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~~No Foreign Dissem~~

*Targeting the first U-2 coverage
of Soviet nuclear facilities.*

MISSION TO BIRCH WOODS
Via Seven Tents and New Siberia
Henry S. Lowenhaupt

I suppose I remember so distinctly working on nuclear targets for the U-2 missions of late August 1957 because this was my first direct experience with reconnaissance operations, and first impressions are lasting. Besides, it was a striking reminder of my 1944 mission from a basic training camp in Alabama to a telephone number in Knoxville, Tennessee, which turned out to be the secret atomic city of Oak Ridge. Here in 1957 my prime target was a secret atomic city known as the Post Box, Tomsk, in central Siberia.

There was also at the time an anticipatory feeling of self-vindication. In 1945 I had been impressed with the accuracy of a wartime estimate of the output from the famous Joachimsthal uranium mines of Czechoslovakia, an estimate based on aerial photographs taken a year apart. So in 1949, after the first Soviet nuclear test, I had advocated photo-reconnaissance of the nuclear production sites in the Urals. I actually persuaded the Air Force member of the Joint Atomic Energy Intelligence Committee to submit a formal proposal for flying the Urals in a B-25 which would take off from Iran and afterwards be ditched beside an aircraft carrier in the Barents Sea off Novaya Zemlya. We still have in the files Secretary of State Dean Acheson's reply, through the DCI to the Chairman of JAEIC, denying as of 30 December 1949 permission to implement the scheme.

U-2 Against the Atom

I was convinced that satisfactory photographic coverage of a U-235 separation plant, or of a plutonium production reactor, would be worth the proverbial thousand words, giving information "on electric power consumption, cooling water consumption, plant arrangement and size, new construction, and the physical details which, when analyzed, should enable us to make a much better estimate of Soviet critical material production."¹ I would have been shocked at the

¹ Briefing of Joint Chiefs of Staff by General Charles P. Cabell, DDCI, 28 August 1957.

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suggestion that it might take months of steady work by competent photointerpreters aided by the best procurable consultants to work out the real intelligence meaning of a picture. Yet this was to be the case. The Russians, not being able to copy our atomic facilities, had had to engineer and design their own from scratch. We were thus to face a real cryptographic problem in trying to interpret the totally foreign engineering shown in the U-2 photography.

The atomic sites near Tomsk, those to the east near Krasnoyarsk, and the nuclear weapon proving ground known through seismic measurements to be near Semipalatinsk had been selected on 27 May 1957 by interagency agreement in the Ad Hoc Requirements Committee as three prime objectives for flights over central Asia and Siberia. Other major objectives than the atomic ones included what is now the Tyura Tam missile test range east of the Aral Sea, the aircraft industry in Omsk and Novosibirsk, and beyond the latter all of Stalin's second industrial bastion, the Kuznetsk Basin. It was the conjunction of all these targets with immediate bearing on weapon systems that had persuaded first the ARC, and then eventually U-2 Project Director Richard M. Bissel and DCI Allen Dulles to cash in the blue chips necessary to procure take-off bases along the southern periphery of the USSR and China.

As an analyst in CIA's Office of Scientific Intelligence, I was therefore directed in July 1957 to work up target briefs, by priority, for all atomic targets in the enormous geographical area of central Asia and Siberia. The U-2 program was still being kept under extraordinary security measures, and I did my targeting in the Blue Room, a small centrally located secure area away from my normal desk. Psychologically, we were prepared to be not only secure but devious: the Blue Room was in fact painted light green.

The targets thus identified were to be used by the operational side of the program in planning the actual flights or missions. The procedure was to plan each specific mission around one or two of the ARC's highest-priority targets but to cover as many lower-priority targets as possible along the way. As targeteer, I became involved in selecting the flight path because the best photography, that from the vertical angle, covered a band only five miles wide: it was desirable to orient this band lengthwise over an oblong target and adjust it in

other respects so as to counteract possible errors in target location or in navigation.

Seven Tents

Semipalatinsk had been so named because seven trading companies had maintained residencies there when it was an important crossroads on the caravan trails to China and the fabled cities of Samarkand and Bukhara to the south. Twenty-odd nuclear tests had occurred near there in the last eight years, but the exact location of any test was not known closer than within thirty miles. I had no idea how big the test area was. Our own atomic test site at Frenchman's Flats in Nevada, measured against a five-mile-wide camera swath, was of astronomical size.

I finally asked Doctor Donald Rock of the Air Force Technical Applications Center (then AFOAT-1)² to average for me the seismic epicenters of the five largest nuclear detonations at Semipalatinsk. The geographic coordinates for this "centroid" turned out to designate a spot in the featureless desert some seventy miles due west of Semipalatinsk, about one-third of the way to Karaganda. It was south of the old caravan trail, and the only names on the map in the vicinity were those of seasonally dry salt lakes. This was an arbitrary pin-point for a highest-priority target whose location was so poorly known that it ought to be represented as a hand-sized blur on a standard aeronautical chart—a hardly realistic target in operational terms.

This difficulty in locating the Semipalatinsk nuclear proving ground pointed up the essence of our dilemma: we needed and wanted U-2 flights in central Asia and Siberia because we knew so little about what was going on there; yet unless we had precise knowledge of an activity and where it was located, we would stand little chance of photographing it. General Philip C. Strong, director of scientific collection in CIA, who had had much World War II reconnaissance experience, was on the side of precision in targeting and of detailed justification for the collection priority given each target. He questioned the accuracy of maps and suggested that targets be located relative to major features that could be identified visually rather than by coordinate systems of longitude and latitude. That we could not do in this case.

² For the early history of AFOAT-1 see Northrup and Rock's "The Detection of Joe 1" in *Studies X 4*, p. 23 ff.

Nearer Targets

Thus it was with renewed care that I assembled data on other atomic targets in this area. I reviewed the atomic sites which had been listed in 1955 for the Genetrix program, in which free balloons bearing cameras were allowed to drift across the USSR on predetermined paths. Lower-priority targets included the uranium concentration plants of Combine 6 in the Fergana Valley, notably one just south of Leninabad at Ispisar, one north of Leninabad near Taboshar, and one a good many miles to the east near Andizhan. These had already been located as well as possible: a 1947 Jewish refugee who had driven a bread truck to each of them had been interrogated exhaustively and then resettled with appreciation in Brazil. Incidentally, there had been a curious problem with the maps he drew: east of where the Syr Darya river turns north on its way to the Aral Sea he had swapped north and south, but west of there his maps were right side up. In several instances his reporting had been confirmed by returned prisoners of war.

Other uranium concentration plants which belonged to Combine 8 lay east of these toward the Pamir Knot and south of Alma Ata, but their locations were at best poorly known and targeting was considered doubtful.

Krasnoyarsk

Ever since we had learned that Novosibirsk, Tomsk, and Krasnoyarsk, deep in Siberia north and east from Semipalatinsk, were the location of the second generation of Russian atomic sites fathered by those in the Urals³ we had maintained a special watch on these cities and the countryside nearby. Krasnoyarsk had been made off limits to foreigners by 1948, and information about the atomic site on the east bank of the Yenisey river some 35 miles downstream (north) from the city had been especially hard to come by. The defector Icarus reported in early 1951 that many trainloads of mining equipment had been sent there the year before from Wismut, A.G., the vast Russian uranium mining enterprise in East Germany, so he believed the purpose of the new enterprise at Krasnoyarsk to be the mining of uranium. By 1952 all administrative centers in the peninsula of land south of the confluence of the Kan and Yenisey rivers and north of the Trans-Siberian

³For the Ural plants see the author's "The Decryption of a Picture" in *Studies* XI 3, p. 41 ff.

Railroad had disappeared from the annual editions of "Deleniye," the published MVD listing of administrative centers in the USSR.

Then a German prisoner of war had been returned to West Germany, who, despite all the Russian rules and regulations, had actually spent several years as a construction worker at the Krasnoyarsk atomic site. He reported hearsay information about many kilometers of tunnels all lined with concrete. His name for the associated town was Kom-somolsk na Yenisey. In early 1957 a Genetrix balloon was recovered from the Aleutian Islands with a number of aerial photographs of Dodonovo, as the Krasnoyarsk site came to be known after an old village there. These photographs showed an enormous construction effort—a new city of apartment houses, laboratories, warehouses, and machine shops—and a vast mining enterprise. There was every reason to believe that higher-resolution photography would clarify the functions of the large, complex, and possibly underground installation.

New Siberia

The uranium metal plant northeast of Novosibirsk had also first been identified by the defector Icarus. In 1956 Doctor Nikolaus Riehl and other German scientists formerly engaged at Elektrostal, near Moscow, in research on uranium metal manufacture⁴ confirmed and updated Icarus' testimony. Attachés had photographed it from the Trans-Siberian Railroad in 1952 and 1954 because of its evident size and importance, and George Monk, now State Department representative on JAEIC, had identified it by comparing these photographs with material filed in the old Industrial Register under the name "Stalin Auto Works," apparently the local cover name for the enterprise. It could be located within half a mile of permanent map features.

A uranium metal manufacturing facility was basically of second priority as a U-2 mission objective, but across the Trans-Siberian Railroad was the Novosibirsk Airframe Plant, an additional reason for the U-2 to visit this northeast suburb of Novosibirsk.

Post Box, Tomsk

The atomic site near Tomsk was a matter of more concern, though the amount of information on its function and location was woefully

⁴ See the author's "On the Soviet Nuclear Scant" in *Studies XI 4*, p. 13 ff.

sparse. Furthermore, it was at extreme range so that the aircraft could not, in fact, spend time hunting for it even though we felt we could justify such an effort as against a prime target. Our collection effort against this site had been especially impeded by the 15 January 1952 Soviet order closing Tomsk, Novosibirsk, Omsk, and other specific areas to foreigners because Tomsk was not accessible, like Novosibirsk, to attaché photography from the Trans-Siberian Railway.

There had been a number of remarks in reporting about something atomic or about a special post box in connection with Tomsk. These had led to the location and interrogation of a few prisoners of war who had at one time or other been in the area before returning to West Germany in 1954 and of a few ethnic Germans who had been returned in 1956. By now in 1957, however, the resulting evidence of a kind one could put one's finger on was all contained in just three reports and the analysis of a fur hat.

The latest of these reports was from an ethnic German who claimed to have been employed in Tomsk in 1955 as a blacksmith. He told his Army interrogator that local inhabitants had facetiously suggested "Atomsk" would be a better name for the town. He knew of no clearly atomic installation in particular but had heard of an underground secret plant and settlement called "Kolonne [Labor Brigade] 5" located northeast of the Tomsk II railroad station.

Another returned ethnic German told his British interrogator he had heard of an industrial enterprise engaged "in manufacturing fillings for atomic weapons locally known as the Post Box." In Tomsk II he had seen a large building with barred windows on all floors and a large sign saying "Information Office, Personnel Department, Post Box." He knew of two relatively small sites belonging to the enterprise, one east and the other northeast of Tomsk.

On reinterrogation this man mentioned traveling north from Tomsk II on a bus belonging to the Post Box when going to visit a friend of his in a lunatic asylum located on the southern fringe of a prohibited area. He reported seeing railway trains running into the prohibited area carrying coal, wood, and building materials. He had also heard that persons employed there were well paid and received preferential treatment in the distribution of foodstuffs, etc. He mentioned seeing at a distance of six to eight kilometers north of Tomsk II three large chimneys which emitted black smoke.

The interrogator noted that the source had a very poor memory, seemed to be suffering from some kind of mental disorder, and was

preoccupied with his plans to emigrate to Canada. Clearly, neither of these two reports tended to inspire confidence in the existence of a major atomic installation in the Tomsk area, let alone its precise location.

The story of a returned German prisoner of war who had been employed in 1949 as a tailor in a small factory northwest of Beloborodovo, some twelve kilometers north of Tomsk city, seemed much more persuasive. Interrogated by the Air Force, he reported that within eight days in April or May 1949 some 12,000 penal workers passed through the bathing and delousing facilities of the Beloborodovo penal camp and were put to work in a secure area fenced off between his factory and the village of Iglakovo, several kilometers north and west down the Tom river. The tailor, clearly proud of his professional ability and reputation, said that many military officers of the construction staff in charge of this project came to his tailor shop to get their uniforms fitted properly.

This military construction outfit had arrived, complete with families, from Tallin where they had just completed another large job. In charge was a Soviet general who had arrived in April with his staff. Interestingly, from the point of view of MVD responsibility for nuclear facilities, the guard force was of a different subordination and neither lived nor mingled with the construction staff officers. The tailor's Russian supervisor had told him that the fenced-off area was to be an atomic energy plant.

In an application of environmental sampling, CIA scientific officer John R. Craig had obtained in the summer of 1956 a fur hat from one of the ethnic Germans who had recently lived in Tomsk. Its analysis, done by AFTAC with the aid of AEC laboratories, was at last conclusive: its exterior surface contained 50 parts per billion of uranium that was slightly, but definitely, enriched in the U-235 isotope. Since no U-236 was detectable, the uranium was not from fall-out, nor had it been through a reactor. Additional analyses for plutonium, radio-iodine, and separated lithium isotopes were all negative.

The U-235 enrichment was evidence of U-235 separation in the Tomsk area. The fabrication of nuclear warhead components was an alternative possibility, but the size of this atomic operation seemed much too great for that. The evidence was against its being a reactor with associated chemical plant or a lithium isotope separator. I made my target a U-235 separation plant and centered it on the spot where

the German tailor had seen 12,000 prisoners go to work. The die was cast.

Luck at the Proving Ground

In late August 1957 the missions were flown—rapidly to minimize possible counteraction, and many of them to cover as much useful area as possible. Here we cannot review all the results but will cite some of the outstanding ones.

One flight was planned around Stalinsk in the Kuznetsk Basin and Alma Ata in the Kirgiz SSR as prime targets. In between, the Semipalatinsk proving ground was a prime target, but confidence in its location was so low that the cities of Semipalatinsk and Karaganda were made way-stations and the flight path between them adjusted to hit the latitude and longitude of my seismic centroid. Mention of the proving ground was dropped from the flight plan for security reasons ("Why give away knowledge if you don't have to?"). I doubt that anyone thought seriously about the danger of flying into a nuclear test.

The coordinates turned out to be good. The U-2 passed directly over the proving ground on 22 August 1957, and the pilot got a *thrill*. He had many times flown over our Frenchman's Flats, and he recognized what he saw. Moreover, he saw that the shot-zone had been cleared and they were ready to fire.

It was actually four hours later that Joe 36 was detonated; it was airdropped and went half a megaton. The pilot had photographed it and its carrier aircraft on the ground when he had flown over the Semipalatinsk airfield and associated nuclear weapon assembly facility. The nuclear weapon "cab" he apprehensively spotted on the shot-tower at the proving ground was for a low-yield device that was not to be detonated until 13 September.

Other Findings

The same mission photographed a well-planned, modern community of 20,000 people not previously known of on the north shore of Lake Balkhash. This turned out to be the headquarters of the Sary Shagan antimissile test range, a real find. It also covered the uranium mill at Kadzhi-Say near the west end (not the east end as I had thought) of Lake Issyk Kul⁵ south of Alma Ata, proving that the Russians had

⁵"Warm Water," so named because its salinity kept it from freezing.

large modern uranium mills. The uranium mines of Bystrovka were covered but not found in the film for another year.

The flight that was to cover the Dodonovo mining site near Krasnoyarsk failed with respect to this target because of heavy cloud cover, an all too familiar occurrence in the reconnaissance business.

The uranium metal plant at Novosibirsk turned out to be quite a large installation, including what is probably a large lithium isotope separation plant then under construction between its raw uranium ore facility and its thermal power plant.

Birch Woods

The outstanding target, the Tomsk atomic site, was covered on 21 August in clear vertical photography. The tailor's location for it proved correct. Allen Dulles is said to have exclaimed jubilantly, when he heard the news, "You mean you really did know that something atomic was going on 'way out there in the wilds of Siberia!"

As summarized in the mission report, the installation

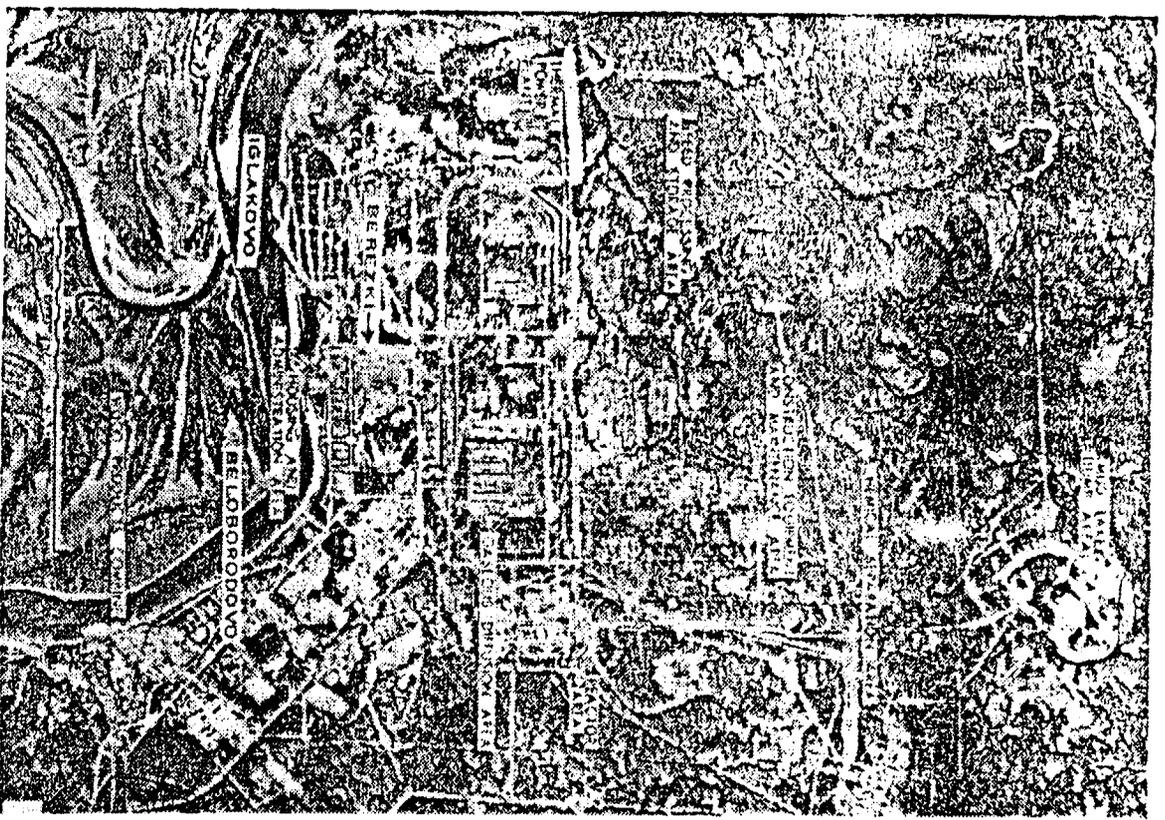
covers an irregular shaped area of about 40 square miles on the right bank of the Tom River. No single atomic energy complex in the western world includes the range of processes taking place here. The villages of Iglakovo and Beloborodovo are encompassed in the housing and administration area along the river. On the west edge of the area, a large thermal power plant with an estimated capacity of 400 megawatts is undergoing further expansion. Further power is provided by Gres II in Tomsk and by tie-ins to the Kuzbas Grid. East of this plant is located the feed and processing section and gaseous diffusion plants. One gaseous diffusion building is uncompleted. On the east edge is located the reactor area. One of the two reactors appears to be in the final stage of construction. A maintenance and construction area is just north of these areas. On the northeast edge, a plutonium chemical separation area is uncompleted. A mud lake dump area is on the north edge of the complex outside of the fence which encompasses the whole installation. It is rail served by a spur line from Tomsk.

Actually, one reactor was already in operation, and two more were under construction. These latter would eventually turn out by-product electric power. The gaseous diffusion U-235 separation facility, with its four operating buildings and a fifth under construction, was about one-sixth the size of that at Oak Ridge, which drew about 2000 megawatts of electric power.

The photograph could not tell us, of course, for the purpose of production estimates just how long each installation had been operating or would begin, nor what the Russians called them. Fortunately, we

Birch Woods

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The Tomsk Site

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Birch Woods

were able in the spring of 1958 to talk to a defector who had been a soldier in a military construction brigade working there from July 1955 to February 1956. He solved many of our time schedule problems and supplied names and identities. The general address of the whole installation was Post Box 5, Tomsk. The new city was named Berezki, Birch Woods, and the birch forest was still preserved around the city then, for the Russians love such forests. Beloborodovo had apparently been expanded to become the construction workers' town of Chekist (Tomsk 19), presumably in honor of their connection with the MVD, and Iglakovo had become Kuzminka (Tomsk 17). The man in charge was Major General Tzarevskiy, who had built the steel town of Nizhniy Tagil in the Urals in the 1930's.

This was the important atomic installation that now took shape out of mere indications and the vague rumors given substance by a fur hat and location by a tailor.

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