



DEPARTMENT OF THE NAVY

NAVY ENVIRONMENTAL HEALTH CENTER  
2510 WALMER AVENUE  
NORFOLK, VIRGINIA 23513-2617

6470 2964  
Ser 31/  
28 MAY 1993

From: Commanding Officer, Navy Environmental Health Center  
Subj: NAVY RADIOACTIVE MATERIAL PERMIT PROGRAM INFORMATION NOTICE 93-4  
Encl: (1) NRC Information Notice No. 93-30 "NRC Requirements for Evaluation of Wipe Test Results; Calibration of Count Rate Survey Instruments"

1. Enclosure (1) is forwarded for review and action by your Radiation Safety Officer and Radiation Safety Committee.
2. Enclosure (1) discusses the requirement to determine the efficiency and sensitivity of the wipe test counter prior to counting wipes. The Navy Environmental Health Center has verified that the Nuclear Associates Deluxe Wipe Test Counter Model 05-578, which each command has, meets the requirements of 10 CFR 35.70(f) as long as the counter is used in accordance with the manufacturer's operating instructions. If another wipe test counting system is used, the command shall verify that its sensitivity meets the requirements of 10 CFR 35.70(f). Also the efficiency of the counter must be determined for the isotope being counted so that the results can be recorded in disintegrations per minute.
3. Enclosure (1) also discusses the use of a thin window Geiger-Mueller (GM) pancake probe with a count rate survey instrument. The efficiency of the DT-304 probe when used with an IM-254, IM-249A or IM-247 has been determined for several isotopes used in nuclear medicine as follows:

<u>ISOTOPE</u>	<u>EFFICIENCY</u>
a. Technetium-99m	.0125
b. Iodine-131	.0405
c. Thallium-201	.0030

The efficiency was determined from a dry source placed one centimeter from the sensitive volume of the probe.

Use the following formula to convert survey instrument count rate [counts per minute (CPM)] for a particular isotope to disintegrations per minute (DPM):

$$DPM = (CPM - BACKGROUND) / EFFICIENCY.$$

4. The IM-254, IM-249A or IM-247 with the DT-304 probe does not meet the requirements of 10 CFR 35.70(f) to be able to detect contamination on each wipe sample of 2000 DPM. This system also does not meet the requirements of 10 CFR 20.1906(d)(1) to detect removable surface contamination exceeding 2200 DPM per 100 square centimeters for packages required to be monitored per 10 CFR 20.1906(b).

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5. Point of contact on this subject is LCDR G. I. Snyder, MSC, USN, Head, Radiation Health Department (NEHC-31), DSN 564-4657 or (804) 444-4657, Ext. 413.



G. I. SNYDER

By direction

Distribution:

NATNAVMEDCEN Bethesda MD  
(Attn: LCDR J. Jacobus, MSC, USN)  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
WASHINGTON, D.C. 20555

April 12, 1993

NRC INFORMATION NOTICE NO. 93-30: NRC REQUIREMENTS FOR EVALUATION OF WIPE TEST RESULTS; CALIBRATION OF COUNT RATE SURVEY INSTRUMENTS

Addressees

All U.S. Nuclear Regulatory Commission Licensees

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert NRC licensees to the following:

- a. NRC requirements for evaluation of wipe test results
- b. Calibration of count rate survey instruments based on the use of the instrument.

It is expected that recipients will review this information for applicability to their facilities and consider actions, as appropriate, to ensure instruments used for contamination surveys are properly calibrated. However, suggestions contained in this information notice are not new NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Licensees have recently been cited for failure to properly calibrate instruments used to evaluate wipe tests and survey instruments used for contamination surveys.

Some licensees are evaluating wipe samples with wipe test counters without determining the instrument sensitivity or efficiency. The licensee must demonstrate that the instrument is calibrated to make measurements and sufficiently sensitive to meet the applicable regulatory requirements in 10 CFR Parts 20, 34 and 35.

Also, NRC inspections have revealed that many count rate survey instruments used exclusively with pancake probes for measuring surface contamination are not being calibrated with procedures established for this use. The instruments have been calibrated following the procedures outlined in Appendix B of Regulatory Guide 10.8, Revision 2, "Model Procedure for Calibrating Survey Instruments." This procedure provides guidance for calibrating survey instruments used for dose rate measurements, not contamination levels.

## Discussion

The following provide examples of NRC regulations that include specific performance criteria: 10 CFR 20.205(b)(2) requires a minimum detection limit of 0.01 microcurie per 100 square centimeters of package surface, when monitoring the external surfaces of incoming packages; 10 CFR 34.25(c) and 10 CFR 35.59 (c)(3) require that a leak test be capable of detecting the presence of 0.005 microcurie of removable contamination on a sealed source; 10 CFR 35.70(f) requires that a medical use licensee conduct the surveys required by 10 CFR 35.70(e) so as to be able to detect contamination on each wipe sample of 2000 disintegrations per minute (dpm),  $9.01E-4$  microcurie; 10 CFR 35.315(a)(7) requires that rooms used by patients undergoing radiopharmaceutical therapy not be reassigned until removable contamination levels are less than 200 dpm per 100 square centimeters; and 10 CFR 35.70(h) requires that survey records for removable contamination in each area be expressed in dpm per 100 square centimeters.

Calibration information can be found in the instrument manufacturer's guidance or the following references for calibrating instruments to detect surface contamination:

- 1) National Council on Radiation Protection and Measurements (NCRP) Report No. 112, *Calibration of Survey Instruments used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination* (see Attachment 1 for address)
- 2) American National Standards Institute, Inc. (ANSI) ANSI N323-1978, *Radiation Protection Instrumentation Test and Calibration* (see Attachment 1 for address)
- 3) NUREG-1156, *Accuracy and Detection Limits for Bioassay Measurements in Radiation Protection, Statistical Consideration* (see Attachment 1 for address)
- 4) NUREG/CR-4007, *Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent Environmental Measurements*, September 1984 (written by the National Bureau of Standards, now the National Institute of Standards and Technology) (see Attachment 1 for address)

### I. Wipe Test Counters

The licensee, not the instrument manufacturer, is responsible for demonstrating that the instrument and method used are sensitive enough to meet NRC regulatory requirements.

The efficiency and sensitivity of the instrument are a function not only of the physical components of the device, but also of the methodology of

the survey and the counting procedures. The counting procedures need to address the time of counting, the background count, the energy spectrum and emission rates of the isotope, and the desired accuracy of the measurement.

An efficiency must be determined for each isotope used, and normally the isotope with the lowest efficiency is assumed to be the isotope detected until the emission spectrum of the sample can be analyzed.

The sensitivity, or minimum detectable activity (MDA), defines the minimum activity which will produce counts above the background for a specific counting time that will yield the true count rate within a predetermined degree of accuracy.

The MDA may be set by the regulations governing the licensed activity, for example, 2000 dpm may be chosen to comply with 10 CFR 35.70(f). Licensees must, at a minimum, choose a measurement system with an MDA equal to, or less than, that required by applicable NRC regulations. Licensees may either develop their own procedure or follow the manufacturer's instructions for the calibration of the wipe test counter and the check of the MDA.

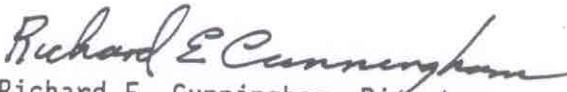
If the background is too high to accurately count the required MDA, the instrument may need to be moved to a lower background area or serviced.

## II. Count Rate Survey Instruments

Count rate survey instruments (those with a counts per minute (cpm) scale) using pancake probes are routinely used to detect and measure surface contamination. Pancake probes are thin window Geiger-Mueller probes which typically have an active face area of about 15 square centimeters. Pancake probes are most efficient for detecting and measuring energetic beta radiation from radioactively contaminated surfaces. The measured activity is commonly expressed in units of disintegrations per minute (dpm).

To obtain uniform radiation fields, calibrations are commonly made with the detector window nearly in contact with large area, flat, uniformly distributed sources such as planchet sources. The American National Standard Institute (ANSI) N323-1978, *Radiation Protection Instrumentation Test and Calibration*, specifies that calibration shall be performed with a standard source or sources providing radiation fields similar to those for which the instrument is used (Section 4.3.2). For example, the proper beta radiation response of an instrument would be determined with a source of beta radiation of similar properties to the radioisotopes in use.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact the technical contacts listed below or the appropriate regional office.

  
Richard E. Cunningham, Director  
Division of Industrial and  
Medical Nuclear Safety  
Office of Nuclear Material Safety  
and Safeguards

Technical contacts: Jim Smith, NMSS  
(301) 504-2613

Torre Taylor, NMSS  
(301) 504-2611

Attachments:

1. Addresses of Organizations
2. List of Recently Issued NMSS Information Notices
3. List of Recently Issued NRC Information Notices

ADDRESSES OF ORGANIZATIONS

1. NUREG Documents:  
The NRC Public Document Room  
2120 L Street, N.W., Lower Level  
Washington, D.C. 20555
2. NCRP Publications  
P.O. Box 30175  
Washington, D.C. 20014
3. ANSI  
1430 Broadway  
New York, NY 10018