Traces of the borrowed German scientists combine with other scraps of information to throw light on the USSR's early atomic program.

ON THE SOVIET NUCLEAR SCENT

Henry S. Lowenhaupt

As World War II in Europe ended, the German nuclear scientists, handicapped by insufficient coordination and paltry official backing, were nevertheless only just short of achieving a self-sustaining chain reaction in a heavy-water-moderated pile. They had elaborated most aspects of reactor theory; they knew the best arrangement for the lattice of fuel elements; they had gained experience in the production and casting of metallic uranium. They had prepared detailed designs for two pilot plants for the industrial production of heavy water. They had also experimented with several methods of isotope separation for concentrating the fissile U-235, especially the gas centrifuge method, though none of these had by any means reached the production stage. In short, they had a body of know-how, experimental machines, and basic materials unique outside the United States and Britain.

U.S. and UK forces moved aggressively to prevent the proliferation of this nucleus of nuclear capability. They promptly seized the scientists and materials in their own zones of occupation and snatched some from the agreed zones of France and the USSR ahead of their advancing armies. They even destroyed by air attack the Auer Company plant, in the prospective Soviet zone, that had produced the uranium metal for the German program. They interned near London the ten ranking scientists, led by Professors Otto Hahn and Werner Heisenberg, most directly concerned with the program, and only after Hiroshima did they release them under such conditions that they would not want to go to the USSR.[1]

Scientists Eastbound

Yet the sweep could not be clean. In June 1945 British intelligence reported that Dr. Nicolaus Riehl of the Auer Company had left Ger-

[1] The story of the German effort and its denouement is well told in David Irving's *The Virus Home* (London, 1967), reviewed on page 103 of this issue.

GUSTAV HERTZ

many for the USSR along with six others who had worked with him on the manufacture of uranium metal. Then four days after Hiroshima word came from London that Professor Gustav Hertz had flown to Moscow four weeks previously and Professor Adolf Thiessen was in a Soviet camp with eighteen fellow workers awaiting transportation to Russia. Both Hertz and Thiessen, though not immediately involved in the German atomic program, were prominent and technically competent scientists who could command the loyalty of other scientists. Hertz, a Nobel Prize winner in atomic physics, had been chief of the famous Siemens-Halske Laboratories since 1934 and had discovered the gaseous diffusion method of separating isotopes. Thiessen had directed the Kaiser Wilhelm Institute for Physical Chemistry and had published an impressive string of important research papers.

From this point U.S. and UK intelligence had the task of trying to follow the incipient Soviet atomic effort, and it was largely the early results of this pursuit, as decribed below, that encouraged the U.S. Air Force to mount a watch for the first Soviet test explosion two years before it was expected.[2] G-2, OSS, and their British counterparts, under the direction of the two nations' atomic authorities,[3] began with a vigorous campaign to discover which Germans had been recruited for this effort and which Russians were doing the recruiting. The

[2] See Northrup and Rock, "The Detection of Joe 1," *Studies* X 4, p. 23 ff.

[3] The intelligence analysis and the general direction of the collection effort in the nuclear field were vested, on the U.S. side, in General Groves' "Manhattan Engineering District" until its dissolution in January 1947, when these functions passed to CIA. In Britain they were performed through 1952 by a section of the Ministry of Supply and, after its formation, the British Atomic Energy Authority. The Supply section was staffed in part by Secret Intelligence Service officers under the leadership of Lt. Comdr. Eric Welsh. See *The Virus House*, cited in footnote 1 above, for Welsh's role in atomic intelligence to the end of 1945.

task was complicated by the fact that the Russians were recruiting German and Austrian scientists and technicians for all sorts of programs; the numbers ran to many hundreds. By the end of the year, however, it was clear that for atomic work well over a hundred technicians were being grouped around a few rather good scientists as leaders.

In addition to Riehl, Hertz, and Thiessen, the group leaders included: Baron Manfred von Ardenne, Germany's foremost cyclotron constructor; Professor Max Vollmer, an outstanding physical chemist; and Dr. Hans Born of the Kaiser-Wilhelm Institute for Brain Research, who had been working on the biophysics of radiation. As for the Russian recruiters: at Leipzig there was a General "Katchkatchian" aided by a Major "Krassin"; a Colonel "K. K." Kikoin at Karlshorst had persuaded Hertz to go; and a Lt. Colonel "Kargin" had handled negotiations with Vollmer. A General "Ivanov," who had had to do with recruitment in Vienna, turned out to be none other than General Meshik, Lavrentiy Beriya's right-hand man.[4]

Many of the German scientists were well enough known that their specialties and skill could be assessed. The intelligence reporting also tended to sort them into groups under the respective leaders. But this did not tell us what each group was to work on in the USSR and where they were to do the work; and that was what we needed to know.

Russian security was initially well below its subsequent standards. By February 1946 the Strategic Services Unit, successor to OSS, was able to report from an agent in the East Zone of Germany that Baron von Ardenne's presumably cyclotron-centered group went to the Crimea in the summer of 1945 and then in October was established in one of the small communities between Anaklia and Poti on the east shore of the Black Sea, about 120 kilometers north of the Turkish border. Another agent reported that Thiessen, Hertz, and Vollmer, as well as Von Ardenne, were on this stretch of the Black Sea coast between Sukhumi and Poti—in ancient Colchis, where the Argonauts found the Golden Fleece. They had reportedly not done any work up to the beginning of November 1945, as housing and laboratories were still under construction. The biophysicists under Born, as well as Riehl's Auer Company group, were left unaccounted for.

[4] P. Ya. Meshik was executed on 23 December 1953. As Minister of Internal Affairs of the Ukrainian SSR, he was charged with being an active participant in the coup attempted by Beriya.

The Russians rounded out their atomic recruitment early in 1946 by assembling a group of German scientists under Dr. Heinz Pose, who had worked on nuclear reactor physics at Ronneburg under the German Bureau of Standards. This particular group had been considered inferior by their more renowned fellows, but in fact they had shown Heisenberg an error in his calculations and thus put the program on the right track towards a working reactor. We had no information on where the Russians stationed these reactor specialists.

Letters and Defectors

At about this time U.S. and UK intelligence stumbled onto the interception of letters from the expatriated scientists as a source of information about their locations and activities which in the end proved far more fruitful than the alternative of penetrating institutes in East Germany. An intercepted letter dated 18 March 1946 from Hertz to his son disclosed the identity of the Russian go-between in Germany as Lt. Colonel "Cedenko," 46 Wassersportallee, Berlin-Gruenau. Then in August and September there was a change in Russian personnel and their address, for Lt. Colonel "Yelan" and Lt. Petrochenko at Buntzelstrasse 11, Gruenau, were handling the mail.

In October Riehl wrote from Elektrostal—a small town about 60 kilometers east of Moscow. Later his location there was confirmed by a March 1947 letter postmarked Moscow from Mrs. Blobel, his secretary, which indicated that biophysicists Born and Karl Zimmer, as well as the Auer Company people, were living 60 kilometers from Moscow. The implication was that the processing of uranium ore and the study of biological effects were being organized in or near Elektrostal while theoretical and experimental work was going on down by the Black Sea.

The Russians had always maintained a security wall between themselves and the East Germans; but after four German atomic scientists who had been to the USSR for job interviews returned to East Germany and defected to the West in early 1947 the rules were tightened up. From then on no East German was ever told anything about German atomic scientists in Russia. All letters from the scientists were strictly censored and bore without exception the return address Post Box 1037P Main Post Office, Moscow.

The Russian assessment was correct: these defectors did possess information of value to us. For instance, Dr. Adolf Krebs had first had interviews in Germany with Colonel Professor "Alexandrow" and a Professor Leipunski. The former was clearly Professor Simon Peter

Alexandrov, who represented the USSR at the Bikini "Crossroads" tests in 1946 and in UN discussions on atomic energy in 1947; the latter presumably was A. I. Leipunski, a well-known Russian nuclear physicist. When Krebs was then flown to Moscow (without his consent) he learned that the German groups worked as an independent organization under the supervision of General "Sawiniaki," whose staff of several generals included a General "Krawtschenko." Ungarbled, the boss must be Colonel General Avram Pavlovich Zavenyagin, the builder of Magnitogorsk in the Urals and the Norilsk Nickel Combine in far northern Siberia; he was reportedly head of the secret Ninth Chief Directorate of the MVD and had a General Kravchenko as assistant. Thus the MVD continued into 1947 to play a significant role in the Soviet atomic energy program, even though this had been reorganized in late 1945 as the First Chief Directorate attached to the Council of Ministers under Colonel General Boris Lvovich Vannikov, who had managed Russia's munitions production during the war.

A. P. Zavenyagin

Krebs also reported: that the Hertz group was working on isotope separation problems at Sukhumi; that the Von Ardenne and Thiessen groups were also there, as we had thought; that Dr. Vollmer and several assistants were working at Sukhumi on heavy water production methods, that Dr. Riehl and his group at Elektrostal were turning out uranium metal on a production scale; and that Dr. Patzschke, a former director of the Joachimsthal uranium mine in Czechoslovakia, was head of a group prospecting for uranium ore near Tashkent in Central Asia. The Pose group was presumably somewhere east of the Urals, since in May and June of 1945 this territory had been surveyed, Krebs had heard, as to its suitability for their reactor work.

The news that the Vollmer group was working on heavy water came as a surprise: by this time it was known that a group of Germans under Dr. P. Herold from the former I. G. Farben Leuna plant at

Merseberg in East Germany were continuing their wartime research on methods for the industrial production of heavy water at the Karpov Institute in Moscow. But the Leuna group was administered quite separately from the Post Box 1037P groups, presumably because the Karpov Institute was a research and design facility of the Ministry of Chemical Industry, while the 1037P scientists were administratively under the MVD.

Uranium Production; Isotopes

The year 1947 brought the first real confirmation of the thin information we had about the manufacture of uranium. The UK had managed to learn in 1946 that one ten-ton freight car of uranium ore was being consigned from the Jachymov (Joachimsthal) area of Czechoslovakia to Elektrostal every ten days. The UK had also learned that the Russians were requiring the former Bitterfeld plant of I. G. Farben to set up the production of highly pure metallic calcium at 30 tons per month, enough for the manufacture (by oxide reduction) of 60 tons of uranium metal. Penetration sources had furnished the specifications on the amounts of impurities allowable in the calcium; these conclusively indicated that it was for atomic use somewhere.

It remained for the covert collection arm of CIA to acquire a bill of lading for three freight-car loads of calcium from Bitterfeld consigned to Post Box 3 Elektrostal, Moscow Oblast. This proved beyond question that at Elektrostal there was a uranium factory making the metal in quantity, using methods worked out at least in part by the Auer group under Riehl. Indeed it also forced the conclusion that the Russians were at least attempting to build somewhere a large reactor to produce plutonium for nuclear weapons.

Shadowing the German scientists in Russia, largely through mail intercept, had thus produced information which could form the basis for detailed debriefing when one of them came to the West, while penetration attempts had run squarely into Russian security. It was decided to make thorough preparations, mainly by mail analysis, for the day when the nuclear scientists might return to an area from which they could be defected, even though that day might be years away. Later, in 1951, this concept was extended to all German scientists in the USSR under a program called Operation Dragon. The work settled into a routine in which the (U.S.) Army Security Agency inter-

cepted most of the letters while the detailed collation of the data was performed by UK analysts.

Meanwhile atomic collection proceeded on a broad front. In 1948 former prisoners of war began to return from the USSR to West Germany, and it was soon learned that a number of them had helped construct two institutes in the Sukhumi area, one under Professor Hertz near the village of Agudzeri, the other near that of Sinop, namesake of the Turkish city. The year 1949, if it surprised us with the Soviets' first atomic test, showing that their plutonium production was much farther along than we had suspected, also brought the first of two *Russian* defections which helped the analytical picture immensely.

The first defector was a scientist nicknamed "Gong" who had worked in 1947 at the Institute of General and Inorganic Chemistry under a Professor Dmitriy A. Petrov on a way to make porous metal membranes for the separation of uranium isotopes by gaseous diffusion. A prize of 100,000 rubles had been promised for the correct solution of this problem. In the course of his work Gong had that summer visited Special Laboratory No. 3, located in west Moscow. Here he had spoken to Professor Isaac Konstantinovich Kikoin, Deputy Director of the Laboratory and a corresponding member of the Academy of Sciences. Gong was positive that Special Laboratory No. 3 worked on the separation of isotopes by the diffusion method and on other physical-chemical processes. He had also heard of a Special Laboratory No. 1, location not known to him, and of Special Laboratory No. 2, under the direction of Academician Alikhanov in Moscow. All three Special Laboratories were intimately tied to the First Chief Directorate with respect to work priorities, supplies, security, etc.

Thus it became clear that the Colonel "K. K." Kikoin who in 1945 had recruited Hertz for work on isotope separation methods was the person responsible in Moscow for gaseous diffusion research for the Soviet atomic energy program.

Research papers had been published by Gong's boss, Professor Petrov, in 1947 [5] and 1948 on the subject of "skeleton catalysts." The method of preparing these catalysts was just that reported by Gong for barrier membranes. Interestingly enough, moreover, the pores in the "catalysts" were of a size reasonably correct for a membrane to separate out U-235 by gaseous diffusion.

---

[5] "Investigation of the Structure of the Copper Skeleton Catalyst," with L. U. Kefeli and S. L. Lel'chuk; Dok. An. 57, No. 6, 1947.

Procurement Abroad

In 1950 the second Russian defector, "Icarus," proved of even more value. As a Colonel of the MVD concerned with supplies, first in the Moscow office of the First Chief Directorate and later at Wismut AG in Saxony,[6] he knew personally many of the Russians involved in the atomic energy program in Moscow and in Berlin. He was aware that General Meshik was in charge of personnel and security for the whole program. He knew that Lt. Colonel (fnu) Sidenko (the "Cedenko" who handled the letters intercepted in early 1946) had been the representative of the Ninth Directorate of the MVD in Berlin in 1945 and that he had been replaced (by August 1946, our intercepts had shown) by Lt. Colonel Elyan (not Yelan, as we had it), who eventually had returned to Moscow to work for the First Chief Directorate under one Dorofeyev, chief of its Supply Directorate. Icarus also reported that a man named Panin ran a warehouse under Dorofeyev known as Post Box 200, Moscow.

Now that we had the correct Russian spelling of the names of the atomic representatives in Berlin, as well as their addresses, it seemed useful to investigate their activities in depth. It soon developed that the Berlin atomic office was always in two sections at separate locations: one handled mail, packages, etc., for the German scientists; the other was concerned with special procurement for the Soviet program. Both sections changed personnel and location approximately every year and a half. Through some rather clever intelligence work against these offices, CIA covert collection was to show in 1952-1953 that they expedited the procurement of several million square feet of very fine nickel wire mesh per year and that at least one shipment of this mesh was flown from Tewa/Neustadt to Panin's warehouse at Post Box 200, Moscow. This clearly established by administrative procedures that the ultimate user was the Soviet atomic program. The technical specifications and amounts of the mesh suggested porous barrier for U-235 separation as the only possible use in an atomic program.

An attempt to learn whether the Bitterfeld plant shipped other atomic materials than the calcium revealed that all shipments now bore only the Moscow address of the main offices of GUSIMZ, the Chief Directorate of Soviet Property Abroad of the Ministry of Foreign

[6] Wismut AG (Bismuth Inc.) was the cover name for the vast Soviet-run uranium mining operation in East Germany.

Trade. All carried nine- and twelve-digit order numbers and five-digit transport numbers. Surely numbers as complicated as these should have character in the cryptographic sense.

For background purposes, we studied documentation on equipment ordered by the Soviet commercial mission, Amtorg, in New York. Unfortunately, by about the time we understood the ordering system the Russians decided to tighten it up, so that this work was nullified. However, the reporting on Amtorg (by the CIA domestic collection organization) showed that a P. M. Sidenko had had a tour of duty with the mission between December 1946 and June 1948. This man, presumably the same Lt. Colonel Sidenko who was at the Berlin atomic office in 1945 and through July 1946, arrived in the United States during the same month that brought the departure of Anatoli Yakovlev, head of the atomic espionage chain involving Harry Gold and Klaus Fuchs.

Others working with Sidenko on procurement were soon identified: Nikolai L. Artemiev, who visited a plant making geiger counters in November 1946 and who tried in June 1947 to purchase helium leak-detectors used in U.S. U-235 plants; Nikolai S. Sventitsky, co-author of an article on spectroscopy, Artemiev's replacement; and N. N. Izvekov, who was interested in all sorts of manufactures, from heavy construction machinery to fine-woven wire mesh "for electronic equipment." Some three million dollars worth of goods purchased by the Sidenko group was identified as apparently for the Soviet atomic program; it included the machinery for a complete plant for extracting radium from uranium ore wastes. Sventitsky joined Artemiev in London in January 1948 when Sidenko returned to Russia.

Into the Fifties

With respect to the German atomic scientists in Russia the early 1950's was a period of continued information collection and analytical consolidation. Letter intercepts by the hundreds were collected and results collated. Not only the main groupings but interrelationships within groups were studied, with a view to the eventual recruitment of adequate representatives of each group when they were allowed to return to Germany. In trying to determine who was in the Von Ardenne group at Sukhumi, for instance, it was noted that letters (all severely censored and postmarked Post Box 1037P Moscow) mentioning the accidental death of a small child, from playing with matches, came from Becker, Felicitas Jahn, D. Lehmann, Gerhard Mueller,

Liselotte Steenbeck, Frau Wittstadt, and Dr. Froelich; that an outbreak of scarlet fever was referred to by Felicitas Jahn, Liselotte Steenbeck and Frau Schrottke; that "on Saturday the Bernhardts visited the Schrottkes and on Sunday the Schrottkes visited the Bernhardts"; that the "bull in a china shop" complained about by Bergengruen was identified by Felicitas Jahn as Helmut Hepp.

Such studies had resulted in the identification of the seven distinct groups. The Hertz group was still located in the Sukhumi area, by the town of Agudzeri. The Von Ardenne and Thiessen groups were together at Sinop in the same area. Vollmer's group, no longer with Hertz's, had moved to Moscow, and a POW returnee who had been used in the electronics program confirmed that it was working on heavy water production processes. The Riehl uranium specialists continued at Elektrostal, and Riehl had been awarded a Stalin Prize and made a Hero of the Soviet Union after the success of the test explosion he had helped make possible in August 1949. The location of Pose's reactor group posed a problem; likewise that of the biophysicists under Dr. Born, for they had left Elektrostal in 1948.

Some rather clever analysis by the Directorate of Scientific Intelligence in the UK in 1951 succeeded in narrowing down the location of the Born group to within 20 miles of the town of Kyshtym in the southern Urals. The Kyshtym area was the site of the nuclear reactor which had made the plutonium for the first Soviet atomic device, and the placing of a biophysics group near a reactor site made good sense. The British detection was done as follows.

Born Found

The letters from the Born group described topography, scenery, weather, and temperatures strongly suggesting the hilly country of the Urals. In fact, the heavily censored letters spent so much time on the weather that it was decided to see what could be done with this information. So the weather as described by known members of the group on a given day was compared with weather charts of the USSR for that day, and the irregular portions of the USSR having such weather were highlighted. Once some dozen of these weather overlays had been compiled, it was clear that only one area was common to them all. This was a stretch of the Urals some 100 to 200 miles north and south of Sverdlovsk, with a very slight balance of probability toward the north.

Now an analysis was made of a train trip from Sukhumi to the Born group which a man named Rintelen reported in an intercepted letter: "After the first long train journey, we had an opportunity on the 10th of December from morning till evening to buy warm clothes, travel by underground and bus and to sit in good cafes. . . . In the evening we traveled on again and arrived on the 12th of December in the next large town from here [i.e. from the location of the Born group]. The following evening we traveled a further five hours by train and on the 14th of December we arrived here after a two-hour bus journey . . ."

Rintelen's pleasant stop on the 10th of December must have been in Moscow, for it alone of Soviet cities possessed an underground railroad at that time. There were three trains leaving Moscow on the evening of the 10th for Perm (then Molotov), a likely "large town" on the Moscow side of the Urals. Two were scheduled to arrive early in the morning and one in the evening of the 12th. Why would Rintelen lay over a day in Perm? An evening train heading for the north Urals left there at 1620 on the 12th, arriving at Kizel the five prescribed hours later, so if Kizel had been his destination he should have taken it. Similarly he would not have had to lay over had he been going to the eastern side of the Urals north of Sverdlovsk, say to the Nizhniy Tagil area, for he would have taken from Moscow one of the two trains that get to Perm in the morning so as to catch the 1150 for Nizhniy Tagil and arrive there near midnight on the same day, the 12th. Thus the north Urals did not appear a likely destination, and the "large town" of the layover must therefore be Sverdlovsk (Chelyabinsk lying outside the area defined by the weather information).

The three trains leaving Moscow on the evening of the 10th were scheduled to reach Sverdlovsk on the evening of the 12th (at 1520, 1609, and 1702 respectively). Five trains left Sverdlovsk for various destinations after 1800, so all these appeared unlikely to have been Rintelen's. The two trains per day to Kamyshlov, five hours away, left Sverdlovsk at 1300 and 1525 and so would probably have required a layover, but Kamyshlov, well east of even the foothills of the Urals, was quite unlikely on geographic grounds. One last midafternoon train, however, left Sverdlovsk southbound at 1420 and five hours later arrived at Kyshtym. Rintelen would have had to stay in Sverdlovsk overnight to catch this, and in midwinter at latitude 56°N, the ride from 2:30 to 7:30 p.m. might well have seemed to be

an evening one. Thus by elimination his destination, and the position of the Born group, lay some 20-30 miles (the two-hour bus ride) from Kyshtym in the south-central Urals.

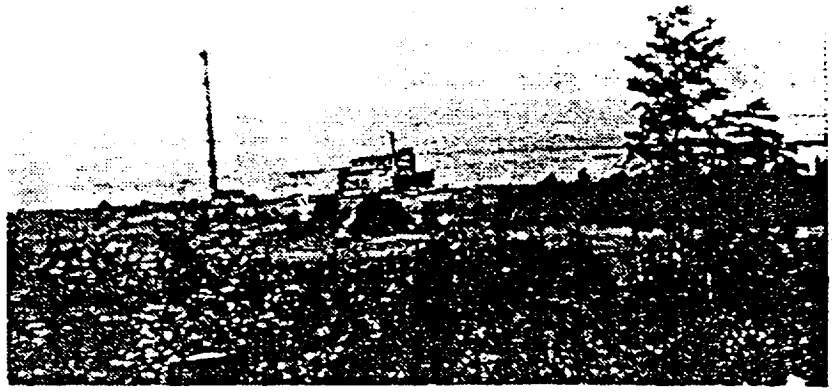
The Reactor Specialists

The Pose group was located in a similar manner. Evidence from intercepted letters had put it a three-hour bus ride from Moscow. Thus it was not now in the Urals, as Krebs had guessed in 1947. Several U.S. analysts, studying the intercepted mail, gleaned the additional information that it was two and a half hours by train from Moscow, that the members had good swimming in a river, and that there was a great deal of building activity in new suburbs around them. After a study of maps and railroad timetables the Maloyaroslavets area southwest of the capital was suggested as a possibility.

UK analysts, spurred by this hypothesis, surveyed their much larger volume of intercept and were able to add that (a) the return trains from Moscow did not "fit well," (b) there was a local market-town a half-hour bus ride away, and (c) the "nearest big hospital was 15 km. away."

Railroad timetables showed that Obnino station, 15 km. northeast of Maloyaroslavets, was 2 hours and 30 minutes by train from Moscow. That was also where the road and the railroad crossed the Protva river on the way to Maloyaroslavets. The train took 16 minutes to get from Obnino station to this good-sized town; a bus would probably take half an hour. The only morning train from Obnino to Moscow left at 0750. The possible return trains left Moscow at 1300, 1440, and 1630, giving scarcely more time there than the round trip consumed and so not "fitting well." Some ten other localities were two and a half hours by train from Moscow, but few were near rivers which might have good swimming. Of those that were, several, like Mozhaysk, were large towns in themselves; others had excellent evening train service. Obnino station thus remained the only likely place.

In August 1953 attaché photographs from the railroad looking northwest from the bridge over the Provta river showed several large buildings under construction and a completed large stack with blower house such as is usually required for a nuclear reactor. Photointerpretive measurement done by comparison of these with wartime German aerial photography showed that the stack was almost 210 feet high. Obnino was thus the location of a probable nuclear establishment containing a reactor. The Pose group moved to Sukhumi in 1952.



First Western Picture of Obninsk Plant

In 1954 the Russians publicized the initial operation of the first atomic power station in the world at Obninsk (the variant name used for the town served by Obnino station).

The Special Labs

Meanwhile a 1952 report from the UK settled the destination of a high-voltage accelerator for nuclear research built by Koch and Sterzel of Dresden in the East Zone. By checking the interrogation of a bordercrosser who had taken the accelerator to Laboratory No. 3 in Moscow against reports from several returned POW's, the British had concluded that Laboratory No. 3 was in Cheremushki, a suburb of south Moscow. Evidently "Gong" had been mixed up about the numbers of Special Laboratories 2 and 3 when he identified Kikoin and his work in west Moscow on isotope separation with Laboratory No. 3. That one must be No. 2, and the laboratory of the famous nuclear physicist A. I. Alikanyan in south Moscow No. 3.

The question of Special Laboratory No. 2 was solved completely through the efforts of the Biographic Register when it undertook the monumental task of rearranging the 1951 Moscow telephone book by telephone number and by street address. For a west Moscow address given in a 1944 newspaper clipping as that of "Laboratory No. 2 of

the Academy of Sciences" there were three telephone numbers, and against these were listed several hundred persons, many of them renowned nuclear physicists such as I. V. Kurchatov and G. N. Flerov, known to have been involved in the uranium problem as early as 1941. I. K. Kikoin was there too. So Laboratory No. 2 of the Academy of Sciences was the same as Special Laboratory No. 2 (not 3) of the First Chief Directorate attached to the Council of Ministers, and it must conduct research on reactors as well as that on U-235 separation under Deputy Director Kikoin.

The Pow's Return

At this time Operation Dragon was girding itself for the expeditious procurement of POW's who had worked with German scientists in the USSR on many projects, including the atomic ones. By 1951 these POW's had been redeployed to "cooling-off camps" in European Russia where they worked at unclassified tasks in industrial plants. There were many hundreds of them. Some used POW camp addresses, other Moscow Post Boxes. Some idea of the complexity of keeping track of them can be gleaned from the following redeployment chart tracing the movement toward only one of the new Moscow addresses. C stands for POW camp:

Most of the civilian members of Moscow Post Box 1037P, the scientists, had by 1952-3 also started their cooling-off period and were using Sukhumi Post Box 3122. For a time there was a question whether they were actually at Sukhumi, for we had only the letter postmarks to vouch for it. This question was settled neatly when a Miss Verena Weber wrote her aunt that on 30 June 1954 they had seen an eclipse of the sun reaching 97 percent totality which started at half past four and ended at half past six. A check with the Naval Observatory established that in the locale of Sukhumi the eclipse reached slightly more than 97 percent totality and that it started at approximately 1623 local time and ended at approximately 1835. This agreement, along

with information in the intercepts on climate, flora, and physical surroundings, confirmed the location as in the general area of Sukhumi.

The POW's from 1037P who had cooled off since 1951 began to return in mid-1954, practically the last of those who had helped German scientists in the USSR. Though many knew little except their own particular tasks, their information tended to round out the deductions which had previously been made about the work of each of the main groups of atomic scientists. The Born group really had been located at Singul, near Kyshtym, and had worked on the biophysics of radioactive substances. The Pose group really had been at Obninsk and had worked on the design of nuclear reactors.

Of most interest at the time was the report of one Von Maydell, which established clearly that the Thiessen group was the one which had developed the nickel-wire-mesh-backed barrier of sintered nickel powder used after 1950 in the Soviet gaseous diffusion process for separating U-235. He knew technical details. The plant that put it into practice must have operated under considerably different conditions from those of its U.S. counterpart.

We were still ignorant of the location of that plant, although it had produced as early as 1951 the U-235 for the Soviet Union's third atomic test. By now our guesses were largely limited to what were known to be atomic facilities at Nizhnyaya Tura and Verkh Neyvinsk in the north Urals. Nizhnyaya Tura seemed most likely, for a large electric power plant had been built there in the postwar period. But then the function of Verkh Neyvinsk lay in question. Were the Soviets pursuing more than one kind of U-235 separation process?

Several POW's knew that German scientists from Sukhumi had visited the U-235 plant using the barrier, and we looked to them to help locate it. Imagine our consternation when it developed that they had heard the place spoken of only as "Kefirstadt," so dubbed because the favorite soft drink there was kefir, the fermented milk of the Caucasus.

Scientists Tell All

Finally, in April 1955, the German scientists returned from Sukhumi to the East Zone of Germany, the last of them except for some groups engaged in missile research. The defection plans went into action. Hertz, Von Ardenne, Vollmer, Steenbeck, Pose, and several others would not respond, but many of those working for them did. Despite the three-year cooling-off period, skillful and exhaustive interrogation

in depth revealed technical details, individual names, etc., in a richness unbelievable to one who has never witnessed this procedure.

Nikolaus Riehl defected as soon as he learned that he could not keep the proceeds from his Stalin Prize. He and others detailed the uranium processes at Elektrostal exhaustively.

Patzschke's uranium prospecting effort near Tashkent was reportedly a failure. His fate was not, and still is not, known.

Members of the Born group discussed their radiobiological research at Singul. Without knowledge of the reactor site near Kyshtym, they reported they had gotten their radioactive "soup" from Teche. Teche was listed in the file as one of the villages east of Kyshtym which had disappeared in the 1950 Deleniya, the MVD's biennial listing of administrative centers in the USSR; it was within the area of the Kyshtym reactor site as delineated by earlier POW interrogations.

Members of the Pose group discussed their abortive attempts at Obninsk to design and construct a beryllium-oxide-moderated reactor. Because graphite-moderated reactor research at Laboratory 2 and heavy-water-moderated reactor research at Laboratory 3 had both been quite successful, the decision had been taken in 1950 to build up around the German nucleus at the Obninsk site and under the direction of Academician A. I. Leipunski a third Russian center for reactor research working on power reactors and other advanced types.

The research of the Vollmer group on heavy water production turned out to be in connection with a heavy water facility built at Norilsk, where Zavenyagin's Nickel Combine was already located, in the far north of Siberia. The wartime work of the Leuna group had been used by the Karpov Institute in connection with two other heavy water production processes, according to a member of that group. Presumably he was referring to those used by the heavy water plants at Aleksin, Chirchik, Kirovakan, Dneprodzerzhinsk, Gorlovka, and Berezniki, which had been uncovered by returned POW interrogations and attaché photography.

The work at Sukhumi prior to 1952 had been mostly devoted to isotope separation, as we had supposed. The Von Ardenne group worked on the electromagnetic method and the Steenbeck group on the gas centrifugal method. Several Germans had been concerned with the thermal diffusion method. Hertz himself had worked on a variation of gaseous diffusion termed mass diffusion in the United States. None of these were actually put into practice for U-235 separation.

Thiessen's group, with calculational help from the Hertz group, worked on mesh-backed gaseous diffusion barrier (as Von Maydell had reported) and on plant design. Some of the Germans had even helped set up a barrier factory at Elektrostal and knew the cutting and loss factors required to turn square footage of nickel wire mesh into completed barrier. The German mathematical theory on gaseous diffusion was strangely easy to understand; with minor exceptions the symbols and formulae somehow seemed familiar. Then someone had the bright idea of looking up several of Klaus Fuchs' wartime papers on gaseous diffusion: that was where the Germans got it.

"Kefirstadt" turned out to be Verkh Neyvinsk in the Urals, leaving the function of Nizhnyaya Tura and its associated large power plant an enigma. Presumably power was sent by transmission line to Verkh Neyvinsk, there being mention in the technical press of transmission line construction from Nizhnyaya Tura southward.[7]

In retrospect, following the trail of Gustav Hertz and his associates proved to have been a wise course of action. Despite Russian efforts at security compartmentation the Germans had valuable information which complemented that from other sources. Indeed it would not have been possible to achieve an understanding of the later U-2 photography of Soviet U-235 facilities and uranium metal plants without the information obtained from the Germans.

---

[7] For the subsequent solution of this mystery and further description of the Urals atomic complex see the author's "The Decryption of a Picture" in *Studies* XI 3, p. 41 ff.