The Sharashka System: The Link Between Specialized Soviet Prison Camps and American POW-MIAs in Korea?

Paul M. Cole and Theodore Karasik

DRR-231-USDP

May 1993

Prepared for the Office of the Under Secretary of Defense for Policy
This Draft Report (DRR) describes the organization, administration and purpose of Soviet-era research facilities known as Sharashka. The Sharashka camp system provided Soviet defense industry with state of the art technology and design produced by imprisoned Soviet citizens and foreign specialists. With the use of new primary source material from the post-Soviet archives, this paper explores the use of foreign POWs who were exploited in this way by the security services of the USSR.

This DRR discusses the possible link between the Soviet MVD system for exploiting foreign POWs and American POW-MIAs lost during the Korean War. In addition to archive materials, the authors gathered information for this document through interviews with Russian officials and specialists in Moscow. Other data derives from Russian and English language sources in the United States.

This DRR is a part of a series of publications produced by the RAND project on World War II, the early Cold War and Korean War MIA-POW issues. Research for this paper was sponsored by the Under Secretary of Defense for Policy and undertaken within the International Security and Defense Strategy Program of RAND's National Defense Research Institute (NDRI), a federally-funded research and development center sponsored by the Office of the Secretary of Defense and the Joint Staff.

The DDR is expected to be of interest to government officials, private researchers and the family members of unrepatriated POW-MIAs seeking information on the probability that American POWs were transported to the USSR during the Korean War.
CONTENTS

Preface ................................................................. iii
Figures ................................................................. vii
Summary ................................................................. ix
Acknowledgments ....................................................... xi

1. THE GULAG SYSTEM ................................................ 1
   Introduction ......................................................... 1
   The Gulag System .................................................. 1
   GULAG Administration ............................................ 5

2. SHARASHKA .......................................................... 7
   Administrative History 1930-1953 ................................ 7
   Sharashka Administration .......................................... 11

3. POWs IN THE SHARASHKA CAMPS ................................ 13
   Foreign POWs ....................................................... 13
   MVD POW and Internee Assessment Report ....................... 14
   American POWs in Sharashka Camps? ............................. 18

4. THE PATTERN OF SOVIET CONTACT WITH AMERICAN POWS IN KOREA ..... 21
   The Motive for Soviet Contact with American POWs in Korea ... 21
   KGB Recruitment Efforts Among Korean War Prisoners .......... 22
   Other Soviet Contact with American POWs ....................... 23
   Soviet Interrogation of American POWs ........................... 25

5. STRATEGY FOR FURTHER RESEARCH ............................ 29
   The Availability of Archive Material ............................ 29
   Access to Sharashka Materials .................................... 30

6. CONCLUSIONS ...................................................... 31

A. PROBABLE LOCATION AND ACTIVITY OF SHARASHKA CAMPS IN FORMER SOVIET
   EMPIRE ................................................................. 33
FIGURES

2.1 Total GULAG and Sharashka Prisoner Population, 1937-1941 .................................................. 10

3.1 Organizational Chart of Sharashka POW Interaction with Soviet Bodies, 1945-1950 .......................... 16
SUMMARY

Sharashka, also referred to as Sharaga or "Paradise Islands," were secret scientific research or design facilities that operated within the Soviet GULAG system. The objective of this DRR is to describe the role foreigners, specifically POWs, were forced to fulfill in the Soviet Union's Sharashka camps. There are two purposes to this DRR. The first is to examine the possibility that American citizens in general and POW-MIAs in particular were exploited in Sharashka camps on the territory of the Soviet Union. The second is to discuss the degree to which Soviet structures that exploited foreign POWs during World War II manifest themselves in the contact between Soviet forces and American POWs during the Korean War.

This DRR is a first step toward a more complete understanding of the degree to which Soviet forces exploited American citizens during the Cold War in general and the Korean War in particular. There are many impressionistic accounts of labor conditions in the Sharashka camps written by Soviet citizens (such as Lev Kopelev's Ease My Sorrow and Aleksandr Solzhenitsyn's The First Circle). This DRR is the first assessment of Sharashka in Western literature that derives from primary source Soviet-era documentation such as interviews with Russian MVD officials and Soviet-era archival materials.

The evidence examined for study shows that the Soviet Union had in place at the outbreak of the Korean War a sophisticated system whose purpose was to derive tactical and technical intelligence and specialized information from foreign prisoners of war. The pattern of contact between Soviet forces and American POWs during the Korean War suggests that the Soviets extended the reach of this system into the Korean theater of combat operations.

This study concludes with recommendations for additional research into the issue of American POWs in Sharashka camps.

Sections One and Two of this study provide background information on the GULAG and Sharashka systems. Section Two also explores everyday life in Sharashka camps. Section Three investigates the use of POWs as
researchers in Sharashka camps. Section Four discusses the problems of locating documents pertaining to whether American MIA-POWs passed through Sharashka camps between 1945 and 1953 and proposes a methodology for future work on this topic.
ACKNOWLEDGMENTS

The authors would like to thank Sergei Zamascikov, lead consultant to the RAND MIA-POW research project, for his comments and assistance.

Several Russian sources deserve recognition: Vasilii Gato, Independent Researcher; MVD Colonel Valerii Khrebtoy; MVD Colonel Stanislav Kuzmin, Head Researcher at the Russian MVD Academy; Ludmilla Lebedeva, Military History Analyst, International Center for Human Values; Sergei Mironenko, chief of Russian State Archives; and Viktor Sokolsky, chief of the Department of Aviation and Air Space History Academy. There are also a number of Russian specialists whose contribution, at their request, must remain anonymous.

Any errors, of course, are the responsibility of the authors.
1. THE GULAG SYSTEM

Introduction

The purpose of this DRR is to explore the possible link between Soviet structures that were created to exploit foreign prisoners of war (POW) and American POWs and missing in action (MIA) during the Korean War. The assertion tested in this DRR states that Soviet security forces would not have moved Americans from Korea to the USSR without a compelling motive. One motive would have been to extract defense and security information from American personnel. This might have been conducted by the MVD in order to provide additional data to specialized Soviet forced-labor research facilities (Sharashka). A second motive would have been to conduct espionage operations within the POW population. These operations, which would have been the responsibility of the NKVD, could have been conducted in Korea, China or on the territory of the USSR. This DRR describes the Soviet structures whose purpose was to exploit foreign POWs on the territory of the USSR. The issue is whether this system was used to exploit American POW-MIAs from the Korean theater of combat operations.

The Gulag System

To set the stage for a discussion of the Sharashka system, one must begin with a general overview of the Soviet GULAG system. In 1930, Soviet dictator Joseph Stalin created the GULAG (Glavnoye upravleniye ispravitelno-trudovykh lagerei i trudposelenii, or the Main Administration of Prison Camps) prison system. In the beginning, one of the KGB's predecessors, the OGPU (Obedinenoe glavnoe politicheskoe upravlenie or the Unified Main Political Administration), supervised the GULAG which existed alongside the RSFSR (Russian Soviet Federation

The former security organs of the Soviet state were the VChkP (Cheka, 1917-1922), GPU (State Political Administration, 1922-1923), OGPU (Unified Main Political Administration, 1923-1934), NKVD (People's Commissariat of Internal Affairs, 1934-1946), MGB (Ministry of State Security, 1946-1953), and the KGB (Committee for State Security, 1953-1991).
Socialist Republic) and NKIu (Narodnyi komissariat Justitsii or People’s Commissariat of Justice) corrective labor camps. GULAG was the harshest of the three camp systems because of its strict work ethic, abusive camp directors and guards and lack of food. OGPU Chairman G.G. Yagoda showed exceptional energy and ruthlessness in carrying out grandiose construction projects with the use of prison labor.

The NKVD (Narodnyi komissariat vnunrennikh del or People’s Commissariat of Internal Affairs), which replaced the OGPU in 1934, placed all USSR camps under its jurisdiction. This was a massive undertaking. By this point there were at least several hundred camps in the Russian Federation, Ukraine, and Kazakhstan with hundreds of thousands of prisoners—even possibly millions of prisoners. Moreover, the NKVD helped to organize some fifteen specialized main administrations in the late 1930s and early 1940s to assist the country’s economic development. These administrations included Dalstroi (Main Construction Administration of the Far Northeast), GYZhDS (Glavnoe upravlenie zhelez-nodorozhnogo stroitel’stva), Gidrostroi (Water Construction Administration), GUGIMP (Glavnoe upravlenie gornoi i metallurgicheskoi promyshlennosti or Main Administration of the Mining and Metallurgical Industry), and others.2

By 1941, L.P. Beria had become an increasingly important GULAG administrator. As the first state security chief to become a member of the highest CPSU organs, Beria had responsibility for the entire police apparatus and GULAG system, including surveillance, investigation, and arrest of criminal suspects. He was responsible for the several hundred GULAG camps throughout the Soviet Union and developed some of them into Sharashka camps. Moreover, Beria kept the police ministries busy during and after World War II. He ordered mass deportations of and espionage operations targeted on German, French and other Allied POWs. Many foreign POWs found themselves in the GULAG camps. Beria’s actions during the war received praise from the Soviet regime. The Supreme Soviet decreed the military title of Marshal of the Soviet Union on

---

2Several of these administrations became part of the USSR government. In 1953, Dalstroi became the USSR Ministry of the Mining Industry while GYZhDS was transferred to the USSR Ministry of Railways.
Beria for his service to the state—a rare honor for a state security chairman.\(^3\)

After World War II, Soviet dictator J.V. Stalin made a major reshuffle in the police organization. This made a dramatic impact on GULAG's administration. In January 1946, the Soviet dictator removed Beria as NKVD chairman and gave the post to Colonel General S.N. Kruglov, deputy chief of the disbanded wartime spy organization, SMERSH. In March 1946, Stalin reorganized all commissariats into ministries. With that, the NKVD was split into two organizations. One became the MVD (Ministerstvo vnutrennykh del or Ministry of the Interior) while the NKGB (Narodnyi komissariat gosudarstvennoi bezopasnosti or People's Commissariat of State Security) became the MGB (Ministerstvo gosudarstvennoi bezopasnosti or Ministry of State Security). Stalin retained Kruglov as MVD chairman and appointed SMERSH head General V.S. Abakumov as MGB chairman. Simultaneously, Stalin shifted Beria away from supervising state security and the police. Beria's new job was to oversee the development of atomic and conventional weapons.\(^5\) Beria retained an alliance with Abakumov which proved to be quite beneficial to the Soviet defense industry.\(^6\)

By 1953, several hundred, or by some estimates several thousand, GULAG forced labor camps were located in every corner of the Soviet Union. Beria cunningly established camps in major population centers under the cover of camouflage. The population of the camps ranged from several tens of thousands to more than a million prisoners. At its peak, the GULAG population was enormous—by some estimates as large as twelve million inmates, or Zeks—since millions of people were imprisoned in successive waves of repression. The first wave of


\(^4\)Formed in 1941 for wartime internal security operations.


\(^7\)Interview with Ludmilla Lebedeva, February 15, 1993, Moscow, Russia.
prisoners was taken after Stalin launched a series of purges in the 1930s. After World War II, thousands of Soviet soldiers who had been labeled "traitors to the Fatherland" because they had retreated to avoid capture or had been captured by the Germans were sentenced to terms ranging from five to twenty-five years in the GULAG. Books by Soviet-era dissidents, such as Aleksandr Solzhenitsyn's *Gulag Archipelago* and *The First Circle*, provide an account of the extent and horror of these prison labor camps.

GULAG prisoners built large portions of the Soviet infrastructure. Hundreds of thousands of starving and poorly clothed prisoners erected the first gigantic construction projects of communism despite the lack of mechanized equipment. Huge numbers of convict laborers constructed railroads and canals throughout Siberia, Central Asia and the Far North. GULAG prisoners were forced to work on major construction projects such as the White Sea-Baltic Canal, the Tulom hydroelectric station near Murmansk, the Moscow-Volga Canal, parts of the Moscow subway system, the Saratov-Moscow gas pipe-line, the Volga-Don Canal, many large metallurgical, chemical and other plants located at Kuznetsk and Magnitogorsk, military fortifications, airfields, underground installations, harbors, railroads and atomic plants and installations.\(^8\) NKVD generals or colonels supervised the productivity, security, and penitentiary aspects of the GULAG camps and administrations during the building of these projects. Millions of prisoners died due to starvation and disease over several decades.

After Stalin's death in March 1953, Soviet leader N.S. Khrushchev transferred scientific and technical GULAG administrative functions to defense and economic ministries,\(^9\) stripping GULAG of its responsibilities for scientific and technical contributions. For instance, nuclear weapons production was reportedly turned over to the Ministry of Medium Machinebuilding.\(^10\)

---


\(^9\)Wolin, p. 28.

\(^10\)Knight, p. 50.
GULAG Administration

The Soviet security organs divided GULAG camps into six administrative organs which supervised life in the GULAG. Each division served the GULAG's four main goals. First, GULAG security forces sought to isolate unreliable and "suspect elements." Second, security organs supervised the transfer of a prison labor work force over any distance and to any place. Third, administrative organs opened new camp complexes. Fourth, GULAG organs enforced periodic liquidation of prisoners. These "sub-administrations" continued to exist following the reorganization of the OGPU into the NKVD. The six administrative organs were:

- **Production Organs:** The production organs included the Planning Division, the Administration of Major Construction Projects (Upravleniye kapital nykh sooruzhenii), the Building Construction Division, the Lumber Division, the Agricultural Division, the Highway Division, and other divisions for camp economic development. These administrations and divisions determined the program of the camp inmates.

- **Regime Organs:** The regime organs included the Division of Guards and Regime (Otdel okhrany i rezhima) which controlled the militarized guard (Voyenizirovannaia okhrana or VOKhR), the Division for Accounting and Work Distribution (Uchotno-raspredelitelnyi otdel or URO); and the Cultural and Educational Division (Kulturno-vospitatelnyi otdel).

- **Administrative, Housekeeping, and Auxiliary Organs:** These bodies supervised the Personnel Division, the Administrative and Housekeeping Division, the Medical and Sanitary Division, the Veterinary Division, the Housing Division, the Transportation Division, the Chief Bookkeeping Office, and the Finance Division. After World War II, the transportation division worked closely with the MVD's Main Administration of Prisoners of War and Internees (Glavnoye upravleniye po delam plennykh i internirovannykh or GUPI) and the Main Transportation Administration (Glavnoye transportnoye...
upravleniye) to transport prisoners and supplies during and after World War II.

- **Political Division:** Supervised and ensured that the USSR's (Union of Soviet Socialist Republics) Communist Party of the Soviet Union (Bolshevik) indoctrination and propaganda objectives.

- **Punitive Organs Division:** Security forces for the GULAG.\(^{11}\)

Each of the above organs implemented a harsh regime on GULAG prisoners. Inmates suffered greatly due to lack of food. Camp administrators based daily food norms on the prisoners' ability to complete their production tasks. The GULAG administration made sure that prisoners had no days off even though their work hours lasted 11.5 hours per day. Exercise occurred on an infrequent basis. Prisoners walked in a single-file line for no more than thirty minutes during the evening. Moreover, GULAG administrators failed to provide inmates with medical care. Chronic illness such as arthritis, asthma, hypertension, rheumatism, and heart disease were not treated. Millions of prisoners died. Contact with the outside world was prohibited.\(^{12}\)

\(^{11}\)Wolin, pp. 146-147.

2. SHARASHKA

Administrative History 1930-1953

In contrast to the banality of GULAG horror, a small, relatively unknown yet salient component of the GULAG system—Sharashka—exploited Soviet and foreign scientists and technicians who were forced to serve Soviet defense industry projects. Sharashka resulted from one of Stalin's famous show trials of the late 1920s. From May 1928 through July 1929, fifty-three engineers and technicians stood trial for attempting to create the Industrial Party—an organization which intended to sabotage Soviet industry. The OGPU quashed their effort. The trial, held in the city of Shakhty and widely reported in the Soviet press, ended on November 25, 1930 with the conviction of all defendants. The court sentenced the scientists, including L.K. Ramzin, a leading specialist in thermodynamics, to death. All had their sentences converted to 10 years "deprivation of freedom" and were sent to the special forced labor camps—Sharashka—to conduct scientific work. As the show trials and mass arrests continued, the security organs sent the highly educated and the well-trained to Sharashka camps that sprang up following the Shakty trial.

Sharashka, also sometimes known as Sharaga or "Islands of Paradise," were secret scientific research or design institutes within the GULAG system. Also known as promploshakda (industrial site or territory), these camps existed near large industrial enterprises. Solzhenitsyn describes Sharashka camps in Gulag Archipelago. From 1930 to World War II Sharashka camps were located in only Russia and Kazakhstan. After 1945, they proliferated throughout the Soviet empire. In remote areas, security officials constructed the camps near other hard labor camps so prison officials could tap educated GULAG prisoners as potential assistants for the Sharashka scientists. One

The plural form of Sharashka in Russian is Sharashki.

Lebedeva interview. Interview with MVD Colonel S.I. Kuzmin, February 18, 1993, Moscow, Russia. See Appendix for a chart of probable Sharashka sites and industries throughout the former Soviet Union.

Do not reproduce or retransmit without permission of RAND
Sharashka camp, established on Furkasovsky Lane behind Lubyanka and the Izhora Factory in Moscow, was concealed in the confines of that large city within easy access to the country's ruling elites. The OGPU and its successor, the NKVD, kept extensive lists of all specialists and tracked their movements through Sharashka camps.

There were several infamous Sharashka camps. For example, in the former Suzdal nunnery, microbiologist prisoners developed bacteriological weapons. The most notorious special research institutes were located in Moscow, Rybinsk, and Bolshino. A.N. Tupolev, one of the leading Soviet aircraft designers, became a victim of the mass arrests. In 1938, the NKVD arrested him as "an enemy of the people" and sent him to work in a Sharashka. By 1943, the security forces released him. Many of Tupolev's airplanes and a number of his other industrial designs emerged from Sharashka work. In 1946, the MGB monopolized all such special research institutes and transferred Sharashka findings to the armed forces and other security organs. A number of scientists, engineers, and other specialists, including satellite experts, engaged in developing rockets, radar, submarines, and atomic energy. This type of work also occurred at OKB (Osobo konstruktorske biuro or Special Construction Bureau) facilities. Sharashka's scientific output was applied in many of the Soviet Union's irrigation and transportation projects.

Soviet security organs supervised Sharashka prisoners who were mostly Soviet scientists and engineers imprisoned after being accused or convicted of treason or sabotage. Foreigners, such as German nuclear scientists and rocket specialists, went imprisoned in Sharashka camps after being kidnapped in Germany or captured by Soviet forces during World War II. Security officials made everyday life in the Sharashka for these specialists easier compared to conditions that prevailed in the rest of the GULAG. In Sharashka camps there was adequate food, an

16Kuzmin interview.
17Lebedeva interview.
18Wolin, p. 107.
19Kuzmin interview.
abundance of current professional literature and freedom to discuss and explore topics with fellow prisoners. Internes often lived in a single dwelling or compound where they also worked—usually laboratories were on the first floor with living area on the second level. They had no restrictions on communicating with each other so that comradery and scientific findings could be shared. The scientists' work lasted eight hours a day with one day off per week plus holidays. As for food, it was much better then in the rest of the GULAG. In fact, prison officials did not ration food. Prisoners spent their free time playing chess, volleyball, and basketball.

Sharashka populations varied among camps. Sharashka prisoners accounted for approximately five percent of all GULAG internes between 1937-1941. In contrast to the massive GULAG camps, Sharashka camps held as few as three or four scientists and technicians or as many as several thousand specialists. For example, the Sharashka where aircraft designer A.N. Tupolev worked housed over 3,000 technicians and specialists.

---

20 See Figure 2.1. Based on figures given during interviews with Lebedeva and Kuzmin.
21 Interview with Viktor Sokolski, February 17, 1993, Moscow, Russia.
Figure 2.1: Total GULAG and Sharashka Prisoner Population, 1937-1941

- Total GULAG
- Sharashka
Sharashka Administration

Sharashka prisoners faced less supervision and better living conditions than other Zeks. Sharashka camps had a separate Personnel Division, Administrative and Housekeeping Division, Medical and Sanitary Division, Veterinary Division, Housing Division, Transportation Division, Chief Bookkeeping Office and Finance Division. When scientific work had to be discussed with security officials, for example, the above divisions shared responsibility for the transport of the prisoner to the proper authorities and his return to the camp. An Operative Department provided research supervision over Sharashka prisoners. Overall, few police functions were required in these camps.

The Soviet security services provided scientists and technicians in Sharashka camps with many of their basic needs and more. Officials provided the prisoners with recent and foreign technical publications in several languages. Lev Kopelev, a former Sharashka prisoner, reflected:

"Everything was set up very simply. Professors, engineers with higher degrees, inventors—they're used to being spoiled. They get lots of money and special food rations.... In those circumstances one occasionally got the urge to live it up—in a restaurant with girls or at the dacha with one's legal spouse."

Prison officials even allowed the scientists and technicians to correspond with their closest relatives. Sharashka prisoners had the opportunity to send pay to love ones at home. Even family members visited their imprisoned relatives. Finally, the Sharashka camps had relatively few guards. In the 1930s, there was one guard for every ten people.


Kuzmin interview.

Kuzmin interview. Kuzmin, who worked on Sharashka and GULAG issues for ten years, provided the authors with many cites from regional archives.

Kopelev, p. 4.

Rossi, pp. 498-500.
prisoners. In general, fences did not surround Sharashka camps since in many rural locations there was no where to flee. Overall, the atmosphere in the Sharashki seemed free for pure academic thinking dedicated to the Soviet state; but the prisoners lacked the freedom of movement.

---

27 Kuzmin interview.
28 Some Russians and Germans argued that these arrangements actually made the academics happy since they now lived in "monasteries" dedicated to scientific research and discussion. Kuzmin and Lebedeva interviews.
3. POWS IN THE SHARASHKA CAMPS

Foreign POWs

Foreign POWs were forced to work in Sharashka camps. The purpose was to obtain military information that could be applied to Soviet tactics and strategy and contribute to the acceleration of the rate at which new technologies with military applications could be developed and applied. Within the Soviet leadership, the association between security chiefs Beria, Abakumov and Kruglov provided a tremendous opportunity for boosting Sharashka's role in the growth of Soviet defense industry after World War II.

NKVD officials directed the removal of technical specialists and industrial equipment from occupied Germany to the Soviet Union for use in Soviet industry.\(^{29}\) Foreign POWs in the Sharashka system were forced to provide the Soviet state with scientific data and other information that contributed to the production of weapons systems and a more complete understanding of foreign tactics and strategy. Soviet officials tapped German POWs for their knowledge of chemistry, physics, metallurgy, radar work and rockets. Security officials created a special prison and research institute for kidnapped German scientists and rocket specialists. Located on an island in the middle of Lake Seliger, the scientists assisted Soviet scientists in the creation of rocket technologies.\(^{30}\)

Foreigners contributed greatly to Soviet defense industry, including the Soviet nuclear weapons program. Soviet engineers designed anti-aircraft missiles and other anti-aircraft weapons based on data obtained from Germany POWs. Soviet documentation shows how information derived from German POWs captured during World War II permitted the Soviets to accelerate design programs and to derive a better understanding of American matériel, doctrine and strategy. The demand


\(^{30}\)Wolin, 23.
for data on materials and flight characteristics of foreign aircraft intensified as the Cold War progressed.

There is no reliable estimate of how many foreign POWs were exploited in this manner, nor is it possible to determine from extant data how many POWs were not repatriated from the Soviet Union. It is possible, however, to describe the structures of the organization whose task was to derive information from and recruit agents among foreign POWs.

**MVD POW and Internee Assessment Report**

Portions of a 1,000-page MVD POW and Internee Assessment Report obtained for this study contain a great deal of information concerning the exploitation of foreign POWs in Sharashka camps during and after World War II. Written in 1950, the Top Secret document, *Ob agenturno-operativnoi rabote s voennoplennymi i internirovannymi, zakhvachennymi v velikoi otechestvennoi voine sovetskogo naroda 1941-1945* (About Spies, Operative Work with POWs and Internees taken Prisoner During the Great Patriotic War of the Soviet People, 1941-1945), summarizes and assesses the methods and results of programs used to exploit foreign POWs on Soviet territory. Between 1945-1950, MVD officials had the responsibility for locating POWs who could work for Soviet defense industry. Several MVD administrative organs pursued this goal, viz, the 4th Special Department and the 9th Administration.

The exploitation of foreign POWs was centralized and tightly controlled. According to this MVD assessment, the MGB placed their own agents (usually German nationals referred to as "X") in POW camps. The agents were given the task to identify German prisoners with highly specialized scientific backgrounds in nuclear physics, aerodynamics and electronics. These agents reported back to the MVD and other security organs the presence of these individuals. The MVD then passed information to the USSR Council of Ministers. When a ministry—such as the USSR Aviation Machinebuilding Ministry, the USSR Metallurgy

---

31 The MGB and the MVD maintained detailed written records of all POWs who passed through the Sharashka camps. Beria helped to establish this system and it "recorded prisoner movements better than modern-day computers." Based on Kuzmin interview.
Industry, the USSR Electro-Industrial Ministry, the USSR Heavy Machinebuilding Ministry, the USSR Industrial Construction Materials Ministry and the USSR Chemical Machinebuilding Ministry, or any other organization--wanted to tap POW knowledge, the request first had to be directed to the USSR Council of Ministers. This body could authorize POWs to be put to work in: 1) their current location (RSFSR, Kazakhstan, Belarussia, or Ukraine) with specialized equipment; or 2) other camps near research centers and factories. The MVD would supervise the transfer of these prisoners to MVD republic or regional organs. (See Figure 3.1)\(^\text{32}\)

\(^{32}\)Ob'agenturno-operativnoi rabote s voennoplennymi i internirovannymi, zakhvatchennymi v velikoi otchestvennoi voine sovetskogo naroda 1941-1945 (About Spies, Operative Work with POWs and Internees taken Prisoner During the Great Patriotic War, 1941-1945) (Top Secret).
Figure 3.1: Organizational Chart of Sharashka POW Interaction with Soviet Bodies, 1945-1950

Do not reproduce or retransmit without permission of RAND
Chapter 11 of the MVD report, "Vyiavlenie vysokokvalifitsirovannykh spetsialistov i nauchnykh rabotnikov, ispolzovanie ikh v interesakh nashei strany" (Exposure of Highly Qualified Specialists and Scientific Workers and Uses of Them in the Interests of Our Country), is divided into three sections that analyze various contributions made by foreign POWs to Soviet industry. Section one, Organizatsionnye meropriitilia, vyrabotka form i metodov raboty (Organizational Measures, Manufacturing Content and Methods of Work), describes how MVD agents recruited German POWs for Soviet defense industry work. This section, which analyzes the aftermath of a 1945 NKVD order to search for POWs with backgrounds in chemistry, radiology, nuclear physics and electronics, also describes where the POWs worked and which ministries received their findings.

Section two, Poluchenie ot voennoplennykh i internirovannykh tekhnicheskih predlozhenii (About POWs and Internees of Technical Proposals), discusses the manner in which German POWs worked alongside the Soviets and reveals how institutions, ministries and factories could request the transfer of POWs through the USSR Council of Ministers.

The third section, Peredacha spetsialistov iz chusla voennoplennykh i internirovannykh v narodnoe khoziatstvo SSSR (Transmission of Specialties from a Number of POWs and Internees to the Peoples Economy of the USSR), assesses the contribution of German POWs to Soviet economic objectives. This section reiterates the degree to which German POWs assisted Soviet industry, the location of camps they worked in and which ministries requested their assistance. This section also gives a breakdown of areas of specialties for German POWs. For example, out of a total of 1,353 POWs who worked in Sharashka, thirty-one worked for the USSR Ministry of Defense. The third section, which gives an assessment of the German POW's work, asserts that while POWs contributed much to Soviet industry, much more information could be obtained.

The MVD concluded that foreign POWs should be exploited for specific purposes. The MVD system for exploiting foreign POWs focused on the following eight objectives.

- Obtaining tactical information from POWs for immediate use.
Recruitment of agents among German POWs whose task was to identify POWs who possessed scientific and specialized technical training.

Intelligence gathering on German military decisionmaking.

Work results from German, Japanese, Romanian, and Hungarian POW officers.

NKGD operative measures to exploit correspondence between POWs and their relatives in Austria, Hungary, Romania, Italy, Japan, Korea and Manchuria.

Exposure of intelligence agents among POWs.

Exposure of American and English intelligence activities against the USSR through POWs.

Methods for recruiting agents and double agents among POWs who would be activated after repatriation.

This was the organization and mission of the MVD when the Korean War broke out in 1950.

American POWs in Sharashka Camps?

The pattern of Soviet contact with American POWs in Korea points toward the conclusion that the MVD system for exploiting foreign POWs was extended to the Korean theater of combat operations. Thus far there is no direct evidence that American POWs were placed into Sharashka camps. Rumors of Americans in these camps originated from other foreign POWs in Soviet camps after World War II and during the Korean War. Recently, the U.S. Senate Select Committee on POW/MIA Affairs confirmed the transfer of American POWs to Soviet territory during the Korean War. One cannot exclude the possibility that Soviet intelligence organs transferred Americans to Sharashka camps.

Several articles in the Soviet and Russian press suggest that the Soviets may have taken Americans to the Soviet Union. For example, former Red Army Colonel Grigorii Dzhagarov revealed that he was part of a secret organization in Korea which hunted for the wreckage of U.S. aircraft and for downed pilots. Colonel Dzhagarov outlines how the Soviets took Americans from Korea to the Soviet Union to secret
interrogation sites in the USSR in order to extract military knowledge.\textsuperscript{33}

In December 1991, in Na Strazhe, Major Valerii Amirov, a military journalist from Sverdlovsk, is reported to have testified before the Russian Parliament subcommittee on POW/MIAs to the effect that he had interviewed a former KGB official in Kazakhstan who had been involved in the transportation of U.S. Korean War POWs to Kazakhstan. The Kazakh connection may have been related to the need for prisoner assessments of emerging technologies at the Saryshagan missile test site. Moreover, the use of pilots and their crews in Sharashka may have been part of this distribution of POWs throughout the Soviet empire. If Americans were transferred to Soviet territory, as the U.S. Senate Select Committee on POW-MIA Affairs and others assert,\textsuperscript{34} then security officials may have sent them to Sharashka camps in Western Siberia, the Far East, Kazakhstan, Ukraine or Belarus.

\textsuperscript{33}Interview Alpha. Alpha requested anonymity.

\textsuperscript{34}U.S. Congress. Senate. Select Committee on POW-MIA Affairs. 

4. THE PATTERN OF SOVIET CONTACT WITH AMERICAN POWS IN KOREA

The Motive for Soviet Contact with American POWs in Korea

The Soviet structure for exploiting foreign POWs described in the MVD assessment was intact and in operation on Soviet territory when the Korean War broke out. The pattern of Soviet contact with American POWs in Korea parallels the Soviet exploitation of German POWs during and after World War II. The pattern is also consistent with NKVD efforts to recruit agents among the French prisoners held at Tambov in 1944-46.

Soviet military forces and intelligence officers were present in Korea from the very beginning of the Korean War. The Soviet presence on the ground was multidimensional. The mission of the Soviet military was to derive lessons from combat operations, to advise and control North Korean and Chinese military units and acquire tactical-technical information directly from American POWs. The mission of the Soviet security organs in Korea was to assess American POWs for the purpose of recruiting agents. In support of these missions there was systematic, continuous contact between Soviet officers and American POWs. Soviet military intelligence (GRU) would have focused on the collection of tactical-technical information, primarily information associated with air operations and anti-aircraft weapons and strategy.

Soviet intelligence gathering operations focused on the characteristics of aircraft, notably the F-86 and B-29, and technical information concerning systems such as radar-directed gun sights, bomb sights and other components. Since the Korean War occurred during the time when the U.S. declared policy was massive retaliation, the Communist forces had reason to believe that U.S. tactics in Korea might be repeated in the skies above Moscow and Beijing. The dismal performance of Soviet-made aircraft and anti-aircraft systems early in the war caused consternation among the Soviet design bureaus and intelligence collection agencies. The Korean War provided an excellent opportunity to experiment with new designs as well as to learn about the
details of U.S. systems by studying the hardware and the people who operated it.

KGB Recruitment Efforts Among Korean War Prisoners

There is no doubt that Soviet forces were on the ground prepared to interrogate and recruit POWs from the opening days of the Korean War. George Blake, a British SIS officer serving in Seoul under diplomatic cover at the British representation, was captured in the opening days of the North Korean invasion. Blake asserts in his memoirs that he was not recruited by Soviet intelligence; rather, "I joined because of [the Communist] ideals."35 The picture is probably more complex than Blake's version of events. A KGB source familiar with Blake's operational file said that the North Koreans and Chinese contributed to the recruitment process by identifying Blake as a prisoner who appeared to be "soft" or potentially susceptible to recruitment. Resident KGB officers mounted recruitment efforts on North Korean territory. Other operations were staged in North Korea by KGB officers resident on Soviet territory. Blake supported the idea that the KGB was screening and recruiting American POWs. In Blake's view, "There must have been others beyond the officer who recruited me. I was recruited by the head of the First Directorate (Intelligence) of the KGB in Vladivostok.36"

The record shows that efforts were made to recruit American POWs. Soviet intelligence wanted to recruit agents among the westerners captured in Korea. There may have been some successes. In May 1953 the Army determined that "twenty-three individuals having been initially screened by FECOM as having accepted Communist ideological indoctrination to some degree were sent to Valley Forge Army Hospital. All are members of the Army."37 Five of the individuals had been tentatively identified as "hard core" communists and thirteen as "having accepted Communist ideology in some small degree."

35George Blake, No Other Choice (New York: Simon and Schuster, 1990), 134.
36Interview with George Blake, February 11, 1993, Moscow.
37Memorandum to Lt. Colonel F. W. O'Brien, Assistant Secretary General Staff (Confidential Security Information) from Colonel James L. Frink Jr., Executive, Pers Actions Br., G-1 May 15, 1953. RG319 (Army Staff) AC of S, G-1 (Personnel) Decimal File 1953 383.6 Box 1512.
Army G2 analyses of repatriated American POWs turned up an alarming number of cases of returning POWs who had been recruited for espionage and sabotage purposes. In June 1954 the U.S. Army advised the Air Force that

"... evidence had been uncovered which concerned the assignment of Sabotage and Espionage missions to repatriated American prisoners of war during "Big and Little Switch," and that quite recently new cases of this type have been discovered."

Army intelligence could not rule out the possibility that POWs had accepted "sleeper" missions, thus repatriated POWs were not permitted to accept overseas assignments for eighteen months after their return.

Other Soviet Contact with American POWs

Neither the Soviet nor the Russian government has ever admitted that Soviet forces had direct contact with American POWs during the Korean War. Contradictory versions of the same story are often told by the same Soviet sources. The difficulty today is how to sift through the layers of official lies in order to get at the reality of Soviet conduct in Korea.

The Soviet military maintained liaison officers in North Korea whose mission was to participate in the interrogation of USAF POWs. Caucasian (possibly Soviet) interrogators generally were found at intermediary interrogation sites such as command posts, artillery and anti-aircraft battalions, where the prisoner temporarily was held. Presumably, they were there as military advisors to the North Koreans and performed a few interrogations out of curiosity or perhaps expediency. Chinese- and Korean-looking individuals who interrogated Americans may not have necessarily been nationals of China or Korea, particularly later in the war.

In the beginning of the Korean War there was a shortage of Soviet intelligence officers (KGB and GRU) other than Caucasians trained in the

---

38 Memorandum to Assistant Chief of Staff, G-2 Intelligence, Department of the Army (Secret) from Gilbert R. Levy, Chief, Counter Intelligence Division, Directorate of Special Investigations, The Inspector General, Department of the Air Force, June 14, 1954.
English language. As the war progressed, a more clandestine Soviet presence was established as racially compatible Soviet officers mingled in North Korea with similar looking Chinese and Korean interrogators. This is one explanation why repatriated American POWs reported that contact with Caucasian interrogators occurred only sporadically after approximately mid-1951. The Soviets continued to have systematic, direct contact with American POWs, but it was impossible for American POWs to detect the true nationality of these individuals due to the deception.

The Soviet presence was not limited to ground forces or anti-aircraft units. Eyewitness testimony and intelligence service documentation reveals a significant Soviet presence on the ground in North Korea and in the air during the war. Contacts between Russians and American servicemen were reported in the open press as early as 1950. U.S. Army personnel who returned to friendly lines after being captured in 1950 reported they were "questioned at three places by Russian officers in North Korean uniforms."40

The presence on Korean territory of Russians and those suspected of being Russians was confirmed when in a few scattered instances returnees claimed to have been interrogated by persons whom they thought to be Russians. Retired Soviet Army Colonel Gavriil Korotkov, who was stationed in Khabarovsk from 1950-54, reported directly to the Commander of the Soviet Far East Military District concerning his contact with American POWs. Korotkov told Army Task Force Russia (TFR) investigators that "Soviet military specialists had been given approval to interrogate American servicemen in Korea and that some of the senior, more experienced Americans as well as those with specific specialties were selected for transfer to the USSR for further interrogation."41 Korotkov told TFR that hundreds of Americans were sent to Khabarovsk for Posyet. Interrogation reports were forwarded to the Far East Military District Headquarters, the 7th Directorate of the Main Political Directorate and the GRU. In subsequent interviews Korotkov

41 POW/MIA's, p. 433
modified his original statement to the effect that no Americans were transferred to the territory. Though Korotkov told RAND researchers that he had not been pressured into changing his story, Task Force Russia researchers concluded that intense pressure was focused on Korotkov to alter his story to conform to the official line. Korotkov said that the interrogation facility was located along the "undemarcated" Soviet-North Korean border thus it was more appropriate to refer to the location of the interrogations as the "Far East." No repatriates reported being interrogated by Russians outside of China or North Korea. Thus Korotkov raised the question of what happened to the Americans who were interrogated on the territory of the USSR in the "Far East."

Soviet Interrogation of American POWs

When American POWs were interrogated in Korea it was not unusual for a summary of the information collected to be prepared in writing. In the cases where Chinese or North Koreans conducted the interrogations, a copy of the material was given to Soviet translators who would prepare a copy in Russian that would routinely be forwarded to Corps Headquarters as well as the General Staff Headquarters in Moscow.

Five complete POW interrogation protocols and fragments of six others were obtained from archival sources in Russia. Each protocol appears to be the summary of one or more interrogation sessions with a single U.S. Air Force POW who was interrogated during the Korean War. The information in the RAND protocols is straightforward. There are no lurid details of torture or anything of the sort. In some cases answers to questions on what appears to be a form are recorded in handwriting. In others the information is more freewheeling including sketches of combat or diagrams of mechanical devices.

The format of the protocols tells a great deal. The protocols appear to be from two separate collections. One group of documents was bound with string through two holes in the left hand margin. Others show as many as four holes through which binding string is passed. The documents are paginated in two different ways. The first is the

---

Interview with Gavriil Korotkov, February 10, 1993, Moscow.
The second is the pagination for the series in which the document was placed. One document, for example, is numbered 1-45 from the series 101-148. In the lower left hand corner of the transmittal letter and the final page there is a number that shows the document's registration number representing the series in which it was produced. A protocol from January 29, 1952 is number 314, one from February 24, 1952 is number 450, another from February 24, 1952 is number 451. The routing list shows that copies went to the headquarters of the 64th Air Corps in addition to the General Staff in Moscow.

The fact that the interrogations show a series number of 451 suggests that there were at least 451 or more interrogations in this collection. During the entire Korean War, 1,303 USAF were declared missing in all categories. Of these, 263 USAF personnel were officially listed as POWs. There is considerable evidence that Soviet officers and interrogators had direct contact with USAF personnel who were not subsequently listed as an official POW. If there are 451 or more interrogation protocols that deal exclusively with American Air Force POWs, then this suggests two alternatives. Either more interrogations were made of individuals who died of wounds in captivity shortly after capture, or individuals who were interrogated by Soviet officers were transported to the territory of the USSR to mask the fact that direct interrogations by Soviet officers had taken place.

The transmittal memos for the interrogation records reveal data concerning distribution routes, protocol organization, and the document's contents. The cover sheet, in the lower left corner, contains information on the number of copies and where they were routed by date. Dates for the interrogation protocols reveal that the reports moved quickly from field to headquarters—usually several weeks because of their usefulness in assessing American technology. For example, the protocols show that the Soviet Air Force 64th Air Corps, located at Muk Den, China, sent the interrogations directly to the Soviet General Staff in Moscow. A stamp appears at the bottom of the coversheet to confirm its registration at the Soviet General Staff. Also, handwriting on the cover gives routing destinations and acknowledgment of receipt. Second, the cover sheet provides evidence that interrogation protocols are.

Do not reproduce or retransmit without permission of RAND
numbered in three key ways. For instance, each interrogation protocol has its own numbering system in the upper middle part of each page. This number gives the reader information on how many pages are in the interrogation (i.e. 1, 2, 3...). Another set of numbers appears in the upper right corner. These sequential numbers reveal that the documents were kept in a large binder numbering several hundred pages (i.e. 124, 125, 126...). A third set of numbers next to the interrogation date, located in the lower left corner, apparently indicates where a protocol might fit into a larger series of interrogations.\(^3\) Finally, a summary of the document's contents appears on the coversheet. The contents list consist of four or five topics of interest to the Soviet General Staff and the security services.

One of the interrogation protocols concerns an individual, Captain Charles E. McDonough, who did not return alive from Korea. McDonough lived long enough after capture to be interrogated by Communist Chinese forces.\(^4\) A fellow prisoner, Captain Hamilton B. Shawe, described to USAF investigators that McDonough told him he had been burned and lost his flying boots after being shot down by MiGs. McDonough wandered for three or four days without any shoes and suffered severe frostbite that reached from his feet to his knees. After turning himself in, McDonough was interrogated and moved from a hospital to a prison near Sinuiji. On December 16, McDonough was placed on an ox cart by the North Koreans, allegedly to be moved to a hospital. He was never seen alive again.

Since McDonough was a crew member of one of America's most sophisticated reconnaissance aircraft, the RB-45, Soviet forces would have been interested in obtaining information from him.

These documents may represent a link between American POWs and Shushashka camps. Interrogation protocols contain pertinent information

\(^3\) The Stahl interrogation suggests that there were at least 423 interrogations in the series from which this one was taken. See the cover sheet of Material: Doprosa plennogo letchika F-86e 16.

\(^4\) A fragment of an interrogation protocol of Charles E. McDonough (USAF AO-794558) was sent to the author of this study by Jeanne McDonough Dear on February 12, 1993. McDonough, who was shot down on December 4, 1950 on an RB-45 mission, is carried on the Battle Monuments Commission list of 8,177. A note at the end of McDonough's protocol states, "Kuznetsov prepared the questions. A Chinese comrade translated from English."
that could have been used by scientists and technicians in the Sharashki. However, what is missing is the actual link between the Soviet General Staff, MVD headquarters, and the Sharashki themselves. How did information filter to the camps after Moscow read the interrogations? Furthermore, not one of the documents either confirms or denies that American POWs traveled to a Sharashka facility. The presence of interrogation records in the post-Soviet archives suggests that more may be found in the archives. Assessment reports must exist on how American POWs provided information similar to the assessment report from WWII. Moreover, reports of POW contributions may exist in ministerial archives. These have yet to be unearthed.
5. STRATEGY FOR FURTHER RESEARCH

The Availability of Archive Material

Sharashka materials are located, for the most part, in the Kremlin Archive, KGB and MVD files. The Kremlin Archive's Special Files, for instance, contain the most sensitive files of the Communist Party and KGB leadership holds classified KGB and NKVD memos on the use of POWs in the GULAG and Sharashka between 1940-1953. Sharashka materials could probably be found in the KGB Central Archive under the files for the OGPU, the NKVD, and the MGB. Moreover, the MVD has its own set of archives which would contain references to Sharashka. But the exact location of these materials is unknown. Some other archives may contain references to GULAG and Sharashka. For example, the Russian State Archive contains all holdings related to the GULAG prison system. But there are no references to Sharashka in any indexes at this archive. Many Russian archivists pointed out that Sharashka files would not be kept in a state archive because the Soviets considered defense and security work classified.

Declassification remains a key obstacle to any quick access to records in the post-Soviet archives. Little movement can be expected on declassification from the defense and former KGB and current MVD lobbies since they seek to protect their interests. The first law of 1981 still, theoretically, applies. According to this law, all archive materials more than 30 years old is declassified. But this law has little current meaning. Thus, as of February 1993, declassification is still arbitrary in Moscow. The Russian government has accommodated the

---

45Interview with Sergei Mironenko, Chief of the Russian State Archive, February 11, 1993, Moscow, Russia. Thus far, Sharashka files have been located in the MVD and KGB archives but not in the Russian State Archive.


47Mironenko interview.
security services by placing further limits to archival access from the Soviet period. As yet, there is still no law on state secrets and thus it is unclear how these documents can be released. Russian legislators and security officials have embroiled the declassification issue in legal and constitutional debates over access and secrecy. For two years, the Russian Supreme Soviet has been debating the merits of a draft law on declassifying materials including those on Sharashka.48

Access to Sharashka Materials

Westerners face an extraordinary hard time trying to access and verify Sharashka materials. Russian archive officials limit access to their archive holdings or deny that they have any information on Sharashka or other aspects of missing Americans in the Soviet Union. Many are more than willing to pursue the subject if they are offered thousands of dollars, computers and photocopier equipment. Other sources of primary source evidence, such as interviews with individuals with first-hand knowledge and experience with Sharashka issues, can lead to frustration and aggravation. Older Russians simply do not want to talk about the subject because they feel that it is too sensitive of an issue to discuss.

If the Sharashka camps were the ultimate destination for American personnel transferred from the Korean theater of operations, there is a possibility that evidence to this effect has been collected and destroyed by Russian officials. Evidence that links Americans to the Sharashka would contradict long-standing Soviet and Russian denials that Americans were transferred from Korea to the USSR. A further complication derives from the possibility that American specialists who defected or were coerced into coming to the USSR during the Cold War participated in Sharashka research. The possibility cannot be excluded that Americans, if they went to the USSR voluntarily and worked in Sharashka, are still alive. If this is the case, the Russian security services have probably taken measures to protect the identity of these individuals. This would include destruction of archive materials.

48Mironenko interview.
6. CONCLUSION

The pattern of contact between Soviet forces and American personnel in Korea is consistent with the activities of the MVD-NKVD structures that exploited foreign POWs during and after World War II. American personnel fit the profile of individuals the MVD-NKVD sought to exploit during the Korean War. The Senate Select Committee on POW-MIAs and the U.S.-Russian Joint Commission on POW-MIAs have both concluded that a small number of Americans (at most two or three dozen) were transferred to the territory of the USSR from the Korean theater of combat operations. The Sharashka camp system was designed to extract information from foreign specialists, including foreign POWs. The question of whether American personnel were incarcerated in or participated willingly in Sharashka research facilities cannot be resolved until the relevant records are examined. Until then, the possibility cannot be excluded that the Sharashka camps were the link between American personnel taken from Korea to the territory of the USSR.
Appendix

A. PROBABLE LOCATION AND ACTIVITY OF SHARASHKA CAMPS IN FORMER SOVIET EMPIRE*

<table>
<thead>
<tr>
<th>Former Republic</th>
<th>Location</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>Razdan</td>
<td>Radio electronic equipment</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>Baku</td>
<td>Radio communications equipment</td>
</tr>
<tr>
<td>Belarus</td>
<td>Gomel</td>
<td>Radar systems</td>
</tr>
<tr>
<td></td>
<td>Minsk</td>
<td>Nuclear technology</td>
</tr>
<tr>
<td></td>
<td>Minsk</td>
<td>Optical equipment</td>
</tr>
<tr>
<td></td>
<td>Minsk</td>
<td>Radio communications equipment</td>
</tr>
<tr>
<td></td>
<td>Vitebsk</td>
<td>Radio communications equipment</td>
</tr>
<tr>
<td>Georgia</td>
<td>Sukhumi</td>
<td>Nuclear research</td>
</tr>
<tr>
<td></td>
<td>Tbilisi</td>
<td>Combat aircraft</td>
</tr>
<tr>
<td></td>
<td>Tbilisi</td>
<td>Nuclear research</td>
</tr>
<tr>
<td></td>
<td>Tbilisi</td>
<td>Radio communication equipment</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Alma-Ata</td>
<td>Radio communication equipment</td>
</tr>
<tr>
<td></td>
<td>Petropavlovsk</td>
<td>Missile transport and launchers*</td>
</tr>
<tr>
<td></td>
<td>Semipalatinsk</td>
<td>Nuclear weapons research</td>
</tr>
<tr>
<td></td>
<td>Uralsk</td>
<td>Machine Guns</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>Bishkek</td>
<td>Munitions</td>
</tr>
<tr>
<td>Moldova</td>
<td>Kishinev</td>
<td>Electronic radio equipment</td>
</tr>
<tr>
<td>Russia</td>
<td>Kazan, Tatarstan</td>
<td>Strategic bombers,*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>helicopters,*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>missiles,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>rocket engines,*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>optical equipment,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>radio-communications equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Naval vessels</td>
</tr>
<tr>
<td>Ukraine</td>
<td>Zelenodolsk, Tatarstan</td>
<td>Nuclear materials</td>
</tr>
<tr>
<td></td>
<td>Glazov, Udmurtiya</td>
<td>Armor vehicles</td>
</tr>
<tr>
<td></td>
<td>Izhevsk, Udmurtiya</td>
<td>Infantry weapons</td>
</tr>
<tr>
<td></td>
<td>Izhevsk, Udmurtiya</td>
<td>Strategic missiles</td>
</tr>
<tr>
<td></td>
<td>Votkisk, Udmurtiya</td>
<td>Helicopters*</td>
</tr>
<tr>
<td></td>
<td>Kemertau, Bashkiriya</td>
<td>Optical equipment</td>
</tr>
<tr>
<td></td>
<td>Salavat, Bashkiriya</td>
<td>Communications equipment</td>
</tr>
<tr>
<td></td>
<td>Ufa, Bashkiriya</td>
<td>Engines*</td>
</tr>
<tr>
<td></td>
<td>Ufa, Bashkiriya</td>
<td>Optical equipment</td>
</tr>
<tr>
<td></td>
<td>Chernovitsa</td>
<td>Radar systems</td>
</tr>
<tr>
<td></td>
<td>Dnepropetrovsk</td>
<td>Strategic missiles</td>
</tr>
<tr>
<td></td>
<td>Dnepropetrovsk</td>
<td>Naval ships</td>
</tr>
<tr>
<td></td>
<td>Feodosiya</td>
<td></td>
</tr>
</tbody>
</table>

Do not reproduce or retransmit without permission of RAND
<table>
<thead>
<tr>
<th>Location</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Izyum</td>
<td>Optical equipment</td>
</tr>
<tr>
<td>Kharkov</td>
<td>Tanks</td>
</tr>
<tr>
<td>Kharkov</td>
<td>Transport aircraft*</td>
</tr>
<tr>
<td>Kherson</td>
<td>Naval ships</td>
</tr>
<tr>
<td>Kiev</td>
<td>Artillery and infantry weapons</td>
</tr>
<tr>
<td>Kiev</td>
<td>Communications equipment</td>
</tr>
<tr>
<td>Kiev</td>
<td>Optical equipment</td>
</tr>
<tr>
<td>Kiev</td>
<td>Radar systems</td>
</tr>
<tr>
<td>Lugansk</td>
<td>Transport aircraft*</td>
</tr>
<tr>
<td>Lvov</td>
<td>Lasers</td>
</tr>
<tr>
<td>Nikolaev</td>
<td>Naval ships</td>
</tr>
<tr>
<td>Pavlograd</td>
<td>Strategic missiles</td>
</tr>
<tr>
<td>Sevastopol</td>
<td>Naval ships</td>
</tr>
<tr>
<td>Zaporozhe</td>
<td>Communications equipment</td>
</tr>
<tr>
<td>Zaporozhe</td>
<td>Engines*</td>
</tr>
<tr>
<td>Tashkent</td>
<td>Radio communication equipment</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td></td>
</tr>
</tbody>
</table>

*Highlights industry where American POW interrogations might have helped Soviet defense industry*