

# Encounters with Nuclear Space and Time

N. A. J. Taylor

## Grappling with the enormity of nuclear harm

### I

On 11 March 2011—as I was preparing to enter graduate school—a 9.0-magnitude earthquake and resultant tsunami caused a full meltdown of the Fukushima Daiichi nuclear power plant located on the island of Honshu, on the east coast of Japan. Within days the Vienna-based international organisation tasked with verifying the proposed moratorium on nuclear-weapons testing—the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization—issued a series of six technical briefings to its then 182 member states that detailed the nature and extent of the plant’s radioactive emissions. Interestingly, this was despite the detection of radionuclide releases from civilian nuclear reactors being outside its terms of reference. The CTBTO’s mandate was, after all, exclusively nuclear weapons—related. At the time, the CTBTO’s ‘international monitoring system’ had around thirty-five active radionuclide stations that were able to detect radioactive particles and noble gases at levels a billion times lower than those that are harmful to humans. Working in tandem with the radionuclide stations was the CTBTO’s network of seismic, hydroacoustic and infrasound sensors. The verification regime is designed such that any significant event on the planet—not to mention the troika of earthquake, tsunami and nuclear meltdown, as occurred at Fukushima—would be detected in one or more constituent parts of Earth’s biosphere, in real time.

The first radionuclide station to detect the hazardous plume from Fukushima was around 200 kilometres away, at Takasaki in central Japan. The second and third CTBTO stations—based in eastern Russia and on the west coast of the United States—detected the presence of radioactive nuclides in the atmosphere a mere two days later. It took a further seven days for the radioactive cloud to cross North America and by day 15 an Icelandic station confirmed that it had reached Europe—thereby indicating that a radioactive belt had travelled almost around the entire globe. By 13 April 2011—some four weeks after the earthquake had struck Fukushima—the radioactive plume, which thus far had only been detected above the equator, entered the southern

hemisphere. By this stage, more than 1600 data points detailing higher than usual levels of radioactive isotopes had been detected by the CTBTO’s network of sensors.

The CTBTO data has been deemed so valuable that the United Nations Secretary-General requested greater interagency cooperation between the International Atomic Energy Agency (IAEA), the World Meteorological Organization and the World Health Organization, among others. Such capabilities led to the CTBTO trumpeting these Fukushima communiqués as a significant ‘stress test’ for an international monitoring system. Indeed, the CTBTO’s verification regime is so powerful that ‘[a] rooftop detector at the CTBTO’s headquarters in Vienna still catches traces of emissions from the 1986 Chernobyl disaster’. These novel non-nuclear weapon applications of the CTBTO’s verification regime meant that by the time of North Korea’s subsequent nuclear-weapons tests in 2013 the CTBTO was in a position to deliver detailed reports of its findings within twenty-four hours, with greater accuracy and confidence than it had done for North Korea’s tests conducted in 2006 and 2009.

For a significant period of my doctoral training the CTBTO’s ecological attunement illuminated what humanity’s intervention on the biosphere on a planetary scale looked like. Although this explanatory power of Fukushima was to stay with me, it took two further encounters with the problem of nuclear harm to appreciate how I might have to empirically, conceptually and normatively reimagine it.

### II

On 22 October 2015, I went to that place that you should never go.

Located 420 metres below the Earth’s surface and accessible only by navigating through more than 5 kilometres of tunnels, Onkalo is the world’s first deep geological nuclear-waste repository. Hewn into bedrock at 61°14’08.02"N 21°28’58.69"E on Finland’s southwestern coast, the facility is intended to isolate high-level radioactive material from people and the Earth’s biosphere for the next 100,000 years. The nuclear barons refer to this as ‘final disposal’, although it is perhaps more accurately described as deferral, since we have no way of being certain that Onkalo will remain effective for even a fraction of that time span.

To enter Onkalo is therefore to venture into the far future. My experience there prompted me to reflect

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One of the works from the **Nuclear Deferral** series, printed on archival paper. Image: N. A. J. Taylor.

upon the encounter between humanity and ecology and to view its documentation as future cultural heritage. However, since radioactivity is a form of energy for which people have no sense—you cannot see it, hear it, smell it or feel it—I found myself taking two sideways glances. For this I picked up my camera to visualise nuclear harm rather than merely continue to write about it. This impulse is to be expected, for as John O’Brian has stated: ‘Wherever nuclear events occur, photographers are present. They are there not only to record what happens, but also to assist in the production of what happens?’

The first series of images catalogues select human artefacts and other details—such as plastic pipes, painted

**What responsibilities follow from bringing down to Earth the nuclear processes of stars?**

walls, drilled test holes, and mosses that will be inadvertently entombed along with Finland’s radioactive material. The medium selected to do so is stoneware ceramic fired at 1200°C to withstand a 5-kilometre ice shield, as well as other radiation, magnetic and chemical interferences. Original copies of the tablets on display have been deposited into chambers measuring 5 by 5 by 3 metres that are nestled deep inside salt deposits dating back more than forty million years. The facility, known as the Memory of Mankind and located at 47°33’19.82”N 13°38’43.74”E in Hallstatt, Austria, has been purpose built within saliferous (i.e. flowing) rock that will have wholly encased the works by 2050, with no foreseeable imbrication (i.e. overlapping) points. The stoneware medium and salt-storage method promise to preserve the images for at least 10,000 years.

The second series has been printed and exhibited with bare photographic archival materials that are known to fade and decay in a mere one hundred years. This is deliberate, for the images chase a string of green lights that are designed to lure us towards a refuge chamber to be used only in the event of an emergency. It is such details that remind us that Onkalo is a gravely dangerous place, in which even now we do not truly belong. These are, however, temporary measures and impermanent installations that will be removed when Onkalo is entombed sometime in the next century. No intruder after this date will find refuge there.



The facade of Hanford's B Reactor. Image: N. A. J. Taylor.

Several hours after I had resurfaced, although the stars could not have feasibly changed, I saw each differently. What responsibilities follow from bringing down to Earth the nuclear processes of stars? Do I—and you—through either our actions or our apathy share in the responsibility for future nuclear harms?

For my reader, all of this is perhaps sobering thinking—as it is for me. Yet from this encounter with the deep nuclear future I came to more closely *feel* not only the spatial but also the temporal enormity of nuclear harms.

### III

Almost exactly a year later, in October 2016, I was invited to design and deliver a course in the emerging interdisciplinary subfield of the nuclear humanities to students at a prestigious liberal-arts college in the United States. As part of the second day of the course I asked the students to *visualise* nuclear harm—prompting them to consider what it *looks* and *feels* like—in the form of a jigsaw exercise performed on their own and in smaller groups before they reconvened to present the visualisations each group had settled on with the entire class.

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Specifically, I asked students to select two images that best depicted ‘the (il)logic[ality] of nuclear deterrence’ and ‘how nuclear harms violate bodies and/or biospheres’, in addition to three images that illustrate ‘what nuclear pain, suffering and vulnerability looks and/or feels like’. When the class reconvened, each of the groups reported having encountered archival photographic images of atomic survivors—or *hibakusha*—of the nuclear attacks on Hiroshima and Nagasaki. These sorts of images confronted an underlying ‘humanity’, or concern for others, many seemed to say. Although, more interestingly still, most of the smaller groups decided that it was not

appropriate to share these images, even within class, to other students whom they might reasonably expect had seen the images themselves.

When I probed for reasons as to why, each group’s spokesperson—and also various other individuals—expressed a responsibility for the attacks, either as Americans or as human beings, and some felt quite strongly that this burden extended to (re)distributing the images alone. Instead, some groups decided to eschew mimetic representations of the nuclear attacks that graphically depicted human suffering and instead selected artworks, comics or scenes from manga and anime that in some way stood in for the pain, suffering and vulnerability of the *hibakusha* (e.g. Group F). Others averted their gaze altogether from depictions of human suffering and instead looked towards the destruction of the built environment, most notably the A-Bomb Dome—or Prefectural Industrial Promotion Hall—that stands in the Hiroshima Peace Memorial Park today as a marker of human folly and a call for a future peace that we are yet to realise (e.g. Group A).

In response to the presentations, a debate between students ensued about whether the presence or absence of a human being made any difference to what nuclear harm looks and feels like—just as my string of questions had intended for them to do. Without any of the students expressly acknowledging it, what was at stake appeared to be not merely a battle over the appropriate emotional response, or the limits of responsibility, but a philosophical puzzle concerning the moral status of—and human solidarity with—nonhuman beings and things. As the class adjourned for lunch and the chatter continued down the hall, I reflected upon how unexpectedly effective this experiential and discovery-based pedagogical exercise had been for reaching people with very little nuclear knowledge of any kind. Through visualising nuclear harms my students had grasped how vexing the task of adding

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ecology to the problem of nuclear harm could be.

It was not until the next day, however, as I led a small number of the students on a field trip to Hanford—which produced the plutonium for the Trinity nuclear-weapons test and the Nagasaki device—in the very early hours of the morning that I realised how formative this encounter had been for them, too. As we critically evaluated the ways in which the Manhattan Project was memorialised and commemorated by the government-sponsored tour guides, one of the students remarked that there was surprisingly also ‘very little to see, but everything to feel’.

Within days I was travelling interstate with two colleagues—my sponsor, Shampa Biswas, and my long-time collaborator Stefanie Fishel—to the annual open day of the Trinity nuclear-test site at Alamogordo, New Mexico. The car trip enlivened the literature I had been reading, as did the opportunity to visit what many were only just beginning to consider the birthplace—or marker—of the Anthropocene.

Located at White Sands Missile Range, a 3200-square-mile military facility deep in the New Mexico desert, the site is, to paraphrase Joseph Masco, uncannily nuclear. Without such knowledges, as that student had remarked a few days before, one would not sense a thing. As we waited to enter the facility in our car we joked about publishing a co-authored piece on our fieldwork as a piece of narrative nuclear politics. We discussed the possibility—and the need—to evaluate what actually experiencing the commemoration and memorialisation of the Manhattan Project for the first time might mean for the production of nuclear knowledges, but also whether the encounter had any bearing on our understanding of the nuclear Anthropocene. After all, the Trinity test was so called, Carol Cohn reminds us, because it symbolises ‘the unity of the Father, the Son, and the Holy Spirit—the male forces of Creation’.

Although that piece lies dormant in sketch form, it is clear that we each saw and felt differently. For me, the remarkable and unexpected realisation was that the claims to expertise were mediated through technology—still and motion cameras, as well as Geiger counters. Indeed, Fishel and Biswas seemingly experienced an altogether



The road to the Trinity site, where the world’s first nuclear-weapon test occurred on 16 July 1945. Image: N. A. J. Taylor.

different Trinity. Fishel directed my gaze to how gendered and racialised the site was, wherein predominantly white men speak (from mostly potted histories) and women listen (to a man’s highly contestable expertise). For Biswas, the trip only confirmed the colonial order to the nuclear age that she had pointed to in her book *Nuclear Desire*.

Thinking towards our book project under advance contract with Routledge on the nuclear Anthropocene, Fishel and I quickly became preoccupied with the encounter between humanity and ecology that continues to take place at the Trinity site. Despite our common goal, here too our perspectives violently differed: whereas Fishel began documenting signs of struggle and other entanglements within the site’s bounds, such as where mammals had burrowed



The obelisk marking the Trinity nuclear-test site. In the background are people pressed against the perimeter of the facility in order to read small boards with the official historical narrative. Image: N. A. J. Taylor.

their way inside, my mind drifted beyond the bounds of the site itself towards the mountain peaks and national parks that surround the facility. That is, whereas Fishel asked how the National Park Service would manage the (re)emergence of life within the chainlink fence, I wondered how the adjacent sites of conservation and refuge, established prior to the nuclear age, had been changed by the event. Through her post-colonial stance, Biswas gently reminded us—though never explicitly—that while we each sought to break out of the human frame of our intellectual traditions, we were ultimately caged by our own whiteness.

Several hours later, having seen relatively little but beginning to talk about feeling a lot, we made our way to our car and left.



I offer these three vignettes—or encounters—with various aspects of the problem of nuclear harms because each in its own way explicates not only the spatial and temporal enormity of those harms but also how ‘unimaginable’ people commonly deem them to be. Through this narrative of nuclear politics, it has emerged that in the post–Cold War period if people are not ignorant of the nuclear danger then they are likely to be apathetic about its continued threat. Tens of thousands—sometimes millions—of people protest against oppressive regimes, the G20 and climate change. However, seldom in recent memory have such numbers marched for the abolition of nuclear weapons or the cessation of the civilian application of nuclear technology. These people need activating to bring about the requisite change and those already alert to the problem of nuclear harm must continually reimagine what it *looks* and *feels* like to draw them in. This, I would argue, is the broader goal of the emerging interdisciplinary subfield of the nuclear humanities. Despite this, those who have obtained a

certain nuclear knowledge have done so almost exclusively in human-centred terms, and the nuclear-disarmament campaigns—whatever their recent successes—are becoming increasingly concerned with speaking in private to policymakers rather than listening to the clamour of the crowd that they might have otherwise assembled. In this way, nuclear technology is both an industry and an archaeology of a very particular kind. 

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Lonely Witness

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