



Standard Guide for Shipboard Generated Waste Management Audits¹

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1. Scope

1.1 *Purpose*—This guide covers information for assisting shipowners in planning for costs or scheduling complications during maintenance, repair, modifications, purchase negotiations, or scrapping activities. Removal and disposal of certain materials disturbed during modification, maintenance, or disposal of systems or components may be costly or interrupt the work schedule.

1.2 *Objectives*:

1.2.1 This guide will describe materials that may be disturbed on ships during maintenance or scrapping activities, which may result in costly or time-consuming removal or disposal actions.

1.2.2 This guide will provide a systematic method to identify and record the locations of materials of concern for immediate planning and future reference.

1.2.3 This guide will include a brief discussion of issues related to the handling and storage of materials described in this guide.

1.3 *Considerations Beyond Scope*:

1.3.1 This guide is not intended to address materials carried as cargo or material stored onboard in prepackaged containers.

1.3.2 This guide is not intended to address waste products related to the ongoing, day-to-day operation of a ship, such as sewage, solid waste, incinerator ash (or other residual products resulting from solid waste treatment), and residual sludge left in segregated ballast tanks.

1.3.3 This guide does not provide a comprehensive index of test methods available for characterizing the materials discussed. Test methods referenced or described should be considered as examples.

1.3.4 This guide is not intended to address directly regulatory issues for any of the materials described.

1.3.5 This guide is not intended to address remediation concerns.

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2. Referenced Documents

2.1 *ASTM Standards*:²

D923 Practices for Sampling Electrical Insulating Liquids
E849 Practice for Safety and Health Requirements Relating to Occupational Exposure to Asbestos³

2.2 *ASHRAE Standards*:⁴

ASHRAE Guideline 3, Reducing Emission of Fully Halogenated Chlorofluorocarbon (CFC) Refrigerants in Refrigeration and Air-Conditioning Equipment and Applications

2.3 *EPA Methods*:⁵

EPA 600/M4-82-020, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

EPA SW-846, Method 8080, Organochlorine Pesticides and PCBs

EPA SW-846, Method 1311, Toxicity Characteristic Leachate Procedure

EPA SW-846, Method 8270, Semi-Volatiles List

EPA SW-846, Method 8260, Volatiles List

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *audit, n*—a process to identify waste materials associated with maintenance, repair, modifications, purchase negotiations, or scrapping activities, some of which may be hazardous, with the goal of providing planning information about environmental, health, and safety risks and related costs.

3.1.2 *friable, n*—a physical state in which a dry material can be easily crumpled, pulverized, or reduced to powder by hand pressure.

3.1.3 *mobile, adj*—capable of being transported from one surface to another.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Withdrawn.

⁴ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329.

⁵ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

3.1.4 *PCB, n*—a class of chemicals comprised of polychlorinated biphenyls.

3.1.5 *streaming agents, n*—a type of chemical used to fight small, contained fires by directing the firefighting agent specifically at the fire.

3.1.6 *target materials, n*—specific materials that the audit process will identify for evaluation.

3.1.7 *waste oil, n*—oil that cannot be reused or recycled.

4. Significance and Use

4.1 *Applicability*—This guide is intended to describe a planning audit that will improve the shipowner's ability to forecast costs and schedule impacts and aid the shipowner in identifying environmental, health, and safety concerns associated with the removal, handling, and disposal of potentially hazardous shipboard materials.

4.2 *Use*—Audits may be performed to aid in planning for a variety of events, including maintenance, repair, modification, purchase, or scrapping. To maximize efficiency, audits should be tailored to meet the specific needs of the shipowner, with target materials identified during the planning process.

4.3 *Caution*—Legal restrictions on the removal and disposal of materials discussed in this guide may vary significantly from port to port, both within the United States and abroad. Reasons for this variation include the decentralized nature of port control, state, and local environmental regulations, and the local availability of landfill or treatment facilities. Users of this guide should consult local authorities to obtain information on specific legal requirements.

5. Procedure

5.1 *Planning*—Objectives for the waste management audit should be established at the planning stage. A well-planned audit will focus on target materials in critical locations to minimize audit costs. Waste management audits, therefore, should be performed by environmental, health, and safety experts familiar with the specific objectives of the audit. Past audit reports of the area and other documentation that may provide insight into material characterization should be reviewed to avoid the expense of unnecessary tests. For example, construction specifications may characterize a particular material, eliminating the need for testing. In some instances, inspection of the ship or interviews with personnel on-site may be beneficial in planning the audit.

5.2 *Testing*—Many materials will require sampling and characterization tests. A sampling plan should be followed by qualified and authorized personnel. Analysis performed by a qualified or certified laboratory may be required.

6. Potential Shipboard Generated Wastes

6.1 *Asbestos:*

6.1.1 *Description*—Asbestos is the common name of a number of substances including amosite, anthrophyllite, amphibole, and chrysotile (1).⁶ When asbestos becomes friable, it may be inhaled or swallowed, penetrating body tissues and

remaining there for many years. Exposure to asbestos has been linked to asbestosis, mesothelioma, and other cancers. Exposure to cigarette smoke may increase the long-term risk of developing asbestos-related lung cancer by as much as 90 %.

6.1.2 *Uses*—Many common construction products contain asbestos, although use of the material in the United States was significantly reduced during the 1970s. Likely products include pipe lagging and other types of insulation, vinyl tile and linoleum, floor tile adhesives, cement sheet and fiberboard, brake pads and linings, and gasket materials, particularly for high-temperature applications.

6.1.3 *Test Methods (for Thermal Insulation) (2):*

6.1.3.1 *Sampling*—The area to be sampled should be subdivided into homogeneous areas, and sampling of each homogeneous area should be conducted in a statistically random manner. For surface materials, collect at least three samples for each area under 1000 ft², at least five for areas between 1000 and 5000 ft², and at least seven for each area greater than 5000 ft². For piping insulation, collect at least three samples from each homogeneous section of piping.

6.1.3.2 *Analysis*—Samples should not be composited for analysis. Analysis of each sample should be conducted using the Polarized Light Microscopy Method described in EPA 600/M4-82-020. Under current U.S. regulations, a homogeneous area may be considered free of asbestos if all samples from that area are shown to contain less than 1 % of asbestos.

6.1.4 *Handling Precautions (3)*—Asbestos should only be handled by trained personnel. If asbestos must be disturbed, the area should be isolated and well-labeled to protect employees not involved with the removal or repair work. Protective clothing including disposable coveralls, gloves, goggles, and a respirator should be worn when handling asbestos, and personnel should remove contaminated clothes and wash before leaving the work site. Material should be kept wet to minimize potential for airborne fibers. Waste products should be stored in plastic bags in a sealed rigid container and protected from physical damage. Asbestos material, including asbestos waste, should be stored in an isolated, regulated, and well-marked area. Smoking, eating, drinking, chewing, or applying cosmetics should be avoided in areas in which asbestos exposure is likely. Practice E849 provides additional details. Asbestos replacement materials also may pose environmental, safety, and health risks.

6.2 *PCB-Contaminated Media:*

6.2.1 *Description*—PCBs have many useful properties including high stability, low vapor pressure, low flammability, high heat capacity, and low electrical conductivity. They are suspected carcinogens, however, and have been associated with adverse health and reproductive effects. They also have a high potential for bioaccumulation in the food chain. A number of trade names exist for PCBs, including Aroclor, Asbestol, Chlorextol, Diacolor, and Dykanol (4).

6.2.2 *Uses*—Because of the many positive characteristics of PCBs, oils containing PCBs have been used in a great variety of applications. The most common use has been as a dielectric fluid in transformers, capacitors, and other electrical equipment. The oil also has been used in many other situations

⁶ The boldface numbers in parentheses refer to the list of references at the end of this standard.