

Fukushima's Hot Particles in Japan: Their Meaning for the Olympics and Beyond

By Cindy Folkers

Hundreds of thousands of people—athletes, officials, media, and spectators—will flood into Japan for the 2020 Olympics. But radiation exposure dangers from the Fukushima nuclear catastrophe have not ended since the meltdowns and explosions spread radioactive contamination over large areas reaching down to Tokyo and beyond. Soon after the start of the meltdowns in 2011, experts began warning of exposure to radioactive micro-particles or “hot particles”—a type of particle that poses a danger unaccounted for by regulatory agencies. In order to understand the special danger posed by these particles at the Olympics and beyond, we must first understand the current state of radiation exposure standards.

Hot Particles Don't Fit Current Exposure Models

For decades, protection from radiation exposure has been based on understanding how doses are delivered to the human body. Are the doses high or low? Inside or outside the body? If a dose is internal, which organ is it impacting? Is the dose given all at one time, or over a longer time? Additional consideration should be given to who is receiving the exposure: men, women, children, fetuses—although protection based on age, gender and pregnancy falls short.

The difficulty with hot particles, which can travel great distances, is that they don't deliver doses in the way experts expect. Current exposure assumptions hold that radionuclides settling in the body, i.e. through inhalation or ingestion, deliver a low dose to surrounding cells where they lodge. But these models are not truly reflecting the damage that is occurring. For instance, precise distribution of many radionuclides within the body eludes experts. And radiation doses delivered inside cells, which may seem low to an entire body, are large doses when just single cells or groupings of cells receive them. Hot particles deliver a much larger dose than what is considered “low.” And once they are inhaled or ingested, they deliver it specifically to the (often unpredictable) area of the body where they lodge.

Hot Particles Make Already Unpredictable Damage Worse

Not only can hot particle doses be unpredictable—so can the damage. Called “stochastic,” damage from radiation exposure may occur at all doses [no matter how small]. The higher the dose is, the greater the chance is that damage will happen. However, the severity of the damage is independent of the dose; that is even low doses of radiation can result in severe consequences. Sometimes these consequences take decades to manifest, but for times of life when fast growth is occurring—such as pregnancy or childhood—the damage may show up in a much shorter time frame.

Melting Ice & Sea Level Rise Could Spread Abandoned Military Rad Wastes

From opposite ends of the Earth, radioactive wastes left by the US military are colliding with climate disruption—icecap melt and sea level rise—threatening to further contaminate the oceans.

In the Greenland icecap, the US military dug 120 feet down into ice in 1959 and excavated enough to build a small “town.” Intended as an anti-Soviet nuclear missile launch site, the Pentagon carved over 1.5 miles of ice tunnels and chambers into the ice for laboratories, a dining hall, a recreation area, work space, a hospital, and living quarters for up to 200 soldiers, according to news accounts. Unfortunately, Camp Century, as it was called, was lit and heated by the world's first “mobile” nuclear reactor.

When the site was abandoned in 1967, the military reportedly packed out the reactor vessel, but left behind 9,000 tons of biological, chemical and radioactive waste, “on the assumption it would be ‘preserved for eternity’” by the island's historically perpetual accumulation of snow and ice, Jon Henley wrote for *The Guardian*.

In the years since, ice and snow cover above the dump has increased to about 110 feet, but today's rapidly accelerating heating of the climate means

of Fukushima's reactors. Radionuclides from the meltdowns were found in Tokyo's metropolitan area as late as 2016 and would increase and decrease, researchers observed, based on rainfall and run-off. One “high activity radioactively-hot dust particle” traveled from Fukushima's ruined core, to a house in Nagoya, Japan—270 miles away.

In our normal lives, each one of us breathes in a modest amount of dust daily. People are also exposed through contaminated food, ingestion of dusts and soil, or through skin contact. Endurance athletes are at a higher risk, since they often eat much more—and take in more breaths per minute—than an average athlete or a person at rest. And, biologically, due to developing cells, children and pregnant women are at a much higher risk from radiation exposure than men. Many Olympic and Paralympic athletes are of childbearing age or adolescents.

Contamination in Japan has not gone away and neither should our awareness. While most of the athletes, coaches and spectators will leave Japan, the contamination remains, impacting generations of people who will have to contend with this danger for much longer than the eight-plus years they have already been through.

Japan's government policy of dismissing radiation's dangers, and normalizing exposure to radioactivity, is part of an attempt to resettle people in areas that would allow an external dose of 2 rem per year. Prior to the Fukushima meltdowns, this level was considered high-risk to the general population. This is not an acceptable level of exposure. The radioactive micro-particles found in areas with even lower background levels indicate a significant risk that Japan and governments around the world who support nuclear technologies are covering up. Merely understanding and quantifying these hot particles is not enough. Governments must protect people from exposure everywhere in the world, not just in Japan.

The danger of radioactive micro-particles should be added to a long list of reasons why nuclear technology is not safe and should no longer be used.

Thanks to Arnie and Maggie Gundersen at Fairewinds Energy Education for technical and editorial input.

— *Cindy Folkers is on the staff of Beyond Nuclear where she specializes in radiation impacts on health, Congress watch, energy legislation, climate change, and federal subsidies. She handles the group's administrative operations, and wrote this report for the group's website.*

Under the cement cover known as Runit Dome, there are over 3 million cubic feet of deadly radioactive waste left by the US military's nuclear bomb testing authorities. Like the US waste in Greenland's warming ice, radioactive military debris is threatening to spread to the rising Pacific partly because of US industry-led carbon and methane pollution. As Susan Rust reported, “Now the concrete coffin, which locals call ‘The Tomb,’ is at risk of collapsing from rising seas and other effects of climate change. Tides are creeping up its sides, advancing higher every year as distant glaciers melt and ocean waters rise.”

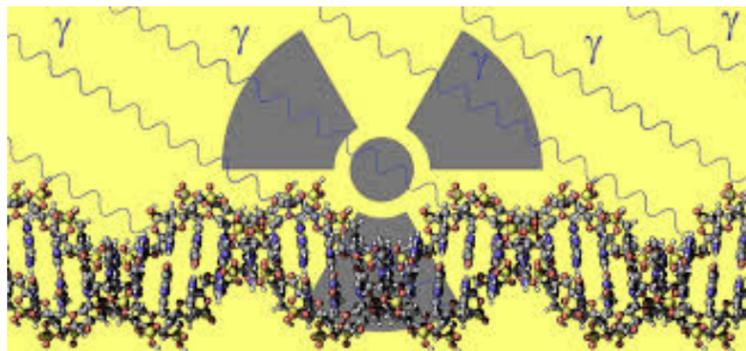
“More than any other place, the Marshall Islands is a victim of the two greatest threats facing humanity—nuclear weapons and climate change,” said Michael Gerrard, a legal scholar at Columbia University's law school, the *LA Times* article noted. “The United States is entirely responsible for the nuclear testing there, and its emissions have contributed more to climate change than those from any other country,” Gerrard said. —*JL*

— *Los Angeles Times*, Nov. 10, 2019, *The Guardian*, Sept 27, 2016; *Scientific American*, Aug. 5, 2016

Olympics 2020 and Beyond

Clearly, as Japan prepares to host the 2020 Olympics, the danger posed by exposure to radioactive micro-particles should be considered, in addition to known and better understood radio-caesium contamination. While most of the radioactive particle dust has settled, it can be easily re-suspended by activities such as digging or running, and by rain, wind, snow, and flooding. Health officials in Japan continually fail to act and stop ongoing radioactive exposures. This lack of governmental action puts all residents of Japan at risk, and also any athletes, spectators and visitors that participate in the Olympics.

Currently, the torch relay is scheduled to begin with a special display of the “Flame of Recovery,” as the torch passes through still-contaminated areas of Fukushima Prefecture. Then, the “Grand Start,” the Japanese leg of the Tokyo 2020 Olympic Torch Relay, will occur at “J. Village,” the former disaster response headquarters used during the initial nuclear meltdowns in 2011. It is 12.4 miles from Fukushima-1 wreckage site, and resides close to acres of radioactive topsoil and other material stored in bags. The bags and the cranes moving them are visible on satellite maps dated 2019. After starting in Fukushima, the torch will travel to all remaining prefectures of Japan. Further, there is indication that J. Village (now called National Training Center) is being retrofitted as a practice area for baseball, softball, and soccer. Games hosted in Fukushima Prefecture aren't the only exposure concern, as radioisotopes have traveled far from the ruined cores



Meanwhile, Susanne Rust, reporting for *Los Angeles Times*, wrote recently that, “... on a far-flung spit of white coral sand in the central Pacific, a massive, aging and weathered concrete dome bobs up and down with the tide.”

While Greenland's melting ice helps propel sea level rise, 10,000 miles away on Runit Island, in the Anewetak Atoll of the Marshall Islands—where the US conducted some 67 nuclear bomb detonation experiments—a giant cement-covered radioactive waste dump site is being threatened by the rapidly rising seas.