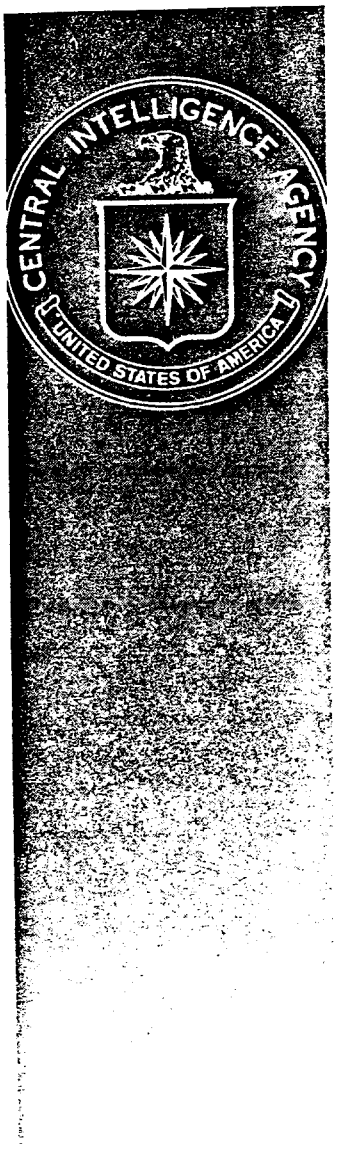

Directorate of Intelligence

Intelligence Memorandum

[redacted]

15 September 1992

The Russian Space Launch Vehicle Industry: Looking to Foreign Sales for Survival [redacted]

Summary

Sharply falling government purchases have prompted Russian space launch vehicle (SLV) producers to step up their activities to market their products and services abroad. The newly-created Russian Space Agency and Glavkosmos--formerly charged with marketing SLVs abroad--will provide little help in this effort, forcing individual producers to go it alone. Large stockpiles and low prices would appear to give Russian SLV producers a competitive edge in the space launch market. They face, however, serious obstacles including declining budgets and government orders, technical incompatibilities, Western technology transfer restrictions and other trade barriers. In market-entry negotiations with the United States in October and November, the first item on the Russian agenda will be reductions in technology transfer restrictions. In exchange, Russian officials probably would agree to follow US pricing policy but would resist an agreement that confines Russia to only a few launches per year. [redacted]

This memorandum was prepared by [redacted]

In recent negotiations with the United States, Russia took the first steps to gain access to the commercial space launch services market. Negotiations will continue in October and November and, by the end of the year, the Russians hope to have an agreement that will allow them to bid on and win Western launch contracts. The Russians are seeking entry into the space launch market to earn hard currency and to provide new customers for their resource-starved space industry. [redacted]

The Space-Industrial Complex in Decline

Until the late 1980s, the Soviet space industry enjoyed high levels of funding and priority access to skilled manpower and scarce materials. Since the demise of the USSR, however, the space industry of Russia--where about 90 percent of the facilities are located--and other CIS states have faced severe budget cuts; we estimate that government spending on hardware for space programs has declined in real terms by about 50 percent since the beginning of 1988. According to Yuriy Koptev--director of the newly-created Russian Space Agency (RSA) (see inset, "Creation of the Russian Space Agency)--funding may be cut further next year. [redacted]

Creation of the Russian Space Agency

President Yel'tsin created the Russian Space Agency (RSA) in February 1992, largely to coordinate and represent the various entities involved in the civil space program, including the Russian space-industrial complex. RSA's envisioned principal tasks are establishing civil space policy, controlling the space research and test institutes, coordinating programs that cross institutional and national boundaries, and acting as general contractor to the struggling space industries. However, its space missions must also satisfy the science-oriented Interagency Expert Commission, established under the same decree an advisory body. In the cases of dual military/civilian space systems--such as many existing communications satellite networks--the RSA is required to coordinate efforts with the Ministry of Defense. The RSA does not directly control individual design and production facilities, but is supposed to operate a contract system similar to the current US government's contracting procedures. According to Koptev, the agency will employ only 300 people and will reorganize the space sector to ensure the rational use of resources. Although it is the lead agency for inter-governmental projects, the RSA does not have much of a role in sales efforts by individual organizations, though each sale must be licensed by the RSA. [redacted]

Glavkosmos--created in 1985 to market Soviet and Russian space launch services--has been unable to counter falling domestic demand with foreign sales. Glavkosmos' poor reputation, earned through years of marketing failure and recently imposed US punitive

sanctions, appear to have further eroded the organization's ability to sell.[1] According to Koptev, in late July President Yel'tsin "stripped" Glavkosmos of any authority to negotiate international contracts, except with India. Koptev has made it clear that Russian SLV firms will have to step up their own efforts to win commercial sales.[2] [redacted]

Producers On Their Own

Russian space firms are trying to distance themselves from the troubled Glavkosmos sales organization and market their products and services themselves (see appendix). Western technology transfer restrictions, however, have largely prevented them from selling launch services on traditional boosters or attracting interest in plans to modify ballistic missiles for launching commercial payloads (see inset, "Russian Space Launch Vehicles"). To date, Russia has launched only two commercial satellite payloads for foreign currency--two Indian-built remote sensing satellites in 1988 and 1991. [redacted]

Russian Space Launch Vehicles

The Russians are marketing the services of two basic types of launch vehicles. The first consists of traditional SLVs, developed for the former Soviet Union's space program. These SLVs are launched from three sites: Tyuratam, Plesetsk, and Kapustin Yar. Most of these SLVs--such as the Proton (SL-12/13)--have been used extensively to launch a variety of Soviet civilian and military satellites and other payloads. (C NF)

Russian firms are also developing and marketing a second type of SLV, derived from ballistic missiles. Some of these systems will be mobile, which theoretically allow the Russians to launch payloads from any location on the globe. Others will be launched from silos or other fixed launch complexes. None of these SLVs--such as the "Start" derived from SS-20/25 technology--have yet launched civilian payloads. While missile-derived SLVs have the advantage of mobility, they are too small to launch the heavier payloads that dominate the commercial launch market. [redacted]

If there were no technology transfer restrictions or other trade barriers, Russian SLV producers would have several advantages that could give them a competitive edge. First, Russian producers can tout their long track record and reputation for reliability, especially for traditional SLVs. Also, a variety of sources indicate that many traditional

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1 Glavkosmos has been involved in the sale of Russian cryogenic engine technology to India, restricted by the Missile Technology Control Regime (MTCR). Despite US opposition and punitive sanctions--which ban Glavkosmos from purchasing US technology or selling products and services to the US for the next two years--Glavkosmos chose not to cancel the deal. [redacted]

2 Ukraine's Dnepropetrovsk facility and the associated Yuzhnoye design bureau--which is involved in producing the Zenit (SL-16) booster as well as the air-launched system dubbed "Space Clipper", and an SLV based on the SS-18 ICBM--also are heavily involved in marketing their products and services. The Russian launch vehicle industry likely will find itself competing with Ukraine in bidding for commercial launch contracts. [redacted]

SLV producers have excess boosters stockpiled due to overproduction. At the same time, ballistic missile producers have large stockpiles of missiles deactivated under arms control treaties. These excess SLVs and missiles, produced in the years before surging inflation, could be an important source of low-cost hardware for sales abroad. [redacted]

Thus far, price quotes for existing Russian launch services have been below, and in most cases well below, prices offered in the West. Proton (SL-12/13) launch service prices, for example, have usually been roughly half of comparable prices offered by Western boosters, such as the French Ariane. Koptev indicated in September that Russia's inexperience in setting hard-currency prices is exacerbated by the current exchange rate--a typical Russian launch would cost $1 million if translated directly from rubles, well below comparable Western market prices. Price quotes by missile producers for converted ICBMs and SLBMs also have been relatively low. Russian SLV providers, however, are becoming more sensitive to charges of dumping and are more cautious about touting below-Western prices for their launch services; a 1992 sales brochure for the "Start" SLV stated that their prices would be low, but not low enough to be considered dumping. [redacted]

The leading Russian contenders for commercial sales, at least in the near term, probably will be producers of traditional SLVs. Of these, the Khrunichev organization will be in a strong position by virtue of its relatively developed market, the Proton's ability to place payloads into geosynchronous orbit and its reputation for reliability and experience--its Proton SLV has been in operation since 1967 and boasts a 93 percent success rate. The Proton is well-known among Western consumers, and the Khrunichev plant itself is relatively well-versed in Western business practices. [redacted]

Samara Aerospace Plant 1 and Omsk Airframe Plant 166 also produce reliable, well-tested traditional SLVs--Aerospace Plant 1's Vostok (SL-3) booster launched the two Indian-built satellites--but overall the two plants' launch vehicles have not been as heavily publicized as Khrunichev's Proton, and the plants lack marketing experience. Scientific Production Association (NPO) Energiya's SL-17 booster, though well-publicized, lacks a viable market due to its very large size and correspondingly high cost. Originally designed to launch the Buran space shuttle orbiter, the SL-17 can launch over 100,000 kilograms into low earth orbit--considerably more than necessary to launch the heaviest of communications satellites. The SL-17's reliability has not yet been established since it has only flown twice. NPO Energiya also is asking $250 million per launch--a price too high to attract many customers. Moreover, the strap-on boosters used on the SL-17 are produced in Ukraine, which could disrupt supplies of the boosters if political relations deteriorate. [redacted]

Of the family of missile-derived SLVs, the "Start" likely has the greatest potential to come to fruition due to the producer's heavy marketing of the project and Russian government support. Acting Prime Minister Gaydar himself has stated his support for the "Start" project, including it in Russia's state space program. The Rokot (SS-19) is another strong contender due to its relatively large payload capacity and the fact that it has already been tested once in its modified form. In early September, Koptev claimed to have two silos available at the Tyuratam launch center for Rokot commercial launches. [redacted]

Obstacles to Future Sales

The ability of Russian firms to succeed in the commercial launch market will require overcoming a number of obstacles. Technical incompatibilities between Russian launch vehicles and foreign payloads could pose major problems when processing and launching the payload and could raise the overall cost to near that of a Western SLV. In some cases, the Russians could require Western payload producers to supply sensitive information about the payload that could raise technology transfer problems. In addition, the ground support equipment may be too primitive for the payloads of many potential Western customers. Russian payloads are prepared in a warehouse environment, rather than in environmentally controlled conditions as in the West. [redacted]

A lack of insurance underwriters in Russia also has hindered SLV producers' efforts. The Russians reportedly have lost at least one launch contract due to insurance concerns on the part of the customer. In July, a Russian launch firm lost a bid to launch two Iranian communications satellites, even though they provided the lowest bid at $46 million. The Iranians would have preferred to use the Proton (SL-12), but awarded the contract to a Western firm because they could not otherwise obtain insurance for their payload. In the West, a number of organizations underwrite launch contracts, primarily to insure the payload. Insurance premiums vary from 15 to 25 percent of the payload's value. The Russians, however, have no experience in providing launch insurance to foreigners. In most cases, Russian launch vehicle providers have offered a free second launch if the first fails, but have not provided insurance to cover the payload, generally the most expensive component of a launch. [redacted]

Another potential sticking point for some Russian launch vehicle producers is Kazakhstan's control of the Tyuratam launch facility, where the majority of Russia's commercial launches take place. On 25 May, Presidents Yel'tsin and Nazarbayev signed an agreement on the joint use of Tyuratam for both civilian and military operations. In return for access to the facility, the Russians reportedly will share a portion of their profits from commercial launches with Kazakhstan. Kazakhstan, however, will have significant control over the facility--such as the right to change launch dates--although it currently lacks any significant physical presence at the facility to enforce such changes. The Russian press reported that President Yel'tsin had considered expanding the Plesetsk launch site--located in Russia--to accommodate all Russian launch vehicles, but decided the cost would be prohibitive. Should political relations between Russia and Kazakhstan worsen, or were Kazakhstan to charge exorbitant fees for use of its facilities, producers of launch vehicles dependent on Tyuratam would be at a disadvantage. The Soyuz (SL-4), Molniya (SL-6), and Cosmos (SL-8) can be launched from Plesetsk, but these SLVs are not as commercially attractive as the Proton (SL-12) SLV, which currently can only be launched from Tyuratam due to its payload and orbital requirements. [redacted]

Russian SLV producers must also survive current economic difficulties if they are to compete in the longer term. Declining budgets and production orders have pushed many Russian space enterprises to the brink of bankruptcy. Many firms are being squeezed, and are paying their workers with bank loans. Some organizations, such as NPO Energiya, occasionally have been unable to pay their employees at all. While gauging the prospects of any individual firm is fraught with uncertainties, we expect dramatic contraction and fundamental restructuring in the industry as a whole. As cost-

accountability and bankruptcy laws begin to take effect, some may fail in the next few years. [redacted]

Finally, SLV producers face a number of external obstacles that will seriously hinder their ability to compete. At this month's negotiations, it appeared that Western technology transfer restrictions imposed by the Coordinating Committee on Multilateral Export Controls (COCOM)--which have blocked the Russians from bidding on Western launch contracts in the past--are the Russians' primary concern. The Russian delegation appeared irritated that transfer restrictions were not on the agenda. [redacted]

Producers of SLVs derived from ballistic missiles must also contend with the START and INF Treaties, which strictly regulate the use of ballistic missiles. These treaties, in addition to the Missile Technology Control Regime (MTCR), an international body which regulates the flow of ballistic missile technology to Third World countries, also will restrict Russia's opportunities to launch SLVs based on mobile ballistic missile systems from outside its borders. These arms control treaties also are of major concern to the Russians because they would restrict the use of transportable launch systems, such as the "Start." [redacted]

In addition, Russian SLV producers will find the market extremely tight. Producers of traditional SLVs will be competing for a relatively small number of commercial launch contracts--estimated at 10 per year. Moreover, most launch contracts are concluded two to five years in advance of the launch date--a long time for a struggling industry to wait. In the present market, there also is very little demand for the small-payload launches that missile-derived SLVs can provide. Finally, the Russian market position could be eroded if Western governments, in the course of negotiations, force the Russians to set prices comparable to those offered in the West to keep Western producers from being undercut. [redacted]

Russian space officials also continue to be befuddled by Western trade and economic policies. At recent negotiations, delegation members appeared confused over the mechanisms involved in the forming and operation of international trade consortiums--such as the General Agreement on Tariffs and Trade (GATT)--to regulate trade. Russian officials are perplexed that their effort to compete in the market on the basis of low prices has left them open to charges of dumping. This lack of understanding of basic Western economic thinking could severely hamper Western efforts to reach agreements on "rules of the road" with Russia. [redacted]

Impact on Future Negotiations

The issue of primary importance to Russian officials in future negotiations will continue to be reduction of Western technology transfer restrictions. The Russians likely will continue to view these restrictions as the primary obstacle to market entry and probably will be reluctant to move ahead on other aspects of the agreement until this issue is resolved. Negotiators are likely to be more accommodating, however, on the issue of launch prices. Koptev has stated that he would agree to "restrictions and conditions" on

the use of Russian launch vehicles and probably would be willing to sign an agreement that fixes launch prices. [redacted]

Despite their desire to reduce or eliminate technology transfer restrictions, Russian negotiators will be reluctant to sign an agreement similar to the one between the United States and China. Such an agreement would eliminate technology transfer restrictions but, at the same time, limit Russia to a specific number of launches per year. Koptev and other delegates probably will persist in their view that a limit on launches unfairly constrains Russian market access. [redacted]

A China-like agreement would also face strong opposition in Russia. Traditionalists in the Russian government would consider any agreement which places Russia at a perceived disadvantage as yet another example of Yel'tsin bowing excessively to US influence. SLV producers would further argue that the government should focus on removing trade barriers and other restrictions rather than on limiting launches. Producers might also fear that competition among Russian launch service providers would intensify if the number of launch contracts per year were restricted. [redacted]

Appendix: Major SLV Producers and Their Products

Salyut Design Bureau/Khrunichev Fili Missile Production Plant 23. The Khrunichev plant and its affiliated design bureau--KB Salyut--are attempting to win launch contracts for the Proton (SL-12/13) SLV to offset falling domestic orders. The Khrunichev plant, for example, reportedly has a stockpile of a number of Proton (SL-12/13) SLVs--enough to last two to three years. Khrunichev also produced the SS-19 ICBM, currently undergoing tests as a converted commercial SLV dubbed "Rokot." The latest test of the converted SS-19 occurred in December 1991. Khrunichev also produces manned-space equipment and spacecraft. Khrunichev's director, Anatoliy Kiselev, is reaching out directly to the customer. In some cases, Khrunichev uses KB Salyut as an intermediary--KB Salyut, for example, is the organization submitting a bid for the upcoming INMARSAT launch contract using the Proton SLV. KB Salyut also is the lead organization supplying cryogenic upper-stages for the Indian launch vehicle program. Several other Western countries--including South Korea, Brazil, and Argentina--also have expressed an interest in the Proton. Khrunichev officials stated in April that they hope to earn some $160 million in profits from launch services over the next five years. Recent reporting, however, indicates that Khrunichev may be experiencing a severe financial crisis and is considering building civilian aircraft. [redacted]

Aerospace Plant 1 (also referred to as the Progress Plant). The Aerospace Production Plant 1, which is located in Samara (formerly Kuybyshev), assembles the Vostok (SL-3), Soyuz (SL-4) and Molniya (SL-6) SLVs as well as some Energiya (SL-17) components. The plant has little experience in marketing its SLVs but has enjoyed some success in marketing other products, such as materials processing payloads. Little is known about the plant's financial health, although military procurement cuts likely are forcing the plant to seek other sources of funding to survive. [redacted]

Airframe Plant 166. Located in Omsk, the production facility for the Cosmos (SL-8) SLVs may see an opportunity for sales of its booster's services, especially in the light satellite market. SLVs based on ballistic missiles, however, could compete for commercial payloads with the Cosmos--which has a considerably smaller payload capacity than other existing Russian SLVs at 1,780 kilograms. Like Aerospace Plant 1, this plant has little experience in marketing SLVs, and has relied heavily on Glavkosmos in the past. [redacted]

NPO Energiya. This Moscow-based scientific production organization (NPO) designed and manufactures the Energiya (SL-17) as well as the Buran space shuttle orbiter and other space-related components. Energiya's director, Yuriy Semenov, has been pushing sales of the Energiya (SL-17) heavy-lift SLV--designed to launch the Buran--which is in danger of being canceled with the mothballing of the Buran program. Energiya employs over 35,000 people and has consumed 75 percent of the Soviet civilian space budget in the past. Semenov is desperate to make some sales in order to keep the Mir space station--which it now claims to control--in orbit and avoid conversion to low-tech items. NPO Energiya, however, has met with little success in marketing its SL-17 booster. Semenov has been trying to woo the US into using the SL-17 to launch components for Space Station Freedom as well as space exploration programs, such as Mars. NPO Energiya is also developing the Energiya-M, whose payload-lift capability to geosynchronous orbit would fall between that of the Proton (SL-12/13) and the Energiya (SL-17). [redacted]

Kompleks/Votkinsk Missile Production Association. Votkinsk is the final assembly plant for the SS-25 ICBM and formerly assembled the SS-20 IRBM, now eliminated under the INF Treaty. With the assistance of the I.V.K. commercial joint stock company, Kompleks and the Votkinsk plant are marketing an SLV dubbed "Start," based on the SS-20 and SS-25 technology. Kompleks officials claim that "Start's" inaugural flight will take place this December at Plesetsk. Cutbacks in military orders have forced the plant to seek commercial ventures. In addition to the proposed "Start" SLV, both [redacted] firms have expressed interest in building equipment such as satellites at the plant. The "Start" has generated considerable foreign interest. The French [redacted] as well as several Asian nations have requested further information on the projected capabilities of "Start," and in some cases have visited Russian facilities. We believe that an operational commercial version of "Start" could be available some time in the next few years. [redacted]

Miass Design Bureau/Krasnoyark Voroshilov Plant. These organizations are attempting to find a market for converted SLBMs. The Krasnoyarsk facility produced the SS-N-6, SS-N-8, and SS-N-18 liquid-propellant SLBMs, and currently produces the SS-N-23. With the assistance of the Ural-Kosmos joint stock company, Miass and Krasnoyarsk are proposing modifying all four missiles for commercial launch purposes. The Zyb (SS-N-6), Vysota (SS-N-8), and the Volna (SS-N-18) would be launched from submarines--the Shtil-3N (SS-N-23) would be launched from a stationary ground-launch complex. The first test-launch of the Zyb occurred on 19 December 1991. To date, several countries, including [redacted] and Brazil, have expressed an interest in launches using converted SLBM space launch vehicles for light satellites and microgravity experiments. The Volna and Vysota were offered to Brazil last year as part of a bid to launch a Brazilian-built satellite, but the contract later was awarded to a US launcher. A [redacted] firm recently requested information on the Zyb (SS-N-6)--priced at $140,717 for a launch from Russian waters and $448,332 for a launch from [redacted] waters--as well as the Shtil-3N (SS-N-23). [redacted]

Dubna Raduga Design Bureau. Raduga has designed supersonic and air-launched cruise missiles, as well as naval cruise missiles. The design bureau reportedly is working on a new commercial project called "Burlak," which will be a single-stage liquid-propellant SLV, air-launched from a Tu-160 Blackjack heavy bomber. The Raduga organization hopes that the Burlak will compete with the US Pegasus air-launch system by virtue of its superior launch capacity. Raduga appears to be marketing the Burlak on its own--but reportedly still needs considerable investment funds to proceed. We estimate that Burlak is unlikely be to developed before the year 2000, if ever. [redacted]

Russian Space Launch Vehicles

Russian Fixed Ground–Launch Space Vehicles	Producer/Marketer	Price (in Million $)	Payload to Low Earth Orbit (kg)	Launch Site/ Platform	Reliability (%)[a]
Vostok (SL–3)	Aerospace Plant 1/ Glavkosmos	10–14	6,300	Tyuratam Plesetsk	100
Soyuz (SL–4)	Aerospace Plant 1/ Glavkosmos	15	7,500	Tyuratam Plesetsk	98
Molniya (SL–6)	Aerospace Plant 1/ Glavkosmos	N/A	7,500	Tyuratam Plesetsk	97
Cosmos (SL–8)	Airframe Plant 166/ Glavkosmos	N/A	1,780	Plesetsk Kapustin Yar	96
Proton (SL–12/13)	Khrunichev/ KB Salyut	28–56	20,600	Tyuratam	93
Energiya (SL–17)	NPO Energiya	250	100,000	Tyuratam	100[b]
Proposed Russian Launch Vehicles (Technology)	**Producer/Marketer**	**Price (in Million $)**	**Payload to low Earth Orbit (kg)**	**Launch Site/ Platform**	**Reliability (%)[c]**
Rokot (SS–19)	Khrunichev/KB Salyut	N/A	2,000	Silo	91
Start (SS–20/SS–25)	Votkinsk/Kompleks	7–10	350–500	Ground Launcher	95
Zyb (SS–N–6)	Krasnoyarsk/ Ural–Kosmos	N/A	100–800	Submarine	96
Vysota (SS–N–8)	Krasnoyarsk/ Ural–Kosmos	N/A	130	Delta I Submarine	92
Volna (SS–N–18)	Krasnoyarsk/ Ural–Kosmos	N/A	350	Delta III Submarine	75
Shtil–3N (SS–N–23)	Krasnoyarsk/ Ural–Kosmos	N/A	500	Stationary Ground Launch Complex	80
Burlak (New Vehicle)	Dubna Raduga	N/A	700	Tu–160 Blackjack Bomber	N/A

[a] Reliability calculated over last ten years.

[b] SL–17 only launched twice, 1987 and 1988.

[c] Reliability based on in–flight figures––numbers likely will fall without a robust program for maintenance and testing. Figures are not valid when compared with those of fixed ground–launch SLVs––they are useful only in assessing potential reliability.

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