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Four Munitions Demilitarization Facilities Identified in USSR (S)

A Research Paper

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*IA 84-10069
September 1984*

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**Four Munitions
Demilitarization Facilities
Identified in USSR (S)**

Summary

*Information available
as of 1 April 1984 was
used in this report.*

We believe that four previously unidentified facilities located in the western USSR are probably used for the demilitarization—disassembly, destruction, and disposal—of solid-propellant munitions. The four facilities—located near Faustovo, Irsha, Kirov, and Nizhnyaya Salda—are very similar in design, and were all constructed in the mid-to-late 1970s. We believe that their construction was necessitated by a growing requirement to dispose of deteriorating solid-propellant munitions.

Munitions containing solid propellants are widely deployed in the USSR, and many are produced in large quantities. Because solid propellants deteriorate over time, such munitions have a more limited service lifetime than most other types of munitions. Some of the solid-propellant munitions deployed in the USSR are due or past due for disposal or refurbishment, and more will require such treatment in the future. We believe that these four facilities are used for such disposal. Comparison of the sites with a Soviet facility known to refurbish ground forces munitions indicates that while some refurbishment may be conducted at these sites, it is probably not their primary function.

The presence at two of the four sites of what we believe are system-specific missile canisters and missile canister transporters indicates that the facilities are primarily associated with tactical surface-to-air missiles, and may be associated with strategic surface-to-air missiles. The large number and variety of other objects and shipping crates at the same two sites suggest that other types of solid-propellant munitions—such as air-to-surface missiles, antitank missiles, artillery rockets, and other ground forces munitions—may also be processed at the facilities. We see no evidence, however, that the four facilities are involved with strategic offensive systems.

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Figure 1
Location of Probable Solid-Propellant Munitions Demilitarization Facilities, USSR



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Four Munitions Demilitarization Facilities Identified in USSR (S)

Introduction

Four similar facilities were constructed in the western USSR during the mid-to-late 1970s, near Faustovo, Irsha, Kirov, and Nizhnyaya Salda (figure 1). Because the function of these facilities could not be identified, an ad hoc working group was established in 1977 within the Central Intelligence Agency to determine the significance of the four facilities. At that time the group identified apparent similarities among the four facilities, but could not determine their specific function. However, the working group did agree that, based on their known characteristics, the installations posed no strategic threat to the US.¹ (S [redacted])

The four facilities are situated along an east-west line in the western Soviet Union, at intervals ranging from approximately 650 to 750 kilometers. Each installation is located in a remote, heavily forested area; each is rail- and road-served; and each is well secured. There are no known facilities of this type elsewhere in the USSR. (S [redacted])

At the time of the 1977 study, the installations at Kirov and Nizhnyaya Salda were still under construction. Recent satellite photography indicates that all four facilities are now operational, and provides a basis for further analysis. Imagery was the sole source of information for the current study, as it was for the 1977 research; as far as we can determine, other sources of information on these facilities are not available. This paper describes the four facilities as they appear in recent imagery, and ascribes a function to them. It discusses activity, equipment, and items recently observed at the sites, and compares the facilities' configuration and work flow with those of a USSR munitions refurbishment facility and a US demilitarization facility. (S [redacted])

¹For a further discussion of these sites, see CIA, SI-SID 77-011J (Top Secret Multiple Codeword), November 1977, *Four Unusual Soviet Installations with Similar Features*. (C)

Characteristics of the Four Facilities

Besides their remote location, the four facilities share several common characteristics (figures 2, 3, 4, and 5). Each installation has clearly defined operations and support areas. The arrangement of buildings and the size and configuration of buildings at the four sites are very similar, and in some cases individual buildings are identical from site to site. All of the facilities are secured, with one board fence and one or more wire fences. Construction was begun on the facilities at Faustovo and Irsha in mid-1973; the Kirov and Nizhnyaya Salda facilities were begun in early 1975. All four facilities had been completed by the late 1970s or early 1980s. (S [redacted])

Based on their appearance, we believe that the four facilities are part of the Soviet defense-industrial complex, and that they probably employ a primarily civilian work force to perform a weapons-processing function. The latter conclusion is drawn from two factors: a layout uncharacteristic of most operational Soviet military facilities, which in most cases are almost identical from site to site; and the absence of on-site military housing or training facilities. Only at Nizhnyaya Salda is there evidence of a military personnel presence. That facility is linked by road to a small military housing area, about 3 kilometers to the south, that was constructed concurrently with, and is probably related to, the main installation. Nizhnyaya Salda also has more buildings than the other three facilities. We do not know the reason for these anomalies at the Nizhnyaya Salda facility. (S [redacted])

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Operations Area Features

At all four facilities, the operations area is comprised of several key functional structures, including rail-served, revetted transshipment buildings and a fabrication/assembly-type building. Two of the facilities also have a shop-type building, and Nizhnyaya Salda has an additional assembly-type building. A second fabrication/assembly-type building under construction at the Faustovo facility will probably be used to increase the facility's processing capability. All four facilities have at least one small bunker and one or more additional revetted buildings, indicating that explosive materials are handled at the sites. The accompanying table lists the key features of the operations and the support areas of the four facilities. (S)

an engine test facility at Kuznetsovo, 4 kilometers to the southwest; a steam line extends to Faustovo from Kuznetsovo, and firefighting services are probably also provided from the engine test facility. (S)

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Support Area Features

The support areas of the four facilities are also similar. Each installation has several rail sidings. The Irsha, Kirov, and Nizhnyaya Salda facilities all have a locomotive shed, a steam plant, and a fire station. The Faustovo facility is linked by road to

Each of the four facilities also has general-purpose support facilities, including a motor pool, a buried water tank, and one or more administration buildings. At two facilities, Kirov and Nizhnyaya Salda, the support area includes a small electrical substation, and there are several small support structures at Irsha. The Faustovo installation also has a helicopter pad. Industrial-scale sewage treatment facilities are not present at any of the four sites, but Irsha and Kirov do have small-scale sewage treatment facilities, and Faustovo and Nizhnyaya Salda have several ponds that could serve as settling ponds for sewage. It is likely that these facilities are used for conventional sewage treatment rather than for processing of industrial wastes. (S)

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Key Features of the Four Soviet Facilities

	Faustovo	Irsha	Kirov	Nizhnyaya Salda
Key Operations Area Features				
Transshipment buildings (revetted, rail-served)	2	2	2	2
Fabrication/assembly-type building	2	1	1	1
Revettted building	2	1	1	8
Bunker	1	1	1	2
Shop building	1		1	
Support buildings	6		3	9
Security fences				
Board	1	1	1	1
Wire	1	1	2	3
Key Support Area Features				
Rail sidings	Yes	Yes	Yes	Yes
Locomotive shed	No	Yes	Yes	Yes
Steam plant	No ^a	Yes	Yes	Yes
Fire station	No ^b	Yes	Yes	Yes

^aA steam line is provided to Faustovo from the Kuznetsovo Engine Test Facility.

^bFirefighting services are probably provided from the Kuznetsovo Engine Test Facility.

This table is Secret [redacted]

Evidence of Solid-Propellant Munitions at the Four Facilities

At the time of the 1977 study, the ad hoc research group determined that the facilities under analysis were industrial rather than military in character, but also noted that the installations' security and operational features suggested involvement with military-related work. The presence of bunkers and revetments further indicated that explosives were handled at the facilities, but at that time there was no evidence to define the types of explosives handled. [redacted]

[redacted]

Evidence of solid-propellant SAMs has been identified at two of the four facilities, Faustovo and Irsha. We have not observed such evidence at Kirov or Nizhnyaya Salda, even though these facilities are complete and operational; the reason for this is not clear. Based on the similarities among the facilities, however, we believe that all four installations are involved in the same kind of work. Moreover, evidence observed at Faustovo and Irsha appears to be identical, suggesting that the same types of munitions are probably handled at all four sites. (S [redacted])

Evidence of SAMs at Faustovo

At Faustovo, probable SA-6 missile canister transporters and possible SA-6 missile canisters were observed on 1983 satellite imagery; the SA-6 is a tactical solid-propellant SAM system. Five transporters were identified at the facility in May 1983, just south of the fabrication/assembly-type building. In July 1983, four transporters were observed at the same location. Another vehicle, possibly a fifth transporter, was observed in an open storage area near the smaller transshipment building, carrying two possible SA-6 missile canisters. (S [redacted])

Also present in this storage area at Faustovo were unidentified crates about 4 meters long and 1 meter wide. Stacks of small, unidentified, light-toned objects, numbering in the hundreds—which could be small solid-propellant motors—were observed in this storage area and near one of the revettted buildings in the operations area. Figures 2 and 6 indicate the position of the missile canister transporters, the crates, and the stacks of small objects at Faustovo in July 1983. (S [redacted])

Evidence of SAMs at Irsha

At Irsha, at least three different types of canisters and two different sizes of shipping frames have been observed, near the larger transshipment building and in the vicinity of the fabrication/assembly-type building (figures 3 and 7). The largest canisters observed are about [redacted] 1 meter in

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diameter.² These canisters are similar in size to those used with the SA-10, a strategic solid-propellant SAM; however, because the SA-10 missile was introduced into the Soviet inventory relatively recently, the presence of SA-10 canisters at this facility is difficult to explain. It is possible, therefore, that these canisters are for another weapons system that uses shipping canisters of the same size, although we do not know of such a system at this time. (S [redacted])

In addition to these large canisters, two types of smaller canisters are also present at Irsha. The larger of these, about [redacted] long and 1 meter in diameter, may be for shipping SA-4 solid-propellant boosters; the SA-4 is a tactical mobile SAM that consists of four solid-propellant boosters and a liquid-propellant sustainer. The other small

canister is about [redacted] long and 1 meter in diameter. This canister has not been associated with any particular weapons system. (S [redacted])

Of the two sizes of shipping frames observed at the facility, the larger is about [redacted] long and 2 meters wide. These frames are canvas-covered, and are probably used to ship either two or four of the [redacted] canisters seen nearby. The smaller shipping frames are about [redacted] long and 2 meters wide, and are probably used to ship two of the [redacted] canisters seen at Irsha. (S [redacted])

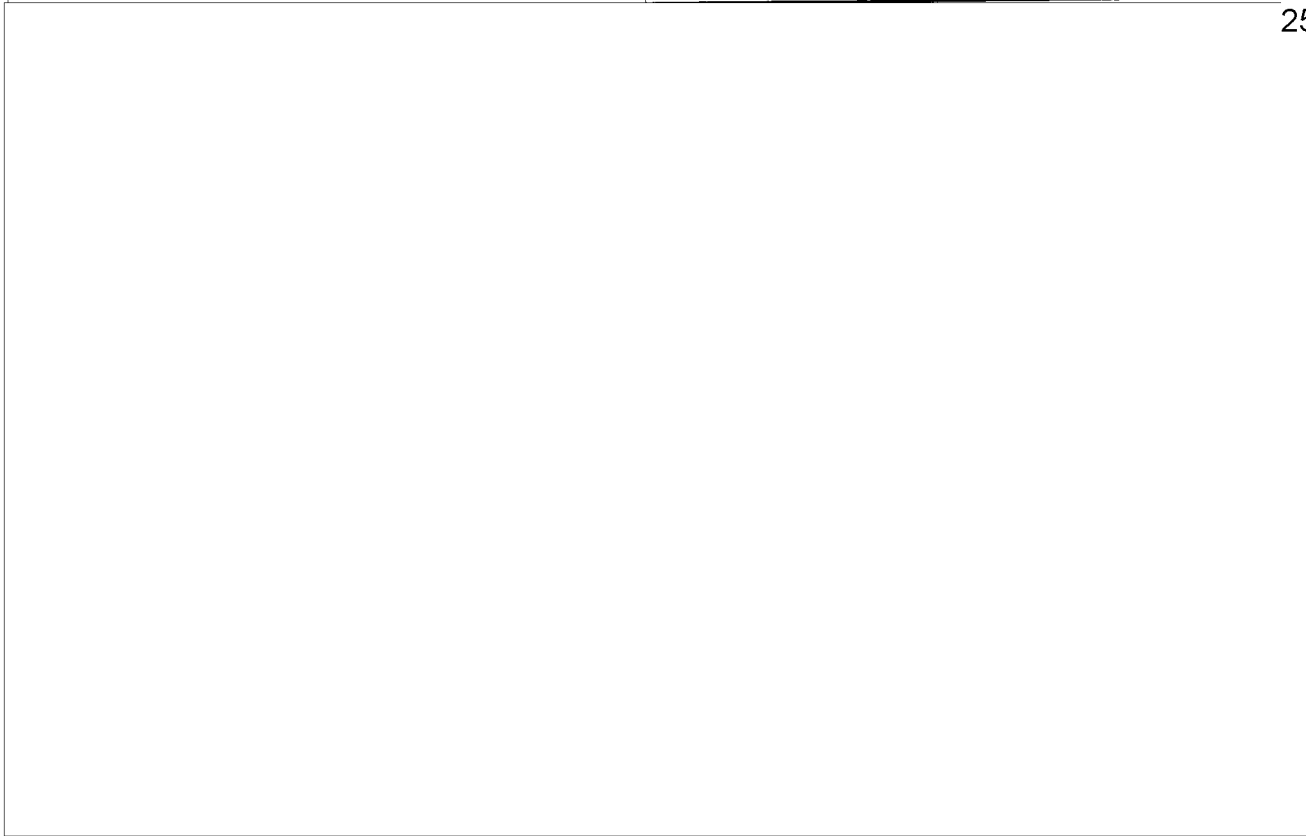
Near the smaller transshipment building, in an open storage area, we have seen stacks of objects that include canisters with a bulbous end, measuring about 3 meters long and less than 1 meter in diameter (figure 8). It is possible that these are shipping canisters for the original version of the

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SA-8 missile, a tactical solid-propellant SAM. We have also seen crates, about 4 meters long and 1 meter wide, and stacks of small light-toned objects, about 1 meter long—both similar, if not identical, to those seen at Faustovo (figures 2 and 6). Stacks of other small objects of various lengths have also been observed at Irsha (figure 8). Recent imagery of the facility shows that sheds or tents have been erected over most of these objects, probably for concealment, protection from the environment, or both. (S [redacted])

Possibility of Refurbishment at the Facilities: Comparison With a Known Soviet Refurbishment Facility

Refurbishment Activity at Balakleya, Kharkov Oblast

[redacted] the USSR has refurbished and recycled certain ground forces munitions at least since 1960, at a facility near Balakleya in Kharkov Oblast (figure 9). [redacted]

[redacted] a refurbishment facility situated within the Balakleya Ammunition Depot was involved at that time in the refurbishment of high-explosive munitions, armor-piercing and high-explosive antitank munitions, and spent cases for 100-mm and possibly 115-mm tank munitions. Unserviceable munitions were shipped to the facility by rail, and after refurbishment were either shipped out by rail or stored in nearby bunkers. During the refurbishment operation, the propellant charges and primers of the munitions were replaced [redacted] the plant did not produce munitions, and implied that the work force consisted mainly of local civilians. Recent satellite imagery indicates that the facility is still operational. (S [redacted])

Facilities Comparison

Like the facilities at Faustovo, Irsha, Kirov, and Nizhnyaya Salda, the Balakleya facility has a distinct processing area and adjacent support facilities. The refurbishment facility consists of a dozen major buildings, many of which are rail-served. Unlike those facilities, however, the Balakleya

Depot also includes approximately 80 storage buildings and numerous open storage areas, as well as seven storage bunkers and an associated check-out building, which constitute a tactical surface-to-surface missile support facility. (S [redacted])

Although we believe that the four study facilities are involved in processing munitions, the dissimilarities between these facilities and Balakleya indicate that their primary function is something other than refurbishment. There are no long-term storage facilities at or near any of the four sites—an important functional contrast to the Balakleya Ammunition Depot, where the many storage buildings and associated facilities indicate large-scale storage of processed munitions for eventual reissue to deployed forces. The absence of long-term on-site storage at Faustovo, Irsha, Kirov, and Nizhnyaya Salda suggests that the end product at the four facilities is not finished munitions, but component materials that will be reused or destroyed. (S [redacted])

The lack of storage facilities at the four sites also suggests that a relatively rapid turnaround of processed munitions was envisioned when the facilities were designed. The makeshift storage of crates and other objects along the roads and near the transshipment buildings at Faustovo and Irsha suggests that these facilities probably process a greater volume of materials than the other two sites, and that the initial operations plan for these facilities was not very realistic. (S [redacted])

Probability of Demilitarization at the Facilities: Comparison With a US Demilitarization Facility

The Western Demilitarization Facility, Hawthorne, Nevada

The Western Demilitarization Facility (WDF) was constructed in the mid-1970s at the Naval Ammunition Depot near Hawthorne, Nevada, approximately 150 kilometers southeast of Reno (figure 10). Its construction was dictated primarily by environmental concerns about the toxic nature of

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the effluents produced by the burning, burying, or dumping of unserviceable munitions components. The WDF is designed to demilitarize unserviceable munitions with up to about 1,300 kilograms of high-explosive/propellant content. Unserviceable munitions are shipped to the facility by rail; their explosive components are removed, and either disposed of on-site or converted to chemicals to be sold for reuse. Virtually all metals recovered during the demilitarization process are sold for scrap. (U)

Facilities Comparison

The WDF, like the four Soviet facilities, has both operations and support buildings. Operations buildings at the facility include rail-served, earth-covered offloading docks, small earth-covered bunkers, a compartmented, blast-resistant cell complex, and seven other munitions processing buildings, most of them with blast walls. Support facilities at the WDF include an administration building, a steam plant, a sewage treatment plant, and several settling ponds, as well as a shipping area with several rail sidings. (S)

The WDF and the four Soviet facilities are similar in several important respects. All five facilities are situated in remote locations. Materials to be processed at all five sites are delivered by rail and offloaded in blast-protected—either bunkered or revetted—buildings. After processing, the products are shipped out from separate buildings located at the end of the materials flow pattern, as discussed below. Most of the buildings within the five facilities are revetted, bunkered, or constructed with heavy, blast-resistant walls to protect adjacent areas and minimize damage from the blast of an accidental explosion. All five sites also have comparable support facilities. (S)

Two important similarities indicate that the four Soviet sites are functionally correspondent to the WDF. First, neither the WDF nor the four Soviet facilities have any significant long-term on-site storage facilities. The absence of such storage suggests the flow-through of munitions and components. Second, large amounts of raw materials have not been observed either at the WDF or at the four Soviet sites, and this similarity suggests that the

four facilities, like the WDF, are not involved in fabrication. Rather, they appear to have been designed, like the US facility, for the receipt, processing, and shipment of munitions and munitions components. (S)

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The WDF differs from the facilities at Faustovo, Irsha, Kirov, and Nizhnyaya Salda in several respects. Some of these differences are in the flow of materials through the facilities, as discussed below. There are also configurational differences: the WDF's operations and support structures are not separated into clearly defined and separately secured areas, and it does not have a central processing building; the separate stages of the demilitarization process are carried out in separate buildings. We do not believe, however, that these configurational differences represent a significant factor in assessing the Soviet facilities' probable functional characteristics. (S)

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Materials Flow Comparison

At the WDF, munitions flow through the operations facilities in a clear functional pattern, shown in figure 10. Unserviceable munitions are received at the offloading docks (1) and then sent to the preparation building (2) for removal from shipping containers.³ In the preparation building, munitions containing smokeless powder are held for removal of the powder; after removal, the powder is transported to an adjacent accumulator building (3) by vacuum pipeline or conveyor for temporary storage. Munitions not held for powder removal are sent to the large cell complex (4) or the mechanical removal building (5) if access to the explosive material must be gained through the use of a lathe or a saw. If the explosive material can be removed by melting, the munitions are sent instead to the steamout building (6), where hot water and steam are used to melt out the explosives. The effluent from this operation is processed and reduced to water and a thick slurry in the adjacent sewage plant (7). The clear water resulting from this process is reused in the facility or drained off to the local sewage system. The processed slurry is dried in nearby settling ponds (8). Both the dried slurry

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³Numbers in parentheses refer to key numbers in figure 10. (U)

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and the explosives extracted by mechanical removal are either incinerated in the bulk explosives disposal building (9), or further processed in the bulk explosives refining building (10) and eventually sold for reuse. Scrap metals eventually end up in the decontamination and small items furnace building (11), and are shipped out by rail from a separate section of the building. Small bunkers (12) in the processing area provide temporary storage for the munitions being processed. (U)

At the four Soviet facilities—Faustovo, Irsha, Kirov, and Nizhnyaya Salda—the rail patterns and the relative positions of buildings and roads are similar to the pattern at the WDF. [redacted]

[redacted]

[redacted] Figure 3 (page 3) shows, as an example, the probable flow of materials at Irsha, a pattern typical of the four facilities. (S [redacted])

[redacted]

The small bunker or bunkers near the fabrication/assembly-type building at each of the facilities most likely provide temporary storage for the munitions, as do the bunkers at the WDF. Processed munitions components are eventually shipped out from the smaller transshipment building at each Soviet facility. Numerous crates and stacks of objects have

been observed in temporary storage near the shipment buildings at Faustovo and Irsha (figures 2 and 3, pages 2 and 3). (S [redacted])

Explosive components recovered during processing at the WDF are disposed of on-site. At the four Soviet facilities, however, such components are probably shipped from the smaller transshipment building to another location for disposal. This conclusion is based on three significant differences

[redacted]

These differences mark the only apparent functional divergence of the four sites from the materials processing flow at the WDF. (S [redacted])

[redacted]

Conclusion

The similarities of the four Soviet facilities to the WDF in the US indicate that these previously unidentified sites are probably involved primarily in the demilitarization, and possibly in some limited refurbishment, of solid-propellant munitions. The identification of what are probably SA-6 missile canisters and missile canister transporters at Faustovo, and of possible SA-8 and SA-10 missile canisters and SA-4 booster canisters at Irsha, indicates that these facilities are involved with tactical and possibly strategic solid-propellant SAMs. Further, the large number and variety of crates, canisters, and shipping frames seen at these two sites suggest that additional weapons systems—probably other solid-propellant munitions—are also handled there. Based on their strong design and operational similarities, we believe that all four facilities perform the same function. There is no indication, however, that any of the facilities is involved with strategic offensive missile systems.

(S [redacted])

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The timing of the facilities' construction is consistent with the probability that they are involved in the demilitarization of solid-propellant munitions. All four facilities were constructed in the mid-to-late 1970s, a time frame that is consistent with a likely growing Soviet need for demilitarization or refurbishment of SAMs, and probably of other solid-propellant munitions as well. (S [redacted])

The service life of a solid-propellant munition ranges from approximately five to 20 years, depending, in large part, on the chemical composition of the propellant and on the storage and handling conditions it is subjected to. We estimate that an average of service lives for Soviet solid-propellant systems is roughly 10 to 12 years. The Soviet inventory includes virtually millions of solid-propellant munitions, among them air-to-surface and surface-to-air missiles, artillery rockets, and anti-tank missiles. Considering the number of solid-propellant munitions and the fact that some of these munitions have been in service for decades, it is reasonable to conclude that the demilitarization or refurbishment of these systems would be a considerable undertaking, and would probably require specialized facilities. We do not know where unserviceable munitions were demilitarized before the four demilitarization facilities were established; it is likely that the Soviets disposed of them locally by burning, burying, or dumping the components. (S [redacted])

The SA-4 system provides one example of the quantities of munitions that will require demilitarization. This system has been in service for about 17 years; it is expected to be replaced gradually by the SA-X-12, and this replacement will apparently begin soon. Each SA-4 missile has four solid-propellant boosters, and we estimate that there are six missiles available at some point in the supply chain for each of the almost 2,500 deployed SA-4 launch rails. Thus, there are approximately 60,000 SA-4 boosters in the Soviet inventory, many of them past due for disposal or refurbishment. Based on the number of solid-propellant systems in the Soviet inventory, it is clear that the demilitarization of unserviceable munitions represents a significant—and an increasing—demand. (S [redacted])

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