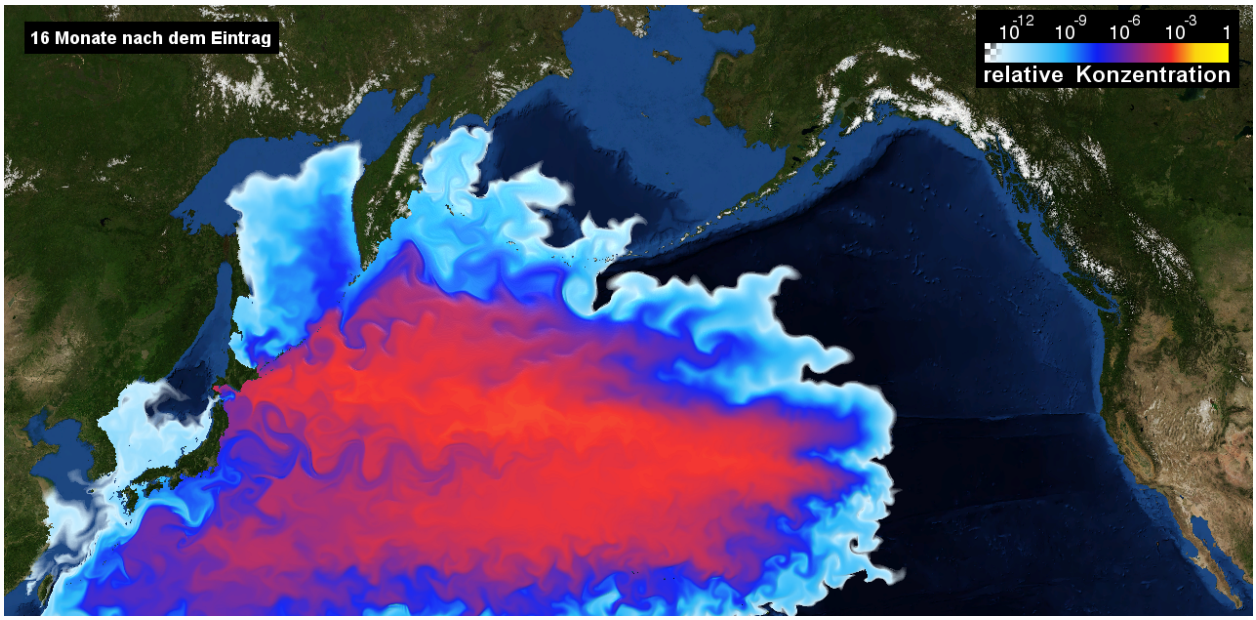
Last Update: Aug 23 2022 • Disclaimer: This essay is not about the efficacy of nuclear energy. It focuses only on the Fukushima Decommissioning Project.

Overview

Radioactive contamination from Fukushima has already been detected in US plants, animals, and food supply, ranging from fish (Stanford) to wine (CNN). Computer models by GEOMAR show the traversal of highly diluted radionuclides reaching the U.S. in just 5 months.



SOURCE: https://www.geomar.de/en/news/article/fukushima-the-fate-of-contaminated-waters

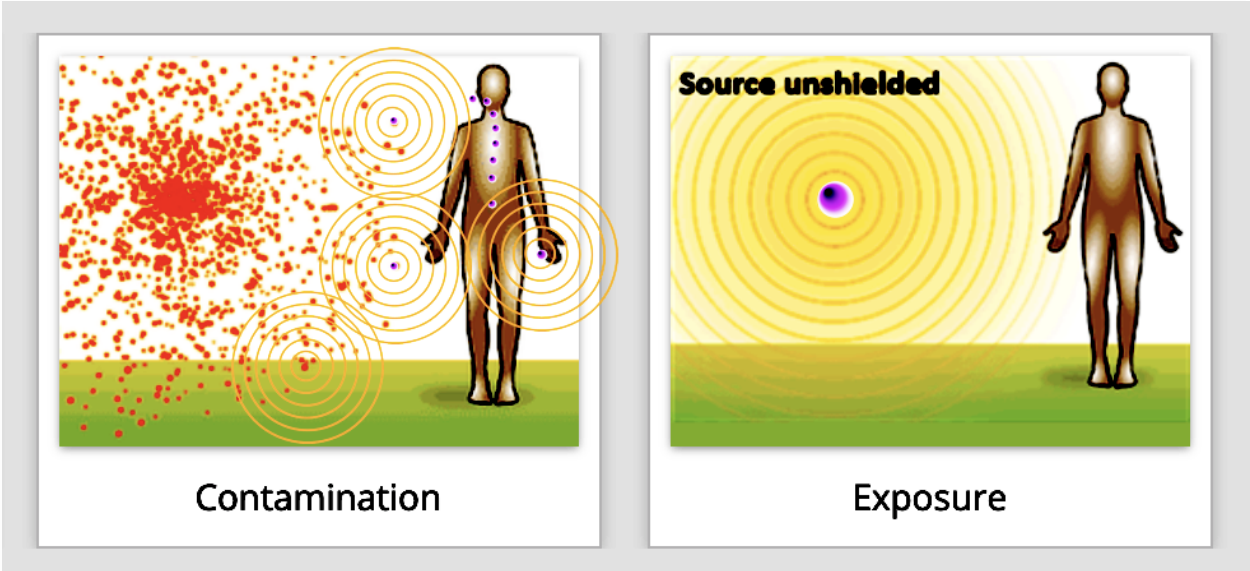
Background

Fukushima Daiichi is one of the largest nuclear meltdowns in history. Currently there are over 1.3 million tons of radioactive waste water stored in tanks near the site of the meltdown. Storage costs and real estate implications have been cited as the reason for a new plan to “discharge” the tanks into the Pacific Ocean, despite the presence of radioactive materials.

SOURCE:
https://en.wikipedia.org/wiki/Comparison_of_the_Chernobyl_and_Fukushima_nuclear_accidents

Dispersal of radionuclides

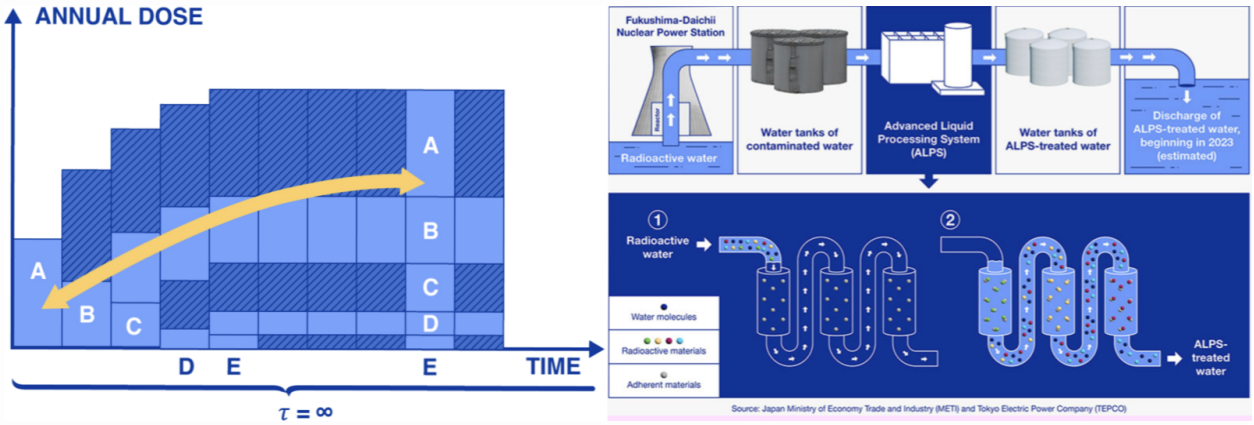
Radioactive contamination of the environment by radionuclide dispersion is much more hazardous and insidious than exposure to a localized radiation source. If the radionuclides enter the water supply and food supply they will continue to emit radiation for hundreds of years.



SOURCE: https://remm.hhs.gov/index.html

Unknowns, Potential Risks and Side effects

Proposals released by TEPCO describe discharging of “treated” radioactive water into the Pacific Ocean by mid-2023. The discharge is a 30-year process of continuous release into the ocean. The reports also appear to evaluate the changes in radiation dosage over time in the environment. However, several environmental groups and nuclear energy consultancies pointed out that TEPCO’s water treatment technology, ALPS, could not remove tritium and other radioactive isotopes.



SOURCE: docs/assets/reports/report_1_review_mission_to_tepco_and_meti.pdf

Environmental Effects

Marine plants produce over 70% of our oxygen, and aquatic invertebrates constitute approximately 90% of life on the planet and play a vital role in ecosystem function. The ocean is critically important in our strategy to solve climate change. Irreversibly contaminating the entire Ocean with radioactive materials undermines ecological stability.

Despite TEPCO’s claims that these radionuclides will be diluted and therefore present in only small quantities, these do not account for the accumulation of radionuclides in consumers higher up in the food chain, including humans. Lab studies have presented evidence for DNA damage from extended exposure to radioactive particles, including isotopes (such as tritium) found at the Fukushima reactor site. It is also critically important to consider that the natural water cycle will precipitate contaminated water

particles and carry them inland, which will release radionuclides into our watersheds and soils.

Alternative Solutions and Recommendations

Multiple plans have been proposed by academic institutions. The University of Hawai'i at Manoa offers a detailed set of initial recommendations that have been made available to the Secretariat. In the meantime, the panel's recommendation is to wait.

Fairewinds Energy Education also recommends simply letting the tanks wait for at least another 100 years, and that the current focus should be on stopping groundwater from infiltrating into the containment buildings and migrating to nearby environmentally sensitive areas and the Pacific Ocean by injecting drilling mud.

Paul Stamets, a renowned mycologist, has developed a bioremediation plan to utilize hyper-accumulating mushroom-forming fungi to decontaminate radioactive regions at the site.

Greenpeace scientists also recommend continued storage in the tanks and getting approvals from the government to acquire adjacent land for the additional tanks to allow tritium levels to decay, with a half-life of 12 years. They also cited that companies like Kurion and Purolite offer processing and removal of tritium and other radionuclides, and should be considered.

Nobel prize winning lasers have also been developed which could cut the lifespan of nuclear waste from "a million years to 30 minutes".

University of Hawaii Recommendation • Fairewinds Energy Recommendation • Greenpeace Recommendation • Fungi Bioremediation Recommendation • Gelatin Preservation Recommendation

International Law

> “[H]ailed by environmentalists as a turning point in the protection of the world’s oceans, the United States and 36 other governments voted yesterday to impose a permanent, legally binding ban on the dumping of all types of radioactive waste at sea.” - New York Times (in reference to The London Convention)

While modern micro-nuclear reactors offer unprecedented power density and operational capabilities for many future applications, including high-speed space travel and interplanetary human expansion, international laws help to ensure a safe and healthy environment for future generations of humans, animals, and all other life. The passing of this agreement represented the best of international collaboration and proved that safe nuclear power and healthy oceans could coexist. It is time to reaffirm our commitment to The London Convention for our children and future generations.

Acknowledgement

All of the hard work and valuable research in this document was completed and made possible by University of Hawaii at Manoa, GEOMAR Helmholtz Centre for Ocean Research Kiel, Greenpeace, Stanford University, Fairewinds Energy Education, Nuclear Consultants Group, SFGate, New York Times.

Resources

“Tuna caught off California carry radiation from the Japanese disaster, Stanford scientist finds”
https://news.stanford.edu/news/2012/may/tuna-radioactive-materials-053012.html

“Cesium-137 can get into your body if it's inhaled or ingested. Exposure to radiation from cesium137 can result in malignant tumors and shortening of life. “
https://semspub.epa.gov/work/HQ/176308.pdf

“Scientists say impact of long term low-dose [radiation] exposure to the environment and humans are unknown, and that tritium can have a bigger impact on humans when consumed in fish than in water.”
https://www.sfgate.com/news/article/Japan-OKs-plan-to-release-Fukushima-nuclear-plant-17180803.php

“Fukushima Radiation Detected Off California Coast”
https://www.iflscience.com/harmless-levels-fukushima-radiation-detected-california-coast-26283

“Tests of milk samples taken last week in Spokane, Washington., indicate the presence of radioactive iodine from the troubled Fukushima Daiichi nuclear plant in Japan “
https://www.nytimes.com/2011/03/31/us/31milk.html

Greenpeace Summary & Recommendation

https://www.greenpeace.org/static/planet4-japan-stateless/2021/12/9a52607f-public-comment-on-fukushima-radiological-assessment-.pdf

Fairewinds Recommendations:

https://www.fairewinds.org/fairewinds-recomendation-for-fukushima/?rq=Fairewinds%20reco

University of Hawaii Recommendations:

https://www.hawaii.edu/news/2022/05/02/treated-nuclear-wastewater-dump

Paul Stamets Recommendation & Petition:

https://www.permaculture.co.uk/articles/how-mushrooms-can-clean-radioactive-contamination-8-step-plan

https://sign.moveon.org/petitions/implement-paul-stamets

Lasers could cut lifespan of nuclear waste from “a million years to 30 minutes,” says Nobel laureate

https://bigthink.com/the-present/laser-nuclear-waste/

Science: Opening the floodgates at Fukushima

https://www.science.org/doi/10.1126/science.abc1507

Friends of the Earth Statement: TEPCO Dumping Radioactive Wastewater Into Sea

https://foe.org/news/2011-04-tepco-dumping-radioactive-wastewater-into-sea/

Nuclear Consulting Group: Should TEPCO / Japanese Government Dump Tritium-Contaminated Water from Fukushima into the Sea?

https://www.nuclearconsult.com/blog/should-tepco-japanese-government-dump-tritium-contaminated-water-from-fukushima-into-the-sea/

Official TEPCO AFPS Water Treatment Plan:

https://www.iaea.org/sites/default/files/report_1_review_mission_to_tepco_and_meti.pdf

Official TEPCO Decommissioning site:

https://www.tepco.co.jp/en/hd/responsibility/index-e.html

Impact of Radioactive Wastewater on Marine Life

https://theconversation.com/nuclear-power-how-might-radioactive-waste-water-affect-the-environment-159483

Fukushima: Contaminated water could damage human DNA

https://www.bbc.com/news/world-asia-54658379

Journal of Radiation Research: Health effects triggered by tritium

https://academic.oup.com/jrr/article/62/4/557/6256015

Scientific American: Is Radioactive Hydrogen in Drinking Water a Cancer Threat?

https://www.scientificamerican.com/article/is-radioactive-hydrogen-in-drinking-water-a-cancer-threat/#:~:text=Cancer%20is%20the%20main%20risk,some%20other%20biologically%20important%20molecule

Overview by Greenpeace

https://www.greenpeace.org/static/planet4-japan-stateless/2021/03/ff71ab0b-finalfukushima2011-2020_web.pdf

https://www.forumsec.org/2022/06/02/release-proof-sought-by-global-experts-on-safety-of-treated-water-at-fukushima/

3D Animated Reactor Overview

https://www.youtube.com/watch?v=YBNFvZ6Vr2U

https://www.thenation.com/article/archive/seven-years-on-sailors-exposed-to-fukushima-radiation-seek-their-day-in-court/

Petitions
https://actions.sumofus.org/a/japan-stop-tepco-dumping-nuclear-waste-in-the-pacific?sp_ref=772864211.99.182249.t.0.2&source=tw

https://secure.avaaz.org/community_petitions/en/STOP_FUKUSHIMA_RADIATION_UN_ACTION_NEEDED/

https://sign.moveon.org/petitions/implement-paul-stamets