



Nuclear Compensation

Lessons from Fukushima

Edited by Hirokazu Miyazaki

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Nuclear Disaster Compensation: A Call for Action

Nuclear energy provides 10% of electricity world-wide, a percentage that is likely to increase as nation-states work to fuel growing economies while limiting the devastating environmental effects of carbon-based energy sources. Yet, on the tenth anniversary of Japan's devastating triple disaster, we are reminded that nuclear energy imposes unique risks and burdens on citizens. Between 1979 and 2011, three reactor meltdowns, with distinct causes and effects, have forced communities to deal with the insidious consequences of radiological contamination. Radionuclides, in contrast to many other by-products of energy production, require the interventions of experts to sense and assess their danger. They cannot be readily smelled, tasted, heard, seen, or felt. The pathways of exposure, moreover, are multiple and include full body exposure, inhalation, and consumption of contaminated food sources. Many of these radionuclides linger in environments for decades, centuries, and even millennia in some cases. These features of radiological harm place people affected by radioactive fallout in a difficult position. They must rely on experts to regulate the risks of a disaster and, afterward, to assess its effects and provide a means of redressing their injuries. Across three major disasters—Three Mile Island in 1979, Chernobyl in 1986, and Fukushima in 2011—those affected by nuclear reactor meltdowns have been forced to navigate complicated administrative and legal compensation regimes in an attempt to rebuild their lives and communities. Tax-payers and power companies' rate-payers, meanwhile, have borne many of the financial burdens of these disasters. When a major nuclear disaster occurs, its effects reach deeply into economy and society, and more often than not these effects extend to people far away from the accident's geographic location.

The fact that up until now, severe nuclear accidents have occurred only rarely, along with the stigma attached to anticipating and planning for nuclear catastrophe, means that public debate on nuclear disasters tends to recede into the background quickly. However, there are important issues that deserve to be addressed in more than an ad hoc fashion; one of them is compensation for victims of nuclear disasters. This report shows that compensation plans have not met the needs of victims of nuclear disasters for three primary reasons:

1. Compensation plans have been devised by unelected officials and without full public knowledge or participation.

2. Governments have often capped the liability of the owners of nuclear facilities, which distorts cost-benefit analysis and creates a moral hazard.
3. International conventions limit compensation and responsibility for nuclear disasters. Both Chernobyl and Fukushima demonstrate that these limits may be too low.

Due to the complexity of nuclear technology and our limited understanding of potential failures, our starting assumption is that there will be additional severe accidents at nuclear reactors in the future.¹ In this context, we suggest that issues of compensation be part of nuclear emergency preparedness and response planning. In this report we call for the creation of a forum that enables laypersons and experts to engage in an ongoing conversation about nuclear disaster compensation issues before the next disaster occurs. The forum should include the many groups that are affected by nuclear power and disasters, including nuclear industry representatives, government officials, project finance specialists, political leaders, victims of past disasters, potential victims, taxpayers, and ratepayers. Many methods for enabling conversation between experts and their publics have been developed and so this forum may take a variety of forms, including as a consensus conference. It could take place online and/or include online components. With this report we invite your suggestions for methods of achieving this conversation, as well as your participation in this dialogue.

The final form of the forum must enable three goals. First, a deliberative conversation about nuclear disaster compensation must be **anticipatory**—that is, it must take place prior to the disaster occurring. Many dedicated professionals are working to prevent future disasters, but the case studies presented later in this report show that governments on the whole have not fully prepared for nuclear disasters before the disasters have occurred. In short:

- ◆ Plans have failed to anticipate the magnitude and types of harms that people experience after disasters, or precisely how people will be compensated.
- ◆ Some plans have created loopholes for “natural” disasters, which may not ensure that owners of nuclear facilities adequately prepare for environmental hazards.
- ◆ Organizational sociologists have shown that interactive complexity and tight coupling, as well as our limited understanding of system properties, make disasters “normal,” even with the best possible management and governance structures in place—and the real world is far from the best possible world.
- ◆ The problem of nuclear disaster compensation has often been marginalized by assurances that the probability of a disaster is very low. As a result, citizens have too often accepted plans for nuclear power because they are assured that a disaster is extremely unlikely, and citizens have not understood the possibly catastrophic consequences of a disaster. However, history shows that this assumption is flawed. Nuclear disasters have repeatedly occurred, and they will almost certainly continue to occur.

The tendency to explain each nuclear disaster as an anomaly—an *unusual* case of operator error, irresponsible governance, poor engineering, or all of the above—only serves to reinforce the misguided faith that nuclear disasters can be entirely prevented.

This leads to the second goal of a forum on nuclear disaster compensation issues: deliberations must be **participatory**—that is, they must include the ordinary citizens who have been impacted or are likely to be impacted by a nuclear disaster, as well as nuclear engineers, medical doctors, environmental scientists, and other experts who have specialized knowledge relevant to disasters. We recognize, though, that participatory governance of science and technology faces challenges, especially as experience with participatory governance shows that not all groups are able or permitted to contribute equally. Citizens who participate in decision-making about nuclear power are often economically disadvantaged. They do not “choose” to accept the risks of living and working in proximity to nuclear power and nuclear waste disposal. While those who work in the industry are eager for the jobs and economic opportunities that nuclear power and waste disposal are seen to offer, others are often constrained by financial and historical circumstances. Even when these citizens “participate” in nuclear decision-making, for example as rate-payers, they are rarely on equal footing with governments and corporations. The experts who play an outsized role in framing problems and solutions instead give citizens simple yes-or-no votes in otherwise complicated processes.

A truly participatory forum would recognize the extremely broad group of people who are affected by nuclear disasters and enable them to help frame problems and solutions. Nuclear disasters affect not only the people living close to nuclear facilities, but also everyone in the path of the fallout, which can spread around the entire globe. It affects the costs and reliability of electricity for all persons on the electrical power grid. And it affects the livelihood of agricultural workers and the supply of food that they provide. A participatory forum would also ensure that all of these citizens understand what they might lose in a nuclear disaster. The impacts of previous disasters must be fully visible to those considering accepting such risks. We can begin to create a more participatory forum by broadening conceptions of expertise to include forms of knowledge that have historically been marginalized in decision-making about nuclear power. This includes local knowledges about natural and built environments as well as economic practices and interdisciplinary knowledge about disaster response and recovery.

This leads to the third goal of a conversation about nuclear disaster compensation: it must be **transnational** because nuclear disasters do not respect national borders. Although methods for participatory governance have proliferated in recent years, most of these experiences have been confined to single nations or localities.² Nonetheless, there are models for a transnational forum. Nongovernmental organizations often gather alongside intergovernmental meetings on climate change. A transnational conversation should include decision-makers and citizens from nations that are considering investing in nuclear power. Such nations should explicitly consider the risks of nuclear disasters in their planning. The costs of disaster compensation may go beyond compensating citizens in the state where a catastrophe occurs. Large-scale nuclear disasters may also impact neighboring nation-states, others in the international community, and international environments, such as the high seas. Again, current international agreements strongly limit compensation and responsibility for disasters.

In sum, we are calling for a dialogue that is **anticipatory, participatory, and transnational** to best enable wiser decisions about nuclear power and its many consequences. We invite your ideas about possible forums that can move the conversation forward.

1. See Downer 2011

2. See, e.g., Chilvers 2020, 347-380; Irwin 2006, 299-320; Laurent 2011, 649-666; and Lezaun 2017, 195-221

BIBLIOGRAPHY

Chilvers 2020

Chilvers, Jason, and Kearnes, Matthew. "Remaking Participation in Science and Democracy." *Science, Technology, & Human Values* 45, no. 3 (2020): 347-380.

Downer 2011

Downer, John. "'737-Cabriolet': The Limits of Knowledge and the Sociology of Inevitable Failure." *American Journal of Sociology* 117, no. 3 (2011): 725-762.

Irwin 2006

Irwin, Alan. "The Politics of Talk: Coming to Terms with the 'New' Scientific Governance." *Social Studies of Science* 36, no. 2 (2006): 299-320.

Laurent 2011

Laurent, Brice. "Technologies of Democracy: Experiments and Demonstrations." *Science and Engineering Ethics* 17, no. 4 (2011): 649-666.

Lezaun 2017

Lezaun, Javier, Noortje Marres, and Manuel Tironi. "Experiments in Participation." In Ulrike Felt, Rayvon Fouché, Clark A. Miller, and Lauren Smith-Doerr (eds). *The Handbook of Science and Technology Studies*. 4th edition. Pp. 195-221. Cambridge, MA, MIT Press, 2017.

Introduction: Nuclear Compensation

What lessons ought to be learned from the nuclear disaster at Fukushima Dai-Ichi Power Plant following Japan's earthquake and tsunami of March 11, 2011? This question has been asked many times since the disaster. Nuclear regulators, industry experts, policymakers, and citizen activists in Japan, the US, and elsewhere have studied the accident carefully in search of lessons. For example, immediately following the accident, the US Nuclear Regulatory Commission established a taskforce to investigate the Fukushima disaster. The taskforce proposed a long list of technical recommendations for making the US regulatory framework more coherent, but it essentially concluded that Fukushima was not directly relevant to situations in the US given that the accident was caused by a natural disaster of an unprecedented scale:

The current regulatory approach, and more importantly, the resultant plant capabilities [in the United States] allow the Task Force to conclude that a sequence of events like the Fukushima accident is unlikely to occur in the United States and some appropriate mitigation measures have been implemented, reducing the likelihood of core damage and radiological releases. Therefore, continued operation and continued licensing activities do not pose an imminent risk to public health and safety.¹

In contrast, and yet not necessarily in contradistinction to this conclusion, Japan's National Diet Fukushima Nuclear Accident Independent Investigation Commission blames the "collective mindset of Japanese bureaucracy," especially those in charge of Japan's energy policy and regulatory oversight of utility companies:

[The accident's] fundamental causes are to be found in the ingrained conventions of Japanese culture: our reflexive obedience; our reluctance to question authority; our devotion to 'sticking with the program'; our groupism; and our insularity...

This [mindset] led bureaucrats to put organizational interests ahead of their paramount duty to protect public safety.

Only by grasping this mindset can one understand how Japan's nuclear industry managed to avoid absorbing the critical lessons learned from Three Mile Island and Chernobyl; and how it became accepted practice to resist regulatory pressure and cover up small-scale accidents. It was this mindset that led to the disaster at the Fukushima Daiichi Nuclear Plant.²

If Japanese culture, reflected in the culture of Japanese bureaucracy, is the problem, however, there is little that can be done by way of policy reform. Likewise, there is little that can be learned across national boundaries. The premise of the report is that Japanese culture does not fully explain the disaster response and that there are valuable lessons to be learned for other nations operating nuclear power plants.

Little has changed in regulatory policy following Fukushima, both inside and outside Japan.³ This perhaps has much to do with the rarity of serious nuclear accidents. To date, only two, one in Chernobyl in 1986 and the other in Fukushima in 2011, have been classified by the International Atomic Energy Agency (IAEA) as level 7 “major” accidents. Whereas the Chernobyl accident has been attributed, at least implicitly, to Soviet technocracy, the Fukushima accident, as noted earlier, has been attributed to the Japanese group-oriented mind-set, on the one hand, and the unprecedented scale of the March 11, 2011 tsunami, on the other. (The 1979 accident in Three Mile Island, Pennsylvania was far less severe than these two major accidents. According to the IAEA it was a level 5 accident; that is, an “accident with wider consequences.”)

Despite the powerful argument put forward by sociologist Charles Perrow that accidents like nuclear power plant accidents are “normal accidents” to be expected of any complex technical systems and will happen regularly,⁴ there is a persistent perception globally that nuclear accidents are anomalies. A report compiled by the Union of Concerned Scientists observes:

*Fukushima triggered extensive “lessons learned” reviews in Japan, France, the United States, and elsewhere. Many lessons have indeed been learned, but to date few have been promptly and adequately addressed—at least in the United States. The reason, of course is the prevailing mind-set.... In the United States, “It can’t happen here” was a common refrain while details of the Fukushima accident were still unfolding.*⁵

The present report seeks to illuminate lessons from Fukushima in two different registers. First, the report draws attention to lessons learned by and for ordinary citizens—particularly, victims of the Fukushima disaster, not nuclear experts or regulators. Other energy sources, such as fossil fuel, hydro power, and even wind, solar, and other renewable energy sources, each also come with social and environmental costs, and issues of compensation have been discussed in relation to various damages associated with these energy sources. There are issues raised in these cases that are similar to issues examined in this report (e.g., artificial boundaries created concerning compensation eligibility, inequality, and other secondary problems arising from the distribution and use of compensation funds, etc.), but the profoundly uncertain nature of damages associated with radiation exposure—especially, their invisibility, randomness, and long temporality, generates a distinctive set of practical and policy challenges.⁶

While lawmakers, policymakers, and regulators may not have learned a great deal from the Japanese disaster, there have been new forms of civic engagement and learning, including citizen-driven collaborative radiation monitoring and other efforts of “citizen scientists,” arising from their distrust of politicians, bureaucrats, and experts. This in turn suggests that “Considerable potential and capacities exist for technoscientific creativity and informed collective learning in the Japanese public, sensitized to the threats of nuclear disaster. ... We could do worse than adopt this emerging concerned group of radiation monitoring amateurs as an important component of a blueprint for change.”⁷ This report calls for the incorporation of these citizens’ voices and concerns from below into policy recommendations for the future use and management of nuclear energy.

Second, the report seeks to address the present needs of Fukushima rather than simply anticipate future possible disasters and their fallout. Despite assertions by the government and the Tokyo Electric Power Company (TEPCO), the operator of the power plant, that the accident in Fukushima has been largely contained, there are many dimensions of the disaster that are at least arguably still ongoing and will likely be so for some time to come. For example, tanks used to store contaminated water used to keep the troubled reactors cool are full and reportedly leaking continuously into the Pacific Ocean through underground waterways. Likewise, it appears that the removal of fuel from spent fuel pools and other challenges associated with the long-term decommissioning process are progressing slowly.

One dimension of the disaster that is clearly still unresolved is damage compensation. Nuclear compensation has not been a focal issue of the extensive studies of either the Fukushima disaster or the other two historically significant nuclear accidents. The nuclear meltdown at the Fukushima Dai-ichi Power Plant caused the contamination of a vast area of Fukushima Prefecture and robbed thousands of local residents of their homes, communities, ancestral homelands, and sense of everyday normalcy. No deaths have been attributed directly to the accident, but over 1,500 lives have been lost due to physical and mental stress related to evacuation. Since the disaster, TEPCO has already paid over 9.7 trillion yen (approximately 92 billion dollars) to victims of the accident through a compensation mechanism set up for the accident.⁸ This is by far the largest amount of damage compensation ever paid to victims of a nuclear disaster anywhere in the world and is possibly the highest amount of compensation paid for any industrial disaster, including the disaster at Union Carbide's pesticide plant in Bhopal, India and BP's Deepwater Horizon oil spill in the Gulf of Mexico. Despite the large amount of compensation already paid to victims of the Fukushima disaster, many of the victims who have received compensation are not satisfied. There are others who have not been compensated for their losses at all due to the fact that their areas of residence were outside the mandatory evacuation zones (areas within 20 kilometers from the troubled power plant as well as some other areas stretching northeast beyond those areas). There are currently nearly 30 pending collective lawsuits against TEPCO and the Japanese government to address these concerns.⁹ Although the political, legal, and social situations surrounding the Three Mile Island and Chernobyl accidents were radically different from those surrounding the Fukushima disaster, it is important to remember that suffering, fear of health effects from radiation, and the pursuit of compensation continue for the victims of these two earlier accidents as well.¹⁰

This report focuses primarily on ongoing political, legal, and social issues concerning damage compensation and seeks to discern a set of lessons learned from and for victims' ongoing experiences of pursuing nuclear compensation. The report ultimately calls for a more inclusive dialogue about nuclear power plant accident damage compensation schemes with a view to establishing a broader framework for assessing their economic, public policy, and moral implications.

The Enigma of Nuclear Compensation

Nuclear compensation is a complex and peculiar subject. Many nuclear power plant accident damage compensation laws, such as the US Price-Anderson Nuclear Industries Indemnity Act of 1957 and Japan's Act on Compensation for Nuclear Damage, explicitly limit or exempt nuclear reactor manufacturers' liability. These laws dictate that compensation claims should be directed at nuclear power plant operators, not manufacturers, which in turn are required to have insurance coverage

for each nuclear power plant they operate through national and international insurance pools.

Issues regarding nuclear compensation are also governed by three international legal regimes: the OECD's 1960 Paris Convention on Third-Party Liability in the Field of Nuclear Energy and several supplementary agreements (Paris Convention); the Vienna Regime consisting of the IAEA's 1963 Vienna Convention on Civil Liability for Nuclear Damages and supplementary agreements (Vienna Convention); the IAEA Joint Protocol of 1988, linking the two regimes; and the IAEA's Convention on Supplementary Compensation for Nuclear Damage of 1997.¹¹ Yet, not all countries with nuclear power plants are signatories to these international conventions. In fact, the US, the USSR, and Japan were not party to any of these international conventions at the time of their respective severe accidents. Even today, China, which currently has 45 nuclear power reactors and is building more, and South Korea, which has 24 reactors and is actively seeking to export power plants to developing countries, are not signatories to any of the international conventions.

These domestic laws and international conventions were, at least originally, designed primarily to promote nuclear energy and protect the interests of the nuclear power industry.¹² These legal regimes have not often been tested due to the rarity of major accidents. The Chernobyl disaster in particular did trigger reforms of these international legal regimes, and some domestic laws, to strengthen victim protections.¹³ These laws, however, continue to limit liability for operators and limit compensation for victims, meaning that investors may continue to pursue nuclear energy without bearing the financial burden of compensation in the case of a major accident.¹⁴ The World Nuclear Association, which represents the interests of the nuclear industry, has compiled an overview of nuclear compensation schemes and identifies the following key "principles" to the global legal compensation regime:

- ◆ Strict liability of the nuclear operator
- ◆ Exclusive liability of the operator of a nuclear installation
- ◆ Compensation without discrimination based on nationality, domicile or residence
- ◆ Mandatory financial coverage of the operator's liability
- ◆ Exclusive jurisdiction (only courts of the State in which the nuclear accident occurs have jurisdiction)
- ◆ Limitation of liability in amount and in time

The report asserts, "Altogether these principles ensure that in the case of an accident, meaningful levels of compensation are available with a minimal level of litigation and difficulty." The report also suggests that the compensation paid to victims of the Fukushima disaster so far is disproportionately (and irrationally) large considering the actual scale of the nuclear disaster.¹⁵

In contrast, in their 2014 article, Ken Lerner and Edward Tanzman, both from the Argonne National Laboratory, draw attention to the inadequacy of the US nuclear compensation scheme in light of the Fukushima disaster. Lerner and Tanzman point to the possibility that an accident of the magnitude of the Fukushima disaster would "overwhelm the resources currently available in the US system."¹⁶ They also observe that the issue of compensation has not been a central concern of the recent policy debate about disaster prevention and preparedness and they urge a more careful

study of the Fukushima experience and recommend “advance planning”¹⁷ focusing on compensation:

*If nuclear power is to be a component of efforts to reduce carbon emissions and mitigate climate change, it will have to be accompanied by the readiness to respond to accidents. Robust response capabilities, including mechanisms to compensate victims, are part of the social contract with communities hosting nuclear power plants.*¹⁸

The hitherto most comprehensive study of Japan's nuclear compensation scheme set up for the Fukushima disaster is a 2013, award-winning Japanese-language book written by public policy studies scholar Noriko Endo, *Genshiryoku songaibaisho sendo no kenkyu: Tokyo Denryoku Fukushima Genpatsu jiko kara no kosatsu* [A Study of Nuclear Power Damage Compensation Schemes: Considerations from the Tokyo Electric Power Corporation Fukushima Power Plant Accident]. In it, Endo closely examines the process through which the Japanese compensation system for victims of the Fukushima disaster and its financing mechanism were developed and operationalized. Endo's study focuses primarily on domestic policy-making processes rather than victims' experiences, but it deserves detailed discussion here given that the book is currently only available in Japanese language.

Although the Japanese legal framework for nuclear compensation before the Fukushima disaster was largely in conformity with global standards for nuclear compensation, Endo draws attention to several distinctive features in the Japanese nuclear accident compensation scheme. For example, in the US, under the Price-Anderson Act, nuclear power plant operators are only responsible for a compensation amount up to the limit of what insurance companies have agreed to underwrite.¹⁹ However, in Japan, under the Act on Compensation for Nuclear Damage, operators bear unlimited liability—a feature that prominent Japanese Civil Code experts originally protested.²⁰ Endo suggests that the law's assignment of unlimited liability to nuclear power plant operators resulted from the government's appreciation of the Japanese public's broadly shared sensitivity to the risks of nuclear power stemming from Japan's unique experience of the atomic bombings of Hiroshima and Nagasaki:

*The government took into account the public sentiment toward nuclear energy and the social situation at the time when it introduced a seemingly just and yet impractical system of unlimited liability as if it had guaranteed that nuclear power plant operators assume all liability in the case of an accident.*²¹

As Endo notes, given the limited financial capacity of operating corporations, this is in actuality an unrealistic expectation. In fact, the law does stipulate that the Japanese government should work with the industry to design a financing mechanism for damage compensation when a major accident occurs. In other words, according to the law, the government is expected to provide “aid” if the amount of compensation required exceeds the operator's legally required insurance coverage.²² The mandatory coverage is currently 120 billion yen (approximately 1.1 billion US dollars) for each power plant and remained unchanged after the Fukushima disaster. Endo points out, however, that the law is silent on the specific responsibility the government ought to bear in the case of an accident.²³ This leaves the Japanese government's role in damage compensation deeply “ambiguous.”²⁴

In Endo's view, this ambiguity allowed the Japanese government to quickly and flexibly devise a mechanism for processing and financing damage compensation following the disaster in Fukushima. It is important to note that immediately after the

Fukushima disaster there was a heated debate about a particular clause in the Act on Nuclear Damage Compensation cancelling nuclear power plant operators' liability in the case of an accident resulting from a "grave natural disaster of an exceptional character."²⁵ The application of this indemnity clause would have led to a series of contentious lawsuits about TEPCO's responsibility, on the one hand, and to the creation of a government-led compensation scheme potentially requiring the injection of a large amount of public funds, on the other.²⁶ The government ultimately deemed this clause non-applicable for political reasons.

The Japanese government eventually designed a compensation mechanism based on its experience of managing Japan's banking crises since the early 1990s. This was ironically apt given that the Fukushima disaster also triggered a national financial crisis. TEPCO was, and still is, a major corporation enjoying a de facto regional monopoly in the greater Tokyo area electric power market. Prior to the accident, TEPCO bonds were rated as equivalent to Japanese Government Bonds in terms of their creditworthiness, and they were held by practically all major Japanese banks and other institutional investors as part of their investment portfolios. The value of TEPCO shares dropped sharply after the accident and there was a broad concern among TEPCO's creditors, major banks, insurance companies, and pensions funds about the possibility of its default.²⁷ TEPCO was quickly regarded by the Japanese government as "too big to fail."²⁸ From the outset, damage compensation was estimated to exceed 4 trillion yen (40 billion dollars), and establishing a financially viable and timely mechanism for processing compensation claims was one of the Japanese government's most urgent tasks. The government needed to act quickly to ensure the financial stability of the operator, TEPCO, but also the Japanese financial system as a whole. In particular, the government's extensive experience using the Deposit Insurance Corporation of Japan to mitigate systemic risks from failing banks in the 1990s led to the creation of the Nuclear Damage Liability Fund. This special vehicle for funding nuclear damage compensation is primarily financed through issuing Japanese government bonds and through contributions from all operators of nuclear power plants in Japan.²⁹

Endo's in-depth analysis focuses on the policy-making and political processes through which the Japanese compensation mechanism was developed for victims of the Fukushima disaster. This report in contrast seeks to evaluate the effectiveness of this compensation scheme through close and on-the-ground observations of the operation of the scheme in Japan, and through a comparative study of the compensation schemes activated for all three of the Fukushima, Chernobyl, and Three-Miles Island accidents. The report seeks to introduce a fresh perspective on nuclear compensation by offering an analysis of victims' experiences of pursuing damage compensation.

Meridian 180's Engagement with Fukushima

This report is the product of a series of transnational cross-disciplinary and cross-professional conversations that Meridian 180, a multilingual platform for global collaboration, hosted together with scholars and experts based at Cornell University and other institutions since 2011 concerning the nuclear power plant accident in Fukushima. Meridian 180 was founded at the Cornell Law School shortly after Japan's earthquake, tsunami, and nuclear power plant accident on March 11, 2011 and has since become a collaborative endeavor of several universities in Australia, Japan, South Korea, and the US with over 1,200 members worldwide. The project has organized numerous online multilingual forums and in-person workshops and

conferences about a broad range of transnational issues from cybersecurity to financial market governance and smart and shrinking cities. And yet Japan's Fukushima crisis has remained a compelling reference point for the project.

The nuclear disaster in Fukushima naturally surfaced as a focal point of debate for Meridian 180. This is not simply because Meridian 180 began in the midst of Japan's unfolding crisis partially created by the nuclear disaster, but rather because the nuclear disaster itself was deeply transnational in scope. The troubled reactors at the Fukushima Dai-Ichi Power Plant were US-designed and the nuclear fuel used at the plant likely originated from countries such as Canada, Kazakhstan, Niger, Australia, Russia, and Namibia—six countries that supply over 50% of nuclear fuel worldwide. Radioactive clouds spread over the Pacific Ocean and contaminated water used to keep the troubled reactors cool has been flowing into the Pacific Ocean, meaning that victims of the accident include non-Japanese citizens such as members of the US Navy who participated in rescue work following the disaster. Several cross-border litigations have been waged against TEPCO and the Japanese government.³⁰

Nuclear energy itself is also deeply transnational given its international security implications as well as its origins in efforts to find peaceful uses for nuclear power in the post-World War II world. Japan's nuclear energy policy has never been entirely independent of the country's national security concerns as well as US strategic interests.³¹ The development of Japan's nuclear energy in fact originates from negotiations related to the Agreement for Cooperation between the Government of the United States of America and the Government of Japan Concerning Peaceful Uses of Nuclear Energy, and a similar agreement made between Japan and the U.K. in the 1950s.³²

In light of the transnational currents the Fukushima disaster touches on, Meridian 180 recognizes that many issues we face in today's world are exceedingly complex and are simultaneously both highly technical and deeply social, cultural, and human. This is put into further relief as the disaster—and, specifically, what is widely regarded as its mismanagement on the part of the Japanese government and TEPCO—has exposed the socio-economic, political, and deeply human dimensions of complex technology. The disaster has moreover intensified public distrust for expertise and experts and has revealed a series of intellectual and policy challenges that today's transnational issues pose collectively. These complex global issues call for globally collaborative, cross-disciplinary, and cross-professional solutions incorporating diverse perspectives and values, as well as diverse forms of expert and non-expert knowledge. Meridian 180 seeks to offer a space for this broad consultation. In other words, what Meridian 180 strives to offer is a process for truly democratic conversation about critical issues of today's world. Meridian 180's engagement with post-Fukushima Japan described below serves as a model for this collaborative process.

Meridian 180's engagement with the Fukushima disaster and its after-effects began with the project's two inaugural online multilingual forums: "Cry from the Scene," proposed and facilitated by Naoki Kasuga, a renowned cultural anthropologist based at Hitotsubashi University, Tokyo, addressing the crisis of knowledge surrounding radiation and radiation exposure; and "A Grand Coalition for a Rise in the Consumption Tax is the Only Way," proposed and facilitated by Yuji Genda, an influential labor economist and public intellectual based at the University of Tokyo Institute for Social Science, addressing Japan's fiscal and political crisis following Japan's natural and nuclear disaster. These forums provided a distinctive space for

transnational dialogues and reflections as Japan's crisis unfolded in the midst of confusion and uncertainty.

One year after the disaster, Meridian 180 once again hosted an online forum titled "How Can We Bring Closure to Crises?" Following the online forum, the project hosted a conference on the topic jointly with Cornell University's East Asia Program. In conjunction with this conference, Meridian 180 also recorded reflections on Japan's crisis by a broad range of experts, from anti-nuclear activists to a humanitarian NGO leader, an architect, a lawyer, and an economist.

In preparation for the first Meridian 180 global summit in Okinawa in July 2016, Meridian 180 established a global working group focusing on the nuclear disaster in Fukushima. The working group included legal professionals, environmental activists, and social scientists from Japan, South Korea, Europe, and the US. The group first hosted an online forum on the future of nuclear energy and solicited input from a diverse group of scholars and professionals, including experts on nuclear energy. The dialogue included a former US nuclear regulator, experts on the accidents in Three Mile Island and Chernobyl, experts on environmental disasters, renewable energy researchers and activists, legal scholars and lawyers working with victims of the disaster in Fukushima, and project finance specialists and others working with the nuclear industry. These scholars and professionals also came from various parts of the world including Europe, the US, Japan, South Korea, China, and Singapore. Other Meridian 180 members who had not actively been involved in nuclear energy-related issues also offered valuable perspectives informed by their own expertise and experience.

The question of the economic, social, and other costs of nuclear energy quickly became a major focus of this dialogue.³³ The group discussed a broad range of costs, from the costs of nuclear power plant decommissioning to the costs of site clean-up and spent fuel storage to the human costs of uranium extraction.³⁴ It became clear that the group needed to seek a fuller picture of the costs of compensation for nuclear disasters in order to make policy recommendations about the future of nuclear energy as part of a broader solution to climate change.

After three days of conversation, the issue of compensation emerged as a useful framework for the group's collaboration. Everyone was interested in this issue, albeit for entirely different reasons. Compensation is one endpoint of nuclear disaster management. The costs of nuclear energy certainly need to incorporate the costs of compensation. Most importantly, this is the phase in which a broad range of ordinary citizens are implicated as victims, ratepayers, and taxpayers. A resolution of the issue therefore requires not just the input of scientists and engineers but also engagement with civic activists, anthropologists who work with ordinary citizens, lawyers who work with victims, and project finance specialists who work with the industry and investors. The working group decided to conduct a comparative study of nuclear power plant accident compensation schemes from this broad perspective. This study covers nuclear power plant accident compensation schemes in the US, the Soviet Union (and Russia and other successor states to the Soviet Union, such as Ukraine and Belarus), and Japan. The Meridian 180 Global Working Group on Nuclear Energy intends this report to serve as a fresh starting point for broader discussion about nuclear accident compensation schemes in a way that incorporates diverse perspectives, particularly victims' perspectives, and asks citizens to navigate the necessary political and economic tradeoffs and make the difficult policy choices.

Outline of the Report

This report consists of four sections. The first section contains a set of reports written by scholars and activists working directly with victims of the nuclear disaster in Fukushima. The “Fukushima Team” of the Meridian 180 Global Working Group includes four previously unrelated individuals. Takao Suami is a professor of law at Waseda University. A specialist in EU law, since 2012 Suami has been involved in a legal clinic organized by the Waseda University Institute of Clinical Legal Education to aid victims of the nuclear disaster in Namie, a municipality within the mandatory evacuation zone in Fukushima Prefecture. Yuki Ashina is an attorney based in Shizuoka Prefecture. A graduate of a prestigious law school, Ashina chose to participate in the Japan Bar Association's program to send young lawyers to rural parts of Japan where there are few legal professionals, and she spent the first two and half years of her legal professional career in Soma City, 31 miles north of the Fukushima Dai-Ichi Power Plant. Since the nuclear disaster, Ashina has provided legal assistance for evacuees from Fukushima and has been involved in several claims and lawsuits for damages against TEPCO. Satsuki Takahashi is an environmental anthropologist who conducted her doctoral research in a fishing village near the Fukushima Daiichi Nuclear Power Plant. Takahashi has been conducting field research on families involved in fishery in Soma City. Nobuyo Fujinaga is a veteran civic activist based in Osaka who has been passionately involved in environmental and anti-nuclear activism.

The Fukushima team's report shows how the current Japanese framework for damage compensation, as expensive as it may be, still does not address a broad range of significant losses and damages sustained by victims of the disaster. Some victims have not received any compensation at all due to their residence outside the mandatory evacuation zones.³⁵ Others feel that other kinds of losses and damages not recognized within the current compensation scheme also ought to be compensated. These include the loss of ancestral homelands, social relationships, and normal daily life,³⁶ as well as other kinds of damages and losses not readily visible or calculable in monetary terms.³⁷

These limitations are, of course, not necessarily specific to nuclear compensation. Disaster damage compensation tends to create and deepen divisions among victims by introducing artificial boundaries of all kinds. It does not aim to compensate for every damage and loss sustained by those who see themselves as victims. It also tends to differentiate victims on the basis of residence, time spent in the area during the disaster, and other somewhat arbitrary criteria.³⁸

As Suami points out, however, damage caused by a nuclear disaster is particularly deep, multidimensional, and potentially long-lasting. Nuclear damage also goes beyond the usual scope of damage compensation focused on certain categories of individual damages and losses because a nuclear accident deeply affects local communities and environmental settings. There are ongoing collective lawsuits aiming to overcome these limitations within Japan's current legal framework, but the Fukushima team's report indicates that damage compensation may not serve as an adequate framework for addressing all of these concerns.³⁹ The Fukushima team suggests that social security, rather than damage compensation, may be a better model for responding to these simultaneously both highly individualized and deeply collective needs.⁴⁰

The Fukushima team's report draws attention to the specific temporal dimensions of a nuclear accident and their implications for the damage compensation framework.

Satsuki Takahashi suggests that a nuclear accident damage compensation scheme should not only compensate for what has been lost but also for continuing and ongoing losses in the present as well as into the future.⁴¹ Suami also points to types of damage that may not end in the near future. For example, the health effects of low-level radiation exposure are not well-known and anxiety about potential long-term effects is likely to continue for many years to come. Likewise, voluntary evacuees may face new challenges in their new locations and may encounter secondary damage.⁴²

The second and third sections of this report are written by two science and technology studies scholars specializing in nuclear issues: Mary Mitchell, who has studied legal cases involving Marshall Islanders exposed to radiation caused by nuclear weapons testing in the Pacific, and Sonja Schmid, who has written extensively on the Chernobyl disaster. What these sections make clear is the fact that, at least on the surface, the three accidents—Three Mile Island, Chernobyl, and Fukushima—are not straightforwardly comparable. First, the three major accidents took place in three different specific situations—the US, the Soviet Union, and Japan, respectively—at three different historical junctures. Each accident has contributed to the revision of the associated country's regulatory and safety standards as well as compensation schemes, and each accident has led to the amendment of existing international conventions or the creation of new agreements and conventions. Yet, the Fukushima case shows that even large amounts of compensation do not fully address losses and damages sustained by victims.

Second, the three accidents are also vastly different in terms of their respective gravity. Compared to the Chernobyl and Fukushima disasters, both of which have been rated by the IAEA as Level 7 major accidents, the Three Mile Island incident was relatively less severe and has been rated as a Level 5 accident by IAEA. In her report, however, Mitchell suggests that, precisely because of this difference, the Three Mile Island case offers a distinctive set of insights about “how the boundaries of nuclear compensation are drawn and contested when uncertainty abounds and linkages between incident and injuries are difficult to discern.”⁴³

Third, each accident took place in a distinctive legal and administrative framework. As Mitchell points out in her report, the three accidents have led to three different kinds of treatment of injury and compensation claims. Whereas administrative procedures have been developed for processing compensation for the Chernobyl and Fukushima disasters, compensation claims arising from the Three Mile Island accident were initially processed by private insurers of the power plant and later were addressed in “a series of long, arduous, costly, and ultimately unsuccessful legal disputes.”⁴⁴ Mitchell uses extensive archival records to show how these legal cases have been blocked largely due to difficulties in producing satisfactory scientific evidence linking bodily symptoms to the accident.

Mitchell's report importantly shows that prior to the Three Mile Island accident, the only claims made under the US Price Anderson Act were claims related to injuries sustained by nuclear power plant workers and contractors. They were all “resolved through the insurers' administrative claim processing procedures rather than through litigation.”⁴⁵ Until the Three Mile Island (TMI) accident, in other words, many issues surrounding nuclear compensation within the legal framework of the Price Anderson Act were largely untested: “The TMI incident now forced courts to begin to interpret the Price Anderson Act's as-yet-untested provisions as a variety of claim types went into litigation—not least, resident's claims of injury.”⁴⁶ The federal government conducted scientific investigations on local resident's radiation exposure

and concluded that their exposure was too low to cause any negative health effects. However, residents were skeptical about this conclusion and in fact began to exhibit some symptoms, and some developed cancer. Cancer can be caused by many factors, however, not only radiation exposure; it is difficult to prove the causal linkages between symptoms and the accident, which created a challenge for the plaintiffs in the lawsuit related to the Three Mile Island accident. Mitchell shows how plaintiffs mobilized a broad range of experts in radiobiology, including experts on the Chernobyl disaster, to construct scientific evidence about bodily harm they experienced and changes in the local environment they observed following the Three Mile Island disaster. The court eventually ruled that most of the expert testimony be excluded. Instead, the court's decision relied largely on dose estimates conducted by federal agencies on the accident, which had failed to take residents' observations or concerns into account. This trial court's decision was in turn confirmed by the Third Circuit Court of Appeals in 2002. Given the long-term and unpredictable future effects of radiation exposure, as demonstrated in the cases of atomic bomb survivors in Hiroshima and Nagasaki, however, compensation issues surrounding the Three Mile Island accident may not be declared completely settled yet.

Mitchell notes that, in the Three Mile Island accident, the private insurers of the power plant paid out approximately 71 million dollars, well under the plant's mandatory insurance coverage of the time. The US President's Commission on Catastrophic Nuclear Accidents set up in the aftermath of the Chernobyl disaster submitted a report urging Congress to reconsider the Price-Anderson Act and institute an administrative settlement process for nuclear compensation that would meet the demand of a potentially larger-scale accident than the one at Three Mile Island. The proposal was not implemented, although the Act was updated after the Chernobyl accident and set the requirement for each power plant to be insured for up to 13 billion dollars. More importantly, Mitchell points out, the commission did not consult claimants or victims of the Three Mile Island accident before making recommendations: "Although lawmakers have thought long and hard about the solvency of energy and insurance companies, they have not considered fully claimants' experience of being harmed and seeking compensation."⁴⁷ Mitchell suggests that "these suffering and at-risk communities should be brought to the table in a democratic, participatory, and anticipatory process—not after, but before the next disaster occurs."⁴⁸

As Sonja Schmid explains in this volume, at the time of the Chernobyl accident there was no legal framework for handling nuclear compensation in the Soviet Union. Instead, the compensation scheme for victims of the Chernobyl disaster was based on existing procedures for processing compensation and social benefits for war veterans, disabled persons, and others. Under this administrative process for processing compensation payouts, "privilege and compensation were determined according to the levels of radioactive contamination in the territories."⁴⁹ Twelve different levels of entitlement and compensation were developed according to different radiation dose levels and locations of residence. However, this scheme ultimately failed due to the Soviet Union's economic crisis and eventual collapse. Schmid observes, "Many of the benefits, privileges, and compensation alike, might have been enough and more or less effective in a system with full employment, state-provided housing, state-run medical and education systems and a controlled currency."⁵⁰ The history of the evolution of the compensation frameworks in Russia and other affected former Soviet countries shows how states have struggled with the definition of "affected" areas and persons. As medical anthropologist Adriana

Petryna has powerfully shown, victims struggled to prove the harm they had sustained.⁵¹

The three reports on the Fukushima, Three Mile Island and Chernobyl accidents, respectively, amply demonstrate the limitations of existing compensation schemes. Each accident poses fundamental questions about what constitutes victimhood, what counts as damage, and how to prove the causal linkage between radiation exposure and medical symptoms in the context of a nuclear power plant accident. The fourth report, authored by three legal scholars, Mary Mitchell, Annelise Riles, and Dai Yokomizo, addresses issues raised by several trans-border lawsuits concerning compensation claims related to the Fukushima disaster. These include a case involving US military personnel who participated in Operation Tomodachi, a disaster response operation completed by US military forces immediately following Japan's triple disaster. The authors discuss how Fukushima was not the first nuclear disaster whose impacts went beyond the borders of a single country. The Chernobyl disaster significantly affected many parts of Europe. After the Chernobyl disaster, however, the Soviet Union did not provide compensation for any harm resulting from the accident outside Soviet territory. At that time, the Soviet Union was not a signatory to any of the existing international conventions governing nuclear compensation, and various affected European countries handled compensation claims mostly internally within each country's framework for dealing with environmental disaster.

Mitchell, Riles, and Yokomizo note Japan was not a signatory to any international conventions at the time of the Fukushima disaster either, and this has ironically created opportunities for cross-border lawsuits for victims. This is particularly ironic given that the Japanese government's initial hesitation to join the Convention on Supplementary Compensation for Nuclear Damage of 1997 (CSC) had much to do with the convention's impact on jurisdictional issues. The CSC gives jurisdiction to the country in which an accident occurs and prior to the Fukushima disaster, the Japanese government was reluctant to join because it would prevent Japanese victims of a nuclear accident in a neighboring country, such as China and Korea, from using the Japanese legal system to wage lawsuits against the operator of the troubled power plant.⁵² At that time, the Japanese government perhaps did not take seriously the possibility of facing a nuclear disaster in Japan and its transnational repercussions. Precisely because Japan was not a signatory to the CSC at the time of the Fukushima disaster, however, TEPCO and the Japanese government can be sued outside of Japan for damage stemming from the disaster, and several lawsuits have taken advantage of this situation.⁵³

The cross-border lawsuits discussed by Mitchell, Riles, and Yokomizo challenge the current dominant framework for considering nuclear compensation. They tackle transnational legal issues likely to arise from a future major accident due to the pervasive lack of attention to cross-border issues as well as to the unevenness with which the international conventions govern nuclear compensation across national borders. As the report notes, "the question of liability for cross-border harm has not been extensively tested."⁵⁴ The report offers legal strategies for pursuing compensation in cross-border contexts from the perspective of private international law or conflict of laws.

Keeping the Future in View

The disaster in Fukushima has certainly challenged the notion that nuclear energy is cheap. Given the negative health and environmental effects of uranium extraction in

Africa and elsewhere, nuclear energy may not be as sustainable as it may seem. However, it is probably not realistic to envision a nuclear-free world in the near future. Given the distinctively long-range perspective nuclear energy demands due to issues such as spent fuel storage, reactor decommissioning, and disaster cleanup, nuclear energy expertise will inevitably be essential for years to come.

It is important to remember, however, that another accident will undoubtedly occur somewhere sometime in the future. More power plants are being built in China and other developing countries. Some of these countries are not signatories to any international conventions and their domestic compensation schemes and financial capabilities are not as robust as those in the US, Japan, and elsewhere in the developed world. More significantly, trans-border conflicts similar to those arising from the Fukushima disaster will arise if a major accident occurs in countries that are not party to any international conventions. More attention needs to be paid to the issue of nuclear compensation, as part of preparedness and response efforts, as well as to the prevention of future nuclear accidents.

All the chapters in this report stress the importance of careful attention to victims' experiences with compensation schemes and lawsuits. Victims have never been part of the policy debate about the design of the domestic and international legal frameworks for nuclear compensation. From victims' perspectives, neither a system relying heavily on litigations, such as the US framework, nor the ad-hoc administrative schemes for processing compensation claims developed for Chernobyl and Fukushima victims have proved effective, for different reasons. Importantly, the Fukushima case demonstrates the limitations of both systems. Compensation paid so far is large but not sufficient. It is not enough for those who have received it because it does not even begin to address a much broader range of types of damages and losses these victims have actually experienced. Moreover, the current compensation scheme does not address the grievances of many others who did not reside in the mandatory evacuation zones. Collective lawsuits against TEPCO and the Japanese government have seen some initial successes, but they are likely to face an uphill battle as they are appealed to higher courts, just like the long and ultimately unsuccessful lawsuit related to the Three Mile Island accident in the US.

The key lesson from Three Mile Island, Chernobyl, and Fukushima is this: victims and their concerns about and experiences with compensation schemes have been consistently ignored by governments and energy policy experts. This conclusion calls for careful attention to the specificity of each victim's individual case and claim as well as the breadth, depth, and distinctive duration of the impacts of a nuclear accident. This does not necessarily mean that a unique solution needs to be found for each individual case or that a blanket solution needs to be developed to cover all kinds of damage and loss claim in perpetuity. Rather, it demands listening carefully to victims and incorporating their concerns into the design of a compensation scheme, especially one that reimagines compensation beyond monetary terms. What is at stake here are massive inequalities in power, knowledge, and access to resources, all of which are not only pressing moral issues, but also potential impediments to the production of scientific knowledge and effective public policies. Indeed, compensation is not simply an economic or financial issue; there are limitations to what money can do to redress damage or loss. Compensation is a moral issue that is intertwined with macrolevel public policy issues and microlevel personal issues.⁵⁵ In this sense, compensation is ultimately a matter of hope to the extent that it may allow victims as well as their society to move on and create new future relations.⁵⁶ In

light of the public distrust in expertise, such efforts may ultimately reach well beyond the nuclear energy sector.

At the minimum, this report calls for the establishment of an inclusive and ongoing process for incorporating diverse perspectives—especially those of victims, in the broadest sense of the term—in the continuous readjustment of nuclear compensation schemes. This report suggests that this simple step has never been taken largely because policy makers, regulators, industry specialists, legal professionals, and even the broader public persist in learning about only the most eclectic issues from nuclear disasters.

Svetlana Alexievich remarks in *Chernobyl Prayer*, “Chernobyl is, above all, a catastrophe of time. The radionuclides strewn across our earth will live for 50,000, 100,000, 200,000 years. And longer. From the perspective of human life, they are eternal.”⁵⁷ She defines her book, a collage of stories about Chernobyl, as a chronicle of the future: “What lingers most in my memory of Chernobyl is life afterwards: the possessions without owners, the landscapes without people. The roads going nowhere, the cables leading nowhere. You find yourself wondering just what this is: the past or the future. It sometimes felt to me as if I was recording the future.”⁵⁸ What this report offers is nothing short of a glimpse of the ongoing struggles to keep this futurity in view while seeking a better way to prepare ourselves for and manage a future crisis. The lessons from Fukushima lie precisely in these struggles.

1. Miller 2011, vii
2. Kurokawa 2012, 9
3. See Samuels 2013, 200
4. Perrow 1990, 5
5. Lochbaum 2014, 247
6. See, e.g., Green 2016; and Mayer 2015, 369-390 for in-depth analyses of compensation issues related to relocation for the construction of a hydropower dam in Laos and the “Deepwater Horizon” oil spill case.
7. Morita 2013, 94 See also Gill 2013, 94
8. Tokyo Electric Power Company, “Records of Applications and Payouts for Compensation of Nuclear Damage,” February 5, 2021, https://www.tepco.co.jp/en/hd/responsibility/revitalization/pdf/comp_result-e.pdf.
9. Nihon Bengoshi Rengokai (Japan Federation of Bar Associations), “Bengoshi hakusho 2019-nen ban” (Attorney white paper 2019), pp. 140-141,
10. See, for example, Alexievich 2013
11. See also Mitchell, Riles, and Yokomizo, this volume.
12. Endo 2013, 25
13. Endo 2013, 25-26, 57-81; Mitchell, this volume; and Mitchell, Riles, and Yokomizo, this volume.
14. Mitchell, this volume; Mitchell, Riles, and Yokomizo, this volume.
15. WNA 2018
16. Lerner 2014, 591
17. Lerner 2014, 593

18. Lerner 2014, 594
19. See Mitchell, this volume.
20. Endo 2013, 47-48
21. Endo 2013, 44
22. *Act on Nuclear Damage Compensation*, Act No. 147, Section 16, 1961.
23. Endo 2013, 40
24. Endo 2013, 27
25. *Act on Nuclear Damage Compensation*, Act No. 147, Section 3, 1961; Endo, *Genshiryoku songaibaisho*, 153-162.
26. Endo 2013, 160
27. See, for example, Miyazaki 2014, 127-140
28. See, for example, Riles 2013, 555-569
29. Endo 2013, 227-28
30. See Mitchell, Riles, and Yokomizo, this volume.
31. Chunichi Shimbun Shakaibu, *Nichibei-domei to genpatsu: Kakusareta kaku no sensgoshi (The US-Japan Alliance and Nuclear Power Plants: The Hidden History of Nuclear Energy in Postwar Japan)* (Nagoya: Chunichi Shimbun, 2013); Matthew Penney, "Nuclear Nationalism and Fukushima," *The Asia-Pacific Journal* 10, no. 11 (March 5, 2012): 1-23.
32. Endo 2013, 34
33. See also Oshima 2011
34. See also Hecht 2012
35. See Ashina, this volume.
36. See Ashina, this volume; Suami, this volume.
37. See Fujinaga, this volume.
38. See Suami, this volume.
39. Suami, this volume.
40. Suami, this volume; Suami, Ashina and Takahashi, this volume.
41. See Takahashi, this volume.
42. Suami, this volume.
43. Mitchell, this volume.
44. Mitchell, this volume.
45. Mitchell, this volume.
46. Mitchell, this volume.
47. Mitchell, this volume.
48. Mitchell, this volume.
49. Schmid, this volume.

50. Schmid, this volume.
51. Petryna 2002
52. Endo 2013, 105-108
53. Mitchell, Riles, and Yokomizo, this volume.
54. Mitchell, Riles, and Yokomizo, this volume.
55. Koga 2013, 503
56. Miyazaki 2004
57. Alexievich 2013, 24
58. Alexievich 2013, 33

BIBLIOGRAPHY

Alexievich 2013

Alexievich, Svetlana. *Chernobyl Prayer: A Chronicle of the Future*. Translated by Anna Gunin and Arch Tait. New York: Penguin Books, 2013.

Endo 2013

Endo, Noriko. *Genshiryoku songaibaisho sendo no kenkyu: Tokyo Denryoku Fukushima Genpatsu jiko kara no kosatsu / A Study of Nuclear Power Damage Compensation Schemes: Considerations from the Tokyo Electric Power Corporation Fukushima Power Plant Accident*. Tokyo: Iwanami-shoten, 2013.

Gill 2013

Gill, Tom, Brigitte Steger, and David H. Slater, eds. *Japan Copes with Calamity: Ethnographies of the Earthquake, Tsunami and Nuclear Disasters of March 2011*. Oxford: Peter Lang, 2013.

Green 2016

Green, W. Nathan and Ian G. Baird. "Capitalizing on Compensation: Hydropower Resettlement and the Commodification and Decommodification of Nature-Society Relations in Southern Lao." *Annals of the American Association of Geographers* 106, no. 4 (2016): 853-873.

Hecht 2012

Hecht, Gabrielle. *Being Nuclear: Africans and the Global Uranium Trade*. Cambridge, MA: MIT Press, 2012.

Koga 2013

Koga, Yukiko. "Accounting for Silence: Inheritance, Debt, and the Moral Economy of Legal Redress in China and Japan." *American Ethnologist* 40, no. 3 (2013): 494-507.

Kurokawa 2012

Kurokawa, Kiyoshi, Katsuhiko Ishibashi, Kenzo Oshima, Hisako Sakiyama, Masafumi Sakurai, Koichi Tanaka, Mitsuhiro Tanaka, Shuya Nomura, Reiko Hachisuka, and Yoshinori Yokoyama. *The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission*. The National Diet of Japan, 2012.

Lerner 2014

Lerner, Ken, and Edward Tanzman. "Making Victims Whole: Compensation of Nuclear Incident Victims in Japan and the United States." *Legislation and Public Policy* 17 (2014): 543-94.

WNA 2018

"Liability for Nuclear Damage." World Nuclear Association, 2018. <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/liability-for-nuclear-damage.aspx>.

Lochbaum 2014

Lochbaum, David, Edwin Lyman, Susan Q. Stranahan and the Union of Concerned Scientists. *Fukushima: The Story of a Nuclear Disaster*. New York: New Press, 2014.

Mayer 2015

Mayer, Brian, Katrina Running, and Kelly Bergstrand. "Compensation and Community Corrosion: Perceived Inequalities, Social Comparisons, and Competition Following the 'Deepwater Horizon' Oil Spill." *Sociological Forum* 30, no. 2 (2015): 369-390.

Miller 2011

Miller, Charles, Amy Cubbage, Daniel Dorman, Jack Grobe, Gary Holahan, and Nathan Sanfilippo. *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*. Nuclear Regulatory Commission, 2011.

Miyazaki 2004

Miyazaki, Hirokazu. *The Method of Hope: Anthropology, Philosophy, and Fijian Knowledge*. Stanford, CA: Stanford University Press, 2004.

Morita 2013

Morita, Atsuro, and Shuhei Kimura. "Environmental Infrastructures of Emergency: The Formation of a Civic Radiation Monitoring Map during the Fukushima Disaster." In *Nuclear Disaster at Fukushima Daiichi: Social, Political and Environmental Issues*, edited by Richard Hindmarsh, 78–96. New York: Routledge, 2013.

Oshima 2011

Oshima, Kenji. *Genpatsu no kosuto: Enerugi tenkan eno shiten | The Costs of Nuclear Energy: A Perspective on Energy Shift*. Tokyo: Iwanami-shoten, 2011.

Perrow 1990

Perrow, Charles. *Normal Accidents: Living with High-Risk Technologies*. Princeton: Princeton University Press, 1990 [1984].

Petryna 2002

Petryna, Adriana. *Life Exposed: Biological Citizens after Chernobyl*. Princeton: Princeton University Press, 2002.

Riles 2013

Riles, Annelise. "Market Collaboration: Finance, Culture, and Ethnography after Neoliberalism." *American Anthropologist* 115, no. 4 (2013): 555–69.

Samuels 2013

Samuels, Richard J. *3.11: Disaster and Change in Japan*. Ithaca, NY: Cornell University Press, 2013.

The Compensation Scheme for the Nuclear Power Plant Disaster in Fukushima

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The accident at the Fukushima Daiichi Nuclear Power Plant, triggered by the Great East Japan Earthquake on March 11, 2011, is the most recent large-scale nuclear accident in the world. The main goal of our chapter is, through providing detailed case studies based on invaluable lessons that we have learned from the Fukushima nuclear accident, to make a contribution to global conversation regarding possibilities and limits of damage compensation when a nuclear accident occurs. We also hope that our reports on the Fukushima accident will invite a broader discussion on our collective future relationship with nuclear power. With the goals in mind, our chapter presents a collection of essays, which are organized as Section I through Section VII.

Section I gives a brief overview of questions on disaster compensation. Section II provides a general outline of the current Japanese nuclear damage compensation scheme and its limitations. Section III reports on the factual basis for compensation; that is, actual damages that the victims of the Fukushima accident have sustained. The team has followed a common format for summarizing results of interviews and surveys conducted on four types of victims: mandatory evacuees, voluntary evacuees, farmers, and fishers. Section IV focuses on Fukushima's fishing industry and discusses meanings of damage and reconstruction. Section V provides a general outline of contentious issues that have surfaced in Japan while nuclear accident damage compensation payments proceed. This section draws attention to limitations to relief for victims through compensation as well as difficulties involved in the design of a compensation scheme. Section VI discusses lawsuits that have been filed seeking an injunction on the resumption of operation at various nuclear power plants in Japan. Although these lawsuits have no direct relationship with the issue of compensation, it provides a broader context to the state of nuclear energy in Japan.

Lastly, Section VII concludes our chapter by laying out the current conditions of the Fukushima nuclear accident and posing questions for the creation of future conventions.

SECTION I – WHY DISCUSS COMPENSATION?

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Another nuclear-related accident is bound to occur in the future; we just do not know when and where. It is nevertheless a certainty. One thing we should do in preparation for this unavoidable future crisis is to pool our knowledge together. Sharing, engaging in discussion, and globally disseminating information about past accidents is particularly meaningful. The goal of this report prepared by members of the “Fukushima Team,” though the joint project of Meridian 180 and the Cornell University Mario Einaudi Center for International Studies, is to share the information with people within and outside Japan, regarding what we have observed and what we have learned through our respective activities related to this most recent nuclear power plant accident at the Fukushima Daiichi Nuclear Power Plant. More specifically, this introductory section seeks to outline the current state of the nuclear power plant accident aftermath and draw attention to issues from the perspective of damage compensation.

There are several reasons why we chose to focus on damage compensation for this project. Due to the safety myth surrounding nuclear power plants, the costs of nuclear energy are often calculated based only on the costs of their construction and maintenance. If we assumed that nuclear power plant accidents inevitably occur, however, it would be necessary to add in accident-related costs as well. Moreover, when it comes to post-accident costs, we tend to focus our attention on expenses related to damage compensation. However, we must also consider the existence of damages that cannot be fully taken into account through existing damage compensation schemes. For example, the experiences of voluntary evacuees, in which attorney Yuki Ashina has been involved in, draw attention to the existence of damages whose monetary value cannot be easily computed. These damages include the loss of hometowns, human relationships, and families.

Problems with Fukushima's existing damage compensation scheme are also related to the issue of what counts as “reconstruction.” While damage compensation usually provides payments for things lost, it is important to note that, in the case of nuclear power plant accidents, losses continue to be produced for a long period of time. Thus, losses do not only exist in the past when the actual accident occurred but also in the present and future. Now, nearly ten years following the Fukushima nuclear accident, many continue to question whether the responsibility for damage compensation has been adequately fulfilled, whether those people who left towns for evacuation will come back after the lifting of the restriction orders, and when the farming and fishing industry will recover. This disaster is, indeed, still ongoing for the people of Fukushima, and reconstruction continues to be a goal for the distant future. The responsibility for the nuclear accident as well as its costs must thus be understood in the context of such a long-term reconstruction process.

The 2011 Fukushima Daiichi Nuclear Accident provided an opportunity to discuss issues surrounding nuclear energy in regions all over the world. While some countries are attempting to reduce their dependence on nuclear power, there are other countries that are developing new forms of nuclear power generation. Even in

Japan, where the accident took place and continues to resonate, the reactivation of nuclear power plants is an argument that divides the country. How should humanity deal with nuclear energy as we turn toward the future? The present international joint project has only just begun its bold attempt to answer such questions, and we believe that this report will put us on the proper path for developing future discussions.

SECTION II — OVERVIEW OF THE DAMAGE COMPENSATION SCHEME FOR THE FUKUSHIMA DAIICHI NUCLEAR POWER PLANT ACCIDENT

Yuki Ashina, Attorney, Shizuoka Bar Association

Introduction

Since the Fukushima nuclear accident occurred in 2011, a certain level of compensation has already been paid to victims of the nuclear accident. To some extent the compensation paid so far has contributed to recovery from accident-related damages, but there are other kinds of damages that have not been indemnified by this compensation. The main goal of this section is to introduce the existing damage compensation scheme in Japan. The other goals are to show what kinds of damage are being addressed in the current damage compensation scheme and what damages are falling between the cracks of this scheme, specifically those regarding different categories of victims; and to visualize the nature of the damages and injuries wrought by the nuclear accident and consider the challenging question of what is necessary for victim relief.

Legal Framework

The following is a set of laws that form the basis for the existing damage compensation scheme. Firstly, because Article 3.1 of the Japanese Act on Compensation for Nuclear Damage (hereafter referred to as the “Nuclear Damage Compensation Act”) stipulates that “in the event of nuclear damage caused by the operation of a nuclear reactor or the like, the nuclear operator involved in the operation of the nuclear reactor or the like bears responsibility for such damage,” the nuclear operator, Tokyo Electric Power Company Holdings, Inc. (TEPCO), is responsible for damage compensation.

However, the total dollar amount of damage compensation exceeds TEPCO's ability to pay—according to TEPCO's official public statement: approximately 9.7 trillion yen, about 92 billion dollars as of February 5, 2021.¹ As a result, the Nuclear Damage Compensation Facilitation Corporation Act was enacted in August 2011 based on Article 16 of the Nuclear Damage Compensation Act that stipulates support by the national government. In September of that year, the Nuclear Damage Compensation Facilitation Corporation (now titled the Nuclear Damage Compensation and Decommissioning Facilitation Corporation) was established, and through it, the Japanese national government has been providing compensation funds. It is also important to note that this body not only gives financial support to TEPCO but also provides compensation consultation services for victims with the cooperation of a large number of attorneys and notaries public. Over the period from October 2011 to

March 2020, a total of 39,239 cases of consultation and information provision (cyclical, permanent-type, etc.) in and outside Fukushima prefecture have been handled.²

Criteria for Compensation

The criteria for the provision of damage compensation by TEPCO primarily relies on the guidelines officially published by the Dispute Reconciliation Committee for Nuclear Damage Compensation (hereafter referred to as the Reconciliation Committee) established under Article 18 of the Nuclear Damage Compensation Act. The Reconciliation Committee has published its official guidelines intermittently since April 2011 and because the core criteria, “Interim Guidelines,” were publicized in August of that year, the series of criteria published by the Reconciliation Committee will be referred to in this section as the “Interim Guidelines, etc.”

The Interim Guidelines, etc., have presented uniform and clear criteria and thereby realized simplified and rapid damage compensation, but these criteria are literally interim guidelines and do not constitute the finalized compensation criteria. For this reason, they feature the following characteristics: 1) the awarding and amount of compensation is linked to whether or not evacuation was ordered in the established zone; 2) monetary amounts are uniform and clear (for example, the amount generally awarded for “mental damages” is fixed at 100,000 yen, or approximately 968 dollars, per month per person); and 3) as a rule, when the evacuation orders are discontinued, so is compensation. Put another way, the Interim Guidelines, etc. have provided uniform criteria about compensation items and the amount of compensation based on the geographical area in which the victims resided at the time of the accident. Residents living outside of the ordered evacuation zones as a rule are not awarded compensation, and the awarded compensation amounts vary widely even for those living inside the evacuation zones, depending on where the victim lived (i.e., in “difficult-to-return zones,” “restricted residential zones,” or “zones in preparation for the lifting of evacuation orders”). That being said, residents will not receive compensation once a zone’s evacuation orders have been lifted.

However, the actual damage cannot be classified or uniformized as simply as the Interim Guidelines, etc. dictate. For residents inside difficult-to-return zones, family composition, occupation, and lifestyle status will differ, as will the damage, loss, and injury they might have received from the accident. At the same time, for residents outside the zones in which evacuation was ordered, there are a considerable number of people who chose to evacuate voluntarily. While these residents would never have evacuated had there not been a nuclear accident, they are nonetheless excluded from nuclear disaster compensation under the Interim Guidelines, etc.

Moreover, TEPCO treats the Interim Guidelines, etc. as though they constitute final compensation criteria, instead of as “interim,” “provisional,” or “temporary,” and does not accept compensation damage claims not described in the Guidelines. While it is obvious that the Interim Guidelines, etc. are not criteria meant to provide aid in accordance with the wide range of individualized circumstances of damages, at the very least the damage calculated in monetary terms needs to combine “damage compensation receivable under the Interim Guidelines, etc.” and “damage compensation that varies according to the individual” in a tailor-made way for each victim.

The Compensation Application Process

It is likely that victims will employ one of the following three methods in their specific compensation request process: (1) a direct claim made to TEPCO in line with the criteria of the Interim Guidelines, etc., (2) an application to the Nuclear Damage Compensation Dispute Resolution Center, or (3) a lawsuit. Each of these has its own advantages and disadvantages.

Firstly, for (1) a direct claim made to TEPCO, a compensation claim may be submitted by merely filling out the prescribed form, with the advantage of simplified and rapid receipt of payments. On the other hand, as described in the preceding paragraph, the disadvantage here is that one cannot receive compensation beyond the criteria stipulated in the Interim Guidelines, etc. Under the Interim Guidelines, etc. those persons excluded from “victim” status cannot use this method.

Next, (2) the Nuclear Damage Compensation Dispute Resolution Center (hereafter referred to as “The Center”) is an extra-judicial mediation and conciliation authority in charge of dispute resolution, established under the Dispute Reconciliation Committee for Nuclear Compensation. This route is used by victims seeking compensation who could not obtain consent to employ the application procedure (1), or by those seeking damage compensation that takes into consideration one's specific individual circumstances. At the Center, several hundred lawyers work as intermediary committee members and investigators. After they accept victim complaints, they review details while listening to opinions from TEPCO. They then present their proposals for amicable settlements to both sides. Since their proposals are not necessarily bound by the Interim Guidelines, etc., it is possible for victims to receive damage compensation in an amount equal to or greater than that which TEPCO would offer. This procedure can thus be significantly advantageous for victims.

However, it gradually became obvious that the Center's overall proficiency in dispute resolution was in decline. The Center does not provide arbitration but mediation and conciliation. In the Center's planning stage, exercising a binding force on TEPCO alone with regard to the settlement proposals proposed by the Center was considered, but because TEPCO repeatedly claimed that it would sincerely accept the Center's settlement proposals, the motion to enforce a one-sided binding force was denied. At the beginning, TEPCO accepted all settlement proposals from the Center. However, since the spring of 2014, TEPCO has refused to accept some settlement proposals, especially regarding mass claims such as Namie residents' claim discussed below. Because of this issue, disputes have not been resolved in a timely manner for many of the victims. As TEPCO started refusing to accept settlement proposals, the Center began proposing settlements with reduced compensation amounts, hoping to avoid TEPCO's refusals. This created disadvantages for some victims, where the compensation amounts they accept from the Center are sometimes less than those from direct claims. From the victims' point of view, it was not made clear, at the application stage, whether they would receive compensation equal to or more than those specified in the Interim Guidelines.

The lawsuit method (3) is the victim's only choice if either methods (1) or (2) of seeking compensation cannot be pursued. As far as we know, as of August 31, 2019, lawsuits are pending in 18 prefectures nationwide, with the total number of plaintiffs exceeding 12,000

individuals.³ For both direct claims and mediation and conciliation through the Center, the receipt of damage compensation ultimately depends on TEPCO's consent. Thus, a significant advantage of a lawsuit is that it does not require a prior mutual agreement between the parties, and the victim can hope for a favorable decision from the court. However, lawsuits can be disadvantageous from the victim's point of view in that the procedure takes a considerable amount of time and there is no guarantee that the victim will be happy with the judgment.⁴

There are many cases in which victims who claim damage compensation are unsatisfied with the results from making only a direct claim (1), and it might seem desirable to apply to the Center (2), or file suit in court (3), but in reality, the majority of victims ultimately make only the direct claim (1).

Issues with Nuclear Damage Compensation Schemes

In the next section, Section III, Suami delves into the details of the issues surrounding nuclear damage compensation schemes, but here I would like to call special attention to two particular issues. First, all victims need a method that leads to compensation claims, yet there is a lack of awareness around how to connect victims to means of compensation. The Hamadori region along the coastline of Fukushima Prefecture near the damaged nuclear power plant has long been a sparsely populated area, and the number of attorneys is also extremely low compared to urban areas. Thus, in general, there has historically been few opportunities for people in these rural areas to consult an attorney proactively and attempt resolution on a legal basis. Additionally, in the wake of the nuclear accident, those evacuees—mandatory and voluntary alike—who moved to different prefectures across the nation faced further difficulty in accessing legal experts for their consultation.

As mentioned in the previous section, the damage (and possible levels of compensation) experienced by different individuals varies but strong support from lawyers was still necessary to make specific damage compensation claims. However, for those individual evacuees from rural towns in Fukushima, the general lack of familiarity with legal experts as well as the physical and social distance from their hometowns made it difficult to come up with concrete damage compensation claims. Such an issue was especially apparent among local cities and towns without aggressive leadership in uniting evacuees and gaining compensation. An exception was the town of Namie in Fukushima Prefecture, which spearheaded proactive efforts to address the compensation problem.⁵

Second, there was a fundamental problem in that suffering from the nuclear accident would not be relieved by damage compensation alone. As the next section's three case reports point out in greater detail, the nuclear accident affected things beyond those that can easily be calculated in terms of monetary value, such as one's home or employment. The nuclear accident also destroyed people's hometown, a sense of community, interpersonal relationships, and people's sense of purpose in life, but it is extremely difficult to put a dollar amount on those losses. The reality is that some damages deprive victims of things upon which no monetary value can be placed—these damages cannot be relieved by means of damage compensation alone. Thus, for victims to recover their purpose in life and human dignity, it is crucial that post-disaster reconstruction policies play an essential role. In reality, however, the only means available to set evacuees on the path to reconstruction was monetary damage compensation, and a recovery of victims' humanity has largely been excluded from the agenda for post-disaster reconstruction.

SECTION III — CASE STUDY REPORTS OF NUCLEAR DAMAGE

(1) Mandatory Evacuees: The Case of the Town of Namie

Takao Suami, Waseda Law School

Damage (Suffering and Damages Sustained by Victims)

According to an interview survey of 9,384 Namie residents, conducted by Waseda University's Legal Assistance Project for Restoration from Great East Japan Earthquake from April to May, 2013, the damage suffered by mandatory evacuees is roughly classified below:

1. Breakup of the family. There were many three-generation family households in Namie prior to the accident. After the accident, however, in many cases it was impossible to secure a joint residence in the evacuation destination on the same scale as the previous conditions in Namie, so senior citizens had no choice but to live alone.
2. Income reduction/lifestyle difficulties. Reductions were observed among town residents at all income levels.
3. Anxiety and mental anguish. Many residents were exposed to a high level of radiation while evacuating from their town. Therefore, they are frightened of future health effects. Furthermore, not only were the residents forced to move against their will, but it was also unclear when they would be able to return home, and even after returning home, the chances of returning to the same lifestyle as before were low. All of these factors cause considerable anxiety about the future.

Compensation (i.e., Compensation Paid to Victims Suffering Damages)

As mentioned in Section II, the Reconciliation Committee was established based on the Nuclear Damage Compensation Act, in accordance with the Interim Guidelines, etc. It provides compensation payments to mandatory evacuees for property damage (loss of use of land and housing, loss of income from business shutdowns, etc.) and mental suffering (mental anguish accompanying evacuation). These Guidelines were sufficient for managing a large amount of compensation claims in a relatively short period of time, but there was strong criticism concerning both how it was formulated and the appropriateness of the compensation amounts.

Damages That Can't be Calculated in Terms of Compensation

Excluding negligence on the part of TEPCO, compensation claims are made based on tort law for compensation for damages caused by illegal acts. Because of this, some of the damages (for example, the destruction of communities) cannot be fully calculated at face value. Also, even when they are, the way they are ascertained might not be appropriate, resulting in a portion of damages that cannot be fully comprehended.

Other Issues

The legal principle of damage compensation based on tort law is generally effective for handling individual damage cases such as traffic accidents. However, unlike cases

where damage occurs only to a specific individual or a part of society, nuclear damage is spread across a region covering the entire area. For this reason, it is not appropriate to rely solely on damage compensation to individuals as a means to recover from the damage. Damage incurred by individuals must definitely be compensated but compensation payments bring about new problems and suffering. For example, the town of Namie was classified into three zones based on the intensity of the radiation dose received: namely, zones in preparation for the lifting of evacuation orders, restricted residential zones, and difficult-to-return zones. The property-related/mental anguish damage compensation criteria vary zone-to-zone.

The extent of contamination from radioactive material is not spread uniformly within each zone but is non-uniform. As such, it is not necessarily the case that all locations within the difficult-to-return zone exhibit higher levels of radiation than do restricted residential zones; subjective and discretionary factors are probably inherent in drawing such zoning lines. However, if and when a zone is classified as difficult-to-return, the victims in that zone will certainly enjoy higher compensation than do the victims in the restricted residential zone. This demarcation will have the effect of breaking down the local community in Namie and will likely hinder reconstruction from the nuclear accident.

(2) Voluntary Evacuees

Yuki Ashina, Attorney, Shizuoka Bar Association

I will analyze the nature of damages incurred by “voluntary evacuees” and their compensation. First, “voluntary evacuees” means the people who evacuated based on their own decisions from the areas where the Japanese government did not order evacuations because the total amount of radiation exposure in the area was assumed to be less than 20 millisieverts per year. They are also called “the evacuees from out of the ordered area.” The areas where voluntary evacuees originally lived encompass not only Fukushima Prefectures but also Northern Kanto and Metropolitan areas in Japan. The areas where they evacuated to range all over Japan.

There are many people who evacuated from the originally ordered evacuation areas and then have remained evacuated even after the evacuation orders were lifted, and they can be included in the “voluntary evacuees.” However, I want to focus on the people who evacuated from the areas that were not originally ordered to evacuate. There are no official statistics about the accurate number of these voluntary evacuees because they are not recognized as official evacuees by Japanese government. However, the number was assumed to be about 40,000 in September 2011 according to the website of the Ministry of Education, Culture, Sports, Science and Technology.⁶ It can be assumed there are still many voluntary evacuees even now.

One of the most unique points for voluntary evacuees is that most of them took their infant or school-aged children with them during evacuation. This is because the main reason they decided to evacuate was to avoid low-level radiation exposure that may cause harmful health effects several decades later. It is also characteristic of many voluntary evacuee families that they were composed of only mothers and children because most fathers found it necessary to remain and continue working in order to keep their family income.

Compensation

Though voluntary evacuees were not recognized as needing compensation, the fourth interim guideline (a supplemental guideline of the Interim Guidelines), announced in December 2011, stipulated that they would be paid the money detailed below. The fact that there were some geographic areas outside the mandatory evacuation zone in which the radiation level was actually quite high made this possible. In addition, a conference held to determine the criteria of compensation for the Fukushima accident that included some voluntary evacuees' appeals regarding their disastrous situations also promoted their need for compensation. TEPCO complied and paid compensation as follows:

1. Children under eighteen and pregnant women in specific areas would receive 680,000 yen (about 6,577 dollars) per person for mental suffering.
2. Adults except pregnant women would receive 80,000 yen (about 773 dollars) for mental damage and 40,000 yen for incidental expenses, totaling 120,000 yen (about 1161 dollars)

In addition to this compensation, some voluntary evacuees were able to receive extra compensation for evacuation expenses or rental fees for residences to live in during evacuation through using alternative dispute resolution (ADR) held via the Center. However, those who were eligible to receive extra compensation lived in limited specific areas such as Yamagata prefecture and Niigata prefecture where specialized attorneys could support them.

Despite these compensation options, the relief policy for voluntary evacuees is not adequate for several reasons. First, eligible areas were limited to certain, partial areas (Fukushima City, Koriyama City, Soma City and so on) despite evacuees having moved from various areas. Second, the amount of money they received is much less than what mandatory evacuees received, even though voluntary evacuees also spent huge amounts of money to evacuate (as discussed further later). Lastly, though there was a system to provide all evacuees with money for rent through the local governments based on the Disaster Relief Act, the free rent policy was terminated in March 2017.

Damages of Voluntary Evacuees

Financial Hardship

The distinguishing characteristic of the damages of voluntary evacuees was that most of them had to pay for living expenses in both their original households and their evacuated households, in addition to expenses for transportation, furniture, and daily living that mandatory evacuees also incurred. Unlike mandatory evacuees, however, voluntary evacuees did not receive damages for lost earnings or monthly compensation for mental suffering caused by evacuation. They could only receive the one-time allowance mentioned above, and thus many voluntary evacuees chose to divide their households to secure their living expenses. In a typical case, one parent remained in Fukushima to continue their job and maintain (to some extent) the family's income and the other parent (in many cases, the mother) evacuated with their children. Many voluntary evacuees subsequently fell into financial hardship.

High Anxiety Over Losing Residences

As the policy of lending rent money was supposed to be reviewed once a year based on the Disaster Relief Act, a number of voluntary evacuees had high anxiety about

how long the evacuation would last and when they would be able to return to their residences. According to the 91 free telephone consultation the Kanto Federation of Bar Associations held in July 2016, almost half of the evacuees had concerns about losing their residence.⁷

Concerns about the Destruction of the Community

Voluntary evacuees have two kinds of unique concerns about the collapse of their communities, which are distinct from the concerns shared with mandatory evacuees. Their first unique concern is the conflict between voluntary evacuees and those who chose to stay in their original residences or those who were forced to stay. Some voluntary evacuees feel guilty about their decision to leave their hometown. At the same time, those who could not or did not evacuate tend to blame the voluntary evacuees for causing an overall loss of trust in the safety in their areas. Those who did not evacuate were afraid that the existence of voluntary evacuees spread a negative image that the areas were too risky to continue to live in. The second unique concern is a conflict between voluntary evacuees and the mandatory evacuees. Some mandatory evacuees who have no place to return to, despite their eagerness to return, feel resentment for voluntary evacuees' decisions not to return, even though they have places to live in. Overall, many voluntary evacuees feel isolated because it is difficult for them to find peers to share their worries with both in their original communities and in the new communities they evacuated to.

Separation of Families

As mentioned before, one of the unique characteristics of voluntary evacuation is that there are many cases of family separation. Some relationships between husbands and wives or between parents and children were destroyed during the long evacuation. Some couples reached the decision to divorce. Above all, these kinds of damages cannot be solved through temporary and limited compensation or through the unstable provision of residences.

The Newly Established Law

The essential concern of voluntary evacuees is that they are not officially treated as “victims” of the nuclear power plant accident. Indeed, they did not evacuate following the orders of the Japanese government. However, it is also certain that they would have never chosen to evacuate had there not been an accident. Therefore, precluding them from the status of “victims” is not consistent with their actual situation. Voluntary evacuees largely decided to evacuate with the motivation of avoiding low-level radiation exposure, a reasonable decision given the uncertainties surrounding low level radiation exposure.

Under these circumstances, the new law, the “Act on Promotion of Support Measures for Lives of Disaster Victims to Protect and Support Children and Other Residents Suffering Damage Due to Tokyo Electric Power Company's Nuclear Accident” was made in June 2012. This law guarantees the right for each victim to choose between residing in their original location, relocating, or returning (Article 2). It also stipulates that the government shall make the utmost effort to eliminate any health concerns regarding external and internal exposure to radiation (Article 3) and to take responsibility for supporting evacuees in securing housing, finding employment, and providing for children's education. Thus, this new law was expected to give voluntary evacuees rights as victims of the accident.

However, the Basic Framework (Article 5) for policies to make each Article concrete was not decided for more than a year after the law was made. Though the Basic Framework was eventually announced in October 2013, the contents of the Framework were ultimately disappointing to voluntary evacuees because they limited the areas eligible for support to only 33 municipalities in the central and coastal areas of Fukushima prefecture. Further, there were few concrete policies to carry out the law.

In summary, there are only weak measures for voluntary evacuees as regards to both compensation and supporting policies so far.

(3) The Case of the Farmers Affiliated with the Fukushima-ken Nouminren (Fukushima Prefecture Farmers Group)

Nobuyo Fujinaga, Osaka City Residents Network

Economic Damages Suffered by Victims

The Fukushima-ken Nouminren (Fukushima Prefecture Farmers Group, hereafter “Farmers Group”) includes both those affiliated and those not affiliated with the Japan Agricultural Cooperatives (hereafter referred to as JA). The farmers in this group are working together to realize various demands, including satisfactory damage compensation, which they have successfully secured.

The fundamental stance of the Farmers Group is the following:

1. If victims delegate their demands to a third party, there is no way for them to assess what damage they have sustained or to know when and how much they will be compensated for the damage. The degree of damage varies from one victim to another. When confronting TEPCO, victims are encouraged to first assess the monetary value of the damage they have sustained, become convinced of the validity of their claim, and finally make a decision about their demand.
2. Instead of complying with TEPCO's demands for damage claim documentation, victims are encouraged to make TEPCO recognize their damage claims as a human rights issue. The victims negotiate their claims individually. Moreover, damage to agricultural products is not simply reputational damage, but is actual damage.

In Fukushima, cultivated land area and commercial farms have both shown a notable decrease of 26% compared to the pre-accident year of 2010, and this rate of decrease is much higher than the nationwide loss of 19%. Commercial farms, in particular, shrunk by 18,000 units, and the reduction was quite remarkable in the Hamadori region evacuation zones. Aging of the population has progressed, and the use and maintenance of farm lots are reaching their limits. The output of agricultural products in 2013 was 165.6 million yen, which had stagnated at approximately 80% of the 2009 pre-accident level. Other impacts on the market are found in a fear of “Fukushima-grown products,” and consequent price reductions.

Issues with the Reconstruction Policies of the Government, Decontamination Effects and Compensation

Rice Paddies

In 2011, the year of the accident, the radiation level of a harvest of unmilled rice exceeded 500 bq/kg, the radiation cutoff criterion at the time, and its shipment was suspended. Since 2011, measures to control cesium absorption have been implemented using zeolite and potassium spraying onto the fields. Every bag processed for shipment is inspected, and any unmilled rice that exceeds 100 bq/kg of radiation is not distributed for sale.

Orchards

In the winter of 2012, the trunks and branches of peach, apple, persimmon, and grape vines/trees were high-pressure washed to decontaminate them. The bark of pear trees was also scraped for decontamination. From 2014, measures to strip away the topsoil from groves, orchards, fields, etc. and transfer it to a corner of the farmland for decontamination have been carried out for the farmers who wished for it. As a consequence, radiation levels did fall, but there was no compensation for declines in crop yields due to the stripping of the all-important topsoil or its effect on the fruit trees.

Pastures

Radiation control measures combined the spraying and sprinkling of potassium as an absorbent with other methods such as the stripping of the topsoil, tilling using a plow, and deep plowing. Starting in 2015, cattle were allowed to graze once radiation analyses of the grass in the pastures showed lower than standard values. However, there are still concerns about cesium intake. For that reason, dairy farmers feed their animals not only grass from their land, but also purchased feed. There is no compensation for this purchased livestock feed, which is an increased burden on the farmers. Zeolite and potassium for decontamination is distributed through local government channels and agricultural cooperatives, and these expenditures are covered by the compensation funds.

Damage Compensation (Funds Paid for Damages Suffered by Victims)

If there is a clear causal relationship with the nuclear disaster, any difference in the sales volume or unit price of a produce from pre-accident standard figures is compensated. However, TEPCO sometimes arbitrarily demands additional documentation that was not needed immediately after the accident, and changes the method of payment of compensation. In particular, there are cases in which TEPCO refuses to take into account the natural increase in fruit yield (due to the tree's age) and delays compensation payment. As a result, farmers in Fukushima have less motivation to increase their production scale. For example, the price of spinach at a farmer's market has not changed since before the accident and remains 100 yen. In many of these cases in which the unit price of a produce has not dropped and yet the sale volume has dropped, no compensation is paid.

Following the accident, dairy farmers were not able to use grass from their land because of the radioactive contamination and had no choice but to quickly switch to purchased feed. In the aftermath of the disaster, dairy cows began to die regularly after giving birth. There was a farm in which six head of cattle died within six months.

Because TEPCO did not recognize any causal relationship to the accident, however, no compensation was paid. A claim for compensation for the decline in milk shipment was also lodged against TEPCO but no payments were made because TEPCO did not recognize the causal relationship between the death of cows and the nuclear accident.

Necessary additional expenses due to radiation testing and the accident are also being compensated. For example, inspection of agricultural products is naturally compensated as an additional cost, but expenditures for soil analysis are no longer compensated. The radiation level of much of the land in Fukushima Prefecture's Hamadori and Nakadori regions exceeds 40,000 bq/m². This figure shows that these regions technically qualify as radiation-controlled areas. Some farmers asked the Ministry of the Environment, the Ministry of Health, Labor, and Welfare, and the Ministry of Agriculture, Forestry, and Fisheries if the ministries saw any issues with farming in these areas. For over two years they received no straightforward replies, with some responses along the lines of "since you are a self-employed person, there are no departments that can address your concerns." Yet for laborers working in farming corporations, employers are required to carry out control measures such as radiation dose control and health diagnoses. There is a problematic contradiction in these policies.

Damages That Cannot be Calculated in Terms of Compensation

Following the nuclear accident, newly introduced criteria emerged mandating that no infringement of rights be recognized in areas where the radiation measures 20 mSv/year or less. These are government-mandated guidelines and they have in effect treated Fukushima as separate from the rest of Japan. Outside Fukushima Prefecture, the general public's annual dose limit is 1 mSv, the same as before the accident. The 20 mSv amount is considered as an emergency dose limit and serves as grounds for pain and suffering, grounds for evacuation, and grounds for compensation. The revocation of the criterion of 20 mSv is important for the reconstruction of Fukushima.

In the Farmers Group, the radiation dose in becquerels (Bq) of the members' farmlands is measured and is shared with the members wherever it is possible. The Ministry of Agriculture, Forestry, and Fisheries measures the air radiation dose rate (in Sievert) via aerial monitoring (2 km in all directions). However, farmers work the land itself, touching the soil and sometimes even inhaling its dust—radiation exposure is often particularly high in orchards since no tillage is done. The Farmers Group has been requesting that, rather than the air radiation dose rate, the radiation dose in becquerels should be used to measure radiation and inform the public. The circumstances force Fukushima farmers to labor in this affected area, and they are left with no choice but to risk exposure. They are demanding 30,000 yen per decare as damage compensation for their continued farm work in contaminated farmlands in the affected areas, but this has not come to fruition.

Responsibility (People and Groups Shouldering the Burden of Responsibility for Compensation Payments)

Fukushima-grown produce is sold at a low price because of the nuclear accident and the radioactive substances released by it, not because of misinformation consumers may have about risks associated with the produce from Fukushima. Most radioactive substances in harvested agricultural products are below the reference value or under test detection limits, but the farmlands are still contaminated with radioactive

substances. Reducing such damage to reputational damage in a situation in which there is no prospect of controlling the nuclear accident fallout or decommissioning the nuclear reactor itself is nothing but transferring responsibility to consumers. It should not be forgotten that the responsibility for the damage lies with TEPCO, which caused the accident, and the government that promoted nuclear power in the first place.

The Future Oriented Uses of Farmland: Toward Renewable Energy Enterprise

2012 saw the start of the renewable energy buyout guarantee scheme (Feed-In Tariff). Farmers are attempting to move away from nuclear power by generating energy they need themselves. To stabilize farm management, farms are being encouraged to install solar panels. Regional energy sources for local city residents and farmers are now indispensable for the sake of energy independence, intra-regional circulation of money, and the maintenance and development of local communities. Citizen-funded power plants have been built in Ryozenmachi in Date City with a maximum output of 50 kilowatts, and in Atami-cho in Koriyama City with a maximum output of 210 kilowatts. Further, corporations that generate power are being launched in various localities, promoting solar power generation. These initiatives make use of idle land owned by Farmers Group members. The planned total output is six megawatts. There are also plans to set up a power plant using methane gas generated through anaerobic fermentation of food residue, organic sludge, livestock manure, and energy crops.

	Units	Fukushima Prefecture	Fukushima Prefecture	Fukushima Prefecture	Fukushima Prefecture	Nationwide
		2015 A	2010 B	Change C (A-B)	Rate of Change (%) (C/B)	Rate of Change (%)
Agriculture & Forestry	# of Businesses	53,623	72,604	18,981	26.1	18.7
Agriculture	# of Businesses	53,157	71,654	18,497	25.8	18
Forestry	# of Businesses	2,721	4,929	2,208	44.8	37.7
Arable Land	Hectares (ha)	100,279	121,488	21,209	17.5	5
Rice Paddies	Hectares (ha)	77,283	90,572	13,289	14.7	4.8
Fields	Hectares (ha)	17,921	25,057	7,136	28.5	4.1
Lumber/ Forestry	Hectares (ha)	5,076	5,859	783	13.4	11.8
Abandoned Fields/Paddies	Hectares (ha)	25,226	22,394	2,832	12.6	6.8
Professional Farmers	Households	52,270	70,520	18,250	25.9	18.5
Full-time Farmers	Households	12,078	13,004	926	7.1	1.9

	Units	Fukushima Prefecture	Fukushima Prefecture	Fukushima Prefecture	Fukushima Prefecture	Nationwide
Part-time Farmers	Households	40,192	57,516	17,324	30.1	24.8

Agriculture output calculated (Unit: 100,000,000 yen)

	2009	2013
Rice	928	754
Vegetables	546	469
Fruits	272	245
Cows raised for meat	137	108
Raw milk	97	80

SECTION IV – NUCLEAR DAMAGE COMPENSATION AND RECONSTRUCTION OF FUKUSHIMA FISHING: THE CASE OF SOMA CITY

Satsuki Takahashi, Faculty of Sustainability Studies, Hosei University

Introduction

The Fukushima Daiichi Nuclear Power Plant accident had a tremendous impact on coastal fishermen who make a living from the ocean. Fishing operations have been suspended in the coastal waters of Fukushima since the accident, and despite conducting trial runs, the situation is not looking brighter for a resumption of operations. The purpose of this section is to examine the actual condition of the damages that cannot be captured simply by looking at damage compensation, as well as the gap between damage compensation and the reconstruction of the fishing industry, based on interview surveys conducted among coastal fishermen from Soma City, Fukushima Prefecture in 2014.

The Case of Soma City, Fukushima Prefecture

Many of the families working in the coastal fisheries in Soma City, Fukushima Prefecture lived in districts near the coastline. Thus, most lost their homes in the giant tsunami of 2011, and many people lost their families. Mr. Akasaka was a coastal fisherman in his fifties and one of those living in this coastal region.⁸ Luckily, his family evacuated to high ground after the earthquake, so everyone was safe from the tsunami—but his home, which he was so fond of, was swept away, leaving only the foundation. Starting immediately after the tsunami and for the next two months, Mr. Akasaka and his family lived as evacuees, relocating to temporary housing. At the time of the interview in 2014, he was still living in the same place with his wife. Plans were underway for a group transfer to higher elevation for those who lived in districts near the coast, and within three years their new home would be finished. While Mr. Akasaka was happy that prospects were looking up for the reconstruction of his family home, he did not hold the same optimism for the prospects of the fishing industry, so he had deep anxiety about the future.

In 2011, on the afternoon of the earthquake, after they took in the last catch of the day, Mr. Akasaka and his wife were resting at home. Right when the large quake had settled down, Mr. Akasaka's wife headed toward the designated evacuation site on high ground and Mr. Akasaka returned to the harbor to take the boat offshore. When a large earthquake occurs, generations of fishermen in this region have a practice of taking their boats out to the open sea before the tsunami makes landfall. This was customary to protect the boat, which is the fisherman's indispensable possession, and many of the fishing boats, including Mr. Akasaka's, remained unscathed.

Risking his life in this way protected the fishing boat. However, since the ban on fishing continues to this day due to the radioactive contamination from the Fukushima accident, most boats have spent their time since the earthquake moored in the harbor. At the time of this report nine years have passed since the earthquake and the result of regular monitoring tests has shown a downward trend on the measured dosages of radioactive substances detected from the bodies of fish and other seafood. Starting June 2012, continuous trial operations have been conducted targeting fish species in which radioactive substances are continuously not detected, and assessment surveys at shipment destinations of Fukushima Prefecture-caught seafood are being conducted. Furthermore, the number of species of marine life targeted by the trial operations has increased dramatically from the initial three species. According to the Fukushima Prefectural Federation of Fisheries Cooperative Associations, as of February 20, 2020, 228 species of marine life tested safe for consumption.⁹ However, consumer evaluations of Fukushima-caught seafood are still severe. Even when it has been established by monitoring results that there is no radiation effect, one can predict that it will be many years before consumer anxiety about Fukushima-caught seafood will ease up.

For the nearly 10 years since the earthquake, the coastal region's fishermen have spent their time mostly on activities other than fishing. Although they received compensation for the tsunami and nuclear accident-related damages, these funds have been exhausted by the rebuilding of homes, re-purchasing of fishing gear, and the maintenance of the fishing boats saved by putting them offshore, etc. Because of this, many fishermen are working at reconstruction-related sites as day laborers. Some of these individuals have expressed concerns about their identities as fishermen. Hardly any have been on a boat in the long years since the earthquake, and as they work at construction sites without knowing when they can get back to fishing again, days of frustration are spent wondering if they will be able to return to their true calling. If the nuclear accident had not happened, the rebuilding of the fishing industry would have occurred much more rapidly. However, the discharge of contaminated water into the ocean continues even today in Fukushima, and the concerns about the future held by these fishermen who have lived in harmony with the sea are indeed great.

For Mr. Akasaka, who has been unable to return to his true calling as a fisherman, finding himself powerless was like a battle with himself. Ever since May 2011, when he started living in the temporary housing, he has been working on construction sites. As he patted his tanned cheeks, Mr. Akasaka said, "Only my skin color is the same as when I was fishing, lightly darkened by the sun," as a self-deprecating smile rose to his face. "However, before when I was working as a fisherman on the ocean, the condition of my body was completely different. Even though I am a fisherman, I am wearing the temporary mask of a construction worker. I wonder if the day will ever come when I can get back to fishing? I might not be able to end my days as a fisherman," he said sadly. At the time of the interview-based survey, in the summer

of 2014, Mr. Akasaka had not stepped onto a fishing boat even once since the earthquake. Trial runs have begun on several types of marine life and he had friends who were able to go fishing once or twice a month. But because flounder, Mr. Akasaka's specialty, had not been entered into the list of species targeted in the trial operation, he has not even been able to do the trial runs. The struggle related to identity described above is not well reflected in the support proffered by compensation funds.

While the fishermen do anticipate the eventual reopening of fishing waters, the future that follows these operations nevertheless is clouded in uncertainty. Because TEPCO wishes to end its responsibility for compensation soon, it wants these operations to start as early as possible. The fishermen themselves are hoping for the fishing industry to restart. At the same time, however, consumer anxieties about Fukushima-caught seafood are such that even if these operations start up again, there is no guarantee that the fish will sell, and deep anxieties remain about whether fishing operations are economically viable. If it turns out that the market price for fish when fishing operations open in the future is far lower than that before the earthquake, the fishermen will have to make a claim to TEPCO based on damages caused by false rumors and misinformation, but in the end exactly how much TEPCO will consent to pay out is very much up in the air.

Damage Compensation in the Coastal Fishing Industry

Following the nuclear accident, high concentrations of radioactive substances were detected in marine life whose habitat was the surrounding coastal waters and, starting immediately after the accident, fishing operations were suspended in all Fukushima prefecture waters. Trial operations are being done at present, though actual fishing operations are not yet set. For this reason, damage compensation is being paid by TEPCO for damages caused by the suspension of operation. The operational suspension status continues, and compensation payments are also continuing.

In general, when a disaster affects the coastal fishing industry in Japan, overall negotiations for damage compensation are handled by a prefectural federation of fishing cooperatives (hereafter referred to as fish coops). In the case of the Fukushima nuclear disaster, Fukushima and neighboring prefectural federations of fishing coops took the initiative and hired attorneys to conduct compensation negotiations. However, individual coop members, namely coastal fishermen, are required to have detailed catch records for the last five years in order to claim their own economic losses caused by the nuclear accident and receive actual compensation. The rough calculation of compensation is made as follows. First, the years with the highest and lowest hauls are taken out from the past five years' catch records, and the remaining three years' average amount of haul is calculated. This then dictates the amount of damage compensation owed due to the suspension of fishery operation, and TEPCO will be requested to pay this amount.

In this way, when one looks only at the conditions of compensation for the economic damage accompanying the suspension of operations, one may be forgiven for thinking that the fishermen are receiving appropriate compensation. However, as many fishermen told me in their interviews, they have lost more than compensation can cover. The loss of the victim's identity as a fisherman, and the unending anxiety regarding the re-birth of the fishing industry mentioned by Mr. Akasaka are not generally categorized as damage to be compensated. We should take clear note of

the fact that the opportunity to catch fish was not the only thing that was taken away from fishermen by the nuclear accident.

Reconstruction of the Fishing Industry

As was the case with the Fukushima nuclear accident, and many other manmade disasters, “responsibility” for reconstruction is often interpreted as “compensation responsibility.” However, this blurs the lines of responsibility for damage that does not fit into the compensation schemes currently in play, and distorts the meaning of reconstruction. Reconstruction of the fishing industry is not finished once trial operations have segued into real operations, in the same way that lifting the evacuation orders does not automatically mean reconstruction is complete for an area. Also, the responsibility that should be borne for evacuees and fishermen by TEPCO, who caused the accident, and the state government that actively promoted policies of nuclear power, does not disappear simply because regular fishing operations resume and evacuation orders are lifted. Isn't their guaranteed responsibility not just for damage compensation, but also for reconstruction?

What is reconstruction, then? When I posed this question to Mr. Akasaka in the summer of 2014, he answered, “I can't even imagine reconstruction right now.” As Mr. Akasaka put it, “If the prospect of actual fishing operations is no good, then nothing will get off the ground at all. If the prospects for actual fishing operations are good, then maybe we can start to think about reconstruction.” In other words, reconstruction to him means a process that can begin only after a return to regular fishing operations. Just as we can see from looking at past case studies of nuclear weapons testing in the Marshall Islands and the Chernobyl nuclear accident, the time necessary to recover from radioactive contamination is quite long. With reconstruction comes many difficult things. In spite of that fact, accident responsibility is often understood as compensation responsibility—and we wonder why those who are responsible are trying to relinquish their responsibility in less time than the period actually needed for reconstruction.

Many people involved with reconstruction policy will tell you that reconstruction is not a return to the state before the earthquake. If that is true, shouldn't responsibility for the nuclear accident be regarded in the same way? For that which was taken from victims, merely going back in time to provide compensation does not count as fulfilling responsibility. Responsibility is not just about the past; it should also be about the present and the future.

SECTION V — ISSUES WITH THE COMPENSATION SCHEME FOR NUCLEAR ACCIDENT VICTIMS FROM DISCUSSIONS IN JAPAN AFTER THE FUKUSHIMA ACCIDENT

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Introduction

Following the Fukushima Daiichi Nuclear Plant Accident, compensation was given to all those who suffered injury and damage due to the accident. First and foremost, this included the many residents who had no choice but to undergo mandatory

evacuation, and also a large number of individuals and businesspeople. In this section, we give an overview of the kind of issues that were discussed in Japan after the accident of March 2011 with regard to compensation to the victims with the aim of obtaining suggestions for our quest for an appropriate compensation system.

Disaster Reconstruction and Compensation for Damages

The Limits of Damage Relief by Compensation

In Japan, almost ten years have passed since the accident, so the limits and insufficiency of victim aid through the damage compensation system are starting to be recognized. As of February 5, 2021, TEPCO secured governmental support, and approximately 9.7 trillion yen (approximately 92 billion dollars) had already been paid to a large number of victims as compensation.¹⁰ However, in actuality, there is a considerable portion of compensation payments that are not directly linked to life recovery/regional reconstruction, and the appropriateness of victim aid that centers around damage compensation is being called into question.

The Harm Inherent in Damage Compensation

Of course, the principle of “full compensation for damages” must be observed. This is because the victim has the right to make a claim to the injurer for compensation. The blurry lines of this principle, however, makes calculating the cost of nuclear power generation inaccurate and turns the discussion of victims’ rights toward considerations of nuclear policy. However, it is notable that compensation payments have created the following divisions among victims of the earthquake and the Fukushima accident because of the applied criteria for compensation: a) the division between earthquake/tsunami victims and nuclear accident victims; b) the division between mandatory and voluntary evacuees; and c) the classification of residence among mandatory evacuees (zones in preparation for the lifting of the evacuation orders, restricted residential zones, and difficult-to-return zones). The presence or absence of legal effects are decided upon depending on whether or not certain requirements are fulfilled. This is an essential attribute of contemporary law and is usually understood as a proper phenomenon. However, especially under the circumstances of a mandatory evacuation which damages the local community on all fronts, the current compensation system has the effect of anchoring such damage and making it more severe.

Compensation Payments and Reconstruction of Livelihoods

In addition, although compensation payments are substantial for mandatory evacuees, they do not always contribute directly to the reconstruction of their livelihoods. The intent of the damage compensation system is for the victims to be able to start a new life by receiving compensation for the damages they have sustained, thus restoring their lives to the pre-disaster state. For the victims of the Fukushima accident, however, the compensation may be enough for their day-to-day living but it is not enough to overcome the obstacles to reconstructing their new lives. As a result, many of the victims are still without a clear plan for rebuilding their lives. For example, fishermen are unable to resume their normal operations due to radioactive contamination of the ocean from the nuclear accident. The circumstances surrounding the farmers have not improved either, as consumers are avoiding the purchase of agricultural produce from Fukushima out of concern for the radioactively contaminated soil, and the sales prices of products from Fukushima have dwindled.

Furthermore, elders who were forced to leave their hometowns are having difficulties adjusting to their new environments, which leaves them isolated. Children who had to move to another prefecture are often bullied at their new schools. Although the fact that the compensation for damages does not necessarily result in the rebuilding of livelihoods is an inherent limitation in tort law for damage compensation, this limitation is even more real and prominent in the case of nuclear disasters in which the foundations of local communities and local industries have been wholly destroyed and swept away.

Emergence of New Damages Associated with the Victims Returning Home

It is natural to assume that the compensation process would approach its end as compensation is paid out to the victims. The evacuation orders in some of the forced evacuation areas have been lifted and some of the residents have already returned. However, it has been reported that some business owners ran into financial difficulties after they returned home and resumed their businesses, representing just one of the obstacles facing evacuees in reconstructing their local communities. In these cases, TEPCO is likely to claim that the compensation has already been completed and that there is no causation between these difficulties and the nuclear accident, but in reality, the causation cannot be categorically denied. By March 2017, most evacuation orders were lifted, except for the “difficult-to-return zones” in which evacuees are unable to return for the foreseeable future due to high-dose radiation. In light of this, claims for damage compensation are likely to continue for the near future. In 2013, the Ministry of Economy, Trade, and Industry (METI) estimated the total amount of compensation at 5.4 trillion yen, but close to 6.5 trillion yen had already been paid by 2016, far exceeding the initial estimate. According to the new estimate in December 2016, therefore, the total amount of compensation would balloon to 8 trillion yen. Even then, it was still unclear as to whether or not this amount would fully cover the compensation. As mentioned before, more than 9.7 trillion yen has been paid up to now. In essence, with the circumstances still in flux, what were formerly potential damages are revealing themselves to be actual damages, and therefore it is not clear when the compensation payments will be completed.

Limitations of the “Compensation for Damage” Framework

In general, for a disaster such as a nuclear accident in which the entire region is affected, a system of paying compensation only to individual victims is simply inadequate. This is because the sum of damages sustained by each individual victim still does not reflect the various damages that were sustained by the community as a whole. In addition to reconsidering how the damage compensation system is structured, it is necessary to consider a separate system that could complement the compensation system.

Discussions in Japan after the Fukushima Accident

In this part, I will outline the issues that have been debated in Japan since the Fukushima accident and provide concise explanations of them.

Compensation for Damages vs. Compensation for Losses

In the case of the Fukushima accident, since the efforts to provide relief to the victims have been made in accordance with the Nuclear Damage Compensation Act, it is irrefutable that payments made so far to the victims have been compensation for

damages. However, it is theoretically possible to perceive the compensation as that for losses, rather than compensation for damages, in terms of restrictions on property rights by public welfare (Article 29-3 of the constitution), which is particularly the case for the mandatory evacuees. This is because residents were forced to evacuate based on the evacuation order zones that were established by the government. As to damage compensation, Japanese law adopts the principle of “actual loss compensation” (resulting in the denial of punitive damages) and it is therefore difficult to be compensated for more than the objective value of the assets. On the other hand, some take the view that compensation for losses should take survival security and livelihood protection into consideration, which can potentially allow for a more flexible calculation of the amount of payment than that of compensation for damages. Having said that, in the case of the nuclear disaster in Fukushima, although the compensation is for damages, payments in amounts exceeding the objective damages have been approved. For example, because the prices of real estate are generally higher in areas where the evacuees are resettling compared to the prices in the evacuated zones, the amounts are determined by considering the additional cost that would be required for securing new real estate property. This fact in itself suggests that there is a limitation to the existing compensation system.

Structure of the Damage Compensation System

The major issues that have been debated regarding the damage compensation system are as follows:

Scope of victims

It is natural that mandatory evacuees are considered victims of the Fukushima accident, but when it comes to the voluntary evacuees, i.e., those who evacuated from areas for which an evacuation order was not issued, the damages they have sustained and their connection to the Fukushima accident is a point of contention. This is because their decisions to evacuate were voluntary in one sense, even if in reality they had no alternative but to evacuate. For this reason, the amount of damage compensation that has been paid to voluntary evacuees is significantly lower than that paid to mandatory evacuees, and the scope of voluntary evacuees who are eligible for compensation is limited to those who were residents of Fukushima at the time of the accident. This means that the status of voluntary evacuees as victims is not fully recognized.

Victims are not limited to those who were forced to evacuate. Many business owners, both from within and outside the evacuated zones, have experienced financial damages from business interruption and reduced sales after resuming their businesses. Determining which business owners qualify as victims is particularly problematic when the damages are reputational damages (e.g. damage from harmful rumors or misinformation, described further below).

Each local government in the evacuated zones is also a victim on its own, independent of its residents. This is because not only has it been forced to cover various expenses for the Fukushima accident but because municipal properties have also been damaged. Having said that, these local governments have received financial support from the central government. The issue to be discussed is in regards to how this financial support should be evaluated in relation to the damages.

Scope of damages and calculation of the amount of compensation

According to Japanese law, damages that are related to the Fukushima accident are eligible for compensation, which include economic damages (property, income) and mental anguish damages (consolation). For the former, “reputational damage” became a point of contention. Reputational damage was recognized in precedents, but a wide range of reputational damages that would have been considered far out of the scope of conventional criteria have been included for compensation, such as the lower prices of agricultural and fishery products across Japan (i.e., not just in Fukushima). For example, based on the supplement to the Interim Guidelines, mushrooms that were produced 800 km away in Hiroshima are also considered to have sustained reputation damage.

As for the latter, determination of the “base amount for mental anguish damages” for the mandatory evacuees was debated in particular. Starting with the sudden evacuation order, mandatory evacuees had to endure poor living conditions for a long time. The residents of difficult-to-return zones do not even know when they will be able to go home, which means that they have practically lost their hometowns for good. For residents of zones prepared for evacuation orders to be lifted and in restricted residence areas, even if they are able to return, their hometowns are far from what they remember. It is likely that very few will actually decide to return out of concern for low-dose exposure and deteriorated living infrastructures. Although there is no doubt that these circumstances are causing a great deal of extreme psychological pain, it is not easy to assess them in terms of monetary amount. In the case of the Fukushima accident, the base compensation amount for mental anguish damage was set to 100,000 yen (about 968 dollars) per month by the Reconciliation Committee—an amount that received strong criticism from victims. First of all, the compensation criteria were set based on inadequate investigation. For mental anguish damages in which an objective justification of the calculated amount is difficult, a thorough survey of the actual conditions through victim-oriented interviews and the like would have lent credibility to the criteria. In other words, the opinions of the legal experts in the Committee alone are unable to substantiate the criteria.

Secondly, the rationale behind the compensation criteria is also important to convince victims. The Reconciliation Committee explained that it decided on the compensation criteria based on the criteria for victims of traffic accidents. This explanation was not well-received by the victims. The mental anguish damages due to mandatory evacuation (e.g. separation of family members, reduced income, difficulties and anxiety of living as evacuees), anxiety, and suffering (including the fear of radiation exposure and uncertainty of the future) are completely different from those caused by traffic accidents. Therefore, it is not possible to simply adapt the traffic accident criteria to the situation of nuclear disaster.

Third, the appropriateness of the compensation criteria themselves is questionable. All of the lawsuits that were filed by victims across Japan have demanded much higher compensation, suggesting that many victims are not satisfied with the amounts that were set by the Committee. However, for mental anguish damages, the first and second points reflect the appropriateness of the monetary amount.

Subject of liability

In Japan, only the nuclear operators (mainly electric power companies) are subject to liability in accordance with the Nuclear Damage Compensation Act, and they bear

liability without fault. However, two issues have been debated since immediately after the accident. The first is whether or not the government, in addition to the nuclear operators, should be held liable. Many of the lawsuits that have been filed by the victims pursue not only the liability of TEPCO but also that of the government, because for all intents and purposes, nuclear power generation has been promoted as a government policy. The second issue, in relation to the first, is whether the liability of the nuclear operators is unlimited or limited. If the nuclear operators become bankrupt, their unlimited liability becomes virtually meaningless, and if we consider the fact that nuclear generation has always been a national policy, it can be argued that the liability borne by the nuclear operators should be limited and that the government should also be subject to liability. However, the idea of turning the nuclear operators' liability from unlimited to limited has met strong opposition from the Japanese citizens as they believe it will lessen the safety consciousness of the nuclear operators and cause a moral hazard. Ultimately, the Parliament decided to maintain that the nuclear operators continue to bear unlimited liability.

Dispute Settlement Understanding

With regard to the procedure for the victims to pursue TEPCO's liability, the following two points have been argued. Firstly, the current Japanese proceedings for civil actions lack a system that can unify the demands made by multiple victims for damage compensations caused by unlawful acts, as happens in class action lawsuits in the US. This flaw is particularly serious when there are many cases in which a large number of victims have sustained damages of relatively small amounts. After the Fukushima accident, the Center, which is an alternative dispute resolution (ADR) body, was established under the Reconciliation Committee to resolve disputes concerning compensations between the victims and TEPCO. In the case of the town of Namie, the local government made a claim to the Center to increase the amount of compensation for mental anguish damages by acting as a representative for over 15,000 town residents. Such a collective claim is a practical measure against the aforementioned flaw in the system.

Secondly, the ADR procedures are not always effective in resolving disputes.¹¹ As mentioned before, the Center only provides services for mediation and conciliation. As a result, dispute settlement depends upon TEPCO's consent.

Conclusion: A Desirable Compensation Scheme

We believe that the main objective of the compensation scheme as it applies to victims of nuclear accidents must be a recovery from the damages sustained by the victims. However, what the victims truly desire is restitution to the pre-accident state, and damage compensation is the last resort when other alternative measures have been insufficient to achieve such restitution. Reconstruction from the nuclear accident needs to involve recovery, in one form or another, of the victims' local communities, which have been completely devastated. However, the current damage compensation system in Japan does not independently recognize the destruction of communities as damages. Although it is unclear as to whether or not such damages should be covered by damage compensation, the fact remains that a compensation system that is exclusively focused on the individual victims cannot reconstruct the local communities that have been destroyed as a whole, and therefore the lives of the victims that were built on the relationships with other people within the communities cannot be reconstructed, either.

In addition to recognizing that individual victims have sustained their own damages within the general context in which local communities have been entirely destroyed, we believe that the experience of the Fukushima accident suggests that a compensation scheme that can contribute to the victims' prospective lives is also needed.

SECTION VI – THE SIGNIFICANCE OF THE “INJUNCTION LAWSUIT” FILED BY RESIDENTS TO PREVENT NUCLEAR DISASTERS

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On March 9, 2016, the Otsu District Court made a provisional injunction to order a “suspension in operation of the Takahama Nuclear Power Plant's No. 3 and 4 nuclear reactors.”¹³ This ruling put an end to a 5-year-long court action that was started in August 2011 by the residents of Shiga Prefecture who refused to become the victims of severe nuclear damages. This ruling came along when nuclear power plants across Japan were resuming operation as exemplified by both the approval to resume operation of the Sendai Nuclear Power Plant in Kagoshima Prefecture and the Fukui District Court's decision to overturn the original ruling to suspend the operation of the Takahama Nuclear Power Plant. Thus, this ruling was extremely significant as it put a stop to the trend of resuming the operation of nuclear power plants by suspending one that was in operation. It was also a major victory in a sense that it honored the personal rights of the residents who wanted to suspend nuclear operations even if it meant going to court, and there are no words to describe the joy it has brought. Since then, a stay of execution complaint by the Kansai Electric Power Company (KEPCO), the defendant, was denied on June 17 and KEPCO's objection was denied on July 12. The lawsuits have now reached the Osaka High Court, where court deliberation has started.¹⁴

The aforementioned lawsuit was filed by the residents based on their anger towards the ongoing trend of resuming the operation of nuclear power plants when as many as 100,000 people are still unable to return home, and the cause and resolution of the Fukushima accident remain unclear. In this context, the residents were concerned about a serious risk of accident at the Takahama Nuclear Power Plant's No. 3 and 4 reactors and the gravity of the associated damage. On April 16 and 17, 2016, an epicentral earthquake caused by an active fault occurred in the Kumamoto region, causing extensive damages. Since then, Mt. Aso has erupted and a fault-type epicentral earthquake caused significant damage in Tottori Prefecture, affecting a wide area with seismic intensity of 4 according to the Japan Meteorological Agency (JMA) Seismic Intensity Scale along the entire Median Tectonic Line. Seismic activity measured at an intensity of grade 3 to 4 was also felt in Osaka. The area of Tsuruga in Fukui Prefecture is known for a string of nuclear power plants concentrated in the area as it is home to 14 nuclear reactors KEPCO operates, and it sits directly above a cluster of active faults known as the Kinki Triangle, of which the Median Tectonic Line forms the base. An accident at the Takahama and Ōi Nuclear Power Plants would contaminate Lake Biwa, which serves as the water source for 14 million residents in the Kinki area who live within a 30 km radius, and the magnitude of such damage would be unimaginable.

The defense counsel summarized the reasons for the suspension ruling as follows. The plant's severe accident measures are inadequate. 700 Gal as the design basis

earthquake ground motion is inadequate.¹⁵ There is also a risk of a major tsunami. The used fuel pit is not sufficiently safe from such a tsunami. There are no effective evacuation plans, either. Based on these, the defense counsel (1) explicitly placed the burden of proof on KEPCO; (2) clearly pointed out the irrationality of the new regulatory standards; and (3) argued that the approval of nuclear power plants should be a community decision, not an expert decision.

In addition, 1107 residents in the Kansai area filed a lawsuit to suspend the operation of the Ōi Nuclear Power Plant's No. 1 to 4 nuclear reactors on November 29, 2011. Preparation is underway for additional lawsuits with the aim to have up to 10,000 plaintiffs for the second through fifth campaigns.

SECTION VII — WHAT THE FUKUSHIMA DAIICHI NUCLEAR ACCIDENT ROBBED: EXPLORING THE LIMITATIONS AND POTENTIALS OF THE COMPENSATION PAYMENT SYSTEM

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Introduction

After the Fukushima accident, compensation payments have been made to many residents who were forced to evacuate, as well as to many individuals and businesses that were affected by the accident. In this section, we will examine various issues that have been discussed domestically with regards to compensation for the Fukushima accident since March 2011. We aim to understand what compensation payments were made to victims of the nuclear accident for what types of damages and under what compensation system, with the objective of drawing out suggestions for a better compensation system for nuclear power plant accidents.

For that purpose, we will first clarify the place of compensation within the framework of victims' relief and discuss the limitations of the damage compensation system that have been revealed through the Fukushima accident. Next, as topics for further discussion on the damage compensation, we will illustrate the difficulties in determining the definition of, and the range of, "victims." Then we will examine the extent to which the damage compensation system contributes to reconstruction from a nuclear accident in which damages are continuously generated for an extended period of time. And lastly, we will discuss what kind of compensation payments are needed for the future, and regulations for establishing such schemes. Meridian 180 has discussed many critical issues in the past. Who is classified as a victim? What counts as damage? What happens when compensation does not permit for an adequate recovery of a person or community? Who is responsible for compensation? What is considered as disaster reconstruction? This section represents our answers to these questions that were obtained through repeated discussions based on experience from the Fukushima accident. It is our hope that this section can stimulate a discourse on how we should deal with nuclear accidents that will probably occur again somewhere in the world.

Compensation Issues in the Context of Victims' Relief

The objective of victims' relief is to recover the serious damages inflicted by the Fukushima accident, to rebuild their lives, and to regain the peaceful daily lives they had before the accident. This objective itself is thought to be widely shared in Japan, and victims' relief of the Fukushima accident has primarily revolved around compensation payments for nuclear damages. The total amount of compensation paid as of February 2021 to individuals and corporations amounts to approximately 9.7 trillion yen, and in order to complete the payment process for such a large amount of compensation, TEPCO assigned about 5,040 staff (as of July 1, 2017) to the Fukushima Nuclear Power Compensation Consultation Room in their Fukushima Headquarters, to handle the payment matters.¹⁶ Payment of compensation is still ongoing as of this writing.¹⁷ However, latent damages continue to surface as situations change, making it impossible to predict when the payments can be completed.

If all the damages inflicted on the victims can be recovered by compensation payments, then completion of the payment will mark the reconstruction and the end of the accident, making the event itself a thing of the past. If that is the case, then prompt payment of compensation should be the foremost focus of policies for rebuilding Fukushima. However, victims do not feel that the damages they have suffered have been fully covered by the payments, and the payments do not seem to directly translate to rebuilding their normal lives. Furthermore, the prospects for the reconstruction of the regions affected by the accident are still unclear (as we will point out later, the definition of "reconstruction" is multi-faceted).¹⁸ The compensation payment system assumes that the victims can recover the conditions of their lives prior to the damages through the payment and start anew. For the victims of the Fukushima accident, however, compensation may allow them to make ends meet day-to-day but various obstacles still exist that prevent them from restarting new lives. Thus, many of the victims still do not have clear prospects for rebuilding their new lives. For example, if you are in fishery, because the effects of radioactive contamination still persist and you can only engage in trial operations, you still cannot restart normal fishing operations. For farmers, a rigid inspection of radioactive materials is in place and the products can be verified to be safe at least according to the standards set by the government. Nevertheless, as consumers are psychologically concerned about radioactive contamination of agricultural soil, products "from Fukushima" are still being avoided, resulting in lower prices, and difficulties for the Fukushima farmers remain. Furthermore, a number of senior citizens who were forced to leave their hometowns have had difficulty getting used to wherever they have relocated to and are forced to live lonely lives. There have also been reports about children who moved from Fukushima who have been bullied by others in their new schools. The fact that payment of compensation will not directly rebuild the lives of victims is an inherent limitation of the laws regarding compensation, but this limitation becomes even more apparent in the case of nuclear accidents, where the foundations of local communities and regional industries are fundamentally damaged.

Thus, in reality, compensation payments do not necessarily result in sufficient reconstruction of individual lives nor the rebuilding of local communities, and so the appropriateness of victims' relief that focuses on compensation payment is being questioned. Despite large amounts of compensation being paid out relatively quickly, why did such a contradiction occur? In order to shed more light on this matter, we need to reconsider the very nature of the compensation payment system.

Inherent Limitations of the Compensation System for Nuclear Accident Damages

The compensation system establishes the final monetary amount to be paid to the victims, by officially determining and acknowledging the types of “damages” (compensatory damages) to be paid by the damaging party, from among various tangible and intangible “losses” actually inflicted on the victims (general damages), and also by assessing the degree of such damages. Victims can forcefully collect the designated amount of compensation through lawsuits as a last resort. On the other hand, “pain and suffering” is excluded from the subject of compensation and is considered not worth legal protection. As a result, under the current compensation system, “pain and suffering” that is excluded from the subject of compensation becomes intangible. Furthermore, even in case of “pain and suffering” included in compensation, any amount of “pain and suffering” that exceeds the acknowledged monetary amount would also be considered non-existent. And payment of the acknowledged amount will mean that the damages have been mended.

In general, victims generally do their best to have their “pain and suffering” officially acknowledged as “damages” under such a compensation system and, once that is accomplished, take actions to increase the amount of compensation so that the public will also acknowledge the severity of their “pain and suffering.” However, there are inherent limitations to such responses. Although compensation is an alternative method of relief when damages are irreversible, it is a type of legal fiction to assume that compensation can undo a person's “pain and suffering.” In cases of psychological trauma in which, unlike a financial loss, victims cannot simply revert to their original condition, it is clear that treating compensation as a means of restoring the person's original condition is a legal fiction. And if that is the case, no matter how sufficient the compensation system may be, there will always be a gap between the compensation and the victim's recovery from pain and suffering. In addition, once certain kinds of pain and suffering are excluded from the range of damage compensations, any damages are deemed to be non-existent in a legal sense regardless of the “actual” pain and suffering that occurred. In this sense, compensation payments artificially divide the pain and suffering inflicted on the victims, and this structure causes anxiety in the victims. Of course, this is not limited to nuclear accidents, since victims of traffic or medical accidents face the same problems. However, it can be said that the functions of the compensation payment system brings results that are acceptable to other types of victims, whereas with nuclear accident victims, the situation is quite different.

Damages that Cannot be Attributed to Individuals

First, the current compensation payment system is structured with a focus on itemized damages inflicted on each individual or company. That is, the current system is designed to compensate for the infringement of individual interests that are worth legal protection. An individual's loss of financial contribution or prospective profit would be compensated as financial damages, while his or her loss of non-financial interests would be classed under consolation money. In traffic, medical, or pharmaceutical accidents, the majority of damages are to specific individuals. Therefore, the individual-centered system of damage compensation functions well in these cases. However, as a result of the nuclear accident, the forced evacuation zones were completely and fundamentally destroyed. Damages caused to the land, housing, and business operations of the residents in the forced evacuation zones can

be acknowledged as generating individual damages. But victims who were forced to evacuate not only lost their assets and means of living, but also the local community which served as the home ground of their daily lives. This is a significant characteristic of the pain and suffering caused by the nuclear accident that is different from other types of pain and suffering that have occurred in the past. Therefore, the pain and suffering inflicted on the residents in the forced evacuation zones is clearly different from the pain and suffering from traffic or medical accidents that do not affect the local community where the victims live. Although nuclear pain and suffering shares certain similarities with air pollution in the sense that they affect a large geographical area, there is no comparison in its severity. When dealing with area-wide pain and suffering that affects an entire region, such as with a nuclear accident, the current compensation payment framework that focuses on individuals cannot fully satisfy the victims' needs. Simply accumulating damages inflicted on individual victims cannot draw a comprehensive picture of the various pain and suffering caused to the local community.

However, at present, there are no well-developed theories in damage compensation laws to thoroughly understand the losses caused to an entire region. Therefore, in order to be brought under the current compensation system, all losses, regardless of the type, must be considered as individual damages. And so long as the system is ultimately designed to compensate for pain and suffering inflicted on individuals, it is difficult to apply such a system to compensate for any losses or pain and suffering that cannot be associated with specific individuals. In short, the current compensation system, developed with a focus on individuals, cannot meet the needs of entire regions destroyed or groups of residents affected by a nuclear accident, and this mismatch causes the current system to be dysfunctional.

Endless Recurrence of Damages

The second factor that limits the function of the compensation system for nuclear accidents is the aspect of time. As mentioned before, for damages caused by traffic or medical accidents, a specific time that the incident occurred can be identified, and while the effect of the damages may be sustained in the future (as aftereffects), the damages themselves are transient. On the other hand, with the Fukushima accident, substantial damages are continuously being generated even after the accident, forcing the victims to live with them. First, since radioactive substances dispersed by the Fukushima accident have not been completely cleaned up even in decontaminated areas, damages resulting from low level radioactive rays generated by these radioactive materials (low level radiation exposure) may continue to occur for a long time. There are different opinions regarding the possibility of actual health damage caused by low level radiation exposure, but we must at least recognize the fact that anxiety caused by fear of low-level exposure will persist. Second, due to an extended evacuation order and because of residents' consideration of the danger of low-level exposure, the infrastructure for local livelihoods was destroyed. Because of this, even though the evacuation orders have been lifted, many residents continue to remain evacuated. Some still live in temporary housing and many continue to face various inconveniences, which forces us to acknowledge that new damages are being created on a daily basis. Third, farmers and fishermen also continue to suffer from damages. For example, for fishermen, a true recovery means being able to fish at sea in Fukushima, like before. However, contaminated water from the Fukushima Daiichi Nuclear Power Plant continues to flow into the sea, and because decommissioning of the reactor is still in progress, it is not certain when they will be able to return to regular operations. While they hope to begin normal operations as soon as possible,

compensations for the interruption of business that they are currently receiving will stop as soon as they start normal operations. Yet, there is no guarantee that they will be able to continue normal operations without problems, and this uncertainty makes them hesitant to start again.¹⁹

As stated above, damages that are paid out through the compensation system need to be determined within a limited time frame. However, this means that some of the pain and suffering will be excluded from compensation, and pain and suffering that continues to affect the victims will not be taken into consideration. Needless to say, it is theoretically possible to identify pain and suffering that occurs after compensation has been paid, as newly generated damages, and list them for compensation payment. In reality, however, once the scope of damages caused by the nuclear accident has been established, acknowledging newly occurred damages as directly relevant to the nuclear accident requires proving a causal relationship, which can be considerably difficult.²⁰ In short, while the damages resulting from the Fukushima accident will continue to affect victims in the future, the compensation system only covers transient damages that are commonly assumed to occur and, as a result, victims of the Fukushima accidents will continue to feel like their losses were not completely redressed, even if they have received compensation for them up to a certain period in time.

Relying on the Compensation System

Considering these issues, we are forced to face the fundamental problem of how much we should rely on the compensation system in order to recover damages caused by the nuclear accident. As has been examined earlier in this report, the compensation system alone is not sufficient for victims' relief. Needless to say, the principle of "full compensation for damages" must be observed in any case. Victims have the right to demand compensation from the assailant. Obfuscating this principle will not only prevent an accurate calculation of nuclear power generation costs, but also move discussions on nuclear power policies toward the wrong direction. At the same time, we must also be aware that compensation payments for the Fukushima accident have caused the following three divisions among the victims of the earthquake and nuclear accident in terms of the compensation standards that were applied, thus making it difficult to rebuild the affected region.

Those divisions are: a) victims of the earthquake/tsunami and victims of nuclear accidents, b) forced evacuees and voluntary (outside of the zone) evacuees, and c) demarcation within the forced evacuees in terms of their residential places (zone preparing to have the evacuation order lifted, residence restricted zone, and difficult-to-return zone). Meeting certain requirements determines eligibility to receive legal remedies. This is an essential attribute of contemporary law and normally would not cause any major inconvenience. However, in the case of nuclear accidents, and particularly for victims of forced evacuation whose local communities were completely destroyed, the current compensation system may anchor the divisions, making them even worse. (Unlike big city areas such as Tokyo, in the Tohoku region that was struck by the Great East Japan Earthquake and Tsunami, including Fukushima prefecture, there existed strong local communities supporting people's daily lives.) When dealing with relief for the victims of the nuclear accident, we are therefore forced to admit that the current compensation system has only limited capabilities.

We must face how, under the present circumstances, damages that are not normally recoverable and problems that are not solvable through the compensation system might have been forcibly processed within the framework of the compensation system. Secondly, we must recognize the limitations of damage compensation as a principle as well as the compensation system itself, and thirdly, discuss various mechanisms that can possibly complement such shortcomings. To begin, we need to seriously discuss what reconstruction from wide-spread destruction by the nuclear accident actually means. It would not be possible to easily arrive at a clear-cut answer to this question, so we need to be prepared to deal with multiple solutions after carefully examining each aspect of the current state of destruction. For example, we may need to flexibly combine the following to compensate for pain and suffering that will continue to occur, or may newly occur, in order to meet the various needs of both the victims and the affected areas while stimulating creative ideas for rebuilding them: a life-long medical treatment program under a general framework of the social security system for all Japanese citizens who were exposed to low level radiations, housing aid for not only the residents of the forced evacuation zone but for all citizens who evacuated out of fear from radiation exposure, continuous aid to affected municipalities, aid for NGOs that support the victims, a system to provide financial aid for new and existing businesses in the affected areas, and a system to maintain and rebuild the local community in the affected areas.

Of course, it is also true that, for the victims, the compensation payment system is the primary means of reconstruction. In the following section, therefore, we will also discuss problems that exist in the design of the current compensation system.

Topics for Discussion Regarding the Compensation System

What Japan experienced after the Fukushima accident raised many topics for discussion regarding the design of a compensation system, including the scope of victims, range of damages subject to compensation, and who should be responsible for the payment. Here, we will discuss the following topics in order: (1) who are victims of the nuclear accident, (2) what is included in the scope of damages, and (3) who is responsible for compensation, and (4) what the reconstruction from a nuclear accident means.

1. Scope of Victims of the Nuclear Accident

Evacuation zone defined with a concentric circle

First, there is a lot of discussion regarding evacuees who were forced to evacuate through government orders. Those forced evacuees are clearly the victims of the Fukushima accident. However, delimitating the mandatory evacuation zone itself is a difficult issue. At first, the Japanese government determined the mandatory evacuation zone using a concentric circle centered around the Fukushima Daiichi Nuclear Power Plant (set at a 20 km radius), but then later extended the area more to the northwest according to actual radioactive contamination. The first issue to be discussed is the designation of the evacuation zone with a concentric circle. On the one hand, this evacuation zone did not necessarily match the actual radioactive contamination conditions and thus led to criticism for its arbitrariness. On the other hand, during the early stages, because the conditions of the contamination were not fully known and there was also a high risk of further leakage of radioactive substances from the power plant, it probably is not fair to criticize the decision to set an evacuation zone based on a concentric circle. However, there is a need to further

discuss whether the distance of 20 km was appropriate and whether it was necessary to draw lines that divided local municipalities.

In terms of the former, considering the risk of low-level radiation exposure, the question is whether a wider area needed to be designated as a mandatory evacuation zone. At the time, the Japanese government used the standard of 20 SV a year of exposure to arrive at its decision, but many people in Japan disagreed and still disagree with the appropriateness of this standard. In addition, immediately after the Fukushima accident, the US government recommended a 50 mile (approximately 80 km) radius from the power plant to be the evacuation zone for US citizens staying in Japan, raising questions regarding the appropriateness of the zone as defined by the Japanese government and concerns for safety spread, especially among residents outside of the mandatory evacuation zone.²¹ As for the latter issue, it became an issue only because the evacuation zone was directly linked to the standard of compensation, and the resulting differences in the amount of compensation among residents within the same local municipality led to the division of that local community.

During the emergency period immediately after the nuclear accident, it may have been necessary to use a concentric circle to define the evacuation zone as a temporary measure. However, following this period, the zone should be redefined according to actual radiation levels, and through established procedures. In Japan, the evacuation zone was reevaluated several times, but the procedure lacked transparency. The concentric evacuation zone was maintained until April 2014 after which evacuation orders were consecutively lifted for areas with low radiation levels. These reevaluations should also be considered in terms of appropriateness of dividing local municipalities.

Finally, designating an evacuation zone has a substantial social effect on not only the relevant areas but also other areas accepting the evacuees from them. Therefore, we need to understand that designating evacuation zones is potentially a highly political negotiation. What might the effects be of, for example, designating an area with a high population concentration as an evacuation zone? This political factor must be taken into further consideration regarding the treatment of those who evacuated from the areas outside of the evacuation zone, which we will discuss in the next part. Overall, radiation levels are not the only factor that delimits an evacuation zone, and so there needs to be more transparent and effective laws in place to guarantee the "right to evacuate" for residents of areas with high radiation levels that are outside the evacuation zone. Although the "Act on Promotion of Support Measures for Lives of Disaster Victims to Protect and Support Children and Other Residents Suffering Damage due to Tokyo Electric Power Company's Nuclear Accident" was enacted in 2012 to support the right of evacuation for children and adult victims, there was no realistic policy to put this right into effect and there are strong criticisms that the law is not actually being realized.

Evacuees from outside the evacuation zone

The second topic of discussion which is more critical than the first one is whether to acknowledge the so-called voluntary evacuees, who evacuated to different areas from areas not designated as evacuation zones (either within or outside Fukushima prefecture) in order to escape from the dangers of radioactive exposure. Radiation contamination by the Fukushima accident is not confined to the mandatory evacuation zone but spread to central Fukushima including Fukushima City and Koriyama City, as well as to the northern Kanto area that includes Tochigi prefecture

and all the way to the metropolitan regions including Tokyo, though the contamination level there is generally lower. As a result, a number of residents, primarily young mothers with children, evacuated from not only Fukushima but from across northern Kanto to all over Japan. Those “voluntary” evacuees would likely never have relocated unless the Fukushima accident had occurred, so in reality they were forced to evacuate. Based on the concentric circle model determining the evacuation zone, however, it was often argued that their evacuation was voluntary. On that account, their damage claims as associated with the Fukushima accident became a topic of dispute. While the Japanese government admitted that voluntary evacuees have rights to compensation to some extent in December 2011,²² it is problematic that the scope of voluntary evacuees eligible for compensation is limited to only those who were residents of Fukushima prefecture at the time of the accident as there are areas outside of Fukushima that are affected by similar levels of contamination. Further problems have arisen for the forced evacuees. Even forced evacuees from designated evacuation zones are considered to become voluntary evacuees when they remain relocated after evacuation orders were lifted. In fact, after the evacuation order was lifted, in most of the municipalities, only a small population of the residents have returned. As a consequence, the number of voluntary evacuees is increasing, raising more complications regarding questions of compensation.

Business operators and municipalities

Nuclear accident victims are not limited to those citizens who were forced to evacuate. Many business operators inside and outside of the evacuation zone suffered financial losses due to disruptions in their businesses and reduction in sales after reopening their operations. The termination of an evacuation order does not mean that market conditions will return to previously experienced levels. Therefore, there have been having long-term difficulties for businesses. Independent of residents, local municipalities (e.g., cities, towns, and villages) within the evacuation zone are also victims in their own right. This is because not only did they have to increase various expenditures because of the accident, their assets (movable property/real estate) were also damaged by radioactive contamination. Local municipalities and TEPCO have different opinions regarding the calculation methods for compensation. While the central government has provided financial aid to the local municipalities after the Fukushima accident, it has become a topic of dispute how such financial aid should be evaluated in relation to the damage calculation.

2. Scope of Damages

The scope of damages refers to the range of pain and suffering inflicted on victims that is acknowledged as being subject to compensation. The following detailed calculations are performed to determine the amount of compensation for such acknowledged damages, and payments are made for that amount.

Reputational damages of business operators

Under Japanese law, damages that have causal relation with the nuclear accident are subject to compensation, including compensation for both financial losses (assets/income) and non-economic damages (consolation money). As for financial losses, payments were made to victims who had lost their assets/income from the Fukushima accident. Among those payments, the range of “reputational damage” considered for the compensation payments is significantly greater than in the previous cases. A “reputational damage” refers to a financial loss resulting from

consumers' reluctance to purchase products such as agricultural and marine products and to travel to tourist spots out of safety concerns, regardless of whether the government declared them safe. The huge gap between the safety standards set by the government and people's sense of security is the biggest reason why there were so many claims for reputational damage after the Fukushima accident.

However, it should be kept in mind that not all business operators succeeded in obtaining damage compensation for reputational damages. Farmers, fishermen, and tourist business (e.g., travel agencies, tourist entertainment facilities, hotels and inns) mostly demanded compensation for reputational damages from the Fukushima accident. When business operators request compensation for reputational damages, they usually file a collective lawsuit through an association such as a business organization or an agricultural cooperative. Since businesses who do not belong to any organization must bear costs for the lawsuit by themselves, it is difficult in practice for them to demand compensation for reputational damages. In addition, when requesting compensation for reputation damages, it is crucial for business operators to submit past business records to prove that such financial losses actually resulted from consumers' reluctance to purchase their products or services. In the case of products, the amount of reputational damage has to be determined on the basis of business data from the last 5 years (including a list of products for each production date, the production amount, expenses and other items). First, an average monthly revenue is calculated on the basis of data from 3 years among 5 years (the data in the years of both the highest and the lowest production is excluded from this calculation). Then, the average revenue is compared with the revenue after the Fukushima accident in order to find out the decline in revenue. After due consideration of fluctuations in production volume and the production amount of each item, the exact amount of damage is finally decided. Therefore, if a business operator does not keep sufficient business data accumulated, the amount of compensation will be greatly reduced.

Despite difficulties documenting losses when filing for reputational damage, actual payments to business operators were significantly larger than in past cases of damage compensation. Thus, the appropriateness of the amount was much discussed. So long as we respect the principle of "full compensation for damages," the compensation for reputation damages paid to businesses is considered appropriate. However, with the Fukushima accident, it is clear that the amount of compensation greatly differs depending on the type of financial damage, and that above all, compensation paid to voluntary evacuees is extremely low compared to those paid to business operators. If compensation amounts calculated according to past business data are to be considered appropriate, then we must conclude that the compensation amounts paid to voluntary evacuees are unjustifiably low.

Non-economic Damages of Forced Evacuees

When it comes to assessing non-economic damages, the focus of dispute has long been how to calculate the standard compensation for forced evacuees. The evacuees, beginning with the sudden evacuation order, were forced to live in a harsh environment for an extended period of time. Residents in the "difficult-to-return" zones have essentially lost their hometowns, and residents in both "zones in preparation for lifting of evacuation order" and "restricted living zones," even when they are permitted to return, face local communities that have been destroyed and hometowns that have completely changed. Given the risk and uncertainty of low-level radioactive exposure, deteriorated infrastructure and failed local social systems, only a handful of people decided to immediately return to evacuated zones. There is no

doubt that such conditions inflict a great amount of non-economic damages on evacuees, yet it is difficult to evaluate such damages and to calculate them in monetary amounts. First of all, we must consider the pain and suffering evacuees experienced in their lives after evacuation. There is also a consensus that the existence of a hometown and the functions of the local community had played important roles in the victims' lives before the accident. However, these variables are ambiguous and subjective, and their understanding also depends upon each victim. Therefore, it is difficult to uniformly define them as damages. In addition, it is not easy to locate such pain and suffering in the context of damages.

Secondly, even if such pain and suffering can be identified as damages per se, it would be a challenge to calculate a monetary amount adequate to their repair. In the case of the Fukushima accident, the Reconciliation Committee calculated the standard compensation amount for non-economic damages of victims to be 100,000 yen (about 968 dollars) a month, but this calculation was strongly criticized by the victims; first, because this compensation standard was formulated based on insufficient investigation. Since objective calculation of compensation is difficult for non-economic damages, the legitimacy of the standard is provided by the fact that a sufficient fact-finding survey is conducted, which includes interviews with the victims. The Reconciliation Committee consists of legal professionals, but their opinions alone cannot validate such standards. Second, the underlying reasons for the compensation standards have also become targets of criticism. In the Interim Guidelines of August 2011, the Committee stated that they referenced traffic accident compensation standards to determine compensation guidelines. However, damages from traffic accidents are clearly very different from non-economic damages caused by forced evacuation in terms of separation of families, reduced income, hardship, fear of radioactive exposure, anxieties about an uncertain future, and psychological trauma. Therefore, we cannot make an analogy from the standards for traffic accidents to the compensation standards for the victims of the nuclear accident. Nevertheless, the Interim Guidelines were adopted on the analogy of traffic accidents. This analogy presumes that the standard amount of 10,000 yen set by the Guidelines did not take into account several factors to be covered by damage compensation. As mentioned in the previous section, due to the underdevelopment of the existing compensation theory, the current system of damage compensation can only deal with community damage affecting the entire local society by treating it as an individual damage. For that reason, the scope of damage compensation specified by the Guidelines does not cover all of the various pain and suffering that should be compensated. Accordingly, the forced evacuees have to choose between two options: namely, to give up on compensation claims entirely or to accept the difficulties of proving the existence of their unpaid damages by themselves.

Third, the appropriateness of the compensation standard is itself in question. Within many lawsuits and the appeals to the Center that victims have filed, the claimants have always requested amounts that are higher than the compensation standard. This fact demonstrates that many victims are not satisfied with the amount determined by the Reconciliation Committee. In cases of non-economic damages, it is notable that the appropriateness of the damage amount has relevance to the first and the second points. So long as adequate procedures are ensured to determine standards for non-economic damages, those victims are likely to be satisfied, even if the amount itself does not change much from that in the Guidelines.

Compensation for Non-economic Damages for Voluntary Evacuees

Voluntary evacuees from within the prefecture of Fukushima are also acknowledged as victims and compensation was made for their non-economic damages as well as their increased daily expenses. However, compensation paid to voluntary evacuees was much lower than that which was paid to forced evacuees. For this reason, many voluntary evacuees filed lawsuits to demand more compensation, but the amount determined by the courts is generally still low. And while free housing had been provided by local municipalities where voluntary evacuees settled, this support measure ended at the end of March 2017. As illustrated by these examples, voluntary evacuees are not sufficiently acknowledged as victims and it is therefore important to discuss how to deal with this problem. The situations of voluntary evacuees from outside the evacuation zone depends upon each evacuee. Therefore, we cannot treat forced and voluntary evacuees in the same manner. On the other hand, so long as the scope of the evacuation zone is problematic in terms of attention to the risk of low radiation exposure, voluntary evacuees should be given as much support as possible. From this perspective, the extreme differences between how forced and voluntary evacuees are treated currently in Japan is beyond acceptable limits.

3. Who is Responsible for Compensation?

In Japan, the Nuclear Damage Compensation Act stipulates that the operator of a nuclear power plant (the electric power company) is solely responsible for compensatory payments and assumes absolute liability for damages caused by a nuclear accident. However, after the Fukushima accident, it was advocated that the government should assume legal responsibility together with the nuclear operator. This is because the promotion of nuclear power had been a consistent national policy of the Japanese government and thus without the government's support, nuclear power plants would not have propagated in Japan. The additional reason is that the government did not exercise its regulatory authority over TEPCO despite being aware of the dangers of nuclear accidents from large-scale tsunamis caused by big earthquakes.²³ Thus, many of the lawsuits filed by the victims vehemently pursue the government's responsibility as well as that of TEPCO, and several judgements acknowledged joint liability for victims (e.g. the Maebashi District Court in March 2017, the Fukushima District Court in October 2017, the Kyoto District Court in March 2018, the Tokyo District Court in March 2018, the Yokohama District Court in February 2019, the Matsuyama District Court in March 2019, the Sapporo District Court in March 2020 and the Sendai High Court in September 2020). Although it is doubtful that joint liability is always applicable, joint liability makes sense in situations where the government is negligent in exercising its regulatory powers to ensure the safety of a nuclear power plant.

Secondly, further discussions were had about whether the nuclear operator's responsibility is unlimited or limited. If the responsibility is limited, it follows that excesses of this limit should be the government's responsibility. The Nuclear Damage Compensation Act does not limit the responsibility of the operator and places no compensatory responsibility on the government. This means that if the operator goes bankrupt, then any unlimited responsibility becomes meaningless. Therefore, given that the promotion of nuclear energy had been consistently a national policy, revisions to the Nuclear Damage Compensation Act were presented to limit the responsibility of the operator, while making the government responsible. However, limiting the compensation responsibilities of the nuclear operator to a certain fixed amount, regardless of the amount, risks lowering the safety awareness of the

operators, which may thus lead to a moral hazard. Furthermore, since the government's responsibility for compensation ultimately becomes the burden of the general public, there is strong opposition in Japanese civil society toward limited liability. Thus, it seems that for the time being in Japan, the nuclear power operator will continue to assume unlimited responsibility.

As mentioned, under the Nuclear Damage Compensation Act, the government is not liable for any damages from the Fukushima accident. Nevertheless, after the accident, the Japanese government established the Nuclear Damage Compensation Facilitation Corporation and has virtually assumed the responsibility for compensatory payments by pouring large amounts of capital into TEPCO through this Corporation. This means that, regardless of whether the nuclear power operator assumes limited liability or not, in the case of a large-scale nuclear disaster, the government becomes the primary agent of responsibility. This is because it is politically impossible to stop compensatory payments to victims even if the assets of the nuclear power operator are depleted. As long as the government permits potentially dangerous nuclear power generation, the government must be legally responsible not only for the compensatory payments but also for the recovery of the life of each victim and the rebuilding of the local community.

4. Method of Dispute Resolution

If the compensation acknowledged by the nuclear power operator or the government is not sufficient to cover the damages, disputes will arise between the nuclear power operator/central government and victims. In the case of the Fukushima accident, the following two points regarding procedures for the victims in pursuing the responsibility of TEPCO for compensation have become topics of dispute. First, civil litigation procedures in Japan lack a system to integrate allegations of multiple individuals who are involved in the same accident, similar to class-action lawsuits in the US, for cases involving compensation for damages resulting from unlawful acts such as a nuclear accident. This shortcoming becomes especially critical when a large number of victims seek to recover relatively small amounts of damages. After the Fukushima accident, the Center was established under the Reconciliation Committee as an alternative dispute resolution (ADR). Highlighting the shortcomings of this system, the town of Namie filed a claim with the Center as representatives of over 15,000 residents and demanded increased compensation for their non-economic damages.

Second, the ADR procedures under the Center lack effectiveness. Victims took issue with the lack of actual results of the ADR procedure. The Center offers mediation and conciliation, not arbitration. At the beginning, it was discussed whether or not the settlements proposed by the Center should have binding authority on TEPCO. In reply to this discussion, TEPCO repeatedly expressed its willingness to sincerely accept the settlement proposals that the Center presented. Taking this into account, the idea of a unilateral binding of authority was not adopted. During the several years after the accident, TEPCO always accepted the settlement proposed by the Center and so dispute resolution by the center remained functional. However, beginning in the spring of 2014, TEPCO began to refuse settlement proposals for some of the cases, including the aforementioned allegation by the town of Namie, and settlement proposals for collective complaints in particular. The government has been implicitly allowing TEPCO's refusals. Consequently, disputes have not been resolved swiftly for many of the victims. As described, since many of the victims are not satisfied with the standard determined by the Reconciliation Committee, it is a grave issue that the means of dispute resolution are not functioning as expected. To

conclude, in order to cope with the dissatisfaction of the victims, this matter requires legal and political means, such as establishing new compensation guidelines or assigning unilateral binding authority to the Center's proposals.

Compensatory Payments and Reconstruction

Various issues that surround the current compensation system are also deeply intertwined with the meaning of "reconstruction." Compensation for damages is normally payment for what was lost. However, a nuclear accident takes away not only the past but also the present and the future from the victims. Now that ten years have passed since the Fukushima accident, the completion of compensatory payments, the lifting of evacuation orders, and the resuming of normal farming and fishery are often equated with completion of the "reconstruction" period. However, for victims of the nuclear accident, their pain and suffering is still ongoing and reconstruction remains a goal for a distant future. We need to understand the "pain and suffering" caused by the nuclear accident and the responsibility for compensation in ways that are aligned with the long-term "reconstruction" process. Our starting point should recognize that while damage compensation is only a step towards reconstruction, damage compensation is not the same as recovery.?

When we discuss the relationship between "damage compensation" and "reconstruction," we have to think of the meaning of "recovery" and its ambiguity. In the ten years since the Fukushima accident, the Japanese government has put forth various efforts for the recovery of Fukushima. The Reconstruction Design Council that was established in April 2011 immediately after the earthquake and tsunami discussed various policies aimed at reconstruction, with the participation of many intellectual figures with close ties to the Tohoku region. Then on June 25 of the same year, the Council made public the "Recommendations on Reconstruction Planning," which the government adopted as guidelines for reconstruction. The government, at the same time, appointed a Minister for Reconstruction, and in February of 2012 established the Reconstruction Agency, prompting various recovery projects for several years. However, no clear definition of recovery is found in their "Recommendations on Reconstruction Planning" nor in any of the documents issued by the Reconstruction Agency. This is because each has its own definition of "reconstruction." Some would see reconstruction as returning to life before the disaster, while others consider reconstruction as a way of life with hope for the future, even if that life has changed since before the disaster. Furthermore, the definition of reconstruction is even more complex for the victims of the Fukushima accident. Those who evacuated, those who did not, those who have returned and those who remain evacuated—the damages, harms, and losses that these victims suffer vary widely, and many of them are irreversible. Nonetheless, they must all continue to look forward and continue to live their lives. Given such varied forms of recovery, we cannot depend solely on the uniform policies of the central government. In order to promote a reconstruction that suits the various needs of Fukushima, the role of municipalities, in particular those which are the closest to the victims (e.g., cities, towns, and villages) is so important. The central government should cooperate with those municipalities for the purpose of designing and implementing a compensatory payment system (e.g., standards for damage compensation and dispute settlement procedures) that targets and helps individual victims and the regions they call home.

Conclusion: Building a New Compensation System and The Process of System-Building

The primary objective of a damage compensation system that is utilized for nuclear accident victims is recovery from the damage inflicted on them. However, what the victims truly need and desire is a recovery of their peaceful lives before the accident. Compensation does not bring forth a recovery of their original lives and must be the last resort when no other alternative measures can satisfy this need. For a true reconstruction, together with the recovery of victims, the local communities which have been totally destroyed need to be rebuilt, which is difficult to imagine let alone achieve under the current compensation system that does not acknowledge the destruction of a community as an independent damage. Although it is not clear whether or not such destruction should be included in the scope of damages which deserve compensation, compensation for individual victims is not going to rebuild a destroyed community, and the lives of victims who had interactive relationships with other people in their communities cannot be rebuilt satisfactorily.

The experience of the Fukushima accident indicates that we need a compensation system that leads to better future lives for the victims individually and collectively on the basis of understanding that each individual has their own specific suffering within the overall situation where local communities were utterly destroyed. For example, if nuclear accident victims residing in the mandatory evacuation zone were to file a collective lawsuit and under some mutual agreement contribute a part of awarded compensation to a fund for the rebuilding of their local communities, we may be able to better visualize damages to communities that could not be recovered through individual compensation alone, and to push the reconstruction of the affected area forward even a little.

Last but not least, what is needed for the establishment of such a system is fair and adequate procedures. It is necessary to establish such a system in collaboration with the victims, and by incorporating the opinions of various organizations that are active in the local areas, basic municipalities that assume primary responsibilities for the area, as well as international organizations. Such collaboration will in turn help establish better working conditions for reconstruction. Fundamentally, compensatory payments are for settling of the past. However, in the case of a nuclear accident where damages are continuously reproduced, compensation for past damages must be made in ways to generate new dynamism that leads to building a new future.

To fulfill our responsibility as citizens who live with the Fukushima accident, we will continue to examine the limits of the current compensation system and to explore possibilities to improve its functions, thereby continuing to think of what we can do to recover the peaceful life before the accident that victims truly desire.

(Note: This research is financially supported by Japan Law Foundation [Research No.109 (2014-2015)]. On this occasion, we express our sincere thanks to the Foundation.)

1. With the aid from the government, as of February 5, 2021, Tokyo Electric Power Company has paid a substantial amount of compensation (app. 9.7 trillion yen) to many victims (app. 1,127,000 cases of forced evacuees, app. 1,308,000 cases of voluntary evacuees, and approximately 520,000 cases of corporate and individual business operators). Tokyo Electric Power Company, "Records of Applications and Payouts for Compensation of Nuclear Damage," February 5, 2021, https://www.tepco.co.jp/en/hd/responsibility/revitalization/pdf/comp_result-e.pdf.

2. “Results of the consultation business and the content of the consultation,” Nuclear Damage Compensation and Decommissioning Facilitation Corporation, 2020, <http://www.ndf.go.jp/press/at2020/20200703.html>.
3. Nihon Bengoshi Rengokai (Japan Federation of Bar Associations), “Bengoshi hakusho 2019-nen ban” (Attorney white paper 2019), pp. 140-141, https://www.nichibenren.or.jp/library/pdf/document/statistics/2019/3-6-4_2019.pdf
4. No lawsuits have reached the supreme court's rulings as of December 2020.
5. See Suami's report, Section V.
6. Japanese Government Ministry of Education, Culture, Sports, Science, and Technology, “Fukushima ni okeru hinan no gaikyo” (The status of evacuation in Fukushima), https://www.mext.go.jp/b_menu/shingi/chousa/kaihatu/016/shiryo/_icsFiles/afieldfile/2011/09/21/1311103_1_2.pdf.
7. “Kanbenren ga yuku, dai 4 kai” (“The Kansai Bar Association on the move, No. 4”), *Kanbenren dayori* (Kansai Bar Association Newsletter), No. 235, September, 2016, pp. 1-2.
8. All names of individuals used in this paper are pseudonyms.
9. Fukushima Prefectural Federation of Fisheries Cooperative Associations, 2020, <http://www.fsgyoren.jf-net.ne.jp/siso/sisotop.html>.
10. Tokyo Electric Power Company, “Records of Applications and Payouts for Compensation of Nuclear Damage,” February 5, 2021, https://www.tepco.co.jp/en/hd/responsibility/revitalization/pdf/comp_result-e.pdf. See also Ashina's report, Section I.
11. See Ashina report, Section I.
12. This section was written in 2016.
13. “Otsu District Court suspends operations at Kanden Takahama nuclear power plant,” *Nihon Keizai Shinbun*, July 12, 2016, https://www.nikkei.com/article/DGXLAHC11H4A_S6A710C1000000/.
14. The Osaka High Court reversed this decision in March 2017.
15. “Gal: A unit of acceleration which represents the intensity of seismic acceleration of the foundation/building due to an earthquake,” according to https://www.kepco.co.jp/english/energy/nuclear_power/jishin_ss.html.
16. Tokyo Electric Power Company, “Records of Applications and Payouts for Compensation of Nuclear Damage,” February 5, 2021, https://www.tepco.co.jp/en/hd/responsibility/revitalization/pdf/comp_result-e.pdf.
17. See Ashina's report, Section I.
18. For example, in the case of Namie, where residents were forced to evacuate after the nuclear accident, although the evacuation order was lifted at the end of March 2017 except in certain areas, of the total population of 18,020, only 440 people have returned as of the end of November 2017. Even at the end of December 2020, only 1,554 people among the total population of 16,718 reside in the territory of Namie.
19. See Takahashi's Report, Section II.
20. Evacuation order after the Fukushima accident has been lifted in many of mandatory evacuation zones, and some residents have already returned. However, there have been cases reported of difficulties in maintaining businesses by returned business operators, and these are becoming obstacles for residents to return or towards rebuilding. For these instances, TEPCO maintains that compensatory payments have been completed, and that

these reported difficulties are not related to the nuclear accident. Under the current compensation system, it is not easy to get acknowledgment that such revenue losses of the business to have been derived from the nuclear accident.

21. "U.S. urges citizens within 80 km of Japan plant leave," Reuters, March 17, 2011, <https://www.reuters.com/article/us-japan-usa-shelter/u-s-urges-citizens-within-80-km-of-japan-plant-leave-idUSTRE72F73J20110316>.
22. See Ashina's report, Section II.
23. Tokyo Denryoku Fukushima Genshiryoku Hatsudensho Jiko Chosa Iinkai (National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission), "Kokkai Jikocho Tokyo Denryoku Fukushima Genshiryoku Hatsudensho Jiko Chosa Iinkai chosa hokokusho" (Report of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission), National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, 2012, <https://dl.ndl.go.jp/info:ndljp/pid/3514600>.

Mapping Three Mile Island: Nuclear Liability and Compensation in the United States

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On March 28, 1979, the core of Reactor 2 at the Three Mile Island Nuclear Generating Station near Harrisburg, Pennsylvania began to melt down.¹ Radiation levels built to dangerous levels inside the facility's buildings as radioactive gasses escaped the plant through a ventilation stack.² The plant's operator and US government agencies had no immediate way of ascertaining how much of the core had melted or how much radioactive material had escaped. Some of the plant's radiation monitors went off the scale and failed. A small offsite network of twenty thermo-luminescent dosimeters (TLDs), meanwhile, lay unevenly dispersed and too widely spaced to track the precise path of the effluent.³ By Friday, March 30, Pennsylvania Governor Richard Thornburgh had advised all pregnant women and pre-school-aged children within a five-mile radius to evacuate. Thousands of residents left the area as scientists, engineers, and regulators scrambled to control the meltdown and assess its effects.⁴

Over the months and years that followed, the Three Mile Island (TMI) incident became a source of legal controversy over nuclear compensation. Amidst uncertainty over the magnitude of offsite contamination and distrust of corporate and government actors, residents filed thousands of claims for compensation in US federal and state courts.

This chapter explores injury litigation arising out of TMI as a means of mapping the US system of liability and compensation for offsite harms caused by nuclear power generation. TMI was the first major incident in a civilian nuclear power plant worldwide. It was also the first major test of the US legislation that governs and limits liability for civilian nuclear power incidents—the Price-Anderson Nuclear Indemnities Act. Consequently, TMI provides an important window into questions at the heart of nuclear liability and compensation: Who is a proper claimant? How are the geographical and temporal boundaries of a disaster determined? What knowledge and knowers are privileged in these processes?

Analysis of TMI offers an important point of comparison to the later-arising catastrophes at Chernobyl and Fukushima for several reasons. First, the TMI incident was far less severe. Unlike the Chernobyl facility, which did not employ any kind of containment, the TMI 2 reactor sat within a robust containment vessel. Later investigations revealed that about half of the reactor core melted, but the containment vessel remained intact.⁵ Although legal claimants contested the magnitude of the release, damage from the TMI incident was largely limited to short-lived, airborne emissions of radioactive noble gases through a vent stack. By way of comparison, the International Atomic Energy Agency (IAEA) has rated the TMI incident as a level 5 “accident with wider consequences” on its seven-tiered International Nuclear Event Scale. It has rated both Chernobyl and Fukushima as level 7 “major accidents”—the most serious category in the IAEA classification scheme.⁶

Because the TMI incident was far less severe than the other reactor disasters discussed in this volume, it sheds light on how the boundaries of nuclear compensation are drawn and contested when uncertainty abounds and causal linkages between incident and injuries are difficult to discern. After TMI, this process was shaped by legal disputes between claimants and the operating corporation—a private corporation represented in court by lawyers funded by private nuclear insurance pools. US government participation in the claims process was largely limited to adjudication of intractable disputes by the federal courts.

This raises the second major distinction between the TMI incident and the Chernobyl and Fukushima disasters: claimants sought compensation not from governmental or quasi-governmental entities, but from private corporations. They ultimately did so within an adversarial litigation system, rather than a system of entitlements (as in the case of Chernobyl) or a government-crafted administrative settlement scheme (as in the case of Fukushima). Courts’ reliance on routine tort (injury) law to set the standards for recovery, in turn, raised difficult legal and scientific challenges for the claimants. Foreclosed from participation in making the rules of nuclear compensation in the first instance, everyday people who faced the risks of nuclear power generation fared poorly in the US courts. The TMI claimants’ chief avenues of participation in setting the boundaries of nuclear compensation were a series of long, arduous, costly, and ultimately unsuccessful legal disputes. The system that governed injury claims after TMI endures largely unaltered today.

THE PRICE-ANDERSON NUCLEAR INDUSTRIES INDEMNITY ACT

At the time of the TMI incident, the US legislative regime governing nuclear reactor meltdowns focused on promoting foreign policy goals and growing private industry, rather than on protecting the public from harm. Beginning in the 1950s, the US pioneered a legislative regime that promoted private insurance and technology industry participation by shielding corporate participants from the full costs of a catastrophic nuclear disaster.

The United States’ regulation of reactor liability emerged in response to Cold War politics. During the 1950s, the Eisenhower administration sought to promote the peaceful uses of nuclear energy as a salve against the horrors of nuclear weapons and a bargaining chip in US foreign policy.⁷ Concurrently, the US adopted a model of public-private collaboration in the field of nuclear power. Facing the potential of

liability for a nuclear reactor catastrophe, corporations such as General Electric, Westinghouse, and Monsanto lobbied for special protections.⁸

Lawmakers designed a *sui generis* legislative regime, the Price-Anderson Nuclear Industries Indemnity Act of 1957, to foster private participation in developing nuclear power by limiting the financial risks that corporations would face. The Act channeled the financial costs of all public liability—injuries to persons and property outside the boundaries of a nuclear facility (excepting certain workman's compensation claims and acts of war)—to the operators of nuclear facilities (i.e., the power companies). It shielded other industry participants, such as suppliers of parts and designs, from all financial responsibility.⁹ Concurrently, the Act also limited the financial responsibility of nuclear plant operators to the costs that newly forming nuclear insurance pools were willing to underwrite. (In the earliest decades of the Act, the US government also covered an additional increment of funding, though this was later phased out.¹⁰)

Protecting the public from the risk of nuclear power was not the primary goal of the legislation at its inception.¹¹ From the outset, the total amount of funding for public liability fell far short of the potential cost of injuries to the public that could result from a catastrophic meltdown. US scientists estimated in 1957 that a meltdown could cause up to \$7 billion in damages, but the Price-Anderson Act, in its initial iteration, limited guaranteed compensation to \$560 million.¹² This left open the possibility that losses to citizens and communities near a malfunctioning plant would not be compensated fully in the event of a major disaster.

The Price-Anderson legislation enabled lawmakers to treat civilian nuclear power as a financially exceptional field. The legislation fostered the private insurance industry by keeping the US government from becoming a primary insurer.¹³ Meanwhile, the regime ensured that the full risks of nuclear electricity generation were not reflected in the price of parts, transit, or kilowatt hours.

This system relied on private insurers as the primary gatekeepers of the claims process, leaving the courts as the final forum for recourse in difficult disputes. Insurers, not US government agents, would interact with claimants and take a first pass at judging the validity of claims. The Price-Anderson regime also assumed, however, that major incidents would generate contentious litigation. Thus, the state and federal courts would be the final arbiters of claims against operators. Under this regime, the nuclear insurers would be responsible for defending litigation claims against operators. Insurers would be both gatekeepers in the claims process and interested parties in ensuing litigation.

The Act created an exceptional regime for managing financial risk, but it left the substantive laws of injury largely unaltered. The system left in place all of the typical legal obstacles to making a successful claim under civil laws governing injury to persons and property, known as tort laws. Although the specifics of tort laws varied among the United States' fifty states, claimants would face some similar hurdles in making claims. Among other things, in the case of bodily harm, a claimant would have to prove her injury was more likely than not caused by ionizing radiation.

As legal commentators recognized in the 1950s, the nature of radiation exposure and the kinds of injuries it could induce raised special challenges for tort claims. Radiation exposure is difficult to trace. A person harmed by radiation would need the help of experts and specialized equipment to establish that they had been exposed. Many of the injuries caused by radiation, moreover, are not specific. Solid tumor cancers, for instance, commonly arise from a variety of causes that cannot be discerned from a

tumor's biological characteristics. This would make it very difficult for a claimant seeking to prove that exposure to ionizing radiation, rather than some other factor, had more likely than not caused her injury. Finally, radiation injuries could take many years to manifest, creating additional problems of proof and difficulties surrounding procedural limitations on the time frame in which a case could be filed.¹⁴

Legislators initially justified this financially exceptional but legally mundane regime as a temporary measure to foster the growth of the nuclear industries. It became permanent, however, in the decades that followed. The legislative regime remained largely intact over time, with some changes to increase the portion of liability that the insurance pools would underwrite, to phase out government contribution, and to limit operators' defenses against liability in some extreme circumstances. By 1979, the Act required operators to carry \$140 million in insurance for each facility. If the costs of public liability outstripped this primary layer of insurance, every operator would be obligated to pay retrospective premiums of up to \$5 million per reactor. The secondary layer of insurance provided for about an additional \$340 million in insurance coverage.¹⁵ If damage awards outstripped these coverages, claimants would not be fully compensated for the harms they suffered.

The amended Act also contained provisions intended to ease legal hurdles for plaintiffs in the case of a major incident—dubbed in bureaucratic-speak an “extraordinary nuclear occurrence” (ENO).¹⁶ To qualify as an ENO, a nuclear incident had to meet two criteria. First, the incident had to cause a substantial release of radiation offsite or substantial radioactive contamination offsite. This could be measured by dose to persons or exposure of environments.¹⁷ The criteria set these thresholds quite high, for example, requiring a skin dose of at least 60 rem to qualify—a dose high enough to cause immediate symptoms of acute radiation sickness in some people. Second, an incident also had to cause actual or likely substantial offsite damages, measured in harm to life or financial damage.¹⁸ These criteria were less stringent, requiring, for example, only \$5 million in aggregate financial harm.

If US regulators deemed an incident to be an ENO, several defenses against liability would be waived and the statute of limitations set uniformly at three years following discovery of an injury, provided the injury was discovered within 10 years of the ENO. A plaintiff would still have to prove that the ENO caused her injury and would also have to prove damages—the most difficult hurdles in any radiation injury case.¹⁹ The amendments consequently left the rules of state tort laws intact while lowering some barriers to a plaintiff's recovery.

Anti-nuclear activists were not appeased by these periodic amendments to the Price-Anderson regime. During the early 1970s, public interest groups began to challenge what they saw as an inequitable distribution of the risks and benefits of nuclear power. In 1973, individuals living in the proximity of nuclear plants under construction in North and South Carolina sued Duke Power. They argued, in part, that the Price-Anderson Act violated the Equal Protection Clause of the US Constitution because the limitation of corporate liability placed a disproportionate burden of the risks and costs of nuclear energy on the victims of an accident.²⁰ The citizen plaintiffs won at trial but faced difficulties on appeal.

On June 26, 1978, less than one year before TMI, the US Supreme Court held unanimously that Congress had acted constitutionally in limiting liability in order to promote the production of nuclear energy.²¹ Over two decades after its genesis, the US nuclear liability regime remained focused on private, corporate interests—

insurers, plant operators, and suppliers—protecting the nuclear industry at the expense of the public.

PRICE-ANDERSON AFTER TMI

The TMI incident tested the Price-Anderson regime in unprecedented ways, exposing the complicated private-public nature of nuclear compensation in the United States. Up until 1979, claims brought under the Price-Anderson regime had been fairly small, work-related ones mainly handled through the insurers' administrative claims-processing procedures. There had been no major incident at a civilian nuclear facility, and no claim had ever come close to the financial ceiling of the primary layer of insurance.

Nuclear insurance in the US had actually proven to be a lucrative, low-risk field with minimal litigation. The aggregate of all paid claims was quite low. Between 1957 and March of 1979, for example, the nuclear insurance pools paid only 28 claims totaling \$1,453,911.²² All of these claims arose in the context of workers' and contractors' activities and none had involved a claim by a member of the public. It appears that all claims brought under the Price-Anderson Act and terminated prior to TMI were resolved through the insurers' administrative claim processing procedures rather than through litigation.²³

In comparison to the low rate and cost of claims, the insurers had charged substantial premiums. For example, in 1957, the insurance pools charged about \$300,000 per-year per-facility for \$60 million in required coverage.²⁴ These costs increased over the decades along with increasing coverages and inflation. Although the insurers returned a portion of unused premiums periodically to avoid taxation, the business was still lucrative since claimants made relatively few demands on the insurers' reserves.

The TMI incident forced nuclear insurers to reckon with a much larger, costlier, and more complicated incident than they had previously handled. On Friday, March 30, Pennsylvania Governor Richard Thornburgh advised all pregnant women and pre-school-aged children within a five-mile radius of the plant to evacuate.²⁵ An estimated 144,000 people—roughly 39% of the population within the 5-mile radius—evacuated.²⁶

The nuclear insurance pools moved quickly to set up claims-processing operations near the plant. By March 31, they had opened a claims office in the area and dispatched claims officers to the Red Cross shelter at Hershey Stadium. All told, the insurers paid 3,806 claims worth about \$1.3 million for evacuation expenses and lost wages incurred by residents living within a five-mile radius of the plant during the eleven-day evacuation advisory.²⁷ These smaller, routine claims associated with the costs of evacuation nearly outstripped the combined cost of all claims paid before TMI.

The incident also gave rise to extensive litigation—a first in the Price-Anderson Act's long history. The Price-Anderson Act's draftspersons had focused on the financial terms of the legislation, leaving courts to deal with silences and legal ambiguities. The TMI incident now forced courts to begin to interpret the Price-Anderson Act's untested provisions as a variety of claim types went into litigation—not least, residents' claims of injury.²⁸

The TMI injury claims centered on uncertainty surrounding the release of radioactivity from the plant. As mentioned, the ability to trace radioactive releases during the crucial early hours and days of the incident had been hampered by an inadequate number and distribution of TLDs. After extensive testing for radionuclides in the environment surrounding TMI, a US interagency taskforce concluded in 1980 that any radiation exposures had been too low to cause illness. The taskforce calculated a maximum individual dose of only 100 millirem (1 millisievert)—roughly one year's dose of naturally occurring background radiation for most people living in the United States.²⁹ Because the estimated exposures were so low, the US Nuclear Regulatory Commission concluded that the incident had not been an ENO.³⁰ This ruling benefitted the operator and the insurers tasked with defending it in court by ensuring that all legal defenses would be available to them.

This version of events did not sit right with local people who had begun to connect with Japanese industrial health and antinuclear activists visiting the area in the wake of the meltdown.³¹ As the community came together around questions of dose, many individuals recalled experiencing strange tastes and smells, erythema, and nausea. Others observed a variety of harms to animals and the environment.³² Residents sought to understand potential linkages between their observations and the TMI incident, but their concerns were largely dismissed by US government agencies and studies.³³

Despite the volume and number of studies undertaken by US government agencies to trace radionuclides, residents remained distrustful and upset that few officials had taken time to listen to them or to assess the harm to their bodies and environments.³⁴ As early as spring of 1979 residents began to sue in state and federal courts seeking to remedy what they felt was shoddy science. In 1981, the operator's insurers reached settlement on a class action lawsuit, filed in the US Federal District court for the Middle District of Pennsylvania.³⁵ The plaintiffs had sought class certification for several classes of individuals situated within a twenty-five-mile radius of the plant.³⁶ The insurers, which had previously only entertained economic loss claims from a five-mile-radius evacuation zone surrounding the plant, now agreed to pay \$20 million for the reimbursement of economic losses of individuals and businesses within this broader area. In addition, they provided a \$5 million public health fund to support epidemiological and environmental studies.³⁷

The Public Health Fund's work failed to salve residents' worries. An independent 1984 review of dosimetry sponsored by the Fund actually further kindled residents' concerns, suggesting that government dose estimates had been problematic and incomplete.³⁸ By this time, some residents had begun to receive diagnoses for health problems they associated with possible radiation exposure—ailments like thyroid conditions and a variety of cancers. Local activists turned to both science and law, mobilizing on their own to collect data about health and local environments and filing scores of lawsuits.³⁹ By 1985, over 2,000 individuals had filed personal injury claims in state and federal courts in Pennsylvania, New Jersey, and Mississippi.⁴⁰

Initial disputes centered on questions of whether US federal or state courts would exercise jurisdiction over the injury claims. Though a technical legal issue, in personal injury claims, jurisdiction can have profound consequences for the result of a dispute. Legal professionals typically assume that state courts favor injury plaintiffs and federal courts favor corporations. Consequently, TMI's operator initially removed all of the claims to US federal court in the Middle District of Pennsylvania. In declining to declare the TMI incident an ENO, however, the Nuclear Regulatory Commission vitiated the clearest source of federal jurisdiction. The US Court of Appeals for the

Third Circuit ruled in the plaintiffs' favor, holding that the Price-Anderson Act did not confer jurisdiction on the federal courts. Pending claims were consolidated in state court in Dauphin County, Pennsylvania.⁴¹ Not long after, in 1985, the insurers paid roughly \$14.25 million in settlements to about 280 claimants, taking the public position that they had settled not because the claims were valid, but to avoid the cost of litigation.⁴²

This small victory was short-lived. In 1988, Congress created a federal cause of action for "public liability" suits and retroactively conferred jurisdiction on the US federal courts.⁴³ The defendants immediately removed the more than 2,000 remaining personal injury claims to federal court in the Middle District of Pennsylvania, which would apply Pennsylvania tort law to the dispute. Pressure toward settlement dissipated, and the injury claims began to slowly work their way through the pre-trial motions.

The outcome-determinative features of the dispute did not become clear until 1995, when the court held that plaintiffs needed to demonstrate they were exposed to at least 10 rem of radiation.⁴⁴ This was a sub-acute dose-level widely agreed by scientists to cause an increased risk of harm.⁴⁵ As in most injury lawsuits in the United States, the plaintiffs had to demonstrate it was more likely than not (i.e., 51% likely) that radiation from the meltdown had caused this dose. Given the lack of scientific consensus over the effects of low-dose radiation, the court reasoned that, as a matter of law, plaintiffs would not be able to meet their burden of proof if they showed a lower level of radiation exposure.⁴⁶

The deck was stacked against the plaintiffs from the outset. Under the rules governing the admission of expert evidence, US government agency studies and reports were automatically admissible.⁴⁷ In the case of TMI, those studies had concluded that residents had not been exposed to levels of radiation sufficient to cause injuries. As discussed above, moreover, civil law evidentiary burdens were in tension with how radiation exposure was understood to cause or contribute to bodily harm. Many radiogenic cancers can also arise from other causes. In many other cases, radiation exposure does not necessarily cause injury, but rather combines with other factors to increase a person's overall risk of developing particular cancers. The plaintiffs would have to produce persuasive expert evidence in an attempt to establish causation.

This introduced problems of cost. Where the operator could rely on government-funded studies to support their defense, the plaintiffs had to develop extensive and novel scientific studies. The plaintiffs' attorneys very likely covered those costs up front. In the vast majority of personal injury cases—and presumably in the case of TMI, though the archival record is silent on the point—attorneys represent claimants on a contingent fee basis. Under this method of payment, claimants do not pay any expenses or lawyers' fees unless they win a verdict or a settlement. Typically, the attorneys are entitled to recover their expenses, including costs of expert reports, and thirty percent of the settlement or judgment. This process creates incentives for lawyers to attempt to save on costs.

The plaintiffs focused on developing expert evidence of dose that US government agencies had overlooked—principally the effects of radiation on sufferers and plants and animals in the region. To do this, they assembled an impressive array of experts in dose reconstruction, drawn from experiences studying a number of other nuclear incidents, most notably Chernobyl. Although the Chernobyl disaster had occurred seven years after the TMI incident, the lengthy litigation process meant that data and

experts from Chernobyl were now available to the TMI plaintiffs. Well-regarded experts from the US nuclear complex and government facilities similarly joined in the plaintiffs' cause. So did a number of other physicians, epidemiologists, veterinarians, and dose reconstruction experts from academic institutions, private practices, and consulting businesses.⁴⁸

The plaintiffs' experts, in turn, collaborated closely with community activists to identify areas where harm to persons and environments appeared to aggregate.⁴⁹ This close collaboration with sufferers was a routine practice in retrospective dose reconstruction.⁵⁰ For the plaintiffs, however, the collaboration represented a new and welcome opportunity to make the case that they had been harmed by the meltdown. Working in this fashion, the plaintiffs produced a number of small scientific studies geared toward proving exposure levels by establishing dose ranges in plants, animals, and people.

Despite the plaintiffs' development of several intriguing pilot studies, other aspects of the attorneys' work practices undermined the case. For reasons unclear in the archival record, but likely related at least in part to cost, the plaintiffs' attorneys directed or permitted their experts to file piecemeal letters, affidavits, and responses of various sorts, rather than formal, comprehensive expert reports typically introduced in litigation.⁵¹ In many cases, the studies themselves were not as robust as they could have been. Cytogeneticists, for example, neglected to employ established techniques to account for problems introduced due to the passage of time.⁵² Immunologists did not examine the patients or their full medical histories to rule out other possible causes of immune suppression.⁵³ On top of this, the plaintiffs' lawyers routinely missed court-imposed filing deadlines, which, as any practicing lawyer knows, can easily be fatal to a case.

The already high evidentiary burdens placed on the plaintiffs, coupled with the lawyers' conduct, proved insurmountable across a series of pre-trial hearings to assess the admissibility of the plaintiffs' expert evidence. The court excluded almost all expert materials that had been untimely filed. This reached nearly every expert in the case, since the experts' materials trickled in letter-by-letter and affidavit-by-affidavit over an extended period of time.⁵⁴ After filtering out most of the late-filed documents, the court then ruled to exclude almost all of the plaintiffs' remaining expert testimony on grounds that it was unreliable and would not help a trier of fact (i.e., a jury or judge) to decide the case. The court's decision was motivated in large part by the vast corpus of government studies on the incident. Where the plaintiffs had to pay for, and introduce new studies and testimony, the defendants had been able to rely on voluminous government data. Focusing on these reports and on expert testimony that very little radioactive material had been released from the plant in the first place, the defendants were able to persuade the judge to exclude evidence of high doses as unreliable.⁵⁵

On the balance, although the plaintiffs had introduced some novel evidence of harm in their bodies and in living organisms in the regions around the plant, the court concluded they could not, as a matter of law, prove it was more likely than not that they were exposed to a dose over 10 rem. The plaintiffs' experts had established the *possibility* of a larger exposure, but not its *probability*. This severed the causal link between plaintiffs' suffering—their cancers and injuries—and the TMI incident. The trial court entered summary judgment in favor of the defendants, terminating the case in the pre-trial stages.⁵⁶ The Third Circuit Court of Appeals affirmed, ruling on its final appeal in 2002, more than twenty years after TMI.⁵⁷

TMI AND THE FUTURE OF NUCLEAR COMPENSATION

Today, the TMI incident serves as a dark mirror, reflecting deeply held beliefs about nuclear power. Nuclear insurers and industry participants look back at TMI as a successful proof of concept of the Price-Anderson regime. The nuclear insurers paid out nearly \$71 million, including payments of approximately \$29 million in defense-side legal fees. (The plaintiffs' legal fees, covered by the plaintiffs' law firm, were not included in official calculations of the cost of TMI.) This fell well within the site's primary layer of insurance coverage.⁵⁸

The insurance pay-outs tell only part of the story, however. The cleanup of TMI lasted more than ten years and cost approximately \$1 billion. The Japanese government furnished \$18 million and sent engineers to participate in the cleanup as a means of building experience in dealing with nuclear incidents. The remainder of funding came from nuclear property insurers, distinct from third-party liability insurers, who paid about \$300 million; ratepayers, who paid about \$125 million; shareholders; the Department of Energy; and the states of Pennsylvania and New Jersey. All told, the TMI incident cost approximately \$1.7 billion, and the publics that had been put at risk footed a large portion of the bill.⁵⁹

Those who attribute their suffering to the TMI incident, meanwhile, continue to feel the system failed them. Contentious litigation over the incident lasted roughly twenty-three years and cost tens of millions of dollars. Most claimants never received compensation for their injuries or felt heard by a system that discounted their suffering. Almost forty years after the incident, whispers of a cover-up continue to circulate in some communities.

The plant itself remains set on the Pennsylvania landscape, though it no longer produces electricity. The cost of operating the plant ultimately proved too high to compete with cheaper sources of power. Pennsylvania's legislature declined to further subsidize the plant. Forty years post-meltdown, TMI has been mothballed. Its cooling towers still mark the horizon as "spent" but highly radioactive fuel remains sheltered within.

The edges of nuclear disaster will always be porous. Nuclear contamination endures for generations and heeds few boundaries. Radiobiological knowledge shifts as each disaster unfolds and new techniques of study emerge. Determinations of who must be compensated after a nuclear disaster remain highly contestable and will often—perhaps always—be challenged. For every claimant who recovers compensation, there is another, barely disqualified claimant whose suffering will not be redressed.

Disputes over compensation at TMI demonstrate that it is not only the outcome, but also the *process* of determining the boundaries of compensation that matters to claimants. To residents living around the TMI plant, the process seemed unfair and unjust. They bore the risks of TMI and stood to suffer the most from the incident, yet government and industry actors disregarded their voices and experiences. Interested parties—corporations, insurers, and government agencies—had controlled the process. Whether or not one believes that the TMI incident caused radiogenic harm in the region or to the claimants, the process itself fueled distrust of the nuclear complex and feelings of disenfranchisement that reverberated throughout publics in the US and abroad.

The TMI claimants' experiences are but one small part of a broader system that excludes at-risk and suffering communities from influencing nuclear compensation regimes in the US. Across numerous renewals, the legislative process has remained

focused on industry participants, who possess money and power necessary to lobby successfully. Although NGOs have contributed periodically to legislative debates over the Price-Anderson regime, lawmakers have not solicited the views of those who know first-hand what it is like to experience nuclear harm or to attempt to make a claim. And under the existing insurance regime individuals can do nothing to protect themselves. To avoid being twice exposed for the same incident, insurers exclude nuclear damage from consumer policies.⁶⁰

The Price-Anderson regime, moreover, retains private insurers and federal courts as gatekeepers of US public liability claims. In 1990, the President's Commission on Catastrophic Nuclear Accidents convened in the wake of the Chernobyl meltdown. The Commission's final report urged Congress to consider adopting streamlined administrative settlement procedures for handling nuclear compensation.⁶¹ Shifting to an administrative regime in the case of massive disasters, the Commission felt, would lessen the burdens on claimants in a variety of ways. It would speed up compensation, lower the burdens of claims-making, and potentially permit recovery for those unable to prove that their injuries were caused by radiation. Such regimes have far more flexibility than litigation to address suffering in line with the limits of radiobiological knowledge.⁶²

Administrative settlement schemes also have disadvantages, however, as Schmid and Suami et al. clearly demonstrate in this volume. Eligibility criteria—whether based on a territorial/environmental exposure model or dose model—are almost always controversial. The resulting settlement regimes tend to overcompensate some sufferers whose illnesses were not likely caused by radiation, while undercompensating other sufferers whose illnesses were caused by radiation. Since settlement funds are always limited, this distributional issue can lead to serious injustices. Other problems arise from the definitions of harm. Not least, as Suami et al. demonstrate in the case of Fukushima, these regimes typically only cover conventional categories of injury, such as damage to persons and property. They do a poor job of recompensing the many and varied types of harm that persons and communities suffer in the wake of a nuclear disaster.

The US Congress ultimately failed to act on the Commission's recommendation to proactively institute an administrative settlement scheme that could apply in cases of catastrophic nuclear disasters. Over the intervening decades, the state of knowledge and experience about nuclear disaster and mass settlement has changed. It is now up to Congress or the courts to reexamine these issues or to try new approaches at a future date.

Most recently, amendments to the Price-Anderson regime have done little to address how future nuclear disasters will be bounded and compensation awarded, let alone to include suffering and at-risk communities in such discussions. In 2005, the US Congress extended the Price-Anderson Act through 2025, focusing its attention principally on increasing the amount of coverage afforded. Although the primary and secondary tiers of insurance under the Act now total over \$13 billion dollars, among the largest pools worldwide, the overall coverages pale in comparison to the full costs of a catastrophic disaster.⁶³ The Japanese government, for example, estimated in 2016 that the costs of Fukushima would exceed \$188 billion.⁶⁴ More recent estimates by the think tank Japan Center for Economic Research suggest that costs may run as high as \$315-\$728 billion.⁶⁵

As long as nuclear power provides a significant source of electricity, communities located near reactors will bear many of the risks of a catastrophic meltdown. Yet they

have little say in how they would be treated in seeking compensation after a disaster. Although lawmakers have thought long and hard about the solvency of energy and insurance companies, they have not fully considered claimants' experiences of being harmed and seeking compensation. When the Price-Anderson regime was initiated in the 1950s, it was not possible to ask victims of a civilian nuclear reactor meltdown about such experiences. There had been no meltdown because civilian power generating facilities did not yet exist. Today, as this volume saliently demonstrates, communities worldwide have experience seeking compensation for nuclear harm across a range of compensation regimes. These suffering and at-risk communities should be brought to the table in a democratic, participatory, and anticipatory process—not after, but before the next disaster occurs.

1. For a detailed recounting of the incident, see Walker 2004. For a view of the incident's cultural and political impacts, see Zaretsky 2018
2. Walker 2004, 78-80
3. See Jan Beyea, *A Review of Dose Assessments at TMI and Recommendations for Future Research* (Three Mile Island Public Health Fund, 1984).
4. Walker 2004, 137
5. Walker 2004, 72-78; NRC 2018a
6. See International Atomic Energy Agency Information Series, Division of Public Information, 08-26941/E, *International Nuclear and Radiological Event Scale*.
7. Hewlett 1989, 198-199; Mazuzan 1985, 18-31. On nuclear energy as a part of US international diplomacy, see also Krige 2006, 161-181
8. See, for example, *Atomic Power and Private Enterprise: Hearings Before the Joint Committee on Atomic Energy*, 82d Cong. 30-31 (1952) (statement of Edwin J. Putzell, Jr., Secretary, Monsanto Corporation); *Hearings to Amend the Atomic Energy Act of 1946: Hearings on S. 3323 and H.R. 8862 Before the Joint Committee on Atomic Energy* 334-35 (1954) (statement of Frank McCune, General Manager of Atomic Products Division, General Electric Company); *Governmental Indemnity for Private Licensees and AEC Contractors Against Reactor Hazards: Hearing Before the Joint Committee on Atomic Energy*, 84th Cong. 27-56 (1956) (statement of William Mitchell, General Counsel, AEC). See generally Butler 1959.
9. For an overview, see Mazuzan 1985, 113-117.
10. See *Governmental Indemnity for Private Licensees and AEC Contractors Against Reactor Hazards: Hearing Before the Joint Committee on Atomic Energy*, 84th Cong. 27-56 (1956) (statement of William Mitchell, General Counsel, AEC); Thomas 1958; Butler 1959
11. *Governmental Indemnity for Private Licensees and AEC Contractors Against Reactor Hazards: Hearing Before the Joint Committee on Atomic Energy*, 84th Cong. 33, 38, 56 (1956) (statement of Harold L. Price, Director of Regulation, AEC).
12. Mazuzan 1985, 203-208
13. For more on the development of nuclear insurance regimes in Europe, see Daston 2017
14. See, for example, Stason 1959, chapter 3.
15. Gourley 1985, 113. Chub Wilcox served as lead counsel for defendants in the TMI personal injury cases.
16. Although some commentators favored the imposition of strict or absolute liability on operators, federal preemption of state tort law was not seen as a wise political move and it seemed unlikely that states would uniformly adopt such provisions on their own. See Walker 1992, 135-36

17. In its implementing regulations, the AEC defined a substantial release of radiation as exposure of one or more persons offsite to a whole body or bone marrow dose of 20 rem, an organ or thyroid dose of 30 rem, or a skin dose of 60 rem. A release could also be deemed substantial if 100 square meters or more of offsite property were contaminated to specified levels. This included offsite contamination of property owned by third parties at levels of .35 microcuries per square meter of alpha emission from transuranic isotopes (practically speaking, this referred mostly to certain plutonium isotopes with exceptionally long half-lives), 3.5 microcuries per square meter of other alpha emission, or 4 millirads/hour at 1 cm² of beta or gamma emission. See 42 U.S.C. § 2210(n) (Supp. 1967). 10 C.F.R. § 140.84; Walker 1992, 137-38
18. Under the regulations, damages were (and still are) considered to be “substantial” if an incident caused death or hospitalization of five or more people within thirty days. Alternatively, an incident could also be deemed substantial if it caused \$2.5 million in damage to one person or \$5 million in aggregate damages. Finally, damages would be substantial if they caused \$5,000 in damage to fifty or more persons, provided \$1 million or more of aggregate damages were likely to be sustained. 10 C.F.R. § 140.85; Walker 1992, 137-38.
19. 42 U.S.C. § 2210(n) (Supp. 1967); Walker 1992, 137-38
20. See *Carolina Environmental Study Group, Inc. v. AEC*, 431 F. Supp. 203 (W.D. N.C. 1978), *rev'd sub nom. Duke Power v. Carolina Environmental Study Group, Inc.*, 438 U.S. 59 (1978) (appealing directly to the Supreme Court).
21. *Duke Power*, 438 U.S. 59.
22. Gourley 1985, 108-134 Claims data are presented in Table 1, 124-127.
23. Gourley 1985, 110-112 A database search returned no published cases litigated to a verdict under the Price-Anderson Act between its inception and the TMI incident. This does not necessarily mean there was no litigation, however. Dropped or settled claims would not have resulted in a published decision. The data in Gourley et al., “The Nuclear Liability Claims Experience of the Nuclear Insurance Pools,” Table 1, 124-127, do not identify claimants or facilities.
24. 85 Cong. Rec. 10,716 (daily ed. July 1, 1957); Butler 1959, 55-56
25. Walker 2004, 137
26. Rockett 1988, 28
27. Gourley 1985, 119
28. Besides personal injury cases, the incident gave rise to a variety of corporate and municipal claims. The plant operator sued the plant designer, Babcock and Wilcox, claiming the company had failed to warn it of known valve defects. It alleged \$4 billion in damages for cleanup, reactivation, and lost revenues. Babcock and Wilcox settled the case in 1983, agreeing to give the operator \$37 million worth of rebates on future service and equipment purchases by the operator. See *General Public Utilities Corporation v. Babcock and Wilcox*, 547 F. Supp. 842 (S.D.N.Y. 1982); Prial 1982; Osif 2004, 87 A group of the operator's shareholders also sued, arguing that the operator had concealed the true risks of building and operating nuclear plants. The operator settled the suit out of court in 1983. It agreed to pay back \$20 million in stock and securities to shareholders who had purchased operator stock prior to the incident. Osif 2004, 87; Samson 1983 The State of Pennsylvania and local municipalities sued the operator separately for a variety of claims, including ones arising in public nuisance, for loss of revenues, and to recoup expenditures related to the disaster. See *Commonwealth of Pennsylvania v. General Public Utilities Corp.*, 710 F.2d 117 (1983) (later superseded by amendments to the Price-Anderson Act). In 1984, the insurers settled, paying

\$250,000 to the state of Pennsylvania and \$235,000 to each municipality within a twenty-five-mile radius of the plant. Smith 2013, 22

29. Walker 2004, 205-207
30. In the Matter of Three Mile Island Unit 2, 11 NRC 519 (1980). See also *Report to the Regulatory Commission from the Staff Panel on the Commission's Determination of an Extraordinary Nuclear Occurrence* (Washington, DC: Nuclear Regulatory Commission, 1980).
31. See generally M. X. Mitchell, "The Cosmology of Evidence: Suffering, Science, and Biological Witness after Three Mile Island," *Journal of the History of Biology*, forthcoming.
32. Mitchell forthcoming, 120-122
33. Mitchell forthcoming, 120-122 For a recounting of distrust sown by the TMI incident and citizens' activism in response see generally Walsh 1988
34. For an overview of the US government studies see *Report of the Public Health and Safety Task Force, Staff Report to the President's Commission on the Accident at Three Mile Island* (Washington, D.C.: US Government Printing Office, 1979).
35. Stipulation of Settlement and Agreement, In re Three Mile Island Litigation, Civ. No. 79-0432, February 17, 1981, Folder 14, Box 91, Series IV, Ruth Patrick Papers, Philadelphia Academy of Natural Sciences, Philadelphia, PA; Walsh 1988, 120-21
36. See In re Three Mile Island, 87 F.R.D. 433, 440 (M.D. Pa. 1980).
37. Gourley 1985, 120-21. This settlement did not limit the rights of individuals to sue for personal injuries.
38. For the report, see Beyea 1984
39. On citizen activism, see Walsh 1988; Zaretsky 2018, chapter 3
40. For a summary of these suits and events, see In re TMI, 193 F.3d 613, 624-26 (3d Cir. 1999). Plaintiffs selected Mississippi for its favorable statute of limitations.
41. In re TMI, 193 F.3d 613, 624-26 (3d Cir. 1999).
42. Reed 1989; Smith 2013, 22
43. *An Act to Amend the Price-Anderson Provisions of the Atomic Energy Act of 1954 to Extend and Improve the Provisions for Liability and Indemnification for Nuclear Accidents*, Pub. L. 100-408, 102 Stat. 1066. 20 Aug. 1988. With the Chernobyl disaster now also in view, Congress also concurrently raised the insurance coverages and called for a new study on catastrophic nuclear accidents. Amendments increased the amount of primary financial protection amount to \$200 million per reactor. It increased the retrospective premium to \$63 million per reactor and the maximum annual payment of retrospective premiums to \$10 million per year per reactor. This raised the total coverages to \$9.5 billion per incident. The amendments required an increase in assessments every five years tied to inflation. They also clarified that precautionary evacuations would be covered by the Act, that punitive damages would not be available in public liability claims, and that legal fees were to be covered out of the primary insurance. Ibid.
44. See In re TMI Cases Consol. II, 67 F.3d 1103, 1118 (3d Cir. 1995). The US Supreme Court's 1993 *Daubert* decision, 509 US 579 (1993), as interpreted by the Third Circuit Court of Appeals in *In re Paoli Railroad PCB Litigation*, 35 F.3d 717 (3d Cir. 1994), governed the admission of expert evidence in the case.
45. The trial court seemed confused about the distinctions between exposure and dose and it and the parties tended to use the terms interchangeably. Exposure refers to radiation present in the environment and is often measured in Roentgen. Absorbed dose, in contrast, refers to the amount of radiation absorbed by a living being or an object. It is often measured in

Radiation Absorbed Dose (rad) or Gray (Gy). Finally, effective dose combines the absorbed dose with measures of the harmfulness of particular kinds of radiation on the human body. It may be measured in Roentgen Equivalent Man (rem) or sievert (Sv). The court consistently referred to “exposure” but used a measure—rem—that referred to effective dose. It is likely the court wished to refer to the maximum possible effective dose—the same measure used by the interagency taskforce when it concluded that no harm had come to people in the region.

46. *In re TMI Litig. Consol.*, 927 F. Supp. 834, 865 (M.D. Pa. 1996).
47. See Federal Rule of Evidence 803(8)(c) (excepting US agency reports from the prohibition on admission of hearsay).
48. Mitchell forthcoming
49. Mitchell forthcoming
50. On practices of dose reconstruction, see especially Lindee 2016, 185-188
51. See *In re TMI*, 193 F.3d at 717-722.
52. For discussion of problems with the cytogenetic studies see *In re TMI*, 193 F.3d at 689-93.
53. For discussion of problems with the immunological analysis see *In re TMI*, 193 F.3d at 697-98.
54. See *In re TMI*, 193 F.3d at 717-723.
55. See *In re TMI II*, 911 F.Supp. 775 (M.D. Pa. 1996), *aff'd in part* 193 F.3d 613 (3d Cir. 1999).
56. *In re TMI II*, 193 F.3d 613.
57. Although the Court of Appeals upheld the District Court's summary judgment, it also held that the District Court had erred in finding summary judgment applied to all the remaining plaintiffs beyond those whose claims had been chosen as test cases. The Third Circuit held that plaintiffs who were not a part of the test claims could still proceed with trial seeking to prove that exposure below 10 rem had caused their injuries. It remanded roughly 1,990 claims for trial. In doing so, however, the court also noted that discovery period had closed. *In re TMI*, 193 F.3d at 726-729. On remand, the remaining plaintiffs attempted to reopen discovery since all of their previously introduced expert testimony had used the 10 rem floor as the basis for claiming causation. The District Court rejected the plaintiffs' motion and granted summary judgment in favor of the defendants. The Third Circuit Court of Appeals upheld the District Court's grant of summary judgment in December of 2002. 53 Fed. Appx. 648 (3d Cir. 2002).
58. Walker 2004, 230; Smith 2013, 22-23
59. Walker 2004, 230; Smith 2013, 22-23
60. Butler 1959, 33; McClure 1968, 260-62
61. Curiously, although the Commission heard experts' testimony about a variety of mass disasters and settlement schemes—nuclear and non-nuclear—it did not once call a claimant or sufferer to talk about her experiences. See President's Commission on Catastrophic Nuclear Accidents, Hearings, Containers 1-2, RG220 Temporary Committees, Commissions, and Boards, National Archives and Records Administration II, College Park, MD.
62. For the final report and recommendations, see *Report to the Congress from the Presidential Commission on Catastrophic Nuclear Accidents* (Washington, D.C.: Presidential Commission on Catastrophic Nuclear Accidents, 1990).
63. NRC 2018b
64. Obayashi 2016
65. Kumori 2019

BIBLIOGRAPHY

Beyea 1984

Beyea, Jan. *A Review of Dose Assessments at Three Mile Island and Recommendations for Future Research*. Philadelphia, PA: Three Mile Island Public Health Fund, 1984.

Butler 1959

Butler, Richard H. "Liability Insurance for the Nuclear Energy Hazard." *Proceedings of the Casualty Actuarial Society* XLVI, 1959.

Daston 2017

Daston, Lorraine. "What Is an Insurable Risk?: Swiss Re and Atomic Reactor Insurance." In *Managing Risk in Reinsurance: From City Fires to Global Warming*, pp. 230-247. Oxford University Press, 2016.

Gourley 1985

Gourley, Donald, Chub Wilcox, and Joseph Marrone. "The Nuclear Liability Claims Experience of the Nuclear Insurance Pools: Report to American Nuclear Insurers and Mutual Atomic Energy Liability Underwriters." In *The Price-Anderson Law: Reports on Price-Anderson Issues*. American Nuclear Insurers and Mutual Atomic Energy Liability Underwriters, 1985.

Hewlett 1989

Hewlett, Richard G., and Jack M. Holl. *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission*. Berkeley, CA: University of California Press, 1989.

Krige 2006

Krige, John. "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence." *Osiris* 21, no. 1 (2006): 161-81. <https://doi.org/10.1086/507140>.

Kumori 2019

Kumori, Atsushi. "Think Tank Puts Cost to Address Nuke Disaster up to 81 Trillion Yen." *Asahi Shinbun*, March 19, 2019.

Lindee 2016

Lindee, Susan. "Survivors and scientists: Hiroshima, Fukushima, and the Radiation Effects Research Foundation, 1975-2014." *Social Studies of Science* 46, no. 2 (2016): 184-209.

Mazuzan 1985

Mazuzan, George T., and J. Samuel Walker. *Controlling the Atom: The Beginnings of Nuclear Regulation, 1946-1962*. Berkeley, CA: University of California Press, 1985.

McClure 1968

McClure, Richard D. "A review of Nuclear Energy Insurance." In *Proceedings of the Casualty Actuarial Society* 55, pp. 255-94. 1968.

Mitchell forthcoming

Mitchell, M. X. "The Cosmology of Evidence: Suffering, Science, and Biological Witness after Three Mile Island." *Journal of the History of Biology*, forthcoming.

NRC 2018b

Nuclear Regulatory Commission, "Backgrounder on Nuclear Insurance and Disaster Relief." January 2018. <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.html>.

Obayashi 2016

Obayashi, Yuka, and Kentaro Hamada. "Japan Nearly Doubles Fukushima Disaster-Related Costs to \$188 Billion." *Reuters*, December 8, 2016.

Osif 2004

Osif, Bonnie A., Anthony John Baratta, and Thomas W. Conkling. *TMI 25 Years Later: The Three Mile Island Nuclear Power Plant Accident and its Impact*. College Park: Penn State University Press, 2004.

Prial 1982

Prial, Frank J. "Civil Trial on Blame for Accident at Three Mile Island Opens Today." *New York Times*, November 1, 1982.

Reed 1989

Reed, Susan, and Melissa Herman. "Ten Years Later, Nuclear Ghosts Still Haunt Three Mile Island." *People*, April 3, 1989.

Rockett 1988

Rockett, Laurie R. *Financial Protections Against Nuclear Hazards*. New York: Columbia University Legislative Drafting Fund, 1988.

Samson 1983

Samson, Peter J. "General Public Utilities Corp. Thursday Agreed to Payout." *UPI News*, April 7, 1983.

Smith 2013

Smith, Tyson R. "The Price-Anderson Act and the Three Mile Island Accident." *Organization of Economic Cooperation and Development Conference on Nuclear Damages, Liability Issues, and Compensation Schemes*, 2013.

Stason 1959

Stason, E. Blythe, Samuel D. Estep, and William J. Pierce. *Atoms and the Law*. Ann Arbor: University of Michigan Law School, 1959.

Thomas 1958

Thomas, DeRoy C. "Can We Insure Against Liability from Nuclear Incidents?" *California Law Review* 46, no. 1 (1958): 14–21. <https://doi.org/10.2307/3478395>

Walker 1992

Walker, J. Samuel., and George T. Mazuzan. *Containing the Atom: Nuclear Regulation in a Changing Environment, 1963-1971*. Berkeley, CA: University of California Press, 1992.

Walker 2004

Walker, J. Samuel. *Three Mile Island: A Nuclear Crisis in Historical Perspective*. Berkeley, CA: University of California Press, 2004.

Walsh 1988

Walsh, Edward J. *Democracy in the Shadows: Citizen Mobilization in the Wake of the Accident at Three Mile Island*. New York: Greenwood Press, 1988.

Zaretsky 2018

Zaretsky, Natasha. *Radiation Nation: Three Mile Island and the Political Transformation of the 1970s*. New York: Columbia University Press, 2018.

Nuclear Liability and Compensation Models after Chernobyl

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INTRODUCTION

More than 30 years after the Chernobyl disaster, debates over radioactive contamination of land and human bodies are ongoing; in particular, debates regarding the question of how individual states and the international community should handle the disaster's legacy. The questions guiding this chapter emerged from discussions with nuclear professionals, lawyers, and social scientists in the aftermath of the Fukushima disaster, which, 25 years after Chernobyl, raised very similar issues: Who is, or should be, classified as a victim? What counts as damage? Who is responsible for compensation? These questions had been addressed before, in one way or another, but without having yielded "lessons learned," let alone a set of consolidated guidelines. Too strong was the desire to brand Chernobyl as a "one-off," something that would never happen again. This chapter tries to reconstruct where the post-Chernobyl debates came down on these questions and, more specifically, what model(s) were used to compensate victims.

The Soviet case is also a post-Soviet case, as the state in charge of the Soviet nuclear industry, including the Chernobyl nuclear power plant (NPP), ceased to exist in December 1991: five years after the worst nuclear accident at a commercial nuclear facility, multiple successor states inherited the disaster's legacy. This chapter, then, attempts more than simply to reconstruct "the Soviet response." I have narrowed my analysis to the three Soviet successor states that were left with most of the contaminated territory, quantitatively and qualitatively, as well as most of the affected population. It is worth mentioning, though, that the Chernobyl mitigation work drew on professionals from the entire Soviet Union, and many "liquidators," those who assisted in the emergency response operations on site, came from places across the vast Soviet lands.

Furthermore, in the process of creating compensation schemes for all of these liquidators, others who had suffered from radioactive fallout or had lived in contaminated territories also laid claim to nuclear victimhood. Different from the

American, and to some extent Japanese, situations, Soviet and post-Soviet citizens rarely went to court—they relied on administrative settlement processes, even where distrust in the government was high. The post-Soviet period also witnessed a new wave of legal frameworks, both nationally and internationally, where Russia, Ukraine, and Belarus developed their own laws covering nuclear liability, and joined international conventions. All such frameworks typically cap financial responsibility, and carve out certain limitations of liability, e.g., in case of a natural disaster, war, or a terrorist attack.

It is not easy to find information on the legal status of nuclear installations during Soviet times, as this country no longer exists and most of its successor states have either joined international conventions or treaties, or otherwise adopted policies much more similar to US and/or European legal frameworks. I focus on Russia, Ukraine, and Belarus, which are the three states most severely affected by the fallout from Chernobyl, and the way these states modified or clarified policies taken during Soviet times and since the USSR disintegrated at the end of 1991. Among the sources I consulted are actual laws, international treaties and agreements, or references to them, as well as secondary resources in Russian- and English-language law journals.¹

In a nutshell, the compensation scheme implemented in the wake of the Chernobyl disaster in the Soviet Union fell back on compensation and social benefits frameworks well established in areas of civil law, such as social benefits for war veterans, low-income families, the elderly, disabled people, etc. The first comprehensive legal framework on Chernobyl was not articulated until 1991, and the law passed at that time has since been modified and updated multiple times to accommodate challenges to it, but also to reflect the fundamental changes affecting the political order and socio-economic situation in the successor states of the USSR. The first part of this chapter chronicles the main efforts to establish a legal framework for compensating individuals affected by the Chernobyl accident. The second part goes into some detail on definitions and differentiations that emerged as particularly problematic in the process of implementing the initial framework, as a result of challenges by both individual citizens and organizations, and of the Soviet Union's successor states trying to adopt or conform to existing international legislation on nuclear liability. In conclusion, I return to the fundamental questions this chapter seeks to address in the light of this history and definitional and practical challenges: who is a victim, what counts as damage, and who is responsible for compensation? As an appendix, I list the major decrees and laws discussed here.

CHRONOLOGY OF LEGAL EFFORTS TO DEAL WITH CHERNOBYL'S AFTERMATH

When Chernobyl happened in April of 1986, the “method of compensating for radiation damage in the form of compensations and benefits for harm to property and health of the victims was not known to the acting legislature.”² Alla Yaroshinksaya, an energetic politician and activist, writes that in 1986, “NOT A SINGLE legislative act existed in the USSR that could protect victims of possible nuclear accidents and incidents.”³ One legal scholar concluded that, in fact, despite its military and peaceful nuclear programs, “the USSR was the only nuclear country in the world without its own laws regulating the use of nuclear energy and its safety,”⁴ in contrast to the US, France, or Britain. This may be the case as it relates to liability laws, but the nuclear industry did in fact develop its own internal safety regulations as early as 1957.⁵ Back then, they modeled regulations for the anticipated fleet of

nuclear power plants on those already in force for conventional power plants. Nuclear industry regulations focused primarily on the construction and operation of nuclear power plants, whereas rules relating to guaranteeing the safety of the nuclear fuel cycle remained the task of a secret ministry, the Ministry of Medium Machine Building, which was also in charge of the Soviet nuclear weapons program.

The issue of harmonizing Soviet nuclear safety laws with international regulations was raised in the early 1970s and resulted in a regulatory document, OPB-73, in 1974.⁶ However, this document focused on design, construction, and operation of nuclear power plants, not on severe accident mitigation or compensation. The first independent nuclear oversight committee was created only in 1983, and even then Soviet nuclear safety regulation relied on oversight and supervision, not licensing and setting norms. After the Three Mile Island accident, Soviet specialists revised the initial nuclear safety document, and although the new legislative document OPB-82 was submitted in 1984, it was not approved, let alone implemented, in time to prevent Chernobyl. This meant that after the disaster, there was no legal basis on which affected individuals could demand legal settlement from the government.⁷ What did exist at the time of the Chernobyl disaster was legislation on social benefits and (financial and other) compensation, including “benefits and payments for war veterans, disabled persons and pregnant women, among others.”⁸ These civil laws became the model for crafting a Chernobyl compensation legal framework.

1986-1991: IMMEDIATE POST-CHERNOBYL LEGISLATION

The first legal action after the April 1986 disaster was the adoption of a joint decree of the Communist Party’s Central Committee and the Council of Ministers of the USSR, which back then was the usual mechanism for government decision-making. The decree was adopted 12 days after the accident, on May 7, 1986, “On terms of payment and material provision of employees of enterprises and organizations in the Chernobyl nuclear power plant zone.” According to legal scholar Milan Zgiersky, it became “the first document regulating the relations between the USSR government and the Chernobyl NPP.”⁹ A number of other such joint decrees were issued, and to some extent implemented, in the years following the accident.¹⁰

By 1990, a year before the Soviet Union fell apart, three different, independent programs were put in place: a Ukrainian program, a Belarusian program, and one for a single region (Bryansk) in Russia.¹¹ These programs were based on two approaches to mitigate the consequences of the Chernobyl disaster: one focused on the decontamination of territories, the other on social protection, where the latter supplemented the former. Privileges and compensations were determined according to the levels of radioactive contamination in the territories. The amounts of compensations and premiums were based on different principles in the laws of Russia, Ukraine, and Belarus. In Russia, it was linked to the minimum wage, in Ukraine it was based on a person’s base salary, and in Belarus it was a monthly premium based on a specific indexation. Other privileges and compensations were similar across the three states, with Ukraine establishing additional privileges and compensations for health care workers and educators.¹²

Only on April 25, 1990, four years after the accident, and at least in part as a consequence of public hearings about the accident, a Government Expert Commission elaborated, and the Supreme Soviet of the USSR adopted, the first

Union-wide, comprehensive legal program on the “Liquidation of the Consequences of the Chernobyl Disaster.”¹³ This program put the Soviet Council of Ministers in charge of drafting an actual “Law on the Chernobyl Catastrophe” by the end of the year 1990, in which the legal status of disaster victims was to be clearly defined (both participants in the mitigation work and evacuees), the legal status of the disaster area was to be determined, and all activities related to residence, activities, and state administrative bodies in the affected areas were to be regulated.¹⁴

It took until almost five years after the disaster, 1991, for the Soviet Union to finally adopt “fully adequate legislative acts regulating the responsibility of the government for the damage inflicted to the citizens as a result of the activities of a nuclear enterprise.”¹⁵ These laws were:

- ◆ the Law of Belarusian SSR “On the Social Protection of Citizens Affected by the Catastrophe at the Chernobyl NPP” from 12 February 1991
- ◆ the Law of the Ukrainian SSR “On the Status and Social Protection of Citizens Affected by the Accident at the Chernobyl NPP”
- ◆ the Law of Russian Federation “On the Social Protection of Citizens Affected by Radiation as a Consequence of the Accident at the Chernobyl NPP” from 15 May 1991, and
- ◆ the Federal Law “On the Social Protection of Citizens who Suffered as a Consequence of the Chernobyl Catastrophe” from 12 May 1991.

Zgersky notes that these laws applied to the affected population and only indirectly addressed ecological problems: “However, in comparison to the legal vacuum that in fact existed during five years after Chernobyl, these laws were a significant step forward.”¹⁶ These laws used the radiation dose with a threshold of average effective dose not to exceed 1 mSv (0.1 rem) per year, as well as residence in contaminated territories for defined periods, as the main criteria for deciding about protective measures, benefits, and compensation for damages to the population.¹⁷ The above-mentioned Federal Law from May 1991 featured the exact “system of social guarantees,” differentiating twelve categories of citizens entitled to compensation and benefits, and setting compensation rates. Yaroshinskaya writes, however, that the law was inefficient as compensation payments were concerned, and was modified for the first time in June 1992 and many more times since then.

THE CHERNOBYL LAW AND THE 1990S ECONOMIC CRISIS: POST-SOVIET CHALLENGES TO THE NUCLEAR LEGAL FRAMEWORK

The adoption of actual laws on compensation for people affected by the Chernobyl catastrophe coincided with a severe economic crisis in the former Soviet Union, and was followed by the disintegration of the entire political system of the region.¹⁸ This meant not only that compensation payments were delayed, irregular, or partial because the authorities had no funds from which to pay out compensation, but also that many of the benefits set up for the social and economic system of the Soviet Union (free public transport, assigned government housing, access to free quality health care, etc.) were either no longer available or had lost their value.

In addition to the economic recession, Yaroshinskaya points out severe problems with corruption. For example, the first attempt to collect money to assist Chernobyl victims, still in Soviet times, was the so-called Special Chernobyl Account #904, set up by the Soviet government. As it became known subsequently, the government embezzled the funds to fly in paid consultants who penned dubious reports about the radiological situation in the affected territories.¹⁹ Other instances of corruption involved the blatant misuse by local authorities of funds allocated to resettlement or decontamination work. Overall, with declining government investments, many of the planned projects were left unfinished, forcing some of the evacuated population to return to “dirty” territories for job opportunities.²⁰ As a result of these economic challenges and rampant corruption, the Chernobyl Laws were often left unclaimed, and “millions of people are suffering in the affected territories under conditions that protection measures for the environment are not carried out in necessary scales, and the ecosystems are not rehabilitated to the full extent.”²¹

Apparently as a direct consequence of creating a legal framework for compensating nuclear disaster victims, public debate challenged how these laws applied only to those affected by Chernobyl. In the following years, the laws were amended to include victims of other incidences of fallout, most prominently the population near the nuclear test site at Semipalatinsk in Kazakhstan where the Soviet Union had conducted a large number of above- and below-ground nuclear weapons tests. The other prominent site that claimed the status of “affected population” under the Chernobyl laws were those living in the area of Cheliabinsk, in the Russian Urals. Home to the Soviet Union's most important plutonium manufacturing facility, as well as other facilities devoted to the most toxic parts of the nuclear fuel cycle (reprocessing, storage), this area had experienced massive radioactive contamination over the course of its history. For example, the first Soviet plutonium producing reactors there were cooled with water from the Techa river, and after passing through the core, that water had been released back into the river; radioactive waste had also been dumped in that same river, in most cases without informing the affected local population (historian Kate Brown has documented the largely unsuccessful resettlement and decontamination efforts there in her 2013 book *Plutopia*). In the period after Chernobyl, but before the disintegration of the Soviet Union, another serious accident that had been classified as secret at the time, came to light: in 1957, a nuclear waste storage facility near Cheliabinsk had exploded, showering the area with radioactive debris.²² The local population, at the time left ignorant, learned about the causes of their various illnesses during the early 1990s and successfully mounted a challenge to be considered as “individuals affected by nuclear accidents,” with grave consequences for the emerging post-Chernobyl legal framework.²³

At the same time as some tried to expand the Chernobyl legislation, others criticized it. The central point of criticism became the problem of dose evaluation, which the entire system was based upon: “how to evaluate delivered dose, as well as to determine the consequences, in consideration of peculiarities of release and migration of radionuclides, irradiation duration, dose rate, etc.”²⁴ Zgersky argues that the original Chernobyl legislation relied on imperfect underlying dose estimates that neglected the following complicating factors:²⁵

- ◆ the radiation risk to the population may vary greatly
- ◆ calculating *averages* misses the wide variation in exposure, especially when based on infrequent monitoring²⁶

- ◆ the existing dosimetric and epidemiological data is insufficient to specify dose distribution, or biological effects, to name but a few factors
- ◆ humans vary in their sensitivity to radiation.

Similarly, and as will be discussed in more detail below, this “dose approach” replaced the “aerial [or territorial] approach,” both of which relied on ill-defined terms and concepts that did not take into account the complexity of how radioactive isotopes decay, move, and change properties depending on their location.

Given these problems with defining the scope of the population entitled to compensation under the new laws, it is not surprising that in the mid-1990s, members of the Russian parliament (the Duma) were trying to reduce the privileges for affected citizens, resulting in a struggle between the parliament and the President of the Russian Federation; the aforementioned definitional problems were at the core of this struggle, which ended without resolution. According to Zgersky, the struggle boiled down to the “question about the criteria that should be the basis to provide privileges to inhabitants living in the contaminated territories, the level of soil contamination or the value of irradiation dose.”²⁷ Below, I briefly recount the original territorial organization of affected areas, and how this classification varied as early as 1991 and 1992 among the three republics most affected by fallout from the Chernobyl disaster. I’ve also tried to summarize these differences in a preliminary table that compares criteria and levels of contamination (Table 1).

RUSSIA

In Russia, initially only one region around Bryansk was singled out as “affected” by Chernobyl-related radioactive contamination, though it became known only years after the accident that as many as 16 additional regions within the Russian Federation suffered from fallout-related ecological problems.²⁸ A government decree from December 25, 1992, “On the Regime of Territories Exposed to Radioactive Contamination in Consequence of the Accident at the Chernobyl NPP,” following a special article of the Law “On Social Protection of Citizens...” (from 15 May 1991), defined different zones and how they should be governed (the description below closely follows Zgersky’s analysis).²⁹ In Russia, four zones were defined, with boundaries that could be revisited once every five years:

1. The restricted zone. This was the 30-kilometer zone around the NPP that authorities first set up in 1986-1987, which was later referred to as the evacuation zone from 1988 until the adoption of the 1991 Law. The population was evacuated from these territories in 1986 and in subsequent years.
2. The resettlement zone. This was the part of the territory of the Russian Federation outside the restricted zone (Table 1), which was also evacuated. It was defined based on soil contamination density by caesium-137, strontium-90, plutonium-239 or plutonium-240 (for threshold values please refer to Table 1).
3. The residence zone with the right for resettlement. This zone, outside the restricted and the resettlement zones, was also determined based on the density of soil contamination with long-lived radionuclides (below the limits set for the resettlement zone).
4. The residence zone with privileged socio-economic status. Not subject to evacuation or resettlement, people living in this part of the territory of the

Russian Federation were considered entitled to special benefits as a result of measurable radioactive soil contamination density.

Ukraine

The legal status of contaminated territories in the Ukraine followed a similar model as in Russia, dividing them into zones:³⁰

1. The restricted zone. The area from which residents were evacuated in 1986.
2. The zone of mandatory resettlement. This was a territory intensely contaminated with long-lived radionuclides, and—here is one difference with the Russian system—where the individual effective equivalent radiation dose was calculated as being 0.5 rem/year (or 5 mSv/year) higher than the pre-accident dose.
3. The zone of guaranteed voluntary resettlement. Individuals living in this zone were entitled, but not forced, to resettle; again, the demarcation follows soil contamination density and a calculated individual effective equivalent radiation dose of 0.1 rem/year (or 1 mSv/year) above the pre-accident dose.
4. The zone of intensified radio-ecological control. This was a territory delineated by soil contamination density and a calculated individual effective equivalent radiation dose of 0.05 rem/year (or 0.5 mSv/year) in excess of the pre-accident dose. People living in this zone were not subject to evacuation or mandatory resettlement, but to increased dose monitoring.

It is important to note that Ukraine declared independence in 1991, and defining territories and populations affected by Chernobyl became a crucial part of defining the new nation state. This process allowed Ukrainian leaders to castigate Soviet mismanagement of safety in the nuclear industry, and to demonstrate a responsive, responsible Ukrainian government assisting those affected by the catastrophe.³¹ "Ukraine has used the legacy of Chernobyl as a means of signaling its domestic and international legitimacy and staking territorial claims. ... Ukraine's response to the Chernobyl legacy is unique in that it combines humanism with strategies of governance and state building, market strategies with forms of economic and political corruption."³² As a consequence, Ukraine's social welfare system expanded in the years following independence, which ran counter to Western prescriptions for a smooth transition to market economics.³³

BELARUS

The Republic of Belarus, after declaring independence in August of 1991, adopted its own special law, "On the Legal Regime of Territories Exposed to Radioactive Contamination as a Consequence of the Catastrophe at the Chernobyl NPP," on November 12, 1991. The law was intended to ameliorate the impact of radioactive contamination on the population and ecosystems, by instituting measures to recover and protect the environment. As in Russia and Ukraine, the law regulates the regime of residence, as well as economic and scientific activities in these territories. Zgersky notes that the division into zones in Belarus differs from Ukraine and Russia, and is based fundamentally on the damage inflicted by radiation on the public.

1. Zone of evacuation (restricted zone). This is the territory around the Chernobyl NPP, from which the population was evacuated in 1986, the 30-kilometer zone

around the plant and additional lands contaminated by strontium-90 (exceeding 3 Ci/km²) and plutonium-238, 239, 240, and 241 exceeding 0.1 Ci/km². It is notable that these values are significantly higher than in Russia or Ukraine.

2. First priority resettlement zone. This is territory with extreme soil contamination density that neither Russia nor Ukraine had to consider.³⁴ The fact that this zone is not labeled a “mandatory evacuation zone” or similar indicates not only what later became clear, namely the inability of the state to live up to its compensation promises, but also a tendency in Belarus specifically to downplay and even deny radioactive contamination effects on its territory and population.³⁵
3. Zone of subsequent resettlement. This is a territory with a soil contamination density similar to the “mandatory resettlement” zone in Ukraine and the “resettlement zone” in Russia, but based primarily on average individual effective doses of 0.5 rem/year (5 mSv/year) or higher—even where soil contamination levels were lower.
4. Zone with the right for resettlement. This is all territory where the average individual effective equivalent dose exceeds 0.1 rem/year (or 1 mSv), with or without radioactive soil contamination.
5. Zone of residence with recurring radiation control. All territories where the average individual effective equivalent dose may not exceed 0.1 rem/year (or 1 mSv/year), with or without radioactive soil contamination.

Petryna notes that although 23% of the territory of Belarus was considered contaminated as a result of Chernobyl, the Belarusian government “has tended to suppress or ignore scientific research; it downplays the extent of the disaster and fails to provide enough funds for the medical surveillance of nearly two million people who live in contaminated areas.”³⁶

Table 1: Comparative Chart of Categories Used to Determine Affected “Zones”

Russia	Ukraine	Belarus
Restricted zone (also called evacuation zone) where population has been evacuated from according to the norms of radiation safety in 1986 and in subsequent years	Restricted zone (evacuated in 1986)	Zone of evacuation (restricted zone) Soil contamination of Sr-90 >3 Ci/km ² and Pu-238, 239, 240, 241 >0.1 Ci/km ²
		First priority resettlement zone Soil contamination of Cs-137 > 40 Ci/km ² , Sr-90 >3 Ci/km ² , or Pu-238, 239, 240, 241 >0.1 Ci/km ²
Resettlement zone (outside restricted zone) Soil contamination of Cs-137 >15 Ci/km ² , or Sr-90 >3 Ci/km ² , or Pu-238, 240 >0.1 Ci/km ²	Zone of obligatory resettlement Soil contamination of Cs >15 Ci/km ² or Sr >3 Ci/km ² or Pu >0.1 Ci/km ² and higher AND Individual effective dose >0.5rem/yr greater than pre-accident dose	Subsequent resettlement zone Soil contamination of Cs-137 15-40 Ci/km ² , or Sr-90 0-3 Ci/km ² , or Pu-238, 239,240, 241 0.05-0.1 Ci/km ² AND/OR Individual effective dose >0.5 rem/yr

Russia	Ukraine	Belarus
Residence zone with right for resettlement Soil contamination of Cs-137 5 to 15 Ci/km ² and other long-lived radionuclide contamination	Zone of voluntary resettlement Soil contamination of Cs 5 to 15 Ci/km ² , or Sr 0.15 to 3 Ci/km ² , or Pu 0.01 to 0.1 Ci/km ² AND Individual effective dose >0.1 rem/yr greater than pre-accident dose	Zone with right for resettlement Individual effective dose >0.1 rem/yr AND/OR Soil contamination of Cs-137 5-15 Ci/km ² , or Sr-90 0.5-2 Ci/km ² , or Pu-238, 239, 240, 241 0.02-0.05 Ci/km ²
Residence zone with privileged social-economic status Soil contamination of Cs-137 from 1 to 5 Ci/km ²	Zone of intensified radio-ecological control Soil contamination of Cs 1 to 5 Ci/km ² , or Sr 0.02 to 0.15 Ci/km ² , or Pu 0.005 to 0.01 Ci/km ² AND Individual effective dose >0.05 rem/yr greater than pre-accident dose	Zone of residence with recurring radiation control Individual effective dose may not exceed 0.1 rem/yr AND/OR Soil contamination of Cs-137 1-5 Ci/km ² , or Sr-90 0.15-0.5 Ci/km ² , or Pu-238, 239, 240, 241 0.01-0.02 Ci/km ²

POST-SOVIET DEVELOPMENTS: HARMONIZING WITH INTERNATIONAL NUCLEAR LIABILITY LAWS

The Soviet Union did not pay any compensation for trans-border loss or harm caused by the Chernobyl accident, nor did any of its successor states, which it justified with the fact that the Soviet Union had not been party to any international convention that would have held it responsible.³⁷ This was also the conclusion reached by European countries and their legal advisors when it came to deciding whether or not to demand state level compensation from the Soviet Union for the contamination of territories beyond the boundaries of the USSR.

Anisimov and Ryzhenkov point out that environmental law and human rights legislation developed only gradually in the post-Soviet space. They argue that while environmental laws did exist in the Soviet Union, “they were either declarative...or referred to the protection of certain [specific] natural resources (land, water, forests, etc.) and complexes (reserves, natural monuments, etc.)”³⁸ Given the complex relationship between contaminated territories and affected populations, the authors propose an interesting connection between environmental liability and human rights, invoking “environmental refugees,” a term coined in 1985 (prior to Chernobyl), as a possible label for those forced to resettle as a result of the Chernobyl disaster, a point I will return to in the conclusion.

The abovementioned difficulties of post-Soviet states to effectively compensate citizens affected by Chernobyl—including the financial crisis, corruption, and the overall decline of organized governance in the disintegrating Soviet Union, came to a head in 2000. One citizen, A. T. Burdov, filed a complaint with the European Court of Human Rights (ECtHR) “in accordance with Article 34 of the European Convention on Human Rights.”³⁹ The ECtHR issued a pilot judgment of *Burdov (No. 2) v Russia* in 2009, effectively requiring the Russian Federation to adopt a legal remedy, which was created in 2010. “The judicial precedence thus established led to mass appeals by citizens affected by the Chernobyl accident to the ECtHR.”⁴⁰ The matters concerned compensation payments, the privileged allocation of residential premises, pension provision, targeted social assistance etc.

Also at least indirectly as a consequence of the ECtHR ruling, the Russian Constitutional Court in 2002 established that “the state is not entitled to refer to a lack of funds as the reason for non-payment of the debt.”⁴¹ Of course, it is also safe to assume that this did not change the reality of citizens not receiving their full compensation payments on time, or on a regular basis.

DEFINITIONS AND DIFFERENTIATIONS

The emerging legal frameworks in the post-Soviet space considered two kinds of measures: territorial decontamination and rehabilitation on the one hand, and social benefits such as access to “clean ” food, new living space, public transport, health care, scholarships etc., and compensation for harm to health and/or loss of income on the other.⁴² In addition to public works projects to construct new housing and infrastructure such as hospitals, schools, and nurseries, a “National Radiation and Epidemiological Registry” and the “Russian Medico-Dosimetric Registry” with regional branches were set up to contain “information on more than 600,000 people.”⁴³ While none of these measures were expected to last longer than a few years, the authorities soon found that the changes in both the radiation and the socio-economic situation necessitated continued “modifications and additions to the existing normative and legal basis” even beyond the year 2000.⁴⁴

Because the Soviet state owned the Chernobyl nuclear plant, it was considered “the cause of the harm” and the Chernobyl legislation would go on to feature a number of similarities to existing laws meant to care for citizens:

*The State as the constitutional guarantor and owner of the nuclear power plant, and not the perpetrator of the damage, is responsible for the radiation damage done. The method of compensating for the radiation damage in the form of compensations and benefits for damage done, the [Chernobyl] law provides guarantees and benefits according to labor law, social security, tenancy and tax law, protection of health and environment and other measures required for the victims to lead a normal life.*⁴⁵

The norms of the social security law were designed to help the elderly, the disabled, households who had lost the main breadwinner, the unemployed, families with children, and individuals with income below the poverty line, and provided free medical care, free social services, and some other privileges, including educational benefits for children. Both the Chernobyl legislation and the social security law similarly concern somewhat “incapacitated citizens,” are mandatory, feature similar periods of validity, and share certain procedural relations. In summary, “[t]he legal relations between the victims and the State according to the law are similar to the alimentary character of the social security norms, and the government is responsible for providing the appropriate benefits and compensations.”⁴⁶

The sources of the compensation are “special means provided in the federal budget, along with medical insurance and pension funds,” as well as workers’ compensation funds—all of which have been stretched thin in the years since the disaster.⁴⁷

Important differences between the Chernobyl law and social security law include that Chernobyl compensation is also paid to healthy people who are not incapacitated but who had to evacuate as a result of the accident. These individuals obtain “benefits and compensation for actual or possible harm to their health.”⁴⁸

As can be seen from the establishment of evacuation zones, the “aerial [territorial] approach” dominated early Chernobyl legislation. And yet, it soon became clear that this approach could not adequately handle individual exposure to radiation, in part because the soil contamination was not the only factor determining effective dose. Gerasimova writes, for example, that in 1996, the threshold for intervention was set at extra exposure dose above 1 mSv/yr, but that this threshold was actually in conflict with the earlier law from 1991, which took surface contamination with cesium 137 as the criterion to decide about mandatory implementation of rehabilitation measures.⁴⁹ These conflicting concepts constitute “a serious obstacle for completing

the elimination of accidents consequences in the territories of the greater part of contaminated regions."⁵⁰ Furthermore, both approaches, the aerial and the dose approach, required constant, comprehensive, and reliable monitoring, which was nearly impossible given the lack of infrastructure and personnel, and due to the difficulty of tracking the transient population of those subject to resettlement. Indeed, people rarely stayed where they were resettled to, especially given the challenges of finding jobs in their new environments.

CONCLUSION

This chapter has touched on the many nuances of nuclear liability that have come to light in the post-Chernobyl period. The disaster's occurrence at a time of extraordinary economic, political, and social turmoil contributed to the confusion of the legal framework that may have worked out very differently had, for example, the Soviet system persisted longer. Many of the benefits, privileges, and compensation alike might have been enough in a system with full employment, state-owned housing, state-run medical and educational systems, and a controlled currency. The simultaneous transition to separate nation states, a market economy, and a democratic political system made many of the benefits originally granted to "affected citizens" irrelevant or useless; the economic crisis caused states to cut expensive resettlement projects, decontamination and recovery activities, and medical as well as territorial monitoring for radiation.

As a consequence, the one factor already hardest to quantify in the process, that of socio-psychological trauma, was probably amplified and exacerbated in the process. Gerasimova wrote in 2002 that the socio-psychological factor was "characteristic of any extreme situation. It should be noted that in the case of radiation accidents the unfavorable psychological effect was severely aggravated by insufficient and sometimes distorted information on [the] actual radiation situation and possible radiation impact upon human health."⁵¹ The newly uncensored press in the post-Chernobyl period, with its myriad voices, cannot but have confused Soviet citizens who for over 70 years were used to *one* version of the news, however doubtful and tainted. Coupled with the invisibility of radiation and the elusive character of epidemiological causation, the psychological side of this disaster and its traumatizing effect on generations of newly independent, formerly Soviet, citizens, is completely missing from the literature and, at least so far, from the legal stage.

Several legal authors consulted for this report took the compensation paid out after Fukushima as a watershed moment to conclude that "the economic losses as a result of a nuclear incident may be not only huge, but extraordinary."⁵² Kozheurov concludes that the sums paid out by the Japanese government and TEPCO as compensation for an accident that, at least officially, had only 1/6 of the radioactive emissions of Chernobyl demonstrate that the amounts currently set aside for severe accident compensation—not mitigation, just compensation—"are clearly insufficient."⁵³ As a consequence, if the extent of nuclear harm may amount to several times the sums established in the Vienna Convention, the main burden for compensation (and mitigation) will rest on the state, regardless of who owns a nuclear power plant.⁵⁴

Returning to the initial question of what compensation scheme the Soviet government modeled its post-Soviet nuclear liability framework on, we can see that any post-Chernobyl compensation was based on privileged access to a state-controlled system of housing, medical care, education, transportation, and other

social services, similar in most ways to existing social security law. However, the overall framework for this system collapsed at the same historical moment as the Soviet state finally articulated a legal framework for post-Chernobyl nuclear compensation.

Furthermore, the criteria established to determine who counted as “affected” by the consequences of Chernobyl proved to be preliminary, changing, and contestable, both within and beyond the Soviet Union's socio-economic framework. Aerial monitoring of territorial contamination levels required tools, labor, and scientific expenditure that existed perhaps only on paper, and that was even more true for monitoring dose rates and systematically cataloguing health effects. The initial attempts to cover up the disaster and to falsify records crippled many later efforts to calculate averages, which in turn turned out to be problematic. Tensions and contradictions between laws such as the above-mentioned territorial versus dose criteria were no doubt used to justify inaction, but they also ironically made it possible for affected citizens to plead (literally) refugee status in the ECtHR.

In this context, Anisimov and Ryzhenkov propose an update of the 1951 Refugee Convention and wish to expand it to “ecological disaster zones” that so far lack a clear legal status, not to mention “a detailed plan of measures for restoration of the destroyed ecological systems.”⁵⁵ They argue that a nuclear disaster exceeds the authority of disaster response authorities (e.g., the Russian Ministry for Extreme Events, EMERCOM) and that territories affected by radioactive contamination should be legally treated as “ecological disaster zones” with uninhabitable environments that transcend EMERCOM's responsibility and capability, and that produce “environmental refugees.”⁵⁶

To conclude, evidence from the Chernobyl nuclear catastrophe suggests that nuclear liability is at best an emerging area, and that the financial resources set aside to assist a population in case of a severe nuclear accident is likely to be a drop in the ocean in terms of what will be needed to reliably scrutinize and remedy territorial contamination, and to monitor and ameliorate health effects. This raises disconcerting questions about the economic feasibility of nuclear energy. Ultimately, a “one-size-fits-all” legal framework for compensation in case of a severe nuclear accident may run the risk not only of justifying an industry too expensive to operate, but also of setting parameters too rigid to allow for the uncertainties of what is known, how it is known, and how it can possibly be governed, both within individual states and across borders.

1. I also interviewed a Ukrainian civil servant who used to work in the nuclear industry and later transferred into the Ukrainian government apparatus, and who was involved with Chernobyl compensation issues both personally and from a policy-maker's standpoint, to correct and clarify my conclusions.
2. Bychkova 1999, 526 Bychkova even claims that as late as 1999, despite the programs since designed to assist victims of the disaster, “there are no laws in current legislation that regulate the responsibility for injury caused by a nuclear accident.”
3. Emphasis in original. Yaroshinskaya 1998, 257
4. Zgersky 1998, 266
5. Schmid 2015, 43
6. Anisimov 2016, 270
7. Zgersky 1998, 266

8. Anisimov 2016, 274
9. Zgersky 1998, 266
10. Yaroshinskaya 1998, 266 Yaroshinskaya claims that these decrees were secret, but at least general versions (possibly lacking some details) were in fact published at the time.
11. Yaroshinskaya 1998; Zgersky 1998 These laws were for the social-economic protection of the citizens of Russia (“On Social Protection of Citizens Affected by Radiation in Consequence of the Accident at the Chernobyl NPP”), of the Ukraine (“On Status and Social Protection of Citizens Affected by the Accident at the Chernobyl NPP”), and of Belarus (“On Social Protection of Citizens Affected by the Catastrophe at the Chernobyl NPP”).
12. Zgersky 1998, 269 Zgersky notes that the amounts of compensations and premiums suggests that Russia put more emphasis on resettlement than Ukraine and Belarus.
13. Yaroshinskaya 1998, 258; Zgersky 1998, 266 The “Supreme Soviet” was the highest legislative authority in the USSR.
14. Zgersky 1998, 266-7
15. Zgersky 1998, 267
16. Zgersky 1998, 267
17. Yaroshinskaya 1998, 258
18. Anisimov 2016, 275; Yaroshinskaya 1998, 260
19. Yaroshinskaya 1998, 262
20. Gerasimova 2002, 262 Gerasimova states that between 1992 and 1999, Russia spent the equivalent of two billion USD on various programs related to the Chernobyl disaster.
21. Zgersky 1998, 270
22. Anisimov 2016, 275; Gerasimova 2002, 108
23. Zgersky 1998, 270 According to Zgersky, this “trend to spread the ‘Chernobyl law’ onto other regions of Russia that have been affected by radiation impacts” is problematic because “a direct application of the articles of the ‘Chernobyl Law’ for these situations is inadmissible.”
24. Zgersky 1998, 269
25. Zgersky 1998, 269-70
26. For more on the lack of, and underfunding of monitoring, see Kuchinskaya 2014 Olga Kuchinskaya, *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl* (Cambridge, MA: MIT Press, 2014).
27. Zgersky 1998, 270
28. Zgersky 1998, 268
29. Zgersky 1998, 268-9
30. Zgersky 1998, 267
31. Petryna 2013, 5 Petryna writes in 2002 that the Ukrainian citizens “legally designated as *poterpili* (sufferers) number 3.5 million and constitute a full 5 percent of the Ukrainian population” (4).
32. Petryna 2013, 5 I don't have comparable evidence on Russia or Belarus, but Petryna writes that the compensation payments for Chernobyl victims in Ukraine are financed by a new state-wide 12% Chernobyl tax.

33. Petryna 2013, 25
34. I literally flagged these levels as a typos initially, they were so high.
35. Petryna 2013, 5
36. Petryna 2013, 5 For more details on scientific research into the Chernobyl disaster in Belarus, and the ongoing efforts by the government to silence it, see Kuchinskaya 2014
37. Kozheurov 2014, 100
38. Anisimov 2016, 270
39. Anisimov 2016, 275, citing ECtHR from 5/7/2002 “Burdov v. Russia” [complaint No. 59498/00]).
40. Anisimov 2016, 276
41. Anisimov 2016, 276
42. Some of the sources I consulted elaborate distinctions between “liability” and (various shades of) responsibility (absolute, objective, etc.), as well as industrial activities characterized as “toxic” or “noxious” (i.e., dangerous *per se*) as opposed to “hazardous” (which include danger only when operated beyond design parameters). I refer the legally competent readers to the references section.
43. Gerasimova 2002, 109
44. Gerasimova 2002, 110
45. Bychkova 1999, 528
46. Bychkova 1999, 527
47. Bychkova 1999, 527
48. Bychkova 1999, 528
49. Gerasimova 2002
50. Gerasimova 2002, 111 I’m not entirely clear how exactly this affects the implementation of these laws. Presumably people living in contaminated territories can be assumed to have received effective doses of over 1 mSv/year, although the reverse is not necessarily true (people having received an excess dose may live in territories more or less contaminated by long-lived radionuclides). In practice, I suspect, the issue was more mundane: bureaucrats inferred one law to block the implementation of the other.
51. Gerasimova 2002, 110
52. Khlestova 2015, 129, my translation.
53. Kozheurov 2014, 103-4
54. Kozheurov 2014, 139
55. Anisimov 2016, 280
56. Anisimov 2016, 282

BIBLIOGRAPHY

Anisimov 2016

Anisimov, Aleksey Pavlovich, and Anatoliy Jakovlevich Ryzhenkov. “Thirty Years after the Accident at the Chernobyl Nuclear Power Plant: Historical Causes, Lessons and Legal Effects.” *Journal of Energy & Natural Resources Law* 34, no. 3 (2016): 265–83. <https://doi.org/10.1080/02646811.2016.1162047>

Bychkova 1999

Bychkova, K. F. "Characteristic Features of the Legal Relations Concerning Compensation for Injuries Caused by the Chernobyl Accident." *Atomic Energy* 87, no. 1 (July 1999): 526–28. <https://doi.org/10.1007/bf02673213>.

Gerasimova 2002

Gerasimova, N.V. "Results and Tasks of the Implementation of Federal Target Programs Aimed at Overcoming the Consequences of Radiation Accidents and Catastrophes in the Russian Federation." In *Proceedings of the Conference RADLEG 2000: International Conference on Radiation Legacy of the 20th Century: Environmental Restoration*. AEA-TECDOC-1280, Vienna: IAEA, 2002.

Khlestova 2015

Khlestova, Irina O. "International Legal Regulation of Nuclear Liability / Mezhdunarodno-pravovoe regulirovanie otvetstvennosti za iadernyi ushcherb." *Zhurnal rossiiskogo prava* 1 (2015): 127-139.

Kozheurov 2014

Kozheurov, Ya. C. "From Hiroshima to Fukushima: International Legal Aspects of the State's Practice of Compensation for Nuclear Damage." *Russian Juridical Journal / Rossiiskii iuridicheskii zhurnal* 97, 5 (2014): 89-109.

Kuchinskaya 2014

Kuchinskaya, Olga. *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*. Cambridge, MA: MIT Press, 2014.

Petryna 2013

Petryna, Adriana. *Life Exposed: Biological Citizens after Chernobyl*. Princeton, NJ: Princeton University Press, 2013.

Schmid 2015

Schmid, Sonja D. *Producing Power: the Pre-Chernobyl History of the Soviet Nuclear Industry*. Cambridge, MA: MIT Press, 2015.

Yaroshinskaya 1998

Yaroshinskaya, Alla. "Problems of Social Assistance to the Chernobyl Sufferers in Russia." In *Research Activities about the Radiological Consequences of the Chernobyl NPS Accident and Social Activities to Assist the Sufferers by the Accident*, edited by T. Imanaka, 257–65. Kyoto, Japan: Kyoto University Research Reactor Institute, KUR-KR-2, 1998.

Zgersky 1998

Zgersky, Milan. "Legal Regime of the Chernobyl Problems in the USSR, Belarus, Russia and the Ukraine." In *Research Activities about the Radiological Consequences of the Chernobyl NPS Accident and Social Activities to Assist the Sufferers by the Accident*, edited by T. Imanaka, 266-270. Kyoto, Japan: Kyoto University Research Reactor Institute, KUR-KR-21 1998.

Compensation for Transboundary Claims in Nuclear Disasters

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INTRODUCTION

The Fukushima meltdown is often described as a uniquely Japanese catastrophe, but its causes and consequences extend far beyond Japan's borders. As the incident unfolded, clouds of radioactive material moved over the Pacific while operators pumped contaminated water into the ocean. A US corporation, General Electric, supplied several of the reactors on a "turn-key" basis and developed aspects of the site's design. The fuel pellets that slumped and melted in the reactor cores, meanwhile, came from overseas where just six countries—Canada, Kazakhstan, Niger, Australia, Russia, and Namibia—furnish half of all nuclear fuel worldwide. The Fukushima plant itself may be local to Japan, but it is also one point on a broad, transnational web of commerce and contamination. Compensation for nuclear accidents is therefore not just a domestic problem but a transnational one.

From the advent of nuclear power, nation-states with nuclear ambitions bargained to create international legal regimes governing transboundary consequences of nuclear accidents. These regimes sought to buoy and bolster nuclear industries and the capacity of nation-states to develop nuclear power. While several distinct international legal regimes govern transboundary harm, a significant portion of nuclear energy production happens outside of their purview. In the gaps between international conventions and local action, national legal doctrines that are not specific to the nuclear context—ones such as jurisdiction and conflicts of laws—fill the gaps. The viability of claims for compensation arising out of transboundary, transnational harm often depends on fortuitous elements of an individual case.

The Fukushima incident has exposed not only the flaws, but also the unexpected and uncertain compensation *possibilities* of this confusing system. The nuclear meltdown at Fukushima Daichi generated two novel sets of claims within the US courts that deserve greater attention and analysis. As the Fukushima plant melted down in March of 2011, the USS Ronald Reagan, a US Navy aircraft carrier, approached the

region from the sea to provide humanitarian assistance. Injured members of the vessel's crew (along with the crews of several other US Navy vessels) sued in the US courts against TEPCO and GE, seeking damages for injuries that they argued were related to their presence off of the coast at the time of the disaster. In a second case, a group of claimants from Japan, led by physicians from heavily affected regions, sued GE, the manufacturer of the reactor, in a US court, arguing that design flaws on GE's part caused the incident.

As we will explain, these transboundary claims would typically be precluded under most national laws, including Japan's, and under the international liability conventions. Indeed, they are precisely the kinds of actions that drafters of international liability conventions hoped to prevent. Ironically, the claims remained viable *only in the context of transboundary harm* because international regulatory regimes have failed to take root. Although, as we shall see, these claims failed in the US courts, they expose important, ongoing gaps and contingencies in regimes covering transnational harm from nuclear disasters.

While this state of affairs may impose heightened and uncertain costs on corporations, it might also afford a wider range of legal possibilities or political leverage to claimants seeking compensation. Such cases also provide new opportunities to think about nuclear power as neither purely domestic nor purely international. The structure of nuclear businesses and the itinerant character of nuclear harm makes these issues more than just a matter of state-to-state relations. They are trans-local issues that implicate economic, political, and social ties of ordinary citizens, consumers, and corporations.

In this chapter, we describe the patchwork of international agreements relating to cross-border harm from nuclear accidents and identify some of the most significant lacunae in the international legal regimes. We describe how cases and issues that are not covered by these conventions are handled as a matter of private international law. We then turn to claims brought in US courts and analyze their implications for cross-border compensation.

INTERNATIONAL CONVENTIONS

Transboundary harm is governed by a complicated patchwork of national laws, international conventions, and traditional sources of public and private international law. Where a claimant may sue, whom a claimant may sue, what she must prove, and what she may recover are largely contingent on where the plant was located and where the harm occurred. The three worst nuclear power incidents, meanwhile, occurred in states that produced a large proportion of the world's nuclear kilowatt hours, but which had, at the time of the incidents, declined to participate in these international legal regimes: the US, the USSR, and Japan. The US and Japan have since joined one of the international conventions, but many emerging producers of nuclear power, such as the People's Republic of China and the Republic of Korea (South Korea), have not.

Several distinct international legal regimes govern liability for a nuclear reactor incident: the Organization for Economic Cooperation and Development's (OECD) 1960 Paris Convention on Third-Party Liability in the Field of Nuclear Energy and several instruments that supplement or revise it (the Paris Regime); the United Nations International Atomic Energy Agency's (IAEA) 1963 Vienna Convention on Civil Liability for Nuclear Damages and instruments that revise it (the Vienna Regime); the

IAEA Joint Protocol of 1988, that links the Paris and Vienna Regimes; and the IAEA's Convention on Supplementary Compensation for Nuclear Damage of 1997 (the CSC).

The Paris and Vienna Regimes are *sui generis* international legal regimes that grew out of early efforts to facilitate nuclear development and international trade in expertise, designs, and technologies by circumscribing the financial and legal risk to industry participants. Protecting the public against losses was, initially, a secondary concern.¹ Delegations of experts and state representatives negotiated the initial conventions during the 1950s and 1960s.²

After fallout from the Chernobyl meltdown spread across Europe, joint expert committees of the IAEA and OECD worked to improve the Conventions' compensation schemes and to address existing regulatory gaps and ambiguities within them. The situation in Europe was particularly complex. Some member nations had signed on to one agreement, others had signed on to another, and still others had signed on to none at all, raising the possibility of vastly different compensation outcomes for accidents in different member states and raising thorny legal questions.³

In response to Chernobyl, the IAEA also developed a third, US-promoted regime, the CSC, to increase the amount of funding available in the case of a meltdown and to attract nation-states that had declined to join the Vienna or Paris Conventions. The US, for example, had declined to sign on to the Vienna or Paris Conventions because of legal differences in how US legislation treated nuclear liability domestically. The IAEA hoped that the CSC could overcome such differences and increase compensation globally.

Just as Chernobyl prompted new critique and efforts at reform, the incident at Fukushima has once again drawn attention to the international conventions and prompted calls within the IAEA for the promulgation of a truly global international liability regime. The EU and European Commission have begun consulting stakeholders, including the public, about revising these liability regimes. Management of the claims process has drawn particular scrutiny in the wake of the Japanese government's difficulties following Fukushima.⁴ Yet despite newfound interest in reform, the process has progressed very slowly.

Consequently, depending on how one counts, there are currently eleven international instruments governing liability for a nuclear meltdown, summarized in Table 1. Although both the initial Paris Convention and Vienna Convention have been amended, signatory states choose whether and when to adopt and ratify each amendment. Some states still adhere only to the original Paris or Vienna Convention. And many states have declined to join any regime. This creates a confusing patchwork of coverage.⁵



TABLE 1

PARIS REGIME

INSTRUMENT	ENTRY INTO FORCE
Paris Convention on Third Party Liability in the Field of Nuclear Energy (1960) (PC in table 2, below)	1968

INSTRUMENT	ENTRY INTO FORCE
Additional Protocol (1964)	1968
Protocol to Amend (1982)	1988
Protocol to Amend (2004) (RPC in table 2, below)	Not Yet in Force
Brussels Supplementary Convention (1963) (BSC in table 2, below)	1974
Additional Protocol (1964)	1974
Protocol to Amend (1982)	1991
Protocol to Amend (2004) (RBSC in table 2, below)	Not Yet in Force

VIENNA REGIME

INSTRUMENT	ENTRY INTO FORCE
Vienna Convention on Civil Liability for Nuclear Damages (1963) (VC in table 2, below)	1977
Protocol to Amend (1997) (RVC in table 2, below)	2003

LINKING INSTRUMENT

INSTRUMENT	ENTRY INTO FORCE
Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1988) (JP in table 2, below)	1992

SUPPLEMENTARY REGIME APPLYING TO EITHER OR STATES NOT SIGNATORY TO PARIS OR VIENNA

INSTRUMENT	ENTRY INTO FORCE
Convention on Supplementary Compensation for Nuclear Damage (1997) (CSC in table 2, below)	2015



TABLE 2⁶

State	# Reactor	# Reactor Under Constr.	TWh Nuc. Pwr	Nuc. Pwr as % of state energy prod.	PC	VC	BSC	JP	RVC	CSC	RBSC	RPC
Argentina	3	1	7.9	5.9		VC			RVC	CSC		
Armenia	1	0	2	27.8		VC						
Bangladesh	0	2	0	0								
Belarus	0	1	0	0		VC			RVC			
Belgium	7	0	41.4	47.6	PC		BSC					

State	# Reactor	# Reactor Under Constr.	TWh Nuc. Pwr	Nuc. Pwr as % of state energy prod.	PC	VC	BSC	JP	RVC	CSC	RBSC	RPC
Benin						VC		JP	RVC	CSC		
Bolivia	0	0	0	0		VC						
Bosnia & Herzegovina	0	0	0	0		VC			RVC			
Brazil	2	1	15.2	2.7		VC						
Bulgaria	2	0	15.9	37.5		VC		JP				
Cameroon	0	0	0	0		VC		JP				
Canada	19	0	94.9	14.9						CSC		
Chile	0	0	0	0		VC		JP				
China	49	16	330.1	4.9								
Croatia	0	0	0	0		VC		JP				
Cuba	0	0	0	0		VC						
Czech Republic	6	0	28.6	35.2		VC		JP				
Denmark	0	0	0	0	PC		BSC	JP				
Egypt	0	0	0	0		VC		JP				
Estonia	0	0	0	0		VC		JP				
Finland	4	1	22.9	34.7	PC		BSC	JP				
France	56	1	382.4	70.6	PC		BSC	JP				
Germany	6	0	71.9	12.4	PC		BSC	JP				
Ghana	0	0	0	0		VC		JP	RVC	CSC		
Greece	0	0	0	0	PC			JP				
Hungary	4	0	15.4	49.2		VC		JP				
India	23	6	40.7	3.2						CSC		
Iran	1	1	5.9	1.8								
Italy	0	0	0	0	PC		BSC	JP				
Japan	33	2	65.7	7.5						CSC		
Jordan	0	0	0	0		VC			RVC			
Kazakhstan	0	0	0	0		VC			RVC			
Korea	24	4	138.8	26.2								
Latvia	0	0	0	0		VC		JP	RVC			
Lebanon	0	0	0	0		VC						
Lithuania	0	0	0	0		VC		JP				
Macedonia	0	0	0	0		VC						
Mauritius	0	0	0	0		VC						

State	# Reactor	# Reactor Under Constr.	TWh Nuc. Pwr	Nuc. Pwr as % of state energy prod.	PC	VC	BSC	JP	RVC	CSC	RBSC	RPC
Mexico	2	0	10.9	4.5		VC						
Montenegro	0	0	0	0		VC		JP	RVC	CSC		
Morocco	0	0	0	0					RVC	CSC		
Netherlands	1	0	3.7	3.2	PC		BSC	JP				
Niger	0	0	0	0		VC			RVC			
Nigeria	0	0	0	0		VC						
Norway	0	0	0	0	PC		BSC	JP			RBSC	RPC
Pakistan	5	2	9.1	6.6								
Peru	0	0	0	0		VC						
Philippines	0	0	0	0		VC						
Poland	0	0	0	0		VC		JP	RVC			
Portugal	0	0	0	0	PC							
Republic of Moldova	0	0	0	0		VC						
Romania	2	0	10.4	18.5		VC		JP	RVC	CSC		
Russian Federation	38	2	195.5	19.7		VC						
St. Vincent & Grenadines	0	0	0	0		VC		JP				
Saudi Arabia	0	0	0	0		VC			RVC			
Senegal	0	0	0	0		VC						
Serbia	0	0	0	0		VC						
Slovakia	4	2	14.2	53.9		VC		JP				
Slovenia	1	0	5.5	37	PC		BSC	JP				
South Africa	2	0	13.6	6.7								
Spain	7	0	55.9	21.4	PC		BSC				RBSC	
Sweden	6	0	64.4	34	PC		BSC	JP				
Switzerland	4	0	25.4	23.9	PC						RBSC	RPC
Taiwan	4	0	22	8								
Trinidad & Tobago	0	0	0	0		VC						
Turkey	0	0	0	0	PC			JP				
Ukraine	15	2	78.1	53.9		VC		JP				
United Arab Emirates	1	3	0	0				JP	RVC	CSC		

State	# Reactor	# Reactor Under Constr.	TWh Nuc. Pwr	Nuc. Pwr as % of state energy prod.	PC	VC	BSC	JP	RVC	CSC	RBSC	RPC
United Kingdom	15	0	65	20	PC		BSC					
United States of America	94	2	809.4	19.7						CSC		
Uruguay	0	0	0	0		VC		JP				

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FOUNDATIONAL PRINCIPLES

The Paris, Vienna, and CSC Regimes all focus on the private liability of the producers of nuclear power for harm to private victims rather than on the obligations of states to one another.⁷ In other words, they treat harm from nuclear incidents as a concern of *private* international law rather than one of *public* international law. Although the regimes differ in meaningful ways, it is widely recognized that all three are built on a handful of foundational principles of international nuclear liability.⁸

The regimes channel liability exclusively to the operators of nuclear installations.⁹ Operators alone bear legal responsibility for injuries to persons or businesses outside of the facility harmed by a meltdown. (In states where nuclear operators are state-owned, the state is liable up to the amounts for which any operator would be held responsible.) Corporations providing parts, expertise, designs, or even “turn-key” plants do not face liability for damage to the public caused by a defect in their product or design.

These regimes concurrently place limits on an operator’s financial liability for an incident.¹⁰ The operator, in turn, is required to take out financial protection (typically private insurance) up to the full amount of its stated liability. The amounts set by the regimes are quite low compared to the costs of a catastrophic incident. For ease of reference, the designated financial protection minimums and maximums, where applicable, are summarized in Table 3.

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TABLE 3

PARIS REGIME

CONVENTION	FINANCIAL PROTECTION
Paris Convention on Third Party Liability in the Field of Nuclear Energy (1960)	5,000,000-15,000,000 SDR
Protocol to Amend the Paris Convention (1982)	Minimum of 5,000,000-15,000,000 SDR
Protocol to Amend the Paris Convention (2004)	Minimum of 700,000,000 EUR

VIENNA REGIME

CONVENTION	FINANCIAL PROTECTION
Vienna Convention on Civil Liability for Nuclear Damages (1963)	Minimum of \$5,000,000
Protocol to Amend the Vienna Convention (1997)	Minimum of 300,000,000 SDR

CSC REGIME

CONVENTION	FINANCIAL PROTECTION
Convention on Supplementary Compensation for Nuclear Damage (1997)	Minimum of 300,000,000 SDR



The OECD's Paris Convention requires signatory states to set a minimum financial protection level of 5 million Special Drawing Rights (SDR) (about \$7.2 million USD in 2021). No Paris state may set the level of an operator's financial protection below this level. The Convention permits signatory states to extend the financial protection level to a maximum of 15 million SDRs (about \$21.6 million USD in 2021). A 1982 Protocol, which entered into force in 1985, established that signatory states are free to exceed the 15 million SDR cap with state-provided funds.¹¹ Although not yet in force, the 2004 Protocol to Amend the Paris Convention raises the minimum amount of financial protection to 700 million EUR.

The IAEA, in contrast, set the minimum level of financial protection at just \$5 million in deference to states that felt higher caps would make nuclear capacity unattainable for cash-poor states.¹² A state may require operators to provide a higher or unlimited amount of financial protection, but not lower. The 1997 Protocol to Amend the Vienna Convention increases the financial protection level to a minimum of 300 million SDR (about \$432 million USD in 2021). States may set the level lower so long as they provide state funds to cover the shortfall.¹³ The IAEA's CSC requires that a signatory state either ratify one of the Vienna or Paris Conventions, or have national laws in force that require a minimum financial protection level of 300 million SDR.

Several other instruments and the CSC provide for additional compensation tiers that may be drawn upon once financial protection—i.e., the operator's insurance—is exhausted. They create additional layers of compensation for victims harmed by a major incident. The supplementary funding regimes are summarized in Table 4.



TABLE 4

CONVENTION	ADDITIONAL COMPENSATION AFTER FINANCIAL PROTECTION EXHAUSTED	SOURCE OF FUNDS
Brussels Supplementary Convention (1963)	175,000,000 SDR less financial protection	Installation State
	125,000,000 SDR	Member-State Contributions
Protocol to Amend the Brussels Supplementary Convention (2004)	500,000,000 EUR	Installation State
	300,000,000 EUR	Member-State Contributions

CONVENTION	ADDITIONAL COMPENSATION AFTER FINANCIAL PROTECTION EXHAUSTED	SOURCE OF FUNDS
Convention on Supplementary Compensation for Nuclear Damage (1997)	Determined by Formula	Member-State Contributions



Within the Paris Regime, the 1963 Brussels Supplementary Convention adds two additional layers of compensation to be drawn upon if the costs of liability for an incident exceed the operator's financial protection. One is a fund provided by the installation state totaling up to the difference between 175 million SDRs (about \$252 million USD in 2021) and the amount of financial protection. The third layer is a pooled fund of 125 million SDRs (about \$180 million USD in 2021) comprised of member-state contributions. The total of the three layers of compensation in the Brussels Supplementary Convention is therefore 300 million SDRs (about \$432 million USD in 2021). The 2004 Protocol to Amend the Brussels Supplementary Convention increases the second tier of installation-state-provided funds to 500 million EUR and the third tier of pooled public funds to 300 million EUR. These 2004 amendments have not yet entered into force.¹⁴

The CSC Regime provides one additional layer of compensation above the financial protection requirement. This is a pooled, international fund to which signatory states are required to contribute after damages exceed the primary tier of coverage—e.g., after the operator's insurance or indemnity is exhausted. The amount of this fund depends on the number of signatory states and the number of reactors and installed nuclear capacity of each signatory state. A formula uses these factors to scale a signatory state's contribution to the size of its nuclear industry.¹⁵

In addition to limiting operators' liability in terms of the amount of compensation available, the regimes also impose time limits on an operator's liability.¹⁶ Initially, all three Conventions set the limit at ten years following an incident.¹⁷ The 1997 Protocol to Amend the Vienna Convention and the 2004 Protocol to Amend the Paris Convention raised the limitations period to thirty years.¹⁸ The CSC allows the period of limitation to extend beyond ten years, provided the financial protection policy—either insurance or government indemnification—is still in place. But in practice, most private nuclear insurance policies expire after only ten years.

Moreover, the regimes typically impose a form of *strict* or absolute liability on operators.¹⁹ This means that although claimants still need to prove that their injuries were caused by the actions of the party being sued (causation) and establish the financial extent of their injury (damages), they need not prove that an operator is at fault. These provisions relax some of the legal burdens that claimants face.

Finally, the regimes set jurisdiction over claims with the courts of the nation-state in which the incident occurs. With few exceptions, this is defined as the state in which installation is situated.²⁰ In other words, nuclear nation-states typically hold the right to pass judgment on incidents occurring at facilities within their territory. The presiding court determines the law that applies to a case.

PROBLEM AREAS

All of the previously outlined provisions circumscribe liability and legal uncertainty for operators and suppliers, but the resulting regimes are far from comprehensive or

robust. Some of the instruments conflict with each other and each instrument leaves regulatory silences. We summarize several key problems below.

Lack of Adherence by Nuclear Power States

Perhaps the greatest problem is that several major nuclear power states refuse to join a regime. Notably, China and South Korea have not signed on to any of the alternatives. Japan only joined the CSC in 2015, long after the devastating Fukushima catastrophe. As East Asia expands its nuclear power capacity, the risk of transboundary harm within the region will grow. Where nuclear facilities are state-owned, doctrines of sovereign immunity, which preclude claims against the state, may prevent any recovery against an operator.

No Provision for State Liability

The Conventions do not address the liability of states to one another or to individual citizens. Although IAEA has considered promulgating a separate instrument to govern state liability, every attempt has met opposition. Under customary international law, it remains unclear whether a state can be held liable for damage caused by lawful activities, such as the generation of nuclear power. Partly for this reason, European states affected by Chernobyl's fallout compensated their own citizens for harm rather than suing the USSR. If an incident like Chernobyl happens again in a state-owned facility of a non-signatory state, the same legal problems will follow. For example, it might be difficult for a state to recover damages on behalf of its citizens for transboundary harm from a meltdown in China.

Level of Compensation

Fundamental differences remain between the Paris and Vienna Regimes' requirements for financial protection. The Joint Protocol resolved that any claimant from a state that had ratified either the Vienna or Paris Convention as well as the Joint Protocol could claim the benefits of the Convention in force in the installation state. Not all Paris and Vienna states signed the Joint Protocol, however. The Paris Regime provides for higher levels of financial protection than Vienna. It remains unclear which financial provisions would apply if an installation in a state signatory to one Convention irradiated victims in a state covered by the other.

In addition, supplemental compensation pools provided by the Brussels Convention on Supplementary Compensation and the Protocol to Amend the Brussels Convention are limited to member states. If an incident in a Brussels state harms victims in a non-Brussels state, for example, less compensation would be available to remedy the injuries of claimants from the non-Brussels state.²¹ Brussels states insisted on this limitation since the supplementary pools are comprised of public funds. The limitation, however, could result in a particularly unjust allocation of resources were a Brussels state to cause extensive damages in a non-nuclear, non-signatory state such as Austria, Ireland, or Luxembourg. The CSC addresses this tension by setting aside half of the pooled, supplemental compensation exclusively to address transboundary damage.²²

Even in regions where many nuclear power states participate in the same regime, as in much of Western Europe, the cost of a catastrophic incident would dramatically outstrip the levels of compensation that most national legislation and international

conventions provide. By way of comparison, in 2019, the think tank Japan Center for Economic Research suggested that costs of the Fukushima disaster may run as high as \$315-\$728 billion US dollars.²³ No international convention comes close to requiring this level of funding and most nation-states' domestic laws similarly cap damages at far lower levels. Some signatory states, moreover, may struggle to find the cash reserves necessary to meet their obligations, let alone to cover the costs of a catastrophic meltdown. Armenia's sole reactor, for example, does not have a containment unit and sits in a seismically active region. A catastrophic incident at a facility with no containment unit would cause a tremendous amount of damage and potentially a significant amount of transboundary harm that could outstrip the operator and the state's resources.

Suppliers' Immunity

Imposition of liability for faulty products or design is one means of promoting safety in a variety of industries. If suppliers know they will face liability should their products or designs cause harm, then they may invest in safety *a priori*. Under all three regimes, however, nuclear technology suppliers are shielded from liability even if an incident is caused by their negligence or a defect in product or design. This initially induced technology suppliers to participate in developing the fledgling industry. It is unclear, however, why suppliers should still be entitled to such protections after nearly seven decades of experience and profit in the nuclear field.

Supply of nuclear technologies also raises issues of state participation and immunity from liability. Increasingly, aspiring nuclear power states are contracting to purchase nuclear reactor facilities fully designed, built, and installed by a handful of corporations—so-called “turn-key” plants. Previously, privately-owned US and Japanese technology suppliers dominated this business. In more recent years, a number of wholly or partly state-owned corporations have moved into this field. Russia, China, South Korea, and France have supported these ventures. Although, as we discuss below, the lack of coverage by a Convention may open up suppliers to liability, many of these state-run corporations, such as Russia's Rusatom and France's Areva, claim protections of sovereign immunity.²⁴ As state-run entities, moreover, these corporations are able to benefit from diplomatic negotiations between states. The Russian government, for example, has negotiated bilateral agreements governing nuclear liability with states in which Rusatom is operating.²⁵

Lack of Claims Process

The Conventions dictate which courts will have jurisdiction over claims arising from an incident, but say little else about the administration of claims. Granting jurisdiction and choice of law to installation states may tilt the playing field towards nuclear industry interests as against foreign claimants. Difficulties crafting a fair and easy-to-use claims system compound such problems. As Suami et. al. discuss in this volume, the Japanese government had to craft an ad hoc claims procedure in the wake of Fukushima, and Japanese claimants have faced difficulties in navigating this system. Issues surrounding the administration of claims and compensation would be magnified in the case of major transboundary harm. Even assuming foreign claimants would be treated fairly, they would still face a difficult process of navigating a foreign legal system to make damage claims. Despite periodic references to the burden that victims would bear in navigating a claims process in a foreign installation state, the international community has not addressed these problems prospectively.

Conflicts Between Instruments

The CSC was designed to mesh with the Paris and Vienna Regimes. The 1988 Joint Protocol, moreover, reconciles differences between them. Among other things, it enables sufferers in a signatory state to claim the benefits of whichever Convention is in force in the installation state. Policymakers hoped the Joint Protocol could entice newly post-socialist states to join the Conventions, creating more uniform coverage within Europe but, as shown in Table 2, its adoption by Paris and Vienna states has been far from uniform.²⁶ Consequently, conflicts between the Vienna and Paris Conventions remain relevant today. Important differences center on the Conventions' territorial application, to which we now turn.

Territorial Scope & the Question of Non-Signatory States

The Vienna and Paris Conventions only apply to damage suffered in a contracting state. With minor exceptions, the 1997 Protocol to Amend the Vienna Convention expands the reach of the Convention to all damage, wherever suffered.²⁷ The 2004 Protocol to Amend the Paris Convention expands the reach of the Convention to non-contracting states that have no nuclear installations or that provide equivalent protections under national law.²⁸ Because few signatory states have ratified amendments to the Paris or Vienna Conventions, however, there is still the possibility that victims in a non-nuclear, non-contracting state, such as Austria, Ireland, or Luxembourg, could receive different treatment than other victims.

Definitions of Damage

The Paris and Vienna Regimes initially limited claimants to recovery of damages for bodily injury, death, and harm to property. Damage to the environment and costs of environmental remediation were left out of the Conventions as were other kinds of damages, such as emotional harm or harm to reputation. Although the Revised Vienna and Paris Conventions and the CSC now permit signatory states to enact laws that would allow recovery of a wider array of environmental harms and injuries, they neither cover such damage under their own terms nor require states to legislate in this area. Thus, recovery for environmental harm and for injuries beyond the narrow categories of embodied harm, death, and property damage varies depending on both the controlling convention and the underlying laws of the installation state.

Contingency and Unpredictability of Transboundary Harm

Decades of research have shown that the environmental pathways of radiation are complicated. Radioactive materials collect in hotspots and move in unpredictable ways. Human activity, similarly, brings unexpected populations into proximity of harm from a meltdown. Fukushima offers a case in point. No transboundary claims were expected, yet ship crews faced possible exposures. The unpredictability of exposures, coupled with the difficulties that lay-communities face in detecting exposure and linking it to harm, add further burdens to claims-making in the transboundary context.

THE CASE OF FUKUSHIMA

As we have seen, international nuclear liability regimes attempt to limit the consequences of a meltdown for corporations and states. They are not principally oriented towards protecting members of the public. Yet, paradoxically, a number of major nuclear nation-states have *not joined* any of these conventions. Prior to the Fukushima meltdown, Japan had elected not to join one of the international conventions. In the wake of Fukushima, claimants brought lawsuits over the meltdown in both the Japanese and the US courts. Litigation over Fukushima exposes the strange and imperfect patchwork of reactor liability that endures in the gaps between international treaties. It also highlights claimants' concerns with the bargains struck by international liability regimes.

Japanese law presents foreign claimants with several means of obtaining compensation for damage suffered within Japan.²⁹ First, foreign claimants may make claims under Japan's administrative compensation scheme on the same terms as compensation to Japanese citizens, subject to the condition of reciprocity.³⁰ In addition, some foreign claimants may also sue for compensation within the Japanese courts. The Fukushima District Court has ruled that, as concerns claims against the Japanese government, foreign citizens can sue the Japanese government as long as a Japanese citizen could bring a similar lawsuit in the foreign citizen's home state.³¹

The situation is far less clear for injuries suffered by foreign claimants located outside of Japan, however. There has been no legal decision explicitly permitting such claimants to bring lawsuits.³² Similarly, it is not clear whether the Japanese compensation scheme extends to harms from the Fukushima accident suffered outside of Japan.³³ As an added concern for potential claimants, TEPCO itself has been a key player in developing and administering compensation regimes. As a result, claimants seeking redress for harms suffered outside of Japan and others seeking new avenues for recovery have sued abroad in the US federal courts.

The first set of claims implicated the transboundary nature of nuclear harm. In the immediate wake of the triple disaster, US Navy vessels approached the coast of Japan on a humanitarian relief mission known as Operation Tomodachi. Fallout from Fukushima, the US plaintiffs alleged, irradiated their ships as they moved through international waters and into Japanese waters. Thus, a double transboundary movement—of the fallout and of the ship—was in issue.

Crew members of the USS Ronald Reagan and other ships participating in the mission brought claims in US federal court in California across several cases, *Cooper*, *Bartel I*, and *Bartel II*.³⁴ The plaintiffs in these suits sought compensation from TEPCO and General Electric (GE), the designer and manufacturer of the plant, for negligence, strict liability for manufacturing and design defects, and strict liability for ultrahazardous activities. The movement of fallout over US vessels and US citizens, they argued, entitled them to the protection of US laws and courts as against TEPCO, the Japanese plant operator, and GE, the US designer.

A second set of claims, in contrast, targeted the trans-boundary nature of nuclear production—the movements of parts, designs, expertise, and capital.³⁵ In the *Imamura* case, it was not the movement of fallout that theoretically opened US law and courts to plaintiffs, but rather the participation of US corporations in the allegedly harm-causing incident. Nine Japanese plaintiffs, mainly medical doctors from Fukushima Prefecture, filed a class action suit against GE in US federal district court in Massachusetts, home of GE's international headquarters. They alleged many

of the same claims as the *Cooper* and *Bartel* plaintiffs—negligence, strict liability for manufacturing and design defects, strict liability for ultrahazardous activities—and also included claims for damage to real property. In essence, the *Imamura* plaintiffs argued that the participation of a US corporation in the design of an allegedly faulty facility enabled them to call on US laws and courts for redress against GE, the US designer.

Together, these US court cases exposed tensions between the bounded territorial configurations of law and courts, on the one hand, and the itinerant nature of both nuclear harm and global capitalism, on the other. They raised important issues surrounding the status quo ante in global liability regimes. Namely, they renewed questions of whether it is just and fair to leave many aspects of decision-making over nuclear liability claims with interested parties such as nuclear operators. Moreover, these cases raised questions about whether claims should be resolved and governed by the legal institutions and laws of nation-states where incidents occur, many of which have vested interests in perpetuating nuclear power and limiting public liability. The US litigations refracted these issues through complicated legal questions of jurisdiction, forum, and choice of law. We discuss each in turn.

JURISDICTION

How is it that TEPCO, a Japanese nuclear plant operator, found itself defending a claim for compensation in a US federal court? Personal jurisdiction doctrines arising under US state and Constitutional laws determine when a foreign party may be sued in the US courts. The *Bartel II* claims raised the issue of whether doctrines of general jurisdiction—which require a defendant to have a strong connection to the US state where litigation is brought—support US court jurisdiction over damage from Fukushima.

The plaintiffs argued that TEPCO's business ties to the state of California were sufficient to support court jurisdiction there—that TEPCO “purposefully availed” itself of California. The plaintiffs contended that TEPCO's registration in 2003 to do business in California as well as its relationship with GE, which designed the Fukushima plant and had headquarters in California until 2005, supported general jurisdiction.³⁶

TEPCO's business relations within California, however, had little specific connection to the Fukushima meltdown, the court surmised. Although the District Court found that TEPCO had contact with California, it ultimately held that TEPCO's actions in the state did not relate sufficiently to the operation or meltdown of the Fukushima power plant in Japan. The court dismissed these claims for lack of personal jurisdiction.³⁷

The plaintiffs appealed this ruling to the US Court of Appeals for the Ninth Circuit, but the appeal turned solely on whether the plaintiffs filed their notice of appeal in a timely manner. The circuit court dismissed the case, reasoning that the plaintiffs had missed the filing deadline.³⁸ The *Bartel* dismissals stand.

Forum Non Conveniens

US plaintiffs have faced obstacles to suing TEPCO, a Japanese corporation, in the US. But in the *Imamura* case, the facts were reversed: the defendant was a US corporation, and the plaintiffs were Japanese. This time, the US court located in Massachusetts accepted jurisdiction because it is a long-accepted doctrine that

corporations can be sued at their principal place of business. Yet it is also well-established that plaintiffs may sue in their home states, and hence that Japanese courts could also exercise jurisdiction. The *Imamura* litigation therefore raised questions about which forum was the most appropriate one for a trial. While the plaintiffs argued that the US courts would be the fairest and most logical forum, GE successfully sought removal of the claims to Japan under doctrines known as *forum non conveniens*.³⁹

The *Imamura* litigation showed how plaintiff claimants attempted to work the gaps in the international system to their favor. The clever theory of the *Imamura* litigation was this: while both US and Japanese statutory law protect manufacturers from liability, neither legal system regulates fully cross-border claims for compensation. Where there is no statutory law, ordinary tort law fills the gap, and ordinary tort law allows the plaintiffs to recover against manufacturers if certain thresholds of liability can be proven. Hence, the plaintiffs brought *ordinary tort claims* against GE. The cross-border movement of parts, expertise, and capital opened up the possibility that GE could face liability in the US courts.

Since jurisdiction was not in question, GE argued that Japan would be a better forum for the litigation than US courts in Massachusetts. The District Court's analysis of GE's claim turned on whether Japan offered an "alternative adequate forum"—on whether the balance of public and private factors in the case favored resolving the claims there.⁴⁰ In this case, the alternative forum was not the Japanese courts, but the Alternative Dispute Resolution Center (ADRC) created through the Japanese Nuclear Compensation Act. The plaintiffs argued that the ADRC would not be an alternative adequate forum because, among other things, the sizes of its awards are not comparable to tort awards in the US courts and its mechanisms channel all liability to TEPCO, relieving GE of any potential liability.⁴¹ In other words, they argued that the claimants would not be made whole. They also identified TEPCO's potential conflict of interest as both the alleged tortfeasor and a party having a role in making awards.

The District Court disagreed with the plaintiffs and held that the ADRC was an alternative adequate forum. It reasoned that the ADRC had awarded other claimants with compensation, even though GE was not the payor. It noted, moreover, that claimants still retained the right to sue TEPCO in the Japanese courts.⁴² Japan, in sum, provided some compensation, however incomplete. This, according to the court, was enough to render Japan an alternative adequate forum.

The court next turned to the balance of public and private factors. Noting the curious nature of the case, the District court expressed its belief that the Japanese plaintiffs' preference for a US court was not entitled to deference because it seemed like impermissible forum shopping. It also assumed that Japanese law would apply in the case under Massachusetts conflict of laws precedents. Pointing to administrative difficulties of running such a trial in the United States, the court ruled in favor of GE and dismissed the case.⁴³

The US Court of Appeals for the First Circuit affirmed this decision on April 24, 2020, approving of the District Court's reasoning.⁴⁴ The theory of the litigation—the fact that navigating the interstices of treaty law potentially opened GE to liability—was ultimately held against the claimants.

For a time, the *Imamura* case raised the tantalizing possibility that producers of parts and expertise might be held liable for defects in their products. Though the plaintiffs' efforts were unsuccessful in this case, the pathway remains open. A future meltdown,

perhaps one with a more patently inadequate compensation or no compensation scheme at all, could yield a different result.

Conflict of Laws

Determining *where* a case will be heard is only a threshold question. Courts exercising jurisdiction must also determine *which nation-state's laws* will apply. As the *Imamura* court noted, a case litigated in the United States might involve the application of Japanese laws. The doctrines governing these questions are known as conflict of laws, or private international law.

Conflict of laws doctrines are understood as analogs to the public international law of treaties, discussed above. In the absence of applicable treaty law, they provide the doctrinal fabric that knits together different legal regimes across jurisdictions. Because these legal doctrines are domestic and vary between jurisdictions, the availability of compensation may turn on *where* the case is brought.

The *Cooper* litigation against GE, TEPCO, and several other suppliers showcased the operation of these doctrines and the stakes for the claimants.⁴⁵ For the *Cooper* plaintiffs, the choice of law question was outcome determinative, since TEPCO waived its jurisdictional defenses.⁴⁶ Under Japanese law, as explained above, the Japanese Nuclear Compensation Act would bar a lawsuit against GE and would establish limits on TEPCO's liability to each plaintiff. California laws, in contrast, opened up possibilities for recovery under tort (personal injury) laws since the US Federal law governing nuclear accidents, the Price-Anderson Act, only covers US-licensed facilities. While the plaintiffs urged the application of California law, GE and TEPCO argued the court should apply Japanese law to the dispute.⁴⁷

The *Cooper* trial court applied California's three step "governmental interest" analysis to determine which jurisdiction's laws should apply. This entailed assessing: 1) whether the laws of the jurisdictions differ, 2) whether both jurisdictions have a legitimate interest in the decision, and 3) assuming the prior two questions are answered in the affirmative, which state's interests would be most impaired if its laws were not applied—an analysis called "comparative impairment."⁴⁸

The *Cooper* court held that the first two elements of the analysis were satisfied. California state law might provide remedies that Japanese law would not. The court further held that both California and Japan have legitimate interests in the decision. While California has a strong interest in promoting product safety and preventing nuclear disaster, Japan has an interest as the place where the incident occurred as well as in the policy-aims of its compensation scheme.⁴⁹ The District Court's analysis therefore hinged on the question of comparative impairment.

Comparative impairment doctrines seek to tip the balance toward the laws of the state with the greatest interest in a conflict. The comparative impairment test asks which state's interests would face greater harm and then applies the laws of that state.⁵⁰ The *Cooper* plaintiffs argued at trial that California's interests would be more impaired because Japanese law would totally absolve GE—the supplier of parts and designs—from liability. This, they reasoned, would strip any incentive for GE or other companies to build safe reactors. The plaintiffs also contended that recovery from TEPCO under the Nuclear Compensation Act was impermissibly limited.⁵¹

The *Cooper* court held that Japan's interest in applying its Compensation Act uniformly and fairly to businesses outweighed California's interest in product safety.

It concluded that Japanese laws should apply to the dispute. Since the Compensation Act channels all liability to the operator, the court dismissed the claims against GE. Noting the “overwhelmingly strong” interest of Japan in preserving its compensation scheme, the court also dismissed the claims against TEPCO.⁵² The US Court of Appeals for the Ninth Circuit affirmed the District Court’s decision and reasoning almost ten years after the Fukushima meltdown, ending the claimants’ search for redress in the US courts.⁵³

Like *Bartel* and *Imamura*, however, *Cooper* nonetheless demonstrates the dramatic contingency of litigation in the interstices of the international conventions. The courts gave substantial weight, in the end, to the bilateral international relations between the US and Japan and to Japan’s compensation system and policies. But the United States does not enjoy such close relations with all nuclear power states, and it remains an open question how rising nuclear-power states might handle compensation. The pathways exposed by the Fukushima cases remain open.

US Claimants in Japan?

The above cases involved lawsuits brought in the US concerning harms suffered in Japan. These cases highlighted the possibilities for interested parties to control compensation at the expense of those harmed by a meltdown. Yet the US courts have remained skeptical of plaintiffs’ motives and generally have deferred to defendants’ arguments for dismissal on a variety of grounds. But what of the reverse possibility—what if plaintiffs chose to sue in Japan seeking compensation for harms suffered outside of Japan?

A leading expert in Japanese private international law, Professor Masato Dogauchi, has argued that if any party sustained injuries from the Fukushima accident outside of Japan—for example if an American fisherperson claimed that his or her livelihood was impeded due to concerns about the effects of radiation on US fisheries—a Japanese court would hear the claim but would apply *foreign law*⁵⁴ (in this case, the law of the US state in which the fishing occurs) to the dispute *to the extent that a claim could be maintained under Japanese law*.⁵⁵

The implication is that a claim against TEPCO, which is allowable under Japanese law, would proceed according to the law of the US state to determine liability and compensation, but a claim against a US or foreign manufacturer of the nuclear power plant could not proceed, even if it were allowed under US state law, because a Japanese statute protects manufacturers of nuclear power plants from liability.

In the aggregate, these questions—especially those surrounding conflict of laws—will be an important dimension of any future cross-border claims for compensation for nuclear accidents. One can imagine, for example, an accident in Korea or China, neither of which are parties to any of the international conventions, leading to claims in Japan, based on the pollution of the environment in Japan. According to Professor Dogauchi, if any person suffered damage in Japan due to a nuclear accident outside of Japan—if for example a Japanese fisherperson sustained economic damages due to contamination of Japanese waters from a nuclear accident in Korea—the Japanese citizen could bring a lawsuit before Japanese courts and Japanese law would apply. In such a case, however, the Compensation Act would not apply, since that Act concerns only incidents occurring in Japan, so general principles of Japanese tort law in the Civil Code would determine the extent of liability and damages.⁵⁶

CONCLUSION

At one time, during the heart of the Cold War, the promotion of the nuclear power industry seemed an unqualified good to national and international lawmakers. But three disasters later, as victims attempt to rebuild and new states seek nuclear technologies it is time to reconsider the basis of the bargain.

Claimants' attempts to recover in the interstices between treaty regimes have so far failed. Yet the challenges expose the ways in which the system as a whole favors pro-nuclear interests. Concerns of promoting safety in the supply of parts and designs fall to the wayside. Those affected by meltdowns, meanwhile, pay the price in the form of diminished financial recovery through administrative compensation regimes. The public at large may accept this state of affairs where, as here, the disputes involve two closely allied nation-states. But dynamics in global markets for nuclear energy suggest that the states' interests will not always be so aligned.

Today, the nuclear power ecosystem is shifting toward emerging markets. While nuclear power faces economic and political woes in jurisdictions like the United States and Germany, other nation-states are pressing forward with nuclear development. The World Nuclear Association reports that twenty countries have plans to become nuclear-power states. Existing nuclear power states such as China, Korea, and India are pursuing with plans to expand nuclear capacity. As more states build more nuclear reactors, the risk of a transboundary incident grows along with the possibility that nuclear nation-states might not have the political wherewithal or adequate resources to handle the transboundary aftermaths of a catastrophe. As we have seen throughout the volume, the existing, imperfect system suffers from important defects in coverage. It also has substantial room for play at the joints, in the places where the uneven patchwork comes together in transboundary disputes.

Victims have driven these novel litigations as a means of having a voice in questions of compensation. Their recourse to the courts is unsurprising. Throughout the long history of international discussions of transboundary aspects of nuclear meltdowns, at-risk and harmed communities have been left out of serious conversations about legal standards and reforms. While Fukushima has prompted a new wave of discussions over third party liability within the IAEA, OECD, and similar organizations, it seems that claimants' experiences in seeking compensation have remained less of a concern. Work remains to be done to understand their experiences of diverse compensation systems, their understandings of the complicated legal situation, and their preferences for addressing nuclear risk moving forward.

1. See Pelzer 2007
2. For a detailed overview of the procedural histories of drafting at the IAEA see Szasz 1970, 703-709; and at the OECD see Schwartz 2007; Pelzer 2007 Detailed elaboration of these complicated conventions is beyond the scope of this chapter and has been covered in depth by legal commentators like Schwartz and Pelzer, many of whom served in various capacities within these international organizations. For a detailed overview, see Schwartz 2010, 307-354; Pelzer 2010, 355-386 For extensive, comprehensive commentary on the IAEA regimes (the Vienna Convention and the Convention on Supplementary Compensation) see IAEA On the Paris regime see "Revised Exposé des Motifs of the Paris Convention," OECD, November 16, 1982.
3. Borrás 2008, 31-42
4. Heffron 2016, 8-9
5. See Currie 2006, 85; Adisianya n.d.

6. Source for Columns 2-5: World Nuclear Association, Table & Country Profiles (last visited 01/15/2021). Data vary by country as to year collected. Columns 6-13 include only states that have both signed and ratified or acceded to a convention. Data drawn from up-to-date lists available from OECD, and IAEA, (last visited 01/15/2021).
7. One IAEA regulator proposed a convention on state liability, but this was widely dismissed as a “gimmick” to increase IAEA influence in comparison to OECD in the nuclear field. See TFC/PC/435, 1957, Folder: 201498441, OECD Archive.
8. Detailed elaboration of these complicated conventions is beyond the scope of this chapter and has been covered in depth by legal commentators who, like Schwartz and Pelzer, have served in various capacities within these international organizations. For a detailed overview, see Schwartz 2010, 307-354; Pelzer 2010, 355-386 For extensive commentary on the IAEA regimes (the Vienna Convention and the Convention on Supplementary Compensation) see IAEAb On the Paris regime see OECD, Revised Exposé des Motifs (Paris: OECD, 1982).
9. Schwartz 2010, 310-311
10. Schwartz 2010, 312-313
11. Schwartz 2006, 42-44 As Schwartz explains, the SDR is unit of measure defined by the International Monetary Fund and tied to the value of the US Dollar, UK pound, the Euro, and the Japanese Yen. Her estimates, used in this text, were prepared according to the 2006 exchange rates. The exchange rate is about the same in March of 2018 as it was in 2006.
12. Schwartz 2006
13. For summary of these change see Schwartz 2010, 21-61
14. See Schwartz 2010, 333
15. Schwartz 2010
16. On this principle, see Schwartz, Schwartz 2010, 320-321
17. Schwartz 2010, 320-321
18. For summary of these change see Schwartz 2010, 326-328 For a detailed recounting of all technical changes see IAEAb, 21-61.
19. On this provision, see Pelzer 1988, 100-101
20. See Schwartz 2010, 321-322
21. See Schwartz 2006, 44
22. Schwartz 2010, 329-331
23. Kumori 2019
24. On the shifting supply market and participation of states within it see Kerr 2014, 20-21
25. Heffron 2016, 9-10
26. See Schwartz 2010, 325
27. Schwartz 2006, 47; Schwartz 2010, 325
28. Schwartz 2006, 54
29. See Feldman 2015, 127; Lerner 2013, 543
30. Article 6 of the State Redress Act: “In cases where the victim is a foreign national, this Act shall apply only when a mutual guarantee exists.”

31. See Fukushima District Court, Judgment, October 10, 2017, *Hanrei Jihō* Law Cases Reports, No. 2356, p. 3 (finding that the reciprocity requirement was satisfied with respect to Korea, China, the Philippines, and Ukraine).
32. Cf. Tokyo High Court, Judgment, July 18, 2007, *Hanrei Jihō*, No. 1994, p. 36 (which rejected the claim on the ground of the injuries caused by the explosion of the hazardous gas thrown away in China by the Japanese army during the World War Two, but with the reason other than the place of the injury). However, recently, the Tokyo District Court held that the State Redress Act shall directly apply to a claim for damages in cases in which a Japanese civil servant has caused harm against a natural or legal person in the exercise of public authority in a foreign country. Tokyo District Court, Judgment, February 12, 2020 (Hei 30 (wa) No. 32649), *unpublished* (available at Westlaw Japan, 2020WLJPCA02128018).
33. See OECD, *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident* (2012), p. 21.
34. See generally *Bartel v. TEPCO*, 2018 WL 312701 (S.D. Cal. Jan. 5, 2018) (hereinafter *Bartel I*); *Bartel v. TEPCO*, 371 F.Supp. 3d 769 (S.D. Cal. 2019) (hereinafter *Bartel II*); *Cooper v. TEPCO*, 2019 WL 1017266 (S.D. Cal. Mar. 14, 2019). All three cases arise out of the same fact pattern, yet their procedural history is complicated due to a number of early deficiencies in the complaints. For the sake of simplicity, we supply citations to the most recent decisions in these cases.
35. See *Imamura v. GE*, 371 F.Supp.3d 1 (D. Mass. 2019).
36. See *Bartel II*, 371 F.Supp.3d at 785-789.
37. *Bartel II*, 371 F.Supp.3d at 785-789.
38. *Bartel v. TEPCO*, 2019 WL 5260743 (9th Cir. Jul. 30, 2019).
39. *Imamura*, 371 F.Supp.3d at 5.
40. *Imamura*, 371 F.Supp.3d at 7.
41. *Imamura*, 371 F.Supp.3d at 7-10.
42. *Imamura*, 371 F.Supp.3d at 7-10.
43. *Imamura*, 371 F.Supp.3d at 10-14.
44. *Imamura*, 371 F.Supp.3d at 15; *Imamura v. GE*, 2020 WL 1969460 (1st Cir. Apr. 24, 2020).
45. See generally *Cooper*, 2019 WL 1017266.
46. See *Cooper*, 2019 WL 1017266 at 10.
47. See *Cooper*, 2019 WL 1017266.
48. *Cooper*, 2019 WL 1017266 at 5-9.
49. Memorandum of Points and Authorities in support of GE's Motion to Dismiss at 6, *Bartel v. Tokyo Elec. Power Co., Inc.*, 17-CV-1671- JLS, 2018 WL 312701 (S.D. Cal. January 5, 2018).
50. See Memorandum of Points and Authorities in support of GE's Motion to Dismiss at 7-9.
51. Memorandum of Points and Authorities in support of GE's Motion to Dismiss at 7-9, 12-13.
52. Memorandum of Points and Authorities in support of GE's Motion to Dismiss at 9-12.
53. *Cooper v. TEPCO*, No. 19-55295 (9th Cir. May 22, 2020).
54. Memorandum of Points and Authorities in Support of GE's Motion to Dismiss at 15, *Imamura et al. v. General Electric Company et al.*, Docket No. 1:17-cv-12278 (D. Mass. November 17, 2017).

55. Dōgauchi 2013, 131 However, Nomura 2012, 21 argue that the application of California law would be problematic because it is unforeseeable from the point of view of the tortfeasor, although they give no reason for this argument.
56. Article 22 (1) of the *Hō no tekiyō ni kan suru tsūsoku-hō* the Act on General Rules for Application of Laws: “If the obligations arising from a tort are governed by a foreign law, claims for damages or any other remedies under that law may not be claimed if the event does not constitute a tort under Japanese law.”

BIBLIOGRAPHY

Adisianya n.d.

Adisianya, Anthony. “Different Compensation Systems Under Nuclear Liability Conventions,” University of Dundee, <http://www.dundee.ac.uk/cepmlp/gateway/?news=31321>

Borrás 2008

Borrás, Alegría. “La Fragmentation des Sources de Droit International Privé Communautaire: Le cas de la responsabilité nucléaire.” In *Le Pluralisme Normatif: De La Comparaison à la Coordination*. Paris, Dalloz, 2008, 31-42.

Currie 2006

Currie, Duncan EJ. “The problems and gaps in the nuclear liability conventions and an analysis of how an actual claim would be brought under the current existing treaty regime in the event of a nuclear accident.” *Denver Journal of International Law & Policy* 35 (2006): 85-127.

Dōgauchi 2013

Dōgauchi, Masato. “Kokkyō wo koeru Genshiryoku Songai nitsuiteno Kokusai Shihō Jō no Mondai Private-International-Law Issues with Regard to Cross-Border Nuclear Damages.” *Waseda Hōgaku* Vol. 87, No. 3 (2013): 131-158.

Feldman 2015

Feldman, Eric A. “Compensating the Victims of Japan's 3-11 Fukushima Disaster.” *Asian-Pacific Law & Policy, Journal* 16 (2015): 127-158.

Heffron 2016

Heffron, Raphael J., Stephen F. Ashley, and William J. Nuttall. “The Global Nuclear Liability Regime Post Fukushima Daiichi.” *Progress in Nuclear Energy* 90 (2016): 1–10. <https://doi.org/10.1016/j.pnucene.2016.02.019>.

IAEAb

International Atomic Energy Agency. *The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage—Explanatory Texts*. Vienna: IAEA, 2007.

Kerr 2014

Kerr, Paul K, Holt, Mark, and Nikitin, Mary Beth. *Nuclear Energy Cooperation with Foreign Countries: Issues for Congress*. Washington, D.C.: Congressional Research Service, 2014.

Kumori 2019

Kumori, Atsushi. “Think Tank Puts Cost to Address Nuke Disaster up to 81 Trillion Yen.” *Asahi Shinbun*, March 19, 2019.

Lerner 2013

Lerner, Ken, and Edward Tanzman. “Making Victims Whole: Compensation of Nuclear Incident Victims in Japan and the United States.” *NYU Journal of Legislation & Public Policy* 17 (2013): 543.

Nomura 2012

Nomura, Toyohiro, Taro Hokugo, and Chihiro Takenaka. “Japan's Nuclear Liability System.” In *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident*, 15-28. Paris: OECD Nuclear Emergency Agency, 2012.

Pelzer 1988

Pelzer, Norbert. "Concepts of Nuclear Liability Revisited: A Post-Chernobyl Assessment of the Paris and the Vienna Conventions." In *Nuclear Energy Law After Chernobyl*, edited by Peter Cameron et. al., 97-114. London: Graham and Trotman, 1988.

Schwartz 2006

Julia A. Schwartz, "International Third-Party Liability Law: The Response to Chernobyl," in the Joint Report by the OECD, NEA, and IAEA, *International Nuclear Law in the Post-Chernobyl Period* (Paris: OECD, 2006)

Szasz 1970

Szasz, Paul C. *The Law and Practices of the International Atomic Energy Agency*. Vienna: IAEA, 1970.

Appendix 1

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Appendix 2

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The Role of Civil Society

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<https://vimeo.com/148636664>

Chika Watanabe, Anthropology, Cornell University, interviews Keiko Kiyama, General Secretary, NGO JEN, concerning their work in the aftermath of the March 11, 2011 disasters in Northeast Japan. Cornell East Asia Program

INTERVIEW WITH KEIKO KIYAMA, INTERVIEWED BY CHIKA WATANABE

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Chika Watanabe, Cornell Anthropology, interviews Keiko Kiyama, General Secretary, NGO JEN, concerning their work in the aftermath of the March 11, 2011 disasters in Northeast Japan. Cornell East Asia Program

The Role of Architects and Engineers

**INTERVIEW WITH SHIN SAKURAI, INTERVIEWED BY
HIROKAZU MIYAZAKI**

Fukushima within the Configuration of the U.S. Cold War Strategy

INTERVIEW WITH YUKIO YAMAGUCHI, INTERVIEWED BY NAOKI SAKAI, TRANSLATED BY JOSHUA YOUNG

<https://vimeo.com/141947682>

On the meaning of March, 2011 Fukushima. A selection of an interview by Naoki Sakai, Asian Studies, Cornell University, with Mr. Yukio Yamaguchi, Co-Director, Citizen's Nuclear Information Center, Tokyo. Cornell East Asia Program

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On the meaning of March, 2011 Fukushima. The full interview by Naoki Sakai, Asian Studies, Cornell University, with Mr. Yukio Yamaguchi, Co-Director, Citizen's Nuclear Information Center, Tokyo. Cornell East Asia Program

INTERVIEW WITH ICHIYO MUTO, INTERVIEWED BY NAOKI SAKAI, TRANSLATED BY JOSHUA YOUNG

<https://vimeo.com/141946881>

Selection of interview by Naoki Sakai, Asian Studies, Cornell University, with Mr. Ichiyo Muto of the People's Plan Study Group, January 5, 2012. In the wake of the Fukushima nuclear disasters, Mr. Muto outlines the history of nuclear power and nuclear technology in Japan from 1945 through to the present. Cornell East Asia Program

<https://vimeo.com/151186500>

Full interview by Naoki Sakai, Asian Studies, Cornell University, with Mr. Ichiyo Muto of the People's Plan Study Group, January 5, 2012. In the wake of the Fukushima nuclear disasters, Mr. Muto outlines the history of nuclear power and nuclear technology in Japan from 1945 through to the present. Cornell East Asia Program

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**INTERVIEW WITH YUKI ASHINA, INTERVIEWED BY
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Bibliography

Adisianya n.d.

Adisianya, Anthony. "Different Compensation Systems Under Nuclear Liability Conventions," University of Dundee, <http://www.dundee.ac.uk/cepmlp/gateway/?news=31321>

Alexievich 2013

Alexievich, Svetlana. *Chernobyl Prayer: A Chronicle of the Future*. Translated by Anna Gunin and Arch Tait. New York: Penguin Books, 2013.

Anisimov 2016

Anisimov, Aleksey Pavlovich, and Anatoliy Jakovlevich Ryzhenkov. "Thirty Years after the Accident at the Chernobyl Nuclear Power Plant: Historical Causes, Lessons and Legal Effects." *Journal of Energy & Natural Resources Law* 34, no. 3 (2016): 265–83. <https://doi.org/10.1080/02646811.2016.1162047>

Beyea 1984

Beyea, Jan. *A Review of Dose Assessments at Three Mile Island and Recommendations for Future Research*. Philadelphia, PA: Three Mile Island Public Health Fund, 1984.

Borrás 2008

Borrás, Alegría. "La Fragmentation des Sources de Droit International Privé Communautaire: Le cas de la responsabilité nucléaire." In *Le Pluralisme Normatif: De La Comparaison à la Coordination*. Paris, Dalloz, 2008, 31–42.

Brown 2013

Brown, Kate. *Plutopia Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters*. Oxford: Oxford University Press, 2013.

Butler 1959

Butler, Richard H. "Liability Insurance for the Nuclear Energy Hazard." *Proceedings of the Casualty Actuarial Society* XLVI, 1959.

Bychkova 1999

Bychkova, K. F. "Characteristic Features of the Legal Relations Concerning Compensation for Injuries Caused by the Chernobyl Accident." *Atomic Energy* 87, no. 1 (July 1999): 526–28. <https://doi.org/10.1007/bf02673213>.

Chilvers 2020

Chilvers, Jason, and Kearnes, Matthew. "Remaking Participation in Science and Democracy." *Science, Technology, & Human Values* 45, no. 3 (2020): 347-380.

Chunichi 2013

Chunichi Shimbun Shakaibu. *Nichibei-domei to genpatsu: Kakusareta kaku no sensgoshi / The U.S.-Japan Alliance and Nuclear Power Plants: The Hidden History of Nuclear Energy in Postwar Japan*. Nagoya: Chunichi Shimbun, 2013.

Currie 2006

Currie, Duncan EJ. "The problems and gaps in the nuclear liability conventions and an analysis of how an actual claim would be brought under the current existing treaty regime in the event of a nuclear accident." *Denver Journal of International Law & Policy* 35 (2006): 85-127.

Dōgauchi 2013

Dōgauchi, Masato. "Kokkyō wo koeru Genshiryoku Songai nitsuiteno Kokusai Shihō Jō no Mondai Private-International-Law Issues with Regard to Cross-Border Nuclear Damages." *Waseda Hōgaku* Vol. 87, No. 3 (2013): 131-158.

Daston 2017

Daston, Lorraine. "What Is an Insurable Risk?: Swiss Re and Atomic Reactor Insurance." In *Managing Risk in Reinsurance: From City Fires to Global Warming*, pp. 230-247. Oxford University Press, 2016.

Downer 2011

Downer, John. "'737-Cabriolet': The Limits of Knowledge and the Sociology of Inevitable Failure." *American Journal of Sociology* 117, no. 3 (2011): 725-762.

Endo 2013

Endo, Noriko. *Genshiryoku songaibaisho sendo no kenkyu: Tokyo Denryoku Fukushima Genpatsu jiko kara no kosatsu / A Study of Nuclear Power Damage Compensation Schemes: Considerations from the Tokyo Electric Power Corporation Fukushima Power Plant Accident*. Tokyo: Iwanami-shoten, 2013.

Feldman 2015

Feldman, Eric A. "Compensating the Victims of Japan's 3-11 Fukushima Disaster." *Asian-Pacific Law & Policy, Journal* 16 (2015): 127-158.

Gerasimova 2002

Gerasimova, N.V. "Results and Tasks of the Implementation of Federal Target Programs Aimed at Overcoming the Consequences of Radiation Accidents and Catastrophes in the Russian Federation." In *Proceedings of the Conference RADLEG 2000: International Conference on Radiation Legacy of the 20th Century: Environmental Restoration*. AEA-TECDOC-1280, Vienna: IAEA, 2002.

Gill 2013

Gill, Tom, Brigitte Steger, and David H. Slater, eds. *Japan Copes with Calamity: Ethnographies of the Earthquake, Tsunami and Nuclear Disasters of March 2011*. Oxford: Peter Lang, 2013.

Gotchy 1979

Gotchy, R. L., and R. J. Bores. *The Public Whole Body Counting Program Following the Three Mile Island Accident. Technical report, April-September 1979*. No. NUREG-0636. Nuclear Regulatory Commission, 1980.

Gourley 1985

Gourley, Donald, Chub Wilcox, and Joseph Marrone. "The Nuclear Liability Claims Experience of the Nuclear Insurance Pools: Report to American Nuclear Insurers and Mutual Atomic Energy Liability Underwriters." In *The Price-Anderson Law: Reports on Price-Anderson Issues*. American Nuclear Insurers and Mutual Atomic Energy Liability Underwriters, 1985.

Green 2016

Green, W. Nathan and Ian G. Baird. "Capitalizing on Compensation: Hydropower Resettlement and the Commodification and Decommodification of Nature-Society Relations in Southern Lao." *Annals of the American Association of Geographers* 106, no. 4 (2016): 853-873.

Hecht 2012

Hecht, Gabrielle. *Being Nuclear: Africans and the Global Uranium Trade*. Cambridge, MA: MIT Press, 2012.

Heffron 2016

Heffron, Raphael J., Stephen F. Ashley, and William J. Nuttall. "The Global Nuclear Liability Regime Post Fukushima Daiichi." *Progress in Nuclear Energy* 90 (2016): 1-10. <https://doi.org/10.1016/j.pnucene.2016.02.019>.

Hewlett 1989

Hewlett, Richard G., and Jack M. Holl. *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission*. Berkeley, CA: University of California Press, 1989.

IAEA

"International Atomic Energy Agency Information Series." International Atomic Energy Agency. Division of Public Information, 08-26941/E. <https://www.iaea.org/sites/default/files/ines.pdf>.

IAEAb

International Atomic Energy Agency. *The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage—Explanatory Texts*. Vienna: IAEA, 2007.

Ioirysh 1987

Ioirysh, Abram I., Vladimir F. Petrovskii, and Andranik M. Petros'iants, eds., *Mezhdunarodnoe atomnoe pravo International Nuclear Law*. Moscow: Nauka, 1987.

Irwin 2006

Irwin, Alan. "The Politics of Talk: Coming to Terms with the 'New' Scientific Governance." *Social Studies of Science* 36, no. 2 (2006): 299-320.

Kerr 2014

Kerr, Paul K, Holt, Mark, and Nikitin, Mary Beth. *Nuclear Energy Cooperation with Foreign Countries: Issues for Congress*. Washington, D.C.: Congressional Research Service, 2014.

Khlestova 2015

Khlestova, Irina O. "International Legal Regulation of Nuclear Liability / Mezhdunarodno-pravovoe regulirovanie otvetstvennosti za iadernyi ushcherb." *Zhurnal rossiiskogo prava* 1 (2015): 127-139.

Koga 2013

Koga, Yukiko. "Accounting for Silence: Inheritance, Debt, and the Moral Economy of Legal Redress in China and Japan." *American Ethnologist* 40, no. 3 (2013): 494-507.

Kornienko 2017

Kornienko, V. T., E. A. Bragina. *Osnovy iadernogo prava Rossii. *Uchebno-metodicheskoe posobie (Fundamentals of Nuclear Law in Russia)*. Volgograd: Lambert Academic Publishing, 2017.

Kozheurov 2014

Kozheurov, Ya. C. "From Hiroshima to Fukushima: International Legal Aspects of the State's Practice of Compensation for Nuclear Damage." *Russian Juridical Journal / Rossiiskii iuridicheskii zhurnal* 97, 5 (2014): 89-109.

Krige 2006

Krige, John. "Atoms for Peace, Scientific Internationalism, and Scientific Intelligence." *Osiris* 21, no. 1 (2006): 161-81. <https://doi.org/10.1086/507140>.

Kuchinskaya 2014

Kuchinskaya, Olga. *The Politics of Invisibility: Public Knowledge about Radiation Health Effects after Chernobyl*. Cambridge, MA: MIT Press, 2014.

Kumori 2019

Kumori, Atsushi. "Think Tank Puts Cost to Address Nuke Disaster up to 81 Trillion Yen." *Asahi Shinbun*, March 19, 2019.

Kurokawa 2012

Kurokawa, Kiyoshi, Katsuhiko Ishibashi, Kenzo Oshima, Hisako Sakiyama, Masafumi Sakurai, Koichi Tanaka, Mitsuhiko Tanaka, Shuya Nomura, Reiko Hachisuka, and Yoshinori Yokoyama. *The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission*. The National Diet of Japan, 2012.

Laurent 2011

Laurent, Brice. "Technologies of Democracy: Experiments and Demonstrations." *Science and Engineering Ethics* 17, no. 4 (2011): 649-666.

Lebedeva 2014

Lebedeva, Iuliia V. "O Proekte Federal'nogo Zakona Rossiiskoi Federatsii 'O Grazhdansko-Pravovoi Otvetstvennosti Za Prichinenie Iadernogo Vreda i Ee Finansovom Obespechenii.'" *Atomnaia energiya*, April 29, 2014. <http://www.atomic-energy.ru/articles/2014/04/21/48320>

Lerner 2013

Lerner, Ken, and Edward Tanzman. "Making Victims Whole: Compensation of Nuclear Incident Victims in Japan and the United States." *NYU Journal of Legislation & Public Policy* 17 (2013): 543.

Lezaun 2017

Lezaun, Javier, Noortje Marres, and Manuel Tironi. "Experiments in Participation." In Ulrike Felt, Rayvon Fouché, Clark A. Miller, and Lauren Smith-Doerr (eds). *The Handbook of Science and Technology Studies*. 4th edition. Pp. 195-221. Cambridge, MA, MIT Press, 2017.

WNA 2018

"Liability for Nuclear Damage." World Nuclear Association, 2018. <http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/liability-for-nuclear-damage.aspx>.

Lindee 2016

Lindee, Susan. "Survivors and scientists: Hiroshima, Fukushima, and the Radiation Effects Research Foundation, 1975–2014." *Social Studies of Science* 46, no. 2 (2016): 184-209.

Lochbaum 2014

Lochbaum, David, Edwin Lyman, Susan Q. Stranahan and the Union of Concerned Scientists. *Fukushima: The Story of a Nuclear Disaster*. New York: New Press, 2014.

Mayer 2015

Mayer, Brian, Katrina Running, and Kelly Bergstrand. "Compensation and Community Corrosion: Perceived Inequalities, Social Comparisons, and Competition Following the 'Deepwater Horizon' Oil Spill." *Sociological Forum* 30, no. 2 (2015): 369-390.

Mazuzan 1985

Mazuzan, George T., and J. Samuel Walker. *Controlling the Atom: The Beginnings of Nuclear Regulation, 1946-1962*. Berkeley, CA: University of California Press, 1985.

McClure 1968

McClure, Richard D. "A review of Nuclear Energy Insurance." In *Proceedings of the Casualty Actuarial Society* 55, pp. 255-94. 1968.

Miller 2011

Miller, Charles, Amy Cubbage, Daniel Dorman, Jack Grobe, Gary Holahan, and Nathan Sanfilippo. *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*. Nuclear Regulatory Commission, 2011.

Mitchell forthcoming

Mitchell, M. X. "The Cosmology of Evidence: Suffering, Science, and Biological Witness after Three Mile Island." *Journal of the History of Biology*, forthcoming.

Miyazaki 2014

Miyazaki, Hirokazu. "Saving TEPCO: Debt, Credit and the 'End' of Finance in Post-Fukushima Japan." In *Corporations and Citizenship*, edited by Greg Urban, 127–40. Philadelphia: University of Pennsylvania Press, 2014.

Morita 2013

Morita, Atsuro, and Shuhei Kimura. "Environmental Infrastructures of Emergency: The Formation of a Civic Radiation Monitoring Map during the Fukushima Disaster." In *Nuclear Disaster at Fukushima Daiichi: Social, Political and Environmental Issues*, edited by Richard Hindmarsh, 78–96. New York: Routledge, 2013.

Nomura 2012

Nomura, Toyohiro, Taro Hokugo, and Chihiro Takenaka. "Japan's Nuclear Liability System." In *Japan's Compensation System for Nuclear Damage: As Related to the TEPCO Fukushima Daiichi Nuclear Accident*, 15-28. Paris: OECD Nuclear Emergency Agency, 2012.

NRC 2018b

Nuclear Regulatory Commission, "Backgrounder on Nuclear Insurance and Disaster Relief." January 2018. <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/nuclear-insurance.html>.

Obayashi 2016

Obayashi, Yuka, and Kentaro Hamada. "Japan Nearly Doubles Fukushima Disaster-Related Costs to \$188 Billion." *Reuters*, December 8, 2016.

Oshima 2011

Oshima, Kenji. *Genpatsu no kosuto: Enerugi tenkan eno shiten \ The Costs of Nuclear Energy: A Perspective on Energy Shift*. Tokyo: Iwanami-shoten, 2011.

Osif 2004

Osif, Bonnie A., Anthony John Baratta, and Thomas W. Conkling. *TMI 25 Years Later: The Three Mile Island Nuclear Power Plant Accident and its Impact*. College Park: Penn State University Press, 2004.

Pelzer 2007

Pelzer, Norbert. "The NEA Nuclear Law Committee." Presentation, 50th Anniversary of the Nuclear Law Committee, the Colloquium on the Past, Present and Future of the Nuclear Law Committee, Paris, France, February 6, 2007.

Penney 2012

Penney, Matthew. "Nuclear Nationalism and Fukushima." *The Asia-Pacific Journal* 10, no. 11 (March 5, 2012): 1-23.

Perrow 1990

Perrow, Charles. *Normal Accidents: Living with High-Risk Technologies*. Princeton: Princeton University Press, 1990 [1984].

Petryna 2013

Petryna, Adriana. *Life Exposed: Biological Citizens after Chernobyl*. Princeton, NJ: Princeton University Press, 2013.

Prial 1982

Prial, Frank J. "Civil Trial on Blame for Accident at Three Mile Island Opens Today." *New York Times*, November 1, 1982.

Reed 1989

Reed, Susan, and Melissa Herman. "Ten Years Later, Nuclear Ghosts Still Haunt Three Mile Island." *People*, April 3, 1989.

Riles 2013

Riles, Annelise. "Market Collaboration: Finance, Culture, and Ethnography after Neoliberalism." *American Anthropologist* 115, no. 4 (2013): 555-69.

Rockett 1988

Rockett, Laurie R. *Financial Protections Against Nuclear Hazards*. New York: Columbia University Legislative Drafting Fund, 1988.

Samson 1983

Samson, Peter J. "General Public Utilities Corp. Thursday Agreed to Payout." *UPI News*, April 7, 1983.

Samuels 2013

Samuels, Richard J. *3.11: Disaster and Change in Japan*. Ithaca, NY: Cornell University Press, 2013.

Schmid 2015

Schmid, Sonja D. *Producing Power: the Pre-Chernobyl History of the Soviet Nuclear Industry*. Cambridge, MA: MIT Press, 2015.

Schwartz 2006

Julia A. Schwartz, "International Third-Party Liability Law: The Response to Chernobyl," in the Joint Report by the OECD, NEA, and IAEA, *International Nuclear Law in the Post-Chernobyl Period* (Paris: OECD, 2006)

Smith 2013

Smith, Tyson R. "The Price-Anderson Act and the Three Mile Island Accident." *Organization of Economic Cooperation and Development Conference on Nuclear Damages, Liability Issues, and Compensation Schemes*, 2013.

Stason 1959

Stason, E. Blythe, Samuel D. Estep, and William J. Pierce. *Atoms and the Law*. Ann Arbor: University of Michigan Law School, 1959.

Stoiber 2010

Stoiber, Carlton, Abdelmadjid Cherf, Wolfarm Tonhauser, and Maria de Lourdes Vez Carmona. *Handbook on Nuclear Law: Implementing Legislation*. Vienna: International Atomic Energy Agency, 2010.

Szasz 1970

Szasz, Paul C. *The Law and Practices of the International Atomic Energy Agency*. Vienna: IAEA, 1970.

Thomas 1958

Thomas, DeRoy C. "Can We Insure Against Liability from Nuclear Incidents?" *California Law Review* 46, no. 1 (1958): 14–21. <https://doi.org/10.2307/3478395>

Walker 1992

Walker, J. Samuel., and George T. Mazuzan. *Containing the Atom: Nuclear Regulation in a Changing Environment, 1963-1971*. Berkeley, CA: University of California Press, 1992.

Walker 2004

Walker, J. Samuel. *Three Mile Island: A Nuclear Crisis in Historical Perspective*. Berkeley, CA: University of California Press, 2004.

Walsh 1988

Walsh, Edward J. *Democracy in the Shadows: Citizen Mobilization in the Wake of the Accident at Three Mile Island*. New York: Greenwood Press, 1988.

Yaroshinskaya 1996

Yaroshinskaya, Alla, ed. *Iadernaia entsiklopediia*. Moscow: Blagotvoritel'nyi fond Yaroshinskoi, 1996.

Zaretsky 2018

Zaretsky, Natasha. *Radiation Nation: Three Mile Island and the Political Transformation of the 1970s*. New York: Columbia University Press, 2018.

Zgersky 1998

Zgersky, Milan. "Legal Regime of the Chernobyl Problems in the USSR, Belarus, Russia and the Ukraine." In *Research Activities about the Radiological Consequences of the Chernobyl NPS Accident and Social Activities to Assist the Sufferers by the Accident*, edited by T. Imanaka, 266-270. Kyoto, Japan: Kyoto University Research Reactor Institute, KUR-KR-21 1998.

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Sonja Schmid is an associate professor of Science and Technology Studies (STS), and serves as the co-director of the STS graduate program in Northern Virginia. For her first book, she studied the history and organization of the emerging Soviet nuclear industry. In other research, she traced the results of Soviet nuclear technology transfer to Central and East European nations that have since joined the European Union. She is particularly interested in examining the interface of national energy policies, technological choices, and nonproliferation concerns. For her most recent NSF-supported research project on the challenges of globalizing nuclear emergency response, she has worked with postdoctoral scholars Davide Orsini and Başak Saraç Lesavre, and has hosted a monthly speaker series (SIREN) that is now available as an online archive. She teaches courses in social studies of technology, science and technology policy, socio-cultural studies of risk, energy policy, and nuclear nonproliferation. Together with the Nuclear Engineering Program and the School of Public and International Affairs at Virginia Tech, she developed and launched an interdisciplinary graduate certificate in "Nuclear Science, Technology, and Policy".

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