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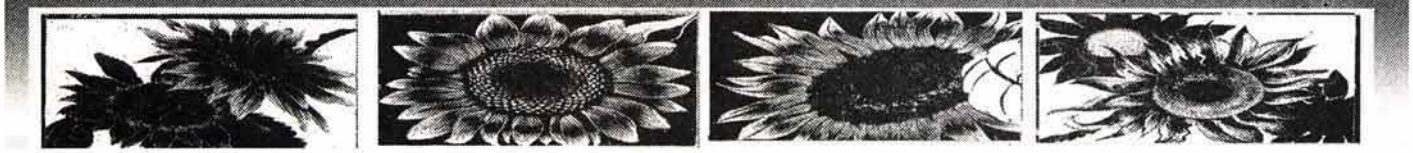

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News & Information on Nuclear Weapons, Power, Waste & Nonviolent Resistance

Nuclear Resisters Released, Sabotage Convictions Overturned —Appeals Court Says Jury Verdict Was "Not Rational"

By John LaForge

A federal appeals court has vacated the sabotage convictions of peace activists Greg Boertje-Obed of Duluth, Minnesota; Michael Walli of Washington, DC; and Sister Megan Rice of New York City. On May 8, a three-judge panel of the Sixth US Circuit Court of Appeals found that federal prosecutors had failed to prove—and "no rational jury could find"—that the protesters had intended to damage "national defense."

Transform Now Plowshares activistss (L-to-R) Greg Boertje-Obed, Sister Megan Rice, and Michael Walli were released May 16 after spending two years in prison for their July 2012 protest at the Y-12 nuclear weapons complex. Photo by Linda Davidson/Washington Post/Getty Images.

In July 2012, Greg, Michael, and Megan clipped through four fences and walked right up to the "Fort Knox" of weapons-grade uranium, the Highly Enriched Uranium Materials Facility inside the Y-12 complex in Oak Ridge, Tennessee. In the hour before they were confronted, the nuclear abolitionists painted "Woe to an Empire of Blood" and other slogans on several structures, strung banners, poured blood on the building, and enjoyed their surprise in catching the nuclear weapons system asleep at the wheel. When a guard finally approached them, they offered him some bread.

The three have been imprisoned since they were convicted in May 2013 of damage to property and sabotage. Boertje-Obed, 60, and Walli, 66, were both sentenced to 62 months on each conviction, to run concurrently; Sister Rice, now 85, was given 35 months on each count, also running concurrently.

Following the appeals court reversal, a motion for immediate release was filed and granted—unopposed by the government—on May 15. All three activists were hastily allowed to return to their respective homes.

The appeal did not address questions about the legal status of nuclear weapons, but rather focused on whether the Sabotage Act applies to nonviolent protesters. During the appeal's oral argument, the prosecutor insisted that the three senior citizens had "interfered with defense." Circuit Judge Raymond Kethledge asked pointedly, "With a loaf of bread?"

The court's written opinion, also by Judge Kethledge, ridiculed the idea of depicting peaceful protesters as saboteurs, saying. "It is not enough for the government to speak in terms of cut fences…" To apply the Sabotage Act, the government must prove that the defendant's actions were "consciously meant or practically certain to" interfere with "the nation's capacity to wage war or defend against attack." The court found that Greg, Megan, and Michael "did nothing of the sort"; thus, "the government did not prove the defendants guilty of sabotage." The opinion went so far as to say, "No rational jury could find that the defendants had that intent when they cut the fences." The opinion is uncharacteristically blunt in its direct implication of prosecutorial overreach and judicial manipulation of the jury.

Another reason the appeals court vacated the sabotage conviction was that the Supreme Court's legal definition of "national defense" is unclear and imprecise, "a generic concept of broad connotations…" The appeals court said it needed "a more concrete" definition because "vague platitudes about a facility's 'crucial role in national defense' are not enough to convict a defendant of sabotage. And that is all the government offers here." The definition is so general and vague, the court said, that it barely applies to the Sabotage Act, since, "It is hard to determine what amounts to 'interference with' a 'generic concept.'"

Re-sentencing may result in "time served"

The appeals court took the unusual additional step of voiding the prison sentences for both the sabotage and damage-to-property convictions, even though the second conviction still stands. This was because the harsh prison terms given for property damage were heavily weighted in view of the (ill-gotten) sabotage conviction. The result is that the three radical pacifists were released until their re-sentencing, which is scheduled for July 8. As the appeals court said: "It appears that the [sentencing] … for their [damage to property] conviction will be substantially less than their time already served in federal custody."

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Wasting New Mexico:

State Invites High-Level Reactor Waste as Energy Department Eyes Carlsbad's Contaminated WIPP Site for Plutonium Disposal

By Arianne Peterson

In an April 10 letter, New Mexico Governor Susana Martinez urged the US Energy Secretary Ernest Moniz to move forward with plans to establish a "consolidated interim storage facility in southeastern New Mexico." The proposed site would hold the nuclear power industry's ever-growing legacy of reactor fuel rods and other high-level radioactive waste, which the government projects will reach 141,000 metric tons based on current reactor licenses. Since the rise of nuclear energy in the 1970s, the US government has promised to find a permanent, safe solution for disposing of its deadly by-products—but so far, the Energy Department has failed to find a viable option, and decades' worth of discarded fuel rods have remained at reactor sites throughout the country.

New Mexico's interim storage proposal would require transporting this dangerous reactor waste from more than 60 sites dispersed across the country to the state's southeastern corner. The waste would remain at the site for 100 years, or ostensibly until a more permanent solution is found. The global energy company Holtec International and a private regional company called the Eddy Lea Energy Alliance have signed a Memorandum of Agreement to partner in the venture. The site they have identified is near Carlsbad, just 12 miles from the Waste Isolation Pilot Plant (WIPP) radioactive waste repository. WIPP has been closed since February 2014 when an underground barrel explosion there contaminated 22 workers and caused an above-ground release of radioactive particles.

Holtec would be responsible for designing, licensing, building, and operating the new facility using a scaled-up version of its HI-STORM UMAX (for Holtec International Storage Module Underground Maximum Capacity) underground dry-cask storage design. This design has not yet been successfully implemented anywhere in the world; Holtec will hold an "inaugural loading campaign" later this summer at the Callaway nuclear power facility in Missouri, where its first HI-STORM UMAX casks will be filled with radioactive waste. Holtec claims "there is no technical limit on the [planned New Mexico] facility's storage capacity," implying that the dump would accommodate all current reactor waste—and encourage the industry to keep producing more.

More plutonium headed to WIPP?

While Governor Martinez invites waste from the rest of the country's nuclear power facilities for storage at Holtec's proposed site (New Mexico doesn't actually have any commercial reactors of its own), the federal government is considering the contaminated, shuttered WIPP facility just down the road as a final resting place for 34 metric tons of surplus weapons-grade plutonium. On May 9, the Energy Department released a report identifying WIPP as a lower-cost alternative to the proposed mixed oxide (MOX) nuclear program, which was supposed to convert weapons plutonium into commercial reactor fuel. Taxpayers have already spent $4.4 billion on construction of the MOX facility at Savannah River in South Carolina; a division of the French nuclear giant Areva has benefitted from the design contract. Watchdog groups have long derided the project—which is over-budget and behind schedule, suffering from poor management and a lack of oversight.

The May Energy Department report projected the final cost of the MOX program to be at least $47.5 billion, a price government officials admit the country cannot afford. Sending the plutonium to WIPP would be far less expensive—and so far, it's the only other option they've studied. Of course, the WIPP plan would first require that the shuttered site be reopened; it would also necessitate an amendment to the Land Withdrawal Act, which governs WIPP's operations, to allow for more plutonium disposal. An Energy Department report on further plutonium disposal options is due out in September.

Meanwhile, WIPP remains closed, with clean-up expected to require several years and $550 million. In April, the ad hoc Accident Investigation Board appointed by the Energy Department issued its final report on the barrel explosion, which it termed "preventable." The report blames the Los Alamos National Laboratory (LANL), where contractors packed the volatile drum, and the Energy Department itself for mismanagement and negligence, including failure to listen to worker concerns—such as reports of foam and neon smoke emanating from drums. The Board's investigation confirmed that a highly combustible combination of nitrate salts and organic cat litter in the improperly packed, improperly labeled barrel was the direct cause of the explosion.

State settles with Energy Department over violations

Because of the WIPP disaster, the Energy Department reduced the bonuses (monetary incentives above and beyond operating costs) for its contracted operators at WIPP and LANL in 2014. The New Mexico Environment Department threatened to levy more than $150 million in fines against the federal government for permit violations and other failures that caused the contamination, but the state recently accepted a settlement of just $73 million in federal dollars earmarked for highway improvements and other infrastructure projects around the WIPP and LANL.

Greg Mello of the watchdog Los Alamos Study Group expressed concern that the settlement does not actually address the problems that led to the leak. "I'm a little flabbergasted … that the state would negotiate what the money is used for. … What does that have to do with [the Resource Conservation and Recovery Act] violations? It seems like an entirely different sphere." Mello argues that the projects, which are directly related to maintenance and operations of the federal Energy Department facilities, should be part of a regular budget rather than the result of a settlement for environmental permit violations. New Mexico's Environment Department Secretary Ryan Flynn reported that lobby groups for local contractors, who will benefit from the projects, "heavily influenced the settlement."

New Mexico's radioactive burden

Radioactive contamination is not a new problem for New Mexico. In addition to the Los Alamos facility, the state is also home to the Sandia National Laboratories; both labs were established in the 1940s to develop the first atomic bombs and are still active in nuclear weapons research. The White Sands Missile Range, including the site of the first nuclear bomb test, occupies over 3,000 square miles in the southern part of the state. Uranium mining has left a terrible radioactive legacy on the western New Mexico portion of the Navajo Nation, with 450 abandoned mines and eight former mills—three of which are designated Superfund sites—contaminating countless acres and tens of millions of gallons of groundwater.

On the east side of the state, Urenco USA opened a uranium enrichment facility in 2010. Just yards away from the Urenco facility, on the Texas side of the border, Waste Control Specialists (WCS) operates the nation's only private low-level radioactive waste dump. In a February bid that could put it in competition with Holtec and WIPP, WCS announced plans to apply for a permit to store high-level waste, including reactor fuel rods and plutonium-contaminated military waste. No matter which company or government contractor ends up profiting from the nation's nuclear legacy, odds seem good that New Mexico will bear the brunt of the country's nuclear waste burden.

—*Aiken Standard*, May 20; Santa Fe *New Mexican*, May 1; Holtec Highlights, Apr. 30 & May 4; Albuquerque *Journal*, Apr. 17; *Bulletin of the Atomic Scientists*, Jan. 18, 2015; Truthout, Feb. 20, 2014

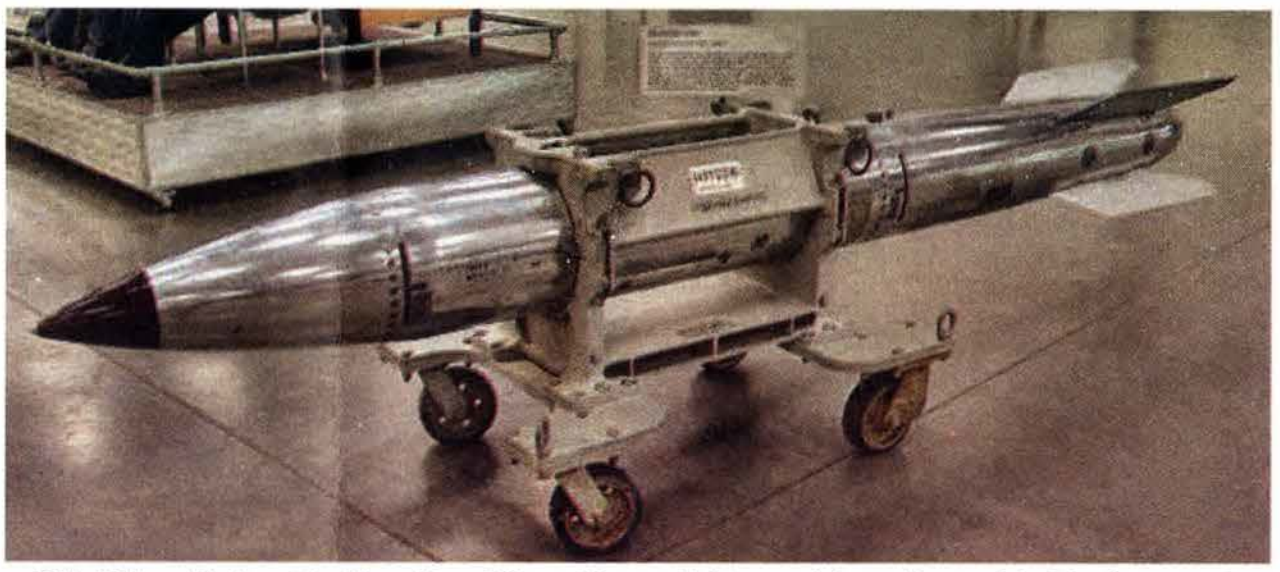
Nuclear Weapons Proliferation—Made in the USA

By John LaForge

As the Nuclear Non-Proliferation Treaty (NPT) Review Conference in the United Nations was finishing its month-long deliberations in New York in May, the US delegation distracted attention from its own violations using the standard red herrings—warnings about Iran and North Korea, the former without a single nuclear weapon, and the latter with 8–10 (according to the always reliable CIA) but no means of delivering them.

The United States is perhaps the principle nuclear weapons proliferator in the world today, openly flouting binding provisions of the NPT. Article I of the treaty forbids signers from transferring nuclear weapons to other states, and Article II prohibits all signers from receiving nuclear weapons from other states.

The Treaty's prohibitions and obligations were reaffirmed and clarified by the International Court of Justice in its 1996 Opinion on the legal status of nuclear weapons. The world's highest judicial body said in its famous decision that the NPT's obligations not to transfer or receive nuclear weapons are unqualified, unequivocal, unambiguous, binding and absolute. It's for these reasons that US violations are easy to illustrate.



This B61, on display at the Pima Air and Space Museum in Tucson, Arizona, is a model of the thermonuclear gravity bombs the US deploys in five European countries—in direct violation of the Nuclear Non-Proliferation Treaty. Photo by Flickr user Pat's_Pics36.

Nuclear missiles "leased" to British Navy

The US "leases" intercontinental ballistic missiles to Britain's Royal Navy for use on its Trident ballistic missile submarines. We've done this for two decades. British submarines travel across the Atlantic to pick up the US-made missiles at the giant Kings Bay Naval base in Georgia. (You can read about this bizarre proliferation business in "Trident: Deadly—and Very, Very Expensive," by Patrick Barkham and Richard Norton-Taylor in the *Guardian*, May 20, 2010.)

Helping to ensure that the US proliferates only the most verifiably devastating H-bombs, a senior staff engineer at Lockheed Martin in California is currently responsible for planning, coordinating and carrying out development and production of the "UK Trident Mk4A [warhead] Reentry Systems as part of the UK Trident Weapons System Life Extension program." This is according to John Ainslie of the Scottish Campaign for Nuclear Disarmament, which watchdogs the British Tridents—all of which are based in Scotland, much to the chagrin of the Scots.

In addition, even the warheads that arm the US-owned missiles leased to England have parts made in the United States. The warheads use a Gas Transfer System (GTS) that stores tritium—the radioactive form of hydrogen that puts the "H" in H-bomb. The GTS injects the tritium it into the plutonium warhead or "pit." All the GTS devices used in "Britain's" Trident warheads are manufactured in the US. They are then either sold or given to the Royals.

David Webb, current Chair of the British Campaign for Nuclear Disarmament, reported in an email to Nukewatch that the Sandia National Laboratory announced, in March 2011, that it had conducted "the first W76 United Kingdom trials test" at its Weapons Evaluation and Test Laboratory (WETL) in New Mexico, and that this had "provided qualification data critical to the UK [United Kingdom] implementation of the W76-1." One of the centrifuges in WETL simulates the ballistic [missile] trajectory of the W76/Mk4 submarine-launched reentry-vehicle. The collusion could be called Proliferation Plus.

The majority of the Royal Navy's Trident warheads are manufactured at England's Aldermaston nuclear weapons complex, allowing both the US and the UK to claim they are in compliance with the NPT.

US H-bombs deployed in five NATO countries

An even more blatant NPT violation is the US deployment of between 184 and 200 thermonuclear gravity bombs called B61s in five European countries—Belgium, The Netherlands, Italy, Turkey and Germany. "Nuclear sharing agreements" with these equal partners in the NPT—all of whom declare themselves to be non-nuclear states—openly defy both Article I and Article II of the treaty.

The US is the only country in the world that deploys (proliferates) nuclear weapons to other countries. In the case of the five nuclear sharing partners, the Air Force even trains Italian, German, Belgian, Turkish and Dutch pilots in the use of the B61 H-Bombs—should the President ever order such a thing. Still, the US government regularly lectures Russia and China about aggressiveness and destabilizing weapons activities.

With so much at stake, it is intriguing that diplomats at the UN are too polite to confront US contravention of the NPT. As Henry Thoreau said, "The broadest and most prevalent error requires the most disinterested virtue to sustain it."

Fire at Indian Point:

New York's Nuke Operating Without a License

By Karl Grossman

In 1976, Robert Pollard, a rarity among US government nuclear officials—honest and safety-committed—said of the Indian Point nuclear power station that it was "an accident waiting to happen."

Pollard had been project manager at Indian Point for the US Nuclear Regulatory Commission (NRC) from which he resigned at that time charging the NRC "suppresses the existence of unresolved safety questions and fails to resolve these problems." He joined the Union of Concerned Scientists.

An explosion and fire at a transformer at Indian Point 3 on Saturday May 9 is but one of the many accidents that have occurred at the Indian Point facility through the years—none catastrophic as have been the disasters at the Three Mile Island, Chernobyl and the Fukushima-Daiichi nuclear reactors.

But Indian Point 2 has been in operation for 41 years, although when nuclear power was first advanced in the United States, reactors were never seen as running for more than 40 years because of radioactivity embrittling metal parts and otherwise causing safety problems. So licenses were limited to 40 years.

Indian Point 2 is thus now running without an operating license while the NRC considers an application before it from the reactor's owner, Entergy Corp., to allow it to run another 20 years—for a total of 60 years.

Indian Point 3, where the transformer explosion and fire occurred, has been operational for 39 years and its license expires this year. (Indian Point 1 was shut down early because of mechanical deficiencies.) Entergy also is seeking to have Indian Point 3's operating license extended to 60 years.

These old, long problem-plagued reactors, 26 miles up the Hudson River from New York City, are now disasters waiting to happen in a very heavily populated area. Some 22 million people live within 50 miles of the Indian Point site.

"This [reactor] is the nuclear plant that is closest to the most densely populated area on the globe," declared New York Governor Andrew Cuomo at the Indian Point site on May 10. Gov. Cuomo, who has been pushing to have the Indian Point reactors closed, noted that this was "not the first transformer fire" there, and his concern is that "one situation is going to trigger another." The unit came back on-line on May 27.

Entergy's public relations people have recently stressed that the transformer explosion and fire occurred in the "non-nuclear part" of Indian Point 3. However, as Pollard noted in the television documentary "Three Mile Island Revisited"—that I wrote and narrated on that accident—"there is no non-nuclear part of a nuclear plant."

What could be the extent of a major accident at Indian Point?

The NRC in 1982 issued a report titled "Calculation of Reactor Accident Consequences" or CRAC-2. The research for the report was done at the US Department of Energy's Sandia National Laboratories in New Mexico.

CRAC-2—you can read the full report online at—www.ccnr.org/crac.html—projects that in the event of a loss-of-coolant accident with breach of containment at Indian Point 2, there could be 46,000 "peak early fatalities," 141,000 "peak early injuries," 13,000 "cancer deaths" and a cost in property damages (in 1980 dollars) of $274 billion (which in today's dollars would be $1 trillion).

For an accident at Indian Point 3, where the transformer explosion and fire happened—because it is a somewhat bigger reactor (generating 1,025 megawatts compared to Indian Point 2's 1,020 megawatts)—the impacts would be greater, said CRAC-2

For Indian Point 3, in the event of a meltdown with breach of containment, CRAC-2 estimates 50,000 "peak early fatalities," 167,000 "peak early injuries," 14,000 "cancer deaths," and a cost in property damage at $314 billion.

Compounding the problem of the Indian Point reactors being old—consider driving a 60 year-old car on a high-speed Interstate—they are at the intersection of the Ramapo and Stamford earthquake faults. As a 2008 study by seismologists at Columbia University's Lamont-Doherty Earth Observatory found: "Indian Point is situated at the intersection of the two most striking linear features marking the seismicity and [is] also in the midst of a large population that is at risk in case of an accident. This is clearly one of the least favorable sites in our study area from an earthquake hazard and risk perspective."

"This aging, dilapidated facility has endless problems leaking radioactive chemicals, oil and PCB's into the Hudson River. It's unconscionable to permit the continued operation of Indian Point," said Susan Hito-Shapiro, an environmental attorney and member of the leadership council of the Indian Point Safe Energy Coalition.

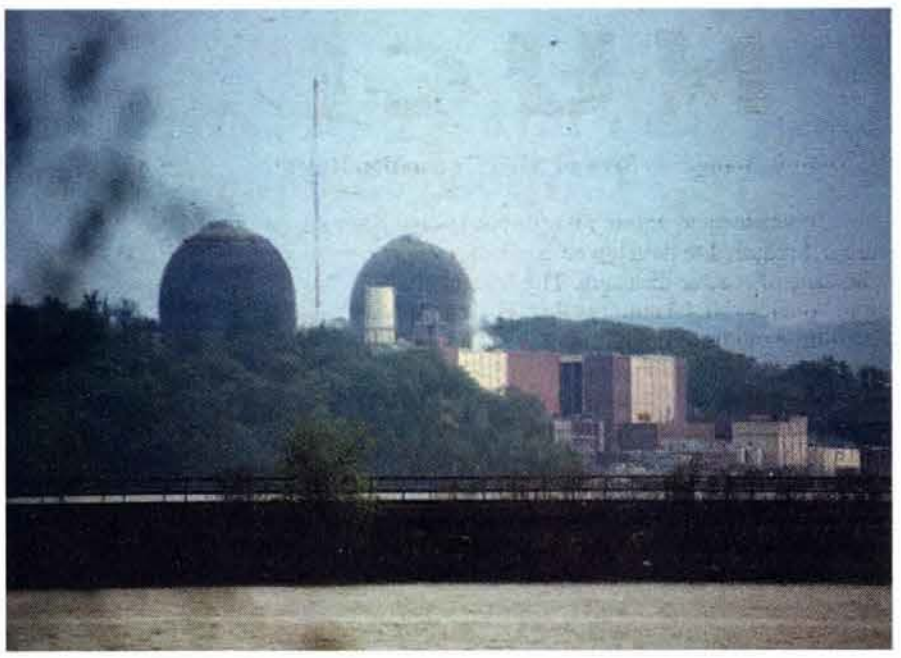
Further, she pointed out this week, Indian Point has been described as "the most attractive terrorist target" in the US because of its proximity to New York City and it also being seven miles from the US Military Academy at West Point. Indeed, there was consideration by the 9/11 terrorists of crashing into Indian Point. Both captured jets flew over the Indian Point nuclear station before striking the World Trade Center minutes later.

And she described it as "outrageous" that the Federal Emergency Management Agency has approved an evacuation plan for Indian Point "although it would never work" in the event of a major accident at the reactors, considering the millions of people who stand to be affected.

The key to New York State's strategy to shut down Indian Point is the denial by the state's Department of Environmental Conservation (DEC) to give Entergy a "water use permit" to let it continue to send hundreds of millions of gallons of water a day from the reactors into the Hudson River.

"We need to make sure DEC stays strong," says Hito-Shapiro.

In light of the historic, reckless, scandalous weakness of the federal government when it comes to Indian Point—and the nuclear power reactors of other utilities—strong state action is most necessary.



Smoke rises from a transformer fire at Indian Point's Unit 3 reactor in Buchanan, New York on May 9. The Indian Point complex is just 26 miles up the Hudson River from New York City. Photo by Ricky Flores/AP.

Karl Grossman, professor of journalism at the State University of New York/College of New York, is the author of* The Wrong Stuff: The Space Program's Nuclear Threat to Our Planet, *and is an associate of the media watch group Fairness and Accuracy in Reporting.

Chernobyl and the Fire Next Time

By John LaForge

The April 26, 1986 Chernobyl disaster was remembered unhappily the world over. In Germany, 29 years after the fact, the ancient custom of wild boar hunting is still prohibited because the animals remain too contaminated with Chernobyl's long-lived radioactive fallout.

Government warnings of Chernobyl's dispersed cancer agents are nearly forgotten today, but a May 14, 1986 bulletin from the US Environmental Protection Agency (EPA) said, "[A]irborne radioactivity from the Chernobyl nuclear accident is now so widespread that it is likely to fall to the ground wherever it rains in the United States."

A week later, Minnesotans read, "For the second time since the [Chernobyl disaster] last month, a slightly elevated level of radioactive iodine has been found in a Minnesota milk sample, state health officials said. ... The amount of iodine-131 in the air also increased slightly [May 19] after several days of decline, health officials said." ("Slight rise in radioactivity found again in state milk," Duluth *News-Tribune & Herald,* May 22, 1986)

The AP reported May 15, 1986, "State authorities in Oregon have warned residents dependent solely on rainwater for drinking that they should arrange other supplies for the time being." Likewise, regarding the triple reactor meltdowns at Fukushima, *Forbes* reported on April 11, 2011: "Radiation from Japan has been detected in drinking water in 13 more American cities, and cesium-137 has been found in American milk—in Montpelier, Vermont—for the first time since the Japan nuclear disaster began, according to data released by the EPA late [April 8]."

Wildfires put contamination back in the air

Chernobyl exploded and burned out of control for weeks. The French Nuclear Energy Agency's "2002 Update of Chernobyl," noted that "[C]ontinuing low-level releases occurred ... for up to 40 days after the accident, particularly on 15 and 16 May, attributable to continuing outbreaks of fires or to hot areas in the reactor...."

Demonstrating nuclear power's capacity for whole-earth poisoning, the catastrophic consequences are still spreading three decades later.

The dispersion of large amounts of radioactive cesium-137—which persists in the environment for at least 300 years—was especially concentrated in Ukraine, Belarus, and Russia, where half the spewed radiation fell. The other half spread to every country in the Northern Hemisphere. The American Geophysical Union reported in 2009 that radioactive cesium-137 dispersed by Chernobyl wouldn't "disappear" from the environment through decay for up to 320 years.

Cesium has heavily contaminated forested areas of Chernobyl's Exclusion Zone, an area of some 1,000 square miles surrounding the reactor where access and habitation are severely limited. When the forests catch fire, radioactive materials including cesium are again dispersed to the winds.

For two months in the summer of 2010, wildfires in Russia burned over 2 million acres and caused at least 50 deaths. The August 10, 2010 the *New York Times* noted that "dozens of fires have been burning in contaminated zones." Two days later, the AP and the Agency France Presse cited government reports that at least six wildfires had been extinguished "this week" in the heavily-contaminated Bryansk region.

About the 2010 wildfires, *Time* magazine reported that Russian leaders had removed maps of likely radiation-contaminated fires from web sites maintained by the national forestry agency. (Taking a lesson from the Russians, the US government halted its emergency radiation monitoring of water and milk on the West Coast a mere two months after the start of Fukushima's three explosions and meltdowns.)

In 2002, dozens of peat fires and wildfires again spread across heavily-contaminated Belarus. The AP reported July 22, 2002 that "Belarusian Emergency Minister Valery Astapov said radiation levels in the fire zone are elevated..."

The Washington Post and AP reported in April 1996 that a wildfire had "spread quickly through five villages in the exclusion zone, carried by strong winds blowing toward Kiev and its 2.6 million residents. It burned pines and buildings in one of the areas most heavily contaminated with radioactive cesium."

"Eight percent" of radioactive fallout re-suspended—but eight percent of what?

The latest news of cesium spreading from Chernobyl comes from a team of researchers led by Timothy Mousseau, a biologist at the University of South Carolina. According to Dr. Mousseau's report, published in *Ecological Monographs*, wildfires that burned in the exclusion zone in 2002, 2008 and 2010 have together redistributed approximately eight percent of the original amount of cesium-137 released by the 1986 disaster—the world's worst accidental airborne release. The researchers warned that large blazes in the future could spread significant amounts of radioactive soot across Europe, leading to contamination of food crops, the *New York Times* reported April 6, 2015.

In 2006, The Other Report on Chernobyl (TORCH, by Ian Fairlie and David Sumner) concluded that about 30 percent of the reactor's radioactivity was distributed over the reactor building and surrounding areas and about 1–2 percent was ejected into the atmosphere. The sum total of radioactivity released was about 324.3 million curies. All of the reactor's radioactive gases (xenon and krypton) were released.

In 2005, the Chernobyl Forum—comprised of more than 100 scientists, eight UN agencies and the governments of Russia, Belarus and Ukraine—estimated that the total release over the first 10 days reached 378.3 million curies. (Bob Edwards, "Major UN report counts human cost of Chernobyl," *New Scientist*, Sept. 5, 2005.)

The Lawrence Livermore National Lab suggested in 1986 that 50 percent of the core's radioactivity was spewed—4.5 billion curies, according to *Science*, June 13, 1986. In 1991, Vladimir Chernousenko, a fellow of the Institute of Theoretical Physics of the Ukrainian Academy of Sciences and chief scientific supervisor of "clean up" in the 10-kilometer zone around the demolished reactor, noted that independent experts estimated that 80 percent of the reactor's radioactivity escaped—over 6.4 billion curies.

According to Mousseau, forests covered 50 percent the Chernobyl exclusion zone before 1986, but trees and brush now cover 70 percent of the no-go area. Mousseau's team reports that as climate change increasingly heats and dries the region, wildfires are expected to rage more often and more fiercely.

Asked by the *Times* what the consequences of this dispersion of radioactive materials might be, Mousseau was circumspect and grim. "There is never a positive consequence of having increased amounts of mutagenic materials in our environment," he said. "It's always negative."

NUCLEAR SHORTS

Double Standards Seen in NRC Evacuation Rules

Towns located within 50 miles of US nuclear reactors are not required to develop emergency evacuation plans in the case of reactor disasters. The federal Nuclear Regulatory Agency (NRC) requires that communities within only a 10-mile radius of operating reactors plan for evacuations in the case of radiation disasters.

The discrepancy was highlighted in April by the non-profit organization Disaster Accountability Project, which called on communities inside the larger area to prepare for a reactor accident, citing the NRC's 2011 recommendation to US citizens in Japan. When the Fukushima-Daiichi disaster began March of that year, the NRC advised people within 50 miles to evacuate, the *Wall Street Journal* reported April 15.

The Disaster Accountability Project study notes that a 50-mile radius around the Indian Point reactors in Westchester, New York includes the New York City metropolitan area and parts of New Jersey, Connecticut and Pennsylvania.

In May last year, the NRC told the owner of the Indian Point reactors to re-evaluate how prepared the facility is to withstand an earthquake. The NRC listed Indian Point reactors 2 and 3 among 10 reactors in the eastern US that have the highest need to renew its emergency preparedness plans. In 2011, after evaluating all 100 operating US reactors, the NRC named Indian Point's Unit 3 the reactor most vulnerable to severe earthquake damage.

—*The Wall Street Journal*, Apr. 14, 2015; (Lohud) *Journal News*, May 9, 2014; NBC News, March 17, 2011

World Uranium Symposium: Leave it in the Ground

Over 500 participants from 20 countries joined the World Uranium Symposium in Quebec City in April. In its final communiqué, the gathering called for a worldwide ban on uranium exploration, mining, milling, and processing, and a halt to reprocessing of radioactive waste.

Reaffirming declarations made at conferences in 1992, 2006 and 2010, the statement demands that "Uranium and its associated radioactive substances must remain in their natural location."

Pointing to "the growing awareness that nuclear power is not a cost-effective, timely, practical or safe response to climate change, and applauding the enormous expansion of the use of renewable energy and the significant strides made in recent years to phase out nuclear power," the communiqué recommends that all governments, industries and Peoples "eliminate nuclear power generation and use, and dedicate themselves to the development and use of intelligent energy services based on sustainable, safe and renewable energy resources."

The notice decries "the unique health, environmental and social dangers present at all stages of the nuclear fuel chain, from the exploration, mining and milling of uranium, to nuclear power generation, the development of nuclear weapons and the storage of radioactive waste." The signers urged responsible parties "provide full, fair and equitable redress to all those harmed by uranium- and nuclear-related activities and to ensure that those responsible are held accountable for their actions and failures."

—The full Communiqué is at: http://uranium2015.com/en/news/quebec-declaration-uranium.

NRC Approved Seismic Safety Report for Diablo Canyon Before Seeing Results

In 2008, Pacific Gas and Electric Company (PG&E) began replacing steam generators and reactor vessel heads at its Diablo Canyon station near San Luis Obispo, California. In 2011, they realized that proper testing for seismic activity hadn't occurred. The Nuclear Regulatory Commission missed this oversight. While the company had run tests for seismic instability and loss-of-coolant accidents, they did not run them simultaneously—the deadly combination of failures that led to the Fukushima reactor disaster.

> ***"A common denominator, in every single nuclear accident—in a nuclear plant or on a nuclear submarine—is that before the specialists even know what has happened, they rush to the media saying, 'There's no danger to the public.' They do this before they themselves know what has happened because they are terrified that the public might react violently, either by panic or by revolt."***
>
> **—Jacque Cousteau, 1989**

After the revelation PG&E began doing their own tests. Two weeks before the disclosure of the results, the NRC prepared talking points approving the reactor as earthquake-safe. The internal commission memo was discovered by environmental groups through public records act requests. Instead of issuing fines on PG&E, the NRC preemptively approved the utility's unsubstantiated analysis of safety and permitted amendments to the seismic safety section of the operating license without public hearings, the latter of which prompted Friends of the Earth to file a lawsuit.

In March, the US Geological Survey reported a much higher probability of a major earthquake hitting California in the next 30 years than previously expected. Diablo Canyon is located between 1,000 feet and 45 miles from four different faults. If the hazards of long term safety of nuclear waste storage aren't enough to close this reactor as opponents have demanded since its original construction, new knowledge about the geologic volatility should render this reactor closed and not a candidate for special favors by the government. —US Geological Survey, Mar. 10; *San Francisco Chronicle*, Mar. 12 & Apr. 15, 2015

Struggling Areva Corp. Scraps More Reactor Plans

French nuclear giant Areva billed its European Pressurized Reactor (EPR) design as one of the safest yet, with plans to build a "worldwide fleet" of EPRs—starting in Olkiluoto, Finland in 2005. The Olkiluoto project is currently nine years behind schedule and three times its original $3.3 billion budget. In May, Finnish utility TVO lost patience with Areva and canceled plans for a second reactor.

Areva abandoned the last of four unrealized US EPR plans in February, citing a more profitable market in China. But now China's two EPR projects are on hold, as Areva has to check their steel components for flaws. Recently, work was halted at Areva's half-built Flamanville EPR project in France, because unacceptably high levels of carbon were found in the steel used to make its pressure vessel. Parts for the China reactors were made in the same French forge as the compromised Flamanville steel.

England is currently the only country moving forward with EPR plans, but those seem unlikely to continue until at least one of the four Areva EPRs now under construction can be shown to work. The company has not sold a new reactor since 2007, and it has not shown a profit since 2010. Areva lost $5.38 billion in 2014, and 85 percent of the company is now owned by the French government.

—Climate News Network, May 28; *New York Times*, May 9, 2015

Republic of the Marshall Islands Appeals Dismissal of Lawsuit

UNITED NATIONS, New York—The Republic of the Marshall Islands (RMI), a Pacific Islands nation of 70,000, took first-of-its-kind action for disarmament April 24, 2014, when it brought lawsuits at the International Court of Justice or World Court, against the nine nuclear-armed states (the US, Russia, China, India, England, France, Pakistan, Israel, and North Korea), accusing them of violating the 1968 Nuclear Non-Proliferation Treaty (NPT). Because the US has rejected compulsory jurisdiction of the World Court, the RMI brought a separate lawsuit against the US government in federal district court in northern California.

On February 3, 2015, US District Judge Jeffrey White dismissed the separate suit in California on the grounds that the RMI lacks standing to bring the case and that the lawsuit is barred by the political question doctrine.

Attorneys for the Marshall Islands have appealed the US district court's dismissal of the case. An appeals court will consider legal briefs in support of reinstating the suit after the July 20 filing deadline.

Attorney Laurie Ashton, representing the RMI, outlined the status of the suit at an NPT Review Conference workshop in New York on April 28. Ashton reported that the Marshall Islanders are not seeking financial compensation for the 67 US nuclear bomb tests that devastated their homelands. The suit seeks only a judicial declaration that the NPT is binding, and a formal injunction against the nuclear-armed states for violations of the NPT involving: 1) failure to pursue a treaty outlawing the Bomb; 2) failure to eliminate nuclear arsenals; and 3) production of new nuclear weapons. Only Pakistan, India and England have agreed to contest the issue before the World Court.

India and Pakistan have filed objections to the suit, and England is expected to do the same, claiming the case is frivolous and that the World Court is not qualified to interpret the Non-Proliferation Treaty. However, attorney Ashton said, the court's 1996 Advisory Opinion on Nuclear Weapons stated that the NPT's explicit pledge to negotiate nuclear disarmament is an "unqualified, inescapable, unequivocal and binding obligation."

RMI Foreign Minister Tony deBrum also addressed the UN workshop, explaining that the lawsuits ask grave, momentous questions: "Do treaties matter? Do nuclear-armed states have to obey the same legal obligations as non-nuclear states? Who decides that a treaty is currently being violated?" Mr. deBrum said, "We are accused of being frivolous and juvenile, but we could not be more serious." —*JL*

Resources mentioned in this issue

* **Beyond Nuclear**, 6930 Carroll Avenue, Suite 400, Takoma Park, MD, 20912; Email: info@beyondnuclear.org; Web: beyondnuclear.org
* **Campaign for Nuclear Disarmament,** 162 Holloway Road, London N7 8DQ; 020 7700 2393; Email: enquiries@cnduk.org; Web: cnduk.org
* **Disaster Accountability Project,** 4402 Bestor Drive, Rockville, MD 20853; (202) 556-3023; Email: info@disasteraccountability.org; Web: disasteraccountability.org
* **Earthjustice,** 50 California Street, Suite 500, San Francisco, CA, 94111; (800) 584-6460; Email: info@earthjustice.org; Web: earthjustice.org
* **Great Lakes and St. Lawrence Cities Initiative,** 20 North Wacker Drive, Suite 2700, Chicago, IL, 60606; (312) 201-4517; Email: david.ullrich@glslcities.org; Web: glslcities.org
* **Indian Point Safe Energy Coalition** (IPSEC), PO Box 131, Ossining, NY 10562-0131; 888-I-SHUT-IT; Email: ipsec2009@gmail.com; Web: closeindianpoint.org
* **Institute for Energy and Environmental Research,** 6935 Laurel Ave., Suite 201, Takoma Park, Maryland, 20912; (301) 270-5500; Email: info@ieer.org; Web: ieer.org
* **Los Alamos Study Group,** 2901 Summit Pl. NE, Albuquerque, NM 87106; (505) 265-1200; Email: gmello@lasg.org; Web: lasg.org
* **Midwest Renewable Energy Association** (MREA), 7558 Deer Road, Custer, WI 54423; (715) 592-6595; Email: info@midwestrenew.org; Web: midwestrenew.org
* **Nonviolent Action to Abolish Nuclear Weapons** ("GAAA" in German), Beckstr. 14, 20357 Hamburg, Germany; 040-4307332; Email: marion.kuepker@gaaa.org; Web: gaaa.org
* **Northwatch**, Box 282, North Bay, Ontario, Canada P1B 8H2; (705) 497-0373; Email: northwatch@northwatch.org; Web: northwatch.org
* **Nuclear Information & Resource Service**, 6930 Carroll Avenue, Suite 340, Takoma Park, MD, 20912; (301) 270-6477; Email: nirsnet@nirs.org; Web: nirs.org
* **Oak Ridge Environmental Peace Alliance** (OREPA), PO Box 5743, Oak Ridge, TN 37831; (865) 776-5050; Email: orep@earthlink.net; Web: orepa.org
* **Tri-Valley CAREs** (Communities Against a Radioacive Environment), Citizen's Watch, 2582 Old 1st St., Livermore, CA 94550; (925) 443-7148; Email: marylia@trivalleycares.org; Web: trivalleycares.org
* **Union of Concerned Scientists,** Two Brattle Sq., Cambridge, MA 02138-3780; (617) 547-5552; Web: ucsusa.org

UPCOMING EVENTS

The 26th Annual Energy Fair

Join Nukewatch at the Midwest Renewable Energy Fair

June 19–21, 2015
Central Wisconsin
www.midwestrenew.org

Visit our table for information on how nuclear power risks catastrophe, steals resources from solutions to climate change, produces ferocious radioactive waste, and spreads H-bomb material.

Please join our workshops:
'Nuclear Power is Not the Answer (to Anything)'
Sat., 6/20, 2-3 p.m., Green tent
'Get Ready for Nonviolence'
Sun., 6/21, noon-1, Blue tent

Take Action on the 70th Anniversary of the US Atomic Bombings of Hiroshima & Nagasaki

Oak Ridge, Tennessee:
Details at www.orepa.org

- **Thurs., Aug. 6:** Annual Names & Remembrance Ceremony at the Y12 Nuclear Weapons Complex
- **Sat., Aug. 8:** Mass gathering for nuclear abolition in Oak Ridge
- **Sun., Aug. 9:** Peace Lantern Ceremony in Knoxville

Livermore, California:
Details at 925-443-7148 (Tri Valley CAREs) • **Thurs., Aug. 6:** 8 am gathering for global nuclear weapons abolition at the Livermore Nuclear Weapons Lab

Fukushima Triple Reactor Disaster—A Crisis Without End

The Great Northeast Japan Earthquake in March of 2011, which resulted in the deaths of 15,000 people and destroyed the Fukushima-Daiichi nuclear reactor complex, caused the evacuation of 160,000 residents who might not return in their lifetimes.

The catastrophic meltdown of three separate nuclear reactors, out of the six at the complex, was unprecedented and—between hydrogen explosions and ongoing flushing of the molten uranium fuel, with tons of seawater—sent plumes of radioactive materials into the atmosphere and into the Pacific Ocean. Ken Buesseler, a marine chemist at Woods Hole Oceanographic Institution who has positively documented radioactive contamination from Fukushima in seawater off the west coasts of the US and Canada, said in a statement last April 7, "Radioactivity can be dangerous, and we should be carefully monitoring the oceans after what is certainly the largest accidental release of radioactive contaminants to the oceans in history." Woods Hole began its monitoring regime when US agencies declined to initiate routine measurements.

Nick Roney

Buesseler told the (Oregon) *Statesman Journal* April 6 that radiation concentrations off the east coast of Japan near Fukushima in the first weeks of the catastrophe measured 50 million Becquerels* per cubic meter. Woods Hole has tracked the radiation plume for 5,000 miles as it spread across the Pacific, and its concentration now is both diluted and ubiquitous. Reuters news service reported that Canadian water samples off Vancouver Island, British Columbia contained 1.4 Becquerels per cubic meter of cesium-134 and 5.8 Bq per cubic meter of cesium-137.

Decommissioning lacks plan, method, means

At the reactor site, Naohiro Masuda, President of the Fukushima-Daiichi Decommissioning Company, told Japanese Public Television NHK in a March 31 interview that technical equipment needed to remove the brutally radioactive melted fuel wreckage from three shattered reactor vessels still needs to be invented.

"We have no idea about the debris [the melted fuel]. We don't know its shape or strength. We have to remove it remotely, from 30 meters above, but we don't have that kind of technology yet. It simply doesn't exist." The current manager of the reactor site, Akira Ono, said likewise. "For removal of the debris, we don't have accurate information (about the state of the reactors) or any viable methodology…", he told the *Times of London* March 30.

Robots sent inside the vessels have repeatedly broken down under the harsh radioactive environment and have failed to transmit sufficient information to even pinpoint the location of the mass of fuel much less design a decommissioning process.

Theoretically, during the fuel removal process—not expected to begin for another five years—workers must keep all the melted uranium submerged under water, which shields workers by absorbing much of the radiation. This theory may not be sound.

"We still don't know whether it's possible to fill the reactor containers with water," Masuda told NHK. There are so many cracks and holes in the containers, Masuda says, "We may have to look for some other way to remove the debris."

Can the removal begin in 2020 as the government insists? Masuda said he doesn't know if that is possible either, and "There is no text book to teach us what to do."

Taiwan imposes new limits on Japanese food imports

Taiwan imposed new bans on food imported from Japan, the French news agency AFP reported May 15. The cause was the recall of hundreds of products in March whose labels were faked in order to disguise the fact they came from areas contaminated by Fukushima's radioactive fallout.

Taiwan's government banned food sent from five prefectures near Fukushima soon after the March 11, 2011 disaster when it was found to be contaminated. Now, all food imports from Japan will have to carry proof that they come from outside the banned areas. Some particular foods will also require "radiation inspection certificates," according to Taiwan's Ministry of Health and Welfare.

Japan complained about the new restrictions through its de facto embassy in Taipei, saying, "Falsified labels of product origins and food safety are different issues." Three weeks earlier, on April 22, Japanese officials brought a complaint against South Korea in the World Trade Organization, over similar food import restrictions saying they violate trade rules. In place since March 2011, South Korean precautions include an outright ban on seafood from the Fukushima region and require radiation testing and certification for other foods.

Separate courts reject, approve reactor restarts

A three-judge panel set back Japanese government and industry hopes to restart the idled nuclear reactor industry, ruling April 14 that restart of two Takahama reactors appear too unsafe. The ruling affects reactors 3 and 4 which went on-line in the 1980s but have been shut down since the catastrophic March 2011 earthquake, tsunami and triple meltdowns at Fukushima.

Japan's Nuclear Regulation Authority (NRA) had approved the restart at Takahama, in west-central Japan, but a group of citizens filed suit to stop it. They convinced the court that the NRA had underestimated the reactors' vulnerability to earthquakes and that evacuation plans in the event of another disaster, prepared by the Kansai Electric Power Co., were inadequate. Presiding judge Hideaki Higuchi, who issued a similar ruling against separate reactor restarts last May, said the restart proposal was "lacking in rationality."

A similar lawsuit—against restart of the Sendai reactors No. 1 and 2 in Japan's far southwest—was dismissed April 22, although citizens had argued that a recent increase in volcanic activity threatens potential disaster. The citizens vowed to appeal.

Then on May 27, the NRA announced that only operational tests were still needed to fire-up the Sendai reactors, opening the door to the possible restart of Unit 1 in July and Unit 2 in September.

Owned and operated by the Kyūshū Electric Power Company, Sendai is located on Japan's main southern island of Kyushu, home to Japan's most active volcano, Mount Aso, as well as the great Sakurajima volcano.

The NRA's announcement came two days before the May 29 volcanic eruption on the southern island of Kuchinoerabujima, 70 miles away. The eruption may lend weight to the citizen's appeal of the court's restart approval. Restart may also be reconsidered in view of recent earthquakes: the severe 8.5 magnitude earthquake that struck deep undersea, 620 miles south of Tokyo, and dramatically shook buildings there May 30, and the 5.5 level quake on May 25 that hit northwest of Tokyo.

Hong Kong finds radioactivity in Japanese tea

Powdered tea imported by Hong Kong from the Japanese prefecture of Chiba in March, was found to have traces of radioactive cesium-137, although at levels below what the government allows in food, the *New York Times* reported March 12. Chiba is over 135 miles from Fukushima-Daiichi in northeast Japan—site four years ago of the world's worst or second worst radiation disaster.

Soon after Fukushima's triple reactor meltdowns and massive radiation releases began in March 2011, Hong Kong's state Center for Food Safety found three samples of vegetables imported from Japan to have "unsatisfactory" levels of radioactive contaminants. Since then, Hong Kong has repeatedly found samples of food imports contaminated with low levels of Fukushima's radioactive fallout.

Hong Kong's limits for radioactive materials in food are "low and stringent," the *New York Times* indicated. But allowable limits of radioactive contamination in foods are set arbitrarily and enforcement is poorly regulated. Ingestion of even the smallest trances of radioactive materials can cause cancer and other illnesses, although illnesses may not appear for years or decades following ingestion or inhalation.

Surge in workers exposed to high radiation

Radiation containment workers at the devastated Fukushima site have increasingly been exposed to high levels of radiation, the *Japan Times* reported May 10.

A total of 992 workers were exposed to more than 20 milliSieverts* in 2014, according to data made public by Tokyo Electric Power, Co. (Tepco), which runs the operation. The number of highly contaminated workers was 50 percent higher than the 660 who were so exposed in 2013. Tepco said that the increases were because of increased debris removal and decontamination work in areas of high-radiation.

The most dangerous work in the worst of high-radiation areas—the three destroyed reactor vessels, where hundreds of tons of melted fuel rods make them inaccessible—has not been started, and "poses a huge long-term challenge," the IAEA said.

Failed pumps cause additional ocean spills

On April 22, all eight water transfer pumps at the Fukushima-Daiichi complex were shut down by an electric outage, and the shutdown led to another spill of highly radioactive water into the Pacific, the *Japan Times* reported.

The April accident followed a series of ocean-contaminating leaks of highly radioactive water that came from faulty holding tanks. Thousands of such tanks were hastily built to hold waste water poisoned with cesium, strontium, tritium and dozens of radio-toxic chemicals. The contaminated water results from constantly flushing seawater through the three wrecked reactor vessels and over the 150–300 tons of melted uranium fuel. Thousands of tons of contaminated waste water is also produced by the movement of groundwater that enters the wreckage through cracks and smashed duct work before finding its way to the Pacific.

According to Tepco admissions over the last few months, the period between May 2011 and August 2013, saw leaks that put at least 20 trillion Becquerels of cesium-137, 10 trillion Becquerels of strontium-90, and 40 trillion Becquerels of tritium into the sea.

New leaks douse attempts to limit water pollution

International Atomic Energy Agency (IAEA) monitors hurried to Japan in April to investigate a spike in radiation levels caused by highly contaminated water leaking into the Pacific Ocean. Tepco had known about the leaks for months, but kept the information secret during the IAEA monitors' February 2015 visit. Bloomberg News reported May 5, that Tepco has since claimed to be disclosing more of its radiation data, although, as IAEA spokesperson Serge Gas wrote in an e-mail from the agency's offices in Vienna, "Tepco has no obligation to report to the IAEA."

Tepco behind in payments for decontamination work

The *Japan Times* reported March 30 that Tepco has only covered 2 percent of the $638.8 million that municipalities have spent on decontamination work since 2011.

According to the federal Environment Ministry, the company has refused to cover the costs of removing and bagging up contaminated soil and debris in radioactive fallout-hit areas, saying it is studying whether the law requires it. A law enacted in August 2011 stipulates that Tepco bears financial responsibility for the decontamination work.

The central government has paid for the cleanup and expects to be reimbursed by Tepco. So far the company has paid only for decontamination work done by the central government near its reactors. Japan allocated $11.3 billion in this regard, including around $5.08 billion for work done by local municipality offices by the end of fiscal 2014. The Environment Ministry asked that Tepco reimburse $638.8 million by the end of February, but Tepco has only covered $12 million.

Accidents still happening

On March 1, the *Japan Times* reported that waste water pouring into the Pacific from the reactor wreckage showed a huge spike in radioactivity. Tepco acknowledged that levels of strontium-90 in the waste water were up to 70 times, or 7,000 percent higher than what is allowed to be dumped into the ocean. Strontium was measured at up to 7,230 Becquerels per liter of water, while the contamination limit is supposed to be 5 Bq/L. — ***JL***

*Becquerels, curies, and milliSieverts are what again?

As a measure of radioactivity, a Becquerel is a small amount equaling one atomic disintegration per second. One trillion Becquerels is called a "terabecquerel" or 1TBs, and is scientifically written as 10^{12} Becquerels.

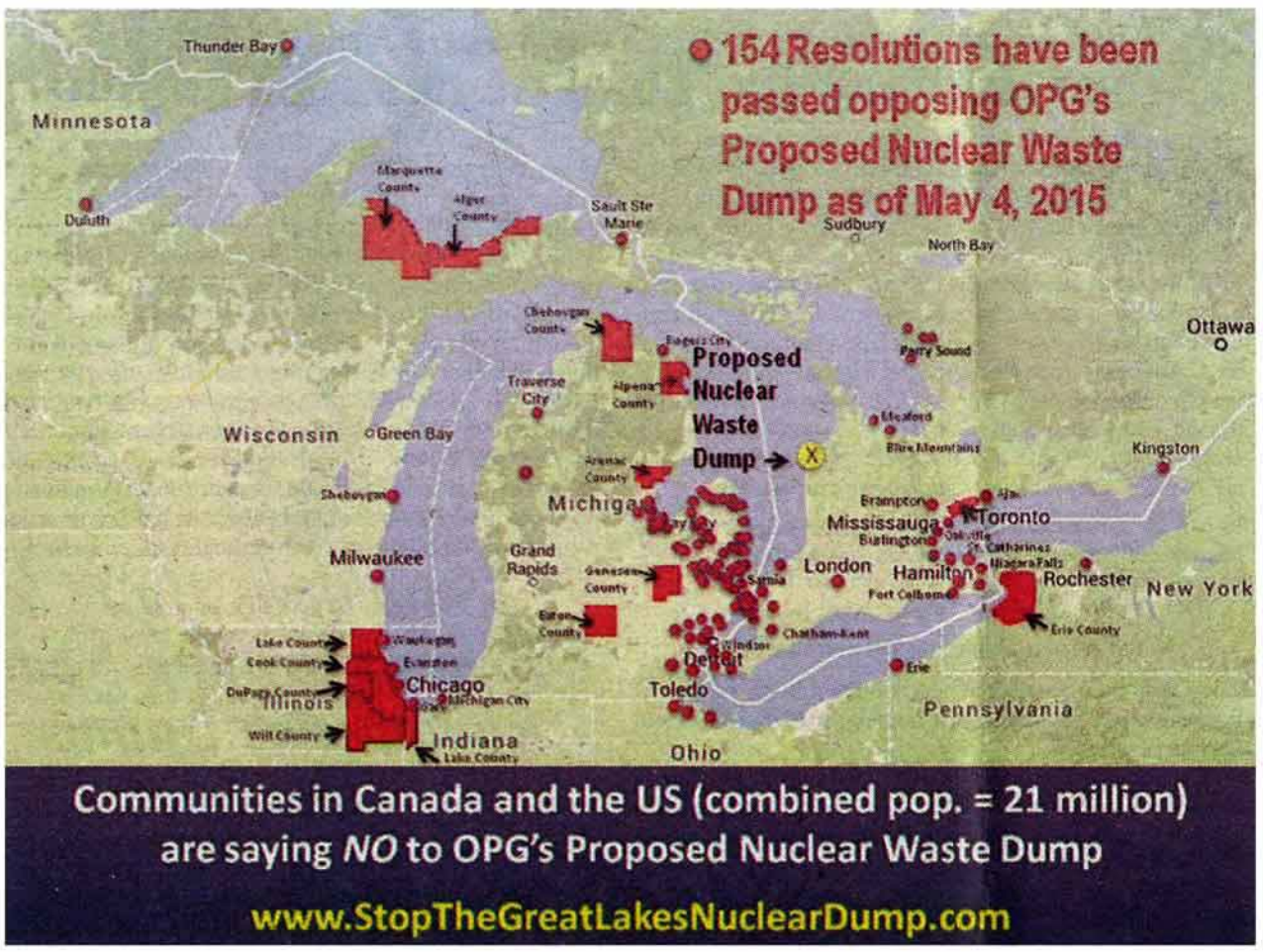
A curie by contrast is a large amount of radiation, equal to 37 billion disintegrations per second. So, 1 trillion Becquerels equals 27 curies.

Sieverts and milliSieverts are "calculated doses," or estimates of radiation damage to tissue.

Diane D'Arrigo from Nuclear Information and Resource Service reminds us that different radioactive materials give off different combinations of alpha, beta and gamma radiation.

Since most detectors only count gamma radiation (not beta and alpha), the reported doses are mostly just estimates. Further complicating the estimates is that radiation usually comes from a combination of radionuclides—never just iodine-131, strontium-90, or cesium-137 alone.

When news reports give dose numbers in "milliSieverts," the assumption is that all the radioactivity being measured is from a single source material—usually cesium-137, iodine-131 or strontium-90—and setting the detection instruments to convert from curies to millirems, or from Becquerels to Sieverts. D'Arrigo warns, "So, we are not hearing the full report."



Public Interest Groups Declare Canadian Waste Dump Study Fatally Flawed

Ontario Urged to Reject Great Lakes Basin for Deep Disposal

Calling a federal review report issued last week on a proposal to bury nuclear waste beside Lake Huron "flawed," close to 100 public interest groups issued an "Open Letter to the Government of Ontario" May 15, calling on the province to step up and halt the project in light of a failed and error-filled federal process.

The letter calls on the government of Ontario, as the sole shareholder of Ontario Power Generation (OPG), to direct the provincial utility to withdraw its proposal to bury hundreds of cubic meters of radioactive waste in limestone caverns beside Lake Huron, beneath the Bruce Nuclear Site. OPG is the proponent of the burial scheme.

On May 6, a panel appointed in 2012 by the federal Minister of the Environment and the Canadian Nuclear Safety Commission provided the Minister with its final report on its review of OPG's proposed Deep Geologic Repository for low- and intermediate-level radioactive waste. The Joint Review Panel (JRP) recommended that the federal minister approve the proposed repository despite volumes of expert testimony and evidence it heard during public hearings that detailed the proposal's numerous technical uncertainties and gross incompleteness. The proposal still faces growing public opposition.

"They got it wrong, plain and simple," said Eugene Bourgeois, closest neighbor to the Bruce Nuclear reactor complex. "There are layers upon layers of dishonesty at play here. This [JRP] has now teamed up with the nuclear industry to rush ahead with unproven technologies to bury wastes OPG claims are being safely managed where they are, and to continue to ignore some of the most vulnerable and most hazardous wastes...", he said.

OPG's proposal was to bury 200,000 cubic metres of low and intermediate level radioactive wastes produced during reactor operations deep underground in a series of underground caverns carved out of limestone. Weeks before the federal hearing began in September 2013, OPG publicly acknowledged its intention to double that amount by adding decommissioning wastes—including radioactive reactor components and contaminated building materials and rubble—through a license amendment after approval based on the initial proposal has been issued.

"The Joint Review Panel got one thing right: they named OPG's proposed burial plan as "precedent-setting" and described it as "likely ... to assist" in the push to bury high level nuclear waste. We've always seen this project as the nuclear industry's trial balloon for nuclear waste burial," said Brennain Lloyd, a spokesperson with Northwatch, a principle intervener in the case.

OPG also holds majority control in the Nuclear Waste Management Organization, an association of provincial utilities in Canada who operate nuclear reactors. The NWMO is currently investigating nine communities as potential burial sites for high level nuclear fuel waste, including six in northern Ontario and three in the vicinity of the Bruce nuclear site.

"These wastes have to be isolated from the environment for hundreds of thousands of years; burying them in limestone right beside Lake Huron simply makes no sense," said Kevin Kamps, a radioactive waste specialist with US-based watchdog group Beyond Nuclear.

"Ontario Power Generation's experts during the hearing talked about Lake Huron being large enough to dilute radioactive wastes that leaked from the repository. That a federal hearing panel would accept using the Great Lakes for the dilution of radioactive pollution as a solution to the industry's waste management problems robs their report of any credibility," Kamps said.

The Saugeen Ojibway and Anishnabek First Nations along with the Great Lakes and St. Lawrence Cities Initiative also released statements condemning the project and expressing grave concern with the Joint Review Panel's conclusions. —*JL*

Nuclear Resisters Released

(Continued from Cover)

The high-profile nature of uranium enrichment at Oak Ridge, and the vulnerability of the site to the entrance of three senior citizens, brought enormous media attention to the case, which has been featured in lengthy investigations by the *Washington Post*, the *New Yorker*, and others. The action, known as "Transform Now Plowshares," also helped uncover scandalous misconduct and malfeasance among security contractors at the Y-12/Oak Ridge complex.

What remains unaddressed is the White House's plan to spend $1 trillion on new weapons production facilities over the next 30 years—$35 billion a year for three decades. The role of the Highly Enriched Uranium Materials Facility in nuclear bomb production—a clear violation of the Nuclear Non-Proliferation Treaty—was named with blood by the Transform Now Plowshares action, but H-bomb business marches on. Protesters will converge on the site again August 6, the 70th anniversary of the US atomic bombing of Hiroshima (see Page 6 for details).

For more on Y-12 and the weapons build-up, see the Oak Ridge Environmental Peace Alliance, OREPA.org.

Ill-Informed Distinction in Appeals Court Order

The appeals court opinion made one apparently ill-informed distinction between this case and two other Plowshares actions. In symbolic protest actions taken on top of Minuteman nuclear missile silos, the Silo Pruning Hooks (Carl Kabat, Helen Woodson, Paul Kabat, and Larry Cloud Morgan) hammered on silo N-5 in Missouri in 1985, and the Sacred Earth and Space Plowshares (Sisters Ardeth Platte, Carol Gilbert, and Jackie Husdon) did symbolic damage to silo N-8 in Colorado in 2002.

The appeals court opinion declares that unlike actions taken at weapons manufacturing sites, protests against sites with armed nuclear weapons on alert could still be characterized as sabotage because, "... even a brief disruption of [the Minuteman III's] operations would have grievously impaired the nation's ability to attack and defend. (Imagine, for example, if Soviet [sic] infiltrators had similarly disrupted the facilities' operations in the minutes before a Soviet first strike.)"

This claim betrays profound ignorance of the US nuclear arsenal's diversity, size, and destructive capacity—and of geopolitical events including the long-past dissolution of the Soviet Union.

A computer glitch at Wyoming's FE Warren Air Force Base in 2010 took 50 Minuteman missiles off-line but had, according to Lt. Gen. Dirk Jameson (USAF, Ret.), "no real bearing on the capabilities of our nuclear forces." Gen. Jameson was a Deputy Commander in Chief and Chief of Staff of Strategic Command, which controls all 450 Minuteman III land-based ICBMs. Lt. Col. John Thomas, a spokesman for the Air Force's Global Strike Command, said at the time, "The wartime capability of that squadron [of missiles] was never significantly affected."

Additionally, the US has 14 Trident ballistic missile submarines, each armed with 24 missiles that carry at least five warheads apiece. If only four of these submarines are on patrol at any given time, their 480 thermonuclear warheads could incinerate all the major cities of the world, not merely those in "Soviet" [sic] territory.

The court also appeared ignorant of the fact that the Air Force regularly takes dozens of Minuteman III missiles off alert for repairs or replacement, meaning they are often "disrupted" without any consequent impairment of the government's nuclear war readiness.

The appeals court cited testimony of an Air Force Lt. Col. who said, regarding missile protests, that "it would be unwise to launch the missile in those circumstances."

Of course, thousands of authorities the world over have said it would be unwise to launch such missiles under any circumstances. Former Reagan Administration Presidential Adviser and Cold War hawk Paul Nitze said, "I can think of no circumstances under which it would be wise for the United States to use nuclear weapons, even in retaliation for their prior use against us."

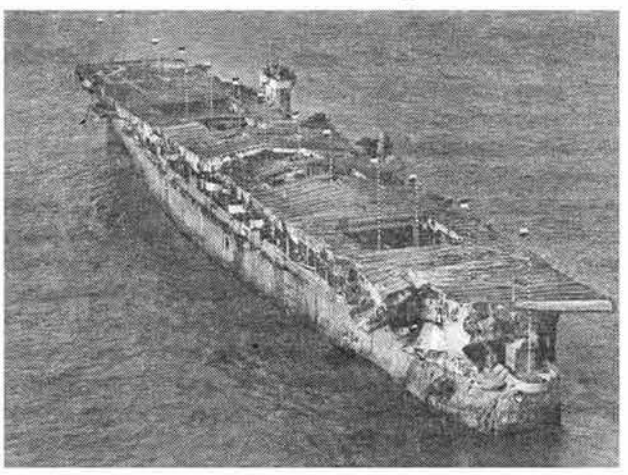
Radioactive Ship "Discovered" in National Marine Sanctuary

A recent expedition by the National Oceanic and Atmospheric Administration (NOAA), in conjunction with the US Navy and Boeing, "discovered" the *USS Independence* laden with radioactive waste 30 miles off the coast of San Francisco. The World War II aircraft carrier, a Bikini Atoll nuclear test survivor, had been loaded with countless barrels of nuclear waste and then sunk in a secret location by the Navy in 1951. The former Farallon Islands Nuclear Waste Dump Site is host to a total of 48,000 barrels that were abandoned from 1946 and 1970. The vessel was found at the dump site, which is now designated the Monterey Bay National Marine Sanctuary.

The 55-gallon barrels on the ship contained hazardous equipment and materials used for cleaning radioactive surfaces. The barrels went down with the ship, which—along with 90 other vessels—the US military itself bombed during Operation Crossroads at Bikini Atoll in 1946. The ship was subjected to two nuclear test strikes, code-named Able and Baker, both 21-kiloton tests. The Navy then returned it to the mainland, converted it into a radiological decontamination school, partially cleaned it, and finally had it scuttled.

While the leader of the NOAA expedition, James Delgado, stated that water near the ship tested at "normal background radiation levels," UC-Berkeley nuclear physicist Kai Vetter, also part of the expedition, admitted that due to normal corrosion, reactions could occur that would allow radioactive material to leak into the water. In addition to harm to human life, there is a threat to the wildlife in the sanctuary, including elephant seals (which like all mammals are protected by the Marine Mammals Protection Act) and the white shark, a vulnerable species according to the International Union for Conservation of Nature. Neither the effects of contamination, nor the cost of clean-up around the ship and the dump site have been independently studied. The ship's discovery after 64 years is one more unfortunate reminder that begs the question: What ugly secrets does the government have that we won't learn about for another 64 years?

—Live Science, Apr. 17; San Jose *Mercury News*, Apr. 16, 2015; United States Nuclear Tests: July 1945 through September 1992, US Department of Energy, Dec. 2000; Santa Cruz *Sentinel*, June 6, 2014; International Union for Conservation of Nature, July 2014 —*KL*



Damage from two Bikini Atoll atomic bomb tests is visible in this January 1951 photo of the *USS Independence* at anchor in San Francisco Bay, California. San Francisco Maritime National Historical Park Photo.

Is Fracking Wastewater More Radioactive Than Scientists Thought?

By Sara Jerome, WaterOnline

Fracking wastewater may be more radioactive than researchers previously believed.

A new study shows that "commonly used testing methods may underestimate the total radioactivity of wastewater produced by gas wells that use hydraulic fracturing, or fracking, to tap the Marcellus Shale," according to a report in *Science*, a publication of the American Association for the Advancement of Science.

The study, published in April in the journal *Environmental Health Perspectives*, states that "current assessments of the radioactivity concentration in liquid wastes focus on a single element—radium. However, the use of radium alone to predict radioactivity concentrations can greatly underestimate total levels."

The study says that predicting radioactivity of fracking wastewater requires "an understanding of the geochemistry, decay properties, and 'in-growth kinetics' of radium and its decay product radionuclides."

The study called for policy changes. "The findings suggest government agencies should consider retooling some testing recommendations and take a fresh look at possible worker exposure to potentially harmful waste, the authors say. But some outside researchers are skeptical that the laboratory study reflects real-world conditions," *Science* reported.

Environmentalists have long been drawing attention to the danger of radioactive oil-and-gas wastewater. Abigail Dillen, the Vice President of Litigation at the environmental law firm Earthjustice, called it a "slow burn" sort of problem.

"It's just cloudy-looking water, hundreds of billions of gallons of which are disposed every year. Though it usually contains chemicals, heavy metals, and radioactive material, it doesn't look like much. It's usually stored in dormant pits or injected underground. So unless something drastic happens, pollution usually accumulates, slowly seeping into soil and groundwater, instead of happening all at once," the website *ThinkProgress* reported.

***—Sara Jerome is a WaterOnline contributing writer and has covered business, technology, and regulation for the Financial Times Group,* National Journal, *and* The Hill.**

North Dakota Suffering Wastewater Spills

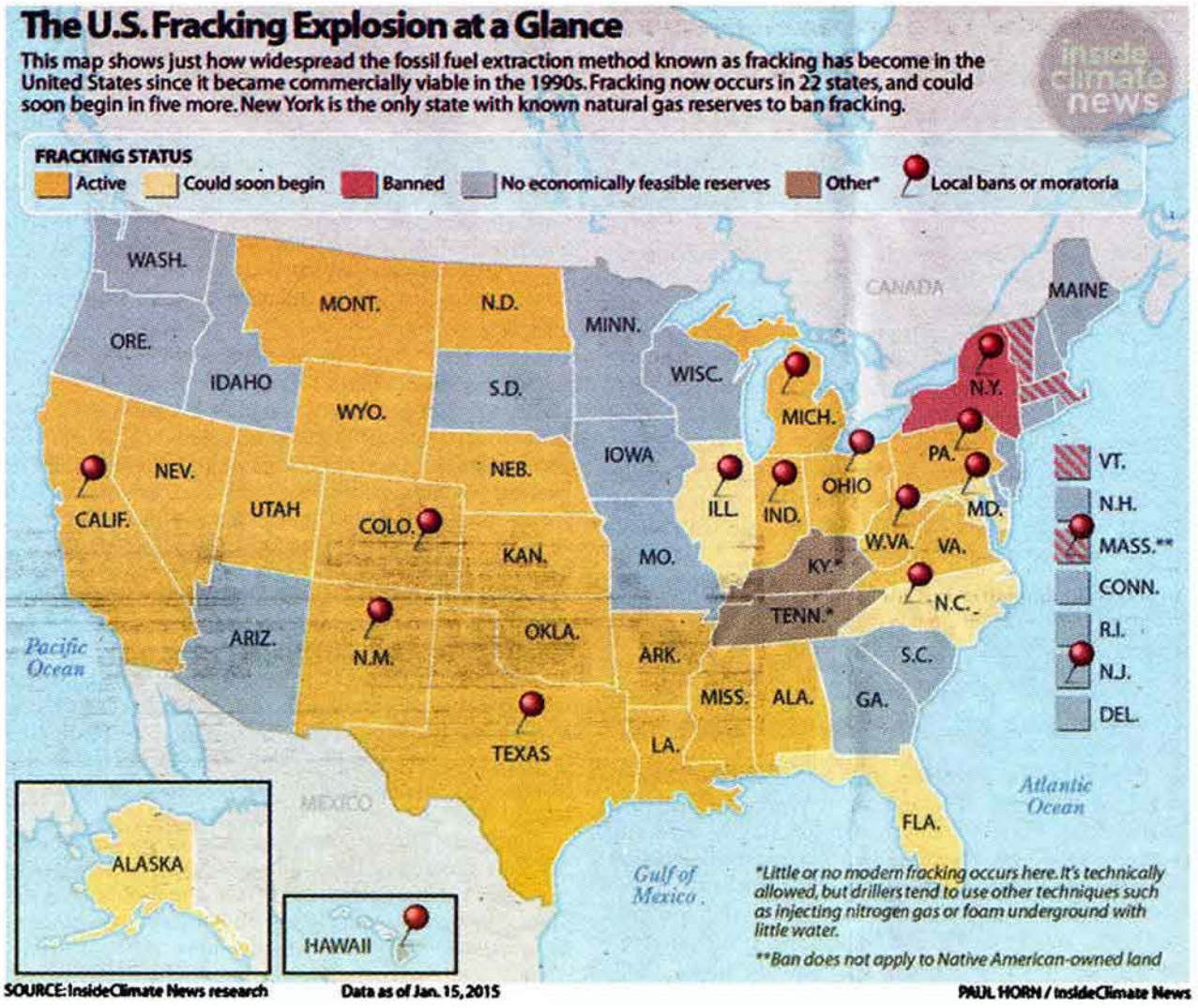
A case in point was the nearly three million gallons of fracking waste that spilled in January 2015 from a North Dakota pipeline.

The large spill of what the industry and North Dakota state officials repeatedly refer to as "saltwater"—from a ruptured pipeline—was reportedly the largest of its kind in North Dakota history.

No ordinary saltwater, the brine is up to eight times saltier than seawater. The waste, which leaked about 15 miles from the city of Williston, was being vacuumed up by the pipeline's operator, Summit Midstream Partners.

Last year, scientists published several peer-reviewed papers on the hazardousness of what's in drilling wastewater. One report found unsafe levels of barium, hexavalent chromium, copper, mercury, arsenic and antimony in the liquid. Another reported that the chemicals used in fracking, which show up in the wastewater, could potentially threaten reproductive and developmental health.

The Grand Forks Herald reported Jan. 21, 2015 that the last spill of such magnitude was in 2006, when another pipeline rupture poured at least 1 million gallons of wastewater into Charbonneau Creek near Alexander. ***—JL***



Sanctions Halt Offshore Drilling Near Radioactive Dumps —for Now

By Kelly Lundeen

US and European Union sanctions on Russia have forced our own ExxonMobil out of an offshore Arctic drilling deal with Russia's state-owned oil company Rosneft. The company's macabre plans would result in drilling next to an area used as a Soviet nuclear waste dump site for decades. The Kara Sea has so far been the loser in a battle between those who want to exploit its underwater gas and oil, and those who want radioactive waste materials removed and the ecologically delicate waters protected from the perils of drilling. However, the sanctions—resulting from Russia's incursions in Ukraine—have left the world's top oil-producing nation alone in the Arctic without its corporate partner, ExxonMobil, upon whom it depended for necessary extraction infrastructure.

In 2014, prior to enactment of sanctions, ExxonMobil and Rosneft began drilling the first well in the Kara Sea, but Exxon had to abandon its plans for partnering with the Russian firm when sanctions took effect. In January, without Western technology and capital, Rosneft announced that drilling would come to a halt for the 2015 season due to lack of a platform. It is currently seeking one from alternate contractors. Rosneft expects to resume drilling next year and hopes that consumer production will begin as early as 2020.

So, how is it possible that nuclear submarines, reactors, and waste containers were secretly dumped in the sea through the 1990s? This was common for dozens of countries until the 1972 London Convention banned marine disposal of radioactive and other wastes. Unfortunately, the Soviet Union did not become party to the Convention until the late '80s, and did not stop dumping until the early '90s.

Is offshore drilling next to a radioactive waste dump really all that dangerous? Not according to Exxon and Rosneft, especially when the reserves are estimated to contain the equivalent of nearly five years of global oil consumption. Following a study on the radioactive waste site, Rosneft and ExxonMobil stated they "are confident that we can safely drill in the Kara Sea and avoid hazards from radioactive materials on the seabed." The nuclear waste disposed of is known to include 14 reactors, 19 ships carrying solid waste, high-level radioactive waste fuel and 17,000 containers whose radioactive contents is unknown.

To help sink the containers carrying radioactive waste, the Soviets followed another norm of the era by shooting holes in them, and there is evidence of leakage from the some of the containers. But the most potentially disastrous object left at the bottom of the Kara Sea is the K-27 nuclear submarine, scuttled in 1981. In 1968, nine sailors were killed in the ship by a leak in the reactor. This nuclear submarine was carrying highly enriched uranium when it was dumped. The corrosion of the propulsion reactor, which occurs naturally under water, could reportedly lead to an atomic chain reaction that would affect an area beyond just the Arctic.

Norway, along with Germany and other Western governments driven to protect its neighboring Barents Sea, has been trying to help Russia clean up the radioactive wastes in the area for a decade. The Russian government however has no definite plans to completely remove the nuclear-powered submarines or other wastes. This is no easy feat, as shown by the CIA's 1974 Project Azorian, in which an attempt to recover a submarine from a seabed resulted in two thirds of the sub breaking off.

At least temporarily, the dump site will be left to its own natural deterioration without the assistance of offshore drilling in the nearby waters. While economic sanctions provide temporary relief from drilling, the long-term problem of cleaning up remains an unresolved issue. And it is not a matter of whether or not there will be large-scale radioactive leak, but of when.

—Reuters, Apr. 9, 2015; *Moscow Times*, Nov. 13, 2014; *New York Times*, Oct. 29, 2014; BBC, Jan. 25, 2013; Bloomberg, Sept. 25, 2012

Whistleblower: It's "harder to get into most nightclubs" than Britain's nuclear subs

A submariner in the British Navy, Able Seaman William McNeilly, 25, has embarrassed the Royal Navy by publishing a 19-page statement ridiculing lax security habits at Britain's giant Faslane submarine base and onboard the giant subs. The base that maintains nuclear-armed Trident submarines is on the Firth of Clyde located in Scotland about 25 miles west of Glasgow.

McNeilly's allegations include details of 30 safety breaches—he alleges that it's "harder to get into most nightclubs" than getting unchecked bags on to a ballistic missile submarine with nuclear warheads—involving broken security code systems, failure to follow standard security requirement, and guards routinely failing to check ID badges. McNeilly claims he was repeatedly waved passed guard posts flashing nothing but a motel door key card.

McNeilly claimed in his report, "In a Base security brief, we were told that thousands of Royal Navy IDs go missing every year." The lapses regularly opened the UK's nuclear weapons program to attacks by enemy infiltrators.

The seaman claims he spent a year preparing his report, went Absent Without Leave in order to release it publicly, which he did May 17 via *WikiLeaks*, and told the *Guardian* that he was willing to risk imprisonment in order to bring his warning to the British people.

"All it takes is someone to bring a bomb onboard to commit the worst terrorist attack the UK and the world has every [sic] seen," he wrote on *WikiLeaks*.

McNeilly turned himself in to police May 20 and is reportedly being held by the Navy in Scotland.

Among McNeilly's revelations is his recounting of the underwater collision on the night of Feb. 3, 2009 between two submarines carrying nuclear nuclear-armed missiles. Somewhere in the Atlantic, the French sub *Le Triomphant* struck the British sub *Vanguard*, while both were presumably carrying 16 ballistic missiles with multiple warheads.

The British and French governments minimized the collision in a jointly prepared, narrowly worded statement that mentioned only inconsequential "scrapes" to the *Vanguard* and damage to the sonar dome on the French sub.

However, McNeilly, who served on the Trident sub *Victorious*, reports that he was told by a Navy chief who was on the *Vanguard* that, "We thought, 'This is it. We're all going to die." The chief told McNeilly that *Le Triomphant* "took a massive chunk out of the front of *HMS Vanguard*."

In his report, which he titled "The Secret Nuclear Threat," McNeilly wrote, "I brought things of all shapes through and none of it was checked. Before sailing I brought my own stuff onboard in a huge grip bag; it wasn't checked. There were 31 BSQ's [sailors with Basic Submarine Qualification] and ship's staff and civilians—over 180 people bringing huge unchecked bags onboard."

Calling the nuclear submarine program "a disaster waiting to happen," McNeilly wrote that he hoped for a pardon from the Prime Minister "for alerting the people and the government to a major threat."

—Mint Press, May 20; *Guardian*, May 18, 2015; *New York Times*, Feb. 17; *Daily Telegraph*, Feb. 16, 2009 ***—JL***

45,000 Rally Against Nuclear Power in Taiwan

By Kelly Lundeen

On March 14, around 45,000 activists gathered across major cities in Taiwan to oppose nuclear power, marking the fourth anniversary of the Fukushima-Daiichi triple reactor disaster. The island-wide mobilization marked the third year in a row that tens of thousands of anti-nuclear activists have taken to the streets in a movement that has been galvanized by the Fukushima meltdown. Like Japan, Taiwan is located near the tectonically-active "Ring of Fire." Concerned about a similar disaster, environmental, human rights, aboriginal, student, labor, workers' and farmers' organizations are demanding green energy and a Taiwan free of nuclear reactors. Pieces of this dream could become reality if the government follows through on its pledge to phase-out nuclear power by letting licenses expire on the three operating reactor complexes and abandoning construction on a fourth.

Of the existing reactors, the oldest are scheduled for decommissioning by 2019 and 2023. The fourth reactor has been in planning stages since the 1980s, but its construction has run into continual setbacks. Last year, it was brought to a complete standstill and the reactor was sealed off as the government was forced to respond to strong public opposition. The reactor's completion now depends on a public referendum expected within the next few years.

A 2014 World Nuclear Association report found that 55 percent of Taiwan's population supported terminating construction and closing the reactor permanently. Taiwan's government appears to be taking public opinion into account in view of its claims to have plans to put an end to nuclear power.

Every year since the Fukushima disaster, the size of nationwide protests has grown from thousands to tens of thousands, reaching 68,000 in March 2013. Activists have employed hunger strikes, sit-ins on high-traffic boulevards and railway stations, marches and other tactics. In the 2012 presidential elections, the popular opposition candidate made ending reliance on nuclear power a central issue. Even though the president—whose party had previously backed nuclear power—was re-elected, he recently backed away from his support of the nuclear industry. The halt to construction on the fourth reactor has been largely due to public pressure, exemplified again by the enormous outcry heard on March 14—although regionally this has not been the case.

Asia is considered to be the emerging market for investment in new nuclear power, and 11 countries in the region have or are developing plans to build new power reactors. Nuclear power promoters like the World Nuclear Association forecast that by 2030, 266 new reactors could be built across Asia. Of the projected $1.2 trillion to be invested in nuclear power worldwide, almost $800 billion of that could be in Asia.

Amidst multi-national corporate momentum toward more nuclear power in Asia, Taiwan is one of the few countries in which politicians have been responsive to the movements against it. And if millions of Taiwanese get their way, the country will join the ranks of Switzerland, Belgium and Germany and make a good-faith commitment to truly rid their home of nuclear power.

—Agence France Presse, Mar. 14, 2015 & Mar. 20, 2011; World Nuclear Association, Mar. 2015; World Nuclear News, Jan. 8, 2015; Green Citizen's Action Alliance, 2015; *Straits Times*, Jul. 31, 2014; Reuters, Apr. 27, 2014; Bloomberg Business, Mar. 3, 2013; *New York Times*, Jan. 12, 2012; *Taipei Times*, May 1, 2011

Anti-nuclear protesters rally in Taipei, Taiwan on March 14. Their signs include the message "stop the nuclear power and start the green power." Photo by Sam Yeh, AFP.

65-Day Protest at Germany's Nuclear-Armed Büchel Air Base

A 65-day-long series of protests at the Büchel Air Force Base in west-central Germany—home to 20 US nuclear bombs—culminated on May 29. Thirty-five different organizations began their string of blockades on March 26, commemorating the Bundestag's (Parliament's) 2010 call to the German government to advocate for removal of US nuclear weapons in Germany. The occupations ended May 29, marking the conclusion of the UN's 2015 Nuclear Non-Proliferation Treaty Review Conference. (See "Nuclear Weapons Proliferation," Page 1.)

Over the course of the 65 days, over 400 people participated in 31 blockades through a wide variety of demonstrations. Local, national and international organizations came to present lively opposition to nuclear weapons and the base's role in the US–German "nuclear sharing" agreement. The actions ranged from an orchestra concert to tripod blockades, a red carpet roll-out of peace flags, a die-in staged to dramatize Edvard Munch's painting *The Scream*, and a Maypole dance. Banners galore punctuated the actions and constantly decorated the peace encampment. Birthdays and a Good Friday service were observed at the gates, contributing to what became disruption of traffic three to four days a week, preventing personnel from accessing the base, and often closing it. On the last day alone, 35 people were taken into custody as they blocked seven gates to the base. A total of 60 protestors arrived armed with toothbrushes to symbolize their willingness to remain at the blockade until there is a commitment to withdraw the weapons.

The US removed its nuclear weapons from England and Greece prior to 2010. The US B61s at Büchel include 20 of the 180 bombs remaining in five European allied states. The stationing and potential use of the weapons violate the Nuclear Non-Proliferation Treaty (NPT), which prohibits signatories like the United States from transferring nuclear weapons to non-nuclear states like Germany; Büchel is charged with the nuclear missions of NATO and the B61 bombs would be delivered by German Tornado aircraft. Contrary to a move toward fulfilling international obligations under the NPT, there are plans to upgrade the B61s to "smart" bombs, giving them the embarrassing distinction of being the only such nuclear weapons on European soil. In a move that some have called a "new arms race," the upgrade plan will further endanger Russia's trust in disarmament talks with NATO.

—Atomwaffenfrei, May 30; Büchel Atomwaffenfrei, May 26; *Rheinische Post*, Mar. 24, 2015 —***KL***

The actions against Germany's Nuclear-Armed Büchel Air Base included a die-in staged to dramatize Edvard Munch's painting *The Scream* by the French group Stop Nuclear Weapons. Photo by Büchel Atomwaffenfrei.

Nukewatch Welcomes New Staff Member

Kelly holds a trespass citation after a 2004 direct action at the Navy's ELF antenna.

Hello Nukewatch community! My name is Kelly Lundeen. I am a mother, organizer, and teacher, and I recently become a staff member at Nukewatch. I first learned about Nukewatch in the late 1990s and I became radicalized by the work to end the sanctions and environmental movement in Earth First. Since then, I have been working to end corporate rule and build people power in Wisconsin, Colombia, South America, Minnesota and back home in rural Shell Lake, Wisconsin, not far from Nukewatch, where I now live with my partner and two-year-old daughter.

For three years I was a live-in volunteer at Casa Maria Catholic Worker in Milwaukee, Wisconsin, where I helped provide shelter to homeless women and children while fighting the systemic causes of that poverty and working for immigrant rights. From 2002–2005, I lived in Colombia doing accompaniment with International Peace Observatory, an organization that accompanied peasant human rights organizations defending their lands from takeover by multinational companies through the use of the paramilitary and government army. I have been arrested six times in direct action against the military–industrial complex and corporate globalization, one of those arrests being at Project ELF, the nuclear submarine communication system in northern Wisconsin that Nukewatch worked for 15 years to close.

At Nukewatch I am thrilled to be a part of decades-long civil resistance to advance the mission of abolishing nuclear power and weapons, which I view as tools of US military and economic imperialism that deny the legitimacy of the human needs here in the US and around the world and prioritizes economic interests. I look forward to being part of a larger community—you all—that shares these concerns and is willing to take action for change!

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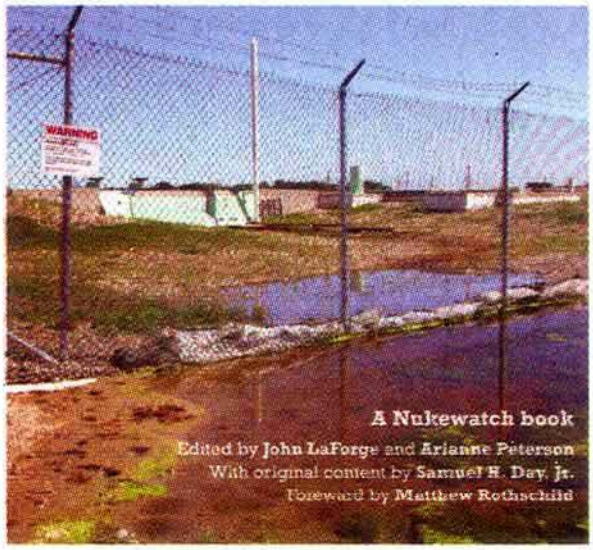
The revised edition of Nuclear Heartland *is almost here—pre-order your copy now!*



In 1988, Nukewatch published the definitive guide to the 1,000 missile silos of the United States as a tool for peace activists.

Now that over half of these nuclear missile silos have been decommissioned, we've revised and updated Nuclear Heartland *for those who would like to see the final 450 eliminated.*

The new edition features:

- A new forward by Matthew Rothschild, former Editor of the *Progressive*, who reminds us: "Becoming aware of these hideous weapons in our midst is the first step toward arousing people to take another run at nuclear disarmament";
- Newly updated maps, directions, and photos of the three remaining missile fields, including links to interactive online maps;
- An expanded ICBM deployment timeline, which now includes decommissioning;
- Additions to the original "Awakening" section chronicling peace actions in the missile fields from 1958 to the present;
- A new chapter telling the story of the "Drawdown" of the missile silo fields in rural Missouri, North Dakota, and South Dakota;
- A chapter examining the current situation in the missile fields, including recent Air Force scandals and the US's new weapons spending plans, as well as the role of the aging missiles as part of global nuclear weapons proliferation; and
- A call to action by long-time Nukewatch staffer and missile field activist Bonnie Urfer.

☒ ***Yes!* I would like to pre-order _____ copies of the revised edition of *Nuclear Heartland.***

☐ My payment of $ _____ ($25/book) is enclosed.

☐ I prefer to pay online and will use the PayPal link at **www.nukewatchinfo.org** to make my payment, including a note for "*Nuclear Heartland* Pre-Order."

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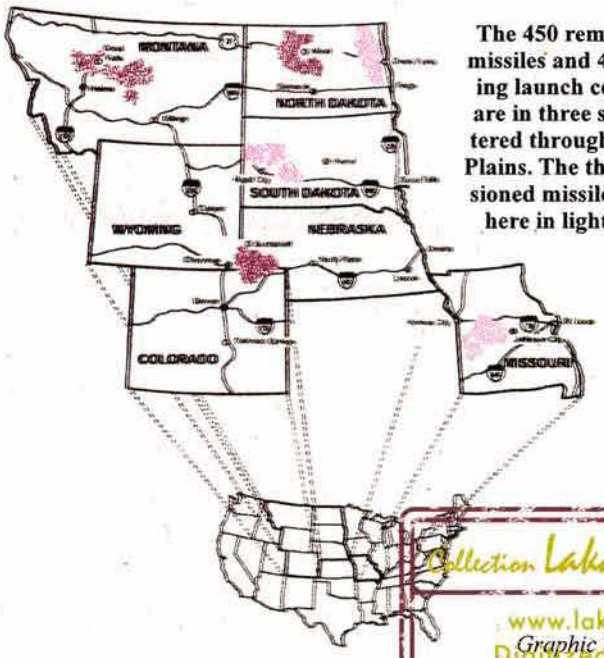

The 450 remaining, active missiles and 45 corresponding launch control centers are in three silo fields scattered throughout the Great Plains. The three decommissioned missile fields appear here in lighter red print.

Graphic by Bonnie Urfer