

DUKE POWER COMPANY

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NUCLEAR PRODUCTION

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August 14, 1986

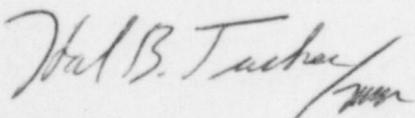
Dr. J. Nelson Grace, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Subject: Catawba Nuclear Station
RII:BKR
50-413/86-20, 50-414/86-23

Dear Dr. Grace:

Please find attached our response to Violation No. 413/86-20-01 which was identified in the subject Inspection Report.

Very truly yours,



Hal B. Tucker

LPT/11/slb

Attachment

xc: NRC Resident Inspector
Catawba Nuclear Station

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CATAWBA NUCLEAR STATION
VIOLATION 413/86-20-01

The Violation As Stated:

10CFR20.401 requires that each licensee maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required and that such records shall be kept on Form NRC-5 are [sic] equivalent, in accordance with the instructions contained in that form.

Form NRC-5, Item 5, requires that unless the lenses of the eyes are protected with eye shields having a tissue equivalent density thickness of at least 700 milligrams per square centimeter, dose recorded as whole body dose should include the dose delivered through a tissue equivalent absorber having a density thickness of 300 milligrams per square centimeter.

Contrary to the above, prior to May 16, 1986, radiation exposure records were not kept in accordance with the instructions contained in Form NRC-5 in that the lenses of the eyes were not shielded by at least 700 milligrams per square centimeter of material but the recorded whole body doses included only dose delivered through a tissue equivalent absorber having a density thickness of 1000 milligrams per square centimeter rather than 300 milligrams per square centimeter as required.

Response:

Duke Power Company denies this violation for the following reasons:

It is our position that the wording on NRC Form-5, Item 5, does not support the Region II interpretation implicit in this notice of violation. The first sentence of NRC Form-5, Item 5, reads, "'Dose to the whole body' shall be deemed to include any dose to the whole body, gonads, active blood forming organs, head and trunk or lens of eye." By use of the word "shall", this sentence makes it mandatory that dose to the lens of the eye be measured as whole body dose. The remaining two sentences of the first paragraph of NRC Form-5, Item 5, describe two recommended methods of ensuring that the requirement of the first sentence is met. Since each of these methods is introduced by the word "should" rather than the word "shall", these particular methods of ensuring compliance are optional even though compliance in determining the whole body dose is mandatory.

In addition, presumably the whole body dose to the lens of the eye is to be considered as that dose delivered through a tissue equivalent absorber having a thickness of 300 mg/cm²; whereas the whole body dose to the other organs is to be that dose delivered through a tissue equivalent absorber having a thickness of 1000 mg/cm². Our dosimetry system characterizes the dose at 300 mg/cm² with more than sufficient accuracy for the beta-gamma radiation fields encountered at our nuclear stations, including Catawba.

Beta attenuation measurements and beta to gamma ratio studies at our nuclear stations show empirically that, for those workers who receive any beta dose, the dose to the lens of the eye is 1% to 12% larger than the dose at 1000 mg/cm². The NRC has sanctioned the NVLAP accreditation program for dosimetry processors and thereby has accepted the accuracy standards required for accreditation under that program. Under NVLAP, a processor's performance is acceptable as long as the performance coefficient, which is the sum of random error (standard deviation of a population of measurements from the mean value of that population) plus the absolute value of the systematic error (the difference between the mean value and the known value), is less than 50% of the known value. As an extreme example, consider that if a processor has 48% standard deviation (for a normal distribution) and no systematic error, it will meet the NVLAP performance criteria and yet a total of 30% of its dose measurements will be more than 50% in error. A processor with 24% standard deviation and a 24% low systematic error would underestimate the dose to 14% of the badges by more than 50%. Our error, in not directly measuring the dose to the lens of the eye, is 1% to 12% for those workers who receive beta exposure. Clearly, this is a small error in comparison with the NVLAP performance standards. Our error may be crudely but conservatively approximated as a 6% low systematic error plus a 6% standard deviation. In our most recent NVLAP performance testing for high energy photons (responsible for the overwhelming majority of our whole body dose), we had a standard deviation of 8% and a systematic error of 14% high.

Thus, we easily passed with a performance coefficient of 22%. If we add the errors due to not directly measuring dose at 300 mg/cm² to the errors measured in NVLAP testing, we get a standard deviation of 14% and a systematic error of 8% high for a performance coefficient of 22% which is well within the acceptable range. Thus, for the beta-gamma radiation fields encountered in our nuclear stations, our dosimetry system yields dose measurements which characterize the dose to the lens of the eye, as required by the first sentence of NRC Form-5, Item 5, with accuracy substantially exceeding that required by the NRC in complying with the NVLAP process.

In summary, our dose determined for 1000 mg/cm² is essentially the same as that at 300 mg/cm² (within 1% to 12%). This is well within the required accuracy for the measurement. However, our primary response to this alleged violation is that NRC regulations, particularly as implied by NRC Form-5, do not require that radiation exposure records be maintained for the dose to the lens of the eye at a depth of 300 mg/cm², since this depth is written under a "recommended" rather than under a "required" statement.