

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.

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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
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

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

| Information Notice No. | Subject | Date of Issuance | Issued to |
|------------------------|---|------------------|---|
| 93-29 | Problems with the Use of Unshielded Test Leads in Reactor Protection System Circuitry | 04/12/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-28 | Failure to Consider Loss of DC Bus in the Emergency Core Cooling System Evaluation May Lead to Nonconservative Analysis | 04/09/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-27 | Level Instrumentation Inaccuracies Observed during Normal Plant Depressurization | 04/08/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-26 | Grease Solidification Causes Molded Case Circuit Breaker Failure to Close | 04/07/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-25 | Electrical Penetration Assembly Degradation | 04/01/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-24 | Distribution of Revision 7 of NUREG-1021, "Operator Licensing Examiner Standards" | 03/31/93 | All holders of operator and senior operator licenses at nuclear power reactors. |
| 93-23 | Weschler Instruments Model 252 Switchboard Meters | 03/31/93 | All holders of OLs or CPs for nuclear power reactors. |
| 93-22 | Tripping of Klockner-Moeller Molded-Case Circuit Breakers due to Support Level Failure | 03/26/93 | All holders of OLs or CPs for nuclear power reactors. |

OL = Operating License
CP = Construction Permit

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* See previous concurrences

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|------|----------|--|----------|--|----------|--|--------------|--|----------|--|
| OFC | IMAB* | | IMAB* | | IMAB* | | IMAB* | | IMAB* | |
| NAME | JASmith | | TMTaylor | | LWCamper | | MALamastra | | JEGlenn | |
| DATE | 01/29/93 | | 01/11/93 | | 01/11/93 | | 01/11/93 | | 02/09/93 | |
| OFC | Tech Ed* | | IMOB* | | OGC* | | D/IMNS* | | | |
| NAME | EKraus | | FCombs | | STreby | | RECunningham | | | |
| DATE | 02/07/93 | | 02/10/93 | | 03/31/93 | | 04/05/93 | | | |

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

Technical contact: Patricia K. Holahan, Ph.D., NMSS
 (301) 504-2694

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| OFC | IMAB* | | IMAB* | | IMAB* | | IMOB* | |
| NAME | PKHolahan | | LWCamper | | JEGlenn | | FCombs | |
| DATE | 03/08/93 | | 03/08/93 | | 03/09/93 | | 03/11/93 | |
| OFC | OGC* | | D/IMNS* | | TechEd* | | | |
| NAME | STreby | | RECunningham | | EKraus | | | |
| DATE | 03/* /93 | | 03/05/93 | | 03/01/93 | | | |

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

LIST OF RECENTLY ISSUED
NMSS INFORMATION NOTICES

| Information Notice No. | Subject | Date of Issuance | Issued to |
|------------------------|--|------------------|--|
| 93-19 | Slab Hopper Bulging | 03/17/93 | All nuclear fuel cycle licensees. |
| 93-18 | Portable Moisture-Density Gauge User Responsibilities during Field Operations | 03/10/93 | All U.S. Nuclear Regulatory Commission licensees that possess moisture-density gauges. |
| 93-14 | Clarification of 10 CFR 40.22, Small Quantities of Source Material | 02/18/93 | All Licensees who possess source material. |
| 93-10 | Dose Calibrator Quality Control | 02/02/93 | All Nuclear Regulatory Commission medical licensees. |
| 93-07 | Classification of Transportation Emergencies | 02/01/93 | All Licensees required to have an emergency plan. |
| 93-05 | Locking of Radiography Exposure Devices | 01/14/93 | All Nuclear Regulatory Commission industrial radiography licensees. |
| 93-04 | Investigation and Reporting of Misadministrations by the Radiation Safety Officer | 01/07/93 | All U.S. Nuclear Regulatory Commission medical licensees. |
| 93-03 | Recent Revision to 10 CFR Part 20 and Change of Implementation Date to January 1, 1994 | 01/05/93 | All byproduct, source, and special nuclear material licensees. |
| 92-84 | Release of Patients Treated with Temporary Implants | 12/17/92 | All Nuclear Regulatory Commission Medical Licensees. |