

THE SPY WHO STOLE THE URCHIN:
George Koval's Infiltration of the Manhattan Project

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More than six decades after the United States developed and used the first atomic bomb against Japan, information surrounding the top-secret Manhattan Project continues to emerge. On November 2, 2007, Russian Prime Minister Vladimir Putin posthumously awarded Soviet citizen George A. Koval with the Hero of the Russian Medal, the nation's highest civilian honor, for "his courage and heroism while carrying out special missions" and acknowledged Koval's contribution to the Soviet Union's development of the atomic bomb. In the Kremlin's press release on this curious event, Putin noted that Koval, who operated under the codename Delmar, "provided information that helped speed up considerably the time it took for the Soviet Union to develop an atomic bomb of its own, thus ensuring the preservation of strategic military parity with the United States." According to the press release, Koval was the "only Soviet intelligence officer to penetrate the U.S. secret atomic facilities producing the plutonium, enriched uranium and polonium used to create the atomic bomb."¹

News of Koval's infiltration of the Manhattan Project shocked the American intelligence community and has prompted a complete reassessment of Soviet espionage during the Second World War. Over the years, government officials and scholars have identified nearly a dozen individuals who spied on the American bomb project for the Soviet Union, especially at Los Alamos in New Mexico. But all of these individuals were "walk-ins"—"spies by impulse and sympathetic leaning rather than rigorous training."² By contrast, Koval was a skilled intelligence officer trained in the Soviet Union by the nation's feared Military Intelligence Directorate (G.R.U.). He was also the only Soviet spy that had top-secret clearance, which gave him unrestricted access to site facilities and buildings.

America's effort to build the atomic bomb was one of the most closely guarded secrets of the twentieth century. From 1944 until 1946, George Koval infiltrated Manhattan Project sites in Oak Ridge, Tennessee and Dayton, Ohio and stole invaluable information about the manufacture of the atomic bomb. He passed that information along to the Soviet Union, which helped significantly reduce the time that it took the USSR to develop its own atomic weapon. While Koval may not have provided the Soviets with detailed blueprints of the bomb's design, he did manage to steal information about one of the most crucial parts of the weapon: the device that initiates the nuclear chain reaction. This device, codenamed "urchin," proved "incalculable" to the development of the atomic bomb. The fact that Koval's infiltration of the Manhattan Project has only recently come to light makes him one of the most important spies of the 20th century that the world has never heard of—until now.

George Koval's story began in the cornfields of northwestern Iowa. In 1910, Abraham and Ethel Koval left their small *shtetl* in Telekhany, Belarus and immigrated to Sioux City, an emerging center of culture and commerce. Iowa's farmlands, meatpacking plants, and coalmines promised a better life for many Russian immigrants who had been ruthlessly persecuted under the czar's anti-Semitic policies and pogroms. Sioux City already had a sizeable Jewish community of merchants and craftsmen by the turn of the century, and many of these early settlers had erected synagogues and formed support groups to assist new immigrants.³ Among them were Abraham and Ethel, who moved into a comfortable house not far from the city's Central High School. There, the family raised three sons—Isaya, born in 1912; Zhorzh, or George, born on Christmas Day, 1913; and Gabriel, born in 1919.⁴

As a teenager, George distinguished himself as a brilliant student as well as an outspoken advocate of Communism. He attended Sioux City's Central High School, where he excelled as a member of the debate team. He was also secretary of the school's Chrestomathian Literary Society, a club known for its "ideals, uprightness, loyalty and democracy."⁵ According to neighbors, George spoke openly about his communist views and told classmates that his family was planning to return to Russia where the government was building a "utopia" for Jews. When he was sixteen, he served as a young delegate to a Communist Party conference in Iowa.⁶ By the time George graduated in 1929, he was a member of the Honor Society and had held a leading role in the class play: *Nothing But the Truth*. A fitting description of George appeared underneath his portrait in Sioux City's Central High School 1929 yearbook: "A Mighty Man is He."⁷

After graduation, George studied electrical engineering at the University of Iowa. But when the Great Depression struck in 1932, Abram Koval decided to pack up his wife and sons and return to the Soviet Union. This was not uncommon for many Jewish families who had immigrated to the United States before the First World War; the oppressive and anti-Semitic tsarist autocracy had been overthrown during the Russian Revolution in 1917 and many Jews perceived the new Soviet Union "as the one government in the world which actively fought anti-Semitism and fostered Yiddish culture."⁸ As a result, many Jews embraced Communism, seeing it as the only way to bring about a revolution in ethnic relations that would finally eliminate anti-Semitism.

The Marxist-Leninist framework of Jewish Communism resonated with Abram Koval. In Sioux City, he became secretary of a Communist organization known as ICOR, a Yiddish acronym for the Association for Jewish Colonization in the Soviet Union.⁹

Founded in the United States in 1924, ICOR provided assistance and funds to Jewish collective farms in Russia and helped Jews in various capitalist countries who were being victimized by pogroms, persecution, and fascism. The organization also served as a rival to the Zionist movement, which hoped for a Jewish homeland in the Middle East. More importantly, ICOR mobilized Jews to “sympathize with and defend the Soviet Union, the only country in the world that, in its view, had established a sound economic foundation for its Jewish population and had almost eliminated anti-Semitism.”¹⁰ Abram Koval’s political activism and Russian nationalistic pride undoubtedly influenced his young son, George, who had never visited his parents’ native land.

Traveling on a U.S. family passport, the Kovals boarded the steamship “Levitan” in 1932 and made the long journey across the Pacific Ocean to the Soviet Union.¹¹ The family had planned to live with relatives in Minsk, “but the Soviet authorities did not allow them to do that.”¹² Instead, they were forced to stay in the Vladivostok area, in the so-called Jewish Autonomous Region that Joseph Stalin had established in the 1920s and promoted as a secular Jewish homeland. The Kovals eventually settled in Birobidzhan, a small town near the Soviet border with Manchuria.¹³

Like many struggling immigrants, the Kovals joined a commune and began working on a collective farm. There, the family was able to “exchange the uncertainty of life as small storekeeper’s in Sioux City for a worry-free existence for themselves and their children.”¹⁴ Abram used his carpentry skills to build and repair houses and his sons provided the wood by cutting down trees. George quickly distinguished himself as one of the commune’s most talented members; after improving his Russian, he taught himself how to repair the farm’s machinery and became the collective’s primary mechanic.¹⁵

But for Koval, life on the collective was tedious and unrewarding. So, in 1934, he applied and was accepted to study at the Mendeleev Institute of Chemical Technology in Moscow. There, he excelled as a student and spent much of his time studying rare gases. Four years later, Koval met and married Lyudmila Ivanova, a fellow student whose father owned a small sweet shop in Moscow.¹⁶ After Koval completed his undergraduate degree with university honors, the State Examination Board waived its postgraduate examination requirement and recommended him for postgraduate study. In 1939, he completed his degree and received his Soviet Citizenship. Koval's achievements soon caught the attention of the Soviet Union's Main Intelligence Directorate (G.R.U.).

If the G.R.U. ever needed a spy that could penetrate deep inside America's secret wartime projects, George Koval was the perfect candidate. He was an American citizen, born and raised in the United States, perfectly attuned to American culture and fluent in both English and Russian. He also possessed the scientific and technical skills needed to carry out intelligence missions on weapons projects. And unlike many Soviet spies in America who had emerged through the ranks of the Communist Party of the United States, Koval "was barely known to other communist comrades in the United States or tainted by the atrocious tradecraft they practiced."¹⁷ Most important of all, he was deeply committed to the Soviet Union and the Communist cause.

In 1938, while Koval was finishing up his postgraduate degree, a representative from the G.R.U. contacted the Institute and inquired about Koval. According to the Institute's Director I. Pilsky, Koval "was an exceptional student who worked hard and was making excellent progress on his study of inorganic substances." He was also

“politically developed” and had been a member of the All-Union Lenin Communist Union of Youth since 1936.¹⁸

Exactly how and when the G.R.U. recruited Koval remains unclear, but after he received his degree he left Moscow and was drafted into the Red Army. “I was drafted into the [Soviet] army in 1939 to cover up my disappearance from Moscow,” Koval would later write to Arnold Kramish, an American scientist he would befriend. Kramish, a Manhattan Project veteran and former member of the Atomic Energy Commission, reestablished contact with Koval in 2000 and kept in touch by letter and e-mail over the last five years of Koval’s life. Despite being drafted into the army, Koval “did not accept an offer of military training and service as an army officer at that time, was never sworn in, or wore a uniform.”¹⁹ The G.R.U. had much bigger plans in mind.

After counterintelligence training, the G.R.U. assigned Koval the codename “Delmar” and instructed him to return to the United States. “I entered the U.S. in October 1940 at San Francisco,” Koval later wrote to Kramish. “I came over on a small tanker and just walked out through the control point together with the captain, his wife and little daughter, who sailed together with him.”²⁰ Koval eventually made his way to New York City, where he assumed deputy command of the G.R.U. station there. To conceal its activity, the station went under the cover of the Raven Electric Company, a supplier for General Electric and other U.S. firms.²¹

According to Russian historian Vladimir Lota, Koval’s initial assignment was to gather information on American chemical weapons research.²² Poisonous gas had been used effectively by both the Allied and Central Powers during World War I and many countries assumed that chemical weapons would be used again in World War II. The

Geneva Protocol, which forbade the use of “asphyxiating, poisonous or other gases” during warfare, had already been ignored by Fascist Italy, which used mustard gas during its invasion of Ethiopia in 1935. The Germans had also secretly resumed research on chemicals weapons, developing the world’s first nerve agent, tabun, in 1936. The United States and Britain responded by strengthening their own chemical weapons programs during the 1930s. To remain competitive, the Soviets tasked Koval with infiltrating the U.S. Chemical Warfare Service to gather intelligence on new types of chemical agents.

But on January 2, 1941—just months after he walked into the United States—Koval was forced to register for the draft. The G.R.U. believed that Koval’s ability to gather intelligence on chemical weapons would be compromised if he were drafted, so the Raven Electric Company secured him several job-related deferments by presenting him as a “key employee” and a board member.²³ To avoid any suspicion, Koval told colleagues that he was a native New Yorker, an only child, and an unmarried orphan.²⁴ Whether or not Koval was able to gather any meaningful intelligence on chemical weapons during his two years in New York remains unclear. At the very least, he received additional reconnaissance training that would prove useful for his next task: stealing atomic secrets.

When Koval’s deferment expired in February 1943, he was drafted into the US Army. After basic training at Fort Dix, New Jersey, Koval was sent to the Citadel in Charlestown, South Carolina to await assignment. After obtaining several fake documents that showed he had an Associate Degree in Chemistry from a community college in New York, Koval was selected to join the Army Specialized Training Program (ASTP).²⁵ The ASTP had been established in December 1942 to ensure a continuous flow

of high-grade technicians and specialists needed by the army. To achieve this, the program provided academically talented men with specialized technical training at colleges and universities across the country. In August, Koval and thirty-nine other men were sent to study at the City College of New York (CCNY).

For the next eight months, Koval studied electrical engineering and became a role model for other members in the program. "There was no better man than George," recalled Kramish, who was also in the ASTP. "He was superb at every job he had."²⁶ But for some, Koval did seem a little unusual; he was a decade older than other ASTP members and he stood out because he acted more maturely. He also never seemed to do any homework (Koval's colleagues had no idea that he was already a college graduate back in Moscow). He also lacked a New York accent. But Koval's knowledge and maturity earned him respect, and none of his ASTP colleagues had reason to suspect he might be a Soviet spy.

After completing the necessary coursework, Koval and about a dozen others from CCNY were selected for the Special Engineer Detachment (SED) in August 1944. The SED was a vital component of the Manhattan Project. The Army had established the detachment in early 1943 to tap into the large pool of draftees possessing scientific and technical skills that could be utilized to solve the many problems impeding the creation of the atomic bomb. Koval's induction into the SED meant that the Soviets had now "infiltrated a professionally trained intelligence officer into America's most secret military endeavor."²⁷

As soon as Koval learned that he would be transferred, he set up a meeting with his Soviet handlers to inform them of his new assignment. According to Lota, Koval met

with an unidentified individual codenamed “Faraday” and reported that he would be transferred to site “X.” Since Koval had no idea where he was going or what he would be doing, he agreed to report back as soon as he received an opportunity to leave the site.²⁸ Neither Koval nor the G.R.U. could have predicted what happened next.

Less than a week after his meeting with Faraday, Koval arrived in Oak Ridge. There, he was made a Health Physics Officer, charged with monitoring radiation levels throughout the site’s sprawling facilities. That position, according to FBI files, gave him top-secret clearance. “He had access to everything,” recalled Kramish, who worked at a different lab at Oak Ridge. Koval’s position also entitled him to special privileges: “He had his own Jeep. Very few of us had our own Jeeps.”²⁹ With unrestricted access to Oak Ridge’s buildings and facilities, Koval was in the perfect position to steal atomic secrets.

When Koval arrived at Oak Ridge in the middle of 1944, Manhattan Project scientists were pursuing two very different bombs. The first bomb, based on a simple gun-type design, required a critical mass of enriched uranium-235 large enough to produce a sustained nuclear reaction. Since most uranium found naturally in the world exists as uranium-238, scientists had to figure out how to separate and purify the much more rare uranium-235 isotope. Three of the four different methods of separation approved by Groves were being pursued at Oak Ridge: gaseous diffusion, electromagnetic separation, and liquid thermal diffusion.

The second bomb was based on the revolutionary principle of implosion and required Plutonium-239, an element that had only been discovered in 1941. The implosion bomb would use conventional explosives placed around a central plutonium mass to instantaneously compress the inner core and initiate a nuclear chain reaction.

Trace amounts of plutonium were first obtained from irradiated uranium at Oak Ridge's X-10 Graphite Reactor in late 1943. The Clinton Pile, as it was commonly referred to, was based on the design and engineering of Enrico Fermi's "Chicago Pile I" constructed underneath the west stands of Stagg Field at the University of Chicago in 1942. The X-10 Reactor and the plutonium production process pioneered at Oak Ridge would serve as the blueprint for the giant plutonium producing facilities built in Hanford, Washington.

Though work at Oak Ridge remained highly compartmentalized, Koval's top-secret clearance meant he probably knew the overall mission of the project. James Schoke, a member of the SED who also received top-secret clearance, explained that even though "information was available only on a need-to-know basis," it did "not mean that you did not hear things that you should not have heard, because you did in the course of relationships with other people on the project."³⁰ As a Health Physicist, Koval would have been required to learn the basic physical and chemical properties of the radioactive materials he was monitoring. In addition, most SEDs worked closely with "very senior physicists and chemists" who would have had knowledge of the Project's overall objective.³¹

After about six months, Koval received his first opportunity to meet with his Soviet contact. According to Lota, Koval met with Faraday and informed him about the existence of a "secret nuclear city" in Oak Ridge that produced uranium-235 and plutonium-239 for use in the atomic bomb. He also reported that the enrichment of uranium and plutonium "was divided into three main sectors: K-25, Y-12, and X-10." After a sufficient quantity of the enriched material was produced, "it was transported by military plane to laboratories in Los Alamos."³² Koval spent most of his time monitoring

radiation levels at X-10, where he observed scientists trying to separate minute quantities of another mysterious element: polonium. Within a week, Faraday had transmitted details of his conversation with Koval to G.R.U. headquarters in Moscow by cable.

When the G.R.U. received the report in early 1945, it was immediately forwarded to Igor Kurchatov, the Soviet physicist who Stalin had selected to direct the USSR's atomic bomb program. By then, Kurchatov had already received detailed reports about the nuclear research being carried out in New Mexico from Klaus Fuchs, a member of the British Mission at Los Alamos who was also a Soviet spy. Kurchatov also knew about nuclear research being carried out at the University of Chicago and the University of California at Berkeley. But the G.R.U. and Kurchatov knew almost nothing about Site "X"; that is until early 1945, when Koval revealed its exact location and purpose.³³ With this information, the Soviets immediately realized the size and scope of the American atomic bomb project.

The intelligence obtained by Koval at Oak Ridge had a significant impact on the direction of Soviet nuclear research. Kurchatov quickly realized that the massive separations facilities required to enrich uranium-235 would be too demanding an endeavor for the Soviet industrial base, especially during the post-war period. As a result, Kurchatov made the decision in 1945 to proceed with the production of a plutonium bomb.³⁴ The Soviet physicist had also been intrigued by Koval's report that scientists at Oak Ridge were developing methods to separate polonium. Since Koval had unrestricted access to the X-10 reactor, the G.R.U. charged him with keeping track of Oak Ridge's polonium. Over the next several months, Koval transmitted information about polonium production through a Soviet contact codenamed Clyde.³⁵

Manhattan Project scientists had become interested in polonium in early 1943 as a possible “initiator” for the implosion bomb. Radio-chemists at Los Alamos knew that spontaneous fission was possible, but without an initiator capable of producing neutrons to “kick start” the chain reaction, they were not sure that it was probable. Timing was also key; in order to obtain a significant yield, scientists needed an initiator that could produce a burst of neutrons within the supercritical core at the exact micro-second of implosion.³⁶ If the chain-reaction started too soon, the bomb would “fizzle” and produce an explosion well below the designed yield. If it occurred too late, the core would expand into a less-dense state and produce little or no yield at all.

In August 1944, after more than a year of research on different types of neutron sources, scientists at Los Alamos decided that polonium-210, in combination with beryllium, “would be the best material to use” as the initiator for the implosion bomb.³⁷ Discovered by Marie and Pierre Curie in 1898, polonium is a rare and highly radioactive metal that emits neutrons and alpha particles when exposed to beryllium. But in 1943, more than forty years after Curie’s discovery, polonium was still not available in sufficient quantity or purity for radio-chemists to determine its chemical and physical properties: “Nothing was known about polonium...at that point in time, the amount of polonium available in the world was next to nothing. There was no material, no knowledge of its chemical, physical, or any other properties.”³⁸ As a result, Manhattan Project scientists “were in doubt as to whether polonium could be purified sufficiently to meet the tolerances for neutron backgrounds” required of the initiator. Since no efficient method for polonium purification existed, MED officials tasked the Monsanto Chemical

Company with solving “the two successive problems of polonium purification and production in the required quantities.”³⁹

Located in Dayton, Ohio, the Monsanto Chemical Company was one of the largest chemical consulting firms in the country. Dr. Charles A. Thomas, the Executive Vice President and Technical Director of Monsanto’s Central Research Department, had been urged by General Groves in early 1943 to become co-director at Los Alamos with Dr. Robert Oppenheimer and to be responsible for the chemistry of the entire project.⁴⁰ Thomas, reluctant to leave his post at Monsanto, declined the offer but agreed to take on the problem of polonium production and purification under the auspices of Monsanto.

In July 1943, the Dayton Project was formally organized. Thomas, together with Assistant Director Dr. Carol Hochwalt and Laboratory Director Dr. James Lum, began recruiting scientists to work on the top-secret project. Over the next two years, the project quickly expanded to include three separate facilities (Unit I, III, and IV) located in close proximity to project headquarters on Nicholas Road.

The Dayton Project was carried out from beginning to end in the upmost secrecy. Those recruited for the project were told nothing about the nature of the work, and those that were eventually hired were required to sign the Espionage Act and have their backgrounds thoroughly investigated by the FBI. When preliminary research commenced at Unit I in 1943, strict measures were introduced to ensure project security. All workers had to pass through a security checkpoint, and armed guards patrolled the facilities day and night. When the project expanded to include Units III and IV, guardhouses were constructed and barbed-wire-topped fences surrounded the grounds, which remained floodlit at night.⁴¹ By the end of 1946, the Dayton Project had forty-three armed guards

who kept unauthorized persons out and maintained a close eye on employees.⁴² Long-time Dayton resident recalled the unusual activity in his neighborhood: “Between big trucks rolling in and out, the floodlights and heavy-duty power lines strung all over, the place was a real mess. But those were the days when you knew enough not to ask questions.”⁴³

When suspicion did arise, the MED went to extraordinary lengths to keep the Dayton Project secret. In February 1944, when the United States government acquired the Runnymede Playhouse (Unit IV) under the Emergency Powers Act, leasing documents stated that the structure would be used as a film laboratory for the Army Signal Corps.⁴⁴ MED officials also endeavored to keep the Project secret by downplaying its importance. Major General Kenneth D. Nichols, who served as Groves' deputy and periodically visited Dayton to consult with Hochwalt, admitted that the polonium initiator was a crucial “part of the weapon, (but) we gave very little indication to anybody that we needed it.” That led to problems, however: “When one of our people would go somewhere to meet somebody,” explained W.C. Fernelius, a Dayton Project director, “they were told that our work wasn’t significant. That produced morale problems we had to fight all the way through.”⁴⁵ Most of those involved eventually accepted the anonymity of their roles, especially if it meant winning the war and preserving the secrecy of the Project.

Information about the polonium initiator was so secret that it still remained classified forty years after the atomic bombs were dropped on Japan. A week after the first bomb exploded over Hiroshima on August 6, 1945, General Groves wrote to the chairman of Monsanto and informed him that “the detailed description of your efforts

must still remain undisclosed because of security requirements.”⁴⁶ This explains why Dayton was never mentioned in the *Smyth Report*, the official U.S. government history about the development of the atomic bombs published in 1945. “The making of the trigger, the process and everything thereafter, we did in Dayton” explained George Mahfouz, a process engineer who worked at the Playhouse. “That work was kept classified until July of 1983.” Up until that time, “No one knew what we did. The entire complex did not know what we did. No one even knew we existed.”⁴⁷ At least, that is what U.S. government officials thought.

On June 27, 1944, after almost a year at Oak Ridge, Koval was transferred to the top-secret laboratory in Dayton. There, he joined the Health Division, which had been organized earlier that month by Lt. B.S. Wolf to monitor the health of staff who had been exposed to polonium and to “establish much more extensive and careful survey and monitoring routines.”⁴⁸ As a Health Physicist, Koval was “charged with the construction and maintenance of instruments and the electronic counting of survey samples of all types.”⁴⁹ He was also responsible for monitoring contamination levels in the area surrounding site facilities, which meant he likely had access to laboratory buildings at Units III and IV. According to Mahfouz, “the health physics people monitored the entire surrounding area, both water and air, on a continuous basis, even as far away as a seventy-five-mile radius around Runnymede, to make sure there was no contamination anywhere.”⁵⁰ Free to roam the installation, Koval was perfectly positioned to steal secret information about the development and design of the polonium initiator.

And, according to the *Manhattan District History*, Koval would have had ample time to complete this task. Since virtually nothing was known concerning the effects of

polonium on the human body and “there were no means available to detect its presence in the human system,” the Health Division at Dayton “had little opportunity during this period [1944-1946] to engage in research design and development.”⁵¹ Instead, Health Physicists spent most of their time collecting and analyzing urine samples from staff. With little else to complete, most members of the group “constructed old type instruments that the Manhattan District could not supply.”⁵² This meant Koval could slip away unnoticed for hours at a time to gather information about polonium production and meet with his Soviet handlers to discuss development of the “urchin.”

And that was exactly what Koval did. According to Lota, between 1945 and early 1946, “Delmar met regularly with “Clyde” to discuss the details of laboratory work at Dayton.”⁵³ Exactly what “details” Koval managed to pass along to his Soviet handler remain hidden inside documents in the G.R.U.’s archives—documents which may never be revealed. What is certain, however, is that Koval’s placement at Dayton, unlike his position at Oak Ridge, gave him firsthand access to the research being carried out on polonium, which greatly “expanded his opportunity to gather new intelligence.”⁵⁴

Koval’s spying at Dayton also provided the Soviets with a better understanding of how each MED site functioned within the overall Project. The Soviets knew from Koval’s espionage at Oak Ridge that polonium was obtained from bismuth irradiated in the Clinton Pile. They also knew that some of this material was transported to secret laboratories in Los Alamos in New Mexico. What they did not know was that the polonium had to be separated and purified before it could be used in laboratory experiments. That work was carried out in Dayton. With Koval’s espionage, the Soviets

could now trace the polonium production process and connect the dots between Oak Ridge, Dayton, and Los Alamos.

Koval's spying also gave the Soviets insight into how the material was transported between the various Manhattan Project sites. The polonium was stored "in a lead pot on the bed of the truck," according to Max Gittler, one of four GIs that made up the "Pony Express"—the special group tasked with transporting materials between MED sites. The container "was estimated at about three thousand pounds of lead," recalled Gittler, "and when we stopped for gas, the attendants would notice that the springs [on the truck] were almost fully compressed...we gave them no explanation for that."⁵⁵ The Pony Express made dozens of trips to MED sites across the country, but for Gittler, one trip stood out in particular:

"We traveled to Dayton, Ohio, to a private residence. For that trip we wore civilian clothes, we carried guns, shoulder holsters, and after we left the compound we put on Tennessee plates. We found to this very high-class residential district, and we backed into the garage of one of the residences grouped in a circle. Inside was a laboratory. There was no furniture; nobody lived there. It was an entire laboratory for polonium."⁵⁶

The heightened level of security surrounding the material transported from Dayton indicated just how crucial polonium was to the development of the atomic bomb. When these shipments increased in mid-1945, Koval was able to draw the conclusion that work on the atomic bomb was "entering its final stages."⁵⁷

On July 16, 1945, the United States tested the world's first atomic weapon in Alamogordo, New Mexico. The test, codenamed Trinity, used an implosion plutonium bomb that produced an explosion equivalent to 20,000 tons of TNT. The successful detonation of the device, codenamed Gadget, proved that the polonium initiator

developed by Manhattan Project scientists had worked. Less than a month later, the United States dropped a replica of the Gadget device on Nagasaki, Japan. Five days later, Emperor Horohito announced Japan's surrender.

Even though the war had ended, polonium production at Dayton continued. Perhaps the most damaging information Koval was able to pass along to the Soviets occurred during this time period. On December 22, 1945 the G.R.U. received a report from Koval that included detailed information about the volume of polonium production: "The polonium is sent to the state of New Mexico, where it is used for the creation of nuclear bombs. Polonium is made from bismuth. On November 1, 1945 the volume of polonium produced was 300 curies per month, but that amount has now been raised to 500."⁵⁸ On February 13, 1946, the G.R.U. received another report from Koval; this time, it included "a brief description of the manufacturing process of polonium."⁵⁹ This information proved vital for the Soviets, who were now rapidly pursuing an atomic bomb of their own.

In 1946, the Dayton Project expanded beyond its initial responsibilities of polonium production and purification to include the manufacture of the "urchin" device itself. In order to prepare for the conversion of the Los Alamos Laboratory to a peacetime basis, "plans were started to transfer the manufacture of the urchin initiators to the Monsanto plant in Dayton, and this transfer had been almost accomplished by 31 December 1946."⁶⁰ During that time, "Monsanto personnel obtained full information from Los Alamos and from equipment manufacturers" about the design of the initiator.⁶¹ It is very likely that Koval passed along information about the initiator to the Soviets.

The USSR detonated its first bomb on August 29, 1949 at the Semipalatinsk Test Site in Kazakhstan. News of the Soviet atomic explosion shocked Americans; U.S. physicists had estimated that it would take the Soviets at least five years to build and test their own device. The bomb, codenamed First Lightning, was an implosion weapon containing a solid plutonium core that was modeled after the Fat Man bomb that the United States dropped on Nagasaki on August 9, 1945. In 2007, Russian military officials disclosed one crucial factor in their accelerated achievement: the initiator for that bomb was “prepared to the ‘recipe’ provided by military intelligence agent Delmar—Zhorzh Abramovich.”⁶²

In 1946, Koval was honorably discharged from the Army. According to Lota, “the chief of the laboratory suggested that he remain at his former post, and even promised him a promotion, but Koval refused.”⁶³ Shortly thereafter, he returned to New York, where he met with Clyde to inform him about the offer he had received. Clyde suggested that Koval accept the promotion because it would allow him to obtain “new intelligence from Dayton.” But Koval expected security around the project to become tighter, and he worried that a more comprehensive background check might reveal that he had returned to the USSR during the 1930s. Koval was also troubled by recent media reports that accused the Soviet Union of nuclear espionage.⁶⁴ In February 1946, the American public was awakened by the story of Igor Gouzenko, a cipher clerk at the Soviet Embassy in Ottawa, Canada who defected to American authorities and revealed information about Soviet espionage activities in the United States and Canada. Worried that he might be exposed, Koval requested that he be allowed to return to Moscow as soon as possible.

In the meantime, Koval returned to CCNY, where he received his bachelor's degree in electrical engineering *cum laude* on February 1, 1948.⁶⁵ Later that year, Koval told friends that he was planning to travel to Europe. Shortly thereafter, he secured a U.S. passport for six months' travel on behalf of a company called Atlas Trading.⁶⁶ That October, he sailed for Europe, never to return.

After eight years of spying for the Soviet Union, Koval returned to Moscow and was discharged from service in the G.R.U. But instead of receiving rewards for his espionage activities in the United States, Koval "received discharge papers as an untrained rifleman in the rank of private—with 9 years of service in the armed forces."⁶⁷ Koval's lackluster record, coupled with his academic and foreign background, made it extremely difficult for him to find work in the Soviet Union because many believed that he could be an American spy. He finally obtained work as a laboratory assistant at the Mendeleev Institute, where he remained for the next fifty years.

George Koval's penetration of the Manhattan Project has forced scholars to reassess the role of Soviet espionage during the Second World War. The information that Koval was able to pass along to the G.R.U. regarding top-secret work at Oak Ridge and Dayton proved "incalculable" for the Soviets and significantly reduced the time that it took the USSR to develop its own atomic weapon. And unlike other Soviet spies, Koval was the only trained agent to infiltrate the project and remain undetected until now: "He was that rarity, which you see a lot in fiction but rarely in real life—a sleeper agent. A penetration agent. A professional officer."⁶⁸ Even as new information surrounding Soviet espionage during the Manhattan Project continues to emerge, Koval will be forever remembered as one of the most important spies of the twentieth century.

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- ¹ President of Russia, "President Vladimir Putin Handed Over to the GRU [Military Intelligence] Museum the Gold Star Medal," November 2, 2007.
- ² William Broad, "A Spy's Path: Iowa to A-Bomb to Kremlin Honor," *New York Times*, 11 12, 2007.
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