

Hazard Risk Analysis

Contamination and Pollution

Air Pollution
Soil Contamination
Water Contamination

Contamination and Pollution

This section discusses air pollution and soil and water contamination. The difference between “contamination” and “pollution” is very subtle. Both processes are linked to each other, and the words are often used to describe either process.

Air pollution and soil and water contamination have harmed the natural environment with chemical, biological, metallic or other substances harmful to humans, animals and plants.

Resources are available to assist you in completing this analysis in the [Risk AnalysisResources](#) section.

Air Pollution - Natural and Human-caused

Definition

Typically air pollution is considered a by-product of large cities due to traffic and industrial activities. Small, rural and remote communities are not usually affected, but sometimes pollution, or smog, is carried by winds outside of larger cities. Air pollution in rural and remote communities can also occur as a result of smoke from forest fires.

Discussion

Air quality in a number of remote, rural sites across Canada is checked through the Canadian Air and Precipitation Monitoring Network. However, most of rural and remote Canada is not well monitored.

Air pollution can have a negative effect on your heart and lungs, and depends on:

- the length of time you are exposed to bad air;
- your health status;
- your genetic background ;
- and the amount of pollutants in the air...

Polluted air can make it harder to breathe, irritate your lungs and airways, and worsen chronic diseases such as heart disease and several lung diseases. Negative health effects increase as air

pollution worsens. Studies have shown that even small increases in air pollution can lead to more emergency room visits, hospital admissions and deaths. Small increases in air pollution over a short period of time can make existing illnesses worse.

The Canadian Air Quality Health Index gives the following risk levels:

- levels 1 to 3 are low health risk;
- 4 to 6 present a moderate health risk;
- 7 to 10 a high health risk; and
- over 10 a very high health risk. Even healthy people should limit outdoor activities.

It Happened Here...

On August 6, 2010 the Members of the Tl'etinqox-t'in First Nation near Alexis Creek in central British Columbia rushed to move people out of the area as heavy smoke from forest fires blanketed their community. About 130 people — mostly elders, children and people with health issues — were moved to Williams Lake.

In May 2010, over 50 fires burned in north Quebec and acrid smoke drifted over much of central Canada and the northeastern United States. About 100,000 acres of forest had burned since a May 25 thunderstorm ignited a series of fires. Over 1,300 people from the Wemotaci First Nation community were evacuated. In some cases, the evacuees were taken by bus to locations as many as four hours away.

Air Pollution

Hazard Rating				High Risk	<input type="checkbox"/>	Low Risk	<input type="checkbox"/>	Need More Info	<input type="checkbox"/>	Not Applicable	<input type="checkbox"/>
Yes	No	Need More	Not	FACTORS							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Has your community experienced air pollution in the past?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Industries such as factories or coal-fired power plants can cause air pollution. Are there any smokestacks near your community and does wind blow in your direction?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	In Canada smoke from wildfires can cause significant air pollution and can cause breathing difficulty. Temperature inversions (warm air overlaying cooler air) can increase the smoke. Is your community affected by wildfire in the summer? Do you have summertime temperature inversions?							

Soil Contamination Human Induced

Definition

Soil contamination can be classified as biological, chemical, radioactive, or metallic in nature. The soil is considered contaminated when it is harmful to humans, animals or plants.

Discussion

Soil contamination can result from industrial activities such as oil and gas exploration and production. It can also arise from mining and mineral processing, saw mills and paper mills, and power generation. There is also increasing concern regarding the use of pesticides and fertilizers, and the effect on the soil and plants.

The Government of Alberta, Ministry of Environment, states the following regarding soil contamination:

Negative environmental impacts caused by chemical substances can be very difficult or even impossible to remedy. Below follow some examples of how soil contamination can be dealt with:

- hydrocarbons (fuels like gas and diesel) can be removed thermally or through bioremediation;
- effects of sulfur can be remediated by neutralization;
- salts (for example, road/ de-icing salts) can be removed by washing;
- and pesticides can be removed by deactivation or bioremediation.

In most cases, substances are only partially removed, unless extreme and expensive removal efforts are used.

Some substances have a direct toxic effect on essential life processes of plants and soil organisms. For example, chlorides found in road salt or salt water produced during oil and gas production are toxic to plants and organisms. Salt and hydrocarbons can also create water deficits by limiting water movement through soil, and uptake by plants and organisms.

It Happened Here...

In the 1980s, diesel fuel was discovered in the crawl space of a school, and the area was contaminated with polychlorinated biphenyls (PCBs). The buildings and infrastructure were affected—many had to be demolished, and the people in the community of the Mathias Colomb Cree Nation in Manitoba had many health issues.

In 2006, soils at eight sites in northwestern Quebec were found to be contaminated with lead within the area surrounding the Horne Copper smelter in Rouyn-Noranda.

Soil Contamination

Hazard Rating				
High Risk		<input type="checkbox"/>	Low Risk	
		<input type="checkbox"/>	Need More Info	
		<input type="checkbox"/>	Not Applicable	
		<input type="checkbox"/>		
FACTORS				
Yes	No	Need More	Not	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Irrigation for agriculture can contaminate soil by increasing salt content. Has there been a long history of irrigation in/near your community?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The application of pesticides in agriculture can cause soil pollution. Do farms use pesticides in or near to your community?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are there old industrial sites in or near your community that have not been properly remediated?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Resource extraction industries (such as gold, copper, oil or gas mining) can cause soil pollution. Are there, or have there been, mining activities near your community?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Old underground (fuel) storage tanks can break and release contaminants into the soil. Are there old buried storage tanks in your community?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Old live firing and military training sites can lead to the contamination of soils by explosives and metals. Is your community near an existing or previous established military training site?

Water Contamination - Human Induced

Definition

Water contamination is a result of biological or chemical contamination of water systems. Waterborne disease outbreaks in Canada have been caused by bacteria (such as Salmonella, Shigella and Campylobacter), protozoa, or Enteric viruses (such as Norwalk and Hepatitis A, which are viruses that affect our bowel-system). Waterborne outbreaks create human health hazards as drinking water and recreational water supplies may be affected. Outbreaks also pose threats to agriculture, aquaculture, aquatic ecosystems and biodiversity.

Discussion

It is estimated by Environment Canada that 90,000 people become ill and 90 die from acute waterborne infections in Canada each year. Waterborne disease outbreaks can lead to beach closings. This negatively impacts local communities that rely on the recreation and tourism sectors.

It Happened Here...

Problems with drinking water wells in the First Nations community of Little Salmon Carmacks, Yukon (population 426) date back to 1991. The community lacks proper wells that can serve the entire community. Many of the small, private wells were contaminated with E. coli and fecal bacteria. The drinking water conditions were so severe that Elder Johnny Sam had to be airlifted to a hospital in Vancouver. He suffered from a bacterial infection and had to remain in the hospital for 4.5 months. The doctors linked his illness to his water consumption. For five years the community remained under a boil water advisory. The contaminated wells were slowly repaired.

Eight hundred members of the First Nation community Kashechewan, in Northern Ontario were evacuated in October/ November 2005. The community had lived on a boiling-water advisory for the past 2 years, as the E. coli bacteria was found in the water supply system. The contaminated water had led to many skin conditions in the community.

Water Contamination

Hazard Rating				
High Risk <input type="checkbox"/>		Low Risk <input type="checkbox"/>		Need More Info <input type="checkbox"/>
				Not Applicable <input type="checkbox"/>
FACTORS				
Yes	No	Need More	Not	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	**Is there a current “Do Not Consume” or “Boil Water” Advisory in place in your community? (Check Risk Analysis Resources – “Do Not Consume” and “Boil Water” Advisories)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Agricultural runoff, such as pesticides or fertilizers, can cause water pollution. Is your community located in or near an agricultural area?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Improperly treated sewage (domestic and industrial) can contaminate water supply. Does your community lack sewage treatment capability?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Landfill sites can leak dangerous compounds into the water table. Do landfill sites in and near your community have adequate bottom-lining?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Resource extraction industry such as mining can lead to water pollution. Are there, or have there been, mining activities near your community?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Industrial waste water can contaminate water. Do polluting industries such as pulp and paper mills operate in or near your community without adequate environmental controls?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Without proper water treatment, drinking water can become contaminated. Does your community lack a water treatment facility?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Animal fecal matter can cause contamination if it gets into water. Does your community have livestock located near water sources?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Abandoned and/or improperly sealed wells can contaminate ground water. Does your community have any abandoned and/or old wells?

Risk Analysis Resources

Health Canada lists short term and long term **drinking water advisories that are in place** on First Nation communities on reserve located south of the 60 degree parallel in Canada (all provinces, except British Columbia):

<http://www.hc-sc.gc.ca/fniah-spnia/promotion/public-publique/water-dwa-eau-aqep-eng.php>

Key Words: Health Canada, drinking water advisory, First Nations

First Nation communities in **British Columbia** should consult with their local Chief about **drinking water advisories**. They can also talk to their local Environmental Health Officer (EHO). A list of EHO's (including telephone numbers and email), as well as general information, can be found on the website of the **First Nation Health Authority** (FNHA):

<http://www.fnha.ca/what-we-do/environmental-health>

Key Words: British Columbia, First Nation, drinking water advisory, environmental health officer

Environment Canada offers additional information on **drinking water advisories**:

<https://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=2C75C17A-1>

Key Words: Environment Canada, drinking water advisory

Health Canada also offers general information about **Boil Water Advisories** and **Boil Water Orders**:

<http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/boil-ebullition-eng.php>

Key Words: Health Canada, boil water advisory, boil water order

Historical Events – General Information

Please Note: See your Provincial/Territorial Risk and Resilience Information Guides for additional resources, including information regarding your community emergency manager, contact with Aboriginal Affairs and Northern Development Canada, and provincial or territorial Emergency Management Organization (EMO). EMO websites generally provide information specific to the hazards in your territory or province. Band websites or regional Aboriginal community websites can provide more information.

Resources
<p>The “Canadian Disasters - An Historical Survey” website by Robert L. Jones provides a great list of past disasters which have occurred since the 1500s in Canada and have resulted in at least 20 deaths.</p> <p>http://web.ncf.ca/jonesb/DisasterPaper/disasterpaper.html</p> <p>Keywords: Canadian disasters historical survey</p>
<p>The Public Safety Canada “Canadian Disaster Database” contains a list of past disasters in Canada.</p> <p>http://www.publicsafety.gc.ca/prg/em/cdd/srch-eng.aspx</p> <p>Keywords: Canada disaster database</p>
<p>Wikipedia has a list of disasters in Canada and links to various events; however, it does not have a lot of information about British Columbia.</p> <p>http://en.wikipedia.org/wiki/List_of_disasters_in_Canada</p> <p>Keywords: Canada disasters wiki</p>
<p>SOS! Canadian Disasters is supported by Library and Archives Canada, and provides some interesting stories on historical events and also has a great website on an education program (Grades 7 to 12) on understanding hazards and disasters in Canada.</p> <p>http://www.collectionscanada.gc.ca/sos/index-e.html</p> <p>Keywords: sos! Canada library archives</p>
<p>CBC Archives have a wide variety of news clips on historical and current disasters in Canada as well as educational information on hazards for teachers. On the CBC Digital Archives webpage, search for “disaster” in their own keyword search bar.</p> <p>http://www.cbc.ca/cgi-bin/MT4/mt-search.cgi?search=disaster&IncludeBlogs=777&limit=20</p> <p>Keywords: CBC archives, Disaster</p>

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