

Managing Polychlorinated Biphenyls (PCBs) From Electrical Equipment

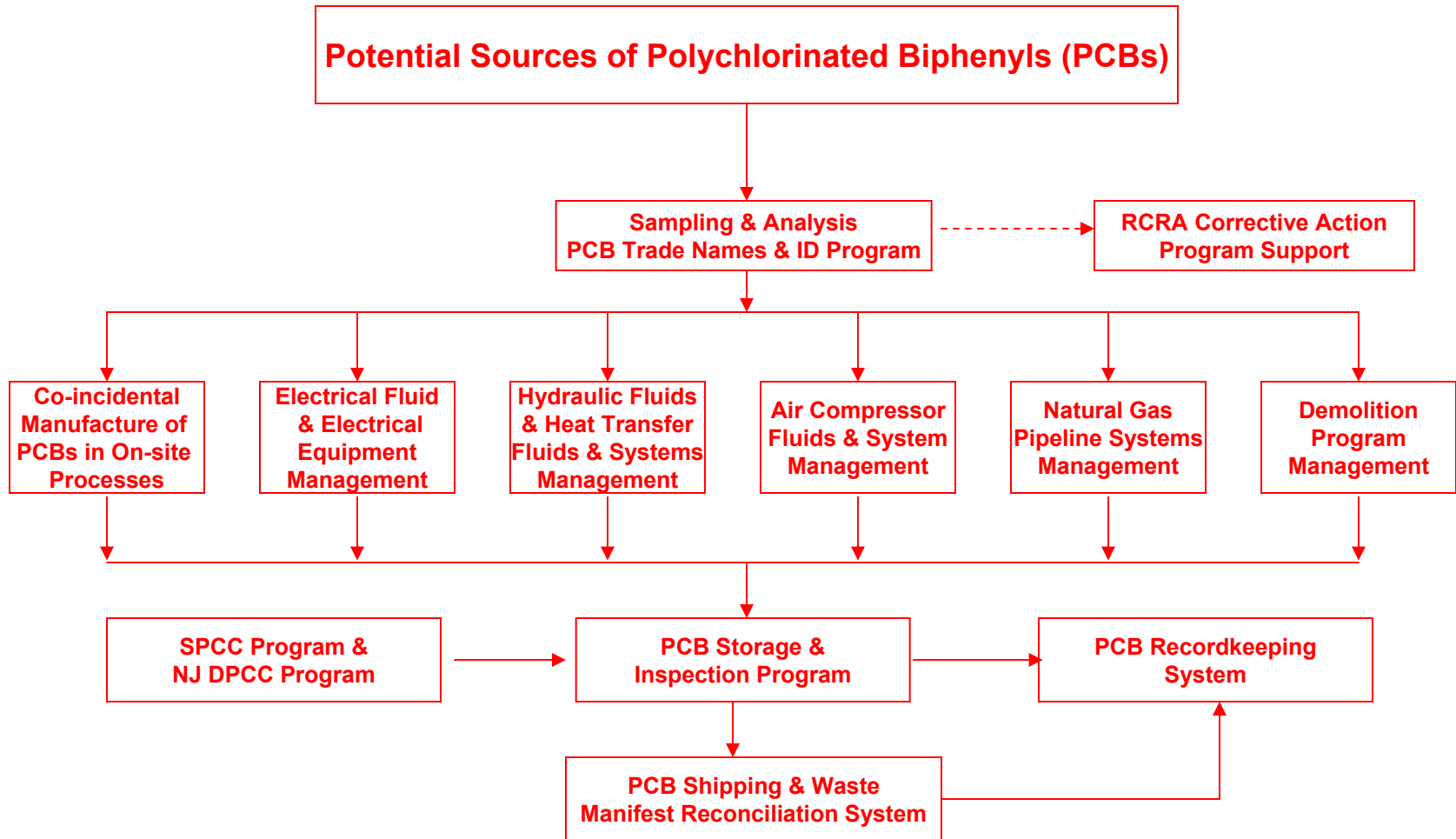
PCB Pollutant Minimization Plan Workshop
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PCB Management Program



PCB Trade Names (Not All Inclusive)

Aroclor – 1016	Aroclor -- 1242	Aroclor – 1260	Aroclor – 4465
Aroclor – 1221	Aroclor – 1248	Aroclor – 1268	Aroclor – 5442
Aroclor – 1232	Aroclor – 1254	Aroclor – 2565	Aroclor – 5460
Asbestol	Dykanol	Kanechlor	Pyralene
Askaral	Elemex	Kanechlors	Pyranol
Chlophen	Fenclor	Kanechlors- 300,400,500	Saf-T-Kuhl
Clorentol	Hi Temp 227	Kennechlor	Sanotherm – FR
Chlorphen	Hyvol	No-Flamol	Therminol FR-0, FR-1, FR-2, FR-3, 77
Chlorinol	Euracel	MCS-1489	Pyroclor
Diachlor	EEC-18	Inclor	Pydraul
DK	Inerteen	Phenoclor	Santovac 1 and 3

Potential PCB Containing Electrical Equipment

Transformers	Voltage Regulators
Large Capacitors	Switches
Circuit Breakers	Sectionalizers
Reclosers	Motor Starters
Electromagnets	Cable
Lamp Ballasts	Small Capacitors

In addition to nameplate and/or trade names, EPA regulations require that oil-filled electrical equipment, other than circuit breakers, reclosers and cable, whose PCB concentration is unknown must be assumed to be PCB-contaminated (>50 ppm, but <500 ppm PCBs) electrical equipment. (Note: Check > 20 year old rectifiers and diodes)

When We Think of PCBs We Think of Transformers



Prior to 1980 transformers were routinely filled with PCB oils

- Transformers contain mineral oil dielectric fluids. Units often contained PCBs with trade names such as Aroclor, Askarel, Pyranol, Inerteen Clorinol, and Pydraul.
- When PCBs are present at 50 ppm or greater the fluids removed from such units require management as PCB wastes.
- All units at DuPont NJ/DE plants have been retro-filled to <50 ppm PCBs or were Non-PCB as purchased.

New Transformers Purchased After 1980 Have No PCB Oils



An important label showing “**Non-PCB**” status

- The unit shown displays a vendor certification indicating that the oil contained “**NO PCBs**” at the time of filling.
- This means that PCBs would be non-detectable using a commonly accepted test method. (Do not rely upon “Snap Tests” for PCB testing)
- Oils removed from such equipment are managed as part of a sitewide electrical equipment non-PCB waste oil profile.

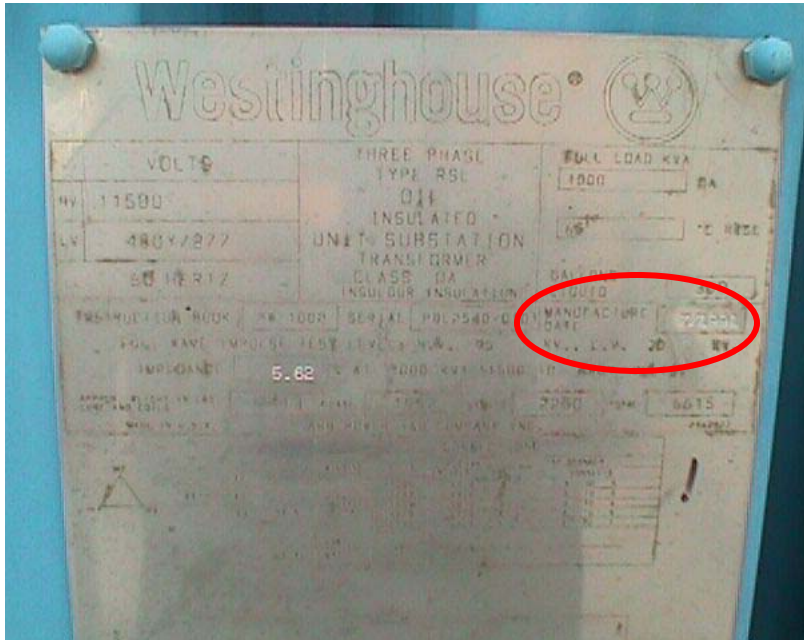
Transformer Substations, Pad And Pole Mounts Are Used On-Site



If a unit such as this contains 500 ppm or greater PCBs, then it would have to be registered with EPA per the new National PCB Transformer Registration Program of 1998.

- Removed electrical oils must be managed properly. Waste oils must be stored in areas included in the site SPCC Plan and DPCC Plan (spill control plans).
- Retro-filled units still contain PCBs at <50 ppm, so collected oils with any level of PCBs are shipped to an incinerator capable of managing <50 ppm PCBs. The sites have electrical oil waste profiles in-place.
- Each unit has an analysis on-file indicating the PCB content after retro-filling. Some disposal facilities may require updated PCB analyses prior to oil acceptance.

The Transformer Nameplate Contains Important Information

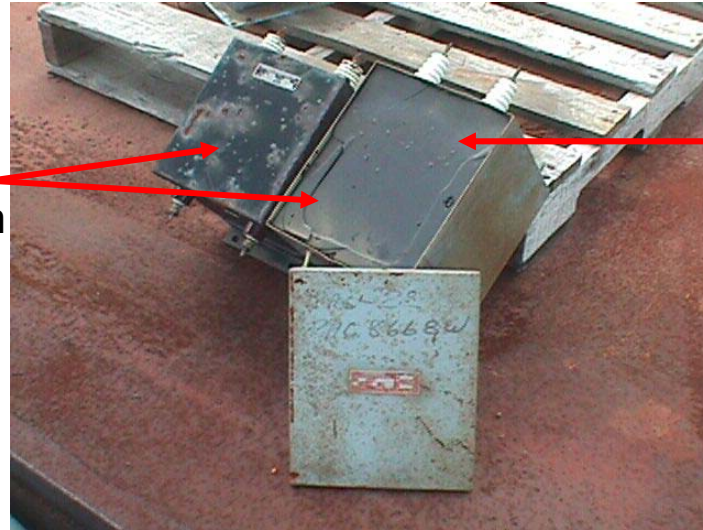


This unit shows an oil capacity of 300 gallons and a date of manufacture of 1991. Thus, no PCBs would be present in this unit.

- Transformer nameplates provide important information such as transformer serial numbers, manufacturer, oil capacity, year of manufacture and, in some cases, the oil PCB name (for pre-1980 units).
- The site records include transformer serial numbers and cross-referencing transformer sub-station numbers (e.g., 11-561) assigned by the site electrical group and found on each unit.

Other Equipment: Transformers Containing <3 Pounds of Fluids Requiring No PCB Label

If these units contain any fluids, then a PCB evaluation is needed



Asphaltic tar should be tested for PCBs due to similarity to PCB lamp ballast potting material (tars), a known source of PCBs

Small circuit transformer reveals insulating material

Do not overlook fluids or potting (insulating) type materials in smaller, unmarked equipment. If the old unit contained <3 pounds of PCB fluids, then no PCB marking was required while in use.

So....Where Do We Find Electrical Fluids Containing PCBs If All Our Transformers Contain <50 ppm PCBs?

No "No PCB" label, assumed
50-500 ppm PCBs



- Smaller oil-filled electrical equipment such as oil-immersed switches are assumed to contain 50-500 ppm PCBs while in-service, but do not require a PCB label under the law if containing <3 pounds of fluid.
- The absence of a PCB label creates the potential for mixing removed switch oils, which may have >50 ppm PCBs, with other non-PCB oils. Such mixing will result in the entire drum of oil becoming a PCB waste and creating a possible violation.

"No PCBs" does not always mean zero PCBs, merely <50 ppm PCBs



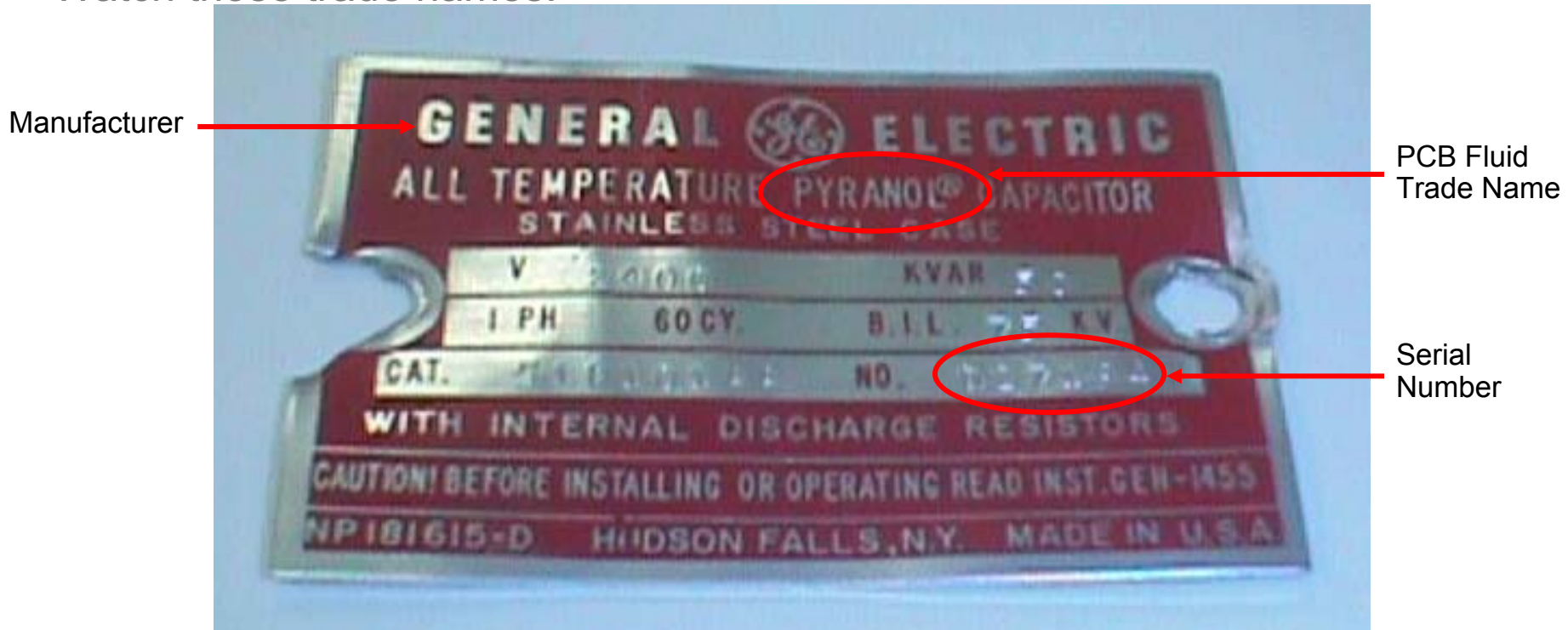
Label shows "No PCBs"

- DuPont Plant's have retro-filled many oil-filled switches over the years. Unless the switch has a "**No PCBs**" type marking or is known to be <20 years old, handle as PCB oil containing >50 ppm PCBs. The site has a waste profile for PCB oils. Collect drained PCB switches for PCB management (add to containers with ballasts, capacitors).

Large Capacitors - PCB Fluids

DuPont Plant's in NJ/DE have no PCB large capacitors in-service or storage. Nameplates such as this are found on large capacitors.

Watch those trade names!



Pyranol[®] is a PCB fluid. This capacitor would be regulated as a PCB waste when removed for disposal. If fluids are removed, the drained PCB article remains subject to PCB disposal requirements. Do not recycle as scrap metal.

Don't Overlook Small Capacitors As a Known Source of >50 ppm PCB Oils



Small capacitors for disposal.
You must find and remove all capacitors

- Our NJ/DE PCB PMP Plants have removed and disposed of all known PCB Large Capacitors, so no discussion is included on this type of unit.
- PCB Small Capacitors in pre-1980 equipment are commonly encountered during electrical work and demolition. These are often found in electrical equipment such as lamp fixtures (HID Lamps) and air conditioners.
- Unless a small capacitor states "No PCBs" as required by law, it is assumed to contain ≥ 50 ppm PCBs.
- **DO NOT PUT PCB SMALL CAPACITORS (even Non-PCB liquid filled small capacitors) IN TRASH OR SCRAP METAL HOPPERS**

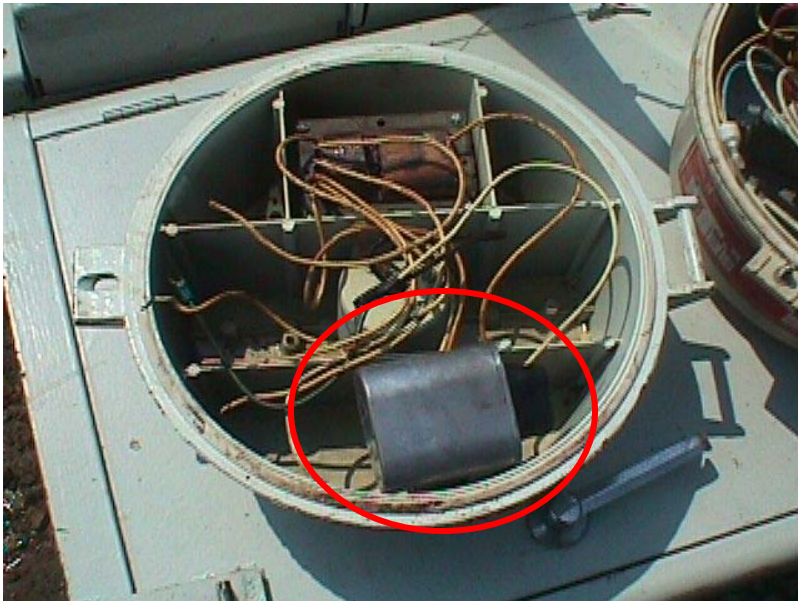
Small Capacitor Displaying A PCB “Trade Name”



NOTE: With PCB trade name “Clorinol” displayed, there is no question that it is a PCB containing capacitor.

- The photo depicts a small PCB capacitor containing “Clorinol” a commonly used PCB fluid.
- The capacitor (approximately 8” in length) does not display a “No PCB” label or marking.
- PCB small capacitors may be found in various types of older electrical equipment (e.g., lamp fixtures, refrigerators, air conditioners).

The Following is a Common Source of Small Capacitors Requiring Examination for PCBs

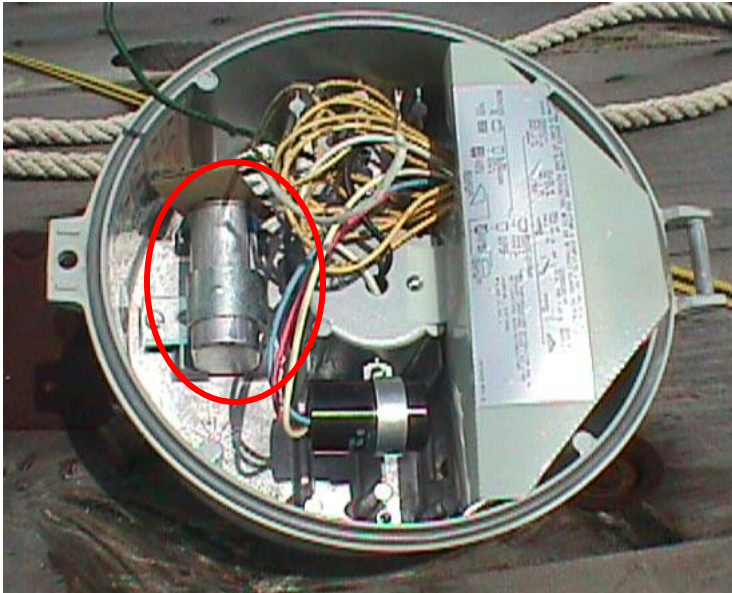


A small capacitor is present with HID lamps.

If the lamp housing is oil stained from leakage, then manage the housing unit as a PCB waste also.

- The photo depicts a small capacitor in a HID lamp fixture (e.g., high pressure sodium or mercury vapor lamp).
- This small capacitor must be removed from ALL HID fixtures. Examine to determine if it is a PCB small capacitor and manage as PCB or Non-PCB according to site waste profiles for capacitors.
- Some capacitors state "**No PCBs**", but still contain a "**combustible fluid**". A site waste profile has been set up for management of non-PCB, combustible liquid capacitors (e.g., DEHP liquid). **DO NOT PUT IN SCRAP METAL**

A Second Look At HID Lamp Fixtures



Fixture with small capacitor in place



You must remove and examine the small capacitor. Note: "No PCBs" on label.

ALL small capacitors must be removed, examined for "No PCB" label and managed as PCB waste if the "No PCB" designation is not shown. Non-PCB capacitors with combustible liquids or hazardous chemicals are also collected for proper disposal (e.g., Di-(2-ethylhexyl) phthalate or DEHP fluids).

Don't Forget Other Sources Of PCB Small Capacitors



Small capacitors in this type of equipment must be examined for PCBs.

- Refrigerators, freezers, microwave ovens, water fountains and air conditioners are some possible sources of PCB small capacitors
- Remove capacitors from equipment and examine to determine if “PCB” or “Non-PCB”, and manage accordingly.

These Lamp Fixtures Are The Source of Most PCB Lamp Ballasts



Fluorescent Lamp Fixture

Look for PCB ballast leak tar stains on plastic covers and metal housing. Mangle as PCB waste if stained.

- The photo depicts a fluorescent lamp fixture, a common source of PCB ballasts.
- The fixture must be disassembled in order to remove the lamp ballasts for examination as “PCB” or Non-PCB”.
NOTE: Fluorescent tubes containing mercury must also be managed properly.
- Do not discard entire lamp fixtures as scrap metal without ballast removal and PCB evaluation. Remove plastic lamp cover for trash disposal (unless stained with ballast tars).

Fluorescent Lamp Ballasts Are A Source of PCBs and Small Capacitors



PCB lamp ballasts

Just have 1 or 2? No need to start a whole new drum, check on adding to inventory of a drum being filled.

- By far the most prevalent electrical equipment source of PCBs at DuPont Plant's is fluorescent lamp ballasts.
- Pre-1980 ballasts may contain >50 ppm PCB in the asphaltic potting (insulating) materials as well as a small PCB liquid filled capacitor.
- Unless the ballast states "No PCBs", it must be managed as regulated PCB waste. The site maintains a PCB Ballast waste profile for use in managing ballasts and capacitors.
- **DO NOT DISPOSE OF PCB BALLASTS AS SCRAP METAL OR AS TRASH**

A Lamp Ballast Doesn't Look Hazardous... What's The Big Deal With Disposal?

DO NOT DISASSEMBLE BALLAST FOR DISPOSAL. Disassembly shown is for training purposes only.



Intact non-PCB ballasts from 8-foot lamps.



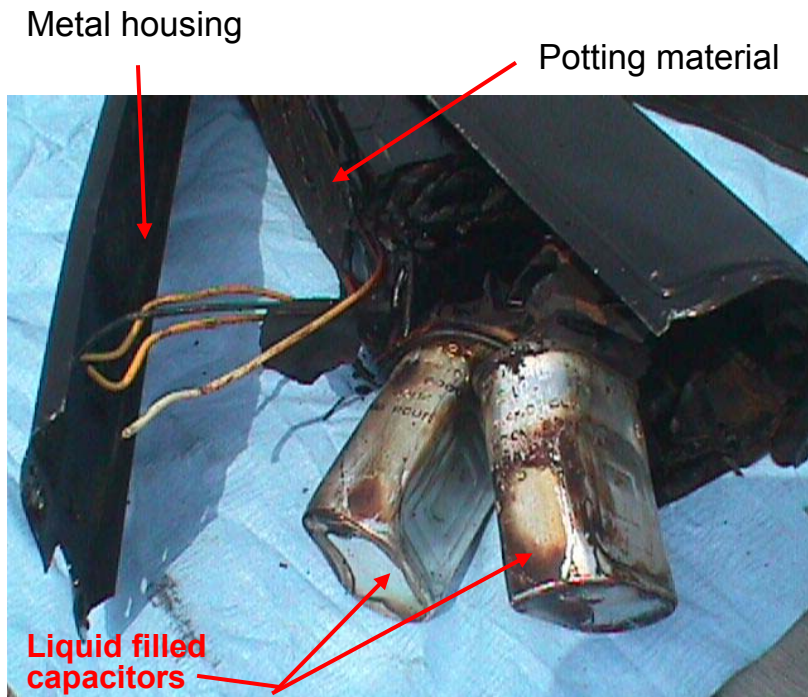
Liquid filled
capacitors

Black colored
insulating
(potting) material

Metal end removed shows bottom of two wet-capacitors (liquid filled) and surround potting material.

Over 50% of pre-1979 PCB lamp ballasts contain >50 ppm PCBs in the potting material. The capacitor in pre-1979 PCB lamp ballasts usually contains pure PCB liquid. Non-PCB lamp ballasts manufactured between 1979 through the early 1990's often contain DEHP [Di-(2-ethylhexyl)phthalate] as a PCB liquid replacement. Collect ALL PCB and non-PCB DEHP fluid filled ballasts for proper management.

Looking a Little Closer You Can See The Issue

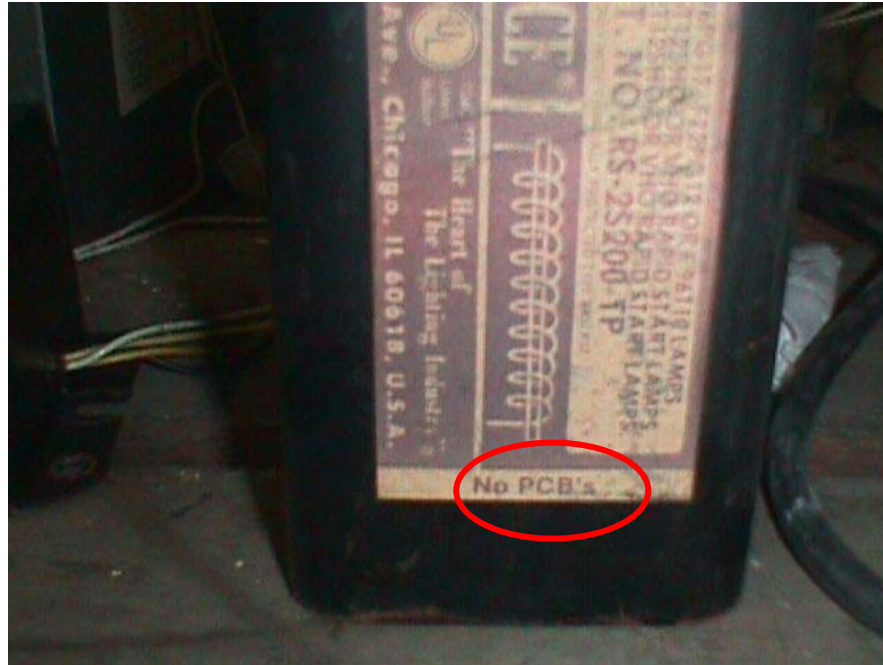


**Non-PCB liquid filled capacitors
assumed to contain DEHP.**

- If this was a PCB lamp ballast the capacitors would be filled with PCB liquid (pre-1979 units).
- If this was a PCB lamp ballast the potting material (insulation) would have a 50% chance of containing >50 ppm PCBs.
- Since this is a non-PCB wet capacitor believed to be manufactured between 1979 - early 1990's, DEHP is the most likely fluid.

NOTE: This ballast states "No PCBs" in the paper label, but also shows "No PCBs" on the internal wet capacitors.

A Ballast Must State “No PCBs” Or It Is Considered a PCB Waste

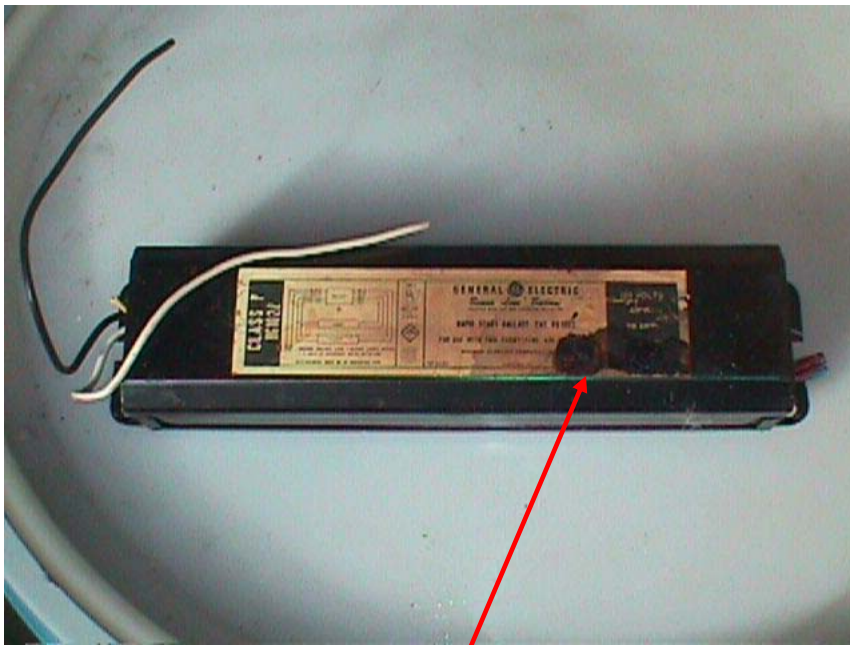


Non-PCB Ballasts

Clearly not a PCB ballast. However, if it was made between 1979-early 1990's the wet capacitor inside may have DEHP.

How About Leaking PCB Ballasts?

The PCB regulations differentiate between leaking ballast and non-leaking ballast disposal. The site program does not differentiate, all are incinerated.



Staining indicates leakage.

If the staining is also found on the lamp housing the fixture should be removed for disposal, not cleaned.

- The photo depicts a ballast stained with asphaltic potting (insulating) material. Note that PCB ballasts contain a small liquid-filled PCB capacitor.
- This is considered a “leaking” ballast and, if it is a PCB Ballast, it **MUST BE INCINERATED** at a TSCA PCB incinerator.
- The site incinerates ALL PCB lamp ballasts and PCB small capacitors at TSCA incinerators.



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