



► **OVERVIEW**

Workers battling to prevent nuclear meltdown at the stricken Fukushima Daiichi plant were temporarily evacuated this morning after radiation levels became too dangerous for them to remain. Staff returned to the plant after about an hour once radiation levels fell.

In order to comprehend the risks from the plant, it is necessary to understand the measurements of radiation.

Radiation exposure is measured as a Sievert (SV), however as 1 SV is a very large amount, this is broken down fractionally and expressed as Millisieverts (mSv) and (uSv) Microsieverts, which is one thousandth or one millionth of a Sievert.

1 SV = 1000 mSv (Millisievert) = 1,000,000 uSv (Microsieverts)

A person's average radiation exposure is about 2.4 mSv per annum. One chest X-ray will give about 0.2 mSv of radiation dose.

Earlier today (Wednesday) the Japanese Chief Cabinet Secretary said the level of radiation at the plant was stable at about 1.5 mSv. In addition, he advised that those located within 20-30km of the troubled plant were not in any immediate danger, but should stay indoors. Those within 20km of the Fukushima Daiichi plant have been evacuated.

On Tuesday, the Japanese authorities informed the International Atomic Energy Agency (IAEA) that the following radiation dose rates were observed on site at the main gate of the plant. At 00:00 UTC on 15 March a dose rate of 11.9 mSv per hour was observed. Six hours later, at 06:00 UTC on 15 March a dose rate of 0.6 mSv per hour was observed. One hour at 12 mSv (the max reading taken at the gate of the plant) is equivalent to less than 2 CT Scans.

An earlier report stated a 400 mSv per hour radiation dose was observed at Fukushima Daiichi, which occurred between Units 3 and 4. This is a high dose-level value, but it is a local value at a single location and at a certain point in time.

The Hino monitoring station in Tokyo showed that metropolitan Tokyo radiation levels rose from a normal reading of around 20-30 CPM (0.2 – 0.3 uSv microsieverts per hour) up to 89 CPM (0.89 uSv microsieverts per hour) for an hour, then dropped to close to normal background levels again. They remain normal as at the time of writing.

► **TRAVEL RISK INTELLIGENCE SERVICE (TRIS)**

Japan: Official confirms country may seek direct US military help to cool reactors

16/03/2011 03:10:33

During a news conference on Wednesday, Japan's chief cabinet secretary, Yukio Edano, gave the strongest hint yet that the country will seek help in cooling reactors from the United States military . . .

Update - Japan: Remaining workers evacuated after radiation levels rise

16/03/2011 02:41:12

Japan's chief cabinet secretary, Yukio Edano, has held a news conference in the last fifteen minutes which was broadcast live on Japanese television stating that radiation readings have started rising rapidly on Wednesday morning outside the front gate of the Fukushima Daiichi plant. As a result he said; "All the workers there have suspended their operations. We have urged them to evacuate, and they have." In the last few minutes it is being reported that radiation levels have started to fall slightly.

Japan: Plume of white smoke reportedly coming from reactor No.3 at Fukushima Daiichi nuclear plant

16/03/2011 01:48:46

There are breaking news reports that a large plume of white smoke is coming from reactor No.3 at the Fukushima Daiichi nuclear plant . . .

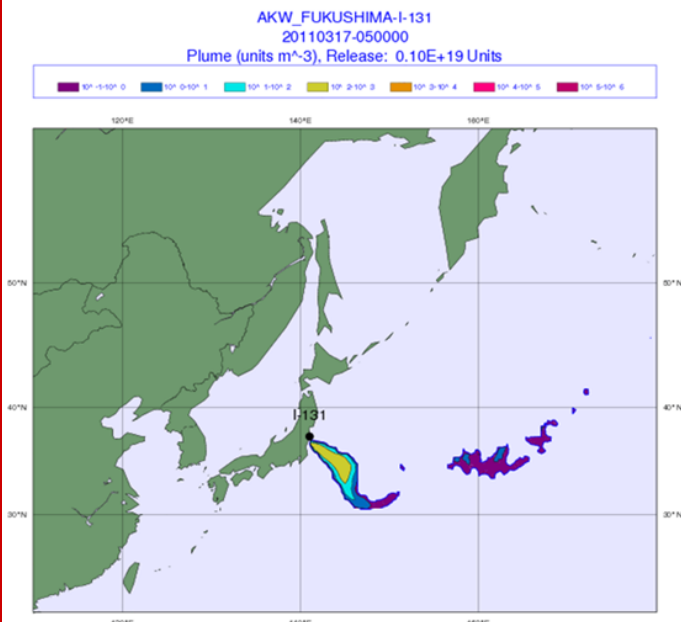


The risk to health depends on how close to the area a person is, hence the evacuation zone of 20km around the plant and advice to those living within 30km of the area to stay indoors and to keep doors and windows closed.

The average person in the United States is exposed to about 6.2 mSv annually, with about half from background radiation and about half from medical sources. So far, Japanese officials have reported possible top exposures at the plant of 5 mSv per hour, a level that has dropped since. While that level is concerning to plant workers, residents who heeded the 20km evacuation zone would not be affected, said Dr. James H. Thrall, chief radiologist at Massachusetts General Hospital in Boston.

"That would only expose nuclear plant workers," he said. "If you're even 100 feet away, or 1,000 feet away, the exposure drops dramatically. People exposed to 1,000 mSv per year are considered at risk for acute radiation sickness, but will likely survive, Thrall said. "At 10,000 mSv, you die rapidly and with a high probability," he added.

Experts say that should any further explosions or leaks at the Fukushima nuclear plant occur, this may lead to a much worse contamination of the atmosphere if meltdown occurs. At the moment, the wind is blowing eastward from Japan, so if any accident happens in Fukushima, all of the radioactive material will be taken to the middle of the Pacific, far away from the populated areas. Please see a Screenshot below of the simulation map for the radiation based on current wind conditions.



Source: <http://www.spiegel.de/images/image-191816-galleryV9-nhjp.gif>

Radiation Levels	Symptoms
10,000 mSv	Death (Full body exposure)
1,000 mSv	Vomiting, Nausea (Full body exposure)
500 mSv	Reduction of white blood cells

Radiation Levels	Comparisons
6.9 mSv	CT Scan
6.2 mSv	United States annual average person exposure
2.4 mSv	World annual average person exposure
0.6 mSv	Stomach X-ray
0.05 mSv	Chest X-Ray

► HEALTH EFFECTS - Frequently Asked Questions

What is ionizing radiation?

- When certain atoms disintegrate, either naturally or in man-made situations, they release a type of energy called ionizing radiation (IR). This energy can travel as either electromagnetic waves (gamma or X-rays) or as particles (neutrons, beta or alpha).
- The atoms that emit radiation are called radionuclides. The time required for the energy released by a radionuclide to decrease by half (i.e. the "half-life") range from tiny fractions of a second to millions of years depending on the type of atoms.

Are people normally exposed to ionizing radiation?

- Human beings are exposed to natural radiation on a daily basis. The radiation comes from space (cosmic rays), as well as natural radioactive materials found in the soil, water and air. Radon gas is a naturally formed gas that is the main natural source of radiation.
- People can also be exposed to radiation from human-made sources. Today, the most common man-made source of ionizing radiation are certain medical devices such as X-ray machines.



- The radiation dose can be expressed in units of Sievert (Sv). On average, a person is exposed to approximately 3.0 mSv/year of which, 80% (2.4 mSv) is due to naturally-occurring sources (i.e., background radiation), 19.6 % (almost 0.6 mSv) is due to the medical use of radiation and the remaining 0.4% (around 0.01 mSv) is due to other sources of human-made radiation. In some parts of the world, levels of exposure to natural radiation differ due to differences in the local geology. People in some areas can be exposed to more than 200 times the global average.

How are people exposed to ionizing radiation?

- Ionizing radiation may result from sources outside or inside of the body (i.e. external irradiation or internal contamination).
- Internal contamination may result from breathing in or swallowing radioactive material or through contamination of wounds. External contamination is produced when a person is exposed to external sources such as X-rays or when radioactive material (e.g. dust, liquid, aerosols) becomes attached to skin or clothes. This type of contamination can often be washed off the body.

What type of radiation exposure could occur in a nuclear power plant accident?

- If a nuclear power plant does not function properly, radioactivity may be released into the surrounding area by a mixture of products generated inside the reactor ("nuclear fission products"). The main radionuclides representing health risk are radioactive caesium and radioactive iodine. Members of the public may be exposed directly to such radionuclides in the suspended air or if food and drink are contaminated by such materials. Rescuers, first responders and nuclear power plant (NPP) workers may be exposed to higher radiation doses due to their professional activities and direct exposure to radioactive materials inside the power plant.

What are the acute health effects of radiation exposure?

- If the dose of radiation exceeds a certain threshold level, then it can produce acute effects, such as skin redness, hair loss, radiation burns, and acute radiation syndrome (ARS¹).
- In a nuclear power plant accident, the general population is not likely to be exposed to doses high enough to cause such effects. Rescuers, first responders and nuclear power plant workers are more likely to be exposed to doses of radiation high enough to cause acute effects.

What long-term effects can be expected from radiation exposure?

- Exposure to radiation can increase the risk of cancer. Among the Japanese atomic bomb survivors, the risk of leukaemia increased a few years after radiation exposure, whereas the risks of other cancers increased more than 10 years after the exposure.
- Radioactive iodine can be released during nuclear emergencies. If breathed in or swallowed, it will concentrate in the thyroid gland and increase the risk of thyroid cancer. Among persons exposed to radioactive iodine, the risk of thyroid cancer can be lowered by taking potassium iodide pills, which helps prevent the uptake of the radioactive iodine.

The risk of thyroid cancer following radiation exposure is higher in children and young adults.

ARS¹ is a set of signs and symptoms that may develop after whole-body doses above 1 Sv (i.e. about 300 times the annual dose to background radiation). It is related to the damage of the bone marrow, where the blood cells are produced. At higher doses (>10 Sv) other organs may be affected (e.g. gastrointestinal, cardiovascular).

PUBLIC HEALTH ACTIONS

Which public health actions are most important to take?

- In the case of a nuclear accident, protective actions may be implemented within a radius around the site.
- These actions depend on the estimated exposure (i.e., the amount of radioactivity released in the atmosphere and the prevailing meteorological conditions such as wind and rain. The actions include steps such as evacuation of people within a certain distance of the plant, providing shelter to reduce exposure and providing iodine pills for people to take to reduce the risk of thyroid cancer).
- If warranted, steps such as restricting the consumption of vegetables and dairy products produced in the vicinity of the power plant can reduce exposure. Only competent authorities who have conducted a careful analysis of the emergency situation are in a position to recommend which of these public health measures should be taken.

Source: http://www.who.int/hac/crises/jpn/faqs_2/en/index.html



How can I protect myself?

Keep you and your family informed by obtaining accurate and authoritative information (for example, information from authorities delivered by radio, TV or the Internet) and following your government's instructions. The decision to stockpile or take potassium iodide tablets should be based on information provided by national health authorities who will be in the best position to determine if there is enough evidence to warrant these steps.

What are potassium iodide pills?

In the setting of a nuclear power plant accident, potassium iodide pills are given to saturate the thyroid gland and prevent the uptake of radioactive iodine. When given before or shortly after exposure, this step can reduce the risk of cancer in the long term. Potassium iodide pills are not "radiation antidotes". They do not protect against external radiation, or against any other radioactive substances besides radioactive iodine. They may also cause medical complications for some individuals such as persons with poorly functioning kidney and therefore taking potassium iodide should be started only when there is a clear public health recommendation to take this step.

Can pregnant women take potassium iodide pills?

Pregnant women should take potassium iodide pills only when instructed by the competent authorities because the thyroid of a pregnant woman accumulates radioactive iodine at a higher rate than other adults and because the thyroid of the foetus is also blocked by giving potassium iodide pills to the mother.

What is WHO's role in nuclear emergencies?

In accordance with its Constitution and the International Health Regulations, WHO is mandated to assess public health risks and provide technical consultation and assistance in association with public health events, including those associated with radiation events. In doing so, WHO is working with independent experts and other UN agencies.

WHO's work is supported by a global network comprising more than 40 specialized institutions in radiation emergency medicine. The network, the Radiation Emergency Medical Preparedness and Assistance Network (REMPAN), provides technical assistance for radiation emergency preparedness and response.

What is the Radiation Emergency Medical Preparedness and Assistance Network (REMPAN)?

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What is the current risk of radiation-related health problems in Japan to those near the reactor at the time, and those in other parts of Japan?

Given the amount of radiation so far released near the reactor, WHO believes that the public health risk is small. The assessment above can change if there are further incidents at these plants. Hence continuous monitoring of the situation is critical to provide an accurate assessment. However, radiation-related health consequences will depend on exposure. Exposure in turn is dependent on the amount of radiation released from the reactor, weather conditions such as wind and rain at the time of the explosion, the distance someone is from the plant, and the amount of time someone is in irradiated areas.

Source: http://www.who.int/hac/crises/jpn/faqs_2/en/index.html

TEPCO, the power company that runs the Fukushima Daiichi plant issued a press release earlier today regarding the impact of the earthquake on all its nuclear, thermal and hydro facilities.

Several countries, including the UK, USA, Canada and Australia have now issued travel warnings for Japan urging travellers to reconsider the need to travel to the country.