

Hazard Risk Analysis

Accidents

Airplane Crashes
Marine Accidents
Motor Vehicle Crashes
Train Derailments

Accidents

There are four main types of accidents that will be discussed: airplane crashes, marine accidents, motor vehicle crashes, and rail (train) derailments. There are numerous accidents that happen in communities all the time – and many of them are tragic. But in this case we are examining accidents that would be considered a big disaster for your community. In most small communities, there may not be ambulances or a nearby hospital that can take seriously injured patients, so even a small crash with more than one casualty can be considered a disaster.

[Resources are available to help you complete this analysis in Risk Analysis Resources section.](#)

Airplane Crashes

Definition

An airplane crash is considered to be an accident involving one or more airplanes. While most airplane crashes occur on or near an airport, airplane crashes can occur anywhere.

Discussion

Airplane accidents can be caused by one or more “stress factors.” Stress factors are typically caused by one or more of the following issues: physical flying, such as the noise, glare and pressure changes; anxiety due to not enough training, night flying and unfamiliar airports; personal reasons such as hunger, fatigue and worry; and emergency situations such as control malfunction, metal fatigue and engine fire

Most air accidents happen at or near airports, but people living in remote communities in Canada tend to use small planes to fly from one location to another, and these planes could go down virtually anywhere in Canada. From a disaster perspective, it is accidents involving large passenger planes, or planes landing in residential, or urbanized areas that are a concern.

It Happened Here...

On January 10, 2012, a plane crash killed 4 people at North Spirit Lake First Nation in northwestern Ontario.

On September 2, 1998 Swissair flight 111 crashed into the waters of Peggy's Cove, Nova Scotia (population 46) killing all 229 passengers and crew onboard.

On May 28, 2010 the wreckage of a twin engine Piper Navajo was discovered near Cartwright, Newfoundland (population 629) shortly after taking off from Happy Valley-Goose Bay. The pilot and passenger both succumbed to their injuries.

On July 8, 1965, a CP Air DC6B exploded and crashed at Dog Creek (population 109), just west of 100-Mile House, BC killing 52 persons on board.

Note that even though your community does not meet any of the risk indicators, it is always possible for a plane to go off course and crash on, or near, your community.

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 Info	Not Applicable	FACTORS							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Communities located in flight paths are at greater risk. Is your community located in a flight path?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	**Most airplane accidents occur at or near airports during landing or take-off. Communities near airports are at greater risk. Is your community located near an airport?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The larger the airplane the less likely it is to crash. This means places located near small airplane routes are at greater risk. Is your community located on/near a small aircraft route?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Airplane crashes are more likely to happen in mountainous regions. Is your community located in a mountainous region?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Airplane crashes are more likely to happen in areas that experience rapidly changing weather that creates poor visibility. Does your community often experience rapidly changing weather (Refer to the section on Atmospheric Hazards if required)?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pilots in training are more likely to crash than trained professionals. Communities located near airplane training facilities are at risk. Is your community located near an airplane training facility? The acrobatic air shows also increase crash risk. Do air shows happen in or near your community?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have there been previous airplane crashes in your community in the past?							

Marine Accidents

Definition

Marine accidents are shipping accidents that threaten human life, property, and natural resources. Ship collisions, ship fires, and hazardous material spills are typical of marine accidents. Although it's not usually considered, nuclear submarine accidents can also pose risks to a coastal community. .

Discussion

There are several types of weather and geographical conditions, such as high winds, rough seas, poor visibility, and the location of shoals, sandbars, or reefs, that create hazardous situations for ships and boats. With this in mind, the risk factors for marine navigation include winds, visibility, currents, water depths, passage widths, course changes, and shipping density (such as crowding of boats on the water). In addition to risk indicators, the type of boat or ship (a fishing boat, passenger vessel, pleasure craft, military vessel, commercial/industrial cargo vessel) plays a role in how big a potential disaster might be.

It Happened Here...

On March 22, 2006 around 12:25am the Queen of the North hit Gill Island around 15km from Hartley Bay, British Columbia (population 200) and began to sink into Wright Sound. It took the ship 1 hour and 15 minutes to fully submerge. Two passengers were never located, but 99 passengers and crew made it off the boat and to safety.

On November 1, 2006 just after 8 am, the small fishing vessel Cape Fin-Tose capsized and began to sink off the coast of Kings Point, Newfoundland (population 775). All four people on board survived.

If you don't have any lakes, rivers or oceans that boats or ships can navigate then you can safely state that this is "Not applicable."

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 Info	Not Applicable	FACTORS					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bad visibility from weather increases the risk of marine accidents. Does your community often experience bad visibility, such as fog or storms (Refer to the section on Fog and Windstorms)?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	High winds and rough seas increase the risk of marine accidents. Does your community often experience high winds or rough seas?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Collisions occur more frequently with larger ships because they are harder to maneuver. Does your community experience a lot of large ship (i.e., tankers) traffic?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ports have increased marine accident rates. Is your community located near a port?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ships that frequently call at port, such as passenger vessels or ferries, have the highest likelihood of having an accident. Is your community located on or near a passenger vessel port?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Accidents increase with the age of a ship. Are most of the boats near your community considered old, or older models?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grounding – when a ship runs aground – is a major cause of marine accidents. Does your community have a marine route that is bordered by shallow waters, reefs and or/sandbars?					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have marine accidents occurred in your community in the past?					

Motor Vehicle Crashes

Definition

Motor vehicle crashes occur whenever a motor vehicle (such as a truck, car, bus, farm vehicle, or any other motor-powered vehicle) collides with another motor vehicle, train or other obstruction; One motor vehicle may also lose control and incur damage. Numerous motor vehicle accidents occur every day in Canada. From the perspective of a disaster, motor vehicle accidents become a concern when they involve large numbers of passengers.

Discussion

Motor vehicle accidents tend to be caused by several different factors. An accident with many fatalities or injuries happens when the driver loses control of a motor vehicle and then crashes into buildings or groups of people. Another situation is where poor driving conditions (usually from bad weather) lead to bus accidents or multiple vehicle collisions, which can lead to many fatalities and have to involve many local response agencies. There will also be situations of driver error which can cause multiple casualties.

It Happened Here...

On October 13, 1997 a bus descending a steep hill near Saint-Joseph-de-la-Rive, Quebec (population 222) suffered brake failure. As a result it missed a curve and plunged into a stony ravine. 43 people died and 5 were injured.

On February 2, 2004 the Alaska Highway was closed almost a week, closing northern B.C.'s main link to the rest of the province, after a southbound three-axle propane truck crossed the highway's centre line and collided with a northbound tractor trailer. The propane truck took almost a week to burn off its load of an estimated 17,000 gallons of liquid propane. The drivers of the trucks were able to escape without injury, but the fire quickly spread across the entire width of the highway and melted the road pavement.

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 Need	Not Applicable	FACTORS							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	As road grade increases (the steepness of the road) so do accidents. This can happen when a vehicle is travelling uphill because more people try to pass slower vehicles. There may be more accidents when a vehicle travels downhill because drivers have increased speeds, which decrease the time to react to situations. Do the roads in and around your community often go up and downhill?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Busier stretches of road tend to have higher accident rates. Does your community regularly experience what you would consider to be a high volume of vehicles on its roadways?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The more lanes on a roadway the higher the accident rate. Does your community have multiple lane highway/roadways either in your community or nearby?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Narrow shoulders decrease the space drivers have to correct errors and increase the rate of accidents. Does your community have roadways with narrow shoulders (1.5 metres or less)?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Highways and freeways tend to have multiple lanes, high speeds, and high traffic volumes, all factors that increase accident rates. Does your community have a highway/freeway through and/or near it?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bad weather (snow storms, rain storms, fog) reduces visibility and increases the risk of accidents. Does your community frequently experience bad weather (Refer to the appropriate Atmospheric Hazards sections)?							

Train Derailments

Definition

Rail accidents happen when a train derails (goes off the tracks) or collides with another train, motor vehicle, or obstruction on the rail tracks. If a train is carrying fuel, chemicals, or other hazardous materials and has an accident, it can create a dangerous situation for nearby communities. A rail accident can also take place on a rapid transit system, such as the ALRT in the Lower Mainland of British Columbia or the GO trains in Metro Toronto.

Discussion

Many accidents are as the result of colliding with another train already on the tracks. Vandalism has also caused train wrecks, as has driver error. Weather conditions, often snow, account for a number of train accidents every year. Motor vehicles often are involved in collisions with trains.

It Happened Here...

The Lac-Mégantic rail disaster occurred in the town of Lac-Mégantic, located in the Eastern Townships of the Canadian province of Quebec, at approximately 01:15 EDT, on July 6, 2013, when an unattended 74-car freight train carrying crude oil ran away and derailed, resulting in the fire and explosion of multiple tank cars. Forty-two people were confirmed dead, with five more missing and presumed dead. More than 30 buildings in the town's centre, roughly half of the downtown area, were destroyed and all but three of the thirty-nine remaining downtown buildings are to be demolished due to petroleum contamination of the town. Initial newspaper reports described a 1-kilometre (0.62 mi) blast radius.

Around 1:35am on December 4, 2002 42 cars of an 80 car Canadian Pacific Railway freight train left the tracks. The molten sulphur on board ignited; causing a chemical fire. Luckily, there were no injuries.

On September 26, Seven Persons, Alberta (population 239) were evacuated as fire crews battled the blaze all 2010 a semi-trailer and Canadian Pacific Railway train collided around 1 pm near Pense, Saskatchewan (population 507). There were no injuries but both the trailer on the truck and engine of the train were severely damaged.

If your community does not have any rail lines running through, or close to, your community you can safely state that this is "Not Applicable."

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 Info	Not Applicable								
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does your community have rail lines running through and/or near it?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Traffic crossings (when roads intersect train tracks) increase the risk of rail accidents. Does traffic cross the rail line in and/or near your community?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Avalanche and steep mountainous areas increase the risk of rail accidents. Is your community located in and/or near steep mountainous and/or avalanche areas?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rail lines that cross fault lines and/or loose soil (at risk of liquefaction) are at risk from earthquakes. Is your community located on and/or near a fault line and/or soil at risk to liquefaction (Refer to the section on Earthquakes)?							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have there been train derailments in your community in the past?							

Risk Analysis Resources

Air Crashes

The Transportation Safety Board of Canada lists all reported airplane crashes that have occurred.

<http://www.tsb.gc.ca/eng/rapports-reports/aviation/index.asp>

Keywords: Canada aviation investigation reports

Marine Accidents

The Transportation Safety Board of Canada lists all reported boating or marine accidents that have occurred.

<http://www.tsb.gc.ca/eng/rapports-reports/marine/index.asp>

Keywords: Canada marine investigation report

Rail Derailments

The Transportation Safety Board of Canada lists all reported train derailments that have occurred.

<http://www.tsb.gc.ca/eng/rapports-reports/rail/index.asp>

Keywords: Canada rail investigation report

Historical Events – General Information

Historical Events for Accidents

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 style="text-align: center;">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 style="text-align: center;">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 style="text-align: center;">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 style="text-align: center;">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 style="text-align: center;">http://www.cbc.ca/cgi-bin/MT4/mt-search.cgi?search=disaster&IncludeBlogs=777&limit=20</p> <p>Keywords: CBC archives, Disaster</p>

References

- CBC News. (2010 September 27). *Truck-train crash in Sask. results in charge*. Retrieved from <http://www.cbc.ca/news/canada/saskatchewan/story/2010/09/27/sk-train-truck-crash-1009.html?ref=rss>
- CBC News. (2012 January 19). *First Nations call for better airports on reserves*. Retrieved from <http://www.cbc.ca/news/canada/thunder-bay/first-nations-call-for-better-airports-on-reserves-1.1205503>
- DKL Engineering Inc. (n.d.). *Sulphuric acid plant safety*. Retrieved from http://www.sulphuric-acid.com/techmanual/Plant_Safety/safety.htm
- Farran, J. I. (2000). No turns allowed - controlling vehicles turning in front of light rail vehicles. *Transit: Rail Transit and Maintenance, Commuter Rail, Major Activity Center Circulation Systems, Light Rail Transit, and Ferry Service - Public Transit 1704*, 85-89.
- Haliday, H. A. (2014). *Highway Disasters*. Retrieved from <http://www.thecanadianencyclopedia.ca/en/article/highway-disasters/>
- Hartley Bay*. Retrieved March 3 2011 from Wiki Wikipedia: http://en.wikipedia.org/wiki/Hartley_Bay,_British_Columbia and <http://www.westcoastferries.ca/ferries/queenofthenorth.html>
- Jessen, K. (1985). Aircraft Disaster Readiness. *Prehospital and Disaster Medicine* 2(1-4) 203-206.
- King's Point*. Retrieved from Wiki Wikipedia: http://en.wikipedia.org/wiki/King%27s_Point and <http://www.tsb.gc.ca/eng/rapports-reports/marine/2006/m06n0082/m06n0082.pdf>
- Lac-Mégantic rail disaster*. Retrieved from Wiki: Wikipedia: http://en.wikipedia.org/wiki/Lac-M%C3%A9gantic_rail_disaster
- Li, G., Pressley, J. C., Qiang, Y., Grabowski, J. G., Baker, S. P., & Rebok, G. W. (2009). Geographic region, weather, pilot age, and air carrier crashes: A case-control study. *Aviation Space and Environmental Medicine* 80(4), 386-390.
- Lighthart, V. H. M. (1980). Determination of probability of marine accidents with respect to gas carriers proceeding in Dutch coastal and inland waters. *Journal of Hazardous Materials*, 3(3), 233-247.
- Looker, J. (2000). *Disaster Canada*. Toronto, Canada: Lynx Images.
- Martin, P., Audet, T., Corriveau, H., Hamel, M., D'Amours, M., & Smeesters, C. (2010). Comparison between younger and older drivers of the effect of obstacle direction on the minimum obstacle distance to brake and avoid a motor vehicle accident. *Accident Analysis and Prevention* 42(4), 1144-1150.
- Milton, J. & Mannering, F. (1998). The relationship among highway geometrics, traffic-related elements and motor-vehicle accident frequencies. *Transportation* 25(4), 395-413.
- Podunk Canada. (n.d.). *Cartwright, Newfoundland and Labrador*. Retrieved from <http://ca.epodunk.com/profiles/newfoundland-and-labrador/cartwright/2000402.html>
- Swissair Flight 111*. (n.d.). Retrieved from the Wiki Wikipedia: http://en.wikipedia.org/wiki/Swissair_Flight_111

Transportation Safety Board – Canada. (2009). *Annual Report*. Retrieved from http://www.tsb.gc.ca/eng/stats/aviation/2009/ss09.asp#table_1.

Wang, J., Pillay, A., Kwon, Y. S., Wall, A. D., & Loughran, C. G. (2005). An analysis of fishing vessel accidents. *Accident Analysis & Prevention*, 37(6), 1019-1024.

Yip, T. L. (2008). Port traffic risks - A study of accidents in Hong Kong waters. *Transportation Research Part E-Logistics and Transportation Review* 44(5), 921-931.