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Chapter 35

A Brief History of Baikonur*

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On 4 October 1957, for the first time, a man-made object was placed in orbit round the Earth. The object was Sputnik 1, and it was Soviet-made. A few months later it was learned that the satellite had been launched from a hitherto-unknown place in the steppes of Kazakhstan: Baikonur. For nearly forty years now, most important space events have originated in Baikonur. Substantial investments have made this isolated spot in the Kazakh steppes the biggest civilian and military launching base in the world.

Today, now that the East-West confrontation is over and the Soviet Union has broken up, the political and economic difficulties of the former Soviet republics are having major effects on the future of the CIS's space programs, and even on that of Baikonur, which, it must be remembered, is in Kazakhstan, whereas it is used by Russians.

Without in any way trying to forecast this future, now that Baikonur is open to foreigners it is interesting to tell the story of the birth, life, greatness and misfortunes of this Mecca in the world of space travel.

The Birth of Baikonur

In 1954, the Soviet Union decided to build an intercontinental ballistic missile, and it became clear that the Kapustin Yar launching base near Vol-

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gograd, used since 1946, was unsuitable. Two main reasons were given. Firstly this base was too small for the intercontinental range of the future R7 Semyorka missile and for satellite launches, and secondly it was too easily observed by the West, in particular the Americans who had radar systems in Turkey.

At the end of 1954 a spot was chosen, in the region of Kzyl Orda in the republic of Kazakhstan, near Tyuratam, a small railway halt amid the vast steppes. There were six main reasons for the choice:

1. It was far enough from the borders for its activities to go relatively unobserved (about a thousand kilometers from the Iranian and Afghan borders).
2. An average of 300 days of fine weather a year and few clouds made visual observation of launches easier. Rainfall was also low, 250 mm per annum.
3. The vast surrounding desert ensured safety for launches and for dropping stages.
4. To guide the R7, it was possible to build two radio guidance centers some 500 km from the launching base.
5. Tyuratam was on the railway line between Moscow and Tashkent and on the Syr-Darya river, which made it easy to bring building materials and, later, launch vehicle components.
6. The site had the further advantage of being the southernmost of the three considered, which meant that advantage could be taken of the highest possible initial speed due to the Earth's rotation (316 meters per second).

WHY BAIKONUR WAS CHOSEN

The Baikonur launching base is 2,100 km from Moscow, 160 km east of the Aral Sea, about 800 km west of Tashkent—and 370 km southwest of the little town of Baikonur. In order to mislead the West, the Soviet officials who had to log the first flight by a cosmonaut—Gagarin in 1961—with the International Aeronautical Federation, chose to name the base after Baikonur rather than the more appropriate Tyuratam. Soviet misinformation even went so far as to put signposts bearing the name Baikonur right at the entrance to the base. For the same reason, Soviet publications on space have always given its position as 47.4°N - 63.4°E, whereas the true position is 45.6°N - 63.4°E. The deception began to emerge with the first visit by foreign journalists in 1975 for the joint Soviet-American Soyuz-Apollo mission, even though a Japanese astronomer had located the base at Tyuratam rather than Baikonur as early as 1957.

Since the founding of the CIS in 1991 the official name has been Tyuratam.

The first contingent of about thirty soldiers arrived at Tyuratam on 12 January 1955. Their task was to make preliminary surveys of the land and to build quarters for the various teams who would come later.

Responsibility for building both civilian and military facilities was given to the Engineer Corps, which was under the direct authority of the Deputy De-

fense Minister in charge of construction. Engineer-Colonel G. M. Chubnikov was engineer for the works.

In February 1955 work started on the road between the launch pad, or site Number 1, and Tyuratam railway station. On 5 May the first large battalion of engineering troops arrived, and within a few months there were 5,000 soldiers on the site.

As well as the launch pad itself, there were plans for two radio guidance systems, nine tracking, remote sensing and orientation centers, and naturally support installations. But the first stage was to build the road and rail network.

Between the station and the Syr-Darya river, building also started on wooden houses in a village known first as Zarya and then as Number 10 or Tashkent 50, for reasons of secrecy. On 28 January 1958 it was given the name of Leninsk. The town was the living quarters for the Baikonur personnel. The first two-story brick building, the barracks, was not erected until August and September 1956. Gradually, a village with streets, houses and offices emerged from the desert. But it was a complete change for the first inhabitants, most of whom came to the steppes from the forests of central Russia. It was hard to live without trees, and so it was decided to plant a vast park, Soldatski Park.

But for the time being the crews lived in tents on the banks of the Syr-Darya, some three kilometers from Tyuratam. They worked day and night in temperatures which sometimes reached 50°C in summer and fell to –30°C in winter, with burning or icy winds.

There were construction sites in several different places, and there was no time to wait for railways, concrete roads and water and electricity supplies. All the building materials and components had to be brought from the station by truck, on unsurfaced roads, which were hidden by an unbroken cloud of dust from sunrise until late in the evening. The trucks had to use their headlamps even in broad daylight. Hard frost and icy winds made digging difficult. Hundreds of trucks and dozens of excavators, scrapers and bulldozers worked day and night. Organizing logistics alone was a large-scale task. They built an enormous sawmill with a wood conditioning plant, and also a big concrete plant and a garage to repair the thousands of vehicles. They boasted that here only the machines broke down, not the men.

Three further enemies were fire, adders and susliks.* Fire often broke out in the tents. During the night, the susliks dug holes which had to be filled in every morning, and diseases could be caught from their bite.

The launch pad was sited on a hillside, to make the best use of the topography. Excavation started in July 1955 in ground consisting of layers of clayey soil, coarse sand and hard clay. The hole for the vent was divided into two sections. The crew in one drilled and dug, while in the other some thirty bulldozers pushed the sand and clay as far as possible up the slope, where it was

* Ground squirrels.

extracted by excavators. The crews were then switched around and the sand was kept to make the concrete for the launch pad and other structures. One million cubic meters of earth were moved in three months, nearly ten thousand cubic meters a day. They naturally worked at night too, by floodlight. The electricity came from a steam generator on a special train. The power station in Leninsk which later provided the whole base with electricity did not start operating until 1956.

By 1 November 1955, just over six months after work began, a major stage was complete—all the railway lines and the road network were finished.

Concreting of the launch pad and of the vent started at 11 pm on 19 April 1956. The vent alone was enormous—250 m x 100 m x 45 m. Thirty thousand cubic meters of concrete were poured between April and September 1956. At the same time, the launcher erection system and the launch gantry with four articulated arms were developed in the Leningrad engineering plant under V. P. Barmin. He had been given twelve months to do the job, but it was finished in less than six. Static and dynamic tests were conducted in Leningrad, where tools were available. Tyuratam did not yet even have any heavy lift cranes. The complete system was tested, using a full-scale model of the R7, in a pit 19 meters in diameter. An actual launch was even simulated. The system passed the tests, and in October 1956 it was sent to Tyuratam, where it was installed on the launch pad. A faster fuelling system was also designed, cutting down fuelling time from an hour and a half to forty minutes.

The State Commission officially accepted the base in March-April 1957, after the transport, launcher erection, fuelling and control systems had been tested. A few weeks later, on 15 May, the first R7 was launched. A gigantic task had been completed in only two years.

PRINCIPAL DATES IN THE BUILDING OF BAIKONUR	
20 May 1954	The Council of Ministers approved the building of a new launching base.
Late 1954	A site was chosen at Tyuratam in Kazakhstan.
12 January 1955	The first contingent of about 30 soldiers arrived at Tyuratam, and preparation work started.
12 February 1955	The Council of Ministers decided to build a launching base at Tyuratam. General A. I. Nesterenko was put in charge.
April 1955	The road from Tyuratam station to the site of the future launch pad was marked out.
5 May 1955	The first stone was laid in the village which was to become the town of Leninsk.
2 June 1955	The Baikonur launching station was officially created.
July 1955	Earthworks started on the launch pad.

October 1955	The first huts, officers' houses and hostels were built in Naberegnaya Street, and the first shops in Labour Square.
1 November 1955	The road and rail networks were completed. Five thousand soldiers were working on the site.
19 April 1956	Concreting of the launch pad started.
April 1956	The first sports contests were held.
1 September 1956	Lessons started for 136 pupils at the school at 30 Shkolnaya Street.
5 October 1956	The road from Tyuratam to the launch pad was completed.
October 1956	The first barracks was built. The launching system was installed on the pad.
7 November 1956	A park was created near the barracks, and 17,000 trees and 900 shrubs were planted.
15 May 1957	The first R7 was launched.

The Biggest Launching Base in the World

The Early Days

From 1957 to the mid-1960s was a pioneering period, with the first satellite, the first man in space, the first woman, the first space-walk, the first pictures of the far side of the Moon, etc.

The starting point of these exploits was Baikonur, and in particular the launch pad of site Number 1. The latter underwent alterations in 1960 to make it compatible with the launch vehicle of the manned spacecraft Vostok. Launches became so frequent that a second pad, site Number 31, was completed at the end of 1958.

Two new launch vehicle programs were decided on between 1960 and 1962. The first, designed by the Tchelomei engineering department, was the Proton, capable of launching heavy payloads such as the planned Almaz and Salyut space stations. During the 1960s and 1970s two Proton launch complexes were built, each with two launch pads, some thirty kilometers to the west of launch pad Number 1. The first Proton launch pad was commissioned on 16 July 1965 for the heavy scientific satellite Proton 1, and the second a few months later. The second complex became operational in 1970-71. But most of the infrastructure investments at Baikonur went on the lunar launcher N1-L3 program, headed by Korolev until his death in 1966, and after that by his first assistant V. P. Mishin. Work on the launch complex started in 1964, about 13 kilometers to the northwest of pad Number 1, with V. P. Barmin as project manager.

The original plan was to build two complexes, each with two launch pads, but only one was built because of a shortage of funds. Construction of the first launch pad started in 1964 and was completed by the end of 1967, and work on the second lasted from February 1966 to the end of 1968.

Seven kilometers from the launch pad there was a technical zone and the living quarters for the personnel of Progress, the company commissioned to assemble the complete launch vehicle and major sub-assemblies and to conduct tests. There were 90 systems to be built. At first it was planned to integrate the 105-meter launch vehicle vertically, which would have required a building 160 meters tall, but once again money was short and it had to be integrated horizontally.

Every day, two trains with several dozen wagons brought materials to Baikonur for the project. The latter was so gigantic that it became an attraction, and was visited several times by delegations from the socialist countries.

Static tests on N1-L3 on the launch pad began in early 1967. In December 1968 the propulsion system was tested with an unloaded launch vehicle. Preparation for the first launch finally started in January 1969. It lasted 28 days and involved 2,300 people. Fifty tank wagons were needed for fuelling with liquid oxygen. After fuelling and checks, the gantry was taken away and the launch vehicle's bearing was set. The rocket stood alone on the launch pad, held only by 48 explosive bolts. It was 21 February 1969. The first N1 launch had been scheduled to coincide with Red Army and Navy Day. Unfortunately this launch and the next three all failed.

In 1959 construction also started on military zones to be used for firing tests on strategic missiles and launches of experimental and operational military satellites.

Major-General P. Z. Prestensky was placed in charge of the building of the first missile silos. The first generation of silos, known as Dvina, Tchussovaya and Desna for the R12U (SS4),* R14U(SS5) and R9A (SS8) missiles, was followed by two more generations. One, in 1967, was for the R36 (SS9), UR100 (SS11) and RT2 (SS13) missiles and the other, in 1975, for the R36N (SS18), UR100N (SS19) and RS16 (SS17).

The first intercontinental ballistic missile to be tested was the R16, in October 1960, and then the R9 and UR200 in 1963. These three types of liquid-propellant missiles were developed by Yanguel, Korolev and Tchelomei respectively. Korolev developed two more missiles, the RT1, the first powder-propellant missile, with a range of 2,500 km, tested in 1963-64, and the RT2, with a range of 8,600 km, tested in 1965-66.

As for military satellites, many types were launched, both at Baikonur and at Plesetsk, the space base near Arkhangelsk, some 800 km north of Moscow.

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* The Western name for the missile is given in brackets.

Baikonur's Apogee

Baikonur's days of glory were those of the USSR's greatest space activity, between 1976 and 1986, when some 150 Soviet satellites, 80 to 90% of them military, were operational in orbit. In some years there were as many as a hundred space launches—one every three or four days. Around 60% of these satellites were in fact launched from Plesetsk and not from Baikonur. Five types of launchers were in use during this period: Semyorka-Soyuz, Semyorka-Molniya, Proton, Tsyklon and Zenit. All these vehicles, together with Energiya-Buran from 1987 on, were launched from Baikonur. Some of the Semyorka-Molniyas, Cosmos* and Tsyklons were also launched from Plesetsk.

As well as the space launches from Baikonur, there were development and practice firing tests on ballistic missiles. During this period a dozen ground-to-ground strategic ballistic missiles were in operational service in the USSR.

Like other launching bases, Baikonur has always been closely involved in civilian and military space activities as well as ballistic missile development. This explains the large military presence at the site, which in fact was run by a Russian Defense Ministry structure, the Military Space Forces.

The Baikonur launching base is about thirty kilometers north of Leninsk, the living quarters for the Baikonur personnel. It consists of three main sites:

- In the center, the NPO Energiya zone, where the manned Soyuz missions and unmanned Progress missions are launched, and the Energiya-Buran† zone,
- On the western side is the Proton zone, used by KB Salyut and the Khrunishev production plant,
- On the eastern side is a second zone for Soyuz and Progress launches and a site used by NPO Yuzhnoe, in charge of the Zenit launch vehicle.

Each zone also contains silos for firing tests on ground-to-ground intercontinental missiles.

The central zone is the historic part of Baikonur. At the entrance is the house where Gagarin spent the night before his flight, and another where Korolev stayed when he came to Baikonur. Nearby is the Gagarin Museum which tells the story of Baikonur's glorious exploits and also of its tragedies.

A few hundred meters further on the actual Soyuz zone starts, with the building for horizontal assembly of the launch vehicle (MIK) and its annexes and then, after another two kilometers, the pad where Sputnik I and Gagarin's flight were launched.

The Energiya-Buran zone was built on the site of the zone intended for the lunar launch vehicle N1-L3 in the 1960s. Building started in 1976 and involved 28 ministries and 200 factories or engineering offices for ten years. It was offi-

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* Cosmos was launched from Baikonur from 1964 to 1968.

† Buran is the Soviet space shuttle, whose first flight took place on 15 November 1988.

cially opened by Mikhail Gorbachev on 11-13 May 1987, two days before the first Energiya launch. The structures in this zone include:

- A universal test and launch bench for static tests on the propulsion stages and actual launches,
- The two Energiya-Buran launch pads,
- A building where the Buran shuttle is integrated and checked,
- An aerodrome, Jubilee,
- A bay 100 meters high for vibration tests on the Energiya-Buran assembly.

As well as the launch zones already mentioned, used mainly for civilian missions, Baikonur is very much involved in military space missions and in the field of strategic ballistic missiles.

Ballistic Missiles

In this field, Baikonur is only a test center. The targets for the missiles fired from Baikonur are either in Kamchatka or in the Pacific. Numerous types of ICBM developed by the USSR have been tested here since 1957: R7 (SS6), R16 (SS7), R9 (SS8), R36 (SS9), RS10 (SS11), RT2 (SS13), RS16 (SS17), RS20 (SS18) and RS18 (SS19). Old silos used for earlier generations of missiles have naturally been converted to take more recent ones.

In July 1991 there were four ballistic missile test sites at Baikonur comprising two SS11 silos, four SS17 silos, ten SS18 silos and two SS19 silos.

Anti-Satellite Systems

Work on the design of an anti-satellite system started in the early 1960s. The first operational system was V. N. Tchelomei's Polyot, of which two were launched in 1963 and 1964 by a modified Semyorka. In 1965, a new type of anti-satellite satellite, again developed by Tchelomei, was launched by a modified version of M. K. Yangel's ballistic missile R36 (SS9). A launching site was then built on the western side of Baikonur, beyond the Proton zone. It is currently used for the Tsyklon, which is assembled in the Proton MIK. This site was used in 1966-67 for tests on the fractional orbit bombardment system and, after 1967, for the anti-satellite system. The latter was declared operational in 1979. It consists of an orbiting intercepting satellite with a homing device which identifies the target satellite and a maneuvering system which places it in the orbit of the enemy satellite to be destroyed. The warhead was a fragmentation bomb. For the tests, the target satellite contained a radio transmitter, which indicated that it had been destroyed when transmission ceased.

A total of 20 anti-satellite satellites were launched and 13 interceptions took place, until 1982. After four years of operational existence the system was withdrawn.

Preparation for the launch took only a few hours and was completely automatic, which meant that several interceptors (launcher and satellite) could be launched daily at short notice. The Tsyklon launcher, which was fired more than a hundred times, failed only twice.

Military Satellite Launches

Military satellites have also been launched from Baikonur:

- Semyorka-Soyuz places photographic reconnaissance satellites in orbit, as well as manned missions
- Semyorka-Molniya, telecommunication satellites
- Semyorka-Vostok, observation satellites in sun-synchronous orbits
- Tsyklon, ocean surveillance, telecommunication, surveyor and radar calibration satellites (only the two-stage version, Tsyklon 2, is launched from Baikonur)*
- Zenit, electronic listening and photographic reconnaissance satellites
- Proton, navigation, radar detection and early warning satellites.

FOBS (Fractional Orbit Bombardment System)

The 1967 Treaty of Moscow banned nuclear warheads in orbit. While complying with the letter of this treaty, the Soviets developed the fractional orbit bombardment system in which a nuclear warhead was sent into orbit but did not complete a full orbit, and so could not be considered as a satellite permanently in orbit. The warhead, launched from Baikonur, followed a partial orbit and when it arrived over the United States and the city chosen as a target it was slowed down, re-entered the atmosphere and aimed at the target. Another original feature of the system was that it approached the United States from the south, and the defense systems were in the north. It was launched with an adapted version of the SS9 ballistic missile. Tests were conducted from 1966 to 1971, and a dozen silos for these launch vehicles seem to have been in use at Baikonur during this period.

BAIKONUR IN 1989: A FEW FIGURES

It is obviously impossible to take in all the Baikonur facilities at a glance. The figures below, referring to 1989, give a better idea of its scale:

- 9 launching complexes with 15 launch pads and the buildings for assembling launch vehicles and preparing satellites.
- 4 ICBM flight test complexes: SS11, SS17, SS18 and SS19.
- 4 space test centers: Soyuz, Zenit, Proton and Energiya-Buran.

* The three-stage version has been launched only from Plssetsk, since 1977.

- 4 ergol supply stations.
- Sensing and tracking stations.
- A liquid oxygen and nitrogen plant.
- A power station.
- A landing strip for Buran.
- An aerodrome.
- 470 km of railway lines.
- 1,281 km of roads.
- 1,240 km of water pipes.
- 2,784 km of telephone lines.
- 6,610 km of electricity lines.
- 360 km of heating pipes.
- 430 km of sewers.
- 600 electricity transformers.
- 220,000 cubic meters of water consumed daily.
- An area of 6717 square kilometers: 120 km from east to west and 80 km from north to south.

  Including the zones where stages are dropped, tracking systems, etc., the facilities cover a total area of 104,000 sqkm in Kazakhstan, Russia, Turkmenistan and Uzbekistan.

Baikonur generates significant economic activity, both in Kazakhstan and in other Soviet republics, and several hundred companies work for it.

The Exploits and Misfortunes of Baikonur

Since 1961 Baikonur has been closely associated with manned missions. As well as events in this field, the history of Baikonur is above all that of the Soviet Union's pioneering exploits in space. Like any human adventure, this glorious history also includes disasters and tragedies. A few notable dates are given below.

Moments of Glory

4 October 1957:	the launch of the first satellite, Sputnik 1.
3 November 1957:	the launch of the first living creature in space, the dog Laika.
15 May 1958:	the launch of the first scientific satellite, Sputnik 3.
4 October 1959:	the launch of Luna 3, which took the first pictures of the far side of the Moon.

12 April 1961:	the launch of the first man in space, Y. A. Gagarin.
16 June 1963:	the launch of the first woman in space, V. Tereshkova.
16 June 1963:	the first dual mission by two manned spacecraft—Bykovsky in Vostok 5 and Tereshkova in Vostok 6.
18 March 1965:	the first "space-walk", by A. Leonov.
31 January 1966:	the launch of Luna 9, which made the first soft landing on the Moon.
12 June 1967:	the launch of Venera 4, which provided the first information on the atmosphere of Venus.
17 August 1970:	the launch of Venera 7, the first spacecraft to land and operate on Venus.
12 September 1970:	the launch of Luna 16, which automatically collected and brought back a soil sample from the Moon.
10 November 1970:	Luna 17-Lunakhod, an automatic exploration vehicle, landed on the Moon.
19 April 1971:	the launch of the first orbital space station, Salyut 1.
15 July 1975:	joint Soyuz-Apollo mission.
15 May 1987:	the launch of Energiya.
15 November 1988:	the launch and automatic return of the Buran shuttle.

The Misfortunes of Baikonur

24 October 1960:	explosion of the R16 missile, 165 people killed.
24 October 1963:	explosion of the R9 missile, 7 people killed.
18 March 1965:	difficult return and landing of Voskhod 2.
28 November 1966 to 7 February 1967:	failure of the first three Soyuz missions.
23 April 1967:	Soyuz 1, Komarov killed.
30 June 1971:	Soyuz 11, Dobrovolski, Patsayev and Volkov killed on return.
5 April 1975:	a near-disaster during the launch of Soyuz 18A. Lazarev and Makarov were recovered alive in the Altai Mountains.
14 October 1976:	Soyuz 23 failed to dock with Salyut 5. Soyuz 23 landed in a lake in Kazakhstan, and the crew were rescued in difficult conditions.
23 September 1983:	explosion of the Soyuz launcher T10A on the launch pad. The rescue system was activated and the two cosmonauts, Titov and Strekalov, survived.

Rendezvous Failures

Developing the technique and procedures for docking between Soyuz vehicles and Salyut space stations was a long and difficult task. At least seven attempted rendezvous failed and were aborted.

12-13 October 1969: Soyuz 7 and Soyuz 8: failure of the Igla antenna.

23 April 1971: Soyuz 10 and Salyut 1: failure of the coupling system.

26 August 1974: Soyuz 15 and Salyut 3: docking failure.

14 October 1976: Soyuz 23 and Salyut 5: docking failure.

9 October 1977: Soyuz 25 and Salyut 6: docking failure.

10 April 1979: Soyuz 33 and Salyut 6: failure of the Soyuz motor.

20 April 1983: Soyuz T8 and Salyut 7: failure of the Igla antenna.

On 23 August 1976, when Zholobov was ill and it was decided to abort the mission, there was great difficulty in separating Soyuz 21 from Salyut 5.

CASUALTIES AT BAIKONUR AND OTHER SITES

The history of missiles and space travel, like all human activities, has been marked by accidents and tragedies. Since 1957, at least 231 people have lost their lives in the course of their duties at Baikonur and Plesetsk. At Baikonur, 172 were killed by the explosion of R16 and R9 missiles in 1960 and 1963. Another 59 died in Plesetsk in 1973 and 1980, when Cosmos and Semyorka launch vehicles exploded.

Space has exacted a heavy price in cosmonauts' lives. Six died in training, in plane crashes and from various other causes, and four perished in space, in 1967 and 1971.

Problems With Salyut Orbital Stations

There were also problems in placing the first space stations in orbit in 1972 and 1973:

LAUNCH DATE	NAME OF STATION	PROBLEMS
29 July 1972	Salyut 2A	Launch failure due to a fault in the second stage of Proton.
3 April 1973	Almaz 1/ Salyut 2B	Faulty seal. Re-entered the atmosphere after 26 days.
11 May 1973	Cosmos 557	Soon became unusable because of the failure of an ionic sensor, causing ergol reserves to become exhausted.

From 1974 on, the Salyut 3, 4, 5, 6 and 7 and Mir stations were placed in orbit successfully. At the beginning of 1985, however, Salyut 7, which was unmanned, developed a fault and drifted in orbit. On 6 June 1985 the Soyuz T13

mission was launched to diagnose the damage and, if possible, repair it. Docking with Salyut was extremely difficult because the station was rotating uncontrollably. When the cosmonauts entered the satellite they found that a general electricity failure had caused many systems to freeze. After repairs, the station gradually resumed normal operation. What could have been a major failure in the Soviet space program in fact turned into an exploit.

The N1-13 Lunar Program

This was undoubtedly the greatest setback in Soviet astronautics. The four launches at Baikonur between 21 February 1969 and 23 December 1972 all failed. The program aimed at landing a cosmonaut on the Moon was abandoned in 1974.

The Zond Lunar Program

At the same time as the N1-L3 program, there was a plan to use the Proton launcher and a modified Soyuz with a two-man crew to orbit the Moon without landing, in June 1968. This objective was not achieved. Zond 5, however, launched on 15 September 1968, was the first spacecraft to circle the Moon with living creatures on board—tortoises and insects.

THIRTY-SIX YEARS OF BAIKONUR LAUNCHES

Although Baikonur was the starting point of all major space travel pioneering, and the first of the Soviet space bases, it does not hold the record for the number of Soviet or Russian launches, 60% of which took place at the northern base in Plesetsk. From 1957 to the end of 1993, however, some 950 satellite launches were fired—an average of 26 a year, and more than two a month. The maximum was 45 launches in 1987.

In 1993, the CIS's launch capacity was 230 a year—100 at Plesetsk and 130 at Baikonur—although there were in fact only 47 launches.

By the end of 1993, 212 two-, three- or four-stage Protons and 21 Zenits had been launched from Baikonur. The remaining 700-odd launches involved the various versions of Semyorka, Tsyklon, Cosmos and two launches of Energiya. Of the Semyorka flights, 77 (between 1961 and the end of 1993) were manned, and some 90% of them were launched with the three versions of Soyuz.

The three thousandth world launch took place at Baikonur on 17 March 1988, of the Indian remote sensing satellite IRS 1A.

Statistics on missiles are more difficult to establish. It seems that, 1,100 ballistic missiles were tested at Baikonur from 1957 to the end of 1992. This number no doubt refers to only some of the missile tests by the USSR and the CIS, because there were 2,648 test firings in only six or seven years, from 1980 to 1986. Missile tests started in 1947, and still continue today, although they are far less frequent.

What Future for Baikonur?

The collapse of Soviet communism, the break-up of the USSR, the end of East-West confrontation and hence of competition in space between the two blocs have radically changed the objectives and issues of space exploration, both in the CIS countries and elsewhere. In the past two or three years the Russians have even been wondering if it is better to keep Baikonur which, we must remember, is in Kazakhstan, or to build a new base in Russia. No one yet knows which solution will eventually be chosen. In the meantime, some of the zones at Baikonur, for example Energiya-Buran, have been inactive for several years.

Whatever the future of Baikonur, brilliant or modest, it must be recorded that human genius shone here for more than thirty years, making this isolated spot on Earth a point of departure towards the stars and space.

And whatever the destiny of Baikonur, the world capital of space travel is already part of our human heritage, like the pyramids of Egypt and the Great Wall of China. May it never become, like them, a mere curiosity for tourists. If Baikonur were to disappear, the human race would lose a large part of its space heritage.

Five hundred years ago, Christopher Columbus discovered the New World, and opened the way to America. From Baikonur, Yuri Gagarin, a twentieth century Columbus, opened the way to another new world, that of space. Let us hope that Baikonur will not become simply a museum of Gagarin's exploit, but the springboard for future human conquests.