

NUCLEAR POWER

Health, Preparedness and Prevention



Following a devastating 9.0 earthquake and tsunami in Japan on Friday, March 11, 2011, explosions have occurred at the Fukushima Daiichi nuclear station. The first explosion occurred on March 12 and two additional explosions and associated fires occurred on March 14 and 15.

PSR-LA extends our deepest sympathy to the people of Japan. The world is still learning about the amount of radiation being released from the damaged nuclear reactors, and we don't know how long the releases will occur. As physicians and public health professionals, we are deeply concerned about the threat this nuclear disaster poses to public health and the environment on a local and global scale.



Photo by DigitalGlobe

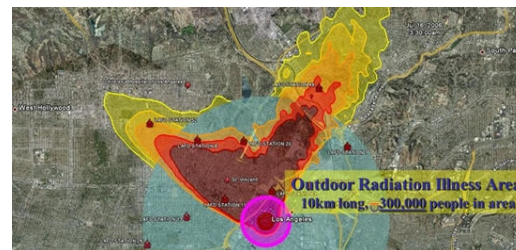
There is no “safe” level of radiation exposure

- ➔ Any exposure, including natural background radiation, causes some increased risk of cancer. Having said that, the dose we expect -- from the releases that have occurred so far in Japan -- will be very low in the U.S. The immediate health threat is in Japan.
- ➔ The danger for Californians is not the radiation coming from the current accident in Japan, but the radiation that might leak from a future accident right here in California.
- ➔ The radiation in a commercial nuclear reactor core is equal to the fallout from 1000 Hiroshima bombs, which if released, can cause short term and long term illness and death.

Nuclear energy is too risky, dirty and expensive

- ➔ The Obama Administration wants to triple the \$18.5 billion for new nuclear reactors to \$54.5 billion for America's 2012 Budget. Tax-payers have been paying for up to 80% of the cost of reactors construction.
- ➔ Accidents are inevitable with technology as complex as nuclear reactors. Nuclear reactors built near fault lines, like our own San Onofre and Diablo Canyon plants in California, have special vulnerabilities. Three Mile Island and Chernobyl were nowhere near earth quake zones, and all nuclear plants are vulnerable to terrorist attacks.
- ➔ The recent tragic accidents remind us that risks with nuclear power are unacceptable. We must halt all new reactor plans and instead prioritize building an energy system that is safe and renewable.

Photo of Los Angeles adapted from 2010 U.S. Dept. of Homeland Security “Emergency Preparedness for a Radiological or Nuclear Incident” presentation at the California Center for Healthy Communities.



Local preparedness plans are needed

- ➔ While preventing nuclear disasters is the real solution, we must have plans in place for the already risky situations existing nuclear power plants have created.
- ➔ Clear plans from local authorities are needed for any protective measures that can happen as a result of a radiological incident. For example, in some cases, Potassium Iodide (KI) can protect the thyroid from radiation damage. With four fully functioning nuclear reactors in California, in addition to the possibility of radioactive drift from nuclear incidents around the globe, local plans must be in place.

HEALTH EFFECTS OF RADIATION EXPOSURE

Information adapted from PSR's publication [Radiation and Public Health](#).

Ionizing radiation is radiation with enough energy to remove electrons in the process of interacting with an atom, causing the atom to become charged or ionized. Ionizing radiation has enough energy to produce free radicals, break chemical bonds, produce new chemical bonds and cross-linkages between macromolecules, and damage molecules in human cells that regulate vital cell processes like DNA and RNA. This in turn may lead to cancer or leukemia.

The National Academies of Science BEIR VII report concluded in 2005 that any exposure to radiation can have detrimental health effects.¹ The most complete data available on the health effects of radiation are on the survivors of the atomic bomb explosions in Japan, on radiation industry workers, and on people receiving large doses of medical radiation.²

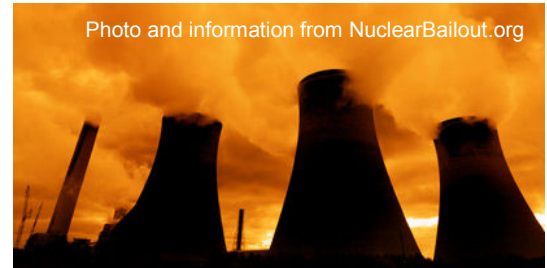
From a health perspective, the most important isotopes are iodine 131, cesium 137, strontium 90, and plutonium 239.

Radioactive iodine caused thousands of cases of thyroid cancer in children after the Chernobyl accident. Cesium and strontium cause a number of different kinds of cancer and remain dangerous for hundreds of years; plutonium causes lung cancer and remains deadly for hundreds of thousands of years.

URANIUM MINING

Uranium mining has created devastating health effects on miners and communities. Miners and their families exposed to radon gas, a highly carcinogenic substance that emanates from uranium mining, have been diagnosed with small cell carcinoma and other forms of cancer.

Uranium mining tends to be concentrated on indigenous lands, where impoverished communities, eager to find work, are uninformed of the environmental and health impacts of the mining.



POTASSIUM IODIDE (KI)

What, Why, and When

Information adapted from CDC's fact sheet [Potassium Iodide \(KI\)](#).

Following a radiological or nuclear event, radioactive iodine may be released into the air and can be breathed into the lungs. Radioactive iodine may also contaminate the local food supply and get into the body through food or drink.

Potassium Iodide (KI) is a salt of stable (not radioactive) iodine used to block radioactive iodine that enters the body after a radiological or nuclear event.³

Because non-radioactive KI acts to block radioactive iodine from being taken into the thyroid gland, it can help protect this gland from injury.

In case of a radiological event, infants (including breastfed infants), children under 18 years of age, young adults between the ages of 18 to 40 years of age, pregnant women, and breastfeeding women are recommended to take KI.



- ➔ KI should only be taken at the direction of emergency management officials, public health officials, or your doctor.
- ➔ KI can only protect the thyroid gland from radioactive iodine, not other radioactive elements, or protect other parts of the body.

¹ BEIR VII Report, "Health Risks from Exposure to Low-Levels of Ionizing Radiation," National Academies of Science (2005). <http://www.nap.edu/openbook.php?isbn=030909156X>

² United States Environmental Protection Agency, Office of Air and Radiation, Ionizing Radiation Factbook (March 2007), <http://www.epa.gov/radiation/docs/402-f-06-061.pdf>

³ "Potassium Iodide (KI)". *Emergency Preparedness and Response*. Center for Disease Control and Prevention. www.bt.cdc.gov/radiation/ki.asp, retrieved March 15, 2011.

CALIFORNIA'S NUCLEAR POWER

California has four operating nuclear reactors, located at two facilities: Diablo Canyon 1 and 2, and San Onofre 2 and 3. Our nuclear capacity is only 7% of the state's total capacity, but this still makes California's nuclear industry one of the ten largest in the nation.



Diablo Canyon

Built to withstand a 7.0 earthquake, this nuclear facility is near four tectonic fault lines, including the San Andreas and Hosgri faults. Diablo Canyon Power Plant is located at Avila Beach in San Luis Obispo County and is operated by Pacific Gas & Electric Company. It was constructed at \$11.556 billion (2007 USD).



Both units at Diablo Canyon are Westinghouse four-loop pressurized water reactors. Diablo Canyon is cooled using a once-through system that draws water from the Pacific Ocean.⁴

San Onofre

Built to withstand a 7.0 earthquake this nuclear facility is near the Cristianitos tectonic fault line. San Onofre Nuclear Generating Station is located next to San Onofre State Beach, which adjoins the Camp Pendelton U.S. Marine Corps Base in northern San Diego County. It is operated by the Southern California Edison Company, and the construction costs of Units 2 and 3 was \$8.968 billion (2007 USD).



San Onofre houses two Combustion Engineering pressurized water reactors. Each reactor has two steam generating loops. San Onofre relies on a unique cooling system that uses a 3,000-foot pipe to draw water from the Pacific Ocean. A velocity cap diverts fish from the intake. Water is dispersed from 1,500-foot pipes through

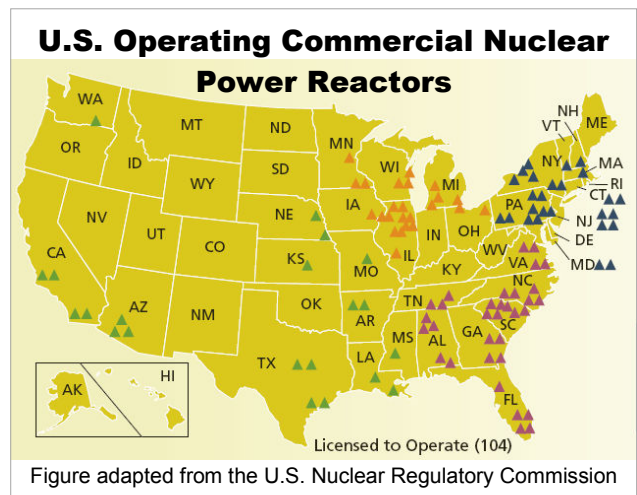
hundreds of openings, thereby helping maintain a temperature that varies by only a couple of degrees from that of the ocean.⁵

THE U.S. AND NUCLEAR POWER

There are 104 commercial nuclear reactors in the U.S.⁶ Reactor operating licenses are valid for 40 years, and the Nuclear Regulatory Commission (NRC) is in the process of extending licenses for another 20 years.

Many important issues are excluded from the license review process, such as the impacts of storing additional low- and high-level radioactive waste indefinitely on-site.⁷ Also, the public safety threat posed by over-packed spent fuel pools is not considered, despite the fact that the National Academy of Sciences has concluded that these pools are at risk from terrorist attacks.

The NRC has not turned down a single renewal application thus far: 59 reactors have received extensions and another 20 reactors have pending applications. A September 2007 audit by the NRC's Office of Inspector General concluded that in over 70% of the reviewed license renewals, NRC staff did not verify the technical safety information provided by the reactor operators and routinely copied word-for-word entire sections of the industry's application into the NRC's safety review document.⁸



⁴ U.S. Energy Information Administration - http://www.eia.doe.gov/cneaf/nuclear/state_profiles/california/ca.html

¹ Ibid

⁶ U.S. Nuclear Regulatory Commission - <http://www.nrc.gov/>

⁷ Boyd, Michelle. "Is there a nuclear revival in the United States?". October 2010. <http://www.psr.org/nuclear-bailout/resources/nuclear-revival-us-loan-guarantees.pdf>

⁸ U.S. Nuclear Regulatory Commission Office of the Inspector General, Audit Report, Audit of NRC's License Renewal Program, September 6, 2007, OIG-07-A-15, http://adamswebsearch2.nrc.gov/idmws/DocContent.dll?Library=PU_ADAMS^PBNTAD01&ID=072500038&Page=1

WHAT YOU CAN DO – ADVOCACY & EDUCATION

Call for safer energy in our state and nation

California and our nation need clean and renewable energy investment, not continued support for dirty, risky and expensive nuclear energy. Let's invest in clean energy solutions and stop supporting further permitting of nuclear power facilities.

1. Call California decision makers to demand that our state invest in clean energy solutions and say “no” to nuclear energy. You can reach Governor Jerry Brown's administration at (916) 445-2841.
2. Demand a national moratorium on the permitting of new facilities, and the giving away of taxpayer dollars to private interests of the nuclear industry. You can reach President Obama's administration at (202) 456-1111.

Demand local preparedness

In the event that potassium iodide is recommended by health professionals in a radiological incident, state and county authorities need a clear response and distribution plan. If this plan is not in place, we run the risk of the general public misusing potassium iodide under no medical supervision, or not having an adequate supply and delivery structure in case it is needed.

1. Call Governor Jerry Brown's administration to ask about the state's preparedness for a radiological event at (916) 445-2841. You can also reach the CA Department of Public Health's hotline if you have radiation exposure related questions at (916) 341-3947.
2. Make sure your family, community and workplace have plans in place for any kind of emergency situation. The CA Emergency Management Agency website can help you prepare, and link you to your local county emergency resources: www.oes.ca.gov, (916) 324-9809.

ADDITIONAL RESOURCES

- ➔ Nuclear Information and Resource Service: www.nirs.org
- ➔ PSR-LA and National PSR website: www.psr-la.org, www.psr.org
- ➔ Beyond Nuclear website: www.beyondnuclear.org
- ➔ Cesium-137, iodine-131, strontium-90, and plutonium are the principal radioisotopes of concern during the crisis at the Fukushima 1 Nuclear Power Plant in Japan. CDC Fact Sheets:
 - Cesium137 - www.bt.cdc.gov/radiation/isotopes/cesium.asp
 - Iodine131 - emergency.cdc.gov/radiation/isotopes/iodine.asp
 - Strontium90 - emergency.cdc.gov/radiation/isotopes/strontium.asp
 - Plutonium - emergency.cdc.gov/radiation/isotopes/plutonium.asp

INTERVIEWS

Contact Denise Duffield at PSR-LA for media interviews with physicians and health advocates. (213) 689-9170, dduffield@psr-la.org.

ABOUT US

PSR-LA was founded in 1980 as a local affiliate of the national organization, Physicians for Social Responsibility. In the 1960's, PSR helped end atmospheric nuclear testing by documenting the presence of strontium 90 — a radioactive by-product of nuclear tests — in children's deciduous teeth. In the following two decades, our efforts to educate the public about the dangers of nuclear war and weapons grew into an international movement, with the founding of International Physicians for the Prevention of Nuclear War (IPPNW). PSR was the American recipient of the Nobel Peace Prize awarded to IPPNW in 1985.

PSR-LA's early work was guided by a singular mission to reduce threats to public health related to war. In 1989, the Los Angeles office was the first PSR office to branch out by deciding to address environmental health threats, and has played a leading role in national, state, and local education and policy efforts.