Duke Energy

W. R. McCollum, Jr.
Vice President

Duke Energy
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672
(864) 885-3107 OFFICE
(864) 885-3564 FAX

March 29, 2001

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Subject: Oconee Nuclear Station
Docket Numbers 50-269, 270, and 287
License Amendment Request for Keowee Surveillance Requirements 3.8.1.9 and 3.8.1.17
Technical Specification Change (TSC) Number 2001-02

Pursuant to Title 10, Code of Federal Regulations, Part 50, Section 90 (10 CFR 50.90), Duke Energy Corporation (Duke) proposes to amend Appendix A, Technical Specifications, for Renewed Licenses DPR-38, DPR-47 and DPR-55 for Oconee Nuclear Station, Units 1, 2, and 3. This License Amendment Request (LAR) fulfills the requirement to submit a follow-on LAR as specified in the NOTE contained in Technical Specification (TS) Surveillance Requirement (SR) 3.8.1.9.a. as amended in Amendment Nos. 316, 316, and 316.

The need for the subject amendment was a result of discussions between Duke and the Nuclear Regulatory Commission (NRC), regarding the interpretation of the upper frequency limit contained in the subject SR. Duke contended that the limit on frequency stated in the SR provides the band that the Keowee Hydro Unit (KHU) must initially achieve within 23 seconds following an emergency start. The NRC stated that this limit must be achieved and maintained within the 23 second time frame. Since the KHU achieves this band within the required 23 seconds, but then temporarily exceeds it before returning to the band at a time beyond 23 seconds, the NRC stated that they believed that this SR was not being met.

A001

Duke submitted a LAR on September 7, 2000 to request revisions to TS 3.8.1, SR 3.8.1.9 to add a Note that would waive the requirements to meet the upper limits associated with the SR until an amendment to TS could be approved which resolved the issue. The Note stated that this future LAR would be submitted by April 5, 2001. The LAR providing this waiver was approved on October 4, 2000 as Amendment Nos. 316, 316 and 316.

As part of the Oconee Refurbishment Program, Duke had already made plans to upgrade or refurbish the KHUs and their controls. One of these projects was the replacement of the existing mechanical-hydraulic governors with new, digital governors and support equipment. There is confidence that a digital governor can provide sufficient control over the unit to assure the KHU remains within a $\pm$ 3 Hz of nominal frequency band on startup. The schedule for the project to replace the governor was accelerated and modification development started in October, 2000. Based on the current schedule for modification package development and procurement lead time, it is expected that the digital governor modification can be implemented on both units by the end of the first quarter of 2003. An integrated schedule for all of the major Keowee upgrades and refurbishments is being developed. Duke will inform the NRC by November 30, 2001 if the above date for implementation of the governor modification and this amendment is changed.

A revision to TS 3.8.1, SR 3.8.1.9 to remove the Note that waives the requirement to demonstrate that the frequency and voltage bands in the SR are met is requested. The Note will remain in effect until the governor modification is implemented at which time it will be removed by inserting the TS pages approved in this amendment.

With the upgrade of the KHU governor, improved control of overshoot will be achieved. Based on this, a revision to TS 3.8.1, SR 3.8.1.17 to reduce the preset time delay for activating the out-of-tolerance logic circuit from the 12 seconds $\pm$ 1 second that was approved in Amendment Nos. 312, 312, and 312 to 5 seconds $\pm$ 1 second is requested. To avoid

any confusion regarding this approved but unimplemented SR, Technical Specification pages and markups for all pages affected by Amendment Nos. 312, 312, and 312 are included. The implementation of the out-of-tolerance logic will occur concurrently with the implementation of the governor modification.

Attachment 1 contains the markup of the current Technical Specification pages. The revised Technical Specification pages are included in Attachment 2. The Technical Justification for the amendment request is included in Attachment 3. Attachments 4 and 5 contain the No Significant Hazards Consideration Evaluation and the Environmental Impact Analysis, respectively.

Duke intends to install the governor modification under the provisions of 10 CFR 50.59. Therefore the review requested herein is for the changes to the TS. The modification package and results of post-modification testing will be available at the station for NRC staff review.

In order to support the installation of the required modifications, approval of this LAR is requested by April 1, 2002. The new surveillance requirements in this modification will be implemented upon completion of the installation of the new governors.

This proposed change to the TS has been reviewed and approved by the Plant Operations Review Committee and Nuclear Safety Review Board.

Implementation of these changes will not result in an undue risk to the health and safety of the public.

The Oconee Updated Final Safety Analysis Report has been reviewed and no changes are necessary to support this LAR.

Pursuant to 10 CFR 50.91, a copy of this proposed amendment is being sent to the South Carolina Department of Health and Environmental Control for review, and as deemed necessary and appropriate, subsequent consultation with the NRC staff.

If there are any questions regarding this submittal, please contact Eric Johnson at (864) 885-4716.

Very truly yours,

W. R. McCollum, Jr., Vice President
Oconee Nuclear Site

cc: Mr. D. E. LaBarge, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Mail Stop O-14 H25
Washington, D. C. 20555

Mr. L. A. Reyes, Regional Administrator
U. S. Nuclear Regulatory Commission - Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

Mr. M. C. Shannon
Senior Resident Inspector
Oconee Nuclear Station

Mr. Virgil R. Autry, Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

W. R. McCollum, Jr., being duly sworn, states that he is Vice President, Oconee Nuclear Site, Duke Energy Corporation, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this revision to the Facility Operating License Nos. DPR-38, DPR-47, DPR-55; and that all the statements and matters set forth herein are true and correct to the best of his knowledge.

W. R. McCollum, Jr., Vice President
Oconee Nuclear Site

Subscribed and sworn to before me this 29th day of March, 2001

Connie Breazeale
Notary Public

My Commission Expires:

2/12/2003

ATTACHMENT 1

MARKUP OF TECHNICAL SPECIFICATION

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.7	Verify both KHU's underground tie breakers cannot be closed simultaneously.	12 months
SR 3.8.1.8	Verify each KHU's overhead emergency power path tie breaker cannot be closed when tie breaker to underground emergency power path is closed.	12 months
SR 3.8.1.9	----------NOTE---------- The upper limits on KHU frequency and voltage are not required to be met until the NRC issues an amendment that removes this Note (license amendment request to be submitted no later than April 5, 2001). ---------- Verify on an actual or simulated emergency actuation signal each KHU auto starts and: a. Achieves frequency ≥ 57 Hz and ≤ 63 Hz and voltage ≥ 13.5 kV and ≤ 14.49 kV in ≤ 23 seconds; and b. Supplies the equivalent of one Unit's maximum safeguard loads plus two Unit's hot shutdown loads when synchronized to system grid and loaded at maximum practical rate.	12 months

DELETE NOTE

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.10	Verify each KHU's battery capacity is adequate to supply, and maintain in OPERABLE status, required emergency loads for design duty cycle when subjected to a battery service test.	12 months
SR 3.8.1.11	Verify each KHU's battery cells, cell end plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	12 months
SR 3.8.1.12	Verify each KHU's battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	12 months
SR 3.8.1.13	----------NOTE---------- Only applicable when the overhead electrical disconnects for the KHU associated with the underground emergency power path are closed. ---------- Verify on an actual or simulated zone overlap fault signal each KHU's overhead tie breaker and underground tie breaker actuate to the correct position.	12 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.14	----------NOTES---------- Not required to be performed for an SL breaker when its standby bus is energized from a LCT via an isolated power path. ---------- Verify each closed SL and closed N breaker opens on an actuation of each redundant trip coil.	18 months
SR 3.8.1.15	----------NOTE---------- Redundant breaker trip coils shall be verified on a STAGGERED TEST BASIS. ---------- Verify each 230 kV switchyard circuit breaker actuates to the correct position on a switchyard isolation actuation signal.	18 months
SR 3.8.1.16	----------NOTE---------- Only applicable when complying with Required Action C.2.2.4. ---------- Verify one KHU provides an alternate manual AC power source capability by manual or automatic KHU start with manual synchronize, or breaker closure, to energize its non-required emergency power path.	As specified by Required Action C.2.2.4

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.16	----------NOTE---------- Only applicable when complying with Required Action C.2.2.4. --- Verify one KHU provides an alternate manual AC power source capability by manual or automatic KHU start with manual synchronize, or breaker closure, to energize its non-required emergency power path.	As specified by Required Action C.2.2.4
SR 3.8.1.17	Verify each KHU's Voltage and Frequency out of tolerance logic trips and blocks closure of the appropriate overhead or underground power path breakers. The allowable values with a time delay of ~~12~~ 5 seconds ± 1 second shall be as follows: a. Undervoltage ≥ 12.42 kV and ≤ 12.63 kV b. Overvoltage ≥ 14.90 kV and ≤ 15.18 kV c. Underfrequency ≥ 53.992 hz and ≤ 54.008 hz d. Overfrequency ≥ 65.992 hz and ≤ 66.008 hz	18 months

BASES

LCO (continued)

An OPERABLE KHU and its required overhead emergency power path must be capable of automatically supplying power from the KHU through the KHU main step-up transformer, the 230 kV yellow bus, the Unit startup transformer and both E breakers to both main feeder buses. At least one channel of switchyard isolation (by actuation from degraded grid voltage protection) is required to be OPERABLE to isolate the 230 kV switchyard yellow bus. If closed, each N breaker must be capable of opening using either of its associated breaker trip circuits. Either of the following combinations provides an acceptable KHU and required overhead emergency power path:

Keowee Hydro Unit		Keowee Hydro Unit	
1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 1 (enabled by one channel of Switchyard Isolate Complete),	2B)	Keowee ACB 2 (enabled by one channel of Switchyard Isolate Complete),
3A)	Keowee auxiliary transformer 1X, Keowee ACB 5, Keowee Load Center 1X,	3B)	Keowee auxiliary transformer 2X, Keowee ACB 6, Keowee Load Center 2X,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B)	Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A)	ACB-1 to ACB-3 interlock,	6B)	ACB-2 to ACB-4 interlock,
7A)	Keowee Unit 1 Voltage and Frequency out of tolerance (OOT) logic	7B)	Keowee Unit 2 Voltage and Frequency out of tolerance (OOT) logic

8) Keowee reservoir level ≥ 775 feet above sea level,

Overhead Emergency Power Path

9) Keowee main step-up transformer,
10) PCB 9 (enabled by one channel of Switchyard Isolate Complete),
11) The 230kV switchyard yellow bus capable of being isolated by one channel of Switchyard Isolate,
12) A unit startup transformer and associated yellow bus PCB (CT-1 / PCB 18, CT-2 / PCB 27, CT-3 / PCB 30), and
13) Both E breakers.

DELETE SIDE BARRING

BASES

LCO
(continued)

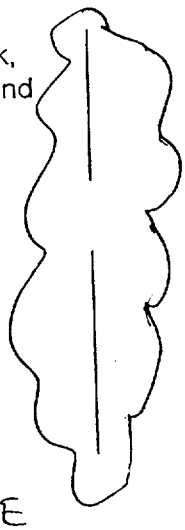
An OPERABLE KHU and its required underground emergency power path must be capable of automatically supplying power from the KHU through the underground feeder, transformer CT-4, both standby buses, and both Unit S breakers to both main feeder buses. If closed, each N breaker and each SL breaker must be capable of opening using either of its associated breaker trip circuits. Either of the following combinations provides an acceptable KHU and required underground emergency power path:

Keowee Hydro Unit		Keowee Hydro Unit	
1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 3,	2B)	Keowee ACB 4,
3A.1)	Keowee auxiliary transformer CX, Keowee ACB 7, Keowee Load Center 1X,	3B.1)	Keowee auxiliary transformer CX, Keowee ACB 8, Keowee Load Center 2X,
3A.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,	3B.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,
3A.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,	3B.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B)	Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A)	ACB-1 to ACB-3 interlock,	6A)	ACB-2 to ACB-4 interlock,
7A)	Keowee Unit 1 Voltage and Frequency OOT logic	7B)	Keowee Unit 2 Voltage and Frequency OOT logic

8) Keowee reservoir level ≥ 775 feet above sea level,

Underground Emergency Power Path

9) The underground feeder,
10) Transformer CT-4,
11) Both SK breakers,
12) Both standby buses,
13) Both S breakers, and
14) ACB-3 to ACB-4 interlock.



DELETE SIDEBARRING

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

This surveillance verifies the KHUs' response time to an Emergency Start signal (normally performed using a pushbutton in the control room) to ensure ES equipment will have adequate power for accident mitigation. UFSAR Section 6.3.3.3 (Ref. 9) establishes the 23 second time requirement for each KHU to achieve rated frequency and voltage. Since the only available loads of adequate magnitude for simulating a accident is the grid, subsequent loading on the grid is required to verify the KHU's ability to assume rapid loading under accident conditions. Sequential block loads are not available to fully test this feature. This is the reason for the requirement to load the KHUs at the maximum practical rate. The 12 month Frequency for this SR is adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

~~This SR is modified by a Note that allows the upper limits on KHU frequency and voltage to not be met until the NRC issues an amendment which removes this Note, with the license amendment request to be submitted no later than April 5, 2001.~~

SR 3.8.1.10

A battery service test is a special test of the battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency of 12 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 6) and Regulatory Guide 1.129 (Ref. 7), which state that the battery service test should be performed with intervals between tests not to exceed 18 months.

SR 3.8.1.11

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The 12 month Frequency for this SR is consistent with manufacturers recommendations and IEEE-450 (Ref. 8), which recommends detailed visual inspection of cell condition and rack integrity on a yearly basis.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.16 (continued)

OPERABLE. When the overhead emergency power path is inoperable, the SR verifies by administrative means that the KHU associated with the overhead emergency power path is OPERABLE.

This SR is modified by a Note indicating that the SR is only applicable when complying with Required Action C.2.2.4.

SR 3.8.1.17

This SR verifies the Keowee Voltage and Frequency out of tolerance logic trips and blocks closure of the appropriate overhead or underground power path breakers on an out of tolerance trip signal. The 18 month Frequency is based on engineering judgement and provides reasonable assurance that the Voltage and Frequency out of tolerance logic trips and blocks closure of these breakers when required.

There are three over voltage relays, three under voltage relays, and three over/under frequency relays per KHU with each relay actuating an auxiliary relay used to provide two out of three logic. These relays monitor generator output voltage and if two phases are above/below setpoint, prevent the power path breakers from closing or if closed, provide a trip signal which is applied after a time delay, to open the power path breakers. Testing demonstrates that relays actuate at preset values, that timers time out and that two under voltage relays, two over voltage relays, or two over/under frequency relays will actuate the logic channel. This ensures that the power path breakers will not close and if closed, will trip after a preset time delay.

INSERT

that becomes effective when the KHU first reaches the required frequency and voltage band

DELETE TOTAL SIDE BARLING

ADD SMALL SIDE BAR

REFERENCES

1. UFSAR, Section 3.1.39
2. UFSAR, Chapter 16
3. 10 CFR 50.36
4. UFSAR, Chapter 6
5. UFSAR, Chapter 15
6. Regulatory Guide 1.32
7. Regulatory Guide 1.129

BASES

REFERENCES (continued)

8. IEEE-450-1980

9. UFSAR, Section 6.3.3.3

ATTACHMENT 2

TECHNICAL SPECIFICATION

Remove Pages	Replace Pages
3.8.1-15	3.8.1-15
3.8.1-16	3.8.1-16
3.8.1-17	3.8.1-17
B 3.8.1-4	B 3.8.1-4
B 3.8.1-5	B 3.8.1-5
B 3.8.1-22	B 3.8.1-22
B 3.8.1-25	B 3.8.1-25
----------	B 3.8.1-26

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.7	Verify both KHU's underground tie breakers cannot be closed simultaneously.	12 months
SR 3.8.1.8	Verify each KHU's overhead emergency power path tie breaker cannot be closed when tie breaker to underground emergency power path is closed.	12 months
SR 3.8.1.9	Verify on an actual or simulated emergency actuation signal each KHU auto starts and: a. Achieves frequency $\geq$ 57 Hz and $\leq$ 63 Hz and voltage $\geq$ 13.5 kV and $\leq$ 14.49 kV in $\leq$ 23 seconds; and b. Supplies the equivalent of one Unit's maximum safeguard loads plus two Unit's hot shutdown loads when synchronized to system grid and loaded at maximum practical rate.	12 months
SR 3.8.1.10	Verify each KHU's battery capacity is adequate to supply, and maintain in OPERABLE status, required emergency loads for design duty cycle when subjected to a battery service test.	12 months
SR 3.8.1.11	Verify each KHU's battery cells, cell end plates, and racks show no visual indication of physical damage or abnormal deterioration that could degrade battery performance.	12 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.1.12	Verify each KHU's battery cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	12 months
SR 3.8.1.13	----------NOTE---------- Only applicable when the overhead electrical disconnects for the KHU associated with the underground emergency power path are closed. ----------	
	Verify on an actual or simulated zone overlap fault signal each KHU's overhead tie breaker and underground tie breaker actuate to the correct position.	12 months
SR 3.8.1.14	----------NOTES---------- Not required to be performed for an SL breaker when its standby bus is energized from a LCT via an isolated power path. ----------	
	Verify each closed SL and closed N breaker opens on an actuation of each redundant trip coil.	18 months
SR 3.8.1.15	----------NOTE---------- Redundant breaker trip coils shall be verified on a STAGGERED TEST BASIS. ----------	
	Verify each 230 kV switchyard circuit breaker actuates to the correct position on a switchyard isolation actuation signal.	18 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.16	----------NOTE---------- Only applicable when complying with Required Action C.2.2.4. ---------- Verify one KHU provides an alternate manual AC power source capability by manual or automatic KHU start with manual synchronize, or breaker closure, to energize its non-required emergency power path.	As specified by Required Action C.2.2.4
SR 3.8.1.17	Verify each KHU's Voltage and Frequency out of tolerance logic trips and blocks closure of the appropriate overhead or underground power path breakers. The allowable values with a time delay of 5 seconds ± 1 second shall be as follows: a. Undervoltage ≥ 12.42 kV and ≤ 12.63 kV b. Overvoltage ≥ 14.90 kV and ≤ 15.18 kV c. Underfrequency ≥ 53.992 hz and ≤ 54.008 hz d. Overfrequency ≥ 65.992 hz and ≤ 66.008 hz	18 months

BASES

LCO (continued)

An OPERABLE KHU and its required overhead emergency power path must be capable of automatically supplying power from the KHU through the KHU main step-up transformer, the 230 kV yellow bus, the Unit startup transformer and both E breakers to both main feeder buses. At least one channel of switchyard isolation (by actuation from degraded grid voltage protection) is required to be OPERABLE to isolate the 230 kV switchyard yellow bus. If closed, each N breaker must be capable of opening using either of its associated breaker trip circuits. Either of the following combinations provides an acceptable KHU and required overhead emergency power path:

Keowee Hydro Unit		Keowee Hydro Unit	
1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 1 (enabled by one channel of Switchyard Isolate Complete),	2B)	Keowee ACB 2 (enabled by one channel of Switchyard Isolate Complete),
3A)	Keowee auxiliary transformer 1X, Keowee ACB 5, Keowee Load Center 1X,	3B)	Keowee auxiliary transformer 2X, Keowee ACB 6, Keowee Load Center 2X,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B)	Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A)	ACB-1 to ACB-3 interlock,	6B)	ACB-2 to ACB-4 interlock,
7A)	Keowee Unit 1 Voltage and Frequency out of tolerance (OOT) logic	7B)	Keowee Unit 2 Voltage and Frequency out of tolerance (OOT) logic

8) Keowee reservoir level ≥ 775 feet above sea level,

Overhead Emergency Power Path

9) Keowee main step-up transformer,
10) PCB 9 (enabled by one channel of Switchyard Isolate Complete),
11) The 230kV switchyard yellow bus capable of being isolated by one channel of Switchyard Isolate,
12) A unit startup transformer and associated yellow bus PCB (CT-1 / PCB 18, CT-2 / PCB 27, CT-3 / PCB 30), and
13) Both E breakers.

BASES

LCO (continued)

An OPERABLE KHU and its required underground emergency power path must be capable of automatically supplying power from the KHU through the underground feeder, transformer CT-4, both standby buses, and both Unit S breakers to both main feeder buses. If closed, each N breaker and each SL breaker must be capable of opening using either of its associated breaker trip circuits. Either of the following combinations provides an acceptable KHU and required underground emergency power path:

Keowee Hydro Unit		Keowee Hydro Unit	
1A)	Keowee Unit 1 generator,	1B)	Keowee Unit 2 generator,
2A)	Keowee ACB 3,	2B)	Keowee ACB 4,
3A.1)	Keowee auxiliary transformer CX, Keowee ACB 7, Keowee Load Center 1X,	3B.1)	Keowee auxiliary transformer CX, Keowee ACB 8, Keowee Load Center 2X,
3A.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,	3B.2)	One Oconee Unit 1 S breaker capable of feeding switchgear 1TC,
3A.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,	3B.3)	Switchgear 1TC capable of feeding Keowee auxiliary transformer CX,
4A)	Keowee MCC 1XA,	4B)	Keowee MCC 2XA,
5A)	Keowee Battery #1, Charger #1 or Standby Charger, and Distribution Center 1DA,	5B)	Keowee Battery #2, Charger #2 or Standby Charger, and Distribution Center 2DA,
6A)	ACB-1 to ACB-3 interlock,	6A)	ACB-2 to ACB-4 interlock,
7A)	Keowee Unit 1 Voltage and Frequency OOT logic	7B)	Keowee Unit 2 Voltage and Frequency OOT logic

8) Keowee reservoir level ≥ 775 feet above sea level,

Underground Emergency Power Path

9) The underground feeder,
10) Transformer CT-4,
11) Both SK breakers,
12) Both standby buses,
13) Both S breakers, and
14) ACB-3 to ACB-4 interlock.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.9

This surveillance verifies the KHUs' response time to an Emergency Start signal (normally performed using a pushbutton in the control room) to ensure ES equipment will have adequate power for accident mitigation. UFSAR Section 6.3.3.3 (Ref. 9) establishes the 23 second time requirement for each KHU to achieve rated frequency and voltage. Since the only available loads of adequate magnitude for simulating a accident is the grid, subsequent loading on the grid is required to verify the KHU's ability to assume rapid loading under accident conditions. Sequential block loads are not available to fully test this feature. This is the reason for the requirement to load the KHUs at the maximum practical rate. The 12 month Frequency for this SR is adequate based on operating experience to provide reliability verification without excessive equipment cycling for testing.

SR 3.8.1.10

A battery service test is a special test of the battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency of 12 months is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 6) and Regulatory Guide 1.129 (Ref. 7), which state that the battery service test should be performed with intervals between tests not to exceed 18 months.

SR 3.8.1.11

Visual inspection of the battery cells, cell plates, and battery racks provides an indication of physical damage or abnormal deterioration that could potentially degrade battery performance. The 12 month Frequency for this SR is consistent with manufacturers recommendations and IEEE-450 (Ref. 8), which recommends detailed visual inspection of cell condition and rack integrity on a yearly basis.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.8.1.16 (continued)

OPERABLE. When the overhead emergency power path is inoperable, the SR verifies by administrative means that the KHU associated with the overhead emergency power path is OPERABLE.

This SR is modified by a Note indicating that the SR is only applicable when complying with Required Action C.2.2.4.

SR 3.8.1.17

This SR verifies the Keowee Voltage and Frequency out of tolerance logic trips and blocks closure of the appropriate overhead or underground power path breakers on an out of tolerance trip signal. The 18 month Frequency is based on engineering judgement and provides reasonable assurance that the Voltage and Frequency out of tolerance logic trips and blocks closure of these breakers when required.

There are three over voltage relays, three under voltage relays, and three over/under frequency relays per KHU with each relay actuating an auxiliary relay used to provide two out of three logic. These relays monitor generator output voltage and if two phases are above/below setpoint, prevent the power path breakers from closing or if closed, provide a trip signal which is applied after a time delay, to open the power path breakers. Testing demonstrates that relays actuate at preset values, that timers time out and that two under voltage relays, two over voltage relays, or two over/under frequency relays will actuate the logic channel. This ensures that the power path breakers will not close and if closed, will trip after a preset time delay that becomes effective when the KHU first reaches the required frequency and voltage band.

REFERENCES

1. UFSAR, Section 3.1.39
2. UFSAR, Chapter 16
3. 10 CFR 50.36
4. UFSAR, Chapter 6
5. UFSAR, Chapter 15
6. Regulatory Guide 1.32
7. Regulatory Guide 1.129

BASES

REFERENCES (continued)

8. IEEE-450-1980

9. UFSAR, Section 6.3.3.3

ATTACHMENT 3

TECHNICAL JUSTIFICATION

ATTACHMENT 3

TECHNICAL JUSTIFICATION

Background

In approved Amendment Nos. 300, 300 and 300, Surveillance Requirement (SR) 3.8.1.9.a required Duke Energy Corporation (Duke) to "Verify on an actual or simulated emergency actuation signal each Keowee Hydro Unit autostarts and: a) Achieves frequency $\geq$ 57 Hz and $\leq$ 63 Hz and voltage $\geq$ 13.5 kV and $\leq$ 14.49 kV in $\leq$ 23 seconds ...".

In discussions between Duke and the NRC in late August 2000, it became clear that interpretation differences existed in the requirements of SR 3.8.1.9. The NRC stated that their interpretation of this requirement is that the band on frequency constitutes upper and lower limits for operation of a Keowee Hydro Unit (KHU). When a KHU is started, it reaches rated frequency and voltage within the required 23 seconds. Due to the characteristics of the KHUs, the speed of the KHUs continues to increase, causing the frequency to exceed the bands specified in SR 3.8.1.9 for a short period of time. Following this brief overshoot, the frequency returns to within the limits specified in SR 3.8.1.9.

Given the interpretation of the upper frequency limits associated with the requirements of SR 3.8.1.9 by the NRC, and the overshoot characteristics of the KHUs, this SR could not be met. Consequently, based on this SR interpretation, both KHUs were declared inoperable at 1440 hours on September 5, 2000, and Notice of Enforcement Discretion (NOED) was requested and granted at 1525 hours on September 5, 2000. This was followed by a license amendment request (LAR) on September 7, 2000 (TSC 2000-08) that added a Note to SR 3.8.1.9 that allowed the upper limits of KHU voltage and frequency to not be met until the NRC issues an amendment that removes this Note. The Note further stated that the LAR would be submitted no later than April 5, 2001.

This LAR has been prepared to satisfy the requirements of the Note associated with SR 3.8.1.9. Duke has determined that a changeout of a KHU governor with a new digital governor will provide control of KHU speed such that relief from the upper limit on frequency specified in SR 3.8.1.9 will no longer be needed.

Description of the Technical Specification Change

The Note that was added to SR 3.8.1.9 in Amendment Nos. 316, 316, and 316 that allows the upper limits of KHU voltage and frequency to not be met until the NRC issues an amendment will be removed. The corresponding Bases change describing the Note will be removed.

This LAR also includes a request to revise SR 3.1.8.17 to lower the preset time delay for activating the out-of-tolerance logic from 12 seconds ± 1 second that was approved in Amendment Nos. 312, 312, and 312 to a time delay of 5 seconds ± 1 second. Since this SR had not yet been implemented, this LAR requests a change that supercedes the above Amendment. New pages that had been affected by the earlier Amendment are contained in this request, including changes to the corresponding bases section.

Technical Justification

SR 3.8.1.9

Duke plans to implement a digital governor modification at Keowee that will be designed to reduce the Keowee overshoot to less than 5%. This 5% overshoot is significantly less than the maximum overshoot of 17 - 18% seen in previous tests and is within typical steady-state frequency tolerances specified by equipment manufacturers. Frequency responses associated with the overshoot condition will be incorporated into appropriate calculations as part of the digital governor modification. The issues associated with TS SR 3.8.1.9 will be resolved when the digital governor modification is implemented.

The rationale Duke provided in its request for Enforcement Discretion dated September 6, 2000 for continued operation of the KHU with the observed degree of overshoot remains valid. Periodic testing of the Keowee units per SR 3.8.1.9 confirms that the units will start and be capable of accepting load within 23 seconds, as required by the design basis. The testing is performed by emergency starting the Keowee units from the Oconee Control Room by procedure. The acceptance criteria for this procedure require that rated frequency and voltage, within the

lower limit of SR 3.8.1.9, be achieved within 23 seconds. This is normally accomplished within 15-18 seconds. Test results from the most recent emergency power start surveillance, conducted on September 29, 2000, demonstrated that the Keowee units were performing consistent with previous emergency start responses. Keowee unit response will continue to be monitored using temporary monitoring equipment during future emergency start surveillances through the digital governor modification implementation.

In an effort to improve design margin, Duke implemented a modification in November 2000, to reduce the Keowee overshoot. This modification involved reducing preset allowable wicket gate opening during emergency start and resulted in a maximum overshoot of 8 to 9% for the two Keowee units. This is a significant improvement in the overshoot when compared to past test data. The results of this modification were discussed with the staff during a meeting on February 21, 2001.

Monthly testing is performed to verify that the Keowee units operate within a steady state voltage and frequency band. This band is identical to the bands for frequency and voltage provided in SR 3.8.1.9. Also, other surveillance procedures are performed in accordance with TS 5.5.18 (Keowee Hydro Unit Commercial Generation Testing Program) when the Keowee units are used for commercial power generation.

Previously performed tests have also demonstrated that the Keowee overshoot did not adversely impact plant equipment. Integrated tests during initial plant startup and special integrated tests conducted in January 1997 and November 1998 demonstrated satisfactory Emergency Core Cooling System and Engineered Safeguards functions when powered from Keowee under emergency start conditions. The overshoot condition is limited in duration. In addition, protection is currently installed on the Keowee units that prevents a Keowee unit from loading if a runaway governor condition exists. Duke has extensively reviewed both the data from emergency start testing and the emergency power system itself. Based on the review of the emergency power system, Duke has concluded that no credible single failure would cause an extended out-of-tolerance frequency or voltage condition.

The results of the above mentioned tests, along with the KHU overshoot characteristics, were discussed with the NRC as noted in the NRC Final Report on the Oconee Emergency Power System, dated January 19, 1999. The staff report indicates that while the testing demonstrated satisfactory performance of the Oconee emergency power system, the staff was concerned that if any modifications to the system were performed that might make Keowee overshoot any larger, then appropriate evaluations would need to be performed.

The following description provides the basis for Duke's confidence that a digital governor can control KHU overshoot.

The speed of a Keowee unit is controlled by varying water flow to the turbine runner via wicket gates on the turbine inlet. Wicket gate position is established by hydraulically-operated servomotors whose position in turn are established by a distributor valve within the governor. Position of the distributor valve is determined by a mechanical control system actuated by speed and gate position.

In a digital governor system the speed governing functions are developed by a digital processor based on speed and gate position analog inputs. A gate position value is calculated and an analog output is sent to an electric hydraulic distributor valve. The hydraulic distributor valve controls the turbine wicket gates to provide frequency control. A new gate position value is calculated during each processor scan. Speed control algorithms can be programmed to be in service over any range of speed. Typically such algorithms are placed in service immediately after rolling a unit on startup. Thus, the digital component of the governor replaces the mechanical control system of the earlier-style governor. This feature gives the digital governor a definite advantage over a mechanical governor by providing a wider range of compensation.

Duke Power has upgraded the governors on 33 hydro units to digital governors, with the first installed in 1995. 11 of these units are designed with "black start" capability so as to provide emergency power to flood gates and aid in emergency system restoration. The units with digital governors range in size from

500 KW to 350 MW. The governors have proven to provide consistent performance, reliable operation, and require very little maintenance.

Discussions have been held with three vendors of hydro digital governors concerning the overshoot performance of Keowee. All three suppliers have expressed confidence that modern digital governors can control the Keowee units such that speed over shoots on emergency starts can be limited to less than 5%.

To provide additional confidence in the digital governor capability, two startups were performed at Duke's Jocassee pumped storage station in late January 2001. This station uses digital governors that are set to enable speed control immediately upon unit start. A digital governor was set up to emulate operation of the Keowee mechanical governor to the extent practical. Although no alteration of the responsiveness of the electro-hydraulic distributor valve could be made that would better emulate the current Keowee governor, the unit was started with a step change in gate limit exceeding speed no load setting and with the speed control function disabled. As the unit accelerated to 95% speed, the governor control was enabled and the degree of overshoot was observed. A second run was performed under normal digital governor control and again, the degree of overshoot was observed.

Comparing the overshoot observed in the two runs yielded expected results. With part of the digital control feature defeated, the unit experienced larger overshoot than when operated in full digital mode. In the first run, the overshoot was seven rpm (rated speed is 120 rpm) and in the second it was less than one. That the overshoot in the first run was not larger is attributed the fact that for the purposes of this demonstration, the target gate limit was set to 26% opening instead of the normal 24%. The results of these tests provide additional confidence in the ability of digital governors to control overshoot.

The discussions with suppliers, as well as Duke's own in house experience, has led to the conclusion that a digital governor can provide improved control over the entire KHU operating range. The Keowee starting ramp time and frequency tolerance requirements are typical performance expectations for a digital governor. Following conversion to digital control, there is confidence that

a digital governor can limit speed overshoots on emergency startup to within the TS criteria.

SR 3.8.1.17

Duke committed to provide protection for out-of-tolerance voltage and frequency on the Keowee generators to further improve the design in response to NRC draft and final reports concerning the Oconee emergency power system. These reports expressed concerns about redundant safety equipment of the three Oconee units being exposed to out-of-tolerance voltage or frequency from a Keowee voltage regulator or governor failure. Amendment Nos. 312, 312, and 312 approved SR 3.8.1.17 that contained the testing and acceptance criteria for out-of-tolerance logic.

The implementation of this modification was scheduled for November 30, 2000 but as a result of the KHU overshoot, the implementation of this modification was delayed by Amendment Nos. 317, 317, and 317. These amendments stated that implementation of out-of tolerance logic was to occur on or before the implementation of Amendments required to be submitted in this submittal.

Implementation of the digital governor modification results in a scope change to the out-of tolerance modification. The timer setpoint used in the out-of-tolerance logic will be revised to reflect the fact that the Keowee overshoot with a digital governor is not expected to exceed the out-of-tolerance setpoint. This permits a reduced time delay for activation of the out-of-tolerance logic circuitry. Therefore it is requested that the time delay of 12 $\pm$ 1 second approved in Amendment Nos. 312, 312, and 312, be reduced to 5 $\pm$ 1 second. This change provides improved protection without exposing the KHU to a spurious actuation.

Summary

The Keowee units currently meet the design basis requirements for the system. Duke committed to provide voltage and frequency out-of-tolerance protection on the Keowee generators to further improve the design. The addition of the out-of-tolerance logic is considered an enhancement to the emergency power system that

provides additional defense in depth. Based on testing, analysis, and engineering judgement, Duke concludes that there is no safety significance associated with delaying resolution of TS SR 3.8.1.9 and implementation of the out-of tolerance modification until implementation of the digital governor modification.

ATTACHMENT 4

NO SIGNIFICANT HAZARDS CONSIDERATION

Attachment 4
No Significant Hazards Consideration

Pursuant to 10 CFR 50.91, Duke Power Company (Duke) has made the determination that this amendment request involves a No Significant Hazards Consideration by applying the standards established by the NRC regulations in 10 CFR 50.92. This ensures that operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   No. The License Amendment Request (LAR) removes a Note to Surveillance Requirement (SR) 3.8.1.9 that temporarily waived the surveillance requirements associated with the upper limits for Keowee Hydro Unit (KHU) voltage and frequency. The waiver of these requirements allowed Duke to avoid an unplanned forced shutdown of all three Oconee units, and the potential safety consequences and operational risks associated with that action.

   This LAR also changes the arming time delay associated with the out-of-tolerance logic that had been approved for installation in Amendment Nos. 312, 312, and 312. This change lowers the allowed time delay, thereby resulting in the activation of the out-of-tolerance logic more quickly after KHU startup.

   Since this LAR assures that each KHU reaches its required operating band within the required time, and that if maloperation of a unit occurs, the KHU will be taken off line, the probability or consequences of an accident previously evaluated is not significantly increased.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

   No. The LAR involves removing a Note that temporarily waived SR 3.8.1.9.a associated with the KHUs. This LAR also changes

the time delay associated with the activation of out-of-tolerance logic that had been approved for installation in Amendment Nos. 312, 312, and 312. This change lowers the allowed time delay, thereby resulting in the activation of the out-of-tolerance logic more quickly after KHU startup.

Since this LAR restores Technical Specification SR 3.8.1.9 to the condition prior to Amendment Nos. 316, 316, and 316 and provides a shortened arming delay for the out-of-tolerance logic that was approved in Amendment Nos. 312, 312, and 312, no new failure mechanism or accident sequence is introduced. Therefore, the possibility of a new or different kind of accident from any kind of accident previously evaluated is not created.

3. Involve a significant reduction in a margin of safety.

No. The LAR involves removing a Note that allowed temporary waiver of the requirements to meet SR 3.8.1.9.a and shortens the arming time delay associated with the activation of out-of-tolerance logic that had been approved for installation in Amendment Nos. 312, 312, and 312.

This LAR, therefore improves the margin of safety by assuring that SR 3.8.1.9.a can be implemented. The change to a shorter arming time delay for the out-of-tolerance circuit activation also improves the margin of safety by limiting the time that a KHU would be carrying safety loads in an out-of-tolerance condition.

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

ATTACHMENT 5

ENVIRONMENTAL IMPACT ANALYSIS

ATTACHMENT 5

Environmental Impact Analysis

Pursuant to 10 CFR 51.22(b), an evaluation of the license amendment request (LAR) has been performed to determine whether or not it meets the criteria for categorical exclusion set forth in 10 CFR 51.22(c)9 of the regulations. The LAR does not involve:

1. A significant hazards consideration.

This conclusion is supported by the determination of no significant hazards contained in Attachment 4.

2. A significant change in the types or significant increase in the amounts of any effluents that may be released offsite.

This LAR involves replacing each Keowee Hydro Unit governor with a new model. The plant will continue to operate as before. Therefore, this LAR will not change the types or amounts of any effluents that may be released offsite.

3. A significant increase in the individual or cumulative occupational radiation exposure.

This LAR involves replacing each Keowee Hydro Unit governor with a new model. The plant will continue to operate as before. Therefore, this LAR will not increase the individual or cumulative occupational radiation exposure.

In summary, this LAR meets the criteria set forth in 10 CFR 51.22 (c)9 of the regulations for categorical exclusion from an environmental impact statement.