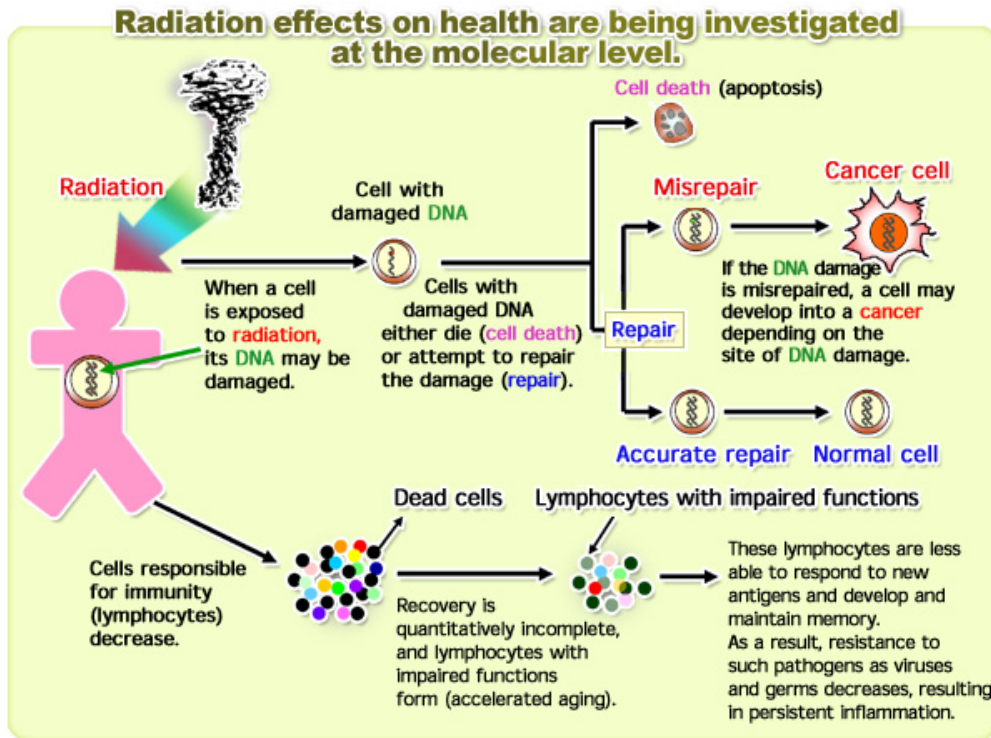


Effects of Radiation Exposure



RADIATION EFFECTS

Measurements in millisieverts (mSv). Exposure is cumulative.

HIGH RISK

- **Potentially fatal radiation sickness. Much higher risk of cancer later in life.**
- 10,000 mSv: Fatal within days.
- 5,000 mSv: Would kill half of those exposed within one month.
- 2,000 mSv: Acute radiation sickness.

MODERATE RISK

- **No immediate symptoms. Increased risk of serious illness later in life.**
- 1,000 mSv: 5% higher chance of cancer.
- 400 mSv: Highest hourly radiation recorded at Fukushima. Four hour exposure would cause radiation sickness.
- 100 mSv: Level at which higher risk of cancer is first noticeable

TOLERABLE LEVELS

- **No symptoms. No detectable increased risk of cancer.**
- 20 mSv: Yearly limit for nuclear workers.
- 10 mSv: Average dose from a full body CT scan
- 9 mSv: Yearly dose for airline crews.
- 3 mSv: Single mammogram
- 2 mSv: Average yearly background radiation dose in UK
- 0.1 mSv: Single chest x-ray

- EYES** High doses can trigger cataracts months later.
- THYROID** Hormone glands vulnerable to cancer. Radioactive iodine builds up in thyroid. Children most at risk.
- LUNGS** Vulnerable to DNA damage when radioactive material is breathed in.
- STOMACH** Vulnerable if radioactive material is swallowed.
- REPRODUCTIVE ORGANS** High doses can cause sterility.
- SKIN** High doses cause redness and burning.
- BONE MARROW** Produces red and white blood cells. Radiation can lead to leukaemia and other immune system diseases.

Nuclear accidents to date:

<http://www.theguardian.com/news/datablog/2011/mar/14/nuclear-power-plant-accidents-list-rank#data>

Chernobyl disaster: April 26, 1986 at the [Chernobyl Nuclear Power Plant](#) in Ukraine

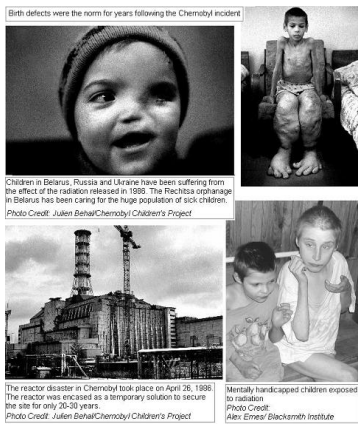
An explosion and fire released large quantities of radioactive particles into the atmosphere, which spread over much of the western USSR and [Europe](#).

The Chernobyl disaster is the worst [nuclear power](#) plant accident in history in terms of cost and resulting deaths,

and is one of only two classified as a level 7 event (the maximum classification) (the other being the [Fukushima Daiichi nuclear disaster](#) in 2011).

The battle to contain the contamination ultimately involved [over 500,000 workers](#) and cost an estimated 18 billion rubles (about half a billion U.S. dollars).

<http://www.youtube.com/watch?v=x7f3VKhIA-c>



The Fukushima Daiichi nuclear disaster:

a [catastrophic failure](#) at the [Fukushima I Nuclear Power Plant](#) on 11 March 2011 resulting in a [meltdown](#) of three of the plant's six nuclear reactors.

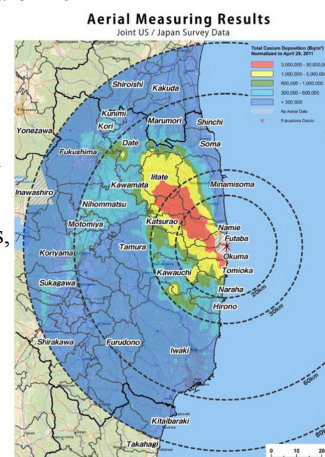
The plant was hit by the [tsunami](#) triggered by an [earthquake](#);

the plant began releasing substantial amounts of [radioactive materials](#).

This was the largest nuclear incident since the 1986 [Chernobyl disaster](#) and the second (after Chernobyl) to measure Level 7.

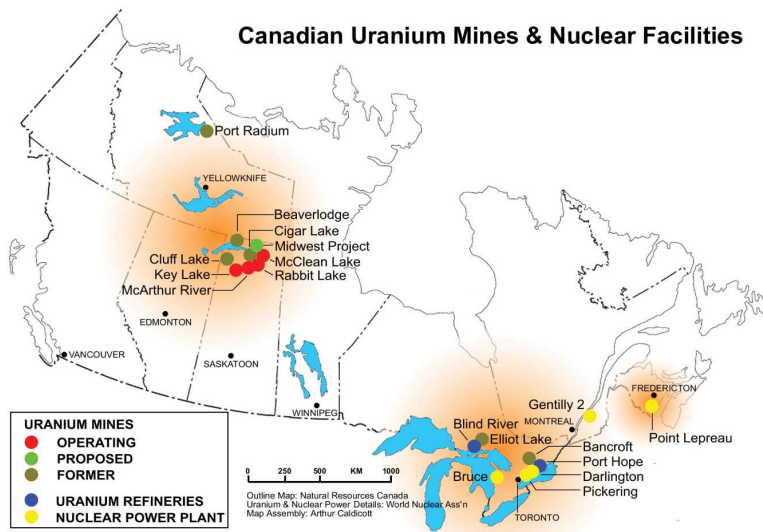
Massive amounts of radioactive water are affecting the cleanup process, which is expected to take decades.

300,000 people [evacuated](#) the area.



Sr-90 is one of the radioactive isotopes that was dispersed throughout Europe. It is found in the soil; has been uptaken into plant tissue, and subsequently into the cows. Milk products have thus been found to contain high levels of Sr-90. Sr-90 causes blood cancer (leukemia) and bone cancer (sarcomas).

Uranium Mines



- > Canada was the world's largest uranium producer for many years,
- > accounting for about 22% of world output, but in 2009 was overtaken by Kazakhstan.
- > Production comes mainly from the McArthur River mine in Saskatchewan, which is the largest in the world.
- > Production is expected to increase significantly from 2014 as the new Cigar Lake mine comes into operation.
- > With known uranium resources of 572,000 tonnes, as well as continuing exploration,
- > Canada will have a significant role in meeting future world demand.

People living near Uranium mines can be exposed to radiation through: 1) contaminated water

2) contact with radioactive dust particles

3) exposure to and breathing of radioactive Radon gas

Canada continues to operate Uranium mines for purely economic reasons. Canada makes \$1 billion per year from its Uranium mining; also Uranium mining provides jobs for 70 000 Canadians.

Food Irradiation

Food is exposed to ionizing radiation (e.g. gamma rays).

The Food and Drug Administration has approved irradiation of meat and poultry and allows its use for a variety of other foods, including fresh fruits and vegetables, and spices.

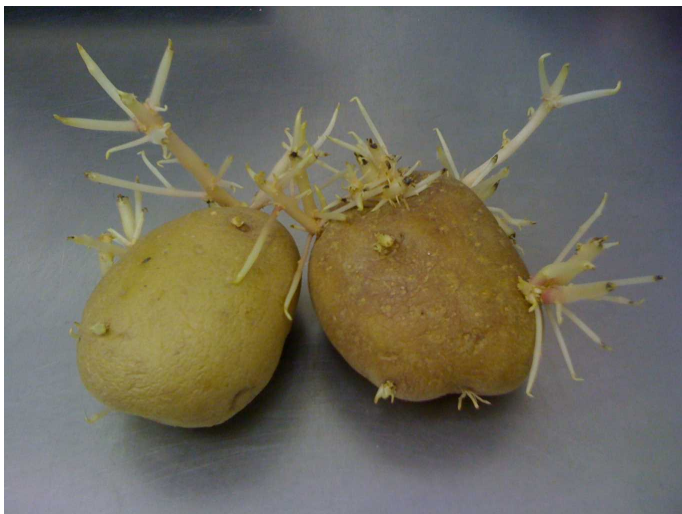
The agency determined that the process is safe and effective in decreasing or eliminating harmful bacteria.

Irradiation also reduces spoilage bacteria, insects and parasites, and in certain fruits and vegetables it inhibits sprouting and delays ripening.

The effects of irradiation on the food and on animals and people eating irradiated food have been studied extensively for more than 40 years.

These studies show clearly that when irradiation is used as approved on foods:

- > Disease-causing microorganisms are reduced or eliminated
- > The nutritional value is essentially unchanged
- > The food does not become radioactive



Food irradiation prevents potatoes from sprouting
and
it kills bacteria and other disease-causing microorganisms.