Hazard Risk Analysis

Nuclear Failure

Nuclear Accidents

Nuclear Failure

Nuclear accidents can be caused by nature or by people (human-caused).

Definition

Nuclear power plants have nuclear reactors that produce heat, which can boil water, drive steam turbines and generate large quantities of electricity. The power plants rely on the process of nuclear fission, which is the ... “splitting of an atom into two smaller atoms, which also yields heat and sends neutrons flying. If another atom absorbs one of those neutrons, the atom becomes unstable and undergoes fission itself, releasing more heat and more neutrons. The chain reaction becomes self-sustaining, producing a steady supply of heat...” Nuclear reactors use enriched uranium for fuel.

A nuclear reactor could malfunction: for example, the uranium casings could get damaged or if power is shut off and the reactor is not able to cool the uranium in time, the reactor may leak dangerous radioactive particles. The radioactive particles are very hazardous to human health and are difficult to clean up. “In a worst-case meltdown scenario, the puddle of hot fuel could melt through the steel containment vessel and through subsequent barriers meant to contain the nuclear material, exposing massive quantities of radioactivity to the outside world.”

As of October 2012, about 15% of Canada's electricity is produced by nuclear power. All of this is produced in Ontario, except for one reactor in New Brunswick.

Discussion

The recent March 2011 nuclear tragedy in Japan, which affected three of the reactors at Fukushima Daiichi station, was caused by a major earthquake and tsunami. There were explosions from a build-up of hydrogen gas and leakages of radioactive gas and water into the environment, causing large amounts of contamination. Because radioactive particles can be carried in the air, communities in the path of air currents from a leaking nuclear reactor were at a much greater risk of contamination.

While there have been smaller accidents at nuclear power plants, the world remembers two main incidents: the 3 Mile Island partial meltdown in 1979 in Pennsylvania where some radiation did

escape from the plant into the surrounding environment, and the 1986 Chernobyl accident where “a power surge caused an explosion in one of the plant's reactors, releasing huge doses of radioactive fallout into the air” affecting thousands of people.

It Happened Here…

On April 19, 2018 the Canadian Nuclear Safety Commission (CNSC) was informed of a package with radiation warning labels found on the side of the highway near Gleichen, Alberta. The Type A package belonged to Quantum Petrophysics, a company based in Blackfalds, Alberta. The local RCMP was contacted and closed highway 901 between junctions 817 and 547 until the source being transported in the package was located and secured. There was no radiological release to the environment and there is no impact to the health or safety of the public.

On December 12, 1952 the reactor core in Chalk River, Ontario (population 800) was damaged at AECL`s NRX reactor causing a Level 5 alert. No immediate fatalities or injuries resulted and a follow-up study of exposed workers showed no long-term health effects.

Hazard Rating	High Risk ☐	Low Risk ☐	Need More Info ☐	Not Applicable ☐

Yes	No	Need More Info	Not Applicable	FACTORS
☐	☐	☐	☐	Are facilities that use or make nuclear/radioactive material located in or near to your community?
☐	☐	☐	☐	Are nuclear/radioactive materials used in, stored in, or transported through your community?
☐	☐	☐	☐	Radioactive materials are sometimes used in healthcare. Is there a nuclear medical facility in your community? If so, have these facilities failed to adhere to the proper handling and storage protocols for any radioactive material, either in the past or currently?
☐	☐	☐	☐	University research facilities may use radioactive materials. Are there any university research facilities that use radioactive materials in or near your community?
☐	☐	☐	☐	Military facilities may use radioactive materials. Are there any military facilities that use radioactive materials in or near your community?
☐	☐	☐	☐	If you have a nuclear power facility in or near your community and you are likely to experience a major earthquake, your community is at added risk (unless the nuclear facility has been specifically built to withstand potential earthquakes). Is there a nuclear facility close to your community that is not specially built to withstand earthquakes, and are you in an area likely to experience earthquakes (Refer to the section on Earthquakes)?

Risk Analysis Resources

The Canadian Nuclear Safety Commission tracks all radioactive spills that occur in waste management facilities in Canada.

Keywords: Nuclear Safety Commission, nuclear-related event reports

The Canadian Nuclear Safety Commission tracks all radioactive spills that occur in the transportation industry or in transit in Canada.

Keywords: Nuclear Safety Commission, transport nuclear-related event reports

References

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