

No Longer a Rational Option

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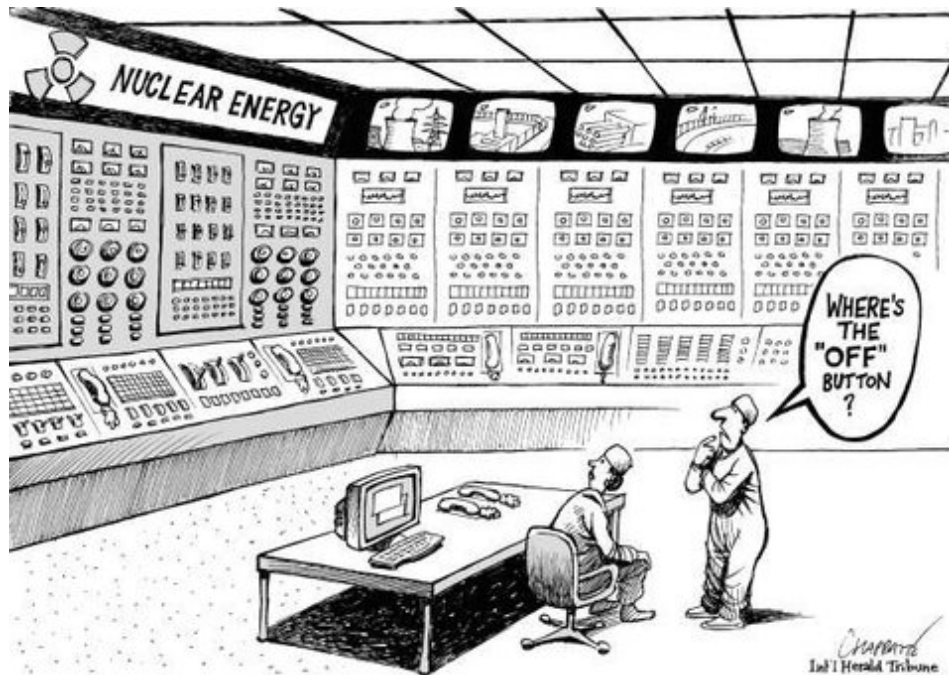
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A Nuclear Plant on the Ring of Fire

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ByHarvey Sherback

Californians have long anticipated and prepared for “the big one,” a mega-thrust earthquake that could strike the west coast at any time. Because our lovely coastline is located within the Pacific “ring of fire” earthquake zone, we live with the possibility that a major earth-shaking event could disrupt our lives at any time. We also remain exposed to a greater disaster than nature is likely to provide. What would happen if “the big one” caused the release of large amounts of radioactive materials from PG&E’s Diablo Canyon nuclear power plant?

To the east of Diablo Canyon, in the direction of the prevailing wind, lies the San Joaquin Valley, California’s breadbasket. Over 25% of the food that passes across America’s dinner tables comes from the central, growing valley. If, somehow, whether caused by nature or accident, Diablo Canyon were to lose containment, we would be rendered helpless as large radioactive clouds rose into the sky. Sea-breezes would carry these toxic plumes eastward into the Valley. No one is going to want to buy produce that’s been contaminated with radioactive cesium, strontium, and iodine. With drought and heat waves destroying much of America’s 2012 corn crop, can we afford to lose California’s agricultural jewel to a nuclear accident?

Additionally, the drinking water for millions of men, women, and children flows from the Sierra Mountains through the Central Valley and into cities that stretch from the Bay Area to Southern California. Nobody is going to knowingly drink water that's been laced with radioactive isotopes.

This double disaster would disrupt our infrastructure. After the multiple-meltdowns at the Fukushima Daiichi nuclear plant, the release of toxic radioactive elements into the environment required far more relief-work than the natural disaster that caused the event. A nuclear meltdown at Diablo Canyon would overshadow all other emergency relief efforts in the state, slowing the repair of our damaged infrastructure while putting first-responders and the public in harm's way. A major release of radioactive materials could disrupt all north-south traffic.

Why must we continue to live with this unnecessary danger?

PG&E has continuously underestimated the challenge of building a nuclear plant within California's portion of the ring of fire. There are over 247 identified fault systems in California – but the truth is that there are just too many to count. In addition to major faults, there are the thousands of undiscovered collaterals. Collaterals are faults that branch off of major fault lines. Two recent devastating earthquakes in California, the 1987 Whittier earthquake and the 1994 Northridge earthquake, occurred along fault lines that were previously unknown.

Around and under Diablo Canyon nuclear plant, there is a confluence of 13 *known* fault systems. The east-west trending Diablo Cove Fault runs directly under Unit 1's reactor. It projects offshore and intersects with the seismically active Shoreline Fault. The Shoreline Fault, less than a mile from the plant, was discovered in 2008. The Shoreline fault may be connected to the Hosgri Fault or other faults to its east. The Hosgri Fault, located just 2.5 miles offshore, is a right-lateral strand of the San Andreas Fault system. The tremendous earth-shaking power of the Hosgri Fault could be triggered by a rupture beginning on the Shoreline Fault Line.

The power stored in this combined network of fault systems can create an earthquake sufficient to exceed Diablo Canyon's safeguards. The plant was originally designed to withstand a magnitude 6.75 earthquake but was later upgraded to survive a magnitude 7.5 quake.

On Saturday, October 27, 2012, a magnitude 7.7 earthquake struck off the west coast of British Columbia. It was Canada's largest earthquake in over six decades. On Friday, January 4, 2013, a magnitude 7.5 quake hit Juneau Alaska. Both quakes were located within the Pacific ring of fire.

The Diablo Canyon nuclear power plant sits in front of the Monterey Shale. The shale spans Monterey, San Benito, and Fresno Counties. Ongoing efforts to hydraulically fracture, or frack, the Monterey Shale for petroleum and methane will increase the potential of a nuclear disaster. The highly pressurized toxic liquids used in fracking can start earthquakes by lubricating pre-existing faults that are located deep underground. This allows masses of rock to slide past each other. Both the U.S. Army and the U.S. Geological Survey have concluded that the practice of injecting pressurized water into deep rock formations causes earthquakes. Fracking the Monterey Shale could trigger a nuclear meltdown!

As the earth's polar caps and glaciers melt at an ever-accelerating rate (2011 was the hottest year on record), the reduced weight on both the top and bottom of our planet is causing the earth's tectonic plates to shift. This increased movement is responsible for larger and more frequent earthquakes.

Diablo Canyon's containment and cooling systems may be more vulnerable to damage than its designers originally imagined. The plant's two high-pressure vessels are made of thick steel and operate at about 1000 pounds per square inch (psi). Unfortunately, due to neutron radiation, these metal vessels tend to become brittle and lose their ability to deform under stress. They can become as fragile as glass from the temperature differential of the cooling water that erupts in the event of an emergency. The idea that nuclear power plants are durable enough to withstand earthquakes and other external shocks is a total myth.

Diablo Canyon is vulnerable to tsunamis. The plant sits perched on a bluff that's 85 feet above sea level and, according to Pacific Gas & Electric, its tsunami wall is robust, with the plant expected to survive a wave up to 25 feet in height. Japanese authorities made similar claims before the wall that protected the Fukushima plant fell. Like the earthquake hazard, the tsunami threat is underestimated. In 1812, the Santa Barbara Channel earthquake produced five tsunami waves in front of the Santa Barbara Presidio. The USGS estimated the largest wave was about 50 feet high.

In 1878, a tsunami at Morro Bay destroyed both Avila and Point Sal piers, and in 1913, a tsunami wrecked the Monterey area. Nearby, at Seaside, immense domes of water appeared to observers to be higher than the highest sand hills along the shore. (The current quad sheet shows elevations as high as 120 feet.)

Over its lifetime, Diablo Canyon's powerful "once-through seawater-intake cooling system" has killed billions of aquatic eggs, larvae, and juvenile fish. They are drawn through the intake screens and cooked to death or crushed by the system's circulation pumps. Marine mammals, birds, adult fish, and crabs who can't escape the suction are pinned to the screens and either suffocate or drown. (So much death and destruction just to boil water!)

From time to time, Diablo Canyon has been forced to go off-line because the screens were clogged with jellyfish and other sea creatures. In October 2008, nearly 1,000 jellyfish floated into the plant's cooling intake cove, closing one reactor and reducing the other to half power. Again, in April 2012, an overwhelming number of jellyfish-like creatures called salps clogged the intake screens, forcing operators to shut the plant's Unit 2 reactor. Similar jellyfish invasions have shut down nuclear power plants in several countries.

Nuclear plants like Diablo Canyon continue to be major contributors to global warming. It's not just the tremendous amount of CO₂ that's released into our atmosphere from the mining, refining, transportation, and guarding of nuclear facilities and their radioactive waste. The greater problem is that these plants are heating up of our world's rivers, lakes and oceans. Diablo Canyon's once-through system alone uses about 87,700 gallons of seawater a minute or about 2.5 billion gallons a day. The seawater is then returned to the Pacific Ocean at temperatures 20 to 25 degrees hotter than the surrounding environment.

With thousands of "once through" coal-fired, oil-fired, natural gas, and nuclear power plants around the world contributing to rising ocean temperatures, it's time for California to aggressively turn toward a future powered by clean energy technologies.

It is not necessary for us to face the frightening prospect of a double-disaster. It is no longer rational for us to live with the risks posed by the Diablo Canyon nuclear power plant. We need to begin planning the removal of this hazard from our coastline.

Harvey Sherback is a regular contributor to the Berkeley Daily Planet.