Alberta Environment June 2003
Science and Technology Branch

Chemical Fact Sheets

Acetaldehyde
CAS No. 75-07-0
C_2H_4O

WHAT IS ACETALDEHYDE?

Acetaldehyde is a colorless, flammable gas or liquid with a pungent, suffocating odor that is slightly fruity when diluted.

USES

Acetaldehyde has applications in the production of a wide range of organic chemicals; as a synthetic flavor & adjuvant; in the manufacture of synthetic resins, dyes, paraldehyde, acetic acid, butanol, perfumes, aniline dyes, plastics, synthetic rubber; in silvering mirrors and hardening gelatin fibers; and as a synthetic flavor ingredient useful in all fruits for lift, especially orange, apple, and butter. It is also an intermediate for pesticides and photographic formulations.

SOURCES

Acetaldehyde is a natural product of combustion and photo-oxidation of commonly found hydrocarbons in the atmosphere. It is also photo-chemically produced in surface water. It occurs naturally in certain foods, such as ripe fruits and coffee. Green plants produce Acetaldehyde as they break down food.

Auto exhaust, tobacco smoke, and emissions from power plants using fossil fuels, wood or trash are also sources of Acetaldehyde. Aldehyde emissions from residential woodburning is estimated to be between 14 and 54 gigagrams/year, which is comparable to power plant emissions and between 22 and 84% of all automobile emissions. It is likely that residential wood burning is the major source of primary aldehydes in some areas during winter months. Chlorination can result in the production of Acetaldehyde in water. Most direct releases of acetaldehyde to the environment are to air or to underground sites.

Table 1: National Pollutant Release Inventory 2001 Acetaldehyde Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0001	2001	Alberta Pacific Forest Industries Inc.	Boyle	AB	18.01	0.00	0.00	tonnes
4867	2001	Burns Philp Food Limited - Fleischmann's Yeast- Calgary Plan	Calgary	AB	12.09	0.00	0.00	tonnes
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	48.79	0.00	0.00	tonnes
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	14.99	0.00	0.00	tonnes
2316	2001	Dow Chemical Canada Inc. - Prentiss Chemical Manufacturing P	Red Deer	AB	2.23	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.08	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	2.08	0.00	0.00	tonnes
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	13.38	0.00	0.00	tonnes
				Total	**111.64**	**0.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Acetaldehyde were not reported in 1997 or 1998 in Alberta.

Exposure to Acetaldehyde might include:

- Breathing low background levels in the environment.
- Breathing higher levels of contaminated air in the workplace or from auto exhaust or fossil-fuel burning.
- Eating foods that naturally contain Acetaldehyde, such as fruit and coffee.
- Eating or drinking contaminated foods or water.
- Smoking or breathing second hand smoke.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In the air it degrades in a matter of hours by reaction with sunlight and other chemicals.
- If released into water it will rapidly break down or go into the air.
- In a typical river one-half of the total amount breaks down every 3 hours.
- Acetaldehyde can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in air.

- If spilled on land it will quickly move into the air or into the ground where it will break down.
- Acetaldehyde does not build up in humans. It breaks down mainly to a chemical that is normally present in the human body.
- Acetaldehyde doesn't bind to soil or build up in animals.
- It is broken down by microorganisms in soil and water.
- It can move into groundwater from spills or landfills.

TOXICITY

Effects of Acetaldehyde on human health and the environment depend on the amount of Acetaldehyde present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Acetaldehyde is classified as Group 2B: "possibly carcinogenic to humans."
- Breathing Acetaldehyde for short periods of time can irritate the human respiratory system. Effects of exposure include irritation and lung edema (fluid accumulation). Breathing Acetaldehyde may result in death if levels are high enough to cause respiratory paralysis (short-term) or edema (long-term). These effects are not likely to occur at levels of Acetaldehyde that are normally found in the environment.
- Breathing elevated levels of Acetaldehyde for short periods of time can also adversely affect the cardiovascular system.
- Breathing Acetaldehyde does not cause chronic poisoning,
- Symptoms of chronic intoxication resemble those of chronic alcoholism.
- Limited evidence from animal studies shows that acetaldehyde can adversely affect the developing fetus.
- Human health effects associated with breathing or otherwise consuming small amounts of Acetaldehyde over long periods of time are not known

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				500	

Adapted from:
Acetaldehyde OPPT Chemical Fact Sheets. United States Environmental Protection Agency 1994. http://www.epa.gov/docs/chemfact
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Zinc
CAS No. 7440-66-6
Zn

WHAT IS ZINC?

Zinc is one of the most common elements in the earth's crust. It's found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide.

USES

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. A zinc and copper alloy is used to make pennies in the United States. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

SOURCES

Some zinc is released into the environment by natural processes, but most zinc comes from human activities, such as mining, steel production, coal burning, and burning of waste.

Zinc was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to zinc might include:

- Ingesting small amounts present in your food and water
- Drinking contaminated water near manufacturing or waste sites
- Drinking water from zinc-coated pipes or drinking beverages stored in zinc-lined metal cans.
- Consuming dietary supplements that contain zinc

- Breathing zinc particles in the air at manufacturing sites.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Zinc attaches to soil, sediments, and dust particles in the air.
- Rain and snow remove zinc dust particles from the air.
- Zinc compounds can move into the groundwater and into lakes, streams, and rivers.
- Most of the zinc in soil stays bound to soil particles.
- Zinc accumulates in fish, but not plants.

TOXICITY

- Zinc is an essential element in our diet. Too little zinc can cause health problems, but too much zinc is also harmful.
- The recommended dietary allowance (RDA) for zinc is 15 mg/day for men , 12 mg/day for women; 10 mg/day for children; and 5 mg/day for infants. Not enough zinc in your diet can result in a loss of appetite, a decreased sense of taste and smell, slow wound healing and skin sores, or a damaged immune system. Young men who don't get enough zinc may have poorly developed sex organs and slow growth. Lack of zinc during pregnancy may result in impaired growth of fetuses.
- Excessive intake of zinc can also be damaging to your health. Harmful health effects generally begin at levels from 10-15 times the RDA (in the 100 to 250 mg/day range). Eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Consumption of large quantities over extended periods can cause anemia, pancreatic damage, and lower levels of high density lipoprotein cholesterol (the good form of cholesterol).
- Breathing large amounts of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. Long-term effects of breathing high levels of zinc are unknown.
- It is not known if high levels of zinc affect human reproduction or cause birth defects. Rats that were fed large amounts of zinc became infertile or had smaller babies.
- Irritation was observed on the skin of rabbits, guinea pigs, and mice when exposed to some zinc compounds. Skin irritation is likely to occur in people.
- The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified zinc for carcinogenicity.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				120	

Adapted from:
Zinc ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Xylene
CAS No. 1330-20-7
C_8H_{10}

WHAT IS XYLENE?

Xylene is a colorless, sweet-smelling flammable liquid.

USES

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume. Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

SOURCES

Xylene occurs naturally in petroleum and coal tar and is formed during forest fires. Xylene has been found in waste sites and landfills when discarded as used solvent, varnish, paint, or paint thinners.

Table 1: National Pollutant Release Inventory 2001 Xylene (mixed isomers) Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3974	2001	Alberta Envirofuels Inc.	Edmonton	AB	0.20	0.00	25.41	tonnes
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	1.94	0.02	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5224	2001	Apache Canada Limited - House Mountain Complex	Swan Hills	AB	3.92	0.22	0.00	tonnes
5223	2001	Apache Canada Limited - Virginia Hills Complex	Swan Hills	AB	0.16	1.33	2.06	tonnes
3219	2001	APEL Extrusions Limited	Calgary	AB	28.00	0.00	31.90	tonnes
5351	2001	Baker Petrolite Corporation - Baker Petrolite Corporation -	Calgary	AB	1.33	0.00	29.77	tonnes
0653	2001	Border Midstream Services Ltd. - Mazeppa Gas Processing Faci	Mazeppa	AB	0.71	0.00	0.00	tonnes
4150	2001	BP Canada Energy Company - Kaybob South Sour Gas Plant	Fox Creek	AB	0.95	2.15	0.00	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	0.46	0.00	0.00	tonnes
4161	2001	BP Canada Energy Company - Ricinus Gas Plant	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
4146	2001	BP Canada Energy Company - South Caroline Sour Gas Plant	Sundre	AB	0.01	0.00	0.00	tonnes
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	15.68	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	0.01	0.00	0.00	tonnes
2183	2001	BRENNTAG CANADA INC. (AS55) - LEDUC (AS55)	LEDUC	AB	0.17	3.07	0.00	tonnes
2291	2001	BRENNTAG CANADA INC. (AS65) - CALGARY (NPRI)	CALGARY	AB	0.13	0.00	0.88	tonnes
5346	2001	Brine-Add Fluids - Eastfield	Calgary	AB	0.00	0.00	0.00	tonnes
4928	2001	Burlington Resources Canada Energy Ltd. - Elmworth Gas Plant	Grande Prairie	AB	0.14	0.64	0.04	tonnes
5370	2001	Burlington Resources Canada Energy Ltd. - Sturgeon Lake Sout	Valleyview	AB	0.10	0.00	0.00	tonnes
1074	2001	Canadian 88 Energy Corp. - Canadian 88 Energy-Olds Gas Plant	Olds	AB	0.42	0.00	0.00	tonnes
4946	2001	Canam Steel Works - Calgary	Calgary	AB	104.40	0.00	0.00	tonnes
5304	2001	Champion Technologies Ltd. - Calgary Plant	Calgary	AB	2.06	5.30	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	0.48	0.00	0.00	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
0698	2001	Chevron Canada Resources - Fort Saskatchewan Plant	Fort Saskatchewan	AB	0.09	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	6.45	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	1.07	0.00	0.00	tonnes
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	0.02	0.00	0.00	tonnes
3427	2001	Cloverdale Paint Inc. - Edmonton Factory	Edmonton	AB	5.81	0.01	0.19	tonnes
1368	2001	Conoco Canada Resources Ltd. - Morrin Ghost Pine Plant	Morrin	AB	1.49	0.00	0.00	tonnes
5345	2001	Conoco Canada Resources Ltd. - Niton Gas Plant	Niton Junction	AB	0.03	0.01	0.00	tonnes
5389	2001	Conoco Canada Resources Ltd. - Peco Plant	Edson	AB	0.20	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	0.09	0.01	0.01	tonnes
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	0.55	0.05	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	0.06	0.15	0.00	tonnes
0106	2001	Devon Canada Corporation - Dunvegan Gas Unit #1	Fairview	AB	0.26	0.00	0.00	tonnes
0432	2001	Devon Canada Corporation - Wapiti Gas Plant	Grande Prairie	AB	21.33	0.00	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	3.89	0.00	0.00	tonnes
5299	2001	Dominion Tanners Edmonton	Edmonton	AB	0.00	0.02	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
5311	2001	Dynamic Furniture Corp.	Calgary	AB	0.40	2.25	0.50	tonnes
0311	2001	Endura Manufacturing Company Ltd - Endura Manufacturing	Edmonton	AB	0.00	0.00	0.00	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	1.66	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	0.22	0.00	0.00	tonnes
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	0.29	0.15	4.54	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	1.26	58.87	3.21	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	3.06	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	15.40	1.53	0.06	tonnes
0434	2001	Imperial Oil Resources - Golden Spike Gas Conservation Plant	Devon	AB	0.44	0.00	0.05	tonnes
5238	2001	Imperial Oil Resources - West Pembina Gas Plant	Drayton Valley	AB	0.03	0.00	0.02	tonnes
0424	2001	Imperial Oil Resources Limited - Bonnie Glen Gas Plant	Thorsby	AB	1.82	0.01	0.20	tonnes
0442	2001	Imperial Oil Resources Limited - Cold Lake Heavy Oil Plants	Grande Centre	AB	3.35	0.00	0.01	tonnes
0430	2001	Imperial Oil Resources Limited - Leduc Woodbend Gas Conserva	Devon	AB	0.61	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	0.26	0.00	0.08	tonnes
0438	2001	Imperial Oil Resources Limited - Redwater Gas Conservation P	Redwater	AB	0.27	0.00	0.05	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1541	2001	Kawneer Company Canada Limited - Lethbridge	Lethbridge	AB	17.34	3.02	21.49	tonnes
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	0.23	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	3.52	0.00	0.04	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	0.29	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	7.99	0.00	0.02	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	3.03	0.00	0.00	tonnes
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	47.65	0.00	0.00	tonnes
5361	2001	Newalta Corporation - Airdrie Hazardous Recyclable Processin	Airdrie	AB	0.00	0.00	0.00	tonnes
6534	2001	Newalta Corporation - Brooks	Brooks	AB	0.00	1.14	0.52	tonnes
6532	2001	Newalta Corporation - Drayton Valley	Drayton Valley	AB	0.13	1.48	2.87	tonnes
5302	2001	Newalta Corporation - Edmonton Process Facility	Edmonton	AB	1.26	0.00	0.00	tonnes
6536	2001	Newalta Corporation - Elk Point	Elk Point	AB	60.34	0.00	2.19	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
6535	2001	Newalta Corporation - Gordondale	Gordondale	AB	0.42	13.62	0.00	tonnes
6533	2001	Newalta Corporation - Grande Prairie	Grande Prairie	AB	0.10	3.09	0.00	tonnes
6531	2001	Newalta Corporation - Hughenden	Hughenden	AB	0.00	10.44	0.00	tonnes
6530	2001	Newalta Corporation - Niton Junction	Niton Junction	AB	0.67	13.74	7.87	tonnes
4561	2001	Newalta Corporation - Raymond Solvent Recycling & Fuel Blend	Raymond	AB	0.02	1.88	35.56	tonnes
5339	2001	Newalta Corporation - Redwater Process	Redwater	AB	0.00	0.02	17.07	tonnes
6527	2001	Newalta Corporation - Stauffer	Stauffer	AB	0.20	4.56	1.92	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	0.63	0.09	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	6.98	0.16	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	2.12	15.40	0.00	tonnes
4567	2001	Ondeo Nalco Energy Services Canada Inc. - Nisku Blend Plant	Nisku	AB	0.08	6.65	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	1.79	0.05	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1881	2001	Parkland Refining Ltd. - Bowden Refinery	Bowden	AB	4.42	0.00	0.00	tonnes
0440	2001	Pengrowth - Judy Creek Gas Conservation Plants	Swan Hills	AB	3.97	0.00	0.01	tonnes
4566	2001	Pengrowth - Judy Creek Production Complex	Swan Hills	AB	5.27	0.00	0.26	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.00	0.00	0.00	tonnes
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	1.28	0.01	6.65	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	15.01	0.05	0.00	tonnes
1077	2001	Petro-Canada - Ferrier Gas Plant	Rocky Mountain House	AB	0.71	0.04	0.00	tonnes
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	0.67	0.06	0.22	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	0.87	0.04	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	0.00	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	1.34	0.12	4.50	tonnes
5259	2001	Sanjel Corporation - Sanjel Corporation - Grande Prairie	Grande Prairie	AB	0.00	0.00	0.00	tonnes
6544	2001	Sanjel Corporation - Sanjel Corporation - High Level	High Level	AB	0.00	0.00	0.00	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
5260	2001	Sanjel Corporation - Sanjel Corporation - Medicine Hat	Medicine Hat	AB	0.00	0.00	0.00	tonnes
5257	2001	Sanjel Corporation - Sanjel Corporation - Red Deer	Red Deer	AB	0.00	0.00	0.00	tonnes
5261	2001	Sanjel Corporation - Sanjel Corporation - Slave Lake	Slave Lake	AB	0.00	0.00	0.00	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	0.00	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	4.09	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	0.84	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	2.33	0.00	0.00	tonnes
2108	2001	Shell Canada Limited - Waterton Complex	Pincher Creek	AB	2.23	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	18.94	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.26	0.00	0.00	tonnes
3757	2001	Shiningbank Energy Management Inc. - Whitecourt Gas Plant	Whitecourt	AB	0.09	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	204.83	3.19	0.00	tonnes
2223	2001	Suncor Energy Inc. - Suncor Natural Gas-South Rosevear Gas	Edson	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	477.44	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	4.42	0.10	0.00	tonnes
3756	2001	Viking Energy Acquisitions Ltd. - Bellshill Lake Plant	Killam	AB	0.06	0.03	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.13	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.16	0.00	0.00	tonnes
5287	2001	Williams Energy (Canada), Inc. - Redwater NGL Fractionation	Redwater	AB	0.10	0.05	0.00	tonnes
				Total	**1135.90**	**154.81**	**200.15**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to xylene might include:

- Inhalation of xylene contaminated air from landfill sites, workplace air, automobile exhaust and cigarette smoke.
- Absorption through the skin, resulting from contact with gasoline, paint, paint removers, varnish, shellac, and rust preventatives.
- Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.

Table 2a: Annual Averages of Ambient Levels of o-Xylene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	1.6811	1.7000
Edmonton Central	1.3458	1.5513
Edmonton East	0.9332	1.1514

Table 2b: Annual Averages of Ambient Levels of m- and p-Xylene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	4.7939	4.8025
Edmonton Central	3.8522	4.4185
Edmonton East	2.6934	3.3240

ENVIRONMENTAL FATE AND BEHAVIOUR

- It evaporates quickly from the soil and surface water into the air.
- In the air, it is broken down by sunlight into other less harmful chemicals.
- It is broken down by microorganisms in soil and water.
- Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

TOXICITY

- Xylene affects the brain. Exposure to high levels can cause irritation of the skin, eyes, nose, and throat, headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance, breathing complications, delayed reaction time, memory difficulties, stomach discomfort and changes in the liver and kidneys. Exposure to extremely high levels can result in death.
- Animals studies show that high concentrations may cause delayed growth and development and death of fetuses. Similar effects in humans are unknown.
- The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans; human and animal studies are inconclusive.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Standards (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	3,700				1,040
Ontario				2,300	

Xylene ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Vinylidene chloride
CAS No. 75-35-4
$C_2H_2Cl_2$

WHAT IS VINYLIDENE CHLORIDE?

Vinylidene chloride is an industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, sweet smell.

USES

Vinylidene chloride is used in flame retardant coatings for fiber and carpet backings, steel pipe coatings, adhesives and certain plastics, including flexible food wraps and packaging materials.

SOURCES

All sources are anthropogenic.

Table 1: National Pollutant Release Inventory 2001 Vinylidene Chloride Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.03	0.00	tonnes
				Total	**0.00**	**0.03**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to vinylidene chloride might include:

- Occupational exposure in industries that make or use vinylidene chloride.
- Food that is wrapped in plastic wrap may contain very low levels.
- A small percentage (3%) of the drinking water supplies may contain very low levels.
- Inhalation of air near production sites or hazardous waste sites.

Table 2: Annual Averages of Ambient Levels of Vinylidene Chloride in Alberta ($\mu g/m^3$)

Station	1997	1998
Calgary Central	0.0238	0.0106
Edmonton Central	0.0284	0.0097
Edmonton East	0.0310	0.0063

ENVIRONMENTAL FATE AND BEHAVIOUR

- Vinylidene chloride evaporates very quickly from water and soil to the air.
- In the air, it takes about 4 days for it to break down.
- Vinylidene chloride breaks down very slowly in water.
- In soil, the chemical is slowly transformed to other less harmful chemicals.
- It does not accumulate appreciably in fish or birds.

TOXICITY

- Contact with skin and eyes causes irritation.
- Breathing high levels may cause loss of breath, fainting and impairment of the central nervous system.
- Breathing low levels over prolonged periods may damage the nervous system, liver, and lungs. Workers exposed to vinylidene chloride have reported a loss in liver function.
- Inhalation and ingestion of the compound caused liver, kidney, and lung damage in animal studies. Inhalation, but not ingestion of the compound caused greater rates of birth defects.
- The Environmental Protection Agency (EPA) has determined that vinylidene chloride is a possible human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	40				4
Ontario				10	

Adapted from:
Vinylidene Chloride ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Vinyl chloride
CAS No. 75-01-4
C_2H_3Cl

WHAT IS VINYL CHLORIDE?

Vinyl chloride is a colorless, flammable gas at normal temperatures with a mild, sweet odor. Vinyl chloride is also known as chloroethene, chloroethylene, and ethylene monochloride.

USES

Vinyl chloride is a manufactured substance that is used to make polyvinyl chloride (PVC). PVC is used to make a variety of plastic products, including pipes, wire and cable coatings, and furniture upholstery.

SOURCES

Vinyl chloride may be released due to plastic manufacturing and the breakdown of other substances, such as trichloroethane, trichloroethylene and tetrachloroethylene.

Table 1: National Pollutant Release Inventory 2001 Vinyl Chloride Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	3.14	0.03	0.00	tonnes
0355	2001	Oxy Vinyls Canada Inc. - Scotford Plant	Fort Saskatchewan	AB	2.87	0.00	0.00	tonnes
				Total	**6.01**	**0.03**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to vinyl chloride might include:

- Breathing vinyl chloride that has leaked from plastics industries, hazardous waste sites, and landfills
- Breathing vinyl chloride in air or during contact with skin or eyes in the workplace
- Drinking water from contaminated wells

Table 2: Annual Averages of Ambient Levels of Vinyl chloride in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.0197	0.0209
Edmonton Central	0.0308	0.0281
Edmonton East	0.0357	0.0305

ENVIRONMENTAL FATE AND BEHAVIOUR

- Liquid vinyl chloride evaporates easily into the air. Vinyl chloride, if it is near the surface of soil or water, can also evaporate.
- Vinyl chloride in the air can break down within a few days to other substances, some of which can be harmful.
- Small amounts of vinyl chloride can dissolve in water.
- Vinyl chloride is unlikely to build up in plants or animals.

TOXICITY

- Inhalation of high levels may cause dizziness and sleepiness. Extremely high levels can cause death.
- Inhalation of elevated levels for long periods of time can result in structural changes in the liver.
- Occupational exposure may result in nerve damage and immune reactions. Some workers have experienced impaired blood flow and bone degeneration in the hands.
- Animal studies have shown that long-term (365 days or longer) exposure to vinyl chloride can damage the sperm and testes.
- It has not been proven that vinyl chloride causes birth defects in humans, but animal studies have shown that breathing vinyl chloride can harm fetuses and may increase miscarriage rates.
- Skin contact results in numbness, redness and blisters.
- The Department of Health and Human Services (DHHS) has determined that vinyl chloride is a known human carcinogen. Exposure results in liver cancer.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	Guidelines (μg/m^3)				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		130			
Texas	130				13
Ontario				1	0.2

Adapted from:
Vinyl chloride ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Vanadium
CAS No. 7440-62-2, 1314-62-1
V

WHAT IS VANADIUM?

Vanadium is a compound that occurs in nature as a white-to-gray metal, and is often found as crystals. Pure vanadium has no smell. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride.

USES

Vanadium is mostly combined with other metals to form alloys. Vanadium is mixed with iron to make important parts for aircraft engines. Vanadium in the form of vanadium oxide is a component in special kinds of steel that are used for automobile parts, springs, and ball bearings. Small amounts of vanadium are used in making rubber, plastics, ceramics and other chemicals.

SOURCES

Vanadium and related compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits. Vanadium mainly enters the environment from natural sources and from the burning of fuel oils.

Table 1: National Pollutant Release Inventory 2000 Vanadium Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	0.09	0.24	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.33	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.16	101.71	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.01	0.01	0.00	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	28.63	0.00	4.21	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.00	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.03	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	4.84	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	2.96	0.00	230.65	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.20	0.00	tonnes
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	23.23	0.00	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	37.68	0.00	10.46	tonnes
				Total	**108.47**	**102.18**	**248.17**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to vanadium might include:

- Consumption of very low naturally-occurring levels in air, water and food.
- Inhalation of vanadium oxide released by fuel oil and coal burning activities.
- Working in industries that process or make products containing vanadium.
- Ingestion of water contaminated by landfill sites.
- Vanadium is not readily absorbed through the skin or gastrointestinal tract.

ENVIRONMENTAL FATE AND BEHAVIOUR

- It stays in the air, water, and soil for a long time.
- It does not dissolve well in water.
- It combines with other elements and particles.
- It sticks to soil sediments.
- Low levels have been found in plants, but it is not likely to build up in the tissues of animals.

TOXICITY

- Inhalation of high levels of vanadium result in eye and lung irritation, coughing, wheezing, chest pain, runny nose, and a sore throat. Symptoms disappear soon after inhalation of contaminated air stops. Similar effects have been observed in animal studies. Laboratory animals that inhaled small doses of vanadium over prolonged periods resulted in kidney and liver problems in laboratory animals.
- The health effects due to ingestion are unknown. Laboratory animals fed small doses over prolonged periods developed kidney and liver problems. Animals fed large doses resulted in birth defects and death.
- No increase in tumors was noted in a long-term study of animals exposed to vanadium in their drinking water.
- The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified vanadium as to its human carcinogenicity.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1.5			0.4	
Ontario				2	

Adapted from:

Vanadium ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

2,4,6-Trichlorophenol
CAS No. 88-06-2
$C_6H_3Cl_3O$

WHAT IS 2,4,6-TRICHLOROPHENOL?

2,4,6-trichlorophenol exists as solid yellow flakes or colorless needles. It has a strong, phenolic odor. It is not known to exist as a natural product.

USES

2,4,6-Trichlorophenol is used currently in the manufacture of Prochloraz (a fungicide) and Chloranile (a bleaching agent). 2,4,6-trichlorophenol was also formerly used as a defoliant and herbicide.

SOURCES

Significant amounts may be released to the environment as a result of the chlorination of phenol-containing wastewater or drinking water and from the bleaching process in pulp and paper mills.

2,4,6-Trichlorophenol was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 2,4,6-trichlorophenol might include:
- Skin absorption, which is thought to be the major route of exposure.
- Inhalation and dermal contact at workplaces where it is produced or used
- Ingestion of contaminated water sources.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Incineration of chlorophenol containing compounds may result in polychlorinated dibenzodioxans and polychlorinated dibenzofurans forming.
- It is expected to exist solely in the vapour form in the atmosphere.
- In the atmosphere reactions occur with hydroxyl radicals. The half-life in the atmosphere is about 26 days.
- It sticks strongly to soils and will not move easily into groundwater.
- Volatilisation from dry soil surfaces is negligible, but volatilization may occur slowly from moist soil surfaces.
- In soils, the chemical breaks down more quickly under aerobic conditions than anaerobic conditions. Half-lives vary from between 5 and 20 days.
- Dissociation occurs in water. The chemical also volatilizes slowly from surface waters. The half-life of the chemical due to volatilization varies between approximately 20 and 150 days for lakes and rivers, respectively.
- Half-lives of the compound due to microbial decomposition in water bodies varies between 3 to 70 days.
- The potential for accumulation in the bodies of organisms is high.

TOXICITY

- Inhalation, ingestion, or skin contact with material may cause severe injury or death.
- Eye contact will cause severe irritation and lacrimation.
- Effects of contact or inhalation may be delayed.
- The carcinogenicity classification of 2,4,6-trichlorophenol is B2: probable human carcinogen.
- In the United States the compound is listed as a HAP (Hazardous Air Pollutant): generally known or suspected to cause serious health problems.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Standards (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	21				
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
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Chemical Fact Sheets

Trichloroethylene (TCE)
CAS No. 79-01-6
C_2HCl_3

WHAT IS TRICHLOROETHYLENE?

Trichloroethylene is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste.

USES

Trichloroethylene is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

SOURCES

Trichloroethylene is not thought to occur naturally in the environment. However, it is present in most underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

Table 1: National Pollutant Release Inventory 2001 Trichloroethylene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.01	0.24	0.00	tonnes
				Total	**0.01**	**0.24**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Trichloroethylene might include:

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products, such as spot removers and typewriter correction fluid
- Drinking, swimming, or showering in contaminated water.
- Contact with contaminated soil near hazardous waste sites.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

Table 2: Annual Averages of Ambient Levels of Trichloroethylene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.1381	0.1567
Edmonton Central	0.1048	0.1310
Edmonton East	0.4932	0.3146

ENVIRONMENTAL FATE AND BEHAVIOUR

- Trichloroethylene easily dissolves in water, and it remains there for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil, where it may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

TOXICITY

- Breathing large amounts of trichloroethylene may cause impaired heart function, coma, and death. Breathing the chemical for long periods may cause nerve, lung, kidney, and liver damage.
- Breathing small amounts for short periods of time may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.
- Drinking large amounts of trichloroethylene may cause nausea, liver and kidney damage, convulsions, impaired heart function, coma, or death. Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, nervous system effects, impaired immune system function, and impaired fetal development.
- Skin contact with trichloroethylene for short periods may cause skin rashes.
- Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver or lung cancer.
- Some limited studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is not classifiable as to human carcinogenicity.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	Guidelines (mg/m^3)				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas	1,350				135
Ontario				115	23

Adapted from:
Trichloroethylene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,1,2-trichloroethane might include:

- Breathing volatile emissions from landfills, breathing contaminated air during the use of the chemical as a solvent or during the manufacture of vinyldiene chloride
- Drinking contaminated water around wastewater discharge sites associated with solvent use, vinyldiene chloride production or landfills.

Table 2: Annual Averages of Ambient Levels of 1,1,2-Trichloroethane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.0385	0.0415
Edmonton Central	0.0266	0.0445
Edmonton East	0.0366	0.0495

ENVIRONMENTAL FATE AND BEHAVIOR

- 1,1,2-trichloroethane releases to water are primarily lost through evaporation
- In the atmosphere it breaks down slowly in the presence of sunlight by reaction with hydroxyl radicals. The half-life of 1,1,2-trichloroethane varies between 24-50 days in unpolluted air to a few days in polluted air.
- It is broken down by soil organisms very slowly.
- It dissolves relatively easily in water.
- It is not strongly attracted to soil surfaces, and it moves easily from soil into water.
- Bioconcentration is not a significant process.

TOXICITY

- Dermal contact results in stinging and burning of the skin.
- In animal studies, inhalation and ingestion of the compound resulted in adverse affects on the stomach, blood, liver and kidneys and nervous system. Normal reproduction and development was also affected. Similar effects on humans are unknown.
- Ingestion of 1,1,2-trichloroethane resulted in an increase in liver cancer in mice, but not in rats.
- The International Agency for Research on Cancer (IARC) has determined that 1,1,2-trichloroethane is not classifiable as to its carcinogenicity to humans.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	550				
Ontario					

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Chemical Fact Sheets

1,1,2-Trichloroethane
CAS No. 79-00-5
$C_2H_3Cl_3$

WHAT IS 1,1,2-TRICHLOROETHANE?

1,1,2-Trichloroethane is a clear, colourless liquid with a pleasant sweet chloroform-like odour.

USES

1,1,2-Trichloroethane is used in adhesives, production of Teflon tubing, in lacquer, and coating formulations. It is an intermediate in the production of vinyldiene chloride, and is a solvent for fats, oils, waxes, resins, and other products. It has applications in organic synthesis.

SOURCES

The sources of the chemical are industrial in nature. The chemical may be formed by the breakdown of related compounds under conditions lacking air.

Table 1: National Pollutant Release Inventory 2001 1,1,2-Trichloroethane Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.08	0.14	0.00	tonnes
				Total	**0.08**	**0.14**	**0.00**	**tonnes**

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Toxaphene
CAS No. 8001-35-2

There is no molecular representation since this substance is a mixture of many compounds.

WHAT IS TOXAPHENE?

Toxaphene is mixture containing over 670 chemicals. It is usually found as a solid or gas, and in its original form it is a yellow to amber waxy solid that smells like turpentine. It does not burn and evaporates when in solid form or when mixed with liquids. Toxaphene is also known as camphechlor, chlorocamphene, polychlorocamphene, and chlorinated camphene.

USES

Toxaphene was one of the most heavily used insecticides in the United States until the chemical was banned in 1990. It was used primarily in the southern United States to control insect pests on cotton and other crops. It was also used to control insect pests on livestock and to kill unwanted fish in lakes.

SOURCES

Toxaphene was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to toxaphene might include:

- Inhalation of contaminated air near a hazardous waste sites where toxaphene was disposed.
- Ingestion of contaminated soil by infants.
- Ingestion of contaminated fish and shellfish.
- Ingestion of contaminated well-water.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Toxaphene may enter the environment from hazardous waste sites.
- It may enter the air by evaporation.
- Toxaphene does not readily dissolve in water, so the chemical is more likely to be found in air, soil, or sediment at the bottom of lakes or streams than in surface water.
- Toxaphene breaks down very slowly in the environment.
- Toxaphene accumulates in fish and mammals.

TOXICITY

- Breathing, eating, or drinking high levels of toxaphene can damage the lungs, nervous system, and kidneys, and can even cause death.
- No information is available on the effects of low-level exposure.
- Laboratory animals fed with contaminated food or water exhibited detrimental effects on the liver, kidneys, adrenal glands, and immune system.
- It is not known whether toxaphene can affect reproduction or cause birth defects in people. Animal studies have reported that toxaphene affects the development of newborn animals when their mothers are exposed during pregnancy.
- The Department of Health and Human Services (DHHS) in the United States has determined that toxaphene may reasonably be anticipated to be a carcinogen. Although it is unknown whether toxaphene causes cancer in people, laboratory studies of animals exposed to high toxaphene levels over their lifetime developed thyroid cancer.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	5				0.5
Ontario					

Toxaphene ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

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Chemical Fact Sheets

Total Reduced Sulphur
CAS No.: None

There is no molecular formula for Total Reduced Sulphur. It is not a molecule.

WHAT IS TOTAL REDUCED SULPHUR?

Total Reduced Sulphur is a general term for sulphur gases. These gases include hydrogen sulphide(H_2S), dimethyl sulphide, dimethyl disulphide and methyl mercaptan, but exclude sulphur dioxide and sulphur trioxide. Hydrogen sulphide is a colourless flammable gas. Sulphur gases are the principle cause of the classic Kraft Pulp Mill odour.

USES

H_2S is used as an additive in natural gas. Methyl mercaptan is used as a jet fuel additive, in plastics and in pesticides.

SOURCES

Natural gas refineries, oil fields and refineries, pulp and paper mills, food processing activities, coke ovens and tanneries are known sources of total reduced sulphur compounds. These compounds also are emitted naturally in volcanic gases and hot springs. Sulphur compounds are present in animal feces and are also released by bacterial breakdown of organic matter. Methyl mercaptan is present in some nuts and cheeses.

Table 1: National Pollutant Release Inventory 2000 Hydrogen Sulphide Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5239	2001	AEC Oil & Gas - Hythe Brainard Gas Plant	Hythe	AB	10.77	9.85	0.00	tonnes
4823	2001	AEC Oil & Gas - Sexsmith Saddle Hills Gas Plant	Sexsmith	AB	32.48	32.85	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	1.18	0.00	0.00	tonnes
5224	2001	Apache Canada Limited - House Mountain Complex	Swan Hills	AB	1.89	0.00	0.00	tonnes
5285	2001	Apache Canada Limited - Zama Gas Processing Complex	Zama City	AB	17449.09	0.00	0.00	tonnes
0653	2001	Border Midstream Services Ltd. - Mazeppa Gas Processing Faci	Mazeppa	AB	1.90	0.00	0.00	tonnes
4142	2001	BP Canada Energy Company - Fort Saskatchewan Underground Sto	NA	AB	0.01	0.00	0.00	tonnes
4150	2001	BP Canada Energy Company - Kaybob South Sour Gas Plant	Fox Creek	AB	5.87	0.00	0.00	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	0.02	0.00	0.00	tonnes
4146	2001	BP Canada Energy Company - South Caroline Sour Gas Plant	Sundre	AB	0.03	0.00	0.00	tonnes
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	5.84	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	2.87	0.00	0.00	tonnes
5370	2001	Burlington Resources Canada Energy Ltd. - Sturgeon Lake Sout	Valleyview	AB	9.59	0.05	0.00	tonnes
4159	2001	Canadian Natural Resources Ltd. - Nipisi Gas Plant	Municipal District of East Peace	AB	0.58	0.00	0.00	tonnes
5235	2001	Cargill Foods	High River	AB	28.61	0.00	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	2.75	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	0.37	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	93.00	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	0.17	0.00	0.00	tonnes
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	29.05	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	8517.25	0.00	0.00	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	12.18	0.00	0.00	tonnes
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	2.85	0.14	0.00	tonnes
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	2.25	0.00	0.00	tonnes
0106	2001	Devon Canada Corporation - Dunvegan Gas Unit #1	Fairview	AB	476.73	0.00	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	14.08	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.08	0.00	0.00	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	2.73	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	0.97	0.00	0.00	tonnes
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	1.27	0.02	0.00	tonnes
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.21	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1439	2001	Husky Oil Operations Limited - Rainbow Lake Processing Plant	Rainbow Lake	AB	26215.03	0.00	0.00	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	465.17	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	53.04	0.01	0.01	tonnes
0434	2001	Imperial Oil Resources - Golden Spike Gas Conservation Plant	Devon	AB	0.08	0.00	0.00	tonnes
5238	2001	Imperial Oil Resources - West Pembina Gas Plant	Drayton Valley	AB	0.14	0.00	0.00	tonnes
0424	2001	Imperial Oil Resources Limited - Bonnie Glen Gas Plant	Thorsby	AB	1.21	0.00	0.00	tonnes
0442	2001	Imperial Oil Resources Limited - Cold Lake Heavy Oil Plants	Grande Centre	AB	5.64	0.00	0.00	tonnes
0430	2001	Imperial Oil Resources Limited - Leduc Woodbend Gas Conserva	Devon	AB	5.80	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	9.13	0.00	0.00	tonnes
0438	2001	Imperial Oil Resources Limited - Redwater Gas Conservation P	Redwater	AB	0.63	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	7.59	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	4.70	0.00	0.00	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	426.46	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	7.14	0.00	0.00	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	7.69	0.00	0.00	tonnes
2130	2001	Marsulex Inc. - Marsulex Sulphides	Fort Saskatchewan	AB	0.01	0.00	0.00	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	25.47	0.00	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	1.82	0.02	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	10.40	0.00	0.00	tonnes
0440	2001	Pengrowth - Judy Creek Gas Conservation Plants	Swan Hills	AB	19.12	0.00	0.00	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.12	0.00	0.00	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	16.95	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	2.53	0.00	0.00	tonnes
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	10.26	0.00	0.00	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	8.78	0.00	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	14.77	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	4.29	0.00	0.00	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	2.60	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.38	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	76.28	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	301.84	0.00	0.00	tonnes
5288	2001	Shell Canada Limited - Shell Shantz Sulphur Forming Facility	Caroline	AB	0.10	0.00	0.00	tonnes
2108	2001	Shell Canada Limited - Waterton Complex	Pincher Creek	AB	54.80	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	2.57	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3757	2001	Shiningbank Energy Management Inc. - Whitecourt Gas Plant	Whitecourt	AB	27.05	0.00	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	18.95	0.00	0.00	tonnes
2227	2001	Suncor Energy Inc. - Suncor Natural Gas-Simonette Productio	Valleyview	AB	0.00	0.00	0.00	tonnes
2223	2001	Suncor Energy Inc. - Suncor Natural Gas-South Rosevear Gas	Edson	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	103.21	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.01	0.00	0.00	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
3756	2001	Viking Energy Acquisitions Ltd. - Bellshill Lake Plant	Killam	AB	22.59	0.00	0.00	tonnes
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	22.75	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	12.54	0.00	0.00	tonnes
				Total	**54676.29**	**42.93**	**0.01**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to total reduced sulphur might include:

- Industrial exposure at natural gas refineries, oil fields and refineries, or pulp and paper mills.
- Breathing contaminated air near marshes or landfills.
- Consumption of certain nuts and cheese.

Ambient air concentrations of total reduced sulphur were not reported in 1997 and 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Sulphur, which is an essential element for plants, is taken up through their root system.
- Methyl mercaptan is broken down by sunlight.
- When released into the air, hydrogen sulphide (H_2S) gas eventually forms sulfur dioxide and sulfuric acid, which are major components in acid rain
- Under atmospheric conditions, H_2S is corrosive to materials.

TOXICITY

- Inhaling large quantities H_2S of may result in sudden nausea, knockdown or death
- Most people recover from non-fatal gassings with little or no long-term effects.
- Chronic exposure to low concentrations of H_2S can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, poor memory, and dizziness
- In animals, exposure may lead to irritation of the eyes, nose and respiratory tract, and may lead to pulmonary oedema, coma, and death. Exposure may also cause interrupt intercellular respiration.
- Plants may respond to atmospheric sulphur exposure by biochemical and physiological changes, enhanced growth and yield or visible injury, decreased growth and yield.
- The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified hydrogen sulfide or methyl mercaptan for carcinogenicity.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario (as Hydrogen sulphide)		30			

Adapted from:
Prior, Mike. Total Reduced Sulphur Science Assessment Document, Chapter 11. CEPA NAC WGAQOG. February 2000.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

2,4-Toluene diisocyanate (TDI)
CAS No. 584-84-9
$C_9H_6N_2O_2$

WHAT IS 2,4-TOLUENE DIISOCYANATE (TDI)?

2,4-toluene diisocyanate may be a colorless to pale yellow crystalline solid or a pale-white liquid, which turns straw-coloured upon standing.

USES

TDI is used in polyurethane coatings in floor and wood finishes, sealers, paints, concrete sealers; aircraft and tank trucks; coated fabrics, clay-pipe seals, adhesives and nylon. It is also used in the manufacture of polyurethane foam.

SOURCES

TDI sources are due to related industrial activities.

No releases of 2,4-Toluene diisocyanate in Alberta were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to TDI is due to:
- Inhalation and dermal contact.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In the atmosphere, TDI reacts with hydroxyl radicals.
- TDI is removed from the atmosphere via dry deposition
- In soil, TDI reacts to form toluene diamines, which undergo a wide variety of biochemical transformations. This process occurs at a much faster rate than that at which TDI is consumed by microorganisms.

TOXICITY

- TDI is classified as Group 2B: possibly carcinogenic to humans.

- TDI vapours are powerful irritants of the respiratory tract.
- Inhalation may result in immunological sensitization.
- Exposure to levels as low as 0.014 mg/m^3 (0.002 ppm) can result in chronic loss of pulmonary function.
- An acute, asthmatic type of bronchitis is not uncommon upon exposure.
- Frank asthma may occur.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.36				0.036
Ontario				0.5	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Toluene
CAS No. 108-88-3
C_7H_8

WHAT IS TOLUENE?

Toluene (also called methyl benzene) is a colorless, flammable liquid. It occurs naturally in petroleum crude oil.

USES

Toluene is added directly to gasoline. Toluene is also used in the production of benzene. Companies also add toluene to aerosol spray paints, wall paints, lacquers, paint strippers, adhesives, printing ink, spot removers, cosmetics, perfumes, and antifreeze.

SOURCES

Petroleum crude oil is the largest source of toluene. Most (up to a billion pounds each year) of this toluene is never isolated from crude oil.

Table 1: National Pollutant Release Inventory 2001 Toluene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	2.08	0.04	0.00	tonnes
5224	2001	Apache Canada Limited - House Mountain Complex	Swan Hills	AB	2.43	0.12	0.00	tonnes
5223	2001	Apache Canada Limited - Virginia Hills Complex	Swan Hills	AB	0.11	0.44	0.69	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5285	2001	Apache Canada Limited - Zama Gas Processing Complex	Zama City	AB	3.78	0.08	0.15	tonnes
5351	2001	Baker Petrolite Corporation - Baker Petrolite Corporation -	Calgary	AB	0.92	0.00	10.61	tonnes
0653	2001	Border Midstream Services Ltd. - Mazeppa Gas Processing Faci	Mazeppa	AB	0.40	0.00	0.00	tonnes
4142	2001	BP Canada Energy Company - Fort Saskatchewan Underground Sto	NA	AB	0.00	0.00	0.00	tonnes
4150	2001	BP Canada Energy Company - Kaybob South Sour Gas Plant	Fox Creek	AB	1.13	1.58	0.00	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	0.86	0.00	0.00	tonnes
4161	2001	BP Canada Energy Company - Ricinus Gas Plant	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
4146	2001	BP Canada Energy Company - South Caroline Sour Gas Plant	Sundre	AB	0.06	0.00	0.00	tonnes
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	12.53	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	0.01	0.00	0.00	tonnes
2183	2001	BRENNTAG CANADA INC. (AS55) - LEDUC (AS55)	LEDUC	AB	0.09	3.49	0.00	tonnes
2291	2001	BRENNTAG CANADA INC. (AS65) - CALGARY (NPRI)	CALGARY	AB	0.11	0.00	0.60	tonnes
4928	2001	Burlington Resources Canada Energy Ltd. - Elmworth Gas Plant	Grande Prairie	AB	0.42	1.65	0.12	tonnes
5370	2001	Burlington Resources Canada Energy Ltd. - Sturgeon Lake Sout	Valleyview	AB	0.38	0.00	0.00	tonnes
1074	2001	Canadian 88 Energy Corp. - Canadian 88 Energy-Olds Gas Plant	Olds	AB	0.82	0.00	0.00	tonnes
4136	2001	Canadian Natural Resources Ltd. - Wolf Lake Plant	NA	AB	0.02	0.00	0.00	tonnes
5304	2001	Champion Technologies Ltd. - Calgary Plant	Calgary	AB	0.96	3.10	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	1.97	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	1.40	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0698	2001	Chevron Canada Resources - Fort Saskatchewan Plant	Fort Saskatchewan	AB	0.65	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	0.54	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	0.05	0.00	0.00	tonnes
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	0.00	0.00	0.00	tonnes
1368	2001	Conoco Canada Resources Ltd. - Morrin Ghost Pine Plant	Morrin	AB	1.64	0.00	0.00	tonnes
5345	2001	Conoco Canada Resources Ltd. - Niton Gas Plant	Niton Junction	AB	0.82	0.04	0.00	tonnes
5389	2001	Conoco Canada Resources Ltd. - Peco Plant	Edson	AB	1.31	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	0.48	0.03	0.03	tonnes
5208	2001	Custom Evironmental Services Ltd - Edmonton Waste Brokerage	Edmonton	AB	0.00	6.80	40.04	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	1.77	0.20	0.00	tonnes
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	0.09	0.11	0.00	tonnes
0106	2001	Devon Canada Corporation - Dunvegan Gas Unit #1	Fairview	AB	1.80	0.00	0.00	tonnes
0432	2001	Devon Canada Corporation - Wapiti Gas Plant	Grande Prairie	AB	21.40	0.00	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	8.50	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.44	0.06	0.00	tonnes
5311	2001	Dynamic Furniture Corp.	Calgary	AB	0.48	2.48	0.30	tonnes
0311	2001	Endura Manufacturing Company Ltd - Endura Manufacturing	Edmonton	AB	0.00	0.00	0.00	tonnes
4721	2001	Enerchem International Inc. - Plant, Technical Centre, Head	Nisku	AB	2.94	0.00	5.25	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	10.30	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	0.64	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	0.51	0.25	9.67	tonnes
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	1.10	52.63	3.13	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	4.43	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	13.13	1.01	0.06	tonnes
0434	2001	Imperial Oil Resources - Golden Spike Gas Conservation Plant	Devon	AB	0.20	0.00	0.01	tonnes
5238	2001	Imperial Oil Resources - West Pembina Gas Plant	Drayton Valley	AB	0.05	0.00	0.00	tonnes
0424	2001	Imperial Oil Resources Limited - Bonnie Glen Gas Plant	Thorsby	AB	1.77	0.00	0.04	tonnes
0442	2001	Imperial Oil Resources Limited - Cold Lake Heavy Oil Plants	Grande Centre	AB	2.29	0.13	0.00	tonnes
0430	2001	Imperial Oil Resources Limited - Leduc Woodbend Gas Conserva	Devon	AB	0.80	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	0.25	0.01	0.02	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0438	2001	Imperial Oil Resources Limited - Redwater Gas Conservation P	Redwater	AB	0.26	0.00	0.01	tonnes
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	0.73	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	2.67	0.00	0.11	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	0.49	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	2.67	0.00	0.10	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	1.25	0.00	0.00	tonnes
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	23.80	0.00	0.00	tonnes
5361	2001	Newalta Corporation - Airdrie Hazardous Recyclable Processin	Airdrie	AB	0.03	0.00	0.00	tonnes
5302	2001	Newalta Corporation - Edmonton Process Facility	Edmonton	AB	3.62	0.00	0.00	tonnes
4561	2001	Newalta Corporation - Raymond Solvent Recycling & Fuel Blend	Raymond	AB	0.18	4.14	48.07	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5339	2001	Newalta Corporation - Redwater Process	Redwater	AB	0.00	0.02	62.15	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	1.17	0.01	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	3.97	2.62	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	4.81	20.32	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	1.36	0.22	0.00	tonnes
1881	2001	Parkland Refining Ltd. - Bowden Refinery	Bowden	AB	7.73	0.00	0.00	tonnes
0440	2001	Pengrowth - Judy Creek Gas Conservation Plants	Swan Hills	AB	4.21	0.00	0.00	tonnes
4566	2001	Pengrowth - Judy Creek Production Complex	Swan Hills	AB	7.19	0.00	0.12	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.00	0.00	0.00	tonnes
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	1.06	0.01	3.83	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	19.60	0.05	0.00	tonnes
1077	2001	Petro-Canada - Ferrier Gas Plant	Rocky Mountain House	AB	0.93	0.04	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	1.92	0.07	0.28	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	0.79	0.05	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	0.00	0.00	0.00	tonnes
4720	2001	Raylo Chemicals Inc. - Argyll Road Site	Edmonton	AB	1.50	0.00	99.30	tonnes
5245	2001	Raylo Chemicals Inc. - Clover Bar Site	Edmonton	AB	0.73	0.00	46.10	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	1.12	0.08	3.06	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	0.00	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	9.31	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	0.50	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	1.73	0.00	0.00	tonnes
2108	2001	Shell Canada Limited - Waterton Complex	Pincher Creek	AB	1.74	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	27.71	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	2.59	0.01	0.00	tonnes
3757	2001	Shiningbank Energy Management Inc. - Whitecourt Gas Plant	Whitecourt	AB	0.00	0.00	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	114.68	2.30	0.00	tonnes
2223	2001	Suncor Energy Inc. - Suncor Natural Gas-South Rosevear Gas	Edson	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	210.29	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	1.67	1.13	0.00	tonnes
3756	2001	Viking Energy Acquisitions Ltd. - Bellshill Lake Plant	Killam	AB	0.53	0.01	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.45	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.25	0.00	0.00	tonnes
5273	2001	WasteCo Environmental Services Ltd. - Edmonton Transfer Stat	Sherwood Park	AB	0.00	27.19	0.00	tonnes
5287	2001	Williams Energy (Canada), Inc. - Redwater NGL Fractionation	Redwater	AB	0.37	0.11	0.00	tonnes
				Total	**574.39**	**132.62**	**333.85**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to toluene might include:

- Workplace or environmental exposures following releases to air, water, land, or groundwater.
- When people use gasoline and other products that contain toluene.
- When consumed with contaminated food or water.
- Absorption through the skin and respiratory tract.

Table 2: Annual Averages of Ambient Levels of Toluene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	5.2156	5.3784
Edmonton Central	4.2031	5.2102
Edmonton East	3.4779	4.5433

ENVIRONMENTAL FATE AND BEHAVIOUR

- Toluene evaporates when exposed to air.
- It dissolves only slightly when mixed with water.
- Most direct releases of toluene to the environment are to air.
- Once in air, toluene breaks down to other chemicals.
- Aquatic and soil microorganisms can break down toluene.
- Because it is a liquid that does not bind well to soil, toluene can contaminate groundwater.
- Plants and animals are not likely to store toluene.
- Toluene can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in the air.

TOXICITY

- Effects of toluene on human health and the environment depend on how much toluene is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.
- Breathing large amounts of toluene for short periods of time adversely affects the human nervous system, kidneys, liver, and heart. Effects range from unsteadiness and tingling in fingers and toes to unconsciousness and death. Direct, prolonged contact with toluene liquid or vapor irritates the skin and the eyes. Repeatedly breathing large amounts of toluene, such as when "sniffing" glue or paint, can cause permanent brain damage, resulting in impairment of speech, hearing, vision, muscle control, memory, and mental capacity.
- Human health effects associated with breathing or otherwise consuming smaller amounts of toluene over long periods of time are not known.

- Laboratory animal studies and, in some cases, human exposure studies show that repeated exposure to large amounts of toluene during pregnancy can adversely affect the developing fetus.
- Toluene by itself is not likely to cause environmental harm at levels normally found in the environment.
- The Department of Health and Human Services and the International Agency for Research on Cancer have not classified toluene for carcinogenic effects. Studies in workers and animals indicate that toluene does not cause cancer.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	3,750				375
Ontario				2,000	

Adapted from:
Toluene OPPT Chemical Fact Sheets. United States Environmental Protection Agency. http://www.epa.gov/docs/chemfact.

Chemical Fact Sheets

Titanium
CAS No. 7440-32-6
Ti

WHAT IS TITANIUM?

Titanium is a dark gray lustrous metal. Crystal packing is hexagonal below 882.5 degrees Celsius, but cubic above 882.5 degrees Celsius. It is the 9th most abundant (0.63% by wt) element in earth's crust.

USES

Titanium is used in aircraft, missiles, surgical implants, prostheses, casings for control wires in atomic reactors and in protective surface on mixers in the pulp-paper industry. Titanium is used for tubing and lining vessels used in the production of nitric acid and acetaldehyde. Titanium powder is used in pyrotechnics, vacuum engineering, surgical appliances, surgical acid for fracture fixation and medications for skin disorders. Titanium powder is also used in the manufacture of electrodes, lamp filaments, welding rods, paints and dyes. Titanium is also in various alloys. Titanium is combined with copper and iron to form titanium bronze. Titanium is added to steel to impart great tensile strength, and to aluminum to impart resistance to attack by salt solution and organic acids.

SOURCES

Titanium sources are primarily electric furnaces

Titanium was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to titanium might include:

- Inhaling urban air. Titanium was a contaminant of urban air at an average concentration of 0.04 µg/m^3 and maximum concentration of 1.10 µg/m^3 in 1964-1965.
- Exposure to titanium compounds, such as titanium dioxide, titanium carbide, or titanium tetrachloride. Exposure is usually in form of dust but exposure to fumes and vapors occur during handling of titanium tetrachloride. Exposure may also be due to titanium and titanium dioxide dust and fumes originating from electric furnace operations.
- Ingestion of contaminated food. Food is considered to be the principal source of titanium exposure for humans.

ENVIRONMENTAL FATE AND BEHAVIOUR

TOXICITY

- Inhaled titanium tends to remain in lungs for long periods. It has been estimated that about 1/3 of inhaled titanium is retained in the lungs.
- Lack of toxicity by contact with skin & tissues has been demonstrated by its use in therapy of skin disorders and in surgical appliances.
- There is no evidence that titanium is carcinogenic in humans.
- The current extent of exposure to titanium of the general population is not thought to pose a health risk.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				120	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Tin
CAS No. 7440-31-5
Sn

WHAT IS TIN?

Tin is a natural element in the earth's crust. It is a soft, white, silvery metal that doesn't dissolve in water.

USES

Tin is used to make cans, brass, bronze, pewter and soldering materials. Tin may be combined with chlorine, sulfur, or oxygen to form inorganic tin compounds used in toothpaste, perfumes, soaps, coloring agents, and dyes. Tin may also be combined with carbon to form organotin compounds used to make plastics, food packages, plastic pipes, pesticides, paints, and pest repellents.

SOURCES

Tin metal and related inorganic and organic tin compounds can be found in the air, water, and soil near places where tin compounds are naturally present in rock, or where the compounds are mined, manufactured, or used. Tin is also released into the environment by coal and oil combustion.

Tin was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to tin includes:
- The ingestion of tin through the consumption of food or drink packaged in tin containers.
- Breathing air that contains tin in the workplace or near hazardous waste sites.
- Touching substances that contain high levels of tin.

ENVIRONMENTAL FATE AND BEHAVIOUR

- The residence time of tin compounds in air, water and soil differs for each compound.
- In the atmosphere, tin, which may be present in gases, attaches to dust particles.
- Some tin compounds dissolve in water. In water, tin attaches to the soil and sediments.
- Organotins build up in fish and plants.

TOXICITY

- Ingested or inhaled inorganic tin compounds usually have minimal toxic effects due to their short residence times in the body. However, large amounts of these tin compounds may cause stomachaches, anemia, and liver and kidney problems.
- Inhalation or ingestion of organotin compounds can cause breathing problems, eye irritation, and impaired brain and nervous system function. Unusually high exposure can cause death.
- Rats exposed to some organotin compounds exhibit decreased immunity to disease. Comparable effects have not been observed in people.
- In contrast to inorganic tin compounds, organotin compounds impair proper reproductive function of exposed rats and mice. Offspring experience high rates of birth defects.
- There is very little information on the health effects caused by touching tin compounds. Exposure of skin and eyes to both organotin and inorganic tin compounds, results in irritation of the respective organ in both human and animal tests.
- The Department of Health and Human Services, the International Agency for Research on Cancer and the Environmental Protection Agency (EPA) have not classified tin for carcinogenicity.
- There is no evidence that tin or tin compounds cause cancer in humans. Animal studies show that inorganic tin compounds do not cause cancer in rats and mice. It is unknown whether organotin compounds cause cancer in animals.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1				0.1
Ontario				10	

Adapted from:
Tin ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

1,1,2,2-Tetrachloroethane
CAS No. 79-34-5
$C_2H_2Cl_4$

WHAT IS 1,1,2,2-TETRACHLOROETHANE?

1,1,2,2-Tetrachloroethane is a manufactured, colorless chemical that does not burn easily. It is volatile and has a sweet odor.

USES

In the past, it was used in large amounts to produce other chemicals and as a solvent, to clean and degrease metals, and in paints and pesticides. Commercial production of 1,1,2,2-tetrachloroethane for these uses has stopped. It presently is used only as a chemical intermediate in the production of other chemicals.

SOURCES

No releases of 1,1,2,2-Tetrachloroethane in Alberta were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

- Exposure to 1,1,2,2-Tetrachloroethane might include:
- Inhaling ambient air: 1,1,2,2-tetrachloroethane can be found at low levels in both indoor and outdoor air.
- It has rarely been found in public drinking water supplies, although in a few instances it has been found in private well water that may have been used for drinking.
- It has not been reported in food or soil.
- Limited exposure could occur from breathing in vapors or touching it due to spills or accidents in the workplace.

Table 2: Annual Averages of Ambient Levels of 1,1,2,2-Tetrachloroethane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.0435	0.0513
Edmonton Central	0.0359	0.0547

Edmonton East	0.0419	0.0495

ENVIRONMENTAL FATE AND BEHAVIOUR

- 1,1,2,2-tetrachloroethane eventually moves into the air or ground water.
- It does not attach to soil particles when released to land.
- When released to surface water, much of it will evaporate to the air while the rest may break down in the water.
- Breakdown of the chemical is slow: it takes about 13 months for half of the chemical to breakdown in the ground water and 2 months for half of the chemical to breakdown in the air.
- 1,1,2,2-tetrachloroethane does not build up significantly in the bodies of fish or other organisms.

TOXICITY

- Breathing high levels of 1,1,2,2-tetrachloroethane in a closed room can cause fatigue, vomiting, dizziness, and possibly unconsciousness. However, most people recover from these effects once they are in fresh air.
- Breathing, drinking, or touching 1,1,2,2-tetrachloroethane can cause liver damage, stomachaches, or dizziness if you are exposed to large amounts for a long period of time.
- The health effects from long-term (365 days or longer) exposure to low levels of 1,1,2,2-tetrachloroethane are not known. It is also not known whether 1,1,2,2-tetrachloroethane will cause reproductive effects in people.
- Animal studies have shown effects on the lungs, liver, blood, and nervous system from breathing in 1,1,2,2-tetrachloroethane. Effects on the liver, kidneys, and nervous system were seen when animals ingested the chemical.
- It is not known whether 1,1,2,2-tetrachloroethane causes cancer in people.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	70				7
Ontario					

Adapted from:
1,1,2,2-Tetrachloroethane ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Terpene

WHAT IS TERPENE?

Terpenes occur naturally in almost all living plants. For example, the liquid derived from orange peel contains a monoterpene called limonene. A limited number of insects manufacture and excrete or emit terpenes as insecticides or sex pheromones. Terpenes, together with many other compounds found in living plants, are considered as derivatives of isoprene and they are classified according to the number of isoprene units in their carbon skeletons.

The term terpenes applies to all compounds containing isoprene units, including saturated or partially saturated compounds, alcohols (terpenoids), aldehydes and esters.

USES

Terpenes are used in medicines, turpentine and other solvents. Terpene derivatives are used in perfumes and as flavouring and food additive compounds. Terpene resin is used as a base in chewing gum and as a moisture barrier in foods. Terpenes are also an important raw material for making pesticides.

SOURCES

The two most important industrial sources of terpenes are turpentine [8006-64-2] and other essential oils. Turpenes are released when wood is processed under high temperature during the steam distillation of pine woods or the cooking of wood pulp.

Naturally, terpenes are emitted from tree leaves, particularly conifers. Terpenes may also be emitted from fried chicken, chickpea seeds, orange juice essence, mangos, roasted filberts, beaufort cheese and baked potatoes.

Terpenes were not reportable to the NPRI in 2003.

ENVIRONMENTAL LEVELS AND EXPOSURE

- Exposure to terpenes is through:
- Inhaling air contaminated with high levels of terpenes.

- Eating fruits or other plant products that contain terpenes.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Limonene is generally resistant to biodegradation under aerobic conditions..
- Limonene and isoprene exhibit low to moderate mobility in soil. Volatilization occurs readily from soil.
- In the atmosphere, limonene and isoprene are oxidized by hydroxyl radicals, ozone and nitrate radicals.
- Limonene and isoprene may bioconcentrate in fish and aquatic organisms.

TOXICITY

- Although many monoterpenes are classified as safe food additives, exposure of terpenes at high levels could cause adverse health effects.
- Undiluted d-limonene and a-pinene have been reported to cause moderate skin irritation in primary dermal irritation studies with rabbits. However, diluted samples of a-pinene and ß-pinene were found not to produce skin irritation in human volunteers

GUIDELINES

Table 3: Current Ambient Air Quality Regulations

Jurisdiction	**Standards (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario					

Adapted from:
Fu, Long. *Monoterpenes in the Ambient Air: A Literature Re*view. October 1995.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Sulphur dioxide
CAS No. 7446-09-5
SO_2

WHAT IS SULPHUR DIOXIDE?

Sulfur dioxide is a colorless, non-flammable gas, which has a strong suffocating odor. It occurs as a liquid below 14 degrees F.

USES

Sulfur dioxide is used in the preservation of fruits, as a disinfectant in breweries and food factories; as a bleaching agent for textile fibers, wicker ware, and wood pulp, in sulfonation of oils, and in the manufacture of corn syrups, molasses and wine

SOURCES

The burning of coal and oil at power plants, copper smelting and oil refining are the main activities leading to the emission of sulfur dioxide. Other emissions occur during the manufacture of sulfuric acid, paper, food preservatives and fertilizers. Sulfur dioxide may be released naturally from volcanic eruptions

Sulphur dioxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to sulphur dioxide is usually through:

- The inhalation of anthropogenic or natural emissions. Exposure is usually greatest for those living or working near industrial operations, involving power generation, copper smelting and oil refining.

Table 2: Annual Averages of Ambient Levels of Sulfur dioxide in Alberta ($\mu g/m^3$)

Station	1997	1998
Calgary Central	No data	No data
Edmonton Central	No data	No data
Edmonton East	7.6	6.3

- ENVIRONMENTAL FATE AND BEHAVIOUR

- Once released into the air, sulfur dioxide may be converted to sulfur dioxide, sulfur trioxide and sulfates.
- The average residence time of airborne sulfur compounds is usually between one and five days, depending on the climate of a region.
- Direct surface uptake of sulfur dioxide is the most important dry removal process for atmospheric sulfur.
- Deposition by precipitation (wet deposition) is the result of both in-cloud and below-cloud capture of sulfur dioxide and particulate sulfate. Diffusional uptake results in sulfur dioxide being taken up in clouds, where sulfate particles serve as condensation nuclei for raindrop formation. Below-cloud processes involve both diffusional uptake of sulfur dioxide and the interception of additional sulfate particles by falling drops. In-cloud scavenging processes are more important where sulfur dioxide levels below the clouds are low.
- The removal rate for particulate sulfate and sulfur dioxide is approximately 40% and 4%, respectively, per hour. The overall efficiency of wet removal depends on the precipitation type and its intensity, duration and frequency. The efficiency of removal also depends on the relative amounts of sulfur dioxide and sulfate present, and the size distribution of particulate sulfate.
- Overall, wet and dry deposition are of comparable importance. However, dry deposition is more important closer to source regions where concentration are higher.
- Although snow covered surfaces are inefficient receptors of gaseous and particulate sulfur compound, the spring melt of the accumulated winter snowpack can result in rapid, short term inputs of high sulfate, low pH water to freshwater systems. These inputs can be very harmful to fish and other aquatic life.

TOXICITY

- Sulfur dioxide is toxic and may be fatal if inhaled. Vapors are extremely irritating and corrosive. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Severe injuries to human eyes have followed contact with the liquefied form of sulfur dioxide
- Inhalation produces all grades of respiratory tract irritation, sometimes with pulmonary edema. With acute exposure, 5 ppm causes dryness of the nose and throat and a measurable increase in resistance to bronchial air flow.
- Sulfur dioxide, sulfites, bisulfites and metabisulfites are not classifiable as to their carcinogenicity to humans.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Standards (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		450		150	30
Texas					
Ontario		690		275	55

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Styrene
CAS No. 100-42-5
C_8H_8

WHAT IS STYRENE?

Styrene (also called vinylbenzene) is a flammable, oily liquid. It is colorless to yellowish in color and has a penetrating odor. Styrene does not occur naturally.

USES

The largest users of styrene are chemical companies that make plastics, synthetic rubber, resins, and insulators. Acrylonitrile-butadiene-styrene plastics are used in business machines, luggage, and in construction materials. Acrylonitrile-styrene plastics are used in automotive and household goods and in packaging material. Food processing companies use small amounts of styrene as a flavoring agent in foods such as ice cream and candy.

SOURCES

Sources of styrene include releases associated with its manufacture, cigarette smoke and automobile exhaust.

Table 1: National Pollutant Release Inventory 2001 Styrene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.17	0.06	0.00	tonnes
5263	2001	MAAX Canada Inc. - Airdrie Plant	Airdrie	AB	51.17	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.21	1.83	0.00	tonnes
0764	2001	PFB Corporation - PFB Corporation-EPR Plant	Crossfield	AB	1.75	0.26	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	16.05	0.19	0.00	tonnes
2301	2001	Triple M Fiberglass Mfg. Ltd.	Edmonton	AB	18.46	0.00	0.00	tonnes
5262	2001	ZCL Composites Inc - Edmonton Plant	Edmonton	AB	52.04	0.00	0.00	tonnes
				Total	**139.86**	**2.34**	**0.00**	**tonnes**

Facility Name	City	On-Site Releases	Transfers for Disposal	Transfers for Recycling
Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	0.21	0.06	0.00
MAAX Inc. - MAAX Westco Airdrie	Calgary	24.53	0.00	0.00
NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	0.68	1.30	0.00
PFB Corporation - PFB Corporation-EPR Plant	Crossfield	1.75	0.40	0.00
Shell Chemicals Canada Ltd. -	Fort Saskatchewan	17.67	1.18	0.00

Scotford Chemical Plant				
Triple M Fiberglass Mfg. Ltd.	Edmonton	11.47	0.00	0.00
ZCL Composites Inc. - Edmonton Plant	Edmonton	53.10	0.00	0.00
		109.42	**2.95**	**0.00**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to styrene may include:

- Workplace or environmental exposure following releases to air, water, land, or groundwater. This may involve inhalation of contaminated air and consumption of contaminated water or food. Absorption through the skin is less likely.
- Inhalation of cigarette smoke or automobile exhaust.

Table 2: Annual Averages of Ambient Levels of Styrene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.2723	0.2727
Edmonton Central	0.3050	0.2521
Edmonton East	0.9104	0.9237

ENVIRONMENTAL FATE AND BEHAVIOUR

- Most releases of styrene to the environment are to air. It can also evaporate from water and soil exposed to air.
- Styrene evaporates when exposed to air and subsequently breaks down to other chemicals.
- Styrene can contribute to smog formation when it reacts with other volatile substances in air.
- It dissolves only slightly when mixed with water.
- Microorganisms that live in water and soil can also break down styrene. Because it is a liquid that does not bind well to soil, styrene that makes its way into the ground can move through the ground and enter groundwater.
- Plants and animals are not likely to store styrene.

TOXICITY

- Effects of styrene on human health and the environment depend on how much styrene is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.
- Styrene vapor irritates the eyes, the nose, and the throat. Styrene vapor can also adversely affect the human nervous system, causing adverse eye effects. These

effects are not likely to occur at levels of styrene that are normally found in the environment.

- Human health effects associated with breathing small amounts of styrene over long periods of time in the workplace include alterations in vision, hearing loss and increased reaction times. Other human health effects associated with exposure to small amounts of styrene over long periods of time are not known. Laboratory studies show that repeated oral exposure to large amounts of styrene adversely affects the blood and the liver of animals. Laboratory studies also show that repeated exposure to large amounts of styrene in air can damage the respiratory system of animals.
- The International Agency for Research on Cancer has determined that styrene is possibly carcinogenic to humans. Several studies of workers have shown that breathing styrene may cause leukemia. There is no information on the carcinogenicity of styrene in people who swallow it or get it on their skin. Studies in animals that breathed or swallowed styrene suggest that it is weakly carcinogenic.
- Styrene has moderate toxicity to aquatic life. Styrene by itself is not likely to cause environmental harm at levels normally found in the environment.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		215			
Texas	430				85
Ontario				400	

Adapted from:
Styrene OPPT Chemical Fact Sheets. United States Environmental Protection Agency.
http://www.epa.gov/docs/chemfact.

Chemical Fact Sheets

Silver
CAS No. 7440-22-4
Ag

WHAT IS SILVER?

Silver is a lustrous white metal, with a face-centered cubic structure.

Silver occurs naturally in the earth's crust at a concentration of 0.1 ppm, and is also present in seawater at a concentration of 0.01 ppm. Principal ores are argentite, cerargyrite or horn silver (mixture of halides), proustite and pyrargyrite. Silver is present in unpolluted freshwaters at concentrations up to 0.5 µg/l while sediments, soils, rocks, and minerals contain from 0.1 to 0.5 mg of silver/kg.

USES

Uses of silver and its compounds include: photography; electrical and electronics products; sterlingware, electroplated ware, and jewelry; and brazing alloys and solders. Other uses include: as an ingredient in dental alloys; in processing foods and beverages; as a catalyst in hydrogenation and oxidation processes; in high capacity silver-zinc and silver-cadmium batteries; as a cloud seeding compound; in minted coins; and in the bearing linings of air-cooled aircraft engines.

SOURCES

Silver occurs naturally in the earth's crust. It may be released into the air and water through natural processes such as the weathering of rocks. Some common industrial processes that lead to emissions of silver to the environment include smelting operations, cloud seeding operations, coal combustion, steel and iron production, cement manufacture, urban refuse incineration, and cigarette tobacco.

Table 1: National Pollutant Release Inventory 2001 Silver Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2316	2001	Dow Chemical Canada Inc. - Prentiss Chemical Manufacturing P	Red Deer	AB	0.00	0.20	70.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.00	0.00	tonnes
				Total	**0.00**	**0.21**	**70.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to silver might include:

- Inhalation of emissions from smelting operations, cloud seeding operations, coal combustion, steel and iron production, cement manufacture, urban refuse incineration, and cigarette tobacco.
- Ingestion of trace amounts from fresh water, sea water and public drinking water supplies.
- Inhalation or dermal contact while carrying out activities such as jewelry-making, soldering, and photography.

Ambient air concentrations of silver and its compounds were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In surface water, sorption and precipitation processes are effective in reducing the concentration of dissolved silver and result in higher concentrations in the bed sediments than in the overlying waters.
- Sorption by manganese dioxide and precipitation with halides are the dominant controls on the mobility of silver in seawater.
- Sorption appears to be the dominant process leading to partitioning into sediments. It appears that magnesium dioxide, ferric compounds, and clay minerals all have some degree of adsorptive affinity for silver and are involved in its deposition into sediments.
- Silver may be leached out of soil into the groundwater.
- Silver does not appear to concentrate to a significant extent in aquatic animals.

TOXICITY ASSESSMENT

- Chronic exposure via inhalation may lead to the development of argyria, a poisoning by silver or a silver salt, which leads to a permanent ashen-grey discoloration of the skin, conjunctiva, and internal organs.
- Exposure to silver may be a cause of metal fume fever.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.1				0.01
Ontario				1	

Adapted from:
Silver ToxFAQs, ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Silica
CAS No. 7631-86-9
SiO_2

WHAT IS SILICA?

Silica is a transparent crystal, or amorphous powder, that is both odorless and tasteless.

Silica occurs in nature as agate, amethyst, chalcedony, cristobalite, flint, quartz, sand and tridymite. Free silica is not combined with any other element or compound. The term "combined silica" originates from chemical analysis of naturally occurring rocks, clays & soils. Crystalline silica is the most widely occurring of all minerals.

USES

Uses of silica include the manufacture of glass, water glass, refractories, abrasives, ceramics, and enamels; in scouring and grinding compounds; molds for castings; decolorizing and purifying oils and petroleum products. It is applied as a clarifying agent; in filtering liquids; the manufacture of heat insulators, fire brick, and fire- and acid-proof packing materials; paints; filler for paper, paints; adsorbent dynamite; in metal polishes, dentifrices; in nail polishes; and in chromatography. Silica is used as a food additive. It is also a post harvest additive to control insects in stored grain, beans, peas, & soybeans.

SOURCES

Due to its high content in earth materials, silica is ubiquitous in the environment as a result of natural processes. It is also released to the environment as a result of industrial processes, in the form of dust produced during processes including rock cutting, drilling, crushing, grinding, mining, abrasive manufacture, pottery making, and processing of diatomaceous earth.

Silica was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to silica might include:

- Inhalation of ambient air.
- Inhalation of ambient air in the workplace, particularly where silica dust is produced by industrial processes.

ENVIRONMENTAL FATE AND BEHAVIOUR

TOXICITY

- Silicosis is initiated by prolonged and extensive exposure to respirable free silica. Particles less than 5 µm in diameter appear to be most important.
- The US Department of Health and Human Services has determined that crystalline silica (respirable size) is a known human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	60				6
Ontario (Respirable, under 10 µm aerodynamic diameter)				5 cristabolite 5 quartz 5 tridymite	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Selenium
CAS No. 7782-49-2
Se

WHAT IS SELENIUM?

Selenium is a metal commonly found in rocks and soil. In the environment, selenium is not often found in the pure form. Much of the selenium in rocks is combined with sulfide minerals or with silver, copper, lead, and nickel minerals. Selenium and oxygen combine to form several compounds.

Industrially produced hydrogen selenide is a colorless gas with a disagreeable odor. It is probably the only selenium compound that might pose a health concern in the workplace.

USES

The compounds of selenium have a wide variety of uses. Selenium sulfide is a bright red-yellow powder used in anti-dandruff shampoo. Selenium dioxide is an industrially produced compound that dissolves in water to form selenious acid. Selenious acid can be found in gun blueing (a solution used to clean the metal parts of a gun).

SOURCES

Selenium is found naturally in the environment, as a metal commonly found in rocks and soil. It is also emitted to the environment as a result of the manufacture, use or disposal of its compounds.

Table 1: National Pollutant Release Inventory 2001 Selenium Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.02	0.00	tonnes
				Total	**0.00**	**0.02**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to selenium might include:

- Inhalation of air that contains selenium or its compounds.
- Ingestion of food, drinking water, or dietary supplements that contain it.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Selenium particles in the atmosphere settle to the ground as dry or wet deposition.
- Soluble selenium compounds may runoff from soils in surface water.
- Selenium can collect in aquatic animals that live in water containing high levels of it.

TOXICITY

- Acute exposure to selenium may cause dizziness, fatigue, irritation, collection of fluid in the lungs and severe bronchitis.
- Dermal contact may cause rashes, swelling and pain.
- Over-exposure to selenium via ingestion may result in brittle hair and deformed nails. A loss of feeling and control in the arms and legs may also occur.
- The US Department of Health and Human Services (DHHS) has determined that selenium sulfide can be reasonably anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	2				0.2
Ontario				10	

Adapted from:
Selenium ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Quinoline
CAS No. 91-22-5
C_9H_7N

WHAT IS QUINOLINE?

Quinoline is a colourless to brown gas with a penetrating odor.

USES

Quinoline is used in the preparation of hydroxyquinoline sulfate (quinosol), niacin, and certain dyes. It is an anatomical specimen preservative and a solvent for resins & terpenes. It is produced as a chemical intermediate for both 8-hydroxyquinoline (a fungistat) and certain pharmaceuticals (eg, antiinfectives). In addition, quinoline is used as a corrosion inhibitor.

SOURCES

Quinoline may enter the environment through atmospheric emissions and/or wastewater from petroleum, shale oil, coal processing and wood preservation industries. It may also be released as a result of its production and use in the above-mentioned industrial processes.

No releases of Quinoline were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to quinoline might include:

- Inhalation due to occupational exposure, cigarette smoke and particulates in urban air.

Ambient air concentrations of quinoline were not reported for Alberta in 1997 or 1998.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Upon release to the atmosphere, quinoline will react with hydroxyl radicals.
- Quinoline can be removed from the atmosphere via wet and dry deposition.
- If released to soil, quinoline will leach into groundwater and biodegrade.

- Hydrolysis, oxidation and volatilization do not appear to be significant fate processes.
- If released to water, quinoline is expected to rapidly biodegrade and photolyze.
- Volatilization from surface waters is not predicted to be significant; however, it has been suggested that volatilization rates from rivers during winter, in cold climates, may be significant compared with winter biodegradation and photolysis rates.
- Hydrolysis, oxidation, bioaccumulation and adsorption onto suspended solids and sediments are not likely to take place in water.

TOXICITY

- Quinoline is toxic; inhalation, ingestion, or skin contact with material may cause severe injury or death.
- Contact with molten substance may cause severe burns to skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Clinical signs of toxicity include lethargy, respiratory distress, & prostration leading to coma.
- Quinoline is irritating to the skin and may cause pronounced permanent corneal injury.

GUIDELINES

Guidelines are not in place in Alberta, Texas or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Propylene oxide
CAS No. 75-56-9
C_3H_6O

WHAT IS PROPYLENE OXIDE?

Propylene oxide is a colourless, ethereal liquid with a sweet, alcoholic odor. In foods, Propylene oxide has no residual odor.

USES

Propylene oxide is used for sterilization of packaged food products in fumigation chambers, and as a method of control of salmonella in meat scraps. It is also used as a herbicide. Propylene oxide is a chemical intermediate in the preparation of many industrial chemicals, such as polyurethane polyols, propylene glycol, dipropylene glycol, glycol ethers and nonpolyurethane polyols, among others. It is used in the preparation of lubricants, surfactants and oil demulsifiers, and is an important solvent, fumigant and soil sterilant.

SOURCES

Sources of propylene oxide include industries involved in the production, storage, transport, and use of propylene oxide. The major release of propylene oxide into the environment is expected to occur during its production or use as an intermediate or as a fumigant and a soil sterilant. In addition to its industrial uses, Propylene oxide may be emitted to the atmosphere in automobile exhaust and combustion exhausts of stationary sources that burn hydrocarbons.

No releases of propylene oxide were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to propylene oxide might include:

- Inhalation of air in the workplace, where production and use of propylene oxide is involved.

Ambient air concentrations of propylene oxide were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the atmosphere, propylene oxide will react in the vapour phase with photochemically produced hydroxyl radicals.
- Physical removal of propylene oxide from the ambient atmosphere is not expected to be generally important, although localized wash-out due to rainfall may occur.
- If released to soil, propylene oxide is expected to be susceptible to leaching and chemical hydrolysis in moist soils. It is expected to evaporate rapidly from dry soil surfaces; evaporation from wet soils may also occur, but at a rate diminished by leaching.
- Volatilization of propylene oxide from the aquatic environment may be an important transport mechanism.

TOXICITY

- Propylene oxide is classified toxicologically as a primary irritant, a mild protoplasmic protein and a mild depressant of Central Nervous System activity.
- Contact with skin may result in irritation and necrosis of skin.
- Excessive exposure to vapor irritates eyes, upper respiratory tract and lung.
- Central Nervous System effects consist of incoordination, ataxia & general depression.
- Chromosomal aberrations have been reported in workers exposed to propylene oxide.
- The US Department of Health and Human Services has determined that propylene oxide can reasonably be anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	250				25
Ontario				1.5	0.3

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Polycyclic Aromatic Hydrocarbons (PAHs)
CAS No. 130498-29-2

PAHs have no chemical formula because PAHs are a mixture of many different chemicals.

WHAT ARE POLYCYCLIC AROMATIC HYDROCARBONS?

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids.

USES

Some PAHs are used in the production of medicines, dyes, plastics and pesticides. They are also used in the preservation of wood, as a component of creosote and coal tar.

SOURCES

Natural sources of PAHs to the environment include volcanoes and forest fires. PAHs are found in coal tar, crude oil, creosote, and roofing tar, and are emitted to the environment as a result of the production, use and disposal of these materials. Other sources include the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. Automobile exhaust and cigarette smoke contain PAHs.

Table 1: National Pollutant Release Inventory 2001 PAH, Schedule 1, Part 3[1] Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	82.61	0.00	0.00	kg
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	199.12	0.00	0.00	kg
				Total	**281.73**	**0.00**	**0.00**	**kg**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to polycyclic aromatic hydrocarbons might include:

- Inhalation of air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Inhalation of air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Dermal contact with air, water, or soil near hazardous waste sites.
- Ingestion of grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Ingestion of contaminated water or cow's milk.

Ambient air concentrations of PAHs, on the whole, were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.
- Most PAHs do not dissolve easily in water. They adsorb to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to adsorb tightly to particles; certain PAHs move through soil to contaminate underground water.

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[1] Schedule 1, Part 3 of the 2000 *Canada Gazette* notice, which can be found at www.canadagazette.ca

- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

TOXICITY

- The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.
- Inhalation of, and dermal contact with, certain mixtures of PAHs and other chemicals for long periods of time have been shown to cause cancer.

GUIDELINES

Guidelines for polycyclic aromatic hydrocarbons, on the whole, are not in place in Alberta, Texas or Ontario.

Adapted from:
Polycyclic Aromatic Hydrocarbons (PAHs) ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Polychlorinated Biphenyls (PCBs)
CAS No. 1336-36-3
$C_{12}H_2Cl_8$ (Octachlorobiphenyl)

WHAT ARE PCBs ?

Polychlorinated biphenyls (PCBs) are a group of manufactured organic chemicals that contain 209 individual chlorinated chemicals (known as congeners). PCBs are either oily liquids or solids and are colourless to light yellow in color. They have no known smell or taste. PCBs don't burn easily and they are good insulating material. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor.

USES

PCBs were at one time used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in Canada and the United States in 1977 because of evidence that they build up in the environment and cause harmful effects. PCBs were also used in the manufacture of fluorescent lighting fixtures, electrical appliances containing PCB capacitors, microscope oil and hydraulic fluids.

SOURCES

There are no known natural sources of PCBs. Before 1977, PCBs entered the air, water, and soil during their manufacture and use. Today, PCBs can be released into the environment from hazardous waste sites that contain PCBs, illegal or improper dumping of PCB wastes, and leaks from electrical transformers containing PCBs.

PCBs were not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to PCBs might include:
- Inhalation of fumes from old fluorescent lighting fixtures and old appliances such as television sets and refrigerators, which may leak small amounts of PCBs into the air when they get hot during operation.
- Ingestion of food, including fish, meat and dairy products, containing PCBs.

- Inhalation of ambient air near hazardous waste sites that contain PCBs.
- Ingestion of PCB-contaminated well water.

Ambient air concentrations of PCBs were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- PCBs may be carried long distances in the atmosphere; they remain in air for approximately 10 days.
- In water, a small amount of the PCBs may remain dissolved, but most adsorbs to organic particles and sediments.
- PCBs in water build up in fish and marine mammals, and can reach levels thousands of times higher than the levels in water.

TOXICITY

- Chronic exposure to PCBs via inhalation may lead to irritation of the nose and lungs, as well as irritations of the skin, such as acne and rashes.
- The Department of Health and Human Services (DHHS) has determined that PCBs may reasonably be anticipated to be human carcinogens.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines ($\mu g/m^3$)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.1				0.01
Ontario				0.15	0.035

Adapted from:
Polychlorinated biphenyls (PCBs) ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Phenol
CAS No. 108-95-2
C_6H_6O

WHAT IS PHENOL?

Phenol is a colourless to light pink crystalline solid that can be liquefied by mixing with about 8% water.

USES

Phenol is used as a general disinfectant in solution or mixed with slaked lime, etc., for toilets, stables, cesspools, floors and drains. It is also used in the manufacture of colourless or light-colored artificial resins along with many medical & industrial organic compounds & dyes. Phenol is an important reagent in many chemical analyses, and is a chemical intermediate for phenolic resins, bisphenol a, caprolactam (via cyclohexanone), adipic acid and other important industrial chemicals.

SOURCES

Phenol is produced naturally by decaying organic matter. It is also an important industrial chemical and enters the environment in air emissions, wastewater and spills connected with its use as a chemical intermediate, disinfectant and antiseptic. Phenol is released by wood stoves, in vehicle exhaust and other industrial processes.

Table 1: National Pollutant Release Inventory 2000 Phenol Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0011	2001	Borden Chemical Canada, Inc. - Borden Chemical - Edmonton	Edmonton	AB	8.21	0.02	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	107.02	0.00	0.00	tonnes
2630	2001	Johns Manville Canada Inc. - Innisfail Plant	Innisfail	AB	18.41	0.01	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	2.45	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.01	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.01	0.06	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	1.49	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.56	0.00	tonnes
5281	2001	Tolko Industries Ltd - High Prairie OSB Mill	High Prairie	AB	1.17	0.00	0.00	tonnes
4830	2001	West Fraser Mills Ltd. - Ranger Board	Blue Ridge	AB	0.02	0.00	0.00	tonnes
				Total	**134.85**	**4.59**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to phenol may include:

- Inhalation and dermal contact in the workplace where phenol is manufactured, used or disposed of.
- Inhalation of ambient air, ingestion of food and lozenges and dermal contact with disinfects and other consumer products containing phenol.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the environment, phenol's primary removal mechanism is biodegradation which is generally rapid (days). Phenol rapidly degrades in sewage, soil, fresh water and seawater.
- In the atmosphere, Phenol occurs as a vapour and reacts with photochemically-produced hydroxyl radicals.
- Sensitized photolysis may be important in the atmosphere.
- Phenol has been shown to be readily removed from the atmosphere by rain.
- Acclimation of resident populations of microorganisms is rapid. Under anaerobic conditions degradation is slower and microbial adaptation periods longer. If Phenol is released to soil, it will readily leach and biodegrade.
- Phenol does not bioconcentrate in aquatic organisms.

TOXICITY

- Phenol is toxic; inhalation, ingestion, or dermal contact with material may cause severe injury or death.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		100			
Texas	154				19
Ontario				100	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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Chemical Fact Sheets

Perchloroethylene
CAS No. 127-18-4
C_2Cl_4

WHAT IS PERCHLOROETHYLENE?

Perchloroethylene (also called PERC) is a colorless, nonflammable liquid with a sharp, sweet odor. Other names include tetrachloroethylene, PCE, and tetrachloroethene.

USES

The dry cleaning industry accounts for a large proportion of perchloroethylene use. In the United States, for example, PERC accounts for 80% to 85% of all dry cleaning fluid used. Textile mills, chlorofluorocarbon producers, vapor degreasing and metal cleaning operations, and makers of rubber coatings also use PERC. It can be added to aerosol formulations, solvent soaps, printing inks, adhesives, sealants, polishes, lubricants, and silicones. Typewriter correction fluid and shoe polish are among the consumer products that can contain PERC.

SOURCES

PERC does not occur naturally in the environment. Its presence in the environment is a result of its manufacture, use and disposal in the above-noted industries.

Table 1: National Pollutant Release Inventory 2001 Perchloroethylene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3974	2001	Alberta Envirofuels Inc.	Edmonton	AB	0.36	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.01	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	0.00	0.00	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.05	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
				Total	**0.42**	**0.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to perchloroethylene might include:

- Inhalation or dermal contact in the workplace where perchloroethylene is manufactured, used or disposed of.
- Inhalation, ingestion or dermal contact in the environment following releases to air, water, land, or groundwater.
- Inhalation or dermal contact in the home when using products containing PERC.
- Inhalation of PERC fumes in the home after having garments dry cleaned.

PERC enters the body when breathed in with contaminated air or when consumed with contaminated food or water. It is less likely to be absorbed through skin contact. Once in the body, PERC can remain stored in fat tissue.

Table 2: Annual Averages of Ambient Levels of Perchloroethylene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.8424	0.7615
Edmonton Central	0.4637	0.5094
Edmonton East	0.2900	0.3579

ENVIRONMENTAL FATE AND BEHAVIOUR

- Perchloroethylene evaporates when exposed to air. It dissolves only slightly when mixed with water.
- Most direct releases of PERC to the environment are to air. It also evaporates from water and soil exposed to air.
- Once in air, PERC breaks down to other chemicals over a period of approximately several weeks.
- PERC can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in air. These reactions tend to eliminate PERC before it reaches the upper atmosphere in amounts sufficient to damage the ozone layer.

- Because it is a liquid that does not adsorb well to soil particles, PERC that makes its way into the ground can move through the ground and enter groundwater.
- Plants and animals living in environments contaminated with PERC can store small amounts of the chemical.

TOXICITY

- Effects of perchloroethylene on human health and the environment depend on the amount present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.
- Breathing PERC for short periods of time can adversely affect the human nervous system. Effects range from dizziness, fatigue, headaches and sweating to incoordination and unconsciousness.
- Dermal contact with PERC liquid or vapor may cause irritation of the skin, eyes, nose and throat.
- Chronic exposure via inhalation can cause liver and kidney damage in humans. Workers exposed repeatedly to large amounts of PERC in air can also experience memory loss and confusion.
- The US Department of Health and Human Services has determined that perchloroethylene can reasonably be anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	340				34
Ontario				360	

Adapted from:
Perchloroethylene OPPT Chemical Fact Sheets. United States Environmental Protection Agency. http://www.epa.gov/docs/chemfact.

Chemical Fact Sheets

Pentachlorophenol
CAS No. 87-86-5
C_6Cl_5OH

WHAT IS PENTACHLOROPHENOL?

Pure pentachlorophenol occurs as a colorless crystal. The impure form is dark gray to brown dust, beads, or flakes. It has a sharp chemical odor when hot, but very little smell at room temperature.

USES

Pentachlorophenol has been registered for use in Canada since 1949. Concerns about dioxins as microcontaminants in 1980 lead to the Pest Management Regulatory Agency (PMRA) prohibiting a number of uses, including uses on horticultural lumber, above-ground interior woodwork of farm buildings, interior use in homes, curing of hides and others in January, 1981. The two use areas left (sapstain inhibition and material preservation) were subject to ongoing scrutiny. In July of 1992 the PMRA announced the re-evaluation of all heavy-duty wood preservatives, including pentachlorophenol. Through the North American Free Trade Agreement, Canada's PMRA is now working co-operatively with the United States Environmental Protection Agency to complete the review. Pending completion of the review, pentachlorophenol remains available for industrial uses. Domestic products have not been registered for approximately ten years. Pentachlorophenol is still used in industry as a wood preservative for power line poles, railroad ties, cross arms, and fence posts.

SOURCES

Pentachlorophenol is a manufactured chemical that is not found naturally in the environment. Environmental levels of pentachlorophenol are a result of its manufacture, use or disposal from the above noted industries.

Pentachlorophenol was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to pentachlorophenol might include:

- Breathing contaminated air while working with treated wood at wood-treatment facilities and lumber mills.
- Touching treated lumber, for example, in wood-treatment facilities and lumber mills or in construction or farming.
- Breathing contaminated air near waste sites, sites of accidental spills, and work sites.
- Eating contaminated food, such as fish, or drinking contaminated water.

Ambient air concentrations of pentachlorophenol were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Pentachlorophenol generally adsorbs to soil particles, but its movement in soils depends on the soil's acidity.
- Not much pentachlorophenol will evaporate into the air.
- It doesn't dissolve easily in water.
- Breakdown is mainly via anaerobic biodegradation; breakdown via sunlight and hydrolysis are not significant processes.
- Aerobic biodegradation occurs mainly in surface waters.
- Pentachlorophenol is toxic to very toxic to fish; however, because of its rapid metabolism, biomagnification is not of concern.

TOXICITY

- Chronic or acute exposure can harm the liver, kidneys, blood, lungs, nervous system, immune system, and gastrointestinal tract.
- Dermal contact with pentachlorophenol can cause irritation of the skin, eyes, and mouth, particularly when it is a hot vapor.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	5				0.5
Ontario				20	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.
Etoxnet. Pesticide Information Profiles. Pentachlorophenol. 1996.
Agriculture Canada, Pesticides Directorate. Trade Memorandum T-1-229. Changes in The Regulatory Status of the Chlorophenols. 1980.

Chemical Fact Sheets

Particulate Matter (PM)
CAS No.: None

(There is no molecular formula for PM: it is not a molecule.)

WHAT IS PARTICULATE MATTER?

Particulates, or PM, are airborne solid and liquid particles. They have no specific chemical composition, and may include a wide range of chemical species. Particulates are classified by size, considered the most important parameter in characterising the physical behaviour of particulate matter. Particulates are classified as follows:

Size	
$PM_{2.5}$	Fine fraction. Refers to airborne particles that are 2.5 microns or less in diameter.
$PM_{2.5\text{-}10}$	Coarse fraction. Refers to airborne particles in the size range 2.5 to 10 microns in diameter, known as the coarse fraction of $PM_{10.}$
PM_{10}	Refers to airborne particles that are 10 microns or less in diameter.

Size of particulate matter is closely related to the health impacts associated with the particle. Fine particulates ($PM_{2.5}$) can pierce further into the lung tissue than coarse particulates.

The chemical composition of fine particles is different from that of coarse particles, such as sea spray or dust, because the mechanisms for formation are different. Fine particles are created when chemicals react in the atmosphere (nucleation of supersaturated vapours), and grow through particle-particle or gas-particle interactions. Grinding or atomization are the primary mechanisms by which coarse particles are formed.

Fine fraction particles ($PM_{2.5}$) scatter light effectively, reducing the distance for which the atmosphere has a clear appearance (i.e. it decreases the visual range). Smog is the term commonly used to describe the photochemical haze that results when light scattering particles are formed through the reaction of chemical pollutants in the atmosphere.

USES

There are no industrial uses of particulate matter.

SOURCES

Fine particulate matter ($PM_{2.5}$) is formed primarily by chemical reactions that occur in situations including:

- Combustion of wood in forest fires or residential wood burning.
- Combustion of fossil fuels in motor vehicles, furnaces, boilers, and heaters.
- Smelting of metals other than iron.
- Recovery, lime kilning, and smelt dissolving in Kraft pulp mills.
- Plywood manufacture, especially relating to the veneer dryer.

Coarse fraction particulate matter ($PM2_{2.5-10}$) is released primarily by mechanical breakdown of matrices, and is generally released from natural sources such as:

- Windblown dust.
- Sea salt particles.
- Vegetation-derived particles, including seeds, pollens, spores, leaf waxes and resins.
- Road dust.
- Agricultural crops (from wind erosion and tillage).

Particulate matter was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to PM might include:

- Inhalation of products from plants (pollens, spores, moulds, cornstarch), animals (bacteria, viruses, hair, insect parts and byproducts, dandruff), minerals (talc, man-made mineral fibers), combustion (tobacco smoke, cooking, heating appliances), home and personal care products (sprays, humidifiers), and radioactive sources (radon progeny).
- Occupational exposure to combustion products from wood or smelters or fossil fuels.
- Inhalation of ambient air during agricultural operations, including tilling.
- Inhalation of smog in traffic-heavy areas.
- Inhalation of dusty air, especially where the climate is dry.

Table 2.0: Annual Averages of Ambient Levels of PM_{10} in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	23.94	23.94
Edmonton Central	No data	No data
Edmonton East	19.62	No data

Table 2.1: Annual Averages of Ambient Levels of $PM_{2.5}$ in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	9.197	9.998
Edmonton Central	No data	9.501
Edmonton East	No data	10.24

ENVIRONMENTAL FATE AND BEHAVIOUR

- Coarse particulates tend to fall to the ground quickly due to gravity's effects (sedimentation) or inertial effects (impaction).
- Fine particulates undergo removal from the atmosphere by interaction with rainfall or by dry deposition.

TOXICITY

- Toxic effects of airborne particles are more likely to be associated with the fine mode of particulate matter air pollution, including acidic sulfates, possibly occurring as a coating on fine or even ultrafine carrier particles.
- Effects of fine particulates may include decreased lung function, decreased (or sometimes increased) particle clearance from airways, altered alveolar macrophage numbers and functions, modified immunological function, cytotoxicity and histological changes, and cardiographic abnormalities.

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario (< 44 µm aerodynamic diameter)				120	60*

*geometric mean

Adapted from:
CEPA/FPAC Working Group on Air Quality Objectives and Guidelines. *National Ambient Air Quality Objectives for Particulate Matter Part 1: Science Assessment .Document*. Minister, Public Works and Government Services.

Chemical Fact Sheets

Ozone
CAS No. 10028-15-6
O_3

WHAT IS OZONE?

Ozone exists as a colorless to bluish gas, a dark blue liquid, or blue black crystals.

USES

Some uses of ozone include: a disinfectant for air and water by virtue of its oxidizing power; bleaching waxes, textiles and oils; organic synthesis; deodorization of air and sewage gases.

SOURCES

Ozone is formed locally in air from lightning, in stratosphere by UV radiation and is found in atmosphere in varying proportions, since it is produced continuously in the outer layers of the atmosphere by the action of solar UV radiation on the oxygen of the air.

Ozone is formed through complex chemical reactions between precursor emissions of volatile organic compounds like hydrocarbons and nitrogen oxides in the presence of sunlight. Car exhaust is one source of precursor emissions for ground-level ozone.

Ozone was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ozone might include:
- Inhalation of ambient air, particularly in urban centres as a result of increased pollution.
- Inhaling natural background levels of ozone.

Table 2: Annual Averages of Ambient Levels of Ozone in Alberta (ppm)

Station	1999	2000
Calgary Central	0.01473	0.01466
Edmonton Central	0.01648	0.01537
Edmonton East	0.01500	0.02105

ENVIRONMENTAL FATE AND BEHAVIOUR

- Ozone can be scavenged by other chemicals in the atmosphere.
- It may be deposited to vegetation and taken up by plants. Inside the plant, it is consumed almost immediately.

TOXICITY

- The primary site of acute injury is the lung, which is characterized by pulmonary congestion, edema, and hemorrhage.
- Inhalation may initiate, accelerate or exacerbate respiratory tract disease of bacterial or viral origin.
- Discomfort to exposed individuals may involve dryness of throat & mucous membranes of nose & eyes following exposures of short duration.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		160			
Texas					
Ontario		165			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Octane
CAS No. 111-65-9
C_8H_{18}

WHAT IS OCTANE?

Octane is a colorless liquid with a gasoline-like odor.

USES

Octane is used in the manufacture of many printing pastes, paints, varnishes, adhesives, and other coatings.

SOURCES

Octane is a highly volatile constituent in the paraffin fraction of crude oil and natural gas. It is released to the environment via the manufacture, use, and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of octane into the environment from printing pastes, paints, varnishes, adhesives, and other coatings; hazardous waste sites, landfills, and waste incinerators; vulcanization and extrusion operations during rubber and synthetic production; and the combustion of gasoline fueled engines.

Octane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to octane might include:

- Inhalation of air in the workplace, where octane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities involved in the manufacture, use or disposal of octane.

Table 2: Annual Averages of Ambient Levels of Octane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.3325	0.3664
Edmonton Central	0.3305	0.4627
Edmonton East	0.6707	0.9149

ENVIRONMENTAL FATE AND BEHAVIOUR

- Octane is expected to exist entirely in the vapor phase in ambient air.
- Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important.
- Nighttime reactions with nitrate radicals may contribute to the atmospheric transformation of octane, especially in urban environments.
- Biodegradation of octane may occur in soil and water; however, volatilization and adsorption are expected to be far more important fate processes.
- Rapid volatilization of octane is expected to occur from environmental waters.
- The bioconcentration of octane may be important in aquatic systems.
- Octane is immobile in soil and may partition from the water column to organic matter in sediments and suspended solids.

TOXICITY

- Inhalation or contact with octane may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Octane is a Central Nervous System depressant in high concentrations.
- The manifestations of exposure to vapors of octane are giddiness, vertigo, headache, and anesthetic stupor.
- Direct aspiration of paraffins into the lung may cause chemical pneumonitis, pulmonary edema, & hemorrhaging.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	3,500				350
Ontario	61,800 (10-minute)			15,300	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Nonane
CAS No. 111-84-2
C_9H_{20}

WHAT IS NONANE?

Nonane is a colorless liquid with a gasoline-like odor.

USES

Nonane is used in the manufacture of some wallpaper, caulking compounds, floor coverings, chipboard, adhesives, cement flagstone, jointing compounds, floor varnishes and floor waxes.

SOURCES

Nonane is a constituent in the paraffin fraction of crude oil and natural gas. Nonane is released to the environment via the manufacture, use, and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of nonane into the environment from: solvent based building materials, printing pastes, paints, varnishes, adhesives and other coatings; hazardous waste sites, landfills and waste incinerators; vulcanization and extrusion operations during rubber and synthetic production; and the combustion of gasoline, diesel fuels and plastics.

Nonane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to nonane might include:

- Inhalation in the workplace, where nonane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities involved in the manufacture, use or disposal of nonane.

Table 2: Annual Averages of Ambient Levels of Nonane in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.3503	0.3336
Edmonton Central	0.2849	0.4037

Edmonton East	0.6313	0.8911

ENVIRONMENTAL FATE AND BEHAVIOUR

- Nonane is expected to exist almost entirely in the vapor phase in ambient air.
- Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important (estimated half-life of 1.5 days).
- Biodegradation of nonane may occur in soil and water; however, volatilization and adsorption are expected to be far more important environmental fate processes.
- Nonane is relatively immobile in soil and may partition from the water column to organic matter contained in sediments and suspended solids.
- The bioconcentration of nonane may be important in aquatic systems.
- Nonane is expected to volatilize readily from environmental waters.

TOXICITY ASSESSMENT

- Inhalation or dermal contact with nonane may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Nonane is a Central Nervous System depressant in high concentrations.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	10,500				1,050
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Nitrogen oxide
CAS No. 10024-97-2
N_2O

WHAT IS NITROGEN OXIDE?

Nitrogen oxide is a colorless, liquefied gas with a pleasant, slightly sweet odour. Some may react explosively with fuels. It may ignite combustibles such as wood, paper, oil and clothing.

USES

Nitrogen oxide is used to oxidize organic compounds at temperatures above 300^oC; to make nitrites from alkali metals at their boiling points; in rocket fuel formulations (with carbon disulfide); and in the preparation of whipped cream. It is an agent in detection of leaks in natural gas pipelines; a propellant for food aerosols; and a general anesthetic. It has been used experimentally as an effective bactericide.

SOURCES

Nitrogen oxide is produced by the thermal decomposition of ammonium nitrate, and by the controlled reduction of nitrites or nitrates. It is released to the environment via natural and man-made sources. Man-made sources include industrial operations involved in the manufacture, use and disposal of nitrogen oxide.

Nitrogen oxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to nitrogen oxide might include:
- Inhalation of ambient air in proximity to facilities involved in the manufacture, use and disposal of nitrogen oxide.
- Inhalation of air in the workplace where nitrogen oxide is important.

Ambient air concentrations of nitrogen oxide were not reported in 1997 or 1998 in Alberta.

TOXICITY

- Vapours may cause dizziness or asphyxiation without warning.
- Acute exposure to concentrations over 50 ppm reduce dexterity, cognition, and motor and audiovisual skills.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				9,000	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Nitrogen dioxide
CAS No. 10102-44-0
NO_2

WHAT IS NITROGEN DIOXIDE?

Nitrogen dioxide is a red to brown gas above 21.1 deg C, a brown liquid below 21.1 deg C, and a colorless solid at approximately -11 deg C.

USES

Some uses of nitrogen dioxide include the bleaching of flour and the manufacture of oxidized cellulose compounds. It is also used as a chemical intermediate for the production of nitric acid, polymerization inhibitor for acrylates, and oxidizer for rocket fuels.

SOURCES

Atmospheric oxidation of nitric oxide (NO) may lead to the formation of nitrogen dioxide. Other natural sources include forest fires, atmospheric lightning discharges and the biogenic oxidation of nitrogen-containing compounds.

Nitrogen dioxide is a ubiquitous product of combustion, occurring in exhaust from motor vehicles, emissions from the combustion of stationary fuel sources such as coal, oil or natural gas and various industrial sources. Nitrogen dioxide's production and use as an intermediate in the manufacture of nitric acid and as an oxidizing agent may also lead to its release to the environment through various waste streams.

Nitrogen dioxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to nitrogen oxide might include:

- Inhalation and dermal contact at workplaces where nitrogen dioxide is produced or used or where combustion processes are important.
- The general population may be exposed to nitrogen dioxide through the inhalation of ambient air and by smoking tobacco products.

Table 2: Annual Averages of Ambient Levels of Nitrogen Dioxide in Alberta (ppm)

Station	1999	2000
Calgary Central	0.02811	0.02806
Edmonton Central	0.02374	0.02485
Edmonton East	0.01731	0.01835

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to air, nitrogen dioxide will exist solely as a gas in the ambient atmosphere.
- Gas-phase nitrogen dioxide is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals.
- Nitrogen dioxide is expected to undergo direct photolysis in the environment, ultimately leading to the production of ozone and smog conditions in the lower troposphere.
- If released to soil, this compound is expected to decompose to nitric acid in moist soil surfaces. Nitrogen dioxide is expected to volatilize from dry soil surfaces based upon its vapor pressure.
- If released into water, nitrogen dioxide is expected to decompose to nitric acid.

TOXICITY

- Nitrogen dioxide is toxic and may be fatal if inhaled or absorbed through the skin at high concentrations. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Only very high concentrations induce prompt or immediate distress. Usually there are no symptoms at the time of exposure, except perhaps for a slight and transient cough, mild fatigue and brief nausea.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		400		200	60
Texas					
Ontario (Nitrogen oxides as Nitrogen dioxide)		400		200	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Nitric oxide
CAS No. 10102-43-9
NO

WHAT IS NITRIC OXIDE?

Nitric oxide is a colourless gas that appears brown at high concentration in air. It has a sharp, sweet odor.

USES

Nitric oxide is used in the manufacture of nitric acid, the bleaching of rayon, and as a stabilizer for propylene and methyl ether. It is also used to prepare nitrosyl carbonyls and is a component of various medications.

SOURCES

Natural sources of nitric oxide to the environment include the action of microbes on fertilizers and by lightning. Nitric oxide is more abundantly emitted to the environment as a result of the high temperature combustion of coal, natural gas, or oil in power plants and the combustion of gasoline in internal combustion engines. Industrial processes where nitric oxide is made or used play an important role in its emissions.

Nitric oxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Nitric oxide might include:
- Inhalation of emissions from the combustion of fossil fuels.
- Inhalation of gases from industrial processes where nitric oxide is made or used, or from fertilizer or explosive factories.

Nitric Oxide accounts for 6% of atmospheric pollution worldwide.

Table 2: Annual Averages of Ambient Levels of Nitric Oxide in Alberta (ppm).

Station	1999	2000
Calgary Central	0.02870	0.02657
Edmonton Central	0.02193	
Edmonton East	0.01398	

ENVIRONMENTAL FATE AND BEHAVIOUR

- Nitric oxide is converted spontaneously in air to nitrogen dioxide; hence, some of the latter gas is invariably present whenever nitric oxide is found in air.
- Nitric oxide enters into the chemical reactions that lead to formation of photochemical smog.

TOXICITY

- Nitric oxide may be fatal if inhaled or absorbed through the skin at very high concentrations.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Only very concentrated nitrous fumes produce prompt coughing, choking, headache, nausea, abdominal pain, and dyspnea (tightness and burning pain in the chest).
- Chronic exposure via inhalation causes corrosion of teeth.

GUIDELINES

Guidelines are not in place in Alberta, Texas or Ontario. However; nitric oxide is a component of NO_x (nitrogen oxides). Many jurisdictions have guidelines for NO_x.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Nickel
CAS No. 7440-02-0
Ni

WHAT IS NICKEL?

Nickel is a very abundant element. Pure nickel is a hard, silvery-white metal that is combined with other metals to form mixtures called alloys. In the environment, it is found primarily combined with oxygen (oxides) or sulfur (sulfides). Nickel and its compounds have no characteristic odor or taste.

USES

Alloys of nickel are used in the making of metal coins and jewelry and in industry for making metal items. Some of the metals that nickel can be alloyed with are iron, copper, chromium, and zinc. Nickel compounds are also used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions.

SOURCES

Nickel is found in all soils and is emitted from volcanoes. Man-made sources include tailings from mining processes and accidental spills. Nickel is also found in cigarette smoke.

Table 1: National Pollutant Release Inventory 2001 Nickel Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4874	2001	Agrium Products Inc. - Fort Saskatchewan Nitrogen Operations	Fort Saskatchewan	AB	0.15	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2134	2001	Agrium Products Inc. - Redwater Fertilizer Operations	Redwater/Municipal Didtrict of Sturgeon	AB	0.03	0.00	0.00	tonnes
5293	2001	All Brite Metal Finishing Ltd. - Edmonton	Edmonton	AB	0.09	0.00	0.00	tonnes
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	0.84	1.39	0.00	tonnes
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	41.35	1.01	tonnes
6556	2001	BP Canada Chemical Company - Joffre LAO Plant	Red Deer	AB	0.00	0.00	0.00	tonnes
4946	2001	Canam Steel Works - Calgary	Calgary	AB	0.00	0.20	17.40	tonnes
0169	2001	CanAmera Foods - Wainwright - Wainwright Plant	Wainwright	AB	0.00	0.00	30.30	tonnes
4650	2001	Criterion Catalysts & Technologies Canada Inc. - CC&T CI	Medicine Hat	AB	0.20	0.36	96.14	tonnes
5253	2001	Cutler-Hammer - Low Voltage Control Assemblies	Airdrie	AB	0.08	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.19	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.47	33.28	0.00	tonnes
5313	2001	Foothills Steel Foundry Ltd. - Foothills Steel Foundry	Calgary	AB	0.02	0.02	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5202	2001	Maple Leaf Metal Industries Ltd.	Edmonton	AB	0.00	0.00	240.55	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.01	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.03	0.12	1.09	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	12.58	0.00	1.44	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.00	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	2.01	11.14	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.01	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.05	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	1.91	0.00	18.24	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	1.30	0.00	137.32	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	0.02	27.05	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4885	2001	The Westaim Corporation - Fort Saskatchewan Site	Fort Saskatchewan	AB	0.00	0.22	9.78	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.17	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	21.56	0.00	5.39	tonnes
4884	2001	Umicore Canada Inc. - Battery Materials Production	Leduc	AB	0.00	0.45	0.00	tonnes
5368	2001	Umicore Canada Inc. - Cobalt Production Facility	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
				Total	**39.48**	**106.65**	**569.78**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Nickel might include:

- Breathing air or smoking tobacco containing nickel.
- Eating food containing nickel.
- Drinking water which contains small amounts of nickel.
- By handling coins and touching other metals containing nickel.

Ambient air concentrations of nickel were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Small nickel particles in the atmosphere settle to the ground or are taken out of the air in rain.
- Much of the nickel in the environment is found with soil and sediments because nickel attaches to particles that contain iron or manganese, which are often present in soil and sediments.
- Nickel does not appear to concentrate in fish, plants, or animals used for food.

TOXICITY

- Nickel is required to maintain health in animals. A small amount of nickel is probably essential for humans, although a lack of nickel has not been found to affect the health of humans.
- The most common adverse health effect of nickel in humans is an allergic reaction. People can become sensitive to nickel when jewelry or other items containing it are in direct contact with the skin. The most common reaction is a skin rash at the site of contact.
- Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized persons react when they eat nickel in food, drink it in water, or breathe dust containing it.
- Chronic exposure, particularly in industrial workers, may result in lung effects, including chronic bronchitis and reduced lung function.
- The US Department of Health and Human Services (DHHS) has determined that nickel and certain nickel compounds may reasonably be anticipated to be human carcinogens. Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.15				
Ontario				2	

Adapted from:
Nickel ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

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Chemical Fact Sheets

Naphthalene

CAS No. 91-20-3

$C_{10}H_8$

WHAT IS NAPHTHALENE?

Naphthalene is a white solid that has a strong, but not unpleasant, odour.

USES

The major products made from naphthalene are moth repellents. It is used for making dyes, resins, leather tanning agents, and the insecticide Carbaryl.

SOURCES

Naphthalene is found naturally in fossil fuels. Man-made sources include combustion of tobacco, fossil fuels and wood. Naphthalene also enters the environment from industrial uses, from its use as a moth repellent, and from accidental spills.

Table 1: National Pollutant Release Inventory 2001 Napthalene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5357	2001	Cancarb Limited - Cancarb	Medicine Hat	AB	10.64	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.18	0.10	0.00	tonnes
0079	2001	Hercules Canada (BetzDearborn Division) - Edmonton Plant	Edmonton	AB	0.01	0.00	0.03	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.06	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	1.29	0.50	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.36	1.93	0.00	tonnes
2994	2001	Nufarm Agriculture Inc. - Calgary Plant	Calgary	AB	0.10	0.00	0.00	tonnes
4567	2001	Ondeo Nalco Energy Services Canada Inc. - Nisku Blend Plant	Nisku	AB	0.00	0.06	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.45	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.35	0.00	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.00	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
				Total	**13.44**	**2.59**	**0.03**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to naphthalene might include:

- Inhalation of low levels in ambient air.
- Inhalation of air contaminated from industrial discharges or from burning wood or fossil fuels.
- Inhalation of indoor air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- Ingestion of water from contaminated wells.
- Dermal contact with clothing, blankets, or coverlets that are treated with naphthalene.

Table 2: Annual Averages of Ambient Levels of Naphthalene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.3588	
Edmonton Central	0.2935	
Edmonton East	0.1913	

ENVIRONMENTAL FATE AND BEHAVIOUR

- Naphthalene evaporates readily.
- In air, moisture and sunlight break it down, often within 1 day.
- Naphthalene in water is destroyed by bacteria or evaporates into the air.
- Naphthalene adsorbs weakly to soils and sediment.
- It does not accumulate in animals or fish.

TOXICITY

- Exposure to large amounts of naphthalene may damage or destroy red blood cells.
- Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines ($\mu g/m^3$)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	440				
Ontario	50 (10 minute)			22.5	

Adapted from:
Napthalene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Molybdenum
CAS No. 7439-98-7
Mo

WHAT IS MOLYBDENUM?

Molybdenum is a dark gray or black powder with metallic luster or coherent mass of silver white color.

USES

The primary use of molybdenum is as a steel alloy. As such it is utilised in the arms industry, in aeronautical engineering and in the automobile industry. End use applications of molybdenum are: Machinery, 35%; oil and gas industry, 20%; transportation, 15%; chemicals, 15%; electrical, 10%; and other, 5%.

Other uses include: processing molybdenum steel; for use as electrodes; during welding operations; as a chemical reagent for lab analyses; in petroleum refining and chemical processing; and as an intermediate in the manufacture of corrosion inhibitors. Molybdenum is also used: as a coloring agent for enamels and ceramic glazes; in agricultural chemicals; in the electroplating process; in formulation of corrosion inhibitors for aqueous systems; as a pigment for paints, lacquers, and coloring animal fibers and hair; in enamel processes for adherence of vitreous coatings to ceramics and metal; and in leather and skin tanning. It is also used as a chlorination catalyst; in fire retardant resins; as a brazing flux and as an intermediate for organometallic compounds; in photography; ion exchange processes and formulation of plastics and adhesives; as a catalyst in desulfurization of gasoline; and as a reagent for determination of phosphorus and lead.

SOURCES

Primary ore bodies in the Western Hemisphere contain about 0.2-0.4% Molybdenum and give a recovery of 2 to 4 kg per metric ton of ore. Molybdenum does not occur as a native species, but is obtained principally from molybdenite (molybdenum disulfide). Wulfenite lead (molybdate) and powellite are also minor commercial ores. Occurrence of molybdenum in the earth's crust is 1-2 mg/kg, and the world mean of soils is around 2 mg/kg.

Molybdenum was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to molybdenum might include:

- Ingestion of dusts and fumes of molybdenum, its oxides and sulfides, chiefly from electric furnace or other high temperature treatment related to production and fabrication of molybdenum products.

Ambient air concentrations of molybdenum were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Global mobilisation of molybdenum by weathering is: 6×10^6 kg molybdenum (Mo)/year; by rivers: 19×10^6 kg Mo/year; by mining: 76×10^6 kg Mo/year; by combustion (oil and coal): 0.8×10^6 kg Mo/year.
- Terrestrial plants can retain molybdenum.

TOXICITY ASSESSMENT

- High levels of ingested molybdenum may be associated with potential mineral imbalance.
- Anemia is a characteristic feature of molybdenum toxicity.
- In persons with impaired pulmonary function, especially those with obstructive airway diseases, the breathing of insoluble molybdenum compounds might cause exacerbation of symptoms due to their irritant properties.

REGULATIONS

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	50-100				5-10
Ontario				120	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Mirex (hexachlorocyclopentadiene dimer)
CAS No. 2385-85-5
$C_{10}Cl_{12}$

WHAT IS MIREX?

Mirex is a white, odorless crystalline solid. It is chemically similar to Chlordecone.

USES

Mirex has been used worldwide as an insecticide to control fire ants, termites and other insect pests. It has also been used as a flame retardant in plastics, rubber, paint, paper, and electrical goods. It was sold as a flame retardant under the trade name Dechlorane. Mirex has not been manufactured or used in the United States since 1978, and was never registered for use as a pesticide in Canada.

SOURCES

Mirex does not occur naturally in the environment. Sources of Mirex to the environment include emissions from its application as a pesticide and from facilities involved in its manufacture, use and disposal.

Mirex was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Mirex might include:
- Dermal contact with, or ingestion of, contaminated soil near hazardous waste sites.
- Ingestion of contaminated fish or other animals living near hazardous waste sites.
- In the case of infants, exposure may occur via ingestion of contaminated breast milk from mothers living near hazardous waste sites.
- Drinking water or breathing air is not likely to cause exposure because these compounds do not easily dissolve in water or evaporate.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Mirex breaks down slowly in the environment, and may reside for years in soil and water.
- It does not evaporate to any great extent from surface water or surface soil.
- Mirex does not dissolve easily in water, but easily adsorbs to soil and sediment particles.
- It is not likely to leach through soil and is therefore seldom found in groundwater.

TOXICITY

- The US Department of Health and Human Services (DHHS) has determined that Mirex may reasonably be anticipated to be a human carcinogen.

GUIDELINES

Guidelines are not in place in Alberta, Texas or Ontario.

Adapted from:
Mirex and Chlordecone ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Methylene diphenyl diisocyanate
CAS No. 101-68-8
$C_{15}H_{10}N_2O_2$

WHAT IS METHYLENE DIPHENYL DIISOCYANATE?

Methylene diphenyl diisocyanate is a colorless gas (or a liquid below 38 degrees F). It has a sweet, chloroform-like odor at high concentrations, but it is normally odorless. It is also known as methylenebis(phenylisocyanate).

USES

Methylene diphenyl diisocyanate is used for bonding rubber to rayon and nylon, and as a chemical intermediate for polyurethane coatings, elastomers, thermoplastic resins, spandex fibers and millable gums.

SOURCES

Methylene diphenyl diisocyanate is not known to exist as a natural product. It can be released to the environment in waste stream emissions from sites of industrial manufacture and use. It is also present in the environment as a result of emissions from manufacturers of metalworking machinery, household furniture, pipe coatings, building materials and electronic components. Emissions may occur from spills during transport of methylene diphenyl diisocyanate.

Table 1: National Pollutant Release Inventory 2001 Methylene Diphenyl Diisocyanate Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3269	2001	Agrium Inc - Carseland Nitrogen Operations	Carseland	AB	0.00	0.04	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2183	2001	BRENNTAG CANADA INC. (AS55) - LEDUC (AS55)	LEDUC	AB	0.00	0.00	0.00	tonnes
5384	2001	Garneau Inc.	Camrose	AB	0.00	0.00	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	13.94	0.00	tonnes
4002	2001	Shaw Pipe Protection Limited	Edmonton	AB	0.00	0.00	0.00	tonnes
4006	2001	Shaw Pipe Protection Limited	Calgary	AB	0.00	0.00	0.00	tonnes
6518	2001	Shaw Pipe Protection Limited	Edmonton	AB	0.00	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	9.77	0.00	tonnes
5280	2001	Steel-Craft Door Products Ltd. - Main Plant - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	3.65	0.00	tonnes
				Total	**0.00**	**27.40**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methylene diphenyl diisocyanate might include:
- Inhalation of vapors and aerosols containing it in the workplace.
- Dermal contact in the workplace.

Ambient air concentrations of methylene diphenyl diisocyanate were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the atmosphere methylene diphenyl diisocyanate will degrade by reaction with hydroxyl radicals formed in the presence of sunlight (with a half-life of approximately 32 hours). The presence of water vapour may increase the atmospheric degradation rate by several times.
- It reacts with water readily and, if spilled into water or moist soil, will form a crust of non-reactive material that does not dissolve in water. This crust will increase the length of time that it remains in the environment.
- It will not leach through soil because of its reaction with water.
- It hydrolyses in solutions containing water, therefore it will not accumulate in the bodies of organisms.

TOXICITY

- Methylene diphenyl diisocyanate is toxic by inhalation, ingestion or dermal contact with vapours or dust.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		0.51			
Texas					
Ontario				1	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Methylene chloride
CAS No. 75-09-2
CH_2Cl_2

WHAT IS METHYLENE CHLORIDE?

Methylene chloride is a colorless liquid with a mild, sweet odor. Another name for it is dichloromethane.

USES

Methylene chloride is widely used as a solvent in paint strippers, as a propellant in aerosols, and as a process solvent in the manufacturing of drugs. It is also used as a metal cleaning and finishing solvent. Methylene chloride is often added to aerosol sprays and used to extract unwanted material from foods and beverages, such as coffee.

SOURCES

- Methylene chloride does not occur naturally in the environment. It is made from methane gas or wood alcohol. Methylene chloride is found in the environment as a result of its manufacture, use and disposal from the above-noted industrial processes. Most direct releases of methylene chloride to the environment are to the atmosphere.

Table 1: National Pollutant Release Inventory 2001 Methylene Chloride Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0152	2001	Carpenter Canada Co. - Calgary Division	Calgary	AB	194.00	0.00	0.50	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.16	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4561	2001	Newalta Corporation - Raymond Solvent Recycling & Fuel Blend	Raymond	AB	0.18	0.10	3.95	tonnes
4720	2001	Raylo Chemicals Inc. - Argyll Road Site	Edmonton	AB	1.81	0.00	120.00	tonnes
5245	2001	Raylo Chemicals Inc. - Clover Bar Site	Edmonton	AB	0.18	0.00	11.61	tonnes
4553	2001	Vitafoam Products Canada Ltd - Calgary facility	Calgary	AB	69.75	0.00	2.86	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.00	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.58	0.00	0.00	tonnes
				Total	**266.66**	**0.10**	**138.91**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methylene chloride might include:

- Inhalation of contaminated air in the workplace, where methylene chloride is manufactured, used or disposed of.
- Inhalation of ambient air or ingestion of contaminated water near facilities involved in the manufacture, use or disposal of methylene chloride.
- Inhalation resulting from use of certain aerosol spray paints and paint strippers.

Table 2: Annual Averages of Ambient Levels of Methylene chloride in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.5529	0.5155
Edmonton Central	0.5529	0.5155
Edmonton East	0.4771	0.6686

ENVIRONMENTAL FATE AND BEHAVIOUR

- Methylene chloride evaporates when exposed to air. Once in air, it is expected to break down to other chemicals.
- It doesn't stick to soil particles or dissolve in water, so it moves from both soil and water to air.
- Because it is a liquid that does not bind well to soil, methylene chloride can readily move through the ground and enter groundwater.
- Plants and animals are not likely to store methylene chloride.
- Soil and water organisms break it down to simpler compounds.

TOXICITY

- Effects of methylene chloride on human health and the environment depend on how much methylene chloride is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.
- Acute exposure to methylene chloride affects the human nervous system and the heart. Effects range from unsteadiness and numbness in fingers and toes to unconsciousness and death.
- Dermal contact with high concentrations of methylene chloride liquid or vapor may cause irritation of the skin and eyes.
- The US Department of Health and Human Services (DHHS) has determined that methylene chloride may reasonably be anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	260				26
Ontario				220	44

Adapted from:
Methylene chloride OPPT Chemical Fact Sheets. United States Environmental Protection Agency. http://www.epa.gov/docs/chemfact.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Methyl chloroform
CAS No. 71-55-6
$C_2H_3Cl_3$

WHAT IS METHYL CHLOROFORM?

Methyl chloroform is a colorless liquid with a sharp, sweet odor. Although it is usually found as a liquid, it evaporates quickly and becomes a vapor. It is also known as 1,1,1-trichloroethane, methyl trichloromethane and trichloromethylmethane.

USES

Methyl chloroform is used in the manufacture of certain glues, paints, industrial degreasers and aerosol sprays.

SOURCES

Methyl chloroform does not occur naturally in the environment. It is found in the environment as a result of the manufacture, use or disposal of glue, paint, industrial degreasers, and aerosol sprays, in which it is a constituent.

Methyl chloroform was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methyl chloroform may include:
- Inhalation of indoor air contaminated as a result of off-gassing from building materials.
- Inhalation of contaminated air in the workplace while using cleaning products, aerosol sprays, paint, and metal degreasing agents.
- Ingesting contaminated drinking water and food.
- Dermal contact with liquids containing methyl chloroform.

Table 2: Annual Averages of Ambient Levels of Methyl Chloroform in Alberta (μg/m^3)

Station	1997	1998
Calgary Central	0.6351	0.4994
Edmonton Central	0.6531	0.4993
Edmonton East	0.5929	0.4520

ENVIRONMENTAL FATE AND BEHAVIOUR

- Most methyl chloroform released into the environment is evaporated into the air, where it has a residence time of approximately 6 years.
- It may aid in the depletion of stratospheric ozone.
- Contaminated water from hazardous waste sites may also contaminate surrounding soil and nearby surface or groundwater.
- Most of the methyl chloroform in surface waters evaporates quickly into the air.
- Water can carry methyl chloroform through the soil and into the groundwater where it can evaporate and pass through the soil as a gas, then be released to the air.
- Organisms living in soil or water may break down methyl chloroform.

TOXICITY

- Acute exposure to methyl chloroform via inhalation may cause dizziness, light-headedness, and loss of balance.
- Breathing much higher levels may cause unconsciousness, low blood pressure, and loss of heartbeat.
- Dermal contact may cause irritation.
- No information is available to show that Methyl chloroform causes cancer.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	19,100				1,910
Ontario				115,000	

Adapted from:
Methyl Chloroform OPPT Chemical Fact Sheets. United States Environmental Protection Agency. http://www.epa.gov/docs/chemfact.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Methyl chloride
CAS No. 74-87-3
CH_3Cl

WHAT IS METHYL CHLORIDE?

Methyl chloride is a colorless gas that compresses to a colorless liquid with a faint, sweet odor.

USES

Methyl chloride is primarily used to produce silicone resins and rubbers. It may be also be used as an aerosol propellant, a foaming agent in the plastics industry, as a refrigerant, and a solvent for extracting oils, fats and resins.

SOURCES

Methyl chloride is produced naturally in the oceans by mechanisms that are not entirely understood. One source is believed to be the reaction of biologically produced methyl iodide with chloride ions. Other significant natural sources include forest and brush fires and volcanoes.

Man-made sources of methyl chloride arise from its production and use in the manufacture of silicones and other chemicals, and as a solvent and propellant.

No releases of Methyl chloride were reported to the NPRI for Alberta in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methyl chloride might include:
- Inhalation of ambient air.

Table 2: Annual Averages of Ambient Levels of methyl chloride in Alberta (µg/m^3).

Station	1997	1998
Calgary Central	1.0137	1.0933
Edmonton Central	1.0520	1.0612
Edmonton East	1.0143	1.0331

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released into water, methyl chloride will be rapidly lost by volatilization (half-life in a typical river is approximately 2.1 hours).
- Methyl chloride will be rapidly lost from soil by volatilization; however, there is a potential for it to leach into groundwater where it may very slowly biodegrade and hydrolyze (half-life may exceed a year).
- In the troposphere it will be lost primarily by upward dispersion, although washout by rain may also be important.
- Above the tropopause, reaction with hydroxyl radicals aids in the removal of methyl chloride. Above 30 km, photodissociation, diffusion and reaction with hydroxyl radicals make roughly equal contributions to its removal.

Table 2: Annual Averages of Ambient Levels of Methyl Chloride in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	1.1349	1.1867
Edmonton Central	1.1788	1.1927
Edmonton East	1.1156	1.1630

TOXICITY

- Vapors may cause dizziness or asphyxiation without warning.
- Contact with gas or liquefied gas may cause burns, severe injury or frostbite.
- Acute exposure may result in dizziness, drowsiness, poor motor coordination, confusion, nausea, vomiting, abdominal pains, hiccoughs, delerium, convulsions or coma. Death may be immediate with acute nephritis.
- Chronic exposure may lead to fatigue, loss of appetite, muscular weakness or drowsiness.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1,030				103
Ontario				7,000	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Methyl bromide
CAS No. 74-83-9
CH_3Br

WHAT IS METHYL BROMIDE?

Methyl bromide is a colorless gas that is usually odorless. At high concentrations it may have a chloroform-like odor.

USES

Methyl bromide is used as a soil and space fumigant.

SOURCES

The primary source of methyl bromide in the environment is ocean water, within which it exists as a salt. Releases to the environment also result from the use of methyl bromide as a soil and space fumigant and its occurrence in automobile exhaust.

No releases of methyl bromide were reported to the NPRI for Alberta in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methyl bromide might include:

- Inhalation of contaminated ambient or occupational air.
- Inhalation of ambient air near sites where methyl bromide is used as a fumigant for soil, grain, or other commodities.
- Inhalation of gas that occurs from its use as a solvent, methylating agent or extracting agent.

Table 2: Annual Averages of Ambient Levels of Methyl Bromide in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.1431	0.1433
Edmonton Central	0.1362	0.1500
Edmonton East	0.1463	0.1463

ENVIRONMENTAL FATE AND BEHAVIOUR

- Methyl bromide released to soil is expected to be lost primarily by volatilisation.
- Methyl bromide can be trapped in soil micropores following application to soil.
- Methyl bromide in soil may be broken down by soil organisms or chemical reaction.
- It is not expected to accumulate significantly in organisms.
- In the atmosphere it reacts with hydroxyl radicals created in the presence of sunlight with a half-life of 0.29 yr to 1.6 yr. In the stratosphere it may be broken down by reaction with sunlight.
- Methyl bromide is expected to aid in the depletion of stratospheric ozone.

TOXICITY

- Effects of methyl bromide on human health and the environment depend on the quantity present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.
- Methyl bromide is toxic by inhalation, ingestion, and dermal absorption.
- Chronic exposure can cause central nervous system depression or kidney injury.
- It may cause contact burns to the skin and eyes, dizziness, headache, nausea, respiratory irritation, ventricular fibrilation, pulmonary edema (sometimes delayed 4-5 days), convulsions, frostbite, coma, and death at certain concentrations.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	190				19
Ontario				1350	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Methane
CAS No. 74-82-8
CH_4

WHAT IS METHANE?

Methane is a colorless gas with a weak odor. It is non-poisonous and a simple asphyxiant. Methane is a highly volatile constituent of crude oil and natural gas.

USES

There are no known industrial uses for methane.

SOURCES

The major sources of methane are biological in origin. Two important natural sources include the rumen of domestic animals, especially of cattle, and the emission of methane during the growing of rice.

Methane is also released to the environment via the manufacture, use, and disposal of many products associated with the petroleum and gasoline industries. Methane may be released to the environment as emissions from coal outgassing, combustion and liquefaction. Data show releases of methane into the environment from hazardous waste disposal sites, landfills and waste incinerators; and the combustion of gasoline and diesel fueled engines.

Methane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to methane might include:
- Inhalation of ambient air containing methane, particularly in close proximity to facilities involved in the above-noted activities.

Ambient air concentrations of methane were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Methane adsorbs strongly to soil, and therefore has low mobility with water in soil.
- Biodegradation and adsorption of methane may occur in soil and water; however, volatilization is expected to be a far more important environmental fate process in water.
- Methane is expected to exist entirely in the vapor phase in the ambient atmosphere. Reaction with hydroxyl radicals is the major sink for methane (half life of 1,908 days).
- Methane is not likely to undergo direct photolysis in the environment.

TOXICITY

- Vapors may cause dizziness or asphyxiation without warning. Some may be irritating if inhaled at high concentrations.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Mercury
CAS No. 7439-97-6
Hg

WHAT IS MERCURY?

Mercury is a metal that has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

USES

Metallic mercury is used to produce chlorine gas and caustic soda and also used in thermometers, dental fillings, and batteries. Mercury salts are used in skin-lightening creams and as antiseptic creams and ointments.

SOURCES

Mercury is a naturally occurring metal that combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by small organisms in the water and soil. More mercury in the environment can increase the levels of methylmercury that these small organisms produce.

Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants. It enters the water or soil from natural deposits, volcanic activity and disposal of wastes.

Table 1: National Pollutant Release Inventory 2001 Mercury Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2134	2001	Agrium Products Inc. - Redwater Fertilizer Operations	Redwater/Municipal Didtrict of Sturgeon	AB	0.09	0.02	0.00	kg

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	15.39	14.50	0.05	kg
0126	2001	AT Plastics Inc. - Edmonton Site	Edmonton	AB	0.00	20.00	40.00	kg
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	111.52	27.04	2.36	kg
1039	2001	ATCO Power - H.R.Milner Generating Station	Grande Cache	AB	5.69	13.28	0.15	kg
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	0.00	0.00	19.00	kg
5308	2001	City of Calgary Wastewater - Bonnybrook Wastewater Treatment	Calgary	AB	18.54	41.15	0.00	kg
5309	2001	City of Calgary Wastewater - Fish Creek Wastewater Treatment	Calgary	AB	2.04	7.19	0.00	kg
5307	2001	City of Calgary Wastewater - Shepard Lagoons - CALGRO	Calgary	AB	0.00	48.34	0.00	kg
6513	2001	City of Edmonton - Edmonton Co-composter Facility	Edmonton	AB	0.00	20.40	0.00	kg
5390	2001	City of Edmonton - Gold Bar Wastewater Treatment Plant	Edmonton	AB	0.00	26.10	0.00	kg
5208	2001	Custom Evironmental Services Ltd - Edmonton Waste Brokerage	Edmonton	AB	0.00	274.80	0.00	kg

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	11.15	0.00	0.00	kg
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	30.00	162.00	0.00	kg
5367	2001	GenAlta Recycling Inc.	Edmonton	AB	0.00	16.00	0.00	kg
2998	2001	Goodyear Canada Inc. - Medicine Hat plant	Medicine Hat	AB	0.00	15.00	0.00	kg
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	5.51	0.00	0.00	kg
5243	2001	Inland Cement Limited - Edmonton Plant	Edmonton	AB	8.67	0.00	0.00	kg
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	5.73	0.00	0.00	kg
1782	2001	Methanex Corporation - Medicine Hat Plant	Medicine Hat	AB	0.00	0.00	0.00	kg
3775	2001	Navajo Metals	Calgary	AB	0.00	32.00	0.00	kg
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	1.24	0.00	kg
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.58	0.07	0.00	kg
4871	2001	Safety-Kleen Ltd. - Ryley Facility	Ryley	AB	0.83	0.10	22.32	kg
1042	2001	Sensor Environmental Services Ltd - Swan Hills Treatment Cen	Swan Hills	AB	38.90	0.00	0.00	kg
1036	2001	Sheerness Generating Station	Hanna	AB	95.37	0.00	2.90	kg

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.47	0.00	0.00	kg
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.13	0.00	kg
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	5.88	43.13	0.00	kg
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	18.63	275.00	0.00	kg
4822	2001	Titan Foundry	Edmonton	AB	0.00	9.08	0.00	kg
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	235.87	0.00	0.00	kg
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	364.95	0.00	27.44	kg
2282	2001	TransAlta Corporation - Wabamun Thermal Generating Plant	Wabamun	AB	115.28	0.00	2.74	kg
5273	2001	WasteCo Environmental Services Ltd. - Edmonton Transfer Stat	Sherwood Park	AB	0.00	105.00	130.00	kg
				Total	**1091.09**	**1151.58**	**246.96**	**kg**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Mercury might include:

- Eating fish or shellfish contaminated with methylmercury.
- Inhalation of vapors from spills, incinerators, and industries that burn mercury-containing fuels.
- Release of mercury from dental work and medical treatments.

- Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).

Ambient air concentrations of mercury were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Methylmercury may be formed in water and soil by bacteria.
- Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

TOXICITY

- The nervous system is very sensitive to all forms of mercury. Methylmercury and metal vapors are the most harmful forms, because more mercury reaches the brain.
- Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.
- Acute exposure to metallic mercury vapors may cause lung damage, nausea, vomiting, diarrhea, increased blood pressure or heart rate, skin rashes, and eye irritation.
- Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and can pass to a nursing infant through breast milk.
- Effects of mercury on the developing fetus may include brain damage, mental retardation, incoordination, blindness, seizures, and an inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems and kidney damage.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.5				0.05
Ontario				2	

Mercury ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Mercaptan
CAS No. 75-08-1
C_2H_6S

WHAT IS MERCAPTAN?

Mercaptan (or ethyl mercaptan) is a colorless liquid at low ambient temperature and a gas above 95 degrees. It has a strong, pungent odor.

USES

There is no commercial production or known use for mercaptan.

SOURCES

Mercaptan occurs naturally in some vegetables (such as cabbage), mammalian excretion products, manure gas from domestic animal pens, in various crude oils and in natural gas. It is formed naturally by biological processes. Anthropogenic sources of environmental release include emissions from petroleum manufacture, waste treatment and pulp mills.

Mercaptan was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to mercaptan might include:

- Occupational exposure through dermal contact (both vapor and liquid) and inhalation of vapor.
- The general population is exposed through inhalation and ingestion.

Ambient air concentrations of mercaptan were not recorded in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the atmosphere, mercaptan will exist primarily in the vapor phase where it will degrade readily by reaction with photochemically-produced hydroxyl radicals (estimated half-life of 8 hours) and night-time nitrate radicals (estimated half-life of 1 hr).

- If released to surface water, volatilization may be important.
- If released to soil, mercaptan may be transported by leaching, gas penetration, and surface evaporation.
- Insufficient data are available to assess the relative importance of biodegradation in soil or water.

TOXICITY

- Mercaptan may be a Central Nervous System (CNS) depressant in high concentrations and can be irritating to mucous membranes. It is toxic by ingestion and inhalation.
- Inhalation or contact with material may irritate or burn skin and eyes. Vapors may cause dizziness or suffocation.
- Fire will produce irritating, corrosive and/or toxic gases.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.8				
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Mecoprop (2-(2-Methyl-4-chlorophenoxy) propionic acid)

CAS No. 93-65-2

$C_{10}H_{11}ClO_3$

WHAT IS MECOPROP?

Mecoprop (MCPP) is a colorless, odorless crystal.

USES

Mecoprop is a selective herbicide for post-emergence control of broad-leaved weeds in wheat, barley, oats, herbage seed crops and turf.

SOURCES

There are no natural sources of mecoprop to the environment. Mecoprop will be released to the environment as a result of its use as a selective post-emergence herbicide for control of broad leaf weeds on cereals, grass-seed crops, apples, pears and turf. It may also be released as a result of its manufacture, formulation, transport, storage, and disposal.

Mecoprop was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to mecoprop might include:

- Occupational exposure via dermal contact with the herbicide and treated surfaces.
- Inhalation and ingestion of spray droplets.
- Ingestion of contaminated drinking water or dermal contact with contaminated surface water.

Ambient air concentrations of mecoprop were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Mecoprop readily biodegrades in soil; reported half-lives generally range from 3 to 21 days.

- Mecroprop is a weak acid and will exist in the anionic form in water. If released into water, it is not expected to adsorb to sediment or particulate matter in the water column, or be lost through volatilization.
- It biodegrades in soil and groundwater and would therefore be expected to biodegrade in surface water. Its estimated bioconcentration potential is moderate.
- Mecoprop will be released to the atmosphere as an aerosol during spraying applications and will be removed from the air by gravitational settling. Any mecoprop in the vapor phase will react with photochemically-produced hydroxyl radicals, with a half-life of 22 hours.

TOXICITY

- Mecoprop may be fatal if inhaled, ingested or absorbed through skin. Inhalation or dermal contact may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Manganese
CAS No. 7439-96-5
Mn

WHAT IS MANGANESE?

Manganese is a gray-pink metal.

USES

Manganese is used in the manufacture of ceramics, matches, glass, dyes and welding rods. It is a component of steel, steel alloys, cast iron, superalloys & nonferrous alloys, as well as a chemical intermediate for high purity salts. Manganese is used as a purifying & scavenging agent in metal production.

SOURCES

Manganese is a naturally occurring substance found in many types of rock; it is ubiquitous in the environment and found in low levels in water air, soil, and food. It is commonly found in the environment as a result of its use in the manufacture of the above-noted materials.

Table 1: National Pollutant Release Inventory 2001 Manganese Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5228	2001	ADM Agri-Industries Ltd. - ADM Animal Health & Nutrition - L	Lethbridge	AB	0.00	0.05	0.00	tonnes
0001	2001	Alberta Pacific Forest Industries Inc.	Boyle	AB	12.96	0.00	0.00	tonnes
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	50.72	154.16	0.00	tonnes
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	124.98	5.78	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1039	2001	ATCO Power - H.R.Milner Generating Station	Grande Cache	AB	0.00	14.07	0.00	tonnes
4946	2001	Canam Steel Works - Calgary	Calgary	AB	0.00	0.20	18.20	tonnes
5390	2001	City of Edmonton - Gold Bar Wastewater Treatment Plant	Edmonton	AB	6.14	7.53	0.00	tonnes
0557	2001	Crown Cork & Seal Canada Inc. - Crown Cork & Seal Canada Inc	Calgary	AB	0.00	0.33	0.00	tonnes
5253	2001	Cutler-Hammer - Low Voltage Control Assemblies	Airdrie	AB	0.16	0.00	0.00	tonnes
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	16.44	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.05	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.59	300.12	0.00	tonnes
5313	2001	Foothills Steel Foundry Ltd. - Foothills Steel Foundry	Calgary	AB	0.30	0.30	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	0.05	0.00	0.00	tonnes
2446	2001	I-XL Industries Ltd. - Medicine Hat Brick & Tile Plant	Medicine Hat	AB	0.10	0.02	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.05	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.00	0.00	0.00	tonnes
5682	2001	Russel Metals Inc - Russel Metals	Calgary	AB	0.07	0.03	4.86	tonnes
5283	2001	Russel Metals Inc. - 99 Street Plant	Edmonton	AB	17.00	0.00	0.00	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	305.91	0.00	34.09	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.44	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	4.56	0.00	tonnes
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	94.36	0.00	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	211.57	0.00	52.37	tonnes
2282	2001	TransAlta Corporation - Wabamun Thermal Generating Plant	Wabamun	AB	62.04	0.00	44.77	tonnes
5319	2001	Unifeed Limited - Unifeed Mill - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
5241	2001	Unifeed Limited - Unifeed Mill - Lethbridge	Lethbridge	AB	0.00	0.00	0.00	tonnes
5318	2001	Unifeed Limited - Unifeed Mill - Olds, AB	Olds	AB	0.00	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	39.19	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	44.50	0.00	0.00	tonnes
				Total	**862.15**	**606.84**	**160.07**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to manganese might include:

- Inhaling it in ambient air, particularly near industries involved in the manufacture of manganese-containing materials. Occupational exposure via inhalation is most common.

Ambient air concentrations of manganese were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Manganese, as an aerosol, may dissolve upon contact with water on a time scale of a few minutes.

TOXICITY

- Manganese is an element considered essential to human health.
- Inhalation of manganese compounds in aerosols or fine dusts may cause "metal fume fever”.
- Early symptoms of chronic manganese poisoning may include languor, sleepiness and weakness in the legs. Emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are common in more advanced cases.
- Chronic manganese poisoning is not a fatal disease.
- Chronic manganese poisoning following chronic exposure to manganese through inhalation for periods of from 6 months to 2 years results in "manganism", a disease of the central nervous system involving neurological disorders. It is reversible if recognized early and exposure is eliminated.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	10-fume				1-fume
Ontario				2.5	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Lindane (1,2,3,4,5,6-hexachlorocyclohexane)
CAS No. 58-89-9
$C_6H_6Cl_6$

WHAT IS LINDANE?

Lindane is a white, crystalline solid with a slight musty odor.

USES

Lindane is used as a seed treatment insecticide (usually mixed with fungicides) for control of a broad spectrum of phytophagous and soil-inhabiting insects. Lindane has been used to a lesser extent for public-health pests and animal ectoparasites.

SOURCES

Lindane's production and use as an insecticide results in its single greatest direct release to the environment. There are no natural sources of lindane to the environment.

Lindane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to lindane might include:
- Occupational exposure through inhalation of dust particles and dermal contact during or after its application, or at workplaces where Lindane is produced.
- Inhalation of ambient air, ingestion of contaminated food and drinking water, or dermal contact with medicinal products (scabicides, pediculicides, ectoparasiticides) containing this insecticide.
- Infants may be exposed to lindane via ingestion of contaminated breast milk.

Ambient air concentrations of lindane were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to air, lindane will exist in both the vapor and particulate phases in the ambient atmosphere.
- Vapor-phase lindane will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals.
- Particulate-phase lindane will be removed from the atmosphere by wet and dry deposition.
- If released to soil, lindane is expected to have very low mobility.
- Volatilization from moist soil surfaces may be an important fate process.
- Lindane is expected to be biodegraded in soil under anaerobic conditions.
- If released into water, lindane is expected to adsorb to suspended solids and sediment in the water column.
- Volatilization from water surfaces may be an important fate process.

TOXICITY

- Lindane is highly toxic. It may be fatal if inhaled, swallowed or absorbed through the skin. Avoid any skin contact.
- Chronic exposure to vapours of lindane has resulted in fatal aplastic anemia and other hematologic disorders.
- The US Department of Health and Human Services has determined that lindane may reasonably be anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				5	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Lead
CAS No. 7439-92-1
Pb

WHAT IS LEAD?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no special taste or smell.

USES

Lead has many different uses, most importantly in the production of batteries. Lead is also in ammunition, metal products (solder and pipes), roofing, and devices to shield x-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

SOURCES

Lead can be found in all parts of our environment. Most of it comes from human activities like mining, manufacturing, and the burning of fossil fuels.

Table 1: National Pollutant Release Inventory 2001 Lead Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	14.29	44.32	0.00	tonnes
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	22.50	1.88	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.03	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.12	29.20	0.00	tonnes
5367	2001	GenAlta Recycling Inc.	Edmonton	AB	0.00	20.60	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	0.20	0.00	0.00	tonnes
5202	2001	Maple Leaf Metal Industries Ltd.	Edmonton	AB	0.00	0.00	54.55	tonnes
3775	2001	Navajo Metals	Calgary	AB	0.00	41.10	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
4871	2001	Safety-Kleen Ltd. - Ryley Facility	Ryley	AB	118.50	0.00	6.96	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	11.07	0.00	1.57	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	0.00	0.01	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	5.00	0.00	tonnes
0530	2001	Spectra Premium Industries - SPI Heat Transfer Division	Calgary	AB	0.00	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4822	2001	Titan Foundry	Edmonton	AB	0.00	4.77	0.00	tonnes
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	12.38	0.00	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	34.64	0.00	9.73	tonnes
				Total	**191.23**	**167.50**	**74.70**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Lead might include:

- Breathing workplace air in lead smelting, refining, and manufacturing industries.
- Breathing fumes or ingesting lead from hobbies that use lead (leaded-glass, ceramics).
- Breathing or ingesting contaminated soil, dust, air, or water near waste sites.
- Breathing tobacco smoke.
- Ingesting water that comes from lead pipes or lead soldered fittings.
- Ingesting contaminated food grown on soil containing lead, or food covered with lead-containing dust.
- Ingesting lead-based paint chips.

Ambient air concentrations of lead were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Lead itself does not break down, but compounds of lead are changed by sunlight, air, and water.
- When released from industry or burning of fossil fuels or waste, residence time in the atmosphere is approximately 10 days.
- Most of the lead in soil comes from particles settling out of the air.
- Urban soils also contain lead from landfills and leaded paint.
- Lead adsorbs to soil particles.
- It does not move readily from soil to underground water or surface water unless the water is acidic or "soft".

TOXICITY

- Lead can affect almost every organ and system in one's body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system. The effects are the same whether lead is inhaled or ingested.
- Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children.
- In adults, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can cause abortion and damage the male reproductive system.
- The US Department of Health and Human Services (DHHS) has determined that lead acetate and lead phosphate may reasonably be anticipated to be human carcinogens.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		1.5			
Texas					
Ontario				2	(0.7 per 30d + 0.1 g/m^2 per 30d)

Adapted from:
Lead ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Isocyanates
CAS No. 71000-82-3

WHAT ARE ISOCYANATES?

Isocyanates are a group of chemicals that are volatile at room temperature and which historically have had widespread industrial applications. The most common isocyanates in use are toluene diisocyanate (TDI), hexamethylene diisocyanate (HDI), biuret-modified HDI (HDI-BT), and methane diphenyl diisocyanate (MDI).

USES

Isocyanates are most commonly used in spray-paints and polyurethane coatings.

SOURCES

Isocyanates may be released due to the application of polyurethane coatings or use of spray paints.

Table 1: National Pollutant Release Inventory 2000 Diisocyanates (mixed isomers) Emissions (tonnes/year)

Facility Name	City	On-Site Releases	Transfers for Disposal	Transfers for Recycling
Carpenter Canada Co. - Calgary Division	Calgary	0.01	0.00	0.00
Vitafoam Products Canada Ltd. - Calgary Facility	Calgary	0.06	0.00	0.00
	Total	**0.07**	**0.00**	**0.00**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to isocyanates might include:

- Inhalation of air near a source where isocyanates are being manufactured, used or disposed of.

- Dermal contact with isocyanates.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In the atmosphere, hexamethylene diisocyanate is degraded upon reaction with photochemically produced hydroxyl radicals. The half-life in the atmosphere is 2 days. Atmospheric degradation may also occur through contact with water vapor, clouds, fog or rain.
- Hexamethylene diisocyanate reacts readily with water to form amines and polyureas.

TOXICITY

- Acute exposure to isocyanates via inhalation can produce eye irritation, moderate skin sensitization and inflammation of the lungs, respiratory edema, and chemical bronchitis.
- Even at low levels, isocyanates can cause respiratory sensitization capable of producing an early or late asthmatic response and nonspecific airway diseases, including chronic pneumonitis.
- The US Department of Health and Human Services has determined that toluene diisocyanate can reasonably be anticipated to be a human carcinogen. The carcinogenicity of other isocyanates is unknown.

GUIDELINES

Table 3a: Current Ambient Air Quality Regulations (for MDI)

Jurisdiction	**Standards (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		0.51			
Texas					
Ontario				1	

Table 3b: Current Ambient Air Quality Regulations (for HDI)

Jurisdiction	**Standards (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				0.5*,1**	

*monomer
**trimer

Table 3c: Current Ambient Air Quality Regulations (for TDI)

Jurisdiction	**Standards (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.36				0.036
Ontario				0.5	

Adapted from:
American College of Occupational and Environmental Medicine. *Exposure to Isocyanates and Organic Solvents, and Pulmonary-Function Changes in Workers in a Polyurethane Molding Process.* JEOM Volume 38, Number 12, December 1996.

Alberta Environment June 2001
Science and Technology Branch

Chemical Fact Sheets

Iron
CAS No. 7439-89-6
Fe

WHAT IS IRON ?

Iron is a silvery-white or gray, soft, ductile, malleable metal that occurs naturally.

USES

Iron is used in the manufacture of iron and steel castings (pig iron); of alloys with carbon, chromium, & other metals; and as a material to increase density of oil well drilling fluids. It is also used in tracer studies and was previously used in biological studies and as a catalyst.

SOURCES

Iron is the 2nd most abundant metal in earth's crust after aluminum, at about 5%. Earth's core is believed to consist mainly of iron. Important ores include hematite (Fe_2O_3), magnetite (Fe_3O_4), limonite [$FeO(OH).xH_2O$] & siderite ($FeCO_3$).

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to iron might include:

- Mining & handling of iron ores, which result in exposure to dusts of iron oxides.
- Ingestion of naturally occurring levels in foods.
- Intake of supplements.

TOXICITY

- Metallic iron foreign bodies in the cornea produce "rust ring" of yellow-brown staining. This phenomena is often associated with eye irritation and hyperemia of the conjunctiva.
- Long-term inhalation results in mottling of the lungs, a condition referred to as siderosis. This condition does not ordinarily cause significant physiologic impairment.

- Excessive consumption may cause lethargy, vomiting, diarrhea, hyperglycemia and leukocytosis. Extreme cases may result in stupor, acidosis, hematemesis, shock and coma.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario (metallic)				4	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Hydrogen sulfide
CAS No. 7783-06-4
H_2S

WHAT IS HYDROGEN SULFIDE?

Hydrogen sulfide is a colorless gas with a strong odor of rotten eggs.

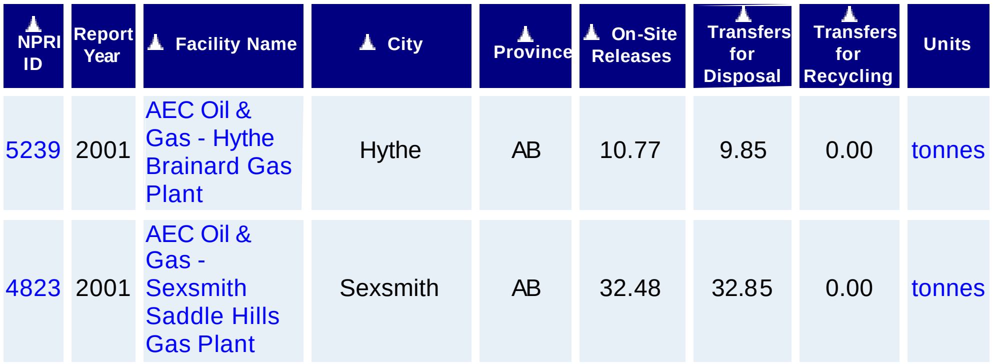
USES

Hydrogen sulfide is used in the production of elemental sulfur and sulfuric acid, as well as in the manufacture of heavy water and other chemicals. In addition, it is used as a disinfectant, as an additives in extreme pressure lubricants and cutting oils, and as an analytical reagent.

SOURCES

Natural sources of hydrogen sulfide include sulfur springs, volcanic gas and natural gas. Industrial sources include: emissions from industrial paper plants; combustion of coal, fuel oil and natural gas (including gas flares); and emissions from sewers and waste treatment facilities. Cigarette smoke is also a source of hydrogen sulfide.

Table 1: National Pollutant Release Inventory 2000 Hydrogen sulfide Emissions (tonnes/year)



NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5239	2001	AEC Oil & Gas - Hythe Brainard Gas Plant	Hythe	AB	10.77	9.85	0.00	tonnes
4823	2001	AEC Oil & Gas - Sexsmith Saddle Hills Gas Plant	Sexsmith	AB	32.48	32.85	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	1.18	0.00	0.00	tonnes
5224	2001	Apache Canada Limited - House Mountain Complex	Swan Hills	AB	1.89	0.00	0.00	tonnes
5285	2001	Apache Canada Limited - Zama Gas Processing Complex	Zama City	AB	17449.09	0.00	0.00	tonnes
0653	2001	Border Midstream Services Ltd. - Mazeppa Gas Processing Faci	Mazeppa	AB	1.90	0.00	0.00	tonnes
4142	2001	BP Canada Energy Company - Fort Saskatchewan Underground Sto	NA	AB	0.01	0.00	0.00	tonnes
4150	2001	BP Canada Energy Company - Kaybob South Sour Gas Plant	Fox Creek	AB	5.87	0.00	0.00	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	0.02	0.00	0.00	tonnes
4146	2001	BP Canada Energy Company - South Caroline Sour Gas Plant	Sundre	AB	0.03	0.00	0.00	tonnes
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	5.84	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	2.87	0.00	0.00	tonnes
5370	2001	Burlington Resources Canada Energy Ltd. - Sturgeon Lake Sout	Valleyview	AB	9.59	0.05	0.00	tonnes
4159	2001	Canadian Natural Resources Ltd. - Nipisi Gas Plant	Municipal District of East Peace	AB	0.58	0.00	0.00	tonnes
5235	2001	Cargill Foods	High River	AB	28.61	0.00	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	2.75	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	0.37	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	93.00	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	0.17	0.00	0.00	tonnes
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	29.05	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	8517.25	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	12.18	0.00	0.00	tonnes
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	2.85	0.14	0.00	tonnes
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	2.25	0.00	0.00	tonnes
0106	2001	Devon Canada Corporation - Dunvegan Gas Unit #1	Fairview	AB	476.73	0.00	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	14.08	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.08	0.00	0.00	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	2.73	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	0.97	0.00	0.00	tonnes
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	1.27	0.02	0.00	tonnes
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.21	0.00	0.00	tonnes

▲ NPRI ID	Report Year	▲ Facility Name	▲ City	▲ Province	▲ On-Site Releases	▲ Transfers for Disposal	▲ Transfers for Recycling	Units
1439	2001	Husky Oil Operations Limited - Rainbow Lake Processing Plant	Rainbow Lake	AB	26215.03	0.00	0.00	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	465.17	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	53.04	0.01	0.01	tonnes
0434	2001	Imperial Oil Resources - Golden Spike Gas Conservation Plant	Devon	AB	0.08	0.00	0.00	tonnes
5238	2001	Imperial Oil Resources - West Pembina Gas Plant	Drayton Valley	AB	0.14	0.00	0.00	tonnes
0424	2001	Imperial Oil Resources Limited - Bonnie Glen Gas Plant	Thorsby	AB	1.21	0.00	0.00	tonnes
0442	2001	Imperial Oil Resources Limited - Cold Lake Heavy Oil Plants	Grande Centre	AB	5.64	0.00	0.00	tonnes
0430	2001	Imperial Oil Resources Limited - Leduc Woodbend Gas Conserva	Devon	AB	5.80	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	9.13	0.00	0.00	tonnes
0438	2001	Imperial Oil Resources Limited - Redwater Gas Conservation P	Redwater	AB	0.63	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	7.59	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	4.70	0.00	0.00	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	426.46	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	7.14	0.00	0.00	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	7.69	0.00	0.00	tonnes
2130	2001	Marsulex Inc. - Marsulex Sulphides	Fort Saskatchewan	AB	0.01	0.00	0.00	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	25.47	0.00	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	1.82	0.02	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	10.40	0.00	0.00	tonnes
0440	2001	Pengrowth - Judy Creek Gas Conservation Plants	Swan Hills	AB	19.12	0.00	0.00	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.12	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	16.95	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	2.53	0.00	0.00	tonnes
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	10.26	0.00	0.00	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	8.78	0.00	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	14.77	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	4.29	0.00	0.00	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	2.60	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.38	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	76.28	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	301.84	0.00	0.00	tonnes
5288	2001	Shell Canada Limited - Shell Shantz Sulphur Forming Facility	Caroline	AB	0.10	0.00	0.00	tonnes
2108	2001	Shell Canada Limited - Waterton Complex	Pincher Creek	AB	54.80	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	2.57	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3757	2001	Shiningbank Energy Management Inc. - Whitecourt Gas Plant	Whitecourt	AB	27.05	0.00	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	18.95	0.00	0.00	tonnes
2227	2001	Suncor Energy Inc. - Suncor Natural Gas- Simonette Productio	Valleyview	AB	0.00	0.00	0.00	tonnes
2223	2001	Suncor Energy Inc. - Suncor Natural Gas- South Rosevear Gas	Edson	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	103.21	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.01	0.00	0.00	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
3756	2001	Viking Energy Acquisitions Ltd. - Bellshill Lake Plant	Killam	AB	22.59	0.00	0.00	tonnes
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	22.75	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	12.54	0.00	0.00	tonnes
				Total	**54676.29**	**42.93**	**0.01**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Hydrogen Sulfide might include:

- Inhalation of gases from sulfur springs, volcanic gas and natural gas.
- Inhalation of ambient air in the vicinity of industrial paper plants using the kraft process.
- Inhalation of cigarette smoke; products from the combustion of coal, fuel oil and natural gas; ambient air in the vicinity of municipal sewers.
- Ingestion of water contaminated with Hydrogen sulphide.

Table 2: Annual Averages of Ambient Levels of Hydrogen Sulfide in Alberta (μg/m^3)

Station	1997	1998
Calgary Central	No data	No data
Edmonton Central	No data	No data
Edmonton East	2	2

ENVIRONMENTAL FATE AND BEHAVIOUR

- The residence time of hydrogen sulfide in the atmosphere is affected by ambient temperature and other atmospheric variables, including humidity, sunshine, and presence of other pollutants. The decreased temperatures and decreased levels of hydroxide in northern regions (e.g. Alberta, Canada) in winter increase the residence time of H_2S in air.
- Once released into the atmosphere, hydrogen sulfide will behave like many other gaseous pollutants and be dispersed and eventually removed. Residence times in the atmosphere range from about one day to more than 40 days, depending upon season, latitude, and atmospheric conditions.

TOXICITY

- Hydrogen sulfide is toxic and extremely hazardous. May be fatal if inhaled or absorbed through skin.
- Initial odor may be irritating or foul and may deaden one’s sense of smell.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		14		4	
Texas					
Ontario		30			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Hydrogen
CAS No. 1333-74-0
H_2

WHAT IS HYDROGEN?

Hydrogen is a colourless gas that occurs abundantly in nature. It is extremely flammable.

USES

Hydrogen is used in hot air balloons and dirigibles. The element is also used in the production of ammonia, methane and hydrogenated fats. Hydrogen is also used to separate metals from their oxides. Hydrogen has many applications in basic research laboratories. Certain isotopes of hydrogen are used in nuclear reactors.

SOURCES

Hydrogen occurs chiefly in combination with oxygen in water, but it is also present in organic matter, such as living plants, petroleum and coal. It is present as a free element in the atmosphere at 1 ppm. Hydrogen from natural sources consists of more than 99.8% protium.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to hydrogen may include:

- Inhaling ambient air.

Ambient air concentrations of hydrogen were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Hydrogen reacts with oxygen in the atmosphere to form water.

TOXICITY

- Vapors may cause dizziness or asphyxiation without warning. Some may be irritating if inhaled at high concentrations.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Hydrazine
CAS No. 302-01-2
H_4N_2

WHAT IS HYDRAZINE?

Hydrazine is a colourless, fuming, oily liquid.

USES

Hydrazine is produced and used as a chemical intermediate and reducing agent. It is also used rocket fuel and as a boiler water treatment agent.

SOURCES

Hydrazine is produced naturally by certain bacteria during nitrogen fixation. Other important sources of hydrazine to the environment include emissions during the manufacture, use and disposal of the chemical in industrial processes. Hydrazine is also a constituent of cigarette smoke.

No releases of Hydrazine were reported to the NPRI for Alberta in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Hydrazine might include:
- Inhalation or dermal contact at workplaces where Hydrazine is produced or used.
- Inhalation of cigarette smoke or the ingestion of trace residues in processed foods.

Ambient air concentrations of hydrazine were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the atmosphere, hydrazine will exist solely in the vapor phase in the ambient atmosphere.
- Hydrazine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and ozone.
- Release of hydrazine to soil is expected to result in degradation in soils containing a high percentage of organic carbon and in strong adsorption in soils containing high clay content. In other soils, especially sandy soils, hydrazine may have high mobility.
- Biodegradation is not expected to be an important environmental fate process in the presence of a large amount of hydrazine, due to its toxicity to microorganisms.
- Release of hydrazine to water should result in rapid degradation of Hydrazine, especially in water containing high concentrations of organic matter and dissolved oxygen.
- Bioconcentration in aquatic organisms may be an important fate process.

TOXICITY

- Dermal contact with anhydrous hydrazine leads to caustic-like burns and dissolves hair.
- Toxic effects of hydrazine include conjunctivitis, pulmonary edema, anemia (hemolytic), ataxia, convulsions, kidney toxicity, and liver toxicity.
- Two reports of cancer mortality in workers exposed to Hydrazine have appeared in recent years.
- The US Department of Health and Human Services has determined that hydrazine can be reasonably anticipated to be a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					0.013
Ontario					

Adapted from:
Hydrazine ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Hexane
CAS No. 110-54-3
C_6H_{14}

WHAT IS HEXANE?

Hexane is a colourless liquid. It is a highly volatile, widely occurring atmospheric pollutant.

USES

Hexane is used in the determination of the refractive index of minerals and as a filling for thermometers. It is also used as: a paint diluent; a solvent in extraction of soybean oil, cottonseed oil, flaxseed oil, safflower seed oil & other oil seeds; and a reaction medium in the manufacture of polyolefins, elastomers and pharmaceuticals. Hexane is also used as a denaturant for alcohol, a cleaning agent for the textile, furniture, and leather industries, and as a laboratory reagent. It is a component of many products associated with the petroleum and gasoline industries.

SOURCES

The presence of hexane in the environment is most commonly due to emissions and waste streams from industries involved in the manufacture of the chemical. Spills and leaks during transport are also important sources.

Hexane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to hexane might include:
- Inhalation in occupational settings where hexane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities where the manufacture, use or disposal of hexane is common.

Table 2: Annual Averages of Ambient Levels of Hexane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	1.611	1.5524
Edmonton Central	1.7984	1.7798
Edmonton East	5.3218	6.3193

ENVIRONMENTAL FATE AND BEHAVIOUR

- Hexane is expected to exist entirely in the vapor phase in ambient air.
- Vapor phase reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important.

TOXICITY

- Hexane acts as a mild central nervous depressant in acute exposures.
- Direct contact of hexane with the eye may cause pain and a dulling of the cornea. Damage appears to be scattered loss of epithelial cells due to solution of some of fats that occur in these cells.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1,760				176
Ontario				12,000	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Hexachlorobenzene
CAS No. 118-74-1
C_6Cl_6

WHAT IS HEXACHLOROBENZENE?

Hexachlorobenzene is a white crystalline solid that is not very soluble in water.

USES

Hexachlorobenzene was registered for use in Canada as a fungicidal seed treatment. Registration was discontinued in 1976, with the proviso that existing stock could be sold and used until the end of 1981. It was also used to make fireworks, ammunition, and synthetic rubber. Currently, there are no commercial uses of hexachlorobenzene in the United States or Canada.

SOURCES

Hexachlorobenzene does not occur naturally in the environment. It is formed as a by-product while making other chemicals, in the waste streams of chloralkali and wood-preserving plants, and when burning municipal waste.

Table 1: National Pollutant Release Inventory 2000 Hexachlorobenzene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4880	2001	Ainsworth Lumber Co. Ltd. - Grande Prairie OSB	Grande Prairie	AB	0.00	0.00	0.00	g
0001	2001	Alberta Pacific Forest Industries Inc.	Boyle	AB	0.00	0.00	0.00	g
5157	2001	Alberta Plywood Ltd. - Slave Lake Division	Slave Lake	AB	0.00	0.00	0.00	g
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	28.50	0.00	0.00	g

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	1932.59	0.00	0.00	g
1039	2001	ATCO Power - H.R.Milner Generating Station	Grande Cache	AB	276.42	0.00	0.00	g
5220	2001	Bell Pole Company - Carseland Operation	Carseland	AB	0.02	11.24	0.00	g
5358	2001	Blue Ridge Lumber Inc - Blue Ridge Lumber	Blue Ridge	AB	0.00	0.00	0.00	g
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	1.24	0.00	0.00	g
5170	2001	Canadian Forest Products Ltd. - Grande Prairie	Grande Prairie	AB	0.00	0.00	0.00	g
5171	2001	Canadian Forest Products Ltd. - Hines Creek	Hines Creek	AB	0.00	0.00	0.00	g
5195	2001	Carrier Lumber Ltd. - Trout Lake Sawmill	Trout Lake	AB	0.00	0.00	0.00	g
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	0.00	0.00	0.00	g
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	0.00	0.00	0.00	g
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	2849.00	41.00	0.00	g

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	2080.00	0.00	0.00	g
5313	2001	Foothills Steel Foundry Ltd. - Foothills Steel Foundry	Calgary	AB	0.00	0.00	0.00	g
5243	2001	Inland Cement Limited - Edmonton Plant	Edmonton	AB	0.00	0.00	0.00	g
5377	2001	La Crete Sawmills Ltd.	La Crete	AB	0.00	0.00	0.00	g
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	165.87	0.00	0.00	g
5344	2001	Manning Diversified Forest Products Ltd	Manning	AB	0.00	0.00	0.00	g
6506	2001	Millar Western Forest Products Limited - Boyle Solid Wood Di	Boyle	AB	4.62	0.00	0.00	g
6505	2001	Millar Western Forest Products Limited - Whitecourt Solid Wo	Whitecourt	AB	0.71	0.00	0.00	g
5375	2001	Mostowich Lumber Ltd - Mostowich Lumber Ltd.	Fox Creek	AB	0.00	0.00	0.00	g
5363	2001	Northland Forest Products Ltd.	Fort McMurray	AB	0.00	0.00	0.00	g
0355	2001	Oxy Vinyls Canada Inc. - Scotford Plant	Fort Saskatchewan	AB	0.00	0.00	0.00	g
5159	2001	Seehta Forest Products Ltd. - Brewster Mill	Slave Lake	AB	0.00	0.00	0.00	g

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1042	2001	Sensor Environmental Services Ltd - Swan Hills Treatment Cen	Swan Hills	AB	868.53	0.00	0.00	g
1036	2001	Sheerness Generating Station	Hanna	AB	2217.14	0.00	0.00	g
3959	2001	Slave Lake Pulp	Slave Lake	AB	0.00	0.00	0.00	g
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	0.00	0.00	0.00	g
5366	2001	Tall Pine Timber Co. Ltd.	Lodgepole	AB	0.00	0.00	0.00	g
5281	2001	Tolko Industries Ltd - High Prairie OSB Mill	High Prairie	AB	1.09	0.00	0.00	g
6504	2001	Tolko Industries Ltd. - High Level Lumber Divsion	High Level	AB	0.00	0.00	0.00	g
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	271.04	0.00	0.00	g
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	721.06	0.00	0.00	g
2282	2001	TransAlta Corporation - Wabamun Thermal Generating Plant	Wabamun	AB	168.35	0.00	0.00	g
5371	2001	Vanderwell Contractors (1971) Ltd.	Slave Lake	AB	0.00	0.00	0.00	g

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5362	2001	Wainwright Regional Waste to Energy Authority - Wainwright R	Wainwright	AB	0.00	0.00	0.00	g
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	0.00	0.00	0.00	g
5353	2001	Weyerhaeuser Company Limited - Grande Cache Sawmill	Grande Cache	AB	0.00	0.00	0.00	g
2764	2001	Weyerhaeuser Company Ltd. - Slave Lake O.S.B.	Slave Lake	AB	0.00	0.00	0.00	g
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	0.00	0.00	0.00	g
				Total	**11586.18**	**52.24**	**0.00**	**g**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to hexachlorobenzene might include:

- Ingestion of contaminated food, including fish, dairy products or meat from cattle grazing on contaminated pastures.
- Ingestion of contaminated water.
- Breathing contaminated air.
- Eating or touching contaminated soil.
- For babies, drinking contaminated breast milk from exposed mothers.
- Inhalation or dermal contact in the workplace, where hexachlorobenzene is being used or produced unintentionally.

Ambient air concentrations of hexachlorobenzene were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Hexachlorobenzene breaks down very slowly in the environment.
- It does not dissolve in water very well, so most of it will remain adsorbed to particles on the bottom of lakes and rivers.
- Hexachlorobenzene adsorbs strongly to soil.
- Bioconcentration may occur in fish, marine mammals, birds, lichens, and animals that eat lichens (such as caribou) or fish.
- It may also build up in wheat, grasses, some vegetables, and other plants.

TOXICITY

- A syndrome called “porphyria” (general disruption in the normal metabolism of porphyrin compounds, including hemoglobin) is associated with exposure to hexachlorobenzene. Symptoms of hexachlorobenzene-induced porphyria include red-colored urine, skin sores, changes in skin color, arthritis, and problems of the liver, nervous system, and stomach.
- Studies in animals show that chronic exposure via ingestion can damage the liver, thyroid, nervous system, bones, kidneys, blood, and immune and endocrine systems.
- The U.S. Department of Health and Human Services (DHHS) has determined that hexachlorobenzene may reasonably be expected to be a carcinogen.

GUIDELINES

Guidelines for hexachlorobenzene are not in place in Alberta, Texas or Ontario.

Adapted from:
Hexachlorobenzene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Heptane
CAS No. 142-82-5
C_7H_{16}

WHAT IS HEPTANE?

Heptane is a colorless liquid with a gasoline-like odor.

USES

Heptane is a highly volatile constituent in the paraffin fraction of crude oil and natural gas. It is also used in the manufacture of printing pastes, paints, varnishes, adhesives and other coatings. Heptane is used as a research chemical.

SOURCES

Heptane is released to the environment via the manufacture, use and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of heptane into the environment from landfills and waste incinerators, vulcanization and extrusion operations during rubber and synthetic production, and the combustion of gasoline fueled engines.

Heptane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to heptane might include:

- Inhalation in occupational settings where heptane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities where the manufacture, use or disposal of heptane is common.

Extensive monitoring data indicates heptane is a widely occurring atmospheric pollutant.

Table 2: Annual Averages of Ambient Levels of Heptane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.8179	0.8584
Edmonton Central	0.8783	1.0708
Edmonton East	1.8138	2.2988

ENVIRONMENTAL FATE AND BEHAVIOUR

- Biodegradation of heptane may occur in soil and water; however, volatilization and adsorption are expected to be far more important fate processes. Heptane is slightly mobile to immobile in soil.
- In aquatic systems heptane may partition from the water column to organic matter in sediments and suspended solids. The bioconcentration of heptane may be important in aquatic environments.
- Heptane volatilizes rapidly from environmental waters.
- Heptane is expected to exist entirely in the vapor phase in ambient air.
- Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important (estimated half-life of 2.4 days).

TOXICITY

- Inhalation may cause irritation or a burning sensation of the skin and eyes.
- Acute exposure via inhalation of vapors may cause dizziness or suffocation.
- Fire may produce irritating, corrosive and/or toxic gases.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	3,500				350
Ontario				11,000*	

* Ontario guideline for n-heptane

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment   July 2003
Science and Technology Branch

Chemical Fact Sheets

Glyphosate
CAS No. 1071-83-6
$C_3H_8NO_5$

WHAT IS GLYPHOSATE?

Glyphosate is an odorless, white solid.

USES

Glyphosate itself is an acid, but is commonly used in the salt form, most commonly as the isopropylamine salt. It is used as a non-selective, non-residual, post-emergence herbicide. As a herbicide, glyphosate is used to control a great variety of annual, biennial, and perennial plants. It is used in fruit orchards, vineyards, conifer plantations, and many plantation crops. Glyphosate is also used for pre-harvest weed control in canola, cereals, peas, beans, etc.

SOURCES

Glyphosate does not occur naturally in the environment. Glyphosate is released to the environment in its use as a non-selective, post emergent herbicide for controlling woody and herbaceous weeds on forestry, right-of-way, cropped and non-cropped sites. It is applied as a spray of the isopropylamine salt.

Glyphosate was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Glyphosate might include:

- Inhalation and dermal contact during spraying, mixing, and cleanup of glyphosate in the workplace or during home gardening.
- Inhalation and dermal contact during glyphosate's manufacture, transport, storage, and disposal.

Ambient concentrations of glyphosate were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Glyphosate is removed from the atmosphere primarily by gravitational settling; it will occur in the atmosphere only as an aerosol and may degrade by photolysis.
- After glyphosate is applied to forests, fields, and other land by spraying, it is strongly adsorbed to soil, remains in the upper soil layers, and has a low propensity for leaching.
- Glyphosate readily and completely biodegrades in soil; however, biodegradation in foliage and litter is somewhat faster than in soil.
- Glyphosate may enter aquatic systems through accidental spraying, spray drift, or surface runoff. It dissipates rapidly from the water column as a result of adsorption and possibly biodegradation.
- Sediment is the primary sink for glyphosate.
- Glyphosate does not bioconcentrate in aquatic organisms or bioaccumulate in species in higher trophic levels.

TOXICITY

- Glyphosate is practically non-toxic by dermal exposure.
- Glyphosate causes eye irritation upon exposure; some formulations may be more irritating than others.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

January 2002

Chemical Fact Sheets

Glutaraldehyde
CAS No. 111-30-8
$C_5H_8O_2$

WHAT IS GLUTARALDEHYDE?

Glutaraldehyde is a colorless liquid with a pungent odor.

USES

Glutaraldehyde is used as an embalming fluid and for tissue fixation. It is an intermediate in reactions for cross-linking protein and polyhydroxy materials, and is used in the tanning of soft leathers. It is a chemical intermediate for adhesives, sealants, and electrical products. In the case of endoscopic instruments, thermometers, rubber or plastic equipment that can not be sterilised using heat, glutaraldehyde is employed. It is a biocide in the oil industry. Glutaraldehyde is also the most popular enzyme cross-linking reagent. It is cross-linked with microbial cells to yield cell pellets. Skin disinfectants are another application of this substance.

SOURCES

Glutaraldehyde is found in the environment primarily as a result of its presence in waste streams from the above-noted uses.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to glutaraldehyde might include:

- Dermal contact through instrument sterilisation; this type of exposure is common for health care workers.
- Exposure to liquid or vapours during tanning operations or chemical laboratory procedures.

Ambient air concentrations of glutaraldehyde were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

TOXICITY

- Dermal contact with the liquid form can cause severe irritation of the eyes and skin.
- Inhalation of the vapour can cause irritation of the nose, throat and respiratory tract. Sensitized workers may be susceptible to asthma
- Exposure may cause nausea, headaches, drowsiness, dizziness, severe itching, skin rashes and eczema.
- Rat and mice studies do not show glutaraldehyde to be carcinogenic. It is unknown whether the compound is a human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario		35		14	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Formaldehyde
CAS No. 50-00-0
CH_2O

WHAT IS FORMALDEHYDE?

Formaldehyde is a clear, very slightly acid gas or liquid with a pungent, irritating odor.

USES

Formaldehyde is produced in large quantities primarily for use in the manufacture of resins and as a chemical intermediate. It is also used for disinfecting dwellings, ships, storage houses, utensils and clothes. Other uses include: as a germicide and fungicide for plants and vegetables; for destruction of flies and other insects; in the manufacture of artificial silk and cellulose esters, dyes, organic chemicals, glass mirrors and explosives.

Formaldehyde is also used for: improving fastness of dyes on fabrics; mordanting and waterproofing fabrics; preserving and coating rubber latex; hardening gelatin plates and papers in photography; toning gelatin-chloride papers; chrome printing and developing; rendering casein, albumin and gelatin insoluble; preventing mildew and spelt in wheat and rot in oats; and as a fumigant.

Formaldehyde is used in the fixation of histological specimens and in alteration of bacterial toxins to toxoids for vaccines, as a germicide, and in wood-industry products, as a molding compound, foundry resins, adhesives for insulation, slow-release fertilizers, the manufacture of permanent-press finishes of cellulose fabrics, and formaldehyde-based textile finishes. Other applications include the manufacturing of fatty amides and in precious metal recovery, as a sewage treatment agent and as a chemical intermediate for other chemicals.

SOURCES

Many of the industrial uses of formaldehyde do not result in releases to the environment, as the chemical is captive in these processes. Most formaldehyde entering the environment is produced directly or indirectly in combustion processes. Indirect production is derived from photochemical oxidation of hydrocarbons or other formaldehyde precursors that have been released from combustion processes. Cigarette smoke is also a source of formaldehyde.

Table 1: National Pollutant Release Inventory 2001 Formaldehyde Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5346	2001	Brine-Add Fluids - Eastfield	Calgary	AB	0.00	0.17	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.26	0.00	0.00	tonnes
4721	2001	Enerchem International Inc. - Plant, Technical Centre, Head	Nisku	AB	0.13	0.00	0.00	tonnes
5259	2001	Sanjel Corporation - Sanjel Corporation - Grande Prairie	Grande Prairie	AB	0.00	0.00	0.00	tonnes
6544	2001	Sanjel Corporation - Sanjel Corporation - High Level	High Level	AB	0.00	0.00	0.00	tonnes
5260	2001	Sanjel Corporation - Sanjel Corporation - Medicine Hat	Medicine Hat	AB	0.00	0.00	0.00	tonnes
5257	2001	Sanjel Corporation - Sanjel Corporation - Red Deer	Red Deer	AB	0.00	0.00	0.00	tonnes
5261	2001	Sanjel Corporation - Sanjel Corporation - Slave Lake	Slave Lake	AB	0.00	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.02	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	0.00	0.00	0.00	tonnes
				Total	**0.41**	**0.17**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to formaldehyde might include:

- Inhalation of ambient air in heavy traffic, particularly during photochemical smog episodes.
- Inhalation of air in the workplace where resins are used or where formaldehyde is used as a fumigant, disinfectant, embalming fluid, etc.
- Inhalation of indoor air, particularly in energy efficient homes, which can have high levels of formaldehyde from stoves, insulation, furniture, resin-coated rugs and other fabrics.

Ambient air concentrations of formaldehyde were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Formaldehyde is removed from the atmosphere by direct photolysis and oxidation by photochemically produced hydroxyl radicals (with a half-life of several hours).
- Additional quantities are removed by dry deposition, rain or by dissolution in the ocean and other surface waters. Biodegradation takes place in a few days in surface water bodies.

TOXICITY

- The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects may be coughing, wheezing, chest pains, and bronchitis.
- Ingestion exposure to formaldehyde in humans has resulted in corrosion of the gastrointestinal tract and inflammation and ulceration of the mouth, esophagus, and stomach.
- Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and eye, nose, and throat irritation.
- The US Department of Health and Human Services has determined that formaldehyde may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		65			
Texas	15				1.5
Ontario				65	

Adapted from:

ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

2-Ethylhexanol
CAS No. 104-76-7
$C_8H_{18}O$

WHAT IS 2-ETHYLHEXANOL?

2-Ethylhexanol is a colourless liquid with an odor reminiscent of rose.

USES

2-Ethylhexanol is used in the process of mercerizing textiles and as a solvent for dyes, resins and oils. It is also used as a plasticizer for PVC resins and in solvent mixtures for nitrocellulose, paints, lacquers and baking finishes. 2-Ethylhexanol is an important chemical in the manufacturing of inks, rubber, paper and lubricants and in dry cleaning.

SOURCES

2-Ethylhexanol is a plant volatile and may be released into air by natural processes. It is more commonly released to the environment as a constituent in air emissions or in wastewater as a result of its manufacture, transport, storage, disposal and use as a chemical intermediate in the manufacture of plasticizers and other chemicals.

2-Ethylhexanol was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 2-Ethylhexanol might include:

- Occupational exposure to 2-Ethylhexanol via inhalation and dermal contact.
- The general population may be exposed to 2-Ethylhexanol by ingesting some fruits, in which it occurs naturally, and drinking water and also from indoor air.

Ambient air concentrations of 2-ethylhexanol were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released in soil, 2-ethylhexanol will leach and readily biodegrade. Some volatilization may also occur from both moist and dry soil.
- If released in water, 2-ethylhexanol will volatilize; the estimated half-life in a model river is 1.7 days.
- Adsorption to sediment and bioconcentration in fish are not expected to be important processes for 2-ethylhexanol.
- In the atmosphere, 2-ethylhexanol will occur as a vapor and react with photochemically produced hydroxyl radicals. Its estimated half-life in the atmosphere is 1.2 days.
- Since 2-ethylhexanol is moderately water soluble, it may be washed out of the atmosphere by rain.

TOXICITY

- 2-ethylhexanol is moderately irritating to skin & slightly toxic when ingested.
- Symptoms of acute exposure may include headache, nausea , muscle weakness, giddiness, ataxia, confusion, delirium, and coma.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario		600			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

Ethylene oxide
CAS No. 75-21-8
C_2H_4O

WHAT IS ETHYLENE OXIDE?

Ethylene oxide is a colourless gas with a sweet, ether-like odor, similar to that of bruised apples.

USES

Ethylene oxide is used as a ripening agent for fruits and a fungistat. It is also used as a fumigant for foodstuffs & textiles, as a component of organic synthesis and as agricultural fungicide. In Canada, ethylene oxide is registered for the control of bacteria and stored product insects in spices and natural seasonings. Ethylene oxide has also been used for sterilizing medical instruments, and articles in the patient care areas of hospitals.

SOURCES

There are no natural sources of ethylene oxide. Ethylene oxide will primarily enter the environment in association with its production and use as a chemical intermediate as well as its relatively minor use as a sterilant and fumigant.

Table 1: National Pollutant Release Inventory 2001 Ethylene Oxide Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2316	2001	Dow Chemical Canada Inc. - Prentiss Chemical Manufacturing P	Red Deer	AB	5.88	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	4.09	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.78	0.00	0.00	tonnes
				Total	**10.76**	**0.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethylene oxide might include:

- Inhalation of air in the workplace, where ethylene oxide is manufactured or used.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Once in the atmosphere ethylene oxide will degrade very slowly by reaction with hydroxyl-radicals.
- Releases into water will be removed by volatilization, hydrolysis and to a lesser extent, biodegradation. Ethylene oxide does not accumulate in fish.
- Ethylene oxide will not adsorb strongly to soil.

TOXICITY

- Ethylene oxide is toxic; it may be fatal if inhaled or absorbed through skin.
- Acute exposure via inhalation may cause nausea, vomiting, neurological disorders, and even death.
- The US Department of Health and Human Services has determined that ethylene oxide is a known human carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta	15				
Texas	18				1.8
Ontario				5	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Ethylene dichloride
CAS No. 107-06-2
$C_2H_4Cl_2$

WHAT IS ETHYLENE DICHLORIDE?

Ethylene dichloride is a clear chemical that has a pleasant smell and a sweet taste. It is also called 1,2-Dichloroethane.

USES

The most common uses of ethylene dichloride today are the manufacture of vinyl chloride and other chemicals and as a solvent for grease, glue, and dirt. It has also been added to leaded gasoline to remove lead. In the past, ethylene dichloride was used in home products such as cleaning solutions and paint removers. It is rarely used in these products today.

SOURCES

Ethylene dichloride is not found naturally in the environment. Its presence in the environment is primarily a result of its manufacture for the above-noted uses.

Table 1: National Pollutant Release Inventory 2001 Ethylene Dichloride Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2316	2001	Dow Chemical Canada Inc. - Prentiss Chemical Manufacturing P	Red Deer	AB	0.00	0.21	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	12.32	8.24	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.02	0.00	0.00	tonnes
				Total	**12.34**	**8.45**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethylene dichloride might include:

- Breathing contaminated air in workplaces where it is used.
- Breathing contaminated air near factories where ethylene dichloride is made or used.
- Breathing contaminated air near hazardous waste sites that contain the chemical.
- Drinking water from contaminated wells.
- Breathing contaminated air when using cleaning products or other products that contain ethylene dichloride.

Table 2: Annual Averages of Ambient Levels of Ethylene Dichloride in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.0787	0.0855
Edmonton Central	0.1289	0.1310
Edmonton East	0.1336	0.1693

ENVIRONMENTAL FATE AND BEHAVIOUR

- Ethylene dichloride readily volatilizes during manufacture or use.
- It evaporates very quickly from surface water into the air.
- In air, it is readily broken down by sunlight.
- It slowly breaks down in water, and can therefore stay in groundwater for many years.
- In soil, it can be broken down within several months if methane is also present.

TOXICITY

- Acute exposure to ethylene dichloride via inhalation or ingestion may result in damage to the heart, central nervous system, liver, kidneys, and lungs. The effects of chronic exposure are unknown.
- The US Department of Health and Human Services has determined that Ethylene dichloride may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	40				4
Ontario				2	0.4

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Ethylene dibromide
CAS No. 106-93-4
$C_2H_4Br_2$

WHAT IS ETHYLENE DIBROMIDE?

Ethylene dibromide is a colorless liquid with a mild, sweet odor. Other names are EDB, 1,2-dibromoethane and glycol bromide. Trade names include Bromofume and Dowfume.

USES

Ethylene dibromide has been used as a pesticide in soil, and on citrus, vegetable, and grain crops; however, these uses are becoming more restricted. Another major use was as an additive in leaded gasoline; however, since leaded gasoline is now banned, it is no longer used for this purpose. Uses today include treatment of logs for termites and beetles, control of moths in beehives, and as a preparation for dyes and waxes.

SOURCES

Ethylene dibromide occurs naturally in small amounts in the ocean where it is formed by algae and kelp. However, the presence of ethylene dibromide in the environment is due primarily to its manufacture for the above-noted uses.

Ethylene dibromide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethylene dibromide might include:
- Ingestion of contaminated water, especially well water near farms or waste sites.
- Inhalation of contaminated workplace air.
- Dermal contact when using ethylene dibromide or from bathing or swimming in contaminated water.

Table 2: Annual Averages of Ambient Levels of Ethylene Dibromide in Alberta (µg/m^3)

Station	1997	1998
Calgary Central	0.0121	0.0068
Edmonton Central	0.0132	0.0056
Edmonton East	0.0106	0.0048

ENVIRONMENTAL FATE AND BEHAVIOUR

- When released, ethylene dibromide quickly volatilizes and will evaporate from surface water and soil to the air.
- It dissolves in water and will move through soil into the groundwater.
- Small amounts remain adsorbed to soil particles.
- It breaks down slowly in air (over 4-5 months), more quickly in surface water (2 months), and hardly at all in groundwater.
- It is not expected to accumulate in plants or animals.

TOXICITY

- Ingestion of large amounts of ethylene dibromide may result in skin blisters and mouth and stomach ulcers.
- Occupational exposure via inhalation may result in reproductive abnormalities in human males.
- The US Department of Health and Human Services has determined that ethylene dibromide may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	3.8				0.38
Ontario				3	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Ethylbenzene
CAS No. 100-41-4
C_8H_{10}

WHAT IS ETHYLBENZENE ?

Ethylbenzene is a colorless liquid with a pungent, gasoline-like odor.

USES

Ethylbenzene is used primarily in the production of styrene. It is also used as a solvent, as a constituent of asphalt and naphtha, and in fuels.

SOURCES

Ethylbenzene will enter the atmosphere primarily from fugitive emissions and exhaust connected with its use in gasoline. More localized sources will be emissions, waste water and spills from its production and industrial use.

Table 1: National Pollutant Release Inventory 2000 Ethylbenzene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	0.13	0.00	0.00	tonnes
5351	2001	Baker Petrolite Corporation - Baker Petrolite Corporation -	Calgary	AB	0.01	0.00	1.52	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	0.04	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4161	2001	BP Canada Energy Company - Ricinus Gas Plant	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	0.00	0.00	0.00	tonnes
2183	2001	BRENNTAG CANADA INC. (AS55) - LEDUC (AS55)	LEDUC	AB	0.03	0.42	0.00	tonnes
2291	2001	BRENNTAG CANADA INC. (AS65) - CALGARY (NPRI)	CALGARY	AB	0.03	0.00	0.12	tonnes
4928	2001	Burlington Resources Canada Energy Ltd. - Elmworth Gas Plant	Grande Prairie	AB	0.00	0.00	0.00	tonnes
1074	2001	Canadian 88 Energy Corp. - Canadian 88 Energy-Olds Gas Plant	Olds	AB	0.56	0.00	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	0.01	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	11.13	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	0.06	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	0.01	0.00	0.00	tonnes
5345	2001	Conoco Canada Resources Ltd. - Niton Gas Plant	Niton Junction	AB	0.16	0.04	0.00	tonnes
5389	2001	Conoco Canada Resources Ltd. - Peco Plant	Edson	AB	1.11	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	0.31	0.03	0.04	tonnes
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	0.26	0.05	0.00	tonnes
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	0.04	0.09	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	0.34	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	0.40	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	0.12	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.26	11.76	3.21	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	0.93	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	2.26	0.98	0.01	tonnes
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	0.01	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	0.40	0.00	0.01	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	0.07	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	0.27	0.00	0.06	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	0.11	0.00	0.00	tonnes
5361	2001	Newalta Corporation - Airdrie Hazardous Recyclable Processin	Airdrie	AB	0.00	0.00	0.00	tonnes
5302	2001	Newalta Corporation - Edmonton Process Facility	Edmonton	AB	0.48	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
4561	2001	Newalta Corporation - Raymond Solvent Recycling & Fuel Blend	Raymond	AB	0.00	0.57	12.66	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	0.10	0.02	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.67	0.24	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	1.29	1.72	0.00	tonnes
4567	2001	Ondeo Nalco Energy Services Canada Inc. - Nisku Blend Plant	Nisku	AB	0.01	1.33	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	0.98	0.05	0.00	tonnes
1881	2001	Parkland Refining Ltd. - Bowden Refinery	Bowden	AB	0.81	0.00	0.00	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.00	0.00	0.00	tonnes
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	0.11	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	3.04	0.01	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	0.01	0.00	0.02	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	0.00	0.00	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	0.00	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	0.14	0.01	0.49	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.79	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	0.03	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	0.16	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	4.37	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	16.79	0.23	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	41.28	0.00	0.08	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	70.09	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.00	0.01	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.01	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.06	0.00	0.00	tonnes
5287	2001	Williams Energy (Canada), Inc. - Redwater NGL Fractionation	Redwater	AB	0.01	0.01	0.00	tonnes
				Total	**160.27**	**17.58**	**18.21**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethylbenzene might include:

- Occupational exposure where petroleum products or byproducts are manufactured.
- Inhalation of ambient air under conditions of high atmospheric smog generated by motor vehicle emissions.
- Inhalation of cigarette smoke.
- Ingestion of contaminated drinking water.

Table 2: Annual Averages of Ambient Levels of Ethylbenzene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	1.2325	1.3147
Edmonton Central	1.0063	1.2685
Edmonton East	0.7680	0.9825

ENVIRONMENTAL FATE AND BEHAVIOUR

- Atmospheric releases of ethylbenzene exist primarily as a vapor, and break down by reaction with hydroxyl radicals, which are produced by reaction with sunlight. The half-life is 0.5 to 2 days. It can partially return to the earth in rain.
- Releases into water are reduced by evaporation and breakdown by microorganisms. Estimates for the half-life in water are several days to 2 weeks.
- Some may adsorb to sediment surfaces in water bodies.
- Ethylbenzene is not expected to accumulate in the bodies of fish.

TOXICITY

- Ethylbenzene may cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with the material may irritate or burn skin and eyes.
- Inhalation of vapors may cause dizziness or suffocation.
- Chronic exposure to vapors may result in a variety of functional disorders, increase in deep reflexes, irritation of the upper respiratory tract and blood disorders.
- Aspiration of even a small amount may cause serious injury, as it can spread over a large surface of pulmonary tissue.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario	1900 (10-minute)			1000	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Ethyl acrylate
CAS No. 140-88-5
$C_5H_8O_2$

WHAT IS ETHYL ACRYLATE?

Ethyl acrylate is a clear liquid with a penetrating, acrid odor. It was formerly used as an additive in food as a flavoring and fragrance. It occurs naturally in pineapple, and is also a component of certain cheeses.

USES

Ethyl acrylate is used in the manufacture of emulsion polymers (for use in surface coatings), textiles, paper, polishes, leather and acrylic fibers.

SOURCES

There are no natural sources of ethyl acrylate. The major source of ethyl acrylate in the environment is the manufacture of the above-noted materials, which may result in environmental releases via waste streams.

No releases of Ethyl acrylate were reported to the NPRI for Alberta in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethyl acrylate might include:
- Occupational exposure through inhalation and dermal contact with the compound in workplaces where the compound is manufactured or used.
- Inhalation of air, ingestion of food, or dermal contact with this compound and other products (paper products, latex paints, etc.) containing it.

Ambient air concentrations of ethyl acrylate were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Ethyl acrylate will exist solely as a vapour in the ambient atmosphere, where they will be degraded by reaction with hydroxyl radicals produced in the presence of sunlight (estimated half-life 1.5 days) and by reaction with ozone (estimated half-life 2 days).
- Adsorption to soil occurs only to a small degree, and it can move easily into groundwater.
- Ethyl acrylate volatilises readily from wet soil surfaces and water bodies and, to a lesser extent, from dry soil surfaces.
- Ethyl acrylate is broken down readily by microorganisms.
- It does not accumulate readily in the bodies of organisms.
- In water the rate at which it is broken down depends on the level of acidity in the water (half-life at pH 7 estimated at 3 years, at pH 8 estimated at 103 days, at pH 11 estimated at 2.5 hours).

TOXICITY

- Ethyl acrylate may cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with the material may cause irritation and a burning sensation in the eyes.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m³)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	5				
Ontario		4.5			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch
July 2003

Chemical Fact Sheets

Ethane
CAS No. 74-84-0
C_2H_6

WHAT IS ETHANE?

Ethane is a colorless gas which may be odorless or may have a mild gasoline-like odor.

USES

Ethane is used in the production of ethylene by high temp thermal cracking, as a feedstock in the production of Vinyl Chloride, in the synthesis of chlorinated hydrocarbons, and as a refrigerant.

SOURCES

Ethane is a highly volatile constituent in the paraffin fraction of crude oil and natural gas. Ethane gas is released to the environment via the manufacture, use and disposal of many products associated with the petroleum and natural gas industries. Extensive data show release of ethane into ambient air from waste incinerators and the combustion of gasoline, natural gas and polyethylene.

Ethane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethane might include:

- Inhalation of ambient air. Extensive monitoring data indicates ethane is a widely occurring atmospheric pollutant.

Table 2: Annual Averages of Ambient Levels of ethane in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	8.1410	8.1316
Edmonton Central	9.6436	9.6463
Edmonton East	14.2063	15.1066

ENVIRONMENTAL FATE AND BEHAVIOUR

- Biodegradation of ethane may occur in soil and water; however, volatilization is expected to be the dominant fate process. Adsorption may occur to a smaller degree.
- Ethane is moderately mobile in soil.
- In aquatic systems, ethane may partition from the water column to organic matter contained in sediments and suspended materials; however, volatilization is rapid from environmental waters.
- Ethane is expected to exist entirely in the vapor phase in ambient air. Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to occur (average half life of 52 days or greater).

TOXICITY

- Ethane is considered to be physiologically and toxicologically inert. At high concentrations, ethane acts primarily as a simple asphyxiant by displacing oxygen from the blood and air.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2001

Chemical Fact Sheets

Endrin
CAS No. 72-20-8
$C_{12}H_8Cl_6O$

WHAT IS ENDRIN?

Endrin is a solid, white, almost odorless substance. Little is known about the properties of Endrin aldehyde (an impurity and breakdown product of Endrin) or Endrin ketone (a product of endrin when it is exposed to light).

USES

Endrin was used as a pesticide to control insects, rodents, and birds. Endrin has not been produced or sold for general use in the United States since 1986.

SOURCES

Releases from hazardous waste facilities.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Endrin might include:
- In air, water, or soil if you live near a hazardous waste site.
- Eating foods that contain Endrin.
- Children living near hazardous waste sites could be exposed to endrin in contaminated soils if they eat dirt.
- Human breast milk may be a route of exposure for nursing infants.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Endrin levels can build up in the tissues of organisms that live in water.
- Endrin does not dissolve very well in water. It has been found in groundwater and surface water, but only at very low levels. It is more likely to cling to the bottom sediments of rivers, lakes, and other bodies of water.
- Endrin is generally not found in the air except when it was applied to fields during agricultural applications.

- The persistence of endrin in the environment depends highly on local conditions. Some estimates indicate that endrin can stay in soil for over 10 years.
- Endrin may also be broken down by exposure to high temperatures or light to form primarily endrin ketone and endrin aldehyde.
- It is not known what happens to endrin aldehyde or endrin ketone once they are released to the environment. However, the amount of endrin broken down to endrin aldehyde or endrin ketone is very small.

TOXICITY

- Exposure to endrin can cause various harmful effects including death and severe central nervous system (brain and spinal cord) injury. Swallowing large amounts of endrin may cause convulsions and kill you in a few minutes or hours.
- Symptoms that may result from endrin poisoning are headaches, dizziness, nervousness, confusion, nausea, vomiting, and convulsions.
- No long-term health effects have been noted in workers who have been exposed to endrin by breathing or touching it. Studies in animals confirm that endrin's main target is the nervous system. Birth defects, especially abnormal bone formation, have been seen in some animal studies.
- In studies using rats, mice, and dogs, endrin did not produce cancer. However, most of these studies did not accurately evaluate the ability of endrin to cause cancer. No significant excess of cancer has been found in exposed factory workers. The EPA has determined that endrin is not classifiable as to its human carcinogenicity because there is not enough information to allow classification.

Adapted from:
Endrin ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Dioxins (Chlorinated Dibenzo-p-Dioxins)

CAS No. 1746-01-6

$C_{12}H_4Cl_4O_2$ (2,3,7,8-Tetrachlorodibenzo-p-Dioxin)

WHAT ARE CHLORINATED DIBENZO-P-DIOXINS (CDDs)?

CDDs are a family of 75 chemically related compounds commonly known as dioxins. One of these compounds is called 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD); it is one of the most toxic of the CDDs and is the one most studied.

In the pure form, CDDs are crystals or colorless solids. CDDs enter the environment as mixtures containing a number of individual components. 2,3,7,8-TCDD is odorless, while the odors of the other CDDs are not known.

USES

CDDs are not intentionally manufactured by industry except for research purposes. They are of no practical use in industrial operations.

Dioxins were not reportable to the NPRI in 2001.

SOURCES

CDDs (mainly 2,3,7,8-TCDD) may be formed during the chlorine bleaching process at pulp and paper mills. They are also formed during chlorination by waste and drinking water treatment plants. They can occur as contaminants in the manufacture of certain organic chemicals. CDDs are released into the air in emissions from municipal solid waste and industrial incinerators.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Dioxins might include:

- Ingestion of meat, dairy products, and fish contaminated with CDDs makes up more than 90% of the intake of CDDs for the general population.
- Breathing low levels in air and drinking low levels in water.
- Dermal exposure to certain pesticides and herbicides.
- Chronic inhalation of contaminated air or ingestion of contaminated water from uncontrolled hazardous waste sites containing CDDs or incinerators releasing CDDs.
- Occupational exposure in industries involved in producing certain pesticides containing CDDs as impurities, pulp and paper mills, or incinerators.

Ambient air concentrations of Dioxins were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Some CDDs are very persistent in air and thus may be transported long distances, even around the globe.
- When released in waste waters, some CDDs are broken down by sunlight, while some evaporate to air; however, the majority attach to soil and settle to the bottom sediment in bodies of water.
- CDD concentrations may build up in the food chain, resulting in measurable levels in animals.

TOXICITY

- Acute exposure to high-level concentrations of 2,3,7,8-TCDD and chronic exposure to low-level concentrations is often associated with the development of chloracne. Chloracne is a severe skin disease with acne-like lesions that occur mainly on the face and upper body. Other skin effects include rashes, discoloration, and excessive body hair.
- Exposure to high concentrations of CDDs may induce long-term alterations in glucose metabolism and subtle changes in hormonal levels.
- Exposure to lower levels of 2,3,7,8-TCDD in animals can cause a variety of effects such as weight loss, liver damage, and disruption of the endocrine system.
- The US Department of Health and Human Services has determined that 2,3,7,8-TCDD is known to cause cancer.

Adapted from:
Chlorinated Dibenzo-p-Dioxins ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment July 2003
Science and Technology Branch

Chemical Fact Sheets

1,3-Dichloropropene
CAS No. 542-75-6
$C_3H_4Cl_2$

WHAT IS 1,3-DICHLOROPROPENE?

1,3-Dichloropropene is a colorless liquid with a sweet smell. There are two forms of 1,3-Dichloropropene: cis-1,3-Dichloropropene and trans-1,3-Dichloropropene. These forms are very similar to each other and are usually combined in different amounts to form mixtures.

USES

1,3-Dichloropropene is used mainly in farming to kill nematodes, which are pests that eat the roots of crops. It is often sprayed, undiluted, directly on the soils of vegetable and tobacco crops. Much smaller amounts are used to dissolve or to make other chemicals.

SOURCES

1,3-Dichloropropene is a manufactured chemical that does not occur naturally in the environment. The primary source of 1,3-Dichloropropene in the environment is application to land as a pest controlling substance.

1,3-Dichloropropene was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,3-Dichloropropene might include:

- Breathing contaminated air or coming in contact with it during crop treatment.
- Breathing contaminated workplace air or air around hazardous waste sites that contain it.
- Drinking contaminated water near where it is produced or used, or near hazardous waste sites that contain it.

Table 2a: Annual Averages of Ambient Levels of cis-1,3-Dichloropropene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.0013	0.0005
Edmonton Central	0.0007	0.0005
Edmonton East	0.0019	0.0002

Table 2b: Annual Averages of Ambient Levels of trans-1,3-Dichloropropene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.0092	0.0124
Edmonton Central	0.0066	0.0131
Edmonton East	0.0095	0.0111

ENVIRONMENTAL FATE AND BEHAVIOUR

- 1,3-Dichloropropene rapidly evaporates from soil into the air, where it is broken down by sunlight.
- While in soil, it is often broken down by small organisms.
- It dissolves and breaks down slowly in water.
- It may reach underground water supplies, although it does not normally penetrate this deep.
- Other chemicals often found in hazardous waste sites may slow the breakdown of 1,3-Dichloropropene.
- It is not likely to bioaccumulate (most leaves the body within 2 days).

TOXICITY

- Acute or chronic exposure (to high and low concentrations or 1,3-Dichloropropene, respectively) via inhalation may result in irritated skin, eyes, nose, and throat, and coughing, nausea, headache, and fatigue.
- Acute high level and chronic lower level studies in animals show damage to the nose and lung tissues.
- Animal studies have reported damage to the stomach lining, lung congestion, difficulty walking, and effects on the liver and kidneys from ingesting high levels of 1,3-Dichloropropene.
- Long-term dermal contact with pesticides that contained 1,3-Dichloropropene may cause increased sensitivity to further exposure.
- The US Department of Health and Human Services has determined that 1,3-Dichloropropene may be reasonably anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	Guidelines (μg/m^3)				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas	45				4.5
Ontario					

Adapted from:
1,3-Dichloropropene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment June 2001
Science and Technology Branch

Chemical Fact Sheets

1,2-Dichloropropane
CAS No. 78-87-5
$C_3H_6Cl_2$

WHAT IS 1,2-DICHLOROPROPANE?

1,2-Dichloropropane (also called Propylene Dichloride) is a colorless liquid with a sweet, Chloroform-like odor.

USES

1,2-Dichloropropane is used for livestock (in dd mixture), solvent in plastics, resins, & metals industry, and as an intermediate in rubber processing and other chemical reactions. It is also an oil and fat solvent, is used in dry cleaning fluids, in degreasing, and in insecticidal fumigant mixtures.

SOURCES

There are no natural sources of 1,2-Dichloropropane. Most 1,2-Dichloropropane in our environment is derived from its production and industrial applications. Another source is its application to agricultural lands as part of insecticidal fumigant mixtures.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,2-dichloropropane might include:
- Inhalation of 1,2-dichloropropane in ambient air.
- Drinking contaminated water.
- Inhalation and skin contact during its application as a soil fumigant or by being near fields within several days after treatment.
- Occupational exposure during its production and use.

Human exposure is primarily due to inhalation

Table 2: Annual Averages of Ambient Levels of 1,2-dichloropropane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.0195	0.0375
Edmonton Central	0.0153	0.0369

Edmonton East	0.0227	0.0372

ENVIRONMENTAL FATE AND BEHAVIOUR

- In the atmosphere, 1,2-Dichloropropane reacts with hydroxyl radicals and is washed out by rain.
- 1,2-dichloropropane remains in the atmosphere for sufficient time to disperse widely, as evidenced by its presence in ambient air.

TOXICITY

- 1,2-dichloropropane may be toxic to humans if absorbed through the skin or inhaled.
- Inhalation or contact may irritate or burn skin and eyes.
- Vapours may cause dizziness or suffocation.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1,150				350
Ontario				2,400	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

2,4-Dichlorophenoxyacetic acid (2,4-D)
CAS No. 94-75-7
$C_8H_6Cl_2O_3$

WHAT IS 2,4-DICHLOROPHENOXYACETIC ACID?

2,4-Dichlorophenoxyacetic acid (2,4-D) occurs as a white to yellow crystalline powder, which is odorless when pure.

USES

There are approximately 300 registered products containing 2,4-D, including herbicides in solutions, dispersions or emulsions in water and/or oil. Various 2,4-D esters, salts and mixtures with other herbicides have been marketed by many companies over the past 40 years. A sequestering agent is included in commercial formulations to prevent precipitation of calcium or magnesium salts by hard water.

SOURCES

There are no natural sources of 2,4-D. It is produced commercially by the chlorination of phenol to form 2,4-dichlorophenol, which reacts with monochloroacetic acid to form 2,4-dichlorophenoxyacetic acid. Primary sources include chemical plants involved in the manufacture of 2,4-D and land to which it has been applied as a herbicide.

2,4-D was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 2,4-D might include:

- Breathing or coming in contact with 2,4-D compounds, such as herbicides, in a working environment.
- Breathing or coming in contact with 2,4-D compounds as a result of working or living near fields sprayed and treated with 2,4-D compounds.
- Ingestion of contaminated food products and drinking water.

Ambient air concentrations of 2,4-Dichlorophenoxyacetic acid were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released on land, 2,4-D readily biodegrades (typical half-lives <1 day to several weeks).
- Adsorption to soils depends upon organic content and pH of the soil.
- Leaching to groundwater is commonly a significant process in coarse-grained sandy soils with low organic content or in very basic soils.
- If released to water, 2,4-D biodegrades (typical half-lives are from 10 to >50 days). It is more persistent in oligotrophic waters and where high concentrations are released.
- It does not accumulate in aquatic organisms or appreciably absorb to sediments, especially at high pH values.
- If released in air, it is subject to photooxidation (estimated half-life of 1 day), gravitational settling of aerosols and rainout (due to its significant solubility in water).

TOXICITY

- The potential for carcinogenicity of 2,4-D is real but very limited and not potent.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	100				10
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2001

Chemical Fact Sheets

1,4-Dichlorobenzene
CAS No. 106-46-7
$C_6H_4Cl_2$

WHAT IS 1,4-DICHLOROBENZENE?

1,4-Dichlorobenzene is a white or colorless solid at room temperature with a strong, pungent odor that can be detected at very low concentrations. When exposed to air, it slowly changes from a solid to a vapor. Other names include para-DCB (or p-DCB), Paramoth, para crystals and paracide.

USES

1,4-Dichlorobenzene is used to control moths (in the form of mothballs), molds and mildew, and to deodorize restrooms and waste containers.

SOURCES

Most 1,4-Dichlorobenzene in our environment comes from its use in moth repellent products and in toilet deodorizer blocks. There are no natural sources of 1,4-Dichlorobenzene.

1,4-Dichlorobenzene was not reportable to the NPRI in 1997.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,4-Dichlorobenzene might include:

- Breathing indoor air in public restrooms and homes that use 1,4-Dichlorobenzene as a deodorizer.
- Breathing air around some mothballs (check the label).
- Breathing workplace air where 1,4-Dichlorobenzene is manufactured.
- Drinking contaminated water around hazardous waste sites.
- Eating foods such as pork, chicken, and eggs that are contaminated with 1,4-Dichlorobenzene from its use as an odor control product in animal stalls.
- Eating fish from contaminated waters.
- Drinking human breast milk from mothers exposed to 1,4-Dichlorobenzene.

Table 2: Annual Averages of Ambient Levels of 1,4-Dichlorobenzene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.1933	0.1787
Edmonton Central	0.1410	0.1345
Edmonton East	0.0572	0.0688

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, 1,4-Dichlorobenzene breaks down to harmless products in approximately one month.
- It does not dissolve easily in water.
- It evaporates readily from water and soil.
- It is not easily broken down by soil organisms.
- It is taken up and retained by plants and fish.

TOXICITY

- There is no evidence that moderate use of common household products containing 1,4-Dichlorobenzene will result in harmful health effects.
- Very high usage of 1,4-Dichlorobenzene products in the home can result in dizziness, headaches, and liver problems.
- High levels of 1,4-Dichlorobenzene in the workplace may result in painful irritation of the nose and eyes.
- Ingestion of p-DCB products may lead to development of skin blotches and a decrease in the number of red blood cells.
- Animal studies indicate that breathing or eating p-DCB can harm the liver, kidney, and blood.
- The Department of Health and Human Services has determined that 1,4-Dichlorobenzene may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	1,080				450
Ontario				95	

Adapted from:
1,4-Dichlorobenzene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Dicamba
CAS No. 1918-00-9
$C_8H_6Cl_2O_3$

WHAT IS DICAMBA?

Dicamba is a pale, odorless, crystalline herbicide.

USES

There are approximately 87 products containing dicamba registered for use in Canada. Dicamba is used for broadleaf weed control in turf areas, on cropland and for brush and weed control on non-crop areas.

SOURCES

Herbicidal application of dicamba releases the compound directly to the environment and is therefore the primary environmental emission source. Dicamba is found frequently in summer precipitation samples in Alberta, with some samples having levels exceeding Canadian Irrigation Water Guidelines.

Sales of dicamba in 1998 in Alberta totaled 138,290 kg active ingredient.

ENVIRONMENTAL LEVELS AND EXPOSURE

Average ambient levels in air measured in 1999 were 0.0016 ng/m3 (for 4 sites).

Exposure to Dicamba might include:

- Breathing Dicamba dust while using it or products that contain it.
- Breathing it or touching it in the workplace if you are involved in its manufacture, formulation and application.
- Drinking contaminated water.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Dicamba is released directly to the environment by its application as a herbicide.
- It is broken down easily by microorganisms in soil and water.
- Removal from water occurs primarily through the break down by water microorganisms and reaction with sunlight.
- It does not bind strongly to soils. It binds more strongly to soils that are acidic than soils that are basic.
- It can move into groundwater.
- In soil, about one-half of the total amount breaks down every 4 to 555 days, with the typical length of time being 1 to 4 weeks)
- It will remain significantly longer in soils that are dry compared to soils that are wet.
- In air, it remains in vapour form or sticks to particles in the air. About one-half of the total amount of vapour is thought to break down from chemicals generated in the presence of sunlight, every 6 days.
- Dicamba that is stuck to particles in the atmosphere will move to soil or water as

TOXICITY

- Dicamba is slightly toxic by ingestion and slightly toxic by inhalation or dermal exposure
- In some individuals dicamba is a skin sensitizer and may cause skin burns, but there is no evidence that dicamba is absorbed through the skin
- Appetite loss, weight loss, vomiting, depression, muscular weakness, and even death may occur if exposed to sufficient quantities.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.
Extoxnet, Pesticide Information Profiles. Dicamba. 1996

Chemical Fact Sheets

DEHP, Di(2-ethylhexyl)phthalate
CAS No. 117-81-7
$C_{24}H_{38}O_4$

WHAT IS DEHP OR DI(2-ETHYLHEXYL)PHTHALATE?

Di(2-ethylhexyl)phthalate is a manufactured chemical that makes plastic more flexible. It is also called DEHP. DEHP is a colorless liquid with almost no odor. Trade names for DEHP are Platinol DOP, Octoil, Silicol 150, Bisoflex 81, and Eviplast 80.

USES

DEHP is used in the manufacture of polyvinyl chloride (PVC) plastic products such as toys, vinyl upholstery, shower curtains, adhesives, and coatings. It is also used in inks, pesticides, cosmetics, and vacuum pump oil. It is used to detect leaks in protective face gear, and as a test material for filtration systems.

SOURCES

There are no natural sources of DEHP. Concentrations of DEHP in the environment are normally a result of emissions during the manufacturing process. Plastics containing DEHP can be a source to the environment if allowed to degrade in landfills or as litter.

Table 1: National Pollutant Release Inventory 2001 DEHP Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5299	2001	Dominion Tanners Edmonton	Edmonton	AB	0.00	0.02	0.00	tonnes
5336	2001	Weatherford Completion Systems - Inflatable Packer Products	Calgary	AB	0.00	1.20	0.00	tonnes
				Total	**0.00**	**1.22**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to DEHP might include:

- Use of medical products packaged in plastic such as blood products.
- Ingestion of some foods packaged in plastics, especially fatty foods like milk products, fish and seafood, and oils.
- Drinking well water near waste sites.
- Breathing workplace air or indoor air where DEHP is released (from plastic materials, coatings, and flooring).
- Fluids from plastic intravenous tubing if used extensively as for kidney dialysis.

Exposure to DEHP by the above-noted routes is normally associated with low concentrations.

Ambient air concentrations of DEHP were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- DEHP evaporates into air and dissolves into water at very low rates.
- It attaches strongly to soil particles.
- Small organisms in surface water or soil break it down into harmless compounds.
- DEHP does not break down easily in deep soil, or in lake or river bottoms.
- DEHP is often found in plants, fish, and other animals; however, animals high on the food chain are able to break it down, resulting in lower tissue concentrations.

TOXICITY

- Adverse effects in animals were generally seen only at high doses or with long term exposures. There is currently very little data regarding the toxicity of DEHP to humans.
- DEHP can not be taken up easily through the skin, and is therefore of little concern from this exposure pathway.
- The US Department of Health and Human Services has determined that DEHP may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	50				5
Ontario				50	

Adapted from:
DEHP ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

July 2003

Chemical Fact Sheets

Decane
CAS No. 124-18-5
$C_{10}H_{22}$

WHAT IS DECANE?

Decane is a colorless liquid.

USES

Decane's uses include organic synthesis, solvent, and the standardization of aircraft engine carburetors. It is also used in the calibration of jet engine nozzles and in jet fuel research.

SOURCES

Decane is a constituent in the paraffin fraction of crude oil and natural gas. It is released to the environment via the manufacture, use, and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of n-Decane into the environment from solvent based building materials, printing pastes, paints, varnishes, adhesives and other coatings, landfills and waste incinerators, vulcanisation and extrusion operations during rubber and synthetic production, and the combustion of gasoline, fuels, and plastics.

Decane was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Decane might include:

- Breathing low background levels in the environment. This is the most probable route of human exposure. Breath samples have demonstrated exposure among urban residents. Extensive monitoring data indicates that n-Decane is a widely occuring atmospheric pollutant.
- Breathing higher levels of contaminated airinthe workplace or from using products containing it.
- Breathing exhaust fumes from motor vehicles. The ground level concentration in a car park may be 140 $\mu g/m^3$, on a motorway 1,060 $\mu g/m^3$.

Table 2: Annual Averages of Ambient Levels of Decane in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.5395	0.5127
Edmonton Central	3.2096	3.8826
Edmonton East	0.6237	0.9039

ENVIRONMENTAL FATE AND BEHAVIOUR

- Breakdown of n-decane may occur in soil and water, but evaporation and binding to soil are considered more important.
- It binds strongly to soil and may attach itself to suspended particles in water.
- It may build up in the bodies of aquatic animals.
- It is expected to exist almost entirely as a vapor in air.

TOXICITY

Effects of Decane on human health and the environment depend on how much Decane is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you breathe it or touch it, it may irritate or burn your skin and eyes.
- Decane may cause suffocation in high concentrations, and may lessen the activity in the brain and spinal cord.
- It is considered relatively nontoxic.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario		60,000			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Cumene
CAS No. 98-82-8
C_9H_{12}

WHAT IS CUMENE?

Cumene is a colorless liquid with a sharp, penetrating, aromatic gasoline-like odor.

USES

Cumene is used as a constituent for some petroleum-based solvents used as paint and enamel thinners. It is a component of high octane aviation fuel. Cumene is also used in Styrene, Phenol, Acetone, Acetophenone and alpha-methylstyrene production. Minor amounts of it are used in gasoline blending. It is a proposed replacement for Benzene in many of its industrial uses.

SOURCES

Cumene can be produced from coal tar naptha fractions or from petroleum, or from propylene and benzene. It is also a natural constituent of a variety of foods and vegetation.

Table 1: National Pollutant Release Inventory 2001 Cumene Emissions (tonnes/year)

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
5351	2001	Baker Petrolite Corporation - Baker Petrolite Corporation -	Calgary	AB	0.00	0.00	0.89	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	0.45	0.00	0.00	tonnes

NPRI ID	Report Year	Facility Name	City	Province	On-Site Releases	Transfers for Disposal	Transfers for Recycling	Units
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	10.93	0.00	0.00	tonnes
				Total	**11.38**	**0.00**	**0.89**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposures to cumene might include:

- Breathing air contaminated with cumene. This is the main way in which people are exposed. You are more likely to be exposed if you work in industrial settings where cumene is processed or produced. The human odor perception level for Cumene is 0.06 mg/m^3 (0.012 ppm).
- Breathing low levels in contaminated air at a gasoline station or in the presence of gasoline or other petroleum products.
- Eating or drinking food and water contaminated with it.
- Touching it or products that contain it.

Table 2: Annual Averages of Ambient Levels of Cumene in Alberta (µg/m^3)

Station	1997	1998
Calgary Central	0.0997	0.1073
Edmonton Central	0.0850	0.0848
Edmonton East	0.0930	0.0741

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, about one-half of the total amount breaks down from reaction with chemicals generated in the presence of sunlight every 5-14 days.
- It is broken down by organisms in the soil, or evaporates from the soil surface.
- It binds strongly to soil and is not expected to move into groundwater.

- It is broken down by microorganisms in water, or evaporates from the water surface. About one-half of the total amount is broken down by microorganisms every 14 days.
- It is not expected to build up in animals.

TOXICITY

Effects of cumene on human health and the environment depend on how much Cumene is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- When absorbed through skin, the major portion is excreted in the urine as alcohols or acids.
- Inhalation may irritate or burn the skin and the eyes.
- Breathing, eating or drinking large amounts of it may cause effects including nausea, vomiting, salivation, pain in the middle of the chest, cough, confusion, and hoarseness.
- It may be fatal if inhaled, injested ir absorbed through the skin in large quantities.
- You are more likely to be affected by exposure to cumene if you have kidney, chronic respiratory, liver or skin disease.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	500				245
Ontario				400	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Copper
CAS No. 7440-50-8
Cu

WHAT IS COPPER?

Copper is a reddish, lustrous, malleable solid with no odor.

USES

Copper has a wide variety of industrial and household uses. It is found in wires in electrical and electronic products, in corrosion-resistant piping, and in the electroplated protective coatings on some cooking utensils. It may be used as an ingredient in pigments. Insecticides, herbicides, and fungicides have been created that contain copper.

SOURCES

Copper is widely distributed in nature in the elemental state. Occurrence of all forms of Copper in the earth's crust is 70 ppm, in seawater: 0.001-0.02 ppm.

On a global basis, the amount of copper entering the air because of man's activities are approximately three times higher than the amount entering the air from natural sources. Non-ferrous metal production is a large contributor of atmospheric copper.

Table 1: National Pollutant Release Inventory 2001 Copper Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
4874	2001	Agrium Products Inc. - Fort Saskatchewan Nitrogen Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
2134	2001	Agrium Products Inc. - Redwater Fertilizer Operations	Redwater/Municipal Didtrict of Sturgeon	AB	0.06	0.00	0.00	tonnes
5293	2001	All Brite Metal Finishing Ltd. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	4.07	11.33	0.00	tonnes
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	13.41	0.90	tonnes
5220	2001	Bell Pole Company - Carseland Operation	Carseland	AB	0.00	0.03	0.00	tonnes
4946	2001	Canam Steel Works - Calgary	Calgary	AB	0.00	0.20	16.60	tonnes
5208	2001	Custom Evironmental Services Ltd - Edmonton Waste Brokerage	Edmonton	AB	0.00	0.00	61.85	tonnes
5253	2001	Cutler-Hammer - Low Voltage Control Assemblies	Airdrie	AB	0.08	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.16	54.72	0.00	tonnes
6514	2001	Envirofor Preservers (AB) Ltd. - Edmonton Preservation Plant	Edmonton	AB	0.12	0.41	0.00	tonnes
5207	2001	Futura Forest Products - Alberta Wood Preservers	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5367	2001	GenAlta Recycling Inc.	Edmonton	AB	0.00	5.00	0.00	tonnes
5282	2001	Landmark Feeds Inc - Strathmore	Strathmore	AB	0.01	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5202	2001	Maple Leaf Metal Industries Ltd.	Edmonton	AB	0.00	0.06	2045.46	tonnes
5622	2001	Modine of Canada, Ltd. - Edmonton, AB	Edmonton	AB	0.01	0.00	11.47	tonnes
5340	2001	Natal Forest Products Ltd.	Coleman	AB	0.00	0.02	0.00	tonnes
3775	2001	Navajo Metals	Calgary	AB	0.00	10.00	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.01	0.02	0.00	tonnes
5398	2001	Ridley Inc - Feedrite	Linden	AB	0.00	0.00	0.00	tonnes
5399	2001	Ridley Inc. - Feedrite	St. Paul	AB	0.00	0.00	0.00	tonnes
6500	2001	Ridley Inc. - Quality Feeds	Lacombe	AB	0.00	0.00	0.00	tonnes
5212	2001	Rocky Wood Preservers	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
5204	2001	Sercel Canada Ltd.	Calgary	AB	0.00	0.00	1.93	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	0.00	0.02	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.10	0.00	tonnes
0530	2001	Spectra Premium Industries - SPI Heat Transfer Division	Calgary	AB	0.00	0.00	4.71	tonnes
2517	2001	Spray Lake Sawmills (1980) Ltd.	Cochrane	AB	0.00	0.09	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	0.08	0.00	0.01	tonnes
4827	2001	Sunpine Forest Products Ltd. - Treating Plant	Sundre	AB	0.00	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	0.07	0.00	115.22	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	0.00	0.18	0.00	tonnes
4885	2001	The Westaim Corporation - Fort Saskatchewan Site	Fort Saskatchewan	AB	0.00	2.57	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	1.30	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	12.29	0.00	2.94	tonnes
5368	2001	Umicore Canada Inc. - Cobalt Production Facility	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
5241	2001	Unifeed Limited - Unifeed Mill - Lethbridge	Lethbridge	AB	0.00	0.00	0.00	tonnes
				Total	**16.96**	**99.45**	**2261.10**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Copper were not reported in 1997 or 1998 in Alberta.

Exposure to Copper might include:

- Breathing copper dust generated by copper processing operations is the primary source of air exposures.
- Breathing tobacco smoke and stack emissions of coal burning power plants.

- Breathing fumes in industrial operations. Fumes occur in copper and brass plants and in welding copper containing metals
- Drinking or eating food with higher levels of copper from the vicinity of copper mines or smelting works, if the water and pasture have been contaminated with copper.
- Drinking water that has contacted Copper pipes. The reaction of soft water with the copper pipes that are used in some household plumbing systems contributes to the copper levels in water at the tap.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Copper may be bound in rocks and soil.
- When copper-containing rocks and soil are exposed to acid rain or other acid conditions the copper may dissolve into the water.
- There is no evidence that it is broken down by microorganisms in water

TOXICITY

Effects of Copper on human health and the environment depend on the amount of Copper present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- It is not clear what the impact of long-term exposure to Copper is. Many cases of illness formerly attributed to copper poisoning are now believed to have been due to other metals, especially lead.
- If you are exposed to Copper itself there will probably be little or no toxic effects, although there are conflicting reports in literature.
- Copper salts are generally believed to be more toxic than Copper itself.
- When acid conditions increase the amount of copper found in a water body, microorganism and aquatic animal populations may be changed.
- In soils exposed to acid rain, high levels of copper may be directly toxic to certain soil microorganisms and can disrupt important microbial processes in soil.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	10/1				1/0.1
Ontario				50	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Cobalt
CAS No. 7440-48-4
Co

WHAT IS COBALT?

Cobalt is a compound that occurs in nature. It occurs in many different chemical forms. Pure cobalt is a steel-gray, shiny, hard metal.

USES

All cobalt used in industry is imported or obtained by recycling scrap metal that contains cobalt. It is used in industry to make alloys (mixtures of metals), colored pigments, and as a drier for paint and porcelain enamel used on steel bathroom fixtures, large appliances, and kitchen wares.

SOURCES

Small amounts of cobalt naturally occur in food. In addition, vitamin B12 is a cobalt-containing compound that is essential for good health.

Some important natural sources of cobalt in the environment are soil, dust, and seawater. Cobalt is also released to the environment from burning coal and oil, and from exhaust from cars and trucks.

Table 1: National Pollutant Release Inventory 2001 Cobalt Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
4650	2001	Criterion Catalysts & Technologies Canada Inc. - CC&T CI	Medicine Hat	AB	0.03	0.03	1.99	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.02	10.81	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	0.10	3.43	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.00	0.00	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	0.00	3.01	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.00	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	10.98	0.00	2.80	tonnes
4884	2001	Umicore Canada Inc. - Battery Materials Production	Leduc	AB	0.00	0.04	0.00	tonnes
5368	2001	Umicore Canada Inc. - Cobalt Production Facility	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
				Total	**11.12**	**17.33**	**4.79**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Cobalt were not reported in 1997 or 1998 in Alberta.

Exposure to Cobalt might include:

- Breathing and eating or drinking cobalt at low levels in air, water, and food. Everyone is exposed to small amounts of cobalt this way.
- Breathing and eating or drinking cobalt at higher levels near hazardous waste sites containing cobalt, or while working in industries that process cobalt or make products containing it.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Cobalt stays in the air for a few days.
- Pure cobalt does not dissolve in water, but some of its compounds do.
- Cobalt can stay for years in water and soil. It can move from the soil to underground water.
- Cobalt is taken up by plants from the soil.

TOXICITY

Effects of Cobalt on human health and the environment depend on the amount of Cobalt present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Cobalt has both beneficial and harmful effects on human health. Cobalt is beneficial because it is part of Vitamin B12. Cobalt has also been used as a treatment for anemia, because it causes red blood cells to be produced.
- Exposure to high levels of cobalt can harm your health. Effects on the lungs, including asthma, pneumonia, and wheezing, have been found in workers who breathed high levels of cobalt in the air.
- In the 1960s, some breweries added cobalt to beer to stabilize the foam. Some people who drank large quantities of the beer experienced nausea, vomiting, and serious effects on the heart. However, effects on the heart were not seen in people with anemia or pregnant women treated with cobalt.
- Animal studies have found problems with the development of the fetus in animals exposed to high concentrations of cobalt during pregnancy. However, cobalt is also essential for the growth and development of certain animals.
- The International Agency for Research on Cancer has determined that cobalt is a possible carcinogen to humans.
- Studies in animals have shown that cobalt causes cancer when placed directly into the muscle or under the skin. Cobalt did not cause cancer in animals that were exposed to it in the air, in food, or in drinking water. Studies on people are inconclusive regarding cobalt and cancer.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.5				0.05
Ontario				0.1	

Adapted from:
Cobalt ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Chromium
CAS No. 7440-47-3
Cr

WHAT IS CHROMIUM?

Chromium is a naturally occurring element. Chromium has three main forms chromium(0), chromium(III), and chromium(VI). Chromium(III) compounds are stable and occur naturally, in the environment. Chromium(0) does not occur naturally and chromium (VI) occurs only rarely. Chromium compounds have no taste or odor.

USES

Chromium(III) is an essential nutrient in our diet, but we need only a very small amount. Other forms of chromium are not needed by our bodies. Chromium is used for making steel and other alloys, bricks in furnaces, and dyes and pigments, and for chrome plating, leather tanning, and wood preserving.

SOURCES

Chromium is found naturally in rocks, soil, plants, animals, and in volcanic dust and gases.

Table 1: National Pollutant Release Inventory 2001 Chromium Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5293	2001	All Brite Metal Finishing Ltd. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
1106	2001	AltaSteel Ltd. - AltaSteel Ltd	Edmonton	AB	4.50	9.65	0.00	tonnes
5305	2001	Armor Wood Products Ltd.	Edmonton	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	56.29	1.88	tonnes
5220	2001	Bell Pole Company - Carseland Operation	Carseland	AB	0.00	0.03	0.00	tonnes
4946	2001	Canam Steel Works - Calgary	Calgary	AB	0.00	0.10	13.70	tonnes
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	0.00	38.95	0.00	tonnes
5253	2001	Cutler-Hammer - Low Voltage Control Assemblies	Airdrie	AB	0.08	0.00	0.00	tonnes
5299	2001	Dominion Tanners Edmonton	Edmonton	AB	0.00	7.35	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.03	0.00	0.00	tonnes
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.70	67.12	0.00	tonnes
6514	2001	Envirofor Preservers (AB) Ltd. - Edmonton Preservation Plant	Edmonton	AB	0.10	1.96	0.00	tonnes
5313	2001	Foothills Steel Foundry Ltd. - Foothills Steel Foundry	Calgary	AB	0.03	0.04	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5207	2001	Futura Forest Products - Alberta Wood Preservers	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5229	2001	Harris Steel Services Ltd. - Leduc Plant	Leduc	AB	0.00	0.28	0.00	tonnes
2446	2001	I-XL Industries Ltd. - Medicine Hat Brick & Tile Plant	Medicine Hat	AB	0.36	0.27	0.00	tonnes
2630	2001	Johns Manville Canada Inc. - Innisfail Plant	Innisfail	AB	0.00	5.61	0.00	tonnes
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	0.75	0.00	0.00	tonnes
0848	2001	Lethbridge Iron Works	Lethbridge	AB	0.00	0.25	0.00	tonnes
5376	2001	M.A. Steel Foundry Ltd.	Calgary	AB	0.00	0.00	0.00	tonnes
5340	2001	Natal Forest Products Ltd.	Coleman	AB	0.00	0.02	0.00	tonnes
3523	2001	Nexen Chemicals Canada Limited Partnership - Bruderheim	Bruderheim	AB	5.88	0.00	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.02	0.00	0.00	tonnes
5212	2001	Rocky Wood Preservers	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
1036	2001	Sheerness Generating Station	Hanna	AB	59.12	0.00	4.88	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	0.00	0.08	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.06	0.00	tonnes
2517	2001	Spray Lake Sawmills (1980) Ltd.	Cochrane	AB	0.00	0.11	0.00	tonnes
4827	2001	Sunpine Forest Products Ltd. - Treating Plant	Sundre	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.38	0.00	tonnes
2286	2001	TransAlta Corporation - Keephills Thermal Generating Plant	Duffield	AB	13.22	0.00	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	23.71	0.00	6.23	tonnes
				Total	**108.50**	**188.47**	**26.78**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Chromium were not reported in 1997 or 1998 in Alberta.

Exposure to Chromium might include:

- Breathing contaminated workplace air (stainless steel welding, chromate or chrome pigment production, chrome plating, leather tanning)
- Handling or breathing sawdust from chromium treated wood
- Breathing contaminated air, or ingesting water, or food from soil near waste sites or industries that use chromium

- Very small amounts of chromium(III) are in everyday foods

ENVIRONMENTAL FATE AND BEHAVIOUR

- Manufacturing, disposal of products or chemicals containig chromium, or burning of fossil fuels release chromium to the air, soil, and water.
- Chromium particles settle from air in less than 10 days.
- Chromium sticks strongly to soil particles.
- Most chromium in water sticks to dirt particles that fall to the bottom; only a small amount dissolves.
- Small amounts move from soil to groundwater.
- Fish don't take up or store chromium in their bodies.

TOXICITY

Effects of Chromium on human health and the environment depend on the amount of Chromium present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- All forms of chromium can be toxic at high levels, but chromium(VI) is more toxic than chromium(III).
- Breathing very high levels of chromium(VI) in air can damage and irritate your nose, lungs, stomach, and intestines. People who are allergic to chromium may also have asthma attacks after breathing high levels of either chromium(VI) or (III).
- Long term exposures to high or moderate levels of chromium(VI) cause damage to the nose (bleeding, itching, sores) and lungs, and can increase your risk of non-cancer lung diseases.
- Ingesting very large amounts of chromium can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death.
- We don't know if chromium harms the fetus or our ability to reproduce. Mice that ingested large amounts of chromium had reproductive problems and offspring with birth defects.
- Skin contact with liquids or solids containing chromium(VI) may lead to skin ulcers. Some people have allergic reactions including severe redness and swelling.
- The Department of Health and Human Services has determined that certain chromium(VI) compounds are known carcinogens. This is based on increased lung cancer in some workers who were exposed to chromium. Animal studies also indicate chromium(VI) is a carcinogen. We do not have enough data to determine if chromium(0) or chromium(III) are carcinogens.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		1			
Texas	0.1-1				0.01-0.1
Ontario (di-, tri-, and hexavalent forms)				1.5	

Adapted from:
Chromium ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Chlorpyrifos
(O,O-diethyl O-(3,5,6-trichloro-2-pyridyl) phosphorothioic acid)
CAS No. 2921-88-2
$C_9H_{11}Cl_3NO_3PS$

WHAT IS CHLORPYRIFOS?

Chlorpyrifos is an insecticide that is a white crystal-like solid with a strong odor of sulfur.

USES

Chlorpyrifos is widely used in homes and on farms. In the home, it is used to control cockroaches, fleas, and other structural pests; it is also used in some pet flea and tick collars. On the farm, it is used to control ticks on cattle and as a spray to control crop pests.

SOURCES

- There are no natural sources of Chlorpyrifos to the environment. Chlorpyrifos enters the environment through direct application to crops, lawns, and pets. It may also enter the environment through volatilization, spills, and the disposal of Chlorpyrifos waste.

Chlorpyrifos was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Chlorpyrifos may include:
- Inhalation or skin contact during application to control household pests such as fleas or cockroaches.
- Breathing air in a field where Chlorpyrifos was sprayed on crops.

Ambient air concentrations of Chlorpyrifos were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Chlorpyrifos is moderately persistent in soils. It adsorbs to soil particles and is not readily soluble in water. Leaching to groundwater is of little concern.
- Once in the environment, it is broken down by sunlight, bacteria, or other chemical processes.

TOXICITY

- Chlorpyrifos is an organophosphate insecticide, which disrupts proper functioning of cholinesterase (an enzyme responsible for nerve function).
- Chlorpyrifos is readily absorbed into the bloodstream through the gastrointestinal tract if ingested, through the lungs if inhaled, or through the skin if there is dermal exposure.
- Acute exposure to Chlorpyrifos results in nervous system effects such as headaches, blurred vision, and salivation. It may also result in unstable blood pressure, diarrhea, nausea, and muscle cramps.
- Ingesting very high concentrations of Chlorpyrifos can cause paralysis, seizures, loss of consciousness, and death, while high concentrations can cause dizziness, runny nose, confusion, salivation, and rapid heart rate.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas		2			0.2
Ontario					

Adapted from:
Chlorpyrifos ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

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Chemical Fact Sheets

Chloroform
CAS No. 67-66-3
$CHCl_3$

WHAT IS CHLOROFORM?

Chloroform is a colorless liquid with a pleasant, nonirritating odor and a slightly sweet taste. It will burn only when it reaches very high temperatures. Other names for chloroform are trichloromethane and methyl trichloride.

USES

In the past, chloroform was used as an inhaled anesthetic during surgery, but it isn't used that way today. Today, chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water.

SOURCES

Sources of chloroform are associated with its manufacture and use.

Table 1: National Pollutant Release Inventory 2000 Chloroform Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.13	1.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.35	0.00	0.00	tonnes
				Total	**0.49**	**1.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of chloroform were not reported in 1997 or 1998 in Alberta.

Exposure to Chloroform might include:
- Drinking water or beverages made using water containing chloroform
- Breathing indoor or outdoor air containing it, especially in the workplace
- Eating food that contains it
- Skin contact with chloroform or water that contains it, such as in swimming pools

Table 2: Annual Averages of Ambient Levels of Chloroform in Alberta (μg/m^3)

Station	1999	2000
Calgary Central	0.1390	0.1340
Edmonton Central	0.1151	0.1382
Edmonton East	0.1052	0.1126

ENVIRONMENTAL FATE AND BEHAVIOUR

- Chloroform evaporates easily into the air.
- Most of the chloroform in air breaks down eventually, but it is a slow process.
- The breakdown products in air include phosgene and hydrogen chloride, which are both toxic.
- It doesn't stick to soil very well and can travel through soil to groundwater.
- Chloroform dissolves easily in water and some of it may break down to other chemicals.
- Chloroform lasts a long time in groundwater.
- Chloroform doesn't appear to build up in great amounts in plants and animals.

TOXICITY

Effects of Chloroform on human health and the environment depend on the amount of Chloroform present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing about 900 parts of chloroform per million parts air (900 ppm) for a short time can cause dizziness, fatigue, and headache. Breathing air, eating food, or drinking water containing high levels of chloroform for long periods of time may damage your liver and kidneys. Large amounts of chloroform can cause sores when chloroform touches your skin.
- It isn't known whether chloroform causes reproductive effects or birth defects in people.
- Animal studies have shown that miscarriages occurred in rats and mice that breathed air containing 30–300 ppm chloroform during pregnancy and also in rats that ate chloroform during pregnancy. Offspring of rats and mice that breathed chloroform

during pregnancy had birth defects. Abnormal sperm were found in mice that breathed air containing 400 ppm chloroform for a few days.

- The Department of Health and Human Services (DHHS) has determined that chloroform may reasonably be anticipated to be a carcinogen. Rats and mice that ate food or drank water with chloroform developed cancer of the liver and kidneys.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	98				10
Ontario				1	

Adapted from:
Chloroform ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
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Chemical Fact Sheets

Chlorine dioxide
CAS No. 10049-04-4
ClO_2

WHAT IS CHLORINE DIOXIDE ?

Chlorine dioxide is a yellow to reddish-yellow gas at room temperature, and has an unpleasant odor similar to chlorine and nitric acid.

USES

Uses of Chlorine dioxide is used for bleaching cellulose, flour, leather, oils, textiles, and beeswax. It is also used in the purification, taste and odor control of water. The processes of cleaning and detanning of leather use Chlorine dioxide. It also has applications in the manufacture of chlorine salts; as an oxidizing agent; a bactericide and as an antiseptic. It is used for swimming pool water purification.

SOURCES

Table 1: National Pollutant Release Inventory 2001 Chlorine Dioxide Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0001	2001	Alberta Pacific Forest Industries Inc.	Boyle	AB	14.95	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	1.07	0.00	0.00	tonnes
				Total	**16.02**	**0.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Chlorine dioxide were not reported in 1997 or 1998 in Alberta.

ENVIRONMENTAL FATE AND BEHAVIOUR

- It breaks down to other chemicals in open water bodies and reservoirs.
- It can remain for days in clean distribution systems.

TOXICITY

Effects of Chlorine dioxide on human health and the environment depend on the amount of Chlorine dioxide present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing Chlorine dioxide for short periods of time can irritate the human eyes respiratory system, and in large amounts can lead to death.
- Chlorine dioxide has a carcinogenicity classification of D: not classifiable as to human carcinogenicity.
- Chlorine dioxide is by itelf not likely to cause environmental harm at levels normally found in ambient air.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines ($\mu g/m^3$)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		2.8			
Texas	2.8				0.28
Ontario				30	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
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Chemical Fact Sheets

Chlorine
CAS No. 7782-50-5
Cl_2

WHAT IS CHLORINE?

Chlorine is a greenish-yellow, diatomic gas, with a suffocating, pungent, irritating odor. Contaminants found in chlorine are traces of bromide, hexachloroethane, hexachlorobenzene, and water.

USES

Companies use Chlorine in the manufacture of chlorinated lime (used to bleach fabric), in the manufacture of synthetic rubber and plastics, in the purification of water, for detinning and dezincing iron, and for disinfecting. Chlorine is also used to manufacture many other chemicals, including trichloroethylene and chlorinated hydrocarbons.

Applications of Chlorine include: biofouling control agent in cooling systems, fungicidal agent for foot baths, root canals or tooth extraction, cleaning dairy equipment, the manufacture of pesticides, and disinfection in laundries.

SOURCES

Chlorine is produced on a large scale by electrolysis from fused chlorides. It is also a coproduct of metals manufacture.

Table 1: National Pollutant Release Inventory 2001 Chlorine Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
3269	2001	Agrium Inc - Carseland Nitrogen Operations	Carseland	AB	0.00	0.00	0.00	tonnes
4874	2001	Agrium Products Inc. - Fort Saskatchewan Nitrogen Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
2134	2001	Agrium Products Inc. - Redwater Fertilizer Operations	Redwater/Municipal Didtrict of Sturgeon	AB	0.00	0.00	0.00	tonnes
3974	2001	Alberta Envirofuels Inc.	Edmonton	AB	0.10	0.00	0.00	tonnes
1091	2001	BP Canada Energy Company - Empress Gas Plant	RM of Cypress	AB	0.00	0.00	0.00	tonnes
5715	2001	BRENNTAG CANADA INC. (AW10) - ALPAK (FORT SASKATCHEWAN)(NPRI	LEDUC	AB	0.00	0.00	0.00	tonnes
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	0.00	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	10.88	0.00	0.00	tonnes
5308	2001	City of Calgary Wastewater - Bonnybrook Wastewater Treatment	Calgary	AB	0.00	0.00	0.00	tonnes
5380	2001	City of Grande Prairie - Water and Wastewater Treatment Plan	Grande Prairie	AB	0.00	0.00	0.00	tonnes
2749	2001	City of Medicine Hat - Wastewater Treatment Plant	Medicine Hat	AB	0.26	0.00	0.00	tonnes
5201	2001	ClearTech Industries Inc. - ClearTech	Edmonton	AB	0.00	0.00	0.00	tonnes
0502	2001	Colgate-Palmolive Canada Inc. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.25	0.00	0.00	tonnes
5341	2001	EPCOR Water Services - Canmore Waterworks Pumphouse #1	Canmore	AB	0.00	0.00	0.00	tonnes
5343	2001	EPCOR Water Services - Canmore Waterworks Pumphouse #2	Canmore	AB	0.00	0.07	0.00	tonnes
3912	2001	EPCOR Water Services - E. L. Smith Water Treatment Plant	Edmonton	AB	0.00	0.00	0.00	tonnes
3910	2001	EPCOR Water Services - Rossdale Water Treatment Plants	Edmonton	AB	0.00	0.00	0.00	tonnes
6509	2001	EPCOR Water Services - Strathmore WaterWorks	Strathmore	AB	0.00	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	10.79	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5232	2001	Lakeside Feeders Ltd. - Lakeside Packers	Brooks	AB	0.00	0.00	0.00	tonnes
0853	2001	Marsulex Inc. - Customer Service Centre	Fort Saskatchewan	AB	0.10	0.00	0.00	tonnes
3523	2001	Nexen Chemicals Canada Limited Partnership - Bruderheim	Bruderheim	AB	0.04	0.00	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	0.00	0.00	0.00	tonnes
2857	2001	Orica Canada Inc - Carseland Works	Carseland	AB	0.00	0.00	0.00	tonnes
6503	2001	Regional Municipality of Wood Buffalo - Fort Chipewyan Water	Fort Chipewyan	AB	0.00	0.00	0.00	tonnes
6501	2001	Regional Municipality of Wood Buffalo - Fort McMurray Water	Fort McMurray	AB	0.00	0.00	0.00	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	21.55	0.00	2.25	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.84	0.00	0.00	tonnes
2132	2001	Sherritt International Corporation - Fort Saskatchewan	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
2796	2001	Sterling Pulp Chemicals Ltd. - Sterling Pulp Chemicals Ltd.,	Grande Prairie	AB	0.42	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	0.00	0.00	0.00	tonnes
5382	2001	The City of Calgary - Bearspaw Water Treatment Plant	Calgary	AB	0.00	0.00	0.00	tonnes
5383	2001	The City of Calgary - Glenmore Water Treatment Plant	Calgary	AB	0.00	0.00	0.00	tonnes
5378	2001	The City of Red Deer - Water Treatment Plant	Red Deer	AB	0.00	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	2.87	0.00	0.00	tonnes
				Total	**48.08**	**0.07**	**2.25**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Chlorine were not reported in 1997 or 1998 in Alberta.

Exposure to Chlorine might include:
- Breathing Chlorine gas during a storage, transportation, or industrial accident involving pressurized liquid Chlorine, during school chemistry experiments, following accidental release of chlorine from swimming pool operations, or while mixing cleaning gases (adding acidic cleaning agents to hypochlorite bleach releases chlorine gases).

ENVIRONMENTAL FATE AND BEHAVIOUR

- Chlorine reacts with organic substances that are found in many source waters to produce a potential carcinogen, chloroform
- Chlorine does not build up in animals.
- Chlorine gas has been found to build up in the leaves of plants.

TOXICITY

Effects of Chlorine on human health and the environment depend on the amount of Chlorine present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Chlorine is highly toxic to aquatic life.
- Exposure to Chlorine may be fatal if large amounts are inhaled or absorbed through skin.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		15			
Texas	15				1.5
Ontario				10	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Chlordecone
CAS No. 143-50-0
$C_{10}Cl_{10}O$

WHAT IS CHLORDECONE?

Chlordecone is a tan to white colored, odorless, crystalline solid.

USES

Chlordecone was registered in Canada as a bait in ant traps. The remaining registration for one ant trap product will expire in December 2000. Chlordecone has not been manufactured or used in the United States since 1978.

In countries other than Canada, chlordecone is used as an insecticide for bananas and ornamental shrubs, and was formerly used for non-bearing citrus trees, tobacco, insects in buildings, lawns, turf, flowers, and indoor and outdoor areas. It is also used as a base material for the production of kelevan. Chlordecone is also reported to have fungicidal activity against apple scab and powdery mildew (a former use). Chlordecone is released as a degradation product of the pesticide MIREX. Chlordecone was also known by the name Kepone.

SOURCES

Chlordecone does not occur naturally in the environment. Its main source is as a pesticide.

There were no sales of chlordecone reported in Alberta in 1998. Chlordecone was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Chlordecone were not reported in 1997 or 1998 in Alberta. Chlordecone was not analyzed for in ambient air samples collected in 1999 (4 sites).

How might I be exposed to Chlordecone?

- Touching or eating soil or food that contains the chemical, especially by eating contaminated fish and seafood. This is the primary exposure route.
- Touching or ingesting contaminated soil near hazardous waste sites.
- Eating contaminated fish or other animals living near hazardous waste sites.
- Nursing infants of mothers living near hazardous waste sites may be exposed to Mirex through their mothers' milk.
- Drinking water or breathing air is not likely to cause exposure because these compounds do not easily dissolve in water or evaporate.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Chlordecone breaks down slowly in the environment, and may stay for years in soil and water.
- It does not evaporate to any great extent from surface water or surface soil.
- Chlordecone does not dissolve easily in water, but sticks easily to soil and sediment particles.
- It is not likely to travel far through the soil and into groundwater.
- It can build up in fish or other organisms that live in contaminated water or that eat other contaminated animals.
- Chlordecone should be sorbed to particulate matter in the atmosphere and thus subject to gravitational settling.

TOXICITY

Effects of Chlordecone on human health and the environment depend on the amount of Chlordecone present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- At high levels, chlordecone may cause damage to the skin, liver, or nervous and reproductive systems.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Carbon tetrachloride
CAS No. 56-23-5
CCl_4

WHAT IS CARBON TETRACHLORIDE ?

Carbon tetrachloride is a manufactured compound that does not occur naturally. It is a clear liquid with a sweet smell that can be detected at low levels. It is also called carbon chloride, methane tetrachloride, perchloromethane, tetrachloroethane, or benziform. Trade names include Benzinoform, Freon 10, Halon 104, Tetraform, or Tetrasol. Carbon tetrachloride is most often found as a colorless gas. It is not flammable and does not dissolve in water very easily.

USES

Carbon tetrachloride was used in the production of refrigeration fluid and propellants for aerosol cans, as a pesticide, as a cleaning fluid and degreasing agent, in fire extinguishers, and in spot removers. Because of its harmful effects, these uses are now banned and it is only used in some industrial applications.

SOURCES

Carbon tetrachloride moves very quickly into the air upon release, so most of it is in the air.

Table 1: National Pollutant Release Inventory 2001 Carbon Tetrachloride Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.08	0.61	0.00	tonnes
				Total	**0.08**	**0.61**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposures to Carbon Tetrachloride may include:

- Breathing contaminated air near manufacturing plants or waste sites.
- Breathing workplace air when it is used.
- Drinking contaminated water near manufacturing plants and waste sites.
- Breathing contaminated air and skin contact with water while showering or cooking with contaminated water.
- Swimming or bathing in contaminated water.
- Contact with or eating contaminated soil at waste sites.

Table 2: Annual Averages of Ambient Levels of Carbon Tetrachloride in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	0.6197	0.7424
Edmonton Central	0.6256	0.7187
Edmonton East	0.6354	0.7051

ENVIRONMENTAL FATE AND BEHAVIOUR

- It evaporates very quickly from soil and surface water.
- Only a small amount sticks to soil particles; the rest evaporates or moves into the groundwater.
- It is very stable in air (lifetime of 30-100 years).
- It can be broken down or transformed in soil and water within several days.
- When it does break down, it forms chemicals that can destroy ozone in the upper atmosphere.
- It does not build up in animals. We do not know if it builds up in plants.

TOXICITY

Effects of Carbon tetrachloride on human health and the environment depend on the amount of Carbon tetrachloride present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- High exposure to Carbon tetrachloride can cause liver, kidney, and central nervous system damage. These effects result from either eating, drinking, or breathing it, and possibly from exposure to the skin. The liver is especially sensitive to carbon tetrachloride because it swells and cells are damaged or destroyed.
- Kidneys are also damaged, causing a buildup of wastes in the blood.
- If exposure is low and then stops, the liver and kidneys can repair the damaged cells and function normally again.
- If exposure is very high, the nervous system, including the brain, is affected.
- People may feel intoxicated and experience headaches, dizziness, sleepiness, and nausea and vomiting. These effects may subside if exposure is stopped, but in severe cases, coma and even death can occur.

- There have been no studies in people on carbon tetrachloride's effects on reproduction or development, but studies in rats showed no adverse effects.
- The Department of Health and Human Services has determined that carbon tetrachloride may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	126				13
Ontario				2.4	

Adapted from:
Carbon tetrachloride ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Carbon monoxide
CAS No. 630-08-0
CO

WHAT IS CARBON MONOXIDE?

Carbon monoxide is a colorless, odorless, tasteless gas.

USES

Carbon monoxide is used in metallurgical operations, in the manufacture of metal carbonyls, and in certain processes for petroleum-type products. It is also used in the manufacture of zinc white pigments. Carbon monoxide is increasingly being used on a very large scale for the production of chemical intermediates. It is used in the production of the intermediate syngas, which can be used in making ammonia. Carbon monoxide is used for the synthesis of commodity chemicals and fuels by using syngas as an alternative to petroleum based feedstocks. It is a reducing agent in blast furnaces. A large variety of chemicals, ranging from saturated hydrocarbons to oxygenated compounds (i.e. methanol), are produced using syngas.

SOURCES

Natural sources such as atmospheric oxidation of methane, forest fires, terpene oxidation and the ocean (where microorganisms produce Carbon Monoxide) are responsible for about 90% of atmospheric Carbon Monoxide; human activity produces about 10%.

A small amount of Carbon monoxide is produced normally in the body. The Carbon monoxide produced within the body is sufficient in amount to maintain a Carbon Monoxide hemoglobin saturation of about 0.4 to 0.7 percent. In some persons with blood disease, such as hemolytic anemia, the Carbon Monoxide saturation may reach 6 percent.

Motor vehicles account for about 55 to 60% of global man-made emissions of Carbon monoxide.

Carbon monoxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Carbon monoxide might include:

- Breathing cigarette smoke: cigarette smoke contains over 2% Carbon monoxide, but the average concentration in the smoke that reaches the lungs is about 400 ppm.
- Breathing automobile exhaust: concentrations as high as 30% have been measured in automobile exhaust gas, although 7% is more common.

Table 2: Annual Averages of Ambient Levels of Carbon Monoxide in Alberta (ppm)

Station	1999	2000
Calgary Central	0.7958	0.6994
Edmonton Central	0.7223	0.7386
Edmonton East	0.3703	0.4029

ENVIRONMENTAL FATE AND BEHAVIOUR

Carbon monoxide is eliminated through the lungs when air free of Carbon monoxide is inhaled.

TOXICITY

Effects of Carbon monoxide on human health and the environment depend on the amount of Carbon monoxide present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Chronic exposure to low concentrations may evoke a gradual and cumulative toxicity. Significantly, active cigarette smokers exhibited pronounced elevations of carboxyhemoglobin in blood levels
- When the Carbon Monoxide level in the air exceeds 3%, death occurs almost at once
- The fetus may be extremely susceptible to effects of Carbon monoxide. Infants born to women who have survived short term exposure to a high concentration of the gas while pregnant often display neurological aftereffects.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		15,000	6,000		
Texas					
Ontario			36,200	15,700	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment June 2003
Science and Technology Branch

Chemical Fact Sheets

Carbon disulfide
CAS No. 75-15-0
CS_2

WHAT IS CARBON DISULFIDE?

Pure Carbon disulfide is a colorless liquid with a pleasant odor that is like the smell of chloroform. The impure Carbon disulfide that is usually used in most industrial processes is a yellowish liquid with an unpleasant odor, like that of rotting radishes. Carbon disulfide evaporates at room temperature, and the vapor is more than twice as heavy as air. It easily explodes in air and also catches fire very easily.

USES

The largest users of Carbon disulfide are chemical companies that make rayon. Companies use smaller amounts of the chemical to make agricultural fumigants, rubber chemicals, and cellulose. Companies also use Carbon disulfide to clean metal surfaces. Olive oil processors use the chemical to extract olive oil.

SOURCES

In nature, small amounts of Carbon disulfide are found in gases released to the earth's surface as, for example, in volcanic eruptions. It occurs naturally mostly due to the action of microorganisms living in sediments found on the sea floor and in marshes. It is found in coastal and ocean waters.

Commercial Carbon disulfide is made by combining carbon and sulfur at very high temperatures. The amount of Carbon disulfide released into the air through natural processes is difficult to judge because it is so small. Most Carbon disulfide in the air and surface water is from manufacturing and processing activities.

Table 1: National Pollutant Release Inventory 2001 Carbon Disulfide Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5239	2001	AEC Oil & Gas - Hythe Brainard Gas Plant	Hythe	AB	0.04	0.00	0.00	tonnes
4823	2001	AEC Oil & Gas - Sexsmith Saddle Hills Gas Plant	Sexsmith	AB	0.08	0.00	0.00	tonnes
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	29.33	0.00	0.00	tonnes
4150	2001	BP Canada Energy Company - Kaybob South Sour Gas Plant	Fox Creek	AB	78.88	0.00	0.00	tonnes
4152	2001	BP Canada Energy Company - West Pembina Gas Plant	NA	AB	23.38	0.00	0.00	tonnes
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	118.70	0.00	0.00	tonnes
5370	2001	Burlington Resources Canada Energy Ltd. - Sturgeon Lake Sout	Valleyview	AB	0.46	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	221.00	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources Ltd. - Wembley Gas Plant	Wembley	AB	1.60	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	2.79	0.00	0.00	tonnes
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	62.47	0.00	0.00	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas Plant	Rocky Mountain House	AB	385.67	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	34.20	0.00	0.00	tonnes
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	12.20	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	7.71	0.00	0.00	tonnes
1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	1.40	0.00	0.00	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	28.77	0.00	0.00	tonnes
2130	2001	Marsulex Inc. - Marsulex Sulphides	Fort Saskatchewan	AB	0.00	0.49	0.00	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	132.05	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	179.57	0.00	0.00	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	8.34	0.00	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	76.90	0.00	0.00	tonnes
1990	2001	Prospec Chemicals	Sturgeon County	AB	0.82	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	1.52	0.00	0.00	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	495.00	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	354.03	0.00	0.00	tonnes
2108	2001	Shell Canada Limited - Waterton Complex	Pincher Creek	AB	124.30	0.00	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	30.32	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	21.02	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.07	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
				Total	2432.60	0.49	0.00	tonnes

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Carbon disulphide were not reported in 1997 or 1998 in Alberta.

Exposure to Carbon disulphide might include:

- Breathing higher levels of contaminated air in the workplace at plants that use Carbon disulphide in their manufacturing processes.
- Breathing air, drinking water, or eating foods that contain it.
- Touching soil, water, or other substances that contain carbon disulphide.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, it breaks down to other chemicals.
- Carbon disulfide moves easily into air from water or when spilled on soil.
- Carbon disulphide does not bind to soils and is not likely to build up in plants and animals.
- Carbon disulphide does not appear to be taken up in significant amounts by the organisms living in water.

TOXICITY

Effects of Carbon disulphide on human health and the environment depend on the amount of Carbon disulphide present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing or otherwise consuming Carbon disulfide for short periods of time adversely affects the human nervous system. Effects range from dizziness and headaches, to blurred vision and agitation, to convulsions, coma, and death. Carbon disulfide vapor also irritates the nose and the throat. Direct skin contact with liquid Carbon Disulfide causes chemical burns. Carbon disulfide can severely damage the eyes. These effects are not likely to occur at levels of Carbon disulfide that are normally found in the environment.
- Breathing or otherwise consuming small amounts of Carbon disulfide over long periods of time can cause potentially permanent damage to the human nervous system. Effects range from tremors and weakness to mental impairment. Carbon disulfide can also damage the human cardiovascular system, resulting in increased blood pressure and coronary heart disease.
- Workers repeatedly exposed to Carbon disulfide have developed gastro-intestinal and immune insufficiency problems. Laboratory studies show that exposure to large

amounts of Carbon disulfide during pregnancy adversely affects the developing fetus of animals. Studies also show that repeated exposure to carbon disulfide causes adverse kidney effects in animals.

- Carbon disulfide by itself is not likely to cause environmental harm at levels normally found in the environment. Carbon disulfide can contribute to the formation of photochemical smog when it reacts with other volatile organic substance in air.
- The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified Carbon disulfide for carcinogenicity.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		30			
Texas	30				3
Ontario				330	

Adapted from:
Carbon Disulfide OPPT Chemical Fact Sheets. United States Environmental Protection Agency 1994. http://www.epa.gov/docs/chemfact.

Carbon Disulfide ToxFAQs. Agency for Toxic Substances and Disease Registry. http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Carbon dioxide
CAS No. 124-38-9
CO_2

WHAT IS CARBON DIOXIDE?

Carbon dioxide is a colorless gas or liquid. It can also be present as a solid in the form of white solid snow-like flakes or cubes (dry ice).

USES

Some uses of Carbon dioxide include: along with oxygen, to avoid a reduction of Carbon dioxide tension of blood, as a refrigerant, carbonation of beverages, in sheilded-arc welding, as a respiration stimulant, and in the manufacture of aspirin.

Carbon dioxide is essential to photosynthesis and plant growth. Carbon dioxide absorbed by leaves & water absorbed by roots are converted to simple sugars by sun's energy in plant chlorophyll. It is necessary for respiration cycle of animals.

SOURCES

Carbon dioxide is found in solution in spring water, which is sometimes so charged with gas under pressure that it is effervescent. It is evolved in large quantities from vents and fissures in earth in volcanic regions. Anthropogenic sources include fuel combustion.

Carbon dioxide was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Carbon dioxide were not reported in 1997 or 1998 in Alberta.

Exposure to Carbon dioxide might include:

- Breathing low background levels in the environment. Analysis of air in temperate zones of earth show 0.027 to 0.036% (vol/vol) of Carbon dioxide.

- Breathing higher levels of contaminated air in mines, pits with rotting vegetation, grain elevators and ships' holds loaded with agricultural products (onions liberate large amounts of carbon dioxide)

TOXICITY

Effects of Carbon dioxide on human health and the environment depend on the amount of Carbon dioxide present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- You are exposed to Carbon dioxide on a daily basis. Breathing in Carbon dioxide on a regular basis at levels from 0.5 to 1.5% at 1 atm is well tolerated by normal individuals.
- Breathing Carbon dioxide vapors may cause dizziness or asphyxiation without warning. Vapors from liquefied gas are initially heavier than air and spread along the ground. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- If you breathe Carbon dioxide at high levels you may suffocate.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	90,000				9,000
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Cadmium
CAS No. 7440-43-9
Cd

WHAT IS CADMIUM?

It doesn't have a definite taste or odor.

USES

Cadmium does not corrode easily and has many uses. In industry and consumer products, it is used for batteries, pigments, metal coatings, and plastics.

SOURCES

Cadmium is a natural element in the earth's crust. All soils and rocks, including coal and mineral fertilizers, have some cadmium in them. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide). Cadmium enters air from mining, industry, and burning coal and household wastes. The cadmium that industry uses is extracted during the production of other metals like zinc, lead, and copper.

Table 1: National Pollutant Release Inventory 2001 Cadmium Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5293	2001	All Brite Metal Finishing Ltd. - Edmonton	Edmonton	AB	0.00	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.01	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.01	0.00	tonnes
				Total	**0.00**	**0.02**	**0.00**	**tonnes**

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ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Cadmium were not reported in 1997 or 1998 in Alberta.

Exposure to cadmium might include:
- Breathing contaminated workplace air (battery manufacturing, metal soldering or welding)
- Eating foods containing it; low levels in all foods (highest in shellfish, liver, and kidney meats)
- Breathing cadmium in cigarette smoke (doubles the average daily intake)
- Drinking contaminated water
- Breathing contaminated air near the burning of fossil fuels or municipal waste

ENVIRONMENTAL FATE AND BEHAVIOUR

- Cadmium particles in air can travel long distances before falling to the ground or water.
- It enters water and soil from waste disposal and spills or leaks at hazardous waste sites.
- It binds strongly to soil particles.
- Some cadmium dissolves in water.
- It doesn't break down in the environment, but can change forms.
- Fish, plants, and animals take up cadmium from the environment.
- Cadmium stays in the body a very long time and can build up from many years of exposure to low levels.

TOXICITY

Effects of Cadmium on human health and the environment depend on the amount of Cadmium present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing high levels of cadmium severely damages the lungs and can cause death.
- Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea.
- Long term exposure to lower levels of cadmium in air, food, or water leads to a build up of cadmium in the kidneys and possible kidney disease. Other potential long term effects are lung damage and fragile bones.
- Animals given cadmium in food or water show high blood pressure, iron-poor blood, liver disease, and nerve or brain damage. We don't know if humans get any of these diseases from eating or drinking cadmium.
- Skin contact with cadmium is not known to cause health effects in humans or animals.
- The Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens. This is based on weak evidence of increased lung cancer in humans from breathing cadmium and on strong evidence from animal studies. We do not know if cadmium causes cancer from skin contact or from eating or drinking contaminated food and water.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.1				0.01
Ontario				2	

Adapted from:
Cadmium ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Butyric Acid
CAS No. 107-92-6
$C_4H_80_2$

WHAT IS BUTYRIC ACID?

Butyric Acid is a colourless, oily liquid with an unpleasant, rancid or persistant, penetrating, butter-like odour.

USES

Butyric Acid is used as a chemical intermediate for cellulose derivatives in laquers and plastics, in pharmaceuticals emulsifiers and disinfectants, a leather tanning agent for deliming and swelling hides, and as a sweetening agent in gasolines. It is also used in butter, cheese, butterscotch, caramel, fruit and nut flavors, in the manufacture of esters, and in animal feed.

SOURCES

Butyric Acid is both a natural and a commercially produced organic compound. Runoff from fire control or dilution water may be corrosive or toxic and cause pollution.

Butyric Acid was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Butyric acid were not reported in 1997 or 1998 in Alberta.

Exposure to Butyric Acid might include:

- Drinking or eating items contaminated with Butyric Acid from fugitive emissions released during its production and formulation, the effluent of commercial processes, sewage treatment plants, landfills, and in the exhaust of motor vehicles.

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to soil, it binds somewhat but can still spread.

- It is not expected to move from either moist or dry soil to the air in large amounts through evaporation.
- In air, about one-half of the total amount breaks down every 8 days from reactions with chemicals produced in sunlight.
- It can move from the air into water and soil by rain and snow.
- It is easily mixed with water.

TOXICITY

Effects of Butyric acid on human health and the environment depend on the amount of Butyric acid present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing, eating, or touching Butyric Acid may cause severe injury or death.
- Effects of breathing or touching Butyric acid may not occur immediately after you are exposed.
- Irritating, toxic or corrosive gases may be released when Butyric acid is burnt.
- Touching Butyric acid may cause moderate burning, and slight epidermal scaling may follow.

GUIDELINES

Guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:
Butyric Acid ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

1,3-Butadiene
CAS No. 106-99-0
C_4H_6

WHAT IS 1,3-BUTADIENE?

1,3-Butadiene is a colorless gas with a mild gasoline-like odor.

USES

About 75% of the manufactured 1,3-butadiene is used to make synthetic rubber. Synthetic rubber is widely used for tires on cars and trucks. 1,3-Butadiene is also used to make plastics including acrylics. Small amounts are found in gasoline.

SOURCES

1,3-Butadiene is a chemical made by processing petroleum.

Table 1: National Pollutant Release Inventory 2001 1,3-Butadiene Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	2.32	0.00	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	14.79	0.11	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	10.60	0.00	0.00	tonnes
				Total	**27.71**	**0.11**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,3-Butadiene might include:

- Breathing urban and suburban air, but these levels are generally very low except in polluted cities or near chemical, plastic, and rubber facilities that use it.
- Breathing contaminated workplace air where it is manufactured or used.
- Breathing contaminated air from car and truck exhaust, waste incineration, or wood fires.
- Breathing cigarette smoke.
- Drinking contaminated water near production or waste sites.
- Eating foods contained in plastic or rubber food containers, but levels are generally very low or not present at all.
- Touching gasoline, but levels are low.

Table 2: Annual Averages of Ambient Levels of 1,3-Butadiene in Alberta (µg/m^3)

Station	1999	2000
Calgary Central	0.3401	0.3415
Edmonton Central	0.3336	0.3627
Edmonton East	0.1600	0.1935

ENVIRONMENTAL FATE AND BEHAVIOUR

- It quickly evaporates to the air as a gas from leaks during production, use, storage, transport, or disposal.
- It breaks down quickly in air by sunlight; in sunny weather, half of it breaks down in about 2 hours.
- When not sunny, it takes a few days for about half of it to break down in the air.
- It evaporates very quickly from water and soil.
- Since it evaporates so easily, it is not expected to be found in water or soil, but adequate tests are not available to measure the amounts.
- 1,3-Butadiene may be broken down by microorganisms in the soil.
- It is not expected to accumulate in fish.

TOXICITY

Effects of 1,3-Butadiene on human health and the environment depend on the amount of 1,3-Butadiene present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Most of the information on the health effects of 1,3-butadiene comes from studies where the exposure was from breathing contaminated air.
- Breathing very high levels of 1,3-butadiene for a short time can cause central nervous system damage, blurred vision, nausea, fatigue, headache, decreased blood pressure and pulse rate, and unconsciousness.

- There are no recorded cases of accidental exposures at high levels that caused death in humans, but this could occur.
- Breathing lower levels may cause irritation of the eyes, nose, and throat.
- Studies on workers who had longer exposures with lower levels have shown an increase in heart and lung damage, but these workers were also exposed to other chemicals. We don't know for sure which chemical (or chemicals) caused the effects. We also do not know what levels in the air will cause these effects in people when breathed over many years.
- Animal studies show that breathing 1,3-butadiene during pregnancy can increase the number of birth defects. Other effects seen in animals that breathed low levels of 1,3-butadiene for one year include kidney and liver disease, and damaged lungs. Some of the animals died.
- There is no information on the effects of eating or drinking 1,3-butadiene.
- Skin contact with liquid 1,3-butadiene can cause irritation and frostbite.
- The Department of Health and Human Services has determined that 1,3-butadiene may reasonably be anticipated to be a carcinogen.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (µg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	110				11
Ontario					

Adapted from:
1,3-Butadiene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Beryllium
CAS No. 7440-41-7
Be

WHAT IS BERYLLIUM?

Pure beryllium is a hard, grayish metal. In nature, Beryllium can be found in compounds in mineral rocks, coal, soil, and volcanic dust. Beryllium compounds have no particular smell.

USES

Beryllium is purified for use in electrical parts, machine parts, ceramics, aircraft parts, nuclear weapons, and mirrors.

SOURCES

Beryllium compounds are commercially mined. Beryllium dust gets into air from burning coal and oil. Background levels in air, food, and water are low.

Beryllium was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Beryllium were not reported in 1997 or 1998 in Alberta.

Exposure to Beryllium might include:
- Breathing contaminated workplace air (e.g., mining or processing ores, alloy and chemical manufacturing with beryllium, machining or recycling metals containing beryllium).
- Breathing tobacco smoke from leaf high in beryllium.
- Breathing contaminated air or ingesting water or food near industry or hazardous waste sites.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Beryllium dusts settles from air to the soil and water.

- It enters water from rocks and soil, and from industrial waste.
- Some Beryllium compounds dissolve in water, but most settle to the bottom as particles.
- Beryllium particles in ocean water may take a few hundred years to settle to the bottom.
- Most Beryllium in soil doesn't move up to the surface or into the groundwater.
- Fish do not build up beryllium in their bodies from the surrounding water to any great extent.

TOXICITY

Effects of Beryllium on human health and the environment depend on the amount of Beryllium present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Beryllium can be harmful if you breathe it. The effects depend on how much you are exposed to and for how long.
- High levels of Beryllium in air cause lung damage and a disease that resembles pneumonia. If you stop breathing Beryllium dust, the lung damage may heal.
- Some people become sensitive to Beryllium. This is called a hypersensitivity or allergy. These individuals develop an inflammatory reaction to low levels of Beryllium. This condition is called chronic Beryllium disease, and can occur long after exposure to small amounts of beryllium. This disease can make you feel weak and tired, and can cause difficulty in breathing.
- Both the short-term, pneumonia-like disease and the chronic Beryllium disease can cause death.
- Swallowing Beryllium has not been reported to cause effects in humans because very little Beryllium can move from the stomach and intestines into the bloodstream.
- Beryllium contact with scraped or cut skin can cause rashes or ulcers.
- The United States Department of Health and Human Services (DHHS) has determined that Beryllium and certain Beryllium compounds may reasonably be anticipated to be carcinogens.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (µg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					
Ontario				0.01	

Adapted from:
Beryllium ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch
June 2003

Chemical Fact Sheets

Benzo(a)pyrene
CAS No. 50-32-8
$C_{20}H_{12}$

WHAT IS BENZO(A)PYRENE?

Benzo(a)pyrene (BAP) exists as pale yellowish needles from benzene and methanol. The crystals may be monocyclic or orthorhombic. Benzo(a)pyrene has a faint aromatic odor.

USES

There is no commercial production or known use for BAP.

SOURCES

BAP occurs in fossil fuels and is released to the environment as a product of incomplete combustion. Direct relationships have been found between concentrations of BAP and the intensity of motor transport flow.

Table 1: National Pollutant Release Inventory 2000 Benzo(a)pyrene Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5357	2001	Cancarb Limited - Cancarb	Medicine Hat	AB	0.20	0.72	0.00	kg
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.00	0.00	0.00	kg
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	16.42	0.00	0.00	kg
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	301.71	0.02	0.00	kg

2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	0.36	0.00	1.51	kg
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	0.90	0.00	0.00	kg
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	3.33	0.00	0.00	kg
				Total	**322.93**	**0.74**	**1.51**	**kg**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of BAP were not reported in 1997 or 1998 in Alberta.

Ambient airborne concentrations of BAP at suburban sites 11 – 17 km from city centres are approximately similar inside and outside detached residential houses.

Exposure to Benzo(a)pyrene might include:

- Breathing emissions from typical gasoline and diesel engines.
- Drinking hydrocarbon contaminated water
- Touching coal tar, creosote and shake oils containing polyaromatic hydrocarbons.
- Breathing higher levels in air in workplace situations that involve heating organic materials.
- Breathing coke oven emissions.
- Breathing smoke from cigarettes, cigars or marijuana cigarettes.
- Touching various crude oils and fresh or used motor oils
- BAP has also been identified in charcoal-broiled steaks, various processed foods, fruits, vegetables, cereals, roasted coffee, tea and fats (margarine, butter).

ENVIRONMENTAL FATE AND BEHAVIOUR

- If released into air, benzo(a)pyrene’s it is incorporated into particles in the air.
- Particulates in the air that contain BAP are move into water and soil when the particles settle to the ground or are washed out by rain.
- BAP binds strongly to soil.
- BAP is not likely to move from soil into groundwater.
- BAP does not move easily from soil surfaces into air.
- BAP is not broken down easily by microorganisms in the soil.

TOXICITY

Effects of Benzo(a)pyrene on human health and the environment depend on the amount of Benzo(a)pyrene present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	0.03				0.003
Ontario				0.0011	0.00022

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Benzene
CAS No. 71-43-2
C_6H_6

WHAT IS BENZENE?

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed by both natural processes and human activities.

USES

Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides.

SOURCES

Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

Table 1: National Pollutant Release Inventory 2001 Benzene Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
1755	2001	Anadarko Canada Corporation - Progress Gas Plant	Gordondale	AB	4.63	0.05	0.00	tonnes
5224	2001	Apache Canada Limited - House Mountain Complex	Swan Hills	AB	3.83	0.03	0.00	tonnes
5223	2001	Apache Canada Limited - Virginia Hills	Swan Hills	AB	0.05	0.44	0.69	tonnes

		Complex						
5285	2001	Apache Canada Limited - Zama Gas Processing Complex	Zama City	AB	3.88	0.10	0.17	tonnes
0653	2001	Border Midstream Services Ltd. - Mazeppa Gas Processing Faci	Mazeppa	AB	0.24	0.00	0.00	tonnes
4142	2001	BP Canada Energy Company - Fort Saskatchewan Underground Sto	NA	AB	0.00	0.00	0.00	tonnes
4144	2001	BP Canada Energy Company - North Caroline Plant	Sundre	AB	1.36	0.00	0.00	tonnes
4161	2001	BP Canada Energy Company - Ricinus Gas Plant	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
4146	2001	BP Canada Energy Company - South Caroline Sour Gas Plant	Sundre	AB	0.12	0.00	0.00	tonnes
4138	2001	BP Canada Energy Company - West Whitecourt Plant	NA	AB	0.10	0.00	0.00	tonnes
4928	2001	Burlington Resources Canada Energy Ltd. - Elmworth Gas Plant	Grande Prairie	AB	0.59	0.98	0.06	tonnes
1074	2001	Canadian 88 Energy Corp. - Canadian 88 Energy-Olds Gas Plant	Olds	AB	0.54	0.00	0.00	tonnes
4136	2001	Canadian Natural Resources Ltd. - Wolf	NA	AB	0.02	0.00	0.00	tonnes

		Lake Plant						
1162	2001	Celanese Canada Inc. - Edmonton Facility	Edmonton	AB	64.69	0.62	0.00	tonnes
0686	2001	Chevron Canada Resources - Acheson Sour Gas Plant	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5222	2001	Chevron Canada Resources - Chinchaga Sour Gas Plant	c/o Calgary	AB	1.48	0.00	0.00	tonnes
0698	2001	Chevron Canada Resources - Fort Saskatchewan Plant	Fort Saskatchewan	AB	1.20	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	2.48	0.00	0.00	tonnes
0695	2001	Chevron Canada Resources - Mituse Gas Plant	Slave Lake	AB	0.14	0.00	0.00	tonnes
0689	2001	Chevron Canada Resources - West Pembina Sour Gas Plant	Drayton Valley	AB	0.09	0.00	0.00	tonnes
1368	2001	Conoco Canada Resources Ltd. - Morrin Ghost Pine Plant	Morrin	AB	0.95	0.00	0.00	tonnes
5345	2001	Conoco Canada Resources Ltd. - Niton Gas Plant	Niton Junction	AB	1.05	0.02	0.00	tonnes
5389	2001	Conoco Canada Resources Ltd. - Peco Plant	Edson	AB	0.21	0.00	0.00	tonnes
0536	2001	Conoco Canada Resources	Wembley	AB	0.56	0.02	0.02	tonnes

		Ltd. - Wembley Gas Plant						
1411	2001	Devon Canada Corporation - Carstairs Gas Plant	Carstairs	AB	4.80	0.72	0.00	tonnes
5211	2001	Devon Canada Corporation - Coleman Gas Plant	Coleman	AB	0.03	0.03	0.00	tonnes
0106	2001	Devon Canada Corporation - Dunvegan Gas Unit #1	Fairview	AB	11.34	0.00	0.00	tonnes
0432	2001	Devon Canada Corporation - Wapiti Gas Plant	Grande Prairie	AB	6.39	0.00	0.00	tonnes
3931	2001	Devon Canada Corporation - Wimborne Gas Plant	Wimborne	AB	11.14	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	2.82	0.16	0.00	tonnes
3937	2001	ExxonMobil Canada Ltd. - Carson Creek Cycling Plant	Whitecourt	AB	17.29	0.00	0.00	tonnes
3933	2001	ExxonMobil Canada Ltd. - East Rainbow Gas Plant	Rainbow Lake	AB	1.10	0.00	0.00	tonnes
3939	2001	ExxonMobil Canada Ltd. - Lone Pine Creek Gas Plant	Carstairs	AB	0.57	0.23	6.08	tonnes
0403	2001	Husky Oil Operations - Husky Lloydminster Heavy Oil Refinery	Lloydminster	AB	0.47	22.50	1.34	tonnes
0407	2001	Husky Oil Operations Ltd. - Ram River Gas	Rocky Mountain House	AB	2.77	0.00	0.00	tonnes

		Plant						
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	7.30	0.07	0.01	tonnes
0434	2001	Imperial Oil Resources - Golden Spike Gas Conservation Plant	Devon	AB	0.48	0.00	0.00	tonnes
5238	2001	Imperial Oil Resources - West Pembina Gas Plant	Drayton Valley	AB	0.11	0.00	0.00	tonnes
0424	2001	Imperial Oil Resources Limited - Bonnie Glen Gas Plant	Thorsby	AB	1.69	0.00	0.59	tonnes
0442	2001	Imperial Oil Resources Limited - Cold Lake Heavy Oil Plants	Grande Centre	AB	1.77	0.00	0.00	tonnes
0430	2001	Imperial Oil Resources Limited - Leduc Woodbend Gas Conserva	Devon	AB	0.73	0.00	0.00	tonnes
0426	2001	Imperial Oil Resources Limited - Quirk Creek Gas Plant	Millarville	AB	0.15	0.00	0.01	tonnes
0438	2001	Imperial Oil Resources Limited - Redwater Gas Conservation P	Redwater	AB	0.21	0.00	0.00	tonnes
1362	2001	Keyspan Energy Canada - Brazeau Gas Plant	Drayton Valley	AB	0.65	0.00	0.00	tonnes
1370	2001	Keyspan Energy Canada - Nordegg River Gas Plant	Rocky Mountain House	AB	2.20	0.00	0.01	tonnes
6537	2001	Keyspan Energy Canada - Paddle River Gas Plant	Mayerthorpe	AB	0.35	0.00	0.00	tonnes

1372	2001	Keyspan Energy Canada - Rimbey Gas Plant	Rimbey	AB	1.42	0.00	0.10	tonnes
1374	2001	Keyspan Energy Canada - Strachan Gas Plant	Rocky Mountain House	AB	0.51	0.00	0.00	tonnes
5291	2001	Lafarge Canada Inc - Exshaw Plant	Exshaw	AB	29.53	0.00	0.00	tonnes
5302	2001	Newalta Corporation - Edmonton Process Facility	Edmonton	AB	0.57	0.00	0.00	tonnes
1902	2001	Nexen Canada Ltd. - Balzac Gas Plant	Balzac	AB	0.79	0.01	0.00	tonnes
1779	2001	NOVA Chemicals Corporation - Joffre Site; Olefins and Polye	Red Deer	AB	34.21	14.17	0.00	tonnes
3941	2001	Novagas Canada Limited Partnership - Harmattan Gas Plant	Olds	AB	2.61	8.16	0.00	tonnes
3754	2001	Paramount Resources Limited - Kaybob Gas Plant	Fox Creek	AB	1.74	0.77	0.00	tonnes
1881	2001	Parkland Refining Ltd. - Bowden Refinery	Bowden	AB	4.15	0.00	0.00	tonnes
4566	2001	Pengrowth - Judy Creek Production Complex	Swan Hills	AB	7.23	0.00	0.14	tonnes
1753	2001	Penn West Petroleum Ltd. - Minnehik - Buck Lake Gas Plant	Buck Lake	AB	0.00	0.00	0.00	tonnes
3749	2001	Petro-Canada - Brazeau Gas Plant	Drayton Valley	AB	0.78	0.00	1.13	tonnes
3903	2001	Petro-Canada	Edmonton	AB	14.08	0.01	0.00	tonnes

		- Edmonton Refinery						
1077	2001	Petro-Canada - Ferrier Gas Plant	Rocky Mountain House	AB	0.49	0.02	0.00	tonnes
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	0.68	0.02	0.09	tonnes
3751	2001	Petro-Canada - Wildcat Hills Gas Plant	Cochrane	AB	0.22	0.02	0.00	tonnes
4140	2001	PrimeWest Energy Inc. - East Crossfield Gas Plant	Crossfield	AB	0.00	0.00	0.00	tonnes
3753	2001	Rio Alto Exploration Ltd. - Gold Creek Gas Plant	Grande Prairie	AB	0.58	0.02	0.86	tonnes
2119	2001	Shell Canada Limited - Jumping Pound Complex	Calgary	AB	0.00	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	13.66	0.00	0.00	tonnes
6546	2001	Shell Canada Limited - Scotford Upgrader	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
2781	2001	Shell Canada Limited - Shell Burnt Timber Complex	Caroline	AB	0.38	0.00	0.00	tonnes
2120	2001	Shell Canada Limited - Shell Caroline Complex	Caroline	AB	0.34	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	17.55	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	32.80	0.08	0.00	tonnes
3757	2001	Shiningbank Energy Management Inc. -	Whitecourt	AB	0.11	0.00	0.00	tonnes

		Whitecourt Gas Plant						
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	20.48	0.01	0.00	tonnes
2223	2001	Suncor Energy Inc. - Suncor Natural Gas-South Rosevear Gas	Edson	AB	0.14	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	53.00	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.87	0.30	0.00	tonnes
3756	2001	Viking Energy Acquisitions Ltd. - Bellshill Lake Plant	Killam	AB	0.63	0.00	0.00	tonnes
5287	2001	Williams Energy (Canada), Inc. - Redwater NGL Fractionation	Redwater	AB	0.25	0.08	0.00	tonnes
				Total	**402.36**	**49.64**	**11.30**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Benzene might include:

- Breathing outdoor air, which contains low levels of Benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- Breathing indoor air, which generally contains higher levels of Benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- Breathing air around hazardous waste sites or gas stations, which will contain higher levels of Benzene.
- Drinking contaminated water. Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- People working in industries that make or use benzene may be exposed to the highest levels of it.

Table 2: Annual Averages of Ambient Levels of Benzene in Alberta ($\mu g/m^3$)

Station	1999	2000
Calgary Central	1.6846	1.7507
Edmonton Central	1.6821	1.8302
Edmonton East	1.6017	2.0300

ENVIRONMENTAL FATE AND BEHAVIOUR

- Industrial processes are the main source of Benzene in the environment.
- Benzene can pass into the air from water and soil.
- It reacts with other chemicals in the air and breaks down within a few days.
- Benzene in the air can bind to rain or snow and be carried back down to the ground.
- It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- Benzene does not build up in plants or animals.

TOXICITY

Effects of Benzene on human health and the environment depend on the amount of Benzene present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.
- The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection. Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men. Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.
- The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		30			
Texas	30				3.0
Ontario					

Adapted from:
Benzene ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Arsenic
CAS No. 7440-38-2
As

WHAT IS ARSENIC?

Most arsenic compounds have no smell or special taste.

USES

Inorganic arsenic compounds are mainly used to preserve wood. They are also used to make insecticides and weed killers. You can check the labels of treated wood and insecticides to see if they contain arsenic. Copper and lead ores contain small amounts of arsenic.

SOURCES

Arsenic is found in nature at low levels. It is mostly in compounds with oxygen, chlorine, and sulfur. These are called inorganic arsenic compounds. Arsenic in plants and animals combines with carbon and hydrogen. This is called organic arsenic. Organic arsenic is usually less harmful than inorganic arsenic.

Table 1: National Pollutant Release Inventory 2001 Arsenic Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5305	2001	Armor Wood Products Ltd.	Edmonton	AB	0.00	0.00	0.00	tonnes
5220	2001	Bell Pole Company - Carseland Operation	Carseland	AB	0.00	0.06	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes

6514	2001	Envirofor Preservers (AB) Ltd. - Edmonton Preservation Plant	Edmonton	AB	0.03	1.14	0.00	tonnes
5207	2001	Futura Forest Products - Alberta Wood Preservers	Spruce Grove	AB	0.00	0.00	0.00	tonnes
5340	2001	Natal Forest Products Ltd.	Coleman	AB	0.00	0.04	0.00	tonnes
6512	2001	Norwood Foundry Ltd. - Norwood Foundry	Nisku	AB	0.00	0.00	0.00	tonnes
5212	2001	Rocky Wood Preservers	Rocky Mountain House	AB	0.00	0.00	0.00	tonnes
1036	2001	Sheerness Generating Station	Hanna	AB	9.63	0.00	1.50	tonnes
5374	2001	Sovereign Castings Ltd. - Sovereign Castings	Calgary	AB	0.00	0.02	0.00	tonnes
2517	2001	Spray Lake Sawmills (1980) Ltd.	Cochrane	AB	0.00	0.20	0.00	tonnes
4827	2001	Sunpine Forest Products Ltd. - Treating Plant	Sundre	AB	0.00	0.00	0.00	tonnes
4822	2001	Titan Foundry	Edmonton	AB	0.00	0.03	0.00	tonnes
2284	2001	TransAlta Corporation - Sundance Thermal Generating Plant	Duffield	AB	8.14	0.00	2.02	tonnes
				Total	**17.80**	**1.50**	**3.52**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Arsenic were not reported in 1997 or 1998 in Alberta.

Exposure to Arsenic may include:

- Breathing sawdust or burning smoke from wood containing arsenic.
- Breathing workplace air.
- Breathing, eating, or drinking contaminated water, soil, or air at waste sites.
- Breathing, eating or drinking contaminated water, soil, or air near areas naturally high in arsenic.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Arsenic doesn't evaporate.
- Most arsenic compounds can dissolve in water.
- It gets into air when contaminated materials are burned.
- It settles from the air to the ground.
- It doesn't break down, but can change from one form to another.
- Fish and shellfish build up organic arsenic in their tissues, but most of the arsenic in fish isn't toxic.

TOXICITY

Effects of Arsenic on human health and the environment depend on the amount of Arsenic present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Inorganic arsenic is a human poison. Organic arsenic is less harmful.
- High levels of inorganic arsenic in food or water can be fatal. A high level is $6x10^7$ $\mu g/m^3$. Arsenic damages many tissues including nerves, stomach and intestines, and skin.
- Breathing high levels can give you a sore throat and irritated lungs.
- Lower levels of exposure to inorganic arsenic may cause: nausea, vomiting, and diarrhea; decreased production of red and white blood cells; abnormal heart rhythm; blood vessel damage; and a "pins and needles" sensation in the hands and feet.
- Long term exposure to inorganic arsenic may lead to a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.
- Direct skin contact may cause redness and swelling.
- Breathing inorganic arsenic increases the risk of lung cancer. Ingesting inorganic arsenic increases the risk of skin cancer and tumors of the bladder, kidney, liver, and lung.

GUIDELINES

Table 2: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	5.0				0.5
Ontario				0.3	

Adapted from:
Arsenic ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Antimony
CAS No. 7440-36-0
Sb

WHAT IS ANTIMONY?

Antimony is a silvery-white metal.

USES

Antimony isn't used alone because it breaks easily, but when mixed into alloys, it is used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is added to textiles and plastics to prevent them from catching fire. It is also used in paints, ceramics, and fireworks, and as enamels for plastics, metal, and glass. Antimony ores are mined and then mixed with other metals to form Antimony alloys or combined with oxygen to form Antimony oxide.

SOURCES

Antimony is a natural element that is found in the earth's crust.

Table 1: National Pollutant Release Inventory 2001 Antimony Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	0.00	0.00	0.00	tonnes
4906	2001	Shell Canada Products - Calgary Plant	Calgary	AB	0.01	0.03	0.00	tonnes

2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	0.01	0.00	0.00	tonnes
				Total	**0.01**	**0.03**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient concentrations of Antimony were not reported in 1997 or 1998.

Exposure to Antimony may include:

- Breathing, drinking and eating low levels of it in food, drinking water, and air, because it is a natural substance.
- Breathing air near industries that process or release it, such as smelters, coal-fired plants, and refuse incinerators.
- Breathing, drinking or eating higher levels in contaminated air, water, and soil in areas that have high levels of Antimony.
- Workers in industries that process it or use antimony ore may be exposed to higher levels.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In the air, Antimony is attached to very small particles that may stay in the air for many days.
- Most Antimony ends up in soil, where it binds strongly to particles that contain iron, manganese, or aluminum.
- Antimony is found at low levels in some rivers, lakes, and streams.

TOXICITY

Effects of Antimony on human health and the environment depend on the amount of Antimony present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Exposure to Antimony at high levels can result in a variety of adverse health effects. Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers.
- In short-term studies, animals that breathed very high levels of Antimony died. Animals that breathed high levels had lung, heart, liver, and kidney damage. In long-term studies, animals that breathed very low levels of Antimony had eye irritation, hair loss, lung damage, and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed very high levels of Antimony for a few months.

- Ingesting large doses of Antimony can cause vomiting. We don't know what other effects may be caused by ingesting it. Long-term animal studies have reported liver damage and blood changes when animals ingested antimony. Antimony can irritate the skin if it is left on it.
- Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

GUIDELINES

Table 2: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines ($\mu g/m^3$)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	5				0.5
Ontario				25	

Adapted from:
Antimony ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Alberta Environment June 2003
Science and Technology Branch

Chemical Fact Sheets

Ammonia
CAS No. 7664-41-7
H_3N

WHAT IS AMMONIA?

Ammonia is a colorless, corrosive alkaline gas with a very sharp odor. This intensely irritating odor is characteristic of drying urine. The odor is familiar to most people because ammonia is used in smelling salts, household cleaners, and window cleaning products. In water, most of the ammonia changes to ammonium, which is not a gas and does not smell. Ammonia is necessary to animal and human life. The chemical is found in water, soil, and air, and is a source of much-needed nitrogen for plants and animals.

USES

Eighty percent of all man-made ammonia is used as fertilizer. A third of this is applied directly as pure ammonia. The rest is used to make other fertilizers that contain ammonium. Ammonia is also used to manufacture synthetic fibers, plastics, and explosives. Many cleaning products also contain ammonia. Ammonia in solution, at varying concentrations, is used in a variety of products such as liniments and aromatic spirits. Ammonia used in metal treating operations and other applications where a protective atmosphere is required. Dissociated ammonia is used as a convenient source of hydrogen for the hydrogenation of fats and oils. Ammonia can also be used to control fungal growth during warehousing and as a catalyst for synthetic resin production.

SOURCES

Natural sources of ammonia exceed those of man-made sources. However, high local concentrations are usually due to human activities. Most of the ammonia in the environment comes from the natural breakdown of manure and dead plants and animals.

Table 1: National Pollutant Release Inventory 2001 Ammonia (Total) Emissions
(tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5331	2001	Agricore United - Agricore United - Rycroft, AB	Rycroft	AB	0.10	0.00	0.00	tonnes
5322	2001	Agricore United - Agricore United Camrose East	Camrose	AB	0.10	0.00	0.00	tonnes
1175	2001	Agrium - Agrium - Joffre Nitrogen Operations	County of Lacombe	AB	19.95	0.00	0.00	tonnes
3269	2001	Agrium Inc - Carseland Nitrogen Operations	Carseland	AB	957.60	0.00	0.00	tonnes
4874	2001	Agrium Products Inc. - Fort Saskatchewan Nitrogen Operations	Fort Saskatchewan	AB	592.31	8.02	0.00	tonnes
2134	2001	Agrium Products Inc. - Redwater Fertilizer Operations	Redwater/Municipal Didtrict of Sturgeon	AB	3860.22	17.73	0.00	tonnes
1028	2001	Alberta Newsprint Company	Whitecourt	AB	1.24	0.00	0.00	tonnes
0001	2001	Alberta Pacific Forest Industries Inc.	Boyle	AB	36.22	0.00	0.00	tonnes
1033	2001	ATCO Power - Battle River Generating Station	Forestburg	AB	0.00	0.00	0.00	tonnes
0011	2001	Borden Chemical Canada, Inc. - Borden Chemical - Edmonton	Edmonton	AB	0.41	0.00	0.00	tonnes
2183	2001	BRENNTAG CANADA INC. (AS55) - LEDUC (AS55)	LEDUC	AB	0.00	0.00	0.00	tonnes
5715	2001	BRENNTAG CANADA INC. (AW10) - ALPAK (FORT SASKATCHEWAN)(NPRI	LEDUC	AB	0.00	0.00	0.00	tonnes
4867	2001	Burns Philp Food Limited - Fleischmann's Yeast-Calgary Plan	Calgary	AB	0.00	122.88	0.00	tonnes
6554	2001	Canada Bread Company Ltd. - Calgary Frozen Plant	Calgary	AB	0.00	0.00	0.00	tonnes
3821	2001	Canadian Fertilizers Limited	Medicine Hat	AB	2186.17	0.00	0.00	tonnes
5235	2001	Cargill Foods	High River	AB	11.93	20.95	0.00	tonnes
5304	2001	Champion Technologies Ltd. - Calgary Plant	Calgary	AB	0.33	0.00	0.00	tonnes
0683	2001	Chevron Canada Resources - Kaybob South #3 Gas Plant	Fox Creek	AB	3.97	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5308	2001	City of Calgary Wastewater - Bonnybrook Wastewater Treatment	Calgary	AB	107.20	400.68	0.00	tonnes
5309	2001	City of Calgary Wastewater - Fish Creek Wastewater Treatment	Calgary	AB	457.29	70.00	0.00	tonnes
5307	2001	City of Calgary Wastewater - Shepard Lagoons - CALGRO	Calgary	AB	0.00	470.68	0.00	tonnes
5390	2001	City of Edmonton - Gold Bar Wastewater Treatment Plant	Edmonton	AB	1022.20	222.58	0.00	tonnes
2749	2001	City of Medicine Hat - Wastewater Treatment Plant	Medicine Hat	AB	56.93	0.00	0.00	tonnes
5555	2001	Dairyland Fluid Division Limited - Edmonton	Edmonton	AB	0.05	0.00	0.00	tonnes
0223	2001	Daishowa-Marubeni International - Peace River Pulp Division	MD of Northern Lights	AB	131.13	0.00	0.00	tonnes
0250	2001	Degussa Canada Inc. - Gibbons Site	Gibbons	AB	0.05	0.00	0.00	tonnes
2316	2001	Dow Chemical Canada Inc. - Prentiss Chemical Manufacturing P	Red Deer	AB	1.16	0.00	0.00	tonnes
0280	2001	Dow Chemical Canada Incorporated - Western Canada Operations	Fort Saskatchewan	AB	2.75	0.00	0.00	tonnes
4721	2001	Enerchem International Inc. - Plant, Technical Centre, Head	Nisku	AB	0.55	0.00	0.00	tonnes
5342	2001	EPCOR - Canmore Wastewater Treatment Plant	Canmore	AB	7.70	0.00	0.00	tonnes
3912	2001	EPCOR Water Services - E. L. Smith Water Treatment Plant	Edmonton	AB	0.55	0.02	0.00	tonnes
3910	2001	EPCOR Water Services - Rossdale Water Treatment Plants	Edmonton	AB	0.50	0.20	0.00	tonnes
6508	2001	EPCOR Water Services - Strathmore Wastewater Facilities	Strathmore	AB	1.63	0.00	0.00	tonnes
3707	2001	Imperial Oil - Strathcona Refinery	Edmonton	AB	633.94	0.00	0.00	tonnes
2630	2001	Johns Manville Canada Inc. - Innisfail Plant	Innisfail	AB	71.13	0.00	0.00	tonnes
5232	2001	Lakeside Feeders Ltd. - Lakeside Packers	Brooks	AB	652.00	393.70	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
6516	2001	Lamb-Weston, a Division of ConAgra Limited - Taber Plant	Taber	AB	0.00	22.43	0.00	tonnes
0853	2001	Marsulex Inc. - Customer Service Centre	Fort Saskatchewan	AB	0.10	0.00	0.00	tonnes
1782	2001	Methanex Corporation - Medicine Hat Plant	Medicine Hat	AB	0.00	4.07	0.00	tonnes
0878	2001	Millar Western Forest Products Ltd. - Whitecourt Pulp Divisi	Whitecourt	AB	3.15	0.93	0.00	tonnes
6519	2001	Olymel - Olymel Red Deer	Red Deer	AB	0.50	0.00	0.00	tonnes
2857	2001	Orica Canada Inc - Carseland Works	Carseland	AB	4.10	0.00	0.00	tonnes
1251	2001	Owens-Corning Canada Inc. - Edmonton Plant	Edmonton	AB	48.37	0.29	0.00	tonnes
3903	2001	Petro-Canada - Edmonton Refinery	Edmonton	AB	1763.79	0.00	0.00	tonnes
3758	2001	Petro-Canada - Hanlan-Robb Gas Plant	Edson	AB	6.94	0.00	0.00	tonnes
6502	2001	Regional Municipality of Wood Buffalo - Fort McMurray Aerate	Fort McMurray	AB	71.96	0.00	0.00	tonnes
6501	2001	Regional Municipality of Wood Buffalo - Fort McMurray Water	Fort McMurray	AB	17.83	0.00	0.00	tonnes
0947	2001	Rogers Sugar Ltd - Taber Beet Sugar Factory	Taber	AB	59.68	0.00	0.00	tonnes
3088	2001	RW Packaging Ltd. - Edmonton Plant	Edmonton	AB	0.00	0.00	0.00	tonnes
2128	2001	Shell Canada Limited - Peace River Complex	Peace River	AB	0.00	0.00	0.00	tonnes
2960	2001	Shell Canada Products - Shell Scotford Refinery	Fort Saskatchewan	AB	3138.27	0.00	0.00	tonnes
2963	2001	Shell Chemicals Canada Ltd. - Scotford Chemical Plant	Fort Saskatchewan	AB	1.15	0.00	0.00	tonnes
2132	2001	Sherritt International Corporation - Fort Saskatchewan	Fort Saskatchewan	AB	29.10	25.64	0.00	tonnes
3959	2001	Slave Lake Pulp	Slave Lake	AB	2.93	0.00	0.00	tonnes
2230	2001	Suncor Energy Inc. - Suncor Energy Inc. Oil Sands	Fort McMurray	AB	0.64	0.00	0.00	tonnes
2274	2001	Syncrude Canada Ltd. - Mildred Lake Plant Site	Fort McMurray	AB	1121.55	0.00	0.00	tonnes
5284	2001	Talisman Energy Inc. - Edson Gas Plant	Edson	AB	0.00	0.00	0.00	tonnes

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
5378	2001	The City of Red Deer - Water Treatment Plant	Red Deer	AB	0.00	0.00	0.00	tonnes
4868	2001	The Cobalt Refinery Company Inc. - Fort Saskatchewan	Fort Saskatchewan	AB	195.10	25.62	0.00	tonnes
6524	2001	THE VERSACOLD GROUP - LETHBRIDGE CENTER	Lethbridge	AB	0.00	0.00	0.00	tonnes
4885	2001	The Westaim Corporation - Fort Saskatchewan Site	Fort Saskatchewan	AB	12.68	5.14	3.10	tonnes
2282	2001	TransAlta Corporation - Wabamun Thermal Generating Plant	Wabamun	AB	143.53	0.00	0.00	tonnes
4884	2001	Umicore Canada Inc. - Battery Materials Production	Leduc	AB	0.00	90.70	0.00	tonnes
5368	2001	Umicore Canada Inc. - Cobalt Production Facility	Fort Saskatchewan	AB	1.99	3.48	0.00	tonnes
2340	2001	Vopak Canada Ltd. - Calgary	Calgary	AB	0.12	0.00	0.00	tonnes
2349	2001	Vopak Canada Ltd. - Edmonton	Edmonton	AB	0.96	0.00	0.00	tonnes
2991	2001	Weldwood of Canada - Hinton Division	Hinton	AB	146.28	0.00	0.00	tonnes
2875	2001	Weyerhaeuser Company Ltd. - Weyerhaeuser Grande Prairie Ope	Grande Prairie	AB	65.87	0.00	0.00	tonnes
				Total	**17653.89**	**1905.74**	**3.10**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Table 2: Annual Averages of Ambient Levels of Ammonia in Alberta (µg/m^3)

Station	1997	1998
Fort Saskatchewan	0.835	3.69

Ammonia was only monitored by Alberta Environment at the Fort Saskatchewan station in 1997 and 1998.

Exposure to Ammonia may include:

- Exposure to naturally-occurring low levels of ammonia in air, soil, and water.
- Breathing air or eating food or water contaminated by fertilizers, alkalizers, metal extraction agents and household cleaners.
- Exposure to ammonia-contaminated soil and water at hazardous waste sites.
- Inhalation of high levels of ammonia originating from leaks and spills at production plants, storage facilities, pipelines and shipping vessels, including tank trucks, rail cars, ships and barges.

- Exposure to ranching and chicken-raising operations.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Ammonia readily dissolves in water, in which an equilibrium is formed between ammonia and ammonium. Dissolution increases the pH of water. In wells, rivers, lakes, and wet soils, the ammonium form is most common.
- Airborne ammonia may combine with sulfate ions to create fine particles in the air.
- Precipitation removes ammonia from the atmosphere.
- Aerobic bacteria may convert aqueous ammonia into nitrates, thus causing anoxic conditions in water bodies.
- Ammonia binds strongly to soil, and to sediment particles and colloids in water. Binding increases in water of higher oxygen content.

TOXICITY

- Vapors are extremely irritating and corrosive. Vapours may cause severe burns to the skin, eyes, throat and lungs. Exposure to high levels may be fatal.
- Ingestion of ammonia can cause burns to the mouth, throat and stomach.
- The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified ammonia for carcinogenicity

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		1,400			
Texas	170				17
Ontario				100	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Alberta Environment June 2003
Science and Technology Branch

Chemical Fact Sheets

Aluminum
CAS No. 7429-90-5
Al

WHAT IS ALUMINUM?

Aluminum is a silver-white, flexible metal.

USES

Aluminum is used in several forms including aluminum nitrate, aluminum oxide, aluminum hydroxide (used in antacids), aluminum chlorohydrate (used in deodorants), and aluminum sulfate (used to treat drinking water). It is used in paints and printing inks, explosives and fireworks, and to produce glass, rubber, and ceramics. Aluminum is an important structural material in the building, canning, automobile, and aviation industries. It is also used in the manufacture of steel, in dental alloys; in testing for gold, arsenic, mercury; and precipitating copper. Fine aluminum powder is used for flashlights in photography. Applications for aluminum also reach to the automobile industry, the jewelry industry, and the building and construction industry.

SOURCES

Aluminum is widely distributed in earth's crust in combination with oxygen, fluorine, silicon and other constituents. Its most important sources from the industrial point of view are bauxite, cryolite, aluminum, corundum and the kaolin minerals. Aluminum does not occur free in nature. Aluminum occurs as $Al(OH)_4^{-1}$ dissolved in seawater at a concentration of 2 ug/l.

Table 1: National Pollutant Release Inventory 2001 Aluminum Emissions (tonnes/year)

☐ NPRI ID	Report Year	☐ Facility Name	☐ City	☐ Province	☐ On-Site Releases	☐ Transfers for Disposal	☐ Transfers for Recycling	Units
0267	2001	Edmonton Power Inc. - Genesee Thermal Generating Station	Warburg	AB	0.00	0.00	0.00	tonnes
				Total	**0.00**	**0.00**	**0.00**	**tonnes**

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Aluminum were not reported in 1997 or 1998 in Alberta.

Exposure to Aluminum might include:
- Breathing aluminum bound to particles in the air.
- Breathing higher levels of aluminum in contaminated workplace air.
- Drinking water with high levels of aluminum near waste sites, manufacturing plants, or areas naturally high in aluminum
- Eating substances containing high levels of aluminum (such as antacids)
- It is present in natural diet, in amounts varying from very low in animal products to relatively high in plants.
- Very little enters your body from aluminum cooking utensils. Use of aluminum saucepans, aluminum-lined cooking utensils and containers may increase the content of aluminum in food.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Aluminum binds to particles in the air.
- Content in urban air is reported up to about 10 ug/m^3; in nonurban areas values lower than 0.5 ug/m^3
- It can dissolve in lakes, streams, and rivers depending on the quality of the water.
- Acid rain may dissolve aluminum from soil and rocks.
- It can be taken up into some plants from soil.

TOXICITY ASSESSMENT

Effects of Aluminum on human health and the environment depend on the amount of Aluminum present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you are exposed low levels of aluminum from food, air, water, or contact with skin it is not thought to harm your health. Aluminum, however, is not a necessary substance for our bodies and too much may be harmful.

- People who are exposed to high levels of aluminum in air may have respiratory problems including coughing and asthma from breathing dust.
- Some studies with high levels in mice and rabbits show that aluminum may harm young animals more because it can cause delays in skeletal and neurologic development.
- Aluminum has been linked to Alzheimer's disease because those patients have high levels of aluminum in their brains. We do not know whether aluminum causes the disease or whether the buildup of aluminum happens to people who already have the disease.
- Infants and adults who received large doses of aluminum as a treatment for another problem developed bone diseases, which suggests that aluminum may cause skeletal problems.
- Some sensitive people develop skin rashes from using aluminum chlorohydrate deodorants.
- There is no evidence that aluminum affects reproduction in people or animals.

GUIDELINES

Table 2: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	50				5
Ontario					

Adapted from:
Aluminum TOXFAQs. Agency for Toxic Substances and Disease Registry.
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Acrylonitrile
CAS No. 107-13-1
C_3H_3N

WHAT IS ACRYLONITRILE?

Acrylonitrile (also called AN and vinyl cyanide) is a colorless, flammable liquid. Its vapors may explode when exposed to an open flame.

USES

The largest users of Acrylonitrile are companies that make acrylic and modacrylic fibers. Companies also use AN to make: high impact Acrylonitrile-Butadiene-Styrene (ABS) plastics used in business machines, luggage, and construction material; Styrene-Acrylonitrile (SAN) plastics used in automotive and household goods and in packaging material; Adiponitrile, a chemical used to make nylon; and dyes, drugs, and pesticides.

SOURCES

Acrylonitrile does not occur naturally. Most releases of Acrylonitrile to the environment are to underground sites or to air.

No releases of Acrylonitrile in Alberta were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Acrylonitrile were not reported in 1997 or 1998 in Alberta.

Exposure to Acrylonitrile might include:

- Breathing air or eating food contaminated by releases to air, water, land, or groundwater.
- Touching products that contain Acrylonitrile.
- Inhaling smoke from cigarettes or breathing cigarette smoke.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Once in air, Acrylonitrile breaks down to other chemicals.
- Acrylonitrile evaporates from water and soil exposed to air.
- It does not remain in the body due to its breakdown and removal.
- It dissolves when mixed with water.
- Acrylonitrile doesn't bind to soil and is not likely to build up in animals and plants.
- It is broken down by microorganisms in soil and water.
- It can move into groundwater from spills or landfills.

TOXICITY

Effects of Acrylonitrile on human health and the environment depend on the amount of Acrylonitrile present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you breath Acrylonitrile for short periods of time it adversely affects your nervous system, blood, kidneys, and liver. These effects subside when exposure stops. Nervous system effects of Acrylonitrile range from headaches and dizziness to irritability, rapid heart beat, and death. Symptoms of Acrylonitrile poisoning may occur quickly after exposure or after levels of breakdown products like cyanide build up in the body. Direct contact with Acrylonitrile liquid severely damages the skin. Acrylonitrile liquid or vapor irritates the eyes, the nose, and the throat. These effects are not likely to occur at levels of Acrylonitrile that are normally found in the environment.
- There are several health effects case studies of Acrylonitrile workers. The methods used in these studies limit conclusions that can be made from the results. These studies show that workers repeatedly breathing small amounts of Acrylonitrile over long periods of time may develop cancer. Cancer occurs primarily in the respiratory tract. Laboratory studies show that repeated exposure to Acrylonitrile in air or in drinking water over a lifetime also causes cancer in animals. Studies also show that repeated exposure to Acrylonitrile adversely affects the respiratory and central nervous systems and causes developmental toxicity in laboratory animals.
- Acrylonitrile has moderate toxicity to aquatic life. By itself it is not likely to cause environmental harm at levels normally found in the environment. Acrylonitrile can contribute to the formation of photochemical smog when it reacts with other volatile substances in air.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	43				4
Ontario				0.6	0.12

Adapted from:
Acrylonitrile OPPT Chemical Fact Sheets. United States Environmental Protection Agency 1994. http://www.epa.gov/docs/chemfact.

Alberta Environment
Science and Technology Branch

June 2003

Chemical Fact Sheets

Acrylic acid
CAS No. 79-10-7
$C_3H_4O_2$

WHAT IS ACRYLIC ACID?

Acrylic acid is a colorless, corrosive liquid.

USES

The largest users of Acrylic acid are companies that make acrylic esters and resins, chemicals added to protective surface coatings and adhesives. The fastest growing use of Acrylic acid is in the production of superabsorbent polyacrylic acid polymers. Companies also use acrylic acid to make oil treatment chemicals, detergent intermediates, and water treatment chemicals.

SOURCES

It occurs naturally, being produced by several species of marine algae and in the stomach of sheep. Most direct releases of acrylic acid to the environment are to underground sites or to air.

No releases of Acrylic Acid in Alberta were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Acrylic acid might include:
- Breathing higher levels of contaminated air.
- Eating food contaminated by releases to air, water, land, or groundwater.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, Acrylic acid breaks down to other chemicals.
- Acrylic acid evaporates when exposed to air.
- It dissolves when mixed with water.
- It is broken down by microorganisms in soil and water.

- Acrylic acid does not bind well to soil and is not likely to build up in plants or animals.
- It can move into groundwater from spills or landfills.

TOXICITY

Effects of acrylic acid on human health and the environment depend on how much acrylic acid is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing acrylic acid vapors for short periods of time irritates the human respiratory system.
- Touching liquid acrylic acid irritates the skin and eyes.
- Human health effects associated with breathing or otherwise consuming small amounts of acrylic acid over long periods of time are not known. Laboratory studies show that repeat exposure to acrylic acid vapor damages the lining of the nose of animals. The acrylic acid industry has recently completed several animal studies in response to an EPA request for testing. Acrylic acid causes reduced birth weight in pups of animals consuming acrylic acid in drinking water. These studies report no other adverse effects on the reproductive system or on the development of the fetus of animals.
- Acrylic acid by itself is not likely to cause environmental harm at levels normally found in the environment. Acrylic acid can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in air.

REGULATIONS

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas			60		6
Ontario					

Adapted from:
Acrylic Acid OPPT Chemical Fact Sheets. United States Environmental Protection Agency 1994.
http://www.epa.gov/docs/chemfact.

Alberta Environment June 2003
Science and Technology Branch

Chemical Fact Sheets

Acrylamide
CAS No. 79-06-1
C_3H_5NO

WHAT IS ACRYLAMIDE?

Acrylamide is an odorless solid that exists as flake-like crystals.

USES

The largest users of acrylamide are companies that make polyacrylamide polymers. Companies also use acrylamide to make N-butoxyacrylamide and N-methylolacrylamide. Products such as clarifying agents, adhesives, printing ink emulsion stabilizers, thickening agents for agricultural sprays, and water retention aids can also contain acrylamide.

SOURCES

It does not occur naturally. Most direct releases of acrylamide to the environment are to underground sites or to air.

No releases of Acrylamide in Alberta were reported to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Acrylamide were not reported in 1997 or 1998 in Alberta.

Exposure to Acrylamide might include:

- Breathing higher levels of contaminated air.
- Eating food contaminated by releases to air, water, land, or groundwater.
- Absorbing it through skin contact.

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, acrylamide breaks down to other chemicals.
- Acrylamide dissolves when mixed with water.
- Acrylamide doesn’t bind to soil and is not likely to build up in plants or animals.
- It is broken down by microorganisms in soil or water.
- It can move into groundwater from spills or landfills.

TOXICITY

Effects of acrylamide on human health and the environment depend on how much acrylamide is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you are exposed to acrylamide for short periods of time it can adversely affect your nervous system. Effects range from drowsiness to incoordination, hallucinations, and confusion. Direct contact with dissolved acrylamide irritates the skin. Acrylamide dust irritates the respiratory system. These effects are not likely to occur at levels of acrylamide that are normally found in the environment.
- Human health effects associated with breathing or otherwise consuming small amounts of acrylamide over long periods of time are not known. Workers repeatedly exposed to acrylamide have developed neurologic symptoms such as abnormal sensation, muscle weakness, and incoordination. Laboratory studies show that repeat exposure to acrylamide causes similar adverse nervous system effects in animals. Studies show that repeat exposure to acrylamide also causes general toxicity, adverse blood effects, and adverse reproductive effects in animals. Lifetime exposure to small amounts of acrylamide in drinking water causes cancer in animals. Repeat exposure to acrylamide may likewise cause cancer in humans.
- Acrylamide is not likely to cause environmental harm at levels normally found in the environment.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas					0.03
Ontario				15	

Adapted from:
Acrylamide OPPT Chemical Fact Sheets. United States Environmental Protection Agency 1994. http://www.epa.gov/docs/chemfact.

Chemical Fact Sheets

Acrolein
CAS No. 107-02-8
C_3H_4O

WHAT IS ACROLEIN?

Acrolein is a colorless or yellowish liquid with an extremely sharp, piercingly disagreeable, extremely acrid, burnt sweet pungent odour.

USES

Acrolein is used in the manufacture of colloidal forms of metals, in making plastics and perfumes, and as a warning agent in methyl chloride refrigerant. It has been used in military poison gas mixtures. It is used as a chemical intermediate, an aquatic herbicide, biocide, slimicide and molluscicide, and as a liquid fuel. Acrolein has received quite a bit of attention as a tissue-fixative in histological work. This property has been utilized for the preservation of red blood cells. In World War I, it was used as a tear gas under the name papite. Use in Alberta as an aquatic herbicide is limited. Acrolein is used to control aquatic vegetation in irrigation canals via direct injection into the water column.

SOURCES

No releases of Acrolein in Alberta were reported to the NPRI in 2001.

Sales of Acrolein in Alberta for 1998 for aquatic vegetation control was limited to 17,520 kg of active ingredient. Acrolein was not analyzed for in air samples collected at four sites in Alberta in 1999.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of Acrolein were not reported in 1997 or 1998 in Alberta.

Exposure to Acrolein might include:

- Breathing or drinking higher levels in air contaminated by releases from emissions and effluent from Acrolein manufacturing plants and facilities using this compound.
- Breathing exhaust gas from combustion processes.
- Contact resulting from direct application to water during use as an aquatic herbicide and slimicide.
- Breathing air that contains Acrolein resulting from reaction of various hydrocarbon pollutants (such as 1,3-butadiene).

ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, about half of the total amount is broken down every 10-13 hours, by chemicals generated in the presence of sunlight.
- When Acrolein breaks down in the air in the presence of sunlight, Carbon dioxide, formaldehyde, and glycoaldehyde are some of the substances produced.
- In the presence of Nitrogen oxides, products include peroxynitrate and Nitric acid.
- Small amounts of Acrolein may be removed from the atmosphere in rain, as evidenced by detection in rainwater samples.

TOXICITY

Effects of Acrolein on human health and the environment depend on the amount of Acrolein present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing high levels of Acrolein may lead to irritation of the skin, mucous membranes such as the lining of the mouth and the inside of the nose, and the eyes. It can cause chest tightness and shortness of breath, nausea and vomiting. It may cause asthmatic reactions in asthmatics. If the amount of Acrolein breathed in is great enough, there may be severe damage to the lungs and air passages. If the victim recovers there will be permanent damage.
- Breathing, touching, eating or drinking Acrolein in significant amounts can cause death.

GUIDELINES

Table 1: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	2.3				0.23
Ontario		23.3			

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Acetylene
CAS No. 74-86-2
C_2H_2

WHAT IS ACETYLENE?

Acetylene is a colorless gas with a faint odor of garlic or ether. The smell of it may be unpleasant if phosphine is present as an impurity.

USES

Acetylene is used: as an illuminant; in oxyacetylene welding, cutting and soldering metals, signalling, and precipitating metals. It is also used in the manufacture of Acetaldehyde, Acetic acid, Vinyl chloride, Vinylidene chloride, Vinyl acetate, Acrylates, Acrylonitrile, Acetaldehyde, Perchloroethylene, trichloroethylene, Cyclooctatetrene, 1,4-butanediol, & carbon black; as a fuel for motor boats; a chemical intermediate for Acrylic acid, tetrahydrofuran, chlorinated solvents, & other chemicals; brazing, metallizing, hardening, flame scarfing, and local heating in metallurgy; and in the manufacture of synthetic rubber.

SOURCES

The main sources are due to industrial applications.

Acetylene was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Acetylene might include:
- Breathing low background levels in the environment or where there is smog.
- Breathing higher levels of contaminated air in the workplace or where acetylene is used.

Table 1: Annual Averages of Ambient Levels of Acetylene in Alberta (μg/m^3)

Station	1999	2000
Calgary Central	4.7028	5.3530
Edmonton Central	5.0232	6.1559

Edmonton East	2.5234	3.2802

ENVIRONMENTAL FATE AND BEHAVIOUR

- Acetylene in air is broken down by plants and microorganisms.

TOXICITY

Effects of Acetylene on human health and the environment depend on the amount of Acetylene present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- Breathing high levels of Acetylene can cause reductions in the function of the brain and spinal cord (Central Nervous System), difficulty breathing, headache, suffocation and collapse.
- There is no evidence that repeated exposure to low levels has any effects on health.
- Phosphine in some commercial grades of Acetylene and other impurities must be considered in evaluating cases of exposure to Acetylene.

GUIDELINES

Table 2: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (μg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	26,620				2660
Ontario				56,000	

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.

Chemical Fact Sheets

Acetone
CAS No. 67-64-1
C_3H_6O

WHAT IS ACETONE?

Acetone is a colorless liquid with a distinct smell and taste. It is also called dimethyl ketone, 2-propanone, and beta-ketopropane.

USES

Acetone is used to make plastic, fibers, drugs, and other chemicals. It is also used to dissolve other substances.

SOURCES

Acetone is a manufactured chemical that is also found naturally in the environment. It occurs naturally in plants, trees, volcanic gases, forest fires, and as a product of the breakdown of body fat. It is present in vehicle exhaust, tobacco smoke, and landfill sites. Industrial processes contribute more acetone to the environment than natural processes.

Acetone was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Ambient air concentrations of acetone were not reported in 1997 or 1998 in Alberta.

Exposure to Acetone might include:
- Breathing low background levels in the environment.
- Breathing higher levels of contaminated air in the workplace or from using products that contain acetone (for example, household chemicals, nail polish, and paint).
- Drinking water or eating food containing acetone.
- Touching products containing acetone.
- For children, eating soil at landfills or hazardous waste sites that contain acetone.
- Smoking or breathing secondhand smoke.

ENVIRONMENTAL FATE AND BEHAVIOUR

- A large percentage (97%) of the acetone released during its manufacture or use goes into the air.
- In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days.
- It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air.
- Acetone doesn't bind to soil or build up in animals.
- It is broken down by microorganisms in soil and water.
- It can move into groundwater from spills or landfills.
- Acetone is broken down in water and soil, but the time required for this to happen varies.

TOXICITY

Effects of acetone on human health and the environment depend on the amount of acetone present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you are exposed to acetone, it goes into your blood which then carries it to all the organs in your body. If it is a small amount, the liver breaks it down to chemicals that are not harmful and uses these chemicals to make energy for normal body functions. Breathing moderate-to-high levels of acetone for short periods of time, however, can cause nose, throat, lung, and eye irritation; headaches; light-headedness; confusion; increased pulse rate; effects on blood; nausea; vomiting; unconsciousness and possibly coma; and shortening of the menstrual cycle in women.
- Swallowing very high levels of acetone can result in unconsciousness and damage to the skin in your mouth. Skin contact can result in irritation and damage to your skin.
- The smell and respiratory irritation or burning eyes that occur from moderate levels are excellent warning signs that can help you avoid breathing damaging levels of acetone.
- Health effects from long-term exposures are known mostly from animal studies. Kidney, liver, and nerve damage, increased birth defects, and lowered ability to reproduce (males only) occurred in animals exposed long-term. It is not known if people would have these same effects.
- The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified acetone for carcinogenicity.

GUIDELINES

Table 2: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta		5,900			
Texas	5,900				590
Ontario				48,000	

Adapted from:
Acetone ToxFAQs. Agency for Toxic Substances and Disease Registry.
http://www.atsdr.cdc.gov/toxfaq.html.

Chemical Fact Sheets

Zirconium
CAS No. 7440-67-7
Zr

WHAT IS ZIRCONIUM ?

Zirconium is a bluish-black, amorphous powder or grayish-white lustrous metal (platelets or flakes) of hexagonal lattice below 865 °C and body-centered cubic above 865 °C. Zirconium may also exist as a soft, malleable, ductile solid or gray to gold, amorphous powder.

USES

Zirconium is used in the manufacture of cast iron, steel and rayon spinnerets. The compound is used as a polishing powder for lens and television tubes, as a pigment in plastics, as a tanning agent, as a catalyst in organic reactions and as a reflective surface agent on satellites. Zirconium is used in arc lamps, flash bulbs, superconductors, surgical appliances, non-corrosive chemical apparatus, pyrotechnics, metal-to-glass seals and special welding fluxes. Zirconium is particularly valued as a containment material in atomic reactors and acid-manufacturing plants.

SOURCES

Sources of pure zirconium are almost exclusively due to its use in manufacturing. Zirconium occurs in combined states with other elements in fluvial deposits of igneous origin.

Zirconium was not reportable to the NPRI in 2001.

ENVIRONMENTAL LEVELS AND EXPOSURE

Exposures to Zirconium might include:

- Inhaling dust & fume of zirconium during milling and other industrial processes.

ENVIRONMENTAL FATE AND BEHAVIOUR

- Less than 1% is excreted in urine .
- Absorbed zirconium is either sequestered in the skeleton or excreted very rapidly.

TOXICITY

- Oral toxicity is low. No evidence of industrial diseases related to exposure has been documented.
- Zirconium & its salts generally have low systemic toxicity.
- Zirconium poisoning may occur due to excessive exposure to zirconium salts.

GUIDELINES

Table 3: Current Ambient Air Quality Guidelines

Jurisdiction	**Guidelines (mg/m^3)**				
	0.5hr	**1hr**	**8hr**	**24hr**	**Annual**
Alberta					
Texas	50				5
Ontario					

Adapted from:
ChemBank HSDB, IRIS, RTECS toxicity profiles.