

## Securing the nuclear nation

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In 1946, in the Southern Urals, construction of the Union of Soviet Socialist Republics first plutonium plant fell to the GULAG-Narodnyi Komissariat Vnutrennikh Del (NKVD). The chief officers in charge of the program – Lavrentii Beria, Sergei Kruglov, and Ivan Tkachenko – had been pivotal figures in the deportation and political and ethnic cleansing of territories retaken from Axis forces during WWII. These men were charged with building a nuclear weapons complex to defend the Soviet Union from the American nuclear monopoly. In part thanks to the criminalization and deportation of ethnic minorities, Gulag territories grew crowded with foreign nationals and ethnic minorities in the postwar years. The NKVD generals were appalled to find that masses of forced laborers employed at the plutonium construction site were members of enemy nations. Beria issued orders to cleanse the ranks of foreign enemies, but construction managers could not spare a single healthy body as they raced to complete their deadlines. To solve this problem, they created two zones: an interior, affluent zone for plutonium workers made up almost exclusively of Russians; and anterior zones of prisoners, soldiers, ex-cons, and local farmers, many of whom were non-Russian. The selective quality of Soviet “nuclearity” meant that many people who were exposed to the plant’s secret plutonium disasters were ethnic minorities, people whose exposures went unrecorded or under-recorded because of their invisibility and low social value.

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In 1947, Narodnyi Komissariat Vnutrennikh Del (NKVD) generals broke ground on a new kind of Soviet city, a gated community in the southern Urals for specially selected workers dedicated to making plutonium for atomic bombs. Surrounded by a double-walled fence, topped by razor wire and patrolled by guards, Base Ten, later known as Cheliabinsk-40, then Cheliabinsk-65, and today called Ozersk, was one of the first and the largest closed nuclear cities in the Soviet Union. It serves as an interesting case study to determine how Soviet security officials correlated nationality with national security. It comes as no surprise that NKVD and later Ministerstvo Vnutrennikh Del (MVD) generals equated Russian and sometimes Ukrainian ethnicity with loyalty, while implicitly mistrusting citizens who had identities that could connect them with nations outside the Union of Soviet Socialist Republics (USSR). This kind of fear of cross-border alliances has been well documented (Iwanow

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1991; Rubl'ov and Reprintsev 1995; Gelb 1996; Martin 1998; Brown 2004). Limiting nuclear production to workers of the majority nation was neither unique nor surprising. As NKVD officials worried about "enemy nations" making plutonium, they were in accord with American Federal Bureau of Investigation agents who came up with a similar formula of white and largely Protestant and sometimes Catholic as the safest kind of citizen to produce plutonium in Richland, Washington, Ozersk's American twin (Johnson and Jackson 1981; Bacon Hales 1999; Findlay and Hevly 2011; Brown 2013b).

More interesting than the fact of early Cold War xenophobia are the consequences of this form of ethnic selection in the history of urban planning, labor policy, and public health. Through xenophobic practices the Soviet state created hierarchies of citizens ranked by their value to the Union. Russians, for example, were ranked as most trustworthy. After 1948, Jews no longer comfortably belonged in secret installations. Members of ethnic groups from the Baltics and the Caucasus had a much harder time proving loyalty than Russians, just as ethnic groups from Central Asia had difficulty demonstrating their reliability. Because of their suspect loyalty, these categories of Soviet citizenry were officially banned from the plutonium zone in the southern Urals, but, strangely, they existed in the plutonium zone in a great multitude – Ukrainian nationalists who fought against Soviet power, German prisoner of war (POWs) who battled the Red Army, and deported ethnic minorities from the Caucasus, the Volga, Ukraine, and the Baltics. What were these untrustworthy "enemy nations" doing in the most top-secret installation in the country?

Ethnic minorities remained in the plutonium zone, despite their official ban, for two reasons. At first, incarcerated or exiled suspect ethnic minorities were readily available as a labor force already mobilized in the Gulag infrastructure. Later NKVD generals used ethnic minority prisoners and soldiers to keep loyal "Soviet" citizens safe. Plutonium production is the most polluting stop on the nuclear weapons assembly line. Over time as NKVD generals managing the Maiak plutonium plant realized plutonium's terrific dangers, they came to use ethnic minorities as the majority of shock workers sent to do the most hazardous jobs at the plant. Meanwhile, they deployed Soviet workers, defined at the plant largely as Russian, to serve as fulltime permanent employees who enjoyed greater protections in the form of medical monitoring and safer jobs. Hierarchies of risk, I will show, worked by means of dividing territory into "zones," which reproduced in the plutonium plant existing ethnic hierarchies within Soviet society, at the same time that they facilitated unsafe, accident-ridden, yet speedy and voluminous plutonium production.

In 1947, Lavrentii Beria, in charge of the atomic bomb program, established a goal of creating an ethnically secure, atomic city of Russians and eastern Ukrainians to run the heavily guarded, secret plutonium plant. This objective was impossible to reach in the first postwar decades because, ironically, Soviet xenophobia induced a great deal of ethnic mixing in Soviet society in the form of deportations of borderland groups into the Soviet heartland (for a useful definition, see Martin 1998). The Urals region, where the plant was sited because it was underpopulated and roadless, was just the kind of destination Gulag NKVD officials preferred in locating labor camps and special settlements. Drawing on local labor, Gulag NKVD officials transferred to the plutonium construction site in 1946–1947 the labor they had at hand in the Urals – ethnic German deportees, repatriated Soviet POWs suspected of collaboration with the enemy, Gulag prisoners, many cleansed from re-occupied Ukraine and the Baltic states, and German POWs.<sup>1</sup> They also had military construction battalions made up of men who had failed health and literacy tests for the regular army. These contingents had large percentages of soldiers from Central Asia and the Caucasus (Kuznetsov 2008, 87). Security officials at the Maiak plutonium plant did not have the luxury of disaggregating ethnically suspect prisoners, exiles and soldiers from the working collective. Despite

orders to cleanse ethnic minorities from the plutonium plant and the surrounding territory, security officials had to answer to construction bosses' continual demands for more labor. To solve this problem, security officials ended up creating a two-tiered system.

Regular plant operators, after background clearances and a full medical examination, made up the permanent labor elite of the plant. They lived in the exclusive closed city of Cheliabinsk-40 (now called Ozersk). Migrant soldiers and prisoners were assigned to interchangeable camps and garrisons surrounding the plant and they performed most of the manual labor and the "dirty" work on contaminated grounds. They served as a temporary labor force, working for a few years at the plant. As time passed, this division of labor proved extremely useful because of the relative invisibility and mobility of conscripted largely ethnic minority populations. Over the years as the plant was plagued by dangerous accidents and radioactive spills, industrial leaders and construction bosses came to depend on ethnic minority prisoners, farmers, and soldiers to do the hazardous work of cleaning up radioactive territories, although officially these categories of people were banned from the top-secret nuclear security zone as potentially disloyal. Industrial leaders of the plutonium plant basically treated minority workers as "jumpers," unmonitored temporary workers, called in to do dangerous work off the record of nuclear exposure. More, the two most serious accidents – the 1949–1951 dumping of high-level waste into the Techa River and the 1957 explosion of an underground waste storage tank – sent about 23 million curies of radioactive waste into garrison and camp areas where temporary workers lived and into territories of mostly farming and foraging Bashkirs and Tatars. People from these farming communities – men, women, and children – were conscripted to work as liquidators cleaning up these accidents. As with the plant's soldiers and prisoners, the exposure of these people too went unnoted for years and when discovered, resettlement from radiated territory was extremely slow and to this day a large number of Bashkirs and Tatars are left living on irradiated territory (Brown 2013a). The two tiers of permanent and temporary labor created a paradox that this article will unravel: though NKVD and MVD security officials almost exclusively employed Slavs to work as operators of the closely guarded plutonium plant, the majority of people exposed over four decades of the nuclear arms race were ethnic minorities.

Historians of the nuclear age have shown how this pattern of selective exposure is not unique to Soviet history. In other places, indigenous people were not judged to have much value, so their exposures to radioactive isotopes were allowed to be higher or to go unrecorded. Tellingly, the International Committee on Radiological Protection's guidelines were founded in the words of historian Gabrielle Hecht on the "political assumption that the value of life varied by nation" (Hecht 2012, 207 and 261–269; see also Masco 2006; Johnston 2007). Hecht (2012, 15) coined the term "nuclearity" to describe how "being nuclear" is a techno-political category which shifts in time and space depending on politics, science, infrastructure, race, and states. While radiation is a physical phenomenon that exists independently, how radiation is tracked, detected, politicized, and treated, as a hazard or a medical phenomenon working on the body, has a great deal to do with social relations, on how and where knowledge is produced. As with most other nuclear projects, at the Maiak plutonium plant in the southern Urals, "nuclearity" was Slavic and majority nation, meaning that people who were deemed to be "exposed" were plant employees, vetted by security officials before they were hired and closely tracked by plant radiation monitors and medical doctors throughout their employment. The tens of thousands of people who worked in construction, and served as liquidators of plant accidents, as well as the nearly 50,000 people who lived downstream and downwind ingesting the plant's radioactive isotopes were never considered to be "nuclear," and so their exposures were

scarcely recorded or were not recorded at all. They did not qualify, in Hecht's terms, for "nuclearity."

The selective quality of Soviet "nuclearity" had two important historical reverberations. The first is that in order to try to contain and protect "chosen" Russian and Ukrainian plant operators, plant managers constructed a special, limited-access city designed to segregate plant workers and their families from both the social contagion of volatile prisoners and soldiers and from the physical contamination of spreading radioactive isotopes. Second, most people who were exposed to the plant's secret plutonium disasters were ethnic minorities and prisoners, people with low social value in Soviet society. The invisibility of these exposures has led many commentators to greatly underestimate the public health impact of the Maiak plant's estimated (and astounding) one billion curies spilled into the surrounding landscape (Larin 2012). This story illustrates how hidden, unrecorded exposures of people who fell at the bottom of the chart of ethnic and social hierarchies lie at the core of assertions of nuclear safety.

To tell this story, it helps to start from the beginning. In 1946, when Lavrentii Beria founded the First Main Department to produce atomic bombs, his shadow ministry was granted top priority to requisition goods and labor from anywhere in the Soviet Union. Rather than employing free labor, Beria determined that the massive industrial reactors, labs, and processing plants for atomic weaponry would be built with Gulag labor. This decision begs explanation. Building highly technical, complicated plants with underfed, forced workers wielding primitive tools led, predictably, to a lot of trouble in producing a plant that ran safely. Beria's decision was sensible only given the dire postwar labor shortage compounded by acute scarcities in building supplies and housing stock. In 1946, the site for the plutonium plant, for reasons of secrecy and safety, was a remote, swampy forest of the Southern Urals, 65 miles from Cheliabinsk. Few Soviet citizens willingly moved in the midst of the postwar Soviet famine to isolated territories because these places insured scarcities of food, housing, clothing, and medical care.<sup>2</sup>

Beria probably chose to deploy prison labor because he well knew the difficulties Soviet managers encountered keeping Soviet civilian workers on undesirable jobs in undesirable locations. By the end of the 1930s, Soviet workers had no way to negotiate for better terms than to quit their jobs and find new ones elsewhere. And workers left their jobs like residents running from a house fire. On average Soviet workers in the 1930s changed jobs once a year. In some industries, two-thirds of all workers left each year (Filtzer 2002, 10 and 162–168).<sup>3</sup> For Soviet leaders, workers on the move disrupted production and left important industries desperately short of labor. The 1940 labor laws attempted to fasten industrial workers to their jobs in a similar way that passport laws in the 1930s had tried to pin villagers to collective farms (Mironenko and Werth 2004, 76–77). With the new laws, factory bosses reported to the police names of employees who did not show up for work. The police then searched for "deserters" or "self-willed" quitters and arrested them at first by the thousands, then hundreds of thousands, holding steady at about one million convictions for each year of the war. Despite the arrests, however, job-changing and "desertion" continued apace in the postwar years.<sup>4</sup>

Prisoners and exiles, on the contrary, had few choices but to stay in isolated, miserable locations living in substandard or minimal housing. Captains of industry, such as Beria and his subordinates, valued convict labor because prisoners could be brought to a job site and quickly set up in transient camps. They could be made to live in scarcely accessible areas with little infrastructure, comforts, or calories. Moreover, the NKVD had, because of the extremely active efforts of the security forces in the years of purges, a broad stratum of Soviet society upon which to call. Among convicts were many highly skilled and

experienced laborers, technicians, engineers, and scientists (on the values of convict labor for economic development, see Klevniuk 2004, 44–45).

This made the NKVD by the war one of the largest economic entities in the Soviet Union, occupying 14% of the state budget. The Gulag NKVD, moreover, was an especially important player in the Urals economy.<sup>5</sup> In the Urals, the NKVD controlled huge mining, manufacturing, construction, timber, and agricultural concerns labeled with acronymic precision. The NKVD also acted as a broker, renting out prison labor to contractors, factories, and state enterprises (Kokurin and Petrov 2000, 281). The Gulag NKVD occupied the most prominent housing block in downtown Cheliabinsk, which locals called “Chekist Town.” During the war, the number of prisoners increased in the Urals by 80%, and prisoners grew from 3% to 9% of the working population (Shevyrin 2005, 88–95). In Cheliabinsk, the colossal ChMZ tank factory and the massive Cheliab-metallurgy-construction company (ChMS) were NKVD installations. ChMZ had in November 1945 22,000 unfree laborers and 17,000 freely hired laborers. In short, the Gulag was the region’s major employer, and NKVD agents were the city’s main power brokers (Finadeev 2005, 65).

The war also brought evacuees to the Urals in the hundreds of thousands. People from Ukraine, Belorussia, and western Russia joined mostly Russian city-dwellers. The evacuees also squeezed into villages of Russians, Tatars, and Bashkirs. Because resources were scarce, the Jewish, Ukrainian, and Belorussian newcomers were scarcely welcome. Nor did the evacuees enjoy their new life in the Urals, where they shared living quarters with strangers and scavenged for food. Local censors read letters heading for soldiers on the front.<sup>6</sup> In one letter, a woman complained of the hate the locals express toward the evacuees. “They treat us with cruelty and hatred, not just regular people but the officials too. That is because we are in need of everything – spoon, mug, and shirt. They would happily rip the last shirt off a person’s back” (Potemkina 2005, 169–77).

The wartime Gulag too served as a great ethnic mixer. During and after the war, Gulag transports succeeded in moving hundreds of thousands of people from Ukraine, the Volga, the Baltics, and Caucasus into the Russian interior. The first labor force sent to build the plutonium plant consisted of prisoners and exiles. Pavel Kurpriichuk went to work at the site’s lumber mill, the DOK. He remembered: “from the very beginning the foundation of the labor at DOK was prisoners. Among those freely hired, when I arrived, were literally only a few people” (Chernikov 2003, 129). Special settlers, mostly ethnic Germans deported from the Volga Region and Crimea, built the first log road and railroad spur into the site (Kuznetsov 2004, 17–18). Ethnic Germans were among the first doctors, engineers, and managers (author email correspondence with Ervin G. Polle, Tomsk, 12 February 2012).

NKVD General Iakov Rapoport commanded the plutonium plant construction site and with it a growing crush of incarcerated labor: 10,000 conscripts in penal battalions, 16,000 exiles and ethnic German internees, 8900 Gulag prisoners, and 8000 prisoners of war.<sup>7</sup> In June 1946, Beria sent an order stating that Rapoport employ at the secret site only the most trusted prisoners. Beria banned from the site ethnic Germans, POWs, recidivists, hardened criminals and persons who had lived on territory occupied by Germany during the war.<sup>8</sup> Soviet leaders were especially worried about “traitorous nations,” ethnic groups suspected of betrayal, especially western Ukrainians who had fought against the installation of Soviet power in western Ukraine in a bloody and at the time ongoing civil war (Suslov 2003, 130; Kuznetsov 2008, 86; author email correspondence with Ervin G. Polle, 2 December 2012).<sup>9</sup>

Rapoport, however, found it impossible to carry out these security orders. Three quarters of Rapoport’s construction workers were ethnic Germans and foreign prisoners of war and they were often highly skilled. Many of the rest of his Gulag contingents were

repatriated soldiers and prisoners arrested as collaborators during the war.<sup>10</sup> As a result, Rapoport side-stepped Beria's edict by taking ethnic German special settlers off the roll call.<sup>11</sup> As well, Rapoport wanted only healthy "labor-ready" prisoners, but the healthiest prisoners were hardened criminals who bullied rations out of weaker prisoners and forced them to do their work (see Mochulsky and Kaple 2010, 53). Half of Rapoport's first prisoners were classified as invalids, useless as a labor force.<sup>12</sup> In violation of the security orders, Rapoport accepted hardened criminals and political prisoners.<sup>13</sup> According to Gulag regulations, dangerous criminals were to be guarded at all times, but Rapoport did not have enough guards. Guards at the site were in short supply, and commanding officers did not live in the primitive forest labor camps, but several miles away in the relative comforts of the town of Kyshtym. With few guards, the majority of maximum-security prisoners were sitting at the camp all day, not going to work for a lack of escorts.<sup>14</sup> Rapoport solved that problem too. He issued orders to reclassify the maximum-security prisoners as minimum-security so he could send them out to work without a convoy.<sup>15</sup>

Short of management, prison lords and exiles serving as managers often ran the camps and job sites. Civilian managers and engineers lived in fear of the criminal warlord who supervised inmate labor on the job site. One manager who crossed the warlord *pakhan* was found after several months walled up in a cement foundation. The echelons of unfree workers organized and policed themselves, often within ethnic categories. A former special settler, T. A. Schmidt recalled sitting in the office of his boss, Emil Dumler, and suddenly a prisoner ran in and yelled: "Emil Konstantinovich, hurry, war! The Chechens are attacking the Russians!" Dumler, an exiled ethnic German foreman, summoned his courage to cross the bridge and talk Vania's gang of Russian prisoners into making peace with Ura's band of Chechen convicts (Chernikov 2003, 130). As the demand for labor increased, penal battalions of repatriated soldiers who were also suspected of treason or inadequate loyalty arrived to work at the site. They lived in garrisons that were interchangeable with Gulag camps.<sup>16</sup> The military construction brigades consisted of soldiers considered too untrustworthy to bear arms. Many of the soldier-construction workers at the plutonium plant were veterans repatriated from Axis POW camps. They arrived from Soviet filtration camps still wearing their battle-torn uniforms. Many workers on the site were Ukrainian soldiers of the Organization of Ukrainian Nationalists, Vlasovites, Estonians, Chechens, and Latvians. Conscripted soldiers roamed the surrounding villages stealing, raping, murdering, and picking fights with village men.<sup>17</sup> In short, the top-secret, super max nuclear security zone was largely populated and managed by volatile and violent men, suspected of treason.<sup>18</sup> None of these problems were unique to either Gulag or military camps in the postwar period. What was singular was that these problems of control and security were occurring in a top-secret nuclear installation.

Beria had also requested from Moscow that the plutonium construction zone be specially guarded, civilian entry into the zone controlled and news of the site kept from the general public. Those orders too Rapoport did not carry out. In the first year and a half of construction, Vladimir Beliaevskii remembered, there were no formal security restrictions at the site at all.

"Anyone," he recalled, "who wanted to, could go there without trouble" (Chernikov 1995, 39).<sup>19</sup> A train from Cheliabinsk ran daily to a stop a few miles from the construction site. There was no security division to oversee the site or the selection of personnel. Most able-bodied people who showed up were hired on the spot with no background check. People in the nearby town of Kyshtym talked openly of the "secret atom factory" going up in the woods (Dokuchaev 1998, 279–312).

In sum, securing an ethnically homogenous, protected, and contained community of plutonium operators was difficult for NKVD generals in the poverty and improvisations of the postwar years. To fix these problems, Beria himself had to get involved. In the summer of 1947, he fired Rapoport, a polyglot Jew from the Baltics and replaced him with Mikhail Tsarevskii (Novoselov and Tolstikov 1995, 100). Beria reissued orders for a security regime around the site and he sent a lifelong NKVD general, Ivan Tkachenko, to the Urals to carry it out (Sokhina 2003, 32). During the war, Tkachenko had taken part in deporting Chechens and Ingush from the Caucasus to Kazakhstan. After the war, he served in the security organs cleaning up postwar Latvia, a merciless affair of mass arrests and mass executions. The NKVD leadership noticed Tkachenko's zeal in Latvia and he was called to Moscow to work in the First Main Department.<sup>20</sup> Tkachenko was one of many leading figures in the Soviet atomic bomb program who had directed wartime ethnic cleansings. Others included Sergei Kruglov, Victor Abakumov, Vasilii Chernyshev, and Pavel Meshik (Volkov 1945–1947). In short, leaders of the Soviet atomic program, many of whom were lifelong NKVD officers, had a history of thinking in terms that equated security with ethnic cleansing.

Beria ordered Tkachenko to set up a "special regime zone" to control the movement of workers in and out of the zone. In 1948, after the first reactor started up, Tkachenko commanded that workers hired at the plant be given background security checks. Alexander Saranskii was a security officer in charge of the personnel division for civilian workers. Saranskii directly connected disloyalty with transgressions of international borders. "I personally accounted for the purity of each arriving recruit's biography," Saranskii recalled,

We issued security passes only after a protracted background check. We reviewed a person's file and sent out special KGB agents to investigate. We made sure no one had a criminal record, or had been in occupied territories. Even if a third cousin had been in Germany, we rejected them. (Chernikov 1995, 57–59)<sup>21</sup>

As Tkachenko's security forces worked, they gradually weeded out previously hired civilian workers who had ties abroad or were members of ethnic minorities (Chernikov 1995, 57). In 1948, Tkachenko received orders to cleanse from the security zone "cosmopolitans," people who apishly imitated the West and were not loyal enough to the Soviet cause. These orders went out to security bosses throughout the Soviet Union, but the decree was particularly difficult to carry out at the plutonium plant. The chief physicist, Igor Kurchatov, was closely following blueprints stolen from the American Manhattan Project. He and his fellow scientists regularly requested permission to see the pinched materials, and were not allowed, in fact, to deviate from the successful American bomb designs.<sup>22</sup> Yet Soviet scientists had to balance the orders to copy the American atomic bomb exactly, while not betraying a slavish devotion to the West. Tkachenko also had a laboratory of incarcerated German scientists stashed in a nearby settlement working at "Laboratory B," now called Snezhinsk (Riabev 2004, 762–765). Tkachenko's answer to this new security challenge was to target Jews, who after the war were increasingly characterized as outsiders – "cosmopolitans" lacking loyalty and patriotism to the Soviet Union. In subsequent years, Jews disappeared from the security zone for having relatives in the USA or Israel, or for just being "of the type that litters our environs."<sup>23</sup> Plant managers also rarely hired Tatars and Bashkirs, Muslim religious minorities who made up the majority of the populations in towns and villages surrounding the plant. In subsequent years, some among the few Tatars hired charged that plant management discriminated against them in allocating housing and jobs.<sup>24</sup> Rolls of the local Communist Party show that Tkachenko and his staff interpreted loyalty and trustworthiness among civilian workers as largely Slavic.<sup>25</sup>

Gradually the zone of ethnic and political purity expanded. In the spring of 1948, Tkachenko ordered the creation of a 25 km buffer zone around the plant. He then commanded that this new zone be cleansed of “undesirables.”<sup>26</sup> Undesirables were the usual suspects: ex-cons, ethnic minority special settlers, and people who had lived under foreign occupation. In the early 1930s, the Southern Urals was a major destination for deported kulaks and in the 1940s for ethnic Germans and repatriated citizens. As a result, over 3000 people in the sparsely populated buffer zone made the deportation list, 3% of the local population.<sup>27</sup>

By 1948, the previously “roadless,” largely undifferentiated territory of the plutonium plant had been transformed into a “special regime zone” which was broken into smaller parcels for the segregation of land and people into discreet, hierarchically ranked communities. Indigenous communities of Bashkir and Tatar farmers had been ordered out of the regime zone.<sup>28</sup> Select, majority-nation plutonium workers had moved into Cheliabinsk-40, where they were fenced in, guarded, and well-supplied. Residents had to carry a pass with them and could not leave the zone without special permission, which was granted to few for the first eight years of operation. Camps and garrisons with large numbers of minority-nation prisoners and penal battalions were located not only outside the closed city, but also within the confines of the newly cleared special regime zone. The camps and garrisons were dirty, hungry, and violent. In the cleansed buffer zone surrounding the regime zone, state collective farm villages of mostly Tatars and Bashkirs supplied Cheliabinsk-40 with farm produce and they also suffered the regular attacks and burglary of roving soldiers and prisoners foraging for food.<sup>29</sup>

Despite Tkachenko’s efforts in 1947, the job of cleansing the regime zone was still incomplete. In 1948, Beria again ordered that political undesirables be cleansed from the cadres of working prisoners. Beria especially wanted repatriated soldiers and ethnic Germans removed from the secret site (Novoselov and Tolstikov 1995, 140). But like Rapoport before him, Tkachenko could not carry out this order. The plutonium plant construction site, suffering from major delays, was heavily dependent on the labor of exiles, repatriated soldiers, and prisoners. Instead, Tkachenko issued decrees assigning prisoners to non-sensitive jobs such as road and residential construction, repair, and machinery shops, all of which he had surrounded by fencing in a series of “zones” within the special regime zone. Soldiers, deportees, and hired workers were to be detailed to work on security-sensitive reactors and processing plants. Often, however, these neat spatial divisions failed. As late as 1957, there are records of prisoners living and working inside the top-security industrial zone, which regulations banned them from entering.<sup>30</sup> Despite Beria’s orders for ethnic cleansing of the special regime zone, in 1950, 46,000 special settlers, mostly deported ethnic minorities, were on the roll call of nuclear installations of the southern Urals (Kuznetsov 2004, 18). In short, despite orders, Tkachenko employed suspect incarcerated populations through the most frenetic years of construction at the site.

In 1951, during a lull in construction, Tkachenko announced that he was going to cleanse the zone and the city of ethnic Germans and ex-cons, who after release had been freed to live in the closed city. “We are taking measures,” Tkachenko told a gathering of communists,

to purge our city of all formerly sentenced and this entire kind of criminal element. We just sent off two echelons [of ex-cons and prisoners], and in the course of this month we will dispatch two more. By the end of the year we will banish all the Germans from our city.<sup>31</sup>

Indeed, Ervin Polle recalls that in July 1951 his family was torn from their comfortable life in Ozersk, where his father had worked as chief surgeon in the hospital and his mother as a doctor. They were ordered to pack up in 24 hours and shipped in a freight car to Kolyma



(author email correspondence with Ervin Polle, 12 February 2012). In the subsequent three years, Tkachenko's forces deported from Ozersk to the Far East a total of 12,000 ex-cons, exiles, and convicts, but, even so, the purge was not complete.<sup>32</sup> The labor and training of the ex-cons and exiles were too precious in the isolated, understaffed city and highly contaminated plant.<sup>33</sup> Also, the ethnic mixing which the deployment of Gulag labor had encouraged left a lasting mark. As former special settlers, after prisoners and soldiers finished their time, many stayed, marrying and assimilating into the highly select plutonium city population. Tkachenko, ever on the alert, considered those with ties to foreign ideas and places to be suspect people, but increasingly in the late Stalinist period, other city residents dismissed his warnings of security threats.<sup>34</sup>

In early 1953, Tkachenko made a last-ditch effort to clean out the closed city in what would be his final months of service in Ozersk. Closely following the developing scandal in Moscow over Jewish doctors allegedly poisoning and killing top Soviet leaders, Tkachenko translated the security alert to his home turf. In a closed meeting of Party activists in January 1953, he announced that "Jewish nationalists" led by American intelligence had infiltrated the closed city.<sup>35</sup> "Foreign spies desire the secret data of our establishment," Tkachenko intoned. He pointed to the trials of Czech Communists charged as "Zionists" and to the arrest of "medic-murderers" in nearby Cheliabinsk. "They all were Jewish nationalists," Tkachenko fumed, "and they obeyed orders from a hidden Zionist organization in Moscow. They probably are plotting other conspiracies, all organized by covert American operatives."<sup>36</sup>

Tkachenko listed a number of the plant's remaining Jewish employees, some decorated scientists in failing health from radiation poisoning, and accused them of espionage and sabotage. Tkachenko tried to arrest these "secret Jewish agents," but typically they were saved by factory bosses, who argued the scientists were too important to incarcerate.<sup>37</sup>

At the heart of this controversy over security lay the fact that the top-security plutonium plant relied greatly on prisoners to build a continually expanding plant – new reactors, processing plants, storage, and water treatment facilities. Construction bosses in Ozersk were critical of forced labor for reasons other than security; it was expensive, inefficient, and, because of high labor turnover, a training and security problem.<sup>38</sup> They initially applauded Beria's mass amnesty of prisoners, just three weeks after Stalin died, of more than half of the Gulag population.<sup>39</sup> In April, thousands of prisoners left labor camps in the special regime zone. Fewer prisoners, however, meant fewer construction workers, at the same time that several major construction projects were underway – with Soviet arms builders rushing to manufacture a new round of thermonuclear weapons.<sup>40</sup> To make up for the loss of prisoners, Beria transferred nuclear construction projects from the MVD-run Gulag to a new civilian ministry earmarked for nuclear construction. To address the labor shortfall, the Ministry of Defense allocated 100,000 soldiers to the nuclear industry; 17,000 accompanied by 1000 officers went to Ozersk (Kuznetsov 2008, 103).

Unruly, rebellious prisoners led by criminal warlords filed out, while disciplined soldiers led by Red Army officers marched into the regime zone. This exchange of military for penal labor and civilian for prison administration should have looked like progress. But, within a month of Beria's reforms, the worried messages about unruly prisoners shifted to anxious communiqués about rioting soldiers, while several major construction projects at the plutonium plant fell behind with serious delays for lack of labor.

Soviet military building brigades were the lowest echelon of the army hierarchy. They were often made up of convicted soldiers and soldiers from regions of low literacy, such as Central Asia or from newly annexed regions where young men were considered too suspect to arm. The arriving soldiers were housed in the just-vacated Gulag prison barracks along

with Gulag lice, vermin, uncollected garbage, barbed wire, and other signature features of the camps. The barracks were some of the first built, “rotting” with no plumbing or mess hall. The soldiers were not issued winter uniforms or a change of linen. The bathhouse was out of commission. Nor did they have much for distraction. The young men worked eight hour shifts and then were sent back to their zone, a walled off garrison of slammed together barracks and tattered tents.<sup>41</sup> Unhappy, bored and with a shortage of officers to control them, the soldiers went wild, drinking and carousing. They went to neighboring villages, attacked collective farmers, smashed up the clubhouse and then slipped back into the special regime zone where pursuing local police could not follow. In June, the Provincial Party boss reported to Nikita Khrushchev in Moscow that the arriving young conscripts had committed 891 crimes in just one month (Kuznetsov 2008, 105).

Someone looked into it, and discovered that many soldiers came from the troubled Baltics, Ukraine, and Belorussia, from territories annexed by the Soviet government in the war years where dissent was still sharp. Over a thousand soldiers in the group had criminal records. Among the arriving soldiers were other national minorities – Iranians, Greeks, and Bulgarians. A number of soldiers passed around religious pamphlets published in New York, and snuck off base to attend church.<sup>42</sup> None of these men – the religious believers, the ex-con service men, foreign-born, soldiers or conscripts from annexed territories – were supposed to serve in the special regime zone. They all made the no-fly list. They were also incorrigible. When security forces gathered up the worst troublemakers and brought them to train depots in nearby Kyshtym and Kasli to ship away, the soldiers baptized their departure in vodka, started fights in a workers’ dorm and smashed what they could (Kuznetsov 2008, 105). From a security point of view, this was all bad. The soldiers, national minorities from troubled parts of the USSR, intoxicated and brawling in neighboring towns exposed the nature and location of the secret work in the plutonium zone. Meanwhile, those who remained on the job were so unproductive and insubordinate that plant contractors refused to take soldiers as workers, requesting prisoners instead.<sup>43</sup> At least the hardened criminals, who had spent years toiling in the Gulag, had job training.

Beria did not have much time to witness the failures of his amnesty. In the summer of 1953, Nikita Khrushchev fixed up a case against the small, dark governor of the Gulag. Paradoxically, the minister who had worked so hard to try to secure Soviet atomic secrets from western spies was charged with being an agent of American security services, a traitor, “paid to restore capitalism to Russia.”<sup>44</sup> Indeed, the Georgian-born Beria had a great many international connections. He had been the main official supervising the wartime heist of atomic secrets. He had overseen Soviet counterespionage and was the great conductor orchestrating the Soviet a-bomb, cobbled together in part from 10,000 documents purloined from the West. At the celebration of the Special Committee created to build the atomic bomb, on the day of Beria’s arrest, Viacheslav Malyshev slandered Beria as “an enemy of the people” (Novoselov and Tolstikov 1995, 39–40). Indeed, the charge that Beria had allowed enemies of the people into highly guarded Soviet nuclear installations was true. Khrushchev capitalized on that fact.<sup>45</sup> Dozens of officers in Beria’s circle, including Tkachenko, were fired with him.

Khrushchev could not, however, change the cosmopolitan composition of the manual labor force in the camps and garrisons surrounding Ozersk. In subsequent years, construction managers had to continue to rely on soldiers and prisoners at the plutonium plant because they had no chance of attracting civilian labor to live in the miserable, dangerous construction settlements in the regime zone.<sup>46</sup> Much of this construction work occurred on contaminated ground with prisoners digging in irradiated soils while breathing radioactive

fumes from nearby smokestacks. Nor did the conscripted laborers' behavior improve. During the post-Stalin years, prisoners and soldiers continued to drink, brawl, fight, murder, and rape.<sup>47</sup>

Because the plant was built with forced labor, it suffered many technical problems, accidents and spills over the years. As Soviet leaders raced until the mid-1960s to keep up with the colossal volume of plutonium production in the USA, they had continuous construction and repair projects on increasingly contaminated territory. While civilian workers formally were supposed to receive no more than permissible annual doses of radiation (25 rads in the first years of production), prisoners and soldiers were not monitored and so were valuable to send into dirty zones, working as "jumpers" to clean up spills, liquidate accidents, unjam pipes clogged with radioactive waste, and repair highly contaminated structures.

The Maiak plutonium plant was built alongside the hydraulic system of the Techa River. Racing to produce plutonium, plant directors failed to invest adequately in waste management systems for radioactive by-products, which plutonium plants produce in supersized quantities. When, in 1949, underground, cement storage basins had filled to capacity, the plant director, Boris Muzrukov, ordered that the high-level waste be dumped into the Techa River. A Dixie cup of high-level radioactive waste would kill everyone in a lecture hall. From 1949–1951, plant managers dumped 6 million cubic meters of it into the turgid, muddy Techa River, 4300 curies a day for a total of an estimated 3.2 million curies over three years (Novikov, Akleyev, and Segerstahl 1997; Kossenko, Burmistrov, and Wilson 2000, 553–575; Timonin 2006, 16; Degtva et al. 2012, 25–38). Twenty-eight thousand people lived downstream from the plant on the Techa River. Astonishingly, these mostly Tatar and Bashkir communities were invisible to the plant management.

For two years, it did not occur to them to test the river water or investigate the effects of the dumping on the downstream populations. Plant scientists did not consider the problem until people in the closest upriver community, Metlino, which hosted some auxiliary (ethnically Russian) plant workers, grew very ill. At that point plant scientists measured and realized that the Metlino pond was terrifically radioactive. They then traveled downriver and pulled out dosimeters. To their horror, they found in 1951 that the downstream villagers relied on the river for drinking water, bathing, cooking, cleaning, and watering crops and livestock. Radiologists taking measurements grew very anxious, for their own health and that of the kids swarming them. They estimated that in the most contaminated village, Berdianish, there were spots with an alarming 30,000 curies per square kilometer; the background radiation as high as 350–400 microrentgen a second – enough to get a life-threatening dose in a month in the village.<sup>48</sup>

The belated recognition that the Techa River basin had become the world's first populated radioactive terrain was a nuclear tragedy which no one called by name. Perhaps for that reason the response was slow and inadequate. As at the plant, dealing with the problem of "liquidation" of the Techa River catastrophe fell to people living outside the closed nuclear city of select workers. The liquidation jobs of digging wells, taking water samples, and cordoning off and guarding the river fell to local Bashkirs and Tatars. Soldiers in construction battalions had the job of evacuating the villages and demolishing them. Local men given the duty of standing guard along the contaminated river emanating harmful gamma rays died after five to seven years (Bairamova 2005, 1–5). There is no way of tracking the medical record of soldiers who carried out the evacuation jobs.

In 1953, a panel of Maiak scientists recommended removing all 16 settlements on the Techa River to safe ground and closing off the territory for all use. Moscow officials, however, found the price of the resettlement too expensive and cut the list to 10 villages,

omitting especially the largest settlements, Muslumovo and Brodokalmak, where Tatar and Bashkir villagers continue to live to this day on land contaminated far above the permissible levels.<sup>49</sup>

Another major accident occurred in 1957, when an underground waste storage tank overheated and blew 20 million curies of radioactive waste around the industrial zone and in a spreading tongue windward from the plant. As for earlier accidents, plant managers relied chiefly on soldiers and prisoners to clean up this accident, shoveling radioactive debris, hosing and scrubbing down contaminated factory walls, and burying contaminated equipment, while continuing to build more factories on the highly radioactive terrain. Plant workers wore personal monitoring devices. They submitted urine and blood samples. Supervisors had limits, 15 rads a year in 1957, to the amount of dangerous work they could assign a paid employee, and plant doctors removed workers, once overexposed, from hazardous jobs (Gus'kova 2003, 57–58). This was not true for unmonitored soldiers and prisoners. Liquidation workers received doses as high as 120 rads in the clean-up operation (Batorshin and Mokrov 2013). Plant workers changed their clothes and showered after their shifts, while prisoners and soldiers had no protective jumpsuits or showers and remained for days in barracks covered in radioactive fallout (Kazansky 2007, 12). In the months after the accident, soldiers trooped into the closed city of Ozersk in their “dirty” shoes and clothing, spreading radioactive contamination around the city. In response, city leaders used the gates and fences surrounding the fortress town to finally install radioactive monitoring and finally keep dirty manual laborers (prisoners and soldiers) out, and that way keep their homes, schools, and parks clean.<sup>50</sup> The 1957 accident helped at long last to seal off the closed city from the socially, environmentally, and ethnically contagious surroundings.

In the years that followed, people living in the villages over which the radioactive fallout of the 1957 explosion passed were deployed as liquidators. Young women, some pregnant, children, and men were sent out to harvest crops too radioactive to eat and dump them in lined pits. Collective farm chairmen ordered these same people to be sent to neighboring villages that had been bulldozed flat to bury bricks and plant trees for cover. In a telling case of two villages, Russkaia and Tatarskaia Karabolka, existing in the radioactive trace side by side, only one was evacuated – Russkaia Karabolka. Tatarskaia remains to this day fully inhabited with hot spots in the village measuring up to 20 curies a square kilometer, even though, in the aftermath of the accident, Soviet scientists settled on a permissible threshold of one curie per square kilometer (Institut global'nogo klimata i ekologii 2005).<sup>51</sup>

In short, because of the great wanton spilling of radioactive waste, prisoners were deployed in Ozersk long after they were phased out elsewhere in the Soviet Union as an expensive, inefficient labor force. Today, in fact, Ozersk is the only closed nuclear city to still have a super max prison (Leskov 2010). The dire need that led NKVD construction bosses to deploy suspect, ethnic minority labor mandated their continued use in subsequent decades. This reliance on prisoners and military construction brigades was a weak link in the nuclear security apparatus. Construction managers at the plant deplored the revolving door of forced labor. “They come, we train them, and they leave. We are nothing but a trade school,” a contractor complained. “If you look at this from the point of view of regime secrecy,” he added, “does it make sense that 100,000 various people have worked here and left, and now wander the globe?”<sup>52</sup> Indeed, Zhores Medvedev heard of the major secret accident at the Maiak plutonium plant in 1957 from former prisoners who worked at the site, a fact of which he informed the Central Intelligence Bureau and that he publicized widely in the West (Medvedev 1979; Medvedev 1995). Nonetheless,

the extremely hazardous nature of plutonium production and the specifically accident-prone quality of the Maiak plant made deployment of suspect ethnic minority prisoners and conscripts a necessity despite national security concerns.

Prisoners, soldiers, and villagers served as jumpers, working temporarily and unmonitored on contaminated sites. If they got sick from radiation, no one noticed. Their exposures and illnesses did not enter the record. Residents of Ozersk, on the other hand, were monitored for exposure and were surveyed for health problems. Doctors at Ozersk, meanwhile, bragged that the population of the closed city was healthier, lived longer, and had higher rates of birth and lower rates of mortality than the national averages (Novoselov and Tolstikov 1995, 50–54). These statistics appeared to justify the safety of the Soviet nuclear weapons apparatus and the care by which managers regarded their plutonium plant operators and families. But those statistics were only of a small part of the nuclear labor force that toiled in and around the plutonium plant. By far, most people who were exposed never entered the official record of exposures and most of these people were ethnic minorities. The compartmentalized qualities of the regime zone created categories of labor in separate zones. These zones in turn determined the “nuclearity” of the people in them, which in turn qualified some people, those in Ozersk, for monitoring and limits to exposure, while the rest in camps, garrisons, and villages were not categorized as nuclear workers and so were not monitored and had no limits to exposure. This highly compartmentalized landscape left a lasting toll on public health.

In Muslumovo, on the contaminated Techa River, the vast majority of villagers suffer from illnesses. Ninety percent of children have genetic disorders (Rush 1995; Bairamova 2005, 47–50 and 68; author interview with Alexander Akleyev, 26 June 2007, Cheliabinsk).<sup>53</sup> One Tatar historian has charged that the exposure of the Techa River dwellers was an act of genocide (Bairamova 2005, 1–5). But the story is both more complicated and banal than that. At first plant scientists did not see the Techa catastrophe because, as Hecht (2012, 320) points out, it takes an infrastructure to perceive radioactive contamination: roads to get to the isolated villages, dosimetry, doctors, radiologists, and health clinics to distinguish radioactive isotopes in the body, regulations, courts, and lawyers to make this case credible, believable. Starting in 1962, plant doctors took annual blood samples and studied the residents of Muslumovo, but one of the leading researchers admitted that their dosimetry was inadequate, that they really cannot say how much the people on the Techa River were exposed (author interview with Mira Kossenko, 13 May 2012, Redwood City, CA). These ambiguities save a great deal of money. As it stands, Russian officialdom, like American officials, have admitted that workers in the plutonium plants suffered from excess cancers and radiation-related illnesses. It is difficult to deny the radiation-related health problems of former workers because they were monitored for exposures. The former workers receive compensation for their health problems. Presently, however, the Russian government asserts that people in Muslumovo are sick for reasons of poverty, poor nutrition, alcohol abuse, and inbreeding, not from radioactive contamination (Karchenko 2007, 25). This division between radioactively ill former nuclear employees and local bystanders sick from their own poor habits is a common one. Advocates of nuclear power have used the same explanations (poverty and ignorance) to explain away the health claims of indigenous people in Ukraine, Africa, and the American West (Louvat 2006, 27; Hessler 2010; Hecht 2012, 183). While the US government compensates former workers of the Hanford plutonium plant who have health claims, the same Department of Energy has spent in excess of 60 million dollars defending in court corporate contractors against “downwinders,” farmers in neighboring communities suffering from cancers and thyroid disease (Dorn Steele 2003; Greene 2011). Workers in the USA were

monitored. Their exposures are difficult to refute. For downwind and downstream neighbors, however, with no infrastructure in place to detect radiation, it is the easiest thing in the world for industrial leaders to deny.<sup>54</sup>

If one discounts the unmonitored bystanders, the migrating workers and prisoners whose exposures were never recorded, then the health record of nuclear power and weapons production does not look too bad at all, it looks safer in fact than coal (Brown 2011).<sup>55</sup> But to draw that conclusion is to collude in processes that used the seemingly natural boundaries of ethnic belonging and the legal categories of class and incarceration to rank, categorize, and ultimately selectively expose some people over others. These people were easy in a socioeconomic way to discredit, blame for their medical misfortune or accuse of being welfare cases looking for a compensation check. In large part this is because they were poorer, incarcerated, conscripted, and most of them in the Soviet case were members of suspect or unreliable ethnic minorities. Selective nuclearity was a personal tragedy for hundreds of thousands of people who were quietly contaminated, but this history also points to a repetitive quality in nuclear installations, whether socialist or capitalist, where industrial leaders used social-ethnic categories to make invisible the vast number of exposures. This process has helped erase the popular understanding of the great plutonium disasters from the public imagination. Both the American Hanford plant and the Soviet Maiak issued at least double the number of curies into the surrounding environment than the 1986 Chernobyl explosion (Gephart 2003).<sup>56</sup> Yet both disasters hardly make media mention today in discussions of nuclear catastrophe. Ethnicity studies often track the calling into being of certain groups determined to belong to an ethnic category. This case illustrates the opposite trend, a willful forgetting of people deemed ethnically and politically marginal in order to tell a hopeful story of modern technology, science, and progress.

## Notes

1. In some regions of the Urals, special settlers and prisoners were so numerous they outnumbered free citizens (Suslov 2003, 45, 48–52, 57).
2. On living conditions and low wages for employees in construction firms, see Chernikov (1995, 17).
3. Additionally, prison and special settler labor was deployed from the late 1920s as a substitute for unwilling “free” labor in hard to access territories of the North and East (Viola 2007, 97–98).
4. Catching workers was a problem. In the northern Urals Oblast of Molotov, NKVD agents caught 1590 of 12,170 deserters in the first half of 1944. In the second half, they improved reporting and policing and nabbed 6016 workers or 7448 who had quit. An amnesty of 30 December 1944 gave workers 15 days to return to their original place of work in order to avoid arrest (Livshin and Orlov 2003, 9, 152–155). See also Klevniuk (2004, 44–45). In Perm Oblast, in the immediate postwar years, for example, 1600 prisoners were freed from camps of repatriated POWs. Most of these were scientists, engineers, and industrial leaders (Suslov 2003, 45).
5. Gulag production accounted for 10% of entire gross industrial output of the USSR (Filtzer 2002, 25). On the role industrial managers played in encouraging the growth of Gulag camps in the Urals, see Harris (1999) and Suslov (2003, 30, 51).
6. In just one month, November 1943, the Sverdlovsk censors skimmed over a million letters in 21 languages (Stykalin 2005, 96–108).
7. It is hard to get an accurate number of workers and their status for the plutonium site. Some estimates run as high as 40,000 prisoners. Alexander Saranskii was in charge of hiring and personnel for Cheliabmetallurgstroi (ChMS). He remembered that they took first of all the “special contingents,” prisoners and special settlers, whom he defined as Germans (Chernikov 1995, 37, 57–58, 107, 115). Officials counted in the fall of 1946 that they had sent to the special site no. 859 (Ozersk) 1895 interned Germans, all of the region’s 15,669 special settlers and a portion of the 8000 POWs held by ChMS. As of 1 January 1947, there were nearly 9000 prisoners at the site and the ChMS enterprise wanted to send in more prisoners, but could not for lack of housing. See Ob’edinennyi Gosudarstvennyi Arkhiv Cheliabinskoi Oblasti (hereafter,

- OGAChO R-1619/2/48, 46–59. Four months later, the ChMS NKVD enterprise had 13,000 prisoners, 7000 special settlers and 8200 POWs, only 47% of whom were healthy enough to work. OGAChO R-1619/2/48, 80–91. For much higher estimates of the number of prisoners at 40,000, see Dokuchaev (1998, 282). Kuznetsov (2008, 88) gives a figure of 11 corrective labor camps (ITL) and 16,000 special settlers and internees. He does not give the number of prisoners. See Mel'nikova (2006, 33) on an estimate of 8400 prisoners (but no record of exiles) at the Maiak site.
8. OGAChO 1619/2c/43, 42–43 and OGAChO 1619/2/43, 66.
  9. For the civil war in West Ukraine, see Burds (2001).
  10. On organization of new camps, see OGAChO 1619/2/43, 66–67 and OGAChO 1619/2/43, 63–64. On the lack of a process for selecting out the most dangerous prisoners, see Kuznetsov (2008, 61). On sorting prisoners for health rather than political reliability, see OGAChO R-1619/2/48, 58. For evidence of dangerous criminals within the plutonium site camps, see OGAChO 1619/2/434, 27.
  11. OGAChO 1619/23/48, 86–87 and OGAChO R-1619/2/51, 6–8. For more on the status of special settlers, see Viola (2007, 95).
  12. OGAChO R-1619/2/48, 46–59.
  13. OGAChO 1619/2/44, 225 and OGAChO 1619/2/44, 54–57.
  14. OGAChO R-1619/2/48, 46–59.
  15. OGAChO R-1619/2/51, 5–6. On non-convoy labor, see Bell (2013, 116–141).
  16. OGAChO R-1619/2/51, 6–8.
  17. OGAChO P-288/1/141, 12; OGAChO 1619/1/39, 256; and OGAChO 288/42/77, 4. In a neighboring nuclear installation, 217 soldiers were court-martialed in 1947 alone (Kuznetsov 2008, 96–98). On the general unruliness of postwar soldiers, see Fedorov (2005, 197–208).
  18. OGAChO 1619/2/44, 3; see also Chernikov (1995, 25). On the general features of construction brigades in the atomic sites of the Urals, see Kuznetsov (2008, 86–87).
  19. A rare, hand-drawn map of the plutonium production site from 26 March 1947 shows that there was a Pass Control Point, on the main road into the area from Kyshtym, but the fence to “alienate the territory” was still only “projected” OGAChO R-274/20/18, 121–122. For record of non-site civilians catching rides on ChMS buses to construction sites, see OGAChO 1619/1/39, 300.
  20. On Tkachenko's background, see Chernikov (1995, 48–49).
  21. Saranskii's memories exaggerate the completeness of the background checks. For complaints about the lack of thorough background checking and record keeping in the personnel division, see OGAChO P-1137/1/48, 84–85.
  22. See, for example, Riabev (2004, 431, 633–637)
  23. OGAChO P-1137/1/48, 79–85; and Chernikov (1995, 116, 96). For transcripts of the political working over of a Jewish administrator, see OGAChO 2469/1/4, 1–12. In the Urals, even the successful director of the tank factory, I. M. Zal'tsman, was accused of being a cosmopolitan and fired. OGAChO P-288/14/1, 13–25. On an attempt to clear the larger Soviet nuclear bomb installations of Jews, see Vazhnov (2002, 95–97).
  24. OGAChO 2469/1/121, 173.
  25. By 1957, in the Ozersk Party roster, most candidates and members were Russians with some Ukrainians. OGAChO 2469/1/120.
  26. See Soviet of Ministers decree, no 233–297, “O vyselenii iz osobozhzhimnoi zony vsekh neblagonadezhnykh i rodstvennikov grazhdan poneshekh ugolovnoe nakazanie,” 8 February 1948. For local orders, OGAChO 23/1/22, 4–5 and OGAChO 288/43/21, 1–2.
  27. OGAChO 288/42/34, 56; and Khakimov (2006, 16). For petitions asking to return, see OGAChO R-274/20/30, 50–53, 66–67, 78, and 87.
  28. OGAChO R-274/20/18, 121–122.
  29. OGAChO P-288/1/141, 12.
  30. OGAChO 2469/1/117, 168, 234; OGAChO 2469/1/118, 105; see also Kazansky (2007, 12).
  31. OGAChO P-1137/1/31, 68–70. The periodic cleansing of special regime cities started in the early 1930s and was an essential element of keeping cities such as Moscow and Leningrad as consuming preserves for Soviet elite (Popov 1995, 3–14; Hagenloh 2000, 286–308; Kessler 2001, 478–504; Shearer 2004, 835–881).
  32. The original orders by Ivan Serov called for deporting former prisoners sentenced for counter-revolutionary activity, banditism, and repatriated soldiers (Riabev 2007, 170, 183, 187). The order is also mentioned in “Protokol no. 77 zasedaniia spetsial'nogo komiteta pre sovnarkome SSSR,” 23 May 1949. An earlier call to deport went evidently unheeded (Riabev 2002, 245–46, 368). From 1948–1949, MVD officials sent 5000 people from site 859 to Dal'stroi. In

- 1951–1952, 7000 special settlers and members of their families were sent to Uzbekistan and Tadzhikistan (Kuznetsov 2008, 96).
33. For prisoners' successful requests to remain in the closed city at the end of their sentences, see OGACHO 2469/3/3, 59–64.
  34. OGACHO P-1137/1/38, 142–146; OGACHO P-1137/1/38, 234–235; and OGACHO P-1137/1/48, 78–80.
  35. OGACHO 1137/1/48, 80–84. On the charges against Jewish professors in Cheliabinsk, see OGACHO 288/42/54, 140–152.
  36. OGACHO 1137/1/48, 80–84.
  37. *Ibid.*
  38. For a retrospective view of cost overrun and turnover problems, see OGACHO 1138/1/22, 157–161 and OGACHO 2469/1/2, 10–11.
  39. Prior to 1953, there were smaller, secret amnesties that recognized abuses of the judicial system. A 1949 amnesty, for example, released about 84,000 women and children (Afanasev 2004, 85–86). A 1950 amnesty released pregnant women and women with small children from construction camps of nuclear sites. Female former inmates with children up to the age of 14 years were also free to leave the regime zones (Riabev 2007, 65).
  40. On labor shortage “because of the amnesties,” see OGACHO 1138/1/29, 21–31, 58–64. On amnesties in the ZATO system, see Kuznetsov (2008, 78–81), and in the Cheliabinsk Oblast, see OGACHO 274/20/33, 65–67. On Beria's reforms, see Knight (1993, 185).
  41. OGACHO 1138/1/25, 117–123.
  42. OGACHO 1138/1/22, 125–128.
  43. OGACHO 1138/1/29, 58–63.
  44. As the charges were relayed in Ozersk, OGACHO 1138/1/26, 6–7.
  45. Arkhiv Prezidenta Rossiiskoi Federatsii 3/47/13, I. 1.
  46. OGACHO 2469/1/1.
  47. OGACHO 107/22/67, 52–53.
  48. The estimate was villages would get 150–300 rads in a month, 7–14 times greater than the permissible *annual* dose of 25 rads at the time. Larin, *Kombinat “Maiak,”* 52.
  49. OGACHO R1644/1/4a, 92–94; and Institut global'nogo klimata i ekologii (2005).
  50. OGACHO 2469/1/118, 101–105; OGACHO 2469/2/4, 21–29; and Medvedev (1990, 108).
  51. Areas with more than three curies per square kilometer fall into Zone 1, the most highly contaminated areas of the trace (Dobrynina 2004).
  52. OGACHO 2469/1/1, 93.
  53. A 1968 report by the Institute of General Genetics found evidence of chromosomal aberrations in Muslumovo at approximately 25 times greater than the norm (Shevchenko 1998). For a study on fertility problems, see Akleyev and Ploshchanskaya (2000). For a review of literature that found a rise in congenital problems, but at rates that proved inconclusive, see Kossenko, Burmistrov, and Wilson (2000).
  54. On corporate promotion of doubt, see Proctor and Schiebinger (2008, 14–20).
  55. For an older version of the same argument, see Daniel J. Flood to Glenn Seaborg, 23 August 1963 and “AEC Air Pollution in New York City,” Atomic Energy Commission 506/6, 22 June 1965, DOE Germantown, Record Group 326, 1362/7.
  56. Estimates at the Maiak Plant are far greater, at one billion curies (Larin 2012).

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