# 4 Rights to know and the Fukushima, Chernobyl, and Three Mile Island accidents[1]

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## 4.1 Introduction

Virtually all democratic nations, international organizations, and labor and consumer groups affirm the public's right to know any information that could cause serious harm. This negative right is a protection against any person or group who might attempt to withhold, misrepresent, or manipulate information that is necessary for people to protect themselves. Yet, official government, industry, and UN International Atomic Energy Agency (IAEA) pronouncements – about the 2011 Fukushima (Japan), 1986 Chernobyl (Ukraine), and 1979 Three Mile Island (US) nuclear accidents – have misrepresented information about the severity and consequences of all these accidents. As a result, they have violated citizens' rights to know and therefore likely increased the death and injury rates associated with these accidents. This (chapter (1) outlines the basic scientific-medical facts about the three nuclear accidents; (2) illustrates official IAEA–government–industry misrepresentation of accident-caused health harms at each location; (3) argues that mainly because of IAEA, government, and industry misrepresentation of the accident harms, they violated citizens' rights to know; and (4) suggests some of the reasons that this misrepresentation has occurred.

## 4.2 The right to know

In 2006 in Iceland, Sunshine Press began WikiLeaks, the internet non-profit organization that publishes news leaks and secret or classified information. In 2010, WikiLeaks achieved its first great triumph when *The New York Times,*

[1] Parts of this chapter rely on K. Shrader-Frechette. 2012. Nuclear Catastrophe, Disaster-Related Environmental Injustice, and Fukushima. *Environmental Justice* 5 (3): 133–139 and Shrader-Frechette, K. 2011. *What Will Work: Fighting Climate Change with Renewable Energy, Not Nuclear Power.* New York: Oxford University Press: 130–160.

*The Guardian, Der Spiegel, Le Monde*, and *El País* published parts of secret military cables between the US State Department and diplomats that documented "collateral murder," deaths of innocent civilians because of US wars in Iraq and Afghanistan. It also released classified videos showing US Army helicopters that killed journalists in the streets of Baghdad. In 2011 WikiLeaks published damning secret files concerning treatment of detainees in the Guantanamo Bay prison. In 2012 it released millions of emails concerning the Texas company Stratfor, which, for contracted fees, provides "global intelligence." In 2013 WikiLeaks published infamous cables from then-US-Secretary-of-State and later Nobel Laureate, Henry Kissinger, which confirmed his unethical, illegal, and unconstitutional activities, especially in other nations (Roberts 2011).

In response to these WikiLeaks activities, a Norwegian politician claimed its founders had helped "redraw the map of information freedom," and he nominated them for the Nobel Peace Prize. Although the US government has attempted to prosecute WikiLeaks officials, a *New York Times* editorial affirmed that people have "a right to know what is being done in their name" (Roberts 2011).

Although ethicists and politicians may disagree about whether WikiLeaks' leaders were justified in their attempts to protect citizens "rights to know," these rights themselves are beyond dispute. They are a central part of democratic theory, medical ethics, economic theory, and consumer policy. Rights to know are essential if people and governments are to recognize the principle of autonomy, essential to personhood. They are also essential to personal or governmental assignment of praise and blame, freedom or punishment, because autonomy is the capacity of a rational individual to make an informed, uncoerced decision. Hence for ethicists, autonomy is the main basis for determining moral responsibility and accountability for one's actions and omissions.

Kant and many ethicists likewise affirm that what creates the core of human dignity is autonomy, the ability to make one's own decisions, the ability to impose an objective moral law on oneself. However, this ability is contingent on having full information and hence a right to know. Thus, according to basic ethical theory, autonomy is necessary for human dignity and rights to know are necessary for autonomy. It thus follows that, when these rights to know are violated, human autonomy is jeopardized, as in the infamous Nazi medical experiments. This horrifying and exploitative experimental treatment of Jews, Roma, leftists, and political prisoners violated both the subjects' physical integrity and their personal autonomy – because personal autonomy requires that people have rights to know what potentially harmful things are done or will be done to them by others – so that they can attempt to protect themselves and to give or withhold consent.

In international human rights law and in biomedical ethics, autonomy is typically understood as self-determination, and self-determination obviously requires rights to know the potential risks and harms that others might impose on oneself (e.g. Merlo et al. 2007). However, because no rights are absolute, completely unfettered by considerations such as claims to other rights (e.g. Richardson 2004), all rights are *prima facie*. That is, they put the burden of proof on the potential violator, but they can sometimes be overridden by more important duties or considerations. Thus the exercise of rights, including rights to know, always requires *ultima facie* justification. That is why a citizen might have *ultima facie* rights to know what chemicals some industry is releasing in his neighborhood, but a criminal might not have *ultima facie* rights to know the address of witnesses who have testified against him in court.

### 4.3 Rights to know about nuclear-accident threats

Because both international and national law, at least in democratic societies, recognize rights to know pollutant harms imposed on citizens, often for the profit of polluters (e.g. US Environmental Protection Agency [EPA] 2013), no ethics justification is required to affirm this *ultima facie* right. Indeed, virtually all democratic societies affirm the specific "right to know" of community members who might be threatened by releases of toxins (Ashford and Caldart 1996, 2008). Because these rights are often necessary to protect lives, health, and personal autonomy, it is difficult to imagine many circumstances in which rights to know environmental harms can be overridden – except perhaps in cases in which full disclosure might cause mass panic and thus even greater numbers of deaths.

Indeed, the IAEA, affiliated with the UN and charged with both promoting nuclear energy and protecting people from it, explicitly affirms the public's right to know about nuclear-related harm. In the face of radiological threats and reactor accidents, it explicitly affirms the public's right to know (IAEA 2002: 3; 2012: 16).

Given the clear defensibility of rights to know about environmental threats to life, given explicit, self-imposed IAEA mandates to recognize the rights to know of the public, and given IAEA duties to monitor and correct the nuclear-related behavior of both industry and nation-states, has the IAEA kept its word? Has it recognized and protected citizens' rights to know about threats posed by nuclear accidents? Consider the 2011 Fukushima (Japan), the 1986 Chernobyl (Ukraine), and the 1979 Three Mile Island (USA) nuclear accidents. The remainder of this (chapter (1) outlines each of these three catastrophes, (2) reveals the erroneous government, industry, and IAEA information about these accidents, (3) argues that this nuclear disinformation has violated

nuclear victims' rights to know, and (4) suggests some of the reasons that might explain these violations. Consider first the Japanese nuclear accident.

### 4.4 The 2011 Fukushima, Japan accident

Until March 11, 2011 atomic energy supplied about 30 percent of Japanese electricity. By May 2012, all Japanese commercial nuclear reactors were closed (Inaiima and Okada 2012). Despite massive citizen protests, some began to go back online (Associated Press 2012). By mid-2013, however, only two Japanese reactors were operating (Koike et al. 2013). What happened?

Beginning on March 11, 2011, multiple earthquakes and a tsunami hit Japan. They left nearly 16,000 dead; more than 3,000 missing; more than 6,000 injured; and still more to die from radiation-induced cancer from damaged Japanese nuclear reactors (Johnston 2012). After flooding cut cooling water to the Fukushima Daiichi reactors, radioactive fuel pools, nuclear plant fires, three reactor meltdowns, extremely intense radioactive releases, and at least four explosions occurred. They spewed radioactive contamination around the globe. Roofs and walls blew off several reactors. Gaping holes appeared in radioactive containment. Nuclear fuel melted through thick steel-and-concrete reactor bottoms. Plant radiation doses soared to 500 millisievert (mSv)/hour, roughly a million times higher than normal background radiation. Data from the United Nations International Agency for Research on Cancer (IARC) predict that after only two hours, these doses would cause all the cancers of those exposed. Massachusetts Institute of Technology (MIT) nuclear engineering PhD, Kenichi Ohmae says that "from the amount of fission material released and from the size of the hydrogen explosions," the core melts and containment catastrophes were "undeniable." Yet, the Japanese government denied the meltdowns for three months and denied radioactive-containment destruction for six months (Ohmae 2012).

The Fukushima utility, Tokyo Electric Power Company (TEPCO), was a partner in the cover-up (Taira and Hatoyama 2011; Funabashi and Kitazawa 2012; Normile 2012; Wang and Chen 2012). Nine months after the accident began, in late 2011, TEPCO announced the three melted reactors were in "cold shutdown." Yet months later, high radiation levels still prevent workers from entering the entire plant (Nishikawa 2012). Even outside the buildings, TEPCO says radiation levels could kill someone within 15 minutes (Saoshiro and Layne 2011). In 2013, more than a year after the cold-shutdown claim, radioactively contaminated water continues to leak into the Pacific. The cooling system for four radioactive fuel ponds at three reactors suddenly failed for 30 hours, threatening massive radiation releases. Months after the cold-shutdown claim, a leaking reactor gushed 8.5 tons of radioactive water

and was not stopped for another month. The science journal *Nature* says the severely damaged reactors and radioactive fuel pools will continue leaking radioactivity "for another few years at least . . . TEPCO must continue to [actively] inject water at the rate of around half-a-million liters a day." The eventual cleanup will take many decades, but given still-lethal radiation levels, no one knows when it can begin (Brumfiel 2011). Such a situation seems hardly a cold shutdown.

Late in 2013, more than two years after the catastrophe began, Japanese nuclear engineers say it remains a catch-22 because all alternative ways of removing damaged nuclear fuel rods could kill many people. "If you hoist them up in the air, huge amounts of radiation will come out . . . and people nearby will die" (Dutzki and Madsen 2012; Whitney 2012; BBC News Asia 2013). Yet, not removing them will also kill many people when the damaged facility collapses entirely. Former US nuclear-industry Vice-President Arnold Gunderson warns this collapse could "destroy the world environment and our civilization," creating "a disaster worse than the three [Fukushima] reactor meltdowns . . . People should get out of Japan and residents of the West Coast of America and Canada should shut all of their windows and stay inside" (Whitney 2012).

Did Japanese and nuclear authorities tell the truth about the Fukushima accident? Or did they violate rights to know of accident victims? On one hand, more than two years after the accident, several hundred thousand people are still displaced from their homes. Unremediated, radioactive soils contaminate areas of Tokyo, 200 miles away, including some playgrounds and schools. In the USA, such soils would be considered radioactive waste, dug up, and shipped to waste management sites (Gunderson 2012). Physicians for Social Responsibility, winners of the 1985 Nobel Peace Prize, says continuing Fukushima radiation releases could be several times greater than those from Chernobyl. Fukushima cesium releases, alone, already are more than those from 168 Hiroshima bombs. The pro-nuclear US Nuclear Regulatory Commission (NRC) likewise warns that Fukushima threats and "catastrophic explosions. . . . could persist indefinitely" – one reason the international scientific community and US government recommended a Fukushima 50-mile-radius, 2-million-people evacuation (Shrader-Frechette 2011a, 2012; von Hippel 2011; Foster 2013).

On the other hand, the Japanese government, financially responsible for cleanup, used a 12-mile-radius, 130,000-people evacuation, and claimed it was safe. The government also says stress, not radiation, is the accident's main consequence: "If you live in an area outside of the [12-mile radius] evacuation area, you do not need to worry about . . . receiving any radiation at all . . . If you worry too much about radiation, it causes mental and physical instability" (Japanese MEXT 2011). Obviously, however, people outside

the 12-mile evacuation area received much higher radiation doses than normal – which is why the international scientific community urged Japan to increase its evacuation area. Obviously, also, it is false to say no dangerous radiation would be received outside the evacuation zone, both because of contamination in areas such as Tokyo and because there is no safe dose of ionizing radiation (National Research Council/National Academy of Sciences 2006). Denying the claims of the international scientific community, the Japanese government likewise says Fukushima released only about one-tenth as much radiation as Chernobyl. Yet Fukushima had three times more meltdowns, four times more explosions, and much more radioactive fuel than Chernobyl (von Hippel 2011).

The World Health Organization says the Fukushima area, and especially children, will experience up to a 70 percent increase in some solid cancers, breast cancers, and thyroid cancers – all known to be radiosensitive cancers (Albert 2013). Yet, the main international nuclear-industry lobby group, the World Nuclear Association (WNA), continued the misrepresentation of the Japanese accident, and IAEA said nothing. WNA wrote that people living near the damaged Fukushima atomic energy plant "received such low doses of radiation that no discernible health effect" is expected. Instead, the nuclear industry said that "widespread exaggerated fears of the risks posed by contamination . . . the stresses of . . . the Fukushima nuclear accident, have emerged as the biggest factors in ill health for Japanese people" (World Nuclear News 2012).

### 4.5 The 1986 Chernobyl (Ukraine) accident

Similar official denials of harm took place after the 1986 Chernobyl accident. On April 26, 1986 an explosion and fire occurred at the Chernobyl nuclear plant in Ukraine, which was then part of the Union of Soviet Socialist Republics or Soviet Union. The accident released massive amounts of ionizing radiation into the atmosphere, especially over Belarus, Ukraine, and Russia, and these radionuclides quickly spread over much of Europe and later around the globe. More than 500,000 workers – most without dosimeters and protective equipment – worked to contain the radioactivity and prevent a more massive catastrophe (Shrader-Frechette 2011a).

However, the official Soviet Union casualty count for the Chernobyl accident was thirty-one deaths, and the IAEA claimed that the accident caused at most fifty to fifty-six fatalities (IAEA 1991; WNA 2008). Contrary to this IAEA Chernobyl claim, a UN public-health investigation called the Chernobyl accident "the greatest technological catastrophe in human history" (Savchenko 1995: 11). Because of the long half-lives of many of the radionuclides, the investigators warned that the radioactivity released by Chernobyl would never disappear completely from the biosphere

(Savchenko 1995: 5). They said that during 1986–90, 30 km from the reactor, only 4 years after the accident, there was a 50 percent increase in the average frequency of thyroid disorders, malignancies, and neoplasms. Leukemia increased by 50 percent, and there were major increases in the rates of miscarriages, still births and children born with genetic malformations (Savchenko 1995: 65). Less than six years after the accident, already there was a hundredfold increase in thyroid cancers in Belarus, Russia, and Ukraine (Henshaw 1996: 1052; Rytömaa 1996). Scientists documented a doubling of germline mutations in children born only eight years after, and 400 km away from, the Chernobyl accident (Dubrova et al. 1996, 2006). Twenty years after the accident, the journal *Nature* documented a doubling in breast cancer in the most heavily Chernobyl-exposed areas of Belarus and Ukraine, and an excess of several thousand Chernobyl-induced cancers in the three nations most affected by Chernobyl; yet because of the long cancer latency, full Chernobyl cancers will not appear for at least another twenty years (Williams and Baverstock 2006; Shrader-Frechette 2011a).

Even more disturbing, Chernobyl caused massive genomic instability. This is the phenomenon in which ionizing radiation not only increases mutation rates in the exposed somatic cells, but also causes elevated mutation rates many cell divisions – and generations – after the initial radiation damage (Barber et al. 2006; Hatch et al. 2007). These delayed transgenerational effects of ionizing radiation also cause increased cancers and many other damaging health effects in later generations – in people not even exposed to the offending radiation (Dubrova 2003; Dubrova et al. 2008; Shrader-Frechette 2011a).

Given the preceding Chernobyl health effects, it is troubling that the IAEA could claim no more than fifty Chernobyl fatalities. It knows that the radionuclides deposited by the Chernobyl accident have half-lives from tens, to hundreds of thousands, to millions of years. These airborne, soil-borne, food-borne, water-borne, and ingested radionuclides will cause serious long-term effects and will continue to re-expose citizens for centuries, especially given that millions of people are still living in contaminated areas, especially in Belarus (Hohenemser et al. 1986). This ongoing contamination will add to very long-term human and environmental radiation doses (Cardis et al. 2003; WHO 2006a, 2006b). These health effects will be substantial, despite the fact that many nations still impose Chernobyl-caused quarantines on local crops and farm animals, often because of cesium-137 contamination. For instance, sheep in the UK are quarantined; likewise reindeer in Finland, Norway, Russia, and Sweden (Wright et al. 2003; IAEA et al. 2006: 25; Beresford et al. 2008). Berries, mushrooms, and fish in many European countries are likely to be quarantined at least until 2050 (Nisbet and Woodman 2000; Kritidis and Florou 2001; Anspaugh 2007). At the current time, biologists continue to show reduced numbers of animals near Chernobyl, as a function of radiation

dose, a fact indicating that the accident's effects on animals has been massive (Moller and Mousseau 2009; Shrader-Frechette 2011a).

Given the preceding food chain, genomic instability, and other health effects, some scientists say total Chernobyl-induced fatal cancers may rise to about 475,000 (Zakharov 1988; Gofman 1995: 1–2). If one ignores cancers caused by ongoing mutations in future generations, a reduced Chernobyl-fatality count might be like that published in *Nature*: 125,000 deaths (Campbell 1996). Just from cesium-137, a single radioactive isotope of the hundreds of types of radioisotopes released at Chernobyl, the nuclear-industry research group (the Electric Power Research Institute) and the US Lawrence Livermore Laboratories calculate between 17,400 and 51,000 additional, fatal, Chernobyl-induced cancers, just in this generation (Anspaugh et al. 1988; Smith 2007). Obviously, therefore, the IAEA claim of fifty Chernobyl fatalities is false (Shrader-Frechette 2011a).

### 4.6 The 1979 Three Mile Island, Pennsylvania accident

Similar information problems beset the March 28, 1979 US nuclear accident in Dauphin County, Pennsylvania, the worst accident in US commercial nuclear power plant history. The partial meltdown at the Three Mile Island (TMI) plant resulted in both intentional and unintentional releases of radioactive gases such as xenon and krypton, as well as radioactive iodine into the environment.

Although the US government and nuclear industry claim "no member of the public died" because of Three Mile Island, virtually all university medical scientists who have studied the case disagree (Herbst and Hopley 2007: 138; WNA 2008). They say it has killed and will kill thousands of people prematurely. Four years after the accident, epidemiologists agree that a 64 percent cancer-incidence increase occurred within 10 miles of the plant (Hatch et al. 1990; Talbott et al. 2003). Nevertheless, epidemiologists disagree about what caused this increase. Holding the majority position, nuclear-industry-funded scientists say stress has caused the deaths. Holding the minority position, independent university and medical scientists say radiation caused most of them.

Because the industry radiation monitors went off-scale because of high doses, and because the utility claimed that many other monitors were somehow "lost," stress-hypothesis proponents typically accept the industry and government assumptions that the Pennsylvania nuclear-accident radiation doses were no more than 100 mrem. This is about one-third of annual background radiation. Consequently, they deny that this level of radiation had any impact on overall mortality (Hatch et al. 1990; Hatch et al. 1991; Talbott et al. 2003). Instead, as occurred at Fukushima and Chernobyl, industry scientists

say accident-related stress likely caused nearby cancer and mortality increases (Hatch et al. 1990; Hatch et al. 1991; Susser 1997; Walker 2004: 235; Levin 2009). Scientists supported by nuclear-industry monies from the Three Mile Island Health Fund – mainly at Columbia University and University of Pittsburgh – support the stress position, perhaps because industry spokespeople must approve their study assumptions and protocols (Hatch et al. 1990, 1991; Susser 1997; Talbott et al. 2000, 2003).

Radiation-hypothesis proponents, independent university and medical scientists, who are not funded by the nuclear industry, typically reject industry–government assumptions of low Three Mile Island doses. Consequently they hold the minority position when they say radiation, not stress, likely caused the agreed-upon, increased fatalities (Wing 1995, 2003; Wing et al. 1997; Shrader-Frechette 2011a). These scientists are mostly physicians or epidemiologists working for governmental or nongovernmental agencies or for institutions such as the University of North Carolina (Wing et al. 1997; Wing 2003; Shrader-Frechette 2011a).

For at least four reasons, the radiation-hypothesis proponents appear to be correct about the cause of the devastating TMI-area health harms. That is, at least four reasons suggest that TMI radiation has caused the massive cancer, infant-mortality, and child-retardation increases after the 1979 accident.

1. Most of the post-TMI cancers were radiosensitive cancers, those known to be caused by ionizing radiation. If stress had caused most of these cancers, there would be no reason for most of them to be radiosensitive.
2. Disproportionate numbers of the TMI cancers were respiratory, caused by inhalation of hazards. Yet the TMI releases were radioactive noble gases – precisely material that can be inhaled. If stress had caused most of these TMI cancers, there would be no reason for them to be disproportionately respiratory.
3. TMI cancer increases persisted and were documented hundreds of miles downwind, all the way into the state of Maine, something that easily could have been caused by well-documented, downwind increases in TMI radiation, from hundreds of miles away. Yet people living so far away from TMI, in Maine, had no reason to have stress-induced cancer, particularly because stress proponents claim that the level of cancer/stress is proportional to geographical closeness to the reactor, and people living hundreds of miles away are not close.
4. People living only several miles upwind of the reactor had no cancer increases, yet if proximity to the reactor is the surrogate for stress, and stress caused excess TMI cancers, these upwind people should have had cancers. Yet they did not. However, because these upwind citizens, very

close to TMI, nevertheless were not exposed to TMI radiation, the absence of increased radiation could easily explain the absence of their cancers (Shrader-Frechette 2011a).

### 4.7 Nuclear-accident violations of rights to know

Given the preceding details about the Japanese, Ukrainian, and US nuclear accidents, is it reasonable to conclude that industry, government, and the IAEA covered up accident harms, perhaps in part to avoid liability losses, industry shutdown, negative publicity, paying for citizen relocation from accident areas, and economic harm to the affected regions? Cover-ups and violations of rights to know seem plausible because of other government and industry denials of nuclear-accident harm. Because one cannot see, hear, feel, touch, or taste ionizing radiation, nuclear core melts often can be covered up. This is what occurred, for instance, in Los Angeles. Industry and government covered up this Santa Susana meltdown until cancer increases, years later, nearby forced release of secret reports (Smith 2007; Shrader-Frechette 2011a: 110–60).

Nuclear-accident cover-ups and violations of rights to know also are consistent with the fact, for instance, that the UN's World Health Organization (WHO) says seven million people are receiving or eligible for benefits as Chernobyl victims, living in radioactively contaminated areas (WHO 2006a, 2006b). They are like the nearly two million Japanese living in Fukushima-contaminated areas from which the international scientific community recommends evacuation. Yet the WHO would not classify these people as victims, if only fifty people had died because of Chernobyl, as the IAEA claims.

Contradicting the WHO, the main international commercial nuclear lobby group, the WNA, blames nuclear-accident victims for their health problems. It says Chernobyl's "ionizing radiation killed only a few occupationally exposed people … The Chernobyl fallout did not expose the general population to harmful radiation doses … Psychosomatic disorders … were the only detectable health consequences among the general population … Panic and mass hysteria could be regarded as the most important" (WNA 2009). In 2014, the WNA again blamed the victims for stress, claiming Chernobyl's "biological and health effects … cannot be attributed to radiation exposure … and are much more likely to be due to psychological factors and stress" (WNA 2014; Giel 1991; Rich 1991). In other words, the nuclear industry blamed the victims of Chernobyl, suggesting their own supposed psychological instability caused their ailments, not radiation.

Is such blaming and denial reasonable? It is not, in part because a prominent international physicians group, winner of the Nobel Peace Price, disagrees. It says Fukushima radiation releases could be several times greater than those from Chernobyl. Even before the radioactive releases stopped, Fukushima

cesium releases, alone, equaled those from 168 Hiroshima bombs. The pro-nuclear US NRC says Fukushima threats and "catastrophic explosions … could persist indefinitely" – one reason the international scientific community and US government urged a 50-mile-radius, 2-million-people evacuation after the accident (Shrader-Frechette 2011a: 130–60; von Hippel 2011; Foster 2013).

IAEA, government, and nuclear-industry claims, about the trivial nature of the Fukushima, Chernobyl, and TMI nuclear accidents, err for at least eight reasons.

1. As the US National Academy of Sciences confirms, the scientific consensus is that there is no safe dose of ionizing radiation, no matter how small; 35 electronvolt is enough to disrupt DNA and begin the cancer process, and even normal background radiation causes cancer (National Research Council/National Academy of Sciences 2006).
2. For more than thirty years, repeated scientific studies in England, France, Germany, Scotland, the UK, the USA, and elsewhere have confirmed that even normally operating reactors, without accidents, cause nearby cancer increases, especially among children. These normal radiation releases are much smaller than those from the Fukushima, Chernobyl, and TMI accidents (Heasman et al. 1986; Clapp et al. 1987; Forman et al. 1987; Gibson et al. 1988; Gardner et al. 1990; Michaelis et al. 1992; Morris and Knorr 1994; Viel et al. 1995; Watson and Sumner 1996; Busby and Scott-Cato 1997; Viel and Pobel 1997; Mangano 2000, 2002, 2006, 2008; Guizard et al. 2001; Baker and Hoel 2007; Kaatsch et al. 2008; Mangano and Sherman 2008; Spix 2008).
3. As the US National Academy of Sciences confirms, the scientific consensus, based on universally accepted, empirically confirmed, radiation dose–response curves, is that health effects of ionizing radiation are linear, proportional to dose, with no threshold for harm (National Research Council/National Academy of Sciences 2006). This dose–response curve clearly confirms thousands of premature Fukushima, Chernobyl, and TMI casualties.
4. The New York Academy of Scientists affirmed that because of long-term induced genetic defects, cancers, and other diseases, Chernobyl will cause one million premature casualties (Yablokov et al. 2009). According to University of California scientists and physicians, Chernobyl premature cancer fatalities, alone, will be roughly 475,000 (Zakharov 1988; Gofman 1995).
5. Consistent with the findings of the New York Academy of Sciences, the WHO confirmed that the Chernobyl accident released about 200 times more radiation than did the Hiroshima and Nagasaki bombs (WHO 1995). Although the two types/circumstances of radiation exposure were somewhat different, because bomb radiation has caused thousands of premature

fatalities, Chernobyl radiation has caused and will cause hundreds of times more deaths than the bomb radiation.

6. Consistent with the WHO and New York and US National Academy of Sciences findings, twenty years after the accident, respected journals like *Nature* already documented a doubling in breast cancer in Chernobyl-exposed areas of Belarus and Ukraine – and an excess of thousands of Chernobyl-induced cancers in the three nations most affected by Chernobyl; yet because of the long cancer latency, full Fukushima, Chernobyl, and TMI cancers will not appear for at least another fifty years (Williams and Baverstock 2006).
7. Scientists have confirmed genomic instability – the fact that ionizing radiation not only increases mutation rates in exposed somatic cells, but also causes elevated mutation rates that will continue to occur many cell divisions and generations after the initial radiation damage (Barber et al. 2006; Hatch et al. 2007). These delayed transgenerational effects of ionizing radiation will also continue to cause increased cancers and other damaging health effects in later generations, in people not even exposed to the offending radiation (Dubrova et al. 2003, 2008). As one scientist put it, the health effects of Chernobyl's – and other – ionizing radiation will never end, at least not until/unless natural selection and adaptation eliminate these mutations (Savchenko 1995: 5).
8. The radionuclides deposited by the Fukushima, Chernobyl, and TMI accidents have half-lives from tens, to hundreds of thousands, to millions of years. Airborne, soil-borne, food-borne, water-borne and ingested, these radionuclides will cause serious long-term effects, will continue to re-expose citizens for centuries, especially because millions of people are still living in areas of "wide-scale contamination" where ongoing radioactive contamination will harm health for centuries (Hohenemser et al. 1986; Cardis et al. 2003; WHO 2006a, 2006b).

For all the preceding reasons, the IAEA, government, and nuclear industry erred when they said the Fukushima, Chernobyl, and TMI accidents caused no, or trivial, health harms. But if they erred when they misled the public about the consequences of serious nuclear accidents, obviously they violated citizens' rights to know about the hazards they faced. As a result, at least some people probably did not protect themselves as well as they could have done, given correction information about radiation hazards.

## 4.8 Why there are nuclear-accident violations of rights to know

The preceding data concerning the three major nuclear accidents suggests that the famous US essayist and poet, Ralph Waldo Emerson, was right. He warned

that "money often costs too much"; because people frequently seek money as an end, not a means, money can cost them their character, their family, their education, or their happiness (Emerson 1904: 380). The preceding violations of citizens' rights to know, in the face of deadly nuclear accidents, suggest that polluters' desire for money also may be costing them their ethics – and costing the rest of us our health.

What causes polluters to force the rest of us to pay such a high price for their harms? Apart from greed and expediency, one factor is lack of liability. Many polluters are not legally and financially liable for the harm they cause. In the case of nuclear fission, the vast majority of nations do not make nuclear plant owners legally liable at all for any of the harm they cause, even because of deliberate safety violations. Even in the USA, only 1–2 percent of damages from a worst-case nuclear accident are insurable by law; the government gave the nuclear industry protection from liability and, as a result, citizens arguably lost their rights to due process – and to compensation from harm (Shrader-Frechette 2011a, Ch. 2). Moreover, even where polluter liability exists, theoretically, it often cannot be used in many practical cases. This is because, if government does not fund studies to assess the effects of various pollutants, then there often is inadequate evidence, both to make appropriate regulations, and to charge polluters with environmental crimes. Therefore, polluters typically lobby politicians to avoid funding pollution assessments. As a result, for example, only 7 percent of high-production volume chemicals used in US manufacturing and agriculture have ever been assessed for developmental effects or toxicity to children (Landrigan 2001).

Some of the additional factors that cause and worsen environmental pollution include polluters' tendencies to lie about pollution and to blame the victims for the harms, as already illustrated with Fukushima, Chernobyl, and TMI. Polluters often blame the victims because, given a cancer or disease "cluster" in some location, those guilty try to divert blame from themselves. To do so, they must propose another cause of the local pollution. Mounting an ad hominem attack, they try both to discredit their accusers and to divert attention from their own guilt. Blaming victims' alleged mental illness or instability, polluters also focus on an alleged cause of harm that is very difficult to measure or evaluate. Hence polluters can escape responsibility.

Blaming the victim also is often expedient for polluters, because their victims usually do not understand much science. Frequently victims cannot easily explain how or why some pollutant made them ill, especially when polluters manipulate the relevant science to suit their own purposes. That is, polluters often use special-interest science, "science" that has predetermined conclusions and that is done by those focused on protecting their profits, not determining truth (Shrader-Frechette 2007, Chs. 2–3). Special-interest science is performed or funded by industries, special interests, who seek

private profits, not public goods like health or unbiased knowledge. They fund scientists to give them what they want, including incomplete, biased "science" affirming that the funders' pollution or products are safe or beneficial. This fact has been repeatedly confirmed for pharmaceutical and medical-devices research, energy-related research, and pollution-related research (Krimsky 2003; Shrader-Frechette 2007, Chs. 2–3; 2011a, Chs. 1–4). It explains why so many industries fund special-interest science. After all, such "science" helped US cigarette manufacturers avoid regulations for more than fifty years. It also explains why fossil-fuel industry "science" denies anthropogenic climate change, and why the nuclear industry, its lobbyists, and governments tied to it attempt to claim erroneously that nuclear fission is cheap, low carbon, plentiful, and able to supply reliable base-load electricity. All these government, industry, and IAEA claims are false. They are false because they rely on flawed, special-interest science, just as accounts of the Fukushima, Chernobyl, and TMI accidents rely on special-interest ethics, ethics that ignores the rights to know of nuclear-accident victims (Shrader-Frechette 2007, 2011a).

## 4.9 Conclusion

The 2011 Fukushima (Japan), the 1986 Chernobyl (Ukraine), and the 1979 Three Mile Island (USA) nuclear accidents were deadly, and they resulted in the deaths of many people. This chapter has outlined each of these three nuclear accidents; revealed the flawed government, industry, and IAEA information about these accidents; argued that this nuclear disinformation has violated nuclear victims' rights to know; and suggested some of the reasons that might explain these violations of citizens' rights to know. What remains is for all citizens to become informed and active. Citizens must demand their rights to know. Otherwise they cannot protect themselves from deadly technologies.