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JAFP-11-0102
August 16, 2011

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

SUBJECT: Application for Change to the Current Licensing Basis, Authorizing use of On Load Tap Changers with the Reserve Station Service Transformers
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations, Inc. (Entergy) hereby requests approval for the use of On Load Tap Changers (OLTCs) with the Reserve Station Service Transformers at the James A. FitzPatrick Nuclear Power Plant (JAF).

Attachment 1 provides an evaluation supporting the requested change.
Attachment 2 provides the proposed Technical Specification Bases changes as marked up pages (Info Only).
Attachment 3 provides the proposed Updated Final Safety Analysis changes as marked up pages (Info Only).

The Technical Specification (TS) Bases changes are provided for NRC information only. The final TS Bases pages will be submitted with a future update in accordance with TS 5.5.11, "Technical Specifications (TS) Bases Control Program." Similarly the UFSAR Changes are provided mark-up pages for information, the revised pages will be submitted with the biennial UFSAR Update in accordance with 10 CFR 50.71(e).

Entergy requests NRC approval of the proposed Current Licensing Basis (CLB) change by August 15, 2012, with the change being implemented within 90 days from approval. The 90 day implementation period is to accommodate the installation and testing of the OLTCs and new Reserve Station Service Transformers during JAF's scheduled refueling outage.

In accordance with 10 CFR 50.91, a copy of this application, with the associated attachments, is being provided to the designated New York State official.

There are no new commitments made in this letter.

Questions concerning this report may be addressed to Mr. Joseph Pechacek, Licensing Manager, at (315) 349-6766.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 16th day of August 2011.

Sincerely,

Brian R Sullivan

Kevin Bronson
Site Vice President

PD/JP/ed

Attachments:
1. Technical Justification and Analysis for Proposed Change to the Current Licensing Basis
2. Proposed Technical Specification Bases Change, as marked up pages (Info Only)
3. Proposed Updated Final Safety Analysis Report Change, as marked up pages (Info Only)

cc: next page

cc:

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JAFP-11-0102

Attachment 1

Technical Justification and Analysis For Proposed Change to the Current Licensing Basis

1.0 DESCRIPTION

Pursuant to 10 CFR 50.90, Entergy Nuclear Operations (Entergy) requests an amendment to the Facility Operating License DPR-059, for the James A. FitzPatrick Nuclear Power Plant (JAF). The proposed amendment would revise the JAF current licensing basis (CLB) to allow the use of On Load Tap Changers (OLTCs) with new Reserve Station Service Transformers (RSST) that provide offsite power to JAF.

The OLTCs are sub-components of two new RSSTs that will be installed at JAF in September 2012, during the scheduled refueling outage. The OLTCs are designed to compensate for offsite voltage variations and will provide added assurance that acceptable bus voltage is maintained for safety related equipment.

The proposed amendment requests NRC approval to operate the OLTCs in the automatic mode. Operation of the OLTCs in the automatic mode was evaluated under 10 CFR 50.59 and it was determined that it requires NRC approval because such operation creates the possibility for a malfunction of a structure, system or component important to safety with a different result than any previously evaluated in the Updated Final Safety Analysis Report (UFSAR). Approval of the proposed amendment will necessitate a change to the UFSAR and the Technical Specification (TS) Bases. There are no changes to the plant TS associated with this request.

2.0 PROPOSED CHANGES

There are no changes to the plant Technical Specifications associated with this amendment request. While the RSSTs are required to support Operability of the qualified off-site circuits, there are no Limiting Condition for Operation (LCO) Conditions, Actions, associated Completion Times, or Surveillance Requirements (SRs) that are specific to the RSSTs. The LCO Conditions, Actions, associated Completion Times, and SRs are associated with the qualified off-site circuits.

The UFSAR and the TS Bases will be revised to provide discussion of the OLTCs in both the automatic and manual modes of operation.

3.0 BACKGROUND

As described in the UFSAR, JAF's electrical distribution system provides three sources of power to the JAF safety busses. During normal operation in MODE 1, the safety busses are supplied power from the Normal Station Service Transformer (NSST). The NSST steps down the voltage from the main generator output and supplies 4.16 kV power to the safety busses through circuit breakers located in the 10300 and 10400 busses. During this time the RSST's are in an energized and unloaded condition. In the event of a generator trip or a plant shutdown, loads are transferred to the qualified offsite circuits which supply power from the 115 kV system to the safety busses through the RSST via circuit breakers in the 10300 and 10400 busses. In the event of a main generator trip or plant shutdown coupled with a loss of offsite power, the safety busses are powered from the site emergency diesel generators through circuit breakers in the 10500 and 10600 busses.

The purpose of the qualified off-site circuits is to supply power to the plant vital loads, including the Emergency Core Cooling Systems (ECCS), in the event of an emergency. This is accomplished by using the RSSTs to reduce the voltage from the 115 kV distribution system to 4.16 kV. Each qualified Offsite Circuit consists of a 115 kV transmission line, a RSST, and the circuit breakers and disconnects necessary to complete the circuit. One of the transmission lines (Line 3), approximately 26 miles long, is connected to the Niagara Mohawk (National Grid) transmission system at the Lighthouse Hill Hydroelectric Station. In addition to being a hydroelectric generating station and an integral part of the 115 kV distribution system, this station also serves as the switchyard for the Bennett's Bridge Hydroelectric Station, which is less than a mile away from Lighthouse Hill. Other nearby hydroelectric generating stations are also connected to the Lighthouse Hill 115 kV bus.

The other line (Line 4), approximately 3700 ft long, is connected to the 115 kV bus at Nine Mile Point Nuclear Station (NMPNS) Unit 1 which in turn is directly connected to the South Oswego Substation approximately 12 miles away.

Under normal operation, the sectionalizing disconnect switches and all breakers at both JAF Plant and NMPNS Unit 1 are operated in the closed position, thereby providing two sources of 115 kV power for the JAF Plant.

Each line from the JAF Plant is protected by a 115 kV, 1200 amp, 3 phase, oil circuit breaker. Two complete sets of protective relays are provided for automatic tripping of the circuit breakers under fault conditions. Recognizing that most line faults are transient in nature, automatic re-closing equipment and circuitry is provided to re-energize the lines after the extremely short interruption required to clear a temporary fault.

In the event of a fault on either section of the 115 kV bus, the associated breakers will de-energize the bus and the 115 kV bus disconnect switch will open automatically to isolate the faulted bus section.

The 115 kV lines to the Lighthouse Hill Station and to the South Oswego Substation are the same lines used at the Nine Mile Point Nuclear Station Unit 1. The 115 kV tie line between the JAF Plant and the NMPNS Unit 1 is designed to equal or exceed the requirements of the incoming lines.

Under normal system conditions, both the South Oswego Substation and Lighthouse Hill buses have multiple connections to the Niagara Mohawk (National Grid) 115 kV transmission system in addition to local generation input. To stay within the motor starting capability of the 115 kV and 4 kV station systems, certain loads, whether energized automatically or manually, are sequentially started. With this consideration there is more than adequate capacity to supply power to the NMPNS Unit 1 and the JAF Plant concurrently from either Lighthouse Hill or the South Oswego Substation for any possible combination of normal, shutdown, or engineered safeguard loads.

With degraded supply voltage, the 4 kV undervoltage protection scheme will operate, and after a designated time delay, will start the Emergency Diesel Generators (EDGs) and open the supply breakers to the 10500 and 10600 buses.

In the design basis LOCA, the 115 kV transmission lines must maintain adequate voltage after a generator trip to allow the RSSTs connected to the 115 kV system to power all connected loads, including ECCS loads, and those plant loads that would be energized from the RSSTs, without the emergency buses separating and being energized from the EDGs. This post-contingency voltage is monitored frequently by the 115 kV system operator, using a predictive model to confirm that after a generator trip with the expected emergency loads started and supplied from the RSSTs, the voltage will not decrease sufficiently to cause the 10500 or 10600 bus to separate from the RSSTs. If the post-contingency voltage drops below this level, the 115 kV system operator receives an alarm, notifies the JAF Control Room, and takes whatever actions are available to attempt to raise this post-contingency voltage back above the alarm setpoint. The 115 kV system operator also notifies the Control Room when the post-contingency voltage alarm clears. In cases where the system operator can not make sufficient adjustments to raise the post contingency voltage back above the alarm setpoint JAF enters LCO 3.8.1 Condition A, One Off-site Circuit Inoperable. With the installation and operation of OLTCs in the automatic mode the RSSTs would be able to make adjustments such that 4.16 kV system voltage could be maintained over a broader range of 115 kV system conditions.

This ability to make automatic adjustments, that would maintain the appropriate voltage on the 4.16 kV distribution system, would reduce the number of unplanned entries into LCO Conditions.

4.0 TECHNICAL ANALYSIS

4.1 Evaluation of the Load Tap Changer

The new Reserve Station Service Transformers (RSSTs), 71T-2 and 71T-3 (15 MVA ONAN, 115kV/4.16kV) [References 5.3.14 and 5.3.16] will be installed during the next refueling outage planned for the fall of 2012. The new RSSTs are provided with On Load Tap Changers (OLTCs) [Reference 5.3.17] that can regulate the output voltage of the RSSTs to the respective 4.16 kV buses while in manual or automatic operating mode. Operation of the RSSTs OLTC in the manual mode has been evaluated in accordance with 10 CFR 50.59 and determined to not require NRC approval. The analysis that follows focuses on the proposed RSST OLTCs operation in automatic operating mode.

OLTC operation is based on the typical voltage bands shown in Figure 1 and Figure 2 below. Figure 1 represents the RSST's OLTC voltage and control limits in the "Pre Transfer" condition (RSST's unloaded) and Figure 2 represents the RSST's OLTC voltage and control limits in the "Post Transfer" condition (RSST's loaded). Explanation of these voltage bands is provided in the subsequent descriptions of the OLTC operation.

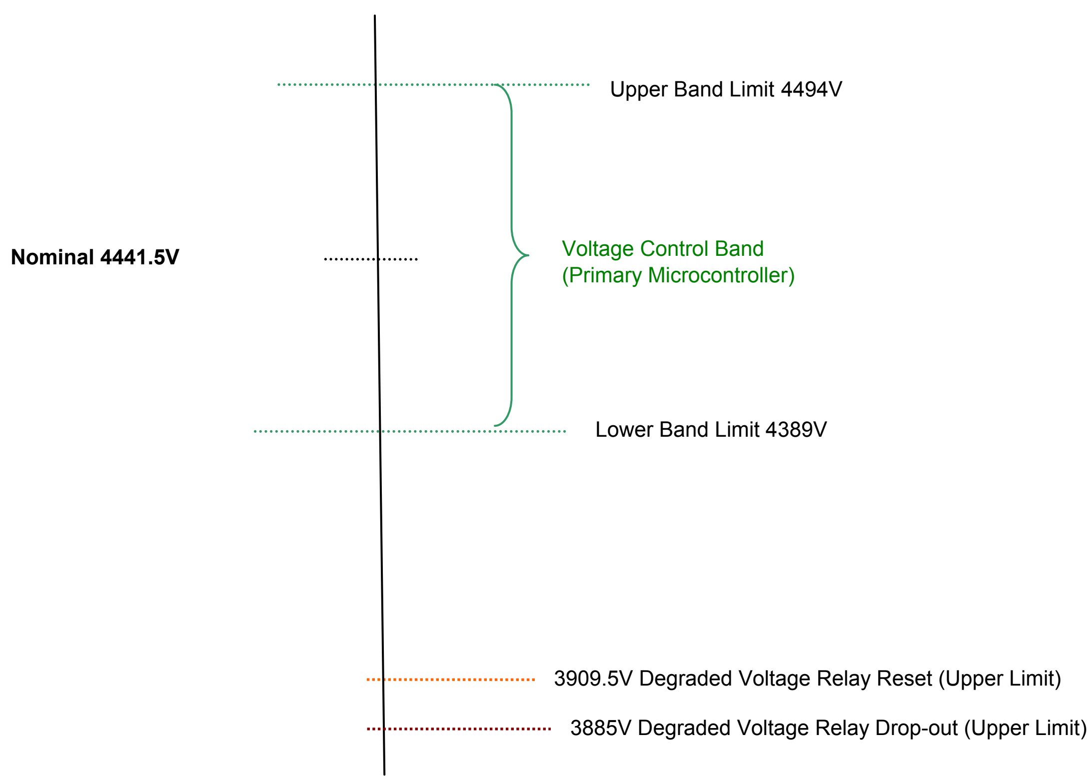

Figure 1 Typical Pre Transfer Voltage Control and Limit Bands

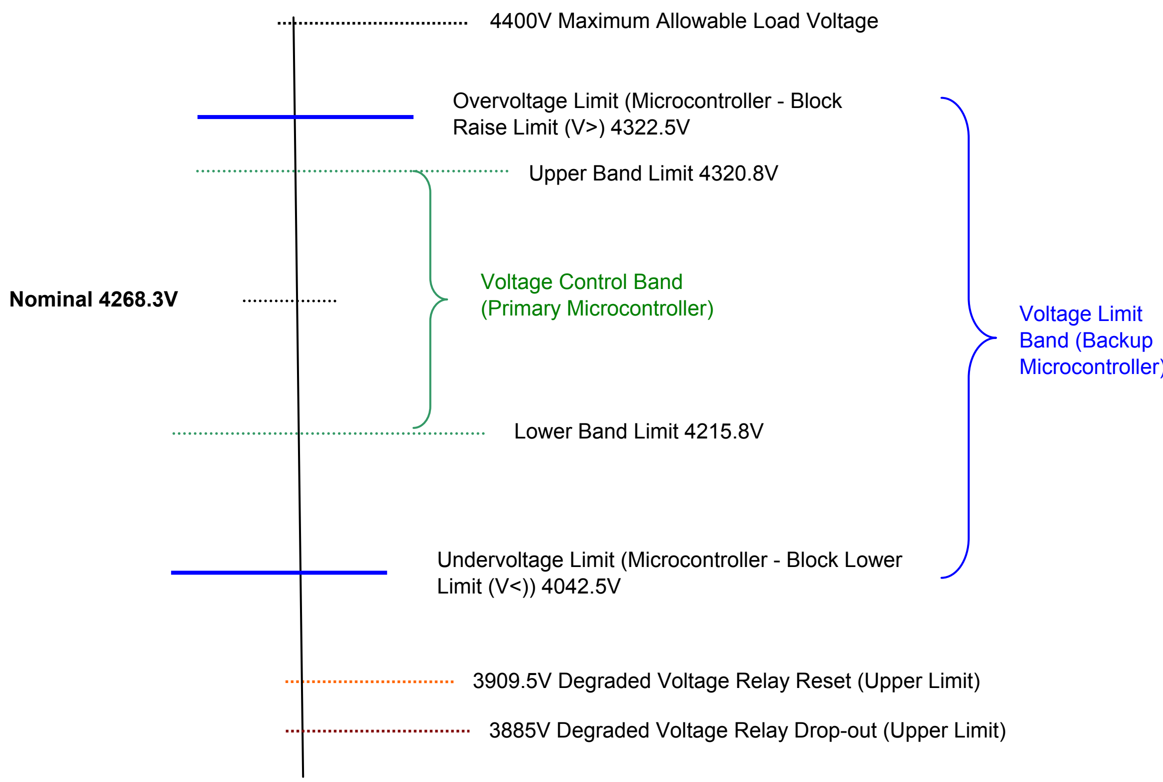

Figure 2 Typical Post Transfer Control and Limit Bands

The Reinhausen RMV-II tap changer mechanism [Reference 5.3.17] for each OLTC is located in a separate enclosure attached to the transformers. A drive motor rotates the tap changer to increase or decrease the number of transformer windings in service. By operating the drive motor, which changes the tap settings, the transformer output voltage is raised or lowered. The tap changer mechanism can be operated in a manual control mode. In the manual control mode, the tap changer can be operated by the drive motor, or operated with a hand crank (if the transformer is de-energized) when no control power is available. Any alarm condition associated with the OLTC mechanism or loss of control supply power will cause Light Emitting Diodes (LED's) to illuminate locally at the OLTC; additionally selected OLTC alarms will annunciate / alarm in the Control Room. Additionally, any single or combination of alarm conditions will result in blocking of the raise/lower switch while bringing the OLTC back to the most recent step position (if the mechanism was in a mid-step condition).

The tap changer mechanism can also be operated in the automatic control mode. A primary Beckwith M-2001C microcontroller and a backup Beckwith M-0329B microcontroller, separate from the transformer and the OLTC mechanism, will be used to control the OLTC mechanism. The primary controller is used in the pre transfer condition and both controllers are utilized in the post transfer condition. The normal power source for the primary and backup digital OLTC Beckwith microcontrollers is from a potential transformer that is located between the RSST

secondary windings and the 4kV RSST bus supply breakers. When operating in the automatic mode, the primary microcontroller monitors voltage of this potential transformer. The primary microcontroller then sends the signal to the OLTC mechanism, which changes the tap setting as required so that voltage is controlled to within the desired range. The initial OLTC tap setting has been selected to minimize tap changes in the event of a transfer to offsite power. Additionally, analysis has been performed to verify that the bus voltages resulting from such a transfer will not result in a loss of offsite power and that those loads connected to the RSST's will continue to operate / or start under various scenarios / events. The primary microcontroller also has programmable overvoltage / undervoltage blocking settings available. Should the primary Beckwith M-2001C microcontroller fail, the backup Beckwith M-0329B microcontroller is designed to prevent improper operation outside the voltage limit band.

The OLTC will provide a range of -10% to +10% of the rated secondary voltage in 16 step increments, each step being 1.25% of rated secondary voltage. By providing automatic adjustment of the voltage to the auxiliary power system from the offsite 115kV system, the RSST OLTCs will compensate for a wide range of 115kV (110kV – 121kV) system operating voltages. The primary microcontroller is set with a time delay during operation; this setting is needed to inhibit the tap changer from unnecessary operations on temporary voltage excursions. The RSST's are normally in an energized unloaded condition. When in this (pre transfer) condition the backup microcontroller is not in the electrical circuit. During this unloaded condition, control room indicators will provide the operators indications if a failure of the OLTC controller or the inability of the OLTC controller to maintain voltage within its prescribed settings were to occur. As such, operator action will be taken to preclude the potential of undervoltage / overvoltage conditions. The manual setting will ensure that during all analyzed events, the electrical loads will start and continue to operate from the RSST's.

Upon initiation of an event to transfer loads to the RSST's or load is placed on the RSST's, the backup controller will provide its backup function. In order to preclude the OLTC from continuously changing taps and to satisfy the needs for engineered safety features (ESF) loads the OLTC setpoint has been selected to provide an initial setting which will satisfy electrical bus requirements for a wide range of 115kV switchyard voltages. Upon receipt of a signal to change taps (in the automatic mode), the tap changer mechanism will complete a tap change in approximately two seconds.

In the event of a 4.16kV bus undervoltage with an accident signal present, the degraded voltage relay (DVR) scheme at the safety-related 4.16 kV buses includes a 8.96 second time delay to allow voltage to recover before the safety-related buses are disconnected from offsite power (this time delay is not allowed to exceed a maximum of 9.5 seconds by the Technical Specifications). In the event of a 4.16kV bus undervoltage without an accident signal present, the degraded voltage relay (DVR) scheme at the safety-related 4.16 kV buses includes a 43.8 second time delay to allow voltage to recover before the safety-related buses are disconnected from offsite power (this time delay is not allowed to exceed a maximum of 46.6 seconds by the Technical Specifications). To

prevent unnecessary disconnection of the safety-related buses from offsite power, analyses have determined the minimum permissible pre LOCA contingency voltage that can occur following generator trip without actuating the DVR scheme. With the OLTC in automatic mode, the analytical minimum allowable post LOCA contingency voltage will then be compared to real time anticipated voltage decay analyses results provided by the transmission company (National Grid). As such, the setpoints for the OLTC have been adequately selected to support the functioning of the electrical loads. Similar to existing operation in fixed tap (manual) mode, when the 4.16kV buses can not be maintained within their specified voltages, JAF Operations personnel will notify National Grid to correct the voltage.

Proper operation of each transformer is verified following installation. This includes verification of OLTC operation over the full range of tap positions. Testing on the primary and backup microcontrollers includes confirmation, using a simulated voltage input, that the OLTC regulating relay provides the correct raise/lower response. Testing on the backup microcontroller also ensures that it provides the proper blocking / lowering function in the event of a primary microcontroller failure.

4.2 <u>Load Tap Changer Automatic Operation Failure Modes Evaluation</u>

An evaluation of the potential failure modes of the OLTC and its control system has been performed for the JAF facility. The evaluation results are discussed below and summarized in Table 1. Use of the OLTC in automatic mode creates the possibility for a malfunction of the OLTC mechanism or the primary microcontroller that raises or lowers the voltage provided to the 4.16 kV safety-related buses. A malfunction is created when the primary microcontroller or the OLTC mechanism automatically lowers the voltage to the safety-related buses. This malfunction was previously evaluated and is conservatively enveloped by evaluations previously performed in the UFSAR for the loss / degraded voltage conditions.

However, the condition created when the primary microcontroller automatically raises the voltage to the 4.16 kV safety-related buses has not been previously evaluated in the JAF UFSAR. As a result, in accordance with 10 CFR 50.59, the use of the OLTC in the automatic mode requires NRC approval, since this potential malfunction of the OLTC creates a possibility for a malfunction of a structure, system, or component important to safety with a different result than any previously evaluated in the UFSAR. As discussed below, this potential malfunction is unlikely and can be corrected by the backup microcontroller or operator action to prevent a sustained high voltage condition.

The most severe potential malfunction would be a failure of the primary microcontroller or OLTC mechanism causing the transformer output voltage to rapidly increase or decrease. The OLTC mechanism is equipped with system monitoring functions that generate alarms in case of malfunctions and block the raise/lower switch while bringing the OLTC back to the most recent step position (if the mechanism was in a mid-step position).

The backup microcontroller prevents a defective primary microcontroller from adjusting voltage outside the established undervoltage and overvoltage limits (voltage limit band - symbolized on Figure 1 as “Undervoltage Limit (Microcontroller - Block Lower Limit (V<)” and “Overvoltage Limit (Microcontroller - Block Raise Limit (V>)” respectively) by initiating alarms, blocking the raise or lower logic of the primary microcontroller (i.e., block raise logic on overvoltage; block lower logic on undervoltage), and attempting to return the voltage to the control band. If the regulated voltage goes above the Extreme Overvoltage Limit (symbolized “Extreme Overvoltage Limit V>> (Backup Microcontroller – Lower Overvoltage Limit” on Figure 1) for a set period of time, an alarm is actuated and the backup microcontroller will initiate a lower tapchange operation. Severe undervoltage is addressed by the degraded voltage relaying. The design also allows operators to override both microcontrollers and take manual control, if necessary.

During a pre transfer condition, where the primary microcontroller is maintaining the energized unloaded RSST’s at a nominal setpoint, with no backup microcontroller in service, there is a potential for overvoltages / undervoltages if the primary microcontroller raises / lowers its voltage beyond the nominal setpoint. In the event this anomaly was to occur, the Control Room indicators will notify the operators. The OLTC “Manual – Automatic” Control Switch will be placed in the “Manual” position and the tap setting will be placed in a predetermined position based upon the 115kV switchyard voltage. This setting will ensure that in the event of a Design Basis Accident that sufficient voltage will exist at the electrical loads. In this configuration a qualified offsite circuit is maintained that is capable of supplying loads at the required voltage / frequency and accepting required loads during an accident, while connected to the emergency buses.

The failure or possible misoperation of the OLTC mechanism is unlikely to significantly affect output voltage for a significant length of time since the OLTC mechanism is monitored by the OLTC mechanism monitoring system, the primary microcontroller, and the backup microcontroller. Simultaneous failure of the OLTC mechanism monitoring system, the primary microcontroller, and the backup microcontroller is unlikely. Therefore, a failure of the OLTC mechanism should be detected and quickly offset by the monitoring system, the primary microcontroller or the backup microcontroller. Furthermore, simultaneous failure of both the RSST microcontrollers, resulting in loss of both safety-related trains at the same time, is even more unlikely.

Microcontroller maintenance and testing activities provide reasonable assurance that failure rates will be minimized. Separately, it is noted that operating an emergency diesel generator (EDG) in parallel with offsite power (e.g., during EDG testing), with the RSST in automatic mode, could cause the OLTC to automatically change taps. This could result in possible damage to the EDG’s. To prevent such a condition, administrative controls will ensure that the associated OLTC will only be operated in manual mode when operating an EDG connected with offsite power.

Failure Modes that Increase Voltage
In the unlikely event of a failure of both primary and backup microcontrollers, which results in increasing voltage, operators can take manual action from the control room or the RSST control cabinets to prevent damage to safety-related equipment. The 4400V used in Figure 1 is 110% of the voltage rating of the safety-related motors fed from the bus, consistent with ANSI/NEMA Standard MG-1-2009, Revision 1-2010, "Motors and Generators" [Reference: Sections 14.33, 14.35.1, etc.) and the JAF Technical Specification Bases [Reference: 5.3.24 Section B3.8.1-14]. The JAF Operations personnel currently use Operating Procedure OP-46A “4160V and 600V Normal AC Power Distribution Procedure” for maintaining electrical bus voltages within specified parameters. During conditions where the JAF facility is fed from the Reserve Station Service Transformers and the electrical bus parameters exceed a specified value, the facility requests Power Control to lower the 115kV system voltage to maintain electrical bus voltages within the specified parameters. Damage from an overvoltage condition is only expected if the condition is sustained for an extended period of time.

At voltages below 4400 V, there is no possibility of causing an overvoltage on 4000 V motors, since this is within the rating of the motor. However, at voltages below 4400 V on the 4.16 kV safety-related buses, there still is the possibility of creating an overvoltage condition on the 600V safety-related buses because of the 4160/600V load center transformer tap settings. As load on the 600V system increases, the actual voltage on the high side (4.16 kV) of the station service transformers will decrease; and with the impedance of the transformers, the overvoltage condition is minimized. Operators will respond under the guidance of Operating Procedure OP-46A “4160V and 600V Normal AC Power Distribution Procedure” for maintaining electrical bus voltages within specified parameters for the 4.16 kV or 600V safety-related buses outside the specified parameters. The procedural guidance will direct operators to place the OLTC “Manual – Automatic” Control Switch in the “Manual” position and place the OLTC tap in a predetermined position based upon the 115kV switchyard voltage. This setting will ensure that in the event of a Design Basis Accident that sufficient voltage will exist at the electrical loads. Additionally, the JAF facility can request the Power Control to lower the 115kV system voltage to maintain plant electrical bus voltages within the specified parameters. As such, there is sufficient procedural guidance to ensure appropriate bus voltage is maintained should a failure of the main and backup controller occur.

Failure Modes that Decrease Voltage
A failure that results in decreasing voltage could initiate the timers on the 4.16 kV bus degraded voltage relays if voltage decreases to the current Technical Specification [Section 3.3.8.1] setpoint (3843V). Under LOCA conditions, failure to restore the bus voltage within 8.4 seconds would cause the power source for these buses to transfer to the emergency diesel generators. A loss of offsite power is analyzed in the UFSAR. The presence of the primary microcontroller blocking setting and the backup microcontroller makes this failure mode extremely unlikely.

Other Failure Modes
OLTC failure-modes or malfunctions that could lead to an overvoltage or undervoltage condition as a result of the tap changer failing to change the tap setting when required (i.e., the tap setting remains "as is") are identified in Table 1. These failure modes or malfunctions can result from:

- Failure of a microcontroller when the OLTC is operating in automatic mode;
- Failure of the OLTC drive motor (including a loss of power to the drive motor) when the OLTC is operating in either the automatic or manual mode; or,
- Interruption in secondary potential transformer (PT) voltage sensor signal (e.g. blown fuse, open circuit).

Failure of the tap changer to change the tap setting when required could create an overvoltage or undervoltage condition if transmission system voltage changed by a sufficiently large amount subsequent to the malfunction. For example, if the failure occurred when high summer load demand existed, a high tap setting could lead to a high voltage condition at a later time (due to failure of the tap changer to reduce the tap setting) when system load demand diminishes and grid voltage increases.

Failure of the tap changer to change settings when demanded (i.e., passive failure) is less severe than active failures of the OLTC. This is because the overvoltage or undervoltage condition would typically evolve relatively slowly and the magnitude of the resultant change in voltage would be limited to the effect of the change in grid voltage. Implementing procedures will instruct operators to take action to mitigate or correct the condition. Under established JAF procedures, the first action is to contact the transmission system operator (National Grid) and request that the voltage be increased or decreased as needed. Additionally, for the RSST's (upon installation of RSST's with OLTC's), operators have the option to manually operate the tap changer and change the tap setting if required (assuming the operating mechanism did not fail and can be operated via the drive motor or the hand crank if there is no load on the transformer). Similar transformers with OLTC's are in use at other facilities. JAF performed an operating experience review that focused on Reinhausen load tap changers and Beckwith controller issues at nuclear power plants. This review identified several instances of a microcontroller spuriously running voltage towards the transformer's upper limit; this was the result of preventative maintenance not being performed on relays, which resulted in the automatic control of the load tap changer to lower voltage. There were several instances of "degraded" OLTC's; these issues were related to (1) hardware not properly torqued and (2) degraded current transformers and (3) poor factory wiring terminations. Reported instances of the tap changer failing "as-is" were infrequent. There were no documented instances of equipment failures resulting from OLTC failure. Since transformers with load tap changers are widely used and have a long service history at nuclear facilities, it is reasonable to conclude that the low number of issues identified in the operating experience search indicate the OLTC's in service at nuclear facilities have been reliable.

Table 1

On Line Tap Changer (OLTC) and Microcontroller Failure Modes and Effects

OLTC Automatic Operation Potential Failure Mode	Impact	Response
OLTC mechanism or microcontroller attempts to raise tap setting when not needed	Could cause overvoltage condition	The backup microcontroller maintains acceptable tap position by blocking the raise signal and attempting to return voltage to the control band. Additionally, alarm on overvoltage will initiate operator action to place OLTC in manual mode.
OLTC mechanism or microcontroller attempts to raise tap setting when not needed and the RSST is in the Pre Transfer Condition	Potential for overvoltage on the unloaded RSST	Control Room indicators will notify the operators and actions will be taken to alleviate the potential for overvoltages on electrical equipment.
OLTC mechanism or microcontroller attempts to lower tap setting when not needed	Could cause undervoltage condition	The backup microcontroller maintains acceptable tap position by blocking the lower signal. Additionally, alarm on undervoltage will initiate operator action to place OLTC in manual mode. In extreme case, results in a loss of offsite power, which has been evaluated as part of the design basis.
OLTC mechanism or microcontroller attempts to lower tap setting when not needed and the RSST is in the Pre Transfer Condition	Potential for undervoltage on the unloaded RSST	Control Room indicators will notify the operators and actions will be taken to alleviate the potential for undervoltages on electrical equipment.
OLTC mechanism or microcontroller malfunction fails to change taps, causing tap setting to remain as is.	Could result in overvoltage or undervoltage condition if grid voltage changes following the failure	Operator action to monitor voltage and respond by placing OLTC in manual mode and lowering or raising the voltage as desired.

OLTC Automatic Operation Potential Failure Mode	Impact	Response
OLTC drive motor fails to change taps (e.g. power to motor is lost) causing tap setting to remain as is	Could result in overvoltage or undervoltage condition if grid voltage changes following the failure	Operator action to monitor voltage and respond lowering or raising the voltage as desired by the transmission operator.

4.3 Evaluation of Offsite Circuit Operability with Non-Functional Load Tap Changers

Implementation of automatic operation of the OLTC's will allow them to automatically compensate for variations in switchyard voltage that could otherwise render the offsite circuits inoperable. An analysis has been performed that has selected an optimal OLTC tap setting, taking into account the 115kV line variations. In the event that the OLTC needs to be placed in manual control, the tap setting will be placed in a predetermined position based upon the 115kV switchyard voltage. A transfer from the Normal Station Service Transformer to the RSST's, in either automatic or manual OLTC mode of operation, will not result in a loss of offsite power or a qualified offsite circuit.

4.4 Conclusion

Implementation of automatic OLTC operation will provide additional assurance that the voltage provided by the transmission system is adequate to maintain operability of the offsite power sources for the James A. Fitzpatrick facility for the expected range of switchyard voltages. OLTC's have been shown to be reliable, and the likelihood and consequences of each OLTC failure mode has been evaluated and determined to be acceptable. Thus, the proposed changes will increase overall reliability of the offsite power sources at the James A. Fitzpatrick facility.

4.5 Testing, Monitoring and Maintenance Programs for the OLTC

Testing, monitoring, and maintenance programs for the OLTC will be in accordance with the JAF Preventive Maintenance (PM) Program guidelines. The current PM Template includes:

4.5.1 Monthly, perform a functional test in manual to verify lower and raise stepping capability of the OLTC (only required if no stepping occurred in prior week; auto stepping of the OLTC satisfies this requirement),

4.5.2 Quarterly, perform a functional test in both manual and automatic to verify stepping capability and automatic response of the OLTC voltage regulator,

4.5.3 Every two refueling intervals perform a diagnostic maintenance calibration and test to verify settings and functionally check the primary Beckwith M-2001C microcontroller and a backup Beckwith M-0329B microcontroller. This includes verification of the OLTC motor drive operation for both normal expected operation (voltage in and outside the normal control bandwidth) and abnormal operation (voltage outside the voltage limit band). Also, perform the recommended maintenance-free interval complementing checks of oil sampling, vacuum interrupter system test, motor drive condition checks, dehydrating breather checks, and checks for oil leaks. The OLTC cabinets are to be visually inspected to check for loose connections, damage, overheating, deterioration, and relay degradation.

4.5.4 Every four refueling intervals perform a maintenance test procedure to check the internals of the OLTC cabinet, including vacuum interrupter, associated motor drive circuitry and equipment, and monitoring system. This inspection is performed per the vendor manual for Load Tap Changer Type RMV-II, which includes a vacuum interrupter examination for a mechanical test, contact erosion indicator check, and Hi-Pot test (if required); bypass switch check; and preparation of the OLTC for service checks. Additionally, check for loose connections, damage and contact wear.

Monitoring of the OLTC's is planned to be provided by local and remote alarms. Local alarm indications are to be available on both the primary Beckwith M-2001C microcontroller and a backup Beckwith M-0329B microcontroller at the transformers. Remote alarms are to be available in the Emergency and Plant Information Computer System (EPIC) and will alarm annunciator windows for the RSST's. Alarm Response Procedures (ARP's) will direct operator response to off-normal conditions. The RSST tap positions are indicated in the control room which can be used for monitoring OLTC operation. Also, voltmeters monitoring the emergency 4kV buses are available in the control room and locally to provide operators an accurate bus voltage level when those transformers are connected to the safeguard buses.

The RSST's are identified at JAF as Maintenance Rule (High Critical / Low Duty Cycle / Severe Environment) / Risk Significant components already within scope of the maintenance rule. As such, the OLTC's are also Maintenance Rule (High Critical / Low Duty Cycle / Severe Environment) as they are installed on this component.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

Pursuant to 10 CFR 50.90, Entergy Nuclear Fitzpatrick (ENNE-JAF), LLC and Entergy Nuclear Operations, Inc. request an amendment to Facility Operating License Number DPR-59 for the James A. Fitzpatrick (JAF) Nuclear Power Plant. The proposed amendment would revise the current JAF current licensing basis to implement use of new automatic on load tap changers (OLTC's) on the new RSST's that provide offsite power to JAF.

The proposed amendment to determine if a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," has been evaluated as discussed below:

1. **Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No.

The proposed amendment will allow operation of the OLTC's in automatic mode. The only accident previously evaluated where the probability of an accident is potentially affected by the change is the loss of offsite power (LOOP) Abnormal Operational Transient (AOT). Failure of an OLTC's while in the automatic mode of operation that results in decreased voltage to the engineered safety features (ESF) buses could cause a LOOP if voltage decreased below the degraded voltage relay (DVR) setpoint. The two postulated failure scenarios are: 1) failure of an primary microcontroller that results in rapidly decreasing voltage supplied to the ESF buses and; 2) failure of an primary microcontroller to respond to decreasing grid voltage. For the first scenario, a backup microcontroller is provided for each OLTC, which makes this failure unlikely. For the second scenario, since grid voltage changes typically occur relatively slowly and the magnitude of the resulting change would be limited to the effect of the change in grid voltage, operators would have ample time to address the condition utilizing identified procedures. In addition, the frequency of occurrence of these failure modes is small, based on the operating history of similar equipment at other plants. Furthermore, in both of the above potential failure modes, operators can take manual control of the OLTC to mitigate the effects of the failure. Thus, the probability of a LOOP will not be significantly increased by operation of the OLTC's in the automatic mode.

The proposed amendment has no effect on the consequences of a LOOP, since the emergency diesel generators (EDG's) provide power to safety-related equipment following a LOOP. The design and function of the EDG's are not affected by the proposed change. The probability of other previously evaluated accidents is not affected, since the proposed amendment does not affect the way plant equipment is operated and thus does not contribute to the initiation of any of the previously evaluated accidents. The OLTC is equipped with a backup microcontroller, which inhibits gross improper action of the OLTC in the event of primary microcontroller failure. Additionally, the operator has procedurally identified actions available to prevent a sustained high voltage condition from occurring. Damage due to overvoltage is time-dependent, requiring a sustained high voltage condition. Therefore, damage to safety-related equipment is unlikely, and the consequences of previously evaluated accidents are not significantly increased. Therefore, this proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The proposed amendment involves electrical transformers that provide offsite power to safety-related equipment for accident mitigation. The proposed change does not alter the design, physical configuration, or mode of operation of any other plant structure, system, or component. No physical changes are being made to any other portion of the plant, so no new accident causal mechanisms are being introduced. Although the proposed change potentially affects the consequences of previously evaluated accidents (as discussed in the response to Question 1), it does not result in any new mechanisms that could initiate damage to the reactor or its principal safety barriers (i.e., fuel cladding, reactor coolant system, or primary containment).

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?**

Response: No.

The proposed amendment does not affect the inputs or assumptions of any of the analyses that demonstrate the integrity of the fuel cladding, reactor coolant system, or containment during accident conditions. The allowable values for the degraded voltage protection function are unchanged and will continue to ensure that the degraded voltage protection function actuates when required, but does not actuate prematurely to unnecessarily transfer safety-related loads from offsite power to the emergency diesel generators. Automatic operation of the OLTC's increases the margin of safety by reducing the potential for transferring loads to the EDG's during an undervoltage or overvoltage event on the offsite power sources.

Therefore, the proposed amendment to the JAF design basis does not involve a significant reduction in a margin of safety.

Based on the above, Entergy Nuclear Fitzpatrick (ENNE-JAF), LLC and Entergy Nuclear Operations, Inc. concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements / Criteria

The US Atomic Energy Commission (AEC) issued their Safety Evaluation (SE) of the James A. Fitzpatrick Power Plant (JAF) on November 20, 1972 with supplements dated February 1, 1973 and October 4, 1974. The Safety Evaluation, Section 14.0, "Conformance with General Design Criteria," described the conclusions the AEC reached associated with the General Design Criteria in effect at the time. The AEC stated:

"Based on our evaluation of the design and design criteria for the James A. Fitzpatrick Nuclear Power Plant, we conclude that there is reasonable assurance that the intent of the General Design Criteria for Nuclear Power Plants, published in the Federal Register on May 21, 1971 as Appendix A to 10 CFR Part 50, will be met."

The JAF Safety Evaluation states compliance to the Commission's General Design Criteria 17 and 18, AEC Safety Guides 6 and 9, and IEEE 308-1971. The current General Design Criteria in 10 CFR 50, Appendix A states the following:

Criterion 17 -Electric Power Systems

"An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that: (1) Specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences; and, (2) The core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. The on-site electric power supplies, including the batteries, and the on-site electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights-of-way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all on-site alternating current power supplies and the other off-site electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss-of-coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained. Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the on-site electric power supplies. Independent alternate power systems are provided with adequate capacity and testability to supply the required engineered safety features and protection systems."

Criterion 18 - Inspection and Testing of Electric Power Systems

“Electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and the condition of their components. The systems shall be designed with a capability to test periodically (1) the operability and functional performance of the components of the systems, such as onsite power sources, relays, switches, and buses, and (2) the operability of the systems as a whole and, under conditions as close to design as practical, the full operation sequence that brings the systems into operation, including operation of applicable portions of the protection system, and the transfer of power among the nuclear power unit, the offsite power system, and the onsite power system.”

Conclusion

In conclusion, based on the considerations discussed above, (1) there is 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.

5.3 References

5.3.1 JAF Calculation JAF-CALC-09-0002 Revision 1 “4kV Emergency Bus Degraded Voltage Time Delay Relay Uncertainty and Set-Point Calculation”

5.3.2 JAF Calculation JAF-CALC-ELEC-01488 Revision 6 “4kV Emergency Bus Loss of Voltage, Degraded Voltage and Time Delay Relay Uncertainty and Set-Point Calculation”

5.3.3 JAF-CALC-09-00016 Revision 1 “James A. Fitzpatrick Auxiliary Power System Analysis”

5.3.4 Quad Cities Nuclear Power Station, Units 1 and 2 Letter RS-06-006 “Request for License Amendment Regarding Automatic Operation of Transformer Load Tap Changers” [ML060310402]

5.3.5 Quad Cities Nuclear Power Station, Units 1 and 2 Letter RS-06-071 “Additional Information Supporting License Amendment Regarding Automatic Operation of Transformer Load Tap Changers” [ML061380550]

5.3.6 NRC Correspondence Regarding Quad Cities Nuclear Power Station, Units 1 and 2 “Issuance of Amendment Automatic Operation of Transformer Load Tap Changers” [ML061770520]

5.3.7 Request for Additional Information Kewaunee Power Station License Amendment Request 236, Automatic Operation of Transformer Load Tap Changers (TAC No. ME4011) [ML102810257]

5.3.8 Supplement and Response to Request for Additional Information Kewaunee Power Station License Amendment Request 236, Automatic Operation of Transformer Load Tap Changers (TAC No. ME4011) [ML102810257]

5.3.9 Dresden Nuclear Power Station, Units 2 and 3 Letter RS-05-037 “Request for License Amendment Regarding Offsite Power Instrumentation and Voltage Control” [ML050950222]

5.3.10 Request for Additional Information Dresden Nuclear Power Station, Units 2 and 3 Letter RS-05-037 “Request for License Amendment Regarding Offsite Power Instrumentation and Voltage Control” [ML060170218]

5.3.11 NRC Correspondence Regarding Dresden Nuclear Power Station, Units 2 and 3 Letter RS-05-037 “Request for License Amendment Regarding Offsite Power Instrumentation and Voltage Control” [ML060520208]

5.3.12 NRC Correspondence Regarding Clinton Power Station, Unit 1 “Issuance of Amendment Number 116 to Facility Operating License No. NPF-62- Clinton Power Station, Unit 1 (TAC No. MA1925)” [ML020990669]

5.3.13 Operating Experience OE33234-20110430 “Reserve Auxiliary Transformer, Automatic Load Tap Changer Failed After Transfer”

5.3.14 JAF Drawing 1.22-101 “Reserve Station Service Transformer Nameplate 71T-2 Drawing”

5.3.15 JAF Drawing 1.22-106 “Reserve Station Service Transformer Schematic Output Signals”

5.3.16 JAF Drawing 1.22-117 “Reserve Station Service Transformer Nameplate 71T-3 Drawing”

5.3.17 JAF Drawing 1.22-118 “Reserve Station Service Transformer Bill of Material Drawing”

5.3.18 Siemens Instruction Book Number L03 26 309 “Vendor Manual for JAF Reserve Station Service Transformers”

5.3.19 JAF Operating Procedure OP-44 “115kV System”

5.3.20 JAF Operating Procedure OP-46A “4160V and 600V Normal AC Power Distribution”

5.3.21 Not Used

5.3.22 FE-1F - EC 12703 Markup - “4160V One Line Diagram Bus 10300”

5.3.23 FE-1G - EC 12703 Markup - “4160V One Line Diagram Bus 10400”

5.3.24 JAF Technical Specification Bases

5.3.25 OE32382 / OE32383 – Cook 2 – Reinhausen RMV-II “Degraded Electrical Connection Discovered During Inspection of Transformer” – Hardware not properly torqued during manufacturing (10/25/2010)

5.3.26 OE32408 – Kewaunee 1 – Reinhausen LTC – “Degraded Current Transformers Discovered Within Load Tap Changer During Visual Inspection” – Defective CT’s were identified by lot code (10/8/2009); all defective CT’s were quarantined. Since then a heat test has been implemented by CT manufacturer. (11/2/2010)

5.3.27 OE33234-20110430 – Cook 1- Beckwith M-2001B – “Reserve Auxiliary Transformer, Automatic Load Tap Changer Failed After Transfer” – Load tap changer relay (90 Device – GE 12HGA111S1 auxiliary relay) no preventative maintenance not performed. (5/2/2011)

5.3.28 OE33319 – Kewaunee 1 – Reinhausen LTC – “Reserve Supply Transformer Manual Tap Changer Setting Below Minimum for Acceptable Operation” – The modification was not effectively communicated to Operations for placement of the LTC after EDG testing. (3/31/2011)

5.3.29 Failure 318 – Monticello 1 – “1AR Transformer Load Tap Changer (LTC) 86RL Lockout Alarm Actuated 3 Times in December 2009 and January 2010” – Poorly made factory inspection. (12/14/2009)

5.3.30 Failure 1009 / 1010 – Quad Cities 2 – Reinhausen RMV-II “T22 Load Tap Changer Failed to Operate Automatically” – Poor factory wiring installation. (10/18/2008)

6.0 ENVIRONMENTAL ASSESSMENT

A review has determined that the proposed changes 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, or would change an inspection or surveillance requirement. However, the proposed changes do not involve: (i) a significant hazards consideration; (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite; or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c) (9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed changes.

7.0 PRECEDENT

This submittal is similar to license amendments that were approved by the NRC for Dresden Units 2 and 3 on March 17, 2006 (Reference: 5.3.11), Quad Cities Units 1 and 2 on July 24, 2006 (Reference: 5.3.6), Clinton Unit 1 on October 1, 1998 (Reference: 5.3.12) and the Kewaunee submittal on January 18, 2011 [Reference: 5.3.8]. The Dresden submittal requested changes to Technical Specification (TS) 3.3.8.1, "Loss of Power (LOP) Instrumentation," and to implement use of automatic load tap changers on transformers that provide offsite power to Dresden Nuclear Power Station, Units 2 and 3. Part of the proposed change to Dresden's TS 3.3.8.1 was to revise the maximum and minimum allowable values for the degraded voltage function of the 4160-volt essential service system bus under-voltage instrumentation. ENNE-JAF is not requesting a change to the degraded grid voltage function in this amendment request. Therefore this part of the Dresden application is not applicable to the ENNE-JAF request. The OLTC portion of the request is similar, except that the transformers are of different sizes.

The Quad Cities submittal requested a change to implement the use of automatic load tap changers on transformers that provide offsite power to Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The Quad Cities amendment request is similar to the ENNE-JAF request.

The Clinton submittal requested a change to implement the use of automatic load tap changers on transformers that provide offsite power to Clinton Power Station, Unit 1. The Clinton amendment request is also similar to the ENNE-JAF request.

The Dominion (Kewaunee) submittal requested a change to implement the use of automatic load tap changers on the Reserve Auxiliary Transformer (RAT) and Tertiary Reserve Transformer (TAT) that provide offsite power to Kewaunee Power Station (KPS). The Kewaunee amendment request is similar to the ENNE-JAF request, except JAF uses a Beckwith microcontroller / backup microcontroller in lieu of the Tapcon microcontroller / backup microcontroller.

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Attachment 2

Proposed Technical Specification Bases Change,
As marked up pages (Info Only)

Pages

BASES

BACKGROUND (continued)

the bus and isolate the faulted bus section. The 115 kV reserve power source is stepped down to 4.16 kV by Reserve Station Service Transformers (RSSTs) 71T-2 and 71T-3. The Reserve Station Service Transformers, 71T-2 and 71T-3, are provided with a load tap changer. These load tap changers provide voltage regulation in the event of changing 115kV transmission system voltage when the facility is connected to this source of offsite power. These load tap changers can be operated in manual or automatic mode. RSST 71T-2 supplies 4.16 kV buses 10200, 10400, and 10600 for plant startup and shutdown. RSST 71T-3 supplies 4.16 kV buses 10100, 10300, and 10500 for plant startup and shutdown. The lines connecting the RSSTs to the 115 kV transmission lines are arranged so that a failure of either line does not result in the loss of the other line. The 345 kV switchyard is connected to the Niagara Mohawk Power Corporation's Edic Substation and the Niagara Mohawk Power Corporation's Scriba Substation. The Main Generator provides power at 24 kV to two main transformers (T1A and T1B) connected in parallel, and to the Normal Station Service Transformer (NSST) 71T-4. NSST 71T-4 steps down voltage to supply power to the 4.16 kV buses 10100, 10200, 10300, 10400 and 10700. Normal (from the Main Generator) or reserve power is supplied to emergency buses 10500 and 10600 through tie connections from buses 10300 and 10400, respectively. If normal power from NSST 71T-4 is lost, the reserve power, RSSTs 71T-2 and 71T-3, will automatically energize all plant buses via the fast or residual transfer, except bus 10700. The only power source to bus 10700 is NSST 71T-4 because the bus has no connected loads necessary for startup or safe shutdown of the plant. If the RSSTs were to fail, the EDG subsystems would automatically energize their respective buses. The 345 kV switchyard is sometimes used to backfeed NSST 71T-4. This operation requires the main generator links to be manually disconnected and therefore can only be used during plant outages. A detailed description of the 115 kV and 345 kV transmission networks and the normal, reserve, and backfeed AC power supply circuits to the plant Class 1E emergency buses is found in the UFSAR, Chapter 8 (Ref. 2).

A qualified offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the 115 kV transmission network source to the plant Class 1E emergency bus or buses. During normal plant operation, with the main generator on line, emergency buses 10500

(continued)

BASES

BACKGROUND (continued)

and 10600 are energized by the normal AC power source from NSST 71T-4 via buses 10300 and 10400, respectively. Loss or degradation of the normal AC power source results in an automatic fast transfer or automatic residual transfer to the reserve AC power source through RSSTs 71T-2 and 71T-3. The load tap changer controller and backup controller settings have been selected to maintain the 115kV offsite power to the JAF facility under various analyzed scenarios. Each RSST is sized to supply all loads on its associated emergency and non-emergency service buses.

The onsite standby AC power sources for 4.16 kV emergency buses 10500 and 10600 consist of two independent and redundant EDG subsystems that are self contained and independent of normal, backfeed, and reserve sources. Each EDG subsystem consists of two EDGs which operate in parallel and are dedicated to an emergency power division (1 or 2). The Division 1 EDG subsystem consists of EDGs A and C and is dedicated to emergency bus 10500. The Division 2 EDG subsystem consists of EDGs B and D and is dedicated to emergency bus 10600. The EDGs start automatically on an emergency bus degraded voltage signal, an emergency bus undervoltage (LOP) signal, or a loss of coolant accident (LOCA) signal (i.e., low-low-low reactor water level signal or high drywell pressure signal). As a consequence of a LOP or degraded voltage signal, independent of or coincident with a LOCA signal, the emergency bus undervoltage control logic starts the EDGs. Coincident with the EDG starting and force paralleling, the emergency bus undervoltage control logic trips the 4.16 kV emergency bus tie breakers, trips the emergency bus load breakers (except for the 600 V emergency substations), and provides a close permissive signal to the EDG output breakers. The EDGs are automatically tied to their respective emergency buses and if a LOCA condition exists, the loads are sequentially connected to the emergency buses by the programmed restart time delay relays. The programmed restart time delay relays control the permissive and starting signals to motor breakers to prevent overloading the EDGs. On a LOCA signal alone the EDGs start, force parallel, and operate in the standby mode without tying to the emergency bus.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

maintaining the onsite (EDGs) or qualified 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 active component failure.

AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii) (Ref. 6).

LCO

Two qualified circuits between the offsite transmission network and the plant Class 1E Distribution System and two separate and independent EDG subsystems each consisting of two EDGs ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an abnormal operational transient or a postulated DBA.

Qualified offsite circuits are those that are described in the UFSAR, and are part of the licensing basis for the plant.

Each qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the emergency buses. Each qualified offsite circuit consists of the incoming 115kV transmission line (line 3 or line 4), the disconnect device to reserve station service transformer (RSST) 71T-2 or 71T-3, the associated RSST (including the load tap changer, while in the automatic or manual mode of operation), and the respective circuit path including feeder breakers to the 4.16 kV emergency bus 10500 or 10600. If one 115k transmission line is inoperable, then one of the offsite circuits must be declared inoperable. In addition, to ensure a fault on one qualified offsite circuit does not adversely impact the other qualified offsite circuit, the 115 kV North and South bus disconnect (10017) automatic opening feature must be OPERABLE if the disconnect is closed. If the automatic opening feature is inoperable, then one of the offsite circuits must be declared inoperable. In addition, due to the unique nature of this design, the automatic opening feature is periodically demonstrated in accordance with plant procedures.

(continued)

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Attachment 3

Proposed Updated Final Safety Analysis Report Change,
As marked up pages (Info Only)

Reserve station service transformer T2 high voltage winding is connected to the 115 kV bus through an underground low pressure oil filled cable; reserve station service transformer T3 high voltage winding is connected to the 115 kV bus through an overhead transmission line.

Each of the oil natural air natural / oil natural air forced (1) / oil natural air forced (2) cooled reserve station service transformers is rated at 15/20/25 MVA, 65 C temperature rise. The high voltage windings are rated 115 kV, 450 kV BIL and are wye connected with solidly grounded neutrals; the two low voltage windings, X or Y, are each rated 4160 V 110 kV BIL and are wye connected with resistance grounded neutrals. The low voltage Y winding is equipped with a load tap changer.

The low voltage windings of the reserve transformers supply 4160 V reserve power through an enclosed nonsegregated bus duct to the plant service AC distribution buses as follows:

TransformerT2	AC Distribution Bus	
"X" winding	10200	
"Y" winding		10400

TransformerT3	AC Distribution Bus	
"X" winding	10100	
"Y" winding		10300

8.4.2.5 Safety Evaluation

The lines connecting the reserve station service transformers to the 115 kV bus are arranged so that a failure of either line does not result in the loss of the other line. The overhead line to reserve station service transformer T3 is designed to equal or exceed the requirements of the 115 kV incoming transmission lines. The line to reserve station service transformer T2 is underground. The underground line is not subjected to the surface conditions which affect the overhead line.

The overhead and underground lines are each capable of continuously carrying full capacity of their respective reserve station service transformers.

The transformers are located approximately 153 ft apart and are further protected by fire walls.

The secondary leads from each transformer consist of a non-segregated phase bus duct.

Each transformer and its high and low voltage connections are capable of starting and supplying all loads on its associated emergency service bus of the Plant Service AC Power Distribution System.

In the event that the normal AC power source is lost, the reserve AC power sources are automatically connected to the Plant Service AC Power Distribution System as described in Section 8.5.

Monitoring and indicating devices are provided in the Control Room to permit supervision of the operational status of the reserve AC power source.

The Reserve Station Service Transformer load tap changers have the capability to be operated in both automatic ands manual modes.

b. EHV Grid System Voltages

The normal operating range of the 345 kV grid system is between a minimum of 345 kV and a maximum of 370 kV. If the 345 kV system voltage should decay to a minimum of 323 kV, undervoltage tripping and system load shedding are initiated by the system dispatcher to maintain the system voltage above this minimum. If the 345 kV system voltage should operate above 370 kV, Control Room operators will notify the appropriate power grid control dispatchers to reduce the grid voltage below 370 kV.

The normal operating range of the 115 kV system at the JAF switchyard bus is between a minimum of 117 kV and a maximum of 122 kV. The minimum voltage on the 115 kV bus that is expected at anytime is 116 kV, however, for conservatism a condition of 115 kV minimum voltage on the 115 kV bus was considered.

With a 115 kV system bus voltage of 117 kV, the voltage on the 4160 V emergency buses is 4143 V and 577 V at the 600 V emergency load center buses at normal load. A system voltage of 122 kV produces 4333 V at the 4160 V emergency buses and 605 V at the 600 V emergency load center buses at normal load.

c. Emergency Bus Voltages When Operating From the Reserve Source

The reserve station service transformers are provided with a load tap changer on the low voltage Y winding with 8 steps above and 8 steps below 4.16 kV for a range of ± 10 percent.

The load tap changers are capable of being operated in the automatic and manual modes. The operator can manually control the load tap changer from the control room.

A no load tap changer is provided on the high voltage H winding with 2 steps above and 2 steps below 115 kV for a range of ± 5 percent. The taps will remain at a fixed position.

Computer studies have been performed to calculate the voltages at the 4160 V and 600 V emergency buses for the full range of the 115 kV switchyard bus voltages taken in conjunction with the existing transformer tap settings and normal load, no load, and full load emergency bus and normal conditions. The voltage profiles at the emergency buses are shown in Figure 8.6-1 and are bounding for application of the load tap changer. A summary of results for the significant conditions is shown below:

1. Normal operating range maximum on the 115 kV switchyard bus of 122 kV and no load on the reserve station service transformer and load center transformers.

   a. 4160 V emergency bus voltage is 4472 V (107.5 percent of nominal)
   b. 600 V emergency bus voltage is 634.5 V (105.75 percent of nominal)

2. Normal operating range minimum on the 115 kV switchyard bus of 117 kV and full load on the reserve station service transformers and load center transformers.

   a. 4160 V emergency bus voltage is 4067 V (97.76 percent of nominal)
   b. 600 V emergency bus voltage is 553 V (92.17 percent of nominal)