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basic imagery interpretation report

# Selected Soviet Liquid Propellant ICBM R&D and Production Facilities (S)

STRATEGIC WEAPONS INDUSTRIAL FACILITIES

BE: Various

USSR

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INSTALLATION OR ACTIVITY NAME					COUNTRY
Selected Soviet Liquid Propellant ICBM R&D and Production Facilities					UR
UTM COORDINATES	GEOGRAPHIC COORDINATES	CATEGORY	BE NO.	COMIREX NO.	NIETB NO.
NA	See below	See below	See below	See below	See below
MAP REFERENCE					
SAC. USATC, Series 200, scale 1:200,000 (see sheet numbers below)					
LATEST IMAGERY USED			NEGATION DATE (If required)		
See "Abstract"			NA		

Installation Name	Geographic Coordinates	Category	BE No	COMIREX No	NIETB (MRN No)	Map Sheet No
Dnepropetrovsk Missile Development Production Center (Plant 186 and Rocket Engine Test Facility)	48-26-03N 034-58-31E					
Voronezh Aircraft Engine Plant 154	51-39-24N 039-10-10E					
Voronezh Rocket Engine Test Facility	51-34-37N 039-09-45E					
Perm Rocket Engine Test Facility	58-00-54N 056-34-09E					

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**ABSTRACT**

1. (S/WN) This report describes recent developments at four Soviet strategic missile research and development, production, and testing facilities involved in liquid propellant ICBM activity. It updates the previous NPIC report, [ ] on these facilities and is based on all relevant satellite imagery acquired through the information cutoff date of [ ]. This report includes a location map, 26 annotated photographs, and five tables.

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2. (S/WN) Significant observations at these facilities include the following:

- a. A framework for a long concealment structure erected over a section of railspur in the missile/space launch vehicle (SLV) shipping area at Plant 186;
- b. Major construction underway in the Utkin Design Bureau area and probable SS-9 production lines being removed from two of the largest series production buildings at Plant 186;
- c. SS-18 Mod 4 payload retrofit components at the plant for the first time and an unidentified 12- to 14-meter possible canister section in the missile/SLV shipping area of the plant on several occasions at Plant 186;
- d. Rocket engine testing underway at the large vertical test stand and a high level of activity in the component test area at Dnepropetrovsk Rocket Engine Test Facility (RETF);
- e. Major earth grading and paving activity, underway outside the RETF, possibly associated with the probable buried propellant facility;
- f. A major construction program underway in the area believed to be the Kosberg/Konopatchov Design Bureau at Voronezh RETF;
- g. Construction continuing on a new fabrication/assembly building and several shop building additions at Voronezh Aircraft Engine Plant 154; and
- h. A rocket engine test conducted at the large vertical test stand at Perm RETF.

**INTRODUCTION**

3. (S/WN) Each of the facilities discussed in this report (Figure 1) is involved in liquid propellant research and development (R&D), production, and testing. Collectively, these facilities represent a significant portion of the Soviet effort in the field of liquid propellant technology.

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## BASIC DESCRIPTION

## Dnepropetrovsk Missile Development Production Center

## Production/Design Bureau Area (Plant 186)

4. [ ] Dnepropetrovsk Plant 186 (Figure 2) is the production plant for the SS-17 and SS-18 ICBMs as well as other Yangel/Utkin-designed strategic missiles and SLVs. The Utkin Design Bureau (KB), located at this plant, is credited with the design and development of the SS-4, SS-5, SS-7, SS-9, SS-17, and SS-18 ballistic missiles and the SL-7, SL-8, SL-11, and SL-14 ballistic missile-derived SLVs. Utkin is also involved with solid-propellant missiles including the 15Zh43 medium-solid ICBM currently under development.<sup>1</sup>

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5. (S/WN) Between early April and mid-June 1982, construction began on a long concealment structure over two of the four railspurs in the missile/SLV shipping area (Figure 3). This is the only area of the plant where loaded SS-18 canister/capsule trains have been seen.

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6. (S/WN) Large-scale construction activity was underway in the Utkin KB area of the plant. This construction will provide new production floorspace for prototype and possibly series production of new missile/space systems. The rail-served fabrication/assembly building along the east-central edge of the KB (item 7, Figure 2) was nearing completion, and when complete, will provide approximately 25,120 square meters of new production floorspace. In the northeast corner of the KB, construction was continuing in the fenced-off area of excavations and pilings. The pattern of footings suggests that one large building will be erected in this area (item 5, Figure 2). Structural steel wall stanchions for one bay of the building were being erected by June 1982. Just south of this construction site, construction was underway for a new building (item 6, Figure 2) in the crane-served prototype production complex. Stanchions had been erected for the new building by June 1982. A new section was added to the final assembly hall and administration/engineering annex of the rail-served fabrication/assembly building in the southern KB area (items 8 and 9, Figure 2).

7. (S/WN) Production lines continued to be removed from the older series production buildings at Plant 186. The removal of older production lines suggests that preparations are underway for the production of new missile/space systems in this area. The dismantled production jigs and assembly fixtures described in the previous report<sup>2</sup> are assessed to have come from SS-5 production lines. SS-9 production lines are also probably being dismantled. Probable SS-9 tooling was observed in May 1981 outside the large high-bay fabrication/assembly building (Figure 4). The materials continued to be removed from the building until January 1982. Additional probable SS-9 production materials have been observed outside the fabrication/assembly building directly to the north. The items in this area were first seen in 1979 with

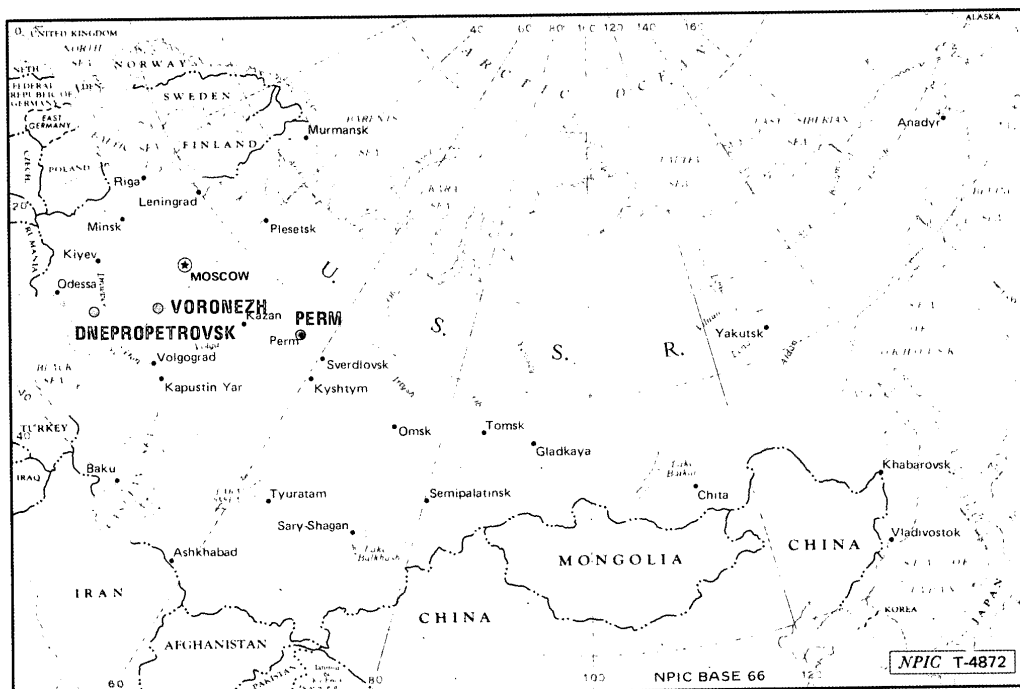


FIGURE 1. LOCATIONS OF SELECTED FACILITIES IN THE USSR INVOLVED IN THE RESEARCH AND DEVELOPMENT, TESTING, AND PRODUCTION OF LIQUID PROPELLANT ICBMs

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additional accumulations noted during 1980. Although no accumulations have been noted since 1980, a concrete apron had been constructed for their storage by May 1981. In addition to the dismantlement activity at these production buildings, a portion of the fabrication/assembly building with the high-bay section was renovated, further indicating preparations for future production in this area.

8. (S/WN) The number of SS-18 three-car canister/capsule trains observed at Plant 186 during the period ranged from between two and eight. From one to three partial canister/capsule trains were seen occasionally. SS-18 canister counts are listed in Table 1.

9. (S/WN) A canister/capsule train carrying SS-18 Mod 4 payload retrofit components (Figure 5) was seen at Plant 186 for the first time on [REDACTED]. Three retrofit crates (designated types A, B, and C) were transported along with a Mod 4-associated, [REDACTED] container on the three-car train. Retrofit crates were observed at the plant for the remainder of the period. Although the contents of the crates are unknown, they are probably upper silo-related components necessary to accommodate the technical advancements incorporated into the propulsion and guidance and control of the SS-18 Mod 4 postboost vehicle (PBV). A retrofit program began at the deployed SS-18 ICBM complexes in April 1981.

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10. (S/WN) From late January to early April 1982, a 12- to 14-meter possible canister section was on a railcar in the missile/SLV shipping area (Figure 6). Also, three identical light-toned objects were on a flatcar in this area from January to March 1982. The objects may have been the hexagonal containers periodically observed in the plant since 1976. The [REDACTED] containers, with unknown contents,

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are carried on a special flatcar which is fitted with three hexagonal cargo stations (Figure 7). A similar flatcar has been at Tyuratam ICBM Support Facility 3 [ ] since at least 1978. Support Facility 3 is associated with the SS-17, the SS-18, and Space Launch Site Y 1/2 [ ] at the Tyuratam Test Range.

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11. (S/WN) A cradle-configured dolly (Figure 8) was outside the final assembly hall of the southern fabrication/assembly building in the Utkin KB on [ ]. The dolly is approximately 13 meters long and 3 meters wide with an inner cradle width of [ ]. A dolly of this type could be used to transport tankage between assembly bays of the building or between different production areas of the plant. Empty canister/capsule trains have also been seen in greater numbers and with increasing frequency near this building. On [ ] three complete canister/capsule trains and one partial canister/-capsule train were on a spur next to the rail-served final assembly bay of this building. Three-car trains are not normally observed in this area.

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#### Rocket Engine Test Facility

12. (S/WN) Missile hardware designed and developed at Dnepropetrovsk Plant 186 is tested at Dnepropetrovsk RETF (Figures 9 and 10). The high level of activity seen during this reporting period at the RETF, particularly in the component test area, indicates that either a product improvement or new product development program is underway.

13. (S/WN) Indications of test activity were observed at test stand 1 in May and October 1981 and in February 1982. On [ ] a dark residue covered a portion of the sump apron and at least on the [ ] the blast apron appeared mottled (Figure 11). By [ ] the residue had subsided. A dark residue was again observed on the sump apron on [ ]. Stronger evidence of testing was observed in February when at least one rocket engine/engine cluster test occurred. Blast marks were observed at test stand 1 on [ ] (Figure 12) when snow melt/residue extended from the flame bucket, across the blast apron, and onto the terrain beyond the blast apron. The flame bucket and sump area were also dark on [ ] although a light layer of snow covered the blast apron.

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14. (S/WN) A vertical upwardly discharging extension was placed on the end of the horizontal exhaust duct at test stand 3 between [ ] (Figure 13). The extension is similar to one placed on the end of the exhaust duct at test stand 4 between September 1980 and February 1981.

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15. (S/WN) Fluctuations were noted in the level of fluid in the collection sump at the cold flow test position. Levels overall ranged from high to very high, indicating a continuing cold flow test program (Figure 14). The existing program apparently began in 1978 or 1979 when fluid levels became consistently higher than those observed since at least 1976.

16. (S/WN) Activity was at a high level in the component test area as was evidenced by the presence of various trailers and cryogen-carrying vehicles (Figures 15 through 19). Cryogen vehicles were seen at three of the flow test stands and at the large structural test building. The ribbed trailer/transporter, first seen in 1980 at the southwestern flow stand, remained there until its departure by mid-1982. Possible steam was emanating from the rear of the large structural test building in February 1982.

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**Table 1.**  
**SS-18 Canisters at Dnepropetrovsk Plant 186**

*This table in its entirety is classified SECRET/WNINTEL*

Date	Lower Canister Sections	Upper Canister Sections	Upper Canister Sections	Mod 4-Associated Containers
				1
	1	1		2
				2
	1	1		
	1	1		
	1	1		1
	1	1	1	
	1	1	1	
	2	2		2
	1	2		1
	1	3		1
		poor coverage		

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17. (S/WN) Triple-domed oxidizer tankcars (ranging in numbers from three to six) were seen in 1981 on [redacted] None were observed in 1982. Single-port probable fuel tankcars were seen only in 1982 although they were seen at the transfer racks of all three propellant receiving and storage buildings. An average of three to six were present between April and August 1982, the date of the latest coverage of the RETF. Cryogen tankcars, some with chamfered roofs and others with a single-port tankcar configuration, were at or near the air liquefaction plant throughout the period.

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18. (S/WN) Construction was observed both inside and outside the boundaries of the RETF. New construction within the RETF consisted of the excavation of trenches and work on three new structures in the area of the air liquefaction plant. Construction continued on the horizontal test building (Figure 14) although the area around the building had been largely cleared of building materials. No further changes were observed on the exterior of this building which should become operational within a year or two. Since the beginning of the modification program in 1974, changes to the test building have included an increase in the heights of the test bays, the removal and replacement of the original pipes and vents on the roof, the construction of a raised platform on which a probable diffuser was placed, and the modification of the exhaust apron.

19. (S/WN) Extensive earth grading was underway outside the western perimeter fences of the RETF; by February 1982, two large concrete block aprons (Figure 20) were being constructed parallel to the railspur serving the probable buried propellant facility. The apron closest to the spur is equipped with a gantry crane, indicating that it will be used for offloading purposes. Another apron was constructed further to the south and a linear stretch of concrete, possibly for a section of road, had been paved. Although the purpose of this construction activity has not been determined, the northern area will apparently be used for the offloading of heavy materials brought in by rail. The proximity of this construction activity to the probable buried propellant facility suggests that the two may be related.

20. (S/WN) A new group of buildings was added outside the southern perimeter fences of the RETF (item 2, Figure 10). Two of the buildings were complete while a third and possibly a fourth were in the very early stage of construction. The perimeter fences will probably be expanded to include these new buildings.

21. (S/WN) Construction was completed on an addition to the easternmost building in the unique line of three buildings paralleling the southern fences (item 1, Figure 10). All three buildings will eventually be interconnected by a pair of small-diameter pipelines although extension of the lines beyond the easternmost building has apparently been postponed. The western terminus of this linear set of buildings is at the new area of apron construction near the probable buried propellant facility. An unusual feature

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of the pipelines serving these buildings is the wide spacing between the two lines. The pipes are spaced about three pipe diameters apart and are supported on wide footings. An explanation for this wide spacing could be that inside the two end buildings, the pipes may be connected by 180-degree returns. The pipes, then, may enter the end buildings, loop around, and return in the opposite direction. The reason for such an arrangement is not apparent although its purpose may become evident as construction progresses in the adjacent area of apron construction.

22. (S/WN) The two new possibly propellant-related buildings in the northern part of the facility were nearing operational status (Figure 21). The first sign of activity in this area was the presence of a probable boxcar at the railspur serving the smaller building in late July and early August. The exact nature of activities to be performed in these two buildings is still not apparent although the open-bay construction of the larger building suggest a shop-type function and the presence of two probable flare stacks and several vertical tanks at the west end of the building suggest work with propellants, possibly for evaluation/test purposes. The purpose of the attached tower structure has not been determined. Next to the smaller building are three horizontal pressure tanks (one under a sloped shelter roof), which were moved from the aerodynamic test facility located outside the RETF to the east.

23. (S/WN) Construction was almost complete on the steamplant (Figure 9) next to the aerodynamic test facility; underground utility connections appear to extend between these facilities. South of the steamplant, a wall was constructed delineating a new area of expansion. By April 1982, footings for a new building were being emplaced inside this enclosed area.

#### Voronezh Aircraft Engine Plant 154

24. [redacted] Voronezh Plant 154 (Figure 22, Table 2) is associated with the development and production of engines for the SS-18 ICBM, the SS-N-18 and SS-NX-20 SLBMs, and the SL-12 and SL-13 SLVs. Plant 154 has also been involved in the development and production of aircraft engines.<sup>3</sup> An expansion program currently underway at this plant will provide new assembly and shop floorspace which may accommodate the series production of a new rocket engine.

25. (S/WN) In May 1981, roof weatherproofing and skylight installation were underway on the west bay of the new fabrication/assembly building in the eastern area of the plant (item 4, Figure 22). The building was not completed until between September 1981 and March 1982. By May 1982, the footings for an additional bay had been installed along the east side of the building. The concurrent construction of new shop floorspace at the plant (items 1 and 3, Figure 22) may be related to the production activities which will occur inside the new fabrication/assembly building.

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26. (S/WN) Trailers and trucks carrying small metallic-toned pressure tanks were seen in small numbers in a parking area near the aircraft engine test building. The tanks may contain pressurized gases for use with engine testing or for general assembly operations within the plant. Probable component crates were observed outside a large fabrication/assembly building and in the transshipment area. These crates included [REDACTED] chamfered-roof crates and [REDACTED] and [REDACTED]-square crates. Cylindrical objects, [REDACTED] in diameter and [REDACTED] in height, were also observed in the transshipment area. During this period, one or two 24-meter missile railcars were normally seen at the plant.

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### Voronezh RETF

27. [REDACTED] Rocket engines produced at Voronezh Aircraft Engine Plant 154 are tested at Voronezh RETF (Figure 23 and Table 3), and it is believed that acceptance testing and product improvement testing of the SS-9 and SS-18 engines may have occurred here.<sup>4</sup>

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28. [REDACTED] A major construction program was underway in the northern and northwestern areas of the RETF. The majority of construction is in the area believed to be the location of the Kosberg/Konopatov Missile Design Bureau.<sup>3</sup> The types of buildings being constructed (i.e., assembly, shop, and engineering) and their location in the probable design bureau area suggest that this new group of buildings will function as a prototype production complex.

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29. (S/WN) The major buildings in this area of expansion are a probable assembly building with an adjacent probable shop building, a high-bay possible test building, and an unidentified building next to the electrical substation. Construction was still underway on a four-fan cooling tower and on a steam-plant addition.

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30. (S/WN) In the horizontal test area, construction was continuing at test position 11 (Figure 24) of the eastern horizontal test building. Building materials and a construction crane remained at this position; by September 1981, roof panels had been placed over an open section of the test bay. The most apparent feature of this modification activity, begun in 1977, is the reconfiguration of the exhaust trough. Originally rectangular, the trough has been narrowed into a flared structure and shortened to approximately half of its original length. Just east of the two horizontal test buildings, a new bank of vertical pressure bottles was being installed and a small support building was in the midstage of construction. Footings for a probable overhead pipe gallery were near the westernmost horizontal test building.

31. (S/WN) Propellant tankcars were observed with regularity at the RETF. From three to nine triple-domed railcars were at or near the oxidizer transfer racks and from one to four single-port tankcars were normally present at the fuel transfer racks. Additional single-port cars (some probably associated with the air liquefaction plant) were usually seen as well. From six to 12 cryogen tankcars were normally present at the air liquefaction plant.

32. (S/WN) No evidence of rocket engine testing was observed. Activity suggestive of laser testing, was seen in the spring and early summer of 1982 when from one to two probable liquefied gas tanks were seen at the southeast end of the laser rangehead.

#### Perm RETF

33. [ ] Perm RETF (Figure 25) is a Soviet acceptance test facility for rocket engines. The types of rocket engines which have been or are being tested here have not been determined although the following system associations have been made: SS-11, SS-17, SS-19, SL-9 and/or SL-12, and TT-05.<sup>3</sup> No major expansion or modification programs were begun at the RETF during this reporting period. Minor construction activity resulted in additional warehousing facilities just outside the rail entrance.

34. (S/WN) Evidence of a rocket engine test at test stand 1 was observed in February 1982 (Figure 26). The test occurred between [ ] as indicated by snow melt in the flame bucket on [ ]. Since a light cover of snow was on the blast apron, a period of snowfall probably occurred after the test. Additional possible test-related activity was indicated by steam emanating from a propellant building next to and connected by pipeline to test stand 1. The emissions were observed on [ ]. Additionally, a probable gas containment shroud section was positioned in the snow outside the blast apron from January to late February. The section was probably removed from the shroud installed inside the test stand and may have been replaced by a new section.

35. (S/WN) Activity was also evident at the possible components test building and at the adjacent probable propellants laboratory. On [ ] steam was emanating from the stack of the possible components test building and on both [ ] steam was emanating from the probable sump associated with the possible propellants laboratory. At the air liquefaction plant, only one of two gasometers appeared to be in use, indicating a continued production of gases for purging/pressurization operations, although on a limited basis.

36. (S/WN) No triple-domed oxidizer tankcars were observed at the oxidizer receiving and storage building. Five of these tankcars were observed on rail lines outside the facility on [ ]. The sightings of single-port tankcars were also infrequent with one tankcar seen at the fuel racks on 7 June 1981 and two on [ ]. From five to eight missile railcars were seen on the tracks outside the southern security fences throughout the reporting period.

**Table 2.**  
**Construction at Voronezh Plant 154, [ ]**  
**(Items keyed to Figure 22)**

*This table in its entirety is classified SECRET//SI//NFTEL*

Item	Description	Dimensions (m)			Floorspace (sq m)	Remarks
		L	W	H		
1	Shop addition					
a	Shop sect	37	12	20	444	
b	Support sect	27	18	13	1,944	4 stories
2	Support bldg	30	12	6	360	
3	Shop addition					
a	Shop sect	38	18	12	648	
b	Shop sect	18	12	12	216	
c	Support sect	18	12	12	648	3 stories
4	Fab/assem bldg					
a	Admin/engr sect	85	13	16	4,420	4 stories
b	Fab/assem sect	169	85	23	14,635	
Total floorspace added					23,315	

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**Table 3.**  
**Construction at Voronezh RETF,**  
**(Items keyed to Figure 23)**

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*This table in its entirety is classified SECRET/WNINTEL*

Item	Description	Dimensions (m)			Floorspace (sq m)	Remarks
		L	W	H		
1	High-bay poss test bldg					
a	Support sect	25	12	11	300	
b	Poss test sect	36	25	20	900	High bay
c	Prob shop/support sect	24	24	10	576	
d	Admin/engr sect	25	16	10	1,200	3 stories
2	Technical support bldg	12	9	6	108	
3	Stor/support bldg	30	11	7	330	
4	Prob assem bldg					
a	Support annex	65	14	9	910	
b	Admin/engr sect	48	18	21	2,592	3 stories
c	Assem sect	74	48	21	10,656	3 stories
5	Shop					
a	Shop sect	37	19	9	703	
b	Shop sect	42	19	7	798	
6	Cooling tower					4 cell; ucon
7	Steamplant addition					Ucon
8	Pressure bottles					Still being installed
9	Test support bldg					Ucon
10	Unid bldg	65	14	9	910	
Total floorspace added					19,983	

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## REFERENCES

## IMAGERY

(S/WN) All relevant satellite imagery acquired through the information cutoff date of [REDACTED] was used in the preparation of this report.

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## MAPS OR CHARTS

SAC. US Air Target Chart, Series 200, Various sheets (see data block), scale 1:200,000 (UNCLASSIFIED)

## DOCUMENTS

1. DIA. DST-1830S-289-80-SAO, [REDACTED] *Missile Industry Design and Development Resources—USSR* (U), 15 Apr 80 (TOP SECRET [REDACTED])

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2. NPIC. [REDACTED] RCA-09/0023/81, *Developments at Soviet Liquid Propellant R&D and Production Facilities* (S), Aug 81 (TOP SECRET [REDACTED])

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3. NPIC. [REDACTED] RCA-09/0026/79, *Voronezh Aircraft Engine Plant 154 and Voronezh Rocket Engine Test Facility* (S), Jan 80 (TOP SECRET [REDACTED])

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—Extracted information in paragraph 28 is classified TOP SECRET [REDACTED]

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4. DIA. DST-1850S-007-79-SAO, [REDACTED] *Rocket Propulsion Development and Test Programs and Facilities - ECC* (U), 5 Nov 79 (TOP SECRET [REDACTED])

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5. NPIC. [REDACTED] RCA-09/0015/80, *Perm Rocket Engine Test Facility* (S), Aug 80 (TOP SECRET [REDACTED])

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## REQUIREMENT

COMIREX J02  
Project 542045J  
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(S) Comments and queries regarding this report are welcome. They may be directed to [REDACTED] Soviet Strategic Forces Division, Imagery Exploitation Group, NPIC, [REDACTED]

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