% (±7.5% tolerance)
Insulation (BIL) – High Voltage	110
Insulation (BIL) – Low Voltage	75
Insulation (BIL) – Low Voltage Neutral	75
Weight	102,000 lbs
Cooling Oil	4,205 gal (including LTC)

The increase in oil volume is addressed in Section 3.3, Fire Protection Design, below.

The weight of the replacement ESF transformer is increased from 53,700 lbs to 102,000 lbs. The transformer foundations were evaluated and determined to be adequate without modification.

The ESF transformers will remain physically and electrically separated. They do not share any common conduits or cables, allowing one ESF transformer to remain available upon failure of the opposite ESF transformer. The replacement transformers will not share any common electrical or control circuits and cannot be paralleled, even if the Class 1E 4.16 kV busses, NB01 and NB02, are cross-connected.

The normal power feed to the LTC is supplied from an auxiliary winding contained in the XNB01 and XNB02 transformers supplied by the original 13.8 kV source. Emergency power for the primary and backup LTC controllers on ESF transformer XNB01 will be supplied from non-safety related motor control center (MCC) PG12K, and emergency power for the primary and backup LTC controllers on ESF transformer XNB02 will be supplied from non-safety related MCC PG13Q.

The LTC operates after a three second delay. The time delay avoids LTC action during a large motor start scenario and switchyard transitions.

The change to use ESF transformers with active automatic LTCs introduces a new active component that must operate properly in order for the replacement transformer to remain operable when operating in the automatic mode. A Failure Modes and Effects Analysis (FMEA) was performed in support of this change and is presented in Section 3.6, below. The credible failure mechanisms were categorized into six distinct cases and evaluated for acceptability. A failure of the replacement ESF transformer in the automatic LTC mode would require the same response and would have the same result as failure of the current ESF transformer. Failure of the automatic LTC could result in the loss of the preferred (offsite) power source and result in the safety related bus being supplied by the emergency DG instead of the preferred (offsite) power source. If undervoltage is detected at the Class 1E bus, the bus undervoltage protection relay will trip the feeder breaker from the ESF transformer and the associated emergency DG will start to supply power to the Class 1E bus.

The following alarms are associated with the replacement ESF transformers. They are displayed locally and are also routed to the plant computer system:

- Transformer Oil Level High
- Transformer Oil Level Low
- LTC Oil Level Low
- Transformer LV Winding Temperature High
- Transformer HV Winding Temperature High
- Transformer Oil Temperature High
- Sudden Pressure Relay Board Trouble
- Transformer Monitor Trouble
- Main Tank Pressure Relief
- LTC Pressure Relief
- LTC Lockout/Vacuum Interrupter Failure
- LTC Not in Auto
- LTC Regulator Failure
- LTC Backup Control Operation
- Loss of 240 VAC Control Power
- Loss of Emergency 480VAC Power Supply
- Loss of Normal 480VAC Power Supply
- Loss of 480 VAC at Transformer Control Cabinet
- Loss of 125 VDC at Transformer Control Cabinet
- Sudden Pressure Relay 2 out of 3 Logic

The above alarms are grouped by function and priority and are shown as the following plant computer alarms which activate TROUBLE and FAULT PRESSURE annunciators in the Control Room:

- XNB01 (XNB02) XFMR TROUBLE
  - XFMR Oil Level High/Low
  - XFMR Oil/Winding Temp Hi/Low
  - XFMR Trouble 63FP/TM/63PR1
  - XFMR Tap Changer Trouble
  - XFMR Loss of AC/DC Aux. Power
- XNB01 (XNB02) FAULT PRESSURE
  - ESF XFMR Fault Pressure 2 out of 3 Logic

USAR Table 8.3-4, Failure Modes and Effects Analysis, will be updated to reflect changes associated with the use of ESF transformers with LTCs. The changes to USAR Table 8.3-4 are provided in Attachment II to this LAR.

3.2 Event Mitigation

3.2.1 Design Basis Accidents (DBA)

The proposed activity does not involve revising or replacing a USAR described evaluation methodology used in establishment of the design bases or used in safety analyses. All calculations, analyses, and evaluations prepared in support of this activity have been completed utilizing the same methodologies used previously at WCGS.

No safety analyses are revised as a result of the change to use ESF transformers with automatic LTCs. The change does not impact any timing requirements or timing assumptions in the safety analyses.

3.2.2 Station Blackout (SBO) (10 CFR 50.63)

The SBO DG system consists of three non-safety related DGs that are capable of supplying essential loads on Class 1E busses NB001 or NB002. Busses NB001 and NB002 feed two redundant load groups that are each capable of safely shutting down the nuclear generating unit.

ESF transformer XNB02 is part of the “B” train equipment which is the preferred circuit that supports restoration of offsite power to the Class 1E loads when recovering from a Station Blackout (SBO) event. XNB02 normally supplies power to 4.16 kV bus NB002, but it can supply power to either train Class 1E 4.16 kV bus, NB001 or NB002.

No changes are made to the SBO event analyses as a result of the ESF transformer replacement project.

3.3 Fire Protection Design

The replacement ESF transformers are physically larger in size and have an increase in oil volume of approximately 2,000 gallons.

The ESF transformers have an oil collection vault located under the transformers in the yard area, with separation from adjacent buildings. The adjacent structures are not safety related. The existing oil collection vault for ESF transformers XNB01 and XNB02 was evaluated and determined to have adequate volume to meet the Nuclear Electric Insurance Limited (NEIL) requirement to contain 100% oil volume from one replacement transformer and a minimum 10 minutes discharge from the water spray system for two replacement transformers.

Due to the increased size of the replacement transformers, the open spray head deluge suppression system will be modified and designed to meet the requirements of National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, and NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection. The deluge system will function the same as the existing system. New heat detectors will be installed to accommodate the new ESF transformer layout and arrangement and will meet the requirements of NFPA 72D, Standard for the Installation Maintenance and Use of Proprietary Protective Signaling Systems for Watchman Fire Alarm and Supervisory Service, and NFPA 72E, Standard for Automatic Fire Detectors. Additionally, the existing outdoor hand pull station will be replaced.

The existing 3-hour fire wall located between the ESF transformers is maintained and meets the guidance identified in the Nuclear Electric Insurance Limited (NEIL) Loss Control Manual.

3.4 Interfaces with Offsite Sources

The WCGS generator unit is connected to the transmission system via the Main Transformers (one per phase). Three 345 kV lines connect the WCGS substation to the area transmission system. If one of the 345 kV lines faulted, any one of the two remaining incoming 345 kV transmission lines can carry the total ESF load required for safe shutdown by controlled switching of the WCGS substation breakers, providing a separate transmission line feeding each ESF transformer.

The existing minimum offsite voltage for the preferred offsite power sources required in the WCGS switchyard after a plant trip is established by load flow analysis. The current minimum voltage with both ESF transformers in service is 338.1 kV (98%). Offsite voltage monitoring and coordination is addressed in Section 3.7, below.

The replacement ESF transformers with automatic LTCs on the transformer secondary winding will help assure that the required minimum safe operating voltage is available at the Class 1E busses under a wider range of grid voltages. The automatic LTCs are capable of varying the voltage at the respective 4.16 kV bus by ±10% (0.625% per step with ±16 steps).

The new transformers meet the electrical design requirements of the original transformers. Transformer loading is limited by the capacity of the core and coils and is not limited by the capacity of the current-carrying components, such as the load tap changers, bushings, current transformers or terminal pads.

3.5 Undervoltage and Overvoltage Evaluations

Electrical Transient Analysis Program (ETAP) analyses were performed and concluded the automatic LTC will regulate the secondary side (4.16 kV) voltage within its predetermined range when the switchyard voltage is maintained within its acceptable range (98% to 105% of 13.8 kV).

The LTC operates after a three second delay. The time delay avoids LTC action during a large motor start scenario and switchyard transitions. Momentary undervoltage conditions were evaluated and shown to meet acceptance criteria.

The LTC controllers receive power from an auxiliary winding in the XNB01 and XNB02 transformers supplied by the original 13.8 kV source. The ETAP analyses confirmed that the LTC controllers receive appropriate supply voltage from their respective 480V auxiliary power source during transients. No new short circuit failures are introduced. Fault current at the XNB01 and XNB02 auxiliary windings are within protective device ratings.

The evaluated scenarios conclude that when ESF transformers XNB01 and XNB02 operate in the automatic LTC mode, all criteria for safety related equipment will be met and all of the scenarios evaluated conclude acceptable results at an analyzed minimum grid voltage of 98%.

ETAP analyses were also performed to determine the most appropriate voltage setpoint for the LTC. The results of those runs demonstrated positive margin for both overvoltage and undervoltage conditions at all equipment, with an emphasis on maximizing undervoltage margins. The ETAP results conclude that at 105% grid voltage, and at 98% grid voltage, the LTC still has additional taps available in either direction.

Operation at 105% switchyard voltage is infrequent (could only occur during a plant outage) and the duration at this voltage is typically very short. Under normal operating conditions, the switchyard voltage is maintained below 103% with a target voltage of 101.5%. When the switchyard voltage is at 105%, the ETAP analyses concluded that overvoltage at the Class 1E bus will not occur with the ESF transformers operating in the automatic LTC mode.

The modifications to the transformer relaying and controls results in a negligible change in load on the associated DC panels. The change evaluation concluded no significant impact on the battery and battery charger sizing calculations and no significant impact on available short circuit values in the short circuit analysis. The load evaluation concludes a negligible load change on batteries PK011 and PK012 and their battery chargers. The evaluation of the impact on the Non-Class 1E 125 VDC System concludes that the loads on the transformer DC panels did not change significantly enough to warrant rerun of the ETAP analyses.

3.6 <u>Failure Modes and Effects Analysis (FMEA) for LTC Automatic Operation</u>

ESF transformers XNB01 and XNB02 are independent and cannot be interconnected with each other. Therefore, the failure of one ESF transformer will have no effect on the operation of the opposite ESF transformer.

The credible failure mechanisms of the replacement ESF transformers that produce the worst-case effects on the associated Class 1E equipment are categorized into six distinct cases:

Case 1 The transformer tap changer fails and raises the 4.16 kV Class 1E bus voltage unexpectedly.

Case 2 The transformer tap changer fails and lowers the 4.16 kV Class 1E bus voltage unexpectedly.

Case 3 The transformer tap changer fails to move.

Case 4 A vacuum bottle fails and causes the transformer tap changer to stop movement.

Case 5 Issues that cause the transformer lockout trip circuit to engage.

Case 6 Issues that prevent the transformer lockout trip circuit from engaging.

The failure modes and their effects are as follows:

Case 1 The transformer tap changer fails and raises the 4.16 kV Class 1E bus voltage unexpectedly.

- The transformer tap changer components fail.
- The transformer tap changer control circuitry fails.
- The transformer tap changer controller potential transformers fail.

EXPECTED RESULT: The LTC will raise the voltage above the expected levels. A signal will be sent to locally display indication of LTC Regulator Failure, and an alarm will be sent to the plant annunciator system. The primary/backup LTC controller will block raise commands to the LTC if the voltage moves beyond a specified block raise setpoint. The backup LTC controller will also command the LTC to lower tap position if the voltage moves a specified amount beyond the block raise setpoint. If the LTC failure results in the transformer failing to provide the required output voltage, station operating procedures would be used to restore the bus voltage to its normal value.

Case 2 The transformer tap changer fails and lowers the 4.16 kV Class 1E bus voltage unexpectedly.

- The tap changer control components fail.
- The tap changer control circuitry fails.
- The tap changer controller potential transformers fail.

EXPECTED RESULT: The LTC will lower the voltage below the expected levels. A signal will be sent to locally display indication of LTC Regulator Failure, and an alarm will be sent to the plant annunciator system. The primary/backup LTC controller will block lower commands to the LTC if the voltage moves beyond a specified setpoint. If the LTC failure results in the transformer failing to provide the required output voltage, it would result in the loss of the Class 1E bus. If the Class 1E bus were to lose power, the emergency DG would start and supply power to the bus. If the LTC failure results in the transformer failing to provide the required output voltage, plant operating procedures would be used to restore the bus voltage to its normal value.

Case 3 The transformer tap changer fails to move.

- The tap changer control components fail.
- The tap changer control circuitry fails.
- The tap changer motor drive fails.
- The tap changer controller potential transformers fail.

EXPECTED RESULT: The LTC will not move, and therefore, fail to regulate voltage. A signal will be sent to locally display indication of LTC Regulator Failure, and an alarm will be sent to the plant annunciator system. If the LTC failure results in the transformer failing to provide the required output voltage, it would result in the loss of the Class 1E bus. If the Class 1E bus were to lose power, the emergency DG would start and supply power to the bus. If the LTC failure results in the transformer failing to provide the required output voltage, plant operating procedures would be used to restore the bus voltage to its normal value.

Case 4 A vacuum bottle fails and causes the transformer tap changer to stop movement.

- Vacuum bottle failure detected by the Vacuum Interrupter Module (VIM) board.

EXPECTED RESULT: The LTC will stop moving. An alarm will be displayed locally at the transformer indicating "LTC Lockout/Vacuum Interrupter Failure" and a "XFMR Tap Changer Trouble" signal will be sent to annunciate "XNB01 (XNB02) XFMR Trouble" in the Control Room. If the LTC failure results in the transformer failing to provide the required output voltage, it would result in the loss of the Class 1E bus. If the Class 1E bus were to lose power, the emergency DG would start and supply power to the bus. If the LTC failure results in the transformer failing to provide the required output voltage, plant operating procedures would be used to restore the bus voltage to its normal value.

Case 5 Issues that cause the transformer lockout trip circuit to engage.

- Internal and External Faults
  - Phase to ground short which occurs on the transformer primary 13.8 kV circuits.
  - Phase to phase short which occurs on the transformer primary 13.8 kV circuits.
  - A single phase opens on the transformer primary 13.8 kV circuits.
  - Phase to ground short which occurs on the transformer secondary 4.16 kV circuits.
  - Phase to phase short which occurs on the transformer secondary 4.16 kV circuits.
  - A single phase opens on the transformer secondary 4.16 kV circuits.
  - A fault internal to the transformer.
- A shorted contact of the neutral overcurrent relay (151N), the transformer differential relay (287), and/or the fault pressure trip relay (263FP/K4) causing the transformer lockout trip circuit to engage.

EXPECTED RESULT: The protective relays for the transformers trip the 13.8 kV transformer feeder breaker and low side breaker and Class 1E voltage relays actuate causing a transfer of the Class 1E bus to the associated emergency DG.

Case 6 Issues that prevent the transformer lockout trip circuit from engaging.

- An open contact of the neutral overcurrent relay (151N), the transformer differential relay (287), or the fault pressure trip relay (263FP/K4) causing the transformer lockout trip circuit to fail to engage.
- A relay coil failure of the fault pressure trip relay (263FP/K4) causing the transformer lockout trip circuit to fail to engage.

EXPECTED RESULT: The remainder of operable protective relays for the transformers trip the 13.8 kV transformer feeder breaker and low side breaker and Class 1E voltage relays actuate causing a transfer of the Class 1E bus to the associated emergency DG. In the case of a failure resulting in an open contact or relay coil failure on a single fault pressure trip relay (263FP/K4), there is another relay in parallel to prevent an issue due to a single point of failure.

The FMEA determined that a failure of the ESF transformer in the automatic LTC mode would require the same response and would have the same result as failure of the current ESF transformer. Failure of the automatic LTC could result in the loss of the preferred (offsite) power source and result in the safety related bus being supplied by the emergency DG instead of the preferred (offsite) power source. If undervoltage is detected at the Class 1E bus, the bus undervoltage protection relay will trip the feeder breaker from the ESF transformer and the associated emergency DG will start to supply power to the Class 1E bus.

The control circuits utilize a Beckwith M-2001D primary controller and a Beckwith M-0329B backup controller. The Beckwith M-2001D primary controller is ISO-certified and highly reliable. A 2018 manufacturer study indicates the mean time between failures is 202 years for the M-2001D controller.

Credible failure mechanisms related to use of the LTCs will be added to USAR Table 8.3-4, Failure Modes and Effects Analysis.

3.7 System Operation/Coordination and LTC Operation

During normal station operations, the WCGS generator output voltage is operated in coordination with Evergy (formerly Westar Energy) Transmission System Operations (TSO).

Evergy TSO monitors the electrical grid reliability using an Energy Management System (EMS) computer, monitors the WCGS actual switchyard voltage, and advises the WCGS Shift Manager of any degraded grid conditions. The current voltage setpoints in the EMS are Low Warning, 99.5% of 345 kV, and Low Operating Voltage, 98.75% of 345 kV.

The Evergy TSO also monitors the EMS for alarms generated by a Contingency Analysis Program and advises the WCGS Shift Manager of any predicted degraded voltage condition. The Contingency Analysis Program simulates the loss of the WCGS generator and the application of LOCA loads. A monitoring function generates alarms when specific data points violate specified limits in a contingency solution. The current setpoints in the Contingency Analysis Program are Low Warning, 99.5% of 345 kV, and Low Alarm, 98% of 345 kV. When switchyard voltage is predicted to be less than the Low Warning or Low Alarm, an alarm is generated signifying a predicted degraded grid voltage condition. The Contingency Analysis Program software sends alarms to the EMS alarm summary page to alert the Evergy TSO operator of violations in the contingency program. Evergy TSO procedures direct TSO actions in the event an alarm is received.

WCGS procedure AP 21C-001, Wolf Creek Substation, documents the responsibilities and specified actions by the Evergy TSO staff and WCGS Shift Management when monitoring and maintaining the offsite power transmission system. WCGS procedure OFN AF-025, Unit Limitations, provides direction for WCGS Control Room operators when Evergy TSO reports grid stability or reliability concerns.

The replacement ESF transformer with an automatic LTC will provide voltage support for the associated Class 1E bus by adjusting output voltage based on switchyard input voltage.

Control of the tap changer is automatic, based on the voltage sensed from the secondary winding of the transformer. The control circuits utilize a Beckwith M-2001D primary controller and a Beckwith M-0329B backup controller. The two controllers are independent and use separate inputs for voltage sensing. The LTC is a Reinhausen Manufacturing Type RMV-II Motor Drive Unit MD-III Vacutap unit. The RMV-II LTC is commonly used in conjunction with oil-immersed power transformers, regulators and phase-shifting transformers to change taps under load, thereby controlling the voltage magnitude or phase angle. The tap changer works on the preventive autotransformer (reactor) switching principle with vacuum interrupters to accomplish the tap change. Vacuum interrupters are used to interrupt the circuit within a half cycle to eliminate arcing under oil. LTC position indication is available locally at the transformer control panel.

The backup controller has adjustable high and low limits and prevents a defective LTC from operating the voltage outside the upper and lower voltage limits. The voltage bands on the backup controller are set slightly wider than the LTC control limits to assure that a failed LTC will not result in a runaway LTC. In the event of a failure of the primary LTC controller, the backup controller automatically takes over to limit voltage on the transformer secondary to prevent damage to equipment. A Block Lower contact prevents a lower operation. A Block Raise contact prevents a raise operation. A Lower contact forces the tap changer down if the primary voltage should subsequently rise.

With the primary and backup control systems in operation, the general response to a Loss of Coolant Accident (LOCA) is the LTC step-correcting the voltage back to the 4.16 kV level. The LTC three second time delay is not bypassed for a DBA as the LTC operation still allows for acceptable transient response. The voltage control systems function to ensure that the voltage at the Class 1E bus is sufficient to reset the safety related degraded voltage relays and loss of voltage relays before time limits are exceeded to retain the preferred offsite power sources for power to the safety related electrical distribution system. The voltage control systems also function to ensure that overvoltage is not present in the safety related electrical distribution system when fed from the preferred (offsite) power source.

As allowed by Technical Specifications and as discussed in the Bases for TS 3.8.1, AC Sources – Operating, an alignment utilizing the Sharpe Station gensets supplying ESF transformer XNB01 may be readied to support the risk-informed 7-day allowed outage time (AOT). This alignment will require the LTC for XNB01 to be placed in the fixed tap (manual) mode. This requirement, including the required tap position, will be prescribed in station procedures that are used to prepare for a planned 7-day emergency DG maintenance outage.

When performing emergency DG testing, the LTC may be placed in a fixed tap position or disabled to prevent cycling due to changes in Class 1E bus voltage from the EDG voltage regulator. When operated in the fixed tap position the transformer acts a typical step down transformer. Station procedures will provide instruction for placing the transformer into the fixed tap position, which is performed manually at the transformer site.

Control Room annunciators will be provided to indicate if the LTC control circuits are not in the automatic mode. Control Room annunciators will also be used to provide indication of system trouble. A multi-point annunciator will also be provided locally at each transformer to allow quick determination of the cause of the trouble signal. Operating procedures will address appropriate responses to Control Room and local annunciators.

Existing safety related circuit breakers provide the means of disconnecting the ESF transformers from the safety related Class 1E bus in the event of equipment maintenance or failure.

In accordance with 10 CFR 50, Appendix A, GDC 17, physical and electrical separation of the ESF transformers will be maintained. The ESF transformers do not share any common electrical or control circuits and they cannot be paralleled, even if the Class 1E 4.16 kV busses, NB001 and NB002, are cross-connected. Therefore, the probability of simultaneous failure of both ESF transformers, causing loss of both offsite power sources, is negligible.

3.8 Manual LTC Operation

The LTC is provided with a Manual-Off-Auto mode selector switch located on the local control panel to select the desired mode of operation. Equipment for automatic and manual control of the tap changing equipment is located in a weatherproof compartment at the transformer site, mounted adjacent to the tap changing equipment. The location allows access and operation from the ground.

The LTC controller can be operated manually in the event the automatic system fails. This is accomplished locally at the transformers using the local control panel.

The tap changers can also be manipulated using a hand crank without the control system. However, due to equipment and personnel safety concerns, the manual manipulation would only be performed with the transformer de-energized.

The transformer primary winding also has a de-energized tap changer handle that allows local manual operation of the tap changer with the transformer de-energized, has tap position indication, and has provisions for padlocking at any tap position.

Instructions for manual operation will be documented in plant operating procedures, including normal, off-normal and annunciator response procedures.

3.9 Testing and Maintenance

The inspections, testing, and maintenance described below demonstrate continuing compliance with 10 CFR 50, Appendix A, GDC 18, Inspection and Testing of Electrical Power Systems.

The ESF transformers are within the scope of the Maintenance Rule (10 CFR 50.65). The LTCs will be added to the scope of the Maintenance Rule at WCGS.

Inspections, testing and maintenance may be modified with appropriate engineering reviews.

3.9.1 Post-Modification Testing

Post-modification testing will test all functions required to ensure appropriate operation of the ESF transformer and LTC in both the manual and automatic modes.

ESF Transformers:

- A transformer inspection and core ground test will be performed prior to unloading the transformer.
- A transformer turns ratio (TTR) verification will be performed between the windings. TTR acceptance is within 0.5% of the calculated ratio. TTR verification will be performed for all taps.
- Insulation power factor testing will be performed. Acceptance will be a maximum of 0.5%, corrected to 20 degrees C.
- Voltage tests:
  - High voltage (HV) winding to low voltage (LV) winding with tertiary voltage (TV) winding grounded
  - LV winding to HV winding with TV winding grounded
  - LTC winding to HV winding with LV winding grounded
- The winding resistance of the transformer will be measured and compared with the manufacturer's certified test data.
- The sudden pressure relay, NBPDI0001 and NBPDI0002, will be calibrated and verified to function properly prior to energization.
- The pressure vacuum bleeder will be verified to operate properly.
- The winding and oil temperature indicators will be verified to provide an indication without load applied to the transformer.
- The oil temperature gauge and switches for fan control and alarm, and low oil level alarm switches, will be checked for proper operation.
- The transformer current transformers will be tested.

Tap Changer:

- With no power connected to the ESF transformer, the high voltage de-energized tap changer will be operated manually through each tap change position to verify proper operation, verify that the mechanical device is operating properly, and verify the mechanical stops are operating properly.
- The LTC will be operated through each tap change position to verify proper operation and to ensure the mechanical/electrical stops are operating properly.
- The backup LTC controller will be tested to verify successful blocking of the primary controller and to verify the settings used to control transformer voltage are properly set.
- With the ESF transformer de-energized, the manual handle for manual LTC operation will be inserted and it will be verified that automatic and manual electrical operation of the LTC is inhibited.

- Inputs to the LTC protective relay trip circuit will be tested.

Transformer Controls:

- A scheme check will be performed prior to energization.
- The protective and control relaying will be calibrated and functionally tested prior to transformer energization.
- 480 VAC wiring will be meggered in accordance with station procedures prior to energization.

Functional Testing:

- The transformer fans will be energized by simulating each of the three start signals (high winding temperature [LV and HV] and high oil temperature). Rotation of the fans will be verified to be proper on all fan banks. The transformer fan current will be measured and recorded.
- The transformer control panel heaters will be checked for proper operation.
- The transformer instruments will be verified to operate properly.
- The sudden pressure relays will be verified to trip the high and low side breakers.
- Inputs to the local annunciator panel and plant annunciator system alarms will be verified to function properly.

3.9.2 <u>Energized Tests for Operability</u>

The following tests will be performed for declaring Operability of Offsite Power Sources for MODES 5 and 6:

- With the transformer disconnected from the bus, and with the transformer tap changer in manual/local control and the LTC tap on Position 6L (XNB01) or Position 3L (XNB02):
  - Record all high side, low side, and controller voltages.
  - Simulate automatic control by operating the LTC through the tap positions using a temporary voltage source. Force the tap changer control bank to operate through the range documented by calculation. Verify parameters, such as voltage levels, bandwidth, timing, etc.
- A phase check will be performed prior to tying the transformer to the Class 1E bus.
- With the transformer connected to the bus:
  - A start of the Essential Service Water (ESW) pump will be made and recorded. Voltage variances will be compared to calculated values. Acceptance criteria include starting of the motors with no operation of the degraded voltage relays.
  - A high current test will be completed to verify current transformer phasing and verify the ratio of inputs to the differential relays.
  - Thermography checks will be performed on the transformer tanks, control panels, and bus connections to detect any hot spots after the replacement ESF transformers have been energized continuously for four hours.

The following tests will be performed for declaring Operability of Offsite Power Sources for MODES 1, 2, 3, and 4:

- A Safety Injection Without Loss of Offsite Power Engineered Safety Feature Actuation System (ESFAS) test will be performed with the transformer tap changer in automatic control (LTC should not respond).
- A Safety Injection Without Loss of Offsite Power ESFAS test will be performed with the transformer tap changer in manual/fixed tap and the LTC transformer tap on Position 6L (XNB01) or Position 3L (XNB02).
- A Restoration from Loss of Offsite Power test will be performed.

Routine maintenance, inspection and testing will also be performed to assure continued functionality of the ESF transformers and LTCs. The activities will include: trending transformer gas pressure verses oil temperature, oil sampling to verify total gas in oil and for fluid analysis, inspection of the transformers using thermography, power-factor of transformers and bushings, operating the transformer tap changer controls throughout their range, calibrating protective relays and transformers, performing a trip check to verify function of the high and low side breakers by manipulating transformer protective devices, Tan Delta testing of high side transformer cable insulation, and station ESFAS testing. During ESFAS testing the LTC will be placed in automatic mode during an ESFAS test where offsite power is not lost to ensure the LTC functions as designed, even if no tap changes occur.

3.9.3 Emergency DG Testing

The ESF transformer LTC may be placed in the fixed tap mode or disabled during emergency DG testing to prevent cycling due to changes in the Class 1E bus voltage from the EDG voltage regulator during testing. If the LTC is placed in a fixed position, the primary fixed tap setting and the acceptable ranges of the secondary fixed tap settings will be as established in station calculations to ensure that in the event of a concurrent DG test and a DBA, the supplied power voltage will be adequate to support all ESF equipment.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

4.1.1 The proposed revisions to the WCGS USAR continue to meet the requirements of 10 CFR 50.34(b)(2) to provide description sufficient to permit understanding of the system designs and their relationship to safety evaluations.

4.1.2 WCGS License Condition 2.C.(5) allows changes to the Fire Protection Program without prior NRC approval if the change does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. A Fire Protection evaluation was performed for this change that concluded prior NRC approval is not needed. See Section 3.3 of this LAR.

4.1.3 10 CFR 50.36 sets forth requirements for the TS contents. No changes are required to the TS related to this LAR. The existing TS and TS surveillances will continue to govern and demonstrate availability of the offsite power sources using the replacement ESF transformers with automatic LTCs.

4.1.4 10 CFR 50.36(a) requires that the TSs have a summary statement of the bases or reasons for such specifications but shall not become part of the TSs. Attachment III of this LAR provides mark-ups showing intended revisions to the WCGS TS Bases as a result of approval of this LAR and after both ESF transformers have been replaced. The TS Bases revisions will be implemented using the WCGS TS Bases Control Program referenced in WCGS TS 5.5.14. If only one of two ESF transformers have been replaced at the time of LAR approval, the TS Bases will be incrementally revised, reflecting the design of the installed transformers.

4.1.5 10 CFR 50.59 allows licensees to make changes to the facility and procedures described in the USAR, and conduct tests and experiments not described in the USAR, as long as these activities do not change the TS or meet the criteria stated in 10 CFR 50.59(c)(2). This amendment request is being submitted in accordance with 10 CFR 50.59 due to the criteria being met in 10 CFR 50.59(c)(2)(ii) as a result of proposing new active components on the replacement ESF transformers. Therefore, the requirements of 10 CFR 50.59 are met. The automatic LTC feature on the replacement ESF transformers cannot be placed in service without the approval of this LAR. Upon approval of this LAR, the WCGS USAR will be revised to reflect the approved changes and 10 CFR 50.59 will continue to be applied to future changes to the electrical distribution system. Attachment II of this LAR provides mark-ups showing the intended revisions to the WCGS USAR after both ESF transformers have been replaced. If only one of two ESF transformers have been replaced at the time of LAR approval, the USAR will be incrementally revised, reflecting the design of the installed transformers.

4.1.6 10 CFR 50.63, Loss of all alternating current power, continues to be met and was evaluated as discussed in Section 3.2.2.

4.1.7 10 CFR 50 Appendix A, General Design Criteria for Nuclear Power Plants, GDC 17, Electric Power Systems, continues to be met as discussed in Section 3 of this LAR.

4.1.8 10 CFR 50 Appendix A, General Design Criteria for Nuclear Power Plants, GDC 18, Inspection and Testing of Electric Power Systems, continues to be met as discussed in Section 3 of this LAR.

4.2 Precedent

The following industry license amendments were reviewed and found to be the most comprehensive and applicable amendments associated with the WCGS LAR. In each case, the cited industry LAR is similar in nature to the WCGS request by requesting use of automatic LTCs on transformers providing offsite power to safety related busses.

Callaway Plant, Unit 1

AmerenUE submitted a LAR for Callaway, Unit 1, on January 18, 2001, titled, "Operating License Amendment Request: 'Unreviewed Safety Question Regarding Installation of Load Tap Changing Transformers to Provide Offsite Power to the Safety Related Electrical Buses.'" The Callaway proposed changes were in support of replacement ESF transformers with active automatic LTCs.

NRC approved the Callaway, Unit 1, LAR by issuance of amendment dated April 6, 2001.

Kewaunee Power Station

Dominion Energy Kewaunee, Inc., submitted a LAR for Kewaunee Power Station on June 1, 2010, titled, "License Amendment Request 236, Automatic Operation of Transformer Load Tap Changers." The LAR requested approval to operate the LTCs in automatic mode for two new transformers that supply offsite power to the ESF 4.16 kV busses.

NRC approved the Kewaunee Power Station LAR by issuance of amendment dated July 29, 2011.

James A. Fitzpatrick Nuclear Power Plant

Entergy submitted a LAR for the Fitzpatrick Nuclear Power Plant on August 16, 2011, titled, "Application for Change to the Current Licensing Basis, Authorizing Use of On Load Tap Changers with the Reserve Station Service Transformers." The LAR requested approval to operate tap changers for new reserve station service transformers to compensate for offsite voltage variations in circuits supplying plant emergency loads.

NRC approved the Fitzpatrick LAR by issuance of amendment dated September 26, 2012, and a corrected amendment on January 11, 2013.

Quad Cities Nuclear Power Station, Units 1 and 2

Exelon submitted a LAR for Quad Cities Nuclear Power Station, Units 1 and 2, on January 25, 2006, titled, "Request for License Amendment Regarding Automatic Operation of Transformer Load Tap Changers." The LAR requested approval of use of automatic LTCs on transformers providing offsite power to safety related busses.

NRC approved the Quad Cities, Units 1 and 2, LAR by issuance of amendments dated July 24, 2006.

4.3 No Significant Hazards Consideration

WCGS has evaluated whether or not a significant hazards consideration is involved with the proposed changes by focusing on the three standards set forth in 10 CFR 50.92(c) as discussed below:

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

   Response: No

   The replacement ESF transformers with automatic LTCs are designed to provide acceptable operating voltages to the safety related electrical distribution system under a wider range of offsite power system voltages. The change implements a station improvement associated with replacement of the current ESF transformers that are approaching the end of their 40-year life. The change to use ESF transformers with automatic LTCs does not significantly increase the probability or consequences of an accident previously evaluated. The automatic LTCs for the ESF transformers are designed and tested for proper operation and reliability of service. The ESF transformers are the preferred (offsite) power source to the Class 1E busses, but they are not safety related. A loss of the preferred (offsite) power source does not directly cause a DBA, therefore, the probability of an accident occurring is not changed. A Failure Modes and Effects Analysis was performed and determined that a failure of the replacement ESF transformer in the automatic LTC mode would require the same response and would have the same result as failure of the current ESF transformer, therefore, the consequence of an accident previously evaluated is not changed. If the ESF transformer fails to provide the required voltage to the Class 1E busses, power would continue to be supplied by the emergency DGs. The change associated with this LAR does not impact the availability or operation of the emergency DGs. The ESF transformers will continue to maintain physical and electrical independence. Therefore, the proposed change will not increase the probability or consequences of an accident previously evaluated in the USAR.

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

Response: No

The proposed activity to replace the ESF transformers that utilize automatic LTCs does not create the possibility of a new or different kind of accident from any previously evaluated in the USAR. The accidents in the USAR describe the loss of the preferred power source to the Class 1E 4.16kV busses (NB001 and NB002) and the required responses. A loss of the preferred (offsite) power source does not directly cause a DBA. A Failure Modes and Effects Analysis was performed and determined that a failure of the replacement ESF transformer in the automatic LTC mode would require the same response and would have the same result as failure of the current ESF transformer. The ESF transformers will continue to maintain physical and electrical independence. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

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

Response: No

The proposed activity does not result in a design basis limit for a fission product barrier as described in the USAR being exceeded or altered. The replacement of the ESF transformers does not affect the design of a fission product barrier. There are no parameters of the fission product barriers that are changed by this proposed activity.

The offsite power distribution system continues to provide the required the preferred power to the safety related electrical distribution system for the safe shutdown of the facility and mitigation and control of accident conditions within the facility. The ESF transformers will continue to maintain physical and electrical independence. ETAP analyses conclude the ESF transformers with automatic LTCs will properly regulate voltage within required ranges when the switchyard voltage is maintained within its acceptable range. The change to use ESF transformers with automatic LTCs has no adverse impact on the operation or availability of emergency power supplied by the emergency DGs. Existing TS and TS surveillances will continue to govern and demonstrate availability of the offsite power sources with the replacement ESF transformers with automatic LTCs. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

4.4 Conclusion

Applicable regulatory requirements/criteria continue to be met for this change. The proposed amendment is in compliance with the cited regulations. Precedents are available for this change and are cited. Based on the considerations discussed, 1) there is a reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, 2) such activities will be conducted in compliance with the Commission's regulations, and 3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environment impact statement r environmental assessment need be prepared in connection with the proposed amendment.

ATTACHMENT II

PROPOSED USAR CHANGES (MARK-UP)

1.2.6.3 Radiation Monitoring System

The liquid and gaseous effluents from the plant are continuously monitored for radioactivity. Release rates are monitored and recorded. The process radiation monitoring system detects radioactivity in fluid systems which is indicative of fuel clad defects and/or fluid leakage between process systems.

Area monitoring stations are provided to measure gamma radiation at selected locations in the plant. Radiation levels, as detected by these monitors, are indicated in the control room, and above normal values are annunciated.

1.2.6.4 Balance-of-Plant Instrumentation and Control Systems

The turbine and generator control systems are designed to regulate generator load. The turbine-generator protection system is designed to ensure safe operation of the unit. The analog Electro-Hydraulic Control (EHC) system has been replaced with a new digital Turbine Control System (TCS). The new system utilizes an Ovation-Based Distributed Control System (DCS). Two redundant sets of controllers are used in the turbine control system. The TCS architecture is based on combined functional and hardware redundancy to create a robust and reliable system.

Additional instrumentation and controls allow manual or automatic control of various temperatures, pressures, flows, and liquid levels throughout the plant. Indicators, recorders, annunciators, and the plant computer inform the operating personnel at the equipment location and/or the control room of plant conditions and performance.

1.2.7 PLANT ELECTRIC POWER SYSTEM

nominal

1.2.7.1 Transmission and Generation Systems

The generating units are connected to the respective utility transmission systems. The transmission system voltage is 345 kV for Kansas Gas and Electric Company (KG&E) and Great Plains. The utilities have integrated transmission networks and interconnections with neighboring systems. A description of system network and interconnection for each utility is given in Chapter 8.0.

The main generator is a General Electric 1,800 rpm, three-phase, 60-cycle synchronous unit. The generator is connected directly to the turbine shaft and is equipped with an excitation system coupled directly to the generator shaft.

Power from the generators is stepped up from 25 kV by the unit main transformers and supplied by overhead lines to the switchyard. A unit auxiliary transformer is connected to the main generator through an isolated phase bus duct to supply the auxiliary loads of the unit during power generation.

The onsite power system is shown in

8.1.2 ONSITE POWER SYSTEM DESCRIPTION

The onsite power system is provided with preferred (offsite) power from the offsite system through two independent and redundant sources of power. One preferred circuit from the switchyard supplies power to a three-winding startup transformer. This startup transformer feeds two medium-voltage 13.8-kV busses and a 13.8/4.16-kV ESF transformer. The second preferred (offsite) circuit is connected to the second 13.8/4.16-kV ESF transformer. Each transformer normally supplies its associated medium voltage 4.16-kV Class 1E bus. Refer to Figure 8.3-1.

The two 13.8-kV busses supply power to the nonsafety-related auxiliary loads of the unit. The 13.8-kV busses are also connected to a three-winding unit auxiliary transformer, in addition to the startup transformer. The unit auxiliary transformer is connected to the main generator through an isolated phase bus duct.

Two 4.16-kV non-Class 1E busses are supplied power from two 13.8-kV busses through two 13.8/4.16-kV station service transformers.

Non-Class 1E low-voltage 480-V loads are supplied power from two 13.8-kV busses through 480-V load centers and 480-V motor control centers.

The onsite power system is divided into two separate load groups, each load group consisting of an arrangement of busses, transformers, switching equipment, and loads fed from a common power supply. Power is supplied to auxiliaries at 13.8 kV, 4.16 kV, 480 V, 480/277 V, 208/120 V, 120 V ac, 250 V dc, and 125 V dc.

The onsite standby power system includes the Class 1E ac and dc power for equipment used to maintain a cold shutdown of the plant and to mitigate the consequences of a DBA.

Class 1E ac system loads are separated into two load groups which are powered from separate ESF transformers or two independent diesel generators (one per load group). Each load group distributes power by a 4.16-kV bus, 480-V load centers, and 480-V motor control centers.

The Class 1E dc system provides four separate 125-V dc battery supplies for Class 1E controls, instrumentation, power, and control inverters. Refer to Figure 8.3-6, sheet 1.

equipped with an automatic load tap changer (LTC)

The automatic LTCs provide acceptable operating voltages to the safety related electrical distribution system under a wide range of offsite power system voltages.

SAFETY DESIGN BASIS TWELVE - Two physically and electrically independent ESF transformers ~~are~~ provided to supply the Class IE ac electric power system.

equipped with automatic load tap changers

8.1.4.2.2 Power Generation Design Bases

POWER GENERATION DESIGN BASIS ONE - A separate non-Class IE dc system is provided for non-Class IE controls and dc motors.

8.1.4.3 Design Criteria, Regulatory Guides, IEEE Standards and IE Bulletins

The onsite power system is generally designed in accordance with IEEE Standards 279, 308, 317, 323, 334, 344, 379, 382, 383, 384, 387, 450, and 484.

Compliance with Regulatory Guides 1.6, 1.9, 1.22, 1.29, 1.30, 1.32, 1.40, 1.41, 1.47, 1.53, 1.62, 1.63, 1.68, 1.73, 1.75, 1.81, 1.89, 1.93, 1.100, 1.106, 1.108, 1.118, and 1.131 and IEEE Standards 323-1974, 338-1971, 344-1975, 384-1974, 387-1984, 308- 1974, and 317-1976 are discussed below:

Refer to Appendix 3A for the applicable revision dates on regulatory guides.

Compliance with General Design Criteria 17 and 18 is discussed in Section 3.1.

REGULATORY GUIDE 1.6, INDEPENDENCE BETWEEN REDUNDANT STANDBY (ONSITE) POWER SOURCES AND BETWEEN THEIR DISTRIBUTION SYSTEMS - The Class IE system is divided into redundant load groups so that loss of any one group does not prevent the minimum safety functions from being performed. Figure 8.3-1 shows this arrangement.

Each ac load group has connections to two preferred (offsite) power supplies and to a single diesel generator. Each diesel generator is exclusively connected to a single Class IE 4.16-kV load group and has no automatic connection to the redundant load group.

For a discussion of this regulatory guide, with respect to the Class IE dc system, refer to Section 8.3.2.2.1.

No provisions exist for automatic transfer of loads between redundant onsite power supplies.

The diesel generator of one load group cannot be automatically paralleled with the diesel generator of the redundant load group.

8.2 OFFSITE POWER SYSTEM

8.2.1 DESCRIPTION

The WCGS offsite ac power supply for the startup, normal operation, and safe shutdown is supplied from the transmission network. The principal design bases as applied to the offsite power system are described in Section 8.1.4.

The portion of the offsite power system from the startup transformer and ESF transformer XNB01 to the 4.16-kV Class 1E busses is discussed here. The offsite power system from the transmission line network to the startup transformer and ESF transformer XNB01 is discussed in Section 8.2.1.1.

Two physically independent sources of offsite power are brought to the onsite power system. One circuit is fed from ESF transformer XNB01 and supplies power normally to its associated 4.16-kV Class 1E bus.

The other circuit is fed from one secondary winding of the startup transformer, through ESF transformer XNB02, and supplies power normally to its associated 4.16-kV Class 1E bus. In addition, each offsite power circuit can be manually aligned to supply power to the opposite or both 4.16-kV Class 1E busses, if required. Each of these offsite power circuits is designed to be available in sufficient time to ensure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded following a loss of all onsite power sources and the remaining offsite power circuit.

The two ESF transformers XNB01 and XNB02 are separated by a 3-hour fire wall. The cables associated with each of these offsite power circuits are routed in separate and distinct raceways. ~~The duct banks and other routing features of the two circuits are shown on drawings E-0R0224, E-0R3321, E-0R3221, and E-1R3211 for the cables for the ESF transformers to the 4.16-kV Class 1E busses, on drawings E-1R0223, E-0R4331, E-0R4321, and E-0R0224 for cables from the startup transformer to the 13.8-kV switchgear and from the 13.8-kV switchgear to ESF transformer XNB02.~~

The offsite power circuits, including the transformers and cables, have been sized to carry their anticipated loads continuously. Each ESF transformer is sized to carry its associated safety-related load group continuously. The secondary feeder cables to the 4.16-kV Class 1E busses are sized in excess of that required to carry their maximum load continuously. The startup transformer is sized to carry its anticipated load continuously, but may be slightly overloaded under certain abnormal conditions. For additional details of the sizing of these components, refer to Section 8.3.1.

The ESF transformers are equipped with automatic load tap changers (LTC). The ESF transformers with automatic LTCs do not share any common electrical or control circuits with any other transformer. They cannot be paralleled to each other even if the Class 1E 4.16kV busses NB01 and NB02 are being supplied by the same transformer. The failure of one ESF transformer will have no effect on the operation of the opposite ESF transformer. The credible failure mechanisms of the transformer that will have the worst-case effects on the associated Class 1E equipment are summarized in Table 8.3-4.

These two circuits are fully testable. Since they are continuously energized ~~and largely passive~~, they are continuously tested by their use. When one circuit is shutdown, relays, meters, and other instruments can be tested and calibrated as required.

Control and instrumentation power for these offsite power circuits is provided by the Non-Class 1E dc system. A dc power source from separate station batteries is provided to each offsite power circuit for control and relaying purposes.

From the above considerations, it is concluded that the installation, sizing, and control of both of the offsite power circuits are designed so as to minimize the likelihood of their simultaneous failure under operating and accident conditions.

For additional details concerning the compliance of the offsite power system with General Design Criteria, refer to Section 3.1.

The instrumentation associated with the offsite ac power system provides sufficient information to determine the system availability at any time.

Table 1.7-1 of the USAR contains drawings 10466-E-01NB01 and 10466-E-01NB02, Single Line Meter and Relay Diagrams for the Safety-Related 4.16-kV Busses NB01 and NB02. These drawings show the surveillance details of the ESF transformers and their associated 4.16-kV bus. Table 8.3-4 of the USAR, Failure Modes and Effects Analysis, shows the system failure modes and the method of such failure detection.

8.2.1.1 Transmission Network

The KG&E and KCPL transmission systems serve as the main outlet and source of offsite power for WCGS. Connection of the station output to the system is achieved via a 345-kV overhead line from the plant yard to the Wolf Creek 345-kV switchyard.

A rather extensive 345-kV network forms the backbone of the KG&E-KCPL and neighboring systems, as can be seen from Figure 8.2-1. This transmission system provides a highly reliable source of continuous power for plant shutdown.

KCPL and KG&E maintains voltage between a maximum and minimum range of +5%, -2% of nominal. The frequency range is 60 ± .002 Hertz.

parallel operation of the 13.8/4.16-kV transformers. Each transformer is sized to carry the entire 4.16-kV screenhouse load in the event the other transformer is disabled. The 4.16-kV switchgear supplies the service water pumps and the motor-driven fire pump.

The remaining site feeder serves 13.8-kV switchgear located in the shop building. This switchgear supplies standby station power for the 345-kV switchyard, an emergency feed for the town of Burlington, Kansas, and 480-volt unit substations for auxiliaries at the shop building, administration building, main warehouse, auxiliary warehouse, technical support center, guardhouse, and Water Treatment Building North.

Electrical interlocks, or administrative controls, prevent interconnection of the onsite auxiliary power system with the Burlington normal source or the switchyard station power normal source.

The selection, application, and design of the equipment used in the onsite auxiliary power system is compatible with that of the power block and is in compliance with applicable standards and regulations.

8.3.1.1.1.2 Non-Class IE Powerblock Power System

The non-Class IE ac system is that part of the power system outside the broken-line enclosures indicated in Figure 8.3-1, sheet 1. The non-Class IE ac system distributes power at 13.8 kV, 4.16 kV, 480 V, and 208/120 V ac for all nonsafety-related loads. The non-Class IE ac system also supplies preferred (offsite) power to the Class IE ac system through two ESF transformers. One ESF transformer is supplied power directly, by one of the preferred power circuits, from the offsite power system. The second ESF transformer is supplied power from one of the secondary windings of the startup transformer. This startup transformer is supplied power from the second preferred power circuit from the offsite power system. ~~Routing of cables from the ESF transformers to the Class IE switchgear is shown on drawings E-0R0224, E-0R3321, E-0R3221, and E-1R3211. Routing of cables from the startup transformer to the 13.8-kV switchgear and from the 13.8-kV switchgear to ESF transformer XNB02 is shown on drawings E-1R0223, E-0R4331, E-0R4321, and E-0R0224.~~ Feeds to ESF transformer XNB01 and the startup transformer are described in Section 8.2.1.2.

The unit auxiliary transformer and the startup transformer each have two secondary windings rated at 13.8 kV.

Two 13.8-kV busses supply power to nonsafety-related loads. Each 13.8-kV bus is connected to a secondary winding of the startup transformer and also to a secondary winding of the unit auxiliary transformer. During starting of the unit, both 13.8-kV busses are

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TABLE 8.3-4 (Sheet 4)

B. FAILURE MODES AND EFFECTS ANALYSIS

Equip. No.	Equip. Name	Function	Failure Mode	Effect on Subsystem	Method of Failure Detection	Effect on Total System	Causes of Failure
N/A	Offsite power	Provides power to startup xfmr XMR01	Loss of power	Loss of preferred power to xfmr XMR01	Undervoltage relays, voltmeters, lights	None-offsite power supplied by alternate source through ESF xfmr XNB01	Offsite system failure, transmission line failure, bus fault, failure of swyd C.B.
N/A	Offsite power	Provides power to ESF xfmr XNB01	Loss of power	Loss of preferred power to XNB01		None-offsite power supplied by alternate source through startup xfmr XMR01	Offsite system failure, transmission line failure, bus fault, failure of swyd C.B.
XMR01	Startup transformer	Provides preferred power to ESF xfmr XNB02	Fails to provide power	Loss of preferred power to XNB02	Overcurrent, neutral ground overcurrent, and differential relays, fault pressure annunciation; undervoltage annunciation for bus NB02 at MCB. Periodic testing and inspection	None-offsite power supplied by alternate source through ESF xfmr XNB01	Internal fault, lightning arrestor failure, bushing failure, cooling system failure (during startup only)
XNB01	ESF transformer XNB01 with automatic load tap changer (LTC)	Provides preferred power to bus NB01 and backup power to bus NB02	Fails to provide power	Loss of preferred power to bus NB01 and backup power to NB02	Undervoltage annunciation for bus NB01 at MCB. Periodic testing and inspection.	None - D-G NE01 energizes NB01 until bkr 152NB0109 is manually closed	Internal fault, bushing failure, inadvertent transformer lockout logic actuation
			Controllers fail low	Raises NB01 bus voltage unexpectedly	Overvoltage annunciation from NG load center	None-short-term overvoltage has been evaluated. Limit device prevents extreme voltage changes. XNB02 offsite power available.	Primary and backup controllers (components, circuitry or potential transformers) fail low
			Controllers fail high	Lowers NB01 bus voltage unexpectedly	Undervoltage annunciation	None-eventually, degraded voltage circuits shed bus. Loads are transferred to D-G. XNB02 offsite power available.	Primary and backup controllers (components, circuitry or potential transformers) fail high
			Tap changer fails to move	NB01 bus voltage remains as is without LTC control	LTC controller self-check causes MCB LTC trouble annunciation. Over/under voltage annunciation.	None-voltage will not be adjusted. Can result in overvoltage or undervoltage depending on offsite voltage. Undervoltage may result in load shed. Loads are transferred to D-G. Overvoltage is evaluated. XNB02 offsite power available.	Controller lockup, LTC motor failure, LTC potential transformers fail low, voltage-sensing transformer fuses fail, LTC vacuum interrupter failure

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TABLE 8.3-4 (Sheet 5)

Equip. No.	Equip. Name	Function	Failure Mode	Effect on Subsystem	Method of Failure Detection	Effect on Total System	Causes of Failure
XNB02	~~ESF transformer~~	~~Provides preferred power to bus NB02 and backup power to bus NB01~~	~~Fails to provide power~~	~~Loss of preferred power to bus NB02 and backup power to bus NB01~~	~~Undervoltage annunciation for bus NB02 at MCB~~ ~~Periodic testing and inspection~~	~~None-D-G NE02 energized NB02 until bkr 152NB0212 is manually closed~~	~~Internal fault, bushing failure~~
252PA0201	1,200-A 13.8-kV N.C. incoming feeder bkr	Provides power to and protects ESF xfmr XNB02	Fails open	Loss of preferred power to xfmr XNB02	Indicating lights, undervoltage annunciation for bus NB02 at MCB	None-D-G NE02 feeds bus NB02 until bkr 152NB0212 is closed	Mechanical failure, relay failure, control power failure
			Fails closed	Swyd bkr isolates xfmr XMR01	Periodic testing and inspection		
152NB0209	2,000-A, 4.16-kV N.C. breaker	Provides preferred power to and protects bus NB02	Fails open	Loss of preferred power to bus NB02	Indicating lights, undervoltage annunciation for bus NB02 at MCB	None-bus NB02 supplied by NE02	Mechanical failure, relay failure, loss of control power
			Fails closed	Bus NB02 isolated by N.C. bkr 252PA0201	Periodic testing and inspection	None-bus NB02 isolated by N.C. bkr 252PA0201; ESF loads fed by L.G.1	
	ESF transformer XNB02 with automatic load tap changer (LTC)	Provides preferred power to bus NB02 and backup power to bus NB01	Fails to provide power	Loss of preferred power to bus NB02 and backup power to bus NB01	Undervoltage annunciation for bus NB02 and MCB. Periodic testing and inspection.	None - D-G NE02 energized NB02 until bkr 152NB0212 is manually closed	Internal fault, bushing failure, inadvertent transformer lockout logic actuation
			Controllers fail low	Raises NB02 bus voltage unexpectedly	Overvoltage annunciation from NG load center	None-short-term overvoltage has been evaluated. Limit device prevents extreme voltage changes. XNB01 offsite power available.	Primary and backup controllers (components, circuitry or potential transformers) fail low
			Controllers fail high	Lowers NB02 bus voltage unexpectedly	Undervoltage annunciation	None-eventually, degraded voltage circuits shed bus. Loads are transferred to D-G. XNB01 offsite power available.	Primary and backup controllers (components, circuitry or potential transformers) fail high
			Tap changer fails to move	NB02 bus voltage remains as is without LTC control	LTC controller self-check causes MCB LTC trouble annunciation. Over/under voltage annunciation.	None-voltage will not be adjusted. Can result in overvoltage or undervoltage depending on offsite voltage. Undervoltage may result in load shed. Loads are transferred to D-G. Overvoltage is evaluated. XNB01 offsite power available.	Controller lockup, LTC motor failure, LTC potential transformers fail low, voltage-sensing transformer fuses fail, LTC vacuum interrupter failure

ATTACHMENT III

PROPOSED TS BASES CHANGES (FOR INFORMATION ONLY)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources - Operating

BASES

BACKGROUND

The unit Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternate from the redundant Engineered Safety Feature (ESF) transformers), and the onsite standby power sources (Train A and Train B diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the ESF systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to its preferred offsite power source and a single DG.

Offsite power is supplied to the unit switchyard from the transmission network by three transmission lines. From the switchyard, two electrically and physically separated circuits provide AC power, through the ESF transformers, to the 4.16 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the USAR, Chapter 8 (Ref. 2).

voltage regulating load tap changers,

An offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus(es).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 1 minute after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the load sequencer.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs A and B are dedicated to ESF buses NB01 and NB02, respectively. The DG starts automatically on a safety injection (SI) signal or on an ESF bus undervoltage signal. A degraded voltage signal produces an undervoltage condition by opening the normal and alternate

BASES

APPLICABLE SAFETY ANALYSES (continued)

meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Electrical Power System, separate and independent DGs for each train, and redundant LSELS for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

One offsite circuit consists of the #7 transformer feeding through the 13-48 breaker power the ESF transformer XNB01, which, in turn powers the NB01 bus through its normal feeder breaker. Transformer XNB01 may also be powered from the SL-7 supply through the 13-8 breaker provided the offsite 69 KV line is not connected to the 345 kV system. The offsite circuit energizing NB01 is considered inoperable when NB01 is only energized from the transmission network through the 345-50 and 345-60 main generator breakers. For this configuration, switchyard breakers 345-120 and 345-80 are open.

Another offsite circuit consists of the startup transformer feeding through breaker PA201 powering the ESF transformer XNB02, which, in turn powers the NB02 bus through its normal feeder breaker.

ESF transformers XNB01 and XNB02 have automatic load tap changers (LTCs). In order for the ESF transformer to be OPERABLE, the LTC must be capable of meeting specified safety design functions when in automatic mode (ref. calculation XX-E-006), or at tap setting 6L (XNB01) or 3L (XNB02), or higher, when in the fixed tap (manual) mode.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 12 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The AC sources satisfy Criterion 3 of the 10 CFR 50.36(c)(2)(ii).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem of LCO 3.8.10, "Distribution Systems - Shutdown," ensures that one train of required loads are powered from offsite power. An OPERABLE DG, associated with the distribution system train required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

The DG must be supporting the train of AC electrical distribution required to be OPERABLE per LCO 3.8.10. The offsite circuit must also support the train of AC electrical distribution required to be OPERABLE per LCO 3.8.10. When the second AC electrical power distribution train (subsystem) is needed to support redundant required systems, equipment and components, the second train may be energized from any available source. The available source must be Class 1E or another reliable source. The available source must be capable of supplying sufficient AC electrical power such that the redundant components are capable of performing their specified safety function(s) (implicitly required by the definition of OPERABILITY). Otherwise, the supported components must be declared inoperable and the appropriate conditions of the LCOs for the redundant components must be entered.

The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in the USAR and are part of the licensing basis for the unit.

One offsite circuit consists of the #7 transformer feeding through the 13-48 breaker power the ESF transformer XNB01, which, in turn powers the NB01 bus through its normal feeder breaker. Transformer XNB01 may also be powered from the SL-7 supply through the 13-8 breaker provided that no offsite load is connected to the 69 KV system. Another offsite circuit consists of the startup transformer feeding through breaker PA201 powering the ESF transformer XNB02, which, in turn powers the NB02 bus through its normal feeder breaker.

The ESF transformers, XNB01 and XNB02, have automatic load tap changers (LTCs). The LTCs are discussed in the Bases for TS 3.8.1.

ATTACHMENT IV

LIST OF REGULATORY COMMITMENTS

LIST OF COMMITMENTS

The following table identifies a commitment made by Wolf Creek Nuclear Operating Corporation in this document. Any other statements in this letter are provided for information purposes and are not considered regulatory commitments. Please direct questions regarding this commitment to Ron Benham, Manager Regulatory Affairs at Wolf Creek Generating Station, (620) 364-4204.

REGULATORY COMMITMENT	DUE DATE
If one or more replacement ESF transformers are installed and operated to satisfy technical specifications prior to LAR approval, controls will be put in place to ensure the transformers are operated in the fixed (manual) mode until this LAR is approved.	Upon approval of the Load Tap Changer LAR.