



Polychlorinated Biphenyl (PCBs)

A. Purpose

1. This section establishes:
 - a. Guidelines for the evaluation and management of polychlorinated biphenyls (PCBs)
 - b. The types of PCB items found in NNS facilities and in work areas on vessels
Note: Contact Health & Safety at 688-5523 regarding PPE concerns and/or PPE questions.

B. Scope

This section includes the requirements for the identification, handling, and disposal of PCBs and PCB Items.

C. Applicability

1. All personnel performing operations at applicable facilities and vessels.
2. Personnel working in radiological areas must contact E81 Radiological Waste Engineering for additional requirements when handling PCBs or PCB-suspect items.
3. All NNS facilities constructed before 1985 or any areas known or suspected to have contained PCBs.
4. Navy vessels docked at NNS constructed on or before 1990.

D. References

40 CFR Part 761

E. Definitions and Acronyms

Refer to Appendix A for definitions of terms used in this section. The requirements in this chapter are based on federal regulations (reference 1) developed by the Environmental Protection Agency (EPA) in accordance with the Toxic Substances Control Act (TSCA). Certain definitions are different than those published by the EPA. This was done to either simplify the regulations, or to better control those NNS practices with the greatest potential for non-compliance.

F. Variances

Only the Environmental Engineering section of the Environmental, Health and Safety Department (027) may grant variances to this section.



G. Training For Handling of PCBs

Prior to working on known PCB items such as felt gaskets, septum plates, PCB transformers, PCB light ballasts, or other known PCB items:

1. Contractors shall ensure their employees receive awareness training per general PCB awareness training (see section L) prior to beginning work per the contractor's EH&S procedures.
2. Contractors shall notify EE prior to generating PCB waste to ensure proper waste handling and disposal.

H. Identification of PCBs

1. Evaluation
 - a. Most PCB waste items are regulated for disposal under the Toxic Substance Control Act (TSCA) at concentrations of 50 ppm or greater.
 - b. To identify what regulatory requirements apply to material containing PCBs, a person can do one of the following:
 - 1) Determine the PCB concentration, and apply the regulations for that concentration and material type
 - 2) Assume the material is 500 ppm or greater
 - c. Contractors are responsible for evaluating material suspected of containing PCBs under their direction in the following situations:
 - 1) When disposing or recycling the material is planned
 - 2) If suspect materials are to be worked in such a manner that could present an occupational hazard
 - 3) If a release/spill occurs from a suspect-PCB item.
 - d. Contact Environmental Engineering at 688-5523 with any questions concerning the material used.

2. Document Review

PCB samples should be collected and analyzed only when the information available in drawings, specifications, and history files does not permit classification of the expected waste in support of management decisions.

3. Visual Site Inspection



The material in contact with residue from items managed as containing PCBs ≥ 50 ppm may be properly characterized by performing a site inspection of the area. Look for residue leaking from known or assumed PCB sources.

4. Potential Sources of PCBs

Paints and Coatings		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
Miscellaneous Paints	Y	<ul style="list-style-type: none"> Items with dried surface coatings which have been applied in 1982 or earlier.
Heat Resistant Aluminum Paint (HRA)	Y	<ul style="list-style-type: none"> Used in high-temperature or fire-resistant applications, such as ovens, furnaces, boilers, steam systems, etc.
Plastisol	Y	

Rubber Products		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
Rubber Ventilation Gaskets	Y	<ul style="list-style-type: none"> Includes composite ventilation gaskets



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Insulating Materials		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
Electrical Cabling Insulation	Y	<ul style="list-style-type: none"> Evaluate only undated cables and cables manufactured before 1/1/84. Low smoke cables (MIL-C-24843, MIL-C-24640 and any with LS prefix designation) and low current carrying cables (lighting, telephone, computer, etc) have been verified to contain < 50 ppm PCBs. Cables suspect for PCBs must also be managed as asbestos-containing unless sample results show otherwise.

Adhesives		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
Glue	Y	
Cloth Reinforced Double Sided Tape	Y	
Miscellaneous		
Wool Felt Gaskets, Sound Dampening	Y	<ul style="list-style-type: none"> Sampling of all surfaces that have been in contact with the wool felt gaskets is required. All grease/grime in contact with wool felt gaskets must be sampled
Oily Residue/Stain	Y	
Sand Tile Dampening Material	Y	<ul style="list-style-type: none"> Sand tiles have a chlorinated wax base and have been sampled once at 2400 ppm. Sand tile is a 1" thick tile that usually measures 1x1 foot. It is made of sand with an adhesive that holds it together. This product is used as sound dampening and is usually found in inaccessible voids. It is installed during vessel construction.



Marked PCB Items		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
1) Transformers: Large High and Low Voltage Capacitors 2) Equipment or Containers with the above Items Marked	N	<ul style="list-style-type: none"> • 500 ppm or greater
Electric Motors, Hydraulic Systems, Heat Transfer Systems, and Containers with the above Items Marked	N	<ul style="list-style-type: none"> • 50 ppm or greater
Equipment Marked with the Statement "This equipment contains PCB capacitor(s)."	N	<ul style="list-style-type: none"> • 500 ppm or greater

Electrical Equipment		
Material Subcategory	Evaluation Required	Uses/Notes/Exceptions
Including but NOT limited to the following: transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches (including sectionalizers and motor starters), electromagnets, and electronic dummy loads	N	<ul style="list-style-type: none"> • 50 ppm or greater • Low-voltage capacitors containing more than 3 pounds of dielectric fluid and capacitors containing less than 3 pounds of dielectric fluid normally used in alternating current circuits manufactured before July 1, 1998 that are marked "No PCBs" or those that will be manufactured after July 1, 1998.

NOTE 1: Items manufactured in 1979 or later are generally considered to be PCB-free, with the exception of electrical cables and electrical equipment. However, stock materials containing PCBs remained in use after 1979



and the use of materials containing PCBs in foreign-built vessels past 1979 are also unclear.

NOTE 2: PCBs have been found above the TSCA limit of 50 ppm in approximately 24% of cables removed from naval vessels.

NOTE 3: Felt gasket material was used extensively with ventilation system flange gaskets since 1950 and can contain 0% to 50% PCBs by weight. The material is a greasy or waxy felt fabric that is dark green or gray. After many years of installation, the material may be hardened and stuck in place, particularly on the adhesive side. PCB felt can **NOT** be distinguished from non-PCB felt unless by laboratory analysis. Wool felt is also classified as a RCRA hazardous waste that fails for chromium (D007) and lead (D008).

NOTE 4: Material, such as paint contaminated by PCB residue leaching from felt gaskets, may **also** be classified as a RCRA hazardous waste, as well as a PCB waste.

I. Wool Felt Uses:

1. Three major uses include:
 - a. Sound dampening on machinery foundations, ships structure and hull surfaces in nuclear submarines
 - b. Sound dampening on main propulsion reduction gears in many surface ships and submarines
 - c. Flange gaskets in ventilation systems
2. Some vessels may have been built without PCB-contaminated wool felt gaskets. However, PCB felt may have been added later during maintenance. Therefore, all felt gasket material is assumed to be PCB- contaminated until laboratory testing proves otherwise.
3. PCBs in felt do **NOT** evaporate while in normal service. The PCBs can become airborne only if the material is sanded, chipped, ground with power tools or heated. The compound may leach from the felt during normal service and contaminate adjacent surfaces. During handling, the compound may be transferred to the skin or clothing.
4. PCB felt can leave surface residues of PCBs which may be very difficult to decontaminate.

J. PCB Markings



1. Sampling Suspect PCB Items
 - a. Suspect PCB Items
 - 1) A suspected PCB item must be assumed to contain PCBs > 500 ppm. This evaluation shall be limited to those items affected by contracted work on either:
 - a) Vessels or
 - b) Authorized facility work
2. Potential PCB-Containing Items
 - a. In some cases, a large component may include a PCB-containing item, such as a PCB-capacitor. The entire component must be managed as a PCB item.
 - b. In other cases, there may be an item within a component that may or may not contain PCBs, but the disassembly of the component is not practical. If there is no evidence, such as drawings, military specifications, or preexisting sampling data for similar items, indicating the internal items are not suspected of containing PCBs, then it may be inferred that the component does not contain PCBs.
3. Contractors shall contact EH&S prior to performing sampling.
4. PCB Items That May Contain Asbestos
 - a. When sampling suspected PCB items, many of the materials may contain asbestos.
 - b. Sampling suspect PCB items known or suspected to contain asbestos shall be sampled in accordance with Federal and Virginia regulations.
5. PCB Items Containing RCRA Hazardous Constituents
 - a. PCB Items can also be regulated under RCRA as hazardous waste.

Example: PCB wool felt is regulated by RCRA for chromium.
 - b. PCB-RCRA waste must be labeled for both PCBs and RCRA hazards.
6. Specific Requirements Applicable to Sampling an Individual Item
 - a. Sampling Dissimilar Materials



- 1) Separate samples shall be obtained when dissimilar materials are detected within a work area.

Example: Varying shades of one color/type of paint on a bulkhead

- 2) Some dissimilar materials may be the same type but have different characteristics, such as thickness, color, and application.
Example: Sampling rubber applied to a pipe for insulation vs. rubber applied to a bulkhead for sound dampening.

b. Sampling Dried Paint

- 1) Paint samples shall be collected by scraping the painted surface.
- 2) For different sampling areas contact Environmental Engineering for questions regarding locations and the number of samples required.
- 3) Each sample shall include all paint layers. However, care should be taken not to include any of the substrate, such as the item that was painted.

Note: Contact Environmental Engineering when taking multiple samples of the same item, such as valves covered with Heat Resistant Aluminum (HRA) paint.

- 4) If dissimilar paint is found, samples of each type shall be obtained.

c. Sampling Mastics, Adhesives, Double-sided Tape

- 1) A plug sample from each system or application within a compartment shall be obtained.

Examples:

- a) Adhesive used to apply rubber and cork
- b) Decking underlayment

d. Sampling Wood Felt

- 1) Typically, wool felt is assumed to be contaminated with PCBs > 500 ppm and does not require sampling. Also, wool felt must be managed as a hazardous waste for chromium.
 - a) A sample from each system or application within a compartment can be obtained to verify the PCB concentration or to verify the fact that the material contains PCBs.
 - b) In ventilation systems, dust and interior surfaces within six (6) inches of the exposed felt shall be assumed to be contaminated with PCBs.



Exterior surfaces within 6 inches shall be considered non-TSCA regulated unless the surfaces show evidence of a spill or leak.

- c) If necessary, these areas shall receive a standard wipe test survey in accordance with 40 CFR 761.123.
- e. Sampling Electrical Cable
 - 1) A sample from each type and each size of cable within a compartment shall be obtained.
 - 2) If an oily residue is present, ask the analytical laboratory to determine the PCB concentration of the residue.
 - 3) These cables are considered to be non-PCB and no sampling is required:
 - a) "LS" designation for low smoke
 - b) Mil-24643/Mil-24640
 - c) Manufactured after 1984
 - 4) Low-current cable wire for telephone, instrumentation, lighting and computers is considered to be a non-PCB item.
- f. Sampling Electrical Equipment
 - 1) A sample from each component suspected of containing PCBs shall be obtained.
 - 2) If it is not practical to collect samples of each component, make sure that the laboratory performing the analysis knows to determine the PCB concentration of only the suspected components.
- g. Sampling Sludge or Multiphase Material
 - 1) A one-quart sample of sludge will be obtained whenever possible.
 - 2) Use glass sample jars for PCB samples.
 - 3) Request the analyzing laboratory to separate the phases and determine the PCB concentration for both the liquid phase and the solid phase.
- h. Sampling For PCB Surface Contamination

If there is evidence of an oily residue or oily liquid in the vicinity of wool felt gasket material, wool felt sound dampening material, or any other suspect items, perform a standard wipe test to determine the amount of PCB surface contamination. Departments responsible for identifying PCBs in their individual work areas shall contact EH&S to arrange for swipe sampling.

K. Visual Inspection of Suspect Areas

1. Signs of Suspect PCB Areas



- a. Look for residue or drips, such as dark stains and waxy-looking residue.
 - b. If the visual inspection reveals any leaching or leaking residue, note the location and the affected area. Place a large PCB label on the affected area. Contact EH&S to arrange for surface wipe sampling.
 - c. Special care must be taken while cutting and draining hydraulic lines. Hydraulic fluid leaking from cut lines can be in contact with PCB residue and spread contamination to other surfaces.
2. Areas Requiring Visual Inspections:
- a. Felt gaskets
 - b. Vent flanges
 - c. Septum plates
 - d. Light ballasts
 - e. Areas/equipment containing transformers & capacitors

L. Analysis of PCB Samples

1. Analytical laboratories shall analyze PCB samples in accordance with this section.
2. Items with More Than One Component
 - a. The concentration of PCBs in an item with more than one component, such as electrical cables, shall be based on the maximum concentration of PCBs in any one component of the item.
 - b. Example #1: An electrical cable may consist of a conductor and insulation. The insulation is the component suspected to contain PCBs. Therefore, it is the component that is analyzed. If the PCB concentration of the insulation is 75 ppm, then the entire cable is considered to be a PCB Item with a PCB concentration of 75 ppm.
 - c. Example #2: A sludge with liquid and non-liquid phases needs to be separated into the various phases, and then each phase shall be analyzed for PCB concentrations.
 - d. Example #3: Heat-resistant aluminum (HRA) paint with a PCB concentration of 75 ppm, painted on a pipe, would cause the pipe and paint to be managed as a PCB Item, unless the paint is removed from the pipe.
3. Detection Limit



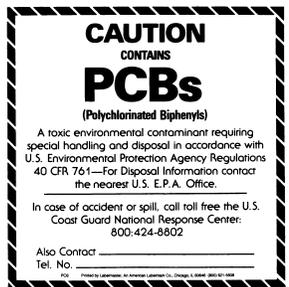
- a. Obtain a minimum detection limit as close to less than one (< 1) ppm as possible.
- b. Analytical results showing non-detectable PCBs > 50 ppm are not acceptable and shall be re-analyzed. If necessary the item shall be managed as PCBs > 50 ppm.

M. Marking PCB Items

1. Specific Areas to be marked as a PCB Item

- a. The following PCB Item areas shall be marked with Mark ML. If the item is too small for the Mark ML, then Mark MS:

- 1) Use the PCB markings below to label PCB Items.



Mark M_L



Mark M_S

- 2) Note: Labels with these markings may be obtained from the On-site Hazardous Waste Contractor (OHWC) at 8-7804 or EH&S at 8-5523.
 - a) PCB containers (bags, boxes, drums & rolloff boxes)
 - b) Waste PCB Items not packaged in PCB containers
 - c) Electric motors, hydraulic systems, and heat transfer systems with fluid that contains PCBs in concentrations of 50 ppm or greater
 - d) Transport vehicles loaded with one (1) or more PCB transformers, or two (2) PCB container(s) with more than 99 pounds of fluid containing PCBs in concentrations of 50 ppm or greater.
 - e) Note: These vehicles shall be marked on each end and each side.
 - f) Storage areas, including temporary areas at work sites, such as skiffs, used to store Waste PCB Items and PCB containers.
 - g) Storage areas used to store PCB Items awaiting reuse

2. Placement of Marks



All Mark M_L and Mark M_S labels shall be placed in such a way that is easily read by any person inspecting or servicing the PCB Item, vehicle, or storage area.

N. Handling Precautions

1. General Information

- a. Contractors responsible for identifying PCBs in an item shall handle them in accordance with this section. Contact Health & Safety at 688-5523 for questions or additional information concerning PPE.
- b. Appropriate PPE at NNS consists of the type that is necessary to:
 - 1) Prevent skin and eye contact and
 - 2) Protect against ingestion.

Note: PCBs are not significantly volatile and do not present an airborne hazard under normal conditions.

2. General Requirements

- a. Other Potential Hazards
 - 1) PCBs are frequently found in conjunction with other hazardous materials, such as asbestos and RCRA hazardous constituents.
 - 2) The requirements for handling these other materials shall also be observed in addition to the handling requirements for PCBs. Refer to the appropriate chapter of Reference (s) when working with additional hazards.
- b. Contact EH&S at 688-5523 before removal of fluid containing PCBs.

3. Solid Materials

- a. Potential Sources of PCBs:
 - 1) Dried paint
 - 2) Dried adhesive
 - 3) Double-sided tape
 - 4) Electrical cables with no visible oily residue or liquid
- b. Minimum PPE
 - 1) Disposable rubber gloves shall be used to prevent prolonged skin contact for persons working directly with the material. This applies to such activities as gasket removal, cleaning, and sample taking.



- 2) An air-purifying respirator [see Reference (s) for specific respirator] is required for paint removal by scraping, needle gunning, sanding and other similar removal methods.
- 3) Gloves are not required for persons working in the vicinity of PCB activities.
- 4) Additional protection, such as disposable coveralls, may be required if work is of a nature where extensive skin and clothing contact is possible.
- 5) Contact H&S for questions regarding PPE for PCBs at 688-5523.

4. Solids with Oily Residue

See below:

Sources	<ul style="list-style-type: none">• Wool felt gasket• Certain electrical cables
Minimum PPE	<ul style="list-style-type: none">• Rubber gloves shall be used for handling wool felt and electrical cables with exposed ends
Other Considerations	<ul style="list-style-type: none">• Additional protection, such as face-shields, chemical goggles, and disposable coveralls, shall be used if any free liquid can drip or ooze from the felt or electrical cable or if the work is of a nature that more extensive skin and clothing contact is possible.• Dust and surfaces in ventilation systems near the wool felt shall be considered to be contaminated with PCBs and shall receive a standard wipe test survey.• Surfaces contaminated by residue leaking from electrical cables shall be assumed to have PCBs > 500 ppm unless the cables have been previously sampled and tested. EH&S will perform a wipe test in the area. Workers must wear proper PPE when in contact with residue.• Cut electrical cable will have the ends sealed with tape to prevent residue leaking.

Table 4 - Solids with Oily Residue

5. Fluids

a. Potential Fluid Sources include the following:

- 1) Transformers
- 2) Hydraulic systems
- 3) Electric motors



Note: Many transformers at NNS and at outside facilities have been replaced or cleaned and contain non-PCB fluid. Transformers and equipment containing no PCBs often have a label that says “Non-PCB.”

b. Minimum PPE:

- 1) Impenetrable gloves and face-shields or chemical goggles shall be used for handling small amounts of liquid (less than a pint).
- 2) Disposable coveralls shall be used if handling larger amounts of fluids (greater than a pint) or if cleaning small amounts of fluid from more complicated surfaces.
- 3) Spill response and cleanup shall be performed in accordance with this Section.

6. PCB Airborne Hazards

Contractor personnel in an area where an airborne PCB hazard has occurred should anticipate the need for PCB decontamination of the area. Contact EH&S and your contract coordinator to determine if PCB levels are high enough to contaminate the surrounding area above acceptable limits.

O. Disposal

1. General Disposal Requirements

- a. All waste containing regulated levels of PCBs shall be managed by the Onsite Hazardous Waste Contractor. Contractors shall be responsible for proper identification and marking PCB Items and Waste Non-TSCA Regulated Items in accordance with this section.
- b. Contaminated porous surfaces, such as wood, concrete, and coated metal surfaces, can be managed in-place by restricting further mitigation of the PCBs from within the porous material.

Note: Contact Environmental Engineering for requirements to manage PCBs in-place.

c. Accumulation Time Limit

- 1) Disposition of Waste PCB Items shall be arranged as quickly as possible.
- 2) Whenever possible, all PCB waste shall be characterized before removing the item from its in-service location.
- 3) NNS is not permitted to store Waste PCB Items for over 30 days.

2. PCB Item Disposal Requirements



a. Item Marking

Marking an item with "Date of Removal from Service for Disposal" (DORSFD) is critical to make sure Waste PCB Items are shipped off-site within the required timeframe.

- 1) An item known to contain PCBs shall be considered a waste on the date of removal from service for disposal.
- 2) An item suspected to contain PCBs shall be considered a waste when laboratory analysis confirms the waste contains PCB \geq 50ppm.

b. Packing Solids

- 1) Package the waste in a UN approved 55-gallon steel drum.
- 2) Obtain approval for bulk containers, such as rolloff boxes and cubic yard boxes, from Environmental Engineering.

Note: Items with PCBs bound within solid material, such as painted items and electrical cables, may be exempted from this requirement **with approval** from EH&S.

c. Packing Liquid

Package PCB items containing liquid, such as capacitors and transformers, in an UN-approved steel drum surrounded by enough absorbent material to soak up twice the amount of liquid.

d. Labeling

- 1) Label the container or item by completing a Waste Label (WL) (NN 4651) and the PCB ML label with a durable marker.
- 2) Include the Date of Removal From Service for Disposal (DORFSFD) on the PCB Label in the following format "DORFSFD MM/DD/YYYY".
- 3) Include the statement "Contains PCBs" on the Waste Material label.
- 4) Personnel labeling the container shall write "Environmental Engineering at 688-5523" on the "also contact" section of the PCB ML label.
- 5) Labeling suspect-PCBs "awaiting analysis"
 - a) Mark the item with a Waste Label (WL) (NN4651).
 - b) Date the label when the item was removed.
 - c) **Do not** use a PCB label on the item. Once the laboratory results are complete, the waste will be marked accordingly.

e. Removed from Service PCB Items

Items, such as felt gaskets and electrical cables, which are placed in poly bags for disposal, will have the "Date of Removal from Service for Disposal



(DORFSFD)” clearly marked directly on the bags. Each bag will be dated and marked to insure they are disposed within acceptable disposal timeframes.

Note: Cables and lagging/insulation that contain asbestos require additional packaging and labeling requirements for asbestos. Refer to the asbestos section of this manual for instructions.

f. Accumulation Time Limit

- 1) Do not accumulate the waste at a work site for longer than 24 hours.
- 2) When the waste is generated, make certain that it is packaged, labeled. Contact the OHWC at 8-7804 or 757-247-6753 for material pick-up.
- 3) NNS is not legally permitted to store this waste for greater than 30 days, unless approved by Environmental Engineering for PCB bulk product/remediation waste storage.

g. Transportation from the Work Site

- 1) Contact the OHWC at 8-7804 to arrange for transportation of the waste from the work site to the NYAA.
- 2) Contractors shall not transport the waste to the NYAA.

h. Material Receipt

- 1) Retain a copy of the Waste Material Transfer form completed by the OHWC.
- 2) In addition to the information required by the form, provide the following:
 - a) The customer contract number or hull number on the form if the waste was created on a vessel.
 - b) Navy programs may dictate disposal methods for certain waste types. Indicate the disposal method on the forms when applicable.
 - c) If no designation is indicated, then the type of disposal shall be as agreed to between the OHWC and Environmental Engineering.

P. Spills and Spill Response

1. Contact *911 or 0-2222 (cell phones dial 380-2222) immediately for spills involving liquid containing PCBs. Control the spills in accordance with the following procedures:
 - a. Secure the area to prevent tracking the PCB liquid.
 - b. Protect any drains that may become contaminated by the material.
 - c. Place absorbent material (clay, cloth) on the spill.