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PCB Annual Report for Oak Ridge National Laboratory - 1985

B. D. Barkenbus

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Department of Environmental Management
Environmental and Occupational Safety Division

PCB ANNUAL REPORT FOR OAK RIDGE NATIONAL LABORATORY-1985

B. D. Barkenbus

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ABSTRACT

It is the policy of the Oak Ridge National Laboratory (ORNL) to submit a Polychlorinated Biphenyl (PCB) Annual Report as required by the Toxic Substances Control Act (TSCA) and the U.S. Environmental Protection Agency regulations. Stringent government regulations control the use and disposal of PCB materials. These regulations require accurate recordkeeping by the owner/operator of a facility where PCBs are in use. This report details ORNL efforts to comply with the TSCA regulations found in Title 40, Code of Federal Regulations and contains records of: (a) PCB equipment in use and removed from service; and (b) PCB wastes generated, stored, and shipped off-site during calendar year 1985.

1.0 INTRODUCTION

Polychlorinated biphenyls (PCBs) are a family of chlorinated aromatic hydrocarbons. They are used extensively in electrical equipment, such as transformers and capacitors, because of their dielectric properties, chemical stability, and fire resistance. PCBs are also used in industry as fluids for heat transfer systems, fire retardants, and plasticizers.

It is known that PCBs can be detrimental to human and animal health due to their persistent nature in the environment. Because they are relatively insoluble in water and highly soluble in liquids, they can accumulate in body fats of humans and animals. The known toxic effects of PCBs in humans include an acne-like skin eruption, pigmentation of the skin and nails, excessive eye discharge, swelling of eye lids, and distinctive hair follicles. There is also a possible association between occupational exposure to PCBs and cancer in humans (NIOSH, Polychlorinated Biphenyls, Current Intelligence Bulletin 7, November 3, 1975, pp. 51-58).

The control of PCBs was mandated by Congress under the Toxic Substance Control Act (TSCA) of 1976, Public Law 94-469, Section 6 (e). To enforce TSCA, the Environmental Protection Agency (EPA) enacted regulations which are published in the Code of Federal Regulations (CFR) under Title 40, Part 761. Subpart B of 40 CFR 761, outlines requirements pertaining to the manufacture, processing, distribution, and use of PCBs. Marketing and labeling requirements are specified in Subpart C and storage and disposal requirements in Subpart D.

The recordkeeping responsibilities of the owner or operator of a facility using or storing PCBs are detailed in 40 CFR 761.180. In addition to various recordkeeping requirements, an annual report is to be prepared for each facility by July 1, covering the previous calendar year. The Oak Ridge National Laboratory (ORNL) submits a PCB Annual Report as required by the TSCA for each calendar year.

ORNL manages PCB- and PCB-contaminated wastes, which are stored on-site before their disposal at an EPA approved off-site disposal facility. In addition, there are PCB articles, PCB containers, PCB equipment, and PCB-contaminated electrical equipment (see 40 CFR 761.3 for definitions) at ORNL which are still in active use.

On December 16, 1985, an EPA-TSCA Compliance Representative conducted a PCB inspection of ORNL. The audit was very favorable. No record of violation was recorded.

The 1985 annual report includes several additions and changes from the 1984 report. Detailed tables on equipment and waste shipments (as well as PCB wastes remaining in storage) have been inserted in the 1985 report. The inventory list has been expanded to include large high or low voltage capacitors. PCB Information for ORNL facilities located at Y-12 are included in the Y-12 PCB Annual Report for calendar year 1985.

This document includes the following specific information for the PCB-related activities at ORNL:

1. PCB Equipment Summary Report;
2. PCB Transformers (> 500 ppm) In Service;
3. PCB Transformers Removed from Service;
4. PCB Large High or Low Voltage Capacitors In Service;
5. Miscellaneous PCB Equipment > 500 ppm;
6. Liquid PCB Waste Shipped Off-Site for Disposal - CY 85;
7. Solid PCB Waste Shipped Off-Site for Disposal - CY 85; and
8. Solid PCB Waste Inventory in Storage - End of CY 85.

The inventory summary list of PCB transformers < 500 ppm in concentration (PCB-contaminated and non-PCB transformers) is included as Appendix A.

2.0 PCB REGULATIONS

The latest and most encompassing federal law on toxicology and safety with which industry must comply is TSCA. The goal of this act is to provide EPA with the authority to regulate chemical substances and mixtures which present an unreasonable risk of injury to human health or to the environment. To achieve this goal, TSCA implementation activities emphasize not only control of specific problems under TSCA regulatory provisions, but the use of TSCA authorities to support other governmental and nongovernmental programs to control toxic substances.

Perhaps the most significant impact of TSCA on ORNL has been the regulations dealing with PCBs. Section 6 (e) of TSCA requires the EPA to control the manufacture, processing, distribution in commerce, use, and disposal of PCBs. EPA issued a final PCB rule on August 25, 1982, that amended the May 31, 1979, PCB rule. This action authorizes the use of PCBs in capacitors and the use and servicing of PCBs in electromagnets, circuit breakers, voltage regulators, cables, and switches. Transformer use (other than railroad transformers) is also covered by this rule. To implement this PCB-control program, EPA, among other provisions, has:

1. Banned the manufacture, distribution in commerce, and use of PCBs in other than a "totally enclosed manner";

2. Established categories of transformers [e.g., PCB transformers (> 500 ppm), PCB-contaminated electrical equipment (50-500 ppm), and non-PCB transformers (< 50 ppm)];

3. Set a ruling that a PCB transformer may be converted to PCB-contaminated electrical equipment or to non-PCB transformer by draining, refilling, and/or otherwise servicing the transformer;

4. Established criteria for the disposal of PCBs, PCB articles (transformers, PCB capacitors, PCB hydraulic machines, PCB-contaminated electrical equipment, and other PCB articles), PCB containers, and PCBs resulting from the clean-up and removal of spills (40 CFR 761.60);

5. Established standards for the marking (40 CFR 761.40), storage, and spill prevention of PCBs and PCB-contaminated liquids and solids (40 CFR 761.65);

6. Prohibited the use of PCB transformers and PCB-filled electromagnets (with concentrations of 500 ppm or greater) posing an exposure risk to food and feed after October 1, 1985;

7. Authorized the use of all other PCB transformers for the remainder of their useful lives and required a quarterly inspection of this equipment for leaks of dielectric fluids; and

8. Authorized the use of large capacitors that are located in restricted access electrical substations or in contained and restricted indoor installations for the remainder of their useful lives. The use of all other large PCB capacitors after October 1, 1988, however, is prohibited.

On July 17, 1985, EPA published a final rule entitled "Polychlorinated Biphenyls in Electrical Equipment." Through this regulation (50 CFR 29170), EPA took action to reduce fire-related risks posed by the use of PCB transformers ($\geq$ 500 ppm). EPA makes a distinction between "commercial buildings" and "industrial buildings" in interpretation of the rules. In the rules (40 CFR 761.30) EPA:

1. Prohibits further installation of PCB transformers in or near commercial buildings by October 1, 1985;

2. Requires the registration of all PCB transformers with fire response personnel and building owners by December 1, 1985;

3. Requires the removal of stored combustibles located near PCB transformers (within 5 m) by December 1, 1985;

4. Requires marking of the exterior of all PCB transformer locations by December 1, 1985 (40 CFR 761.40);

5. Prohibits the use of higher secondary voltage (480 volts and above) "network" PCB transformers in or near commercial buildings by October 1, 1990;

6. Requires the installation of enhanced electrical protection on lower secondary voltage "network" PCB transformers and higher secondary voltage "radial" PCB transformers in use in or near commercial buildings by October 1, 1990; and

7. Requires the owners of PCB transformers involved in fire-related incidents to immediately notify the National Response Center (1-800-424-8802).

3.0 RECORDS AND REPORTING

Detailed tracking of PCB materials at ORNL is accomplished via the PCB Tracking System (PCBTS), the Hazardous Material Tracking System (HMTS), and the Program Maintenance Report (PMR).

A computer inventory listing of equipment in use is generated via the PCBTS. The PCBTS supplies information such as: equipment serial number, equipment location, concentration (ppm) of PCB, gallon and kilogram capacity, and date removed from service for each piece of equipment. Table 1 is the total listing of PCB equipment at ORNL. Lists of transformers grouped by concentrations of PCB and large capacitors are also available via the PCBTS.

Under the Interim Measures Program, PCB transformers of 500 ppm or greater are to be inspected quarterly. In compliance with this regulation, two types of inspections take place. The Plant and Equipment Division conducts monthly preventive maintenance inspections which are documented in the Program Maintenance Report (PMR) database. This database stores inspection reports on each transformer and includes the inspectors' initials, badge number, date, comments, and action taken. Through this system, a specific transformer can be referenced by program maintenance number and all inspection reports reviewed in chronological order.

Secondly, DEM personnel (ORNL TSCA Coordinator) conduct quarterly audit-type inspections of the PCB transformers. These inspections are utilized to check regulatory compliance requirements.

Records of PCB wastes generated are entered into the HMTS along with records of other wastes handled at ORNL. The PCBTS copies the PCB records from this file and produces various reports. Total solid and liquid wastes shipped off-site and stored during a specific time period can be generated by PCBTS.

Table 1. PCB Equipment Summary Report

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
90201110	Emerg. Generator	0902	49	50.000	189.500
72V9421	Transformer	1504	13	220.000	833.800
8110081	Transformer	2000	14	390.000	1478.100
Siemens 250K	L-Capacitor	2008	1000000	40.000	151.600
Custom Built	L-Capacitor	2008	1000000	80.000	303.200
X117378	Emerg. Generator	2011	49	285.000	1080.000
202600110	Emerg. Generator	2026	49	285.000	1080.000
PE100005	Transformer	2026	1000000	140.000	530.600
X119045	Emerg. Generator	2088	49	285.000	1080.000
2506-098	Twin Mill	2506	19	.500	2.000
2519-002	Air Compressor	2519	31	.250	1.000
2519-003	Air Compressor	2519	49	.250	1.000
X118754	Emerg. Generator	2521	49	285.000	1080.000
2525-032	16" Lathe	2525	49	10.000	37.900
2525-029	Trecker Mill	2525	15	10.000	37.900
2525-028	Grinder	2525	28	3.000	11.370
2525-063	Cut Off Saw	2525	11	5.000	18.950
2525-048	Grinder	2525	7	10.000	37.900
2525-049	Grinder	2525	18	10.000	37.900
2525-705	12" Lathe	2525	19	16.000	60.640
X92876	Emerg. Generator	2572	49	285.000	1080.000
2371106	Transformer	2632	18	1297.000	4915.630
8110079	Transformer	3000	13	1350.000	5116.500
8110080	Transformer	3000	16	1350.000	5116.500
8110078	Transformer	3000	29	1350.000	5116.500
PKR-94711	Transformer	3010	30	260.000	985.400
3012-015	Rollermill	3012	16	5.000	18.950
3012-111213	Turburg Reducer	3012	34	192.000	727.680
X105593A	Hydraulic	3012	950000	150.000	568.500
X105593	Turburg Reducer	3012	454	20.000	75.800
3012-004	Rollermill	3012	49	5.000	18.950

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
3012-017	Rollermill	3012	32	400.000	1516.000
X104416	Pump	3012	549	2.000	7.580
3012-016	Rollermill	3012	15	150.000	568.500
X58191	Shear	3012	28	2.000	7.580
X95204	Pump	3012	149	2.500	9.475
2546-1	Transformer	3012	10	80.000	303.200
2546-2	Transformer	3012	39	80.000	303.200
2546-3	Transformer	3012	29	80.000	303.200
X96051	Vacuum Pump	3012	53	1.000	3.790
3019-001	Pipe Threader	3019	49	2.000	7.580
3024-234	12" Lathe	3024	49	15.000	56.850
3024-246	Saw	3024	11	20.000	75.800
3024-194	Mill	3024	49	15.000	56.850
3024-201	Shaper	3024	49	10.000	38.000
3024-238	10" Lathe	3024	49	15.000	56.850
3024-141	Washer	3024	49	20.000	75.800
3024-236	Mill	3024	29	20.000	75.800
3024-269	Grinder	3024	83	3.000	11.370
3024-1101	Thread Grinder	3024	49	150.000	568.500
3024-264	10" Lathe	3024	49	15.000	56.850
3024-260	10" Lathe	3024	49	15.000	56.850
3024-259	10" Lathe	3024	49	15.000	56.850
3024-258	Grinder	3024	1436	1.000	3.790
3024-243	10" Lathe	3024	49	.500	2.000
3024-425	10" Lathe	3024	49	15.000	56.850
3024-240	10" Lathe	3024	49	15.000	56.850
3024-233	12" Lathe	3024	49	.500	2.000
3024-237	10" Lathe	3024	49	15.000	56.850
7910-8480T	L-Capacitor (4)	3025	1000000	1.200	4.548
3025-002	Vacuum Pump	3025	49	.250	1.000
F496875-64P	Transformer	3025	< 5	80.000	303.200

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
F497849-64P	Transformer	3025	< 5	80.000	303.200
F497848-64P	Transformer	3025	< 5	80.000	303.200
3025-007	Milling Machine	3025	18	.250	1.000
X51212	Air Monitor	3025	28	.250	1.000
66710	Transformer	3039	29	130.000	492.700
66711	Transformer	3039	10	130.000	492.700
303901020	Sump Pump	3039	49	7.000	27.000
X67432	Vacuum Pump	3044	8	.250	1.000
1814098	Vacuum Pump	3044	36	.500	2.000
3044-365	Elox Machine	3044	6	55.000	208.450
3044-378	Mill	3044	9	2.000	7.580
3044-370	Mill	3044	7	2.000	7.580
3044-360	Centerless Grinder	3044	40	2.000	7.580
3044-358	Surface Grinder	3044	65	15.000	56.850
3044-366	Metal Cut-off Saw	3044	8	2.000	7.580
7351430	Transformer	3047	36	350.000	1326.500
FRT-3	L-Capacitor (4)	3095	1000000	.800	3.032
A17055	L-Capacitor	3500	1000000	3.700	14.023
03646	L-Capacitor	3500	1000000	3.700	14.023
853557	L-Capacitor	3500	1000000	16.000	60.640
9-1502-00092	L-Capacitor	3500	1000000	7.500	28.425
T093119	L-Capacitor (9)	3500	1000000	4.000	15.160
3502-451	10" Lathe	3502	49	15.000	56.850
3502-562	10" Lathe	3502	49	15.500	58.745
3502-450	10" Lathe	3502	49	15.000	56.850
3525-054	12" Lathe	3525	6	.500	2.000
3525-055	Gear Box	3525	49	.250	1.000
410229	L-Capacitor	3525	1000000	5.200	19.708
001	L-Capacitor	3525	1000000	6.200	23.498
59298	Transformer	3525	2	197.000	746.630
3525-023	Waste Press	3525	301	2.000	7.580

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
60569	Vacuum Pump	3525	32	.250	1.000
X85102	Air Monitor	3525	28	.250	1.000
X83058	Emerg. Generator	3598	49	400.000	1516.000
4500S-039	Oil Bath	4500S	49	5.000	8.950
B48A	L-Capacitor (6)	4500S	1000000	1.200	4.548
7449T	L-Capacitor (2)	4500S	1000000	1.200	4.548
B54	L-Capacitor (18)	4500S	1000000	1.200	4.548
29A104	L-Capacitor 12)	4500S	1000000	.360	1.364
55069	L-Capacitor (12)	4500S	1000000	.360	1.364
4-760	L-Capacitor	4500S	1000000	.900	3.411
7375505	Transformer	4500S	1000000	829.000	3141.910
7367598	Transformer	4500S	1000000	829.000	3141.910
154363	Transformer	4501	< 5	364.000	1379.560
4501-002	13" Lathe	4501	146	.500	2.000
4501-001	10" Lathe	4501	49	.500	2.000
KOA1104-2-1	L-Capacitor (3)	4501	1000000	.400	1.516
A41482	L-Capacitor (2)	4501	1000000	1.900	7.201
79F204	L-Capacitor (6)	4501	1000000	4.000	15.160
49177	Transformer	4505	4	200.000	758.000
7367553	Transformer	4508	28	500.000	1895.000
19F86	L-Capacitor (10)	4508	1000000	2.500	9.475
7367549	Transformer	4508	26	500.000	1895.000
7367553REG	Transformer	4508	5	112.000	425.000
7367549REG	Transformer	4508	8	112.000	425.000
C297207	L-Capacitor	4508	1000000	6.400	24.256
69-03378-9-0	L-Capacitor (3)	4508	1000000	10.200	38.658
7375507	Transformers	4509	1000000	829.000	3141.910
1902056	Transformers	4509	9	682.000	2584.780
1902057	Transformers	4509	7	682.000	2584.780
1902055	Transformers	4509	17	682.000	2584.780
Y53390	Power Hack	5500	49	.500	2.000

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
5500-999	Pump	5500	49	3.000	11.370
X131220	Pump	5500	49	3.000	11.370
D-578512	Transformer	6000	1000000	340.000	1288.910
7375510	Transformer	6000	1000000	829.000	3141.910
6000-077	Vacuum Pump	6000	11	.250	1.000
6000-066	Vacuum Pump	6000	163	.250	1.000
6000-065	Vacuum Pump	6000	163	.250	1.000
6000-064	Vacuum Pump	6000	180	.250	1.000
E-694971	Transformer	6000	1000000	225.000	1004.350
D-554601	Transformer	6000	1000000	800.000	3032.000
12446	Transformer	6000	1000000	375.000	1421.250
7375500	Transformer	6000	1000000	829.000	3141.910
6000-057	Pipe Threader	6000	49	1.000	3.790
6000-052	Oil Reclaimer	6000	96	1500.000	5685.000
6000-063	Oil Reclaimer	6000	247	1500.000	5685.000
FRT6-2	L-Capacitor (4)	6000	1000000	.800	3.032
FRT6-1	L-Capacitor (4)	6000	1000000	.800	3.032
W-1	L-Capacitor (9)	6000	1000000	6.600	25.014
LING-1	L-Capacitor (3)	6000	1000000	1.580	5.988
6010-248	Vacuum Pump	6010	49	.500	2.000
572308L	Air Compressor	6010	49	.500	2.000
6010-037	Hydraulic System	6010	49	40.000	151.600
6010-062	Lathe	6010	49	3.000	11.370
6010-075-1	Power Supply	6010	6	350.000	1326.500
6010-076-2	Power Supply	6010	49	350.000	1326.500
6010-077-3	Power Supply	6010	7	350.000	49.270
6010-078-4	Power Supply	6010	13	350.000	1326.500
6010-079-4	Power Supply	6010	49	300.000	1137.000
6010-080-3	Power Supply	6010	49	300.000	1137.000
6010-082-1	Power Supply	6010	49	300.000	1137.000
F959883	Transformer	6010	< 2	300.000	1137.000

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
F643634-67P	Transformer	6010	46	94.000	356.260
F959884	Transformer	6010	2	180.000	682.200
G4-5165-01	L-Capacitor (2)	7003	1000000	3.900	14.781
3160686	Transformer	7033	46	110.000	416.900
27140-16	Transformer	7033	18	237.000	898.230
A59465	Transformer	7033	< 5	80.000	303.200
15198	Transformer	7033	13	225.000	890.650
A59466	Transformer	7033	< 5	80.000	303.200
A59469	Transformer	7033	< 5	80.000	303.200
27140-11	Transformer	7033	10	237.000	898.230
8671542	Transformer	7033	5	45.000	170.550
6589125	Transformer	7033	7	50.000	189.500
B339639	Transformer	7033	22	185.000	701.150
B339640	Transformer	7033	13	185.000	701.150
957331	Transformer	7033	10	150.000	568.500
8671187	Transformer	7033	46	50.000	189.500
B339641	Transformer	7033	8	185.000	701.150
6154018	Transformer	7033	43	40.000	151.640
3153348	Transformer	7033	5	55.000	208.450
1901716	Transformer	7033	< 5	210.000	795.900
27140-20	Transformer	7033	19	237.000	898.230
27140-10	Transformer	7033	16	237.000	898.230
MONSON-1	L-Capacitor (4)	7041	1000000	.800	3.032
M9D1623	Transformer	7500	25	145.000	549.550
7500-002-1	Feed Pump	7500	49	3.000	11.370
2P175	Feed Pump	7500	49	10.000	37.900
7500-007	Circulating Pump	7500	49	1.000	3.790
M9D1625	Transformer	7500	3	145.000	549.550
M9D1621	Transformer	7500	28	145.000	549.550
7500-014	Crane	7500	49	1.000	3.790
107182	Vacuum Pump	7505	49	.250	1.000
7506-008	Pipe Threader	7506	49	2.000	7.580

Table 1. (Continued)

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
7506-268	Pipe Threader	7506	49	2.000	7.580
7516-001	Pipe Cutter	7516	49	5.000	18.950
7600-011	Hydraulic Blower	7600	49	10.000	37.900
7603-038	Stock Lift	7603	49	15.000	56.850
X57992	Electric Motor	7605	9	.500	2.000
7603-1096	Pipe Threader	7606	49	2.000	7.580
378584	Pipe Threader	7606	49	2.000	7.580
B5H8007	Transformer	7700	5	145.000	549.550
40101	Air Compressor	7700	38	.250	1.000
T35H8007	Transformer	7700	11	145.000	549.550
A9F1211	Transformer	7700	11	145.000	549.550
A9F1213	Transformer	7700	9	145.000	549.550
756725	Fork Lift	7709	49	1.000	3.790
X56503	Lathe	7710	49	5.000	18.950
X103336	Lathe	7710	49	4.000	15.160
X15523	Lathe	7710	49	4.000	15.160
7731582	Transformer	7710	38	500.000	1895.000
R-3333	Transformer	7901	1000000	31.000	117.490
R-3334	Transformer	7901	1000000	31.000	117.490
7367568REG	Transformer	7901	41	119.000	451.118
2371103	Transformer	7901	< 2	1297.000	4915.630
7731801	Transformer	7901	53	499.000	1891.210
7731581REG	Transformer	7901	10	119.000	451.118
9L18ACE301	L-Capacitor (3)	7901	1000000	.450	1.705
7373793	Transformer	7901	68	500.000	72.027
7731581	Transformer	7901	45	499.000	1891.660
3428808	Transformer	7901	15	200.000	758.000
7367568	Transformer	7901	28	499.000	1891.660
7367568SW	Transformer	7901	42	19.000	72.030
7022144	Transformer	7920	38	275.000	1042.250
7921-001	Emerg. Generator	7921	49	10.000	37.900
7921-003	Crane	7921	49	12.000	45.480
7930-009	Hydraul. Waste Pan	7930	49	.250	1.000

4.0 PCB TRANSFORMERS

During 1985, there were twelve PCB transformers in use at ORNL. All of these transformers are indoors except one (serial number PE 100005). There are plans to replace these transformers with non-PCB transformers in 1986. Table 2 lists these transformers, their location, serial number, PCB concentration, and capacity. Their total capacity is 6,087 gal. and weight is 23221.64 kgs.

There was only one PCB transformer shipped off-site during 1985. This transformer was removed from service in 1984 and kept as a spare; however, later it was drained of its oil and moved to storage for disposal (see Table 3). It was shipped on 10/31/85 to the Rollins facility in Deer Park, Texas.

The July 17, 1985, regulations concerning PCBs in electrical equipment have been implemented vigorously. PCB transformers have been registered by "building owners" who are staff members responsible for the transformers at that location and the ORNL Fire Department. Numerous inspections are conducted to ensure that no combustibles are located near PCB transformers. Classification of ORNL buildings for their "commercial" and "industrial" status are described in an action plan which is included in Appendix B. All ORNL PCB transformers are high voltage radial transformers.

During 1985, sixty-six non-PCB transformers (< 50 ppm) were resampled to check their PCB concentration. These transformers were chemically treated between 1980 and 1984 to decrease their concentration from < 500 ppm to < 50 ppm, thereby converting them to non-PCB transformers. Only two of these transformers have exceeded 50 ppm PCB concentration (one was 53 ppm and the other 68 ppm) during the recent sampling. The list of these transformers are included in Appendix A with the recent concentration figures.

There are three non-PCB transformers (with serial numbers 1901716, 6589125, and 1901716) which are kept as spares.

Table 2. PCB Transformers > 500 PPM

Serial Number	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
PE100005	2026	1000000	140.000	530.600
7375505	4500S-W1	1000000	829.000	3141.910
7367598	4500S-W2	1000000	829.000	3141.910
7375507	4509	1000000	829.000	3141.910
7375500	6000	1000000	829.000	3141.910
12446	6000	1000000	375.000	1421.250
D-554601	6000	1000000	800.000	3032.000
E-694971	6000	1000000	225.000	1004.350
7375510	6000	1000000	829.000	3141.910
D-578512	6000	1000000	340.000	1288.910
R-3333	7901	1000000	31.000	117.490
R-3334	7901	1000000	31.000	117.490
TOTAL NUMBER = 12		TOTAL	6087.000	23221.640

Table 3. PCB Transformers Removed From Service

Serial Number	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms	Date Removed From Service	Date to Storage	Date Shipped	Manifest	Disposer	Date of Disposal
H363007P72AA	7033	0 (Drained)	115.000	435.85	10/16/84	7/26/85	10/31/85	00045236	Rollins, Deer Park, TX	12/23/85
TOTAL NUMBER = 1		TOTAL	115.000	435.85						

5.0 PCB CAPACITORS

The ORNL electrical system does not have any PCB large high or low voltage capacitors; however, there are various research related instruments which contain them. A PCB large high voltage capacitor under TSCA means a capacitor which contains 1.36 kg (3 lbs.) or more of dielectric fluid and operates at 2,000 volts or above. PCB low voltage capacitor means a capacitor which contains 1.36 kg (3 lbs.) or more of dielectric fluid and operates below 2,000 volts. A capacitor whose total volume is less than 1,639 cubic centimeters (100 cubic inches) may be considered to contain less than 1.36 kg (3 lbs.) of dielectric fluid. These capacitors were inventoried this year and are included in this annual report. Presently, one hundred and forty-four large capacitors are included in the database system. The weight of these PCBs totals 821.10 kg (216.65 gal). The list of the capacitors is included as Table 4. Identical capacitors at the same location are grouped and a single serial number is assigned to them.

No large PCB capacitors were removed from service in 1985. At ORNL, there are various light ballasts and small PCB capacitors that are packed in DOT drums and shipped off-site in accordance with the EPA/TSCA regulations for disposal. These PCB items are included in tables of Section 8, PCB Waste Totals, as part of the waste inventories.

Table 4. Large High and Low Voltage PCB Capacitors

Serial Number	Quantity	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
CUSTOM BUILT	1	2008	1000000	80.000	303.200
SIEMENS 250KV	1	2008	1000000	40.000	151.600
41061005V-21	4	2525	1000000	.800	3.032
10C275P59-16	3	2525	1000000	.800	3.032
10C275P59-16	3	2525	1000000	.600	2.274
41061005V-21A	4	2525	1000000	.600	2.274
7910-84801	4	3025	1000000	1.200	4.548
FRT-3	4	3095	1000000	.800	3.032
A17055	1	3500	1000000	3.700	14.023
03646	1	3500	1000000	3.700	14.023
853557	1	3500	1000000	16.000	60.640
9-1502-00092-5	1	3500	1000000	7.500	28.425
T093119	9	3500	1000000	4.000	15.160
001	1	3525	1000000	6.200	23.498
410229	1	3525	1000000	5.200	19.708
B48A	6	4500S	1000000	1.200	4.548
7449T	2	4500S	1000000	1.200	4.548
55069	12	4500S	1000000	.360	1.364
B54	18	4500S	1000000	1.200	4.548
29A104	12	4500S	1000000	.360	1.364
4-760	1	4500S	1000000	.900	3.411
KOA1104-2-1	3	4501	1000000	.400	1.516
A414B2	2	4501	1000000	1.900	7.201
79F204	6	4501	1000000	4.000	15.160
19F86	10	4508	1000000	2.500	9.475
C297207	1	4508	1000000	6.400	24.256
69-03378-9-0	3	4508	1000000	10.200	38.658
FRT6-2	4	6000	1000000	.800	3.032
FRT6-1	4	6000	1000000	.800	3.032

Table 4. (Continued)

Serial Number	Quantity	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
LING-1	3	6000	1000000	1.580	5.988
W-1	9	6000	1000000	6.600	25.014
G4-5165-01	2	7003	1000000	3.900	14.781
MONSON-1	4	7041	1000000	.800	3.032
9L18ACE301	3	7901	1000000	.450	1.705
TOTAL NUMBER = 144			TOTAL	216.650	821.103

6.0 PCB EQUIPMENT

In addition to PCB transformers and large PCB capacitors, ORNL has three pieces of PCB equipment (> 500 ppm). These items are summarized in Table 5. Their total PCB capacity is 579.97 kg (153 gal).

Table 5. Miscellaneous PCB Equipment > 500 ppm

Serial Number	Type	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
3024-258	Grinder	3024	1,436	1.000	3.790
X104416	Pump	3012	549	2.000	7.580
X105593A	Hydraulic Unit	3012	950,000	150.000	568.500
TOTAL NUMBER = 3			TOTAL	153.000	579.870

7.0 PCB WASTE CHARACTERIZATION

PCB wastes at ORNL generally consist of contaminated oils, small capacitors, fluorescent light ballasts, contaminated solids, (e.g., rags, papers), and transformer carcasses. There is a very small amount of radioactively contaminated PCB waste which is stored on the 7507 West Pad.

PCB-contaminated oils are classified into oils containing > 2 ppm but < 500 ppm of PCBs and oils with > 500 ppm PCBs. Most of these oils are being used as dielectric fluids for electrical equipment (e.g., transformers and capacitors) or in heat exchange systems. Low concentrations of PCBs (> 2, < 50 ppm) are frequently detected in waste oils from various sources. Oils with $\geq$ 500 ppm of PCBs are found primarily in PCB transformers still in use and are potential contamination sources.

Some PCB wastes are also generated due to unintentional spills and releases; for example, transformers rupturing, light ballasts leaking, or PCB oil spills. There have been no known environmental consequences from these incidents. In each case, samples were taken and areas were decontaminated. A history of PCB-related incidents/spills at ORNL, including 1985, has been included as Appendix C.

The PCB-contaminated (> 2 ppm) wastes are shipped off-site for disposal. They are manifested in the same manner as RCRA hazardous wastes and manifest records are kept at the Department of Environmental Management, Environmental and Occupational Safety Division.

8.0 PCB WASTE TOTALS

Annual waste inventories at ORNL are tracked by the use of the HMTS and PCBTS computer database. The HMTS and PCBTS are utilized to generate reports for those materials which are shipped off-site as well as those remaining in storage at the end of the calendar year. These reports are also separated into categories for solid and liquid wastes.

At the end of the 1984 calendar year, there was no PCB waste left in storage at ORNL. Consequently, all the waste shipped off-site was generated during 1985. The total PCB waste generated in 1985 is 2930.94 kg of solid waste and 9285.50 kg (2450 gal) of liquid waste.

In 1985, a total of 2476.31 kg of solid waste and 7409.45 kg (1955 gal) of liquid PCB waste were shipped to an off-site contractor. Two shipments were made to the Rollins Environmental Services Inc. facility in Deer Park, Texas. These shipments were: a) 44 drums of PCB waste shipped on October 31, 1985, and b) 3 drums of PCB waste shipped on February 26, 1985. These wastes were incinerated and/or placed in a landfill. In addition, ORNL shipped 18 drums of waste on October 31, 1985, and 31 drums on February 26, 1985, which were generated at the Y-12 site. The Y-12 PCB Annual Report will provide detailed information on the ORNL wastes generated at the Y-12 site.

Information as to the source of the waste, number of drums generated, weight, concentration groupings, dates of storage, shipments, and disposer also are available from the PCBTS. Thirty-four drums of liquid PCB waste with concentrations of < 500 ppm and three drums of liquid waste with concentrations of > 500 ppm were manifested in 1985 (see Table 6). The PCB concentration of the solid wastes (consisting of oily rags, light ballasts, and small capacitors) has not been determined. There were ten drums of solid waste manifested in 1985 (see Table 7).

At the end of CY 1985, there was no liquid PCB waste left in the Hazardous Waste Storage Facility, Building 7507. A total of four drums of

Table 6. Liquid PCB Waste Shipped Off-Site for Disposal
CY-1985

Disposal Container	Location	Waste Description	Drum Weight in kg	PCB:PPM	Date to Storage	Date Shipped	Disposer
119B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
120B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
121B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
122B	2018	Transformer Oil	208.45	10	7/23/85	10/31/85	Rollins
123B	2018	Transformer Oil	208.45	10	7/23/85	10/31/85	Rollins
124B	2018	Transformer Oil	208.45	10	7/23/85	10/31/85	Rollins
125B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
126B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
127B	2018	Transformer Oil	208.45	6	7/23/85	10/31/85	Rollins
145B	7033	Transformer Oil	208.45	13	7/26/85	10/31/85	Rollins
146B	7033	Transformer Oil	208.45	15	7/26/85	10/31/85	Rollins
147B	7033	Transformer Oil	208.45	15	7/26/85	10/31/85	Rollins
148B	7033	Transformer Oil	208.45	10	7/26/85	10/31/85	Rollins
149B	7033	Transformer Oil	208.45	13	7/26/85	10/31/85	Rollins
150B	7033	Transformer Oil	208.45	10	7/26/85	10/31/85	Rollins
151B	7033	Transformer Oil	208.45	320	7/26/85	10/31/85	Rollins
152B	7033	Transformer Oil	113.70	228	7/26/85	10/31/85	Rollins
153B	7033	Transformer Oil	208.45	59	7/26/85	10/31/85	Rollins
154B	7033	Transformer Oil	208.45	9	7/26/85	10/31/85	Rollins
182B	7033	Transformer Oil	94.75	21	9/11/85	10/31/85	Rollins
208B	4500S	Oil	208.45	31000	10/02/85	10/31/85	Rollins
210B	3012	Oil	208.45	360	10/02/85	10/31/85	Rollins
212B	3012	Oil	208.45	130	10/02/85	10/31/85	Rollins
231B	6010	Oil	208.45	8	10/23/85	10/31/85	Rollins
31B	2018	Transformer Oil	208.45	49	3/19/85	10/31/85	Rollins
32B	2018	Transformer Oil	208.45	499	3/19/85	10/31/85	Rollins
33B	2018	Transformer Oil	208.45	5	3/19/85	10/31/85	Rollins
34B	2018	Transformer Oil	208.45	5	3/19/85	10/31/85	Rollins
35B	2018	Transformer Oil	208.45	5	3/19/85	10/31/85	Rollins
36B	2018	Transformer Oil	208.45	5	3/19/85	10/31/85	Rollins

Table 6. (Continued)
CY-1985

Disposal Container	Location	Waste Description	Drum Weight in kg	PCB:PPM	Date to Storage	Date Shipped	Disposer
37B	2018	Transformer Oil	208.45	9	3/19/85	10/31/85	Rollins
38B	2018	Transformer Oil	113.70	25	3/19/85	10/31/85	Rollins
39B	2018	Transformer Oil	208.45	25	3/19/85	10/31/85	Rollins
79B	7033	Pyranol	208.45	1000000	5/16/85	10/31/85	Rollins
80B	7033	Pyranol	208.45	1000000	5/16/85	10/31/85	Rollins
81B	7033	Kerosene	208.45	47000	5/16/85	10/31/85	Rollins
82B	7033	Kerosene	208.45	47000	5/16/85	10/31/85	Rollins
		TOTAL	7409.45				

TOTAL DRUMS = 37
TOTAL GALLONS = 1955.00

Table 7. Solid PCB Waste Shipped Off-Site for Disposal
CY-1985

Disposal Container	Location	Waste Description	Drum Weight in kg	PCB:PPM	Date to Storage	Date Shipped	Disposer
118B	4500S	PCB Ballasts	208.45	-	7/23/85	10/31/85	Rollins
14	4500N	PCB Ballasts	208.45	-	2/26/85	2/26/85	Rollins
155B	7033	PCB Transformer	681.82	-	7/26/85	10/31/85	Rollins
18B	2018	PCB Ballasts	208.45	-	3/05/85	10/31/85	Rollins
207	2018	PCB Ballasts	208.45	-	12/11/84	2/26/85	Rollins
208	2018	PCB Ballasts	208.45	-	12/11/84	2/26/85	Rollins
209B	2018	PCB Ballasts	208.45	-	10/02/85	10/31/85	Rollins
20B	2018	PCB Ballasts	221.65	-	3/05/85	10/31/85	Rollins
211B	3012	PCB Contaminated Solids (Rags, Paper)	113.70	-	10/02/85	10/31/85	Rollins
92B	2018	PCB Ballasts	208.45	-	6/19/85	10/31/85	Rollins
TOTAL DRUMS = 10		TOTAL	2476.3131				

Table 8. PCB Solid Waste Inventory in Storage at End of CY-1985

Disposal Container	Location	Waste Description	Drum Weight in kg	PCB:PPM	Date to Storage	Storage Location
255B	3500	PCB Capacitors	35.45	-	11/18/85	7507
256B	4500S	PCB Ballasts	208.45	-	11/20/85	7507
266B	7018	PCB Ballast	208.45	-	12/27/85	7507
322R*	1505	PCB Contaminated Solids	2.27	-	11/25/85	7507W
		TOTAL	454.62			

TOTAL DRUMS = 4

*R = Radioactively Contaminated

PCB solid waste remained in storage at the end of CY 1985 (see Table 8). One of these items (drum number 322R) is radioactively contaminated and therefore cannot presently be sent for disposal. In addition to this radioactively contaminated solid PCB waste (2.27 kg), there is also 11.37 kg (3 gal) of radioactively contaminated PCB oil in storage since November 6, 1986.

9.0 SUMMARY

The results of this report may be summarized as follows for ORNL facilities for CY 1985:

- There are 12 PCB transformers containing 23221.64 kg (6087 gal) of PCBs.

- One PCB transformer carcass was shipped off-site for disposal.

- There are 144 PCB large capacitors containing 821.10 kg (216.65 gal) of PCBs.

- There were no PCB large high or low voltage capacitors removed from service during 1985.

- There are 3 pieces of miscellaneous PCB equipment having over 500 ppm concentration which have a total weight of 579.87 kg (115 gal) of liquid PCBs.

- At the end of the 1984 calendar year, there was no PCB waste in storage. Consequently, the waste shipped off-site and that remaining in storage was generated solely in 1985. Totals for waste generated are 2930.94 kg solid waste and 9285.50 kg (2450 gal) liquid waste.

- A total of 2476.31 kg of solid waste and 7409.45 kg (1955 gal) of liquid waste was shipped off-site.

- There are 2.27 kg of radioactively contaminated PCB solid waste in storage, which was generated in 1985. There is also an additional 11.37 kg (3 gal) of contaminated PCB oil in storage since November 6, 1985.

- A total of 454.62 kg of solid waste remained in storage at the end of CY 1985.

- There was no liquid waste in storage at the end of CY 1985.

APPENDIX A

PCB Transformers < 500 PPM

PCB Transformers < 500 PPM

Serial Number	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
72V9421	1504	13	220.000	833.800
8110081	2000	14	390.000	478.100
2371106	2632	18	1297.000	4915.630
8110080	3000	16	1350.000	5116.500
8110078	3000	29	1350.000	5116.500
8110079	3000	13	1350.000	5116.500
PKR-94711	3010	30	260.000	985.400
2546-3	3012	29	80.000	303.200
2546-2	3012	39	80.000	303.200
2546-1	3012	10	80.000	303.200
F496875-64P	3025	< 5	80.000	303.200
F497849-64P	3025	< 5	80.000	303.200
F497848-64P	3025	< 5	80.000	303.200
66711	3039	10	130.000	492.700
66710	3039	29	130.000	492.700
7351430	3047	36	350.000	1326.500
59298	3525	2	197.000	746.630
154363	4501	5	364.000	1379.560
49177	4505	4	200.000	758.000
7367553	4508	28	500.000	1895.000
7367549REG	4508	8	112.000	425.000
7367549	4508	26	500.000	1895.000
7367553REG	4508	5	112.000	425.000
1902057	4509	7	682.000	2584.780
1902055	4509	17	682.000	2584.780
1902056	4509	9	682.000	2584.780
F643634-67P	6010	46	94.000	356.260
F959884	6010	< 2	180.000	682.200
F959883	6010	< 2	300.000	1137.000
15198	7033	13	225.000	890.650
6154018	7033	43	40.000	151.640
A59466	7033	< 5	80.000	303.200

PCB Transformers < 500 PPM - (Continued)

Serial Number	Location	PCB:PPM	Capacity Gallons	Capacity Kilograms
A59465	7033	< 5	80.000	303.200
A59469	7033	< 5	80.000	303.200
B339641	7033	8	185.000	701.150
B339640	7033	13	185.000	701.150
27140-16	7033	18	237.000	898.230
27140-10	7033	16	237.000	898.230
27140-20	7033	19	237.000	898.230
3153348	7033	5	55.000	208.450
1901716	7033	< 5	210.000	795.900
8671187	7033	46	50.000	189.500
957331	7033	10	150.000	568.500
3160686	7033	46	110.000	416.900
27140-11	7033	10	237.000	898.230
8671542	7033	5	45.000	170.550
6589125	7033	7	50.000	189.500
B339639	7033	22	185.000	701.150
M9D1623	7500	25	145.000	549.550
M9D1625	7500	3	145.000	549.550
M9D1621	7500	28	145.000	549.550
A9F1211	7700	11	145.000	549.550
A9F1213	7700	9	145.000	549.550
T35H8007	7700	11	145.000	549.550
B5H8007	7700	< 5	145.000	549.550
7731582	7710	38	500.000	1895.000
7731581	7901	45	499.000	1891.660
7373793	7901	68	500.000	72.027
7731581REG	7901	10	119.000	451.118
7731801	7901	53	499.000	1891.210
7367568SW	7901	42	19.000	72.030
7367568	7901	28	499.000	1891.660
7367568REG	7901	41	119.000	451.118

PCB Transformers < 500 PPM - (Continued)

Serial Number	Location	PCB:PPM		Capacity Gallons	Capacity Kilograms
3428808	7901	15		200.000	758.000
2371103	7901	< 2		1297.000	4915.630
7022144	7920	38		275.000	1042.250
TOTAL NUMBER = 66			TOTAL	20131.000	74513.633

APPENDIX B

Status, Classification, and Action Plan for PCB Transformers at X-10

ORNL PCB Transformers at X-10

ID #	Use/ Status	Location	Capacity		Concentration	Industrial (I) Commercial (C)	Action
R-3333	In Service	7901	31.00 gal	117.49 kg	1,000,000 ppm	I	Removal (1986-1987)[c]
R-3334	In Service	7901	31.00 gal	117.49 kg	1,000,000 ppm	I	Removal (1986-1987)[c]
PE-100005	In Service	2026	140.00 gal	530.60 kg	1,000,000 ppm	I[a,b]	Removal (1986-1987)[c]
7367598	In Service	4500S-W2	829.00 gal	3141.91 kg	1,000,000 ppm	C	Removal (12/85-7/86)
7375505	In Service	4500S-W1	829.00 gal	3141.91 kg	1,000,000 ppm	C	Removal (12/85-7/86)
7375507	In Service	4509	829.00 gal	3141.91 kg	1,000,000 ppm	I[b]	Removal (1986-1987)[c]
12446	In Service	6000	375.00 gal	1421.25 kg	1,000,000 ppm	C	Removal (1986-1987)[c]
7375500	In Service	6000	829.00 gal	3141.91 kg	1,000,000 ppm	C	Removal (1986-1987)[c]
7375510	In Service	6000	829.00 gal	3141.91 kg	1,000,000 ppm	C	Removal (1986-1987)[c]
D-554601	In Service	6000	800.00 gal	3032.00 kg	1,000,000 ppm	C	Removal (1986-1987)[c]
D-578512	In Service	6000	340.00 gal	1288.91 kg	1,000,000 ppm	C	Removal (1986-1987)[c]
E-694971	In Service	6000	225.00 gal	1004.35 kg	1,000,000 ppm	C	Removal (1986-1987)[c]

[a] Transformer is located outside.
[b] Electrician and substation operators are available at all times.
[c] Replacement contingent upon funding.

APPENDIX C

History of PCB-Related Incidents/Spills at ORNL

History of PCB-Related Incidents/Spills at ORNL

Date	Location	Material	Amount
May 6, 1981	3026	PCB Oil (Transformer) < 5 ppm	Small amount
July 27, 1981	3012	PCB Oil	378.5 L (100 gal)
August 3, 1981	6000	PCB Oil	3.78 L (1 gal)
August 12, 1983	4500S, R-211	PCB Oil (light ballast) 480,000 ppm	0.01 L (0.003 gal)
April 4, 1984	3026-D	PCB Oil (transformer) 500 ppm	0.47 L (1 pint)
April 16, 1985	4500S, D-61	PCB Oil (light ballast) 854 ppm	0.01 L (0.003 gal)
September 24, 1985	4500S, G-260	PCB Oil (light ballast) 930,000 ppm	0.01 L (0.003 gal)

ORNL/TM-10121
Distribution Category UC-13

INTERNAL DISTRIBUTION

1. Ahls, W. L.
2. Alexander, W. A.
3. Atkins, D. P.
4. Atwood, L. L.
5. Batey, J. E.
6-15. Barkenbus, B. D.
16. Berry, J.
17. Braunstein, H. M.
18. Clark, C. Jr.
19. Coker, J. D.
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