

**I. NAVSEA PCB ADVISORY 94-1**

**II. Subject: REMOVAL AND HANDLING OF PCB FELT**

**III. References:**

(a) 40 CFR 761, Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions (NOTAL)

(b) OPNAVINST 5090.1A, Environmental and Natural Resources Program Manual

(c) MIL-G-20241, Gasket Material, Wool Felt, Impregnated Adhesive Pressure Sensitive, canceled by reference (d) (NOTAL)

(d) MIL-G-20241D, NOTICE 1 of 27 October 1989, Gasket Material, Wool Felt, Impregnated Adhesive, Pressure Sensitive (NOTAL)

(e) COMNAVSEASYS COM Washington DC 131906Z Dec 89, NAVSEA PCB Advisory 001-56Y11 1989, SUBSTITUTE MATERIAL FOR FELT GASKET MATERIAL USED IN VENTILATION DUCT FLANGES (NOTAL)

(f) COMNAVSEASYS COM Washington DC 052040Z Feb 90, NAVSEA Advisory 003-56Y1-1990, GASKET MATERIAL FOR HVAC SYSTEMS ON SURFACE SHIPS (NOTAL)

(g) NAVSEA DWG 803-B153, "Packing and Gaskets, Application Criteria for" (NOTAL)

(h) General Specifications for Ships of the U.S. Navy, S9AAO-AA-SPN/GEN SPEC (NOTAL)

(i) General Specifications for Overhaul of Surface Ships, GSO S9 AAO-AB-GOS-010 (NOTAL)

(j) 40 CFR 261, Identification and Listing of Hazardous Waste (NOTAL)

(k) NSTM Chapter 593, Pollution Control S9086-T8-STM-000/CH593

(l) OPNAVINST 5100.19C, Navy Safety Precautions for Forces Afloat

(m) NAVSEA-S9593-A1-MAN-010, Shipboard Management Guide for Polychlorinated Biphenyls (PCBs)

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(n) DOD Directive 6050.16, DoD Policy for Establishing and Implementing Environmental Standards at Overseas Installations (NOTAL)

(o) Overseas Environmental Baseline Guidance Document, October 1992, Chapter 14, POLYCHLORINATED BIPHENYLS (NOTAL)

(p) NEHC-TM90-2 May 1990, Naval Environmental Health Center Technical Manual, POLYCHLORINATED BIPHENYLS (PCBs), POLYCHLORINATED DIBENZOFURANS (PCDFs), AND POLYCHLORINATED DIBENZODIOXINS (PCDDs).

### IV. Cancellations:

(a) COMNAVSEASYSKOM Washington DC 131906Z Dec 89, NAVSEA PCB Advisory 001-56Y11 1989, SUBSTITUTE MATERIAL FOR FELT GASKET MATERIAL USED IN VENTILATION DUCT FLANGES

(b) COMNAVSEASYSKOM Washington DC 112012Z JAN 90, NAVSEA 56Y13 PCB ADVISORY - SUBMARINE VENTILATION WOOL FELT GASKET MATERIAL

(c) COMNAVSEASYSKOM Washington DC 191915Z APR 90, WOOL FELT GASKETS IN VENTILATION SYSTEMS - PCB CONTAMINATION

(d) NAVSSES Philadelphia PA 161814Z MAY 90, URGENT PMS FEEDBACK REPORT SERIAL 0459-90 VENT DUCTING GASKETS

(e) COMNAVSEASYSKOM Washington DC 141907Z AUG 90, ADVISORY ON PCB CONTAMINATED FELT GASKETS IN VENTILATION DUCTS ON SURFACE SHIPS

**V. Applicability:** ALL NAVY ACTIVITIES, ASHORE AND AFLOAT PERFORMING MAINTENANCE ON NAVY VESSELS AND CRAFT.

### VI. Background:

1. This Advisory provides the procedures to be followed when removing impregnated felt gasket material, which does or may contain polychlorinated biphenyls (PCBs), from Navy vessels and craft. This Advisory contains procedures only for removal and handling of the material. Advisory 94-2 provides procedures for cleaning of ventilation systems containing felt gaskets. A future Advisory will provide procedures for sealing PCBs from felt in place.

2. PCBs above 50 parts per million (ppm) require special handling and disposal in accordance with U.S. Environmental Protection Agency regulations, reference (a), and Navy policy, reference (b). Reference (c) was the specification for wool felt

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gasket material impregnated with a non-drying grease or wax-like compound. The specification required the compound to be non-flammable, required a chromate salt to be present for corrosion protection of the surfaces which contact the felt and required one side of the material to be coated with a pressure sensitive adhesive. The felt can contain from 0% to 50% PCBs by weight.

3. Felt gasket material was used extensively as ventilation system flange gaskets in surface ships, non-nuclear submarines, early classes of nuclear submarines, and small craft since 1950. In some vessels, the felt would be used throughout the ventilation system and in others, interchanged with rubber gaskets. The felt was often specifically required in flanges adjacent to heaters where high temperatures could be expected. NAVSEA PCB Advisory 94-2 lists ships having PCB-free felt in ventilation systems.

4. Felt gasket material was used for sound dampening in many ships and submarines and as a pipe hanger wrap on some low temperature piping systems. For sound dampening, the felt was sandwiched between the structure and a metal plate. There were two major applications:

a. Sound dampening on machinery foundations, ships structure and hull surfaces in nuclear submarines constructed through 1972. The dampening material in this application was changed in about 1972 to a graphite/plastic material which is free of PCBs.

b. Sound dampening on main propulsion reduction gears in many surface ships and submarines. Felt is known by drawing review to have been used in SSN 648, SSN 649, SSN 652, SSN 672-680, SSN 682, SSN 683, SSN 688 Class, SSBN 726 Class, CGN 36-41, CVN 68-70, FF 1047-1061, FFG 4-6, LCC 19, LCC 20, LPH 12-20, MHC-51, and PC-1. Felt may be found on the reduction gears of other ships as well.

5. The material appears as a dark green or gray greasy or waxy felt fabric. After many years of installation, the material may be hardened and stuck in place particularly on the adhesive side. There is no way to distinguish PCB felt from PCB-free felt except by laboratory analysis.

6. PCBs were banned in most manufacturing processes by Federal EPA rules effective 1 January 1979. However, it is not known when production of felt containing PCBs actually ceased or when stocks of material purchased before then were consumed. Since there is no easy way to distinguish PCB felt from PCB-free felt, continued use of felt in vessels and craft was banned with the cancellation of the military specification in 1989, reference (d). References (e) and (f) specified alternates for felt used

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in flanges and closures. References (g) and (h) give detail on felt applications.

7. Some States require special handling and disposal of materials containing PCBs at levels lower than the Federal EPA limit of 50 ppm. Local Navy environmental offices will have knowledge of such requirements.

8. The PCBs in felt do not evaporate while in normal service. The PCBs can only become airborne if the material is being sanded, chipped or ground with power tools, or heated. The compound may ooze from the felt during normal service and contaminate adjacent surfaces. During handling, the compound may be transferred to the skin or clothing.

9. The maximum permitted PCB surface contamination level in ships is less than 100 micrograms of PCB per 100 centimeters squared ( $100\mu\text{g}/100\text{cm}^2$ ). PCB felt will leave surface residues of PCBs above  $100\mu\text{g}/100\text{cm}^2$  when the felt is removed. These residues can be very difficult to clean to levels below  $100\mu\text{g}/100\text{cm}^2$ .

10. The felt impregnation compound was required by reference (c) to contain a chromate salt. Reference (i) requires special handling of wastes containing chromate salts as hazardous wastes if they release more than 5 parts per million of total chromium during a Toxic Characteristics Leachate Procedure test. Tests of felt gasket material have been conducted and more than 5 ppm of total chromium was released. Therefore all felt must be handled as a hazardous waste even if free of PCBs.

### VII. Action.

1. Regardless of application, felt materials presently installed in U. S. Navy vessels and craft need not be removed because of PCBs. Installed felt need not be labeled. However, whenever felts are removed and replaced with alternate materials, the installation shall be tagged as required by this Advisory.

2. Felt prescribed by reference (c) or any other form of impregnated felt shall not be used in the maintenance or repair of U.S. Navy vessels or craft. Any instruction or direction to the contrary shall be brought to the immediate attention of the NAVSEA Engineering Directorate, SEA 03, for correction.

3. This Advisory is also to be followed when removing PCB felt gaskets as part of ventilation duct cleaning. The additional procedures to be followed for protection from potential PCB-contaminated dust during cleaning are addressed in PCB Advisory 94-2.

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4. Unless a chemical analysis of the felt has been performed and has shown that PCBs are below 50 ppm, assume that any felt is PCB contaminated and proceed to VII.5. Sampling and analysis requires shore support. For felt installations which are free of PCBs, handle removed felt material as a hazardous waste in accordance with references (i) and (k).

5. Three procedures are provided for jobs involving felt where it cannot be established that PCBs are absent; VII.5.c. Open and Restore (open, remove felt and restore the system without cleaning), VII.5.d. Cut and Dispose (cut out and dispose of the felt installation without disassembly), and VII.5.e. Open, Clean and Restore (open, remove the felt, clean the PCB contaminated surfaces to less than  $100\mu\text{g}/100\text{cm}^2$  of PCBs and restore the system). The vessel crew or maintenance activity should select the procedure which is most advantageous for the job being done. Paragraph VII.5.a. and b. provide precautions and cleaning procedures applicable to all three felt removal procedures.

### a. Precautions:

(1) Tools and Equipment: Dispose of tool working parts which contacted PCB felt or PCB contaminated surfaces in accordance with Paragraph 6 below. Alternately, clean the tool working parts in accordance with paragraph 5.b. to remove visible residues. Apply a PCB label of reference (a) or (m) to the tool and store for future use in a plastic bag or other suitable container. Dispose of tools and cleaning rags in accordance with paragraph 6 below.

(2) Electrical/Vent Operations: If removing ventilation system gaskets, ventilation blowers should be turned off and tagged out by electricians to avoid inadvertent distribution of PCB waste materials during the maintenance process.

(3) Hot work shall not be performed within 12 inches of PCB felt installations to preclude vaporization or combustion of PCBs. Combustion of PCBs can produce highly toxic dioxin and furan gasses.

(4) Avoid skin contact with PCB felt or felt residues. Wear chemical resistant (butyl rubber, neoprene, viton, nitrile) gloves. See NAVSEA Advisory 94-2, paragraph VII.5. for personal protective equipment (PPE) required for cleaning of ventilation system containing PCB felt. If skin contact and/or dust generation is not expected, no protective clothing, other than gloves is required. Dispose of all disposable PPE in accordance with paragraph VII.6.

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(5) Proper control of PCBs is required by Federal Regulation and Law. This Advisory provides the proper procedures for removing and handling PCB felt to be followed. Notify supervisors immediately if there is any doubt about procedures, equipment, or conditions in effect. Personnel performing operations involving PCBs shall be trained prior to being assigned work. Training shall include the hazards and effects associated with PCB exposure, safety and health requirements, and requirements for personal protective equipment.

b. Cleaning: Butcher's "Hot Springs" Cleaner (NSN 7930-01-379-5706) should be used at full strength in all cleaning operations.

(1) Clean by wiping with "Hot Springs" cleaner soaked clean rags until surfaces are free of visible residues, or until wiped three times, whichever occurs first. Follow by wiping with clean rags, wet with water.

(2) If the purpose of cleaning is to decontaminate the surface below  $100 \mu\text{g}/100\text{cm}^2$ , follow clean and wet wipe as above with wipe sampling in accordance with reference (p) and perform analysis in accordance with EPA Method 8080. Repeat cleaning/sampling and analysis until levels are below  $100 \mu\text{g}/100\text{cm}^2$ .

c. Open and Restore:

(1) This procedure is preferred for Ship's Force work because no shore support, other than for waste disposal, is required. This procedure may be most advantageous where felt gaskets installations such as ventilation flanges are being temporarily opened to gain access for cleaning, to remove interferences to allow for other work or where felt dampening is being temporarily removed for maintenance. The procedure recognizes that when the system is restored, the only source of PCBs will be the surface residues remaining from the original installation which will be protected from contact or release by the restored installation.

(2) Secure the work area to traffic and place tarpaulins or plastic on the deck beneath the cuts to be made, as necessary, to collect debris.

(3) Loosen and remove fasteners securing the application, as needed, to expose the felt. Dispose of the fasteners in accordance with paragraph 6 below or retain them for reuse in a plastic bag marked with a PCB label per reference (a) or (m). Remove the felt and dispose of in accordance with paragraph VII.6.

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(4) Scrape both surfaces with a putty knife or scraper, if needed, to remove any remaining particles of the felt. Collect the scrapings for disposal in accordance with paragraph VII.6.

(5) Wipe both surfaces previously in contact with the felt in accordance with paragraph VII.5.b. above to remove visible greasy or waxy residues. Collect and dispose of all used rags and solvents in accordance with paragraph VII.6.

(6) If the installation is not to be restored immediately, cover the surfaces previously in contact with PCB felt with plastic to protect workers from incidental contact with PCBs while maintenance proceeds. Apply a PCB label per references (b) or (d) to the plastic.

(7) Restore the system using approved materials. Clean the exposed surface to 6" on either side of the restored area until surfaces are free of visible residues.

(8) Manufacture a metal tag with the inscription "PCBS ON INTERNAL SURFACES" and secure the tags with wire, bolts, double-sided tape or any other permanent means to the restored system. Locate the tags so that they cannot be easily painted or knocked off during routine ship operations. For ventilation duct flanges, apply one tag per flange. For other applications, apply tag(s) as necessary to alert future workers that the application is PCB-contaminated.

**d. Cut and Dispose:**

(1) This method is often appropriate for the removal of ventilation system flanges and may be appropriate in other applications.

(2) Secure the work area to traffic and place tarpaulins or plastic on the deck beneath the cuts to be made as necessary to collect cutting debris.

(3) Cut at least 12 inches on each side of the PCB felt installation if a cutting torch or cold cutting methods are used. This will ensure all PCBs are included in the cut and there is no combustion of PCBs. If there is visible evidence that PCBs have oozed from the installation, cut 12 inches from the furthest extent of the ooze.

(4) Wrap the removed section with plastic or place in a suitable container. For large jobs, consider folding removed sections to reduce volume. Collect any gloves, disposable

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respirator parts and protective drapes in suitable containers and dispose of in accordance with paragraph VII.6.

(5) Restore the system using approved PCB-free materials.

(6) Manufacture metal tags with the inscription "NON-PCB" and secure the tags with wire, bolts, double-sided tape or any other permanent means to the restored system. Locate the tags so that they cannot be easily painted or knocked off during routine ship operations. For ventilation duct flanges, apply one tag per flange. For other applications, apply tag(s) as necessary to alert future workers that the application is non-PCB.

(7) Store the containers for transfer ashore and disposal in accordance with paragraph 6 below.

### e. Open, Clean and Restore

(1) In some circumstances, it may be appropriate to remove PCB felt and clean contacting surfaces to less than  $100\mu\text{g}/100\text{cm}^2$  PCBs. PCB residues from old PCB felt installations are very difficult to clean to this level. At the present time, there is no known cleaning process which will assure cleanliness to this level without testing. Therefore, to use this procedure, assistance from an analytical chemistry laboratory qualified to collect and analyze PCB wipe samples is necessary.

(2) Clean repetitively in accordance with paragraph VII.5.b.

(3) Clean the surfaces previously in contact with the felt and for 6 inches on either side (if possible).

(4) Collect all used rags, solvents and other materials which may be contaminated with PCBs for disposal in accordance with paragraph VII.6.

(5) Restore the system. No labeling is required.

## 6. Waste Management

### a. Ships Force:

(1) There is no shipboard capability to analyze felt for PCBs nor can PCB felt be distinguished from PCB-free felt any other way. Therefore, all felt must be managed as PCB felt

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unless Ships Force has analytical results from prior work verifying that the felt being removed is PCB-free.

(2) Wastes should be containerized and stored in accordance with the directions provided by the shipboard HM Coordinator per reference (1). Containers containing felt or felt scrapings shall be labeled and managed as chromate-bearing hazardous waste as well as PCB waste. Containers containing used rags, solvents and the like and/or containing used protective equipment slated for disposal shall be managed only as PCB waste, unless a hazardous solvent is also present.

(3) Wastes should be surrendered to a suitable Navy shore facility for subsequent handling and disposal. Forces Afloat should assure that shore personnel are fully aware of the presence or potential presence of PCBs and hazardous materials in wastes being surrendered.

b. Navy shore facility management of wastes removed by Navy shore facilities or received by Navy shore facilities from Navy vessels and craft:

(1) PCB felt and felt scrapings removed from vessels and craft at U.S. Navy facilities overseas shall be handled and disposed of as PCB Items and as hazardous waste in accordance with the Final Governing Standards (FGS) to be used under reference (n) or, if FGS have not been issued, in accordance with reference (o) and applicable Status of Forces Agreements.

(2) PCB wastes should be properly packaged and labeled in accordance with applicable regulations and manifested with the shore facility identified as the waste generator, using the shore facility EPA identification number.

(3) Wastes which may contain PCBs should be managed in accordance with paragraphs (a) or (b) below:

(a) Assume that the wastes contain PCBs and manage the felt and felt scrapings as PCB and hazardous wastes in accordance with applicable local requirements. Manage used rags, solvents, debris, protective equipment etc as PCB waste. Note that per reference (a), waste rags, solvents and clothing etc., must be handled as PCB waste if PCB felt was removed even though the rags, etc., may contain less than 50 ppm by weight of PCBs. Alternately,

(b) Arrange for analysis of the felt or felt scrapings to determine whether PCBs are present above the applicable regulatory limit. The nearest Naval Shipyard Environmental Program Office, a Navy Public Works Center, a waste  
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management agent or a local laboratory capable of testing for PCBs should be consulted for assistance, if necessary. If PCBs above the regulatory limit are found, manage wastes in accordance with VII.6.b(4)(a). If PCBs are found to be below the regulatory limit, manage the felt and felt scrapings as chromated hazardous wastes. Manage waste rags and solvents in accordance with the hazard category of the solvent, if any. Manage used protective clothing, drapes and other waste materials as non-hazardous solid waste, unless otherwise specified.

7. The information in this Advisory will be incorporated in a future revision to reference (m).

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VIII.        **Advisories in effect.**

PCB ADVISORY NO.

SUBJECT

93-1A	MANAGEMENT OF ELECTRICAL CABLES REMOVED FROM VESSELS AND CRAFT (REVISED)
93-2	MANAGEMENT OF SCRAP STEEL GENERATED DURING THE SUBMARINE INACTIVATION, DISMANTLEMENT AND RECYCLING PROCESS
94-1	REMOVAL AND HANDLING OF PCB FELT