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CLEANING UP AND MOVING ON: KAZAKHSTAN'S 'NUCLEAR RENAISSANCE'

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How do we square persistent nuclear pasts with what appears to be a radiant atomic future? How has Kazakhstan apparently disentangled itself from a Cold War legacy of contaminated land and radiation-related pathologies to move on? Cleaning up, after all, can indicate both remediation of contamination – and simply cashing in. Is the reconfiguration of the relationship between town and test site, 'just' another example of a post-industrial town re-inventing itself and, literally in this case, putting itself on the map – or is there something specific or exceptional about nuclear work, legacies, townships and people? As I explore here, there are sometimes insurmountable tensions in the state-building exercises of securing both a particular version of the nuclear past on Kazakh land, and nuclear futures as a distinctively Kazakh enterprise. These in turn affect the ability of the town of Kurchatov to reconfigure its relationship with the Semipalatinsk polygon and move forwards.

Keywords: *nuclear weapon, Semipalatinsk Test Site, Kurchatov town, ecological disaster, disarmament, social infrastructure.*

Introduction

In 1949, the Soviet Union detonated its first atomic bomb in a huge area of the north eastern Kazakh steppe, which had been selected for nuclear tests. By the time testing stopped in 1991, there had been approximately 456 explosions above and below ground; from the late 1960s, the Semipalatinsk Test Site (STS[1]) also hosted a civil nuclear research programme. In the midst of the exceptionally harsh winter of 1993/4, the Soviet-turned-Russian army left the small nearby town that housed the people and their families who worked on the site. These were frightening times for those left behind. As the infrastructure buckled in the extreme cold with no skilled maintenance at hand, the population was painfully aware that, with the single purpose of their isolated town gone, it was as likely to crumble into ruins as neighbouring military garrisons had done, and similarly marooned one-company towns across former Soviet space were to do over the next decade. At this crucial moment, Nazarbaev, Kazakhstan's president arrived and, in a much-quoted speech, said, 'Hey guys, don't leave! Kazakhstan needs your skills! We will build the National Nuclear Centre here.'

Twenty-five years later it seems as though Nazarbaev's boldness was justified. Kazakhstan, a phenomenally resource-rich country, has 12% of the world's uranium reserves and became the world's largest producer of uranium in 2009, its output increasing year-on-year to a 48% global share in 2019 (World Nuclear Association, 2020). In May 2014, Russia and Kazakhstan signed a cooperation agreement to build a reactor for nuclear energy generation on the STS (World Nuclear News, 2014) and, in 2019, the IAEA took delivery of a shipment of low-enriched uranium at a purpose-built facility, operated by the Ulba Metallurgical Plant in Oskamen, north east Kazakhstan (IAEA, 2019). The clearest statements about Kazakhstan's nuclear ambitions appeared in a 2011 government publication. Here, beside setting out ambitions to host a global fuel bank, the then Director of the National Nuclear Centre (NNC) wrote about becoming a new nuclear power (Kadyrzhanov, 2011: 99-101); the then Energy Minister discussed Kazakhstan as a nuclear leader (Shkolnik 2011: 102-5), while the IAEA hailed Kazakhstan for heading 'the nuclear renaissance' (Bennett, 2011: 112-6). The growth of local nuclear industries was also itemized (Gardner, 2010:118-21; Yeskarayev, 2011:120-30). The publication similarly outlined Kazakhstan's leading role in developing peaceful nuclear energy, something on which Nazarbaev had long based his legitimacy (Werner and Purvis Roberts, 2006; 2007; 2013).

[1] The test site where experimental detonations took place alongside research using experimental reactors, nuclear waste storage facilities and other tests, is referred to by the National Nuclear Centre as the STS (Semipalatinsk Test Site). I use this acronym here. Locally it is also called 'the polygon' or *opytnoye polye* (experimental field).

How do we square persistent nuclear pasts with what appears to be a radiant atomic future? How has Kazakhstan apparently disentangled itself from a Cold War legacy of contaminated land and radiation-related pathologies to move on? Cleaning up, after all, can indicate both remediation of contamination – and simply cashing in. Is the reconfiguration of the relationship between town and test site, 'just' another example of a post-industrial town re-inventing itself and, literally in this case, putting itself on the map – or is there something specific or exceptional about nuclear work, legacies, townships and people? As I explore here, there are sometimes insurmountable tensions in the state-building exercises of securing both a particular version of the nuclear past on Kazakh land, and nuclear futures as a distinctively Kazakh enterprise. These in turn affect the ability of the town to reconfigure its relationship with the STS and move forwards (Alexander, 2020).

Arguably, these questions are particularly poignant in the case of Kazakhstan. The key difference between Kazakhstan and other Cold War nuclear test sites is that the political entity that carried out these detonations no longer exists. In other cases, demands for contamination remediation or compensation can theoretically be directed towards the same sovereign nuclear power, although success is notoriously limited (Johnson, 2007). The Soviet geopolitical break shadows Kazakhstan's nuclear futures in other ways. The Soviet plutonium economy, to borrow Masco's (2006) phrase, was sliced up by new national borders after 1991. The institutes and factories where people were trained, built engines and bombs, produced plutonium, devised protocols and analysed the results were all in Russia (Holloway, 1994).[2] Thus, while Kazakhstan's nuclear futures are largely based on the presence of Soviet-era experimental reactors (on the STS and in Almaty's Institute of Nuclear Physics), they are also linked to the Soviet network that allowed them to function.

I suggest that an integral part of the process of moving on has been an emphasis, albeit contested, on a particular way of knowing the STS. Much of the debate over what to do with the site is grounded on different claims on how it can be known—and what those claims enable.

At both the STS and the adjacent town, Kurchatov, which houses employees and their families, we find a double slipperiness, a multiplicity of names for things and things that are themselves unstable, mobile, shape shifting in several senses: radioactive isotopes decay, change form and effect, travel across vectors at varying speeds; hydrogeological vectors are themselves mutable; bricks and metal are scavenged from constructions, rumour says to be sold elsewhere; winds whirl across the steppe; people move in and out of the little town, emigrants taking with them skills, experience and knowledge. Moving on demands at least an appearance of fixity in order to enable the sense that some thing has been contained and left behind, or selectively carried forward. But keeping things in place and creating orderly narratives is difficult work. It is these attempts to hold and moor the flightiness of the STS and bring it into the service of the future that is the theme of this paper.

In the remaining sections, I first return to the opening with a fuller account of the STS and Kurchatov showing how hard it is to pin down commonly agreed points; even where certain things can theoretically be objectively described, measurements fall short in conveying the full affect of an event or object and there is endless recourse to analogy or evocation. The next section briefly illustrates the tradition, largely a product of Cold War secrecy, of deliberately naming things and activities to deflect attention away; things thus have multiple concurrent names, some official, others, an affectionate series of nicknames domesticating places and work. I then discuss the essential instability of Kurchatov, its citizens and the STS, before describing two different approaches to making knowledge claims about the STS: one resting on assumptions of containment, the other on openness. The entailments of each differ sharply.

I have drawn on two periods of fieldwork in 2007 and 2009 in Kurchatov together with a range of interviews in Semipalatinsk and Almaty with former residents and NNC employees, including extensive talks with a retired mayor of Kurchatov. The NNC's Institute of Radioecology and Safety (IRES) kindly showed me round the town, IRES laboratories, museum and STS, and explained their monitoring and remediation work. While there are no formal archives about the town in Kazakhstan, I used documents in Kurchatov's public library. I remained in touch with my neighbours there which helped to bring this up to date.

[2] Uranium mines were more broadly scattered across Soviet space.

Uncertain facts

My informants in the town were keen to tell me that over 350 books (Balmukhanov et al, 2002 and Boztaev, 1997 being the best known in Kazakhstan) had been written on the Soviet nuclear programme already. Few or none, however, described the people who had lived and worked in Kurchatov other than the fleetingly visiting stars of Soviet nuclear physics: Kurchatov, Khariton, Beria and Sakharov. There is scarcely any mention of the town in these accounts and, when it is mentioned, residents often deride the narrative's accuracy. Drawing out an uncontested background to the establishment and functioning of the polygon and town was less straightforward than I had anticipated: there were hesitancies over numbers and both figures and places were often evoked through analogies or other means as though simple quantification were not enough. This essential uncertainty characterized much of my fieldwork. Enumerating global detonations as a context, let alone quantifying their consequences indicates the uncertainty of such calculations.

Between 1945 and 1998, there were 2053 nuclear explosions worldwide,[3] excluding the North Korean detonations 2009-13. In total, the US carried out around 1054 tests, the Soviet Union about 715 and other nuclear powers about 114. The numbers do not neatly add up, simply because there is no clear agreement on the number of tests, nor indeed what always constituted a detonation – hence the familiar qualifiers: 'up to' or 'around' often accompanying these numbers. While being wrapped in secrecy, atmospheric tests were also spectacularly visible and easily detectable through fallout. Some failed to work or exploded erratically. How are these counted or their effect measured?

Apart from tests carried out in the Soviet Arctic grounds of Novaya Zemlya, most of the Soviet Union's other tests were carried out in north east Kazakhstan. Identified by Lavrentii Beria in 1947, this test ground is 18,500 square kilometers, sometimes described as being half the size of Belgium (Gudowski, 2001:3), the whole of Belgium (Harrell and Hoffman, 2012:1), or 22,000 kilometers square and the size of Wales (NATO, n.d.).[4]

Reasons given now for choosing this location are multiple and different. Some say Beria claimed the lands were empty, thus echoing a familiar colonial discourse of denying recognition of indigenous peoples by declaring their land empty (see Banner, 2005; Povinelli, 2002), a kind of stasis from which progress, of a carefully prescribed fashion, can occur. One common trope[5] was to describe the establishment of the polygon on the naked steppe (*golaya steppe*). Others speak of deliberate genocide of Kazakhs from the start (Brummell 2011:241) while a spokesman for the NNC suggests that the effects of nuclear tests were simply unknown at the start (Panov and Shalemetov, 2008: 21-22).[6] Property rights aside, land was also chosen for proximity to the TurkSib railway, an airport in Semipalatinsk, the Irtysh for river transport and other parts of the Soviet nuclear complex[7] in the Urals (Sergazina and Balmukhanov, 1999: 13).

In conditions of tremendous hardship, a small garrison was set up, 30km from the STS, which developed into the small town now called Kurchatov (Anon, 2007:4). By the 1950s, this had developed from a few frozen dugouts and tents on the steppe to a sizeable town for officers, civilians and their families abutted by a similar complex for soldiers, each well-equipped with libraries, schools, medical facilities and Palaces of Culture (Akchurin, 2007:49). The precise size of the town is not known. The likeliest number is about 23,000 adults plus children in 1993, just before the army left.[8] Numbers cited, however range from 50,000 (Paxton, 2011; Brummel, 2011: 453) to the more usual 20,000. In common with most nuclear towns in the eastern bloc (Brown, K., 2013; Šliavaitė, 2005; Baločkaitė, 2010) it was

[3] Bergkvist and Ferm, (2000). The Natural Resources Defense Council (NRDC, 1996) suggests 2046 tests 1945-1996 carried out by the US, USSR, UK, France and one test by India. The two sets of numbers do not tie up.

[4] For the record, Belgium is 30,528 km square; Wales is 20,761 km square.

[5] Interview with former mayor of Kurchatov, G.N.Chaikovsky

[6] Less disputed is the establishment of a clinic by the military in 1957 in Semipalatinsk purportedly to study TB, misleadingly named Anti-Brucellosis Dispensary No. 4. This was to study the effects of radioactivity and nuclear tests on local residents without informing them why (Kassenova, 2009).

[7] This vast complex was called the 'white archipelago' (Alsthuler, 1990), referencing the prison labour on which nuclear establishments depended or might be seen as a 'plutonium economy' to borrow Masco's (2006) term for the US nuclear weapons industry.

[8] This figure was given by Chaikovsky on the basis of a referendum in the town in 1993: he said that 6,000 soldiers had voting rights and 17,000 civilians and officers. These figures therefore only include those over 18.

characterised by secrecy, isolation, and the relative luxury in which the constrained residents lived. Isolation was twofold. The location of such towns was usually peripheral, far from other settlements; towns were also ringed by barbed wire and guarded by KGB checkpoints. Not all Soviet closed cities were concerned with nuclear production: other military strategic towns and border towns were also closed. Isolated or 'pioneer' settlements in the further, mineral-rich, reaches of the Soviet east were also often well-provided for and are undergoing similar reintegration problems (Thompson, 2009). The exceptionality of nuclear towns therefore needs to be modified in some respects; the degree to which secrecy and uncertainty continue to shape Kurchatov's future does, however, suggest a lingering exceptionality, despite attempts by the NNC to reframe the town 'simply' as a normal location with an extraordinary scientific legacy and future. In Russian, one word summarises the extent to which a one-company town is shaped by its primary purpose; if previously it was the military testing programme, today, it is the NNC which is described in Kurchatov as *gradoobrazooyutshyeye*: the structure that defines the town.

It is said (IAEA, 1998: 6) that 456[9] tests were carried out on this territory: 116 were atmospheric until the 1963 Limited Test Ban Treaty ended surface explosions, 4 were excavation tests and 336 were underground either in boreholes in the Balapan area or boreholes and tunnels in the Degelen mountains. The total yield or 'commutative power was 17.424 MTNT' (Gudowski, 2001:4), the equivalent 'of about 1000 Hiroshima bombs' (ibid).[10] Again the numbers are approximate. It is difficult to be precise as some tests did not go as planned but the test documentation is largely in Russian military hands or was destroyed. There were accidents,[11] failed detonations, abrupt and unforeseen changes of wind direction; coal seams that caught fire from underground tests and burned for five years (Mustovya, 1992, IRES, 2009). The IAEA (1998) notes details of failed tests are needed to determine fully any residual effects. Only recently have some Russian military test protocols become accessible for Russian, Kazakh and American nuclear scientists to locate and secure remnants of weapon-grade plutonium (Harrell and Hoffman, 2013; Stone, 2003).

Fallout from surface tests contaminated the ground and was also carried further afield by wind, particularly when meteorological predictions of wind direction and speed were inaccurate. Underground testing reduced the risk of airborne fallout but modified the hydrogeology of the area; radioactive gases have also escaped to the surface. The test site also had experimental nuclear reactors used for parallel civil research programmes testing the effects on materials of nuclear fuel at extremely high temperatures and liquid fuel nuclear space rocket engines, thus combining the two icons of the Cold War in one place. The site was also used to test 'dirty bombs' (designed to spread radioactive contamination) (IRES, 2009) and toxic industrial wastes from nearby cities were later buried there (Yedrisov et. al, 2006).

After a highly public campaign (Brown, 1990; Davis, 1993; Schatz, 1999), the STS was closed in 1991, just before Kazakhstan became independent.[12] For two years the army stayed on, then suddenly left in the winter of 1993, along with many of the Russian civilian scientists. It was an intensely bitter winter. The heating plant failed. Many of the empty apartment blocks were ransacked for wood to burn; some residents vaguely blamed hooligans from the villages. The town is still half-ruined, a fact picked up on by

[9] Another IAEA publication (Stegnar and Wrixon, 1998b) lists 'about 460 nuclear weapons tests', including 5 unsuccessful surface tests. This seems to include detonations carried out for peaceful purposes: experimental crating explosions to create lakes, divert river flow etc.

[10] A press release circulated by the IAEA, to commemorate the site's closure, suggested the combined explosive power of tests on the site was 2,500 times that of the bomb dropped on Hiroshima (Permanent Mission of Kazakhstan, 2009).

[11] The main site doctor speaking at the first open conference, suggested that one in three of the underground tests failed to go as planned (Mustovya, 1992)

[12] Between 1989-1991, Kazakhstan's anti nuclear movement, headed by Kazakh poet Olzhas Suleimenov, joined north American anti-nuclear protests in The Nevada-Semipalatinsk campaign. In Kazakhstan, this emphasized the ravaging of Kazakh lands and people by the Russian Soviet army i.e. this was part of the internationalist ecological protest movement of late perestroika (Schatz, 1999) that was picked up later by the newly independent government and given a nationalist slant by the president. This picture of Russian perpetrators and Kazakh victims is misleading. Long-term residents of Kurchatov are largely Russian. Some spoke indignantly that only Kazakh suffering from nuclear detonations has ever been recognised; the remaining 120 nationalities in the region being effectively eclipsed.

the steady stream of national and international journalists. But my neighbours in 2009 observed, 'When people first come here, they only see ruins. But we don't see them any more. This is our home' (Alexander, 2020).

Although military testing was the main purpose of the site, some Soviet civilian activities also took place on the STS. In a curious inversion of what might be expected, these operated, said the lead scientist, under cover of the weapon testing. Indeed there is a 7km square underground complex that houses experimental reactor facilities. After weapon testing stopped, the NNC has largely been attempting to reverse this: foregrounding research and backgrounding weapon tests and their consequences. The arrival of Nazarbaev on site and his highly-publicized decision to keep nuclear strengths going, but with a Kazakh rather than a Russian face, was a vital turning point for the STS and its people – but also presented a critical challenge to address a past that could neither be left nor lived with, a past that insists itself into the present.

Investment in Kurchatov, beyond the NNC, so far has mainly been in the form of a technopark for nuclear-related industries on Kurchatov's outskirts. Since 2009, repairing ruined apartment blocks has been stepped up. One of the more noticeable external changes is the addition of the standard repertoire of Kazakh state and nationalist symbols to Kurchatov's entrance and public areas: a welcome sign written in Kazakh against the national turquoise colour, statues of the Golden Man,[13] a dombra[14]-playing woman, and sundry animals; the last presumably to indicate a Kazakh pastoralist tradition, although residents seem rather bemused by them. In other words, while residents wait in hope for improved infrastructure, attention has been paid to securing the town symbolically as a Kazakh enterprise.

Arguably, reframing the discipline of secrecy that had been so severely inculcated during the Cold War (see Gusterson, 1997 for an account of Livermore's ritualized secrecy) is essential for allowing the shift from one mode to another, from Soviet weapons testing to Kazakh peaceful nuclear research. Masco (2010) suggests that North American 'counterterrorist' securitization since 9/11 has roots in Cold War cultures of secrecy. The NNC and STS's path has not always been entirely expected. After the Russian army left, the resources and organisation required for comprehensive secrecy were simply not there. Scientists outside the NNC I interviewed spoke of easily accessing the STS in the 1990s for research into mutagenesis, health, and radionucleide migration. Entering the town, however, was a different matter; the Kazakh administration kept the guarded entry point until 1997 'to keep out the banditti and hooligans', as the then mayor expressed it. One geobotanist from another Kazakh institute who had worked on the STS since 1994, told me, with peals of laughter, that although initially she was not allowed a map of the site, an American scientist later showed her his, which had every installation accurately marked. Later, she bought a map in a local shop, showed her University Spets[15] who promptly confiscated it and would only allow her to look at in a locked room.

The then IRES Director tried to re-secure the site as far as possible, to the frustration of some scientists located elsewhere in Kazakhstan who complain that the NNC's bureaucracy is so tortuous that it is almost impossible to carry out scientific work. The IRES Director received praise from many residents for focusing on science, caring for young specialists and attempting to communicate developments openly to the media. But scientists I interviewed in the NNC observed that the civil administration, security services and police frequently made their work extremely difficult, creating obstacles and paperwork largely because, 'they still have Soviet heads and don't realize times have changed'. In turn, many residents who did not work within the NNC spoke of it as a 'state within a state'.

Indeed, many inhabitants were so drilled in the culture of secrecy that mystery continued despite attempts by the Director and Deputy Director of the NNC to open up debate and so combat what they call radiophobia: excessive and irrational fears of radioactivity (see also Stawkowski, 2017). A 14-year old boy dolefully told me, with a curious Churchillian echo, that no-one was permitted to see the small museum I had just been wandering around, as it was an 'enigma wrapped in secrecy in great darkness' (Alexander, 2020).

[13] The Golden Man is purportedly a Scythian warrior and Kazakh ancestor and is a popular, ubiquitous, state symbol. Almaty's statue of the golden man is titled 'symbol of independence'.
[14] A dombra is a traditional wooden, stringed instrument like a lute.
[15] Each institution had a Spetsnaz, a KGB cell.

As I go on to discuss, a particular kind of recognition of Kazakhstan's legacy serves to simultaneously acknowledge and erase it. I suggest this follows a longer tradition of secrecy where nuclear installations and objects were deliberately named to deflect attention from *what* they were and *where* they were. The difference between the uncertainty described above and deflective naming is that the use of these names was a shared convention within a community, including families and service workers. The change in how secrecy is managed indicates new ambiguities over who is in, and who out of that community.

Deflections

Kurchatov and the STS were constructed as places that defied conventional methods for knowing. As with other secret atomic installations, they were not on any map and not only had no public name, they had many working names and nicknames alongside several 'official' names intended to deflect attention elsewhere. At the start, the town was simply called Moscow-400. A nearby farm, Moldary, lent its name for a while to the garrison. Some who had arrived via the river Irtysh, called the garrison after the landing stage where they had landed: Nadyerzhda, meaning hope. Others called it Bereg, or shore – again indicating where they had disembarked, a name that is still used. After the railway link to Semipalatinsk was built, it was also called Konechnaya (Terminus). Official code names for parts of the whole complex were letters. Thus the town was Ploshad M (site M).[16] Finally, in 1974, the settlement was given the status of a civil town, rather than a military garrison, and renamed Kurchatov, after Igor Kurchatov, the scientific architect of the Soviet nuclear project. The name Semipalatinsk-21, by which the town was known externally, was simply its postcode, designed to put people off the trail: the city is 150 kilometres away. Secret atomic installations in the Soviet period were typically identified as a postcode of an existing but distant settlement. Later, after the film *Titanic* came out in Russian, passing motorists seeing the tall chimneys of the half-ruined town poke through its winter snow blanket, nicknamed it Titanic.

Departments were also coded: the United Expedition, sometimes more cozily called the Union, (which later became the Institute of Atomic Energy) and the Central Expedition (later to become the Institute of Geophysics). The seismic station was simply Object-905. The department in charge of the nuclear programme was called the Ministry of Middle Machine Construction, Minsredmash.[17] Sagdeev (1994:46) observed in his autobiography that the deliberate banality of the names was so successful that he was initially put off from applying to work in Kurchatov's laboratory, named the Laboratory for Measuring Instruments.[18]

Thus the site lacked geographical co-ordinates. Names referred to other locations and were designed to deflect attention away from the object being named. The multitude of names used concurrently, formal and informal alike, indicating either parts or the whole complex, suggest again the range of ways in which a place can be known in terms of affect, designation, co-ordinates. Just as my neighbours said they no longer saw the ruins that punctuated the town, I also stopped seeing them as I learnt the social geography of the place. But at the same time, older residents would pause on walks through empty places and trace, not just erstwhile buildings, but vanished lives, dances, marches and celebrations on the dusty ground.

Naming an object, however, is one thing. The other is identifying the object to be named.

Knowing the site

Town, people and site all turn out to be unstable, expanding entities, resistant to being kept in place. In the late 1990s,[19] the soldiers' town, next to the town built for officers and civilians, was gradually taken to pieces brick by brick. By 2007, nothing was left but a bare field where once 6,000 soldiers had been housed and provided with a palace of culture, hospital, workshops, canteens and shops.

[16] Each place on the test site was similarly coded (Akchurin, 2007:20).

[17] The same policy was followed in the US. An early suggestion for naming the atomic project was the Laboratory for the Development of Substitute Materials before place names were adopted instead. This, the Manhattan Engineering District Project eventually became the Manhattan project (Kelly, 2007).

[18] Sagdeev (1994:58) also noted that key elements of experiments were also coded, thus for example, plasma was 'syrup'.

[19] The former mayor dated this to 1997 when military checkpoints into the town were dismantled.

No-one seemed to know who had done this, vaguely ascribing the cars that had appeared and left loaded with bricks as belonging to villagers, hooligans or the mafia. One or two shyly said that they had gone gingerly by night through the half-demolished buildings to remove books from the library or take wood to burn. Some residents wondered (with a broad grin) if the bricks had gone to construct the new capital, Astana (now re-named Nur-Sultan), then rapidly shooting up. This observation provoked wry comments by other people comparing the ruins of the town that had once housed the intellectual elite in luxury and the new-for-old capital that was said to be being built so fast and with so little care it would soon fall down. Others quietly wondered if the bricks were radioactive. Thus the town itself was unstable and seemed to be proliferating, encompassing other places. The tradition of secrecy also lent itself to a sense of the uncanny, hovering unspoken pasts or, as a teenage girl said simply, 'It's spooky here', the simultaneity of other times and presences also destabilising the present (Alexander, 2020).

Itinerant people and knowledge are also cause for attention. Nazarbaev's call for scientists to stay in place is mirrored internationally. While Kazakhstan needs highly-trained nuclear engineers and physicists, international bodies are more alarmed about nuclear knowledge seeping to 'states of concern', particularly in the 1990s when there was simply no money for salaries and workforces were cut (Tulebaev, 2007:28; see also Ninetto, 2001, 2005, on 'rogue' physicists in the context of Novosibirsk's Akademgorodok). The emphasis of the Russian-British government Closed Nuclear Cities Partnership,[20] across the former Soviet Union, has been on helping sustainable employment within these towns. The constant refrain during my fieldwork from residents and workers in Kurchatov was the poverty of social and infrastructural provision from good schools, kindergartens and medical care to roads and entertainment. It was the lack of this (echoing Shkolnik, 2009:5) that was prompting many to leave.

The STS magnifies these questions of unstable objects. Until the military left, the site's 600km perimeter was guarded and fenced, but once the Russian army had gone, the fence was rapidly dismantled, although no-one can say by whom. Anecdote[21] has it that the metal was sold illegally to China. There are now no visible markers of where the steppe ends and the STS begins, only the geometric boundaries of maps that plot the detonations, and the occasional red and white striped post indicating nearby contamination.

After the guards and fence disappeared, the STS was regularly raided for bricks.[22] The blocked-up entrances to the tunnels and boreholes were illegally ripped open by metal scavengers to extract valuable copper wire to sell (Harrell and Hoffman, 2013:5; Werner and Purvis-Roberts, 2003). Indeed it was precisely anxiety that these scavengers were becoming alarmingly close to residual weapon-grade plutonium on site that prompted the 17-year collaboration between Russian, Kazakh and American scientists to secure the site further (Harrell and Hoffman, 2013).

Characterisations of the STS differ markedly between the government-sponsored NNC and other ecologists who have worked on the site. In brief, since 2009 (IRES), the NNC has been developing plans to return or shift up to 95% of the site to grazing, agriculture and mining (Magauov, 2012:19). The land is rich in minerals and areas of lush pasture. Indeed, up to 40,000 head of cattle already graze there illegally (IRES, 2009) and a small coal mine also operates, officially, on the STS.

A radically different view is proposed by some former employees of the NNC and other scientists. They emphasise that the site is essentially an open, and thus expanding ecological system, which is impossible to know and predict in its entirety. Uncertainty is compounded by the very nature of radioactive decay and trans-vector migration as well as the paucity of documentation about the original experiments. Activities such as mining and grazing, they claim, would only exacerbate the spread of contamination.

There are also differing claims about radiation morbidity in the area. Studies carried out by IRES, NATO and IAEA suggest that nearby villages have no more than global norms of background radiation.

[20] The CNCP's mission states, 'it is of the highest importance that displaced personnel find new opportunities to use their skills in a way which minimises the risk of nuclear proliferation. International security considerations mean that it is of the highest importance that acceptable economic and social conditions and the morale and loyalty of the individuals concerned are maintained.'

[21] Apparently based on a comment by Larissa Ptizkaya an early Director of IRES.

[22] Largely from the ruined mockups of urban buildings built to test the effects of nuclear blasts.

Other publications (Balmukhanov et al., 2006; Yedrisov et. al., 2006) state that background levels of radiation in local villages exceed norms as do radiation-related pathologies.

Discussion

In some ways, the strategy of deflection continues. In a clever management of the past, the STS is swept up in the slogan: 'from national tragedy to national patrimony'. By shifting the terms of the legacy, selecting the scientific advances made and leaving behind more problematic elements, the slogan enables the move from passive victims to the active embrace of a scientific inheritance, a stake in history and economic contribution.

The media, too, emphasise this shift. Kurchatov, still half-ruined in 2009, has been named 'a phoenix', the most intellectual town in Kazakhstan, a 'town of science' (Bidanova, 2009), 'the pearl of Kazakhstan' (Vikhrev, 2002). The site itself, the environmental and medical history and consequences in the present and future are displaced by a concern with a research future for the 'only one-company town whose product is scientific knowledge' as a Kurchatovits proudly described his city in 2014. The fact that the testing site was one small part of a vast complex is similarly eclipsed. It is as though the logic of fractals insists on seeing the whole in the part.

Whereas one approach towards the STS, described above, is arguably a similar task of containment, the other is based on openness of the site and what may happen (Alexander, 2020). While this is obviously an oversimplification and there are many shades between, the monochrome alternatives serve to highlight trends. What interests me here is not so much who is right or wrong in their assessment, but the premises and consequences of different positions. Since each starts from a different premise and uses a different process, agreement is unlikely. The consequences of each approach are radically different. One shuts down or 'manages' the STS. The other keeps it alive as an open question.[23]

My argument is this. In order to know and name an object of enquiry it needs to be limited, finite. Following government guidelines, the IRES adopts a geometrical representation of the STS to artificially bound its sampling. A wide range of methods has been used: air photography, extant documentation, regular biochemical sampling, spectrometry, geological testing. The results are then extrapolated. The extrapolation works in two ways: spatially and temporally. Thus the known parameters of the samples are extended to cover the whole STS – but no more and to stretch into the future. In effect, the predictive power of modeling a limited number of variables in a closed system has been applied to the STS. This representation of the site as bounded and finite allows it to be known and modeled, as a laboratory experiment. Once knowable, it can be declared clean and, as we have seen, erased as a legacy and transformed into a commercially-viable future.[24]

The proponents of the alternative approach adopt what they call an ecological stance, by which they mean that the site is essentially open and, in some respects, expanding. This works in several ways. They acknowledge that the site cannot be bounded spatially, that contamination will travel via and across a number of vectors. They suggest that extrapolation from spot samples for so huge a site is suspect, that samples need to be taken at least every 20 metres. Further, by recognizing the unprecedented number of linked variables and the lack of documentation, they say that future effects cannot be predicted, only monitored and used to build up a unique accretion of knowledge about these steppelands and anthropogenic mutations.

The consequences of these two stances are stark in this context and paradoxical. The reductive approach allows a knowledge object to be produced and predictions made. But the act of claiming the STS is knowable also serves to manage it out of existence, to erase uncomfortable histories and make it anew. The expansive approach, in contrast, by asserting the site's uniqueness and unknowability in toto,

[23] There are clear echoes here with Strathern's (2006) distinction between knowledge management (shutting down) and knowledge production/research as an open-ended process.

[24] It is also claimed that the change of name from Semipalatinsk to Semey and the shuffling of administrative borders in north east Kazakhstan so that Semey is no longer a regional capital, was also intended to erase Semipalatinsk from history. Giving a Kazakh name to the city is, however, in line with renaming policies elsewhere in Kazakhstan; other reasons cited for the administrative reshuffle was to obscure concentrations of Russian and Kazakhs and so frustrate possible moves to secede to Russia

keeps it in view, maintains the STS as an ever-expanding question, an enduring present – rather than one that flows into a developing future.

Although I have presented these two approaches as inimical, there are moments when the forward movement of reconfiguring the relationship between Kurchatov and the STS is stopped in its tracks by what seems to be a counterclaim to the possibility of containment, when the contradictions appear between appeals to Kazakh suffering during the Soviet nuclear tests and the emphasis on moving on to a Kazakh nuclear future. The project of state-building and legitimization, is crucially interwoven with both nuclear futures and histories.

Thus, in 2009, in commemoration of the STS's closure (for weapon testing), Nazarbaev released a statement via the IAEA which stated: ''The ecological disaster zone around the Semipalatinsk nuclear testing site occupies more than 300,000 square kilometers. One-ninth of all of the territory of Kazakhstan – a size comparable to the size of Germany – transformed into a toxic wasteland.' (Permanent Mission of Kazakhstan, 2009). Baldly put, this is saying that the effect of the site has exceeded its cartographic limits and irrevocably wasted, a strong word, the land. Cleaning up, this might indicate, is an impossible task as the object under question is constantly increasing in unforeseen directions. Simply leaving this behind via rhetorical term shifting, might be the only option in moving on and embracing atomic futures.

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Убираемся и двигаемся дальше: "ядерный ренессанс" Казахстана

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Как мы соотносим стойкое ядерное прошлое с тем, что кажется лучезарным атомным будущим? Казахстан освободился от наследия холодной войны - загрязненных земель и связанных с радиацией патологий, чтобы двигаться дальше. Очистка, в конце концов, может указывать как на устранение загрязнения, так и просто на обналичивание. Является ли реконфигурация отношений между городом и испытательным полигоном еще одним примером того, как постиндустриальный город Курчатов заново изобретает себя и ставит себя на карту - или есть что-то особенное или исключительное в ядерной работе, наследии, поселках и людях? В статье показано, что иногда возникает непреодолимая напряженность в действиях государства по обеспечению безопасности как конкретной версии ядерного прошлого на казахской земле, так и ядерного будущего как отчетливо казахстанского предприятия. Это, в свою очередь, влияет на способность города Курчатова перестраивать свои отношения с полигоном и двигаться вперед.

Ключевые слова: ядерное оружие, Семипалатинский ядерный полигон, город Курчатов, экологическая катастрофа, разоружение, социальная инфраструктура.

Тазалаймыз және ары қарай жылжимыз: Қазақстанның "ядролық ренессансы"

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Тұрақты ядролық жарылыс сәулесін атом болашағымен қалай байланыстырамыз? Қазақстан ластанған жерлерден және радиациямен байланысты патологиялар деген суық соғыс азабынан әрі қарай жылжу үшін азат болды. Тазару, шындығын айтқанда, ластануды қалай жоюға болатынын, жай ғана қолма-қол ақша төлеу сияқты көрсете алады. Қала мен сынақ полигоны арасындағы қарым-қатынаста постиндустриалды Курчатов қаласы өзін картадан жаңа бейнеде көрсете алатындығы, ядролық жұмыста, мұрада, ауылда, адамдарда өзіндік қасиет пен ерекшеліктің бір мысалы ретінде конфигурация болып табыла ма? Мақалада казақ жеріндегі өткен ядролық нақты кезеңнің қауіпсіздігін қамтамасыз ету бойынша мемлекет әрекетінде, сондай-ақ қазақстандық кәсіпорынның ядролық болашағы кейде айқын шешілмейтін шиеленістің туындайтындығы көрсетілген. Бұл, өз кезегінде, Курчатов қаласының өзінің сынақпен қатынасын қайта жаңғыртуды және алға қарай қадам басу қабілетіне әсерін тигізеді.

Түйін сөздер: ядролық қару-жарақ, Семей сынақ алаңы, Курчатов қаласы, экологиялық апаттар, қарусыздану, әлеуметтік инфрақұрылым

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