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# AIR FORCE

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US C-5s flew secretly into central Asia to bring out a vulnerable stockpile of weapons-grade uranium.

## Project Sapphire

By John A. Tirpak, Senior Editor

During the Persian Gulf War, US officials worried that Iraq might have succeeded in processing a few tens of grams of uranium into nuclear weapons-grade material—enough to make a single low-yield bomb. Later, the CIA became alarmed that North Korea had generated enough nuclear material for two or three bombs.

Imagine, then, the shock to the US government when it learned in fall 1993 that roughly 600 kilograms of highly enriched uranium (HEU)—almost pure U-235, much of it directly applicable to weapons—was sitting in an ill-protected facility at Ust-Kamenogorsk in Kazakhstan. This was more than half a ton of fissile material. To someone with even limited knowledge of atomic bomb-making, it would be enough for twenty weapons. A skilled bomb-maker would be able to produce fifty.

Kazakhstan's revelation, made secretly to the US, seemed to signal that the nightmare age of "loose nukes" truly had arrived. Ever since the dissolution of the Soviet Union, the West had feared that poorly protected nuclear materials from the Soviet arsenal would reach the hands of black marketeers and then those of terrorists or hostile powers. The stockpile in Kazakhstan suddenly made these fears palpable.

Thus began more than a year of intense cooperation to stave off that nightmare and prevent a nuclear catastrophe. From the beginning, the US Air Force was deeply involved in the operation, code-named "Sapphire."

Kazakh authorities discovered the enriched uranium in the Ulba Metallurgical Facility in Ust-Kamenogorsk in 1992 while they were assessing the nuclear legacy left on their soil by the fallen Communist regime in Moscow.

### Kept in the Dark

The Ulba facility was located in a "closed city" because of the highly sensitive work done there. Even local authorities had been kept in the dark about the plant. They could only speculate about the extent of dangerous nuclear testing that had been going on in their

back yard. These nuclear tests, performed with few or no safeguards, had produced terrible environmental and health consequences over the previous forty years.

Once inside the Ulba plant, Kazakh officials discovered about 2,000 tons of radioactive material. They found within this stockpile the 600 kilograms of HEU, which was contained in a beryllium alloy. Soviet scientists had intended to use it in a research reactor dedicated to development of new Soviet naval nuclear propulsion systems, a project abandoned when the USSR dissolved.

When the Kazakhstan government understood what it had, it quickly realized that it could not care for it properly. "They wanted to be responsible about it," said Jeffrey M. Starr, the Pentagon's principal director for Threat Reduction Policy. "They didn't want to sell to aspiring nuclear states."

He added that the Kazakhs "did what they could" to secure the facility with locks, gates, and militiamen with dogs, "but they knew it wasn't enough." Whereas such measures might have been "reasonable by the standards of forty years ago," said Mr. Starr, they likely could not stand up to a dedicated assault by a modern terrorist team or even well-armed thugs from organized crime. Despite their good intentions, the cash-poor Kazakhs lacked the resources to protect the material in the long run.

"There were threats" to the security of the material, Mr. Starr said. "We found it to be vulnerable."

He explained that there was "information to suggest that Iran was aware of the Ulba facility." Unconfirmed reports have alleged that Iranian operatives attempted to contact Kazakh officials about possible sale of the material.

The Kazakhs "knew the interest was not limited to just the Iranians," Mr. Starr added. As knowledge about the uranium spread, it would inevitably come to the attention of terrorists, who might find it an irresistible target.

Kazakhstan's revelation of the existence of the Ulba material—as well as an urgent request for assistance in either caring for it or disposing of it—came quietly to William H. Courtney, the US Ambassador to Kazakhstan. He passed on the request to Washington.

Soon, the United States dispatched a specialist from the Department of Energy's Oak Ridge, Tenn., nuclear storage and processing facility to assay the material and determine "just what we were talking about," Mr. Starr said. The visit was not hard to keep under wraps; there already was a good deal of traffic from the US to Kazakhstan relating to the Strategic Arms Reduction Treaty and various programs to dismantle old Soviet weapons.

The DoE specialist returned after a couple of weeks. With him came protected samples of the HEU, transported by diplomatic pouch to prevent the scrutiny of US Customs officers and others without a "need to know."

Based on the specialist's assay and reports, the National Security Council (NSC) determined that the Department of Defense should

take the lead in a coordinated effort—with the Departments of State and Energy—to secure the fissile material and, if necessary, remove it to a safe storage site in the US. Mr. Starr was appointed to head a "tiger team" to accomplish the mission.

### **Phoenix and Sapphire**

Given the extreme sensitivity and danger of the situation, tight security was clamped on what the Pentagon first code-named "Project Phoenix." Eventually, the project would be known as "Sapphire"—its State Department code name.

The team initially considered keeping the material where it was, only with tighter security. This option was quickly rejected because of the huge investment required to beef up security at Ulba. This step would also have required routine infusions of upkeep money because the Kazakhs simply could not afford to pay the high price for it. Besides, Mr. Starr noted, "there would always be some [US] uncertainty about how secure it was."

US officials determined that the material could be easily accommodated at DoE's Oak Ridge facility, where it would represent a relatively small fraction of the total stockpile of nuclear materials already stored there. The Y-12 facility had just been certified by the International Atomic Energy Agency as "safe" for storage of large quantities of nuclear material.

In the end, the NSC decided to bring the material out of Kazakhstan, a conclusion with which Kazakhstan quickly agreed. The nations further decided that, in order to ensure that the project would have a low profile, no negotiating teams would shuttle between Washington, D. C., and Almaty, the Kazakh capital. All negotiations were to be carried out quietly, using embassy personnel.

By February 1994, the project was well advanced. Officials in Washington and Kazakhstan concluded that it was time to consult with Russia because Russia had inherited virtually all the nuclear facilities and weapons of the Soviet Union and might lay claim to the uranium. Moreover, Russian cooperation—however tacit—was an absolute requirement. Any airlift mission to remove the material would have to cross Russian airspace. As Mr. Starr put it, a covert operation that kept Russia in the dark "was out of the question."

### **Low-Level Shakedown**

Initial contacts with Russian authorities led many in the US government to believe that the Ulba material had been forgotten. A low-level official at Minatom, the Russian atomic energy agency, asked for a "cut" of whatever revenue the Kazakhs might get from the transfer. "We thought maybe these were not the right people to ask," Mr. Starr said of the response.

As a result, the US took further steps to ensure that Russians at high levels were aware of the impending transfer "in generic terms," Mr. Starr said. Vice President Al Gore wrote to Russian Prime Minister Victor Chernomyrdin explaining that the US had been contacted by Kazakhstan and had been "asked to assist in the safekeeping" of the nuclear material.

The letter was carefully worded to make it clear "we were not asking permission," said one Pentagon official. Russia, he explained, "would have no veto power."

In addition to these rather awkward communications, Kazakhstan President Nursultan Nazarbayev simply picked up his phone and called Russian President Boris Yeltsin to explain what was in the offing. Mr. Yeltsin assured him that Russia would not interfere.

Still, alerting the Russian authorities carried some risk. Corruption in post-Soviet Russia had reached such heights that US officials worried that information about the impending transfer might be sold to precisely the people both Kazakhstan and the US wanted to keep in the dark.

The two sides developed a plan for the transfer. First, the uranium had to be put into a transportable form. Though it was already in some 1,000 canisters and 6,000 sample bottles, it was still in a corrosive, "wet" form. Technicians had to remove the material from the containers, then "bake" and "dry" it to remove water and oils so that they could work with it.

Next, the material had to be placed in special metal containers—about the size of a spray-paint can—which in turn would be put into canisters the size of a fifty-five gallon drum. Finally, the drums would have to be transported to the local airport, loaded aboard aircraft, and flown to the United States.

At every step of the process, danger loomed. The drums made the uranium safe to handle; the containers could survive an airplane crash without breaking apart. But that also meant that no special equipment was needed to move it—or to steal it. Once in the canisters, the uranium could be handled by anybody. Security would have to be tight on where the material would be and when it would move.

The US recruited a team of thirty-two volunteers for the processing and "recontainerization" phase. Of them, twenty-seven were technicians at Oak Ridge, four were Russian linguists from the US On-Site Inspection Agency, and one was a physician.

"We had no trouble getting volunteers," Mr. Starr said. "They recognized that this was important work."

The team, led by Alex Riedy, an Oak Ridge technician, put together a transportable, collapsible processing facility the size of a three-car garage. Team members practiced dry runs and emergency drills with it throughout the summer of 1994.

In August, an assessment team traveled to Ust'Kamenogorsk to determine if the local airfield could accommodate Air Force C-5 Galaxy airlifters, which would be needed to transport the necessary people to and from Kazakhstan.

#### **" Things to Consider"**

Meanwhile, USAF officials summoned Lt. Col. Mike Foster, operations officer of the 9th Airlift Squadron, Dover AFB, Del., to Air Mobility Command headquarters for a classified briefing. Colonel Foster and a handpicked loadmaster went to the Tanker Airlift Control Center at Scott AFB, Ill., where they received a top-secret

briefing on the mission and were instructed to develop a list of "things to consider" that would affect the success of the operation.

Number one on the list was weather.

If there were ice, Colonel Foster wondered, would the runway be long enough? Would there be adequate deicing equipment at the field? How would they get permission to fly through the airspace of other countries to get in and out of Kazakhstan? The leaders of Project Sapphire hadn't thought of some of these questions, but Colonel Foster got in touch with the US military attaché in Kazakhstan, Lt. Col. Dan Perry, for the answers. None of the problems posed an insurmountable barrier to the operation.

In September, US security officials drafted a top-secret presidential order authorizing American personnel to initiate Project Sapphire and go into Kazakhstan to bring out the half-ton of HEU for ultimate disposition at Oak Ridge's Y-12 facility.

Carrying out the proper consultations and providing necessary assurances took some time. The presidential order was not issued until October 7, and Project Sapphire got under way in earnest.

Colonel Foster, leading a flight of three C-5Bs, launched from Dover AFB on October 8. One of the enormous Galaxys carried support crews, offloading equipment, and a detachment of Air Force Security Police personnel. The others carried DoE's processing plant, the Oak Ridge team, the ovens to bake the uranium, and the 1,400 containers to hold it. Aboard all aircraft were USAF pilots fluent in Russian.

The flight path taken into and out of Kazakhstan remains a secret; nations that permitted overflights are still sensitive about publicly acknowledging their cooperation with the United States in the venture. For their help, said Mr. Starr, these countries received nothing more than "the hearty thanks of the US government."

The 8,000-foot runway at Ust-Kamenogorsk was "like a bucking bronco," Colonel Foster reported. Though it was not up to Western standards, the runway proved adequate for the huge transports. The C-5s landed and unloaded without mishap and headed home the following day, thus completing the first phase of the Air Force operation.

### **Sliding Toward Winter**

Next came phase two: preparing the uranium and hauling it out of Kazakhstan on another C-5 flight. The lateness of the presidential order threatened to turn Colonel Foster's worst-case scenario into reality. The departure time—originally set for November 1, to beat the arrival of winter—was slipping into mid- to late November, when the bitterly cold weather could seriously imperil the extraction mission. Snow removal capabilities at the field were "not great," Mr. Starr admitted.

Finally, a week before Thanksgiving, technicians completed the processing of the uranium and packed it into the canisters. Colonel Foster and his team began the second flight to Kazakhstan.

The weather had turned very bad. In its first attempt, the C-5 group



had to turn back because of blizzard conditions along the way. On a later try, only the first of the four aircraft that were launched actually made it to Kazakhstan. The others had to divert to other bases. Visibility and runway conditions were below minimums. The first airplane, however, landed at 4:00 a.m. At the same moment, a convoy of trucks set out from the Ulba facility on the eighteen-mile trip to the airport. On board the trucks were the uranium-filled canisters, the DoE team, militiamen, police, and Special Forces from the Kazakh Army.

Originally, there was to be only one convoy, to capitalize on the element of surprise should bandits attempt to waylay the shipment. Because a second C-5 had not made it through to the airfield, however, officials decided to break the shipment up into two convoys. The second convoy would stay put until the arrival of another C-5 airplane.

Along the route to the airport, all roads were closed and every available light was turned on to illuminate the path.

### **The Loadout**

With the convoy en route, the C-5 crew unloaded 40,000 pounds of relief items collected by families and friends of the Oak Ridge team in the US for donation to local orphanages. This humanitarian shipment was possible because the C-5s hadn't been modified for the mission; the canisters made it possible to handle the uranium like any other cargo. Even so, when the convoy arrived, crew members exercised extra care, and the loading took several hours. Security Police ringed the operation side by side with Kazakh Special Forces personnel.

USAF team members wore dosimeters, made periodic checks of radiation levels, and looked for any damage that might have been done to the canisters during loading. They found not a scratch.

Meanwhile, Kazakh workers cleared the runway with a novel device—a truck-mounted jet engine, which literally blew ice and snow off the hard surfaces. "We laughed, but it worked," said Colonel Foster.

As the first aircraft finished loading, the second arrived, and the second convoy set out from the Ulba complex.

The first C-5 prepared to launch and head home. The weather was worse than Colonel Foster could have imagined. The airfield was pummeled by sleet, ice, and rain, but the runway was usable, and the Galaxy had no difficulty getting airborne. The flight home took twenty hours and required five air refuelings. On the way, said Colonel Foster, "we were sitting there in the cockpit, writing Tom Clancy novels in our heads about what would happen if we had to go down."

Fortunately, the flight proved uneventful, and all the aircraft arrived at Dover AFB with crews and cargo intact. There, the material was loaded on unmarked Department of Energy tractor-trailers and sent by varying routes to Oak Ridge's Y-12 facility, where it was to be blended into low-enriched form and used as source material in commercial nuclear power plants.

The value of this material is hard to estimate, but it certainly is far less than the billions of dollars Kazakhstan could have reaped had it chosen to sell the HEU on the black market. That nation will receive a cash grant and US aid to help clean up the problems created by Soviet nuclear operations there.

Once the material arrived at Oak Ridge and was safely stored at Y-12, Washington finally let the world in on the story. Defense Secretary William J. Perry, Secretary of State Warren M. Christopher, and Energy Secretary Hazel R. O'Leary issued a sketchy joint statement announcing the unprecedented venture.

The mission, said Secretary Perry, had succeeded in putting the bomb-grade material "forever out of the reach of . . . black marketeers, terrorists, or a new nuclear regime." The Sapphire team "not only completed a highly complex, sensitive mission with great success, they have done a great deal to make the world safer from nuclear danger."

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