



**RISKS AND COUNTERMEASURES  
FOR JAPAN NUCLEAR CONCERNS  
*RECOMMENDATIONS FOR SEAFARERS***

**if further information on nuclear concern healthy risks is required,  
feel free to contact CIRM via e-mail at the dedicated helpline box  
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*from the CIRM Healthy Ship Team  
for your Safety and Well Being*

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## 1. Contamination risk

Radiation-related health consequences will depend on exposure, which is dependant on several things, including: the amount and type of radiation released from the reactor; weather conditions, such as wind and rain; a person's proximity to the plant; and the amount of time spent in irradiated areas.

Risk of radioactive contamination may derive from:

- Contaminated food. However, contaminated food would have to be consumed over prolonged periods to represent a risk to human health. The presence of radioactivity in some vegetables and milk has been confirmed and some of the initial food monitoring results show radioactive iodine detected in concentrations above Japanese regulatory limits. Radioactive caesium has also been detected.

Natural radiations and radiation doses

- Any subject is exposed to natural radiation (also known as background radiation) on a daily basis. Natural radiation comes from space (i.e. cosmic rays) as well as from naturally-occurring radioactive materials found in the soil, water and air. The most common man-made sources of ionizing radiation are X-ray machines and other medical devices.
- Radiation doses can be expressed in Sievert (Sv) units. On average, a person is exposed to approximately 3.0 milli Sieverts (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.

## 2. Radiation exposure caused by nuclear power plant accident

- In the event a nuclear power plant does not function properly, individuals, land, and structures in the vicinity of the plant could be exposed to a mixture of radioactive products generated inside the reactor, also known as "nuclear fission products". The main radionuclides representing health risk are radioactive caesium and radioactive iodine.
- Members of the public may be exposed directly to radionuclides, either in the air or if food and water become contaminated by these materials.
- Rescuers, first responders, and nuclear power plant workers may be exposed to radioactive materials and higher radiation doses inside or around the power plant due to their professional activities.

## 3. Travel advice

- At this time international health authorities are not advising general restrictions on travel to Japan., although travellers should avoid travel to the areas most affected by the earthquake and tsunami because of disruptions to essential services, such as transport and electric power. The ongoing disaster relief activities, including the nuclear power plant emergency response and control activities, will make travel difficult and could consume resources needed by relief worker and residents.  
**On the other hand, travel within the evacuation and exclusion zones surrounding the Fukushima Daiichi nuclear power plant is currently prohibited.**
- Travellers in Japan should monitor local media, follow the advice and instructions issued by local authorities, and register their travel and location details with their respective embassy or consulate.

- Information on the status of the nuclear facilities in Fukushima can be found on Japan's Nuclear and Industrial Safety Agency (NISA) website and on the International Atomic Energy Agency (IAEA) website.
- Travellers returning from Japan who have come from the 20 km evacuation zone surrounding the Fukushima Daiichi nuclear power plant and who have undergone proper screening and decontamination procedures, and travellers from all other areas, do not pose a radioactive health risk to others and do not require screening.

#### 4. Health effects

- If the dose of radiation exceeds a certain threshold level, it can produce acute effects, including skin redness, hair loss, radiation burns, and acute radiation syndrome (ARS).
- 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.
- Exposure to high doses of radiation can increase the risk of cancer.
- Radioactive iodine can be released during nuclear emergencies. If radioactive iodine is 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.
- Health effects can only occur if someone is exposed to radiation, thus the main protective action someone can take is to prevent exposure. Those closest to the radiation are at greatest risk of exposure and the greater the distance away, the lower the risk. This is why, when a nuclear accident occurs, the recommended public health actions involve evacuation and sheltering of those near the site.
- These necessary actions depend on the estimated exposure (i.e., the amount of radioactivity released into the atmosphere and the prevailing meteorological conditions, such as wind and rain. Actions may include: evacuation of the area around or near the nuclear power plant; advising people to shelter in their homes, offices, other secure buildings or designated shelters to reduce exposure; and distributing and administering potassium iodide pills to reduce the risk of thyroid cancer).
- If warranted, public health or national authorities may restrict or prohibit the consumption of vegetables and dairy products produced in the vicinity of the nuclear power plant in order to reduce exposure.

#### 6. Personal protective measures and food/water safety

- The decision to take potassium iodide should be based on information provided by national health authorities who will be in the best position to determine if this step is warranted. **Potassium iodide is not recommended to be taken by an autonomous decision of someone.**
- Measurements of radionuclide concentrations in food are now taking place and are being released by the Japanese authorities. The presence of radioactivity in some vegetables and milk has been confirmed and some of the initial food monitoring results

show radioactive iodine detected in concentrations above the Japanese regulatory limits. Radioactive caesium has also been detected, but at lower activity concentrations.

- Some foods produced in Japan and likely to be contaminated by radionuclides at levels unsuitable for human consumption. Food producers and consumers in Japan are those most immediately affected and are being advised by their government on the implications of these findings. There is no evidence that radioactivity from the Fukushima Daiichi nuclear power plant has contaminated food produced in any other country.
- Consuming food contaminated with radioactive material will increase the amount of radioactivity a person is exposed to and could increase the health risks associated with exposure to radiation. The exact effect will depend on which radionuclides have been ingested and the amount.
- Not all foods produced in Japan will be affected. Food that was dispatched or commercially packaged before the emergency situation would not be affected. However, some food produced in areas where radioactive material has been deposited has been found to be contaminated. This is why the Japanese authorities have instituted monitoring and are taking measures to address the issue.
- Foods can become contaminated with radioactive materials when they are released as the result of a nuclear or radiological emergency. In these circumstances, radioactive material falling from the air or carried in rain water or snow, can deposit on the surface of foods like fruits and vegetables or animal feed. Also, over time, radioactivity can build up within food, as radionuclides are transferred through soil into crops or animals. Radioactivity can also be washed into rivers, lakes and the sea where fish and seafood could take up the radionuclides. The severity of the risk depends on the radionuclide mix and the level of contaminant released.
- **Radioactivity cannot contaminate food that is packaged; for example, tinned or plastic-wrapped food is protected from radioactivity as long as the food is sealed.**
- Drinking tap water in Japan poses no immediate health risk.
- The standards adopted by the Japanese authorities for this emergency are precautionary. Currently, radioactive iodine is the most common detected contaminant; the standard for adults is 300 Becquerels per litre in drinking-water. In the very unlikely scenario that drinking-water was contaminated and consumed for an entire year at this level, the additional radiation exposure from this water would be equivalent to natural background radiation during one year.
- Standard water treatment procedures may remove significant amounts of radioactive contaminants. Other options to reduce concentrations of radiation contaminants include controlled dilution of contaminated water with non-contaminated water.
- Boiling water will not remove radioactive iodine.

## 7. Specific recommendations for seafarers from the Healthy Ship Team

If ships are transiting areas exposed to nuclear contamination, the general measures listed below will help to protect crew members.

- Being at sea on a moving platform has benefits including being encased by a metal box. The lower you are in the ship the safer you are..... below the waterline is the safest although this is not always possible.
- Before entering a predicted 'fallout area' a few precautions can be taken.

- Brief the team.
  - Turn off ventilation systems if at all possible to avoid potential of dust ingress.
  - If unable try only to have ventilation in machinery spaces and provide dust masks to exposed personnel.
  - If possible move equipment inside the ship as it is easier to decontaminate although the risk is low.
  - Potatoes and vegetables which are often stored on deck should be put within the ship.
  - If possible the upper deck should be kept wet as this will allow the dust to wash over the side. If this is not possible wash the decks as this will remove the majority of the contamination. Try and do this just ahead of entering the cloud.
  - If you can top-up fresh water tanks ahead of entering the contaminated zone. Ration water and top-up once you are clear of the cloud. If you have spare containers fill them early to provide additional water.
  - Reduce the number of accesses to the upper deck and if possible ensure it is sheltered to minimise the amount of air entering the ship. (A door at the back of the superstructure is better than one at the front that will allow a funnel effect and thus more air in).
- On entering the cloud.
    - Avoid going outside especially if it is raining.
    - Keep upper deck and bridge doors closed.
    - When cleaning the upper deck personnel should wear waterproof clothing so that it too can be washed off before entering the ship. This kit needs to be taken off and left near the upper deck access. Regular washing will help keep contamination to a minimum.
- Exposing personnel should be avoided but if unavoidable personnel should wear full foul weather kit – hoods up and dust masks if available.
- Ships sailing in areas under radioactive cloud **should replace all filters of air conditioning systems and/or ventilation as soon as the vessel comes out from the potentially contaminated area.** For doing so it is important that ships with a destination close to the nuclear concern area have an extra supply of filters of air. New filters should be properly stored and open from original containers only before use. Used filters should be placed in closed plastic bags and sealed with tape. These bags should be put in a warehouse far from people, animals and food. The same is recommended for clothes of people who entered the area of radioactive cloud. On the arrival to the destination port, bags with potentially contaminated materials must be delivered to authorities in charge of radioactivity control for checking levels of radiation or of radioactivity present there.