

Science with a Skew: The Nuclear Power Industry After [Chernobyl](#) and [Fukushima](#)

Japanese translation is [available](#).

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It is one of the marvels of our time that the nuclear industry managed to resurrect itself from its ruins at the end of the last century, when it crumbled under its costs, inefficiencies, and mega-accidents. [Chernobyl](#) released hundreds of times the radioactivity of the Hiroshima and Nagasaki bombs combined, contaminating more than 40% of Europe and the entire Northern Hemisphere.[1] But along came the nuclear lobby to breathe new life into the industry, passing off as “clean” this energy source that polluted half the globe. The “fresh look at nuclear”—in the words of a New York Times makeover piece (May 13, 2006)[2]—paved the way to a “nuclear Renaissance” in the United States that [Fukushima](#) has by no means brought to a halt.

That mainstream media have been powerful advocates for nuclear power comes as no surprise. “The media are saturated with a skilled, intensive, and effective advocacy campaign by the nuclear industry, resulting in disinformation” and “wholly counterfactual accounts...widely believed by otherwise sensible people,” states the 2010-2011 World Nuclear Industry Status Report by Worldwatch Institute.[3] What is less well understood is the nature of the “evidence” that gives the nuclear industry its mandate, Cold War science which, with its reassurances about low-dose radiation risk, is being used to quiet alarms about Fukushima and to stonewall new evidence that would call a halt to the industry.

Consider these damage control pieces from major media:

- The “miniscule quantities” of radiation in the radioactive plume spreading across the U.S. pose “no health hazard,” assures the Department of Energy (William Broad, “[Radiation over U.S. is Harmless, Officials Say](#),” NYT, March 22, 2011).
- “The risk of cancer is quite low, lower than what the public might expect,” explains [Evan Douple](#), head of the [Radiation Effects Research Foundation](#) (RERF), which has studied the A-bomb survivors and found that “at very low doses, the risk was also very low” (Denise Grady, “[Radiation is everywhere, but how to rate harm?](#)” NYT, April 5, 2011).
- An NPR story a few days after the Daiichi reactors destabilized quotes this same Evan Douple saying that radiation levels around the plant “should be reassuring. At these levels so far I don’t think a study would be able to measure that there would be any health effects, even in the future.” (“[Early radiation data from near plant ease health fears](#),” Richard Knox and Andrew Prince,” March 18, 2011) The NPR story, like Grady’s piece (above), stresses that the Radiation Effects Research Foundation has had six decades experience studying the health effects of radiation, so it ought to know.

- British journalist George Monbiot, environmentalist turned nuclear advocate, in a much publicized debate with Helen Caldicott on television and in the *Guardian*, refers to the RERF data as “scientific consensus,” citing, again, their reassurances that low dose radiation incurs low cancer risk.[4]

Everyone knows that radiation at high dose is harmful, but the Hiroshima studies reassure that risk diminishes as dose diminishes until it becomes negligible. This is a necessary belief if the nuclear industry is to exist, because reactors release radioactive emissions not only in accidents, but in their routine, day-to-day operations and in the waste they produce. If low-dose radiation is not negligible, workers in the industry are at risk, as are people who live in the vicinity of reactors or accidents—as is all life on this planet. The waste produced by reactors does not “dilute and disperse” and disappear, as industry advocates would have us believe, but is blown by the winds, carried by the tides, seeps into earth and groundwater, and makes its way into the food chain and into us, adding to the sum total of cancers and birth defects throughout the world.[A] Its legacy is for longer than civilization has existed; plutonium, with its half life of 24,000 years, is, in human terms, forever.

What is this Radiation Effects Research Foundation, and on what “science” does it base its reassuring claims?

The Atomic Bomb Casualty Commission (ABCC), as it was originally called, began its studies of the survivors five years after the bombings. (It was renamed the Radiation Effects Research Foundation in the mid seventies, to get the “atomic bomb” out, at around the same time the Atomic Energy Commission (AEC) was renamed the Department of Energy (DOE). Japan, which has the distinction of being twice nuked, first as our wartime enemy then in 2011 as our ally and the recipient of our GE reactors, has also been the population most closely studied for radiation-related effects, for the Hiroshima and Nagasaki bombings created a large, ready-made population of radiation-exposed humans. “Ah, but the *Americans*—they are wonderful,” exclaimed Japan’s radiation expert Tsuzuki Masao, who lamented that he’d had only rabbits to work on: “It has remained for them to conduct the *human* experiment!”[5]

The ABCC studied but did not treat radiation effects, and many survivors were reluctant to identify themselves as survivors, having no wish to bare their health problems to US investigators and become mired in bureaucracy and social stigma. But sufficient numbers did voluntarily come forth to make this the largest—and longest—study of radiation-related health effects ever. No medical study has had such resources lavished on it, teams of scientists, state of the art equipment: this was Atomic Energy Commission (AEC) funding. Since it is assumed in epidemiology that the larger the sample, the greater the statistical accuracy, there has been a tendency to accept these data as the gold standard of radiation risk.

The Japanese physicians and scientists who'd been on the scene told horrific stories of people who'd seemed unharmed, but then began bleeding from ears, nose, and throat, hair falling out by the handful, bluish spots appearing on the skin, muscles contracting, leaving limbs and hands deformed. When they tried to publish their observations, they were ordered to hand over their reports to US authorities. Throughout the occupation years (1945-52) Japanese medical journals were heavily censored on nuclear matters. In late



ABCC examination of Hiroshima victim

1945, US Army surgeons issued a statement that all people expected to die from the radiation effects of the bomb had already died and no further physiological effects due to radiation were expected.[6] When Tokyo radio announced that even people who entered the cities after the bombings were dying of mysterious causes and decried the weapons as “illegal” and “inhumane,” American officials dismissed these allegations as Japanese propaganda.[7]

The issue of radiation poisoning was particularly sensitive, since it carried a taint of banned weaponry, like poison gas. The A-bomb was not “an inhumane weapon,” declared General Leslie Groves, who had headed the Manhattan project.[8] The first western scientists allowed in to the devastated cities were under military escort, ordered in by Groves. The first western journalists allowed in were similarly under military escort. Australian journalist Wilfred Burchett, who managed to get in to Hiroshima on his own, got a story out to a British paper, describing people who were dying “mysteriously and horribly” from “an unknown something which I can only describe as the atomic plague...dying at the rate of 100 a day,” General MacArthur ordered him out of Japan; his camera, with film shot in Hiroshima, mysteriously disappeared.[9]

“No Radioactivity in Hiroshima Ruin,” proclaimed a New York Times headline, Sept 13, 1945. “Survey Rules out Nagasaki Dangers,” stated another headline: “Radioactivity after atomic bomb is only 1000th of that from luminous dial watch,” Oct 7, 1945.[10] There were powerful political incentives to downplay radiation risk. As State Department Attorney William H. Taft asserted, the “mistaken impression” that low-level radiation is hazardous has the “potential to be seriously damaging to every aspect of the Department of Defense’s nuclear weapons and nuclear propulsion programs...it could impact the civilian nuclear industry...and it could raise questions regarding the use of radioactive substances in medical diagnosis and treatment.”[11] A pamphlet issued by the Atomic Energy Commission in 1953 “insisted that low-level exposure to radiation ‘can be continued indefinitely without any detectable bodily change.’”[12] The AEC was paying the salaries of the ABCC scientists and monitoring them “closely—some felt too closely,” writes Susan Lindee in *Suffering Made Real*, which documents the political pressures that shaped radiation science.[13] (Other good sources on the making of this science are Sue Rabbit Roff’s *Hotspots*,[9] Monica Braw’s *The Atomic Bomb Suppressed*, and Robert Lifton and Greg Mitchell’s, *Hiroshima in America*[8]). The New York Times “joined the government in suppressing information on the radiation sickness of survivors” and consistently downplayed or omitted radioactivity from its

reportage, as Beverly Ann Deepe Kever demonstrates in *News Zero: The New York Times and the Bomb*.^[14] Kever, a veteran journalist herself, writes that “from the dawn of the atomic-bomb age,...the Times almost single-handedly shaped the news of this epoch and helped birth the acceptance of the most destructive force ever created,” aiding the “Cold War cover-up” in minimizing and denying the health and environmental consequences of the a-bomb and its testing.

The Atomic Bomb Casualty Commission scientists calculated that by 1950, when the commission began its investigations, the death rate from all causes except cancer had returned to “normal” and the cancer deaths were too few to cause alarm.^[15]

“It’s nonsense, it’s rubbish!” protested epidemiologist Dr. Alice Stewart, an early critic—and victim—of the Hiroshima studies.^[16] Stewart discovered, in 1956, that x-raying pregnant women doubled the chance of a childhood cancer: this put her on a collision course with ABCC/RERF data, which found no excess of cancer in children exposed *in utero* to the blasts. Nobody in the 1950s wanted to hear that a fraction of the radiation dose “known” to be safe could kill a child. During the Cold War, officials were assuring us we could survive all-out nuclear war by ducking and covering under desks and the U.S. and U.K. governments were pouring lavish subsidies into “the friendly atom.” Stewart was defunded and defamed.



Alice Stewart

She persisted in her criticisms of the Hiroshima data which were repeatedly invoked to discredit her findings, pointing out that there was no way the survivors could have returned to “normal” a mere five years after the atomic blasts. This was not a normal or representative population: it was a population of healthy survivors, since the weakest had died off. Her studies of childhood cancer had found that children incubating cancer became 300 times more infection sensitive than normal children. Children so immune-compromised would not have survived the harsh winters that followed the bombings, when food and water were contaminated, medical services ground to a halt, and antibiotics were scarce—but their deaths would not have been recorded as radiation-related cancer deaths. Nor would the numerous stillbirths, spontaneous abortions, and miscarriages (known effects of radiation exposure) have been so recorded. Stewart maintained that there were many more deaths from radiation exposure than official figures indicated.

Besides, the survivors had been exposed to a single, external blast of radiation, often at very high dose (depending on their distance from the bombs), rather than the long, slow, low-dose exposure that is experienced by people living near reactors or workers in the nuclear industry. Stewart’s studies of the Hanford nuclear workers were turning up cancer at doses “known to be too low” to

produce cancer, too low as defined by the Hiroshima data: “This is the population you ought to be studying to find out the effects of low-dose radiation,” she maintained, not only because the workers have been subjected to the kind of exposure more likely to be experienced by downwinders to reactors and accidents, but also because records were kept of their exposures (the nuclear industry requires such records).

In the Hiroshima and Nagasaki studies, by contrast radiation exposure was estimated on the flimsiest of guesswork. The radiation emitted by the bombs was calculated according to tests done in the Nevada desert and was recalculated several times in subsequent decades.[\[B\]](#) Researchers asked such questions as, where were you standing in relation to the blast, what was between you and it, what had you had for breakfast that morning, assuming that the survivors would give reliable accounts five years after the event.



Worker with radioactive waste at Hanford

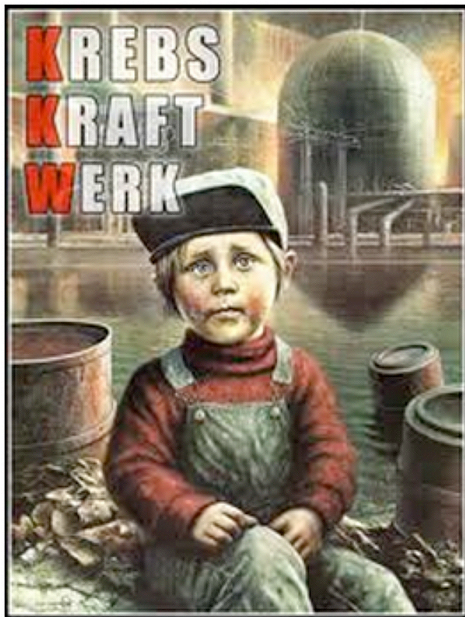
“Bible arithmetic!” Stewart called the Hiroshima data: “it has skewed subsequent calculations about the cancer effect of radiation, and not only the cancer effect, but many other effects – immune system damage, lowered resistance to disease, infection, heart disease, genetic damage. These are serious misrepresentations because they suggest it’s safe to increase levels of background radiation.” In fact, as the Hiroshima studies went on, they turned up numerous radiation effects besides cancer[\[17\]](#)—cardiovascular and gastrointestinal damage, eye diseases, and other health problems—which bore out her prediction. Stewart was also proved right on the issue of fetal X-rays, though it took her two decades to convince official bodies to recommend against the practice, during which time doctors went right on X-raying pregnant women. It took her another two decades to build a case strong enough to persuade the US government, in 1999, to grant compensation to nuclear workers for cancer incurred on the job.[\[18\]](#) (It helps, in this area, to be long-lived, as she commented wryly).

Twice, she has demonstrated that radiation exposures assumed “too low” to be dangerous carry high risk—two major blows at the Hiroshima data. Yet this 60-year old RERF data set continues to be invoked to dismiss new evidence—evidence of cancer clusters in the vicinity of nuclear reactors and findings from Chernobyl.[\[C\]](#)

More than 40 studies have turned up clusters of childhood leukemia in the vicinity of nuclear facilities, reckons Ian Fairlie, an independent consultant on radioactivity in the environment and a former member of the Committee Examining Radiation Risks of Internal Emitters (an investigatory commission established by the U.K. government but disbanded in 2004). Fairlie describes this as a “mass of evidence difficult to contradict”[\[19\]](#)—yet it continues to be contradicted, on the basis of

the Hiroshima studies. Generally when a cancer cluster is detected in the neighborhood of a reactor, the matter gets referred to a government committee that dismisses the findings on the grounds that radioactive emissions from facilities are “too low” to produce a cancer effect—“too low, according to RERF risk estimates.”[20]

But in 2007, something extraordinary happened, when a government-appointed committee formed in response to the pressure of concerned citizens turned up increased rates of childhood leukemia in the vicinity of all 16 nuclear power plants in Germany. The *Kinderkrebs in der Umgebung von Kernkraftwerken* study, known by its acronym KiKK, was a large, well-designed study with a case-control format (1592 cancer cases and 4735 controls). The investigators—who were not opposed to nuclear power—anticipated they’d find “no effect... on the basis of the usual models for the effects of low levels of radiation.”[21] But they found, to their surprise, that children who lived less than 5 km from a plant were *more than twice as likely* to develop leukemia as children who lived more than 5 km away. This was inexplicable within current models of estimating radiation risk:[22] emissions would have had to have been orders of magnitude higher than those released by the power stations to account for the rise in leukemia. So the investigators concluded that the rise in leukemia couldn’t have been caused by radiation.



The findings are not inexplicable, explains Fairlie, when you understand that the data on which risk is calculated, the Hiroshima studies, are “unsatisfactory.”[23] Fairlie’s criticism of these data echoes Stewart’s: “risk estimates from an instantaneous external blast of high energy neutrons and gamma rays are not really applicable to the chronic, slow, *internal* exposures from the low-range alpha and beta radiation from most environmental releases.”[24] (my emphasis) Fairlie points out a further problem with the Hiroshima data: its failure to take into account the dangers of internal radiation. As Sawada Shoji, emeritus professor of physics at Nagoya University and a Hiroshima survivor, confirms, the Hiroshima studies never looked at fallout: they looked at “gamma rays and neutrons emitted within a minute of the explosion,” but did not consider the effects of residual radiation over time, effects from inhalation or ingestion that “are more severe.”[25] The distinction between external and internal radiation is important to keep clear. A bomb blast gives off radiation in the form of high-energy subatomic particles and materials that remain as fallout in the form of radioactive elements such as strontium 90 and cesium. Most of this is likely to remain on the ground, where it will radiate the body from without, but some may be ingested or inhaled and lodge in a lung or other organ, where it will continue to emit radioactivity at close range. Nuclear proponents cite background radiation to argue that low-dose radiation is relatively harmless, asserting (as Monbiot argued against Caldicott) that we’re daily exposed to background radiation and survive. But this

argument misses the fact that background radiation is from an external source and so is a more finite exposure than radioactive substances ingested or inhaled, which go on irradiating tissues, “giving very high doses to small volumes of cells,” as Helen Caldicott says. (Caldicott explains, when physicists talk about “permissible doses,” “[t]hey consistently ignore internal emitters — radioactive elements from nuclear power plants or weapons tests that are ingested or inhaled into the body, ... They focus instead on generally less harmful external radiation from sources outside the body.”[26])

The KiKK study “commands attention,” Fairlie insists.[27] But it got no mention in mainstream media in the U.S. or the U.K.—until *The Guardian*, in early May of 2011, gave this spin to it: “Plants have been cleared of causing childhood cancers,” declared the headline.[28] “Government’s advisory committee says it is time to look elsewhere for causes of leukaemia clusters.” What “elsewhere,” what other causes are cited for cancer clusters in the vicinity of reactors? Infection, a virus, a mosquito, socioeconomics, chance say the experts quoted in *The Guardian*. The U.K. government is now moving ahead with plans to build eight new reactors.

When new evidence comes into conflict with old models, reinvoke the old models rather than looking at the new evidence. The world is flat. So is it flat in Chernobyl.

“There is no evidence of a major public health impact attributable to radiation exposure two decades after the accident at Chernobyl,” announced the New York Times, a few days after the Fukushima reactors began to destabilize (Denise Grady, “[Precautions should limit health problems from nuclear plant’s radiation](#),” March 15, 2011) The Times bases this claim on a [2005 World Health Organization \(WHO\) study](#) that found “minimal health effects” and estimated that only 4000 deaths “will probably be attributable to the accident ultimately.” The worst effect of the accident is a “paralyzing fatalism,” an expert tells the Times, which leads people to “drug and alcohol use, and unprotected sex and unemployment” (Elisabeth Rosenthal, “[Experts find reduced effects of Chernobyl](#),” Sept 6, 2005). “Radiophobia,” this is called—an attitude problem.

The Times did not mention that the International Atomic Energy Agency (IAEA), which is mandated with the promotion of nuclear energy, has an agreement with WHO that gives it final say over what it reports, an entangling alliance much decried by independent scientists.[29] Nor did it mention two other studies that came out in 2006, “The Other Report on Chernobyl” and “The Chernobyl Catastrophe” by Greenpeace, both of which gave much higher casualty estimates than the widely publicized WHO/IAEA report.[30] Nor did it breathe a word about *Chernobyl: Consequences of the Catastrophe for People and the Environment*, by Alexey Yablokov et al., translated into English and published by the New York Academy of Sciences in 2009—which estimates casualties at 985,000, orders of magnitude more than the WHO/IAEA report.[31]

Yablokov et al. draw on “data generated by many thousands of scientists, doctors, and other experts who directly observed the suffering of millions affected by radioactive fallout in Belarus, Ukraine,

and Russia,” and incorporate more than 5000 studies, mostly in Slavic languages (compared with the 350 mentioned in the 2005 report, most of which were in English). The authors are impeccably credentialed: Dr. Alexey Yablokov was environmental advisor to Yeltsin and Gorbachev; Dr. Vassily Nesterenko was former director of the Institute of Nuclear Energy in Belarus. Nesterenko, together with Andrei Sakharov, founded the independent Belarusian Institute of Radiation Safety [BELRAD](#), which studies *–as well as treats–* the Chernobyl children. When he died in 2008 as a result of radiation exposure incurred flying over the burning reactor (which gave us the only measurement of radionuclides released by the accident), his son Dr. Alexey Nesterenko, third author of this study, took over as director and senior scientist at BELRAD. [Dr. Janette Sherman](#), consulting editor, is a physician and toxicologist.

Comparing contaminated areas of Belarus, Ukraine, and Russia with the so-called “clean areas,” the studies document significant increases in morbidity and mortality in contaminated regions: not only more cancer, especially thyroid cancer, but a wide array of noncancer effects — ulcers, chronic pulmonary diseases, diabetes mellitus, eye problems, severe mental retardation in children, and a higher incidence and greater severity of infectious and viral diseases. Every system in the body is adversely affected: cardiovascular, reproductive, neurological, hormonal, respiratory, gastrointestinal, musculoskeletal, and immune systems. The children are not thriving: “Prior to 1985 more than 80% of children in the Chernobyl territories of Belarus, Ukraine, and European Russia were healthy; today fewer than 20% are well.” In animals, too, there are “significant increases in morbidity and mortality... increased occurrence of tumor and immunodeficiencies, decreased life expectancy, early aging, changes in blood and the circulatory system, malformations.”

Parallels between Chernobyl and Hiroshima are striking: data collection was delayed, information withheld, reports of on-the-spot observers were discounted, independent scientists were denied access “The USSR authorities officially forbade doctors from connecting diseases with radiation and, like the Japanese experience, all data were classified.” With the “liquidators,” as they’re called, the 830,000 men and women conscripted from all over the Soviet Union to put out the fire, deactivate the reactor, and clean up the sites, “It was officially forbidden to associate the diseases they were suffering from with radiation.” “The official secrecy that the USSR imposed on Chernobyl’s public health data the first days after the meltdown...continued for more than three years,” during which time “secrecy was the norm not only in the USSR, but in other countries as well.”



Twin brothers Michael and Vladimir Iariga of Minsk, Belarus, are 16 years old. Michael, with hydrocephalus, is five minutes older than Vladimir, who is deaf.

–Photo: Robert Knoth. [1](#), [2](#).

But the parallels are political, not biological, for the Hiroshima data have proven to be an “outdated” and useless model, as Stewart said, for predicting health effects from low-dose, chronic radiation exposure over time. The Hiroshima studies find little genetic damage in the survivors, yet Yablokov

et al. document that “Wherever there was Chernobyl radioactive contamination, there was an increase in the number of children with hereditary anomalies and congenital malformations. These included previously rare multiple structural impairments of the limbs, head, and body,” devastating birth defects, especially in the children of the liquidators. The correlation with radioactive exposure is so pronounced as to be “no longer an assumption, but...proven,” write the authors. As in humans, so in every species studied, “gene pools of living creatures are actively transforming, with unpredictable consequences”: “It appears that [Chernobyl’s irradiation] has awakened genes that have been silent over a long evolutionary time.” The damage will play out for generations — “at least seven generations.”[D]



Chernobyl legacy

—Photo by [Paul Fusco](#)

Such findings have provided radiation experts a chance to reexamine their hypotheses and theories about radiation effects, observes Mikhail Malko, a researcher at the [Joint Institute of Power and Nuclear Research](#) in Belarus.[32] But rather than using new evidence to enlarge their understanding, experts have found ways of dismissing these studies as “unscientific”: they are said to be observational rather than properly controlled, “Eastern European” and not up to Western scientific protocols, and inconsistent with the hallowed Hiroshima data. Radiation scientists denied that the thyroid cancer that increased exponentially after the accident could be a consequence of radiation: it manifested in only three years, whereas it had taken ten years to appear in Hiroshima, and it took a more aggressive form. They explained the increase in terms of improved screening, iodine substances used to treat the children, or pesticides—even though epidemiological studies kept turning up a link with radiation contamination. Finally in 2005, a case-control study headed by Elisabeth Cardis confirmed a dose-response relationship between radiation and thyroid cancer in children in terms that had to be acknowledged.[33]

Chernobyl does not usually provide the kind of neat laboratory conditions that allow such precise dose-response calculations. *But neither did Hiroshima*, where radiation exposure was guesstimated years after the fact and recalculated several times according to new findings. Yet scientists have accepted the Hiroshima uncertainties—all too readily—and have allowed this data to shape policy affecting all life on this planet, while citing the less-than-ideal conditions for studying Chernobyl as an excuse to ignore or discredit these findings, dismissing them according to a model more questionable than the data they’re discounting. The Chernobyl effects demonstrate that “Even the smallest excess of radiation over that of natural background will statistically...affect the health of exposed individuals or their descendants, sooner or later.” But as with Stewart’s findings about fetal x-rays and nuclear workers, as with the studies that turn up cancer clusters around reactors, so with Chernobyl — it can’t be radiation that’s producing these effects because the Hiroshima studies say it can’t. As independent scientist Rudi Nussbaum points out, the “dissonance between evidence and existing assumptions about...radiation risk,” the gap between new information and the “widely

adopted presuppositions about radiation health effects,” has become insupportable.[34]

Chernobyl is a better predictor of the Fukushima consequences than Hiroshima, but we wouldn't know that from mainstream media. Perhaps we would rather not know that 57% of Chernobyl contamination went outside the former USSR; that people as far away as Oregon were warned not to drink rainwater “for some time”; that thyroid cancer doubled in Connecticut in the six years following the accident; that 369 farms in Great Britain remained contaminated 23 years after the catastrophe; that the German government compensates hunters for wild boar meat too contaminated to be eaten[35] – and it paid four times *more* in compensation in 2009 than in 2007. Perhaps we'd rather not consider the possibility that “the Chernobyl cancer toll is one of the soundest reasons for the ‘cancer epidemic’ that has been afflicting humankind since the end of the 20th century.”

“This information must be made available to the world,” write Yablokov et al. But their book has met “mostly with silence,” as he said in a press conference in Washington DC, March 15, 2011.[36] The silence of mainstream media has stonewalled information about Chernobyl's health effects as effectively as the Soviets' blackout concealed the accident itself, and as the Allies' censorship hid the health effects of the Hiroshima and Nagasaki bombings.[E]

“We need to quash any stories trying to compare this [Fukushima] to Chernobyl,” “otherwise it could have adverse consequences on the market.” “This has the potential to set the nuclear industry back globally... We really need to show the safety of nuclear,” that “it's not as bad as it looks.” These statements were made in a few of the more than 80 emails which the *Guardian* got access to, which were not intended for the public eye. “British government officials approached nuclear companies to draw up a co-ordinated public relations strategy to play down the Fukushima nuclear accident just two days after the earthquake and tsunami,” reports the *Guardian*, “to try to ensure the accident did not derail their plans for a new generation of nuclear stations in the UK.”[37]



Alexey V. YABLOKOV
Vasily B. NESTERENKO
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CONSULTING EDITOR: Isabella D. Mariani-Perugia

Comparisons with Chernobyl have been conspicuously absent from mainstream media, even when Fukushima was upgraded, in early June, to a level on a par with Chernobyl, level 7, the highest. Even when Arnold Gundersen, a nuclear engineer turned whistleblower who has been [monitoring Fukushima from the start](#), asserted that this accident may actually be *more* dire than Chernobyl. Gundersen, an informed, level-headed commentator who inspires confidence, points out that there are four damaged reactors leaking into the atmosphere, ocean, and ground in an area more populated than the Ukraine: “You probably have the equivalent of 20 nuclear reactor cores...that is 20 times the potential to be released than Chernobyl.” (Fairewinds, [June 16, 2011](#)). But apart from the

damage control piece it published March 15 ([cited above](#)) and Helen Caldicott's passing reference to "research by scientists in Eastern Europe" (op-ed, "[After Fukushima: Enough is enough](#)," December 2)—the Times has barely mentioned Chernobyl (and even Caldicott did not mention the Yablokov study by name). What Chernobyl has wrought, which has been documented so clearly by Yablokov et al., is simply too dangerous to give press to, undercutting as it does the nuclear industry's claims to safety and viability.

The New York Times has done good reporting on Japanese blunders and corruption. It has described the way plant operators and government officials minimized the severity of the meltdown, the corporate and government cover-ups and irresponsibility (Norimitsu Onishi and Martin Fackler, "[Japan held nuclear data, leaving evacuees in peril](#)," August 8, 2011). It has pointed out complicity between industry and regulators (Norimitsu Onishi and Ken Belson, "[Culture of Complicity Tied to Stricken Nuclear Plant](#)," April 27, 2011). It has done pieces on citizens' opposition (Onishi and Fackler, "[Japanese Officials Ignored or Concealed Dangers](#)" May 17, 2011; Ken Belson, "[Two voices are heard after years of futility](#)," August 19, 2011) and on grass-roots initiatives to gather data where bureaucrats failed (Hiroko Tabuchi, "[Citizens' Testing Finds 20 Hot Spots Around Tokyo](#)," Aug 1, 2011). Tabuchi even takes a swipe at the "tameness of Japanese mainstream media," which is commendable, though her statement is a model of "tameness" compared to Nicola Liscutin's denunciation of Japanese mass media as "little more than the mouthpiece of the government and TEPCO."^[38] Human interest stories abound in the Times, as in other major media, stories of workers sent in to quiet the reactors, of people living in the vicinity of the reactors. In one such piece, "[Life in limbo for Japanese near damaged nuclear plant](#)," May 2, 2011, Fackler and Matthew Wald refer to "a lack of hard data about the health effects of lower radiation doses delivered over extended periods" – a "lack" that's assured, as we've seen, by the stonewalling of evidence endemic in the media.^[F]

As laudable as some of the Times coverage has been, what it targets is the ineptitude and corruption of the Japanese, what happened *over there* as opposed to what goes on here, where our own dirty linen remains unwashed, as it were, and out of sight. How much easier to criticize the lax regulatory mechanisms and lack of transparency of the Japanese than to shine a light on ourselves, on the insidious but largely invisible working of the nuclear lobby and lobbyists in this country, on the complicity of our own government and media with the nuclear industry.^[G]

A fascinating expose by Norimitsu Onishi, "[Safety myth left Japan ripe for nuclear crisis](#)" (June 24, 2011), invites comment along these lines. Onishi investigates the "elaborate advertising campaigns" led by Tepco and the Ministry of Economy to convince the public of the safety of nuclear power. Hundreds of millions of dollars were spent to rally support: "Over several decades, Japan's nuclear establishment has devoted vast resources to persuade the Japanese public of the safety and necessity of nuclear power."^[H] Plant operators built lavish, fantasy-filled public relations buildings that

became tourist attractions.” In one of these, “Alice discovers the wonders of nuclear power. The Caterpillar reassures Alice about radiation and the Cheshire Cat helps her learn about the energy source.”

Lest we feel smug, recall the promotion of “the friendly atom” by Walt Disney’s book and film, *Our Friend the Atom*, read and viewed by millions of schoolchildren (when they weren’t doing “duck and cover” drills).

What Onishi describes as happening in Japan happened in the U.S. as well— perhaps Onishi means to evoke such resonances— where a powerful propaganda campaign was launched, with hundreds of millions of dollars behind it, to promote “Atoms for Peace,” the new energy source “too cheap to meter” (though there was nothing “cheap” about it: it required enormous government subsidies, and still does). This propaganda machine is described in the 1982 study *Nukespeak: The Selling of Nuclear Technology in America*: “Beginning in the mid-1950s, the AEC conducted a huge public relations operation to promote the vision of Atoms for Peace,” using “a wide range of PR techniques, including films, brochures, TV, radio, nuclear science fairs, public speakers, traveling exhibits, and classroom demonstrations” (traveling AEC exhibits with names like “Power Unlimited,” “Fallout in Perspective,” and “The Useful Atom”).[\[39\]](#)



“Millions of kits of atomic energy information literature were distributed to elementary, high school, and college students.” The public relations departments of reactor manufacturers such as Westinghouse and General Electric were also mobilized to prepare communities for nuclear facilities coming soon to their neighborhoods and to prime the general population to welcome the new technology. The connection with mainstream media could hardly be more direct, since “Westinghouse owned CBS for many years, and General Electric, NBC,” as Karl Grossman points out.[\[40\]](#) This same PR apparatus has been busy, in recent decades, conjuring the “nuclear renaissance” from the ashes of Chernobyl, selling nuclear power as “clean, green, and safe.”

The Times coverage of Fukushima has raised hopes in some quarters that this current disaster may have opened a space for public debate in mainstream media about nuclear power. But how real is this debate, when so many fundamental issues remain hidden? How open a discussion can this be, when Chernobyl and the German reactor study go unmentioned, when we have to turn to alternative media to learn that the Yablokov study even exists—or to learn that, as Alexander Cockburn reports,[\[41\]](#) Obama was the recipient of generous campaign contributions from the nuclear industry (which may cast some light on his enthusiastic support of nuclear power)? How open a discussion is this, when the ABCC/RERF radiation risk assessments that enable the industry to exist remain unaddressed? A serious consideration of the Yablokov study and the German reactor study would reveal them to be “skewed” and useless, as we’ve seen; but rather than go this route, the Times calls on RERF experts to do damage control for the industry. So RERF reassurances about radiation risk

remain unchallenged and in place as the invisible buttressing of the nuclear industry, as the basis of radiation safety standards throughout the world.

Contrast the response of U.S. media to the response of the German press: “[Fukushima marks the end of the nuclear era](#)” (Spiegel, March 14, 2011); “[Germany can no longer pretend nuclear power is safe it is over. Done. Finished.](#)” (March 14, 2011) To Spiegel, Fukushima is a warning that cries out for an end to nuclear power; to the Times, Fukushima is a warning that we should build our reactors more efficiently and regulate them more carefully, rather than cease building them at all (NYT Editorial, “[In the wake of Fukushima,](#)” July 23, 2011). In the months after Fukushima, “Spiegel’s most popular online feature as the drama unfolded was an evolving digital map of the ‘radiation plume,’” observes Ralph Martin;^[42] “the German electorate made nuclear power their top concern—they made Fukushima theirs,” whereas “the reaction of American media...[was to] regard the events as yet another story, without any larger social ramifications,” without much relevance to ourselves. And so nuclear power marches on: “[Alabama nuclear reactor, partly built, to be finished,](#)” Matthew Wald, August 18, 2011; “[Two utilities win approval for nuclear power plants,](#)” Matthew Wald, December 22, 2011 (neither of these is a particularly long or noticeable article, and neither is front page).

There has been precious little mention in U.S. mainstream media of the plume Spiegel was tracing, except to whisk it away as presenting “no health hazard” (Broad, [cited above](#)), though the worldwide fallout from Fukushima has occasioned much discussion on the Web. Gundersen cites evidence that the early releases, which were revealed to be more than double what we were initially informed, contained “hot particles” of cesium, strontium, uranium, plutonium, cobalt 60 that have turned up in automobile engine filters, and according to what’s been detected in air filters, a person in Tokyo was breathing about ten hot particles a day through the month of April.^[43] A person in Seattle was breathing about five, that same month.

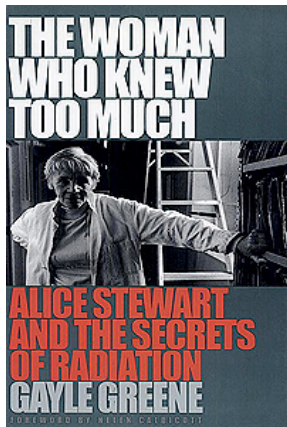
Not to worry: “The effects of radiation do not come to people that are happy and laughing. They come to people that are weak-spirited, that brood and fret.” So says Dr. Yamashita Shunichi,^[44] who has been assigned to head the official study of radiation health effects in the Fukushima population. Yamashita was sent by the Japanese government from Nagasaki University, where he was part of the RERF studies, revered for their long experience with the A-Bomb survivors. Mandated with addressing the concerns of the citizens and correcting their misconceptions, Yamashita rallies the population with stirring words: “The name Fukushima will be widely known throughout the world... This is great! Fukushima has beaten Hiroshima and Nagasaki. From now on, Fukushima will become the world number 1 name. A crisis is an opportunity. This is the biggest opportunity. Hey, Fukushima, you’ve become famous without any efforts.”

We’re in good hands.

Gayle Greene is [Professor of English at Scripps College](#). She is the [author of a number of works](#) including *The Woman Who Knew Too Much: Alice Stewart and the Secrets of Radiation* (University of Michigan Press, 1999), a biography of pioneering British radiation epidemiologist and anti-nuclear guru Alice Stewart, "[Alice Stewart and Richard Doll: Reputation and the Shaping of Scientific 'Truth'](#)," *Perspectives in Biology and Medicine*, autumn 2011, 504-31, and *Insomniac*, (University of California Press, 2008), a first-person account of living with insomnia and exploration of sleep science.



Alice Stewart (right) and the author



Her work has been published in scholarly journals such as *Signs*, *Contemporary Literature*, and *Renaissance Drama*, and in popular venues such as *Ms Magazine*, *The Nation*, *The Women's Review of Books*, and *In These Times*. gaylegreene@earthlink.net

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NOTE: most of the book title links in this list go to WorldCat.org. As described in its About page, "WorldCat is the world's largest network of library content and services. WorldCat libraries are dedicated to providing access to their resources on the Web, where most people start their search for information." These links were accessed from the greater Boston area. Punch in your own zip or postal code (e.g. 43017 or S7K-5X2), City and/or state (e.g. Cincinnati, Ohio or Ohio or OH), Province: (e.g. Ontario or ON, Country: (e.g. United States or United Kingdom), or Latitude Longitude (e.g. 40.266000,-83.219250) to see listings of libraries where you live.

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4. George Monbiot ["Prescription for Survival: A Debate on the Future of Nuclear Energy,"](#) Amy Goodman, March 30, 2011 and ["Correspondence with Helen Caldicott"](#)
5. "Ah, but the Americans...": Daniel Land, "A reporter at large," *New Yorker*, June 8, 1946, quotes Tzuzuki; in Robert J. Lifton and Greg Mitchell, [Hiroshima in America: A Half Century of Denial,](#) 1995, 53.
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Project...said that at that time [Sept 1945] in Hiroshima and Nagasaki all those fatally ill had already died and no one was suffering from atomic radiation." His exact words: "In Hiroshima and Nagasaki, at present, the beginning of September [1945], anyone liable to die has already died and no one is suffering from atomic radiation."

[From pp.143-4 of *No Immediate Danger*.

Dr. Fumio Shingetō, himself a Hiroshima A-bomb victim, discovered that hermetically sealed X-ray plates in the basement of this hospital had been exposed to radiation in the bombing. He was among the first to know that Hiroshima had experienced radiation warfare as well as fire-bombing. It was he who violated the research prohibition, painstakingly collecting evidence on the bomb health effects. In 195, at a meeting of the Japanese Haematological Society he presented his thesis that leukaemia was connected with exposure of the atomic bomb. When news of the physician's concern about leukaemia was reported in Japanese newspapers, he was severely criticised by the Atomic Bomb Casualty Commission. The US Army surgeons had, after all, issued a statement in late 1945 that all people expected to die from the radiation effects of the bomb had already died. No further cases of physiological effects due to residual radiation were acknowledged in the subsequent seven years.

Not to be intimidated by the official pronouncements, Dr Shingetō interested a young medical student, Yamawaki, in the problem. There were no statistics available on leukaemia, so they wrote letters to university hospitals all over Japan to ascertain the general incidence rate of this disease in the population. Yamawaki also examined the medical records of about 30,000 people who died in Hiroshima after the war. For each recorded leukaemia case he visited the physician who had diagnosed it and independently collected specimens and confirmed the diagnosis. As his work progressed, the Atomic Bomb Casualty Commission began to take notice of it and made their data available to him. He completed the work in two years, carefully documenting the statistical connection between the leukaemia and radiation exposure. Dr Yamawaki is now a paediatrician in Hiroshima, but he suffered greatly over the political, journalistic and scientific attacks on his work when it was first publicised. It was called 'merely statistical' and 'medically weak' even by the Japanese Haematological Society. Only later was it accepted and even used by the ABCC as if it were its own accomplishment.

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The atomic bombs dropped on Hiroshima and Nagasaki in August of 1945 unleashed a form of energy as mysterious as it was deadly. *Suffering Made Real* is the compelling story of the first attempts to understand how radiation affected the survivors of the atomic bomb and subsequent generations of Japanese. Arguing that Cold War politics and cultural values fundamentally shaped this scientific research, M. Susan Lindee examines the daily workings, expectations, purposes, and limitations of a project that raises disturbing questions about the ethical implications of using human subjects in scientific research.

In 1946, an American scientific agency, the Atomic Bomb Casualty Commission (ABCC), was established in

Japan to study the long-term biomedical effects of radiation on the survivors. Over the next twenty-nine years, American scientists and physicians, with funding from the Atomic Energy Commission, published hundreds of papers documenting the effects of radiation on aging, life span, fertility, and disease. In 1975, the agency was renamed and reorganized to permit greater Japanese input.

How did the emerging Cold War affect the work of the ABCC? What problems seemed most important to ABCC scientists in their interpretation and public presentation of their data? Why did the ABCC have a "no-treatment" policy toward the survivors, one that conflicted with the ABCC's actual practices? Through a detailed examination of ABCC policies, archival materials, the minutes of committee meetings, newspaper accounts, and interviews with ABCC scientists, Lindee demonstrates how political and cultural interests were reflected in the day-to-day operations of this controversial research program.

Set in a period of conflicting views on nuclear weapons and nuclear power, *Suffering Made Real* follows the course of a politically charged research program and reveals in detail how politics and cultural values can shape the conduct, results, and uses of science. As scientists, politicians, and health care professionals have become sensitized to the ethical problems of research on human subjects, this book speaks not only to the painful legacy of the atomic bomb, but also to contemporary concerns about the biomedical use of potentially dangerous substances on patients, children, prisoners, and other vulnerable citizens.

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ABSTRACT

Large-scale epidemiological studies of U.S. Department of Energy workers have been underway since the 1960s. Despite the increasing availability of information about long-term follow-up of badge-monitored nuclear workers, standard-setting bodies continue to rely on the Life Span Study (LSS) of A-bomb survivors as the primary epidemiological basis for making judgments about hazards of low-level radiation. Additionally, faith in the internal and external validity of studies of A-bomb survivors has influenced decisions about the design, analysis, and interpretation of many worker studies. A systematic comparison of the LSS and worker studies in terms of population characteristics, types of radiation exposures, selection factors, and dosimetry errors suggests that the priority given to dose response findings from the LSS is no longer warranted. Evidence from worker studies suggests that excess radiation-related cancer deaths occur at doses below the current occupational limits; low-dose effects have also been seen in studies of childhood cancers in relation to fetal irradiation. These findings should be considered in revising current radiation protection standards.

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Additional References

- A. Regarding the standard operation of a nuclear power plant, consider just the release of cesium-137 as described in [Chapter 25, "Main Text: A Closing Statement"](#) of [Radiation-Induced Cancer from Low-Dose Exposure: An Independent Analysis](#) by [John Gofman, M.D., PhD.,](#) *Committee for Nuclear Responsibility*, 1990:

Just One Part in a Thousand ?

It may sound like a trifle to put only one part per thousand of a poison into the environment, but we will show what one part per thousand means with respect to radioactive cesium.

The cesium-137 produced each year by a 1000-megawatt (electrical) nuclear power plant amounts to nearly 4 million curies. Since its radioactive half-life is 30.2 years, very little of it decays during a year.

The Chernobyl reactor contained a two-year cesium-inventory of about 8 million curies. Recent estimates are that the Chernobyl reactor released about 2.5 million curies of cesium-137, which is equivalent to (2.5 / 4.0) or 62.5 % of a ONE-year inventory.

Now let us consider 100 large nuclear power plants each operating in the USA for a lifespan of about 25 years each. Call "A" the yearly cesium-137 production by one plant. Then 100A = the yearly production by 100 plants. Lifetime production = 25 yrs x 100A/year = 2,500A. 99.9 % containment = release of 1 part per 1,000. With 99.9 % perfect containment, loss = 2.5A. Chernobyl lost 0.625A. The ratio of 2.5A and 0.625A is 4.0.

This ratio, 4, has an enormous meaning. It means that achieving 99.9 % PERFECT containment of the cesium-137 produced by 100 plants during 25 years of operation, through all steps of the cesium's handling up through final burial, would STILL result in cesium-137 contamination equivalent in curies to 4 Chernobyl accidents.

Worldwide, there are about 400 plants underway, so the same scenario (99.9 % perfection in containing cesium) would mean cesium-loss equivalent to 16 Chernobyl accidents per 25 years of operation. And this assault on human health could occur without blowing the roof off any single plant.

- B. See Section 2: [The Atomic Bomb Survivors—A Study and Its Alteration](#) from [Radiation-Induced Cancer](#), especially Chapter 5: [A Growing Problem: Retroactive Alteration of the Study](#)
- C. For explication of how the RERF as well as International Atomic Energy Agency (IAEA) and World Health Organization (WHO) study's data have been compromised, see Section 5, [Some Examples of Rule-Breaking in Radiation Research](#) from "[Bio-Medical 'Un-Knowledge' & Nuclear Pollution: A Common-Sense Proposal](#)," an address given by John Gofman, M.D., PhD., on the occasion of receiving the Right Livelihood Award, Stockholm, December 9, 1992. Gofman articulates [Nine Essential Rules of Inquiry in Medical Sciences](#) and goes on to demonstrate how RERF violated [Rule 7](#) (No Changes of Input after Any Results Are Known) in the Atomic Bomb Survivor Study, how Rules [2](#) (A Real Difference in Dose), [3](#) (A Sufficiently Big Difference in Dose), and [4](#) (Careful Reconstruction of Dose) were violated in the 1991 IAEA Study of Chernobyl, and how [Rule 9](#) (No Pre-judgments) was violated by the WHO in it's 1989 report.
- D. From "Chapter III. Consequences of the Chernobyl Catastrophe for the Environment." At the end of the Conclusion the observation is made:

Chernobyl is, on the one hand, a microevolutionary incubator, actively transforming the gene pool with unpredictable consequences, and on the other hand, a black hole into which there is accelerated genetic degeneration of large animals. We ignore these findings at our peril.

See Also: "[Asleep at the Wheel": The Special Menace of Inherited Afflictions from Ionizing Radiation](#)" Dr. John W. Gofman and Egan O'Connor, *Committee for Nuclear Responsibility*, Fall 1998

- E. Regarding the stonewalling, blackout, and censorship of the true health effects of man-made radioactive contamination of the biosphere, consider the underlying dynamic of this situation as articulated by Dr. John Gofman's [Arrival at the Key Question](#) in "[Biomedical 'Unknowledge' & Nuclear Pollution](#)":

Surely, it was not by accident that governments sponsoring nuclear energy programs also became the major (or virtually only) sponsors of research ostensibly dedicated to discovering the truth about health hazards from radiation exposure. In similar fashion, we surmise that the tobacco industry would *like* to capture control of all the research on health hazards from smoking.

The conflict of interest should be self-evident, whenever governments (or other entities) are put in charge of the research which could interfere with the very project which they are promoting. Yet in 1963, when the Lawrence Livermore Laboratory and its sponsor, the Atomic Energy Commission (USA), asked me to establish a new laboratory to study health effects of radiation, I was persuaded to do so – by pious statements from both, that no one would dare even to consider any attempt to "manage" the results of the studies.

By 1970, my colleague, Dr. Arthur Tamplin, and I concluded and publicly stated that the "permissible" extra radiation dose for the United States population, *if reached*, would cause approximately 32,000 extra cases of fatal cancer each year in the USA. Such a "permissible" dose would amount to premeditated random murder of 32,000 individuals. (And evidence from subsequent years indicates that our 1970 estimate was too low.)

At that time, the plan was to build about 800 nuclear plants in the USA by the year 2000, and they would, collectively, be allowed to deliver this "permissible" extra dose of radiation. Although Dr. Tamplin and I did not oppose nuclear power when we began our work, the health data caused us to advocate a 5-year moratorium in constructing any new plants, in order to allow time for public debate and some real thinking about the plan.

Our work was treated like a serious heresy.

The reflex reaction of both the Livermore Laboratory and the Atomic Energy Commission was to go into orbit immediately with non-scientific denunciations. The dedication of the Laboratory and the Commission to nuclear energy – at any cost – was exemplified when I was asked by a very high official there, "What makes you think that 32,000 deaths per year are too many?" Dr. Tamplin and I lost government funding for our research, and we left the lab.

The Question Which Demands an Answer

After returning full-time to my professorship at the University of California, I have been thinking about the implications for humanity of the conflict-of-interest problem. How can humanity have even the remotest chance of protecting its own health, when an agent of poisoning the population is also the sponsor of virtually all the health research concerning the pollutant?

- F. There is hard data on the health effects of lower radiation doses delivered over extended periods. Consider the following:

“[I]onizing radiation is not like a poison out of a bottle where you can dilute it and dilute it. The lowest dose of ionizing radiation is one nuclear track through one cell. You can't have a fraction of a dose of that sort. Either a track goes through the nucleus and affects it, or it doesn't. So I said ‘What evidence do we have concerning one, or two or three or four or six or 10 tracks?’ And I came up with [nine studies of cancer being produced where we're dealing with up to maybe eight or 10 tracks per cell](#) [in [Chapter 21, Radiation-Induced Cancer from Low-Dose Exposure](#)]. Four involved breast cancer. With those studies, as far as I'm concerned, it's not a question of ‘We don't know.’ The DOE has never refuted this evidence. They just ignore it, because it's inconvenient. We can now say, there cannot be a safe dose of radiation. There is no safe threshold. If this truth is known, then any permitted radiation is a permit to commit murder.”

“Gofman on the health effects of radiation: ‘There is no safe threshold’,”
[synapse](#), January 1994

See Also from Gofman: “[A Wake-Up Call for Everyone Who Dislikes Cancer and Inherited Afflictions](#),” Spring 1997, “[What Is Factually Wrong with This Belief: Harm from Low-Dose Radiation Is Just Hypothetical—Not Proven](#),” Fall 1995, and “[The Law of Concentrated Benefit over Diffuse Injury](#),” November 1993

- G. For a rare instance of highly informative reporting in the United States see the 2011 *Associated Press* four-part “[Aging Nukes” Investigative Series](#) by Jeff Donn
- H. For an incisive analysis on more of the factors that caused the Fukushima Catastrophe, see Arnie Gundersen's “[The Echo Chamber: Regulatory Capture and the Fukushima Daiichi Disaster](#)” (Part 3 of [Lessons from Fukushima](#), [Greenpeace International](#), 28 February 2012.

While most nuclear power industry commentators have focused on the sequence of technical failures that led to the ongoing release of radioactivity from the three nuclear reactors in the Fukushima-Daiichi nuclear power plant (NPP), a broader and longer-term analysis reveals that the key causes of the three meltdowns were the institutional failures of political influence and industry-led regulation and the nuclear sector’s dismissive attitude towards nuclear risks.

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