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Sverdlovsk Guided Missile Production Plant 8 (S)

A Research Paper

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May 1986
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Sverdlovsk Guided Missile Production Plant 8 (S)

A Research Paper

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May 1986

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Sverdlovsk Guided Missile Production Plant 8 (S)

Summary

Sverdlovsk Guided Missile Production Plant 8, located in downtown Sverdlovsk, is a key Soviet design, development, and production facility. The plant has a long history of involvement with a large number of defensive missile systems and missile-associated equipment and components. Also, the plant has more recently become involved with offensive, long-range cruise missile (LRCM) systems.

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Also for this system, preparations may be under way to assemble a missile that has some anti-tactical-ballistic-missile (ATBM) capabilities. The plant is also associated with the production of the SH-08 antiballistic missile (ABM) and with the SA-10 air defense missile, which is known to be assembled at another facility. In addition, the SS-N-15 and SS-N-16 antisubmarine warfare (ASW) weapons are produced at Plant 8 as is the SS-NX-21 LRCM. Plant 8 may also be associated with the production of other naval weapons. It is associated with attaching the launcher mechanism to the SA-6/-11 launcher and with the final assembly of the SA-11 resupply vehicle. The launcher mechanism for the AS-15 air-launched cruise missile (ALCM) is produced at the plant, as is a component for a space payload for the reusable space shuttle orbiter. Production of the SA-4 missile and SA-4 and SA-6 ground support equipment (GSE) has only recently stopped.

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The production rates for most of these systems cannot be determined. More than one system is apparently produced in each building, not all of the floorspace is dedicated to military production,

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Production estimates could possibly be determined with both an increase in the frequency and increase in the resolution of imagery of Plant 8 and its associated facilities.

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Because of the volume of products designed and produced at Plant 8, we believe some production credited to Plant 8 actually occurs at other facilities affiliated with it.

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Appendixes

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Sverdlovsk Guided Missile Production Plant 8 (S)

Scope Note

This report is a comprehensive analysis of available information— 25X1
–on the evolution of Sverdlovsk Guided 25X1
Missile Production Plant 8 as a key design, development, and production facility primarily for Soviet defensive missile systems. The report describes the growth of the plant since 1959, its involvement with the production of specific missile systems and missile-associated equipment, and the production status of these systems. This report is designed to provide analysts with insights into the complexities of multisystem production at a single plant and the inherent problems in estimating system production rates for such a plant. 25X1

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Sverdlovsk Guided Missile Production Plant 8 (S)

Background

During and immediately after World War II, artillery was produced at Sverdlovsk Guided Missile Production Plant 8 (figure 1). When first imaged, in 1959, component parts and associated equipment for a variety of rocket and missile systems were being produced at the plant. In the late 1960s and early 1970s, the Soviets reorganized the enterprise system, which was implemented to accelerate and increase the efficiency of transferring new technology into production, by combining independent research institutes, design bureaus, and production enterprises into a single structure under production associations (POs) and scientific POs. At this time, Plant 8 was linked with the Yaskin and Lyulev Design Bureaus (OKBs) to form the Sverdlovsk Production Association Machine Building Factory I/N Kalinina (PO Kalinina). The Lyulev OKB, collocated with Plant 8, is involved with missile production technology, while the Yaskin OKB, separately located in Sverdlovsk, is involved with the design of missile support equipment. The addition of the Lyulev OKB to Plant 8 may account for 46 percent of the total administration/engineering floorspace added between 1960 and 1970. However, conclusions presented in this research paper apply only to Plant 8 and do not necessarily reflect the total production association. (

Since 1959, Plant 8 has gone through four major periods of expansion: between 1960 and 1970, 1971 and 1975, 1976 and 1980, and 1981 and 1985 (figure 2 and table 1).

In the late 1950s and early 1960s, facility boundaries were established in anticipation of future expansion. The plant is divided into a western half and a separately secured eastern half. Two transshipment yards, an eastern and western yard, are along the northern side of the facility. Rail and road service is available in both halves of the facility, although production buildings are found only in the western half. (

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In 1959, Sverdlovsk Guided Missile Production Plant 8 consisted of three fabrication/assembly buildings, three administration/engineering buildings, one cafeteria, one vehicle maintenance building, seven shop/forge/foundry buildings, one large transshipment building, various other support buildings, and two transshipment yards (figures 2 and 3 and table 2).

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In 1964, three large SA-4-associated fabrication/assembly buildings were being added to the plant. These are the only production buildings that can be associated with a specific system. Also in 1964, four new administration/engineering buildings were completed, possibly for the Lyulev OKB (figure 2 and table 2). (

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Between 1971 and 1975, moderate levels of fabrication, support, and administration floorspace were added to the plant. However, over one-fifth of the floorspace added was for administration/engineering buildings, an indication of the reorganization of Plant 8 from strictly a production facility into a production association with two design bureaus. In 1972, prototype missile canisters—as opposed to series production canisters—were observed in the northern half of the eastern transshipment yard, another indication of reorganization. Prototypes have been observed there since 1972.

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Two major fabrication/assembly buildings were completed between 1974 and 1976; one contains a probable hydrostatic test stand (figure 4). (A hydrostatic test stand is used to test filament-wound motor cases and/or possibly canisters.) Support for motor case and/or canister production during the development and production of new missile systems as well as support for other series production probably occurs in these buildings.

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(Continued p. 5)

[1]The Soviet enterprise system is a generic term used to refer to the plant, the design bureau, and the research institute and is the cornerstone of the development and production processes. The production associations and scientific production associations are not necessarily within the plant with which they are associated. (S)

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Table 1
Periods of Major Construction at Sverdlovsk Guided Missile Production Plant 8

Function	Floorspace Existing Before 1960	Floorspace Added (sq m) 1960–1970	1971–1975	1976–1980	1981–1985	Total Plant Floorspace (sq m)
Admin/Engr	18,231	42,952	10,585	13,540	4,173	89,481
Fabrication	82,456	76,625	33,845	32,028	24,427	249,381
Production Spt	32,439	29,316[a]	2,977	18,658	12,658[b]	96,048
Cafeteria	1,224	2,571	3,140	3,197	—	10,132
Totals	**134,350**	**151,464**	**50,547**	**67,423**	**41,258**	**445,042**

[a]Does not include POL storage area. [b]Does not include areas under construction.

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Figure 1
Locations of Sverdlovsk and Verkhnyaya Salda

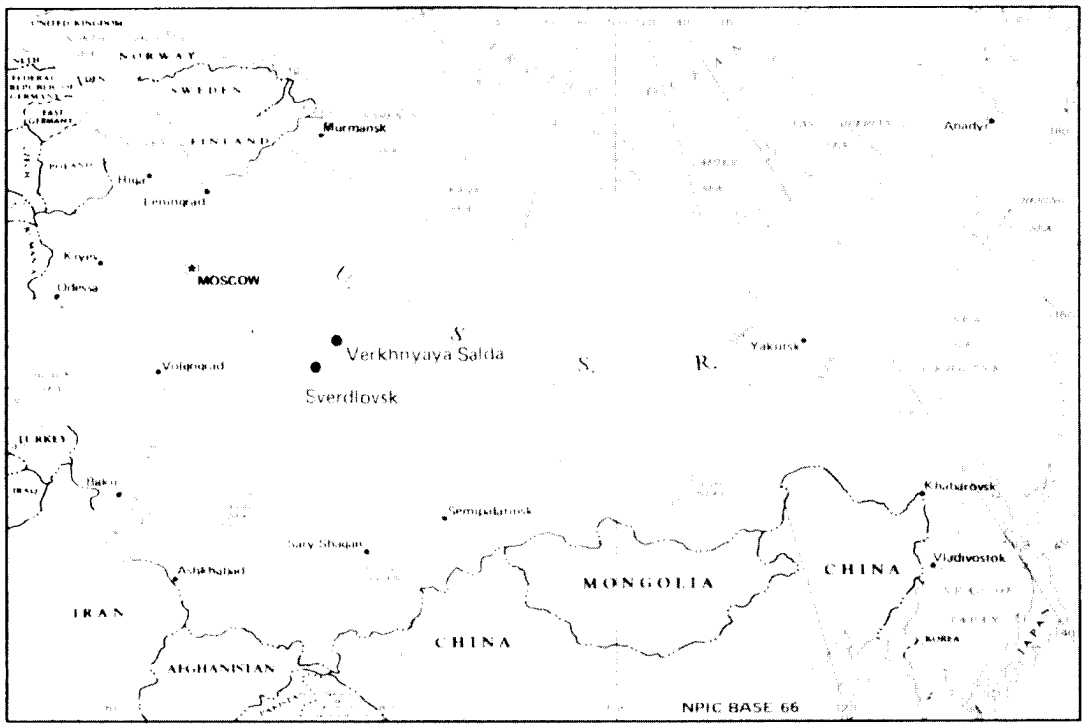

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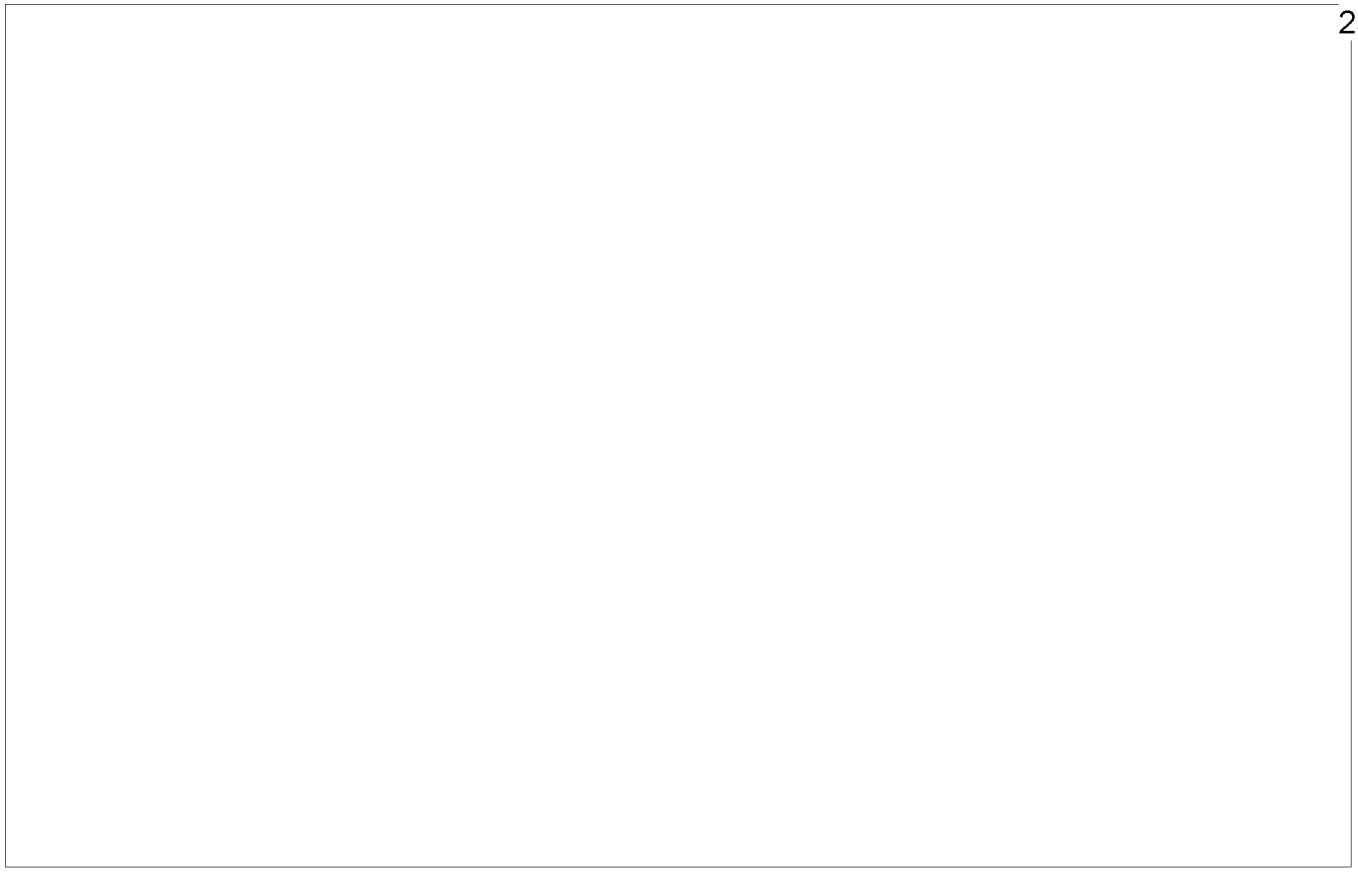
Figure 4
Probable Hydrostatic Test Stand, 13 July 74



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A new large vehicle storage/maintenance area was completed in 1981. This increase in vehicle storage and maintenance indicates that wheeled vehicles were to become the primary mode of intraplant transportation in support of new programs.

In recent years, preparations were being made to modernize production capabilities at Sverdlovsk by adding computers and robotics. One building for computers and an attached building for computer support were constructed between 1981 and 1983.

A large specialized fabrication/assembly building, which may house robotics, was externally completed in December 1985.

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A more detailed chronology of the construction at Plant 8 can be found in Appendix A.

The Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility, the Salda branch, is discussed in Appendix D.

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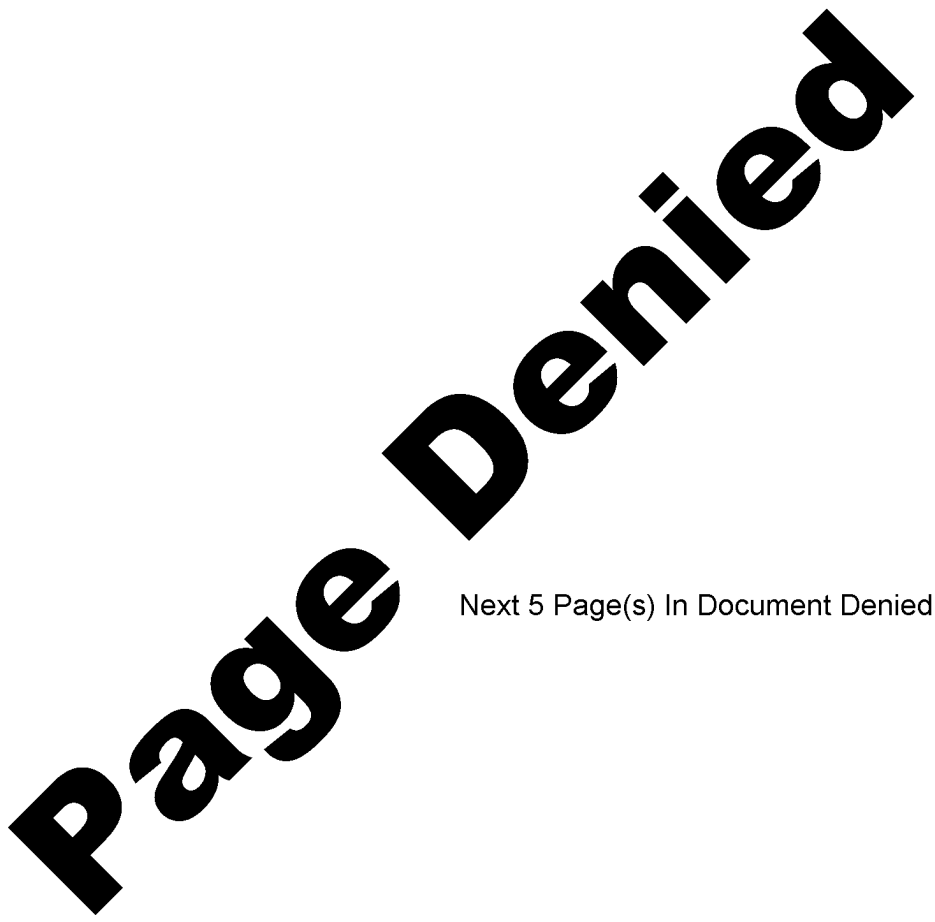

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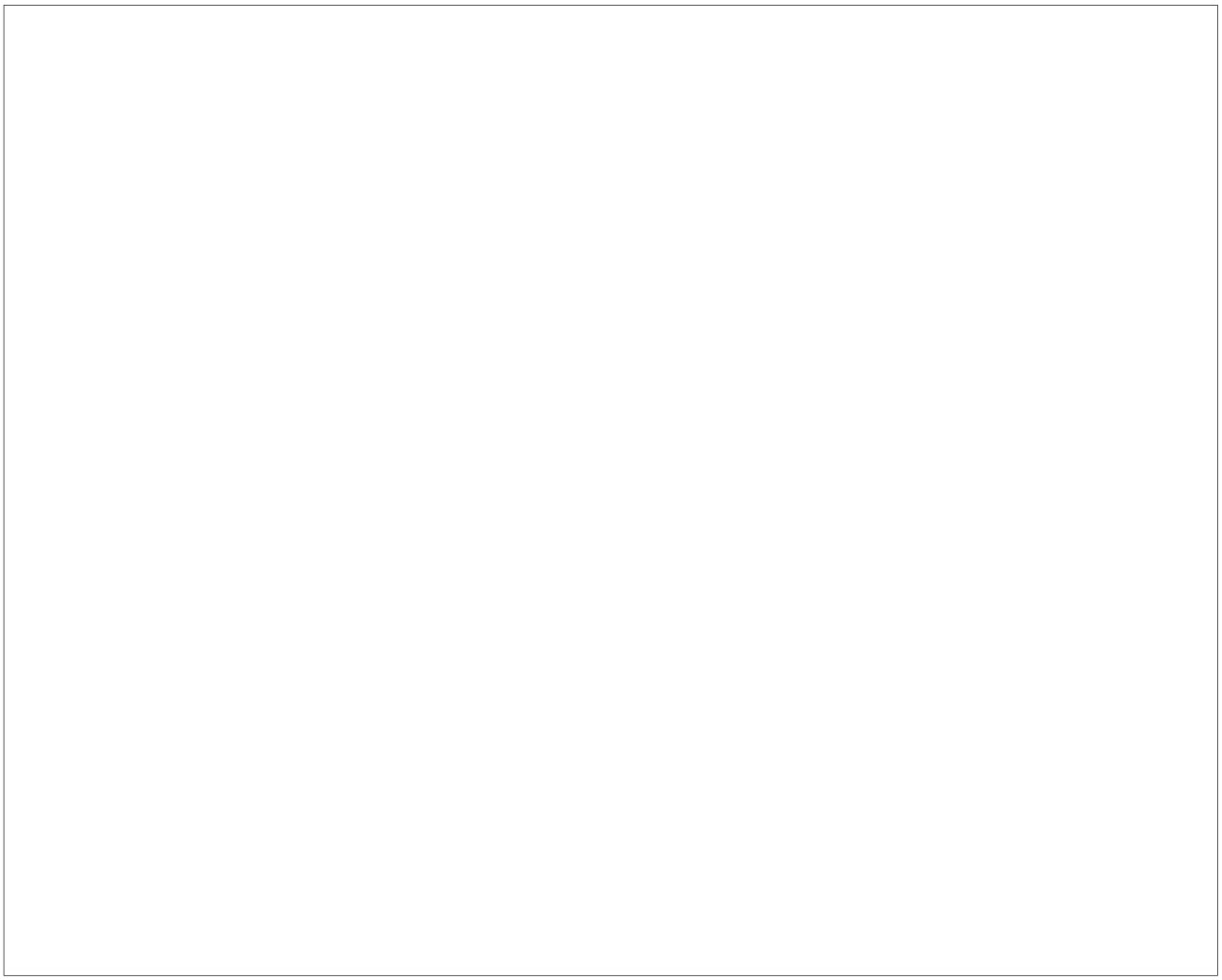

Significant amounts of work may be done at other facilities affiliated with Plant 8. We are not confident we have identified all these "subcontractors," and infrequent coverage of the Salda branch, one we have identified, precludes an accurate production rate estimate (Appendix D).

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Introduction

Sverdlovsk Guided Missile Production Plant 8 is one of six defensive missile production facilities in the Soviet Union, but it is the only defensive missile production plant that also produces the GSE for defensive missiles, offensive missiles, and offensive missile GSE.

Plant 8 has been or is involved with production of GSE for four SAM systems; this GSE includes the SA-4 transporter-erector-launcher (TEL), the SA-6 TEL, the SA-X-12 (both for the GLADIATOR and the GIANT) transporter-erector-launcher and radar (TELAR), and the SA-X-12 resupply vehicle that is referred to as a transloader, the SA-11 resupply vehicle, referred to as a transloader, and either the SA-6 and/or the SA-11 TELAR (chart 1).

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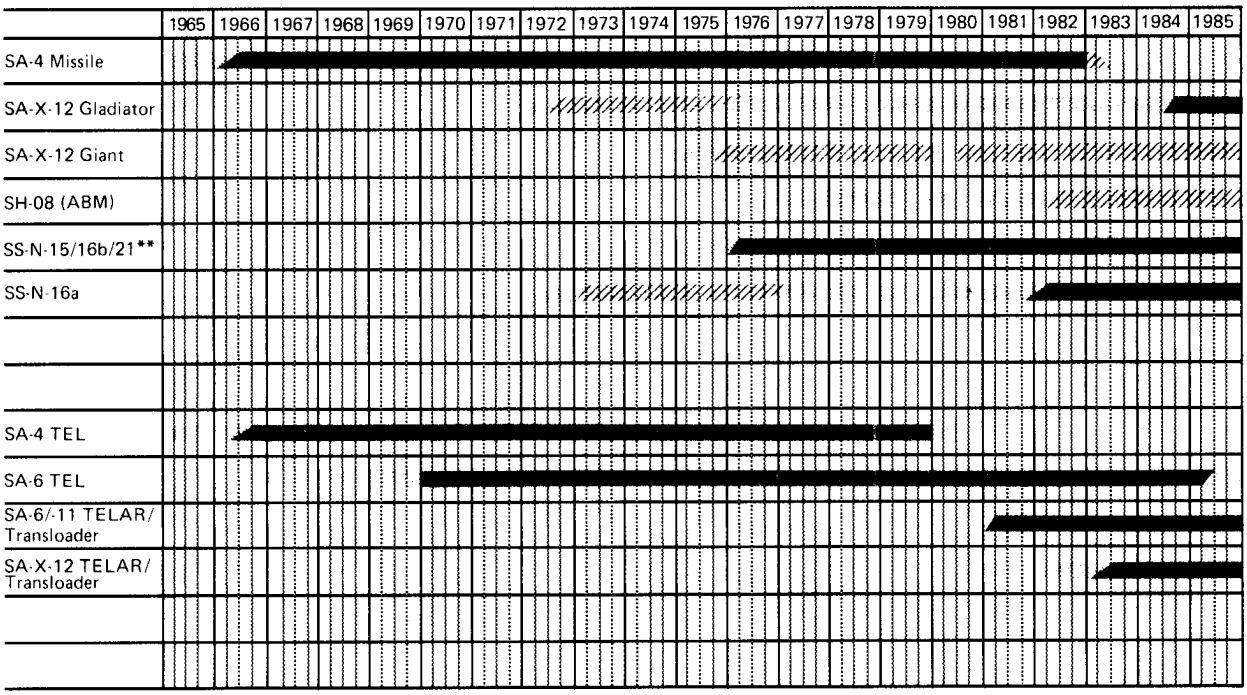
Chart 1

Overall System Development at Sverdlovsk Guided Missile Production Plant 8 *



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This reflects the position of Plant 8 as a key weapons production facility in the Soviet Union.

Series production of the SH-08 ABM and the GIANT subsystem of the SA-X-12 SAM will begin at PO Kalinina, following State approval and acceptance of those systems and completion of a production facility for the systems.

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In addition, the SS-NX-21 LRCM is produced at Plant 8, and the plant is probably involved in the production of its ground-launched version. Plant 8 may also be involved with prototype work on additional naval weapons and is the production facility for a component for a space payload for the reusable space shuttle orbiter. Small boats are manufactured at Plant 8,

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Production rates for systems produced at Plant 8 cannot currently be determined for the following reasons:

- In contrast to our past understanding of practices, but more in line with recent trends in the Soviet defense industries, more than one system is apparently being produced in a single assembly building. We do not know what portion of total floorspace is available for any one system and, therefore, cannot use floorspace as an indicator of production capacity.
- Apparently, covered indoor storage for the missiles is adequate for current production rates because we see fewer canisters[2] than would be expected, considering the volume of production However, as rates increase, we expect more canisters and possibly GSE to be stored in the open. If this occurs, production rate estimates may be possible, even though the use of canvas and netting to cover shipping containers has increased. Otherwise,

SAM Systems

SA-4

The SA-4 was the first missile produced in mass quantity at Plant 8. First deployed in 1967, the SA-4 is a mobile, medium- to high-altitude, medium-range SAM consisting of four solid-propellant, strap-on boosters and a liquid-propellant sustainer. It is deployed with Soviet forces in the USSR and Eastern Europe and with East European national forces. The SA-4 missile and booster were produced solely at Plant 8, and the launcher mechanism of the SA-4 TEL chassis, which was shipped in from another plant, was assembled at Plant 8.

Large amounts of SA-4 equipment, stored in open transshipment yards, had been identified on satellite imagery of Plant 8 by December 1966. Production of SA-4 equipment may have begun as early as 1965 in three large fabrication/assembly buildings, although . As many as 250 SA-4 shipping canisters and boosters and 30 TELs were seen at any one time between 1966 and 1975 (Appendixes B and C). The shipping practices at that time indicate that missiles and possibly TELs were held in the yards until enough equipment was available for a unit. Exact counts of the TELs or chassis, however, could not be made after the construction of a protective shed (begun in 1970) in the western transshipment yard concealed some of these vehicles. However, the number of SA-4 missile shipping canisters generally declined between 1975 and 1978, while counts of SA-4 TELs and chassis remained fairly constant. No confirmed SA-4 TELs were seen at Plant 8 after June 1979, and by July 1983, the number of SA-4 canisters had dropped to no more than six.

SA-6 TEL

SA-6 TELs were first observed at the plant in 1969. The SA-6, a mobile, low- to medium-altitude, short- to medium-range tactical SAM, is deployed in the Soviet Union and other Warsaw Pact countries and is exported to many other countries. At Plant 8, the launcher mechanisms were attached to chassis received from another plant(s),

No SA-6 missile canisters were ever identified at Plant 8, indicating that only the SA-6 TEL, and not the SA-6 missile, was produced at the plant. Between 1969 and early 1985, an average of 15 to 20 TELs was observed. No SA-6 TELs have been observed since June 1985.

[2]The canisters that are observed are probably empty and have been used or are awaiting use.

[3]Evidence of direct shipping stems from repeated observations of tracks in the snow during the winter months. These tracks lead directly into the transshipment building and not to the individual canisters within the transshipment yard.

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SA-6/-11 TELAR and SA-11 Transloader

During the 1970s, the Soviets developed/modified a version of the SA-6 TEL to include a target engagement radar. Two systems are associated with this modification, the SA-6 TELAR and SA-11 TELAR. The SA-6 TELAR has a three-rail launcher mechanism, and the SA-11 TELAR has a four-rail launcher mechanism. The SA-11 is a short-range, low- to medium-altitude, mobile, tactical SAM. This system has capabilities against fixed-wing and rotary aircraft and may have some capabilities against cruise missiles. The new SA-6/-11 chassis was first observed at Sverdlovsk in 1980. Between five and 30 of these chassis have been observed in both transshipment yards (Appendix C). The launcher mechanism is probably attached to the chassis at Plant 8 before final assembly at another facility. Neither the SA-6 nor the SA-11 missile is produced at Plant 8.

It is not certain whether the SA-6 TELAR or the SA-11 TELAR is being series produced at Plant 8.

Fabrication and installation of the rail mechanism and the crane of the SA-11 transloader (resupply vehicle) probably occur at Plant 8.

SA-X-12 System

The GLADIATOR, one of two subsystems of the SA-X-12, is a multialtitude, medium- to long-range system primarily for use against aircraft. Missiles are transported in and launched from canisters mounted on a TELAR. The GLADIATOR TELAR and transloader can carry up to four canisters each. The GIANT is the other subsystem of the SA-X-12 and is believed to have ATBM capabilities, with a secondary function as an air defense weapon. The GIANT TELAR and transloader can carry only two canisters each; however, they are larger than the canisters of the GLADIATOR system. The same chassis are probably used for both the GIANT and GLADIATOR TELAR and transloader.

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In 1972, the GLADIATOR prototype canister was first observed, and the SA-X-12 system was first

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Both Plant 8 and the Yaskin OKB were involved.

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However, by the end of 1972, they considered the GLADIATOR a separate missile system. Work on both canisters was proceeding at Safonovo Plastics Plant and Leningrad Machine Building Plant 232 (Bolshevik Machine Building Plant).

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In 1974, prototype canisters for both systems were at Emba Missile Test Center (MTC).[4] Emba MTC is a primary test and development area for tactical SAMs. Numerous crates of various sizes have also been observed at Sverdlovsk and at Emba MTC and may be related to testing of the SA-X-12 prototypes.

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Between 1975 and 1978, prototype canisters for both the GLADIATOR and GIANT were observed in the eastern transshipment yard.[5]

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[4]Two types of prototype canisters associated with each subsystem of the SA-X-12 have been observed. The earlier prototype canisters of the GIANT and the GLADIATOR featured a conical cap. Later versions, featuring a slightly domed cap and a shorter overall length, were identified at Sverdlovsk Plant 8 in 1977 for the GLADIATOR and in 1980 for the GIANT.

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[redacted] and a GLADIATOR TELAR/transloader was first observed at Plant 8 in January 1983. [redacted] The solid-propellant motors are filled probably at Perm Solid Motor Production Plant. [redacted]

The launch cradle mechanism is probably produced and installed at Plant 8, and the command guidance radar for the GLADIATOR TELAR is installed on a chassis supplied by another plant. The cradle mechanism and the crane for the transloader are probably installed at Plant 8. TELAR or transloader chassis were first observed at Plant 8 in March 1982, but little was done with them for several months. In January 1983, the complete TELAR/transloader was first observed in the transshipment area, and one or two TELARs/transloaders have been present on subsequent occasions. [redacted]

[redacted] increasing number of GLADIATOR launch vehicles and transloaders being delivered to Emba MTC and the Orenburg troop training facilities. These deliveries indicate that initial operational deployment may occur in early to mid-1986. [redacted]

Although the GIANT missile is not yet in series production [redacted] This order may have represented machine tools needed to fit out the large specialized fabrication/assembly building that was externally complete in December 1985 and will probably be operational in early 1987. [redacted] However, GIANT TELARs/transloaders have not been seen there, and no increase in the number of GIANT TELARs/transloaders at Emba MTC has been observed. The start of series production of the GIANT is probably dependent on successful completion of flight testing at Emba MTC and completion of the specialized fabrication building. [redacted]

SH-08 High-Acceleration ABM

[redacted] The Lyulev OKB was involved in the development of the missile motor and first canister. [redacted]

Developmental work on the SH-08 conical motor from the early 1970s through 1984 so closely paralleled that on the smaller GIANT conical booster that the two systems were confused at least once by the Soviets, when an order for a component part used on both systems was mistakenly identified with the GIANT rather than the SH-08. Also, [redacted] In 1974, the two systems were linked for the first time when Zubets, a motor design bureau (MPB), was to ship

[5]The eastern transshipment yard generally can be divided into two functional areas—one for series-produced items and the other for prototype items (Figure 3). Typically, the series-produced items are in the southern area of this yard, while the prototypes are in the northern area. [redacted]

[6]Some of the references refer to a designator originally interpreted as that of the SA-10. However, we believe that information provided indicates a high-acceleration motor. [redacted]

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both mandrels used in the production of the motors within a month of each other to Safonovo Plastics Plant. Both mandrels were shipped while Zubets MPB was developing the SH-08 and the GIANT motors, indicating similar motor winding technology. Other parts were also used for both motors.

In the latter part of the year, a large conical motor, probably for the SH-08, was observed in the test facility transshipment yard at Perm Solid Motor Production Plant, indicating that the motor had probably been tested.

The first confirmed test firing of the SH-08 was conducted at the missile test range at Sary-Shagan MTC on On an SH-08 canister was first observed outside the secured eastern transshipment area at Plant 8, indicating that the canister was empty. The canister likely served as a shipping container for this test firing.

From 1976 to 1981, only the aforementioned SH-08 ABM canister was observed at Plant 8, but by the end of 1981, three more had been added. Since 1983, an average of 13 to 14 SH-08 canisters has been observed at Plant 8 (figure 5), with a high count of 17. Testing of the SH-08 continues at Sary-Shagan MTC,

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The activity and involvement of Plant 8 indicates that some of the prototype work was most likely performed in the missile-associated fabrication/assembly building that was completed in 1975. Both the GIANT and the SH-08 will most likely be series produced in the large specialized fabrication/assembly building that was externally completed in December 1985. Additional work may be performed in other buildings at the plant and at the Salda branch. Series production of the SH-08 will probably be contingent on the successful completion of the flight test program at Sary-Shagan MTC.

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An alternate view[7] is that the SH-08 ABM may be series assembled by the PO Kalinina. However,

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imagery revealed SA-10/SA-N-6 canisters at that facility at about that time.[8] However, there is no data to suggest that the Soviet Navy is sponsoring development of a naval variant of the SH-08 ABM, for use either aboard ships or ashore to

[7]The holder of this view is the Office of Science and Weapons Research, Central Intelligence Agency (C).

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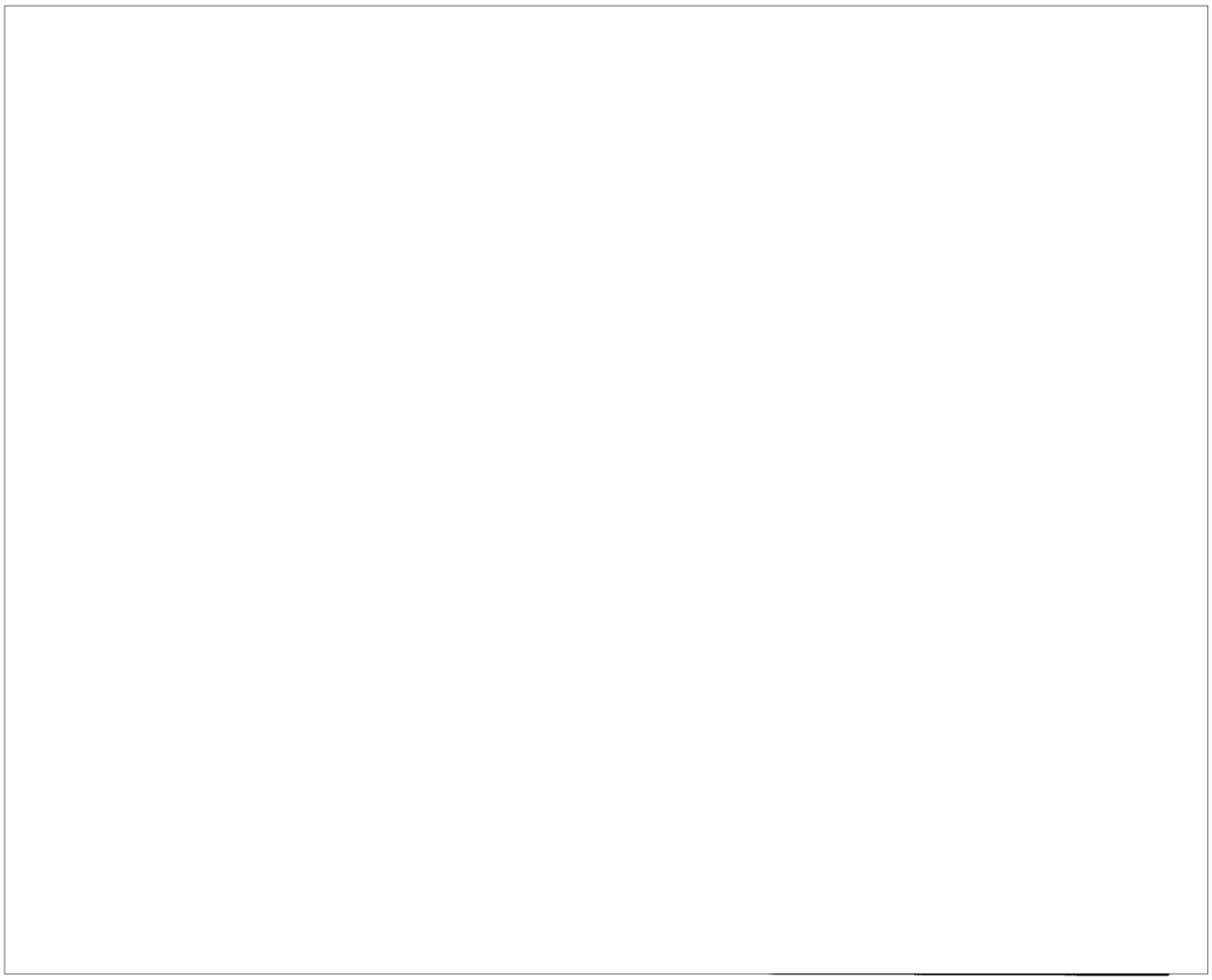

defend naval installations against attack by strategic ballistic missiles.

Therefore, a direct association of the SH-08 development and production programs with PO Kalinina can only be derived. Such production may have begun at a remote plant subordinate to the PO, which, according to

Antisubmarine Warfare Missile Systems

ASW missile canister prototypes were first observed at Plant 8 in 1972. These prototypes, SA-4 canisters modified with a lengthened nose, were used to transport the SS-N-16a submarine-launched, long-range ASW missile and possibly other prototype equipment. Several bulbous-ended, air-dropped payload test vehicle canisters (BL-05s) were also observed in 1972.

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In 1975, two four- or five-banded canisters, associated with the SS-N-15, were identified at Plant 8. The SS-N-15, a submarine-launched, medium-range missile that delivers a nuclear depth bomb, was first deployed in the mid-1970s. From 1976 to 1978, from five to 50 canisters associated with the SS-N-15 were observed, indicating that series production had begun.

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From 1979 through 1985, ASW canisters dominated the northern portion of the eastern transshipment yard and overflowed to the western transshipment yard. The increase in the number of canisters from 25 to 150[10] was an indication that series production of the SS-N-16b had begun and that it was deployed during this time. The SS-N-16a also entered series production and was deployed during this time. The ASW missiles are probably being produced in a large fabrication/assembly building that became operational in 1976, just prior to the start of series production of these systems (item 17b, figure 2 and table 2).

No differences, which would facilitate identification of the four SS-N-16 variants, have been observed in the diameter or length of the two types of ASW canisters at Plant 8.

Cruise Missiles

SS-NX-21/SSC-X-4

[9]The contemporary canister is a nine-banded, canister; the modified SA-4 canister was lengthened from its original

The final assembly of the SS-NX-21/SSC-X-4 is possibly being performed in areas formerly used for SA-4 missile production because the basic production techniques are similar

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No specific canister at Plant 8 can be attributed solely to the SS-NX-21/SSC-X-4 system. A distinctive five-banded canister seen in large numbers at Plant 8 has been associated with SS-NX-21/SSC-X-4 testing at Nenoksa Naval Missile Test Center; however, this canister also carries the SS-N-15 and SS-N-16b ASW missiles.

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AS-15

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No identifiable crate has been associated with this launcher.

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Other Systems

SA-10

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Although SA-10 canisters were identified at the Salda branch in

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[11]The SS-NX-21 and the SSC-X-4 missiles probably used common components during the flight test programs, indicating that these are variants of the same design. Therefore, it is likely that production of the SSC-X-4 began at Sverdlovsk in late 1985.

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Appendix A

Plant 8 Construction Chronology

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Appendix A
Plant 8 Construction Chronology

This appendix provides a thorough explanation of construction within Sverdlovsk Guided Missile Production Plant 8 (figure 2 and table 2) and establishes either multiple system-to-building associations or building functions.

Sverdlovsk Plant 8—Baseline

In 1959, Sverdlovsk Guided Missile Production Plant 8 consisted of three fabrication/assembly buildings (items 64, 66, and 75; figures 1 and 2); three administration/engineering building (items 24, 42, and 76); one cafeteria (item 33); a vehicle maintenance building (item 69); seven shop/forge/foundry buildings (items 31b, 41a, 44, 53, 59, 60, and 63); one large transshipment building (item 40); and various other support buildings.

Until 1959, Plant 8 was involved with the production of artillery pieces, with examples now displayed in an outside museum next to an administration support building (item 70). With the establishment of the production association, increased administration and production space was needed. This increase included the construction of fabrication/assembly buildings, administration/engineering buildings, additional forge/foundry and heating plant sections, as well as cafeterias and storage buildings.

Since 1959, Plant 8 has gone through four major periods of expansion: between 1960 and 1970, 1971 and 1975, 1976 and 1980, and 1981 and 1985 (table 1).

Current facility boundaries were most likely established during the late 1950s and early 1960s. Rail service to a storage building (item 2) and a petroleum, oils, and lubricants (POL) storage area (item 1), both in the eastern portion of the facility, was established by the mid-1960s and remains the easternmost portion of the current facility boundary.

Transportation within the facility changed from rail service to predominately road service since the initial expansion. There are two road and two rail entrances. A rail and a road entrance are near each of the two transshipment yards and next to the materials storage areas at the eastern end of the plant. Some of the rail lines among the older, larger buildings have been removed or appear unused. Fabrication/assembly buildings constructed after 1965 are all road served.

In the late 1950s, the steamplant (item 27) was located on the easternmost edge of the production area. Expansion of the facility to the east left the steamplant in a more central location. The steamplant was enlarged in 1965; and in 1983, construction began on a new section.

In the early 1960s, three large SA-4-associated fabrication/assembly buildings (items 29, 45, and 46a) were constructed. These are the only production buildings that can be associated with a specific missile system. Sections were added to the forge/foundry buildings (items 31a, c, and d and 41c and d). The south section of a fabrication/assembly building (item 46b), which was begun by May 1965, was not externally complete until August 1971. A cafeteria was also constructed (item 48).

The physical configuration, size, and construction period of two sections of a forge/foundry building (items 41c and d) indicate that they were most likely associated with TEL and later with TELAR production, in particular the SA-4 and SA-6 TELs, SA-6/-11 TELARs, and the SA-X-12 TELARs/transloaders. Another fabrication/assembly building (item 66) may also be involved with TELAR production because truck-pulled trailers, parked outside the building, could easily transport vehicles to the transshipment yards or to the TEL/

TELAR test area outside Sverdlovsk. A fabrication/assembly building (item 45) may be associated with the finishing of articles from a nearby fabrication/assembly building (item 46). This assessment is based on articles outside the building and the traffic pattern in the facility. Access is readily available to large vehicles. One of the fabrication/assembly buildings (item 29) was most likely the SA-4 missile final assembly building. It is near a rail line, and transport of the missiles could be accomplished using rail-mounted cranes in the transshipment yards. The forge/foundry sections (items 41c and d) produce the raw materials for both missile and TEL/TELAR production.

The administration/engineering buildings added to this facility in the mid-1960s (items 21, 72, 73, and 74) indicate a marked increase in the design function. The Lyulev OKB, associated with this production association, may be located in these buildings.

In addition, several small support buildings were constructed, including a possible laboratory (item 71) and a large final product storage and transshipment building (item 38).

Sverdlovsk Plant 8—1970 to the Present

Additional construction began in the early 1970s, when one large and one small fabrication/assembly building (items 17 and 34a) were built. The large fabrication assembly section (item 17b) contains a probable hydrostatic test stand. Its completion in April 1975 probably indicates that the building is involved with the prototype production of some missiles and series production of others, in particular the SS-N-15, SS-N-16a/b, the GLADIATOR, and probably the SH-08 and GIANT. Just after the external completion of an addition to a fabrication/assembly building (item 17b), construction began on a possible acoustical building (item 10), which was later linked to the fabrication/assembly section (item 17b). The center portion of the possible acoustical building, not now visible, is an open area without internal walls. Components, instead of entire missiles, may also be tested within the building.

The eastern area of Plant 8 may be considered the missile section of the facility, and the western area may be considered the TEL/TELAR area. The fabrication/assembly section (item 34a) of a fabrication/assembly building, constructed between August 1971 and January 1974, may be involved with small items associated with the systems produced there or may be involved with civilian products.

Construction of a specialty workshop (item 13) was started in July 1974 and completed in April 1977. It is associated with a wood conditioning building (item 12), which indicates that these two buildings are involved with small items (possibly woodworking and painting) and/or civilian products.

Construction was started in the late 1970s on a vehicle maintenance area in the southern section of the facility, near the POL storage area (item 1). Five buildings (items 14, 15, 16, 22, and 23) and a large vehicle parking area were added. Some of the vehicles now parked in this new area were kept at various locations in the plant. The placement of this area along the southern edge of the facility indicates anticipated expansion.

A waste treatment building (item 26) was added to Plant 8 in 1977. Other miscellaneous support and storage structures were also added.

In 1978, construction was completed on the fuel storage area (item 52), in the southwestern part of the plant. Construction in this area was possibly in response to the addition of the SS-NX-21/SSC-X-4 missile to the production schedule of this plant.

This area is probably the fueling facility for this system. It is separately secured, and at least one of the buildings within the area has a drive-through capability. Just after the completion of this area, construction began on a shop (item 49), which may be used to support the fuel storage area. Different types of canisters, some of them canvas covered, have been seen out-

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side this building. Support in the production of part of prototype SS-NX-21/SSC-X-4 missiles probably first occurred in the missile-associated fabrication/assembly section (item 17b) of that fabrication/assembly building.

In recent years, Sverdlovsk has been preparing to modernize production capabilities by adding computers and robotics. Between 1981 and 1983, a computer building (item 8) and an attached building for computer support (item 7) were constructed in the eastern portion of the plant. They may support the production association or may be for the calibration of radar for the various missile systems.

In 1982, construction began on a large specialized fabrication/assembly building (item 19). Each bay of the building appears to have a different function, but the building will probably be for series production of missiles. Delays in the construction of this building were due to problems with documentation and building supplies. Although construction of this building started at a slow pace, it was finished very quickly. Based on the completion of this building in December 1985, we project that series production will begin in early 1987. The timing of this building indicates that Plant 8 will probably be the series production facility for the GIANT and the SH-08 missiles. Both missile systems use conical motors, and these motors have been seen at the same development and production facilities, indicating that both motors will probably require similar assembly technologies. It is unlikely that complete final assembly will be performed in this building because a branch of the plant may be performing that task, but fitting out and some component manufacturing and assembly may be done there. An additional administration/engineering building (item 20), near the southeastern corner of a fabrication/assembly building (item 19), may be used to support this fabrication/engineering building.

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Estimates of the number of people working at Plant 8 have been made using existing cafeteria space. Assuming that these cafeterias are operating at capacity, approximately 12,000 to 16,000 people (using three or four dining shifts, respectively) may be employed at Plant 8. However, this estimate may be high because one cafeteria (item 18) may not be operating to capacity. This cafeteria was recently connected to a fabrication/assembly building (item 19), and may not yet be at capacity because the fabrication/assembly building was just . Therefore, the estimates may reflect a plant population in 1986 or 1987. Additionally, not all of the people are involved in missile production. Some people are involved in the production of civilian products. On

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Summary

The evolution of Sverdlovsk Plant 8 has been an ordered one. The appropriate space and capabilities for systems currently being produced were added before they were needed. It was only recently that large increases in floorspace were needed at the plant. The increase in floorspace also apparently resulted in an increased need for heat and steam production. In the future, any increase in the floorspace of Plant 8 may be outside the boundaries of this facility, as it was with the branch of Plant 8 at Salda. Alternatively, any changes in production may warrant a retooling of existing buildings.

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Appendix B
Canister History

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Appendix B
Canister History

This appendix provides a chronology of the evolution of missile research, development, and production at Plant 8, from 1966 through 1985, by presenting the number of canisters observed on a sampled date from each year (table B1). A spring or early summer date was chosen to provide a baseline as nearly constant as possible. When that was not possible, the best available imagery for the year was used. This appendix was not designed to provide a means of determining production rates; at the present time, except for the SA-4 system, production rate estimates cannot be made from the numbers of canisters present in the yard because the canisters are probably empty. However, the numbers of canisters do give an appreciation for relative levels of activity over a long period of time. [redacted]

Organizational changes in the early 1970s necessitated modification of the transshipment yards to accommodate prototype and preseries production of a variety of new systems. This modification was most likely due to the increase in the responsibilities of the plant. A second modification of the transshipment yards occurred in the mid-1980s, possibly in anticipation of future systems. [redacted]

It should be noted that in the prototype or early limited production of systems such as the SS-N-16a, SS-N-15, GLADIATOR, GIANT, and the SH-08, the quantities of canisters were consistent with those seen in other years because those numbers represented the same canisters. The canisters were sometimes shifted within the yard but remained there. Those canisters were probably empty and remained at the plant for several years before being removed. The Soviets seem to follow very closely their practice of producing items in lots of fives and tens when in preseries production. [redacted] 25X1

Certain crates appeared to be uniquely associated with certain systems, while others remained unidentified or were probably used by several systems. Certain smaller component canisters observed at Sverdlovsk were also observed at naval missile storage areas, Emba MTC, and the branch at Verkhnyaya Salda. Determination of the specific function of these crates and canisters will require further study. [redacted] 25X1

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Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1965	—	—	—	—	—	—	—
1966							25X1
	SA-4 shipping canister	42	18	146	28	—	234
	SA-4 booster canister	—	—	—	17	—	17
1967							25X1
	SA-4 shipping canister	16	40	134	—	—	190
	SA-4 booster canister	—	—	50 poss	46	—	96
1968	—	—	—	—	—	—	—
1969							25X1
	SA-4 shipping canister	86	26	68	—	—	180
	SA-4 booster canister	8	28[b]	8	92	—	136
	crate	—	—	168	—	—	168 25X1
1970							25X1
	SA-4 shipping canister	36	[c]	[c]	[c]	—	36[c]
	SA-4 booster canister	10	[c]	[c]	[c]	—	10[c]
	long crate	—	[c]	[c]	[c]	—	[c] 25X1
1971							25X1
	SA-4 shipping canister	—	26	100	14	—	140
	SA-4 booster canister	18	40[b]	46	—	—	104
	long crate	—	—	—	—	—	— 25X1
1972							25X1
	SA-4 booster canister	—	105	33	—	—	138
	SA-4 booster canister	—	65	74	108	—	247
	modified SA-4 canister	—	9	—	—	—	9 25X1
	canister with bulbous end (BL-05)	—	12	—	—	—	12 25X1
	GLADIATOR prototype canister	—	5	—	—	—	5 25X1
	component canister	—	—	18	—	—	18 25X1

Footnotes appear at end of table.

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1965—No high-resolution imagery was available. [redacted] 25X1

1966--In 1966, both transshipment yards were crowded with equipment. The western transshipment yard had no roof cover, and SA-4 TELs, SA-4 shipping canisters, SA-4 booster canisters, and a large number of unidentified objects were shipped from there. The buildings in the eastern transshipment yard were much the way they appeared at the end of 1985. However, the area north of the rail line was much smaller in 1966 and provided only limited storage capacity. [redacted] 25X1
[redacted] 25X1

1967—Both transshipment yards remained crowded. Again, large numbers of unidentified objects were in the western transshipment area. No physical changes to the yards were apparent. [redacted] 25X1
[redacted] 25X1

1968—No usable imagery was available. [redacted] 25X1

1969—The eastern transshipment yard was crowded with SA-4 shipping canisters, while a relatively small number of canisters were in the western transshipment yard. A large number of unidentified crates were within the eastern transshipment area and, because of their location within a secured area, may have contained components of the SA-4. [redacted] 25X1

1970—A storage shed to house approximately 16 TELs had been constructed in the western transshipment yard, denying further accurate counts of vehicles. The southern portion of the eastern transshipment yard had been expanded. Unidentified material remained in the western transshipment yard. [redacted] 25X1

1971—The physical appearance of the transshipment yards remained unchanged. The absence of missile shipping canisters in the western transshipment yard continued until 1984. [redacted] 25X1

1972—This year marked the most noticeable year for physical changes in the eastern transshipment yard (figure B1). The secured area north of the rail line was greatly expanded. For the first time, prototype missile canisters were observed in this northern area, marking its beginning as a prototype yard. The three prototypes were the [redacted] modified SA-4 canisters, believed to contain 25X1
a prototype SS-N-16; the [redacted] canisters with a bulbous end, containing the BL-05 air- 25X1
dropped test vehicle; and an [redacted] GLADIATOR prototype canister. [redacted] 225X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1973							
	SA-4 shipping canister	[d]	84	122	[d]	—	206[d]
	SA-4 booster canister	[d]	6	6	[d]	—	12[d]
	modified SA-4 canister	[d]	9	—	[d]	—	9[d]
	canister with bulbous end (BL-05)	[d]	11	—	[d]	—	11[d]
	GLADIATOR prototype canister	[d]	—	—	[d]	—	[d]
1974							
	SA-4 shipping canister	—	30	76	—	—	106
	SA-4 booster canister	—	44	44	74	—	162
	modified SA-4 canister	—	1	—	—	—	1
	canister with bulbous end (BL-05)	—	4	—	—	—	4
	GLADIATOR prototype canister	—	2	—	—	—	2
	GLADIATOR prototype canister	—	4	—	—	—	4
	Small component canister	—	Numerous	—	—	—	Numerous
	crate	—	2	—	—	—	2
	crate[e]	—	2	—	—	—	2
	crate	—	1	—	—	—	1
	crate[e]	—	1	—	—	—	1
	crate	—	1	—	—	—	1
	crate	—	1	—	—	—	1
	crate	—	1	—	—	—	1
	crate (approx)	—	2	—	—	—	2
	crate	—	4	—	—	—	4
	crate (approx)	—	4	—	—	—	4
	Unid canister	—	—	2	—	—	2

25X1

1973—No apparent change to the eastern transshipment yard was observed. [redacted] 25X1

1974—A new addition to the TEL shed in the western transshipment yard had been constructed since 1972. No changes in the physical appearance of the eastern transshipment yard were observed; however, numerous small component canisters and crates of varying sizes were in the prototype area of the northern part of the eastern transshipment yard (figure B2). Crates of sizes similar to two of these crates ([redacted] were also observed in the SA-X-12 support area at Emba MTC in 1974.[redacted] 25X1 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1975							
	SA-4 shipping canister	—	45	68	—	—	113
	SA-4 booster canister	—	8	41	76	—	125
	modified SA-4 canister	—	7	—	—	—	7
	canister with bulbous end (BL-05)	—	9	—	—	—	9
	GLADIATOR prototype canister	—	8	—	—	—	8
	GIANT prototype canister	—	5[f]	—	—	—	5
	(approx) canisters	—	2[g]	—	—	—	2
	component canister	—	10	—	—	—	10
	unid canister	—	22	—	—	—	22
	Crate/round object	—	Numerous	—	—	—	Numerous

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1975—Foundations for the construction of an addition to the TEL shed and a shed over the rail transfer point in the western transshipment yard were observed. This year marked the first observation of the GIANT prototype canister ([redacted] in the prototype area of the eastern transshipment yard. Two four- or five-banded canisters that may be associated with the SS-N-15 were also in that yard. Shadows obscured what may have been the same types of crates as observed in 1974 (figure B3). In addition, round unidentified objects were first observed in 1975 and were still present through [redacted] 25X1 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1976							
	SA-4 shipping canister	—	6	24	—	—	30
	SA-4 booster canister	—	10	52	61	—	123
	long crate	—	19	55	—	—	74
	modified SA-4 canister	—	9	—	—	—	9
	canister with bulbous end (BL-05)	—	6	—	—	—	6
	GLADIATOR prototype canister	—	—	—	—	—	—
	GIANT prototype canister	—	5	—	—	—	5
	GLADIATOR prototype canister	—	3–5[h]	—	—	—	3–5[h]
	4- or 5-banded canister	—	25	1	—	—	26
	(approx) component canister	—	6	—	—	—	6
	(approx) component canister	—	2	—	—	—	2
	Crate/round object (various sizes include three types of square boxes seen at Emba)	—	Numerous	—	—	—	Numerous
	ABM canister	—	—	1[i]	—	—	1

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1976—The shed over the rail transfer point in the western transshipment area was complete. Additions to both ends of the TEL storage shed in that yard, as well as widening of an existing shed, were also complete. Six additional TELs may now be stored under cover. The prototype area of the eastern transshipment yard contained many different types and sizes of crates and canisters, while the southern portion was relatively empty of SA-4 shipping canisters. The large number of [redacted] canisters may have indicated that the SS-N-15 has entered series or preseries production. Also present were smaller component canisters, usually associated with naval ASW weapons. The SH-08 ABM canister was first observed in July 1976 and remained outside the secured area of the yard until the early 1980s. Prototype GLADIATOR canisters were no longer present in 1976. [redacted] 25X1 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1977							
	SA-4 shipping canister	—	—	53	—	—	53
	SA-4 booster canister	—	4	73	28	—	105
	long crate	—	29	130	—	—	159
	modified SA-4 canister	—	10	—	—	—	10
	canister with bulbous end (BL-05)	—	9	—	—	—	9
	GIANT prototype canister	—	4–5	—	—	—	4–5
	GLADIATOR canister	—	10–14[j]	—	—	—	10–14
	SS-N-15 canister	—	10	—	—	—	10
	SS-N-16a canister	—	2	—	—	—	2
	unid canister	—	2	—	—	—	2
	unid canister	—	3	—	—	—	3
	unid canister	—	5	—	—	—	5
	unid canister	—	7	—	—	—	7
	component canister	—	60	—	2	—	62
	component canister	—	9	13	—	—	22
	component canister	—	10	—	—	—	10
	Crate/round object	—	Numerous	—	—	—	Numerous
	ABM canister	—	—	1[i]	—	—	1[i]

25X1

25X1

1977—No changes to the physical appearance of the transshipment yards were observed in 1977. Fewer SA-4 shipping canisters were evident in the southern part of the eastern transshipment yard, and no SA-4 shipping canisters were evident in the northern prototype area (figure B4). The present-day configuration of the GLADIATOR canister and the SS-N-16a canister, both observed in the prototype yard, were confirmed. Large numbers of both [redacted]-long crates (possibly associated with SA-4s), [redacted] long component canisters (associated with naval weapons), as well as several unidentified canisters in the [redacted] range were observed within the prototype area. This year marked the first observation of [redacted] unidentified canisters. [redacted]

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Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1978							
	SA-4 shipping canister	—	8	115	—	—	123
	SA-4 booster canister	—	40	58	96	—	194
	long crate	—	20	294	36	—	350
	modified SA-4 canister	—	9	—	—	—	9
	canister with bulbous end (BL-05)	—	10	—	—	—	10
	GIANT prototype canister	—	5	—	—	—	5
	GLADIATOR canister	—	6 poss	—	—	—	6 poss
	SS-N-15 canister	—	37	1	—	—	38
	SS-N-16a canister	—	14	—	—	—	14
	unid canister	—	10	—	—	—	10
	unid canister	—	16	—	—	—	16
	Poss SUW-N-1 canister	—	9	—	—	—	9
	Poss SUW-N-2 canister	—	1	—	—	—	1
	component canister	—	—	—	—	—	—
	component canister	—	5	—	—	—	5
	Crate/round object	—	Numerous	—	—	—	Numerous
	ABM canister	—	—	1[i]	—	—	1
	unid canister	—	—	8	—	—	8

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25X1

1978—The area just north of the western transshipment yard was being cleared and prepared for the eventual construction of a large storage building that may be related to the transshipment of equipment. The eastern transshipment yard appeared to have reached a peak of activity. More types and numbers of equipment were present than ever before or since. The northern prototype area in the eastern transshipment yard appeared to have been divided, with one corner devoted to canisters for SAM prototypes and the remainder of the area occupied by naval weapons canisters. Large numbers of SS-N-15 canisters were again in this area, as well as substantial numbers of the production-configuration SS-N-16a canisters. Ten canisters of the SA-10 size range meters long) were in the northern prototype area, but identification could not be confirmed because they were canvas covered. This year also marked the identification of possible SUW-N-1 and SUW-N-2 (surface-to-underwater ASW missiles) canisters, which are not prototype or series produced at Plant 8. These canisters may have been involved with transportation of unidentified articles to the plant.

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Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1979							25X1
	SA-4 shipping canister	—	25	78	—	—	103
	SA-4 booster canister	—	12	74	159	—	245
	n-long crate	—	36	292	2	—	330 25X1
	-m modified SA-4 canister	—	2	—	—	—	2
	canister with bulbous end (BL-05)	—	—	—	—	—	— 25X1
	GIANT prototype canister	—	5	—	—	—	5 25X1
	GLADIATOR canister	—	2	—	—	—	2 25X1
	SS-N-15/16b canister	—	25[k]	—	—	—	25 25X1
	SS-N-16a canister	—	8	—	—	—	8 25X1
	unid canister	—	7	—	—	—	7 25X1
	unid canister	—	4	—	—	—	4
	unid canister	—	10	—	—	—	10
	unid canister	—	8	—	—	—	8
	Poss SUW-N-1 canister	—	10	—	—	—	10
	Poss SUW-N-2 canister	—	2	—	7	—	9
	-long crate	—	3	—	—	—	3 25X1
	-long crate	—	1	—	—	—	1
	-long, 3-banded crate	—	1	4	—	—	5
	-long crate	—	2	14	—	—	16
	-square crate	—	—	7	—	—	7
	unid canister	—	—	—	—	—	—
	component canister	—	5	8	13	—	26
	component canister	—	—	2	—	—	2
	ABM canister	—	—	1[i]	—	—	1

1979—No changes from the previous year were seen in the physical appearance of the yards. Construction continued on the large storage buildings in an area adjacent to the western transshipment yards. The numbers and positioning of the types of equipment in the prototype area of the eastern transshipment yard had changed significantly from the previous years. The numbers of the three types of prototype canisters observed in 1972 were greatly reduced. Conical-capped GIANT canisters, measuring [redacted] and other prototype canisters had been moved to the corner of the prototype yard. SA-4 shipping canisters were once again in the prototype area in sizeable numbers, while fewer SS-N-15 canisters were observed. [redacted] 25X1 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1980							25X1
	SA-4 shipping canister	—	5	43	—	—	48
	SA-4 booster canister	—	196[l]	38[l]	100	—	334
	long crate	—	—	262	138	—	400 25X1
	modified SA-4 canister	—	1	—	—	—	1 25X1
	GIANT canister	—	2	—	—	—	2 25X1
	GIANT prototype canister	—	5	—	—	—	5
	GLADIATOR/ SS-N-15/16b canister	—	28[m]	—	—	—	28[m] 25X1
	SS-N-16a canister	—	7	—	—	—	7 25X1
	Poss SUW-N-1 canister	—	6	—	—	—	6
	unid canister	—	8	—	—	—	8 25X1
	component canister	—	3	10	—	—	13 25X1
	component canister	—	—	18	—	—	18 25X1
	long crate	—	3	—	—	—	3
	long crate	—	1	—	—	—	1
	component canister	—	—	—	22	—	22
	canister without bands	—	—	—	6	—	6
	large-diameter canister	—	—	—	4	—	4 25X1
	ABM canister	—	—	1[i]	—	—	1

25X1

1980—The storage building in an area next to the western transshipment area was externally complete. The present-day configuration of the GIANT canister was first observed in the prototype yard during the year. Figure B5 shows the GIANT canisters in present-day configuration at Emba MTC. The Soviets began extensive use of canvas strips over prototype canisters to hide the banding and distinguishing canister features. Two transporters used to transport SH-08 ABM canisters were noted within the facility on [redacted] 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total	
1981								25X1
	SA-4 shipping canister	—	14	76[l]	—	—	90	
	SA-4 booster canister	—	—	25	42	—	67	
		—	68[b]	22[b]	—	—	90	
	long crate	—	—	142	210	—	352	25X1
	modified SA-4 canister	—	—	—	—	—	—	25X1
	GIANT canister	—	6	—	—	—	6	25X1
	GIANT prototype canister	—	4	—	—	—	4	
	GLADIATOR canister	—	13[n]	—	—	—	13[n]	25X1
	GLADIATOR/ SS-N-15/16b canister	—	11[m]	—	6[m]	—	17	25X1
	SS-N-15/ 16b canister	—	34	—	—	—	34	25X1
	component canister	—	1	—	9	—	10	25X1
	component canister	—	14	—	7	—	21	25X1
	component canister	—	1	—	—	—	1	25X1
	Poss SUW-N-1 canister	—	9	—	—	—	9	
	Poss SUW-N-2 canister	—	1	2	17	—	20	
	SS-N-16a canister	—	8	—	—	—	8	25X1
	unid canister	—	7	6	—	—	13	25X1
	component canister	—	—	25	13	—	38	
	Crate/round object	—	Numerous	—	—	—	Numerous	
	square crate	—	—	6	—	—	6	25X1
	long crate with 3 bands	—	—	3	—	—	3	
	ABM canister	—	—	1[i]	—	—	1	
	canister without bands	—	—	—	2	—	2	25X1
	large-diameter canister	—	—	—	7	—	7	25X1

25X1

25X1

1981—Both the eastern and western transshipment yards were crowded with SA-6 TELs/chassis and SA-6/-11 chassis. It appears that some rearrangement of SA-4 shipping canisters and SS-N-15s in the prototype area of the eastern transshipment yard was necessary. Low numbers of SS-N-16a canisters continued to be observed. During the latter part of the year, three additional ABM canisters were within the prototype area of the eastern transshipment yard, and one additional ABM canister was outside the secured area.

25X1

25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1982							25X1
	SA-4 shipping canister	—	14	200[l]	—	—	214
	SA-4 booster canister	—	20[b]	59	36	—	115
	-long crate	—	—	51	50	—	101 25X1
	GIANT canister	—	5	—	—	—	5 25X1
	GIANT prototype canister	—	5	—	—	—	5
	GLADIATOR canister	—	16	—	—	—	16 25X1
	GLADIATOR/ SS-N-15/16b canister	—	13[m]	—	—	—	13[m] 25X1
	SS-N-15/ 16b canister	—	31	—	—	—	31 25X1
	SS-N-16a canister	—	13	—	—	—	13 25X1
	Poss SUW-N-1 canister	—	11	—	1	—	12
	Poss SUW-N-2 canister	—	4	—	—	—	4
	component canister	—	11	7	5	—	23 25X1
	component canister	—	—	—	—	—	— 25X1
	component canister	—	—	—	13	—	13 25X1
	component canister	—	—	—	—	—	— 25X1
	canister without bands	—	—	8	2	—	10
	large-diameter canister	—	—	—	4	—	4
	Unid canister	—	6	—	—	—	6
	-long crate	—	1	—	—	—	1 25X1
	ABM canister	—	8[o]	3	—	—	11

25X1

25X1

1982—The first expansion since 1972 began at the eastern transshipment yard. An area south of the yard, usually associated with rejected material, was made smaller in order to provide more space for access into a smaller storage building within the secured area. The fenceline in the northern prototype area was being extended. Large numbers of SA-4 canisters were again evident in the southern area of this transshipment yard, while all other quantities of canisters remained about the same as prior years, with the exception of the large influx of ABM canisters, both inside and outside the secured area. Four of the ABM canisters within the secured area were covered with canvas—possibly an attempt to conceal the exact measurements of the canister.

25X1
25X1

25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1983	[redacted]						25X1
	SA-4 shipping canister	—	—	10[p]	—	—	10[p]
		—	—	18	44	—	62
	SA-4 booster canister	—	—	1[p]	—	—	1[p]
		—	1	30	23	—	54
	[redacted] long crate	—	—	4	21	—	25 25X1
	[redacted] GIANT canister	—	6	—	—	—	6 25X1
	[redacted] GIANT prototype canister	—	4	—	—	—	4
	[redacted] GLADIATOR canister	—	10[q]	—	—	—	10 25X1
	[redacted] GLADIATOR/ SS-N-15/16b canister	—	—	—	4	—	4 25X1
	[redacted] SS-N-15/ 16b canister	—	45[r]	3	—	—	48 25X1
	[redacted] SS-N-16a canister	—	45[s]	3[p]	—	—	48 25X1
	Poss SUW-N-1 canister	—	—	1[p]	21	—	22
	Poss SUW-N-2 canister	—	—	1[p]	12	—	13
	[redacted] component canister	—	—	10	15	—	25 25X1
	[redacted] component canister	—	2	—	—	—	2
	[redacted] component canister	—	—	4	2	—	6 25X1
	[redacted] component canister	—	—	2[p]	24	—	26 25X1
	[redacted] canister without bands	—	—	5	4	—	9 25X1
	[redacted] long crate with banded ends	—	—	—	18	—	18 25X1
	[redacted] long crate	—	—	—	1	—	1 25X1
	ABM canister	—	2	—	1	—	3
		—	6[b]	2[b]	—	—	8[b]
	[redacted] unid canister	—	6	—	—	—	6 25X1
	[redacted] long crate (not square)	—	—	—	13	—	13

1983—No physical changes to the western transshipment yard were observed, and work on extending the fenceline in the eastern transshipment yard was proceeding at a very slow pace. The prototype canisters in the prototype area had been moved to an area next to the rail line. The [redacted] 25X1 ter GLADIATOR canisters and pieces of GLADIATOR canisters had been moved to an area between the two spurs that lead into the yard. ASW canisters had been placed against the wall and arranged in groups of six and 12. The relatively high number of SS-N-16a canisters indicated that series production was well under way. At this time, it was difficult to determine whether the ASW canisters in the prototype area of the eastern transshipment area were empty or full. The low numbers of SA-4 canisters in the secured areas within the facility indicated a probable cessation of SA-4 production during the year. [redacted] 25X1

25X1

Table B1
Representative Sample of Canister Activity and Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
1984							
	SA-4 shipping canister	—	—	4[p]	—	—	4[p]
	SA-4 booster canister	—	5	—	—	—	5
	long crate	—	—	—	—	—	—
	GIANT canister	—	7	12	—	—	19
	GIANT prototype canister	—	—	—	—	—	—
	GLADIATOR canister	—	—	4 poss	—	—	4 poss
	SS-N-15/ 16b canister	— —	51 —	47 8[p]	4 —	2 —	104 8[p]
	SS-N-16a canister	—	24	5	—	8	37
	Poss SUW-N-1 canister	— —	4 —	20 2[p]	17 —	9 —	50 2[p]
	Poss SUW-N-2 canister	— —	4 —	11 13[p]	4 —	— —	19 13[p]
	component canister	—	—	14[p]	16	6	36
	component canister	—	—	24	—	—	24
	component canister	—	—	—	22	—	22
	component canister	—	—	22	12	—	34
	canister without bands	—	—	—	—	—	—
	long crate with banded ends	—	—	—	16	—	16
	Crate, including square crate	—	—	33	—	—	33
	long thin crate	—	—	—	3	—	3
	long thin crate	—	—	—	4	—	4
	GLADIATOR/ 15/16b canister	—	14	—	—	—	14
	poss SA-10 canister	—	—	3	—	—	3

25X1

25X1

Table B1 (continued)

Year	Date Type Canister	Western Transship Yard	Eastern Transship Yard North of RR	Eastern Transship Yard South of RR	Other Areas Within Facility	Area Next to Western Transship Yard	Total
	unid canister	—	—	6	—	—	6
	ABM canister	—	6[b]	1[b]	—	—	7[b]
		—	6	1	—	—	7

25X1

1984—Empty ASW missile canisters were stored in an area next to the western transshipment yard (figure B6). Square crates, similar in size to those seen in the SA-X-12 area at Emba MTC, were observed in abundance. Large numbers of SS-N-15/16b canisters were in the discarded canister area, and four SA-4 canisters had been in the discarded canister area for nearly a year.

25X1
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25X1

25X1

Table B1 (continued)

25X1

[a]One date per year was selected to represent canister counts and activity for that year. Selections were made based on availability of imagery of good interpretability. In some cases, the imagery used represented the only imagery available for that year.
[b]Outside secured area.
[c]Imagery blurred and accurate counts were not possible; however, there appeared to be approximately the same number as prior years.
[d]Some canisters may have been present; however, some areas were obscured by clouds.
[e]May actually be two crates stacked one on top of another.
[f]An GIANT prototype canister was first observed on the end was conical capped.
[g]First observation of the 4- or 5-banded canister associated first with the SS-N-15 and later, the SS-N-16b and SS-NX-21/SSC-X-4.
[h]Appeared to be three GLADIATOR canisters and pieces of two more.
[i]ABM/SH-08 canister first observed on remains outside the secured area of the yard.
[j]First confirmed observation of the present-day configuration of the GLADIATOR canister.
[k]Some and perhaps all of the canisters in this size range have five rather than the four stacking rings observed in prior years. Following the deployment pattern of the SS-N-16a, this would be an appropriate time to see the SS-N-16b.
[l]Some of these are outside the secured area.
[m]Could not distinguish between the GLADIATOR and the SS-N-15/16b.
[n]This figure represents ten GLADIATOR canisters plus pieces of three other GLADIATOR canisters divided two-thirds to one-third.
[o]Three were outside the secured area.
[p]In canister rejection area.
[q]As in prior years, there were five GLADIATOR canisters and pieces of five more.
[r]Stacked in groups of 12, six, and three.
[s]Stacked in groups of six for the most part.

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Appendix C

TEL/TELAR History

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Appendix C
TEL/TELAR History

This appendix is designed to provide indications of the evolution of launcher assembly work on several SAM chassis, including the SA-4 TEL, SA-6 TEL, both TELARs and transloaders for the SA-X-12 GLADIATOR, and the SA-6/-11 TELAR (table C1). Physical changes in the appearance of the transshipment yards are detailed in the descriptive section of Appendix B. The sample dates chosen for every year were the same as those used in Appendix B. This appendix was not designed to provide a means of determining production rates, a task that would be nearly impossible because one-half of the western transshipment yard is under roof cover. Analysis of the types and amounts of equipment observed indicates whether series production of a particular system is under way, as well as to what extent Plant 8 is involved in the assembly of ground support equipment.

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Table C1
Representative TEL/TELAR Counts[a] at Sverdlovsk Guided Missile Production Plant 8

Year	Date Type Equipment	Western Transship Yd	Eastern Transshipment Yard North of RR	 South of RR	Other Areas Within Facility	Total
1965	—	—	—	—	—	—
1966						25X1
	SA-4 TEL	30	—	—	—	30
1967						25X1
	SA-4 TEL	28	—	—	—	28
1968	—	—	—	—	—	—
1969						25X1
	SA-4 TEL	14	—	—	—	14
	SA-6 TEL	3	—	—	—	3
1970						25X1
	SA-4 TEL	9–15	—	5	—	14–20[b]
	SA-6 TEL	5[b]	—	—	—	5[b]
1971						25X1
	SA-4 TEL	—	—	—	—	—
	SA-6 TEL	16 poss	—	—	—	16 poss
1972						25X1
	SA-4 TEL	—	—	—	—	—
	SA-6 TEL	2	—	—	—	2
1973						25X1
	SA-4 TEL	[c]	—	—	[c]	[c]
	SA-6 TEL	[c]	—	—	[c]	[c]
1974						25X1
	SA-4 TEL	5	—	—	—	5
	SA-6 TEL	2	—	—	—	2
	SA-6 chassis	3	—	—	—	3
1975						25X1
	SA-4 TEL	4	—	—	—	4
	Unid vehicle	2	—	—	—	2
1976						25X1
	SA-4 TEL	2	—	—	—	2
	SA-6 TEL	2	—	—	—	2

Footnotes appear at end of table.

25X1

25X1

1965—No high-resolution imagery was available. 25X1

1966—The lack of roof cover provided an accurate count of 30 SA-4 TELs. 25X1

1967—The number of SA-4 TELs was about the same as in 1966. 25X1

1968—No usable imagery was available. 25X1

1969—SA-6 TELs were first observed, while half the number of SA-4 TELs observed in prior years were present. 25X1

1970—Imagery of poor interpretability and construction of a TEL shed in the western transshipment yard precluded further accurate counts of TELs. This was the first year that TELs were seen in the eastern transshipment yard. 25X1

1971-1972—SA-6 TELs were visible in the western transshipment yard in such numbers as to indicate the start of series production. Figure C1 shows SA-6 TELs in 1985. 25X1

1973—The western transshipment yard was cloud covered. 25X1

1974—SA-4 TELs were again seen in the western transshipment yard. 25X1

1975—Two unidentified vehicles were in the western transshipment yard. 25X1

1976—Low numbers of both SA-4 and SA-6 TELs were observed. 25X1

25X1

Table C1
Representative TEL/TELAR Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date / Type Equipment	Western Transship Yd	Eastern Transshipment Yard North of RR	Eastern Transshipment Yard South of RR	Other Areas Within Facility	Total
1977						
	SA-4 chassis	7	—	—	—	7
	SA-6 TEL	7	—	—	—	7
1978						
	SA-4 chassis	8 poss	—	—	—	8 poss
	SA-6 chassis	13	—	—	—	13
1979						
	SA-4 chassis	5	—	—	—	5
	SA-6 chassis	13	—	—	—	13
1980						
	SA-4 chassis	4 poss	—	—	—	4 poss
	SA-6 TEL	8	6[d]	—	—	14
	SA-6 chassis	12	—	—	—	12
1981						
	SA-6 TEL	10	11[e]	—	—	21
	SA-6 chassis	26	—	—	—	26
	SA-6/-11 chassis	13	8[e]	—	—	21
1982						
	SA-6 TEL	8	8	—	—	16
	SA-6 chassis	24	—	—	—	24
	SA-6/-11 chassis	9	—	—	—	9
	SA-X-12 chassis	3	—	—	—	3
1983						
	SA-6 TEL	19	14	—	—	33
	SA-6 chassis	6	—	—	—	6
	SA-6/11 chassis	10	4	—	—	14

1977—SA-6 TELs were observed on flatbed railcars; others were observed on a loading ramp.

1978—Only the chassis for the SA-4 and SA-6 were visible in western transshipment yard.

1979—An SA-4 TEL was last observed at the plant in February. SA-4 chassis, however, continued to be observed during the year, and possible chassis were occasionally observed in subsequent years.

1980—SA-6/-11 chassis were observed at Sverdlovsk for the first time. On , two SA-6/-11 chassis were in the western transshipment yard.

1981—Twice the number of SA-6 TELs and SA-6 chassis were observed this year as compared to the previous year; this was three times the number of SA-6 vehicles observed in 1979. This high number continued to be seen through 1983. The large number of SA-6/-11 chassis in the eastern and western transshipment yards indicated that series production was under way.

1982—SA-X-12 chassis were first observed on (Figure C2 shows a canvas-covered SA-X-12 chassis in 1985.) One SA-X-12 TELAR/transloader may actually have been present on

1983—Although no GLADIATOR TELARs/transloaders were evident on sampled imagery, one or two were seen on numerous occasions in January 1983 and after. From this imagery, we were able to determine that the cradles for the launcher are attached to the chassis at Plant 8 and must be re-configured slightly before shipping (figure C3).

25X1

Table C1
Representative TEL/TELAR Counts[a] at Sverdlovsk Guided Missile Production Plant 8 (continued)

Year	Date Type Equipment	Western Transship Yd	Eastern Transshipment Yard North of RR	 South of RR	Other Areas Within Facility	Total
1984						
	SA-6 TEL	15	—	5	—	20
	SA-6/-11 chassis	8	—	—	—	8

25X1

25X1

[a]One date per year was selected to represent TEL/TELAR counts and activity for that year. Selections were made based on availability of imagery of good interpretability. In some cases, the imagery used represented the only imagery available for that year.
[b]Poor imagery precluded an accurate count.
[c]Cloud covered; equipment count not possible.
[d]These six are on railcars outside secured area.
[e]First observation of TELs and chassis in this part of the eastern transshipment area.

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1984—No significant activity was observed.

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Appendix D

A Branch of Sverdlovsk Plant 8— Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility

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Appendix D
A Branch of Sverdlovsk Plant 8—Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility

We believe that the Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility, 17 km northeast of the town of Verkhnyaya Salda, is the Salda branch of Plant 8 (figure D1 and table D1). Construction of this facility began in 1975 and proceeded very slowly until its completion in October 1981. The facility contains an operations area and a support area. The operations area has 25 buildings within one board and three wire fences. 25X1

25X1

The operations area contains one large fabrication/assembly building (item 6; figure D1 and table D1), one assembly building (item 23), seven separately revetted crane-served buildings (items 7 through 13), two revetted transshipment buildings (items 5 and 14), three revetted storage buildings (items 18 through 20), three component storage buildings (items 15, 17, and 21), two bunkered storage buildings (items 24 and 25), one vehicle maintenance building (item 22), and five miscellaneous support buildings (items 1 through 4 and 16). The support area outside the eastern fenceline contains a steamplant, electrical substation, POL storage facility, fire station, separately secured water storage, five support buildings, and an administration building. A military housing area, 3 km south of the operations and support areas, was constructed concurrently with the Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility. 25X1

25X1

Construction of two storage buildings (items 19 and 20) began in the operations area in October 1983. The buildings were completed in May 1984 and January 1985, respectively. A roof was constructed over the crane at the fabrication/assembly building (item 6) in July 1984. In March 1985, construction began on the two sections of the assembly building, which is possibly the "building 11" mentioned previously (item 23). The sections under construction (items 23c and d) may become

25X1

Table D1
Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility
(Items keyed to Figure D1)

Item	Function	Dimensions (m)			Floorspace (sq m)	Construction Began	Construction Externally Complete	Remarks
		L	W	H				
1	Support bldg	30	18	10	540	1975	Jan 78	
2	Support bldg	25	13	9	325	1975	Jan 78	
3	Support bldg					1975	Jan 78	
a	section	24	18	8	432			
b	section	18	15	4	270			
4	Support bldg					1975	Jan 78	
a	section	14	12	5	168			
b	section	14	3	4	42			
5	Transshipment bldg	73	24	15	1,752	1975	Aug 78	Revetted
6	Fab/assembly bldg							
a	fab/assembly section	131	55	11	7,205	Jun 80	—	
b	roof over crane	47	18	13	846	Jul 84		
7	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
8	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
9	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
10	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
11	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
12	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
13	Crane-served bldg		irregular			1975	Dec 80	Revetments completed May 81
14	Transshipment bldg	37	25	11		Jan 78	Jun 81	Revetted
15	Component storage bldg	25	19	13	475	Jan 78	Oct 81	
16	Support bldg	18	6	4	108	Aug 78	Nov 78	

25X1

25X1

Table D1
Verkhnyaya Salda Probable Missile Fabrication/Assembly Facility (continued)

Item	Function	Dimensions (m)			Floorspace (sq m)	Construction		Remarks
		L	W	H		Began	Externally Complete	
17	Component storage bldg	25	19	13	475	Oct 77	Oct 81	
18	Storage bldg	12	12	9	144	May 78	Oct 81	Revetted
19	Storage bldg	25	25	15	625	Oct 83	May 84	Revetted
20	Storage bldg	19	12	10	228	Oct 83	Jan 85	Revetted
21	Component storage bldg	18	13	10	234	May 84	Jan 85	
22	Vehicle maintenance bldg	40	20	8	800	Mar 80	Jul 81	
23	Assembly bldg							
a	assembly section	73	37	17	2,701	Jan 78	Oct 81	
b	support section	37	7	5	259	Jan 78	Oct 81	
c	section	22	13	—	286	Mar 85	—	Ucon
d	section	19	19	—	361	Mar 85	—	Ucon
24	Storage bldg	13	4	6	52	May 78	Oct 81	Bunkered
25	Storage bldg	13	4	6	52	May 78	Oct 81	Bunkered

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the needed control and paint rooms. A trench now extends between the assembly and the fabrication/assembly buildings, possibly for cables. The assembly building is not rail served. (

Rail activity was first observed in June 1982 (table D2), when five gondola railcars carrying light-toned objects were present. In August 1983, nine 24-meter, missile-associated railcars were observed. Increased rail activity began in October 1983, when both 24-meter and gondola railcars were present.

Canisters were first observed in May 1982, when possible component canisters were seen outside a component storage building (item 17). On two canisters were at the transshipment building (item 14), and two canisters were also under the crane at the fabrication/assembly building (item 6) on A canister near the assembly building (item 23) on

figure D2), may contain the object with the crack in the ring and filler that was mentioned in two canisters were outside the assembly building (item 23). On possible GLADIATOR canisters were observed under the roof-covered crane at the fabrication/assembly building (figure D3). On

Table D2
Highlights of Activity at Verkhnyaya Salda
Probable Missile Fabrication/Assembly Facility
1981–1985

Activity/Items Observed	Date	Remarks
Construction		Facility appeared complete
unid canister		Approx seven poss component canisters were outside a component storage bldg
gondola railcars		Railcars first observed; five railcars with objects inside were outside the facility rail entrance
Gondola railcars		At least two with light-toned objects by the transshipment building
unid canisters		Two canisters by the transshipment bldg
unid canister and unid canister		Canisters under crane at the fab/assembly bldg
unid canister		Near assembly bldg
unid canister		Two canisters outside the assembly bldg

25X1

Table D2
Highlights of Activity at Verkhnyaya Salda
Probable Missile Fabrication/Assembly Facility
1981–1985 (continued)

Activity/Items Observed	Date	Remarks
24-meter, missile-associated railcar		Nine railcars on rail tracks to fab/assembly bldg
24-meter, missile-associated railcars and gondola railcars		Approx ten 24-m railcars and nine gondola railcars with light-toned objects present
24-meter railcars and gondola railcars		Nine 24-m railcars outside facility; four 24-m railcars in facility; six gondola railcars with light-toned objects and two without (within facility)
Unid crates		First time observed by revetted, crane-served bldgs
Two unid crates		Under crane at fab/assembly bldg
Unid crates		First observed by fab/assembly bldg
Roof constructed over crane at fab/assembly bldg		
unid canister		First appearance of unid component at a component storage bldg
unid canister		High counts of unid component canisters at two component storage bldgs

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