



FALLOUT SUITS AND HUMAN RIGHTS: DISRUPTING
THE TECHNOCRATIC NARRATIVE

308 P NP

MEM47.3

by Linda M. Richards

Les enjeux de la filière uranifère au Québec

6211-08-012

In the aftermath of Hiroshima and Nagasaki, Dorothy Day wrote:

We have killed 3 hundred 18 thousand Japanese. That is, we hope we have killed them, the Associated Press, on page one, column one of the *Herald Tribune* says. The effect is hoped for, not known. It is to be hoped they are vaporized, our Japanese brothers, scattered, men, women and babies, to the four winds, over the seven seas. Perhaps we will breathe their dust into our nostrils, feel them in the fog of New York on our faces, feel them in the rain on the hills of Easton...We have created. We have created destruction. We have created a new element, called Pluto [nium]. Nature had nothing to do with it.¹

Day's words express the terror of the link between bodies breathing invisible radioactive contamination and the remains of the victims. Her words also disrupt the effort to naturalize artificial radiation exposure, such as is emitted by plutonium. Plutonium has a cancer-causing potential that eclipses the potency of natural sources. Despite qualitative differences and cumulative effects, artificial radiation doses from fission and fusion were compared by trusted scientists like Willard Libby to the levels of natural background radiation that come from uranium in the soil and cosmic radiation. This way of explaining exposure simplified the complexities of radiation for the public. However, it also minimized the public's perceptions of danger by consistently truncating risks as below concern. This paradigm was amplified by the media and politicians to calm fears during the massive nuclear weapons tests of the 1950s and early 1960s.²

This interpretation of radiation exposure as relatively harmless is historically problematic, but it was recovered as fact in March 2011.

During the Fukushima accident, photographs of people in fallout suits evoked the fears and helplessness of the earlier era of the fallout controversy.³ During the early years of the Cold War, Linus Pauling argued contamination was cumulative and that no level of background radiation could be considered “safe,” because while this type of radiation may be naturally occurring, it is responsible for cancers, early deaths, and birth defects. Pauling also argued that, beyond the science, to live free of threats of nuclear war and pollution was a human right guaranteed by the Constitution and international law.

The topic of radiation exposure is a disputed maze of scientific discrepancy and historical incongruity. Today, many people see nuclear power production as the only realistic choice between two evils: increasing climate change or accepting the risks of contamination. Nuclear power and weapons are for many the inescapable price of modernity, and safety is relative. For example, driving a car is statistically much more dangerous than living next to a nuclear power plant. Many believe radiation standards have historically been shown to be conservative and fully protective: health effects cannot be causally connected to radiation, but are miscalculated and exaggerated.⁴

In contrast, some academic discourse asserts that choices are not so limited and that nuclear technology poses irreconcilable threats to democracy. These threats include violation of equal protection under the law in the utilitarian sacrifice of the few to meet the energy needs of the majority and the lack of intergenerational consent to nuclear contamination.⁵ For many people, time has proven that no amount of radiation can be considered safe.⁶ The fallout alone from just one aspect of the total nuclear project, worldwide nuclear weapons testing, equals the equivalent of 29,600 Hiroshimas. These tests were exploded above ground, underground, in space, and underwater. Many wonder how the effects could have been inconsequential: cancer is an epidemic and birth defects have risen.⁷

According to Barton Hacker, the controversy over radiation safety has been misunderstood because the standards were in actuality socially constructed to the best of health physicists’ ability and never intended as a guarantee of safety.⁸ Gabrielle Hecht’s research suggests that radiation health safety as a science is more a reflection of the value of what is being irradiated than how dangerously radioactive a substance is.⁹ While research has yet to fully explain this incongruity, nuclear history is often told as distinct from the emotional and physical impact on human beings as a technocratic saga of nation-states

pursuing nuclear weapons superiority and energy independence. In addition, in many nuclear narratives, resistance against nuclear technology is often described as disconnected waves of self-interested campaigns by Luddite citizens against nuclear weapons, fallout, power plants, mining, and nuclear waste storage.¹⁰

This combative and often nation-state focused telling of nuclear issues freezes the roles of citizens and activists as a sideline to the main trajectory of national power in nuclear development and begs for new inquiry. A technocratic narrative is incomplete because it separates the glitz of modern reactors from the rocks and dirt of uranium mines, thus hiding much of what is harmful about nuclear technology. It is also missing the dimension of lived human experience particularly of indigenous peoples' physical and cultural interaction with nuclear technology. By consulting the correspondence of primary documents surrounding the rarely studied fallout suits and connecting that emotional history with a view to the intersections between legal history, radiation health safety science, and human rights, historians can build on existing interdisciplinary scholarship to gain a more comprehensive view of the legacy of nuclear technology.

The fallout suits from 1958 to 1964 raised questions about the lack of equivalence between the known scientific evidence of fallout danger and the government's pronouncements of safety, both in terms of nuclear war preparations and fallout. The cases were instigated as an act of intellectual, legal, and even material self-protection. While literal fallout suits that protect against radiation and "the fallout lawsuits" mean different things, they share a related or polysemic meaning. Actual physical fallout suits are a material protection that can serve to make visible to an onlooker, or in a photo, that there is suspicion of radiation in the environment. The history of photography and radiation are inextricably bound by the discovery of x-rays.¹¹ Invisible effects on the environment and humans can also be detected by photographic film degradation, and it is photographs that captured the response in Japan as the radiation from Fukushima spread.¹²

Like a photograph, the fallout suit cases provide a snapshot of the effort by Linus Pauling to protect against intergenerational nuclear contamination and threats of nuclear war as a human rights issue. In particular, the second fallout suit case, heard during the Cuban missile crisis and an intensive period of nuclear weapons tests in space, articulates some of the challenges raised by the conception of background radiation as safe. Also, this little-known history makes visible

the intense efforts of Pauling and his wife Ava Helen Pauling to build the canon of international law. This case and the events surrounding it also resonate with later resistance to uranium mining. A comparison can be made between the fallout controversy and the uranium controversy using more recent legal history. This preliminary interweaving of disparate threads is intended to suggest that nation-state-focused, technocratic nuclear history can one day be reframed as peace history, as one cohesive global human rights struggle against threats of nuclear war and contamination.

THE FALLOUT CONTROVERSY

There is much to be gleaned from the fallout suits and the desperate era of the fallout controversy that produced them. The fallout controversy began primarily as an insulated argument among scientists about the dangers of radioactive fallout from nuclear weapons testing. The precedence to dismiss layperson's concerns about nuclear contamination as ignorant, irrational, and emotional has its origins in the secret Manhattan Project and the following decades when all health physicists were trained by the Atomic Energy Commission (AEC).¹³ As author Toshihiro Higuchi describes, the debate about fallout dangers, however, came into focus for the public after the disastrous March 1, 1954, Bravo thermonuclear weapons test contaminated U.S. soldiers, Japanese fisherman, and Marshallese Islanders.¹⁴

What had once seemed a complex mathematical exercise by health physicists of estimating radiation's external dose to an "average man" became entwined with the biota. The impacts of internal doses to the body from exposures that occurred from fallout released by tests into the environment and then ingested by the body were even harder to characterize for safety.¹⁵ The ability to measure, control, and contain radiation dose and danger eluded scientists and physicians from the first discovery of x-rays.¹⁶ By 1946, the onus of proof of safety, however, did not fall on the shoulders of the AEC, nor, later, the International Atomic Energy Agency (IAEA). The IAEA was established in 1957 as part of Eisenhower's Atoms for Peace program to be the global proponent of nuclear technology. The burden of the proof of harm rested on the detractors, and radiation health history and standards remain contested.¹⁷

The fallout cases were an effort to resolve this tension, which can best be seen in the government response to the 1959 film *On the Beach*. The film illustrates the displacement of the human ability to sense danger and the growing public panic over nuclear weapons and radiation in the late 1950s.¹⁸ In the hit film, radioactive fallout is approaching the few remaining people in Australia who survived after a nuclear war. Life goes on in some odd juxtaposition of normalcy and crisis, as daily life is expected to continue as normal until the inevitable death arrives with the approaching cloud. By 1959, the fallout controversy reached the highest levels of consciousness not only in Hollywood, but in the government as well. Before the release of the film, the Eisenhower administration sent six pages of detailed talking points to foreign posts and Cabinet members to aid them in refuting the film's premises, pointing out scientific errors about fallout.¹⁹

Much of the text was directed to refute the position of Linus Pauling on fallout danger. This was not unusual. Pauling had been subject to libel, FBI surveillance, passport interference, and lack of support from Caltech, the institution Linus Pauling helped make famous. Fierce efforts were marshaled by the anticommunist factions, the AEC, industry scientists, the mainstream press, government officials, politicians, and military planners to discredit and harass Pauling in the media. Despite continual harassment, Pauling and Ava Helen acted as a team to organize and participate in rallies, meetings, conferences, marches, protests, interviews, letter writing campaigns, petitions, and lectures.

The Paulings labored at a kinetic pace for what became the first Atmospheric Test Ban Treaty, a treaty recognized as a defining moment for the legitimacy of international law. The Paulings linked nuclear weapons with politics to frame their struggle against nuclear weapons testing as a human rights issue. Pauling believed foremost in human evolution and that war making would ultimately become extinct when the structure of nation-state and human relationships realigned to effectively resolve conflicts. This thought pattern was intimately connected to his science and his intuition that structure could and did influence behavior. For him, it was only a matter of time and will until war would be replaced by the sanity and rule of international law. The Paulings also believed that it was essential to the development of these laws to elucidate and respect universal human rights.²⁰

In addition, Linus Pauling's ability to think holistically by linking biology, physics, medicine, and chemistry gave him a unique

perspective on radiation's effects as early as 1929. He had been a chemist at the center of the emergence of the field of quantum mechanics that made nuclear science possible. Pauling won the 1954 Nobel Prize for chemistry based on his understanding of chemical bonds. Radiation can break these very bonds. He had studied radiation and fallout studies from around the world since 1945 while working for international control of nuclear weapons. Throughout his life, Pauling questioned the nuclear safety assurances of the nuclear-military-industrial-academic complex. He became the central figure in raising the ethical and practical questions of the responsibility of the scientist to the public and to the state. The Paulings also laid the foundations for an emerging American environmental movement that focused on the interactions of human-made pollutants within the ecosphere.²¹

THE FALLOUT SUITS

But all their efforts in the late 1950s seemed to be for naught. Thermonuclear explosions thousands of times more potent than the Hiroshima bomb were being conducted, in addition to secret nuclear explosions in space. It was under tremendous public scrutiny and private emotional pressure that Pauling agreed to be the lead plaintiff in a suit to stop the tests, as a final legal alternative in national courts, with the hope of proceeding to the International Court of Justice. The Paulings were compelled emotionally and driven by the desperation of their supporters. They received thousands of letters from around the world. These intimate letters make tangible the impact of the fears of nuclear annihilation (be it slow, as in genetic effects over generations, or fast, as in a nuclear war) on the mental and emotional health of the letter-writers. One father attached a photograph of his baby to his letter asking for help, wondering whether Pauling knew how to protect his son from exposure to any more strontium-90.²² Perhaps, in response to these kinds of pleas, Pauling composed a letter to the editor for *The Sunday New York Times* later that summer. In that letter, he recommended the addition of calcium to the diet of humans and animal feed by the government to displace the potential for radioactive strontium-90 to be taken up by the body, an action he felt might reduce the expected deaths from strontium-90 exposure by half.²³

The idea to confront the government through the courts was persuasively suggested to Linus Pauling by Quaker David Walden as well

as several other individuals, such as Dr. Alan M. MacEwan, and in tandem with other cases occurring in the courts.²⁴ MacEwan had initiated his own suit with the state of Oregon Public Health Service. MacEwan wanted to see the raw fallout data collected by a filter on the top of Portland city hall. MacEwan wrote to Pauling that he believed Pauling had the scientific credibility to argue successfully in court about the hazards of the tests.²⁵

The strategy of the case was multifaceted and international. Knowing that the right of the government to provide for defense would preclude a ruling against nuclear weapons themselves, the group that organized the fallout suits opted to make a scientific case that explained the dangers of fallout while utilizing the legacy of human rights and rulings to justify their position.²⁶ Plaintiffs argued as global citizens that it was a previously established human right to not be contaminated nor threatened with ecocide by weapons and that such acts exceeded the authority of the U.S. government. Nuclear threats should be disallowed by the right to liberty as guaranteed in the U.S. Constitution, the Bill of Rights, The Universal Declaration of Human Rights, and the Nuremberg trials as well as the history of international and treaty law. Individual citizens were unable to seek redress in either the International Courts at The Hague or the UN, so the strategy of this suit was to sue the three countries that were testing simultaneously: Russia, the United States, and Great Britain. After suing each nation, the plaintiffs hoped to then be able to introduce the case to the International Court of Justice.²⁷ At the very minimum, the plaintiffs felt their strategy would require the AEC to disclose what was known about fallout. Organizers hoped the cases would also build the momentum of public will to end the tests and eliminate all nuclear weapons while making tangible the intellectual claims of human rights using the authority and drama of the courts.

Much of the case centered on personal responsibility and trust. Pauling accepted the role as lead plaintiff, and the scientific arguments were based on his interpretations of radiation effects. His affidavit contained the extrapolated numbers of individuals who would be afflicted by illnesses and morbidity from testing. To establish these numbers, Pauling used the government's own calculations that had been intended to statistically provide an impression of safety.²⁸ Raising the stakes of personal responsibility, the suits sued government officials by name. These included Neil McElroy, then secretary of defense, Atomic Energy Chairman Lewis L. Strauss, and AEC

Commissioners Willard F. Libby, Harold S. Vance, John S. Graham, and John F. Floberg for exceeding the authority of the Atomic Energy Act of 1954 by ordering tests that endangered the environment and human genome in the present and into the future.

These bodily threats presented a passionate and personal connection to the political conduct of the nuclear arms race. Citizens responded to their forced embodiment of fallout with an expression of a bodily rejection of nuclear weapons. For example, Clarence Pickett was quoted in a fund-raising appeal letter to support the prosecution of the fallout suits: "My whole being cries out against this planned destruction of the human race...To carry on such planned destruction can but prostitute the purpose of life itself. To surrender one's faith in the very purpose of man in the universe is too great a price to pay for what is false security."²⁹ David Walden clarified the goals of the suit: "This litigation maintains that human beings cannot afford to let man-induced radiation continue its cumulative course of environmental, genetic, somatic, and emotional poisoning."³⁰

FALLOUT AS PARTICLES OF POLITICS

Radiation safety and dose has a contested history of its own and serves as an example of the construction of science. Despite much scientific doubt during the fallout controversy, the AEC, the IAEA, the press, academics, nuclear industry, and government officials continued to promote nuclear technology as safe and painted those opposed to nuclear science as over-emotional Luddites and communists.³¹ Despite the known differences between fallout from weapons tests and background radiation (such as is emitted by natural radiation from uranium and cosmic rays), background radiation became a type of gauge for the extent of danger from these man-made radioisotopes and nuclides that did not exist before 1945.³² The safety provided by being "below background" was then reiterated by scientific, industry, and government authorities as a simple, reassuring, scientific fact.³³ Nuclear pollution from weapons testing and energy was effectively portrayed as of small concern and certainly worth the small sacrifice to protect the United States from communism.³⁴ Global protests, from the streets to diplomatic channels, were countered by the AEC and IAEA with authoritative claims and well-publicized press releases reminding readers that radiation occurred naturally. Global fallout

was far below any found in background radiation, and therefore, essentially harmless.³⁵

The fallout cases were an effort to raise questions about the scientific uncertainty in the government's pronouncements of safety. Plaintiffs felt the new technological development of nuclear weapons required the court to rule on both the science and the limits of governmental power. Wisely, Pauling's scientific arguments were based on the consensual facts of the time, between both AEC and non-AEC scientists. Pauling argued that any dose above the naturally occurring or "background" level could be dangerous, as birth defects, cancers, decreased life span, and other diseases were already caused by this natural, yet harmful, exposure. Scientists were troubled by a lack of understanding of how radiation interacted with biological systems on a genetic and cellular level. Scientists were also concerned about the initial calculation of an average background rate that hid a large variation among background levels in different geographic locations and elevations.³⁶ Pauling's estimates of the number of illnesses and morbidity were based on the AEC's own statistical estimates of fallout danger. Pauling's estimates were reviewed by AEC scientists and found to be a reasonable assessment of how radiation could cause cancer, birth defects, and shorten life currently and in the future from the testing.³⁷

The first suit of 1958 was filed with plaintiffs unaware of the large-scale space weapons tests occurring that year before a test moratorium went into effect. The tests were to study the use of nuclear weapons in space as well as the Van Allen radiation belts that protect the earth. The potential for eliminating fallout by testing nuclear weapons in space seemed probable at that time, because it was erroneously believed the radiation would be stored in space or deflected from the earth harmlessly.³⁸ By 1959, these secret Argus tests (two of the tests, Teak and Orange, had yields of 3.8 megatons [Mt], but the size was not declassified for many years) were made public by *The New York Times*. A testing moratorium began that lasted three years, from 1958 until 1961, and during the moratorium, much more information about the dangers and risks of fallout came into public discussion and view. The moratorium also made the first fallout suit moot. The judges ruled against the case as not justiciable, as not decidable by the court. However, they conceded that if the moratorium ended, the case could be revived.

On October 30, 1961, the Soviets broke the moratorium dramatically by detonating the largest weapon ever used, estimated at above

50 Mt. The former plaintiffs and Pauling were grief stricken.³⁹ With the announcement of new upcoming U.S. tests in both the atmosphere and space, Pauling and attorney Francis Heisler immediately began to reinstate the case. The second case recognized testing as more than a threat to bodily health. It was seen as a threat to mental and emotional health as well. The global specter of worldwide contamination or some permanent modification of space from impending space weapons tests intensified the role of the plaintiffs as world citizens.⁴⁰ The original case had begun with fifteen plaintiffs. The second case, *Pauling vs McNamara*, filed on June 21, 1961, began with 186 plaintiffs but soon had added more for a total of 256 plaintiffs from twenty-five countries with ten Nobel Prize winners. Plaintiffs included ordinary grandmothers to notable figures such as Reverend Martin Niemoller, Bertrand Russell, Joan Baez, Dagmar Wilson, and scientists Leslie Dunn, Dorothy Hodgkin, and Maurice H.F. Wilkins.⁴¹

The case integrated new concerns based on scientific findings that were not available in the 1958 case, such as bioaccumulation of radiation in the flora and fauna and new understandings of the dangers of carbon-14 from the explosions in the atmosphere. Also in the spring of 1962, it was announced that an upper space weapons test “Starfish Prime” was being planned by the United States. As the second case was being strategized, Heisler wrote to Pauling:

As to the shooting down of the inner Van Allen Belt, you were not sure whether that should be included. However, I would like to do it, because the controversy raging about it among scientists and particularly their insecurity and lack of knowledge as to the probable results indicate an almost reckless disregard of the “general welfare” and it may be worthwhile to include such charges. The third addition that ought to be considered is the psychological effect of the testing—the anxiety created by it among the people in general, and while psychologists, psychiatrists, and psychoanalysts with whom I have discussed this matter are unable to substantiate such effect they are all unanimous in the opinion that such anxiety is brought about by testing.

Pauling replied that he originally thought the possible disturbance of the Van Allen Belt “a rather weak argument.” However, after a speech that May, “a woman came up to me afterward and asked, apparently with much concern, about how to protect herself and her

children against the Van Allen Belt in case it were brought down by a nuclear explosion.” Pauling now felt Heisler was “accordingly right about psychological effect of testing.”

Overwhelmed by much of the new scientific findings, Pauling and the lawyers had trouble narrowing the focus of the new complaint. Their concerns ranged from worries that space debris from the tests might preclude the peaceful use of space, to the high count of strontium-90 in milk. Their letters discussed how AEC scientists had knowledge of the dangerously high radiation found in milk in the city of St. Louis. The level in the milk had exceeded the lifetime recommended dose for strontium-90 in just three months. Also, the men wanted to show the government’s own estimate of the amount of nuclear fission products that could be tolerated by the planet and the atmosphere had been dramatically exceeded by 1961.⁴²

During the trial preparations, ongoing massive thermonuclear weapons tests were taking place on earth and in space and by October of 1962 the Cuban missile crisis began to unfold. While the Cuban missile crisis gained intensity terrestrially, seven nuclear weapons were exploded in space in a tit-for-tat exchange between the Soviets and the United States with a total of 1.74 Mt of explosive force exploded in space in less than two weeks, from October 22 to November 4, 1962.⁴³ Ironically, the Cuban missile crisis was at its zenith the day *Pauling vs. McNamara* was heard in court. The evening before the hearing, President Kennedy announced on national TV the next morning’s naval blockade of Cuba. Heisler, the lawyer for the plaintiffs, recorded how he felt approaching Washington for the trial after the evening telecast:

I was looking towards the place where the capital building usually is, hoping I will find it still in tact...thus I knew there is still hope the missiles will not be dropped. However, next morning, when I appeared before Judge McLoughlin at 9:45 am and when everyone knew that the blockade goes into effect at 10 am, I was not surprised that the good Judge was pretty well shaken to be compelled to listen to our argument which was so pertinent at that historical moment.⁴⁴

On October 24, United Nations Day, an accidental explosion of a Soviet satellite led the U.S. military to assume a soviet nuclear attack might be underway, but this information was not known to the

public.⁴⁵ In the four years since the original case *Pauling vs. McElroy* was filed, there were eighteen weapons explosions in space alone by both the United States and the USSR which released 10.8 Mt of total force at heights between 20 kilometers and 540 kilometers in altitude. Many scientists, especially astronomers, were deeply disturbed that space was being permanently altered.⁴⁶ By the second fallout suit hearing, the often-repeated AEC motto that “there is no evidence that anyone has been harmed by fallout” had become suspect worldwide; however, the court ruled against the petitioners in a two-to-one ruling on December 23, 1962.⁴⁷

Despite the announcement of an upcoming Atmospheric Test Ban Treaty, plaintiffs continued to believe in the purpose of their case and filed an appeal. Plaintiffs appealed to bring attention to the loophole in the Treaty that allowed a continued arms race with, and contamination by, underground testing. Lawyer Ralph Atkinson explained that it was worthwhile to proceed with the suit to the Supreme Court because of the intergenerational pollution and the profound ecocidal risks of a continued arms race: “We feel it is essential that all possible legal steps be taken in the hope, however vain, that governments will bring radioactive pollution under the control of law.”⁴⁸

The same month as the appeal, a Federal Radiation Council (FRC) report reassured that fallout doses were below background levels but also bluntly explained that the carbon-14 from fallout was so long-lived that it needed to be accepted as a “permanent man-made modification of the environment.” In addition, strontium-90 (the dose of strontium-90 peaked with babies born in 1963, the very year of the report) and cesium-137 would affect people over their lifetimes.⁴⁹ The once-natural background level had been permanently altered by atmospheric testing.⁵⁰

The hope of the fallout suits to control radiation pollution and end the arms race was not to be, but before the case was exhausted by an unanswered writ by the courts, the Atmospheric Test Ban was signed on August 5, 1963, by the United States, the UK, and the USSR. Linus Pauling was awarded the Nobel Peace Prize for his key role in the treaty in Oslo on December 10, 1963. The second reason given by President Kennedy for the treaty was due to the health effects from tests. President Kennedy spoke emotionally in announcing the treaty in his broadcasted speech, connecting breath, consent, and contamination with nuclear arms:

This treaty can be a step towards freeing the world from the fears and dangers of radioactive fallout.... Continued unrestricted testing by the nuclear powers, joined in time by other nations which may be less adept in limiting pollution, will increasingly contaminate the air that all of us must breathe. Even then, the number of children and grandchildren with cancer in their bones, with leukemia in their blood, or with poison in their lungs might seem statistically small to some, in comparison with natural health hazards. But this is not a natural health hazard—and it is not a statistical issue. The loss of even one human life or the malformation of even one baby—who may be born long after we are gone—should be of concern to us all. Our children and grandchildren are not merely statistics toward which we can be indifferent. Nor does this affect the nuclear powers alone. These tests befoul the air of all men and all nations, the committed and the uncommitted alike, without their knowledge and without their consent. That is why the continuation of atmospheric testing causes so many countries to regard all nuclear powers as equally evil; and we can hope that its prevention will enable those countries to see the world more clearly, while enabling all the world to breathe more easily.⁵¹

However, for many the Test Ban arrived with a keen sense of disappointment and disenchantment. Edward Teller and the AEC had persuaded officials that underground tests might not be verifiable and therefore a ban on underground testing was unenforceable by treaty. This resulted in only a partial ban, and the hard-earned treaty was considered by many international activists as an environmental agreement and only a small first step toward eliminating all nuclear weapons. It was not the complete nuclear disarmament treaty they intended.⁵²

The final writ resulted in the case being denied a Supreme Court hearing. *Pauling et al vs. McNamara et al* was ruled against in a terminal two-to-one ruling that reiterated the earlier rulings against plaintiffs on May 18, 1964. Heisler wrote afterwards, “Who knows—maybe in ten years or in one hundred years some other lawyer will take up the case again and at that time the Courts may agree with the position now taken by us and will intervene as we ask them to.”⁵³ At the International World Conference against A & H Bombs in Japan that August, activists were furious that Americans were celebrating the agreement while underground testing would still continue.⁵⁴

Underground tests would allow nuclear weapons production and the arms race to continue for another thirty years.

THE SPECTER OF "GREY FOG"

Primary documents suggest the contamination of people's bodies was inseparably entangled with human rights in the effort to end the specter of nuclear war.⁵⁵ Like many of the letters written to the Paulings, embellished with drawings, poems, and expressions of deep anguish, oral histories and expressions made by the elders of the Navajo Nation are hauntingly similar in tone. These elders are frightened by the "grey fog" that only tribal medicine men can see enveloping their landscape and lives.⁵⁶ The protest signs held by children on the Navajo Nation today echo the phrases of earlier generations, "Peace. Stop Contamination!"

In 1942, Vanadium Corporation of America began secretly surveying for uranium on what was then the Navajo Reservation in the Four Corners Area of the southwest. The surveys led to a Manhattan Engineer District (MED) contract to mine the uranium needed to produce the first atomic bombs.⁵⁷ The location also evoked the atomic frontier in promotional materials by the uranium industry, but now this area exposes the externalizing by corporations and government of known health and environmental consequences to indigenous communities and society at large.⁵⁸ First Nations' role in the plutonium economy has altered the very understanding of risk and psychosocial effects of radiation-induced trauma.⁵⁹

Many academic and industry nuclear scientists and government officials assert that the safety record of the American nuclear industry can be compared positively to other energy industries since the 1979 Three Mile Island (TMI) accident.⁶⁰ Yet, there is much more to the story. The Navajo Nation, sovereign nation of the Diné (in their own language, Diné means "the people"), provided 25 percent of the U.S. supply of uranium from 1944 until 1986.⁶¹ It is casually stated that no one has been killed by commercial nuclear power plants. This dismisses the effects of the nuclear industry in small mining communities such as the Navajo Nation, where the loss of hundreds of uranium miners and millers from lung cancer and radiation-induced illnesses continues to be devastating. The contamination from the previous mining is now an inescapable part of Navajo life.

This history is often disregarded in current discussions of the nuclear renaissance, radiation safety, and by official government sources in their present information on the safety of nuclear power.⁶² For example, in a 2010 government publication, the Department Of Energy states “Since 1957, U.S. utilities have operated commercial nuclear power plants. During this time, no one has died or been injured as a result of operations at a commercial nuclear power plant.”⁶³ Today, a 93 million dollar, five-year clean-up is in the final year to repair the legacy of pollution from the uranium mining on the Navajo Nation. The radioactive pollution was cumulative and caused by abandoned and un-remediated uranium mines as well as routine operations like mine dewatering. The discharged uranium from mines and mills and radioactive mining debris tainted the landscape, groundwater, and waterways.⁶⁴

In addition, a little-known but severe accident released the most radioactivity in U.S. history, three times the amount of radioactivity released by the TMI accident. A United Nuclear Corporation earthen dam at Church Rock, New Mexico, holding back mine and mill waste collapsed on the anniversary of the first atomic weapons test, on July 16, 1979. The dam break resulted in contamination that flowed downstream for at least fifty miles, yet Navajo citizens’ health was neglected by the limited emergency response.⁶⁵ This history is compounded by the fact that the miners, not warned of any health effects, used uranium mining debris to build homes and structures, which now have contaminated living spaces for decades with long-lived radionuclides. The once traditionally sacred hogans, wind, water, and land now contain invisible contamination.⁶⁶

A significant contribution of the Paulings that is often ignored by historians is their belief that to live free from the fear of nuclear contamination and the specter of nuclear annihilation was a human right that had already been established and guaranteed by the constitutional right to life, liberty, and the pursuit of happiness. Legal cases about uranium mining concerning the Navajo Nation also reflect sovereignty and human rights which are embedded in a traditional culture that recognizes each part of the universe as integral to the health of the whole. This, on the whole, considers technological and man-made contamination unacceptable. The Diné word *Hozbo*, to walk in beauty, represents the striving for balance, beauty, and harmony between the five-fingered people and nature. It is believed by many Diné that *Hozbo* has been disrupted by the effects of uranium pollution on their homeland.⁶⁷

The effort to resist uranium mining and the ideas of health, democracy, and sovereignty can be seen in the legal case of *Morris vs. the NRC*. This mining license opposition was primarily based on an earth-centered, indigenous, and holistic worldview of health. However, the Nuclear Regulatory Commission (NRC, the successor agency to the AEC) was ruled correct by the courts on March 8, 2012, in granting licenses to mine uranium to Hydro Resources, Inc. *Morris vs. the NRC* has been appealed by the New Mexico Environmental Law Center as far as possible and now the only recourse, as with the fallout suits, is an international venue. A petition was filed against the NRC on behalf of the Navajo Nation on May 13, 2011, with the Inter-American Commission of Human Rights.⁶⁸

Historically, the clash between science as it has been practiced in the nuclear community and what is most commonly considered natural law is magnified in the experience of the Navajo Nation.⁶⁹ Natural law, or traditional ecological knowledge, can be summarized as an evolved knowledge of trial and error resulting in appropriate estimation of carrying capacity of the land, while integrating estimates of the future needs for at least the next seven generations.⁷⁰ In addition, the framework of international law in which Pauling so passionately believed has grown to encompass the twenty-year effort to obtain the 2007 United Nations Declaration on the Rights of Indigenous Peoples. The document codifies cultural beliefs and resistance to undesired resource extraction as a human right. UN Secretary General Ban Ki Moon called on civil society to enact these rights, which unfortunately were truncated by U.S. interference to imply individual rights as opposed to the conception of communal indigenous rights.⁷¹

As in the fallout controversy, opposition to uranium mining is linked to the rejection of bodily contamination, and the concerns draw attention to the sovereignty of bodies and culture. In 2005, the Navajo Nation instituted a ban on uranium mining that included the text:

The fundamental laws of the Diné...support preserving and protecting...the four sacred elements of life – air, light/fire, water and earth/pollen for these resources are the foundation of the people's spiritual ceremonies and the Diné life way. It is the right and freedom of the people to be respected, honored, and protected with a healthy physical and mental environment...certain substances...that are harmful to the people should not be disturbed and that the people now know that uranium is one such

substance...its extraction should be avoided as traditional practice and prohibited by Navajo law.⁷²

This codification of cultural and spiritual beliefs shows an integration of what have been called “mother earth rights” by indigenous scholars into the common legal system.⁷³

The *Morris vs. NRC* ruling reflects the continued investment in the expertise of regulatory agency scientists, despite the lack of scientific evidence to ascertain safety. The regulatory power of the NRC is not to be overruled by the courts, just as during the fallout suits the AEC science was unquestioned by judges, despite the overwhelming contrary scientific evidence provided by the plaintiffs. However, in *Morris vs. NRC*, the two-to-one opinion also indicated in the dissent a strong indictment of NRC science: “Because the majority’s decision in this case will unnecessarily and unjustifiably compromise the health and safety of the people who currently live within and immediately downwind from Section 17 [the mine site], I must respectfully dissent....The NRC’s erroneous decision and the majority’s endorsement of that decision will expose families [living near Section 17] to levels of radiation beyond those deemed safe by the NRC’s own regulations, jeopardizing their health and safety.”⁷⁴

CONCLUSION

During the first days of the Fukushima crisis, claims that radiation was not dangerous if under a certain threshold or background level, claims that had been effectively countered by Linus Pauling and many other scientists by the early 1960s, were reinvigorated as fact by government officials, the press, and industry. These statements demand close re-examination due to the lingering unanswered questions about the impact of nuclear testing and nuclear development on life today, questions that live outside the nation-state’s focused technocratic narrative. Some of those unanswered questions involve how knowledge circulates and can be excluded or included by the public, scientists, agencies, and the judiciary. Other questions involve conceptions of safety, as well as the lack of consent directly confronted by President Kennedy. Academic inquiry belongs in the locus of the assertion of a human right to not be threatened by ecocide or contamination, as opposed to a taken-for-granted acceptance that threats of nuclear war and contamination are unavoidable consequences of the price of civilization.⁷⁵

It is a useful moment to re-evaluate nuclear history, fifty years after the precipice of nuclear Armageddon became tangible during the Cuban missile crisis and in the midst of the festering Fukushima disaster that returns a nuclear gaze to Japan. Nuclear testing was promoted during the fallout controversy as a choice between the lesser of two evils—contamination in the current generation was the price to be paid to be victorious over communism. Government officials and politicians such as James Conant, an advisor to the AEC, promoted atmospheric testing as a patriotic act and the price to be paid for freedom by the younger generation.⁷⁶ Halting the tests was more dangerous to the political body than exposures of physical bodies to radiation.

Today the choice is framed similarly, and with equal passion—nuclear power or the specter of greenhouse gases destroying the planet. This framing is obsolete when examining the history that connects climate change to much broader issues, such as the amount of previous modification of the environment caused by testing and the effects of continued resource extraction from already fragile subsistence societies.⁷⁷

There are many essential questions raised by the nuclear project that can be asked by a much more detailed look at the fallout suits and *Morris vs. NRC*. It is significant that as Toshihiro Higuchi notes, the United States did not want to prove the safety of fallout in 1958, nor 1962, and current litigation also shows the lack of scientific validation of government claims. A more thorough study may someday explain a shift from Western conceptions of science to a recovery of indigenous traditional ecological knowledge and values. A strand of connections can begin to be traced between the early opposition of nuclear weapons testing and indigenous values of being in relationship with nature and respect for the earth. This history is complex and requires multidisciplinary and intercultural approaches. David Bradley's 1948 first-person account of testing in Bikini Atoll *No Place to Hide* begins by saying "people, for their own protection will have to match natural laws with civil laws. Science and sociology are as inseparable now as man and his shadow."⁷⁸

Pauling's legal efforts to make explicit the human right to self-protection and limits to government power have vanished in much of the academic literature and in current public debates over nuclear issues.⁷⁹ The history of the opposition to nuclear technology and pollution seems in current international and governmental discussions as invisible and undetectable as the spreading radiation from Fukushima itself. Also often absent is indigenous representation intellectually and

in person at forums, such as at the Nuclear Non-Proliferation Treaty Preparatory Review Committee meeting held in 2012, despite the disproportionate impacts of the nuclear fuel chain on these communities.⁸⁰ However, including radiation safety history and a human rights dimension into the nuclear narrative destabilizes the power of an inaccessible technocratic narrative while raising the questions that need to be asked of history.

History belongs in today's discourse about climate change and future energy choices. Environmental historians are asking questions to interrogate safety claims and enter the current public health discussions of the rising increase in cancers in adults and children and to address the lack of the right to consent.⁸¹ How nuclear history is told also matters. The purpose of this study has been to build on established scholarship in order to ask new questions about the historicism of radiation health safety, legal challenges, and the emotional issues of trust, doubt, justice, and human rights. It is time to expand perspectives for a more holistic understanding of history.

NOTES

1. Dorothy Day, "We Go on Record: The Catholic Worker Response to Hiroshima," *The Catholic Worker*, September 1945, 1.

2. Willard Libby, "Radioactive Fallout," *Proceedings of the National Academy of Sciences of the United States of America* 43, no.8 (August 15, 1957): 758–75; Robert A. Divine, *Blowing on the Wind: the Nuclear Test Ban Debate* (New York: Oxford University Press, 1978); Carolyn Kopp, "The Origins of the American Scientific Debate over Fallout Hazards," *Social Studies of Science* 9, no. 4 (November 1979): 403–22.

3. Lawrence Wittner, *Rebels Against War: The American Peace Movement 1933–1983* (Philadelphia: Temple University Press, 1984); Lawrence Wittner, *Confronting the Bomb: A Short History of the World Disarmament Movement* (Stanford: Stanford University Press, 2009); "Assessing the Future of Nuclear Power in the U.S.," hosted by Neal Conan, NPR, March 15, 2011. <http://www.npr.org/2011/03/15/134568574/assessing-the-future-of-nuclear-power-in-the-u-s>. (accessed November 19, 2012).

4. Steven E. Miller and Scott D. Sagan, eds. "On the Global Nuclear Future, vol. 1 and 2" Special issue. *Daedalus Journal of the American Academy of the Arts and Sciences* 138, no. 4 (Fall 2009): 1–167 and 139, no. 1 (Winter 2010): 1–140. Stewart Brand, *Whole Earth Discipline: An Ecopragmatist Manifesto* (New York: Viking Penguin, 2009); Bernard L. Cohen, *The Nuclear Energy Option* (New York: Plenum Press, 1990).

5. K.S. Shrader-Frechette, *Nuclear Power and Public Policy: The Social and Ethical Problems of Fission Technology* (Boston: D. Reidel Publishing Co, 1983);

Arjun Makhijani, *Carbon Free Nuclear Free: A Roadmap for US Energy Policy* (Takoma Park, MD: Institute for Energy and Environmental Research, 2010).

6. National Academy of Sciences BEIR VII Executive Summary, “Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII – Phase 2” (Washington, DC: National Academies Press, 2006), 10.

7. Thomas Mützelburg, lecture, “History of the Comprehensive Treaty Ban Treaty” CTBT Office, IAEA, Vienna, Austria May 8, 2012; Joseph Masco, *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (Princeton: Princeton University Press, 2006); Joseph Mangano, *Low Level Radiation and Immune System Damage: An Atomic Era Legacy* (Washington, DC: Lewis Publishers, 1999); Richard L. Miller, *Under the Cloud, The Decades of Nuclear Testing* (New York: The Free Press, 1986); Philip L. Fradkin, *Fallout: An American Nuclear Tragedy* (Tucson: The University of Arizona Press, 1989); John Gofman *Radiation and Human Health* (San Francisco: Sierra Club Press, 1981); Arjun Makhijani, Howard Hu and Katherine Yih, eds., *Nuclear Wastelands: A Global Guide to Nuclear Weapons Production and Its Health and Environmental Effects* (Boston: MIT Press, 1995).

8. Barton C. Hacker, “Radiation Safety, the AEC, and Nuclear Weapons Testing,” *The Public Historian* 14, no.1 (Winter 1992): 31–53, especially 48–49.

9. Gabrielle Hecht, “Negotiating Global Nuclearities: Apartheid, Decolonization, and the Cold War in the Making of the IAEA,” *Osiris* 21 (July 2006): 25–48; Hecht, “A Cosmogram for Nuclear Things,” *Isis* 98 (March 2007): 100–108.

10. Divine, *Blowing on the Wind*; Barton Hacker, *Elements of Controversy: The Atomic Energy Commission and Radiation Safety in Nuclear Weapons Testing, 1947–1974* (Berkeley: University of California Press, 1994); Fradkin, *Fallout*; J. Samuel Walker, *The Road to Yucca Mountain: The Development of Waste Policy in the United States* (Berkeley: University of California Press, 2009); Walker, *Permissible Dose: A History of Radiation Protection in the Twentieth Century* (Berkeley: University of California Press, 2000); Spencer Weart, *Nuclear Fear: A History of Images* (Cambridge, MA: Harvard University Press, 1988).

11. H.J.W. Dam, “The New Marvel in Photography: A Visit to Prof Roentgen at His Laboratory in Wurzburg...,” *McClure’s Magazine* 6, no. 5 (April, 1896): 403–15.

12. One example of this is “Chernobyl: A Chronicle of Difficult Weeks.” The Soviet film maker Vladimir Shevchenko died within a year of making the 1986 documentary due to his over exposure. See his obituary in *The New York Times*, May 30, 1987; “No Happy Ending: Nuclear Experts Say Japan’s Nuclear Crisis Intensifying,” *Democracy Now*, March 16, 2011. www.democracynow.org/topics/japan_disaster. (accessed November 9, 2012).

13. H.M. Parker, *Health Physics, Instrumentation, and Radiation Protection* (Oak Ridge, TN: Atomic Energy Commission, 1947); Isabel Fisenne, M. Norman Cohen, James W. Neton and Pamela Perry, “Fallout Plutonium in Human Tissues from New York City,” *Radiation Research* 83, no. 1 (July, 1980): 162–68; Robert A. Dudley, “Natural and Artificial Radiation Background of Man,” in *Low Level Irradiation* Publication 59, ed. Austin M. Brues (Washington DC: AAPS, 1959); Jacob Darwin Hamblin, *Poison in the Well: Radioactive Waste in the Oceans in the Dawn of the Nuclear Age* (New Brunswick: Rutgers University Press, 2008).

14. Hacker, "Elements of Controversy," 136–58; Ralph E. Lapp, *The Voyage of the Lucky Dragon* (New York: Harper, 1958). For a more recent analysis, see Toshihiro Higuchi, "Environmental Origin of Antinuclear Activism in Japan, 1954–1963: The Government, the Grassroots Movement, and the Politics of Risk," in *Peace & Change* 33, no. 3 (July 2008): 333–67.

15. Michael T. Ryan and John W. Poston Sr. eds., *A Half Century of Health Physics: A Historical Review* (Lippincott: Williams & Wilkins, 2005); Arjun Makhijani, *The Use of Reference Man in Radiation Protection Standards and Guidance with Recommendations for Change* (Takoma Park, MD: IEER, 2008), 11.

16. Otto Glasser, *The Science of Radiology* (Springfield, Illinois: Charles C. Thomas, 1933), 211; Rebecca Herzig, "In the Name of Science: Suffering, Sacrifice, and the Formation of American Roentgenology," *American Quarterly* 53, no. 4 (December 2001): 563–89; Daniel S. Goldberg, "Suffering and Death among Early American Roentgenologists: The Power of Remotely Anatomizing the Living Body in Fin de Siècle America," *Bulletin of the History of Medicine* 85, no. 1 (Spring 2011): 1–28; *Environmental Health Series, Radiological Health Standards for Performance for Film Badge Services*, (Washington, DC: U. S. Department of Health, Education and Welfare Public Health Service, 1966, Publication Number 999-RH); Ohio State University Health Physics Conference, June 13–15, 1955, American College of Physicians, Mutter Museum, Philadelphia; George T. Frampton, "Radiation Exposure: The Need for a National Policy," *Stanford Law Review*, 10, no.1 (December 1957): 7–52; "News of Science: Radiation Hazards Pose Problem of How Government Can Best be Organized to Protect the Public," *Science*, New Series 129, no. 3357 (May 1, 1959): 1210–12; Barton Hacker, *The Dragons' Tail: Radiation Safety in the Manhattan Project, 1942–1946* (Berkeley: University of California Press, 1987); "The Fallout Suits Press Release" April 4, 1958, courtesy Ava Helen and Linus Pauling Papers (AHLPP), Peace Section, Box 6.001 Folder 1.5, Special Collections and Archives Research Center, Oregon State University Libraries, Corvallis, Oregon; Max Power, *America's Nuclear Wastelands: Politics Accountability and Cleanup* (Pullman: Washington State University Press, 2008); IAEA Archives, "Symposium on Radiological Health & Safety in Nuclear Materials, Mining, Milling & Metallurgy, Prague," 26.8.-30.8.63, I/610-28 and I/610-28(1), Box 09291 and "Programme of IAEA Activities – Long-term Planning – Health & Safety," O/211-5, Box 04066; Ulli Sima, "City Council for the Environment Symposium: The Role of the International Atomic Energy Agency-Nuclear Power after Fukushima" (symposium, City Hall, Vienna, Austria, May 3, 2012).

17. Karl Z. Morgan and Ken M. Peterson, *The Angry Genie: One Man's Walk through the Nuclear Age* (Norman, Oklahoma: University of Oklahoma Press, 1999); Scott Kirsch, "Harold Knapp and the Geography of Normal Controversy: Radioiodine in the Historical Environment," *Osiris* 19 (2004): 167–81; Ioanna Semendeferi, "Legitimizing a Nuclear Critic: John Gofman, Radiation Safety, and Cancer Risks," *Historical Studies in the Natural Sciences* 38, no.2 (Spring 2008): 259–301; Gayle Greene, *The Woman Who Knew Too Much: Alice Stewart and the Secrets of Radiation* (Ann Arbor: University of Michigan Press, 1999); Jacob Darwin Hamblin, "A Dispassionate and Objective Effort: Negotiating the First Study on the Biological Effects of Atomic Radiation," *Journal of the History of Biology* 40 (2007): 147–77; Hamblin, "Exorcising Ghosts in the Age of Automation: United Nations

Experts and Atoms for Peace,” *Technology and Culture* 47, no.4 (October 2007): 734–56; Committee to Review the CDC-NCI Feasibility Study of the Health Consequences from Nuclear Weapons Tests, National Research Council, *Exposure of the American Population to Radioactive Fallout from Nuclear Weapons Tests: A Review of the CDC-NCI Draft Report on a Feasibility Study of the Health Consequences to the American Population from Nuclear Weapons Tests Conducted by the United States and Other Nations* (Washington, DC: National Academies Press, 2003).

18. The film, directed by Stanley Kramer, was based on Nevil Shute’s book *On the Beach* (New York: Vintage International, 1957); Ulrich Beck, *Ecological Enlightenment Essays on the Politics of the Risk Society* (New Jersey: Humanities Press, 1991), 63–67.

19. “On the Beach” in Cabinet Secretariat Records, 1953–1960, Radiation File, Box 1, Dwight D. Eisenhower Presidential Library, Abilene, KS; Lawrence Wittner, *Confronting*, 104.

20. J. Christopher Jolly, “Linus Pauling and the Scientific Debate over Fallout Hazards” *Endeavor* 26, no. 4 (2002): 148–53; Jolly, “Thresholds of Uncertainty: Radiation and Responsibility in the Fallout Controversy” (Ph.D. diss., Oregon State University, 2003); Thomas Hager, *Force of Nature: The Life of Linus Pauling* (New York: Simon and Schuster, 1995); Clifford Mead and Thomas Hager, eds., *Linus Pauling: Scientist and Peacemaker* (Corvallis: Oregon State University Press, 2001); Linus Pauling, *No More War!* (New York: Dodd, Mead and Company, 1958).

21. Ralph H. Lutts, “Chemical Fallout: Rachel Carson’s *Silent Spring*, Radioactive Fallout and the Environmental Movement,” *Environmental Review* 9, no.3 (1985): 211–25; Laura Bruno, “The Bequest of the Nuclear Battlefield: Science, Nature, and the Atom during the First Decade of the Cold War,” *Historical Studies in the Physical and Biological Sciences* 33, no. 2 (2003): 237–60; Rachel Carson, *Silent Spring: The Classic that Launched the Environmental Movement* (Boston: Houghton Mifflin Company, 2002), 6, 208–209; Michael Egan, *Barry Commoner and the Science of Survival: The Remaking of American Environmentalism* (Cambridge, MA: MIT Press, 2007) .

22. William Miller to Linus Pauling, May 12, 1959, AHLPP Correspondence M 1959–1961 Box 258, Folder 8.1; AHLPP Correspondence M 1959 Box 257, Folders 7.1-3, M 1959-1961 Box 258, Folders 8.1-2 and AHLPP Peace, Box 6.001, Folder 1.9-10 and Box 5.012, Folder 2.3.

23. Linus Pauling, “To Combat Strontium 90; Addition of Calcium Compounds to Diet is Advocated” Letters to the Times, *The New York Times* Sunday, September 13, 1959 AHLPP Box 6.001, Folder 1.10.

24. “Press Release: The Fallout Suits,” April 4, 1958 AHLPP Peace, Box 6.001, Folder 1.5; “Fallout Suits” fundraising brochure, u.d. AHLPP Peace Box 6.001, Folder 1.3 not indicated by file name; Earle Reynolds, *The Forbidden Voyage* (New York: David McKay Company, Inc, 1961).

25. MacEwan to Pauling, December 16, 1957; Pauling to MacEwan, January 13, 1958; MacEwan to Pauling, March 6, 1958; MacEwan to Mr. A.L. Wirin, March 6 1958 AHLPP Correspondence Box M 257, 1956–1958; Marylouise Allen to MacEwan, March 13 1958, AHLPP Peace, Box 6.002, Folder 2.1; E. Blithe Stason, Samuel D. Estep, and William J. Pierce, *Atoms and the Law* (Ann Arbor: The

University of Michigan Law School, 1959), 965; James Van Young, *Judges and Science: the Case Law on Atomic Energy* (New York: Arno Press, 1979), 183–84. The case concerned 1957 Oregon Revised Statutes (ORS) 453 and while MacEwan won the case, his win likely never materialized any data because the Oregon legislature dissolved the original statute that had required state analysis of fallout data.

26. Allen to MacEwan, March 13 1958, AHLPP Peace, Box 6.002, Folder 2.1, Box 6.001 Folders 1.1-14 Box 6.002, Folders 2.6-7; “An Exclusive: Nobel Prize Winner Pauling Answers Edward Teller’s Recent *Life Magazine* Article on the Compelling Need for Nuclear Tests,” *IF Stone’s Weekly*, February 12, 1958, AHLPP Peace, Box 6.001, Folder 1.3; Van Young, *Judges and Science*, 173–82.

27. “To all Petitioners from Francis Heisler, Re: *Pauling et al vs. McNamara et al*,” May 25, 1964, AHLPP Peace, Box 6.002, Folder 2.1; eventually the Pauling case contributed as background to the 1996 International Court of Justice ruling on the illegality of use or threat of nuclear weapons, Peter Weiss, in discussion with author, at the Non Proliferation Treaty Review Preparatory Conference Meeting, IAEA, Vienna, Austria, May 2, 2012.

28. “To all Petitioners from Francis Heisler”; “Fallout Suits 1957-1962” AHLPP Peace, Box 6.001.8, Folder 1.8 Affidavit of Linus C. Pauling, 1958 and Affidavit of Linus C. Pauling, 1962, AHLPP Peace, Box 6.002, Folder 2.4.

29. David C. Walden, fundraising appeal, July 14, 1958 AHLPP Peace, Box 6.001, Folder 1.9; “Sue U. S. to Stop A-Tests,” *The Science News-Letter* 73, no.15 (April 12, 1958): 228. Pickett was one of 18 plaintiffs from six countries in the fall-out suit filed April 4, 1958. Plaintiffs included Leslie C. Dunn, Norman Thomas, Bertrand Russell, Dr. Martin Niemoller, Dr. Brock Chisholm and Dr. Toyohiko Kagawa. Later the plaintiffs were joined by more plaintiffs protesting testing in the Pacific to become a consolidated case on June 18, 1958 including sixteen people from the Marshall Islands and Falefaru Uru from Samoa.

30. David Walden, fund-raising appeal.

31. Fradkin, *Fallout*; Hamblin, “Exorcising Ghosts”; Jolly, “Scientific Debate” and “Thresholds”; Hager, *Force of Nature*; AHLPP Peace and Science sections.

32. W.F. Libby, “Radiation Dosages from Natural Radioactivities and Cosmic Radiation” *Science* 122, no. 3158 (July 8, 1955): 57–58; AHLPP Peace Box 7.001, Folder 1.11.

33. AHLPP Peace, Boxes 7.001 -7.025; Dudley, “Radiation Background”; Gioacchino Failla “Ionization and Its Bearing on the Biological Effects of Radiation,” in *Biological Effects of Radiation Mechanism and Measurement of Radiation, Applications in Biology, Photochemical Reactions, Effects of Radiant Energy on Organisms and Organic Products, Volume 1*, ed. Benjamin M. Duggar (New York: McGraw Hill Book Company, 1936), 87–122.

34. Greene, *The Woman Who Knew Too Much*; Hacker, *Elements of Controversy*; Walker, *Permissible Dose*; Soraya Boudia, “Global Regulation: Controlling and Accepting Radioactivity Risks,” *History and Technology* 23, no.4 (2007): 389–406; Hamblin, “Objective Effort”; Jolly, “Scientific Debate”; Makhi-jani, *Nuclear Wastelands*.

35. Pauling to Willard Libby, March 30, 1955, Libby to Pauling, May 6, 1955, RG 326 Records of the AEC, Office of the Secretary, Formerly Top Secret General Correspondence, Box 163, Folder “Medicine, Health and Safety: Radiation

Vol.1,” National Archives and Records Administration II, College Park, MD; Chet Holifield, “Radiation and Man: Broad Studies, Congressional Hearings on Radioactive Fallout,” *Bulletin of the Atomic Scientists* 14, no.1 (1957): 52–54; Committee to Review the CDC-NCI Feasibility Study, *Exposure of the American Population to Radioactive Fallout*; John D. Harrison and Alan W. Phipps, “Comparing Man-made and Natural Sources of Radionuclide Exposure” (paper presented at British Nuclear Society Conference Health Effects of Low-level Radiation in Oxford, England, September 22–24, 2002); United States Atomic Energy Commission, *Atomic Energy in Use* (Washington, D.C.: GPO, 1965; “Radiation Exposure: Five Things You Need to Know,” ABC News/Health, March 14, 2011 <http://abcnews.go.com/Health/radiation-exposure-things/story?id=13131122>. (accessed November 10, 2012).

36. AHLPP Peace, Boxes 7.001-7.025; Dudley, “Radiation Background”; Faila, “Biological Effects,” 87–122.

37. AHLPP Peace, Box 6.001, Folders 1.1–14, Box 6.002, Folders 2.1-7.

38. Bruno, “The Bequest,” 246–48.

39. Viktor Adamsky and Yuri Smirnof, “Moscow’s Biggest Bomb: The Fifty Megaton Test of October 30,” *Cold War International History Bulletin*, 4 (Fall 1994): 3, 18.

40. Herman Hoerlin, “United States High Altitude Test Experiences: A Review Emphasizing the Impact on the Environment,” LA-605, technical report, 1976. www.osti.gov/energycitations/servlets/purl/7122163-NoMqp9/71221.pdf (accessed November 10, 2012); Robert Krulwich, “A Very Scary Light Show: Exploding H-Bombs In Space,” Krulwich Wonders: An NPR Sciencey Blog, July 1, 2010. www.npr.org/blogs/krulwich/2010/07/01/128170775/a-very-scary-light-show-exploding-h-bombs-in-space (accessed December 29, 2012)

41. “Brief for Appellents and Joint Appendix” *Linus C. Pauling et al. Appellents vs. Roberts S. McNamara, Appellees*, United States Court of Appeals, March 15, 1963, AHLPP Peace, Box 6.002 Folder 2.5; “Asks Injunction Against AEC: Lawyer Fighting A-Test Feels No Cause is Lost In Soviet Capital” *Toledo Ohio Blade*, June 24, 1962.

42. Heisler to Pauling, May 29, 1962, Pauling to Heisler May 31, 1962, AHLPP Peace, Box 6.002, Folder 2.1.

43. “DOE Nuclear Tests, 1979” Barton Hacker Papers unprocessed at SCARC, OSU; Nuclear Weapons Archive, Soviet Atmospheric Tests <http://nuclearweaponarchive.org/Russia/Sovatmttest.html> (accessed November 10, 2012); Robert E. Johnston, “High Altitude Nuclear Explosions,” 2009 <http://www.johnstonsarchive.net/nuclear/hane.html> (accessed November 12, 2012); “Known Nuclear Tests Worldwide 1945–1995,” in *Bulletin of Atomic Scientists* (May 1996): 61–63.

44. Heisler to Ralph Atkinson and Pauling, October 31, 1962, AHLPP Peace, Box 6.002, Folder 2.1.

45. Peter Kuran, *Nukes in Space: The Rainbow Bombs*, DVD, directed by Peter Kuran, Los Angeles, VCE, inc., 2000.

46. A.C. B. Lovell and M. Ryle, “West Ford Project, Interference to Astronomy from Belts of Orbiting Dipoles (Needles),” *Quarterly Journal of the Royal Astronomical Society*, 3 (June 1962): 100.

47. The case was formally dismissed on December 27, 1962 by the Court of Appeals for the District of Columbia, based on plaintiffs had no right to sue as glo-

bal citizens, nor had they demonstrated any immediate harm. Also, the case was political, beyond the scope of the courts but the court ruled the government had the authority to order the nuclear tests, and the case was *res judicata* – already adjudicated in 1958. See “Brief for the Appellants and Joint Appendix, United States Court of Appeals, District of Columbia *Pauling vs McNamara*” March 15, 1964, 49, 50, AHLPP Peace, Box 6.002 Folder 2.5.

48. Heisler and Atkinson to all plaintiffs, January 29, 1964; “The Commentary of Urban Whitaker: Atmospheric Testing: Self Defense or Murder?” Broadcast on KPFA-FM July 5, 6, 1963, AHLPP Peace Box 6.002, Folder 2.1.

49. Federal Radiation Council Report, “Estimates and Evaluation of Fallout in the United States from Nuclear Weapons Testing Conducted Through 1962” Report #4, section 2.1-2.2, National Security File, Charles E. Johnson, Box 31, Lyndon Bales Johnson Library, Austin, Texas.

50. Committee to Review the CDC-NCI Feasibility Study, *Exposure of the American Population to Radioactive Fallout*.

51. John F. Kennedy, “Radio and Television Address to the American People on the Nuclear Test Ban Treaty, July 26, 1963.” www.jfklibrary.org/Asset-Viewer/4NPk83kVY0mx8fiA6Ify6A.aspx (accessed December 29, 2012).

52. David Krieger, “Linus Pauling and the Spirit of Peace: A Tale of Two Petitions,” September 1998. www.wagingpeace.org/articles/1998/09/00_krieger_pauling.htm (accessed December 27, 2012).

53. “Brief for Appellants and Joint Appendix” Court Document, March 15, 1963 AHLPP Peace, Box 6.002 Folder 2.5; “Petition for Writ” Box 6.002 Folder 2.6; Quotation is from Heisler and Stewart “Letter to all Plaintiffs” May 25, 1964 Box 6.002 Folder 2.1.

54. Japan Council Against A & H Bombs Newsletters, AHLPP Peace Box 4.008 Folders 8.7-8; Carol Urner, (member of Women Strike for Peace, and Women’s International League for Peace and Freedom, who attended the meeting) in discussion with the author, November 12, 2010, Portland, Oregon; “Known Nuclear Tests Worldwide 1945–1995,” *Bulletin of Atomic Scientists* (May 1996): 61–63.

55. This is seen in the Peace and Correspondence sections of the AHLPP, also see Oregon Senator Richard Neuberger Papers, correspondence Ax 078, Special Collections & University Archives, University of Oregon Libraries, Eugene, Oregon; Urner, discussion with author, November 12, 2010.

56. Judy Fahys, “A Legacy of Uranium A Prayer for Healing,” *The Salt Lake Tribune*, January 3, 2011.

57. Richard G. Hewlett and Oscar E. Anderson, *The New World, A History of the Atomic Energy Commission Volume 1, 1939 to 1946* (Berkeley: University of California Press, 1962), 292.

58. Barbara Johnston, *Who Pays the Price? The Sociocultural Context of Environmental Crisis* (Washington, DC: Island Press, 1994).

59. Masco, *Borderlands*, 156–159; John Byrne and Steven M. Hoffman, “A ‘Necessary Sacrifice’: Industrialization and American Indian Lands,” in *Environmental Justice: Discourses in International Political Economy Energy and Environmental Policy Volume 8*, ed. John Byrne, et al (New Brunswick: Transaction Publishers, 2002), 97–118; Valerie L. Kuletz, *The Tainted Desert: Environmental Ruin in the*

American West (New York: Routledge, 1998); Carol A. Markstrom and Perry H. Charley, "Psychological Effects of the Technological Human Caused Environmental Disasters: Examination of the Navajo and Uranium," in *The Navajo Nation and Uranium Mining*, ed. Doug Brugge et al. (Albuquerque: University of New Mexico Press, 2006), 89–115.

60. Gwyneth Cravens and D.R. Anderson, *Power to Save the World: The Truth About Nuclear Energy* (London: Vintage, 2008) and their joint lecture "Why Going Green Means Going Nuclear" February 24, 2010, Oregon State University.

61. EPA website Region 9, "Addressing Uranium Contamination on the Navajo Nation," www.epa.gov/region9/superfund/navajo-nation/ (accessed December 27, 2012)

62. Nicole Gelinas, "Nuclear Power: The Investment Outlook" *Energy Policy and the Environment Report* 1 (June 2007). www.manhattan-institute.org/html/eper_01.htm (accessed December 27, 2012); Rick Hampson, "In Vermont, Nuke Power Faces Test" *USA Today*, April, 16, 2010; Peter Hessler, "Letters from Colorado: The Uranium Widows," in *The New Yorker* (September 13, 2010): 30–37; Miller and Sagan, "On the Global Nuclear Future."

63. US Department of Energy, "Answers to Questions: Nuclear Energy" Office of Nuclear Energy, Science and Technology, Washington DC 20585, n.d., publication DOE-NE-0068 14-15. local.ans.org/mi/Teacher_CD/Beneficial%20Uses/Electricity/DOE-NE-0068.pdf (December 26, 2012)

64. Peter Eichstaedt, *If You Poison Us, Uranium and Native Americans* (Santa Fe: Red Crane Books, 1994); see endnote 61.

65. Doug Brugge, Jamie L. deLemos, and Cat Bui, "The Sequoyah Corporation Fuels Release and the Church Rock Spill: Unpublicized Nuclear Releases in American Indian Communities," *American Journal of Public Health* 97, no.9 (2007): 1595–1600; Markstrom, "Psychological Effects"; Don Liefgreen, "Residents Near the Rio Puerco Warned not to use Contaminated Water," in *The Navajo Times* July 19, 1979, Window Rock Navajo Museum and Library, The Navajo Times Special Collections, Window Rock, New Mexico.

66. Doug Brugge, *Memories Come to Us in the Rain and the Wind: Oral Histories and Photographs of Navajo Uranium Miners & Their Families* (Jamaica Plain, Massachusetts: Red Sun Press, 2000) and Brugge, Timothy Benally, and Esther Yazzie-Lewis eds., *The Navajo People and Uranium Mining* (Albuquerque: University of New Mexico Press, 2006); Susan E. Dawson and Gary E. Madsen, "Psychosocial and Health Impacts of Uranium Mining and Milling on Navajo Lands," *Health Physics* 101, no. 5 (November 2011): 618–25; "Department of Energy Openness: Human Radiation Experiments, The Advisory Committee on Human Radiation Experiments (ACHRE) Report"; Eichstaedt, *Poison*; Judy Pasternak, *Yellow Dirt: An American Story of a Poisoned Land and People Betrayed* (New York: Free Press, 2010); Dorothy Nelkin, "Native Americans and Nuclear Power" *Science, Technology and Human Values* 6, no. 35 (Spring 1981): 2–13; Bruce E. Johansen, "The High Cost of Uranium in Navajoland," *Akwesasne Notes* New Series 2, no.2 (Spring 1997): 10–12; Tom Zoellner, *Uranium: War, Energy and the Rock that Shaped the World* (New York: Penguin Books, 2009), 171–173.

67. Eichstaedt, *Poison*, and Brugge, *Navajo People*.

68. The case *Morris vs. NRC* was initiated in 1996 and a summary judgment ruled against the petitioners, finding that the case is not ripe for a Supreme Court ruling as of March 8, 2012, see New Mexico Law Center, "Hydro Resources Inc Uranium Mining" http://nmenvirolaw.org/index.php/site/cases/hydro_resources_inc_uranium_mines/ (accessed November 15, 2012).

69. Nelkin, "Native Americans," 2-13.

70. Deanna Kingston, Oregon State University Anthropology Department, in discussion with the author May 19, 2010. Kingston died from breast cancer at the age of 47 on December 2, 2011. This article is a result of our conversations and is dedicated to her memory.

71. Australian Human Rights Commission, text and updates to the 2007 United Nations Declaration on the Rights of Indigenous People http://www.hreoc.gov.au/social_justice/declaration/index.html (accessed November 12, 2012); Charmaine White Face, Facilitator of Defenders of the Black Hills, in discussion with the author August 26, 2012, Rapid City, SD.

72. "Resolution of the Navajo Nation Council, 20th Navajo Nation Council Third Year, 2005 Diné Natural Resources Protection Act" www.sric.org/uranium/DNRPA.pdf (accessed November 12, 2012).

73. Recent legal and international initiatives on the rights of nature have been made by Bolivia, Paraguay, Ecuador, and a consortium of nonprofits. For an example, see Sara Shahriari, "Bolivia Enacts New Law for Mother Earth" *Indian Country*, October 26, 2012. <http://indiancountrytodaymedianetwork.com/gallery/photo/bolivia-enacts-new-law-for-mother-earth-141899> (accessed December 27, 2012).

74. New Mexico Environmental Law Center Press Release, "Dissenting Judge Says Court Decision Puts Health of Navajo People at Risk," March 9, 2010. www.jmarshallplan.com/DISSENTING-JUDGE-SAYS-COURT-DECISION-PUTS-HEALTH-OF-NAVAJO-PEOPLE-AT-RISK (December 25, 2012)

75. Jordan Goodman, ed., *Useful Bodies: Humans in the Service of Medical Science in the Twentieth Century* (Baltimore, John Hopkins University, 2003), 2-5.

76. James Conant, "An Open Letter to American's Grandchildren," *Parade*, July 5, 1959.

77. See endnotes 4, 5, 63.

78. David Bradley, *No Place to Hide 1946/1984* (Hanover, NH: University Press of New England, 1948, rpt. 1983).

79. Miller and Sagan, "On the Global Future"; Mangano, *Low Level Radiation*.

80. IAEA, Vienna, Austria, April 30 to May 11, 2012; Richard A. Falk, *Human Rights Horizons: The Pursuit of Justice in a Globalizing World* (New York: Routledge, 200-, 127-145).

81. Nancy Langston, *Toxic Bodies, Hormone Disruptors and the Legacy of DES* (New Haven: Yale University Press, 2010); Kuletz, *Tainted Desert*; Clark Miller, Daniel Sarewitz, and Andrew Light, "Science, Technology and Sustainability; Building a Research Agenda," Presentation at National Science Foundation Supported Workshop, September 8-9, 2008. www.nsf.gov/sbe/ses/sts/Science_Technology_and_Sustainability_Workshop_Rpt.pdf (accessed November 15, 2012).