



DEPARTMENT OF THE NAVY

BUREAU OF SHIPS

WASHINGTON 25, D. C.

IN REPLY REFER TO

BUSHIPS 5100.16

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24 April 1963

BUSHIPS INSTRUCTION 5100.16

From: Chief, Bureau of Ships
To: Distribution List

Subj: Control of Contamination from Radioactive Luminescent Materials
(including Decontamination)

Ref: (a) BUSHIPS INSTRUCTION 5100.15 of 5 September 1962

Encl: (1) Additional Guidance on the Control of Contamination
from Radioactive Luminescent Materials (including
Decontamination)

1. Purpose. This Instruction is intended to provide additional guidance to Naval activities, both ashore and afloat, on the control of contamination from radioactive luminescent materials and on related decontamination and disposal procedures.

2. Background. Reference (a) was issued to alert the addressees to certain hazards associated with the presence of radioactive luminescent material, to direct attention to existing instructions on this subject, and to reiterate safety precautions pertinent to the handling of this material. Repair activities have requested that the Bureau provide detailed instructions for monitoring repair spaces that might be contaminated from radioactive luminescent material. Enclosure (1) provides such guidance and includes further guidance on decontamination and disposal procedures. In preparing enclosure (1) pertinent information in NAVSHIPS 389-0153, "Radiological Controls for Naval Nuclear Propulsion Plants," and in NAVSHIPS 250-341-3, "Principles of Radiation and Contamination Control," was considered and modified to be applicable to contamination from radioactive luminescent material in Naval activities, both ashore and afloat.

3. Action.

a. Naval activities, both ashore and afloat, shall follow the additional guidance provided in enclosure (1) in establishing procedures for the control of contamination from radioactive luminescent materials and in establishing related procedures for decontamination and disposal.

(See next page for distribution)

K. N. SARGENT
By direction

Enclosure (1)

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Additional Guidance on the
Control of Contamination from
Radioactive Luminescent Materials
(Including Decontamination)

1. Spaces, such as repair shops, in which radioactive luminescent materials are regularly used, shall be periodically surveyed for surface contamination. The surveys shall cover all exposed surfaces of the spaces and all equipment therein. Drawers and shelves containing radioactive luminescent materials shall also be monitored.

2. For any material or equipment to be considered non-radioactive or for any space to be considered an uncontrolled space the following criteria shall be met:

a. The highest radiation level shall not exceed one-tenth of one millirem per hour above background as determined by an open-window beta-gamma survey meter (AN/PDR-27 or other instrument of equivalent sensitivity) held approximately one inch from the surface being surveyed.

b. The loose surface contamination shall not exceed one hundred micromicrocuries beta-gamma activity above background when measured on a dry filter paper wiped over one hundred square centimeters of the surface being surveyed or over the total surface area if less than one hundred square centimeters. The measurement shall be made on beta-gamma counting equipment such as that described in NAVSHIPS 93393 or other equipment of ^{equal} sensitivity. If equipment of adequate sensitivity is not available at the activity where the swipes are taken, the swipes shall be measured for radioactivity by an activity possessing suitable equipment. In such cases the swipes shall be transported in leak-proof plastic bags. *See Repair Facilities*

c. Alpha radioactivity shall be undetectable, using the AN/PDR-10 or AN/PDR-56 alpha survey meter or instrument of equivalent sensitivity, either by direct alpha radiation measurement of the surfaces being surveyed or by alpha measurement of the dry filter paper used for the measurement in (b) above.

3. Complete surveys for surface contamination in accordance with paragraph (2), above should be conducted at regular intervals as determined by the Commanding Officer of the activity; the period between successive surveys should not exceed 6 months. It is recommended that spaces where considerable quantities of radioactive materials are used be surveyed at more frequent intervals.

4. If compartment surfaces exceed the contamination limits specified in paragraph 2., the affected space should be designated as a controlled contamination area. Access to the area should immediately be controlled to allow only personnel in anti-contamination clothing to enter. If the area must be controlled for more than several hours, barriers should be erected and if practical the space should be locked when unoccupied. Signs should be posted conspicuously and should state the access restrictions, anti-contamination clothing requirements for access, level of loose surface contamination, radiation dose rate, and type of radiation.

5. Any materials which do not meet the criteria in paragraph 2. above should be marked or labeled with the standard magenta and yellow radiation symbol and the words "Caution-Radioactive Material."

6. The following safety precautions in addition to those outlined in BUSHIP INSTRUCTION 5100.15 shall be followed in the handling of radioactive luminescent material:

a. Protection of Personnel. When handling components bearing radioactive material, wear gloves to prevent contamination of the hands. Provide each worker with washable work clothing (as distinguished from ordinary street clothing) while actively engaged in the repair and handling of radioactive luminescent parts. Provide masks or respirators for workers if there is likelihood of radioactivity dusting or otherwise becoming airborne. Workers should wash hands after handling radioactive materials.

b. Covering of Surfaces. Avoid the use of wooden work benches, wooden drawers, and wooden shelves which are difficult to decontaminate. Components should be dismantled and disassembled over a piece of disposable absorbent paper. The components should be monitored after the radioactive parts are removed. If the body of the component is contaminated and not reusable it should be placed in a plastic bag and transferred to a supply activity for ultimate disposal in accordance with SECNAV INSTRUCTION 4555.1 of 17 October 1961. After use the absorbent paper should be similarly bagged and disposed of; other potentially contaminated surfaces should be cleaned.

After all radioactive materials and surfaces have been bagged or covered or cleaned so as to prevent further spread of contamination, requirements for gloves and other anti-contamination clothing may be lifted. Contaminated gloves and anti-clothing should be collected in plastic bags for subsequent laundry or for disposal.

7. Procedures for decontamination should be in accordance with the following:

a. Wounds. Radioactively contaminated wounds of any kind shall be decontaminated under the direction of medical personnel. Medical attention should be obtained promptly if wounds are **contaminated**, to avoid having the radioactive material absorbed into the body.

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b. Skin. Skin should be decontaminated using soap and water. Scrub brushes should not normally be used since it is relatively easy to abrade the skin and thus work contamination into the skin. Washing should be repeated several times, monitoring after each washing. If these procedures are not sufficient, further decontamination should be performed under the direction of medical personnel. Spot cleaning to remove local hot spots should be done before showering to avoid spread of contamination over the entire body.

c. Clothing. Contaminated personal clothing and anti-contamination clothing shall be decontaminated or disposed of. Activities not equipped with radioactive clothing laundry facilities should store contaminated clothing and masks in plastic bags and have it laundered by activities possessing such facilities. If necessary, activities not equipped with a decontamination laundry may use normal laundry facilities for clothing and masks contaminated to level less than 0.1 mrem per hour. Laundry water need not be monitored before discharge under these special circumstances since it would not exceed discharge limits at these low levels of contamination. The possibility of contaminating laundry machines is slight in this case, but washing machines should be washed out before subsequent use on uncontaminated laundry. This washing may be performed by running the machine through a washing cycle with no clothes inside. The machine should be checked for contamination before re-use on uncontaminated laundry by analyzing swipes from inside the machine.

d. Means of minimizing decontamination. The need for decontamination may be minimized by covering surfaces and equipment or by taping the handles of tools prior to use and removing the contaminated covering or tape after use. During decontamination precautions should be taken to limit the spread of surface contamination such as by taking care not to splash solutions. Emphasis should be on taking up the contamination rather than on washing it down. Gummed tape may be used to lift contamination from surfaces. If large variations in surface contamination levels exist on a surface, cleaning generally is done from less contaminated toward more contaminated areas. Ventilation may be required to minimize the contamination breathed by personnel performing decontamination, although ventilation may have to be secured or filtered in some cases to limit the spread of contamination to other areas.

e. Decontamination of surfaces and equipment. Work benches, compartment surfaces, tools and equipment can usually be decontaminated by ordinary cleaning methods. In general any procedures which will remove the surface dirt will remove surface contamination. In all cases where liquid is used in decontamination care should be taken to avoid spreading radioactivity. Washing with soapless detergent in water is generally an effective decontamination method. If contamination levels are not specifically reduced, use of solvents, strong chemicals, and mechanical removal of some of the surface may be necessary. If contamination levels are low, wiping with a cloth may provide sufficient decontamination. Organic solvents may be used for machinery with greasy or oily surfaces.

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Acid is used only when it will not damage the equipment. On paint or covered surfaces, if washing will not remove the contamination, the paint or covering may need to be removed to affect decontamination.

f. Waste Disposal. Liquid wastes incidental to the above types of cleaning operations are expected to have low enough radioactivity for disposal via ordinary sanitary waste systems or directly overboard. Materials which cannot be decontaminated and contaminated solid waste such as rags used in cleaning should be collected and promptly sealed in leak proof containers, marked as radioactive, and transferred to the nearest naval supply activity for ultimate disposal in accordance with SECNAV INSTRUCTION 4555.1 of 17 October 1961.

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