Stalin and the Atomic Bomb

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This article was published in Russia on the 120th anniversary of Stalin's birth on 21 December 1879. The first Soviet atomic bomb was exploded on 29 August 1949.

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The beginning of the uranium problem

Amongst physicists, and in many books on the history of atomic energy in the USSR, the code name *Uran**, in Russian, chosen by Stalin in September 1942 as the specified designation of the Stalingrad counter-attack, is linked with the element uranium. They presume that Stalin, having at this time already approved the setting up of investigations into the uranium problem, found himself under the influence of the potential explosive force of the nuclear bomb. The physicists, however, are mistaken. The codename for the Stalingrad operation was chosen by Stalin in honour of Uranus, the seventh planet of the solar system. The strategic battle following 'Uranus' – the encirclement and rout of the German armies in the region of Rostov on Don – was given the codename 'Saturn' by Stalin.

The first mention in the Soviet press of the unusual explosive force of the atomic bomb appeared in *Pravda* on 13th October 1941. Publishing a report about an anti-fascist meeting of scholars in Moscow the previous day, the paper described to the astonished reader the testimony of academician Pyotr Leonidovich Kapitsa.

> '... Explosive materials are one of the basic weapons of war... But recent years have opened up new possibilities – the use of atomic energy. Theoretical calculations show that if a contemporary powerful bomb can, for example, destroy an entire quarter of a town, then an atomic bomb, even a fairly small one, if it is realised, would be able to destroy a large capital city of several million people'.[1]

Already, in 1941, the construction of an atomic bomb was not considered utopian among physicists. The release of a spontaneous chain reaction by the fission of uranium-235, which had been done in 1938 in Germany by

*In Russian, the word 'Uran' means both 'Uranus' and 'Uranium'.

Otto Hahn, and by Frederic Joliet-Curie in France, was independently discovered by the young Soviet physicists Georgy Flerov in Leningrad and Yulii Khariton in Moscow, in 1939. It was obvious that this reaction of the fission of atoms could have an explosive or a regulated character. The possibility of building an atomic bomb was discussed in 1940 in the United States, even in the general press.[2]

Flerov, having worked before the war in the laboratory led by Igor Kurchatov, served in autumn 1941 as a lieutenant in the engineers at a military aerodrome near Voronezh. Kapitsa's statement in *Pravda* did not pass him by. He rapidly began to write to his former colleagues at work to convince them of the necessity of renewing investigations of the uranium problem. Flerov was certain that in Germany and in the United States investigations in this area were continuing, but with war aims. In Moscow, the leadership of the secret intelligence service had already received definite information about this. Declassified and recently published documents show that, at the end of September 1941, a resident of the Soviet secret service in London sent Moscow a cipher communication by radio that Great Britain had established a special 'Nuclear Committee' for the practical working out and creation of the atomic bomb. It was suggested that such a bomb might be ready in two years. The second communication from this resident, received in Moscow at the beginning of October, contained some technical details of the project for a factory to separate the uranium isotopes, and some worked calculations of the critical mass of uranium-235, which is the 'stuffing' of an atomic bomb. A whole dossier about this problem, which had been prepared for the British War Cabinet, was soon received in Moscow.[3] There is no evidence that Stalin was informed about these ciphers. The texts received from England had a particularly complex scientific-technical character, and could be understood only by professional atomic scientists. Meanwhile, during the next year and a half, up to March 1943, not one Soviet atomic scientist was summoned by the intelligence departments of the NKVD or the army (GRU) to give an expert assessment of the documents which had been received.

The secret service and science

It is often asserted, without dispute, that the Soviet secret service advanced the establishment of the 'atomic shield' in the USSR by several years. The materials of the secret service have the maximum effect only if they fall into the hands of precisely those people who are able to understand, assess, and actually use them. In the USSR, the work of the secret service was organised in such a way that agents receiving information could only make a decision about it after it had passed through Stalin's cabinet. Stalin kept under his personal control absolutely all important decisions, and it was precisely in this that the effectiveness of his power resided. In the Soviet Union, on the eve of the war with Germany, only Stalin had all the information to take the decisions. Communications from the intelligence directorates of the Red Army and the NKVD were sent to Stalin, and not to the General Staff. According to Marshal Zhukhov, who was head of the General Staff at the beginning of the war, General Fyodor Golikov, the head of the General Staff Secret Service, often reported to Stalin personally. ‘It is possible to say’, writes Zhukhov, ‘that I.V. Stalin knew significantly more (about the situation on the western border) than the military leadership.’[4] The intelligence communications about the atom bomb were also to be seen and be considered firstly by Stalin. Stalin’s exceptional well-informedness and his certain ‘omnicompetence’ were assured not by his particular intellect, but his monopoly on information. Stalin’s ability to make proper comments in very many fields usually made a strong impression on all his subordinates, and contributed to the ‘cult of personality’.

During 1942, the Soviet secret service received a very great number of documents on the uranium problem. From England the most valuable information came from Klaus Fuchs, the physicist and atomic scientist who left Germany in 1933, and from John Cairncross, the secretary of one of the war ministers of the War Cabinet, Lord Hankey. At this time, information began to arrive from the United States from Bruno Pontecorvo, an Italian emigre and close collaborator of the famous Enrico Fermi, who, in 1942, was the first person in the world to construct a nuclear reactor. Cairncross, Fuchs and Pontecorvo were communists by political conviction. They sent information about the atomic bomb to the Soviet Union not only out of goodwill, but also on their own initiative. The agent link guaranteed the dispatch of materials, not their generation. But this information arrived in the form of actual scientific data, complex mathematical calculations and copies of investigations, which were disseminated as so-called ‘closed publications’ amongst the active participants in the ‘uranium project’ in the USA and England. Each new technological process or technical solution was guaranteed by patent, and copies, together with supporting documentation, were also passed to the Soviet Union. Only scientists with the knowledge of higher mathematics and theoretical physics could understand all these materials. Some of the data was comprehensible only to chemists or physicist-chemists. Nevertheless, they laid unread in the safes of the NKVD for more than a year.

Almost no information about the problems of atomic energy came from Germany to the USSR. In many works on the history of atomic research in the USSR there is mentioned the notebook of a major in the German engineers, who was killed not far from Taganrog, in February 1942. This notebook contained calculation and formulae which indicated an interest in the uranium bomb. This notebook, which was sent from the front to S.V. Kaftanov, the chairman of the Committee on Higher Education and the scientific consultant of the State Committee of Defence (GKO), was never submitted to expert analysis.

In May-June 1942, judging by surviving documents and recollections, Stalin received brief reports about the atom bomb, presented independently of each other by Beria and Kaftanov. Both reports were presented orally. The official written report to Stalin from the NKVD, dated March 1942, cited in many publications of recent times, was not signed by Beria since it had too complex a technical character. Beria communicated to Stalin the findings of the intelligence network, Kaftanov reported on a letter addressed to Stalin from the physicist Flerov, who explained in a much clearer way than the NKVD what the atomic bomb represented, and why Germany or the USA could possess this bomb in the not too distant future. Judging by Kaftanov's memoirs, Stalin walked about a little in his Kremlin office, thought, and said 'it is necessary to act'.[5]

The promotion of Kurchatov

Appointments to important State or Party posts were always the monopoly of Stalin himself. Their presentation as decisions of the politburo, GKO or Presidium of the Supreme Soviet of the USSR, was just a formality. The atomic bomb programme also demanded a leader. Stalin understood that it must be an authoritative and important scientist. Before the war, Stalin had met just once with academicians Vladimir Vernadsky and Abram Joffe. By correspondence, he knew academicians Nikolai Semyonov and Pyotr Kapitsa. Obviously, it was precisely because of this that the legend was born that, in October 1942, Stalin summoned these four academicians to his dacha in Kuntsevo for consultations about the problem of the atomic bomb. Actually, there was no such meeting. Consultations about a possible leader took place in both the offices of Kaftanov and Beria. The position of the NKVD in this choice was important, firstly because the chosen 'leader' had to be acquainted with the great quantity of documents in their possession, many of which even in the NKVD nobody had been able to read through. They consisted of formulae, diagrams, calculations and explanations in English. About two thousand pages of specialised scientific materials had already accumulated in the NKVD at this time. Any physicist who was entrusted with the leadership of this problem would have to spend the first months of work in the NKVD, and not in the laboratory.

First of all, he would have to give some kind of orientation to the secret service, in order to compile a list of concrete questions for 'sources' in the United States and England. Only by specific questions from the USSR, linked to the documents which had already been received, was it possible to show to Fuchs, Pontecorvo and to other scientists who had agreed to help the USSR, that specialists were actually working with the materials that they had sent earlier.

Several physicists were called together for the consultations in Moscow, in the autumn of 1942. It was suggested to them that they make notes about what kind of concrete work was necessary for the renewal of research into atomic physics and the application of atomic energy to war aims. It turned out, actually, that the check on the 'trustworthiness' of the physicists revealed that almost none of them was a member of the Communist Party. Amongst the academicians, the most senior were Abram Joffe, Vitali Khlopin and Pyotr Kapitsa, who, as directors of institutes, already led collectives of scientists. However, these members of the Soviet Academy of Sciences were not the greatest enthusiasts for the bomb, and had little inclination for close co-operation with the NKVD.

From the ranks of the younger physicists – atomic scientists, Georgy Nikolayevich Flerov, Igor Vasilevich Kurchatov, Izaak Konstantinovich Kikoin, Abram Izaakovich Alikhanov and Yulii Borisovich Khariton were called separately for consultations in Moscow that autumn. Alikhanov was the most brilliant physicist in this group. Although younger than Kurchatov, he had already been chosen as a corresponding member of the Academy of Sciences of the USSR. He was elected a full member of the Academy earlier than the others, becoming the youngest academician in 1943.

On the 11th February 1943, Stalin finally signed the decision of the State Committee of Defence (GKO) on the beginning of a programme of work in the Soviet Union to build the atomic bomb. The general leadership of the task was entrusted to GKO vice-chairman V.M. Molotov. It was now his task to make recommendations about the choice of a scientific leader. Molotov himself, in a note dated 9th July 1971, reminisced thus about his decision:

> 'We were engaged on this work from 1943, and it was my job to find the man who could make a reality of the atomic bomb. The chekhists gave me a list of trustworthy physicists upon whom it was possible to rely, and I chose. I called Kapitsa to me, the academician. He said that we were not ready for this, and the atomic bomb was a weapon not for this war, but something for the future. We asked Joffe. He also replied somehow unclearly. Shortly, we came round to Kurchatov, who was the youngest and least known. I summoned him, we talked, and he made a favourable impression on me. But he said that he was still very vague about the task. Then I decided to give him the materials of our secret service – the secret agents had done a very important job. For several days, Kurchatov sat in my room in the Kremlin going through these materials'.[6]

Molotov recalls that he presented Kurchatov to Stalin. However, there is no other evidence to confirm the meeting of Kurchatov and Stalin in 1943. Kurchatov's expert report on the secret service documents which he read in Molotov's Kremlin study is dated 7th March 1943. It was a detailed analysis. Kurchatov began with the observation that materials received by the secret service 'have huge, incalculable significance for our state and science'. In conclusion, he wrote that: '...the totality of intelligence materials indicates the technical possibility of resolving all the uranium problem in significantly shorter time than our scientists thought who were not familiar with the progress of work on this problem abroad'.[7]

Three days later, on 10th March 1943, Stalin signed the decision of the State Committee of Defence of the USSR on the appointment of Igor Kurchatov to the newly established post of scientific leader of work on the use of atomic energy in the USSR.

The atomic Tsar

The GKO and Stalin provided Kurchatov with extraordinary powers to mobilise essential human and material resources for the resolution of the problem. During all of March 1943, Kurchatov studied numerous intelligence documents in the NKVD. In Molotov's study, at the beginning of March, Kurchatov familiarised himself in detail with the materials received from England. Then he was given the documents received from the United States. They comprised a colossal volume. Kurchatov had to make reports on 237 scientific reports connected fundamentally with the construction of the uranium-graphite pile, (as the reactor was called then) and the possibility of using not only uranium, but also plutonium, in order to build an atomic bomb. On this occasion, Kurchatov gave not simply an expert analysis, but even, as the confirmed head of the project, compiled a detailed list of intelligence information ‘which it would be desirable to receive from abroad’, and asked, in connection with this, ‘that orders be given to the Intelligence Services’.[8]

On 12th April 1943, by decision of the Academy of Sciences of the USSR, Kurchatov was appointed director of the newly established scientific institute of atomic energy, which, for reasons of secrecy, was given the code name ‘Laboratory No.2’. Number two was not arbitrary, since the secret ‘Laboratory No.3’ was soon established for research into theoretical problems of atomic physics. Obviously it was decided that ‘Unit No.1’ of this project was located in the Kremlin, or in the Lyubyanka (NKVD headquarters).

The documents which Kurchatov studied in the Kremlin and at the NKVD certainly contained much that was unexpected by Soviet atomic physicists. It came as news to them that there was a possibility of constructing a nuclear reactor with graphite as a moderator of fast neutrons. Until then, physicists considered that a reactor could work only where heavy water (a combination of oxygen and deuterium) was the moderator of neutrons.

In 1942, German physicists also tried to build a reactor with heavy water, but a shortage of this material put a brake on their work. News to Kurchatov was the discovery in the USA of plutonium and the perspective of using this new element for the creation of an atomic bomb. ‘Critical mass’ for plutonium was considerably lower than for uranium-235. A plutonium bomb could have more explosive power for less weight. Research in the USA and England into the separation of natural uranium into isotopes 235 and 238 by gas diffusion was very important. The number of papers was so great, and their spectrum so wide, that Kurchatov, even if he was a super-genius, could not give an expert assessment of them and accomplish the task in hand. Despite the opposition of Beria, who did not wish to widen the circle of the ‘initiated’ into the secrets of the intelligence service, Kurchatov strove to make known the NKVD documents to the leading scientists who headed the various departments of Laboratory No.2. From April 1943, Academician Joffe, Alikhanov and Kikoin gained access to the materials of the intelligence service. Finally, Lev Artsimovich, Yulii Khariton and Kirill Shchelkin were added to this group of ‘trustworthy’ physicists. Each of these was at the head of the investigation into an actual scientific-technical problem. Kurchatov concentrated on the building of a uranium-graphite reactor and the isolation of plutonium. Alikhanov became the head of work on the construction of a reactor based on heavy water. The practical work of separating the uranium isotopes by gas diffusion was entrusted to Kikoin. Artsimovich tried to use magnetic force to separate these isotopes. Khariton and Shchelkin received an especially important task in the construction of uranium and plutonium bombs.

Neither Kurchatov, nor his colleagues who had been given access to the secrets of the intelligence service, were allowed to reveal the sources of their information. This, just like any concrete evidence received from the intelligence service, was a great secret. Its revelation could lead to the exposure of the entire network of agents, and to the inevitable dismissal of the leadership of the NKVD. Thus, Kurchatov and his colleagues had to pass on to each other anything they received from the NKVD for their own discoveries and enlightenment. This gave them a halo of genius, and on the whole was of use to the task in hand. Since Kurchatov's subordinates did not know about the secret service archives, their surprise at his ability to decide complex problems of atomic physics 'immediately' and without calculations was something boundless. The biographies of Kurchatov contain many examples of such instantaneous solutions. I recall here only one of these. Kurchatov demanded data about the character of the slowing down of neutrons in the uranium-graphite prisms. Jakov Zeldovich, an expert on the slowing down of neutrons, made the necessary calculations and presented Kurchatov with the results. 'Having thought deeply, Kurchatov, to the surprise of those assembled, suddenly pronounced: 'It is clear to me even without the calculations – and he gives a strong proof without the help of a complex formulae'.[9]

German nuclear trophies

Although the secret service continued to supply the physicists with a great volume of information which showed how close the USA was to obtaining a real atomic bomb, in the Soviet Union progress in this direction was meagre. The reason was simple: there was no uranium in the country. Tens of tonnes of pure uranium were necessary for even a very small uranium reactor, but Laboratory No.2 had at its disposal only a few kilograms of this metal. Uranium ore was not yet produced anywhere on Soviet territory. The geological search for uranium had already been expanded, but quick results were unlikely. In Europe, as was known, uranium ore for the German project had been produced in Bulgaria, Czechoslovakia and Eastern Germany. The Bulgarian mines were brought under control at the beginning of 1945, almost immediately after the liberation of Bulgaria. But Bulgarian uranium ore was poor, and there were no enrichment plants there. The uranium mines in the western part of Czechoslovakia and in Saxony were bombed by American aircraft prior to the arrival there of the Soviet army. After allied forces landed in Europe, a special group known as the 'Alsos Team' was established in the USA, with the task of capturing any equipment on German territory which was connected with the uranium project, and also German stocks of uranium and heavy water. This group organised the arrest and deportation to England of German atomic scientists. As a result of the activities of the American atomic 'special forces', in the first months of 1945 in Germany, two experimental heavy water uranium reactors, which were not yet complete, were dismantled, taken away and sent to England. One of these reactors was located near Leipzig, in the future Soviet occupation zone.

The NKVD and Laboratory No.2 were somewhat late in forming their own 'captured' uranium team. A group of atomic scientists who spoke German, accompanied by officers of the NKVD, headed by the deputy-chief of the NKVD, Abram Pavlovich Zavenyagin, went to Berlin in the middle of May 1945, after the capitulation of Germany. The group included the physicists Flerov, Kikoin, Khariton, Artsimovich and others. All of them were colonels in the Soviet army. Professor Nikolaus Riehl, the main German expert on the production of pure uranium metal was, at this time, in Berlin, and he freely agreed to meet with his Soviet colleagues. Riehl was born in 1901 in St. Petersburg into the family of a German engineer working for the firm Siemens. He lived in Russia until 1919, and spoke Russian fluently. Riehl led the Soviet scientists to Oranienburg, a town to the north of Berlin, where the main factory in Germany for the production of pure uranium for reactors was situated. The factory, as it turned out, had been completely destroyed by American bombers over some days before the end of the war. This was done without any connection with the military actions which were going on. The damaged remains of the factory's equipment, nevertheless, were dismantled and taken to the Soviet Union. With some help, Kikoin and Khariton succeeded in finding a store of uranium raw material, oxides of uranium. They got nearly 100 metric tonnes of uranium oxide. A further 12 tonnes of uranium were located in another town. Nikolaus Riehl and his family, together with several engineers from the German uranium factory, followed the uranium to Moscow. They went of their own free will. There was nothing for them to do in Germanay. The atomic physicists who were found in the American-British zone of occupation were arrested and detained in England without right of correspondence for more than a year. In July, the German team of Nikolaus Riehl began transforming the 'Electrostal' factory in the Noginsky district of Moscow into a uranium factory. By the end of 1945, the transformation of oxides of uranium into pure uranium had already begun there. The first batches of ingots of uranium metal began to reach the Kurchatov laboratory in January 1946, and the assembly of a uranium-graphite experimental reactor commenced.

The 'Electrostal' factory was immediately converted into a 'zone' enclosed by two rows of barbed wire. Riehl, in his memoirs, published in Germany in 1988, explained without any surprise that the barbed wire was necessary

> '...so that the construction workers engaged on the conversion of the factory could not wander off... This work was carried out basically by convicts, primarily Soviet soldiers who had been captured by the Germans and returned. On coming home, they were not received with flowers and folk dances. Instead they were imprisoned for a few years, charged with being cowards in the face of the enemy.'[10]

'Electrostal' was converted into one of the first 'islands' of the atomic gulag. In the NKVD it became known under the codename 'Building 713'. The number of prisoners in this camp grew proportionately to the growth of production of uranium. In 1950, when production of pure uranium reached one tonne a day, the number of prisoners working in the factory reached ten thousand.[11]

Apart from Nikolaus Riehl, Zavenyagin's team concluded contracts in East Germany with two other groups of German scientists. One of these was led by the celebrated physicist Gustav Hertz, who had received the Nobel Prize in 1925. Manfred Von Ardenne led the other. Famous and not-so-famous physicists and chemists made up these groups. The main task for each of these groups was the various methods for separating the uranium isotopes 235 and 238. Institutes on the Black Sea near Sukhumi were established for them. Some time later, even a German institute for radiochemical and radiobiological research was established. From 1945 to 1955, some 300 German scientists and engineers worked on the uranium project in the Soviet Union.

Yulii Khariton, a participant in utilising the windfall of captured German uranium, subsequently recalled: '... somehow, I remember we went somewhere to the unit with Igor Vasilevich Kurchatov, and he said that these 100 tonnes would help cut the delay in launching the first industrial reactor by approximately one year'.[12]

Stalin after Hiroshima

The first American atomic bomb was successfully tested in the desert of the State of New Mexico on 16th July 1945, the opening day of the Potsdam Conference. Stalin learnt of this test from intelligence communications on 20th or 21st July, some three days before President Truman, on 24th July, told Stalin and Molotov that the USA had a new, high-powered weapon. Stalin, however, did not expect that the atomic bomb would be deployed so soon, in just two weeks. At the Conference of allied powers in Yalta, in February 1945, the United States and Britain insisted that the Soviet Union join in the war with Japan approximately three months after the capitulation of Germany. The Soviet Union's agreement was contained in a secret protocol. Towards the beginning of August 1945, the build-up of one and a half million Soviet soldiers on the Manchurian border was complete. Stalin informed colleagues that the Soviet Union would enter the war with Japan in the middle of August. The Yalta agreements also stipulated that the Soviet Union would return the possession of the Russian territories of Sakhalin and the Kurile Islands, and receive Port Arthur on a long concession together with the China-Eastern Railway which used to belong to Russia before 1904. At the beginning of 1945, the United States considered the entry of the Soviet Union into the war with Japan as an action specifically to bring about a quicker capitulation of Japan and the minimisation of their own losses. Now, they clearly intended to bring about the capitulation of Japan with the help of the atomic bomb. The bomb guaranteed the United States full sway throughout the Asiatic region.

Entering the war with Japan was not, for Stalin, only an act to help allies. He had serious strategic designs in Asia. The advance of the Soviet army into

Manchuria, which was a colony of Japan from 1933, was only the beginning of their realisation. A communication about the explosion of the atomic bomb over Hiroshima on 6th August reached Moscow on the morning of 7th August. That day, at 16.30 hours, Stalin and Chief of the General Staff, A.E. Antonov, signed an order about the commencement of military actions against Japan along all the Manchurian border early in the morning of 9th August local time. That day, by order of Truman, the American airforce dropped a second atomic bomb, this time on Nagasaki. On the 14th August, the Emperor of Japan announced the surrender over the radio. The formal surrender took place only on 2nd September 1945. By this time, the Soviet army had occupied almost all of Manchuria and half of Korea, which had been a Japanese colony since 1905. The initiative to determine the political future of the far-eastern region of Asia had passed to the Soviet Union.

The atomic project after Hiroshima and Nagasaki

The atomic projects in the USA and USSR were born as counter-measures against the nuclear potential of Hitler’s Germany. With the approach of the end of the war in Europe, the scientists who had worked on the building of the bomb became certain that the practical use of this very powerful weapon would never be necessary. Roosevelt, not long before his death in April 1945, considered as a possibility the use of an atomic weapon against the Japanese fleet. But after atomic bombs containing uranium and plutonium were used against the civilian populations of two cities, killing in a moment between 200,000 and 300,000 people, the way was open for the practical use of atomic bombs also in other regions. According to the communciations from Fuchs and Pontekorvo, the production of uranium 235 and plutonium in the USA permitted the preparation of eight atomic bombs per month. In these new conditions the atomic project became, for Stalin, the absolute priority.

Meetings with the main heads of the uranium programme were set in train, beginning on 12th August, at Stalin’s dacha in Kuntsevo. Stalin usually used his ‘newer’, but sometimes also his ‘further’ dacha, for secret meetings. The Kremlin was the official residence of the government and, with its complex system of admissions, guards and large number of different services and staff, not suitable for secret meetings. From the 12th to 16th August 1945, Stalin arrived at the Kremlin for urgent receptions only towards midnight, and worked until two or sometimes three o’clock in the morning. Chinese diplomats came to see him at this time, trying to find out, at Chiang Kai-shek’s behest, about Soviet intentions in Manchuria. They feared, and not for nothing, as soon became clear, that the first people to enter the Soviet zone of occupation in Manchuria would be the Chinese communists. By day, and in the evening, at his dacha in Kuntsevo, Stalin met with the leaders of the atomic project and with members of the State Defence Committee. Kurchatov was not invited to these meetings. They consulted with him by telephone on some questions. Concise, oral recollections of these meetings have been given by the then head of ammunition supply, Boris

Lvovich Vannikov,[13] who, together with the head of the chemical industry, Mikhail Georgevich Pervukhin, was Molotov's deputy on that commission of the State Defence Committee which, from February 1943, was responsible for the atomic project. Beria's role in the atomic project up to this time was not considerable, since, at the end of 1943, the internal secret service moved across from the NKVD to a newly established directorate of state security (HKGB). V.H. Merkulov headed this directorate. Beria remained chief of the NKVD and now directed the police and the Gulag.

As a result of the meetings at Kuntsevo, Stalin signed GKO Decision No.9887 of 20th August 1945, establishing a new structure for the control of the atomic project. The State Defence Committee established a 'Special Committee' with exceptional powers for the general leadership of all those working on the use of atomic energy. It was a kind of 'atomic politburo'. Beria was appointed its Chairman. The members of the committee, the list of which Stalin produced himself, were Malenkov, Voznesensky, Vannikov, Zavenyagin, Kurchatov, Kapitsa, S.A. Makhneyev and Pervukhin. The special committee had to guarantee 'the wide development of geological prospectings and the establishment of a raw material base in the USSR for the extraction of uranium ... and also the use of uranium deposits outside the borders of the Soviet Union ... the organisation of the uranium industry ... and also the construction of atomic energy plants and the production of the atomic bomb'. The special committee established an executive organ, the First Main Directorate (PGU) of the SNK USSR, for the immediate realisation of these tasks. Vannikov was appointed head of the PGU. Numerous scientific, construction, planning, building and industrial enterprises and establishments from various branches of industry were put at the disposal of the PGU. The Kurchatovsky Centre was also given over by the Academy of Sciences to the PGU. The scientific-technical department of the secret service was also put under the control of the Special Committee. The PGU was tranformed into a vast, secret super-directorate.

The main directorate of the NKVD's industrial production camps (GULPS) was the biggest and most powerful construction system given over to the PGU. Towards the end of 1945, this industrial gulag comprised 13 camps, which held 103,000 inmates. At the same time as this, the Main Directorate of the camps for the mining-metallurgy enterprises (NKVD-GULGMU) was given over to the PGU, and was amalgamated with the GULPC. At the beginning of 1946, there were 190,000 inmates in the camps of the GULGMU, a third of whom were designated 'special contingent' (former prisoners-of-war, repatriated persons and others who had fallen into the gulag without court sentence). The unified system of camps, famous in the past as 'Glavpromstroy', was declared in NKVD order No.00932 as 'a special organisation for the construction of enterprises and establishments of the First Main Directorate'.[14] According to the code of classification of NKVD orders existing at that time, two zeros before the sequential number of the order denoted that it was made on the direction or resolution of Stalin personally. As is known, one hundred and twenty-five thousand people participated in the American atomic project. In the Soviet one, towards the end of 1945, there was twice that number. By 1950, the number of people involved in the PGU system had grown to 700,000. More than half of these were prisoners; one-third from military construction units of the Ministry of Internal Affairs (MVD). Only about ten percent were 'civilians', though their freedom of movement was heavily restricted.

Stalin and Kurchatov

Contrary to reports, there were no frequent meetings between Kurchatov and Stalin. Nor was there a demonstration to Stalin of a model of the atomic bomb or the plutomium 'bead', which Kurchatov and Khariton supposedly brought to the Kremlin shortly before the test. In fact, Kurchatov was invited to meet Stalin only twice: on 25th January 1946 and 9th January 1947. Beria, Molotov, Voznesensky, Malenkov, Mikoyan and Zhdanov came with Kurchatov to the first meeting with Stalin. S.V. Kaftanov and Sergei Vavilov, President of the Academy of Sciences of the USSR, were also invited. Kurchatov, together with the others, went in to Stalin at 8.15p.m., and left his study, with Vavilov, 40 minutes later. The other participants remained with Stalin for another two hours.[15] Kurchatov wrote down his impressions of the meeting with Stalin on his return to the institute. This note was deposited in Kurchatov's safe, and was published only recently. It is apparent from the character of the note that Kurchatov was in Stalin's study for the first time. I reproduce here an extract from this note, dated the day of the meeting:

> 'Looking to the future development of the work, Comrade Stalin said that it was not worth dwelling on minor matters, but it was essential to advance broadly, with Russian might, so that every kind of help would be brought to bear on this work...
>
> 'Concerning the scientists, Comrade Stalin was preoccupied with the thoughts of how to ease and help their material living conditions. By awarding bonuses, for example, for great strides in the resolution of our problems. He said that our scientists are very modest, and they sometimes do not notice that they live badly – it is already bad, and therefore, he said, our state suffers badly, but it is always possible to ensure that (several? thousands?) men live in affluence with dachas, that they can rest, that cars are available...
>
> 'It is necessary above all to use Germany, where there are people, equipment, experience, and factories. Comrade Stalin was interested in the work of German scientists in this area, how useful they had been...
>
> '(Then?) there were questions about Joffe, Alikhanov, Kapitsa and Vavilov and the work of Kapitsa.
>
> 'There was expressed (an opinion?) about who (they?) works and on the direction of their activity – for the wellbeing of the Fatherland or not.
>
> 'It was suggested that we write down the measures which are essential to ensure the speeding up of the work. Which new scientists it was necessary to attract to the work.
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> 'The circumstances of the study show the (originality?) of its occupant: stoves with carved tiles, , a beautiful portrait of Ilich, and portraits of Russian marshals.'[16]

Stalin's second meeting with Kurchatov, on 9th January 1947, was, in part, a meeting about atomic problems, which lasted almost three hours. Khariton, Kikoin and Artsimovich, as the scientific leaders of the atomic cities which had already grown up by this time, were also invited with Kurchatov to meet Stalin.

Molotov, Beria, Malenkov, Voznesensky and Pervukhin were present at the meeting, as were Vannikov, Zavenyagin and Makhneyev, as members of the Special Committee. NKVD Major General A.H. Komarovsky, head of Glavpromstroy PGY – atomic gulag, was also present.[17] None of those participating in the meeting left any kind of note of it. The regime of secrecy prohibited making such notes.

Uranium and plutonium for the bomb

In 1945, detailed notes and sketches of the type of plutonium bomb which was dropped over Nagasaki were received from Fuchs, and independently also from Pontekorvo. But, at this time, the production of plutonium still hadn't started in the Soviet Union. They had begun to build a small experimental reactor in Laboratory No.2 with the aim of using captured uranium. A big industrial reactor required not less than 150 tonnes of uranium. At the end of 1945, work re-started at the uranium mines in Czechoslavakia and in Eastern Germany. A Soviet joint-stock company, 'Vismut', was established for exploiting the German mines in Saxony. Germans interned in the Balkans and German prisoners-of-war were brought to work in these mines.

In 1946, uranium deposits were found in various parts of the Soviet Union. Uranium was found in Kolyma, in the Chitinsky region, in Central Asia, in Kazakhstan, in the Ukraine and in the northern Caucasus, near Pyatigorsk. Working the unranium deposits, particularly in remote places, was very difficult. The first domestically produced uranium became available only in 1947 from the Leninobadsky mine-chemical complex in Tadjikistan, which was built in record-breaking time. This complex was known only as 'Construction 665' in the atomic gulag system. The locations of uranium production were kept secret until 1990. Even the workers in the mines did not know about the uranium. Officially they were producing 'special ore', and 'lead' was written in place of the word uranium in the documents of the time. The deposits of uranium in Kolyma were poor. Nevertheless, the mining network known as camp Butugichag was established there. Anatoli Zhigulin wrote about this camp in his novel 'Black Stones', but he did not know that uranium was produced there. In 1946, uranium ore from Butugichag was taken to the 'mainland' by aircraft. This was too expensive and so, in 1947, an enrichment processing factory was built there.

A start was made on building the first industrial reactor, a radio-chemical factory, which was called 'Mayak' (Beacon), in the Urals, near the town of Kyshtym, a hundred kilometres to the north of Chelyabinsk. Nikolai Antonovich Dollezhal, the director of the institute of chemical machinery construction, was put in charge of the engineering project for the reactor. Kurchatov personally supervised the laying of uranium in the reactor. Chief of the PGU, Vannikov, supervised the construction of the whole centre, which was known later as Chelyabinsk 40. The amount of construction was very great. More than thirty thousand prisoners from various camps worked there, together with three regiments of the military construction units of the Ministry of Internal Affairs.

In 1947, another three ‘atomic cities’ were built, two in the Sverdlovsk region, Sverdlovsk 44 and 45, for the industrial separation of uranium isotopes, and one in Gorky region, Arzamas-16, to make plutonium and uranium bombs. Kikoin and Artsimovich were the scientific leaders of the Sverdlovsk units. Khariton and Shchelkin took charge at Arzamags-16. All these people, who are now well-known scientists, were unknown at the end of the 1940s. Their names were secret. The construction work went ahead quickly. There were no complaints to Glavpromstroy PGU about a shortage of workers. But there was not enough uranium. Even at the beginning of 1948, the first industrial reactor was not ready. Nor was there enough uranium for the work of the Sverdlovsk units. The statutory dates for building the first atomic bombs were going by.

The reactor began work in the middle of 1948. All the uranium accumulated in the Soviet Union went into it, including the defective blocks which had been rejected earlier because of contamination. This later led to the ‘swelling’ of some blocks, to accidents and to stoppages of the reactor. There were many instances of the over-irridation of personnel during the repairs.[18] Kurchatov, Vannikov and Zavenyagin were at the Urals unit throughout 1948. Beria arrived there several times. The radio-chemical factory ‘Mayak’ began separating plutonium from spent reactor uranium fuel blocks, not expecting full decomposition of the short-lived products of the fission of uranium. That led to the irridation of radio-chemists. According to the recent evidence of Professor Angelina Guskova, who as a young doctor worked in the Urals unit from 1947 to 1953, in the laboratory for isolating uranium:

> ‘...there worked mainly young women. This was the group at greatest risk, and 120 cases of radiation sickness were recorded amongst them, which they called “plutonium pneumosclerosis”.’[19]

Radioactive waste from the ‘Mayak’ plutonium network was discharged at that time into the little River Techa, which flowed through the industrial zone. This led to heavy pollution of the river for tens of kilometres downstream beyond the perimeter of the unit, and to a large number of cases of radioactive illnesses amongst the local peasant population. Ten kilograms of plutonium, the amount used in the American bomb, was accumulated in the Soviet Union in June 1949. According to the physicists’ calculations, it was possible to create an explosion with a smaller amount of such a precious metal. But the instruction ‘from above’ demanded that they make a ‘duplicate’. Nobody wanted to take any chances.

Decorations for the victors

The successful explosion of the first Soviet atomic bomb took place at a specially constructed testing range in the Semipalatinsk region of Kazakhstan on 29th August 1949. This was, in engineering and ‘scientific’ terms, a more complex plutonium bomb. According to the radioactive fallout of the explosion, which spread into the upper levels of the atmosphere of the entire world, the Americans determined, in the middle of September, that this was almost a copy of the bomb which was dropped on Nagasaki in 9th August. The Soviet Union did not announce the testing of the bomb because Stalin feared an attempt by the United States to make a preventive strike against the Soviet atomic units.

In secret, without any publication of a decree of the Supreme Soviet of the USSR, a large group of participants in the building of the atomic bomb was decorated by the state. The scientists Kurchatov, Flerov, Khariton, Shchelkin, and Dollezhal received the highest award – the title of Hero of Socialist Labour and the Gold Star medal. The German Professor Nikolaus Riehl received the Gold Star and the title of Hero. They were all also given dachas near Moscow and ‘Pobeda’ cars in the name of the state.

The head of PGU, Vannikov, was also awarded the title of Hero of Socialist Labour and a gold medal. Eight men among the Ministry of Internal Affairs staff received the title of Hero of Socialist Labour and the Gold Star medal: deputy minister Zavenyagin; head of Glavpromstroy A. N. Komarovsky and his deputy, P.K. Georgevsky; head of building No.859 (the reactor) M.M. Tsarevsky and his deputies V.A. Saprikin and S.P. Aleksandrov. Also in this group of Heroes in the MVD were two heads of uranium mining networks, B.H. Chirkov (of the German ‘Vismut’) and M.M. Maltsev (of the Leninobadsky network in Tadjikistan). They were decorated for ‘participation in the building of the atomic bomb’. Lavrentii Beria, head of the Special Committee, received only the Order of Lenin. He appeared in the second long list of those who ‘took part’ in the construction of the units of the atomic industry. By this decision, which was offensive to Beria, Stalin wanted, apparently, to underline that the main merit in the organisation of all the work on problem No.1 belonged not to Beria, but to Stalin himself.

Epilogue

Klaus Fuchs was arrested in Great Britain in 1950 and sentenced to 14 years in prison. He was freed in 1959 ‘for good conduct’. He went to the German Democratic Republic, where he headed an institute of nuclear physicists. Bruno Pontecorvo, who feared arrest, fled via Finland to the USSR. He was given a laboratory at the Institute of Nuclear Physics in Dubna, and was quickly elected a full member of the Academy of Science of the USSR. Nikolaus Riehl and other German scientists were able to return to Eastern Germany only in 1955. Four weeks after his return, Riehl, together with his family, crossed to West Berlin and fled to Munich. The British ‘source’ of the Soviet secret service, Cairncross, who in 1941 sent to Moscow the first communication on the uranium project, was not ‘discovered’ until the middle of the 1980s. The KGB staff member, Oleg Gordievsky, who had defected to the West, informed the British services about him. Cairncross at this time was already a pensioner, and living in France. He was not put on trial, but lost his pension and had to make a ‘confession’. Three other British agents who were involved in the transmission of information to the

Soviet Union, fled there in 1951 and 1963, and lived in Moscow for the rest of their lives. They received the title of KGB colonel and worked as consultants to the secret service. In 1990, one of their number, Harold (Kim) Philby, appeared in a series of five postage stamps which were issued in honour of the most successful Soviet spies.

In 1950, a new and more complex stage began in the development of the Soviet atomic project – the establishment of the military arsenal of atomic bombs and the development of the hydrogen bomb. In 1952, five more industrial reactors of larger size were constructed, uranium ore was mined at 14 sites, and the Sverdlovsk factories for the separation of uranium isotopes got right the production of uranium 235 for uranium bombs. There also began the construction of the first Soviet atomic submarine, and the construction of the first atomic power station, 'Construction 442', in the Ministry of Internal Affairs classification.

It was precisely the atomic capability which guaranteed the Soviet Union the status of superpower, a part of which was inherited by contemporary Russia.

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