

Study: Nuclear Reactors Are Toxic to Surrounding Areas, Especially With Age



Diablo Canyon Nuclear Power Plant, Units 1 and 2. (Photo:Nuclear Regulatory Commission)

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By Candice Bernd, Truthout.org, March 11, 2014

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A study released last week shows that public health in the communities surrounding California's Diablo Canyon power plant in San Luis Obispo County declined dramatically after the plant was built. The findings also document the presence of Strontium-90 in baby teeth.

Is the baby tooth under your child's pillow radioactive? It could be if you live relatively close to a nuclear power plant that has been operating normally and in accordance with federal regulations, according to a new study.

[The study](#), released last week by the Santa Barbara-based think tank [World Business Academy](#) for its Safe Energy Project, found that public health indicators such as infant mortality rates and cancer incidence in surrounding areas rose dramatically after Pacific Gas and Electric's (PG&E) two nuclear reactors at the Diablo Canyon power plant began operations in 1984 and 1985.

"This should be a concern for any nuclear reactor and its health risks, whether it's been operating for a day or 30 or 40 years because these reactors create over 100 cancer-causing chemicals; much of it is stored as waste at the plant, but a portion of it is released into the environment and gets into human bodies through the food chain," said Joseph Mangano, who authored the study. He is the executive director of the nonprofit Radiation and Public Health Project (RPHP).

The findings also document the presence of the radioactive isotope Strontium-90 in baby teeth, showing that the Strontium-90 levels in 50 baby teeth collected mostly from San Luis Obispo County, but also from Santa Barbara County, which is downwind from the Diablo Canyon plant, was 30.8 percent higher than the levels found in the 88 baby teeth from the rest of the state.

The isotope displays some biological similarity to the way calcium behaves in the body because of the way it becomes absorbed and deposited in bones and bone marrow. The effects of Strontium-90 on the human body are not completely understood, according to medical professionals, but it has been linked to bone cancer and leukemia.

The Academy study cites previous research conducted from 1996 to 2006 by RPHP, which remains the only analysis of radioactivity levels within the bodies of Americans who live close to nuclear reactors. RPHP tested about 5,000 baby teeth and found consistent elevation levels of Strontium-90 in the teeth of children born in counties closest to nuclear reactors and a consistent rise in these levels over time.

In California, the average Strontium-90 level found in baby teeth has risen with time, increasing 50.2 percent for children born in 1994-97 from the levels found in children born in 1986-89. After the halt of above-ground atom bomb testing in 1963, the average Strontium-90 levels fell, but they began to rise again in the 1980s and '90s. And according to the Academy study, there is only one source of this isotope not

found in nature: the federally-permitted radioactive emissions from all operating US reactors, including the Diablo Canyon plant.

The Academy study's other key findings include that the infant mortality and child/adolescent mortality rates in San Luis Obispo County, which were far below California's average rates before the plant began operations, have nearly closed the gap with the state's average. Moreover, the county's overall cancer rate, which was previously below the state's average, is now much greater than the California average. In fact, San Luis Obispo County has the highest rate of cancer incidence of the state's 20 most southern counties, according to the study, and these rising cancer incidences include statistically significant increases in thyroid and breast cancers, which are particularly radiosensitive.

“Permissible” Limits

The Environmental Protection Agency (EPA) allows what it calls “permissible” limits of radioactive emissions from nuclear reactors as well as radioactive concentrations in the surrounding environment, and the Nuclear Regulatory Commission (NRC) requires all reactor operators to submit detailed annual reports on the types of radioactive emissions released and their concentrations. But many scientists and medical experts agree there is no safe concentration of radiation, no matter how small, especially for children and other vulnerable demographic populations.

“Every single exposure to radiation carries some level of harm. It's like saying if you smoke four cigarettes a day, that's relatively low so we're going to call it permissible, we're going to call that safe,” Mangano told Truthout. “Well, cigarettes are cigarettes,” he said.

Mangano has authored 32 peer-reviewed medical journal articles on the topic of radiation and public health impacts. He notes that the nuclear industry, regulators, government health agencies and academics have all neglected to produce studies demonstrating the safety of nuclear plants, so there is no evidentiary basis for what is “permissible.”

“[Regulators] just set these permissible limits, measure them, say ‘yes, we're below permissible so we're good.’ ... As a health researcher, I think that's irresponsible to do, and I think it's misleading to the public because these are not your ordinary chemicals,” he said.

Mangano believes his work is just the beginning. He hopes other researchers will follow up by studying potential health impacts on surrounding communities in more

depth. Other medical experts agree that his study is enough to warrant this additional work.

Dr. Stephen Hosea, who is associate director of internal medicine education at the Santa Barbara Cottage Hospital in Santa Barbara told Truthout he believes the study has strong epidemiological merits in that it analyzes patterns of *changing* health and disease conditions and identifies risk factors in defined populations.

“Any time you look at a study you want to ask if it makes sense with other things that we know, and we certainly know that exposure to radiation can cause birth defects and problems with the fetus and neonates,” Dr. Hosea said. “It also is well-known to cause cancer as well. So it certainly makes sense from that standpoint.”

The Academy commissioned the study in the hope it will prompt the replacement of California’s last nuclear energy source with renewable energy sources instead. The people behind the Academy and its Safe Energy Project aim to inspire businesses to take responsibility for the environment and the concerns of civil society.

Representatives of the Academy have testified in hearings before the California Public Utilities Commission to shut down the San Onofre nuclear plant in San Diego. The plant closed in June of 2013, but the Academy continues to intervene in ongoing legal hearings before the utilities commission for a refund of \$1.5 billion in rate-payer dollars charged to consumers, claiming the plant was mismanaged by the utility company that owns it.

“Obviously our goal is to close down Diablo Canyon, we had that goal before this study was done,” Jerry Brown, who directs the Academy’s Safe Energy Project, told Truthout. “However, our hope is this study will inspire all interested parties ... to take a serious look at the health impacts of nuclear power plants, Diablo Canyon, and of all the nuclear power plants in the country.”

The Industry and the Government Hit Back, Predictably

Industry and government regulators claim Mangano’s study, as well as his previous peer-reviewed research studying the health impacts of radiation on local communities, is not credible.

“Given Mr. Mangano’s history of discredited reports due to poor science and that this newer report draws on the previously discredited work, PG&E is not giving this report any consideration,” Blair Jones, a PG&E spokesman, told Truthout in a written statement. “Recent assessments performed by the US nuclear industry’s federal

regulator, the Nuclear Regulatory Commission (NRC), demonstrate Diablo Canyon is being operated safely and in a manner that protects the health and safety of the public. The NRC has found our operations continue to meet all safety and security performance objectives.”

And the Nuclear Energy Institute (NEI), an industry group, reacted even more aggressively, calling Mangano a “fearmonger” and “scaremonger.” The group regularly [cites a statistic](#) from the EPA that nuclear power plants only account for 0.1 percent of the radiation an average American is exposed to in the course of a year and that exposures from common medical procedures such as CT scans and X-Rays [account for about 50 percent](#) of this overall level.

But Dr. Hosea questions their claims. “At least with medical radiation you know you’re exposed and you can make a decision whether or not it’s worth the risk of getting a cat scan which is very, very small compared to not knowing [about potential risks from reactors] and finding out later that there’s potentially a problem,” he said. “We keep being reassured there’s not a problem, but there very well may be a problem,” he said.

Strontium-90 is not typically released in the radiation patients are exposed to diagnostically, and different radioactive isotopes can be of different qualities in terms of how much harm they can do to the human body.

“In whose interest is it to discount the study and not pay attention to it? It needs further investigation so we can really know the truth,” Dr. Hosea said.

PG&E and the industry group both point to staffers from eight state departments of health and the NRC who have looked into Mangano’s work and have invalidated it. [The NEI claims](#) that most of the Strontium-90 in the environment, which has a half-life of 28 years, is a remainder left over from above-ground atom bomb tests in the 1950s and early ’60s, and that there has been no significant change in background levels of radiation near nuclear reactors.

But Mangano’s research has found an overall statistically significant increase in concentrations of Strontium-90 found in baby teeth near Diablo Canyon over time. His previous research has also found that after the Rancho Seco nuclear power plant in Sacramento was closed, public health indicators in the surrounding areas improved.

“What the industry does in the absence of not doing these studies and not liking the results, is calling names,” Brown said. “This is not fifth grade; you do not get to talk

about the health and safety of your customers and your neighbors by pointing fingers, and calling names, and trying to discredit, and trying to shoot the messenger.”

“This is not Joe Mangano’s data, this is data that is put out and publicly available by the Centers for Disease Control, by federal statistics and by the California cancer registry,” Brown said.

An NRC spokesman agreed with the industry that Mangano’s latest study lacked credibility. But more than 20 years after a [highly cited study](#) claimed there was no increased cancer risk from proximity to nuclear plants, [the NRC is finally looking into the matter](#). The agency has asked National Academy of Sciences (NAS) to perform its own assessment on cancer risk for populations surrounding nuclear reactors, which is still in the works. The NAS has confirmed there are no safe levels of radiation exposure, in contrast with the EPA’s “permissible limits” approach.

“[The NAS assessment] is essentially the study we asked for 20 years ago,” said nuclear engineer David Lochbaum, who directs the Nuclear Safety Project at the Union of Concerned Scientists (UCS). Lochbaum told Truthout that when he asked NRC staffers why they did not address health impacts in a draft environmental impact statement for a nuclear plant seeking a 20-year license extension in 1998, the staffers told him that “human health was outside the scope of their assessments.”

“We applaud the NRC for doing [the health impact study], we just wish it would have been done...” he paused. “I guess better late than never, so we’ll look at the glass as half-full.”

When it comes to the credibility of Mangano’s work, Lochbaum told Truthout more research still needs to be done.

“When I read Joe’s work, it seems plausible,” he said. “When I read industry’s objections, that seems plausible too, and I know they both can’t be right and I don’t know which is. That’s why we advocated ... for a health study that included people from the entire spectrum.”

Aging Nuclear Plants Like Diablo Canyon Dot the Nation

The United States currently has [100 operating nuclear reactors](#) in 31 states. The last nuclear plant to be constructed was finished in 1996, and the oldest was built in 1969. The average age of all operating nuclear plants in the United States is about 30 years.

Since the last new plant was constructed, the nuclear industry has struggled to get new plants up-and-running. The ongoing nuclear crisis at Japan's Fukushima Daiichi plant has largely renewed concerns about the inherent safety of nuclear reactors, echoing concerns in the United States that date back to the reactor meltdown at Three Mile Island in 1979.

Before Fukushima, Congress allotted \$17.5 billion in loan guarantees to jump-start the nuclear industry with new power plants, but nothing much came of the effort because expenses for construction increased sharply as the economy dragged.

Mangano's study not only suggests that the normal operations of nuclear plants are potentially toxic to local communities, but also that there is an increased likelihood of radioactive leaks from nuclear plants as they age, problems not just confined to the Diablo Canyon plant in California, but to all nuclear plants in the country, which are aging.

"[Nuclear plants] go through steam generator corrosion and leaks. That's been a generic problem with pressurized water reactors throughout the industry. They go through pressure vessel corrosion. They go through reactor vessel embrittlement that makes it more likely for cracking or leaks, and thinning," Brown said.

Diablo Canyon Risks Fukushima-Style Disaster

Another one of the Academy's and grassroots groups' concerns is that the Diablo Canyon nuclear plant is at a major risk of a Fukushima-style disaster because it sits atop an active fault line, and the plant's age is a factor in its vulnerability to seismic activity.

PG&E told Truthout that the Diablo Canyon plant was built with seismic safety in mind and "is designed to withstand the largest ground motions, or shaking that could be expected to be generated from any nearby faults." The company also stressed that it maintains a seismic team of experts who partner with independent scientists to study the seismic activity of the region, and that these scientists' analysis confirm the plant is designed to withstand the highest levels of seismic activity that could occur.

But Lochbaum, who authored a report for UCS called, "[Seismic Shift: Diablo Canyon Literally and Figuratively on Shaky Ground](#)," maintains the earthquake hazard in the 1970s, when the Diablo Canyon plant was proposed and constructed, led its designers to protect against seismic activity no greater than 0.4 g-forces. That was before two other major active fault lines in the region were discovered and estimated

to cause a ground motion of around 0.75 g-forces. PG&E has not made any structural adjustments or modifications to account for this discrepancy.

Lochbaum said that the studies PG&E has conducted about the seismic activity of the region, which state that the plant is safe, use flawed methodology, and that the NRC has also rejected the company's analysis.

But with the three-year anniversary of arguably the worst nuclear reactor disaster in history today, the two Diablo Canyon nuclear reactors remain potentially at risk of a very similar catastrophe off the coast of California.

And despite the potential health impacts of the everyday operations of all US nuclear reactors and the inherent risks of a potentially catastrophic environmental disaster occurring at any one of them, some see a potential “nuclear renaissance” on the horizon just three years after the Fukushima meltdown.

In February Energy Secretary Ernest Moniz [announced the approval](#) of \$6.5 billion in loan guarantees to Atlanta-based Southern Co. for two new nuclear reactors in Georgia. The \$14 billion project is just one of a handful of new reactors planned for construction.

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