Department of the Air Force
HQ AEDC (AFMC)
Arnold AFB, TN 37389

Safety, Health, and Environmental Standard

Title: Polychlorinated Biphenyls (PCBs)

Standard No.: E16

Effective Date: 11/01/14

Releasability: There are no releasability restrictions on this publication.

The provisions and requirements of this standard are mandatory for use by all AEDC personnel engaged in work tasks necessary to fulfill the AEDC mission. Please contact your safety, industrial health and/or environmental representative for clarification or questions regarding this standard.

Approved:

Contractor/ATA Director
Safety, Health, and Environmental

Air Force Functional Chief

Record of Review/Revision

Date/POC	Description
11/01/14 Ben Partin	Minor updates, changed org names and job titles, and clarifications as result of triennial review.
03/11/13	Added NFAC supplement; no other change.
11/01/11 Ben Partin	Added three new sections, *5.0 – Training Requirements, 6.0 – Inspections/Audits and 8.0 – Annexes,* according to revised format structure. (Training in the 2009 edition was addressed in Section 4.8 and Annexes was addressed in Section 5.0.) Added responsibilities in Section 4.10 to address actions that should be taken when manifests are not returned within the time limits specified in the federal regulations. Also added training responsibilities to Section 4.10 that are outlined in the new Section 5.0. Deleted Section 4.2.4. Made other minor edits.
11/01/09 Ben Partin	Replaced PCB Inventory description in Section 4.1.3 with Annual Written Document Log description.
11/01/08 Ben Partin	Removed reference to AEDC Safety, Health and Environmental Standard B10 (*Safety Signs, Markers, and Tags*). It was rolled into SHE B3 which was renamed *Control of Hazardous Areas Using Safety Signs, Tags, and Barricades*.
11/01/07 Ben Partin	Minor edits and clarifications as result of annual review.
11/01/06 Ben Partin	Minor edits and clarifications as result of annual review.
05/27/05 Ben Partin	Added Annexes A and B (PCB waste labels) to reflect conversion to GC forms per ISO9000 compliance; other minor revisions as result of annual review.
01/30/04 Ben Partin	Updated organization structures to reflect new AEDC contractor effective 1 October 2003. General editing and format changes at direction of revised Center Operating Instruction 91-5.
1/21/03 Ben Partin	Updated to comply with changes to EPA PCB regulations to *40 CFR 761*. New cleaning procedures implemented to decontaminate oil-filled equipment. Deleted reference to separate contractors; eliminated redundant table; added introduction section; corrected editorial errors.

Safety, Health, and Environmental Standard

POLYCHLORINATED BIPHENYLS (PCBs)

1.0 INTRODUCTION/SCOPE/APPLICABILITY

PCBs are a large class of liquid chemicals used in transformers, capacitors, valve operators, hydraulic and lubricating systems, circuit breakers, and light ballasts. PCBs must be controlled in or eliminated from systems that contain or are contaminated with them. Procedures outlined in this standard must be followed to protect the health and safety of personnel working with or potentially exposed to PCBs, to prevent PCB contamination of the environment, and to comply with federal regulations.

This standard applies to the use, handling, storage, cleaning, and disposal of:

- PCBs in concentrations ≥ 50 ppm (0.005 percent by weight)
- Equipment and materials containing or contaminated with PCBs at concentrations of ≥ 50 ppm
- Surfaces contaminated with PCBs at concentrations of ≥ 10 μg/100cm^2
- Waste generated by cleaning or decontaminating equipment, materials, or surfaces containing or contaminated with PCBs at concentrations of ≥ 50 ppm without regard to the concentration of PCBs in the waste

2.0 BASIC HAZARDS/HUMAN FACTORS

PCBs may cause liver, kidney, and lung damage; cardiac arrhythmia; dermatitis; and are suspect carcinogens. When released into the environment, PCBs can bio-amplify up the food chain. For these reasons, the government has adopted regulations for the control, elimination of the uses, and the proper disposal of PCBs.

3.0 DEFINITIONS

Base Operating Contractor – A long-term contractor directly accountable to the Air Force for the AEDC mission.

Bushing —An appurtenance mounted on a transformer, circuit breaker, etc., that extends into the internal body and has fittings for electrical connections.

Environmental Protection Agency (EPA)-Approved Incinerator— Facility for disposal of PCBs and PCB items that meets the requirements of *40 CFR 761.70, Incineration.*

EPA-Approved Landfill—A facility for disposal of certain PCBs and PCB items that meets the requirements of *40 CFR 761.75, Chemical Waste Landfills.*

Outside Contractor/Subcontractor - An organization employed by a contractor or the Air Force to do construction, maintenance, repair or other work at AEDC. There is no employment relationship, control or supervision of the subcontractor's employees by AEDC contractors. Also referred to as the construction contractor.

Owner—As used in this Safety, Health, and Environmental (SHE) Standard, the "owner" is intended to refer to the Base Operating Contractor custodian of the equipment in question.

PCB Article—A manufactured system or device, other than a PCB container, that contains PCBs and whose surfaces have been in direct contact with PCBs. Examples are: transformers, capacitors, valve operators, hydraulic systems, vacuum pumps, switches, voltage regulators, cables, motors, and pipes.

PCB Capacitor—containing ≥ 500 ppm:

(1) PCB Large High-Voltage Capacitor—A capacitor that contains 1.36 kg (3 lbs) or greater of dielectric fluid and operates at 2,000 volts or above.
(2) PCB Large Low-Voltage Capacitor—A capacitor that contains 1.36 kg (3 lbs) or greater of dielectric fluid and operates below 2,000 volts.
(3) PCB Small Capacitor—A capacitor that contains less than 1.36 kg (3 lbs) of dielectric fluid.

PCB Container—A device that contains PCBs or PCB articles whose surfaces have been in direct contact with PCBs. Examples are: drums, bottles, buckets, pans, and tanks.

PCB-Free—Containing or having been in contact with <50 ppm PCB. For spent oil, PCB-free means non-detectable, i.e., < 2 ppm PCB.

PCB Inventory—Logs of reported PCB articles and the subsequent disposition for those articles, i.e., the written annual document log.

PCB Storage Area—An area designated for the proper storage of PCBs or PCB articles that meets the requirements of *40 CFR 761.65, Storage for Disposal*.

Polychlorinated Biphenyls (PCBs)—A class of chemicals based on the biphenyl molecule in which chlorine atoms replace some hydrogen atoms. The acronym "PCB" refers also to material that contains PCB in a concentration of ≥ 50 ppm.

Transformer—Transformers that contain or are contaminated with PCBs:

(1) PCB Transformer–A transformer that contains a PCB concentration of ≥ 500 ppm.
(2) PCB-contaminated Transformer—A transformer that contains a PCB concentration of ≥ 50 ppm but <500 ppm.

Waste Identification Form—Form GC-565, *Waste Identification*, is completed for each approved container or article of PCB waste generated, including PCBs and PCB articles designated for disposal that may be too large to be placed in an approved container.

4.0 REQUIREMENTS/RESPONSIBILITIES

4.1 Contaminated Systems/Surfaces/Devices

4.1.1 Systems — Systems/devices that may contain PCBs must be sampled as soon as possible and analyzed for PCB concentrations. If ≥ 50 ppm PCBs are present, the oil must be drained and replaced with a non-PCB oil. Additional testing must be performed after the system has been operating after the change out of oil in the system. The period of time that must pass before a system can be retested and the level below which no additional testing is required depends on the work plan approved by the EPA (see Section 4.4). Industrial plant equipment (IPE) must contain < 2 ppm or it cannot be excessed. Results of the tests must be documented and retained for at least three years after the item has been excessed or scrapped.

4.1.2 Surfaces — Surfaces and soil, gravel, or debris that may have been contaminated with PCBs must be tested for PCB concentration. Results of the tests must be documented and retained for at least three years after the material has been disposed.

4.1.3 Annual Written Document Log — This document must be prepared in accordance with *40 CFR 761.180(a)* by July 1 of each year covering the previous calendar year (January through December). In addition to certain facility information, this document should contain for the calendar year the following: all signed manifests generated; all Certificates of Disposal received; a list of all PCB articles placed in storage and/or disposal along with a means of identifying each article, its weight in kilograms, the date removed from service for disposal, the date it was placed in transport (shipped) for off-site disposal and the unique manifest number. Also, this document should have an inventory of all articles still in service along with their locations, a means of identifying each item and their quantities. This document should be available for inspection by authorized representatives of the EPA and a signed copy (by both the preparer and their manager) presented to the Fire Department.

4.2 Labeling

4.2.1 Items must be marked by the responsible organization with a PCB label (Form GC-1748). In accordance with *40 CFR 761.45*, the PCB label should be yellow with black lettering that states: *CAUTION—CONTAINS PCBs* (see ANNEX A). Items requiring labeling include:

- Approved PCB containers that contain PCBs or PCB articles and PCB-contaminated articles
- PCB large high-voltage capacitors and PCB-contaminated large high-voltage capacitors
- PCB large low-voltage capacitors when removed from use. While capacitors are in use inside equipment, the equipment must be marked.
- PCB transformers and PCB-contaminated transformers

- PCB work areas
- PCB storage areas
- PCB transport vehicles

4.2.2 Each drum of PCB waste must also be labeled with the GC-1749 label that has the top portion containing the words *HAZARDOUS WASTE* removed (see ANNEX B). Information entries must be made so that the label specifies the source of the waste and the appropriate concentration:

- ≥ 500 ppm
- ≥ 50 and < 500 ppm
- < 50 ppm
- ≥ 2 ppm (for spent oil)

NOTE: The exact concentration must be determined analytically. A copy of the lab results must accompany the turn-in documents that are sent to Environmental Quality.

4.2.3 Tagging – Authorized systems or equipment in use or storage must be identified with a GC-82 Safety Information Tag as containing PCBs. (See *AEDC SHE Standard B3, Control of Hazardous Areas Using Safety Signs, Tags, and Barricades*.)

4.3 Isolation

4.3.1 Containment — PCB systems/devices that leak or might leak must be provided with an effective means of catchment/retention to prevent PCBs from entering the environment.

4.3.2 Barricading — Areas specified in Section 4.2 must be barricaded to prevent unauthorized entry. Examples of places requiring barricading include: enclosed rooms, enclosed areas within rooms, and rope barriers. (See *AEDC SHE Standard B3, Control of Hazardous Areas Using Safety Signs, Tags, and Barricades.)*

4.4 Decontamination (See *AEDC SHE Standard C2, Contaminated Equipment*)

4.4.1 Cleaning — PCB-contaminated surfaces must be decontaminated:

- Containers must be rinsed three times with a clean PCB solvent, e.g., kerosene or similar material. The quantity of solvent used in each rinse must be at least 10 percent of the capacity of the container.
- Solid surfaces must be cleaned to a standard as determined by Environmental Quality and the Safety and Health Group.
- Materials that become contaminated with PCBs during cleaning must be disposed of as PCB waste. The original PCB concentration must be used as the contamination level of the materials.

4.4.2 Cleaning Equipment Containing PCBs — When it is necessary to decontaminate equipment in a manner other than prescribed in *40 CFR 761.79(b)* and *(c)*, a specific written plan must be prepared for work involving the removal of PCBs from any equipment. The EPA must approve the plan before any work can begin. This plan must identify:

- Health hazards
- Methods for limiting personnel access to work areas
- Procedures for draining and flushing the equipment
- Methods for decontaminating surfaces
- Procedures for disposing of wastes
- Plans for future retesting of the equipment

4.5 Disposal

4.5.1 Liquids (≥ 50 ppm PCB) — Liquids that contain PCB concentrations of ≥ 50 ppm, or liquid waste generated in decontaminating systems/devices or surfaces contaminated with PCB concentrations of ≥ 50 ppm, must be disposed of only in an EPA-approved incinerator or equivalent.

NOTE: Dilution to circumvent disposal requirements is not permitted. Liquids used for decontamination are considered to be contaminated to the concentration of the original system/device or surface being decontaminated. Liquids must be placed in approved containers.

4.5.2 Solids — Non-liquid PCBs or materials contaminated with PCBs must be disposed of only in an EPA-approved landfill, incinerator, or equivalent.

4.5.3 PCB Transformers — These may be disposed of only in an EPA-approved landfill or incinerator. PCB waste liquids generated must be disposed of as required if the transformer is drained. Alternatively, the transformer may be retrofilled and reclassified as not containing PCBs under *40 CFR 761.30(a)(2)(v)*.

4.5.4 PCB-Contaminated Transformers — These may be disposed of in an EPA-approved landfill. PCB waste liquids generated during transformer draining must be disposed of in an approved incinerator or equivalent. The drained transformer is not regulated for disposal under *40 CFR 761.60(b)(4)*. A PCB-contaminated transformer may also be retrofilled and reclassified as not containing PCBs.

4.5.5 PCB Large and Small Capacitors — Must be disposed of only in an EPA-approved incinerator.

4.5.6 PCB Containers — Containers must be approved for non-liquids, and interstitial space in the containers must be filled with sufficient absorbent material to absorb liquid PCBs remaining in the articles. Each container must be labeled with a PCB label. PCB containers that have been decontaminated as required in Section 4.4, or that have contained materials having a PCB concentration of <500 ppm, must be disposed of in an EPA-approved chemical waste landfill. Containers cannot be returned for reuse.

4.6 Storage

4.6.1 Temporary PCB Storage — Items may be stored in an area near the point of removal from a system for 30 days from the date of removal from the system. Beyond 30 days, the items must be transferred to consolidated interim storage. PCB liquids containing ≥50 ppm PCBs or leaking equipment may not be stored in temporary storage.

4.6.2 Consolidated Interim PCB Storage — The storage area must have a roof and walls and must be above the 100-year flood elevation and above ground level. The storage area must have secondary containment for PCB waste. The capacity of the containment area must be no less than the larger of:

- Twice the capacity of the largest stored container, or
- One-fourth the combined capacity of all containers.

At AEDC, one bay in the permitted Treatment, Storage, and Disposal Facility (TSDF), Building 1456, serves as the interim PCB storage area until the PCB containers can be transported for disposal.

4.6.3 Records must be maintained for each PCB container or item placed in storage *[40 CFR 761.180(a)]*. These records are maintained in the files at Base Operating Contractor Environmental Quality for at least 3 years after disposal of the equipment and include the following:

- Date removed from service
- Date placed in storage
- Date transported for disposal
- Total weight of PCBs in kilograms
- Identification of contents for each container
- All signed manifests
- Certificates of disposal
- Records of inspections
- Annual Inventory Document Log

4.6.4 Enclosed — Totally enclosed PCB transformers, contaminated transformers, and large high- and low-voltage capacitors that are still in service must be visually inspected for leaks quarterly. When an inspection indicates a leak, immediate action must be taken to contain the PCBs. Inspections and leak response must be documented and retained by the owner (Base Operating Contractor custodian of the equipment) for at least three years after disposing of the item.

4.6.5 Storage — PCB articles and containers in temporary storage must be inspected every 30 days. PCB articles and containers in consolidated interim storage must be inspected weekly. Leaking items and their contents must be contained or transferred immediately to Department of Transportation (DOT)-approved non-leaking storage containers. Spilled or leaked materials must be immediately cleaned up and disposed of properly. Inspections must be documented by the operator of the storage facility. The written logs must be retained for at least three years after the facility is no longer used for storing PCBs.

4.7 Personnel Protection/Work Practices

4.7.1 Base Operating Contractor SHE provides guidance for personal protection requirements. Medical examinations must be administered annually to workers having occupational exposure to PCBs. Emergency medical care is provided by the base Dispensary for workers in the event of PCB over-exposure.

4.7.2 Procedures — Should an EPA-approved plan be used (Section 4.4), then those procedures must be followed.

4.7.3 Safety Shower — Operable safety showers and eyewash fountains must be provided in or near PCB work areas. (See *AEDC SHE Standard B8, Safety Showers and Eye Fountains*.)

4.7.4 Personal Hygiene — Workers exposed to PCBs must wash their hands and exposed skin before eating, drinking, or smoking and at the end of each work shift, whether or not gloves are worn. Food, drink, and tobacco products must not be carried into PCB work areas.

4.7.5 Cross-Contamination — Personal protective equipment and other items contaminated with PCBs must not be used or carried outside PCB work areas if contamination of clean areas is likely.

4.8 Owner Responsibilities

4.8.1 Locate systems/devices and surfaces that may be contaminated by PCBs as soon as possible and determine the extent of contamination as required by Section 4.1.

4.8.2 Notify Base Operating Contractor SHE Environmental Quality if systems/devices or surfaces are contaminated with PCBs.

4.8.3 Label, tag, and post systems/devices, containers, and areas as required by Section 4.2. Provide catchment, containment, and barricading of systems/devices and areas within their purview as required by Section 4.3.

4.8.4 Use only EPA-approved procedures for PCB decontamination. Coordinate with and notify Environmental Quality three days before initiating work. Requisition proper containers from Logistics Support.

4.8.5 Decontaminate, clean, and retest systems/devices and surfaces as required by Section 4.4. Provide personnel protection and ensure proper work practices as required by Section 4.7.

4.8.6 Generators must place PCBs and PCB-contaminated material in pre-numbered approved containers and ensure that liquid drums are sampled. (Drums are numbered by Logistics Support.) Ensure that drums are properly labeled as required by Section 4.2 and have a completed Form GC-565 that will accompany them. (See *AEDC SHE Standard E18, Managing Wastes Containing Chemical or Petroleum Products*.)

4.8.7 Complete Form GC-565 on each PCB article (transformer, vacuum pump, etc.) designated for disposal that is too large to be containerized and coordinate with Base Operating Contractor SHE Environmental Quality for disposal.

4.8.8 Provide names of persons known to have or suspected of having exposure to PCBs to the Dispensary for medical surveillance.

4.8.9 Inspect and document inspection of PCB Large Capacitor–a capacitor that contains greater than 1.36 kg (3 lbs) of dielectric fluid in systems/devices or temporary storage areas as required by Section 4.6.

4.9 Base Operating Contractor Maintenance Responsibilities

Ensure that all electrical equipment is labeled properly to identify PCBs.

4.10 Base Operating Contractor SHE Environmental Quality Responsibilities

4.10.1 Provide assistance to organizational units in instruction of personnel as required by Sections 4.7, 4.8 and 5.0; or coordinate with Base Operating Contractor SHE Safety and Industrial Hygiene (IH) to provide this assistance.

4.10.2 Maintain an inventory document log of PCBs and systems/devices contaminated with PCBs as required in Section 4.1. Annually, send updated copy of inventory log to base Fire Department.

4.10.3 Forward procedures for working with PCBs to EPA as necessary for final approval as required by Section 4.4.

4.10.4 Maintain records as required in Section 4.6 and retain in the Base Operating Contractor Environmental Quality files.

4.10.5 Coordinate disposal of PCBs as required by Sections 4.5 and 4.6.

4.10.6 If AEDC does not receive a signed copy of a manifest within 35 days of the date a waste was accepted by the initial transporter, immediately contacts the initial transporter and/or the operator of the designated disposal facility to determine the status of the PCB waste *[761.215(a)]*.

4.10.7 If AEDC does not receive a signed copy of a manifest within 45 days of the date a waste was accepted by the initial transporter, files an exception report with Region IV of the USEPA no later than 45 from the date on which AEDC should have received the manifest *[761.215(b)]*.

4.10.8 Provide PCB awareness training as required by Section 5.0 to employees performing work (i.e., cleaning and abatement activities) as needed for specific work.

4.10.9 Maintain records of employees trained and retain in the Base Operating Contractor Environmental Quality files.

4.11 Base Operating Contractor SHE Industrial Hygiene (IH) Responsibilities

4.11.1 Provide guidance and training on health concerns for employees involved in PCB abatement as required by Section 5.0 or coordinated by Base Operating Contractor Environmental Quality.

4.11.2 Monitor employees working in abatement areas for health concerns as necessary.

4.12 Base Operating Contractor Logistics Support Responsibilities

4.12.1 Assign serial numbers to approved containers (drums) and maintain a record of drum numbers, issues, receipts and disposition (stored, transported, or disposed of).

4.12.2 Warehouse 6 (Scrap Metal Yard) should contact Environmental Quality for guidance anytime equipment is discovered to contain oil. (See *AEDC SHE Standard C2, Contaminated Equipment*.)

4.13 Base Operating Contractor Chemical and Metallurgical (Chem/MET) Lab Responsibilities

4.13.1 Provide consulting advice on sampling techniques.

4.13.2 Provide sample analysis for PCB content as required by Section 4.1.

4.13.3 Report results by serial/drum number or other identification number to the requesting activity.

5.0 TRAINING REQUIREMENTS

Personnel working with or potentially exposed to PCBs must receive specialized instruction/training as necessary to include:

- PCB identification
- Hazards
- Effects
- Medical surveillance
- Regulations
- AEDC PCB program
- Specific operations to conduct
- Specific precautions to take
- Personal protective equipment to use
- Emergency procedures to follow

6.0 INSPECTIONS/AUDITS

Base Operating Contractor Environmental Quality shall maintain an inventory document log of PCBs and systems/devices contaminated with PCBs, and send an updated copy of the inventory log annually to the AEDC Fire Department by 1 July which documents the inventory for the previous calendar year.

7.0 REFERENCES

40 CFR 761, EPA PCB Regulations
29 CFR 1910.1000, Table Z-1, Air Contaminants
NIOSH Criteria for a Recommended Standard for Occupational Exposure to Polychlorinated Biphenyls, 77-225

AEDC SHE Standards
B3, *Control of Hazardous Areas Using Safety Signs, Tags, and Barricades*
B8, *Safety Showers and Eye Fountains*
C2, *Contaminated Equipment*
E18, *Managing Wastes Containing Chemical or Petroleum Products*

8.0 ANNEXES

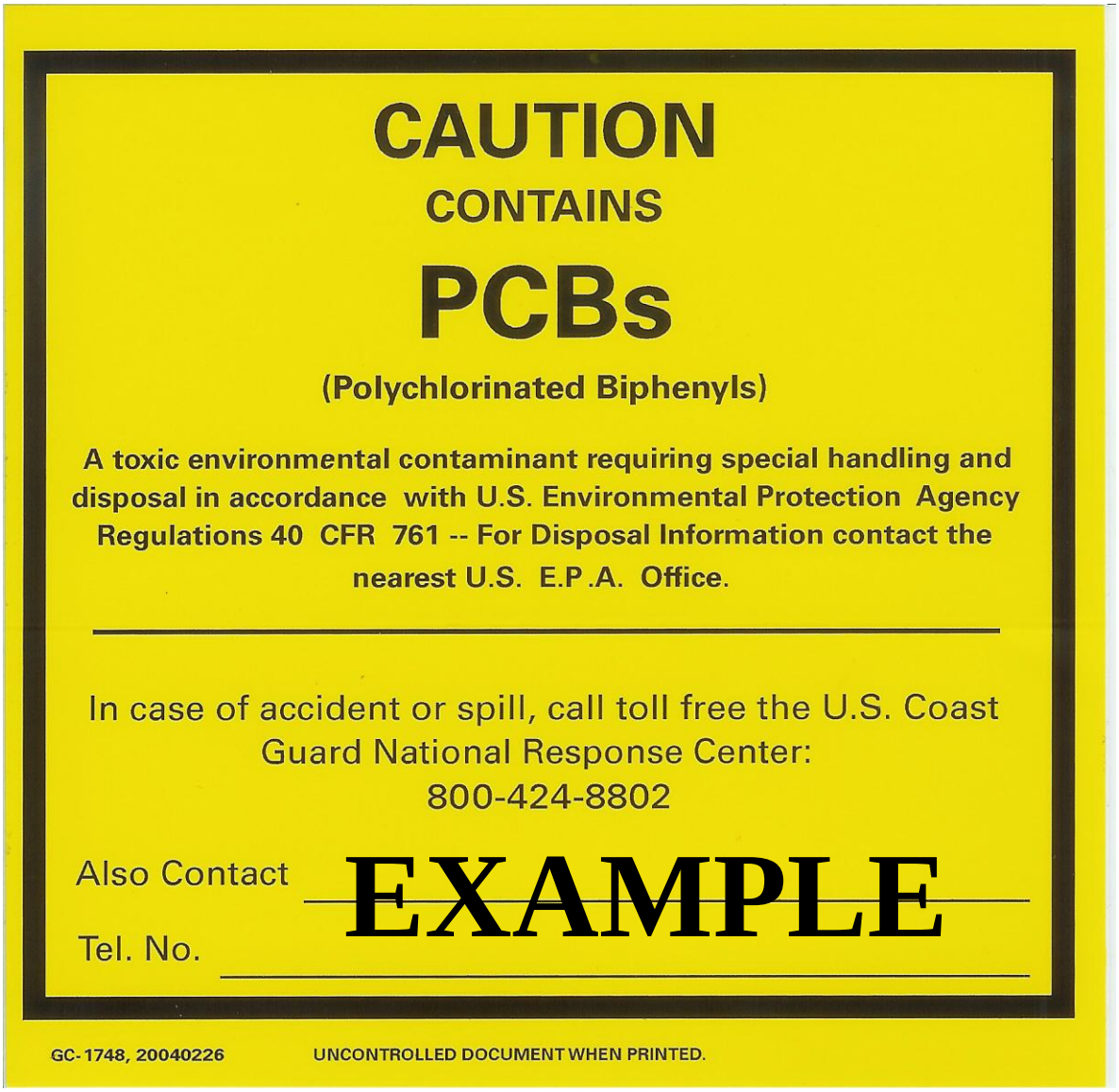
A. Form GC-1748, *CAUTION—CONTAINS PCBs* Label
B. Form GC-1749, *HAZARDOUS WASTE* Label / *PCB WASTE* Label

9.0 SUPPLEMENT

NFAC A321-081-XSP E16 Polychlorinated Biphenals ({CBs)

ANNEX A

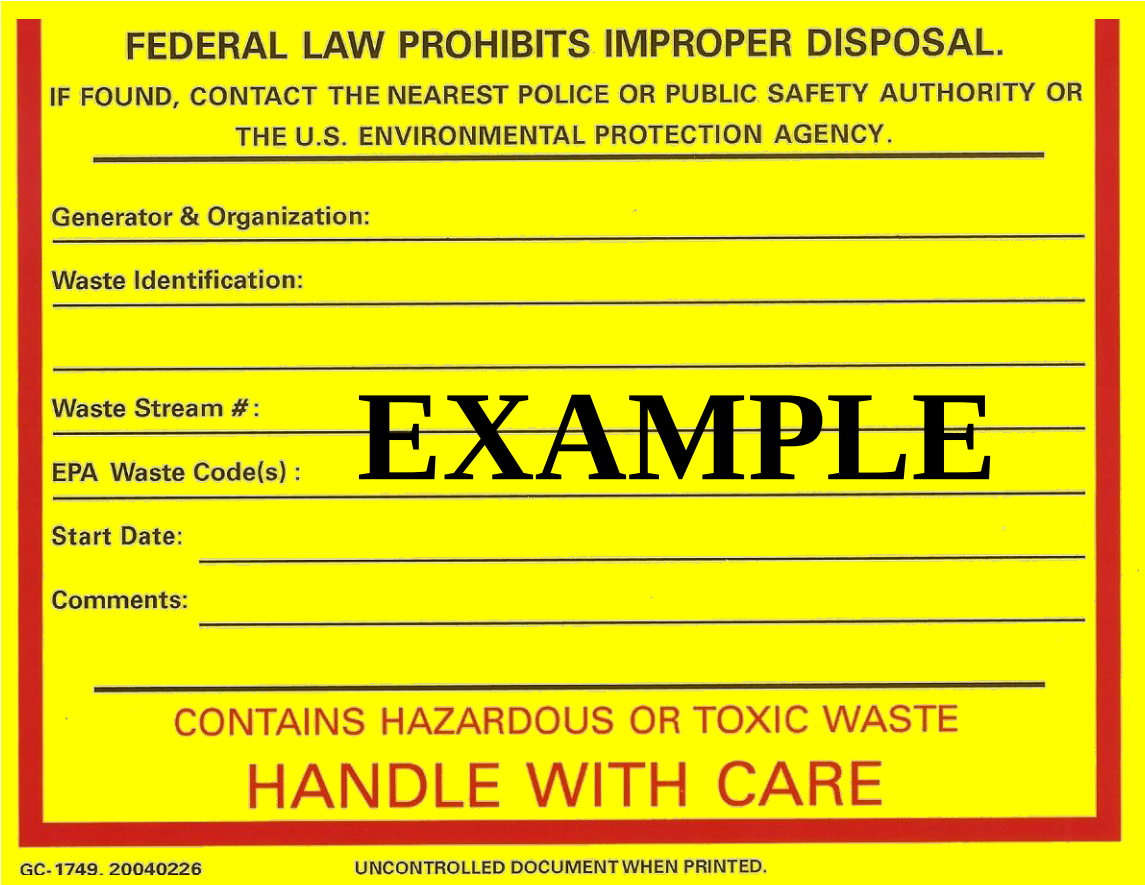
Form GC-1748, CAUTION – CONTAINS PCBs Label



ANNEX B

Form GC-1749, HAZARDOUS WASTE Label / PCB WASTE Label

NOTE: For PCB waste ONLY, use bottom portion only of Form GC-1749 (below words *"HAZARDOUS WASTE")* as shown below.



A321-0801-XSP E16 Polychlorinated Biphenyls (PCBs)

This supplement has been approved for the NFAC Site.

Review: This supplement will be reviewed and updated using the same cycle as the AEDC Safety Standard E16 "Polychlorinated Biphenyls (PCBs)".

References: AEDC Safety Standard E16 – Polychlorinated Biphenyls (PCBs) at the AEDC NFAC Site.

Scope:

PCBs are a large class of liquid chemicals used in transformers, capacitors, valve operators, hydraulic and lubricating systems, circuit breakers, and light ballasts. PCBs must be controlled in or eliminated from systems that contain or are contaminated with them. Procedures outlined in this supplement must be followed to protect the health and safety of personnel working with or potentially exposed to PCBs, to prevent PCB contamination of the environment, and to comply with federal regulations.

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- Equipment and materials containing or contaminated with PCBs at contaminated with PCBs at concentration of ≥50 ppm
- Surface contamination with PCBs at concentration of ≥10 ug/100cm^2
- Waste generated by cleaning or decontaminating equipment, materials or surface containing or contaminated with PCBs at concentration of ≥50 ppm without regard to the concentration of PCBs in the waste

This supplement applies to all personnel conducting operations, maintenance, testing and support at NFAC, NASA AMES.

NFAC Worksite Application:

NFAC will follow Ames Environmental Procedural Requirement APR 8800.3 Chapter 9 Polychlorinated Biphenyl Management.

I. NFAC Site Management shall:
   1. Ensure supplement is followed
   2. Ensure Staff follows supplement

II. NFAC Supervisors and Test Directors shall:

   1. Ensure the supplement is followed
   2. Ensure that staff and customers do not disturb any PCB type equipment unless required
   3. Personnel that are exposed or may be exposed utilize the correct PPE

III. NFAC Safety Engineer shall:
   1. Assess all areas containing PCBs (Sub-Station Transformers)
   2. Conduct at minimum annual inspection on the transformers
   3. Discrepancies entered into the HAL to be corrected

IV. NFAC Staff shall:
   1. Follow the supplement
   2. Report any PCBs concerns, leaks to NFAC Safety Engineer
   3. Do not disturb any PCB type equipment unless knowledgeable and authorized on that equipment