Environment Canada Environnement Canada

# NATIONAL INVENTORY OF PCBs IN USE AND PCB WASTES IN STORAGE IN CANADA - JUNE 1990

## SUMMARY REPORT

PREPARED FOR THE CANADIAN COUNCIL OF MINISTERS OF ENVIRONMENT BY:

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ENVIRONMENTAL PROTECTION DIRECTORATE
CONSERVATION AND PROTECTION
ENVIRONMENT CANADA
DECEMBER 1990

Canada

This report has been approved for distribution by the Canadian Council of Ministers of Environment. Copies may be obtained from the Program Management Division, Office of Waste Management, Environmental Protection Directorate, Environment Canada, Ottawa, K1A 0H3. Phone: (819) 997-1823. Fax: (819) 953-0509. Comments or questions should be directed to John Stevenson at the above address.

Ce rapport est aussi disponible en français sous le titre "Inventaire national des matières utilisées contenant des BPC et des déchets contenant des BPC en entreposage au Canada, juin 1990, Rapport sommaire", à l'adresse suivante: Direction de la gestion des déchets, Direction général de la protection de l'environnement, Environnement Canada, Ottawa, K1A 0H3. Téléphone: (819) 997-1823. Fax: (819) 953-0509.

## EXECUTIVE SUMMARY

This report is the second annual summary report to the Canadian Council of Ministers of Environment on the National PCB Inventory. It summarizes the inventories of in-use PCBs and PCB wastes, and progress in PCB destruction in Canada.

## PROGRESS IN PCB DESTRUCTION

Between July 1989 and June 1990, **15 400 tonnes** of PCB wastes were destroyed by incineration and decontamination technologies:

- **4 960 tonnes** were destroyed by incineration: approximately 3 500 tonnes by the Department of National Defence at Goose Bay, Labrador, and 1 460 tonnes at the Alberta Special Waste Management Centre in Swan Hills, Alberta,
- **920 tonnes** were exported for incineration overseas (further export of PCB wastes was banned July 27, 1990, Canada Gazette),
- **9 520 tonnes** of low-level PCB-contaminated mineral oil were decontaminated.

This is an increase in the total quantity of PCB wastes destroyed in the previous year. Between January 1988 and June 1989, 12 680 tonnes were destroyed, including:

- 2 500 tonnes incinerated at Swan Hills,
- 1 740 tonnes exported for incineration overseas,
- and 8 440 tonnes of low-level PCB-contaminated mineral oil decontaminated.

## NATIONAL INVENTORY TOTALS - JUNE 1990

- In-Use Askarel: **14 450 tonnes** (net weight). There are 12 110 tonnes in transformers, 2 070 tonnes in capacitors, and 270 tonnes in other miscellaneous equipment. Since the last in-use inventory update in 1987, 4 120 tonnes of askarel have come out of service. (In 1987 the in-use total was 18 570 tonnes).

- PCB Waste Storage Sites: **3 089** sites. 2 464 PCB waste storage sites are owned by provincial and territorial governments and the private sector, and 625 are owned by the federal government. The total number of sites increased by 76 from the 3 013 sites reported in 1989 (2 462 provincial/territorial sites, 551 federal sites). The main reason behind the increase in the number of PCB waste storage sites at the national level is the addition of new sites which store only PCB-containing lamp ballasts (most of these new sites contain less than one barrel of ballasts). In fact the number of sites has decreased in five provinces: Prince Edward Island, Quebec, Ontario, Alberta, and British Columbia. The reduction in the number of sites in these provinces can be attributed to the consolidation of wastes at central storage sites.

- Total PCB Wastes: **130 240 tonnes** (gross weight) in storage. This is an increase of 10 640 tonnes from the 119 600 tonnes reported in 1989.

- Waste Askarel: **5 410 tonnes** (net weight) in storage (gross weight = 11 495 t). These wastes are either in barrels or the original equipment (not including fluorescent lamp ballasts). This quantity increased by 670 tonnes from 4 740 tonnes in 1989.

- Other PCB-Contaminated Solid Wastes: **113 640 tonnes** (gross weight) in storage, including soil, absorbents, sludges, miscellaneous debris, and fluorescent lamp ballasts. This quantity increased by 1 220 tonnes from 112 420 tonnes last year.

- Low-level PCB Contaminated Mineral Oil Wastes: **5 110 tonnes** (net weight) in storage. This is an increase of 1 440 tonnes from the 3 670 tonnes in storage in 1989.

Detailed information on waste storage sites under provincial or territorial jurisdiction can be obtained from the provincial or territorial environment offices listed in Appendix A. Information on specific sites owned or operated by the federal government can be obtained from the Environment Canada regional or district offices listed in Appendix B.

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## BACKGROUND

In September 1988, the Canadian Council of Resource and Environment Ministers (now the Canadian Council of Ministers of Environment) published the first national inventory of PCB waste storage sites in Canada.

To facilitate more accurate and streamlined reporting, CCREM decided to unify the way in which PCB data were collected, and to establish a national database system to manage information on PCB wastes as well as PCBs still in use. CCREM further made a commitment to provide the Canadian public with regular summary updates of the national inventory. This report is the second such update.

The data in the national inventory come from a variety of PCB inventories compiled by federal and provincial governments: from Environment Canada's PCB inventory which includes in-use askarel-containing equipment, PCB wastes owned by the federal government, and PCB wastes in Prince Edward Island, Saskatchewan, the Yukon and Northwest Territories; and from PCB waste inventories from the provincial governments of Newfoundland, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, and British Columbia.

## SCOPE OF THE PCB INVENTORY

- The CCME National PCB Inventory includes:
  In-use Askarel-containing Equipment: askarel-containing electrical and mechanical equipment.
  PCB Wastes: askarel-containing equipment, bulk askarel, fluorescent lamp ballasts, PCB-contaminated soil, and any other PCB-contaminated materials.

- Although not part of the National PCB Inventory, this summary report also includes quantities of PCB wastes destroyed.

(Scope continued)

- Quantities in this report are in tonnes (1 000 kg).

- In-use askarel equipment are reported as net weight, i.e., the weight of askarel they contain, but not the equipment casings. This is because the original in-use PCB inventory (started in 1978) was designed to record the quantities of askarel, not the gross weight of equipment. But furthermore, the information required for the management of this equipment depends on the method of destruction planned. If the askarel-containing equipment is drained and treated with an on-line decontamination process it is only necessary to know the liquid contents. But, if the equipment is to be incinerated in its entirety, it is necessary to know the gross weight. Gross weights can be estimated by multiplying the fluid capacity in litres by a factor of 6 to produce a weight in kilograms.
  (The average density of askarel = 1.5 kg/litre; the average casing to liquid weight ratio for askarel equipment = 3:1. Hence, [1.5 + 3 x 1.5] = 1.5 x 4 = 6).

- PCB-contaminated mineral oil is also reported as net weight because the transformers that contain this oil can most often be reused after being retro-filled with clean oil. The density of mineral oil is assumed to be 1 kg/litre.

- PCB wastes such as soil, debris, sludge, etc. are reported as gross weight.

Note:

**In-use** equipment containing PCB-contaminated mineral oil, and **in-use** fluorescent lamp ballasts are not included in this inventory. However, it has been estimated that there are as much as 5 tonnes of PCBs dispersed at low concentrations in 40 million litres of mineral oil in 300 000 to 350 000 transformers, and as much as 2 500 tonnes of PCBs in 63 million light ballasts in Canada.

## PROGRESS IN PCB DESTRUCTION SINCE 1988

Since 1988, 28 080 tonnes of PCB wastes have been destroyed, which represents about 16 percent of the total of in-use and waste PCBs in the National PCB Inventory (Figure 1). 12 680 tonnes were destroyed between January 1988 and June 1989, and 15 400 tonnes were destroyed between July 1989 and June 1990.

In Canada, there are two general methods available for the destruction of PCB wastes: treatment and incineration. Treatment is a chemical decontamination process that can only be used on mineral oil containing low concentrations of PCBs (< 12 000 ppm). All other PCB wastes must be destroyed using an approved destruction technology. The only technology approved at present is high temperature incineration.

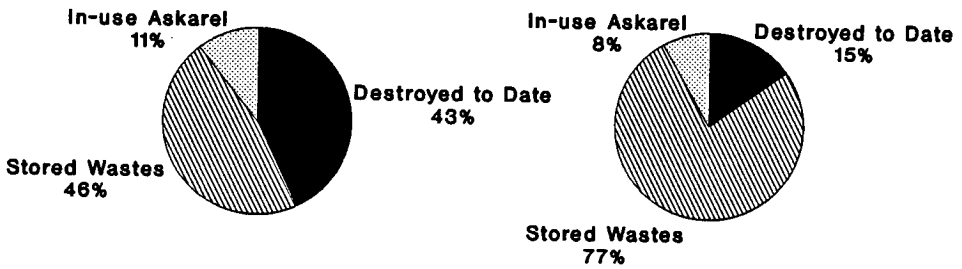
Since 1988, 17 960 tonnes of low-level PCB-contaminated oil have been chemically treated. 8 440 tonnes were treated between 1988 and June 1989, and 9 520 tonnes were treated between July 1989 and June 1990 (Figure 2).

Incineration of PCB wastes, on the other hand, has been limited to only two sites in Canada. The first, and only permanent incineration facility in Canada, is at the Alberta Special Waste Treatment Centre, near Swan Hills, Alberta, where 3 960 tonnes of PCB wastes have been incinerated between 1988, when the facility opened, and June 1990 (2 500 tonnes 1988-89; 1 460 tonnes 1989-90). The second, was a temporary incineration project at the Department of National Defence Base at Goose Bay, Labrador using a transportable incinerator; approximately 3 500 tonnes of wastes were destroyed between January and July 1990.

Until July 1990, it was also possible to export PCBs for destruction abroad, but on July 27 the federal Minister of Environment banned such exports (Canada Gazette). Between January 1988 and June 1989, 1 740 tonnes were exported, and between July 1989 and the date of the export ban, another 920 tonnes were exported.

# Figure 1
# Progress in PCB Destruction Since 1988

## A: Quantities of PCB Wastes Destroyed Compared to In-Use & Waste Inventories for June 1990




Federal
7,250 tonnes

Provincial/Territorial
165,630 tonnes

"Provincial/Territorial" includes provincial/territorial governments plus the private sector (i.e. non-federal)

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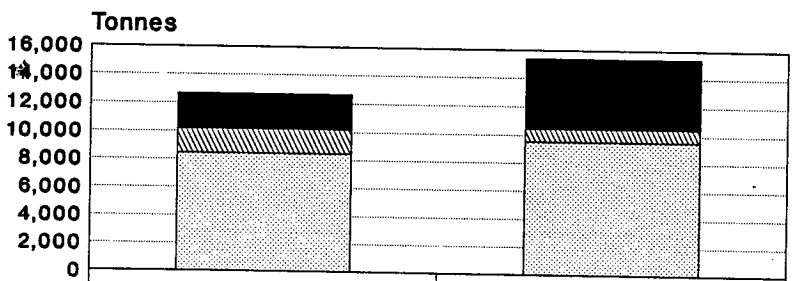
## B: Details on PCB Wastes Destroyed

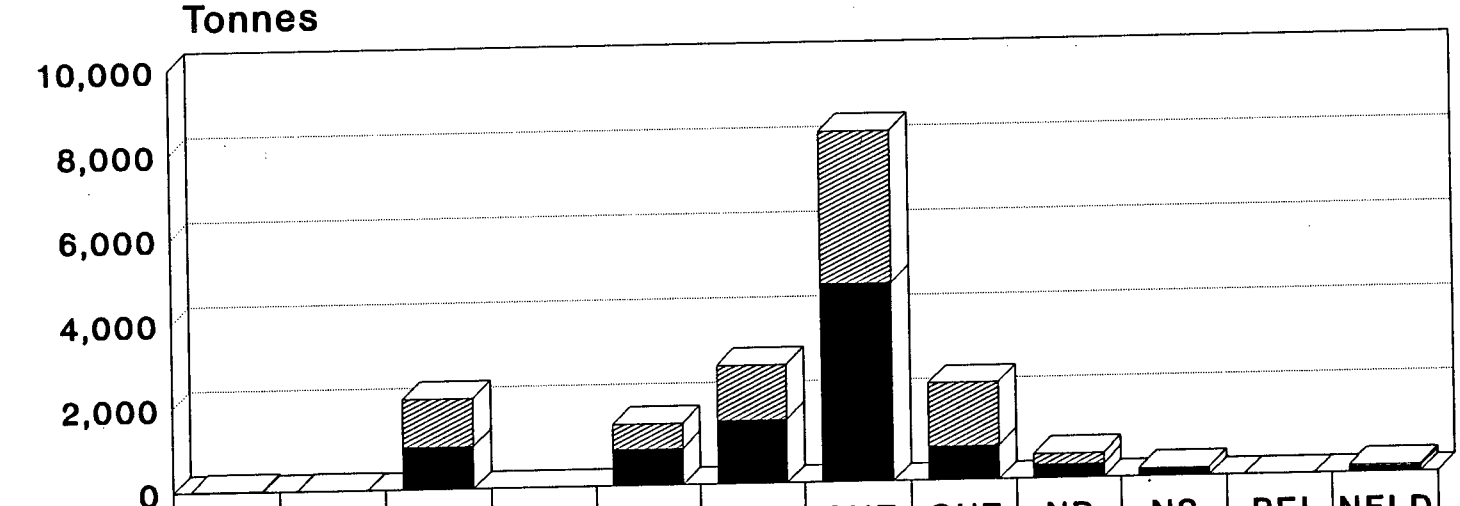



| | 1988 - June/89 | July/89 - June/90 |
|---|---|---|
| Incin. in Canada | 2,500 | 4,960 |
| Exported for Incin. | 1,740 | 920 |
| Mineral Oil Treated | 8,440 | 9,520 |
| Total | 12,680 | 15,400 |

Mineral Oil Treated
Exported for Incin.
Incin. in Canada

Total PCB Wastes Destroyed Since 1988
28,080 tonnes

# Figure 2
# Quantity of PCB-Contaminated Mineral Oil Treated Since 1988




| | NWT | YUK | BC | ALTA | SASK | MAN | ONT | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988-89 | 0 | 0 | 1,140 | 0 | 600 | 1,300 | 3,600 | 1,500 | 250 | ND | 0 | 50 |
| 1989-90 | 18 | 8 | 1,000 | 0 | 860 | 1,500 | 4,700 | 800 | 320 | 190 | 1 | 120 |
| Total | 18 | 8 | 2,140 | 0 | 1,460 | 2,800 | 8,300 | 2,300 | 570 | 190 | 1 | 170 |

1989-90 1988-89

Jan./88 - June/89 Total: 8,440 t
July/89 - June/90 Total: 9,520 t

ND: No Data

## NATIONAL INVENTORY SUMMARY

### IN-USE ASKARELS

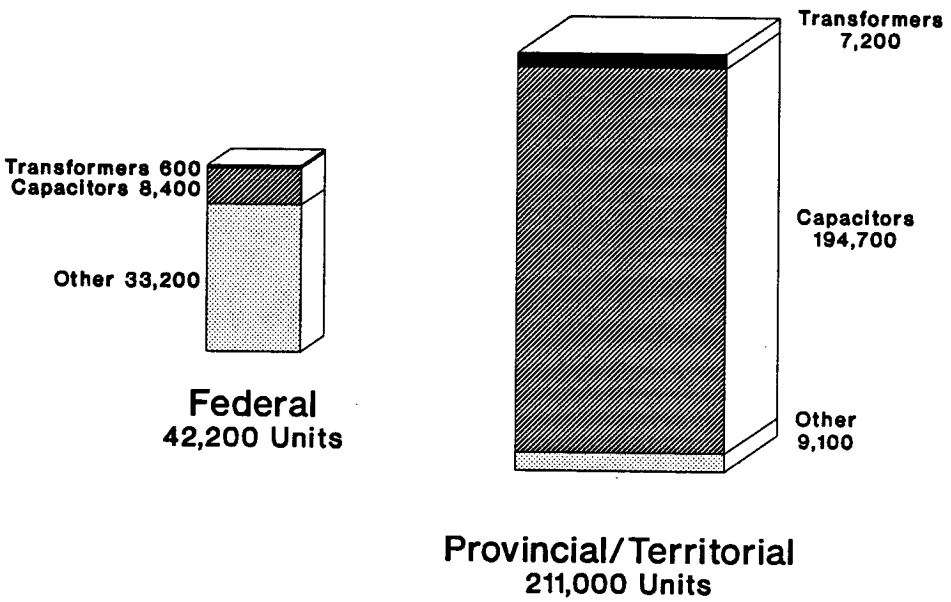
In 1990, there were approximately 14 450 tonnes of askarel in use in Canada. Eighty-four percent of this total is contained in transformers, another 14 percent in capacitors, and 2 percent in other miscellaneous electrical and mechanical equipment (Figure 3). This quantity has decreased by more than 4 000 tonnes since the 1987 inventory (18 570 tonnes). The estimated gross weight of the askarel-containing equipment is 57 800 tonnes (14 450 t x 4).

Trends in the total quantity of askarel in use from 1984 to 1990 indicate a gradual increase from 1984 to 1986 (17 400 to 18 820 tonnes; Figure 4). Since the manufacture of new PCB equipment and the refilling of equipment with PCBs was banned in 1980, this increase can only be attributed to gradual improvements in the inventory, i.e., the addition to the inventory of equipment that was already in service but not in the inventory. Although some equipment was coming out of service at the time, the discovery of new items outweighed the quantities coming out of service. But by 1987 a slight decrease (18 570 tonnes) was apparent, and by 1990 a substantial decrease was evident (14 450 tonnes); the quantities coming out of service are now greater than additions to the inventory.

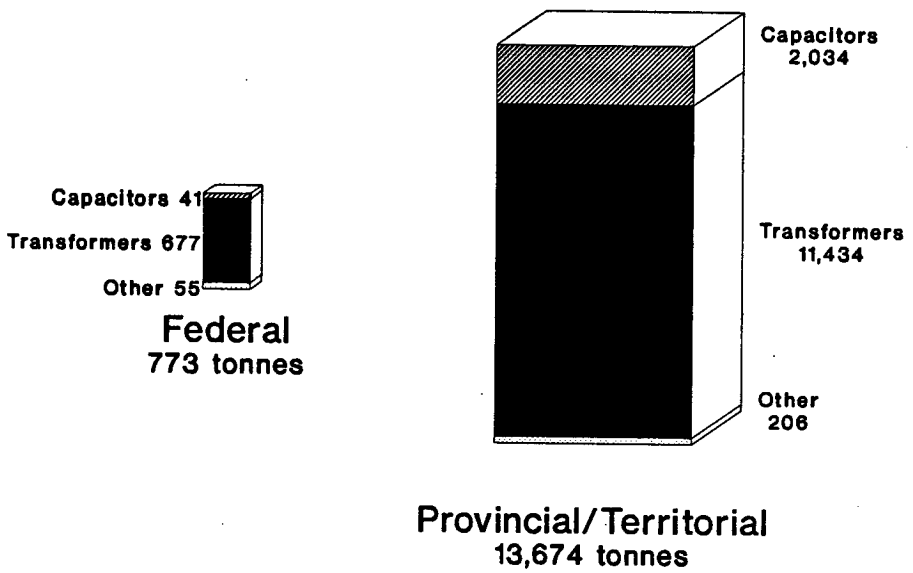
Quantities of in-use askarels have decreased in most provinces, most notably in Ontario and Saskatchewan with decreases of more than 2 000 tonnes and 1 000 tonnes respectively (Table 1). The increases in quantities of in-use askarels in Alberta, British Columbia, and the Northwest Territories of 113 tonnes, 78 tonnes, and 2 tonnes respectively, can be attributed to improvements in the in-use inventory, and not to real increases in askarel use.

# Figure 3
# In-Use Askarel-Containing Equipment in Canada
# June 1990

## A: Expressed as Numbers of Units

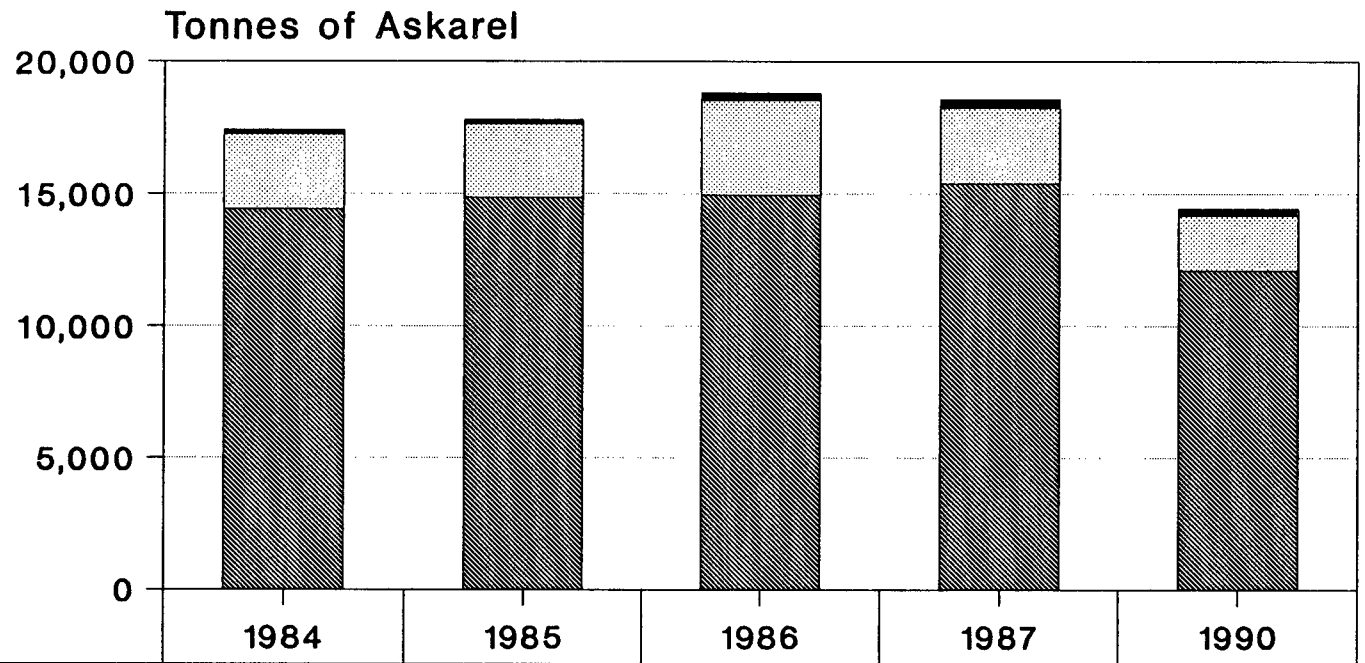



## B: Expressed as Tonnes of Askarel




**Total In-Use Askarel: 14,447 tonnes**
(excluding lamp ballasts)

# Figure 4
# In-Use Askarel-Containing Equipment in Canada
## A Comparison of Inventories from 1984 to 1990

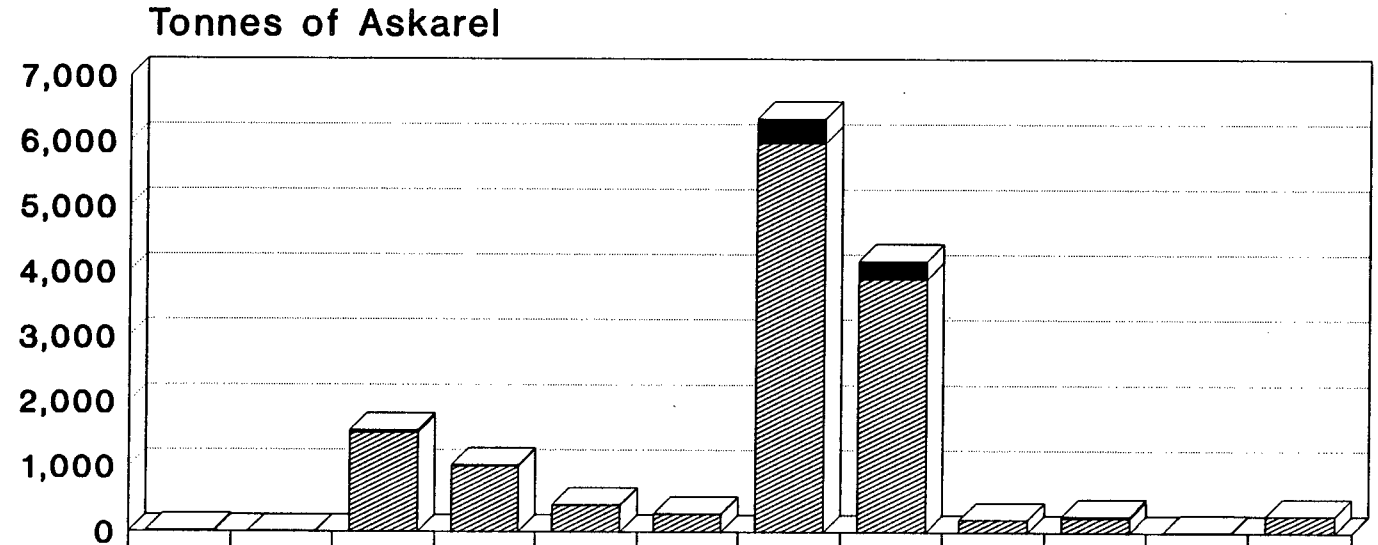



| | 1984 | 1985 | 1986 | 1987 | 1990 |
|---|---|---|---|---|---|
| Other | 160 | 150 | 300 | 330 | 270 |
| Capacitors | 2,810 | 2,790 | 3,560 | 2,860 | 2,070 |
| Transformers | 14,430 | 14,850 | 14,960 | 15,380 | 12,110 |
| Total | 17,400 | 17,790 | 18,820 | 18,570 | 14,450 |

Transformers  Capacitors  Other

Note: In-use data not available for 1988 and 1989.

# Figure 5
# In-Use Askarel-Containing Equipment
## June 1990 - by Province/Territory




| | NWT | YUK | BC | ALTA | SASK | MAN | ONT | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal | 1 | 3 | 39 | 19 | 7 | 9 | 380 | 280 | 6 | 28 | 0 | 3 |
| Prov./Terr. | 20 | 0 | 1,520 | 1,010 | 410 | 270 | 5,970 | 3,890 | 190 | 220 | 10 | 260 |

Prov./Terr. Federal

Federal: 773 t
Provincial/Territorial: 13,674 t
Total : 14,447 t

**TABLE 1**

## DISTRIBUTION OF IN-USE ASKAREL-CONTAINING EQUIPMENT IN CANADA BY PROVINCE/TERRITORY & EQUIPMENT TYPE JUNE 1990

### (Tonnes of Askarel - Net Weight)

| | FEDERAL | | | | PROVINCIAL/TERRITORIAL | | | | GRAND TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TR | CA | OTHER | TOTAL | TR | CA | OTHER | TOTAL | 1990 | 1989 | CHANGE |
| NFLD | 2 | 1 | 0 | 3 | 244 | 12 | 7 | 263 | 266 | 294 | - 28 (10%) |
| PEI | 0 | x | x | x | 11 | 0 | 0 | 11 | 11 | 11 | 0 |
| NS | 13 | 3 | 12 | 28 | 217 | 4 | 0 | 221 | 249 | 308 | - 59 (19%) |
| NB | 3 | 3 | 0 | 6 | 133 | 50 | 7 | 190 | 196 | 288 | - 92 (32%) |
| QUE | 274 | 3 | 0 | 277 | 2,818 | 1,037 | 33 | 3,888 | 4,165 | 4,709 | - 544 (12%) |
| ONT | 337 | 24 | 20 | 381 | 5,479 | 374 | 16 | 5,869 | 6,250 | 8,379 | - 2,129 (25%) |
| MAN | 8 | 1 | x | 9 | 244 | 25 | 1 | 270 | 279 | 708 | - 429 (60%) |
| SASK | 6 | 1 | x | 7 | 376 | 20 | 13 | 409 | 416 | 1,446 | - 1,030 (71%) |
| ALTA | 17 | 1 | 1 | 19 | 898 | 56 | 55 | 1,009 | 1,028 | 915 | + 113 (12%) |
| BC | 15 | 4 | 20 | 39 | 994 | 456 | 74 | 1,524 | 1,563 | 1,485 | + 78 ( 5%) |
| YUK | 2 | x | 1 | 3 | 0 | x | 0 | x | 3 | 3 | 0 |
| NWT | 0 | x | 1 | 1 | 20 | x | 0 | 20 | 21 | 19 | + 2 (10%) |
| CANADA | 677 | 41 | 55 | 773 | 11,434 | 2,034 | 206 | 13,674 | 14,447 | 18,565 | - 4,118 (22%) |

**TR** = Transformer
**CA** = Capacitor
**OTHER** = Other askarel-containing equipment (eg. regulators, electromagnets, mechanical equipment)
x = Less than 500 Kg

## PCB WASTES

### PCB WASTE STORAGE SITES

In June 1990, there were 3 089 PCB waste storage sites in Canada, an increase of 76 since 1989. However, as indicated in the provincial summary in Table 2, there have been decreases in some provinces, and increases in others.

The total number of federal sites in Canada increased by 74 sites, to 625 sites. A significant factor behind the increase in the number of PCB waste storage sites at the national level is the addition of 181 new federal sites in Saskatchewan (28 sites in 1989; 209 sites in 1990). These new sites store only PCB-containing lamp ballasts (most of these sites contain less than one barrel of ballasts, and none store more than two barrels). In fact the number of federally owned sites has decreased in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, and Alberta. The total reduction in the number of federal sites in these six provinces is 114, and is a result of the consolidation of wastes at central storage sites.

With regard to the provincial and territorial inventories, there have been increases in the number of PCB waste storage sites in Nova Scotia, New Brunswick, Manitoba, Saskatchewan, the Yukon, and Northwest Territories, and reductions in the number of sites in Newfoundland, Prince Edward Island, Ontario, Alberta, and British Columbia.

An analysis of PCB waste storage site size is presented in Figure 7 and Table 2. The sites are categorized into the following sizes:

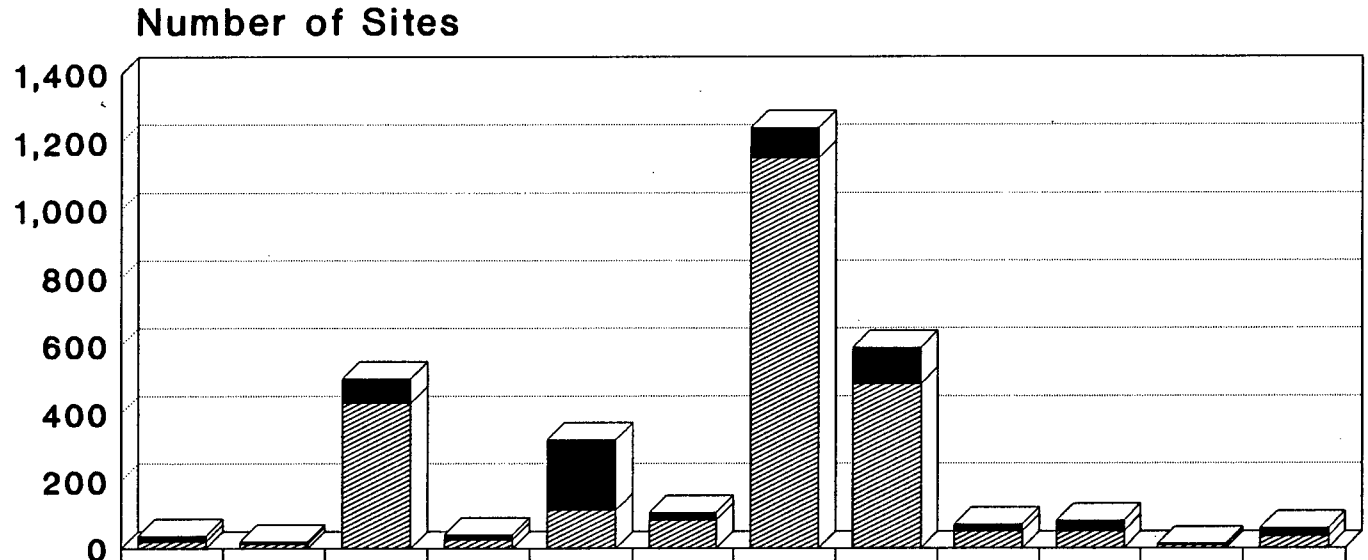
- less than 100 kilograms
- 100 kg to 1 tonne
- 1 to 10 tonnes
- 10 to 100 tonnes
- 100 to 1 000 tonnes
- greater than 1 000 tonnes

No detailed data on the size of provincial/territorial waste storage sites in Nova Scotia or Quebec were available at the time of this report, but for the purposes of Figure 7 and Table 2, the assumption was made that the size distribution within Nova Scotia and Quebec was similar to the national average. Using the numbers available, it would appear that 82 percent (102 230 tonnes) of all PCB wastes are stored in the nine largest sites containing more than 1 000 tonnes. Nearly nine percent (11 060 tonnes) are stored in the 46 sites between 100 and 1 000 tonnes, and close to 7 percent (8 570 tonnes) are stored in the 313 sites between 10 and 100 tonnes. Cumulatively, 97.7% of all wastes are stored in about 14 percent of the total number of storage sites.

At the lower end of the waste-storage-site scale, two percent (2 510 tonnes) of the total wastes are stored in the 697 sites containing between 1 and 10 tonnes each, 0.3 percent (339 tonnes) are stored in the 939 sites containing between 100 kilograms and 1 tonne, and finally, only 0.01 percent (11 tonnes) are stored in the 558 sites containing less than 100 kg.

This analysis clearly indicates the skewedness of the distribution of PCB waste storage sites. The majority of wastes are stored at a relatively small number of sites.

# Figure 6
# PCB Storage Sites in Canada - June 1990



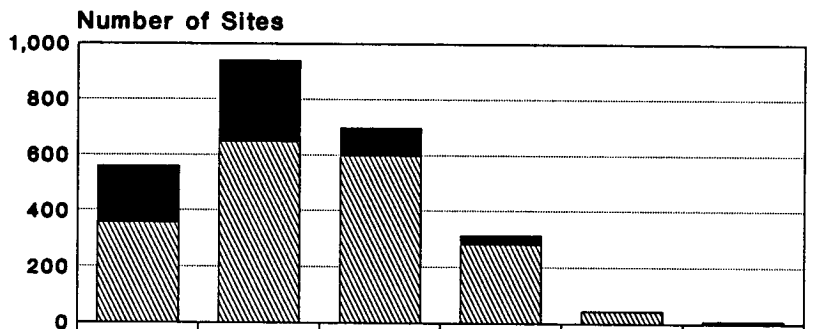

| | NWT | YUK | BC | ALTA | SASK | MAN | ONT | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal | 16 | 8 | 72 | 15 | 209 | 22 | 89 | 109 | 22 | 33 | 5 | 25 |
| Prov./Terr. | 21 | 13 | 430 | 25 | 113 | 84 | 1,152 | 485 | 49 | 49 | 8 | 35 |
| Total | 37 | 21 | 502 | 40 | 322 | 106 | 1,241 | 594 | 71 | 82 | 13 | 60 |

Prov./Terr. Federal

Federal Sites: 625
Provincial/Territorial Sites: 2,464
Total Sites: 3,089

# Figure 7
# PCB Storage Sites in Canada - June 1990

## A: Number of Sites by Size Class

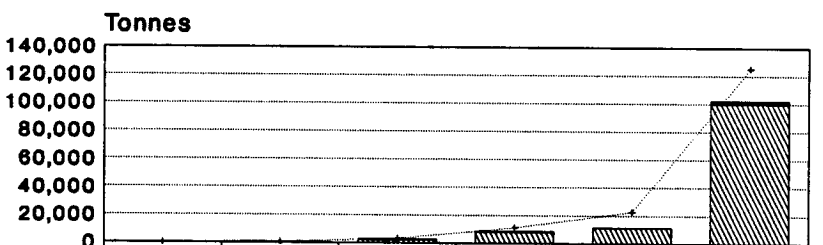



| | ‹ 0.1 | 0.1 - 1 | 1 - 10 | 10 - 100 | 100 - 1,000 | › 1,000 |
|---|---|---|---|---|---|---|
| Federal Sites | 202 | 292 | 99 | 31 | 0 | 1 |
| Prov./Terr. Sites | 356 | 647 | 598 | 282 | 46 | 8 |
| Total Sites | 558 | 939 | 697 | 313 | 46 | 9 |

Size Class - Tonnes

Prov./Terr. Sites  Federal Sites

## B: Tonnes of Waste by Site Size Class and Cumulative Total




| | ‹ 0.1 | 0.1-1 | 1-10 | 10-100 | 100-1,000 | › 1,000 |
|---|---|---|---|---|---|---|
| Fed. Wastes | 3 | 79 | 330 | 750 | 0 | 2,200 |
| Prov./Terr. Wastes | 8 | 260 | 2,180 | 7,820 | 11,060 | 100,030 |
| Total Wastes | 11 | 339 | 2,510 | 8,570 | 11,060 | 102,230 |
| Cum. Total | 11 | 350 | 2,860 | 11,430 | 22,490 | 124,720 |

Size Class - Tonnes

Cum. Total  Prov./Terr. Wastes  Fed. Wastes

Note: Does not include provincial data for Nova Scotia and Quebec. Detailed site data not avail. at time of printing

**TABLE 2**

## DISTRIBUTION OF PCB WASTE STORAGE SITES IN CANADA BY PROVINCE/TERRITORY & SITE SIZE CLASS

### (i) FEDERAL PCB WASTE STORAGE SITES

| | <100 kg | 100kg-1 tonne | 1-10 tonnes | 10-100 tonnes | 100-1,000 tonnes | >1,000 tonnes | Total Number of Sites 1990 | 1989 | Change |
|---|---|---|---|---|---|---|---|---|---|
| NFLD | 5 | 15 | 4 | 1 | - | - | 25 | 21 | + 4 |
| PEI | 1 | 4 | - | - | - | - | 5 | 5 | 0 |
| NS | 8 | 13 | 8 | 3 | - | 1 | 33 | 36 | - 3 |
| NB | - | 14 | 8 | - | - | - | 22 | 27 | - 5 |
| QUE | 9 | 75 | 13 | 12 | - | - | 109 | 144 | - 35 |
| ONT | 24 | 31 | 30 | 4 | - | - | 89 | 93 | - 4 |
| MAN | 4 | 10 | 4 | 4 | - | - | 22 | 41 | - 19 |
| SASK | 100 | 105 | 4 | - | - | - | 209 | 28 | + 181 |
| ALTA | 1 | 4 | 8 | 2 | - | - | 15 | 63 | - 48 |
| BC | 39 | 13 | 16 | 4 | - | - | 72 | 72 | 0 |
| YUK | 3 | 4 | 1 | - | - | - | 8 | 6 | + 2 |
| NWT | 8 | 4 | 3 | 1 | - | - | 16 | 15 | + 1 |
| FEDERAL TOTALS | 202 | 292 | 99 | 31 | 0 | 1 | 625 | 551 | + 74 |

### (ii) PROVINCIAL/TERRITORIAL PCB WASTE STORAGE SITES

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| NFLD | 5 | 10 | 7 | 11 | 2 | - | 35 | 39 | - 4 |
| PEI | 2 | 4 | - | 2 | - | - | 8 | 9 | - 1 |
| NS | no data available | | | | | | 49 | 45 | + 4 |
| NB | 7 | 16 | 13 | 12 | 1 | - | 49 | 36 | + 13 |
| QUE | no data available | | | | | | 485 | 485 | 0 |
| ONT | 216 | 357 | 360 | 183 | 30 | 6 | 1,152 | 1,202 | - 50 |
| MAN | 10 | 38 | 27 | 7 | 2 | - | 84 | 44 | + 40 |
| SASK | 19 | 39 | 41 | 12 | 2 | - | 113 | 104 | + 9 |
| ALTA | 3 | 5 | 8 | 6 | 1 | 2 | 25 | 34 | - 9 |
| BC | 80 | 168 | 129 | 45 | 8 | - | 430 | 447 | - 17 |
| YUK | 3 | 5 | 3 | 2 | - | - | 13 | 10 | + 3 |
| NWT | 6 | 4 | 9 | 2 | - | - | 21 | 7 | + 14 |
| PROV/TERR TOTALS | 356 | 647 | 598 | 282 | 46 | 8 | 2,464 | 2,462 | + 2 |
| TOTALS | 558 | 939 | 697 | 313 | 46 | 9 | 3,089 | 3,013 | + 76 |

### (iii) TONNES OF WASTE IN EACH SIZE CLASS
**(Excluding non-federal sites in NS & QUE)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FED. | 3 | 79 | 330 | 750 | 0 | 2,200 | 3,254 |
| NON-FED. | 8 | 260 | 2,180 | 7,820 | 11,060 | 100,030 | 115, 788 |
| TOTALS | 11 | 339 | 2,510 | 8,570 | 11,060 | 102,230 | 119,042 |

**AS A PERCENT OF TOTAL WASTES (119,042 t - partial total)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| % | 0.01% | 0.3% | 2.0% | 6.9% | 8.9% | 82.0% | 100% |

## TOTAL PCB WASTES

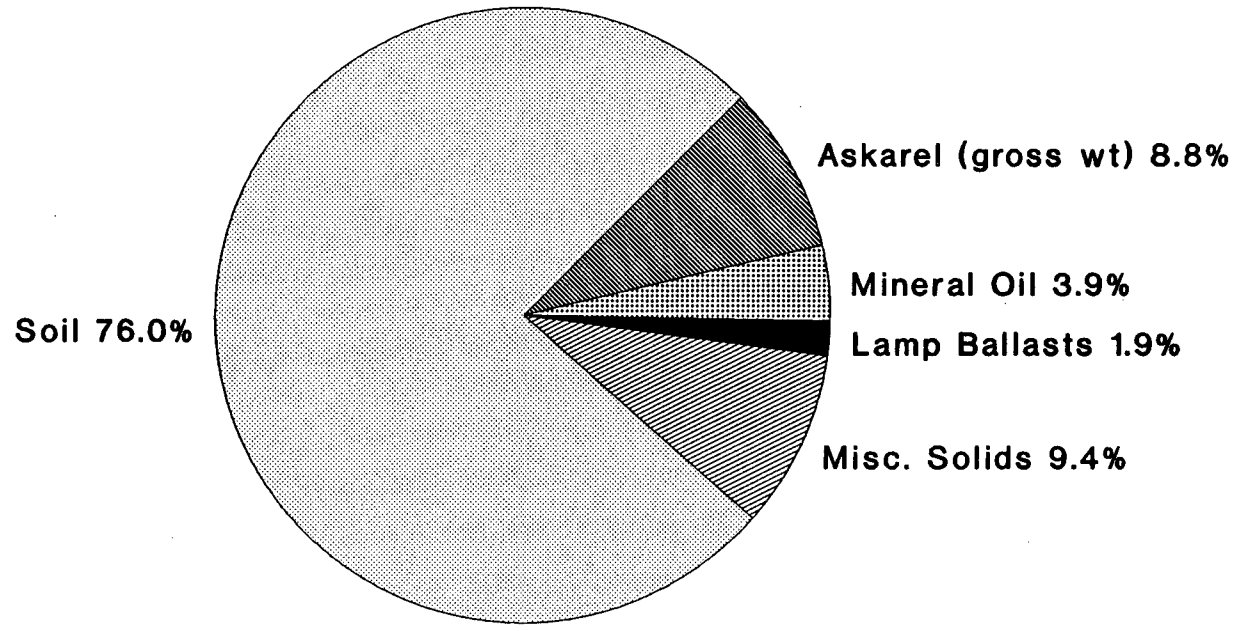
In June 1990 there were a total of 130 240 tonnes of PCB wastes in Canada. Seventy-six percent of these wastes are PCB-contaminated soils, 9.4% miscellaneous PCB-contaminated solids, 8.8% askarel and askarel-containing equipment, 3.9% PCB-contaminated mineral oil, and 1.9% fluorescent lamp ballasts (Figure 8).

As indicated in Figure 9, most of these wastes (82% - mostly PCB-contaminated soil) are located in Ontario, followed by Alberta (4.9%), Quebec (4.2%), British Columbia (3.5%), and Nova Scotia (2.0%), with the remaining three percent divided among the other provinces and territories.

The total amount of waste increased from 119 600 tonnes in 1989 to 130 240 tonnes in 1990, an increase of 10 640 tonnes (Table 3). However, approximately 6 300 tonnes of this increase is due to a change in inventory methods. In the current (1990) inventory, the weight of the casings of askarel-containing equipment, including drained equipment, were included in the total, whereas in 1989, only the weight of askarel in askarel-containing equipment was included. This means the actual increase in the total quantity of PCB wastes is approximately 4 300 tonnes.

There was a large decrease in the total quantity of PCB wastes in storage in Newfoundland (a decrease of 3,138 tonnes), where approximately 3 500 tonnes of wastes were destroyed at Goose Bay, Labrador in 1990 (Table 3). All other provinces and territories with the exception of Prince Edward Island indicate increases in the quantity of PCB wastes. As mentioned above many of these large increases at the provincial level are due to the inclusion of equipment casings in the inventory in 1990.

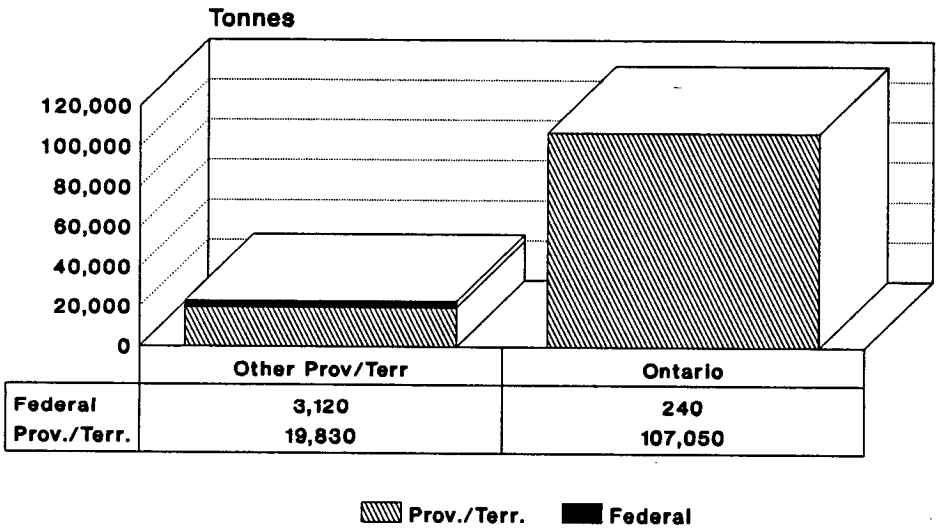
# Figure 8
# Characterization of PCB Wastes in Canada
## Gross Tonnes - June 1990




Total Weight of PCB Wastes
130,240 tonnes

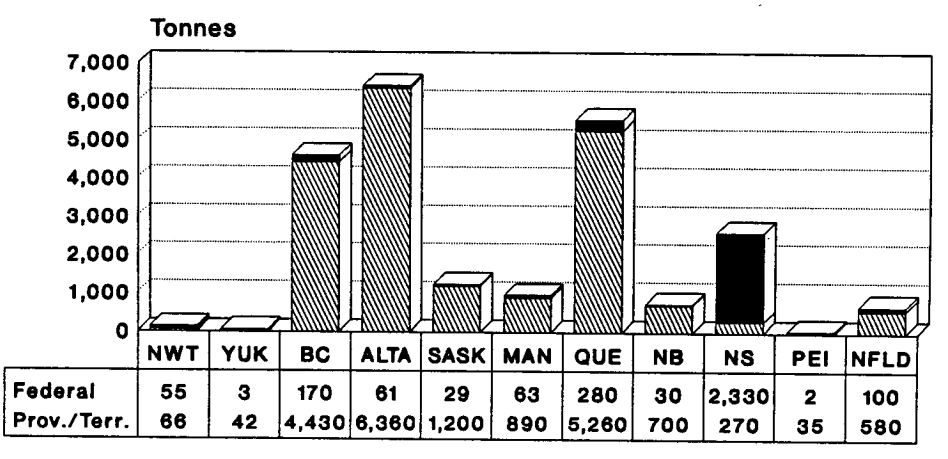
# Figure 9
# Total PCB Wastes in Canada - June 1990

## A: Ontario Wastes Compared to the Total of All Other Provinces & Territories




| | Other Prov/Terr | Ontario |
|---|---|---|
| Federal | 3,120 | 240 |
| Prov./Terr. | 19,830 | 107,050 |

## B: Breakdown of Other Provinces/Territories




| | NWT | YUK | BC | ALTA | SASK | MAN | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal | 55 | 3 | 170 | 61 | 29 | 63 | 280 | 30 | 2,330 | 2 | 100 |
| Prov./Terr. | 66 | 42 | 4,430 | 6,360 | 1,200 | 890 | 5,260 | 700 | 270 | 35 | 580 |

Federal: 3,360 t
Provincial/Territorial : 126,880 t
Total: 130,240 t

**TABLE 3**

## DISTRIBUTION OF TOTAL PCB WASTES IN CANADA BY PROVINCE/TERRITORY & WASTE TYPE JUNE 1990

### (Gross Tonnes)

| | FEDERAL | | | | PROVINCIAL/TERRITORIAL | | | | GRAND TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ASKAREL | OTHER SOLIDS | MINERAL OIL | TOTAL | ASKAREL | OTHER SOLIDS | MINERAL OIL | TOTAL | 1990 | 1989 | CHANGE |
| NFLD | 1 | 96 | 2 | 99 | 221 | 336 | 21 | 578 | 677 | 3,815 | - 3,138 ( 82%) |
| PEI | 1 | 1 | x | 2 | 16 | 0 | 19 | 35 | 37 | 16 | + 21 (130%) |
| NS | 82 | 2,242 | 2 | 2,326 | 219 | 32 | 23 | 274 | 2,600 | 2,437 | + 163 ( 7%) |
| NB | 14 | 16 | x | 30 | 396 | 258 | 44 | 698 | 728 | 219 | + 509 (230%) |
| QUE | 207 | 52 | 21 | 280 | 721* | 4,539* | ND | 5,260* | 5,540 | 5,423 | * |
| ONT | 120 | 56 | 67 | 243 | 4,273 | 98,015 | 4,760 | 107,048 | 107,291 | 102,001 | + 5,290 ( 5%) |
| MAN | 48 | 15 | x | 63 | 435 | 445 | 12 | 892 | 955 | 636 | + 319 ( 50%) |
| SASK | 4 | 25 | x | 29 | 541 | 617 | 42 | 1,200 | 1,229 | 233 | + 996 (430%) |
| ALTA | 47 | 14 | x | 61 | 434 | 5,882 | 41 | 6,357 | 6,418 | 3,081 | + 3,337 (110%) |
| BC | 81 | 73 | 19 | 173 | 3,538 | 869 | 20 | 4,427 | 4,600 | 1,699 | + 2,901 (170%) |
| YUK | 0 | 3 | x | 3 | 11 | 19 | 12 | 42 | 45 | 25 | + 20 ( 80%) |
| NWT | 48 | 6 | 1 | 55 | 37 | 29 | 0 | 66 | 121 | 20 | + 101 (500%) |
| CANADA | 653 | 2,599 | 112 | 3,364 | 10,842 | 111,041 | 4,994 | 126,877 | 130,241 | 119,605 | + 10,636 ( 9%) |

x = Less than 500 Kg
* = Quebec provincial data is from 1989.
ND = No Data

## ASKAREL WASTES

There are two methods of reporting askarel wastes: as net weight (i.e., the quantity of askarel in equipment and in bulk storage containers), or as gross weight (bulk stored askarel plus the quantity of askarel in equipment plus the weight of the equipment casings). The gross weight is important to know because small equipment such as capacitors (and sometimes large equipment such as transformers) are incinerated in their entirety. The gross weight of equipment is often unknown, but can be estimated from the fluid contents. For an explanation of how this is done see page 2, "Scope of the PCB Inventory".

### Net Weight of Askarel

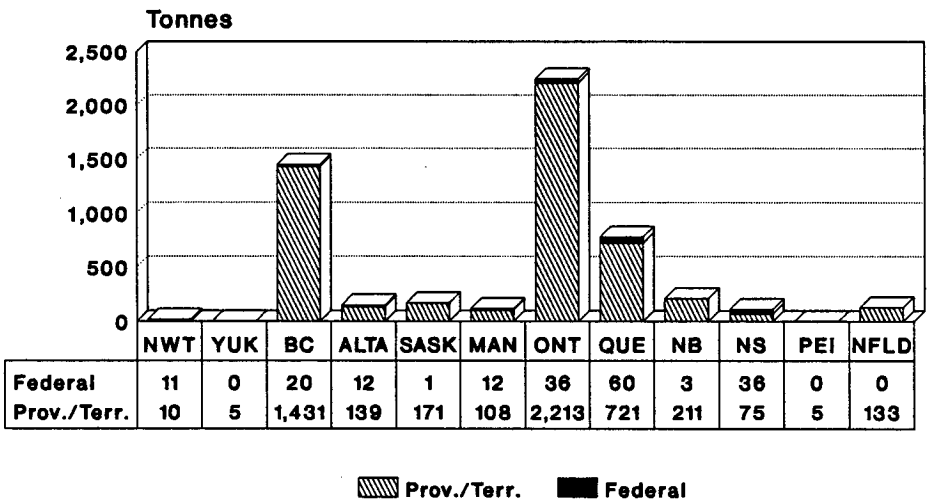
In June 1990 there were approximately 5 410 tonnes of waste askarel in storage (Figure 10, Table 4). In terms of net weight, the majority of askarel wastes are in bulk storage (62.5 percent), followed by transformers (23.2 percent), capacitors (13.8 percent), various other types of electrical and mechanical equipment (0.4 percent).

As indicated in Table 4, the total amount of waste askarel in storage increased 14 percent (676 tonnes) between 1989 and 1990. However, in Newfoundland and Alberta, the only provinces to have incinerated PCB wastes in 1989/90, the quantities decreased by 9 and 207 tonnes respectively. Prince Edward Island, New Brunswick, and the Yukon show little or no change, and all other provinces and the Northwest Territories indicate moderate increases.

Note: The quantity of 1 451 tonnes of askarel for British Columbia is exaggerated because it includes contaminated mineral oil with concentrations greater than 500 ppm PCB. This is because the inventory from the Ministry of Environment for British Columbia categorizes its liquid wastes as "less than 500 ppm", and "greater than 500 ppm", and it was not possible to break out the askarel for 1990. The 1989 report indicates only 222 tonnes of askarel in BC; however, if the method of categorization used in 1990 is applied to 1989 data it produces a total of 1 443 tonnes for 1989. Thus, the inventory of wastes "greater than 500 ppm" for BC has increased by only a small amount, less than 10 tonnes.

# Figure 10
# Askarel Wastes in Storage - June 1990

## A: Expressed as Net Weight of Askarel
**(Does Not Include Equipment Casings)**

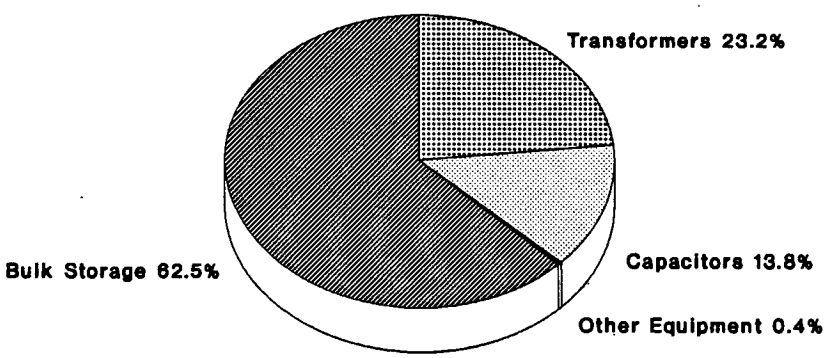



| | NWT | YUK | BC | ALTA | SASK | MAN | ONT | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal | 11 | 0 | 20 | 12 | 1 | 12 | 36 | 60 | 3 | 36 | 0 | 0 |
| Prov./Terr. | 10 | 5 | 1,431 | 139 | 171 | 108 | 2,213 | 721 | 211 | 75 | 5 | 133 |

**Federal: 191 t**
**Provincial/Territorial: 5,222 t**
**Total: 5,413 t**

---

## B: Characterization of Net Askarel Waste




**Total Net Weight of Askarel Wastes**
**5,413 tonnes**

## TABLE 4

# DISTRIBUTION OF ASKAREL WASTES IN CANADA BY PROVINCE/TERRITORY & WASTE TYPE JUNE 1990

## (Net Tonnes)

| | FEDERAL | | | | | PROVINCIAL/TERRITORIAL | | | | | GRAND TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TR | CAP | BULK | OTHER | TOTAL | TR | CAP | BULK | OTHER | TOTAL | 1990 | 1989 | CHANGE |
| NFLD | 0 | x | 0 | 0 | x | 13 | 14 | 104 | 2 | 133 | 133 | 142 | - 9 ( 6%) |
| PEI | 0 | x | 0 | 0 | x | 4 | 1 | 0 | 0 | 5 | 5 | 5 | 0 |
| NS | 12 | 3 | 21 | x | 36 | 38 | 10 | 27 | 0 | 75 | 111 | 114 | - 3 ( 3%) |
| NB | x | 3 | 0 | x | 3 | 43 | 19 | 149 | 0 | 211 | 214 | 88 | + 126 (143%) |
| QUE | 39 | 9 | 11 | 1 | 60 | * | * | 721 | * | 721* | 781 | 765 | * |
| ONT | 18 | 9 | 9 | x | 36 | 603 | 84 | 1,526 | 0 | 2,213 | 2,249 | 1,561 | + 688 ( 44%) |
| MAN | 7 | 5 | 0 | 0 | 12 | 40 | 68 | 0 | x | 108 | 120 | 101 | + 19 ( 19%) |
| SASK | x | 1 | 0 | 0 | 1 | 72 | 51 | 48 | 0 | 171 | 172 | 141 | + 31 ( 22%) |
| ALTA | 8 | 3 | 1 | 0 | 12 | 0 | 97 | 40 | 2 | 139 | 151 | 358 | - 207 ( 58%) |
| BC | 6 | 12 | 0 | 2 | 20 | 332 | 355 | 728 | 16 | 1,431** | 1,451** | 1,443** | + 8 ( 0%) |
| YUK | 0 | x | 0 | x | x | 1 | 1 | 3 | 0 | 5 | 5 | 5 | 0 |
| NWT | 11 | x | 0 | x | 11 | 8 | 2 | 0 | 0 | 10 | 21 | 14 | + 7 ( 50%) |
| CANADA | 101 | 45 | 42 | 3 | 191 | 1,154 | 702 | 3,346 | 20 | 5,222 | 5,413 | 4,737 | + 676 ( 14%) |

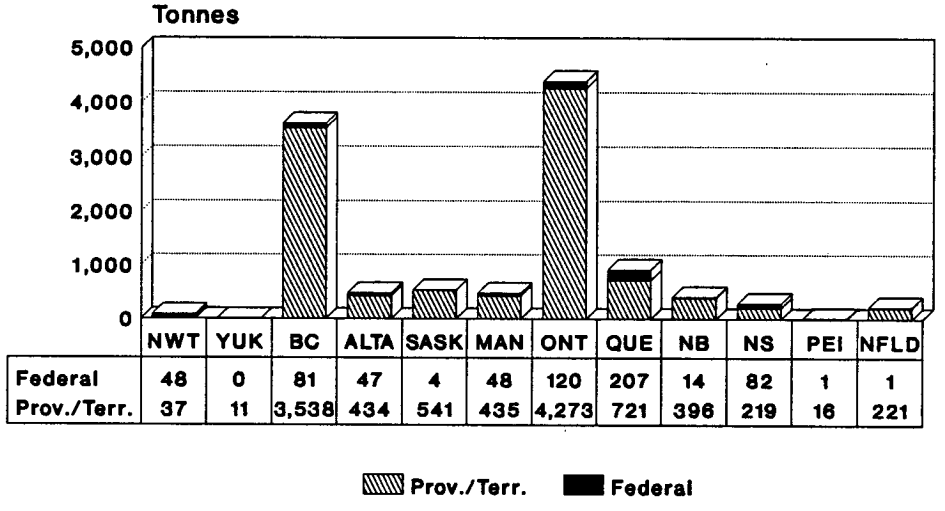
TR = Transformers
CA = Capacitors
BULK = Barrels and other bulk storage
OTHER = Other askarel-containing equipment (eg. regulators, electromagnets, mechanical equipment)
x = Less than 500 Kg
* = Quebec provincial data is from 1989; no waste-type breakdown is available.
** = BC provincial data includes contaminated mineral oil greater than 500 ppm PCB.

Gross Weight of Askarel Equipment

Viewed from a gross weight perspective (Figure 11, Table 5), transformers make up the largest proportion of askarel wastes, at 43.6 percent, followed by bulk askarel (29.5 percent), capacitors (26.1 percent), and other equipment (0.8 percent).

# Figure 11
# Askarel Wastes in Storage - June 1990

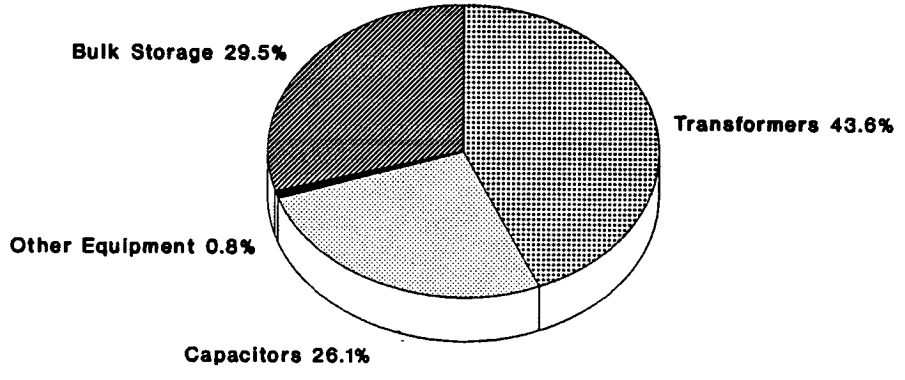
## A: Gross Weight of Equipment
(Includes Equipment Casings)




| | NWT | YUK | BC | ALTA | SASK | MAN | ONT | QUE | NB | NS | PEI | NFLD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Federal | 48 | 0 | 81 | 47 | 4 | 48 | 120 | 207 | 14 | 82 | 1 | 1 |
| Prov./Terr. | 37 | 11 | 3,538 | 434 | 541 | 435 | 4,273 | 721 | 396 | 219 | 16 | 221 |

Federal: 653 t
Provincial/Territorial: 10,842
Total: 11,495 t

## B: Characterization of Gross Askarel Wastes




Total Gross Weight of Askarel Wastes
11,495 tonnes

**TABLE 5**

## DISTRIBUTION OF ASKAREL WASTES IN CANADA BY PROVINCE/TERRITORY & WASTE TYPE JUNE 1990

### (Gross Tonnes)

| | FEDERAL | | | | | PROVINCIAL/TERRITORIAL | | | | | GRAND TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TR | CAP | BULK | OTHER | TOTAL | TR | CAP | BULK | OTHER | TOTAL | 1990 |
| NFLD | 0 | 1 | 0 | 0 | 1 | 52 | 58 | 104 | 7 | 221 | 222 |
| PEI | x | 1 | 0 | 0 | 1 | 14 | 2 | 0 | 0 | 16 | 17 |
| NS | 48 | 13 | 21 | x | 82 | 152 | 40 | 27 | 0 | 219 | 301 |
| NB | x | 13 | 0 | 1 | 14 | 172 | 75 | 149 | 0 | 396 | 410 |
| QUE | 157 | 36 | 11 | 3 | 207 | * | * | 721 | * | 721* | 928 |
| ONT | 73 | 37 | 9 | 1 | 120 | 2,412 | 335 | 1,526 | 0 | 4,273 | 4,393 |
| MAN | 30 | 18 | 0 | 0 | 48 | 160 | 274 | 0 | 1 | 435 | 483 |
| SASK | 1 | 3 | 0 | 0 | 4 | 289 | 204 | 48 | 0 | 541 | 545 |
| ALTA | 33 | 13 | 1 | x | 47 | 0 | 388 | 40 | 6 | 434 | 481 |
| BC | 24 | 50 | 0 | 7 | 81 | 1,328** | 1,419 | 728** | 63** | 3,538** | 3,619 |
| YUK | 0 | x | 0 | x | x | 3 | 5 | 3 | 0 | 11 | 11 |
| NWT | 44 | 2 | 0 | 2 | 48 | 31 | 6 | 0 | 0 | 37 | 85 |
| CANADA | 410 | 187 | 42 | 14 | 653 | 4,613 | 2,806 | 3,346 | 77 | 10,842 | 11,495 |

TR = Transformers
CA = Capacitors
BULK = Barrels and other bulk storage
OTHER = Other askarel-containing equipment (eg. regulators, electromagnets, mechanical equipment)
x = Less than 500 Kg
* = Quebec provincial data is from 1989; no waste-type breakdown is available.
** = BC provincial data includes contaminated mineral oil greater than 500 ppm.

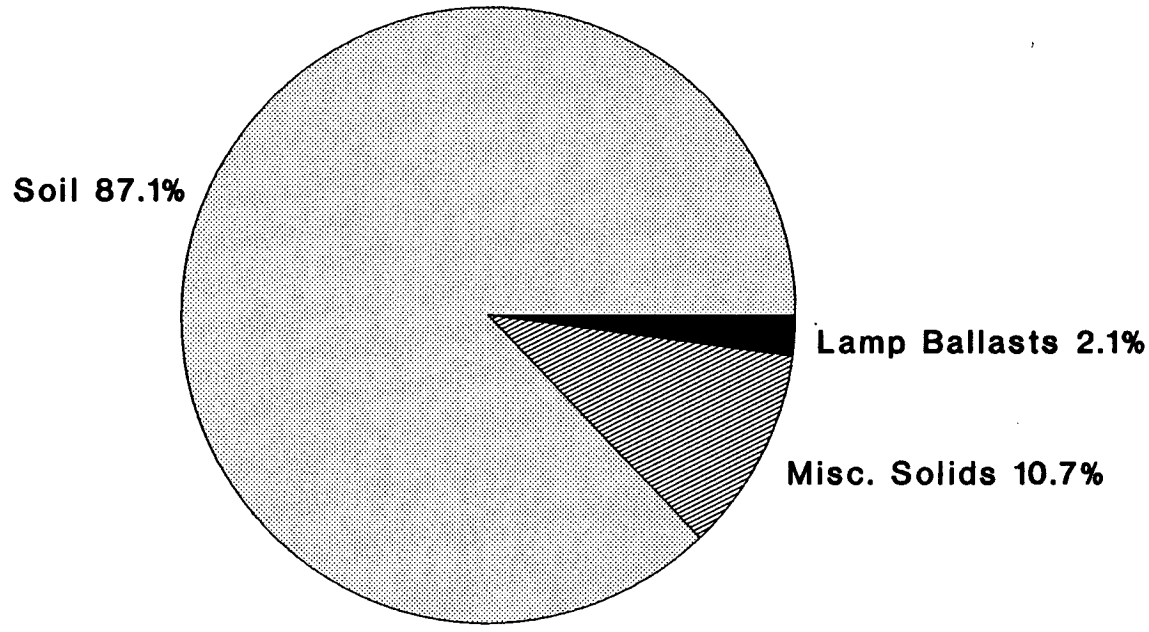
## OTHER PCB-CONTAMINATED SOLID WASTES

In addition to askarel stored in bulk containers and askarel-containing equipment, there are a variety of PCB-contaminated solid wastes in storage. This latter type of waste comprise the majority of PCB wastes; 113 640 tonnes or 87% of the total (Figure 8, p.17). As illustrated in Figure 12, "Other PCB-contaminated solid wastes" include such materials as soil (99 000 tonnes, 87.1%); miscellaneous solids, such as absorbents and clothing used in spill clean-up, and other debris (12 200 tonnes, 10.7%); as well as fluorescent lamp ballasts which contain a small PCB capacitor (2 400 tonnes, 2.1%).

Ontario has the largest inventory of PCB-contaminated solid wastes, with 98 071 tonnes (86 percent of the national total of solid PCB wastes - Figure 13). 97 percent of the solid wastes in Ontario are soils.

The destruction of PCB wastes at Goose Bay is reflected in the decrease in the inventory of solid wastes for Newfoundland, which dropped from 3 641 in 1989 to 432 tonnes in 1990. Manitoba and British Columbia also indicate decreases in this category, but these decreases are a result of improvements in the inventory process, they do not represent real decreases in the quantities of wastes. All other provinces and territories with the exception of Prince Edward Island indicate increases in the amount solid PCB wastes. The increase of 3 394 tonnes in Alberta is largely due to the inclusion of 1 960 tonnes of drained transformers which were not included in the inventory in 1989.

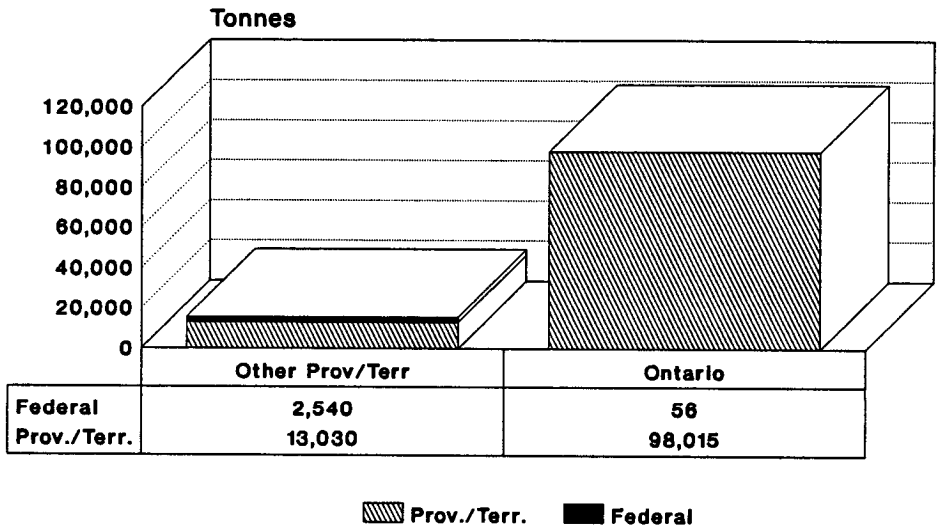
# Figure 12: Characterization of Other PCB-Contaminated Solid Wastes
June 1990



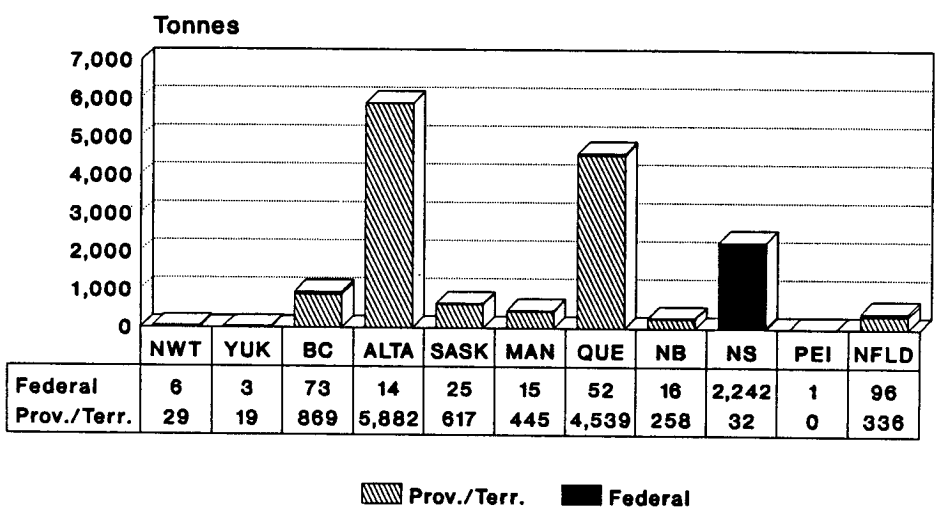

Total Weight of Other Solid Wastes
113,640 tonnes

# Figure 13
## Other PCB-Contaminated Solid Wastes in Canada
## June 1990

### A: Ontario Compared to All Other Provinces & Territories




### B: Breakdown of Other Provinces/Territories




**Federal: 2,600 t**
**Provincial/Territorial: 111,040 t**
**Total: 113,640 t**

**TABLE 6**

# DISTRIBUTION OF OTHER PCB-CONTAMINATED SOLID WASTES IN CANADA BY PROVINCE/TERRITORY & WASTE TYPE JUNE 1990

## (Gross Tonnes)

| | FEDERAL | | | | PROVINCIAL/TERRITORIAL | | | | GRAND TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SOILS | MISC. SOLIDS | BALLASTS | TOTAL | SOILS | MISC. SOLIDS | BALLASTS | TOTAL | 1990 | 1989 | CHANGE |
| NFLD | 82 | 8 | 6 | 96 | 154 | 180 | 2 | 336 | 432 | 3,641 | - 3,209 (88%) |
| PEI | 0 | 0 | 1 | 1 | 0 | x | 0 | x | 1 | 1 | 0 |
| NS | 2,212 | 18 | 12 | 2,242 | 18 | 2 | 12 | 32 | 2,274 | 2,267 | + 7 (0%) |
| NB | 2 | 4 | 10 | 16 | 188 | 58 | 12 | 258 | 274 | 94 | + 180 (191%) |
| QUE | 14 | 18 | 20 | 52 | * | 4,539* | * | 4,539* | 4,591 | 4,640 | * |
| ONT | 3 | 12 | 41 | 56 | 95,227 | 850 | 1,938 | 98,015 | 98,071 | 97,320 | + 751 (1%) |
| MAN | 0 | 4 | 11 | 15 | 57 | 356 | 32 | 445 | 460 | 519 | - 59 (11%) |
| SASK | x | x | 25 | 25 | 273 | 159 | 185 | 617 | 642 | 92 | + 550 (600%) |
| ALTA | 0 | 5 | 9 | 14 | 740 | 5,140 | 2 | 5,882 | 5,896 | 2,502 | + 3,394 (136%) |
| BC | x | 58 | 15 | 73 | 39 | 732 | 98 | 869 | 943 | 1,334 | - 391 (29%) |
| YUK | 0 | 0 | 3 | 3 | 0 | 16 | 3 | 19 | 22 | 1 | + 21 (2200%) |
| NWT | 0 | 6 | 0 | 6 | 0 | 29 | 0 | 29 | 35 | 6 | + 29 (480%) |
| CANADA | 2,313 | 133 | 153 | 2,599 | 96,696 | 12,061 | 2,284 | 111,041 | 113,640 | 112,417 | + 1,223 (1%) |

x = Less than 500 Kg
* = Quebec provincial data is from 1989; no waste-type breakdown is available.

PCB-CONTAMINATED MINERAL OIL

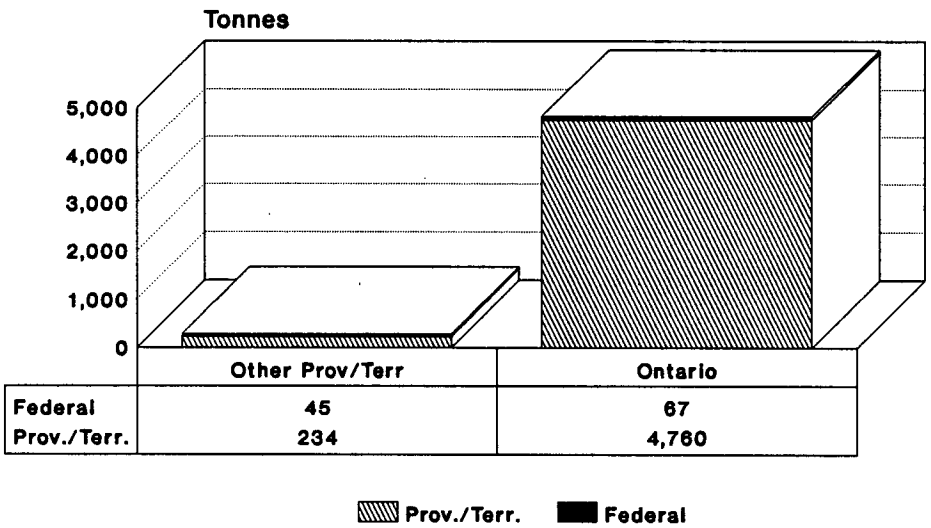
In June 1990, there were approximately 5 110 tonnes (over 5 million litres) of PCB-contaminated mineral oil in storage (Figure 14). As indicated in Figure 14-A, the largest proportion of this inventory is located in Ontario (4 827 tonnes). No data were available for the Province of Quebec at the time of this report, but among the remaining eight provinces and two territories there are less than 300 tonnes in storage.

Note:

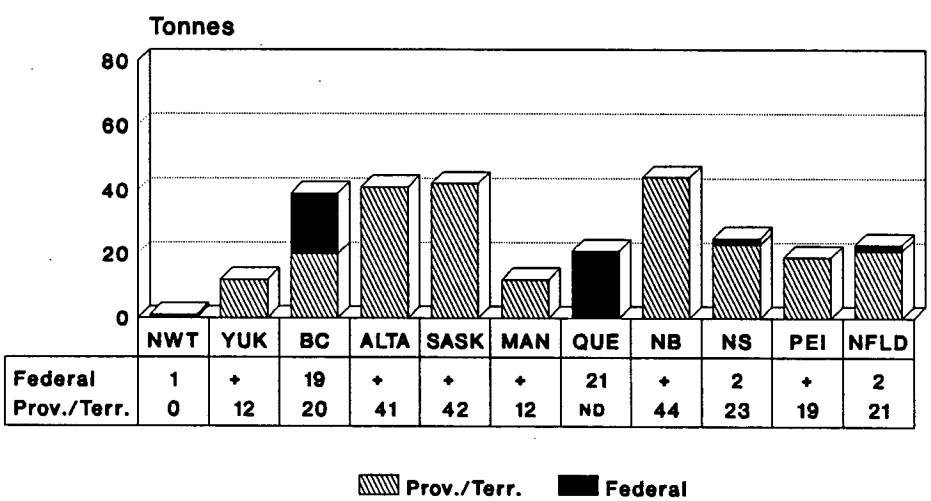
PCB-contaminated mineral oil often goes directly from in-use equipment to a treatment facility without being stored. Thus, the quantity of PCB-contaminated mineral oil treated in a year is usually much greater than the quantity indicated in the waste storage inventory.

# Figure 14
# Low-Level PCB-Contaminated Mineral Oil Wastes in Storage - June 1990

## A: Ontario Compared to All Other Provinces & Territories




## B: Breakdown of Other Provinces/Territories




Federal: 112 t
Provincial/Territorial: 4,994 t

ND: No Data +: < 0.5 t

## APPENDIX A

## PROVINCIAL/TERRITORIAL CONTACTS FOR INFORMATION ON PCB INVENTORIES

Mr. C. Strong
Director, Environmental Investigations
Department of Environment and Lands
Government of Newfoundland and Labrador
P.O. Box 8700, Confederation Bldg.
St. John's, Newfoundland
A1B 4J6

Mr. D. Hynick
Senior Environmental Engineer
Resource Management & Pollution Control Division
Department of the Environment
Government of Nova Scotia
P.O. Box 2107
Halifax, Nova Scotia
B3J 3B7

Ms. S. Godin
Hazardous Waste Officer
Environmental Protection Branch
Department of Municipal Affairs and Environment
P.O. Box 6000
Fredericton, New Brunswick
E3B 5H1

Mr. C. Anctil
Directeur, Direction des substances dangereuses
Ministère de l'environnement
3900 rue Marly
Ste-Foy (Québec)
G1X 4E4

Mr. H. Wong
Director, Waste Management Branch
Ontario Ministry of Environment
40 St. Clair Avenue West, 5th Floor
Toronto, Ontario
M4V 1M2

Mr. D. Thompson
Head, Waste Management
Environmental Control Programs
Department of Environment and Workplace Safety and Health
Building 2, 139 Tuxedo Blvd.
Winnipeg, Manitoba
R3N 0H6

Mr. L. Lechner
Director, Air and Land Protection Branch
Department of Environment and Public Safety
3085 Albert Street
Regina, Saskatchewan
S4S 0B1

Mr. S. Lupul
Branch Head, Industrial Waste Branch
Alberta Environment
5th Floor, Oxbridge Place
9820 - 106th Street
Edmonton, Alberta
T5K 2J6

Mr. H.J. Vogt
Manager
Hazardous Contaminants & Technical Services Section
Ministry of Environment
810 Blanshard Street
Victoria, B.C.
V8V 1X5

Note: To obtain information on inventories for Prince Edward Island, Yukon, and Northwest Territories, contact the Environment Canada Office in that province or territory.

## APPENDIX B

## FEDERAL CONTACTS FOR INFORMATION ON THE PCB PROGRAM

ENVIRONMENTAL PROTECTION SERVICE
ENVIRONMENT CANADA

**Regional Offices**

Mr. C. Duerden
Environment Canada
45 Alderny Drive, 15th Floor
Dartmouth, Nova Scotia
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M. A. Bérnier
Environnement Canada
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Montréal (Québec)
H3B 3H9 (514) 283-2349

Mr. B. Krauel
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25 St. Clair Ave. East, 7th Floor
Toronto, Ontario
M4T 1M2 (416) 973-1809

Mr. A. Beckett
Environment Canada
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4999-98th Avenue
Edmonton, Alberta
T6B 2X3 (403) 468-8034

Mr. K. Wile
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224 West Esplanade, Room 504
North Vancouver, B.C.
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**District Offices**

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