# THE VIOLENCE OF NUCLEAR ENERGY AGAINST INDIGENOUS PEOPLES, LAND, WATER AND AIR

*by Joe Heath*

The nuclear industry negatively and disproportionately impacts on indigenous peoples, nations, land and waters. Three aging Oswego nuclear reactors within the Onondaga Nation's original territory are well past their designed life spans and are a danger to all beings living in relation to Lake Ontario.

## Uranium Mining Impacts on Indigenous Nations and Peoples

The entire life cycle of the nuclear power industry has huge negative impacts on indigenous nations and peoples, from the mining of uranium in Indian country and the vast amounts of nuclear waste associated with the mining and milling of uranium, to the transportation of uranium and the proposed long-term storage of nuclear wastes on Indian country. Negative impacts continue and will worsen due to the current administration's plan to resume uranium mining.

There are three stages of conventional uranium mining: first, the ore is extracted from the ground. Next, a mill grinds the ore to sand, which is processed to remove uranium from the waste rock, known as "tailings." The uranium is then concentrated and dried into "yellowcake" for commercial sale. The tailings—which are radioactive—must be secured and stored.

Uranium mining, milling and related industries destroy sacred sites, petroglyphs and ancestors' unmarked burial sites, and contaminate drinking water. Traditional lifeways are made difficult or impossible because of contamination of water and land; sacred sites have been made inaccessible or dangerous to access; and Indigenous peoples are forced to leave homelands they have occupied for centuries.

Water contamination from uranium mining and tailings is widespread and especially damaging in southwestern states where water is scarce. Surface waters and aquifers are polluted by all phases of uranium mining and production. Water contamination includes various combinations of uranium, arsenic, copper, lead, molybdenum, selenium, sulfate, thorium, vanadium and radium.

Prior to any uranium mining, extensive explorations are conducted on Indian country, such as drilling thousands of holes and cores, and construction of extensive roads and truck pads on undisturbed, pristine lands. Most of these exploratory holes are not sealed or capped and create pathways between groundwater aquifers, allowing contaminated water to pollute clean drinking water supplies.

## Routine Discharges of Radioactive Water and Air

The Nuclear Regulatory Commission relies on self-reporting and computer modeling from reactor operators to track radioactive releases and projected dispersion of radioactivity. This means that a significant portion of the environmental monitoring data is extrapolated and virtual, but not real.[1] Low-level radiation damages tissues, cells, DNA and other vital molecules in humans and all life forms; there is no safe dose.[2]

One of the main radioactive isotopes of concern for both water and air releases from nuclear reactors is tritium (a radioactive isotope of hydrogen), which combines with oxygen to produce tritiated water and is readily absorbed through skin, lungs and the GI tract. Tritium is impossible to remove from air or water by filters and is absorbed by trees and plants, including food crops; when consumed it can incorporate into tissue cells, becoming a dangerous human health risk.

Some radioactive fission gases from the reactor cooling water are contained in decay tanks for days before being released into the atmosphere, and some gases leak into the reactor buildings' interiors. The gases, in addition to tritium, include noble gases which rapidly decay to dangerous daughter isotopes, such as cesium-135 and strontium-90.

Additionally, some contaminated water is intentionally removed from the reactor vessel to reduce the amount of the radioactive and corrosive chemicals; the water is filtered and then either recycled back into the cooling system or released into the environment.

## Radioactive Isotopes

A nuclear reactor produces hundreds of radioisotopes such as plutonium-239 (a component of spent fuel), which decays into various radioactive substances, such as thorium and radium, and must be isolated from the environment for at least 100,000 years to decay to a safe level.

Radioisotopes produced in a reactor remain extremely hazardous from a few days to hundreds of thousands of years; these radioisotopes remain in fuel assemblies and as components of the resulting spent fuel.

## Risks from Accumulation of Spent Fuel Rods

When spent fuel rods are removed from a reactor, they are thermally hot and intensely radioactive; they must be immersed in deep pools of water. Once placed in a holding pool, spent fuel rods continue to decay and generate enormous amounts of heat. Cooling water must be circulated in the pools, requiring an uninterrupted source of power.

Due to cost issues, operators keep rods in pools until full capacity, meaning that only about 25% of domestic spent fuel is stored in dry casks—stainless steel or concrete containers. Spent fuel rods are being stored at an average density of four times higher than originally intended. The higher density of fuel rod storage causes degradation in the neutron-absorbing materials

*Joe is the General Counsel of the Onondaga Nation.*

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that are required to prevent a self-sustaining chain reaction from starting; and it creates an added stress on the cooling and cleaning systems.

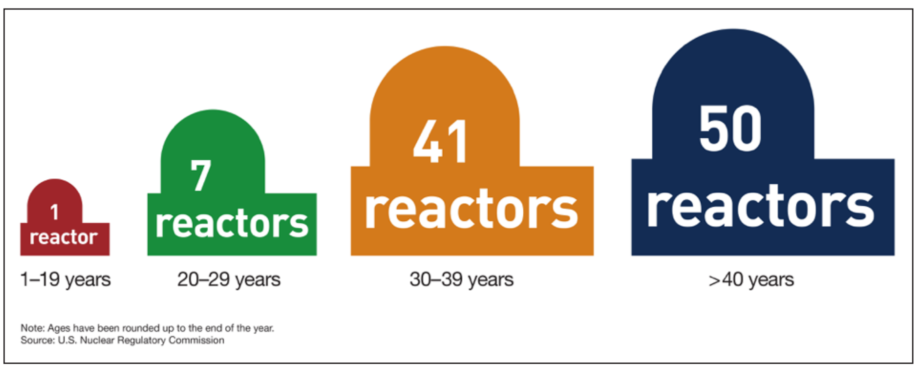
Spent fuel rod storage pools have at least two potential hazards. If a leak develops it could drain enough water to expose the fuel, or the water circulation system used for cooling could fail, which would cause the hot fuel rods to boil off the water in which they are stored and catch fire at 800 degrees Celsius.

Another method of cost savings is to use fuel with higher levels of uranium, which can burn longer and increase the periods between shutdowns for refueling. This fuel is hotter and more radioactive when removed from a reactor core and the length of time it must remain in a pool is extended. The higher levels of uranium in the fuel rods can cause the cladding[3] around a spent fuel rod to become brittle; it also leads to higher pressure from hydrogen and other radioactive gases inside the cladding; all this increases risk that the cladding will fail and allow the escape of radioactive materials.

According to the Government Accountability Office, the worst-case scenario for spent fuel at reactor sites is a self-sustaining fire in a spent fuel pool, which could spread to all assemblies in the pool and release massive amounts of radioactivity.

A 1997 report for the Nuclear Regulatory Commission by the Brookhaven National Laboratory found that a severe pool fire could render about 188 square miles around the nuclear reactor uninhabitable, cause as many as 28,000 cancer fatalities, and result in $59 billion in damages.

Further, spent fuel pools are not under the same type of containment that reactor vessels are, and more likely to release radioactive material into the atmosphere in case of an accident or fire. There are several events which could cause a loss of pool water, including: leakage, evaporation, siphoning, pumping, aircraft impact, earthquake, the accidental or deliberate drop of a fuel transport cask, reactor failure or an explosion inside or outside the pool building.




Nuclear reactor age in the US as of end of 2018. Graphic: US Nuclear Regulatory Commission.

## Dangers of Three Aging Nuclear Power Reactors in Oswego

All three Scriba reactors (Fitzpatrick and Nine Mile Point 1 and 2) are General Electric Boiling Water Reactors (GE BWR). This is the same design as the Fukushima Daiichi reactors in Japan. For more information, see the New York Times article *Experts Had Long Criticized Potential Weakness in Design of Stricken Reactor*,[4] which discusses the weakness in the containment vessel and pressure suppression and relief systems.

GE BWR reactors have two fundamental design flaws which increase risks to the surrounding human populations and to air, water, and land: (a) the containment vessel is not as physically robust as competing designs; and (b) the spent fuel rods are stored on upper floors and not in cooling pools at ground level.

Since 1981, there have been at least 66 incidents at US nuclear reactors with a significant loss of spent fuel cooling water. One of the major threats from the Fukushima reactor disaster was the loss of cooling water surrounding the spent fuel rods on the upper floors.

Concerns about the design escalated in the mid-1980s, when Harold Denton, an official with the Nuclear Regulatory Commission, asserted that Mark 1 reactors had a 90 percent probability of bursting if fuel rods overheat and melt in an accident.

A nuclear reactor's fuel rods, pipes, tanks and valves can all leak. As a nuclear reactor ages, so does its equipment, and leaks generally increase. The three Oswego/Scriba reactors are already operating well beyond their projected life spans. Keeping these three aging reactors operational is both costly and dangerous. The state's $12 billion payer funded bail-out could implement more solar, wind and truly renewable power generation. Renewable energy is less expensive every year, while nuclear becomes more expensive every year.

Recently, a new danger has been added to the list of nuclear risks—the ever increasing risk of flooding due to climate change. Every reactor in the US is on the shore of a water body, because the water is essential for cooling. The risks of flooding are increasing due to intense and more frequent rain events. Lake Ontario has reached record high levels in two of the past three years, causing massive shoreline flooding damage and coming within one foot of overflowing the Scriba reactors. Such flooding could begin the same series of catastrophic events seen at Fukushima.

Footnotes:

[1] Nuclear Information and Resource Services. *Routine Radioactive Releases from Nuclear Reactors.*

[2] University of South Carolina. "Even Low-level Radioactivity is Damaging, Scientists Conclude." *Science Daily*, November 13, 2012.

[3] "Cladding" is the outer layer of the fuel rods, situated between the coolant and the nuclear fuel.

[4] *NY Times*, March 16, 2011, p. A14