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# Investigating Human Exposure to Contaminants in the Environment: A Handbook for Exposure Calculations



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Part 3 of 3

Canada

**TABLE 1:****RECOMMENDED STANDARD VALUES FOR DAILY INTAKE OF AIR, WATER AND SOIL<sup>1</sup>**

Age (years)	Air Inhalation (m <sup>3</sup> /day) <sup>2</sup>	Water Ingestion <sup>3</sup> (L/day)	Soil Ingestion (mg/day)	Total Soil Adhered <sup>4</sup> (mg/day)
0 - < 0.5	2	BF: 0/0 NBF: 0.2/0.75	35	2,200
0.5 - < 5	5	0.2/0.8	50	3,500
5 - < 12	12	0.3/0.9	35	5,800
12 - < 20	21	0.5/1.3	20	9,100
20 +	23	0.4/1.5	20	8,700

<sup>1</sup> From: Health Canada. *Human Health Risk Assessment for Priority Substances*, 1994.

<sup>2</sup> 1,000 litres = 1 m<sup>3</sup>

<sup>3</sup> For each age group, the amount of water a person drinks is shown with two values. The first value is straight tapwater, and the second value is straight tapwater plus tapwater-based beverages such as tea, coffee, and reconstituted soft drinks.

Exclusively breast fed infants (BF) do not require additional liquids. Estimates for non-breast-fed infants (NBF) are based on volume consumed as drinking water, and on drinking of 750 mL/day of formula made from powdered formula and tapwater for total drinking water.

<sup>4</sup> Estimated from the total body surface area for each age group (see TABLE 2); the proportion of the total body surface area exposed to soil is estimated at 30% for ages below 12 years, 28% for ages 12-19, and 24% for ages 20 and older; and approximately 2 mg of soil is estimated to adhere to each square centimetre of exposed skin.

**TABLE 2:****RECOMMENDED STANDARD VALUES FOR BODY WEIGHT AND BODY SURFACE AREA**

<b>Body Weight and Body Surface Area Standard Values</b>								
Age (years)	Body Weight <sup>1</sup> (kg)	Total Body Surface Area <sup>2</sup> (cm <sup>2</sup> )	Head Surface Area <sup>3</sup> (cm <sup>2</sup> )	Trunk Surface Area <sup>3</sup> (cm <sup>2</sup> )	Arms Surface Area <sup>3</sup> (cm <sup>2</sup> )	Hands Surface Area <sup>3</sup> (cm <sup>2</sup> )	Legs Surface Area <sup>3</sup> (cm <sup>2</sup> )	Feet Surface Area <sup>3</sup> (cm <sup>2</sup> )
0 - < 0.5	7	3,680	660	1,325	520	185	770	220
0.5 - < 5	13	5,780	870	2,020	750	350	1,390	400
5 - < 12	27	9,660	1,210	3,330	1,210	480	2,705	725
12 - < 20	57	16,200	1,460	5,350	2,270	810	5,180	1,130
20+	70	18,200	1,275	6,370	2,550	910	5,820	1,275

<sup>1</sup> From: Health Canada. *Human Health Risk Assessment for Priority Substances*, 1994.

<sup>2</sup> Total Body Surface Area was derived using body height (centimetres) and weight (kilograms) data from the Canada Fitness Survey and the Nutrition Canada Survey and the following formula:

$$\text{Total Body Surface Area (cm}^2\text{)} = 0.2035 \times \text{Weight}^{0.51456} \times \text{Height}^{0.42246}$$

<sup>3</sup> Surface Areas for each body part were determined as percentages of the Total Body Surface Area. The percentages were adapted from the *EPA Exposure Handbook*, 1989.

**TABLE 3:****AVERAGE AMOUNTS OF VARIOUS FOOD GROUPS EATEN BY CANADIANS, FROM THE NUTRITION CANADA SURVEY**

FOOD GROUP <sup>1</sup>	Amount Eaten (grams/person/day)				
	0 - < 0.5 yr <sup>2</sup>	0.5 - < 5 yr	5 - < 12 yr	12 - < 19 yr	20 +
DAIRY PRODUCTS	545	670	609	573	283
MEAT, POULTRY, FISH, EGGS	37	90	120	169	183
CEREAL PRODUCTS	53	168	300	325	247
FRUIT AND FRUIT PRODUCTS	112	189	202	160	186
VEGETABLES	42	125	198	250	250
FATS	0.8	11	21	29	25
NUTS AND DRIED LEGUMES	0.2	6	13	19	12
FOOD, PRIMARILY SUGAR	25	46	57	67	57
MIXED DISHES AND SOUPS	5	71	82	89	100
SOFT DRINKS, ALCOHOL	2	102	196	264	255

<sup>1</sup> Food groups have been derived from individual food composites (refer to Source below for details).

<sup>2</sup> These values are used if it is assumed that the infant is not exclusively breast-fed or not exclusively formula-fed.

Source: Health Canada. *Human Health Risk Assessment for Priority Substances*, 1994.

**TABLE 4:****PERMEABILITY CONSTANTS (P) FOR SELECTED COMPOUNDS, WATER SKIN EXPOSURE**

<b>Compound</b>	<b>Permeability Constant (cm/hr)</b>
Aniline	$4.1 \times 10^{-2}$
Benzene	$1.11 \times 10^{-1}$
Butanol	$2.5 \times 10^{-3}$
2-Butanone (Methyl ethyl ketone)	$5.0 \times 10^{-3}$
Carbon disulfide	$5.3 \times 10^{-1}$
p-Chlorophenol	$3.63 \times 10^{-2}$
p-Cresol	$1.75 \times 10^{-2}$
Cobaltous chloride	$5.5 \times 10^{-4}$
Dibutyl phthalate	$2.3 \times 10^{-4}$
Ethanol	$8.0 \times 10^{-4}$
Ethylbenzene	1.37
Mercuric chloride	$1.33 \times 10^{-3}$
Methanol	$5.0 \times 10^{-4}$
Nonanol	$6.0 \times 10^{-2}$
Parathion	$1.0 \times 10^{-2}$
Phenol	$8.22 \times 10^{-3}$
Styrene	$6.7 \times 10^{-1}$
Toluene	1.01
3,4-Xylenol	$3.6 \times 10^{-2}$

Note: The most cautious approach is to use a permeability constant of 1.0 cm/hr in the calculations. This is done by a number of agencies rather than using measured or estimated values.

Source: EPA. *Interim Guidance for Dermal Exposure Assessment*. OHEA-E-367, October, 1990.

**TABLE 5:****BIOAVAILABILITY FACTORS (BF) FOR SELECTED COMPOUNDS, SOIL SKIN EXPOSURE**

<b>Compound</b>	<b>Bioavailability Factor (unitless)</b>
Benzo [a] pyrene	0.01
Benzene	0.47
DDT	0.03
TCDD (Dioxin)	0.01
Toluene	0.55
m-Xylene	1.0

Note: The above bioavailability factors are approximate values only, and may differ from bioavailability factors used by others. The most cautious approach is to use a bioavailability factor of 1.0 in the calculations. This is done by a number of agencies rather than using measured or estimated values.

Source: EPA. *Interim Guidance for Dermal Exposure Assessment*, OHEA-E-367, 1990.

**TABLE 6:****TOLERABLE DAILY INTAKES AND RISK-SPECIFIC DOSES FOR SELECTED CONTAMINANTS**

<b>Non-Carcinogen</b>	<b>Tolerable Daily Intake</b>	<b>Reference*</b>
Copper	0.05 - 0.5 mg/kg/day	1
Endrin	1.0 µg/kg/day	2
Lead	(infants & adults) = 3.57 µg/kg/day	1
Mirex	0.028 µg/kg/day	2
Mercury: Methyl Hg Total Hg (methyl Hg + inorganic Hg)	0.47 µg/kg/day 0.71 µg/kg/day	1
Tin	2 mg/kg/day	1
Zinc	0.3 - 1.0 mg/kg/day	1

  

<b>Carcinogen**</b>	<b>Slope Factor*** (mg/kg/day)<sup>-1</sup></b>	<b>RsD (mg/kg/day) (1 x 10<sup>-5</sup> risk level)</b>
Aldrin	17.0	5.8 x 10 <sup>-7</sup>
Benzene	0.029	3.4 x 10 <sup>-4</sup>
Benzo[a]Pyrene	7.3	1.3 x 10 <sup>-6</sup>
Chlordane	1.3	7.7 x 10 <sup>-6</sup>
Carbon Tetrachloride	0.13	7.7 x 10 <sup>-5</sup>
p,p-DDT, p,p-DDE p,p-DDD	0.34	2.9 x 10 <sup>-5</sup>
Dieldrin	16.0	6.2 x 10 <sup>-7</sup>
Heptachlor	4.5	2.2 x 10 <sup>-6</sup>
Heptachlor Epoxide	9.1	1.1 x 10 <sup>-6</sup>
Hexachlorobenzene	1.6	6.2 x 10 <sup>-6</sup>
Hexachlorocyclohexanes (α-HCH)	6.3	1.6 x 10 <sup>-6</sup>
Pentachlorophenol	0.12	8.3 x 10 <sup>-5</sup>
Polychlorinated Biphenyl (PCB)	7.7	1.3 x 10 <sup>-6</sup>

\* References: 1 - Joint European Committee on Food Additives  
2 - Toxicological Evaluation Division, Health Canada

\*\* Known or probable carcinogen

\*\*\* Slope Factors obtained from the IRIS Database.

**TABLE 7****DOSE CONVERSION FACTORS (DCFs) FOR SELECTED RADIONUCLIDES  
(United Kingdom National Radiological Protection Board, 1991)**

Radionuclide	Dose Conversion Factors for Inhalation and Ingestion (Sv/Bq)			
	Inhalation		Ingestion	
	Children (1 yr)	Adult (18+ yrs)	Children (1 yr)	Adult (18+ yrs)
Tritium ( <sup>3</sup> H)	4.30 x 10 <sup>-11</sup>	1.80 x 10 <sup>-11</sup>	4.30 x 10 <sup>-11</sup>	1.80 x 10 <sup>-11</sup>
Carbon-14 ( <sup>14</sup> C)	1.50 x 10 <sup>-9</sup>	5.60 x 10 <sup>-10</sup>	1.50 x 10 <sup>-9</sup>	5.60 x 10 <sup>-10</sup>
Strontium-90 ( <sup>90</sup> Sr)	1.60 x 10 <sup>-6</sup>	3.50 x 10 <sup>-7</sup>	1.20 x 10 <sup>-7</sup>	2.80 x 10 <sup>-8</sup>
Iodine-129 ( <sup>129</sup> I)	1.40 x 10 <sup>-7</sup>	6.70 x 10 <sup>-8</sup>	2.20 x 10 <sup>-7</sup>	1.10 x 10 <sup>-7</sup>
Iodine-131 ( <sup>131</sup> I)	1.10 x 10 <sup>-7</sup>	1.30 x 10 <sup>-8</sup>	1.80 x 10 <sup>-7</sup>	2.20 x 10 <sup>-8</sup>
Cesium-137 ( <sup>137</sup> Cs)	7.00 x 10 <sup>-9</sup>	8.50 x 10 <sup>-9</sup>	1.00 x 10 <sup>-8</sup>	1.30 x 10 <sup>-8</sup>
Radium-226 ( <sup>226</sup> Ra)	1.40 x 10 <sup>-5</sup>	2.10 x 10 <sup>-6</sup>	9.10 x 10 <sup>-7</sup>	2.20 x 10 <sup>-7</sup>
Uranium-234 ( <sup>234</sup> U)	1.50 x 10 <sup>-4</sup>	3.50 x 10 <sup>-5</sup>	1.70 x 10 <sup>-7</sup>	3.90 x 10 <sup>-8</sup>
Uranium-238 ( <sup>238</sup> U)	1.30 x 10 <sup>-4</sup>	3.10 x 10 <sup>-5</sup>	1.50 x 10 <sup>-7</sup>	3.60 x 10 <sup>-8</sup>
Plutonium-239 ( <sup>239</sup> Pu)	2.00 x 10 <sup>-4</sup>	6.80 x 10 <sup>-5</sup>	1.20 x 10 <sup>-6</sup>	5.60 x 10 <sup>-7</sup>
Americium-241 ( <sup>241</sup> Am)	1.60 x 10 <sup>-4</sup>	7.00 x 10 <sup>-5</sup>	1.30 x 10 <sup>-6</sup>	5.70 x 10 <sup>-7</sup>

Dose Conversion Factor (DCF): The committed effective dose resulting from the inhalation or ingestion of 1 Bq of a given radionuclide. Unit - sievert per becquerel (Sv/Bq).



**TABLE 8:****INTERIM ASSESSMENT CRITERIA FOR SOIL AND WATER**

	Soil	Water
<b>General Parameters</b>		
pH	6 to 8	—
conductivity	2 dS/m	—
sodium adsorption ratio	5	—
<b>Inorganic Parameters</b>		
antimony	20 <sup>1</sup>	—
arsenic	5	5
barium	200	50
beryllium	4	—
boron (hot water soluble)	1	—
cadmium	0.5	1
chromium(+6)	2.5	—
chromium (total)	20	15
cobalt	10	10
copper	30	25
cyanide (free)	0.25	40
cyanide (total)	2.5	40
fluoride (total)	200	—
lead	25	10
mercury	0.1	0.1
molybdenum	2	5
nickel	20	10
selenium	1	1
silver	2	5
sulphur (elemental)	250	—
thallium	0.5	—
tin	5	10
vanadium	25	—
zinc	60	50

Notes: all values in µg/g dry weight or µg/L unless otherwise stated.

Interim assessment criteria are largely based on ambient or background concentrations for most general and inorganic parameters and on analytical detection limits for most organic parameters.

— value not established.

See end of table for numbered footnotes.

Source: Canadian Council of Ministers of the Environment. *Interim Canadian Environmental Quality Criteria for Contaminated Sites*, Report CCME EPC-CS34, September, 1991.

**INTERIM ASSESSMENT AND CRITERIA FOR SOIL AND WATER (continued)**

	<b>Soil</b>	<b>Water</b>
<b>Monocyclic Aromatic Hydrocarbons</b>		
benzene	0.05	0.5
chlorobenzene	0.1	0.1
1,2-dichlorobenzene	0.1	0.2
1,3-dichlorobenzene	0.1	0.2
1,4-dichlorobenzene	0.1	0.2
ethylbenzene	0.1	0.5
styrene	0.1	0.5
toluene	0.1	0.5
xylene	0.1	0.5
<b>Phenolic Compounds</b>		
non-chlorinated <sup>2</sup> (each)	0.1	0.1
chlorophenols <sup>3</sup> (each)	0.05	1.0
<b>Polycyclic Aromatic Hydrocarbons (PAHs)</b>		
benzo(a)anthracene	0.1	0.01
benzo(a)pyrene	0.1	0.01
benzo(b)fluoranthene	0.1	0.01
benzo(k)fluoranthene	0.1	0.01
dibenz(a,h)anthracene	0.1	0.01
indeno(1,2,3-c,d)pyrene	0.1	0.1
naphthalene	0.1	0.2
phenanthrene	0.1	0.2
pyrene	0.1	0.2
<b>Chlorinated Hydrocarbons</b>		
chlorinated aliphatics <sup>4</sup> (each)	0.1	0.1
chlorobenzenes <sup>5</sup> (each)	0.05	0.3
hexachlorobenzene	0.1	0.1
hexachlorocyclohexane	0.01	—
PCBs <sup>6</sup>	0.1	0.1
PCDDs and PCDFs <sup>7</sup>	0.00001	—
<b>Miscellaneous Organic Parameters</b>		
non-chlorinated aliphatics (each)	0.3	—
phthalic acid esters (each)	30	—
quinoline	0.1	—
thiophene	0.1	—

## Table 8 footnotes

<sup>1</sup> Set equal to the Agricultural Remediation Criteria value

<sup>2</sup> Non-chlorinated phenolic compounds include:

2,4-dimethylphenol  
2,4-dinitrophenol  
2-methyl 4,6-dinitrophenol  
nitrophenol (2-, 4-)  
phenol  
cresol

<sup>3</sup> Chlorophenols include:

chlorophenol isomers (ortho, meta, para)  
dichlorophenols (2,6- 2,5- 2,4- 3,5- 2,3 3,4  
trichlorophenols (2,4,6- 2,3,6- 2,4,5- 2,3,5- 2,3,4- 3,4,5-)  
tetrachlorophenols (2,3,5,6- 2,3,4,5- 2,3,4,6-)  
pentachlorophenol

<sup>4</sup> Aliphatic chlorinated hydrocarbons include:

chloroform  
dichloroethane (1,1- 1,2-), dichloroethene (1,1- 1,2-)  
dichloromethane  
1,2-dichloropropane, 1,2-dichloropropene (cis and trans)  
1,1,1,2-tetrachloroethane, tetrachloroethene  
carbon tetrachloride  
trichloroethane (1,1,1- 1,1,2-), trichloroethene

<sup>5</sup> Chlorobenzenes include

all trichlorobenzene isomers  
all tetrachlorobenzene isomers  
pentachlorobenzene

<sup>6</sup> PCBs include mixtures 1242, 1248, 1254, and 1260

<sup>7</sup> PCDDs and PCDFs expressed in 2,3,7,8-TCDD equivalents. NATO International Toxicity Equivalency Factors (I-TEFs) for congeners and isomers of PCDDs and PCDFs are as follows:

Congener	TEF	Congener	TEF
2,3,7,8-T <sub>4</sub> CDD	1.0	2,3,7,8-T <sub>4</sub> CDF	0.1
1,2,3,4,8-P <sub>5</sub> CDD	0.5	2,3,4,7,8-P <sub>5</sub> CDF	0.5
1,2,3,4,7,8-H <sub>6</sub> CDD	0.1	1,2,3,7,8-P <sub>5</sub> CDF	0.05
1,2,3,7,8,9-H <sub>6</sub> CDD	0.1	1,2,3,4,7,8-H <sub>6</sub> CDF	0.1
1,2,3,6,7,8-H <sub>6</sub> CDD	0.1	1,2,3,7,8,9-H <sub>6</sub> CDF	0.1
1,2,3,4,6,7,8-H <sub>7</sub> CDD	0.1	1,2,3,6,7,8-H <sub>6</sub> CDF	0.1
O <sub>8</sub> CDD	0.001	2,3,4,6,7,8-H <sub>6</sub> CDF	0.1
		1,2,3,4,6,7,8-H <sub>7</sub> CDF	0.1
		1,2,3,4,7,8,9-H <sub>7</sub> CDF	0.01
		O <sub>8</sub> CDF	0.001

## GLOSSARY

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Becquerel	The becquerel ( <i>Bq</i> ) is the International System (S.I.) unit for measuring the activity, or radioactive decay, of a radionuclide. A becquerel is defined as one atomic disintegration per second.
Bioavailability factor	A pollutant or other chemical is in a physical or chemical form that permits it to be eaten, breathed, or otherwise absorbed by living things. This is known as the bioavailability of a substance. The bioavailability factor simply estimates the proportion of the substance in the environment that is available to be absorbed. For example, a bioavailability factor of 0.5 means that 50% of the substance in the environment is available to be absorbed. The bioavailability factor is unknown for many compounds. In these cases it is assumed the bioavailability factor is 1.0 (i.e., 100% of the substance in the environment is available for absorption).
Committed dose	The radiation dose, corrected for type of radiation and type of tissue or organ exposed, that will be received over a period of time following a single intake of radioactive material into the body. Standard periods of integration are 50 years for adults and 70 years for children.
Estimated daily intake	The sum of all exposures of a substance from all the pathways of exposure is the Estimated Daily Intake (EDI). This is usually expressed in milligrams of contaminant per kilogram of body weight per day (mg/kg/day).
Exposure	Exposure is any contact between a substance and an individual. Exposure may occur by different means, including eating, drinking, breathing, and skin contact.
Exposure factor	The exposure factor reflects how often a person is exposed to a contaminant averaged over a lifetime. It is calculated by multiplying the exposure frequency (events/year) and the exposure duration (years/lifetime).
Exposure pathway	The pathway a contaminant may take to reach humans or other living organisms. Exposure pathways include all the elements that link the source of a contaminant to the exposure route (ingestion, inhalation, skin contact) by which the contaminant enters the body.
Exposure route	An exposure route is how a contaminant enters the human body. There are three general routes by which humans may take contaminants into their bodies. These include eating and drinking (ingestion), inhalation, and absorption through the skin.
Inorganic chemicals	Inorganic chemicals are mineral in origin. Examples of inorganic substances are lead, cadmium, mercury, and asbestos.
Irradiation	Exposure to ionizing radiation.
Organic chemicals	Organic chemicals contain carbon, usually in combination with other elements such as hydrogen, oxygen, nitrogen or chlorine. Vegetable matter, petroleum, and plastics are examples of organic materials, as are PCBs, DDT, and polyvinyl chloride.

Permeability constant	The permeability constant describes the speed at which a chemical passes through the skin into the body. It is usually determined from laboratory studies and is expressed in cm/hour.
Radionuclide	An unstable nuclide (nucleus of an atom) that undergoes spontaneous radioactive decay, emitting ionizing radiation as it does so, and changing eventually from one element into another.
Sievert	The sievert ( <i>Sv</i> ) is the International System (S.I.) unit for radiation effective dose, equal to 1 joule of energy absorbed per kilogram of absorbing tissue.
Tolerable Daily Intake	The tolerable daily intake (TDI) is the quantity of a chemical that humans can consume on a daily basis, for a lifetime, with reasonable assurance that their health will not be threatened. It is usually expressed in milligrams of chemical per kilogram of body weight per day (mg/kg/day).

## REFERENCES

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## RESOURCES AND CONTACTS

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### 1. Federal Government

Atmospheric Environment Service  
Environment Canada  
25 St. Clair Avenue East, Third Floor  
Toronto, Ontario M4T 1M2  
Tel: (416) 973-1114

Great Lakes Health Effects Program  
Health Canada  
Main Building, Room 1108  
Tunney's Pasture, 0301 A1  
Ottawa, Ontario K1A 0K9  
Tel: (613) 957-1876

Food Directorate  
Health Canada  
Health Protection Building  
Tunney's Pasture  
Ottawa, Ontario K1A 0L2  
Tel: (613) 957-1821

Monitoring and Criteria Division (Hazardous  
Wastes)  
Health Canada  
Room 126, Environmental Health Centre  
Tunney's Pasture  
Ottawa, Ontario K1A 0L2  
Tel: (613) 957-3128

### 2. Provincial Government (Ontario)

Environmental Health and Toxicology Unit  
Ontario Ministry of Health  
5700 Yonge Street, Eighth Floor  
North York, Ontario M2M 4K2  
Tel: (416) 327-7427

Great Lakes Section  
Ontario Ministry of Environment and Energy  
125 Resources Road  
Etobicoke, Ontario M9P 3V6  
Tel: (416) 235-6222

Environmental Radiation Hazards Division  
Radiation Protection Bureau  
Health Canada  
775 Brookfield Road, Confederation Heights  
Ottawa, Ontario K1A 1C1  
Tel: (613) 954-6671

Pesticides Information Division  
Agriculture and Agri-Food Canada  
59 Camelot Drive  
Nepean, Ontario K1A 0Y9  
Tel: 1-800-267-6315 (Pesticides Information  
Call-Line)

Workplace Hazardous Materials Information  
Systems (WHMIS)  
Product Safety Bureau  
Health Canada  
17<sup>th</sup> floor, Zone 2  
Place du Portage, Phase 1  
50 Victoria Street  
Hull, Quebec K1A 0C9  
Tel: (819) 953-2035

Hazardous Contaminants Coordination  
Branch  
Ontario Ministry of Environment and Energy  
135 St. Clair Avenue West  
Toronto, Ontario M4V 1P5  
Tel: (416) 323-5095

Ontario Ministry of Environment and Energy  
Public Inquiries Centre  
135 St. Clair Avenue West, 1<sup>st</sup> floor  
Toronto, Ontario M4V 1P5  
Tel: (416) 323-4231 or 1-800-565-4923

Ontario Ministry of Natural Resources  
Public Information Centre  
900 Bay Street, Room 1-M73  
2 McDonald Block  
Toronto, Ontario M7A 2C1  
Tel: (416) 314-2000

### **3. Municipal Government**

#### ***Local Commissioner of Planning and Public Works***

Address: \_\_\_\_\_  
\_\_\_\_\_  
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Address: \_\_\_\_\_  
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Tel: \_\_\_\_\_

Tel: \_\_\_\_\_

#### ***Local Environment Office***

Address: \_\_\_\_\_  
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Address: \_\_\_\_\_  
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Tel: \_\_\_\_\_

Tel: \_\_\_\_\_

#### ***Local Sewage Treatment Plant***

Address: \_\_\_\_\_  
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Address: \_\_\_\_\_  
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Tel: \_\_\_\_\_

Tel: \_\_\_\_\_

#### ***Other Local Contacts***

Address: \_\_\_\_\_  
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Address: \_\_\_\_\_  
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Tel: (905) 525-9140
- University of Toronto  
Haultain Building  
170 College Street, Room 204  
Toronto, Ontario M5S 1A4  
Tel: (416) 978-3884

Queen's University  
Department of Community Health and Epidemiology  
Abramsky Hall, 3<sup>rd</sup> Floor  
Kingston, Ontario K7L 3N6  
Tel: (613) 545-2901

Ryerson Polytechnical University  
School of Environmental Health  
350 Victoria Street  
Toronto, Ontario M5B 2K3  
Tel: (416) 979-5154

University of Guelph  
Faculty of Environmental Sciences  
Blackwood Hall, Room 101  
Guelph, Ontario N1G 2W1  
Tel: (519) 824-4120

#### 5. Agencies and Associations

Agency for Toxic Substances and Diseases Registry (USA)  
Department of Health and Human Services  
1600 Clifton Road  
Atlanta, Georgia 30333  
Tel: (404) 639-6206

Canadian Centre for Occupational Health and Safety  
250 Main Street East  
Hamilton, Ontario L8N 1H6  
Tel: (1-800) 263-8466

University of Ottawa  
Faculty of Medicine  
Department of Community Medicine  
451 Smyth Road, Room 3231C  
Ottawa, Ontario K1H 8M5  
Tel: (613) 787-6480

University of Toronto  
Institute for Environmental Studies  
170 College Street, Haultain Building  
Toronto, Ontario M5S 1A4  
Tel: (416) 978-2994

University of Waterloo  
Faculty of Environmental Studies  
Waterloo, Ontario N2L 3G1  
Tel: (519) 885-1211 x 3463

University of Western Ontario  
Faculty of Medicine  
Department of Family Medicine  
Kresge Building, Room K101  
London, Ontario N6A 5C1  
Tel: (519) 661-2037

Canadian Institute of Public Health Inspectors  
38 Auriga Drive, Suite 201  
Nepean, Ontario K2E 8A5  
Tel: (613) 224-7568

Canadian Public Health Association  
1565 Carling Avenue, Suite 400  
Ottawa, Ontario K1Z 8R1  
Tel: (613) 725-3769

International Commission on Radiological  
Protection (ICRP)  
The documents of ICRP are published as the  
*Annals of ICRP* and are available from:  
Review Journals  
Pergamon Press plc  
Headington Hill Hall  
Oxford, U.K. OX3 0BW  
Tel: 0865 794141

International Institute of Concern for Public  
Health  
710 - 264 Queen's Quay West  
Toronto, Ontario M5J 1B5  
Tel: (416) 260-0575

National Radiation Protection Board (NRPB)  
Information Officer  
Chilton, Didcot, Oxon, OX11 0RQ  
U.K.  
Tel: 0235 831600

Ontario Public Health Association  
468 Queen Street East, Suite 202  
Toronto, Ontario M5A 1T7  
Tel: (416) 367-3313

U.S. National Technical Information Service  
U.S. Department of Commerce  
Springfield, Virginia 22161 USA  
Tel: (703) 487-4650

## ON-LINE DATABASES

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These databases are on computer. To be able to use them, you will need a computer that can communicate with the main database computer. Some public libraries and most university libraries have the necessary equipment and connections to search at least some of these databases for you. For the very scientific databases, the university libraries are better able to handle your information needs. If they cannot do the search, librarians can usually find out who can. For assistance with health statistics databases, try the Medical Officer of Health and the Ontario Ministry of Health.

Most searches will cost money. The more specific you can be about the information you need, the shorter the search and the lower the cost. Again, librarians usually have good ideas on how to reduce your costs.

<b>Database Name</b>	<b>Description</b>
Biosis Previews	Contains citations from Biological Abstracts.
Cab Abstracts	A comprehensive file of agricultural and biological information.
CA Search	Contains bibliographic data, keyword phrases and index entries for all documents covered by the Chemical Abstracts Services.
Chemical Safety Newsbase	Information on the hazardous and potentially hazardous effects of chemicals and processes encountered by workers in industry and laboratories. It also covers microbiological and radiation hazards encountered in the workplace.
CRIS/USDA	Information on U.S. federal- and state-supported research in agriculture, food and nutrition, forestry and related fields.
Drug Information Fulltext	Information on stability, chemistry and pharmacokinetics of drugs, as well as on their action, use, dosage, and administration. The file also covers compatibility and interactions of drugs and cautions of use.
EiCompendex Plus	Contains abstracts from the world's significant literature of engineering and technology.
EMBASE	Contains abstracts and citations of articles on human medicine and drugs.
Enviroline	Contains index and abstract coverage of literature on all aspects of the environment.
Environmental Bibliography	Covers fields of general human ecology, atmospheric studies, energy, land resources, water resources, nutrition and health.
International Pharmaceutical Abstracts	Information on all phases of development and use of drugs and on professional pharmaceutical practice.
IRIS	The Integrated Risk Information System (IRIS) registry contains toxicological and regulatory information on more than 400 chemicals with more added to the database each year.

<b>Database Name</b>	<b>Description</b>
MEDLINE/MEDLARS	Covers articles on every aspect of biomedicine.
Pollution Abstracts	References to environment-related literature on pollution, its sources and its control.
NIOSH/TIC	Covers all aspects of occupational safety and health.
NTIS	Contains results of U.S. government-sponsored research, development and engineering.
RTECS	The Registry of Toxic Effects of Chemical Substances(RTECS) contains toxicity data for over 100,000 chemical substances.
Sedbase	Full text database that critically analyses the published drug side effect literature on drugs currently in use.
Toxline	Covers the adverse effects of chemicals, drugs and physical agents on living systems.