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No 88

Economic Research Aid

AN EXAMINATION OF THE POSSIBILITY OF MISSILE PRODUCTION AT URALMASH IN THE USSR AS OF 1962

CIA/RR A.ERA 62-5

September 1962

CENTRAL INTELLIGENCE AGENCY
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Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

CONTENTS

Appendixes

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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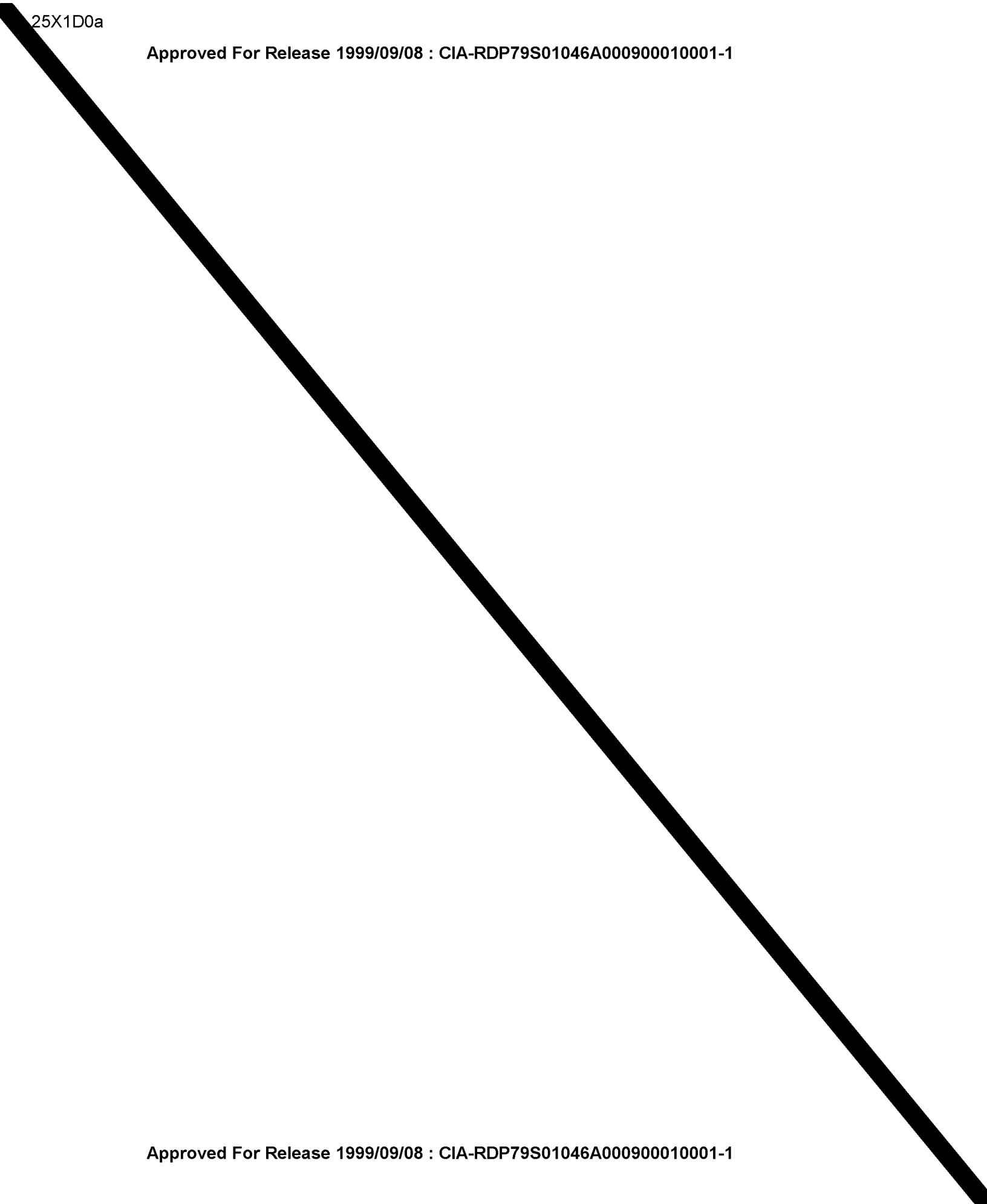
Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1



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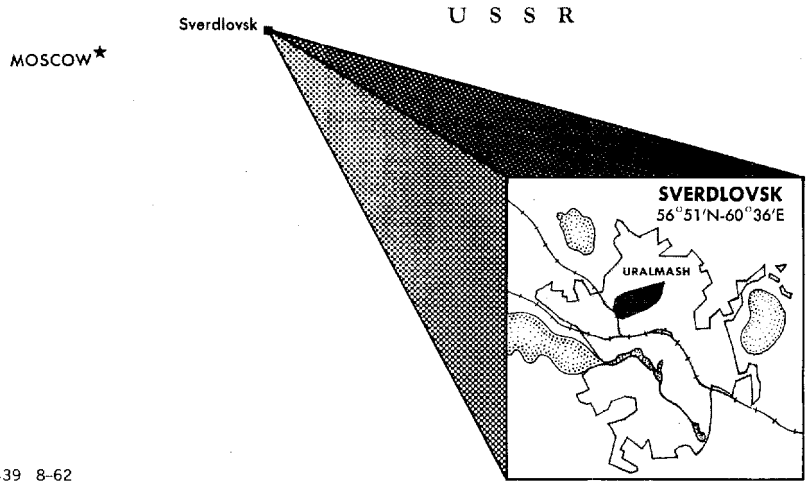
Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

AN EXAMINATION OF THE POSSIBILITY OF MISSILE PRODUCTION AT URALMASH IN THE USSR AS OF 1962*

Summary and Conclusions

The Ural Heavy Machine Building Plant imeni Ordzhonikidze (Uralmash) in Sverdlovsk in the USSR (see the accompanying map) probably is not engaged in production of guided missiles or their components. Production facilities at Uralmash can be used best for production of heavy machinery, and, indeed, some of the major facilities cannot be adapted to any other use. The personnel are specialized and experienced in production of heavy



* The estimates and conclusions in this research aid represent the best judgment of this Office as of 1 September 1962.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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machinery, and such employment represents the optimum utilization of their competence. Uralmash, producer of a major part of the machinery of basic industry in the USSR, has been committed to production of such large quantities of heavy machinery that only the completion of new facilities now under construction will permit it to fulfill these tasks within the time limits set by the Seven Year Plan (1959-65).

The new production buildings, as well as previously existing facilities, are intended for the casting, forging, welding, machining, and assembly of heavy machinery. Artillery Plant No. 9 imeni Stalin, once an independent plant, is now fully integrated with the facilities of Uralmash in production of civilian heavy machinery. A study of all information pertaining to each major building of Uralmash provides no reason to believe that missiles or missile components are being produced in these buildings.

The management and engineering staffs of Uralmash still consist of people who have always been associated with the fabrication of heavy machinery from iron and steel. That 20 percent of the total employment of Uralmash is composed of engineers and technologists suggests that the plant has a product with a complex technology, a circumstance which would be true of production of missiles. The staffing of Uralmash with such a high proportion of technically trained personnel is necessary, however, because of the complexity of its known civilian products, many of which are made to new specifications for each new customer.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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I. Introduction

Serious concern has been expressed over the possibility that the Ural Heavy Machine Building Plant imeni Ordzhonikidze (Uralmash) in Sverdlovsk in the USSR has become involved in production of guided missiles or their components. Whether the use of the facilities of Uralmash is logical or feasible for such production is at issue. Through analysis of the facilities and operations of Uralmash, this research aid attempts to clarify the position of this giant machine building plant in the Soviet missile program and to draw pertinent conclusions.

II. General

Uralmash shares with the Novokramatorsk Heavy Machine Building Plant in Kramatorsk the distinction of being one of the two largest heavy machine building plants in the USSR. As the list of products in Appendix C* indicates, Uralmash makes machines that are among the largest and heaviest kinds and has, therefore, large shops and equipment. The plant is still being expanded, and employment is estimated to have increased from 16,000 persons in 1958 1/** to about 20,000 in 1962. About 20 percent of the total employment consists of engineers and technicians. 2/ The plant makes its own forgings and castings of all the metals, machines and assembles the parts, and purchases from others mostly common items such as antifriction bearings, bolts, rivets, and electrical components.

An aerial photograph of Uralmash (see Figure 1***) taken in July 1959 permits correlation of various reports on the layout of the plant and the identification of most of the main shops. All production areas sufficient in size to accommodate a significant missile production activity have been accounted for. For reference purposes the facilities of the plant are shown in outline in Figure 2.*** By 1959 the following main shops either had been visited by Western engineers or had been mentioned by the plant management or the Soviet press:

- 1 cast iron foundry
- 1 steel foundry
- 2 pattern shops
- 1 forge shop
- 5 shops for the fabrication of structural steel
- 3 machine shops
- 1 powerplant with a capacity of 20,000 kilowatts
- 1 gas generating plant
- 1 maintenance shop for tools and equipment
- 1 building maintenance shop
- 1 instrument maintenance shop

* P. 17, below.
** For serially numbered source references, see Appendix G.
*** Inside back cover.

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Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

Appendix B* gives pertinent details of the equipment installed in those shops that have been visited by Western engineers in recent years.

From 1942 until 1958, Artillery Plant No. 9 imeni Stalin, which produced field and tank artillery during and after World War II, occupied several shops within the Uralmash compound (see Appendix A**). Its facilities are now incorporated into Uralmash. 3/

III. Employment of Facilities

A. General

The buildings and machinery of Uralmash are specially designed for fabricating very large, heavy machinery of iron and steel. The 50-ton*** and 75-ton cranes with which the machine, welding, and assembly shops at Uralmash are equipped would be wasted if those shops were converted to production of missiles. The weight of a completely assembled first stage (largest complete section) of a two-stage ICBM with a thrust of 500,000 pounds does not exceed 7 tons and can be easily suspended from tramrail cranes or transported on lightweight, rubber-tired cradles. 4/ Only one building, No. 62 in Figure 2,† is high enough to be considered as a possible area for vertical testing of assembled ICBM's. Its highest bay is 125 feet high, 600 feet long, and 130 feet wide, too large an area to devote to missile testing purposes. 5/ Moreover, the facts that the rest of the building is used for fabrication of large machinery and that there is a large outside storage yard for heavy steel (No. 65 in Figure 2) adjacent to the high bay indicate that the building probably is not used for missile production activities.

Uralmash has a department for casting aluminum and other nonferrous metals. All evidence indicates that its output consists of permanent patterns and core boxes for use in the foundries and of aluminum components for the usual products of the plant. 6/ Production of airframe or missile engine parts of titanium, aluminum, magnesium, or other materials associated with missile design has never been reported at Uralmash.

The research, design, and technological training institute organized by Uralmash is oriented entirely toward the design and production of heavy machinery and has the following design bureaus: (1) rolling mill equipment, (2) heavy hydraulic presses, (3) oilfield drilling

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* P. 11, below.

** P. 9, below.

*** Tonnages are given in metric tons thoughout this research aid.

† Inside back cover. For more details on Building No. 62, see Appendix B.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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equipment, (4) mining machinery, and (5) electric drives and automation. 7/ This orientation does not provide for development or production of missiles.

Uralmash, in common with other heavy machine building plants, has the capability to produce forgings for missile assembly plants. Its hammers and presses can produce large free forgings and small closed-die forgings of steel. It is not equipped with large extrusion presses (up to 20,000 tons of pressure) needed to produce aluminum skin sections, although such presses are produced by Uralmash for others.

B. Floorspace

At present, 40 percent of the approximately 121 acres of production area at Uralmash are occupied by foundry, forge, and heat treating shops that are uniquely designed for performing basic manufacturing processes on parts for heavy machinery and are not convertible to any other production processes. The areas of the plant devoted to machining and assembly of the semifabricated product of the foundries and forges are no more than adequate for that task, and if any major part of these areas were converted to production of missiles, Uralmash probably would be unable to finish and assemble a large part of the product of its foundry and forge shops. Typical scenes in production shops at Uralmash are shown in Appendix D.*

IV. Characteristics of the Staff

The engineering department at Uralmash has no apparent capability for the design or production of guided missiles or their components. The training and the experience of the designers and production engineers at Uralmash have given the plant a capability for producing heavy machinery to customer specifications. The director, the chief engineer, the chief designer, the assistant chief engineers, and the deputy chief designers all have been employed in heavy machine building (most of them in Uralmash) for many years. By 1960, of a total of almost 20,000 employees, there were nearly 4,000 diploma-holding engineers and technicians at Uralmash, many of whom were former Uralmash employees who had earned credits in night classes at Uralmash's own institute. The Uralmash management defends the 1 to 5 ratio of engineers to total employees as not unusually high for a plant that must design and build such a wide variety of heavy machinery. 8/

V. Mission of Uralmash

Uralmash was conceived originally as the basic heavy machine building plant of the Urals industrial region which would draw on the natural resources of the Urals region and the heavy machine products of which would

* P. 19, below.

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support the further growth of heavy industry, not solely in the Urals but in the entire USSR. Since the first stage of construction was completed in 1933, the plant has been expanded several times to provide increased amounts of heavy machinery for the expansion of basic industry in a rapidly growing economy.* As the representative list of present-day products contained in Appendix C** indicates, the original orientation of the mission of Uralmash has been retained.

In 1957, 80 percent of the Soviet output of crude oil was extracted by oil-well drilling equipment produced by Uralmash, and, in 1959, 90 percent of all deep oil-well drilling in the USSR was accomplished with Uralmash equipment. The plant produced more than 90 percent of the agglomeration machinery and more than 75 percent of the blast furnaces that were in operation in the USSR in 1957. During the period of the Seven Year Plan (1959-65), the plant is required to increase production of rolling mill equipment by 150 percent, of crushing and grinding equipment by almost 50 percent, of excavators by 50 percent, and of large walking draglines by 300 percent. Of the 50 new rolling mills to be installed under the Seven Year Plan, Uralmash is to produce 39. 9/ The planned original capacity of Uralmash was 100,000 tons of finished heavy iron and steel products per year. 10/ By 1959, production actually reached 150,000 tons. 11/ The present expansion of plant facilities is intended to result, by 1965, in production which will be twice that of 1958. 12/

The intentions of the Soviet government toward the development of Uralmash were summed up by A.B. Aristov, former member of the Presidium of the Communist Party, who spoke at the plenary session of the Party in June 1959 of the urgent need to expand and reconstruct the Uralmash plant, as follows 13/: "For the time being, we have no other heavy machine building plants as large as the Uralmash and Novokramatorsk plants. To build similar plants elsewhere would require many years and would necessitate large capital investments." An hypothesis that the plant is engaged in production of missiles or their components is not consistent with its importance as a supplier of heavy machinery to basic industry or with its commitment to increase greatly such production.

The continuous publicity that Soviet news media give to Uralmash is in itself an indicator that Uralmash probably is not engaged in production of missiles. The plants whose involvement in production of missiles

* During World War II, Uralmash produced tanks, self-propelled guns, and medium artillery, the latter item in Artillery Plant No. 9, with personnel (and probably also with equipment) evacuated from other plants that were in the path of the German advance (see Appendix A, p. 9, below).

** P. 17, below.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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has been well established by intelligence research are rarely mentioned in the Soviet press.

VI. Conclusions

All evidence pertaining to the activities, facilities, technical competence, and mission of Uralmash indicates that it is not engaged in production of missiles or their major components and that such activity would constitute economic waste and would jeopardize the assignment of the plant to supply basic industry with the equipment which is essential to the continued growth of the entire Soviet economy.

All its equipment -- cranes, machine tools, foundry and forging equipment, metallurgical furnaces, and heat treating facilities -- are inappropriate to production of missiles and would be wasted in that sort of work. Not a single production building in the plant is properly designed for production of missiles. Those buildings that have sufficient floor area to engage in production of missiles are filled with heavy machine tools. None of the structural assembly shops has sufficient area for production of missiles. All shops are sturdily built to carry heavy loads and are equipped with overhead cranes with a carrying capacity of 50 tons or more. Apart from other considerations, the use of these special, heavy-duty buildings for production of missiles would be a waste of resources.

The expansion of facilities now taking place at Uralmash is required if the plant is to carry out the increased workload placed on it by the Seven Year Plan. The new facilities, like the older ones, are designed for production of heavy machinery and would be inappropriate for production of missiles.

The engineering staff is devoid of experience in the design or production of airframes or of jet and rocket engines. The organization of the engineering department does not provide a section that might even be suspected of engagement in the development or production of missiles.

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APPENDIX A

ARTILLERY PLANT NO. 9

Artillery Plant No. 9 imeni Stalin existed within the Uralmash compound from 1942 until 1958, when it became an integral part of the Uralmash facilities. 14/ During its existence as a separate entity, it apparently consisted primarily of Building No. 58 and nearby small shops. German prisoners of war knew it as Shop No. 9, or Tsekh (shop) imeni Stalin. 15/ It was established in 1942 with a management independent of Uralmash and was staffed with employees from sections of Uralmash as well as with personnel from Plant No. 221 in Stalingrad and from Plant No. 8 in Sverdlovsk. 16/ During World War II, Plant No. 9 produced 30,000 pieces of field and tank artillery, 17/ probably with the assistance of the Uralmash steel foundry and forge. While continuing to turn out guns in 1946, Plant No. 9 began to produce equipment for the oil and coal industry, 18/ an indication that it was cooperating in the civilian production program of Uralmash. The continuance of Plant No. 9 in production of artillery until 1954 is deduced from the fact that its Stalin-Prize-winning gun designer, F.F. Petrov, was mentioned in the Soviet press as chief designer in 1954. In 1947 the assembly operations for tanks and self-propelled guns were transferred from Uralmash to Artillery Plant No. 9, and thereafter, until the last instance of observation by the German prisoners of war, Plant No. 9 was the only site of assembly of guns, tanks, and self-propelled guns within Uralmash. 19/ Plant No. 9 has not been publicly mentioned in recent years and was made a permanent part of Uralmash in 1958. 20/

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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APPENDIX B

DESCRIPTION OF FACILITIES AT URALMASH

Uralmash is a complete manufacturing complex and makes virtually every part that goes into its products, except for such items as electrical equipment and common sizes of bearings and bolts. Uralmash has its own powerplant, gas generating station, trucks, railroad cars and locomotives, and quarries for foundry sand. In addition to its main production shops, Uralmash contains numerous warehouses; shops for maintenance of trucks, railroad equipment, buildings, and tools; a construction materials plant; laboratories; a trade school; and a technical institute offering courses at the university level.

1. Identified Main Shops

Some of the main shops within Uralmash have been visited and described by Western engineers. 21/ Their principal features are detailed here to help give a correct impression of the scale of manufacturing operations at Uralmash.

a. Cast Iron Foundry

The cast iron foundry has a capacity of about 60,000 tons of castings per year and can make castings as heavy as 80 tons, which is the weight of some of the blooming mill housings that are cast there. The foundry has six cupolas with capacities of 10 to 15 tons each. Other equipment includes four 50-ton cranes, a 17-ton coremaking machine, a special chamber for cleaning castings with high-pressure water jets, sand and shot blasting chambers, a belt conveyor for transporting sand, sand slingers, pneumatic rammers, and annealing furnaces.

b. Steel Foundry

In 1955 the steel foundry had the capacity to cast annually 55,000 tons of shaped castings and 165,000 tons of ingots for forging, a total annual steel-casting capacity of 220,000 tons. The heaviest single steel casting made regularly is a 150-ton piece for the roll stand of a blooming mill. This shop has a number of cranes with a capacity of 50 and 75 tons and one crane with a capacity of 175 tons. The steel foundry is equipped with three electric furnaces with capacities of 6 tons each, one electric furnace with a capacity of 13 tons, two basic open-hearth furnaces with a capacity of 60 tons each, one basic open-hearth furnace with a capacity of 35 tons, and one acid open-hearth furnace with a capacity of 90 tons. There also is a vacuum holding pot for ingot casting that

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can contain an ingot of 120 tons or a ladle of 20 tons. This vacuum equipment is used to improve the quality of large forgings -- for example, turbine rotors. In 1962 the steel foundry was being lengthened by 90 meters, and it is to be furnished with modern continuous conveying equipment. 22/

c. Forge Shop

The forging shop has about 100 hammers and presses. Of the hammers, which are of a drop type with steam lift, about 10 have a capacity between 6.5 and 7 tons, and the rest have a capacity between 3 and 5 tons. The largest press is a machine with a capacity of 10,000 tons, served by a 250-ton crane and by a big furnace for reheating large billets. There are three or four other presses varying in capacity from 2,000 tons to 3,000 tons. There also are two or three forging machines, three manipulators to feed billets into the hammers, and a number of furnaces for reheating and heat treatment. Output of the forge in 1955 amounted to 50,000 to 60,000 tons of press forgings and 20,000 to 30,000 tons of hammer forgings per year. The shop was expanded in 1961.

d. Shops for the Fabrication of Structural Steel

Production of weldments of various kinds is carried on in five shops for the fabrication of structural steel. One of these shops specializes in production of components for the 4-cubic-meter excavators that are produced at a rate of about 20 per month. These shops are well equipped with X-ray and gamma-ray inspection machines, gas cutting machines, welding jigs, and special machines for rolling and welding large cylinders and tubes, such as cylinders for rotary kilns. The total capacity of the five structural shops in 1955 was about 4,000 tons per month, or about 50,000 tons per year.

e. Machine Shops

Machining is carried on in a number of shops, including a roughing shop where castings and forgings are rough-machined to eliminate skin stresses and to reduce weight. Three major shops, however, have been identified as shops where final machining of large components and machines takes place. The largest machine shop, which also was the largest building in the compound in 1960, covers 16 acres and employs about 3,500 people in the machining department and 800 in the assembly department. Each of the eight bays of this machine shop has seven or eight cranes, most with a capacity of 75 tons. The shop produced 85,000 tons of machinery in 1955, consisting mostly of blooming mills, tube mills, cold rolling mills, crushers, excavators, large metallurgical cranes, cement kilns, and large mine-shaft digging machines. The next largest machine shop had a capacity for 55,000 tons of machine products in 1955.

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2. Unidentified Shops and Sites of Construction Work

Reports of prisoners of war and Soviet press releases give some clues to the activities being carried on in buildings in Uralmash that have not been visited by Western technologists. The most important of these buildings, the activities of which are not definitely known, are the following (see Figure 2*):

a. No. 23

Building No. 23 has two large connections to the main gasline, two large chimneys, and a cooling tower. It probably is a shop for heat-treating large steel parts.

b. No. 29

Building No. 29 was reported by German prisoners of war as a facility for testing tank engines during World War II and as an assembly shop for diesel-generator sets and diesel-compressor sets for use with oilfield equipment after World War II during the period 1947-49. 23/ Portable engine-driven machinery for oilfield drilling rigs probably is assembled in this building.

c. No. 33

Building No. 33 has two connections to the gasline and two large chimneys. It is located in a site where prisoners of war say that a hardening shop was located in 1949. This building probably is a heat-treating shop.

d. Nos. 48 and 50

The two construction areas, Nos. 48 and 50, are likely sites for the new research laboratory and the new building for developmental engineering. Since the end of World War II, most new construction of production shops has been carried out on the west side of the original plant area, where there is room for expansion into the fields and the areas of the temporary barracks type of housing. It seems probable that the small, unused area along the Pushminskiy Trakt (on the road to Nizhniy Tagil) would be the site of the new research facilities, for expansion of basic production shops in this direction would be definitely blocked by the built-up area of large apartment buildings west of Pushminskiy Trakt.

* Inside back cover.

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e. Nos. 52, 53, and 55

Buildings Nos. 52, 53, and 55 are located in the area once belonging to Artillery Plant No. 9 imeni Stalin and probably once were involved in production of medium artillery in support of Building No. 58, the main shop of Plant No. 9. 24/ Building No. 55 is still fenced off from the rest of the Uralmash plant and could be involved in modifying tanks and self-propelled guns. Prisoners of war identify a north-south-oriented road loop north of the Uralmash complex as a testing track for tanks.

f. Nos. 56 and 57

The Soviet press announced in March 1961 that three more bays of an excavator shop had been placed in operation. These three bays could be part of the addition (No. 56) to Building No. 57, visible in the photograph taken in July 1959. The engineering delegation from India reported that, in 1955, of the five shops for the fabrication of structural steel, one specialized in the fabrication of excavators with a capacity of 3 cubic meters.

g. No. 59

Building No. 59 apparently is a shop. The smaller buildings around it may be warehouses. The shop could be one of the five shops for the fabrication of structural steel reported by the delegation from India. 25/

h. No. 62

Building No. 62 is a large building with very high bays, the highest being in the neighborhood of 125 feet. This building is located south of the area of Artillery Plant No. 9 and in a location where, according to prisoner-of-war reports, a new building was under construction immediately after World War II. Directly east of the building is a large outdoor storage area for heavy steel supplies (No. 65 in Figure 2*), served by a gantry crane. The lack of chimneys indicates that heavy metallurgical processes are not carried on here. The great height of this building would serve well not only for production of large excavators but also for the fabrication of the large parts of such machinery as heavy duty oil-well drilling derricks and large vertical mine-shaft sinking equipment. The assembly of a vertical mine-shaft sinking machine in the northernmost bay of the building is shown in the accompanying photograph, Figure 3.

* Inside back cover.

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Figure 3. USSR: View in Building No. 62 at Uralmash. The absence of a roof monitor and the height of the roof (about 70 feet) indicates that this shop is the northernmost bay of Building No. 62. A machine for sinking vertical mine shafts is shown here. Other views of this machine permitted an estimate of the height of the roof.

i. No. 66

Much has been written in the Soviet press in the past 2 years concerning the construction of a new welding fabrication shop at Uralmash, which when completed is to be 985 feet wide by 1,280 feet in length, covering 28.9 acres. Because the steelwork of the first bay had been erected by October 1960, 26/ it is rather certain that site preparation would have been in progress when the aerial photograph of July 1959 was made. At no location in the present area of the plant, where site preparation was underway in July 1959, was there sufficient space for this building. It therefore seems likely that the newly graded construction site, visible in the aerial photograph beyond a row of temporary barracks-like buildings northwest of the present boundaries of the plant, is to be the new shop for making large weldments. In this shop, which is to be

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larger than any of its type in Europe, very large and heavy steel parts will be assembled from a number of simple cast or forged pieces by a new welding process. This new process permits greatly increasing production of heavy machinery with only small increases in the size of the steel foundry and forge shops. Such a development in production processes typically would not be introduced at a plant that is concerned with production of missiles.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

APPENDIX C

RECENT PRODUCTS OF URALMASH

The following list of products contains most of those that currently are in production at Uralmash. Some items, such as drives for oil-well drilling rigs, are produced in batches or small series. Some, such as rolling mills, are designed and produced individually to customer specifications. Shown in Appendix E are photographs of typical heavy machine products for which Uralmash has a unique production capability.

Major Products of Uralmash

1. Mining equipment

   Special large vertical mine-shaft sinking machines
   Walking draglines with 15-cubic-meter buckets
   Shovel excavators with 4-cubic-meter buckets
   Mine elevators with a capacity of 8 tons

2. Oilfield equipment

   Deep-hole drill rigs
   Mud pumps for turbodrilling
   Powerplants for drill rigs

3. Coal and ore preparation equipment

   Crushers-gyratory, ball, jaw
   Sintering plants

4. Cement machinery

   Roasting kilns
   Crushers

5. Steelmaking machinery

   Hoppers, bells, and skip engines for blast furnaces
   Mud guns for closing notches in blast furnaces
   Machines for making refractory brick
   Pig iron and slag cars
   Automatic blooming mills
   Continuous billet mills
   Rail and structural mills

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Cold rolling mills for thin sheet
Pipe rolling mills
Wheel rolling mills
Roller straighteners for rails and structurals
Pipe bending machines for cold bending pipe up to 550 millimeters outside diameter
30,000-ton press
20,000-ton press
4,000-ton press
10,000-ton extrusion press for covering electric power cable with aluminum
12,000-ton extrusion press for aluminum alloy extrusions
20,000-ton extrusion press for aluminum alloy extrusions
Presses made of prestressed concrete
Metallurgical cranes

6. Heavy forgings to order

Turbine rotors
Crankshafts for marine engines
Other forgings to order

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

APPENDIX D

PHOTOGRAPHS

INTERIOR VIEWS OF URALMASH PRODUCTION SHOPS

The fabrication or assembly of missile airframes in the Uralmash production shops would be wasteful of the heavy-duty cranes, the high ceilings, and other features of the buildings that are necessary for the assembly of heavy machinery.

Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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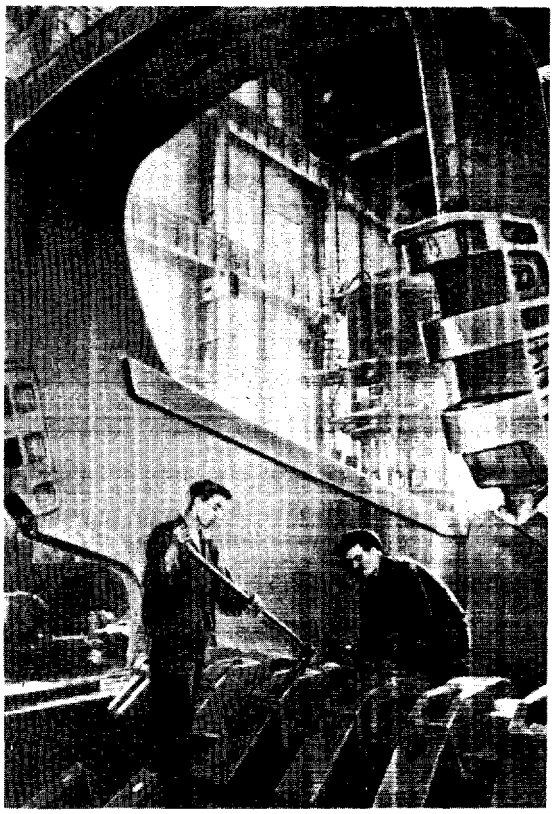

Assembly shop for large and heavy machinery. The assembly of missile airframes here would be wasteful of the heavy-duty cranes and other features of the building that are advantageous to the assembly of heavy machinery.

Free forging a large shaft on a 10,000-ton press. The press is served by a crane with a capacity of 250 tons. The equipment is not applicable to production of missiles.

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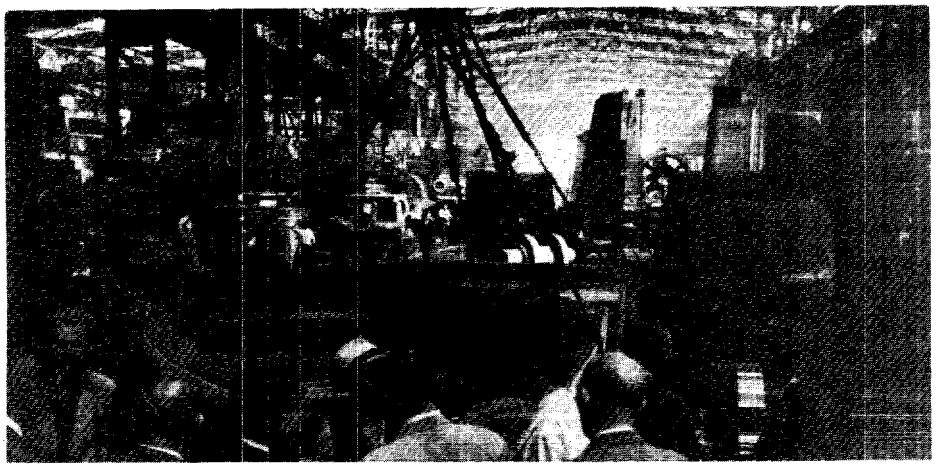
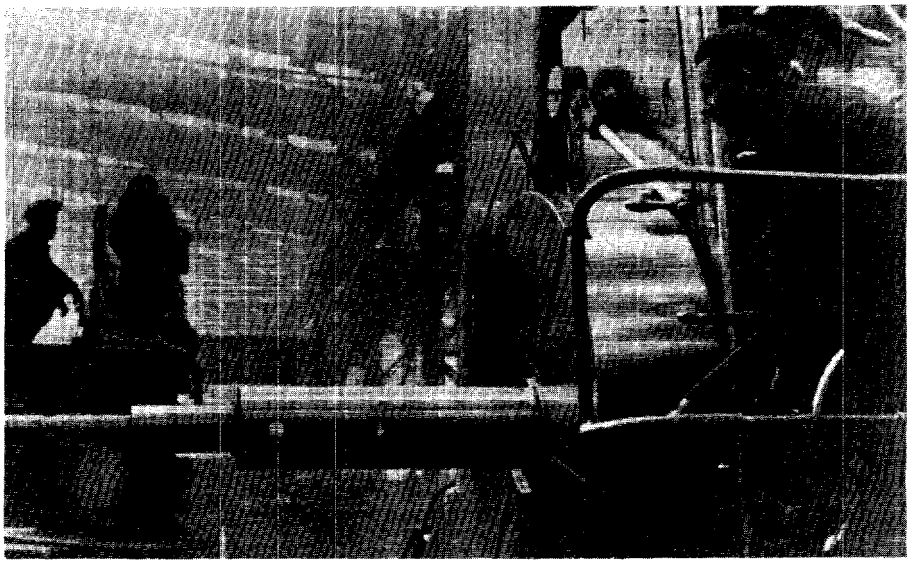


Multiton steel casting being set up for machining in the largest machine shop.



Horizontal boring mill at work in the largest machine shop. The many large tools in this shop would be wasted in production of missiles.

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APPENDIX E

PHOTOGRAPHS

TYPICAL HEAVY MACHINE PRODUCTS MANUFACTURED BY URALMASH

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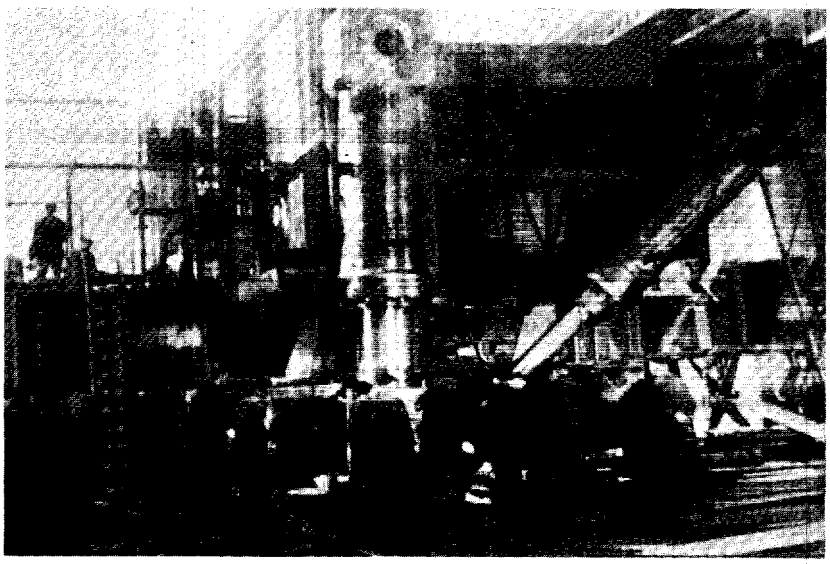
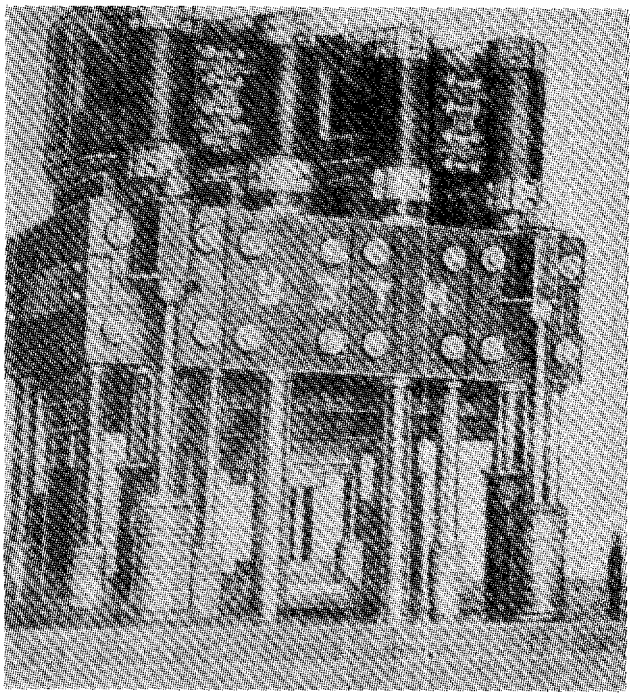


USSR: Base of excavators under construction at Uralmash. This large walking dragline excavator, shown in an assembly shop for large machines, will weigh 1,400 tons when completely assembled. The rate of production in 1958 of about four or five per year is to be increased four times by 1965. The tools that produced these parts have no application in production of missiles.



USSR: Hydraulic press with a capacity of 30,000 tons produced by Uralmash. View of the upper half of a hydraulic press made at Uralmash for closed-die forging of aircraft and missile parts. The facilities that produced this machine are not adaptable to production of missiles.

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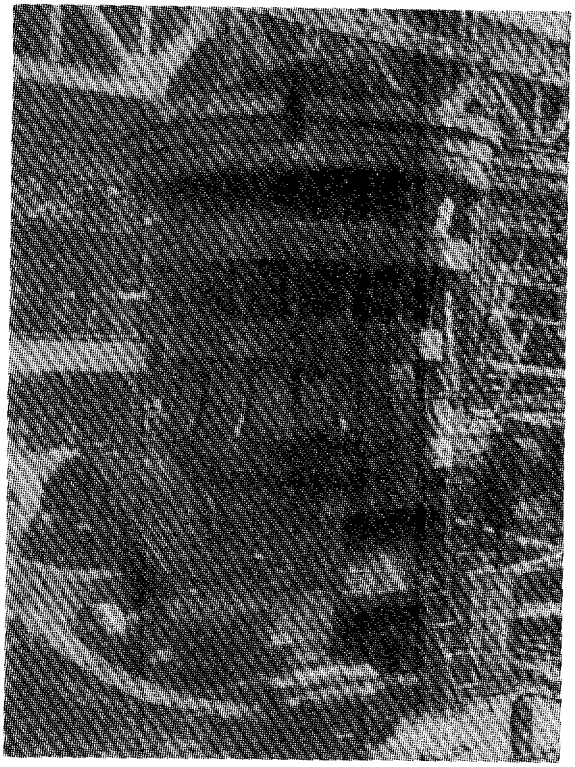
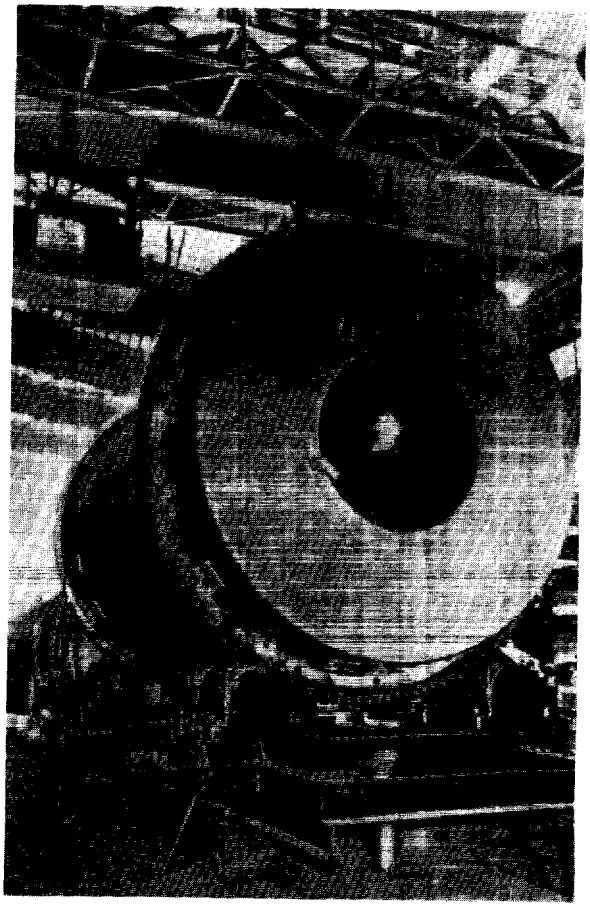


USSR: Model KDD-1500 ore crusher in production at Uralmash. The Uralmash equipment that produced this 450-ton machine is unsuitable for production of missiles. The heavy steel structure of this building, necessary to support heavy crane loadings, would be wasted if the building were converted to production of missiles.



USSR: Section of ore sintering machine in production at Uralmash. The 75-ton cranes in this building are necessary because of the great weight of the machine components that are machined and assembled here. Uralmash produces a still larger sintering machine with a diameter of 16.5 feet and a length of 607 feet.

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APPENDIX F

GAPS IN INTELLIGENCE

Sufficient information is available on Uralmash to draw conclusions concerning its probable noninvolvement in activities related to production of guided missiles with a rather high degree of confidence. Additional information, if available, however, would strengthen the bases for conclusions with respect to the activities of certain major facilities that either have never been visited by informants or have not been visited in recent years. These facilities consist of the following:

Building Number	Description
8	Probable machine shop
17	Unidentified
47	Unidentified
48	Under construction
50	Under construction
55	Unidentified
56	Under construction
57	Probable assembly shop for excavators
58	Machine shop; probably Artillery Plant No. 9
59	Unidentified group of buildings
60	Fenced storage area
61	Under construction
62	Probable assembly shop for large machines
66	Under construction; probably a new weldment fabrication shop

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APPENDIX G

SOURCE REFERENCES

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this research aid. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

The most useful source of information on Uralmash was the aerial photograph taken in July 1959. It was possible to identify on this photograph most of the shops and facilities to which Western visitors and prisoners of war referred in their reports as well as those construction sites claimed by the Soviet press to be in progress at that time. The centrally located major facilities have been described by recent Western visitors and are easily located from Soviet books that were published during the early years of the plant. Additions made to the plant during and immediately after World War II have been described and located in reports by numerous prisoners of war. Comparison of these reports with the arrangement of buildings that are visible in the 1959 photograph has permitted selection of the most accurate prisoner-of-war reports.

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Recent statements in the Soviet press concerning the functions of shops that are newly completed, under construction, or being expanded, when considered in conjunction with the 1959 aerial photograph and, in some cases, with interior photographs of existing facilities, have been very helpful in assigning probable functions to such new facilities.

25X1A2g

1. [redacted]
25X1A2g 2. [redacted] Kommunist, No. 9, 1960, p. 10. U. Eval. RR 2.
3. [redacted]
4. Air. ATIC-M-SR-58-2, Missile Manufacturing Analysis, pp. 5 and 86, 20 Dec 58. S. Eval. Doc.
5. Ibid., p. 29. S. Eval. Doc.
25X1A2g 6. [redacted]
25X1A2g 7. Pravda, 11 Dec 59. U. Eval. RR 1.
8. [redacted]
9. Pravda, 6 Feb 59, p. 5. U. Eval. RR 2.
10. USSR, Gosudarstvennyy Institut po Proyektirovaniyu Novykh Metallozavodov. Ural'skiy mashinostroitel'nyy zavod v Sverdlovske (proyekt) (Ural Machine Building Plant in Sverdlovsk -- Plan), Leningrad, 1928. U. Eval. Doc.
25X1A2g 11. CIA. OO, 3 Sep 59. C. Eval. RR 2.
12. State, Moscow. Dsp 383, 10 Nov 61. U. Eval. RR 1.
13. Current Digest of the Soviet Press, vol 11, no 28, 12 Aug 59, p. 13. U. Eval. RR 2.
25X1A2g 14. [redacted]
15. [redacted]
25X1X7 16. [redacted]
17. Prochko, I.S. Artilleriya bog voyny (Artillery, God of War), 1946. U. Eval. Doc.
25X1A2g 18. Ibid.
19. [redacted]
20. [redacted]
21. [redacted]
22. CIA. FDD Summary no 3058, 27 Jun 61, Information on Soviet Missile-Related Industries(2), p. 11. S. Eval. RR 1.

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23. [redacted]
24. Ibid.
25. [redacted]
26. CIA. FDD Summary no 3058, 27 Jun 61, Information on Soviet Missile-Related Industries(2), p. 11. S. Eval. RR 1.

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25X1D0a

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Approved For Release 1999/09/08 : CIA-RDP79S01046A000900010001-1

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CIA/RR A.ERA 62-5
September 1962

225

1	AD/RR	15 Oct 62	4 Dec 63
2	DDI	"	
3	St/P/C file copy	"	
57 - 88	Rec'd in St/P/C	16 Oct 62	
57	25X1A6a [redacted]	"	
58		"	
59		"	
60		Not Sent	
61 - 64		"	
65	25X1X7	"	
66 - 68		"	
69	NORAD via AFCIN	"	
70, 71	25X1A6a [redacted] 25X1X7	"	
72		"	
73 - 75	25X1X7	"	
76 - 88	Filed in St/P/C	16 Oct 62	
31	Received from St/I/C	25 Oct 62	
69, 75	Sent to Records Center	6 Nov 62	
77	25X1A9a [redacted] Ly for AFCIN	16 Nov 62	
31, 76, 82	Records Center	31 Dec 62	
78	CIA Library for AFCIN	10 Jan 63	
32 25X1A9a	Received in St/P/C	2 April 63	
83-84	Received from Records Center	4 Apr 63	
83-84 25X1A9a	[redacted] OO/C	4 April 63	
79	[redacted] St/I/R for Conference Nat'l War College	16 Apr 63	19 Apr 63
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	
79	25X1A9a [redacted] CGS/DDI for DDI/FE/SR/Reg.	11 Jul 63	
81	CIA Ly. for ACSI/Army	18 Jul 63	
85 & 86	Received from Records Center	22 Jul 63	
85	25X1A9a A Ly for AFCIN	12 Aug 63	
86 25X1A9a	[redacted] LS/CR for ACDA	16 Aug 63	
87	ACDA via [redacted] /CR	28 Apr 64	
80	25X1A9a A via [redacted], LS/CR	1 Jun 64	
3	[redacted] NPIC	16 Jul 64	
88	Rec'd from RC	21 Jul 64	
1, 32	RC	11 Jan 65	

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