**In the House that Plutonium Built: The history of plutonium, radiation and the communities that learned to love their bomb**

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When you think of the most radiated territories on earth, Chernobyl might come to mind or the nuclear test sites in Nevada and Kazakhstan; barren, desolate, abandoned landscapes. Yet Richland, Washington and Ozersk in the southern Russian Urals—quiet, prosperous, sophisticated communities built for operators of the world’s first plutonium plants—are situated in the midst of two of the most radiated territories on the planet.[[1]](#footnote-1) Unraveling the incongruity of suburban prosperity alongside cyclone fencing punctuated with triangular nuclear warning signs is the undertaking of this paper.

In 1944, brigades of construction workers, soldiers and prisoners transformed Richland from a ranch town to an ‘operators’ village’ exclusively reserved for workers at the new Hanford Engineering Works, a vast, ambling complex, fenced and guarded, that produced plutonium for the American Manhattan Project. A few years later, inspired by Richland and Hanford, Soviet soldiers, prisoners and construction workers broke ground on another special city dedicated to plutonium workers. This one, Cheliabinsk-40, was located in the dense, marshy forests of the Russian Urals. Both cities, Richland and Cheliabinsk-40[[2]](#footnote-2)\*, existed to secure the secrets of plutonium. To keep the plutonium safe, plant employees were carefully-screened and closely-watched in isolated communities in remote locations. To keep the plutonium workers, engineers and scientists happy in these provincial locations, industrial leaders rewarded them handsomely and invested generously in the plutonium communities.

In short, it took a village (really a small city) to produce the few kilograms of plutonium necessary for a nuclear bomb. The cities existed for four decades in relative obscurity (Richland) or outright secrecy (Cheliabinsk-40). Chernobyl changed all that. When reactor number four blew in April 1986, it gave a pulse to anti-nuclear groups that had long demanded to know what went on behind the gated complexes of the military nuclear installations. As American and Soviet documents were de-classified, the public learned that the plants had dumped, each day, tens of thousands of curies of radiation into rivers, air and soil. As the days had accumulated into decades, the total of spilled curies mounted into the millions and then hundreds of millions. The world watched in horror as Chernobyl liquidators in white jumpsuits bulldozed villages and sprayed forests with foaming chemicals. Most viewers did not know, however, that the liquidators had cleaned up radioactive landscapes before; that Chernobyl was unique only in that it occurred while cameras were running.

Since Chernobyl, the public memory of the plutonium cities has existed in a vortex of controversy. Commentators, residents, and activists characterize the plutonium cities variously—as radioactive and dangerous, or as safe, wholesome, “a great place to grow up.” The population of the towns are touted as either exceptionally educated, or as duped, silenced, or worse, mendacious.[[3]](#footnote-3) People in farm communities surrounding the plutonium cities filed lawsuits for damage from what they charged were radiation-related health problems. Meanwhile, many plutonium city residents fought against acknowledging a connection between the plutonium plants and local health problems. In Ozersk, plant managers discredited local environmental groups for having taken funds from foreign foundations; for working as agents undermining Russian unity and Russia’s military strength. Richland residents rejected local environmental groups as liberals and enviro-fascists from Seattle or coastal Oregon, meddling in local affairs. They were depicted as outsiders who had no understanding of local conditions.[[4]](#footnote-4)

Why were and are residents so fond of their plutonium plant, even after they learned the plants had spread massive doses of radioactive contamination across a landscape they called home? In both Richland and Cheliabinsk-40, local boosters counted up the number of PhDs and boasted about the high level of education among their residents. Why did these people, so proud of their knowledge, agree to live in ignorance for so long? Soviet citizens had no electoral politics and no independent media, but the residents of Richland lived in a thriving democracy; how did the famed checks and balances fail so that a calamity surpassing Chernobyl occurred in America’s heartland?

Part of the troubling legacy derives from the fact that these towns—where tremendous violent capacity was produced in softball-sized orbs— were considered so pleasant. The cities won prizes for planning, housing and educational achievement.[[5]](#footnote-5) With generous federal subsidies, Richland led American society in charting out the consumer comforts of single-family suburbia, while Cheliabinsk-40 emerged as the long-dreamed Soviet socialist city (*sotsgorod*). The tranquil prosperity of these communities concealed the fact that they were also military fronts in the midst of an undeclared war. In fact, the plutonium cities—so prosperous and solicitous, so good at simulating the functions of a participatory society—proved to be very successful incubators of loyalty, patriotism and faith in science and authority. As I’ll show, many residents were happy to give up their civil rights and freedoms in exchange for a ticket into the plutonium cities. I argue that it was the very powerful authenticating force of prosperity that is in large part to blame for the environmental catastrophes. The incongruity of the comfortable and thriving plutonium cities against an invisible, radioactive geography enabled the tragedy of massive environmental contamination, enabled too the personal tragedies (for there were many) of contaminated bodies to go unnoticed and unheeded for decades.

**CONTAMINATION**

Plutonium production is the most polluting aspect of the nuclear weapons industry. To produce a few kilograms of plutonium requires several tons of uranium and generates hundreds of thousands of gallons of radioactive waste. From 1948 to 1993, the Maiak and Hanford plants each produced, not kilograms, but over a hundred tons of plutonium.[[6]](#footnote-6) The extreme quantities of plutonium translated into massive volumes of radioactive waste that leaked, spilled or floated into the ground, water and air.[[7]](#footnote-7) In four decades, each plant dumped over 200 million curies of radioactive waste into the environment—twice as much as the explosion at Chernobyl.

After Hiroshima, the world learned that Richland housed the operators of the Hanford plutonium plant. In August 1945, the U.S. government issued the Smyth Report, which laid out the basics of American wartime nuclear production and pinpointed the location of the formerly secret Manhattan Project sites. The Report also sought to placate residents in and near Richland: “The success of the separation process at Hanford has exceeded all expectations…None of the fears expressed [regarding]...radiation effects in the chemical processes have turned out to be justified." And: "Factors of safety used in [Hanford] plant design and operation are so great that the hazards of home and the family car are far greater for the personnel than any arising from the plants."[[8]](#footnote-8)

Classified reports about radioactive contamination from Hanford were less sanguine. Initially, Hanford scientists saw the air, river and ground as great sponges that would take up radioactive isotopes and spread them around so thinly as to be safe everywhere to everyone. As they conducted the first small-scale studies, however, Hanford scientists learned to their dismay that the environment made a very selective and unpredictable sponge. They found that radioactive isotopes concentrated in certain places over others: in the eddies where fish lingered to feed, in some underground aquifers and not others, under the pathway of prevailing air currents, on sloping hillsides that caught the wind, and in hardy, efficient desert plants and root vegetables.

In 1943, for example, DuPont engineer Crawford Greenewalt wrote in his diary about concerns that Hanford, located in the nadir of the Great Columbia Basin, would lead to a bottleneck of “high concentrations of radioactivity” heading south down the Columbia River toward the neighboring town of Pasco. Meteorologist Dr. Phillip Church carried out a study that confirmed that radioactive material could drift long distances relatively undiluted toward Pasco, then on to Walla Walla.[[9]](#footnote-9) Scientists checking drinking water in 1946 found that Richland wells number five and fifteen had positive alpha counts, meaning they contained plutonium.[[10]](#footnote-10) Other wells, however, were fine. In 1954, scientists learned, as they expected, that the radioactivity of the river water decreased the farther down the river from the plant, but downstream the radioactivity of plankton and algae *increased*. They determined that aquatic organisms were absorbing and cleaning the water of radioactive isotopes.[[11]](#footnote-11) These plankton and algae then became food for larvae and crayfish, which were, in turn, consumed by larger fish up the food chain in random and unpredictable ways. On the aggregate, scientists agreed it was safe to consume many pounds of ‘average’ white fish a month from the Columbia River. Some fish, however reached contamination levels “appreciably higher than the average,” and would not be safe to eat.[[12]](#footnote-12) Biologists drifted downriver and watched the quiet, warm shallows near the reactor outlet pipes where the fish loved to gather because the water was warmer. There they noticed the water had turned “milky” with “suspended material.” The scientists tested these fish and found they had higher concentrations of radioactivity than the water in which they lived. [[13]](#footnote-13) It turns out that living organisms hungrily absorbed radioactive isotopes from the environment. Bad news for those at the top of the food chain.

Scientists went out to nearby farms downwind on the sloping hillsides and they gathered up soil and produce from the farms. As with the fish, they found that the vegetables had greater concentrations of radioactive isotopes than the soil in which is it was grown, ten times higher than average. When they boiled the vegetables, the radioactivity was yet again “greatly accelerated.”[[14]](#footnote-14) This was one of the surprising discoveries of radioactive isotopes; that as they moved up the food chain, through the roots of plants to the stalk and fruit, from the organs of animals to the feces used as fertilizer, from water to the flesh of fish, the density of radioactivity increased. In short, the average rates of universal diffusion upon which scientists based their safety studies, had no basis in the complex and constantly shifting terrain of geology, soil, plant life, fauna and human bodies.[[15]](#footnote-15) In this uncertain and spotty realm, the aggregate scientific studies and recommendations for maximum ‘permissible’ levels expressed a wish to measure, predict and control, but hardly reflected the dappled, invisible geography pocked with hot spots: hot fish, hot wells, hot pastures, hot vegetables, and hot swimming holes.

The Hanford scientists kept these startling and important discoveries to themselves in classified documents. That means that on the other side of the globe, Soviet scientists, who had in hand stolen plans from the Hanford plant and formulas from Los Alamos, did not learn of the medical studies about the intensifying path of radiation up the food chain. Nor would the discouraging news have stopped them. For the first decade at both plants, production trumped all other priorities.[[16]](#footnote-16)

The truth is Soviet leaders had no business building an atomic bomb. After WWII, the Soviet Union was devastated. In contrast to the postwar wealth of the United States, the Soviet Union in terms of destruction ranked among the defeated powers. Twenty-five percent of the nation’s assets had been destroyed; fourteen percent of the population had been killed.[[17]](#footnote-17) Thirty-five million people were homeless. Thirty-two thousand enterprises and 70,000 villages had been destroyed. Basic necessities: food, shelter, clothing were in dire supply. A drought and dire dislocation led to a major famine in 1946 and 1947.[[18]](#footnote-18) To drum up the necessary cement, bricks, stainless steel, iron ore, precious metals, wood, quarried stone, rubber, laboratory equipment, uranium ore, graphite, lend lease Studebakers, draft horses plus an army of construction workers and trained personnel and the food to feed them meant making terrible sacrifices elsewhere across the pitted and bombed Soviet landscape. It meant homeless refugees would live in wet, cramped, sod dugouts a while longer; that workers and school kids would continue to walk long distances each day rather than ride a bus; that food and consumer goods would remain scarce and the population hungry, threadbare and standing in long lines for yet more years. The Soviet bomb meant, in short, that the promises of socialism and peace were bulldozed to the back lot for the foreseeable future.

But there was no getting around it. Hiroshima and Nagasaki’s flattened crop circles of destruction transformed the victorious Soviet Union, the liberator from fascism in Europe, into, yet again, a technologically-backward nation under siege.[[19]](#footnote-19) For the Soviet imagination of ‘capitalist encirclement’ intensified with the American nuclear monopoly. A few weeks after Nagasaki, in August, 1945, the U.S. Air Force commanders issued a classified map of forty Soviet cities to be targeted in an atomic attack. Soon after, Soviet intelligence obtained copies of the map, and Soviet leaders drew the conclusion that American military leaders were planning a surprise nuclear attack.[[20]](#footnote-20)

Charged with directing the drive for the Soviet bomb, in 1946, physicist Igor Kurchatov went home to the Urals to choose a site for the first Soviet plutonium plant. He skipped over the vast great plains of central Russia and Kazakhstan, the geographical equivalents of eastern Washington, because one of the major goals in sighting the plant was secrecy. He chose a remote, lovely, lakeside isthmus, surrounded by covering forests, in a thicket of bogs and streams along the foothills of the eastern Ural Mountains. Secrecy was paramount. Security officials feared that US agents would learn of the plant and attempt to destroy it.[[21]](#footnote-21) And so they removed the plant and planned city from the map, banned the words radiation and plutonium, and shipped young graduates from physics and chemistry departments to the site in trucks with blinders so travelers could not orient themselves. Some workers arrived shocked to see the barbed wire and guard posts. They assumed they had landed in the Gulag under arrest.[[22]](#footnote-22)

From 1946-1948, Soviet industrial leaders built the Maiak Plant in great haste, rushing to protect the Soviet Union against the expected American nuclear strike. They worked round the clock, deflecting security chief Lavrenti Beria’s menacing phone calls, hastening to build an atomic bomb in the short time Stalin had given them. As at Hanford, Soviet engineers cut corners on waste disposal.

They treated the local river, the Techa, for example, the way most industrial leaders did at the time—as a God-given sewer. At first they poured high-level waste into underground storage tanks and low-level waste into the river. After a year of plutonium production, in late 1949, however, the plants’ special storage tanks were completely full. The plant managers had two options: shut down production or dump the highly-radioactive wastes into the Techa. They chose the second option, pouring forth 2.5 million curies in the subsequent nineteen months.[[23]](#footnote-23) Unlike the swift and rocky Columbia River, the Techa flowed leisurely downstream, gathering in swampy ponds, flooding in spring, dwindling by late summer to a trickle, and leaving cracked muddy flats airborne in the strong summer winds.[[24]](#footnote-24) Radioactive isotopes released from the plant, floated downstream and lodged in the muddy banks, in grassland, flooded pastures, and river fish. About 30,000 villagers lived along the Techa. Most of these communities had no wells. They used the river to cook, clean, bathe, and to water crops and livestock.

In 1951, a radiologist, A. P. Alexsandrov, secretly led a medical research team down the river. The scientists noticed that a thick liquid glided on top of the river covering everything with a rainbow-hue gloss.[[25]](#footnote-25) Pulling out Geiger counters, they were shocked to learn that radioactivity reached eighteen rads an hour on the banks of Kokshrovskii Pond and three rads near the heavily-populated Metlinskii Pond.[[26]](#footnote-26) This meant that a person standing near the pond would exceed their annual permissible dose in a day or two.[[27]](#footnote-27) Alexandrov’s measurements sent out a general alarm. Alexandrov recommended that dumping into the river cease and that the downstream populations be monitored and perhaps the villages evacuated. From 1951-1953, Soviet scientists took monthly measurements of radioactive isotopes in the water, river, pond silt and shore line, of animals, adults and children. The plan called for continued monitoring into the mid-fifties, but by 1953 the medical staff in Cheliabinsk-40 became overburdened caring for plant personnel. Nor did they have the equipment they needed to get to the remote villages and measure. In 1952, engineers built a series of canals to channel waste into Lake Karachai, a swamp with no outlet to the river. With that, the level of radioactivity decreased by twenty times in the Techa, but low level waste continued to flow in, at about 100-200 curies a day.[[28]](#footnote-28)

**OOPS**

When the plutonium plants were working perfectly, they set forth into the surrounding environment tens of thousands of curies of radiation a day—as part of the plan, the working order.[[29]](#footnote-29) This inventoried radiation was already tremendous, but what happened at the plutonium plants when procedures did not go as planned? Until Chernobyl, Soviet scientists had no official definition of a nuclear accident. Officially, there were three accidents at the Maiak Plant.[[30]](#footnote-30) And a handful of events termed “accidents” at the Hanford Plant.[[31]](#footnote-31) The declassified records and oral testimonies from the Hanford and Maiak plants, however, are full of descriptions of spills, seepages, erosion, slides, ruptures, fission, fractures, leaks, cracks, bubbles, burst, explosions—all the usual industrial hazards caused by human error, weather, or aging materials, but when these routine industrial mistakes occurred at a plutonium plant, they became major events in the history of radioactive contamination.

Workers tended to refer to these unclassified releases in shadow fashion. Maiak workers reported spills/utechki, crumbles/possypi, dispersals/vybrosy, hotbeds/otchagi, or slaps/khlopki. Hanford workers talked about equipment or labs getting ‘crapped up’, ‘burnt out,’ or ‘jetted.’ There were hundreds of these minor events. A worker’s hand slipped into a solution, a beaker fell with a crash onto a stone floor, aluminum cladding corroded and ruptured, a bucket kicked over, a valve was left on, two barrels placed too close together exploded in a spontaneous chain reaction. At the Maiak Plant, industrial leaders were so intent on getting every gram of plutonium, they made workers clean up spills by hand, sopping up the spilled solutions that emanated deadly isotopes.[[32]](#footnote-32) Many of these events went unmonitored, unmeasured, unrecorded and unreported.[[33]](#footnote-33) These unnoted incidents too became part of an invisible geography gradually mounting alongside the visible terrain.

One accident at the Maiak Plant, however, was so outsized, it could not escape attention. On a warm, sunny day, September 29, 1957, while the most residents of the town of Cheliabinsk-40 were at the stadium watching a soccer game, an underground storage tank holding highly radioactive waste heated up and blew. The explosion belched a 160-ton cement cap from 24 feet below ground and tossed it 75 feet in the air.[[34]](#footnote-34) The blast smashed windows in nearby soldiers’ and prisoners’ barracks and tore the metal gates off the fence. Then a column of radioactive dust and smoke rocketed skyward a half mile; with it twenty million curies of radiation.[[35]](#footnote-35) Prisoners and soldiers in the barracks raced outside to find a strange, flakey, black precipitation falling from the cloud. Someone muttered sabotage; others mentioned Americans. Few understood immediately that they were victims of friendly fire.

No one knew what to do. There were no emergency plans; no checklist, no buses, ambulances or sanitations points waiting for this kind of nuclear blast. The soldiers, prisoners and blue-collar workers on site at the time did not know officially they were working with radioactive materials. And so valuable hours were lost before the order came from Moscow to evacuate the plant around the explosion where several inches of radioactive fallout covered everything.

The thick cloud of radioactive gas headed away from Cheliabinsk-40, to the northwest, toward forests, lakes and countryside. As it travelled, the cloud descended and spread a radiated tongue about four miles wide to twenty-three surrounding villages in a territory of a 1,000 square kilometers.[[36]](#footnote-36) Radiologists followed the cloud to downwind villages. They measured the ground, farm tools, animals, and people. The levels of radioactivity were extremely high. A couple of days passed before E. P. Slavskii, the plant’s director, ordered an evacuation of the most contaminated villages downwind. These villages were located in remote, roadless forest, far from transportation points. (At the time, there was no paved road or highway in all of the Cheliabinsk and Sverdlovsk Oblasts.) S. F. Osotin was a member of an evacuation team. He remembered: “When we arrived in the village of Berdianish people were living normally. Children ran about barefoot, playing.” One of Osotin’s colleagues went up to a few children and held up his Geiger counter. He said, “I can tell with this instrument exactly how much kasha you had for breakfast.” The children happily stuck out their bellies. He measured 40-50 microroentgen a second. The men backed away.[[37]](#footnote-37)

The villagers were mostly Tatar and Russian farmers. Told they were being evacuated because of “industrial pollution”, they reasonably resisted as soldiers dropped their clothing, bedding, and household items in a pit and buried them, and led their livestock off to be shot at the edge of the forest. As far as they understood, there was no polluting factory for miles and miles.[[38]](#footnote-38) Many of the villagers were evacuated to a summer camp built for the residents of Cheliabinsk-40, called ‘Dal’naia dacha.’ There they waited out the winter of 1957-1958, writing letters: “…in connection with some kind of accident in a closed city, Cheliabinsk-40, many of us are sick and we sit here without jobs and wait. And what are we waiting for?”[[39]](#footnote-39) Other villages originally on the evacuation list remained in place.[[40]](#footnote-40)

**ILLNESS**

Nowhere, in either the SU or US, did scientists who charted out maps of radioactive contamination disclose the maps to the people who lived in or near the hot spots. Without sensitive equipment to monitor alpha, beta and gamma radiation, a person had no way of sensing the dangerous land mines around them. Those who dwelled nearest to the sources of radiation stepped on the mines most often.

Initially plant workers got sick. Some died; their deaths officially attributed to natural causes. In Chelibainsk-40, Taisa Gromova worked in the Radiochemical plant, where teams of mostly young women dissolved radiated fuel slugs to produce plutonium. Gromova was one of those who was always first to work, the most enthusiastic and hard working, energetic and smiling. Unfortunately, she worked in the hottest lab in the Maiak complex, where workers reduced great barrels of highly radioactive solutions down to grams of plutonium. Because the plant was poorly designed and equipped, workers were exposed daily to high levels of radiation.[[41]](#footnote-41) Gromova’s illness started with a cough, then shortness of breath, and a loss of appetite. She started to feel weak, lose weight and suffer from a general malaise. Soon after Gromova, another young woman, Shalygina, fell ill. These two young women were followed by others who been selected for work at the plant because of their youth and excellent health. People started to take note of the young radiochemical plant workers who sat silently in the cafeteria, stirring their soup, chewing weakly their rich, black bread.

Plant doctors examined the young women, rather blindly, because security officials denied them access to their patients’ radiation doses. The doctors learned to guess radiation doses by changes in the blood. They eventually came up with a diagnosis for a new disease, found, so far, only in the Russian Urals—Chronic Radiation Syndrome (CRS). One memoirist described the terrible ache of CRS as a pain that made him “want to crawl up the walls.”[[42]](#footnote-42) Gromova died of the CRS first, at age 30 with 230 times more plutonium in her bloodstream than “the acceptable norm.” Among her colleagues who attended her funeral, were others, also ill. Some of them qualified as invalids by their mid-twenties. Eight others soon followed Gromova to the new city’s new cemetery.[[43]](#footnote-43) The doctors were ordered to classify the files and write the deaths down as due to natural causes.

Inna Ramahova started working at Maiak’s radiochemical plant in 1948. In 1999, she remembered that they used to have “special apparatus operators teams” of volunteers who agreed to remove by hand filters clogged with uranium and plutonium. The workers, usually conscripts or prisoners, got a bonus of 300 rubles each time they did so. The special operators didn’t last long on the job. “Every two to three months the people changed,” Ramahova remembered, “and I never met them again. I saw people doing that work who were coughing up blood."[[44]](#footnote-44) By the end of the 1950s, half of the 1,500 employees at the Radiochemical plant had died prematurely in their forties and fifties. Fifty-four percent of those who died young succumbed to cancers.[[45]](#footnote-45)

Despite the secrecy, it was clear what was happening. One young woman, referred to in a party meeting transcript only as “blabber-mouth,” went home to Magnitigorsk to visit a sick family member in January 1951. There she told enough people that Cheliabinsk-40 was a virtual prison and that she was offered [higher-paying] work in a laboratory, but she turned it down. “To go work there—is to bury oneself”, she reportedly said. The MVD got wind of the woman’s indiscretions and arrested her for “spreading state secrets.”[[46]](#footnote-46)

In 1957, after the storage tank blew, the main cloud or radioactive gas missed Cheliabinsk-40, but radioactive isotopes from tires, shoes, clothing and equipment tracked into the city from the contaminated zone. No one noticed at first. After about two months, a dosimetrist noticed that Lenin and School Streets, where the leadership of the plant lived, were contaminated. [[47]](#footnote-47) That discovery triggered an investigation of apartments, shops and warehouses for spikes in the Geiger counter. In one apartment the investigators found a child’s bed, handmade of construction pipe, glowing with radiation. The child who had slept in the bed and the child’s mother had died, no one had known of what. The father was very ill. The bed had been radiating long before the accident. It turns out that the iron from the bedpost had been made of metal earlier used in a (radiated) reactor.[[48]](#footnote-48)

After the accident, Soviet authorities founded a medical research institute to study the ecology and effects of radiation on bodies. The institute carried out a study of people evacuated from the trace. The institute worked on devising ways to continue to use the agricultural land safely inside the trace. They figured out which vegetables (potatoes) take up less radioactivity from the soil; that it was less hazardous to eat radioactive meat than radioactive vegetables or milk; that skimming the top layer of soil from fields helped reduce the general intensity of radiation.[[49]](#footnote-49) Once Russian leaders publically announced the accident in June 1993, they stated that the accident had killed no one. Medical investigators released classified studies claiming that none of the exposed villagers experienced radiation illnesses. The only epidemiological singularity they found was that children resettled from the trace were five to ten times more likely to get thyroid cancer.[[50]](#footnote-50) Western and independent Russian scientists have criticized the follow-up study for the small size of the population examined (1,059 people), the limited period of observation and lack of an adequate control group.[[51]](#footnote-51) Russian geneticist Valery Soyfer asserts the Soviet government purposefully under-funded and discouraged especially genetic studies of villagers on irradiated territories.[[52]](#footnote-52) Other researchers have shown that the food villagers eat is contaminated; so too the bones of those who died.[[53]](#footnote-53) In general, there are few health studies, and those that exist are government-issued, and they assert the people are not sick, or if sick, then from radiophobia, or alcoholism and poor diets.

To this day, former Hanford officials still insist that the plant had no fatalities.[[54]](#footnote-54) In the plant archives, however, are two autopsies of one man that lead one to question this claim. On June 9, 1952, Ernest Johnson left work early, feeling unwell. He went home, lay down on the couch, and died. Johnson’s wife, Marie, called Richland’s GE-managed Kadlec hospital. Dr. William Russell arrived within fifteen minutes. Johnson, he reported, was dead on arrival. Russell wrote the first autopsy, which states that the 48-year-old janitor died of an aneurysm.[[55]](#footnote-55) Marie Johnson then brought her husband’s body home to Chicago for the funeral. Mrs. Johnson was suspicious. The FBI had been tailing her around Richland, and there was an unexplained burn mark on her husband’s body. She brought the body to the Cook County Coroner, Thomas Carter, who wrote a second autopsy. Carter stated the cause of death was an aneurysm and contact with radiation. He also noted that his autopsy was incomplete because “some of the important evidence [on the body] had been removed.”[[56]](#footnote-56)

Marie Johnson brought in Carter’s report seeking workman’s compensation from General Electric, the government contractor, for her husband’s death. Alarmed at seeing the second autopsy, Dr. Phillip Fuqua, second in command of the Health Physics Lab, flew to Chicago to meet with Carter and ask him to withdraw his autopsy. With Fuqua in front of him, Carter relented, but later changed his mind and refused to retract his initial judgment.[[57]](#footnote-57) What Marie Johnson didn’t know was that GE had a secret contract with the Washington State Department of Labor and Industries to redact evidence of radiation accidents for reasons of national security.[[58]](#footnote-58) Refused compensation, Mrs. Johnson ended up with a small life insurance check.[[59]](#footnote-59) GE officials also denied subsequent claims by widows whose husbands had been involved in accidents at the plant.[[60]](#footnote-60) Because of the secret agreement to redact information related to radiation poisoning, there is no way of knowing for sure how many workers fell ill or died on the job at Hanford.

**LIVING OFF THE LAND**

Along with workers, other changes occurred across the land. Livestock developed strange burns, swollen thyroids, and suffered from mysterious illnesses. Hunters noticed that fish, wild fowl and deer occasionally had malformations, hollow bones, or misshapen organs.[[61]](#footnote-61) In the Urals by 1950, local collective farms were reporting problems that large numbers of livestock and geese were dying. Some collective farms reported that almost all of their livestock died, at the pace of 300 to 350 head a year. Unaware of the plutonium plant nearby, local chairmen of villages and collective farms blamed the problems on poor feeding habits, overly large collective farms, theft, and, perhaps intuitively, water quality.[[62]](#footnote-62)

In 1951, when province officials learned that the territory downstream from the plant was dangerously irradiated, they sat on the news for two years not knowing how to address a problem that could not be called by name. Only in 1953, did the local province executive committee called together villagers to issue a command with no explanation. They told the residents they could not drink from the river or use it in any way at all; they made heads of households sign a statement testifying to that fact. They put up fences and sent soldiers out to patrol the river. But the river was the whole reason for the communities’ existence. With few wells, and those existing bringing up foul-tasting water, the river was the source for drinking, cooking, cleaning, irrigating crops, bathing, fishing, and watering livestock. With no idea why they were banned from using the river, locals passed with buckets under the fences. Kids waited until the soldiers walked off to dive into the cool, sweet water. Villagers cut holes in the barbed wire so household sheep, goats, cows and geese could drink their fill. Where else would they water?

 In 1953, 1954 and again in 1955, doctors specializing in radiation medicine made trips down the Techa River to investigate the people living along it. Villagers complained of headaches, dizziness, pains in the bones, weakness, shortness of breath and irritability. The doctors examined 1,558 people. Among them, they diagnosed 389 with Chronic Radiation Syndrome. Tests showed that most of the rest of the villagers had radioactive substances in their blood and organs. In the village of Muslumova, of 491 people examined, 25% had CRS.[[63]](#footnote-63) Like the employees at the plant, the diagnosis of Chronic Radiation Poison was classified. Doctors were forbidden to inform patients that their disease was caused by radiation damage.[[64]](#footnote-64) The doctors recommended in 1954 that sixteen villages along the upper Techa near the plant be evacuated to safer ground. Council of Ministers in Moscow gave permission for the resettlement of ten villages, an expensive 100-million ruble proposition to build new villages elsewhere.[[65]](#footnote-65)

Downwind from Hanford, much of the land was dry, too dry for prosperous farming. In the early forties 88% of the sage range stood innocent of crops.[[66]](#footnote-66) One of the reasons the Army Corps chose Hanford as for the plant was because of the region’s sparse population and under-development. The plutonium plant, however, brought a measure of prosperity and a good deal of development to the region in the form of new roads, bridges, dams and irrigation networks. So, in the 1950s, the Bureau of Reclamation ran a lottery to give away to WWII and Korean War veterans newly irrigated land—prized farm land—just downwind from Hanford. The veteran/farmers plowed under the rich virgin soil, watered crops from federally-subsidized irrigation ditches, pumped with cheap electricity from federally-subsidized hydro-electric dams, drove on new federal highways, and watched as their crops grew magnificently in the mineral-rich, sun-drenched plain. The farmers ate their home-grown produce, drank milk from their cows, and shot game foraging on the range and geese that had been floating on the U pond and in T swamp—open reservoirs of radioactive waste at the plant.[[67]](#footnote-67) Now and then weather balloons with little boxes attached would float down into a field. The boxes, containing particle filters to measure airborne radioactivity, had a note attached, requesting the finder to send it in to an address in Richland. Most farmers tossed the boxes aside and kept plowing.

Tom Bailie, a local farmer, remembered as a child looking out his window in the fifties and seeing men dressed in space suits like Buck Rogers scooping soil into lead boxes. His mother went out and asked the scientists if anything was wrong. From behind their masks, they told her everything was just fine; they were just doing some routine agricultural sampling. The same scientists asked Tom’s parents to save the beaks and feet of the geese they shot and ate, also for routine tests.

Bailie was born a year after a stillborn brother. He suffered from numerous birth defects, and spent part of his childhood in an iron lung, then a wheelchair with a mysterious paralysis. At 18, Bailie was told he was infertile.[[68]](#footnote-68) Bailie’s mother, sisters and father have all had cancer. Bailie, however, is also alive and well in his sixties, still farming, traveling and cavorting. He is one of the founding activists behind the Hanford Downwinders Organization that coalesced in the 1980s as news of Hanford emissions first reached the public.

Bailie suggested we go to a class of 67 and 68 high school reunion in Connell, Washington. The reunion was held at Michael’s cafe, across the street from a trailer park just off the main road. There were piles of food, plenty of booze, busy middle-aged waiters, pop music scratching from an aging sound system, and several dozen people who looked to be in their sixties. Before we went in, Bailie had told me it would be better not to mention thyroid or health problems. “People don’t want to talk about that.”

While Bailie went off to greet some old friends, I sat down at a table prepared to make small talk. I didn’t get a chance. Pat Paulson rolled up in a wheelchair. She told me she has multiple sclerosis; so does her sister. She said she used to pick peaches down in Ringold, across the river from the plant and attributes her MS to Hanford. Linda Jackey chimed in that her mother had troubles with her thyroid. Her father was always slim and active. He had heart problems very young, and died at age 69. Crystal Hobbs (thyroid and lung cancer, never smoked) said her health wasn’t what bothered her; it was her daughter’s cancer and fertility problems that made her angry. Gwen (thyroid disease) didn’t look well. Her husband had to heave her in from her chair to a walker. Gwen spoke softly and said little. Her parents had won the Bureau of Land Management lottery in the early fifties, and moved to eastern Washington from California.

Bailie turned to Gwen and said, “Remember your mother Gwen? She used to say the water was bad out here. She said she felt fine in California, but once she moved to eastern Washington, she was sick all the time. Your father used say, “You’re crazy woman! That well is 1200 feet down,” he’d say, “good, pure water.”

Gwen’s mother came down with leukemia and died of it, in her forties. Her father also died of cancer. Gwen has had a lifetime thyroid condition. Bailie pulled over a dinner napkin and started sketching. He drew the river, the plutonium plant and the farms across. “Over at Hanford from 1944-1950,” Bailie explained, “they used to dig what they called “reverse wells”—deep well holes for dumping radioactive waste.” Bailie continued sketching. “There is a big aquifer, an underground lake, down there that goes under the river, right over to these farms here where Gwen lived.” Bailie drew his pen down a country road and made an X over the Holme’s farm, “She got bone cancer, the girls both had thyroid problems”. His pen turned a 45 degree angle to make an X at another farm, “She drowned her deformed baby in the bathtub and then committed suicide”. Bailie’s pen paused again, “she had leukemia, and up there the baby was born with no head”.[[69]](#footnote-69) Bailie’s pen stopped at Gwen’s farm. “That’s what we used to call the death mile.”

The women sat, nodding sadly. Then a man walked up to the table. He had had a few drinks, his eyes were red and speech slurred. He said that Bailie was full of bull; that he grew up on a farm downwind and he was fine. “We have plenty of 87 year olds around here.” Bailie, usually outspoken, nodded his head mutely and blinked. The women stared at their laps. The man, still mumbling, stumbled off. Bailie told me later that his critic was having some serious health problems. “I couldn’t argue with him. I felt sorry for him.”

Stories told at reunions and fifty years after the fact, however, are anecdotal.[[70]](#footnote-70) Medical studies could determine more broadly the extent of the damage, the veracity of these claims. But there are problems with medical studies. In 1948, the AEC advisory board discussed a recommendation to carry out studies between possible links between cancer and Hanford workers exposures. The advisory board rejected the recommendation.[[71]](#footnote-71) Critics charge that the AEC and its successor the Department of Energy had an unwritten policy of ignoring, suppressing, and publically denying evidence of contamination.[[72]](#footnote-72) Hanford researchers, did carry out research on the environmental effects of radiation, but classified their findings. In 1974, however, a Washington State epidemiologist informed the Atomic Energy Commission of his study that found that Hanford workers suffered from a significant excess of cancers. The AEC quickly hired Dr. Thomas Mancuso to carry out an independent analysis to check the study. Three years later, AEC officials pressured Mancuso to endorse an AEC press release refuting the cancer charges. Mancuso refused, arguing he had yet no conclusion and AEC officials terminated Mancuso’s contract and gave Battelle Laboratories, a major Hanford contractor, the job of finishing the mortality study. Mancuso published an analysis later in the year stating that workers were dying from cancers at radiation exposures lower than the established standards. Ethel Gilbert, meanwhile, of Battelle Labs, found no such correlation.[[73]](#footnote-73)

In the early nineties, Battelle Labs, still a major Hanford contractor, again won a contract to carry out a major thyroid study of downwind communities. Again, Battelle announced there was no significant impact; that the communities downwind suffered from thyroid disease at the same rates as populations elsewhere. The local uproar over these conclusions led to a National Institute of Health review of the first Thyroid Study concluding that “investigators probably overstated the strength of their finding that there was no radiation effect.”[[74]](#footnote-74) The debate ended inconclusively with this convenient truce. With no conclusive medical evidence, few down-winders have won lawsuits against Hanford contractors.[[75]](#footnote-75)

**SECRECY**

Secrecy is a puzzling concept on these projects. From whom were American security officials keeping the plant’s emissions secret? Not from the Soviets, who learned of the English Uranium Committee in the summer of 1941 and of the Hanford Plant soon after construction began in 1943. Nor did the Soviets have many secrets to keep. British intelligence got wind of the Maiak Plant in 1948, while it was still under construction, and passed the news on to the American government.[[76]](#footnote-76) Oddly, Soviet intelligence was better apprised of radioactive contamination from Hanford than were most residents in Richland and the surrounding communities. While most Soviet citizens lived in ignorance of the Maiak Plant and its great and small accidents, the CIA studied the plant intensely. In short, hiding a massive, highly-polluting plutonium plant from a vigilant adversary proved impossible.

The real security target appears to have been the public. In Cheliabinsk-40, residents could not leave the city without special permission for the first eight years of its existence.[[77]](#footnote-77) Residents could not tell their family members where they lived. They could have no visitors. Until 1956, Cheliabinsk-40 also had no form of local party democracy: no city party committee or soviet, organs that elsewhere in the Soviet Union constituted local governance.[[78]](#footnote-78) Instead the Ministry of Medium Machine Building ran the city as well as the plutonium plant.

DuPont and GE went about it differently. Plant managers spent lavishly on creating an image of the corporations as guardians of public safety. Each year they staged an extravaganza called the ‘Safety Exposition,’ a self-proclaimed “World’s Fair of Construction Safety.” At the fair workers learned of safety techniques and equipment. Judges gave out awards for the most meritorious booths on safety. Crowds, however, really packed in for the free entertainment, dancing girls, big band orchestras, generous door prizes, and the election of the Safety Queen.[[79]](#footnote-79) The pretty girls and music worked. The AEC regularly commended Hanford for its excellent safety record.[[80]](#footnote-80)

But privately there were concerns. In 1949, when Soviet physicists tested the first plutonium bomb, American leaders panicked at the loss of the nuclear monopoly. AEC Chairman, David Lilienthal, sounding like he had seen too many sci-fi thrillers, stated that the U.S. needed to “erect a giant deterrent to aggression in the world.” AEC officials criticized GE for spending too much time building housing in Richland and storage tanks for waste rather than producing plutonium. Under fire, GE got to work. By 1953, the corporation had built five new reactors and two additional reprocessing facilities, all massive complexes. With them, the plant commenced to produce plutonium at a frantic pace.[[81]](#footnote-81) More plutonium spawned more waste. From 1951-1953 the plant released 7,000 curies a day into the Columbia River. In 1959, the daily release nearly tripled, spiking at 20,300 curies a day.[[82]](#footnote-82)

In Richland, medical researchers working for GE grew anxious about a public relations’ fallout if the news of radioactive emissions became publically known. In the classified reports, GE scientists calmly listed curies of radiation, milligrams of plutonium and disintegrations of alpha activity a minute spreading into the surrounding environment. Their prose mounts to anxiety, however, when they dwelled on the “dangerous” problem of public relations and the “threat” of “public hysteria” should the news of thousands of curies of radiation dumped daily get out. In 1954, for example, AEC Chief Lewis Strauss asked Herbert Parker, head of Health Physics Lab at Hanford, to prepare a report on the status of contamination in the Columbia River. In the report, Parker laid out what he knew: that the river had hotspots of contamination, that sources of drinking water and fish habitat were selectively contaminated, and that the contamination would grow to greater densities as more reactors at the plant went on line.

Aware of the value of the Columbia River as a center for sport fishing, especially for salmon, Dr. Parker dedicated section VII of his report to “Public Relations.” He wrote that the AEC had organized a Columbia River Advisory Group (CRAG) to act as if an independent body overseeing the health of the river. Parker noted that thanks to CRAG and “well-chosen press releases by the Atomic Energy Commission and the contractor [GE],” the plant had no record of public relations problems. “Nevertheless,” Parker added, “the [public] relations situation is always potentially dangerous, and it will be severely taxed if and when actual restrictions (as on sport fishing) are recommended.”[[83]](#footnote-83)

Then Parker wrote a revealing paragraph. He noted that the real threat for GE and the AEC came from outside experts on nuclear issues who might question GE and AEC assurances on the safety of the river and salmon. Parker wrote: “A continual threat to the situation is that adverse interpretation can be given by distinguished technical individuals, such as expert sanitary engineers, whose appreciation of the radiological hazards is perhaps limited to rather recent exposure to these complex problems.” Parker’s immediate problem was that, in 1951, just as Soviet radiologists were traveling down the Techa, the US Public Health Service (USPHS) in eastern Washington was conducting a survey of the Columbia River downstream from Hanford. Parker described how GE “defended” the plant:

"The U.S.P.H.S. conducted an independent survey of the river from 1951 to 1953. The report of this work will be published shortly. The first draft of this report contained several statements that would have been highly detrimental to public relations. The combined efforts of the Atomic Energy Commission (HOO) [Hanford], the Columbia River Advisory Group and General Electric forces have led to revision that should tend to preserve the present status. The final report will be a valuable independent appraisal of the river condition."[[84]](#footnote-84)

Did you catch that? The Public Health Service report was indeed the first truly independent evaluation of the river since the plant had started up. By applying pressure on the Public Health Service, however, the Hanford “forces” had the disquieting statements removed from the initial report. With the cleansed final draft, Parker’s employers won what he called a “valuable independent appraisal” assuring the American public that one of the nation’s most beloved rivers was safe. This was the American way, so different from the Soviet method of silence, intimidation and repression that led to a careless disregard of human life. GE and AEC officials understood that silence on such a volatile topic as radioactive contamination would be suspicious. In the US, there was plenty of talk about radiation, plutonium and possible dangers, and plenty of talk by authoritative experts minimizing or dismissing the dangers.

Take Leo Bustard, who worked in Parker’s division. Bustad carried out medical experiments from 1950-1954 in which he fed to sheep pellets lined with radioactive iodine-131, a hazardous isotope emitted from Hanford stacks that replaced natural iodine in human and animal thyroids. The tests showed the sheep on this diet grew fatigued, stupid, weak, disoriented; they had difficulty moving. They acquired ulcers, and gave birth to stillborns, even with low cumulative doses. Bustad also found that the thyroids did not regenerate after exposure ended; that the damage was permanent.[[85]](#footnote-85) Bustad’s sheep study was classified in the Hanford archive. In 1957, however, in direct contradiction to his research, Bustad published an article in *Nature* asserting that the daily doses of I-131 below very high levels (30,000 rads) did no harm at all.[[86]](#footnote-86) Bustad left Hanford to become a professor and dean in veterinary sciences at Washington State University. He spent the second half of his life as a vocal spokesperson for animal rights, compassion for children and, ironically, for truth in the media.[[87]](#footnote-87)

 In this way—via silence or authoritative assurances glossing over uncomfortable facts—the two superpowers dealt in the subsequent forty years with the public health problem of radioactive emissions at the plutonium plant. Rather than hiding the operations of the plant from the enemy, secrecy seems to have served other purposes: to discipline labor and to placate anxieties and rumors about contamination.

**QUESTIONS**

So far there are certain certainties about the plants that emerge amidst the often incomplete, still classified or re-classified information. First of all, the plants issued a great deal of radioactive isotopes. The level of contamination was high enough to trigger concern among plant directors who ordered medical and environmental studies. The studies reported damage to thyroids and circulation systems of animals tested and in the Soviet case the emergence of a new disease, Chronic Radiation Syndrome, among people working and living near the plant. At the same time, plant management kept information on contamination and health studies classified and misinformed the public with assurances or silence about the safety of the plants. From a public relations’ stand point, these efforts were successful. Most residents of the former plutonium cities lived happily, deceived and in ignorance, for decades. In a big reversal after Chernobyl, the American and Soviet governments partially released documents that attested to the large scale contamination caused by the plants. That development seemed to promise a new period of openness. Surprisingly, (or not surprisingly), in the subsequent period of post-Chernobyl glasnost, government-funded studies of the downstream/downwind communities established that there was no significant harm done to the populations living amidst contamination.

While many people in the downwind/downstream regions found it difficult to believe these latest assertions by experts, given the less-than-perfect record of disclosure in the past, the majority of people living in the former plutonium cities continued to accept the experts’ conclusions that their homes and surrounding landscapes were and are safe. These people who worked in Soviet and American nuclear installations had the most reason to be skeptical, cynical and bitter. But most are not. In fact opinion polls and online listservs show the plutonium city residents to be fiercely loyal to their town, their bomb and the defense establishment in general.[[88]](#footnote-88) How did American and Soviet leaders both deceive and seduce at the same time? How did they make a success of this unlikely project with some of their best and brightest citizens?

To answer this question requires stepping across the threshold from the realm of science and medicine to one of culture, architecture and national ideology. For, alongside each massive plutonium plant, the plant leaders also founded special, exclusive communities. They poured a great deal of thought and resources into these communities. Alongside the radiating plants, beneath the anti-aircraft guns lining the roads, they built award-winning, model cities. The cities transmitted a sense of superiority to their residents, of being chosen, of leading the nation. It was akin to an elaborate and expensive bribe; but a bribe would have felt cheap and dirty, would have induced guilt, whereas these cities elicited patriotism, pride, and an irrational will to overlook one’s suspicions and doubts.

**CONSTRUCTING EDEN**

Creating comfortable communities around plutonium plants was not first nature. Initially, American and Soviet military leaders tried to produce plutonium with militarized labor in remote, secured army or prison camp settings. But soldiers, migrant workers and prisoners brawled, boozed and slept around. Reluctantly, Soviet and American leaders realized that those who would operate the plants could not be as volatile as the product they made. In order to secure trustworthy reliable workers to operate the plutonium plant, leaders in both countries built limited-access cities for plant workers, who would live rooted in nuclear families within the atomic cities.

From the start, Manhattan Project security agents and KGB officers set up intricate security systems. They first selected applicants for political and ethnic reliability. In Richland, The DuPont Corporation and the FBI carefully screened employees for political loyalty, social acceptability and whiteness. They rejected African Americans, Mexican-Americans, communists, and those with leftward leaning sympathies.[[89]](#footnote-89) They also removed from the surrounding territory people considered untrustworthy, Japanese-Americans and others “of a suspect nature.” In the Soviet Union, enterprise leaders encircled Cheliabinsk-40 with a double-row of barbed-wire fence and gave entry passes only to employees and their immediate families. MVD General Lieutenant Ivan Tkachenko, young, handsome and cruel, was in charge of security for the project. During the war, Tkachenko had orchestrated the deportation of Chechens, and in Cheliabinsk-40 he was no less concerned with political and ethnic reliability.[[90]](#footnote-90) Local Bashkirs and Tatars were rarely hired at the plant. After 1948, party and security agents suspected Jews of transnational loyalties. In the early fifties, they investigated Jews for cosmopolitanism and fired those who did not show contrition.[[91]](#footnote-91) Soviet security agents also combed the surrounding towns for ‘undesirables’, those with prison records, and shipped about three thousand people from a buffer zone around the plant.

Security officials then made employees sign security oaths and renew them continually. In Richland, General Electric broadly published new laws meting out steep fines and harsh prison sentences for violations of nuclear security. Company officials issued continual reminders to stay quiet. Corporate security officials, as well as the FBI, wire-tapped phones, read mail and cultivated ranks of secret informers to catch violators. The MVD and KGB took similar measures—selection, security oaths, surveillance—In Cheliabinsk-40. These measures were effective. Residents in Richland said they rarely knew what their friends did for work because no one talked about their jobs.[[92]](#footnote-92) Residents in Cheliabinsk-40 were also careful about what they said; many feared even keeping a diary, lest they give some secret away.[[93]](#footnote-93)

Selection and surveillance, however, were only the first circle of security. Plant leaders in both countries set up a second, larger ring of security that assured loyalty and fidelity by means of buildings zones of exclusive, mass contentment. And so, surprisingly, the powerful men charged with producing the world’s first supplies of plutonium spent a great deal of time worried about homes, schools, roads, sewer and electrical lines in addition to reactors and chemical processing plants. For instance, over half of the diary of Colonel Frank Matthias’, the wartime Army Corps officer charged with building Hanford, is devoted to town planning, recreational programs and community relations in Richland.[[94]](#footnote-94) The initial 60,000 person army camp set up to build Hanford was so unpleasant that Matthias had hundreds of workers a day in 1944 walking off the secret, barricaded construction site. Matthias quickly learned how important consumer and job satisfaction was for keeping workers.

Since the thirties, Soviet leaders had been acutely aware of the production problems that consumer dissatisfaction caused. They had seen strikes, production disruptions and riots because of shortages of consumer goods.[[95]](#footnote-95) No less than Stalin himself encouraged Igor Kurchatov, the director of the Soviet atomic bomb program, to spend away on the plutonium town. Stalin told Kurchatov that though Russia was poor, “it is not so poor that a few can’t live well”…“with their own dachas”, Stalin said, “and their own cars.”[[96]](#footnote-96) Kurchatov returned to Cheliabinsk-40 and set out to build not just a bomb, but a wonderful city. He told his workers: “And to spite them [enemies abroad] [a town] will be founded. In time your town and mine will have everything—kindergartens, fine shops, a theater and, if you like, a symphony orchestra! .. and if .. not one uranium bomb explodes.., you and I can be happy! And our town can then become a monument to peace."[[97]](#footnote-97)

Kurchatov’s prophesy came true. In the southern Urals, locals called the residents of Cheliabinsk-40 “the Chocolate-eaters.” The name grew out of the fact that residents of the secret city had supplies of chocolate and sausage, unheard of luxuries in the postwar years of famine, from 1946-1947. By the late fifties residents had more than chocolate. Kurchatov commissioned Leningrad architects to build, secretly, in the thick forest excellent, modern apartment buildings with electricity and plumbing. They constructed theaters, swimming pools, pre-schools, sports stadium, dachas, restaurants and cafes. And best of all, in hungry, goods-starved Russia, the shops in town had first-priority allocations, akin to the closed shops of the top leadership in Moscow.[[98]](#footnote-98) Residents could buy German shoes, Finnish overcoats and delicacies from Poland and Romania. In Cheliabinsk-40, the usual features of provincial Soviet life were nowhere to be found; there were no shortages, no long lines, no threadbare children, no gnawing hunger or damp, basement dwellings. As L. V. Zhondetskaia remembered in 1988: “We had the feeling that we already lived under communism. There was everything in the stores, from crabs to black caviar.”[[99]](#footnote-99)

Stocked stores and good housing were an unbelievable luxury in the early fifties in the Soviet Union. Outside the closed city in neighboring industrial settlements bearing utilitarian names such as Asbestos and New Asbestos, workers finished their shifts, waited in line to buy gray macaroni and disappeared stooping and coughing, into hovels and dugouts. In the nearby city of Cheliabinsk, in1948, 200-300 people lined up daily for bread before dawn, and the line remained until 3 am. Seven years later, little had changed. In 1955, workers wrote on ballots: “I vote for you, but why are there still lines for bread?” or “nothing to eat, give us meat, butter and sugar.”[[100]](#footnote-100) Sallow children walked miles to attend the second, third or fourth shifts of their school.[[101]](#footnote-101) Gangs of disaffected youth and vets attacked one another in spasms of senseless violence. Hunger, and with it illness and crime, haunted the towns and cities surrounding the peaceful, prosperous, orderly Cheliabinsk-40.

In eastern Washington, people in neighboring towns called Richland the “gold coast”. [[102]](#footnote-102) The federal government owned all the land and property in Richland and first DuPont, then General Electric managed the city. DuPont hired an architect who designed houses, shopping centers and residential developments. The company built churches and rented them to congregations for a dollar a year. DuPont built and ran the town hospital, the best in the region, which admitted only residents and plant workers. DuPont and GE selected businesses which were awarded monopolies to conduct business in Richland. GE set up, subsidized and censored the town’s newspaper and denied access and information to rival papers. In the absence of tax revenue, GE allocated federal funds for Richland’s schools, parks, bus service, hospital and recreational programs. Workers paid no local taxes and received wages that were 30% higher than that of workers in surrounding counties. Richland residents were most pleased with the federally subsidized housing. White, male plant employees rented modern pre-fabricated or track housing with all utilities and maintenance included for a third or half as much as Black and Mexican workers paid for dilapidated ghetto housing across the Columbia River in Pasco.[[103]](#footnote-103)

The contrasts between Richland and the surrounding “tiny, dusty” railroad towns were stark.[[104]](#footnote-104) Denied access to Richland’s hospital, locals had to drive eight hours over the mountains for a maternity ward. Neighboring schools were crowded and poorly staffed. Sewer systems, roads and plumbing were spotty. Nearby Pasco had many problems with housing, sanitation, crime, prostitution, gambling, racial segregation and corrupt law enforcement. Across the inland West, little railroad and ranch towns, born of dreams of agricultural prosperity, were going bankrupt and losing populations. But Richland boomed.

For many residents who came from hardscrabble, provincial towns in the US or USSR, residency in Cheliabinsk-40 or Richland was akin to winning the golden ticket; it meant a person had arrived in the kind of material comfort and prosperity that few had expected in their lifetime. Ralph Myrick remembered his childhood in Gamerco[[105]](#footnote-105)\*, a New Mexico company mining camp of packed clay, slag heaps, and miserable company tenements. When DuPont moved his family into a plywood, prefabricated two bedroom house in Richland, his mother broke down in tears of happiness. She had never lived in a house with plumbing and appliances. She had never had a home so clean and new. Ralph’s father had not finished high school. Ralph remembered that his father worried a lot; worried that the plant would close after the war, worried that the supply of plutonium would be satiated, worried that he or his children would do something wrong and he would lose his job. Nowhere else, he knew, could he provide for his family so well with his skills and education. Once as a teenager, Ralph had a run-in with the town police. Terrified, Ralph begged the officer not to write a ticket, for he was sure his father would get fired for his adolescent misbehavior. Residents understood that when an employee was fired from the plant, he had a week to move out of Richland.[[106]](#footnote-106)

In fact, many residents of Richland repeated to me the rumor of a neighboring family that disappeared overnight for asking invasive questions such as “what does your husband do for a living?” [[107]](#footnote-107) The rumor reflects the fear of being evicted for saying too much, asking too many questions or making trouble that would cost a person a spot in town. When Richland residents wrote letters to the editor, they frequently withheld their names.[[108]](#footnote-108) Paul Nissen, the former editor of the GE-sponsored local newspaper in Richland wrote about the town’s exchange of comfort for conformity: “Are you, John Doe likely to want to do anything, at least publicly, which will put you in a position where you will have to do any fast explaining either to GE or the [Atomic Energy Commission] AEC. The question is… "do you like your present job?" "Don't you want to live in that nice house and this pretty little city any longer?” [[109]](#footnote-109)

In Cheliabinsk-40, the contrast between life in the closed plutonium city and life outside was so great that residents referred to the territory beyond the gates as ‘the big world’. It wasn’t difficult to lose one’s place in the socialist paradise. If a worker drank too much, brawled, missed work, or slept with other men’s wives, these issues were taken up at party meetings and the worker was threatened with evicted from town.[[110]](#footnote-110) If a teenager misbehaved in school, dressed like Elvis Presley or was caught listening to the Voice of America, they were sent to boarding schools, never to return to their parents in the closed city. Sometimes when husbands were evicted, wives stayed on alone in the closed city. After the 1957 accident, residents panicked and hundreds of people sent in resignation notices. But after living ‘in the big world’ for a few months, many of the same people wrote letters with requests to return. “I was stupid. Please take me back,” they pleaded.[[111]](#footnote-111) Cheliabinsk-40s charm was so arresting, so seductive that people chose to remain alone in their Eden even when their loved ones were banished beyond the gates, and even when they suspected they were putting their health at risk.

Not that everyone was happy with the special status of these towns. Visiting congressmen worried that Richland, government owned and subsidized, was too ‘socialistic’, even communistic. They need not have worried. Richland epitomized what Lizabeth Cohen calls the consumer’s republic, where activist-consumers gave way to consumer citizens who were told their civic duty and democratic freedoms lay in consuming. Cohen shows how in the postwar period government programs gave up on the New Deal promise of equitable redistribution in favor of prefatory federal subsidies for some over others. White men won federal subsidies via the GI bill and FHA loans at far greater rates than women and minorities. Increasingly-segregated suburbs won massive federal aid for roads, schools and infrastructure, while older inner cities were left without funding to decay.[[112]](#footnote-112) Richland epitomized the postwar inequities, exclusions and hierarchies of suburbanizing America.

In fact, the prosperity of Richland’s consumer’s republic leant credibility to the city’s leaders. The orderly, universal well-being of Richland, which had no indigent, no elderly, no unemployed, telegraphed to residents a heightened sense of superiority and safety. Residents enumerated their superiority in various ways—higher birth rates, longer life expectancies, higher average incomes, more expendable income, higher educational levels—and this general superiority gave residents confidence that their community leaders were indeed knowledgeable, capable, and trustworthy. For this reason, residents for decades did not question plant managers’ repeated claims that the plutonium plant was perfectly safe.

And in some ways, mass consumption did protect residents of Richland. Public health officials encouraged residents to consume milk and produce shipped in from elsewhere, to rip up sage and thistle (which stored radiation) and to plant lawns instead. They instructed residents to limit their consumption of fish from the Columbia River—all without explaining why. Meanwhile, outside Richland, ranchers and farmers continued to produce for their own consumption: they ate their own dairy products, game, sheep, vegetables and fished from the river. The local Wanapum Indians fished, hunted and gathered delicate and radiation-absorbing roots from the range. And so the assertions that Richland residents were healthier were true—in part because they were younger, selected for their good health, more affluent and had far better health care—but also because, as modern consumers, they did not live off the radioactive landscape.

Consumptive superiority also served as a surrogate for freedoms residents forfeited when they agreed to live in the plutonium city dependent on one product. Richland residents voted against incorporation in the early fifties, which would have transformed Richland from a government reservation to a ‘normal’ American city.[[113]](#footnote-113) Residents voted against private property because they feared that if they bought their houses and the plant closed, there would be no jobs and no market for their real estate investments. In so doing, residents also took a pass on the right to self-government, the right to free speech, free assembly and an uncensored press. They also gave up power over their bodies each week as they placed their urine and stool samples on the front porch, underwent compulsory medical exams, and rolled their school-age children through full-body scanners. As consumers, however, residents of Richland won back a bit of their lost voice and power. For it was over issues of consumption where they could safely express their opinions—and indeed they did rise up vociferously over rent hikes in the mid fifties, over parking for their new cars at the new shopping centers, over dog walking on carefully watered lawns.[[114]](#footnote-114) These issues, though seemingly trivial, mattered a great deal because they simulated the motions of American democracy for which Richland residents were putting their lives on the line.

Party leaders in Cheliabinsk 40 also worried. They saw how residents bought up scarce goods, shoes and cars, in the closed city and sold them for speculative rates outside the gates. They feared their residents were becoming too ‘bourgeois,’ too materialistic.[[115]](#footnote-115) They feared that youth, raised without the hardships of their fathers and grandfathers were losing their revolutionary, socialist consciousness.[[116]](#footnote-116) In 1956, however, a young woman, Taishina, stood up at a party cell meeting noting the capitalist-style inequities of her city, “We were chased out to hear a lecture on Marx. But I was out 'in the big world' and there people don't live so well. There is poverty. Why don't you give us a lecture on that?"[[117]](#footnote-117) Party leaders told Taishina that the residents of the closed city deserved the state’s largesse because their work and sacrifice defended the nation, and in turn, the nation needed to support them, unconditionally. After her question, security officials started a file on Taishina. They seemed to prefer other residents’ bourgeois materialism to Taishina’s revolutionary consciousness. The Local Communist Party council minutes show that Party members dwelled most on issues related to consumption: housing, the supply of sporting goods, film distribution and service in the restaurants and grocery stores. As local leaders rushed to accommodate these complaints, consumer issues gave residents a voice and dramatized socialist democracy.[[118]](#footnote-118)

And as in Richland, Cheliabinsk-40 residents enumerated their superiority in material ways: they counted up their larger living space, greater volume of meat and dairy consumed, greater number of appliances, better access to health and child care, and longer life expectancy.[[119]](#footnote-119) And they saw these indicators as validation of their town and its leaders and the community’s safety. And the residents’ superior consuming status did in part save residents from contamination. Downstream from the plant, in remote, poor settlements, villagers who drank and bathed in the radioactive Techa River suffered much more significantly from radiation related illnesses than residents of Cheliabinsk-40, where the water was tested regularly and drawn from monitored wells.[[120]](#footnote-120)

Elena Osokina shows how in the wake of the egalitarian promises of the Revolution, Soviet leaders in the thirties created “hierarchies of poverty” by issuing passports that immobilized majorities on collective farms and cleared prized cities of political and economic undesirables.[[121]](#footnote-121) They then stocked limited-access cities and stores with deficit consumer goods. In so doing, Soviet leaders created zones of prosperity amidst greater zones of poverty. The zones of prosperity kept alive the myth of a thriving socialist society, a place to which one could aspire, all the while the countryside and provinces went hungry. Cheliabinsk-40 and its threadbare hinterland epitomized these spatial inequities written, not in the equitable Soviet Constitution, but across the landscape.

And as long as one left Cheliabinsk-40 only for the special resorts reserved for atomic workers, then Khrushchev’s promise that the Soviet Union would achieve communism and overtake the US in consumer goods appeared to be realized. Plutonium city residents had achieved communism, if off the map, if only in one city. The consuming privileges of Cheliabinsk-40 spoke to the superiority of Soviet society, which residents continued to believe in long after the Soviet Union’s collapse. In 1989 and 1999, the vast majority of residents polled voted to keep their Soviet-era fences, guards, gates, and pass system, which remain to this day.[[122]](#footnote-122)

In Richland, big crowds gathered in the mid-fifties to see GE Theater’s Ronald Reagan demonstrate the “total new electric kitchen.” Reagan transmitted the message that consumer freedom was the cornerstone to democratic freedom.[[123]](#footnote-123) In Richland, where residents had given up most of their political freedoms, this message especially made sense. But residents of Richland were not alone. Across the postwar United States, people turned their backs on espoused democratic values and New Deal promises of equal access and opportunity in order to protect their property values in federally-subsidized, limited-access, racially-segregated communities located just off limited-access ‘National Defense’ highways.[[124]](#footnote-124)

In other words, the lavish fiscal attention the American and Soviet governments paid the plutonium cities was not an accidental coincidence. The well-heeled cities were necessary to maintain a stable labor force and keep good workers, but also served to muzzle residents, keep them from questioning, talking or blowing whistles. Consumption became, in these cases, the seal on a new, high-tech social contract. The segregated suburb or closed city stands in for Hobbe’s commonwealth, while the nuclear security state becomes the Leviathan.

Remember Hobbes?

 “Outside the commonwealth is the empire of passions, war, fear, poverty, nastiness, solitude, barbarity, ignorance, savagery; within the commonwealth is the empire of reason, peace, security, wealth, splendor, society, good taste, the sciences and good‑will.”[[125]](#footnote-125)

To cross the Columbia River from the Jim Crow ghetto of dilapidated shacks and overrun outhouses in Pasco, Washington into the sunny, spacious living-room cocktail parties in Richland might just have felt like passing into the state-protected commonwealth; or more so to leave gray, dingy New Asbestos to pass into Cheliabinsk-40 with its smell of fresh bread and the bright noise of children’s nurseries. Or perhaps you don’t have to search so far to find Hobbe’s commonwealth: drive from a muddy, shabby collective farm village and enter glistening, Soviet Moscow or take Robert Moses’ Cross Bronx Expressway, roaring through, dissecting the Bronx ghetto, and arrive in the peace and opulence of Scarsdale.[[126]](#footnote-126) There were in the United States and the Soviet Union many people willing to make the same kind of exchange—of equity and equality for prosperity and security—as the residents of the plutonium cities.

Much has been written about the controls and fear of the nuclear security regimes, but I am pointing to an interpretation that normalizes the nuclear security state or, perhaps, universalizes it. At least as important to state security was the production of desire and the cultivation of thriving consumer cultures which were in step with the aspirations of the larger Soviet and American societies. As Cheliabinsk-40 residents sought to remain in their special closed city and keep them exclusive, Soviet citizens schemed to obtain a residence permit in a well-supplied city, while American citizens saved for a down payment on a house in a suburb segregated by secret covenants. Zoning territory into regions of privilege and poverty kept alive for Soviet urbanites the myth of socialism, much as Cohen argues that ‘up-zoning’ white, affluent suburbs to leave behind impoverished inner cities maintained for mainstream Americans the mirage of universal opportunity in the American democracy. In these privatized and highly controlled zones of privilege, the space for political expression and questioning of authority narrowed greatly, while ‘civic activism’ corroded into discontent over parking fees, schools, and sports facilities. In the plutonium cities, this exchange of political vigilance and social responsibility for consumer satisfaction bought a great deal of peace and prosperity, and led to unannounced nuclear disasters producing lethal landscapes.

1. Stephen I. Schwartz, *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940* (Washington, D.C.: Brookings Institution Press, 1998). [↑](#footnote-ref-1)
2. \* Cheliabinsk-40 was later renamed Cheliabinsk-65, and then after 1989, Ozersk (‘Lakedale’). [↑](#footnote-ref-2)
3. On Richland’s superior educational achievements, see April 1998, “Alumni Sandstorm,” Sandstorm.com. On Ozersk’s record of exceptional educational achievements, see N. V. Mel'nikova, *Fenomen zakrytogo atomnogo goroda: Ocherki istorii Urala, vypusk 42* (Ekaterinburg, 2006): 93. For sites critical of Ozerk’s legacy of contamination, see Dvizhenie za iadernuiu bezopasnost,’ <http://www.nuclearpolicy.ru/> and ecopress, <http://www.civilsoc.org/nisorgs/russwest/moscow/ecopress.htm>; “katastrofa dlinoi v polveka,” <http://ecodefense.baltic.net.ru/stash/exhibition/index.htm>. For sites critical of the Hanford legacy, see “Hanford Downwinders,” http://www.downwinders.com/ [↑](#footnote-ref-3)
4. In response to the first pro-peace, anti-nuclear group that formed in nearby Pasco in the 1980s, a group defending Hanford’s legacy emerged called The Hanford Family. See William Schreckhise, "The Development of Interest Group Activism at Hanford," in *Critical Masses: Citizens, Nuclear Weapons Production and Environmental Destruction in the United States and Russia*, ed. et al. Russell J. Dalton (Cambridge, MA ; London, England, 1999), 133-63. On the political disputes to releasing information about the Hanford site, See Michael D'Antonio, *Atomic Harvest: Hanford and the Lethal Toll of America's Nuclear Arsenal* (New York: Crown, 1993). In Russia, a number of researchers and journalists have been arrested or threatened with arrest for carrying out research on Russia’s nuclear legacy. See David Rush, "A Letter from Chelyabinsk," *Medicine and Global Survival,* April 1998; Oleg Bodrov, Olga Tsepilova and Tatiana Talalaeva., "Russian Federal Security Service Blocks Independent Research in the Atomic Neighborhoods and Accuses a Researcher of Spying," *Baltic News* 85 (January 2005). See also Paula Garb and Galina Komarova, "A History of Environmental Activism in Chelyabinsk," in *Critical Masses:* 133-63. [↑](#footnote-ref-4)
5. V. N. Novoselov and V. S. Tolstikov, *Taina "Sorokovki"* (Ekaterinburg: Ural'skii rabochii, 1995): 182. The layout and plan of Cheliabinsk-40, built in the fifties, matches closely the prospective plan for Soviet cities laid out in "All Union conference on the Prospects of Soviet City Planning" held in Moscow 1970. The 1970 plan called for building self-sufficient satellite cities with their own services and commerce, surrounded by green zones. See Jr. Alfred John DiMaio, *Soviet Urban Housing: Problems and Policies* (New York, 1974): 52. A General Electric pamphlet in 1958 touted Richland "as one of the best planned cities in the nation." *Richland: the Atomic City, (Richland, GE community Operations, 1958).* In 1961, Richland won the All-American City Award. [↑](#footnote-ref-5)
6. Marco De Andreis, *The Soviet Nuclear Weapon Legacy* (Oxford ; New York: Oxford University Press, 1995): 53. Total US production was 115 metric tons of plutonium, 85 metric tons was weapons grade, 38.2 of that considered excess of national security needs. [↑](#footnote-ref-6)
7. The Hanford plant issued 140 million radio-nuclides into the air and Columbia River during its four decades of operation. After the plant closed, underground tanks contained another 198 million curies of radiation, some of it in cracked tanks leaking into ground water. The Soviet plant dumped a total of more than 200 million curies of radiation into the surrounding environment. Karen Dorn Steele, "Radioactive Waste from Hanford is Seeping Toward the Columbia," *High Country News*, September 1 1997. [↑](#footnote-ref-7)
8. As cited in Michele Stenehjem Gerber, *On the Home Front the Cold War Legacy of the Hanford Nuclear Site*, 2d ed. (Lincoln: University of Nebraska Press, 2002): 65. [↑](#footnote-ref-8)
9. Crawford Greenewalt, Manhattan Project Diary, 22 January 1943, acc 1889, Hegley Museum and Library (HML). Correspondence Frank T. Matthias to General Leslie Groves, 24 October 1960, Col. Frank T. Matthias Papers Hanford Box 1, folder 20.92, acc 2086, HML. On the weather pattern and fish studies, see also Peter Bacon Hales, *Atomic Spaces: Living on the Manhattan Project* (Urbana and Chicago: University of Illinois Press, 1997): 137-138, 144-146. [↑](#footnote-ref-9)
10. “H. I. Section Report for September, 1946,” HW 7-5145, Department of Energy Reading Room, Richland, Washington. [↑](#footnote-ref-10)
11. The plankton absorbed especially longer-living isotopes such as phosphorus 32. P-32 was a concern because if ingested, it readily incorporated into bones and nucleic acids of bodies. It can also penetrate skin and corneas. “Columbia River Situation—A semi-technical review,” 19 August 1954, HW-32809, NARA RG 326/650, box 50, folder 15; 2, 6. [↑](#footnote-ref-11)
12. “Columbia River Situation—A semi-technical review,” 19 August 1954, HW-32809, NARA RG 326/650, box 50, folder 15/2: 6. [↑](#footnote-ref-12)
13. Gerber: *On the Homefront:* 115-117. [↑](#footnote-ref-13)
14. Ibid: 111. [↑](#footnote-ref-14)
15. R. E. Gephart, *Hanford a Conversation about Nuclear Waste and Cleanup* (Columbus, Ohio: Battelle Press, 2003): 2.13, 5.24. [↑](#footnote-ref-15)
16. Hanford administrators settled on a notion of "acceptable risk and level of contamination" which would fit in with production goals. Gephart, *Hanford*: 2.3. In 1957, reflecting on the first ten years of plutonium production, party officials in Cheliabinsk-40 admitted that safety issues had lapsed and expressed the hope to turn the vast amount of waste into production. Zasedanie III‑yi gorodskoi partiinoi konferenstii (Ozersk), 14‑15 December 1958, Ob’edinennyi Gosudarstvennyi Arkhiv Cheliabinskoi Oblasti, Cheliabinsk, Russia (OGAChO) 2469/2/1: 15. [↑](#footnote-ref-16)
17. Donald A. Filtzer, *Soviet Workers and Late Stalinism: Labour and the Restoration of the Stalinist System After World War II* (Cambridge, New York, 2002): 13, and for even higher figures, see N. V. Mel'nikova, *Fenomen zakrytogo atomnogo goroda: Ocherki istorii Urala, vypusk 42* (Ekaterinburg: Bank kul'turnoi informatsii, 2006): 23. [↑](#footnote-ref-17)
18. See Gijs Kessler, “The 1947 food crisis and its aftermath: Worker and peasant consumption in non-famine regions of the RSFSR,” in Donald A. Filtzer, ed., *A Dream Deferred: New Studies in Russian and Soviet Labour History* (Bern [Switzerland] 2008). [↑](#footnote-ref-18)
19. On the postwar mentality of an “osazhdennaia krepost’,” see Mel’nikova: 51. On the effect of the American nuclear bombing of Japan on the Soviet leadership, see Vladislav Zubok, "Stalin and the Nuclear Age," in Cold War Statesmen Confront the Bomb, ed. John Lewis Gaddis et al. (New York: Oxford University Press, 1999). [↑](#footnote-ref-19)
20. On the *Strategic Chart of Certain Russian and Manchurian Urban Areas,* 30 August 1945, see Richard Rhodes, *Dark Sun* (New York: Simon and Schuster, 1995): 20-25. [↑](#footnote-ref-20)
21. Zubok, "Stalin and the Nuclear Age:” 60. [↑](#footnote-ref-21)
22. Novoselov and Tolstikov, *Taina "Sorokovki"*: 125; and Ia. P. Dokuchaev, "Ot plutoniia k plutonievoi bombe: iz vospominanii uchastnikia sobytii," *Istoriia Sovetskogo atomnogo proekta: Dokumenty, vospominaniia, issledovaniia*, ed. V. P. Vizgin (Moscow, 1998): 291. [↑](#footnote-ref-22)
23. Alexander Akleyev and Vladimir Novikov and Boris Segerstahl, "The Long Shadow of Soviet Plutonium Production," *Envrionment*, January 1, 1997. [↑](#footnote-ref-23)
24. The flow in the Columbia River at Hanford averages 3,500 m3 per second and in the Techa River at its mouth the flow was 7 m3 per second. Frank L. Parker, "Observations Concerning Maiak," in *Cleaning up Sites Contaminated with Radioactive Materials: International Workshop Proceedings* (Washington, D.C.: National Academies Press, 2009). [↑](#footnote-ref-24)
25. Interview with Sarvar Shagiakhmetov, *Komsomol'skaia pravda*, 15 July 1989. [↑](#footnote-ref-25)
26. V. N. Novoselov and V. S. Tolstikov, *Atomnii sled na Urale* (Cheliabinsk: Rifei, 1997): 42-43; A. P. Aleksandrov, "Gody s Kurchatovym," *Nauka i zhizn'* 2 (1983). [↑](#footnote-ref-26)
27. The acceptable limit at the time was 30 roentgen/rads. Novoselov and Tolstikov, *Atomnii sled*: 148 [↑](#footnote-ref-27)
28. Novoselov and Tolstikov, *Atomnii sled:* 45. [↑](#footnote-ref-28)
29. In 1954, the Hanford Plant dumped 8,000 curies of radiation a day into the Columbia River alone. “Columbia River Situation—A semi-technical review,” 19 August 1954, HW-32809, NARA RG 326/650, box 50, folder 15. [↑](#footnote-ref-29)
30. Vladislav Larin, "Tri radiatsionnye katastrofy na kombinate "Maiak"," *Energiia* 4 (1996): 46-53, and

Maiak's Walking Wounded," *The Bulletin of the Atomic Scientists* September/October 1999: 20-21. [↑](#footnote-ref-30)
31. See the Hanford Accident report file, NARA RG 326/650, box 50, folder 14. [↑](#footnote-ref-31)
32. One register of accidents in city files were request for sick leaves because of accidents at the plant. See, for instance, “Protokoly gorkoma,” 23 April 1957, Ob’edinennyi Gosudarstvennyi Arkhiv Cheliabinskoi Oblasti (OGAChO) 2469/1/122, ll. 31‑73. [↑](#footnote-ref-32)
33. An investigator at Hanford pointed out in 1994 the problem with the unrecorded releases in attempting remediation of the site. Sonja I. Anderson, “A conceptual study of waste histories from B Plant and other operations, accidents, and incidents at the Hanford Site based upon past operating records, data and reports,” Project ER4945, 29 September 1994: 5. Personal Papers of Tom Bailie. [↑](#footnote-ref-33)
34. Liubov' Shapovalova, "Predtecha Chernobylia," *Ural'skii rabochii* (Ekaterinburg), 29 September 2007. [↑](#footnote-ref-34)
35. Novoselov and Tolstikov, *Taina "Sorokovki*: 211; Valery Kazansky, "Maiak Nuclear Accident Remembered," *Moscow News* (Moscow), October 19 2007, 127-34. [↑](#footnote-ref-35)
36. Novoselov and Tolstikov, *Taina "Sorokovki"*: 212. The first army reports from October 7, 1957 estimated the contaminated territory to amount to 250 square kilometers. N. G. Sysoev, "Armiia v Ekstremal'nykh Situastiiakh: Soldaty Cheliabinskogo 'Chernobylia'," *Voenno-Istoricheskii Zhurnal* 12 (1993): 39. [↑](#footnote-ref-36)
37. Novoselov and Tolstikov, *Taina "Sorokovki*: 217. Cochran reports that the village of Berdianish was among the three most radiated villages. There the calculated cumulative doses of radiation ranged from 150 to 300 rads. Thomas B. Cochran, Robert Standish Norris and Kristen L. Suokko, "Radioactive Contamination at Chelyabinsk-65, Russia," *Annual Review of Energy and the Environment* (1993): 521. [↑](#footnote-ref-37)
38. Novoselov and Tolstikov, *Atomnii sled*: 118. [↑](#footnote-ref-38)
39. Novoselov and Tolstikov, *Atomnii sled*: 121. [↑](#footnote-ref-39)
40. The village of Tatarskaia Karabolka is the most well-known in this category of village on the evacuation list that mysteriously remained in place. See Kate Brown, "The Forsaken," *Journal of International and Working Class Labor* 78 (Fall 2010): forthcoming. [↑](#footnote-ref-40)
41. Ia I. Kolotinskii L. P. Sokhina, G. V. Khalturin, *Plutonii v devich'ikh rukakh* (Ekaterinburg: Litur, 2003); Vladislav Larin, *Kombinat "Maiak": Polveka Problem* (Moskva: [s.n.], 1996). [↑](#footnote-ref-41)
42. Bladimir Bokin and Marina Kamys, "Posledstviia avarii na kombinate "Maiak" v Sentiabre 1957 goda preravneny k posledstviiam shesti Chernobyl'skikh avarii," *Ekologiia*, 4, April 2003: 238. [↑](#footnote-ref-42)
43. Gromova had 230 times more plutonium in her body than was the acceptable norm at the time. Nine people are recorded to have died of CRS in the fifties. Kolotinskii et al., *Plutonii v devich'ikh rukakh*: 106-107: 133-135. [↑](#footnote-ref-43)
44. Larin, 1999: 25. [↑](#footnote-ref-44)
45. Kolotinskii et al., *Plutonii v devich'ikh rukakh*: 105-137. See also A. K. Gus'kova, *Atomnaia otrasl' strany: Glazami vracha* (Moscow, 2004). [↑](#footnote-ref-45)
46. The young woman is not named; called simply a ‘bol’tunia.’ “Sobranii partiinogo aktiva politotdela bazy‑10 ob usilenii ideologicheskogo raboty,” 19 April 1951, OGAChO R-1137/1/31: 31-34. [↑](#footnote-ref-46)
47. "Stenograficheskii otchet: zasedanie II‑a gorodskoi partinoi konferentsii gorkoma Ozerska," 30 November‑1 December 1957, OGAChO 2469/1/117, 168. [↑](#footnote-ref-47)
48. Novoselov and Tolstikov, *Taina "Sorokovki"*: 216. [↑](#footnote-ref-48)
49. The station was called the opytnaia nauchno-issledovate’skaia stantsiia [experimental scientific-research station] and was located in the trace, founded in May 1958. Tol’stikov, 1997: 141. [↑](#footnote-ref-49)
50. Novoselov and Tolstikov, *Atomnyi sled*, 127. [↑](#footnote-ref-50)
51. Cochran et al., "Radioactive Contamination at Chelyabinsk-65, Russia,” 522. [↑](#footnote-ref-51)
52. Valery Soyfer, "Radiation Accidents in the Southern Urals (1949‑1967) and Human Genome Damage," *Comparative Biochemistry and Physiology* Part A, no. 132 (2002): 723. [↑](#footnote-ref-52)
53. T. G. Sazykina, Trabalka, J. R., B. G. Blaylock, G. N. Romanov, L. N. Isaeva, and I. I Kryshev,"Environmental contamination and assessment of doses from radiation releases in the southern Urals." *Health Physics* 74, no. 6 (1998): 687; and E. Tolsthyk, L M Peremyslova, N B Shagina, M O Degteva, I M Vorob'eva, E E Tokarev, and N G Safronova. "The characteristics of 90-Sr accumulation and elimination in residents of the Urals region in the period 1957-1958." *Radiatsionnaia biologiia, radioekologiia* 45, no. 4 (2005): 464-73. [↑](#footnote-ref-53)
54. Author interview with Gene Ashley, Richland, WA. [↑](#footnote-ref-54)
55. Russell to Norwood (undated) and Jurgenson to M. Johnson, 14 August 1952 in James Thomas Collection, acc. 5433‑001/11, Special Collections, University of Washington Libraries. [↑](#footnote-ref-55)
56. Carter to Johnson 5 August 1952 in James Thomas Collection, acc. 5433‑001/11, Special Collections, University of Washington Libraries. [↑](#footnote-ref-56)
57. ‘Incident’ reports in late 1952 show that there was at least one case of contamination where members of the janitorial staff came in to clean up. “Separations Section Radiation Hazards Incident Investigation, 7 June 1952, (HW 24746), in James Thomas Collection, acc. 5433‑001/11, Special Collections, University of Washington Libraries. [↑](#footnote-ref-57)
58. Karen Dorn Steele, "N-Worker Contract Extended While Rules on Secrecy Changed," *Spokesman Review*, January 13 1991, B4. [↑](#footnote-ref-58)
59. James Thomas Collection, “Two Autopsy Cases”, acc. 5433‑001/11, 9-30 December 1952, Ernest E. Johnson 8001217, Special Collections, University of Washington Libraries. [↑](#footnote-ref-59)
60. See State of Washington, Order and Notice, 20 December 1972 and Schur to Hames, re: Smith and Patrick Radiation Reports, 7 June 1973; and the Complaint of Blanche McQuilkin, executrix of the estate of Adelbert McQuilkin, deceased,” 12 May 1968 in James Thomas Collection, acc. 5433‑001/11. The Benton County Superior Court also records two other lawsuits charging wrongful death against GE on 1 May 1980 and 21 November 1988. [↑](#footnote-ref-60)
61. Interview with Rex Buck, 18 May 2008, Priest Rapids Dam, Washington. [↑](#footnote-ref-61)
62. According to the reports, the number of livestock had risen in the region from 1945-1949, the year production began in earnest at the Maiak Plant, and then started to decline. Some farms saw a growth of livestock. Other farms had twice as much feed as in prior years, but livestock were still dying. „Protokol piatoi kaslinskoi raionnoi partiinoi konferenstii ,” 18 February 1950, OGAChO 107/17/510: 52. „Protolol shestoi Kaslinskoi raionnoi partiinoi konferenstii,” 27‑28 January 1951, OGAChO, 107/17/658: 12, 137-140, 144, 154; “Pokazateli po zhivotnavavstvu po sovkhoz im. Kirova,” 1953, OGAChO 107/18a/389; “Sekretariiu Kaskinskoi RK N. S. Gorboveskomy: dokladnaia zapiska komissii po proverke kolkhoz "zvesda" o gotovnosti k vesenninu sevu i zabersheniiu zemovku skota,” 21 March 1953, 107/18a/389: 78. [↑](#footnote-ref-62)
63. Novoselov and Tolstikov, *Atomnii sled*: 170-171. [↑](#footnote-ref-63)
64. Valery N. Soyfer, "Radiation Accidents in the Southern Urals (1949-1967) and Human Genome Damage," *Comparative Biochemistry and Physiology* Part A (2002): 723. [↑](#footnote-ref-64)
65. ‘Correspondence,’ 19 November 1954; OGAChO 1138/1/22 and “Pis'mo ministra srednego mashinostroeniia SSSR A. P. Zaveniagina sekretariiu Cheliabinskogo Obkoma KPSS N. V. Laptevu o zavershenii pereseleniia zhitelie iz likvidiruemykh naselennykh punktov, 20 January 1956, OGAChO R‑288/42/67: 59; and Novoselov and Tolstikov, *Atomnii sled*: 71-72. [↑](#footnote-ref-65)
66. Robert S. Norris, *Racing for the Bomb: General Leslie R. Groves, the Manhattan Project's Indispensable Man* (South Royalton, VT, 2002): 216-217. [↑](#footnote-ref-66)
67. The Radiological Sciences Department noted that migratory waterfowl were stopping in the ponds that were “generally contaminated.” Considering only personnel, they concluded that “it is very improbable that any one individual would ever come into contact with enough contaminated ducks or geese to result in any significant internal exposure.” Radiological Sciences Department Investigation Incident, Class I, no. 245, HW 2746, DOE Reading Room, Richland. [↑](#footnote-ref-67)
68. Bailie gives his biographical information in a *New York Times* editorial: Tom Bailie, “Growing Up as a Nuclear Guinea Pig,” *New York Times,* 22 July 1990: E19. [↑](#footnote-ref-68)
69. Cancer researcher Devra Davis discusses a rare lethal birth defect called anencephaly: "during pregnancy, for reasons we don't usualy understand, the skull and scalp sometimes do not form. In the most extreme cases, called acrania (absence of the skull) and acephaly (absence of the head), a baby will have no head at all." Devra Lee Davis, *The Secret History of the War on Cancer* (New York: BasicBooks, 2007): 345. [↑](#footnote-ref-69)
70. See, among many similar stories of cancer and illness, the alumni listserv for Richland: Gene Prosper, *The Sandbox,*  Issue #49, 6 February 2000; Pamela Scott Hobson, *The Sandstorm,* January 2001; Gail Hollingsworth, Lou Williams, *The Sandstorm,* September 1998; Anne Hutcherson, *The Sandstorm,* December 1998; Peggy Roesch, *The Sandstorm,*  February 1999; Betsy Rathjen Talor, *The Sandstorm,* November 1998;  *Think Out Loud,* “Listen to Nuclear Reaction,” 5 December 2008, http://action.publicbroadcasting.net/opb/posts/list/1972210.page. [↑](#footnote-ref-70)
71. "Hanford radiation risks known in '48,” 14 July 1990: *Tri-City Herald:* A5. [↑](#footnote-ref-71)
72. Connor Bass, "Radiation and Health Workers at Risk," *Bulletin of the Atomic Scientists*, September1990: [↑](#footnote-ref-72)
73. Ibid and Larry Shook, "How Dangerous is Hanford's Radiation? The Scientific Debate," Pan Environmental Journal (Winter 1985). [↑](#footnote-ref-73)
74. *Review of the Hanford Thyroid Disease Study Draft Final Report* (Washington, D.C.: National Academy Press, 2000). [↑](#footnote-ref-74)
75. In 1990, roughly 2,300 people, who charged they were exposed to Hanford’s radioactive contamination, filed suit against DuPont and GE. A few bell weather cases have come to trial in the subsequent two decades. Only a handful of claimants have been awarded compensation for thyroid disease. Greg Gilbert and Warren Cornwall, “Hanford Downwinders get their day in court, *Seattle Times,* 25 April 2005. [↑](#footnote-ref-75)
76. Jeffrey Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran and North Korea* (New York: Norton, 2006): 74. [↑](#footnote-ref-76)
77. Even after travel restrictions decreased after 1956, few residents received permission to go. In 1959, for example, all of 189 residents were given leave to pass out of the gates. “Spravka,” 1959, OGAChO 2469/3/2: 5. [↑](#footnote-ref-77)
78. „Protokol no. 1 zasedaniia plenuma Ozerskogo gorogdskogo Komiteta KPSS,” 17 August 1956, OGAChO 2469/1/2. [↑](#footnote-ref-78)
79. “Safety Exposition Finishes Successful Week’s Program,” *The Sage Sentinel,* 4 August 1944, and “Safety Exposition, Souvenir Program, 24-28 July 1944. The initial exposition was hosted by the Safety Department, a division of the DuPont administration of the plant. [↑](#footnote-ref-79)
80. In 1950, the *New York Times* Magazine wrote "it is ten times as safe to work at Hanford as in an average chemical plant." Hanson W. Baldiwn, "New Atomic Capital," *New York Times Magazine*, 30 July 1950, p. 19, as cited in John M. Findlay and Bruce Hevly, *P.S. Your Bombs Are Certainly Wonderful: Hanford and the American West* (Draft April 2006), Chapter One: 58. [↑](#footnote-ref-80)
81. Findlay and Hevly, *P.S. Your Bombs,* Chapter One; 31. [↑](#footnote-ref-81)
82. Gerber, *On the Homefront:* 125. [↑](#footnote-ref-82)
83. “Columbia River Situation—A semi-technical review,” 19 August 1954, HW-32809, NARA RG 326/650, box 50, folder 15; section VII. [↑](#footnote-ref-83)
84. Ibid. [↑](#footnote-ref-84)
85. L. K. Bustad, “A Comparative Study of Hanford and Utah Range Sheep,” HW-30119, DOE Reading Room, Richland; “Biology Research Annual Report, 1956,” HW-47500; Gerber, *On the Home Front*: 97-98. [↑](#footnote-ref-85)
86. L. K. Bustad, S. Marks, L.A. George and L. J. Seigneur, "Thyroid Adenomas in Sheep Administered Iodine-131 Daily," *Nature* 179 (March 30 1957). [↑](#footnote-ref-86)
87. As Bustad wrote in 1967: “Much appears in the news today that is either slanted or just plain untrue. Some of it is downright dishonest and designed to mislead. In too many place we have an irresponsible press.” Leo K. Bustad, *Compassion: Our Last Great Hope* (Renton, Wash.: Delta Society, 1990); 4. [↑](#footnote-ref-87)
88. See the Richland High School alumni listserv *Sandstorm* at Sandstorm.com and reporting from the *Ozerskii Vestnik*. [↑](#footnote-ref-88)
89. In 1951, with pressure from the NAACP, a few token African American families were given access to Richland; but they were tokens. The number of minority employees in Richland remained in the single digits for decades. See “Hanford Project Survey, 1950-1951,” Seattle Urban League in the Henry Jackson Collection, acc. 3560-2/55/12, University of Washington Special Collections. See also Robert Bauman, "Jim Crow in the Tri‑Cities, 1943‑1950," *Pacific Northwest Quarterly* Summer 2005: 124‑31. In 1950, seven blacks lived in Richland, .2% of the population. In 1960, there were 189; non-whites were 1.3% of the population. Findlay and Hevley: 58. [↑](#footnote-ref-89)
90. Novoselov and Tolstikov, *Taina "Sorokovki*: 107. [↑](#footnote-ref-90)
91. In the 1957 Cheliabinsk-40 party roster, most candidates and members were Russians and Ukrainians. There were two Tatars and no Jews. “Spisok kandidatov v deputaty ozerskogo gorodskogo soveta deuptatov trudiashchiisia,” OGAChO 2469/1/120, 1957. For transcripts of the political working over of a Jewish administrator, see “Protokol #8, biuro ozerskogo gorkom,” 2 October 1956, OGAChO 2469/1/4, ll. 1‑12 [↑](#footnote-ref-91)
92. Paul John Deutschmann, "Federal City: A Study of the Administration of Richland, Washington, Atomic Energy Commission Community" (M. A. thesis, Univ of Oregon, 1952): [↑](#footnote-ref-92)
93. Mel’nikov, *Fenomen zakrytogo atomnogo goroda*: 76. [↑](#footnote-ref-93)
94. Gordon Turnbull, Richland’s master planner stated that the purpose of town planning and investment in the city was to reduce employee turnover in Richland which was not considered tenable in plutonium production. "Because of the technical skill and training required and clearance of all new personnel, such turnover can be less easily tolerated in the production of fissionable materials than in any other line of industry.” Inc Gordon Turnbull, *Master Plan for Richland, Washington* (Cleveland and Chicago, 1948): 48. [↑](#footnote-ref-94)
95. See, for example, Jeffrey J. Rossman, *Worker Resistance under Stalin: Class and Revolution on the Shop Floor* (Cambridge, Mass, 2005). [↑](#footnote-ref-95)
96. David Holloway, *Stalin and the Bomb* (New Haven: Yale University Press, 1994): 148. Holloway quotes Stalin saying to Kurchatov: "our scientists were very modest and they sometimes did not notice that they live poorly...our state has suffered very much, yet it is surely possible to ensure that several thousand people can live very well, and several thousand people better than very well, with their own dachas, so that they can relax, and with their own cars." [↑](#footnote-ref-96)
97. Gerard J. DeGroot, *The Bomb: A Life* (Cambridge, MA, 2005): 144. [↑](#footnote-ref-97)
98. In Ozersk by 1958, 62% lived in one room apartments w/ living space of 5.35 sq meters. The largest contingents of apartments were three room apartments with 11% of families in them. The better conditions were a cause for pride and hope of envy. As one person mentioned at Cheliabinsk-40 party meeting: "Our city isn't on the map, but many can envy the conditions in which we live." OGAChO 2469/7/2: 67. [↑](#footnote-ref-98)
99. Zhondetskaia lived in Cheliabinsk-70, the small research settlement attached to the plutonium plant. Emel'ianov, *Raskryvaia pervye stranitsi*: 27. [↑](#footnote-ref-99)
100. In M. E. Glavatskii ed., *Rossiia, kotoruiu my ne znali, 1939‑1993* (Cheliabinsk: Iuzhnoe‑ural'skoe knizhnoe izdatel'stvo, 1995): 266‑7. [↑](#footnote-ref-100)
101. ed. V. V. Alekseev, *Obshchestvo i Vlast': 1917-1985, Vol. 2, 1946-1985* (Cheliabinsk: UrO RAN, 2006): 93. [↑](#footnote-ref-101)
102. Deutschmann, “Federal City”: 293. [↑](#footnote-ref-102)
103. Pollsters in Pasco in 1949 found that 75% of Blacks and 3% of Whites lives in trailers; 78% of black families and 6% of White families lived in one room; 95% of Blacks in Pasco lived east of tracks in shacks and trailers, in a region that had no city plumbing or electricity. Residents used outhouses and communal showers and hand pumps. The shacks rented for $15-20 a week; four times more than a modern, new one-bedroom in Richland with all utilities included. Pasco by this time had a full-blown Jim Crow establishment. James T. Wiley Jr., "Race Conflict as Exemplified in a Washington Town," M.A. thesis, Sociology, State College of Washington, 1949): 53. [↑](#footnote-ref-103)
104. Deutschmann, “Federal City”: 293. [↑](#footnote-ref-104)
105. \* Gamerco stood for the Gallop American Coal Company. [↑](#footnote-ref-105)
106. Author interview with Ralph Myrick, Kennewick, WA, 19 August 2008. On policies that evicted families from Richland housing once the male breadwinner was terminated for reasons of job performance, health or retirement, see Richland Community Council Minutes, meeting #21, 20 June 1949, Richland Public Library. [↑](#footnote-ref-106)
107. Rumors got to be such a problem that in 1951 GE Public Relations announced a new policy of investigating rumors (in order to get them in hand). "Those that are true will be confirmed." Deutschmann, “Federal City”: 307. [↑](#footnote-ref-107)
108. Findlay and Hevley, *P.S. Your Bombs*, Chapter Two: 34-35 and Deutschmann, “Federal City:” 283. [↑](#footnote-ref-108)
109. Paul Nissen, *Tri-City Herald,* 24 October 1950: 1. [↑](#footnote-ref-109)
110. The wide shoulders of young kids still wiping their sleeves on their nose and wearing wide shoulders was the subject of this meeting. "Protokol sobrannia aktiva gorodskoi partiinoi organizastii," 3 November 1957, 2469/1/119: 159‑170. [↑](#footnote-ref-110)
111. Mel’nikova, *Fenomen zakrytogo atomnogo goroda*: 99-100. [↑](#footnote-ref-111)
112. See, among many examples, Robert Self, *American Babylon: Race and the Struggle for Postwar Oakland* (Princeton: Princeton University Press, 04/08/27 2003): Ira. Katznelson, *When Affirmative Action Was White an Untold History of Racial Inequality in Twentieth-Century America* (New York: W.W. Norton, 2005); Lizabeth Cohen, *A Consumers’ Republic: The Politics of Mass Consumption in Postwar America* (New York: Knopf : Distributed by Random House, 2003). [↑](#footnote-ref-112)
113. A 1952 U.S. Bureau of Census poll conducted for the AEC found that most residents regarded home ownership a risky proposition. In a 1955 poll, Richland residents also rejected plans for ‘disposal and incorporation’ by three to one. Minutes of Richland Community Council, 7 February 1955, Richland Public Library. See also, Rex E. Owinn, Mark W. Fullerton, Neil R. Goff, CHREST Museum Archives, 2006.001, 1, Folder 3.1, "Richland, Washington: A Study of Economic Impact (1955): 49. See also, Excerpts from Delbert Meyer's Thesis on History of Tri‑Cities (1959) CHREST Ass. 2006.1 Box 2, folder 6.1: 120. [↑](#footnote-ref-113)
114. See minutes of the Richland Community Council, 14 June 1948 to 28 June 1953, located at the Richland Public Library. [↑](#footnote-ref-114)
115. "Protokol sobrannia aktiva gorodskoi partiinoi organizastii," 3 November 1957, 2469/1/119 ll. 159‑170; Mel’nikova: *Fenomen zakrytogo atomnogo goroda*: 102-103. [↑](#footnote-ref-115)
116. Zasedanei partiinogo aktiva,” 19 April 1951, OGAChO, 1137/1/31: 1‑75; “Protokol no 2, vtorovo plenuma Ozerskogo gorkoma KPSS,” 15 February 1966,OGAChO, 2469/6/1: 1‑23 [↑](#footnote-ref-116)
117. “Stenogramma zasedaniia biuro gorkoma KPSS s uchastiem chlenov biuro pervichoi partorganizastii TsZL”, 7 December 1956, OGAChO 2469/1/5: 18‑37. [↑](#footnote-ref-117)
118. „Protokol no. 1 zasedaniia plenuma Ozerskogo gorogdskogo Komiteta KPSS,” 17 August 1956, OGAChO 2469/1/2. [↑](#footnote-ref-118)
119. See, among many examples, “Itogi noviab'skogo plenuma TsK KSPSS i zadachi gorodskoi partiinoi organizastii,” 2 December 1958, OGAChO, 2469/2/4: 60‑80. [↑](#footnote-ref-119)
120. Radiation levels along the Techa climbed so high, that local officials had several villages removed from the banks of the river and they established a guard to fend villagers from drawing water from the river. These measures failed, and so were renewed over the years. “Reshenie Cheliabinskogo oblispolkoma o peredache zemel' i imushchestva kolkhoza "krasniy luch" metlinskogo sel'soveta khimzavodu imeni D. I. Mendeleeva”

**OGAChO 288/42/34: 59‑60, and** “Ob ustanovlenii strogogo sanitarnogo rezhima na reke Techa,” 30 August 1958, OGAChO **R‑274/20/48: 94‑96.** [↑](#footnote-ref-120)
121. E. A. Osokina, *Our Daily Bread: Socialist Distribution and the Art of Survival in Stalin's Russia, 1927-1941*, The New Russian History (Armonk, NY: M.E. Sharpe, 2001). For work on cleansings of Soviet city after passportization, see David Shearer, "Elements Near and Alien: Passportization, Policing, and Identity in the Stalinist State, 1932-1952," *The Journal of Modern History* 76 (December 2004): 835-81; V. P. Popov, "Pasportnaia sistema v SSSR (1932-1976)," *Sotsiologicheski issledovaniia* 8 (1995): 3-14; Gijs Kessler, "The Passport System and State Control Over Population Flows in the Soviet Union, 1932-1940," *Cahiers Du Monde Russe* 42 (2001): 478-504 and Nathalie Moine, “Passeportisation, statistique des migrations et controle de l’identité sociale,” *Cahiers du monde russe* 38 (1997): 587-600. [↑](#footnote-ref-121)
122. In 1989, 97% of the residents of the closed city polled voted to keep their gates and guards; mostly for fear of the riffraff lurking outside the gates The poll was used by the city and plant administration to justify the continuance of both the security regime, the fence and its guards. (The poll evidently was planned and taken for that reason: to fend of demands from the Moscow to open the city) A second poll taken in 1999 found that 85% of the population wanted the gates. The lower, laterfigure was attributed to the new migrants who had moved into the city who were not as fearful of the ‘big world’. Viktor Riskin, ""Aborigeny" atomnogo anklava: Y zhitelie Ozerska slozhilsia osobyi mentalitet, oni protiv togo, chtoby ikh gorod stal otrkytym," *Cheliabinskii rabochii*, 15 April 2004. [↑](#footnote-ref-122)
123. Thomas W. Evans, *The Education of Ronald Reagan: The General Electric Years and the Untold Story of His Conversion to Conservatism* (New York: Columbia University Press, 2006): 96-97. [↑](#footnote-ref-123)
124. As Robert Self points out, West Oakland, CA received *none* of the enormous government-subsidized capital investment (3.3 million dollars in San Leandro alone) made in residential property in California between 1945 and the 1960s. Robert Self, *American Babylon: Race and the Struggle for Postwar Oakland* (Princeton, NJ: Princeton University Press, 2003): 104-5. Meanwhile, Beryl Satter argues that in Chicago alone, Blacks paid $1 million a day in inflated rents and property values by the mid-fifties. Beryl Satter, *Family Properties: Race, Real Estate, and the Exploitation of Black Urban America* (New York: Metropolitan Books, 2009). [↑](#footnote-ref-124)
125. Thomas Hobbes, ed., *On the Citizen* (New York, NY: Cambridge University Press, 1998): 115‑116. [↑](#footnote-ref-125)
126. On Moses revisited, see Kenneth T. Jackson and Hilary Ballon, eds, *Robert Moses and the Modern City: The Transformation of New York* (New York, 2008). [↑](#footnote-ref-126)