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March 24, 1980

In reply refer to 80ESG-2661

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

Attention: Dr. Harold Van Der Molen

Reference: USNRC Regulatory Guide 1.133, "Loose-Part Detection Program for the Primary System of Light-Water-Cooled Reactor," Draft 4, October 1978

Gentlemen:

Subject: Loose Parts Calibration

We at Rockwell International understand your concern for limiting radiation exposure to workers and keeping this exposure as low as reasonably achievable. We have, therefore, developed a calibration method for loose parts monitors which will significantly reduce radiation exposure of the plant operators during V&LPM calibration. This method does not require any additional equipment other than that currently available. The calibration procedure is as follows:

Signatures are taken of all V&LPM channels with the spectrum analyzer at frequencies of 25, 250, 2.5 K, and 25 KHz. These are repeated at a number of power levels, e.g., turbine roll; 20, 40, 75 and 100 percent power. These signatures become the reference signatures. For the calibration, a signature is taken at some power level and at a convenient frequency. If the signature is within ± 3 db of the reference spectra, the channel can be considered to be within calibration. The spectra becomes the calibration record. If the calibration is to be performed in conjunction with refueling, spectra comparisons must be made before and after the shutdown. The following precautions must be observed:

- The spectrum analyzer must be in calibration when any of the above spectra are made.
- If the calibration spectra shows any anomalous condition, i.e., lack of signal, 60-Hz noise, or new resonance, appropriate troubleshooting and correction must be performed.

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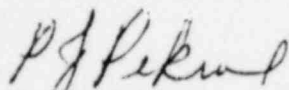
80ESG-2661
March 24, 1980
Page 2

- The method relies on the reactor noise being relatively constant in amplitude and spectral character. This assumption can be verified by a three-sensor reciprocity method.

The suggested calibration is currently not permitted by Paragraph 3.a.(3) of Reg. Guide 1.133. We have tried this method from time to time as a test and found this method to be as accurate as current methods and much more convenient since all work is done at the V&LPM cabinet. In addition, nobody is required to be at each sensor location thus significantly reducing radiation exposure in an operating plant.

We have drafted a change to Paragraph 3.a.(3) to allow use of this method. This change is enclosed. We realize that substantial delays exist in changing regulatory guides and wish to use this procedure in the interim until this change can be included in Regulatory Guide 1.133.

Very truly yours,



P. J. Pekrul
Project Manager
Vibration and Loose Parts
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Enclosure

3. Using the Data Acquisition Modes

The loose-part detection program should include data acquisition in automatic and manual modes. The automatic mode is for online detection of loose parts. The manual mode is for determining system operability (including calibration), establishing the alert level, and detecting significant safety-related trends in the sensor signals.

a. Manual mode. This mode of data acquisition should be used at the following times for the indicated purpose.

(1) Preoperational testing: Establish alert level for this test phase.

(2) Startup and power operation.

(a) Establish alert levels for startup and power operation. The alert level for power operation should be submitted to the Commission (in the startup report when one is provided) within 90 days following completion of the startup test program if the alert level is for power operation following initial startup or there is a change to the preexisting alert level for power operation.

(b) At least once per 2 hours: Perform channel check.

(d) ~~At~~ At least once per 31 days: Perform channel functional tests.

(e) ~~At~~ At least once per 92 days: Verify that ~~alert levels are consistent with the normal background noise and that the data do not indicate the presence or possibility of a loose part, anomalous behavior, or a significant trend that may be safety-related.~~ The alert level and alert logic may be revised to provide for the background noise of these later measurements. The details of such a revision should be submitted within 60 days to the Commission as an amendment to the program description.

(3) Cold shutdown or refueling: At least once per 18 months, verify channel calibration using a controlled mechanical input ~~through a known distance.~~ Channels should, as necessary, be recalibrated at this time. If recalibration is necessary, consideration should be given to replacement of unstable components.

b. Automatic mode. The automatic mode should be activated automatically when the predesignated alert level is exceeded. Activation should comprise an audible or visual alarm to the control room operator and simultaneous initiation of data recording equipment. Data should be acquired for a sufficient period of time to properly characterize the signals from ~~all sensors.~~ Each alert should be documented with regard to time and plant condition.

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to be used periodically for detecting loose parts,

and for diagnostic purposes.

24

Temporary change to the alert level need not be recorded.

(c) At least once per 7 days: Listen to audio portion of signals from all recommended sensors for the purpose of detecting the presence of loose parts. If signals indicate the presence or possibility of a loose part, station personnel should activate the data acquisition system to obtain data for further evaluation.

the background noise measured during normal plant operation is sufficiently small such that the signal associated with the specified detectable loose-part impact would be clearly discernible in the presence of this background noise. Verify that the signal from each recommended sensor does not indicate the presence of a loose part. This should include comparison with data, including audio data, obtained at the time of the last two quarterly measurements to verify that there does not exist a significant trend or anomaly that may indicate the presence of a loose part.

~~that impacts the external surface of the reactor coolant pressure boundary.~~

sensors suitably selected to provide maximum diagnostic information (e.g., the alarming sensor and several adjacent sensors may be selected).

or spectral analysis of the plant operating signal.

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