



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report No.: 50-369/78-25

Docket No.: 50-369

License No.: CPPR-83

Licensee: Duke Power Company
P. O. Box 33189
422 South Church Street
Charlotte, North Carolina 28242

Inspection at: McGuire Nuclear Station

Inspection conducted: August 9, 1978

Inspector: W. J. Millsap

Reviewed by:

A. F. Gibson
A. F. Gibson, Chief
Radiation Support Section
Fuel Facility and Materials
Safety Branch

9/22/78
Date

Inspection Summary

Inspection on August 9, 1978 (Report 50-369/78-25)

Areas Inspected: Whole body counting practices and procedures, and a test count of the NRC phantom on the whole body counter. The inspection involved 5 inspector-hours on site by one NRC inspector.

Results: In the one area inspected, no items of noncompliance or deviations were identified.

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DETAILS I

Prepared by: William J. Millsap
 W. J. Millsap, Radiation Specialist
 Radiation Support Section
 Fuel Facility and Materials
 Safety Branch

22 Sept 78
 Date

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1. Persons Contacted

- *W. M. Sample, Technical Services Engineer
- *T. J. Keane, Station Health Physicist
- *M. A. Jimenez, Assistant Health Physicist
- J. R. Leonard, Health Physics Supervisor

*Denotes those present at the exit interview.

2. Questionnaire Review

The inspector reviewed with a licensee representative his answers to the questions concerning whole body counting sent to him in a letter signed by J. T. Sutherland, dated July 31, 1978. A summary of certain aspects of these results is given below.

a. Whole Body Counting System

This system utilizes a two-detector chair-type whole body counter manufactured by Bio-Nuclear Measurements, Inc. The two detectors, each NaI (Tl) crystals, are of the following sizes: for the torso (lungs and abdomen), 3" diameter x 3" thick; and for the thyroid, 1½" diameter x ½" thick.

The torso crystal is shielded on the sides and back by 2 inches of lead; the thyroid crystal is shielded on the sides and back by ½ inch of steel. The shadow shielding for both the crystals is provided by the chair which is lined with ½ inch of lead; this shadow shield covers the field of view of both detectors. The torso detector head shadows the thyroid detector from the trunk of the subject's body.

The system uses a Nuclear Data Model 6620 multichannel analyzer ----- with 512 channels which can be used by either of the two detectors. Each channel represents approximately 4 kev of energy.

Data reduction is accomplished on-site using the Nuclear Data 6600 Sodium Iodide Program which is based on the ALPHA M program developed at Oak Ridge National Laboratory.

The torso detector is calibrated for the following radio-nuclides: Cs-134, Cs-137, Co-58 and Co-60. The thyroid detector will be calibrated for I-131 once suitable source material is obtained.

Representative lower limits of detection for Co-60 and Cs-137 in the torso are 5 nCi and 7 nCi, respectively. A lower limit of detection for I-131 in the thyroid has not been obtained due to a difficulty in obtaining proper source material. The normal period of count is 600 seconds.

b. Procedures

Health Physics Procedural Guide No. IV -1 (Interim Guidance For Scheduling of Body - Burden Analysis) states that body burden analysis should be performed as soon as practicable on each individual who has been newly-assigned a visitor or permanent Health Physics badge number; on each individual who has worked at a non-Duke nuclear facility since last receiving a body-burden analysis at a Duke facility; on each individual who has accumulated 40 or more mpc-hours to air particulates, iodine, or tritiated water vapor during the immediate past seven-consecutive-day period; on each individual who has been involved in a real or suspected accidental internal exposure incident; and on each individual who has a visitor or permanent Health Physics badge number and who is terminating employment or assignment with Duke Power Company. This Guide also states that a routine monitoring schedule should include at least annual monitoring of every person who frequently works in the Radiation Control Area or who has significant potential for actual internal exposure as determined by the Station Health Physicist. Health Physics Procedural Guide No. IV-4 (Interim Guidance For Body-Burden Analysis (Radioiodines)) states that if a body burden analysis reveals the presence of radioiodine, a thyroid count should be scheduled.

McGuire Nuclear Station Procedure HP/O/B/1001/10 (Operating/ Calibration Procedure For The Body Burden Analyzer) states that the calibration of the whole body counter is to be accomplished every six months. Calibration is performed using a phantom made of acrylic plastic with Styrofoam inserts used to simulate the lungs. This phantom was supplied with the whole body counter.

This procedure also states that an energy versus channel calibration and a performance check are completed daily on the whole body counter during use.

Health Physics Procedural Guide No. IV-2 (Interim Guidance For Body - Burden Analysis (Acute Exposure)) states that whenever any acute intake exceeds 10% of the Maximum Permissible Lung Burden (insoluble), an investigation for a possible technical overexposure should be performed and dose commitments should be assigned. A 5% MPLB intake should trigger additional analysis and dose calculations but not necessarily an investigation for possible overexposure.

3. Test Count of the NRC Phantom

At the request of the inspector, the licensee counted a torso phantom provided by the inspector. The licensee informed the inspector of the amount of each radionuclide detected in the phantom. Since this phantom will be counted by other licensees in Region II, the actual amount of each radionuclide present in the phantom at the time of the count was not communicated to the licensee at the time of this inspection. A summary report will be provided to participating licensees at the conclusion of the test program.

4. Exit Interview

The inspector met with the Technical Services Engineer and Station Health Physicist at the conclusion of the inspection on August 9, 1978 and summarized the scope and findings of the inspection. Items discussed included certain information to be forwarded to the inspector at the Region II office and the issuance of a summary report once the test program is completed.