



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

WASHINGTON, D.C. 20555-0001

March 7, 2001

LICENSEE: Duke Energy Corporation

FACILITY: Oconee Nuclear Station, Units 1, 2, and 3

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 RE: MEETING SUMMARY
REGARDING KEOWEE HYDRO STATION PLANNED MODIFICATIONS

On February 21, 2001, the NRC staff met with the Duke Energy Corporation (Duke) staff at the NRC headquarters in Rockville, Maryland. The purpose of the meeting was to discuss modifications that have been incorporated and modifications that are being planned to upgrade the startup frequency and voltage control system of the Keowee Hydro Station, Units 1 and 2. These units supply emergency power to the Oconee Nuclear Station, Units 1, 2, and 3. Enclosure 1 is a list of the individuals who attended the meeting and Enclosure 2 is the handout material that was supplied by Duke.

A recent modification involving the wicket gate positioning has reduced the opening of the wicket gates when the Keowee hydro units start up in response to an emergency signal and during the annual test, which has significantly reduced a voltage and frequency overshoot that occurs as the units start up. Another modification is being planned to install a digital governor to further control the units during an emergency or annual test startup, which is expected to eliminate the overshoot problem. The purpose of the meeting was to discuss these modifications and resolution of related Oconee Technical Specifications (TS).

The affected TS amendments are:

- a. Amendment No. 316 requires submittal of another amendment by April 5, 2001, to address the upper voltage and frequency limits stated in the TS for the annual surveillance test.
- b. Amendment No. 317 was approved on November 27, 2000, to allow delaying the implementation of Amendment No. 312 that incorporated surveillance requirements for the new Keowee out-of-tolerance trip logic. This logic trips a unit or prevents output breaker closure on overfrequency or overvoltage (the setpoints of the logic trips are above the emergency start and annual surveillance test upper voltage and frequency limits).

The wicket gate position modification that was installed in November 2000 has significantly reduced the overshoot. The modification to install a digital governor (which is similar to digital governors already installed on other Duke hydro units) is expected to be installed in the

summer and fall of 2002. The digital governor is expected to limit the peak overshoot to no greater than 5 percent, which will resolve all staff concerns related to voltage and frequency overshoot that occurs when the hydro units are started in response to an emergency start or annual test signal.



David E. LaBarge, Senior Project Manager, Section 1
Project Directorate II
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Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosures:

1. Attendance List
2. Duke Handout

cc w/encls: See next page

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/RA/

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Oconee Nuclear Station

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ATTENDANCE RECORD

Purpose: Discussion with Duke Concerning
Keowee mods and TS Changes

Date: 2/21/01

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Oconee Nuclear Station



Keowee Overshoot February 21, 2001



Purpose of Meeting

- Discuss Duke's April 5th submittal regarding Keowee overshoot issue
- Brief the staff on the actions taken and planned to:
 - eliminate Keowee overshoot
 - integrate out-of tolerance (OOT) modification into the overshoot solution



Background

- June, 2000 - amendment for installation and testing of KHU OOT modification
- September, 2000 - NOED request for KHU overshoot
- October, 2000 - amendment required an April 5th submittal of a follow-up LAR



Background - continued

- October, 2000 - Duke reevaluated implementation of the OOT modification
- November, 2000 - amendment required implementation of the OOT modification on or before implementation of the solution to the overshoot issue (April 5th submittal)



April 5th Submittal

- Install KHU digital governor to eliminate overshoot
- Remove note in TS 3.8.1.9.a that waives the upper band on voltage and frequency for KHU emergency start
- Install OOT modification with reduced arming time delay in conjunction with the digital governor modification



Keowee Overshoot

- Keowee has always experienced a speed overshoot on emergency startup
 - Present governor controls wicket gate position through hydraulically operated servomotors
 - Servomotors are driven by a distributor valve whose position is determined by the sensing of speed and gate position through a mechanical feedback system



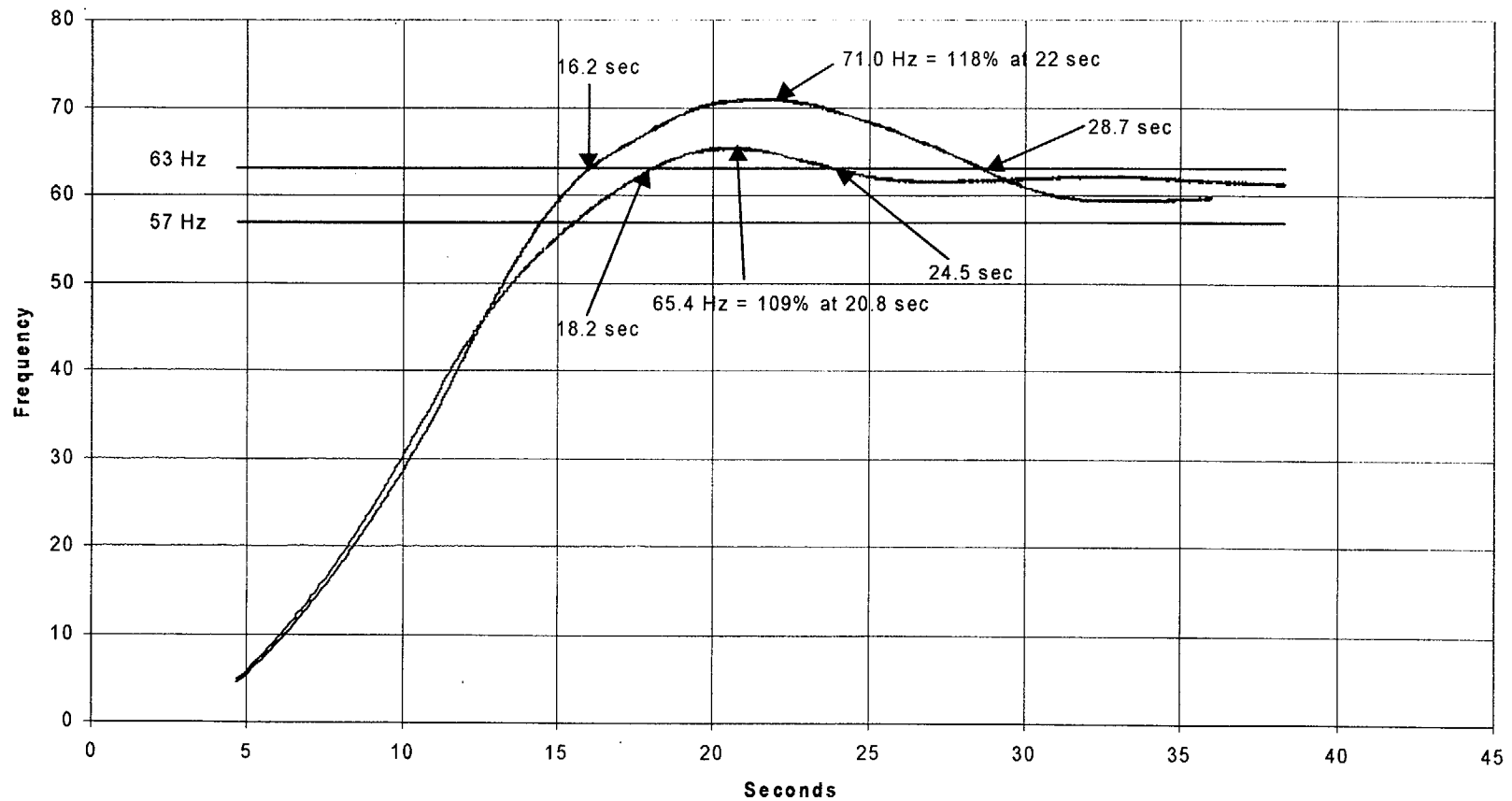
Keowee Overshoot - continued

- Existing plan to upgrade Oconee systems and equipment included replacement of the KHU governor with a digital model
- Duke decided to accelerate the KHU governor modification as a permanent solution to overshoot
- November, 2000 - modification to wicket gate position reduced overshoot to $\leq 110\%$



November Modification

KH Unit 2 Pre and Post Mod Frequency



Oconee Nuclear Station

— KHU2 Premod — KHU2 Postmod



Replacement Digital Governor

- Speed and gate position are processed against an algorithm and the control signal is then sent to an electro-hydraulic distributor valve
- Technical requirements have been sent to vendors for proposal
- The intention is to use a SER-approved digital controller and implement governor mod under 50.59



Replacement Digital Governor Experience

- Duke has successfully implemented digital governor upgrades on over 30 hydro units
- Keowee startup profile is within the envelope of digital controller operating range
- We are confident that peak overshoot of $\leq 5\%$ will be achieved



Current Status

- Integrated testing performed in 1997 and 1998 demonstrated that ECCS equipment performance during overshoot conditions was acceptable
- Keowee response is monitored on annual emergency start tests
- Overshoot has been significantly reduced by November mod
- Engineering evaluations continue to support adequacy of current design



Key Milestones

- April 5, 2001 - KHU overshoot LAR submittal
- April, 2002 - NRC approval
- Summer - Fall, 2002 - implement governor and OOT mods



Summary

- The installation of digital governors on the KHUs will control overshoot on emergency start within TS band
- As a result, the surveillance requirement in TS 3.8.1.9.a will be restored
- OOT modification will be implemented in conjunction with the governor modification