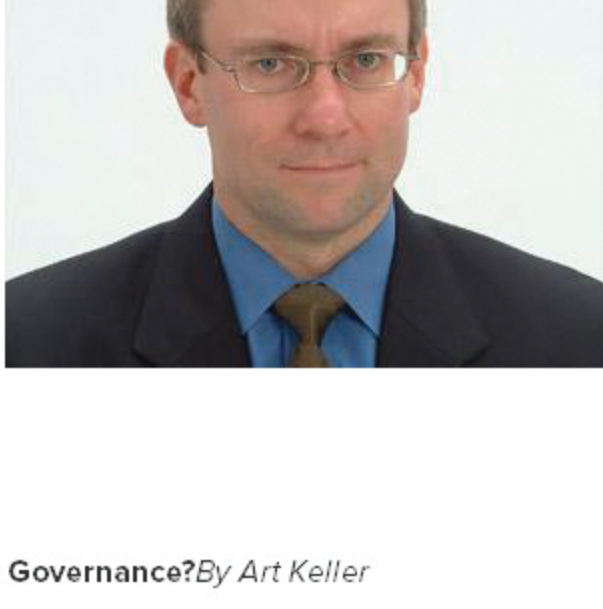


## Cleanup From Fukushima Daiichi: Technological Disaster Or Crisis In Governance?

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### Crisis In Fukushima



### Technological Disaster, Or Crisis In Governance?By Art Keller

More than 19,000 Japanese drowned, their bodies scattered on Japan's eastern shores when a tsunami struck Japan on March 11, 2011. Kevin Wang wanted to help, and his Anaheim, California-based company, [PowerPlus](#), had the cleaning know-how to handle almost anything. Wang has spent decades developing equipment to clean up almost every sort of nasty gunk in existence, from massive oil spills, to radiological contamination, to dead bodies in quantity.

Immediately after the tsunami, Wang visited the Japanese consul general in Los Angeles to offer his company's assistance in dealing the huge threat to public health posed by this mass casualty event. The response by Japan's consul-general made Wang's jaw drop. "Absolutely not," the consul replied, continuing on with rejection language so brusque, Wang had no doubt his offer was taken as an insult.

Far from being an isolated incident, the encounter that Wang had now seems to be a harbinger of the systemic denial that has crippled the Japanese government's response to the Fukushima Daiichi disaster. First-hand witnesses have described a deeply flawed reaction to the nuclear meltdown that has been marked by an underestimation of the extent of the contamination, insufficient radiological testing, and a glacially-slow response making clean-up harder as time passes. Most damning of all has been a stubborn unwillingness to use desperately needed clean-up assistance by ignoring technical competence in favor of political influence.

Undeterred by the consul's rebuff, Wang was galvanized to action in the days after the tsunami when the safety systems at Fukushima Daiichi nuclear power plant subsequently began to fail and massive amounts of radiation started spewing into the air and sea. Wang assembled a crew of indepent decontamination experts and shipped custom radiological decontamination gear to Japan. Wang and his team arrived in Japan to do decontamination demonstrations in June of 2011.

In an effort to begin the intense cleanup work, Wang and his crews demonstrated their cleanup capabilities to a variety of audiences during that trip and three more trips to Japan, the second in October 2011, the third in February 2012, and the last in January 2013. His team was observed by television crews, city, prefecture, and national government officials, bureacrats from Japan's Ministries of Defense and Environment, dozens of businesses, as well as representatives of the Tokyo Power Company (TEPCO), the owners of the ill-fated Fukushima plant.

Wang's crew had notable success decontaminating a car towed out of the highly radioactive "exclusion zone" surrounding the Fukushima plant, reducing the radiation contaminating the car by 99 percent. Given the difficulty in cleaning more porous materials, Wang's team also inevitably turned in some less-stellar results, which included suffering cold-weather equipment failure more than once. Overall, these trips clearly demonstrated that Wang and his crews could consistently clean biological materials in their natural condition, substantially reducing contamination on substances that many others considered uncleanable, including dirt, grass, and water, even reducing the radiation on living cherry trees up to 70%. Even on the days plagued by equipment failure, the team still managed to reduce the radiation levels in frozen earth by 20-40%.

Sam Engelhard, an industrial hygenist and certified radiation protection technologist with years of radiological decontamination work under his belt, was one of the independent consultants who accompanied Wang on all four trips to Japan. Wayne Schofield, a radiation health physicist with decades of on-the-job decontamination experience, including both Three Mile Island and Chernobyl, was present for only the February 2012 trip to Japan..

Shortly after arrival on their first trip to Japan, the group headed for Shirakawa, a city 45 miles west and a few miles south of the Daiichi nuclear plant. Industrial hygienist Engelhard was shocked as soon as he unpacked his radiation sensor gear and turned it on. Here they were almost 50 miles from the accident site and in the opposite direction of the prevailing winds, and the crew's radiation alarms immediately started going off.

"The radiation levels we were seeing were 1,000 times background, higher in spots," Engelhard said. "If we had been working on a site this contaminated in the US, we would have been fully suited up in radiation protection suits, gloves, and respirators. Yet people were walking around and going about their business, with no idea of how contaminated everything around them was."

One of the first demonstrations conducted by Wang's team was at a Japanese school still in routine use. The contamination was widespread and included troubling accumulations of radiation in biological materials. While the asphalt driveway was contaminated, the grass next to it was four times as radioactive as the asphalt. The worst were the patches of fungus on the bleachers at the school's baseball field, which had sucked-up radionuclides to such a degree that they were emitting radiation at 70-times the contaminated asphalt.

Engelhard described the chilling phenomena of the fungus-turned-radiation-sponge as, "a remarkable example of biological amplification."

Wang said it more bluntly, "A boy sitting on that patch to watch a baseball game could do real damage to his gonads."

More disturbingly, during the June 2011 trip, the American decon crew was stunned at how little the government disaster-response "experts" they encountered understood about radiation. After observing the radiation officials' attempts to use their radiation meters, industrial hygienist Engelhard said, "They didn't seem to understand what their radiation sensor equipment did, or how to work it."

After pointing out to three Japanese disaster-response officials from various governmental entities that a nearby concrete bench was "hot," Wang's team was amazed to see the officials perched on the bench.

***"I couldn't believe it," Wang said, "After being warned, they sat on the bench, three so-called 'experts', needlessly getting a dose of radiation. I had to take a picture."***

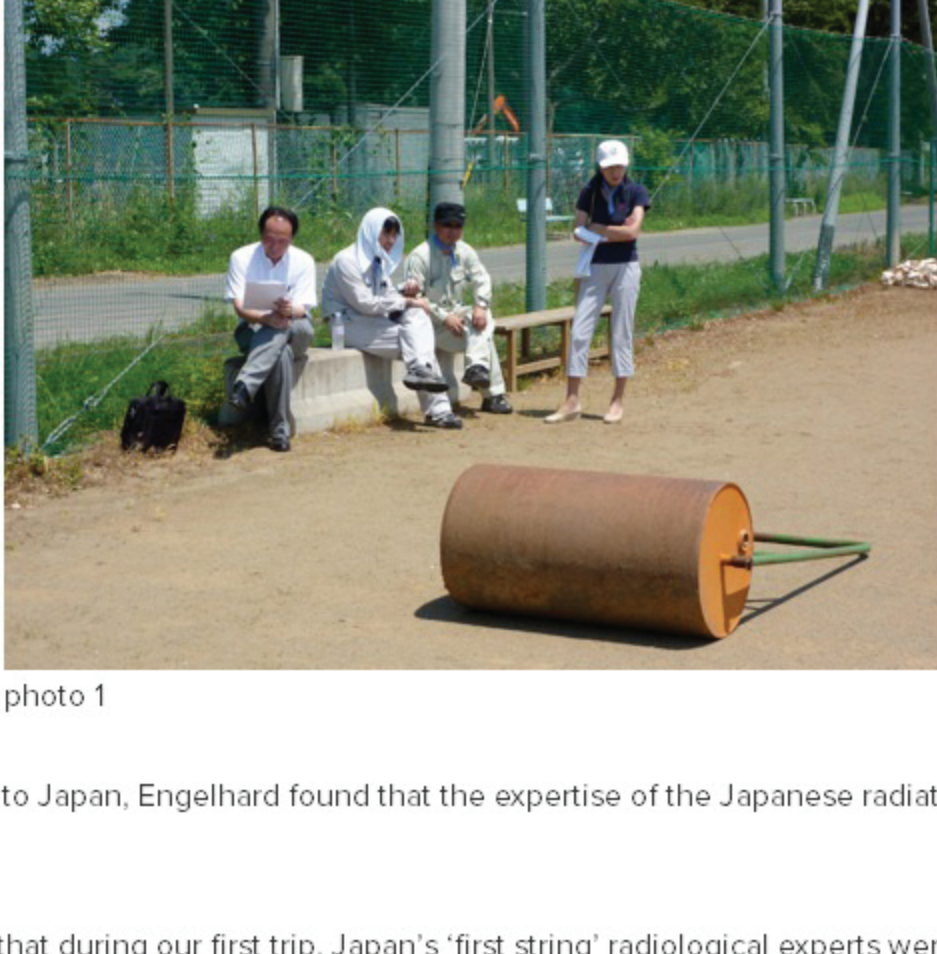


photo 1

On subsequent trips to Japan, Engelhard found that the expertise of the Japanese radiation techs he met was much higher.

"I can only presume that during our first trip, Japan's 'first string' radiological experts were actually in the hottest zones around the Fukushima plant itself, and we were seeing third-string officials," he said. "Still, it was pretty disconcerting to consider how little the first bunch seemed to understand."

In Fukushima City, more than 40 miles northwest of the nuclear plant, Engelhard made another disquieting discovery at a lighted sign where the real-time radiation dose rate was allegedly being posted for local residents. However, when Engelhard stood next to the sign and turned on his own detection gear, he found the actual radiation dosage was up to 50% higher than what the sign was reporting.

"I don't know if they had a sensor calibration problem or the number was being deliberately under-reported. But the information being fed to the citizens of Fukushima City by that sign was wrong," Engelhard said.

During the first trip, when Wang asked an official from Fukushima prefecture what testing methodology to use when recording post-decontamination sensor readings, he was rebuked.

"Don't be an idiot. Don't average your results, report only the lowest number you get," the prefecture official informed him. That technique is a shady practice that had Wang followed it, would have resulted in under-reporting real radiation levels.

The false readings in Fukushima City and the faulty reporting methodology incidents were not the only times Engelhard and Wang saw evidence that radiation readings were being under-reported.

During the January 2013 demo trip, Wang and Engelhard compared the readings the American crew was obtaining to those from the Japanese government techs' instruments. The Japanese instruments were consistently *under-reporting radiation levels* by 30-50%. Wang's US crew verified their instruments were reading accurately by testing them with an on-the-spot "check source," a source that produces a precisely-known amount of radiation in order to properly calibrate equipment.

The next day, the Japanese techs returned with instruments correctly calibrated, and explained that their problem the previous day was due to "a bad cable."

Engelhard was skeptical. "In my experience," he said, "when you get a bad cable, you either get a zero reading, an infinite reading, or a greatly inconsistent reading because you have to jiggle the cable. What you don't get are low readings off by fixed percentages. A 'bad cable' doesn't wash."

According to Engelhard, another problem was that cleanup efforts seemed to be entirely focused on looking for cesium 134 and 137.

"Cesium is definitely the most abundant of the contaminants, and as a 'gamma emitter,' cesium is also the easiest to find with standard detection gear. But cesium was not the only problematic isotope released, and so the easy-to-find gamma emitters are not the only contaminants to worry about", Engelhard emphasized.

Engelhard was not alone in expressing his concern. Team member and veteran radiation health physicist Wayne Schofield said, "In the most contaminated areas, I'd expect to find high levels of cesium, but also strontium-90, plutonium, cobalt, and other contaminants that can be dangerous. Strontium-90 has a thirty-year half-life and it is a 'beta-emitter.' Beta radiation is very difficult to find with hand-held instruments, and easily shielded from detection by a minimal amount of dirt or leaves. "

Generally speaking, both 'alpha' and 'beta' emitters are of little concern, if they remain outside the body, but they can become deadly when ingested.

Engelhard explained, "Your body recognizes strontium as calcium and puts it into your bones, right next to the bone marrow that is the heart of the human immune system. That's bad news."

Health physicist Wayne Schofield agreed that focusing solely on cesium to the exclusion of other contaminants is a mistake. "If you aren't doing comprehensive surveys when looking for hotspots, that's sloppy science."

Guidelines for allowable levels of radiological contamination in food released by Japan's Ministry of Health, Labor, and Welfare in March 2012 specifically mention strontium-90 as a "regulated radionuclide," but ambiguous language in the footnotes of the guidelines calls into question whether Japan is actually looking for strontium-90, plutonium, and other contaminants, or simply relying on estimated levels.

"Effective dose from radionuclides other than cesium are added to these estimates in reality, because these values are estimated only from radioactive cesium."[1]

Engelhard opined, "It sounds like they've come up with a 'fudge factor,' to estimate of how much of these other contaminants may be present. In a nuclear industrial setting, estimating beta radiation based on a known quantity of gamma radiation is a valid technique, because the chemistry of what is going on inside a reactor is very well known. However, once you have an accident, you don't know how the contaminants released are interacting in the environment. The only way you are going to find alpha or beta emitters in the environment is to test for them, but that kind of testing is much more material and labor intensive."

Virgene Mulligan, the Vice President of radiological lab services at ARS International, confirmed the difficulty and expense of finding strontium-90, explaining, "Specifically identifying strontium-90 in a sample takes 14-20 days, because a chemical reaction has to take place and the resin used in the test is expensive. That doesn't mean they shouldn't be testing for it at all."

Further complicating testing efforts is that water is an effective radiation shield for alpha, beta, and gamma emitters: water, or food with high water content, can be highly contaminated but nevertheless give off a false low-contamination reading unless measured with specialized and highly sensitive laboratory detection gear.

Bad as the Fukushima radiation release initially was, health physicist Wayne Schofield passed along estimates that, at first hearing, sound highly encouraging, "At a guess, radiation levels across all the contaminated areas in Japan have dropped considerably, probably by about 80%, since the Fukushima accident. Over time, rain and wind naturally reduce radiation levels by washing or blowing contamination away."

The single "hottest" spot the American team found in Japan, located almost a full year after the disaster, was a metal grating below a rain gutter downspout. It emitted a combined beta and gamma radiation rate five times the threshold rate used in US nuclear power plants to determine when to start limiting radiation worker exposure times.



photo 2

The "hot" grating rather pointedly illustrates that contaminants washed off a surface by rain are not gone, but rather linger in the biosphere. In Germany as recently as 2010, more than 1,000 wild boars were found to be [contaminated](#) [past government health limits](#) with radionuclides that came from the 1986 Chernobyl disaster, even though the closest point in Germany to the failed Chernobyl plant is 650 miles away.

Engelhard further explained "the 80 percent that has been washed or blown away is that portion of the contamination that was loose and would have been relatively easy to clean up, if someone had gotten to it in time. The 20 percent now left behind is not the same. Radiological contaminants start to bond to the material they have settled on over time. Some of the contaminants that could have once been cleaned away easily are now chemically or molecularly bonded, and bonded contaminants are harder to remove."

As with Wang's run-in with the Japanese consul in Los Angeles, Engelhard was baffled by the Japanese officials he talked to. "When we got to Japan the first time, they were really glum. They were more upbeat on later visits, but both the initial glumness and the later improved attitudes were strange."

"Initially the Fukushima meltdown was seen as a shameful blow to national pride, and the improved attitudes a year later seemed a general sense that things were better with the embarrassment of Fukushima mostly behind them", he added.

"Shameful situations are something you avoid and minimize, that's the exact wrong response to a radiological crisis like Fukushima. A crisis of this magnitude needs to be dealt with by an "all hands on deck" mentality, accepting help wherever you can find it, to minimize long-term health consequences," Engelhard emphasized.

Wang believes the Fukushima radiological contamination far more widespread than most Japanese understand. "One thing I heard so often during my trips to Japan that it became a mantra, was that 'Fukushima is a Japanese problem and we have to fix it ourselves.' So far, I haven't seen any evidence that the government is taking the right steps to fix things. Instead, the wounded pride of government officials, and a lack of understanding at the urgency of the problem, prevented Japan from taking the steps they needed to."

On all four trips, Wang's team was greeted with enthusiasm and relief by many in Japan's business community. Several Japanese companies offered to partner with the California firm to import the technology and equipment, and Wang never doubted his Japanese business partners tried their utmost to break through the governmental logjam.

Despite the enthusiasm from the audiences who saw the demonstrations, closing in on two years after the Fukushima disaster, no PowerPlus equipment has been sold, and no decontamination contracts have been forthcoming. Far from unique, this cold reception by the Japanese government was identical to experience of dozens of both Japanese and US firms with decontamination expertise to offer. Health physicist Wayne Schofield is not surprised at PowerPlus' lack of headway, noting that another company he consults for, a leader in the radiation remediation field in the US, has spent even more money on clean-up demonstrations than Wang's company, and had just as poor a reception. According to Schofield, the US radiation remediation industry grapevine has it that the bizarre freeze-out by the Japanese government has happened to nearly every company in the field. The reasons given by Japanese officials for not making use of foreign expertise approaches the bizarre, including a statement by Hidehiko Nishiyama, deputy director of the environment ministry, that foreign techniques won't work because *"the soil in Japan is different...and if we have foreigners roaming around Fukushima, they might scare the old grandmas and granddads."*

Japanese cleanup firms firms have fared little better than their foreign counterparts. Instead, cleanup contracts have gone to Japan's major construction firms, companies with political clout, but grossly lacking in decontamination capability. Disgusted at the shoddy cleanup work being done by the construction firms, Masafumi Shiga, president of a refurbishing company in Fukushima, told the New York Times simply, "What's happening on the ground is a disgrace."

Disasters, both man-made and natural, are as inevitable as the tides. History may well judge that it was not the Fukushima disaster, but the bungled response to it, that ultimately proves to be the most lasting source of shame to Japanese officialdom. Plagued by delayed action, haphazard radiological testing, and the freeze-out of nearly every company with substantive decontamination expertise to offer, both inside and outside of Japan, it now appears that somewhere along the way, Japan's government put national pride and a 'we don't want any help' attitude ahead of the lives of Japan's citizens.

[\[1\] Annual Health, Labour and Welfare Report 2011-2012](#)

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