



# HCB Canadian Inventory for Long Range Transport Modeling

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GLBTS Meeting

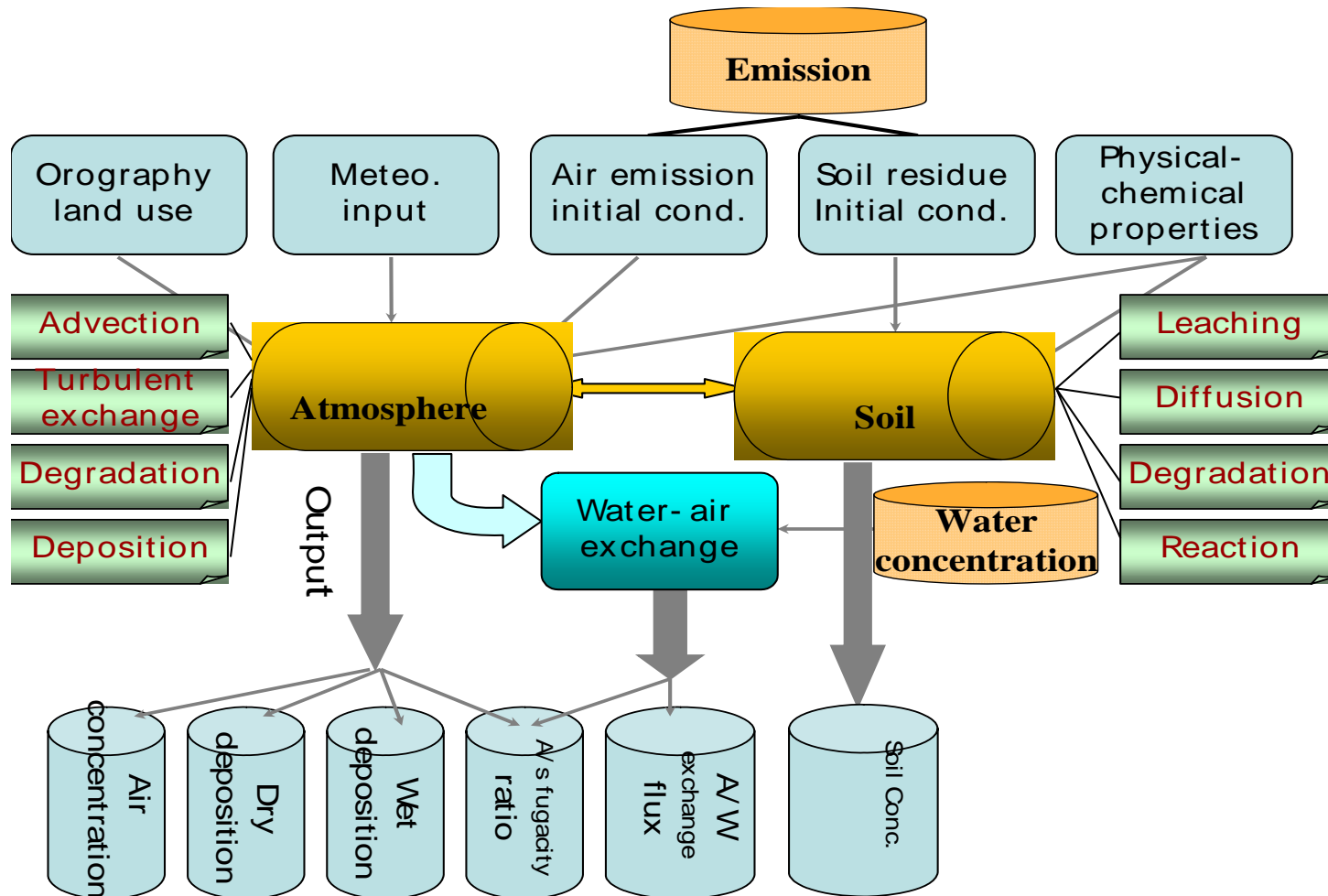


# Outline

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- CanMETOP (Canadian Model for Environmental Transport of Organochlorine Pesticides) Model
- Preliminary Canadian HCB Inventory
- Emission Inventory Data Gaps
- Conclusions
- Next Steps

# CanMETOP Model





# Preliminary Canadian HCB Inventory

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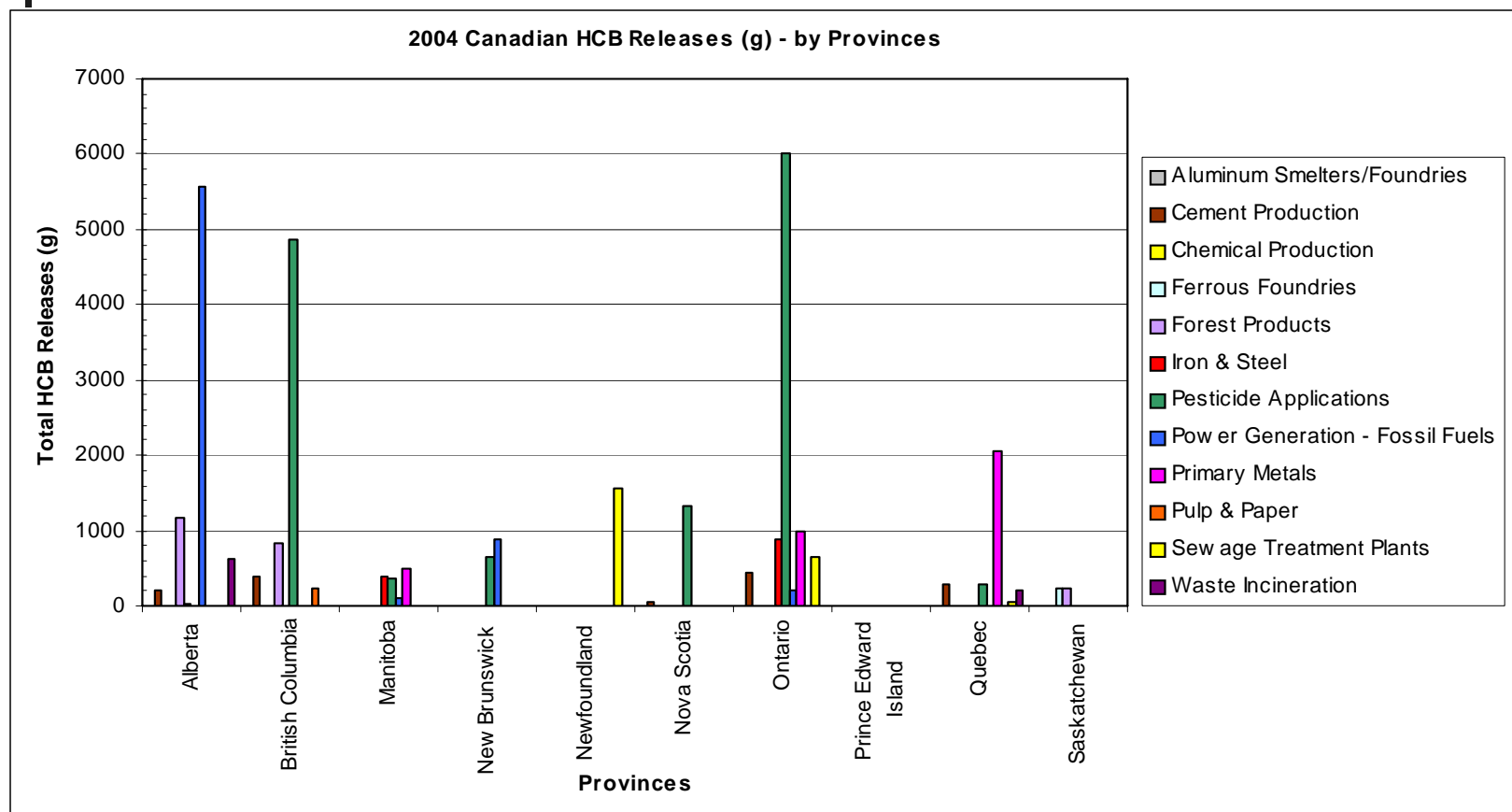
- Methodologies for Inventory Development
  - Area Source
  - Point Source
  - Mobile Source
- Preliminary 2004 Canadian HCB Inventory by Provinces
- Preliminary Canadian HCB Release Trends



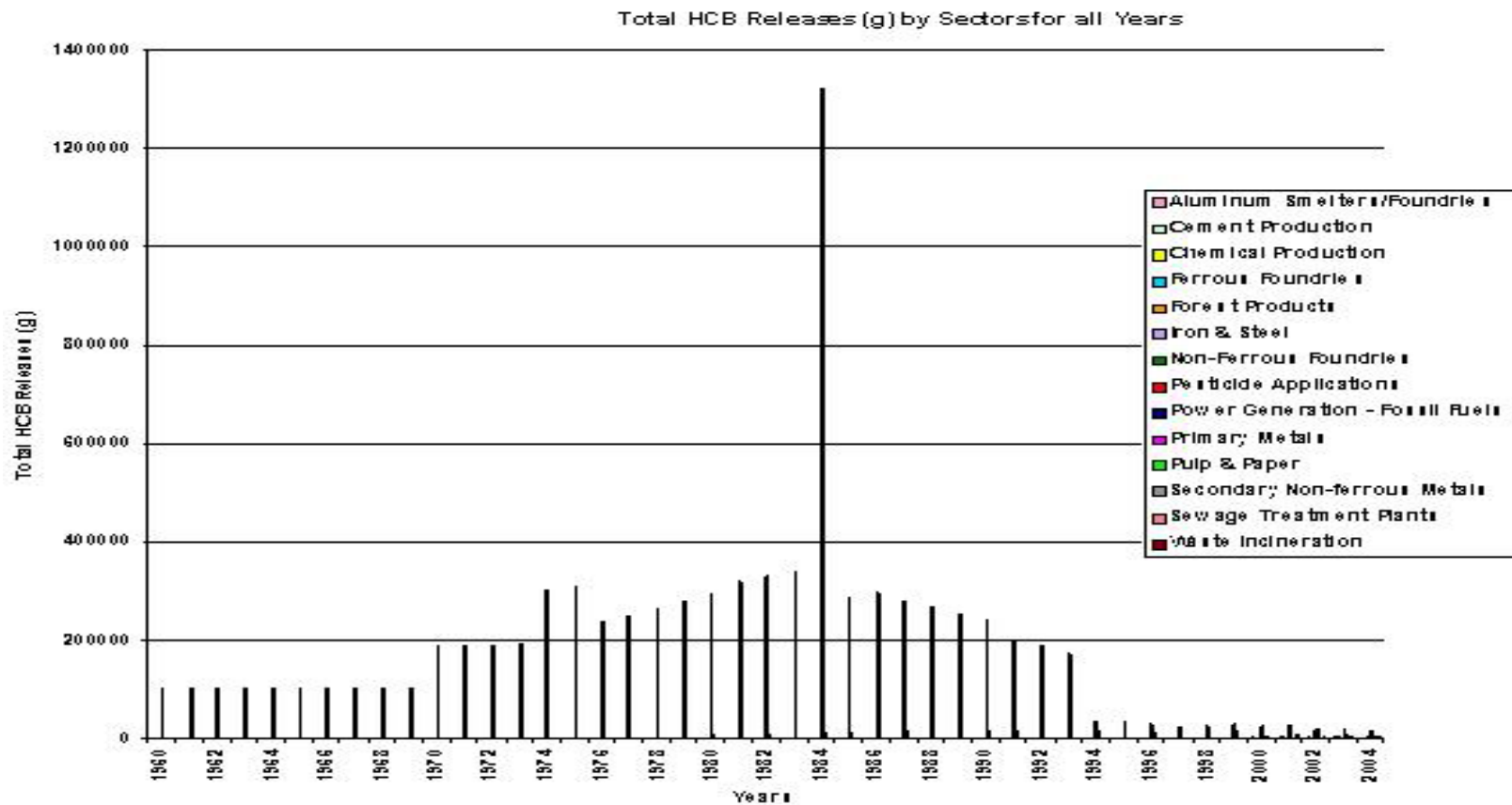
# Methodologies for EI Development

Selected Point Sources	Selected Area Sources	Mobile Sources
Aluminum Smelters/Foundries	Agricultural burning	Aircraft
Cement Production	Commercial/Industrial Fuel Combustion	Off-Road Diesel Equipment
Chemical Production	Crematorium	Off-Road Gasoline Equipment
Ferrous Foundries	Forest Fires	On-Road Motor Vehicles
Forest Products	Household Waste Burning	Rail
Iron & Steel	Pesticide Applications	Road Dust
Petroleum Refining	Prescribed Open Burning	Tire and brake wear
Power Generation - Fossil Fuels	Other products in non-agricultural use (bio-solids)	Marine
Primary Metals	Other products in Agricultural use (e.g. ferric chlorides)	
Pulp & Paper	Residential Fuel Combustion	
Secondary Non-ferrous Metals	Residential Wood Combustion	
Sewage Sludge Incineration	Sewage Sludge Land Application	
Sewage Treatment Plants	Structural Fires	
Vehicle Manufacturing	Use of PCP-treated Wood	
Waste Incineration		
Wood Preservation Plants		

# Preliminary 2004 Canadian HCB Inventory by Provinces

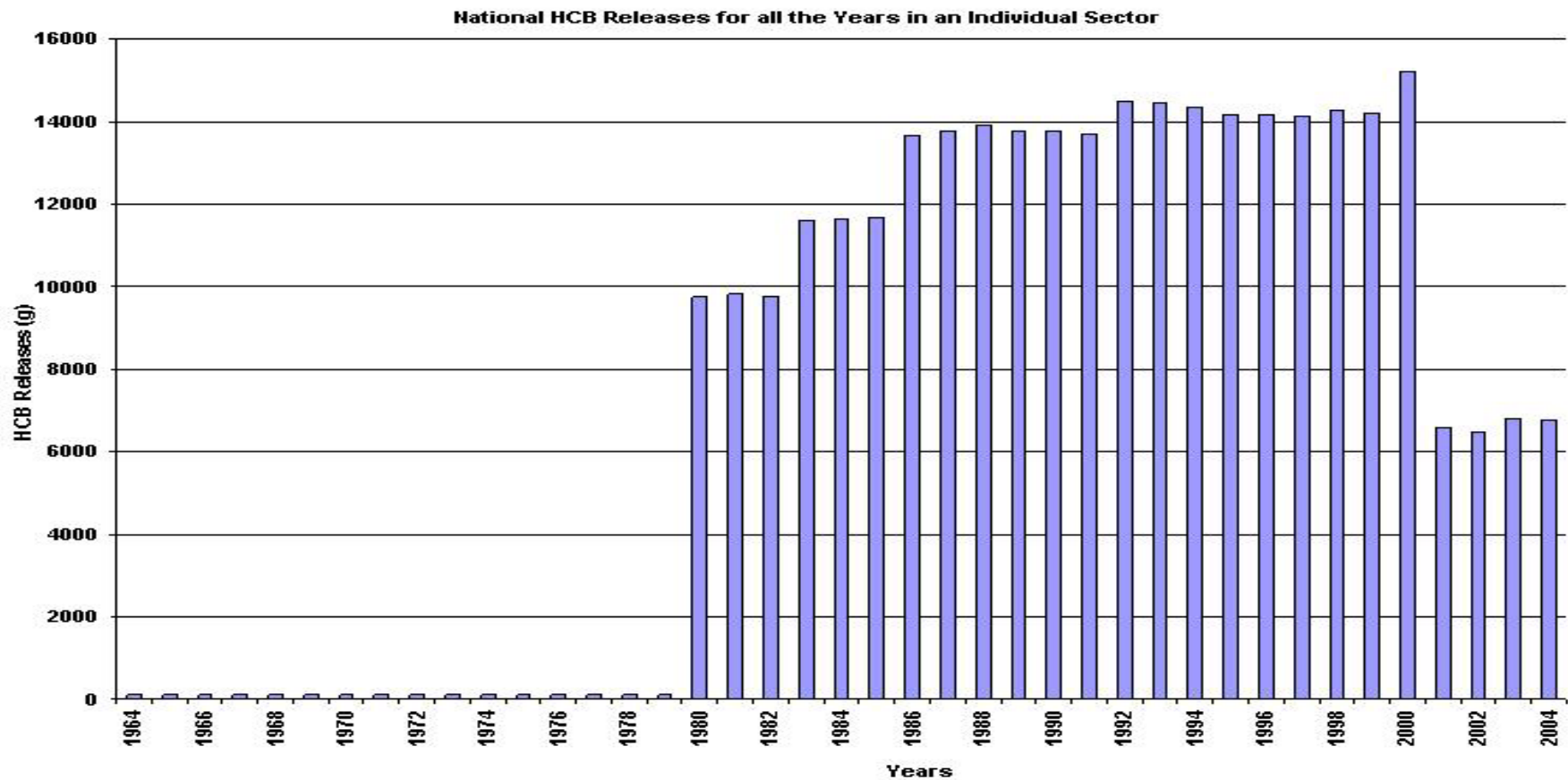


# Preliminary Canadian HCB Release Trends



# Canadian Power Generation – Fossil Fuels

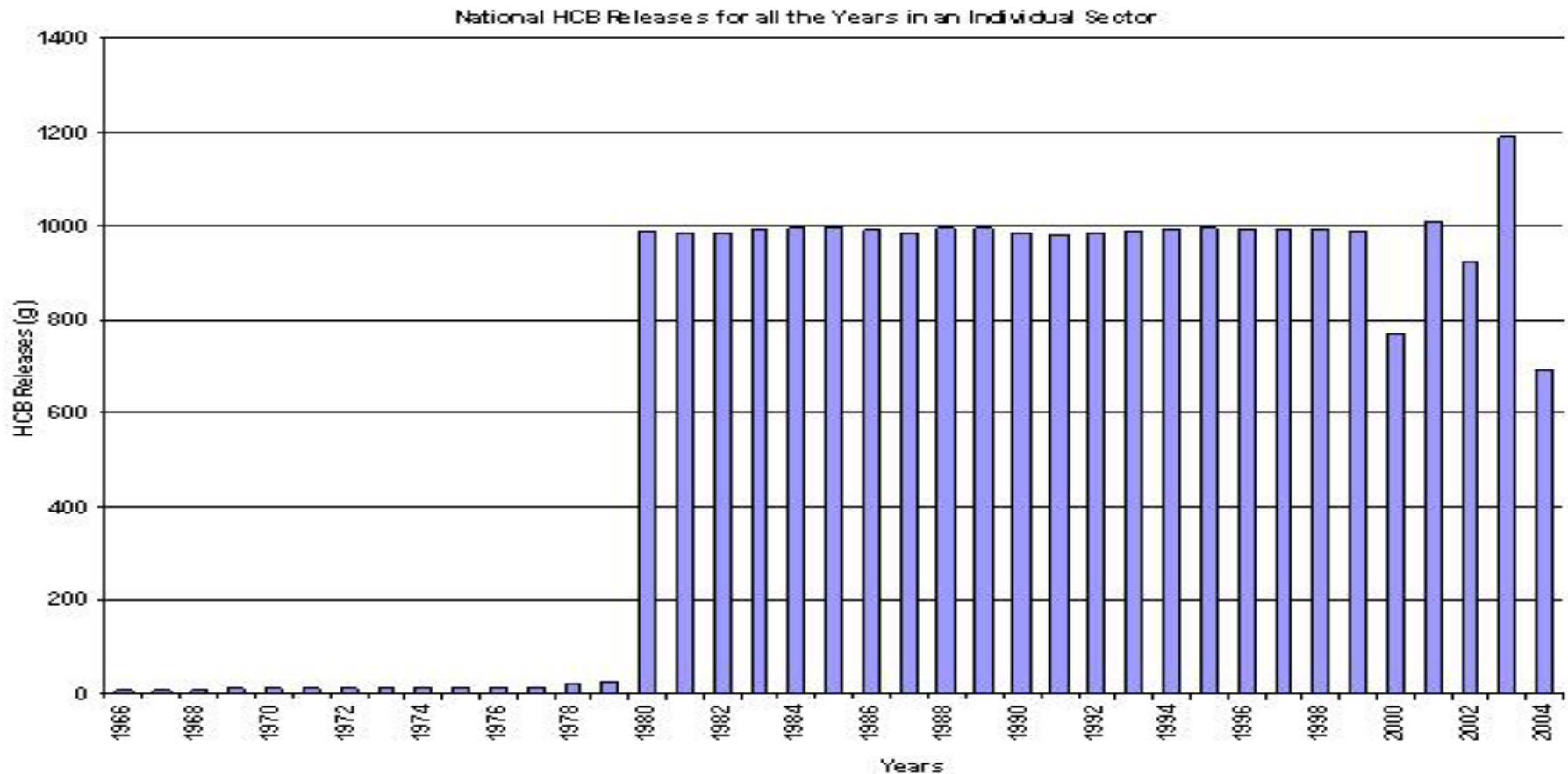
- Combustion of coal in the power generation industry is a source of HCB emission
- HCB emissions dated back to 1960s were obtained for this sector





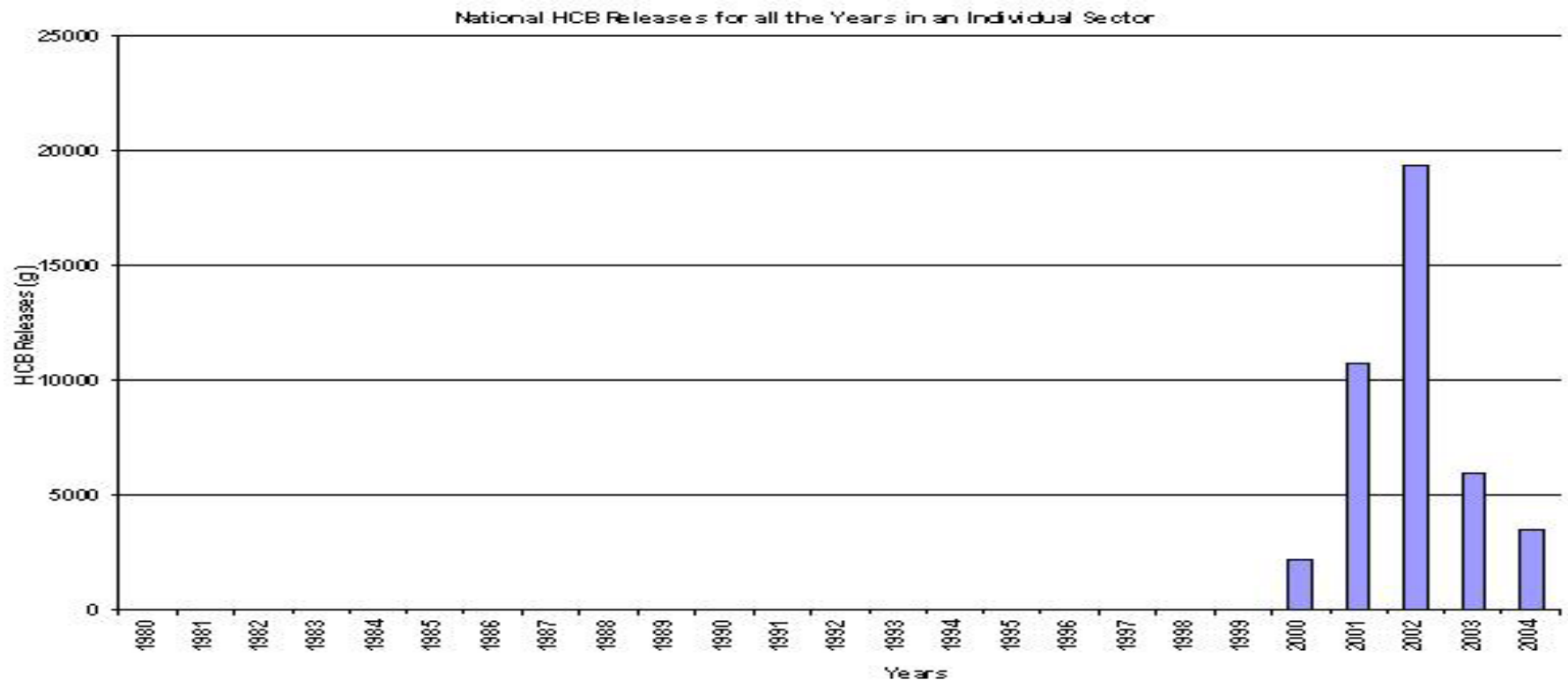
# Canadian Iron & Steel Sector

- HCB found as a trace contaminant/impurity in the combustion of coal in steel arc furnaces in iron sintering processes and coke production
- HCB emission data for the iron & steel industry from 1960 to 2004 were obtained.



# Canadian Primary Metals Production

- Production of magnesium and other nonferrous metals is a source of HCB emission
- HCB is emitted in trace amounts as by-products
- Emission factors differ according to the processes and activity data
- Emission data back to 1970s were obtained for this sector.





# Pesticide Applications

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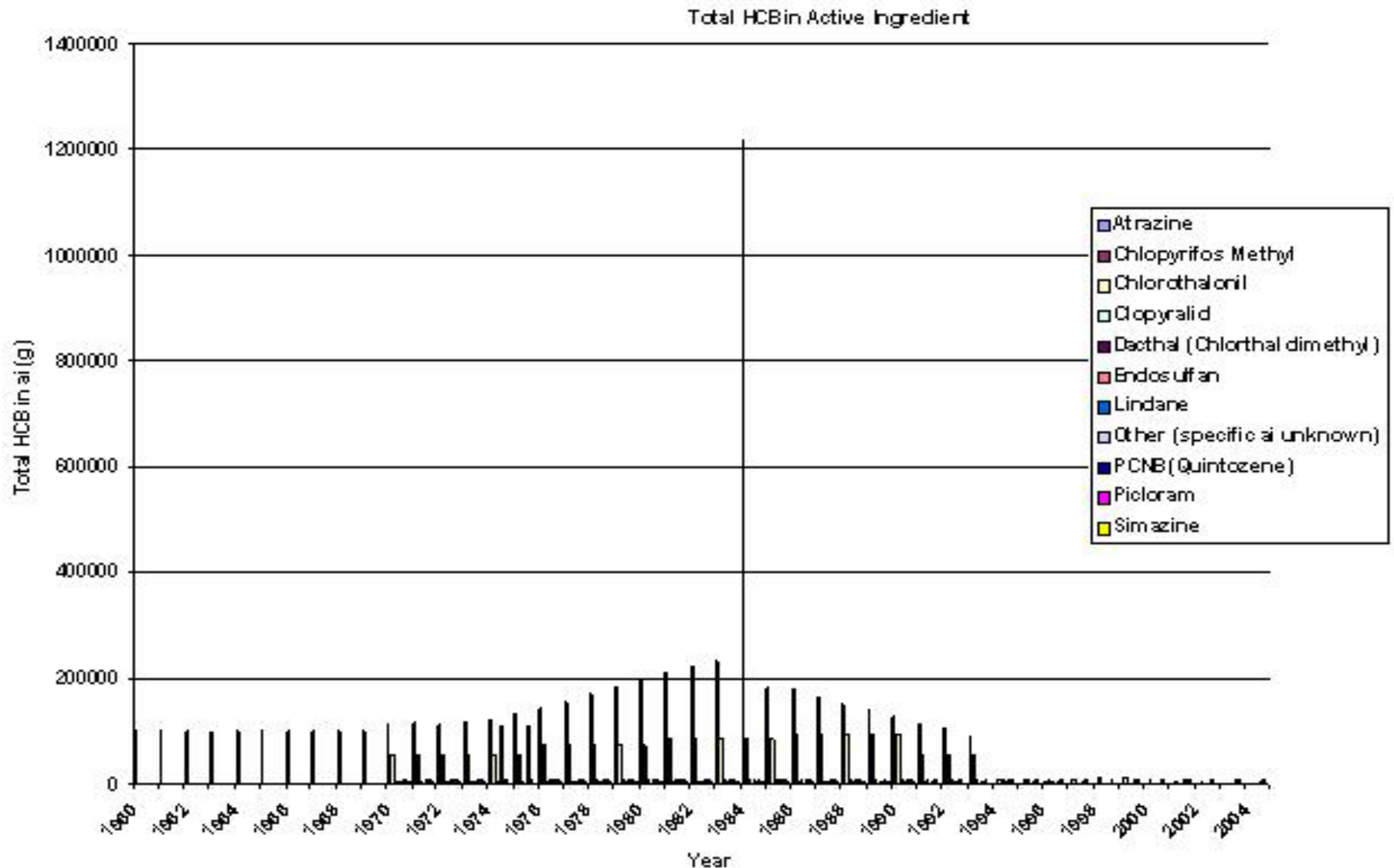
- Usage of pesticides considered to be the main source of HCB
- Active ingredients including Atrazine, Dacthal, Endosulfan, PCNB, Simazine, etc. were known to contain HCB as an impurity
- Pesticide sale and use reports on each province across Canada were obtained
- Assumptions in between the reporting years were made using this information
- Additional data needed for years before 1970



# Pesticides Containing HCB

Selected Pesticide Active Ingredient	Pesticide Type	[HCB] in Pesticide (ppm or mg/kg)
Atrazine	Herbicide	Pre-1993 = 100 ppm Post-1993 = 1 ppm
Chlopyrifos Methyl	Insecticide	?
Chlorothalonil	Fungicide	Pre 1993 = 500ppm 1994 to 2000 = 40 ppm Post 2000 = 10 ppm
Clopyralid	Herbicide	2.50 ppm
Dacthal (Chlorthal Methyl, DCPA)	Herbicide	Pre-1993 = 3,000 ppm 1994 to 2000 = 1,000 ppm Post 2000 = 40 ppm
Endosulfan	Insecticide	Pre-1993 = ? Post 1993=0.1 ppm
Lindane	Insecticide	Pre 1993 = 100 ppm Post 1993 =50 ppm Post 2000 = 1 ppm?
PCNB (quintozene)	Fungicide	Pre-1993 = 1,000 ppm Post-1993 = 500 ppm
Picloram	Herbicide	Pre-1993 = 100 ppm 1994 to 2000 = 50 ppm Post 2000 = 8 ppm
Simazine	Herbicide	Pre-1993 = 100 ppm Post -1993 = 1 ppm

# Canadian Pesticide Trends 1960 to Present





# Emission Inventory Data Gaps

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## ■ Area Source

- Availability, Variation, and Completeness of Pesticide Sale and Use Survey Data
- Activity Data for Other Area Sources (e.g. household waste burning, residential wood combustion, use of PCP wood, etc.)
- Consistency and Comparability in Provincial Data

## ■ Mobile Source

- Lack of HCB Emission Factors
- Lack of Activity Data



# Conclusions

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- Pesticide applications is one of the largest sources in Canada
- Need PMRA/Croplife's involvement for the pesticide sector
- Significant industrial and non-point sources differ in each province
- Need industry co-operation to obtain data
- Difficult to obtain source data before 1970
- Need to fill in the data gaps for non-point sources
- QA/QC the emission inventory to ensure consistency and comparability cross Canada and also between US and Canada.



# Next Steps

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- Canadian HCB Inventory: On-going data compilation
- US HCB Inventory: to be developed
  - TRI and NEI
  - Develop inventories for pesticide and certain non-point sources
- Soil Residue Inventory
- Grid HCB Emission Inventory
- Long Range Transport Modeling
- Analyze Model Output Results
  - Produce gridded (24 km × 24 km) **daily** HCB air concentrations, soil residues, depositions, and water/air exchange fluxes.
  - Predict the temporal loading trends of HCB to the Great Lakes from the past and present sources
  - Assess potential sources having larger impact on the Great Lakes Basin