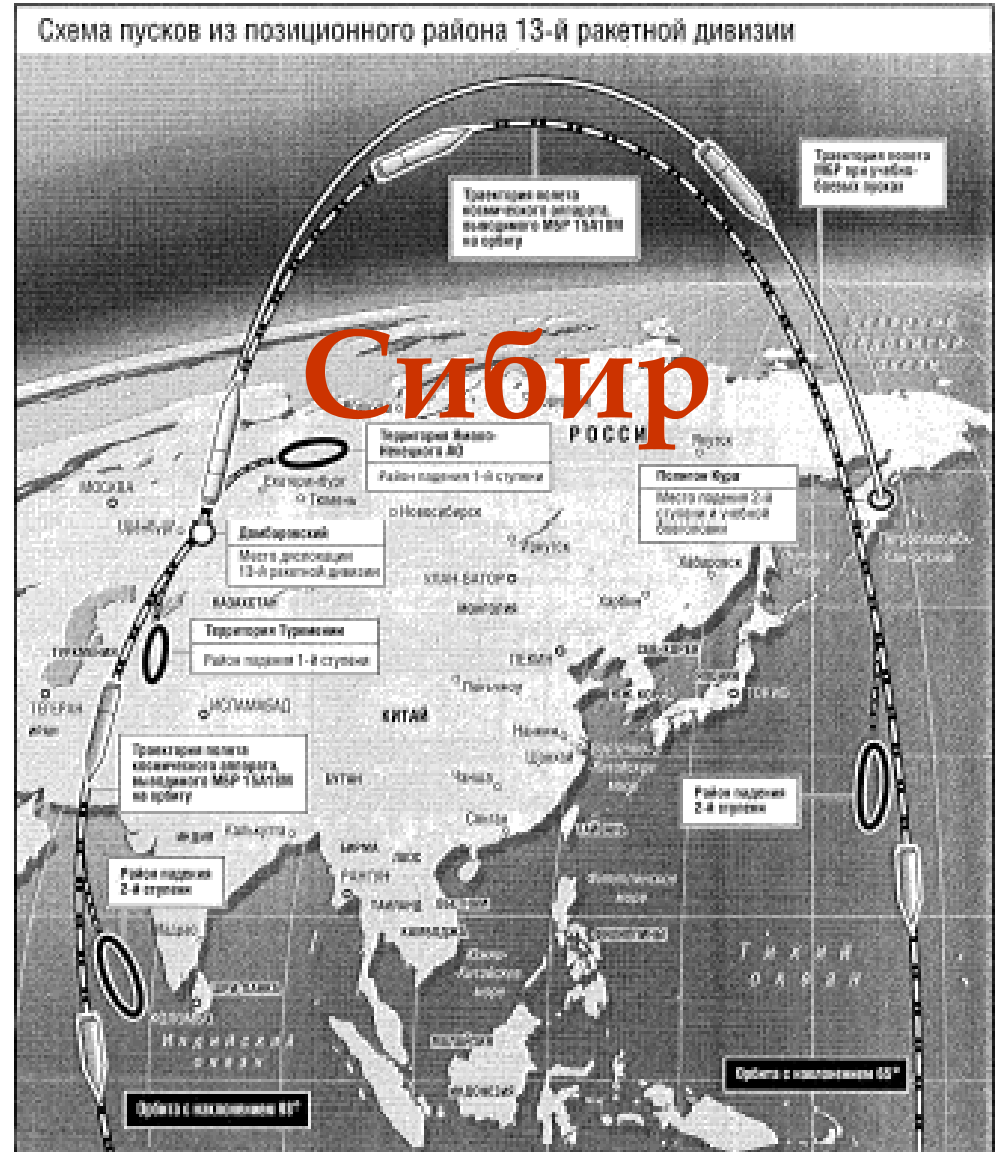


# 'Yasniy' – military surplus rockets on an active nuclear weapons site

*Днепр*

*ЯСНЫЙ*



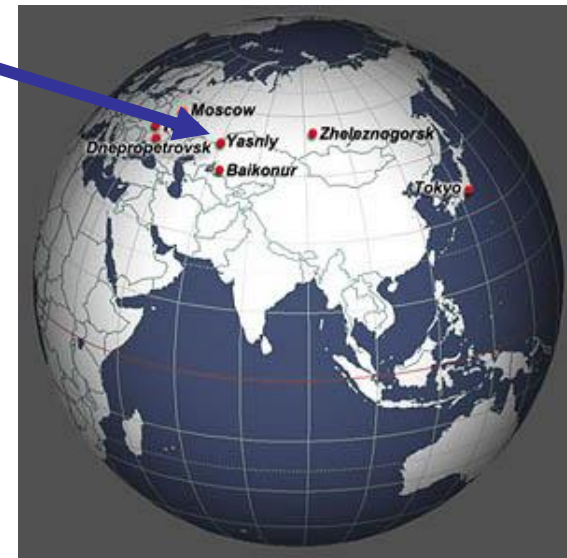
Домбаровский  
DOMBAROVSKIY

# The Yasniy Space Launch Site

Genesis-II launch campaign: June 27-29, 2007

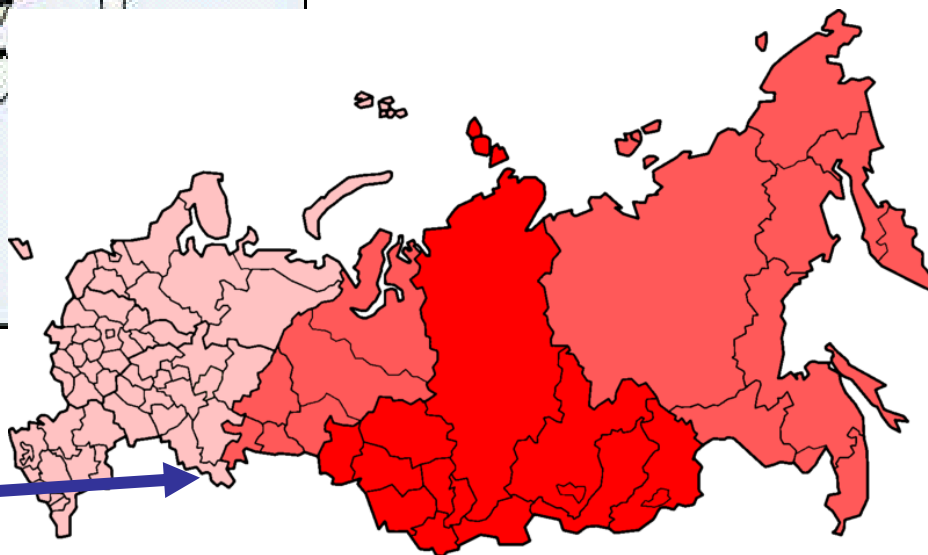
- Where is it?
- What is the area like?
- Why are there rockets there?
- What is launched from there?
- Why and how?
- What payload on June 28?
- What is the significance of this new orbital capability?

# Is it really “Siberia”? ‘Da’ and ‘Nyet’



Geographer's view

Climatologist's view

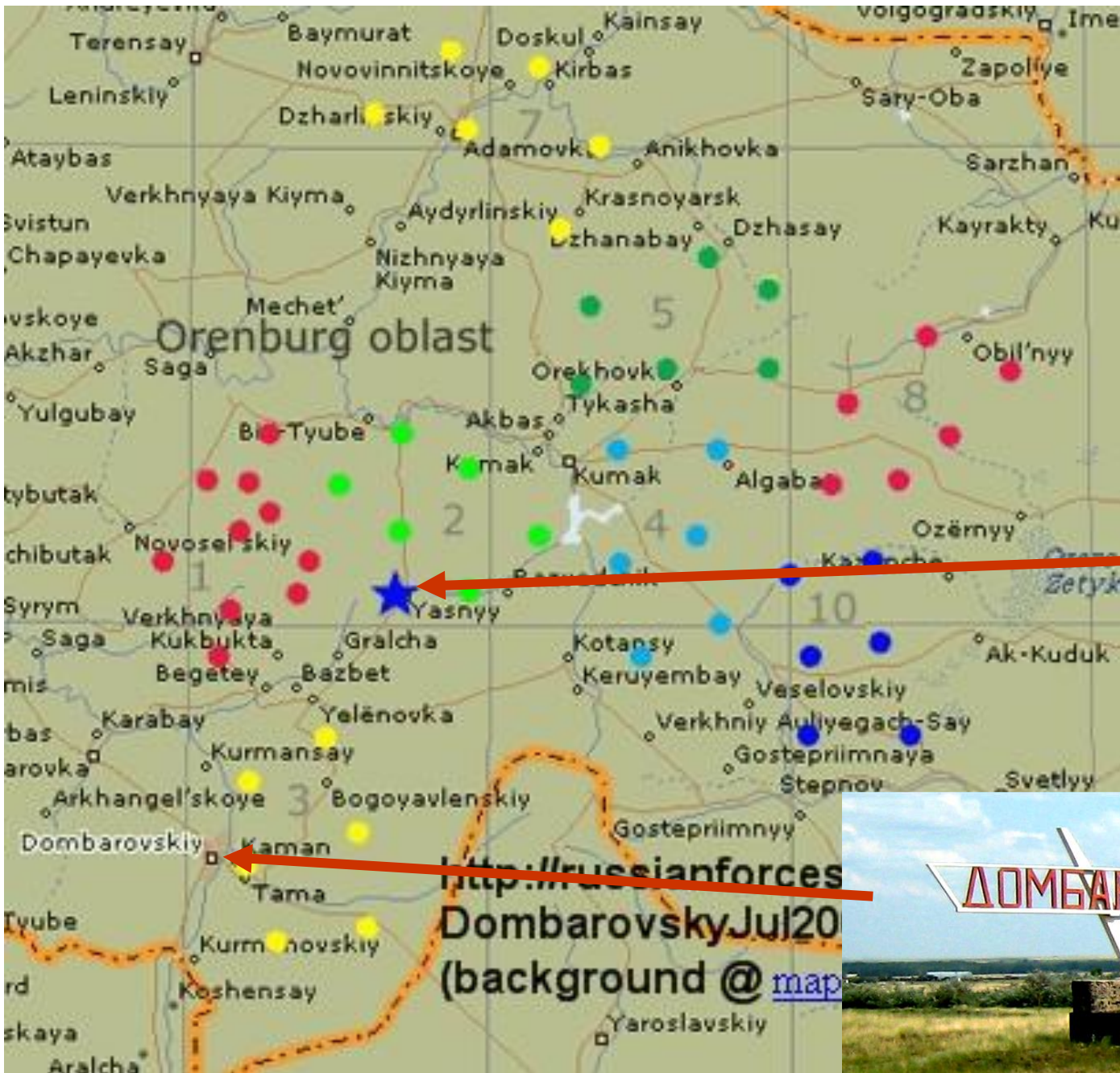


# Orenburg Region crosses the Ural Mountains

European side ← → Asian side



**OPCK**



‘Yasniy is in the middle of RS-20 ICBM field called “Dombarovskiy”

(every colored dot is a silo with nuclear missile)

Town of Yasniy





From GoogleEarth, the weird 'earlobes' across the ground – what was their association with the missile activities?

In preparation for the trip I made intensive Internet searches for information about the area. I also made sure that I was NOT carrying copies of the maps and space-based imagery WITH me when I got there – might be awkward to have to explain.



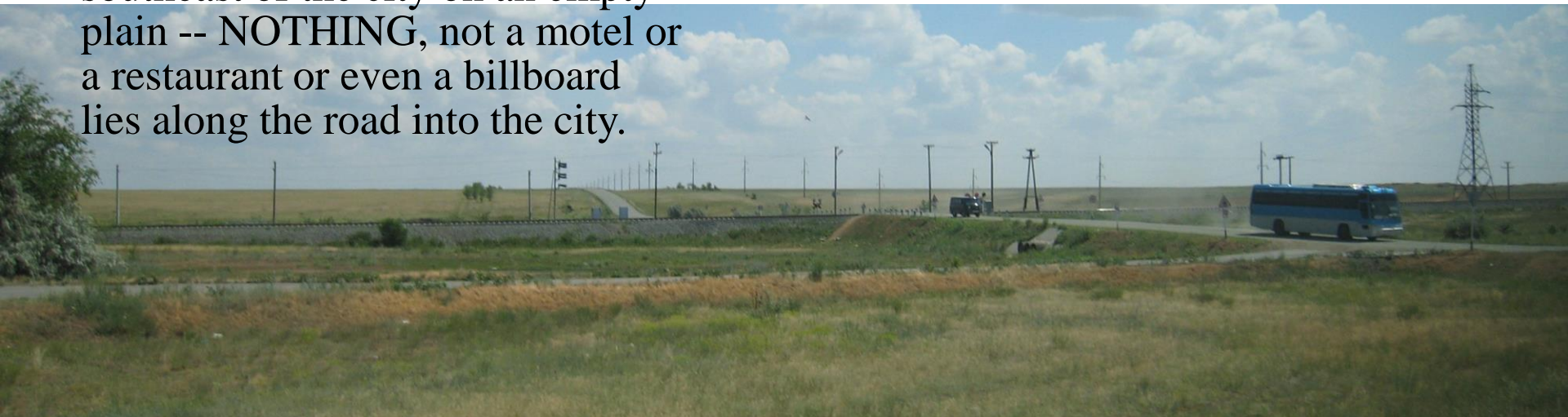
It's not easy to get there

OR

“Yes, I said Orsk,  
not Omsk.”



In a bizarre example of Russian urban planning, the airport sites southeast of the city on an empty plain -- NOTHING, not a motel or a restaurant or even a billboard lies along the road into the city.



# Orsk airport arrival hall – we never saw any private travelers



<http://www.npointercos.jp/Yasny.html>



# Cross country by charter minivans



(above)  
The fabled  
“Or” River  
(yeah, right)



(right)  
Flat country,  
rich pastures,  
stands of tall  
forest (NOT  
‘taiga’ pines)



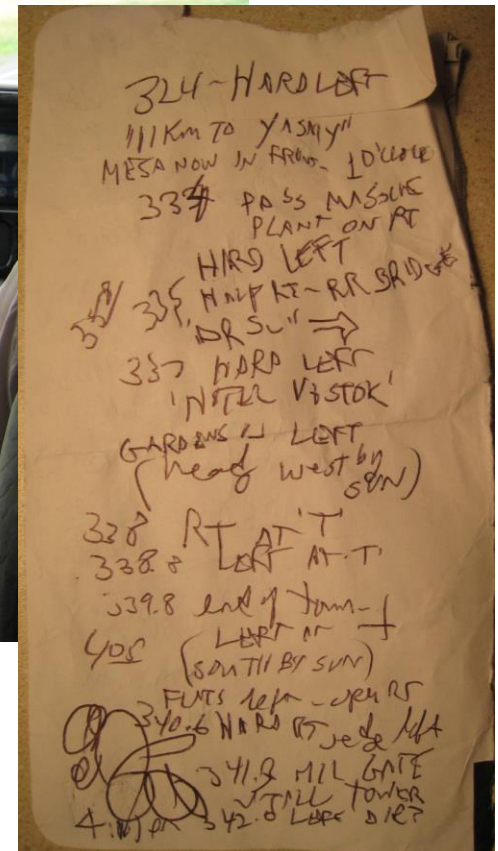
## Tourist shot from another visitor in October



[http://www.dlr.de/blogs/en/desktopdefault.aspx/tabid-5919/9754\\_read-152/searchtagid-2355/gettrackback-1/norobotindex-1/](http://www.dlr.de/blogs/en/desktopdefault.aspx/tabid-5919/9754_read-152/searchtagid-2355/gettrackback-1/norobotindex-1/)

# MAPPING

Logging the road features, indexed to the odometer, on a VERY bumpy, busy border route.



The direct route (return only)

# Checkpoints

We were waved  
right through



No signs of barricades  
or barbed wire – even  
the livestock were free-  
ranging for grasslands



The roundabout route,  
from the southern approach

# Approaching Yasniy, the 'Mystery Mesa'



- Closer in – a humongous artificial dirt pile



# “Yasniy Mining Company”



- Ore mill from road (top right) and
- from space (bottom right)



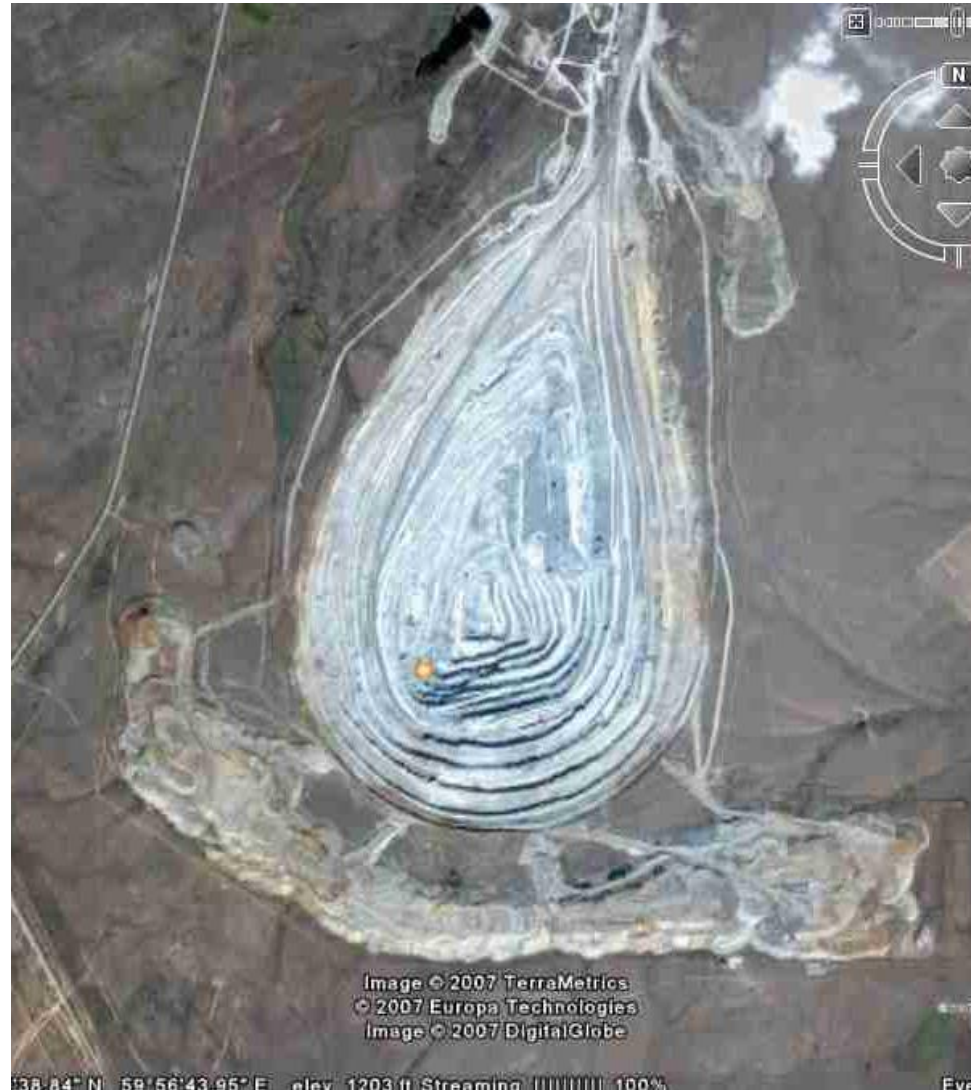
Glimpsed from  
the road – the  
downwind woods  
didn't look too  
healthy



# World's biggest open-pit asbestos mine



The weird lobes (above, medium resolution) turned out (right, high resolution) to be holes, dug over many decades – and the roads to the manmade mesa were clearly visible from space.







tbrc-evrazia.ucoz.ru



tbrc-evrazia.ucoz.ru



tbrc-evrazia.ucoz.ru



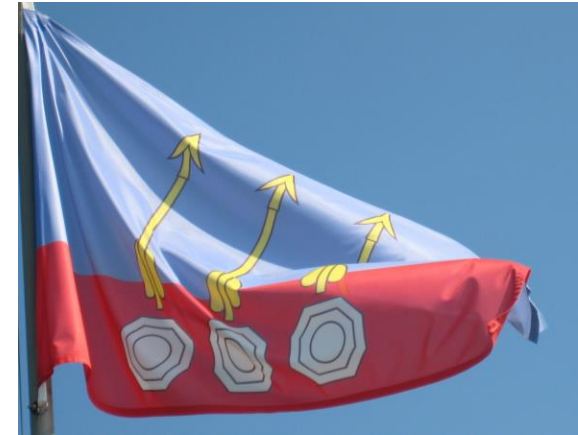
tbrc-evrazia.ucoz.ru

[http://tbrc-evrazia.ucoz.ru/index/g\\_jasnyj\\_segodnja/0-51](http://tbrc-evrazia.ucoz.ru/index/g_jasnyj_segodnja/0-51)

# Town of Yasniy – prosperous-looking (~40,000 population, settled 1930's, town since 1961)



Actually quite a nice-looking town with well-paved streets and well-cared-for buildings and parks -- the mines bring prosperity, but the town flag (right) shows the OTHER type of industry it supports....



Video of town here:[http://tbrc-evrazia.ucoz.ru/index/50\\_let\\_g\\_jasnyj/0-79](http://tbrc-evrazia.ucoz.ru/index/50_let_g_jasnyj/0-79)

# Welcome to Yasniy – courtesy KARAVAN hotels



Two routes to/from Orsk [southern and western], we used both



[tbrc-evrazia.ucoz.ru](http://tbrc-evrazia.ucoz.ru)



[tbrc-evrazia.ucoz.ru](http://tbrc-evrazia.ucoz.ru)



[tbrc-evrazia.ucoz.ru](http://tbrc-evrazia.ucoz.ru)



[tbrc-evrazia.ucoz.ru](http://tbrc-evrazia.ucoz.ru)



Two different views of same section  
of town [north is at bottom]

Left, aerial photo; right, direct-  
overhead [GoogleEarth?]

You can even locate this region on the map  
a few slides back....



Separate sources of overhead imagery allow time-change contrasts – now what I want to find is more views of the missile area [yeah, dream on...]



[Above] Image from town's home page -- [http://tbrc-evrazia.ucoz.ru/foto/jasnyj\\_segodnja/8.jpg](http://tbrc-evrazia.ucoz.ru/foto/jasnyj_segodnja/8.jpg)

[Left] Image from GoogleEarth

No, if I ever go back, I will NOT be carrying these images with me!



For a town that makes its living from rocks, naturally they figure in a lot of the monuments & memorials

*[Shovel bucket [below] is at center of park bull's-eye]*



*Copyright Seiji Yoshimoto, NPO InterCoS*



Looks like a PR photo -- but is a fairly representative view of a well-off community with a strong economic base



# The city museum (NEXT trip, a visit for sure!!)



Photo out the van window, shooting wildly and in the blind

# “On the economy”

*Copyright Seiji Yoshimoto, NPO InterCoS*



Escorted visits to local stores are occasionally allowed for long-term foreign workers preparing their payloads, plus visits to local movie theatre

Another ‘Kosmotras’-allowed photo -- but I saw the same scenes. The town administration is **VERY** much pro-space-commercialization. At the compound, there has been **NO** pilferage in either campaign.

*Copyright Seiji Yoshimoto, NPO InterCoS*



# NOT in the *Yasniy Chamber of Commerce* brochure – a statue of...

Who IS that mysterious goatee-ed plaza bust??  
How about one guess....



File photo



# Old hardware -- and some old attitudes....



We will see signs of these SAMs later on, too



On approach to compound from the town, old SAM-2 & slogan; hand shot occurred when I was nosy on flight line at Orsk

# Location of visitor compound (between the town and the missile base)



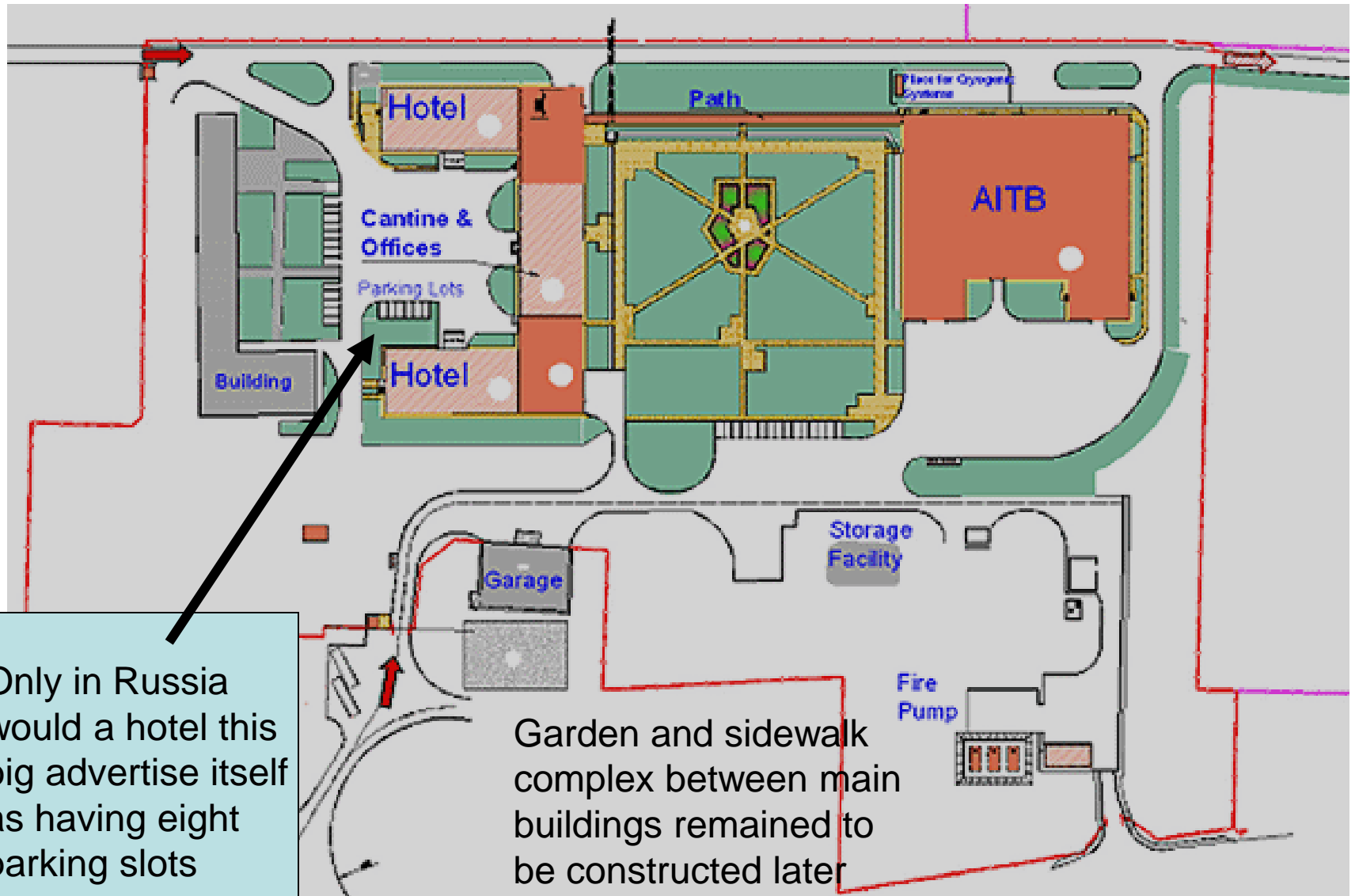
Imaged area is about eight miles west-to-east

# The 'Kosmotras Compound'

- Google Earth image (from about 2005) showed precise location as lat 51.025°N, long 59.845°E



# Official map of buildings



Only in Russia would a hotel this big advertise itself as having eight parking slots

Garden and sidewalk complex between main buildings remained to be constructed later

# Yasny rocket launch site – new start for Russian space program

The Yasny (Dombarovsky) training range has been used as a rocket launch site under the Dnepr program since 2006

## Possible launch routes and first stage impact areas

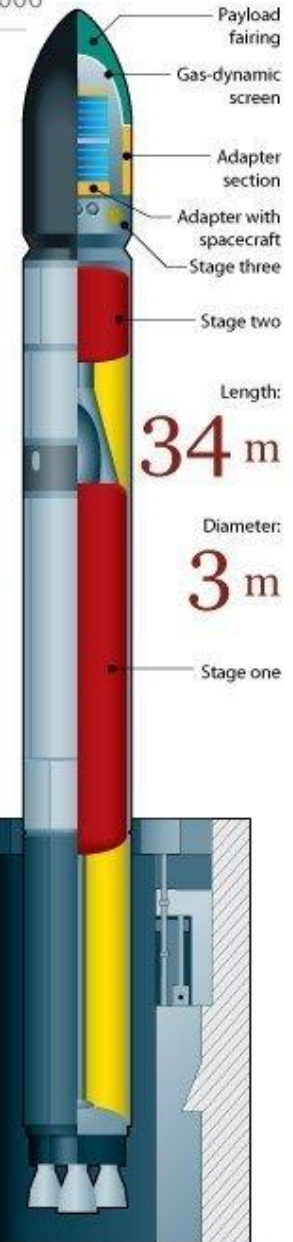


## Launches from the Yasny rocket launch site

Date	Freight (owner)
July 12, 2006	Genesis I (United States)
June 28, 2007	Genesis II (United States)
October 1, 2008	THEOS (Thailand)
June 15, 2010 (scheduled)	Prisma-Mango (Sweden) Prisma-Tango (Sweden) Picard (France) BPA-1 (Ukraine)

## The Dnepr is a converted carrier rocket

It was created from the decommissioned intercontinental ballistic missiles R-36M UTTH and R-36M2 Voevoda



## Description:

Number of stages

**3**

Length:

**34 m**

Launch weight

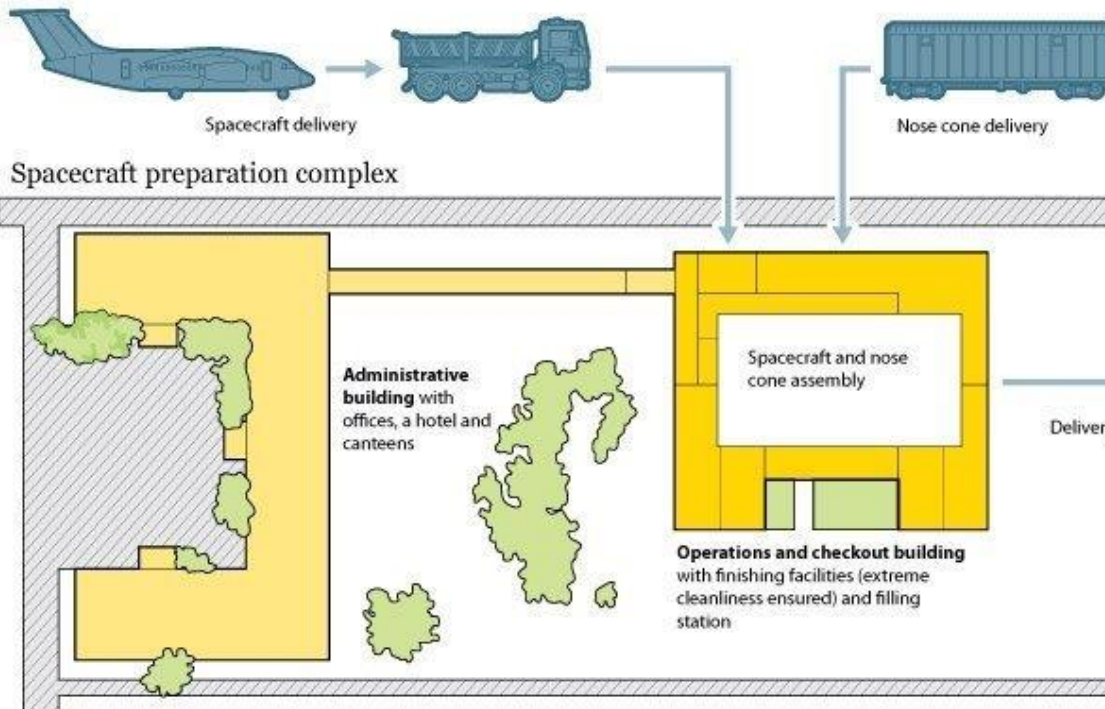
**211 t**

Diameter:

**3 m**

Fuel:

**Amyl + Heptyl**





# Hotel



*All images Copyright Seiji Yoshimoto, NPO InterCoS*



<http://www.npointercos.jp/seasonalreport.html>

# Entire complex

Courtesy Kosmotras [photo circa 2008]



Office with Internet  
access for guests

# Reception



*All images Copyright Seiji Yoshimoto, NPO InterCoS*

# World-class interior

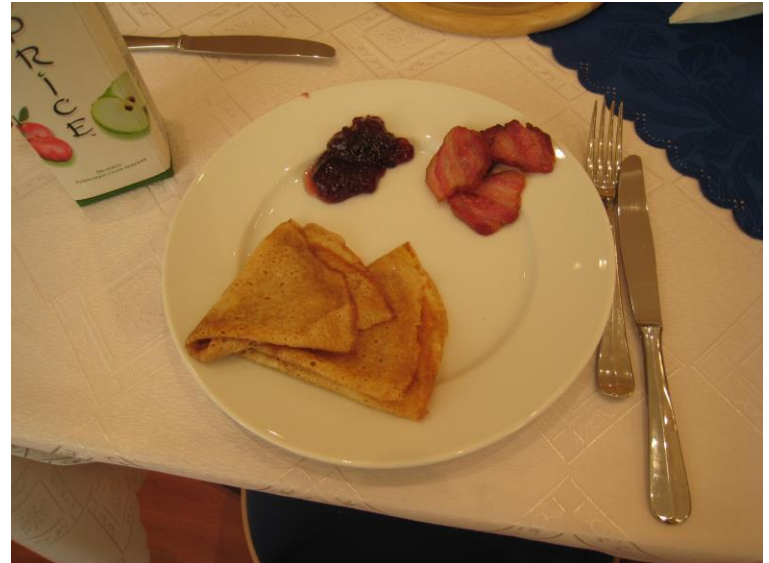


Very clean and comfortable facilities – but you still need to brush your teeth with imported bottled water





VIP food





Satellite dish (above) provides telephone and hi rate internet links to outside world

Hotel rebuilt from abandoned officers quarters of former SAM missile regiment, fully renovated and remarkably comfortable



# Payload processing building

When touring it's always important to keep an eye out for stuff people may have lost....



This badge was lost in front of the building and I happened to see it on the ground.

That's my story.



МЕХАНИК-РЕГУЛИРОВЩИК is a MECHANIC-REGULATOR





# Inside the processing building



# Security – American style



..and the connecting all-weather corridor



# Perimeter Security – Newly installed, effective



Protecting the visitors' compound from... ??



- STOP!
- GO BACK!
- Forbidden Zone

NOT SHOWN -- GUARD AND DOG

OK, them too...  
**Guard and dog**  
(from a polite and discrete distance)



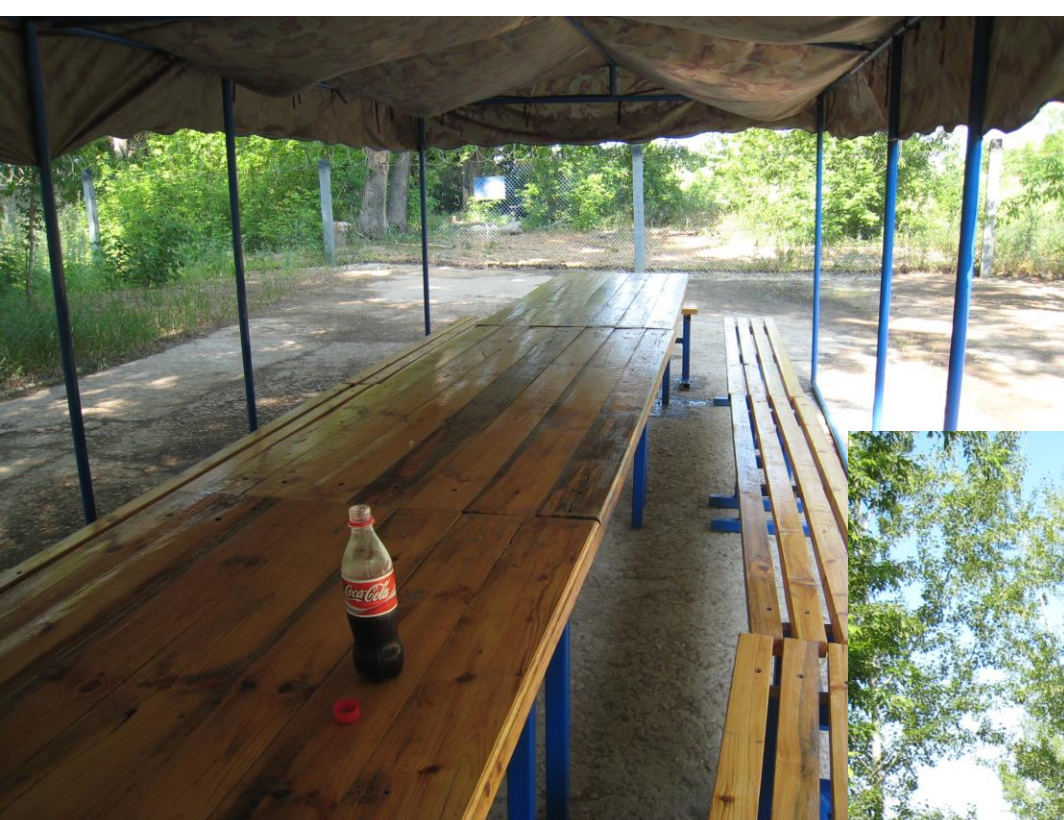
# Cement under trees

(hint: it's been there since about 1974, and it was also connected with a welcome prepared for visiting Americans...)



ANSWER: These are foundations for parking road-mobile SAM-2 anti-missile batteries... The trees were camouflage.

# BBQ park



- Still, a nice pavilion for an outdoor social event – if you overlook the barbed wire fence.

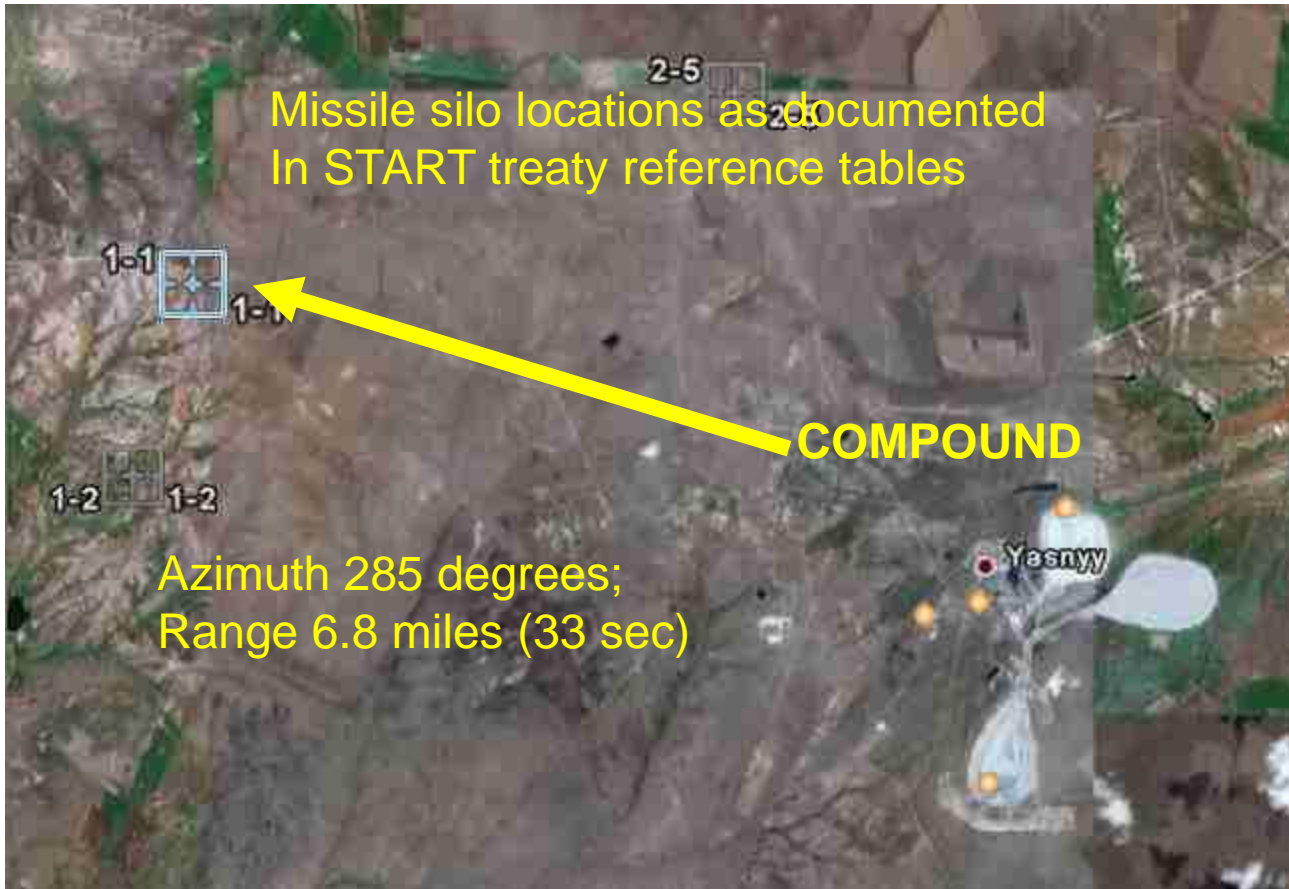


# camouflage

[Afghan war surplus]

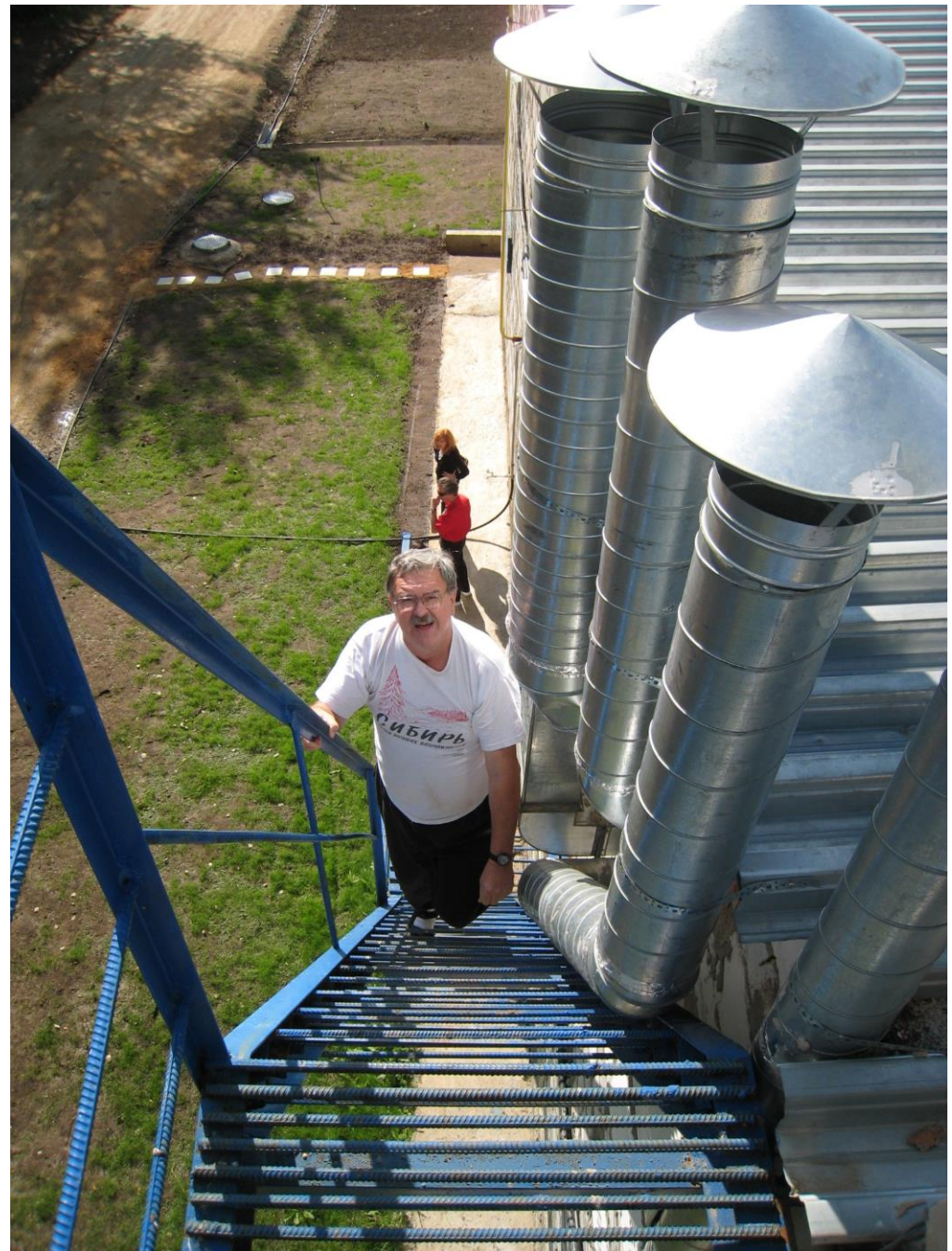


# Yasniy and the launch site

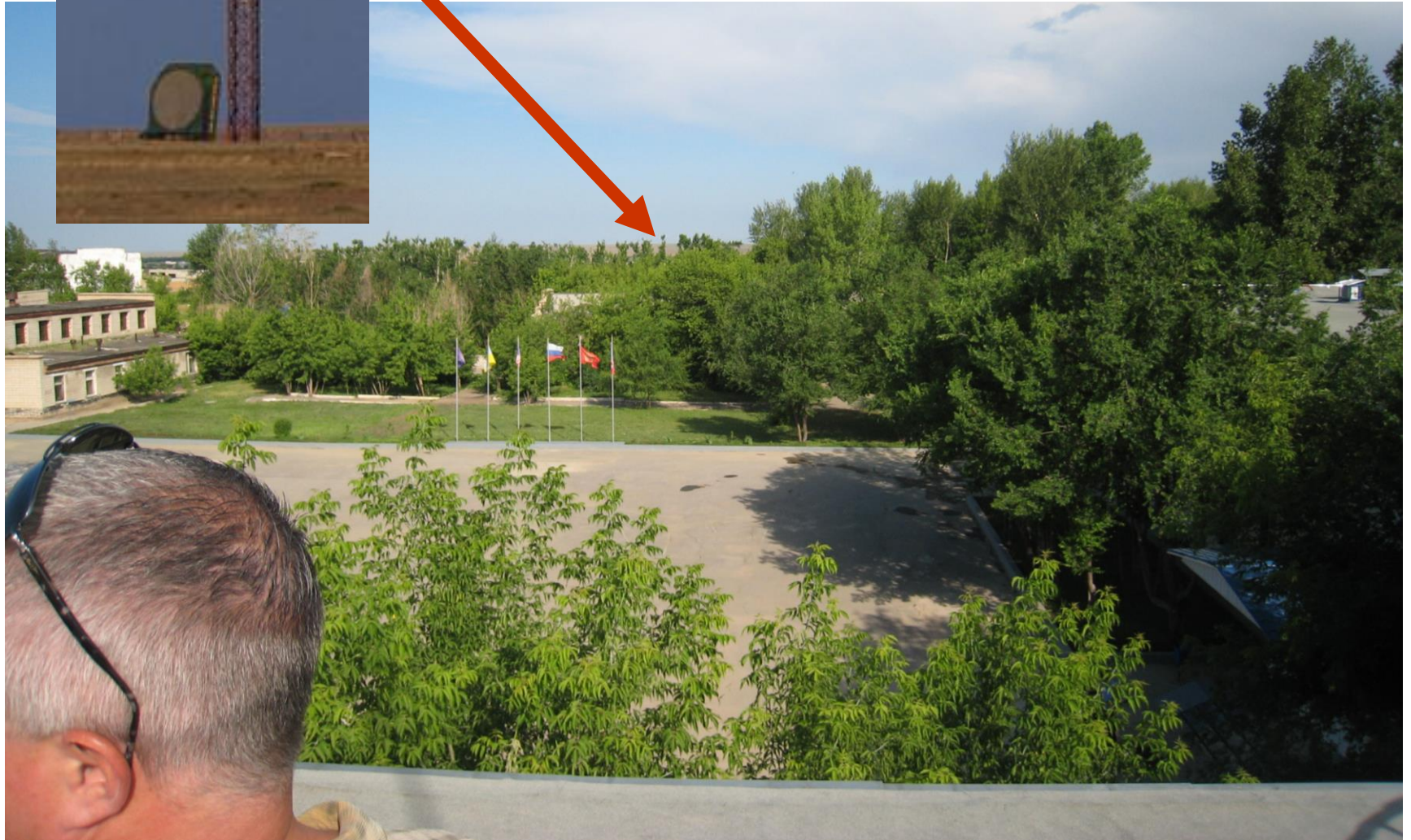
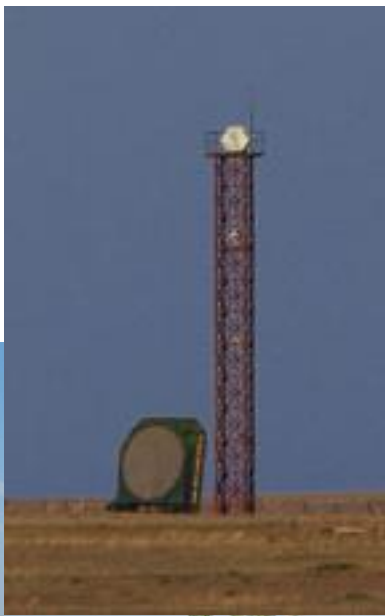


Observed bearing and distance precisely overlaid documented SS-18 pad designated “1-1” in START (based on compass and launch observations)

# Upstairs for a better view



Where's ~~Wade~~ the silo?  
From hotel roof, the view to  
the western horizon



Old-fashioned orienteering -OR-

“What is the Russian for ‘magnetic deviation’, please?”



Trick to it: Don't sneak

# 1941-1945 war memorial



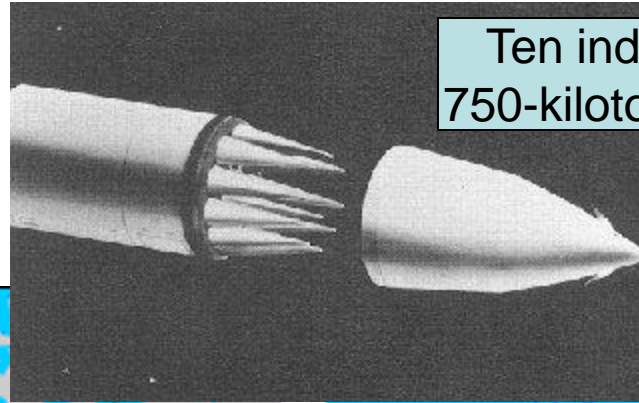
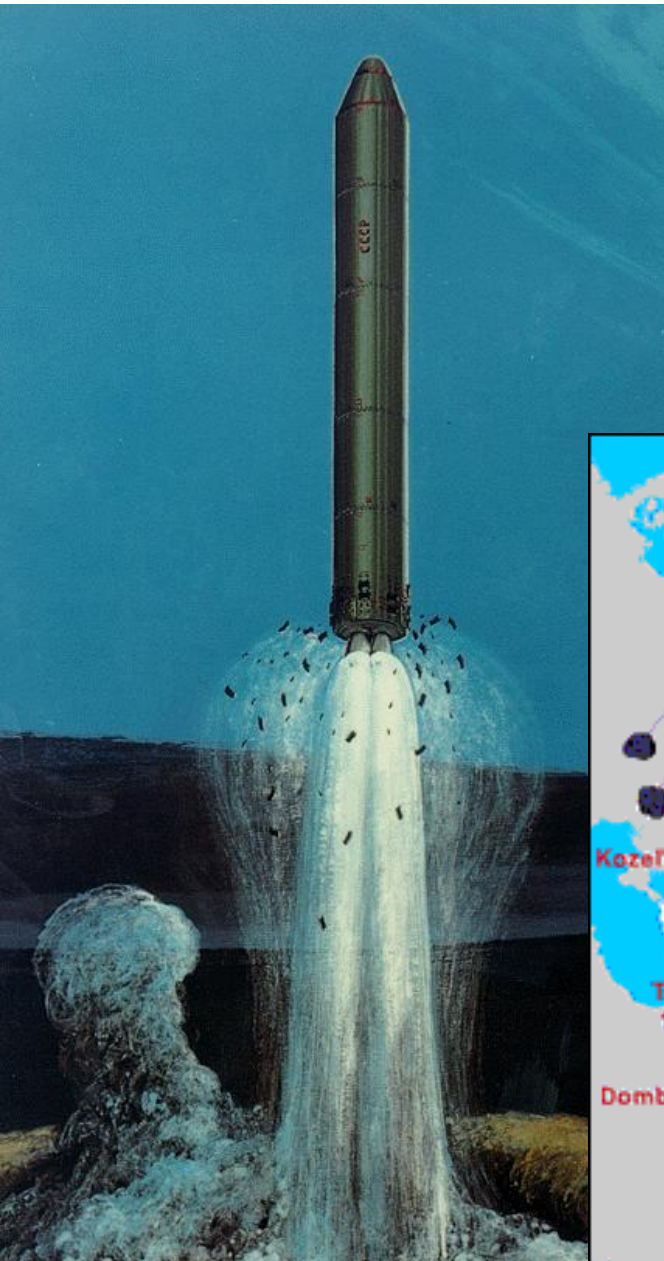
By reading the full names one can identify the brothers, the fathers and sons, who all died



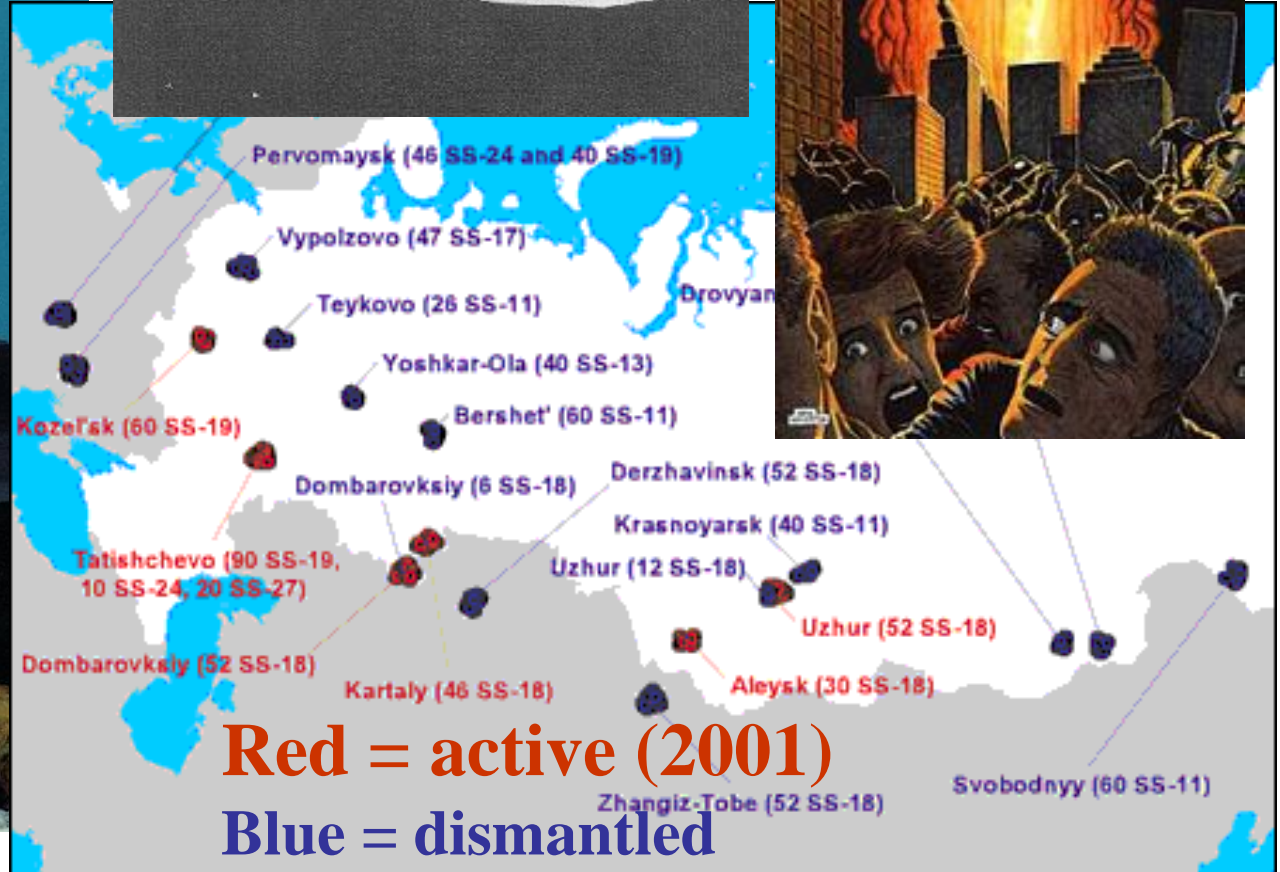
- Even in Yasnyy, a 'young' city, a long, long list of war dead – and instant comradeship for paying our own respects there with flowers, at my suggestion
- *What I had meant as a private moment was noticed, & became a widely celebrated tribute & a key to their hearts*

# The SS-18 "Satan"

## <<Воевода>>

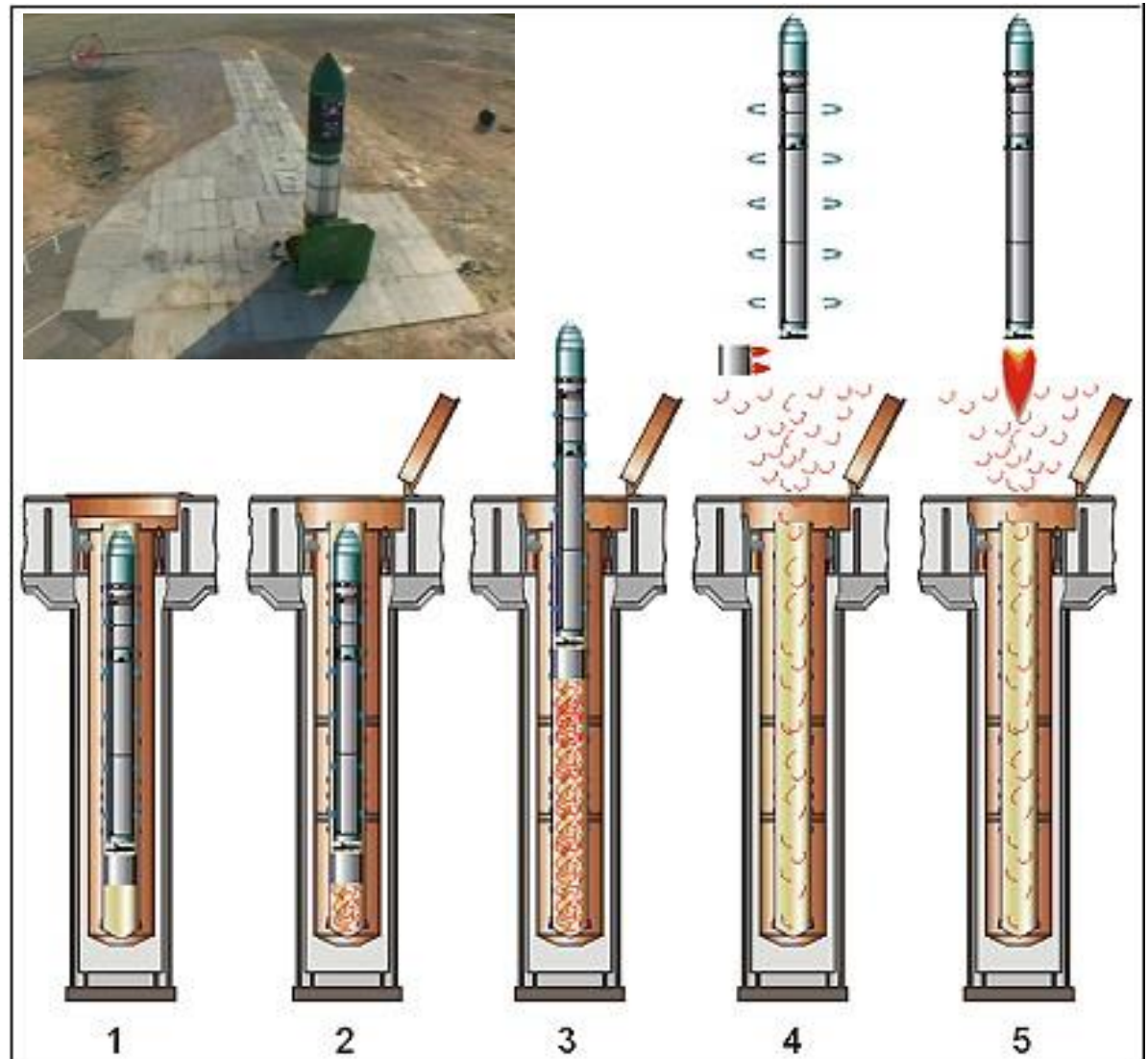


Ten independent  
750-kiloton warheads



# RS-20 (SS-18 'Satan') launch

The “missile-in-a-can” is launched ‘cold’ with a gas catapult that flings it straight up into the air, where the main engines then ignite. The pusher platform is sent off to the side with its own rocket. The silo is pretty unscathed and can be reloaded with another can in a few hours.





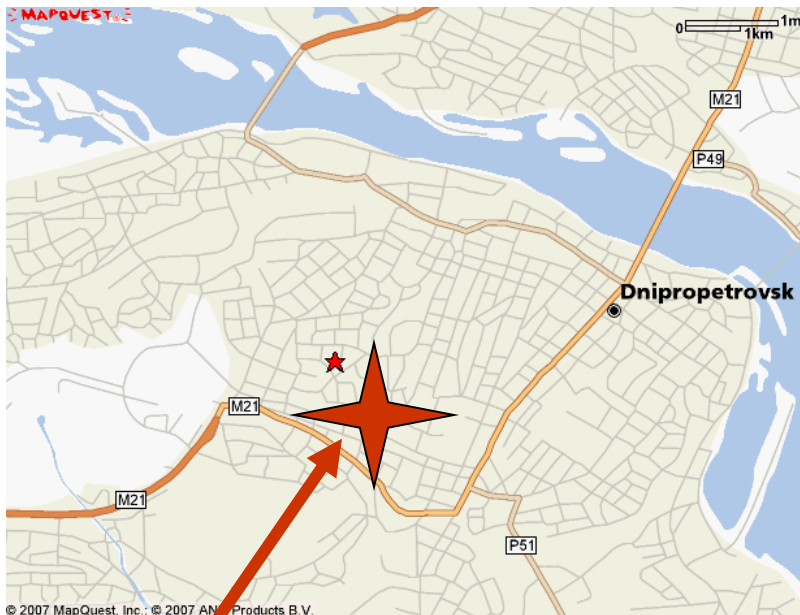
# “Yuzhnoye Bureau” (“Southern”)

- Established in Dnepropetrovsk, Ukraine
- Introduced own design of ICBMs in late 1950's
- Chief Designer Mikhail Yangel's missile caused October 1960 'Nedelin Catastrophe' (100+ dead at pad)
- Different large military missiles deployed; designs were upgraded and converted into space boosters such as 'Cyclone' (Tsiklon) and 'Zenith' (Zenit) that also served as LRB for Energiya superbooster for Buran shuttleski
- Early 1990's, factory manager became president of independent Ukraine, helped spark new plans to commercialize obsolete RS-20 military missiles with addition of special 'kick stage' built at the plant
- Would use missiles retired from alert duty to launch satellites for Western customers, for money for food



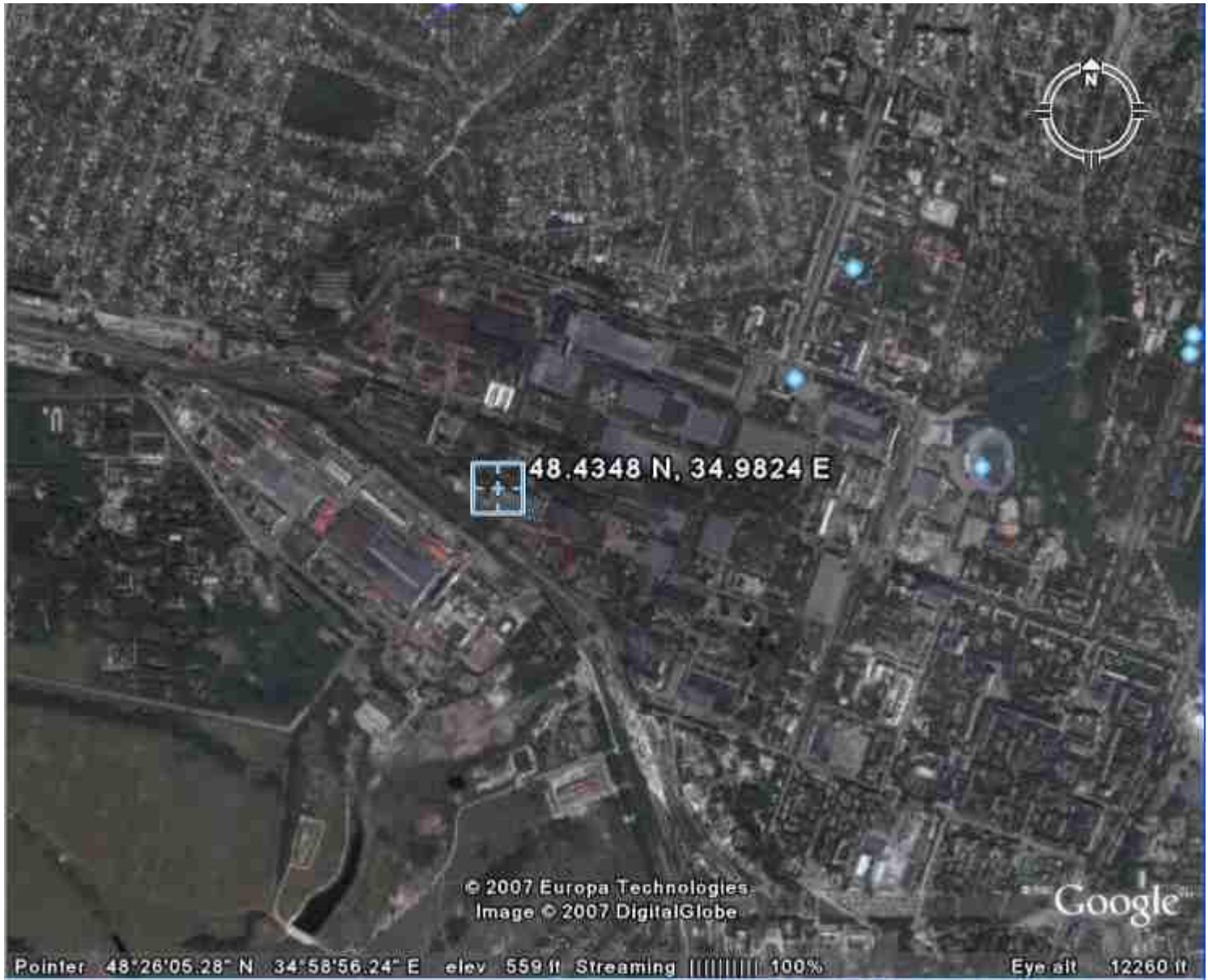
# “Dnipropetrovsk”

- Plant location said to be near 48.4348 N, 34.9824 E (below) but Google-Earth images are of very poor resolution and in early 2007 didn't show individual buildings



Plant located in SW suburbs of city





48.4348 N, 34.9824 E

© 2007 Europa Technologies  
Image © 2007 DigitalGlobe

Google

Pointer 48°26'06.28" N 34°58'56.24" E elev 559 ft Streaming ||||| 100%

Eye alt 12260 ft

# The Rocket Plant Close-Up



**SS18 and Yuzhnoye Head Office,  
Dnepropetrovsk**

**2004-06, (C) Yuzhnoye State Design Office  
via Seiji Yoshimoto, NPO InterCoS**



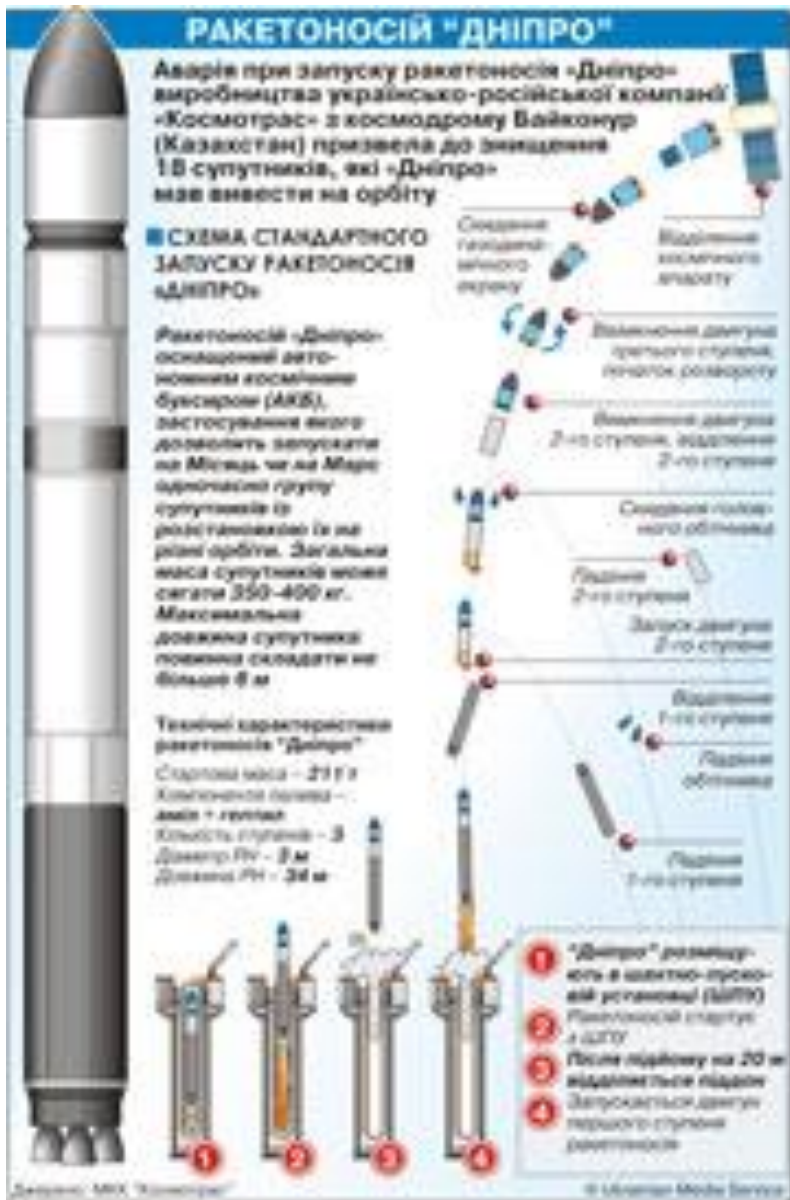
# The display rocket from above

Newest Google-Earth images (September 2007) show display missile at exactly 48d26m00.5s N 34d59m52.9s E

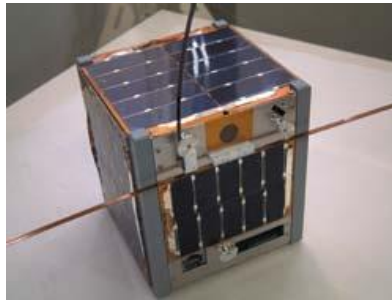
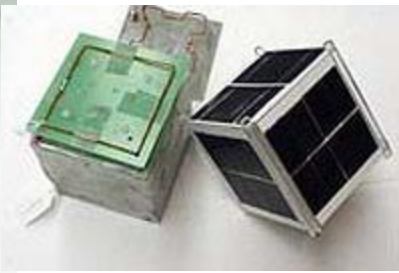


# 'Kosmotras'

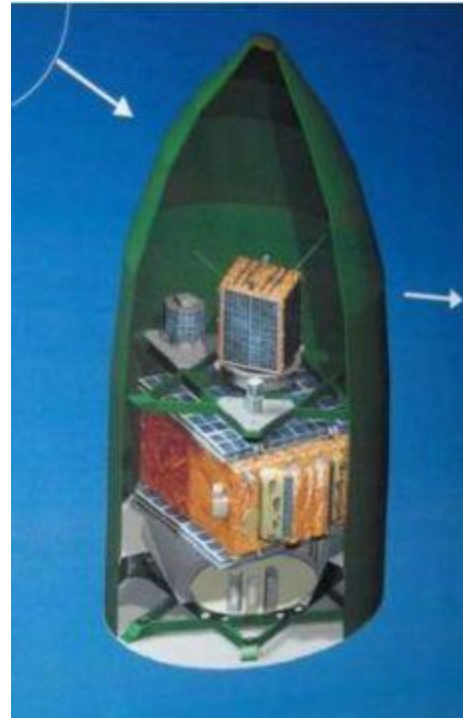
## the swords-into-plowshares rent-a-rocket option



The International Space Company **Kosmotras** or ISC Kosmotras (Russian: ЗАО Международная космическая компания «Космотрас») is a joint project, established in 1997, of Russia, Ukraine, and the Republic of Kazakhstan. It developed and now operates a commercial expendable launch system using the Dnepr rocket. The Dnepr is a converted Soviet era SS-18 ICBM decommissioned as part of the START Treaty. ISC Kosmotras conducts Dnepr launches at both Baikonur Cosmodrome and at a new Yasny launch base in Dombrovskiy, Russia. -- Wikipedia



Typical small foreign commercial satellites, mounted on main bus (lower left), and shroud

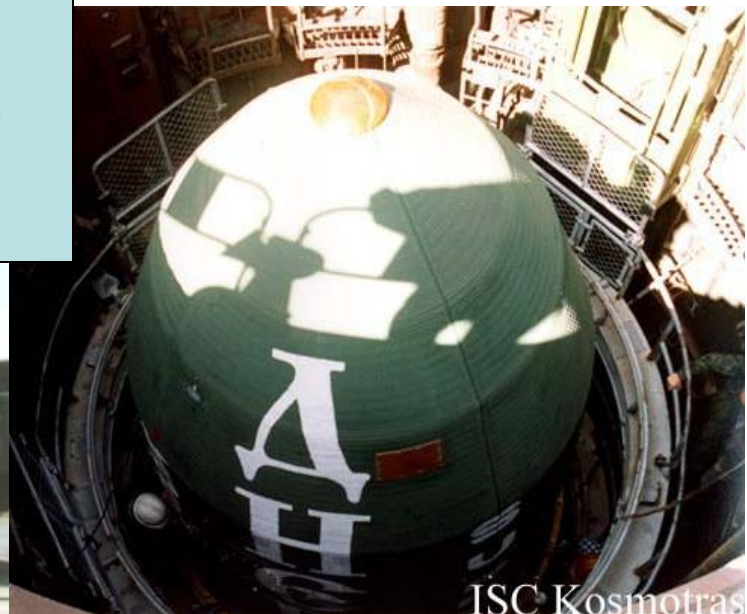




ISC Kosmotras



Modified warhead transporter installs payloads into silo



ISC Kosmotras





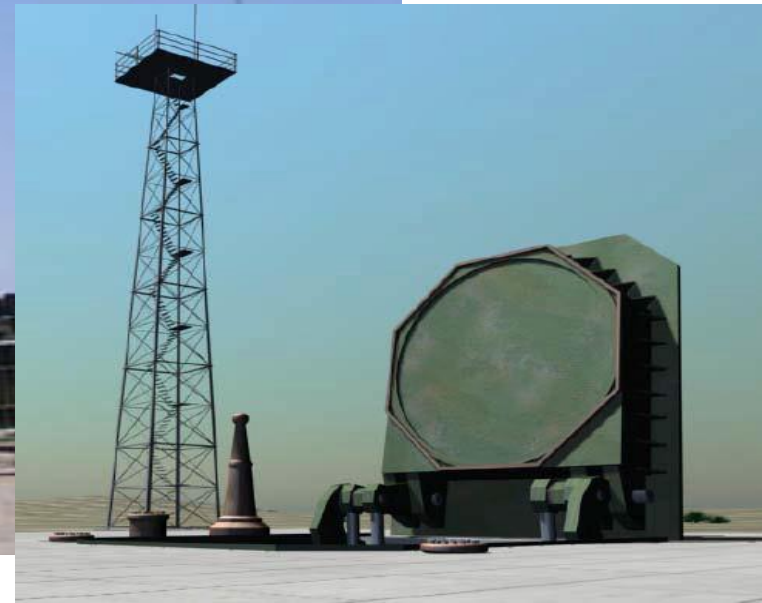
Unusual payload just visible under shroud (left) and VERY unusual launch site -- 'Genesis-I' from Yasniy, June 2006



Bigelow Aerospace (Las Vegas, Nevada) inflatable human habitat prototype test

Something we didn't get to see:

Loading a 'Dnepr' in the launch silo  
[Kosmotras. October 2008]



# MISSILE EJECTION SYSTEM

1. Gas generator is triggered to shove the pusher plate up the shaft

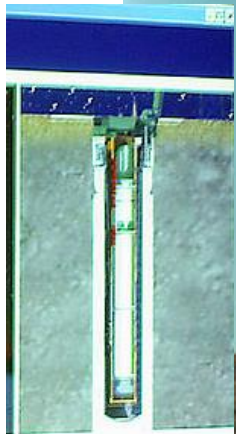
2. Stack exits shaft pneumatically

3. Pusher plate is jettisoned down

4. Thruster propels pusher plate to side

[Without this step, engine ignition will propel pusher plate into ground & it can bounce back up and impact missile – how do you suppose they know this?]

# “Dnepr” [“Dnipro”] launches at Baykonur, Kazakhstan

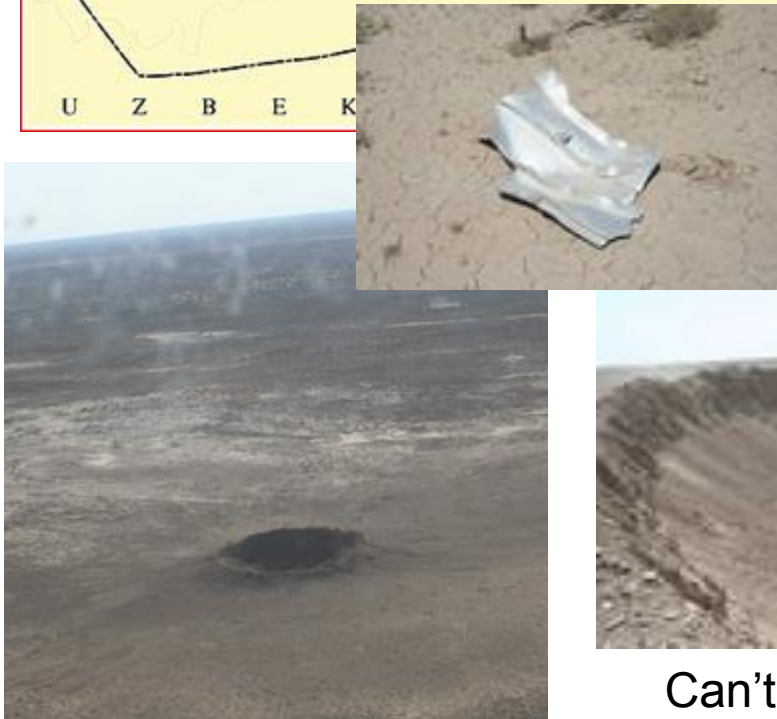
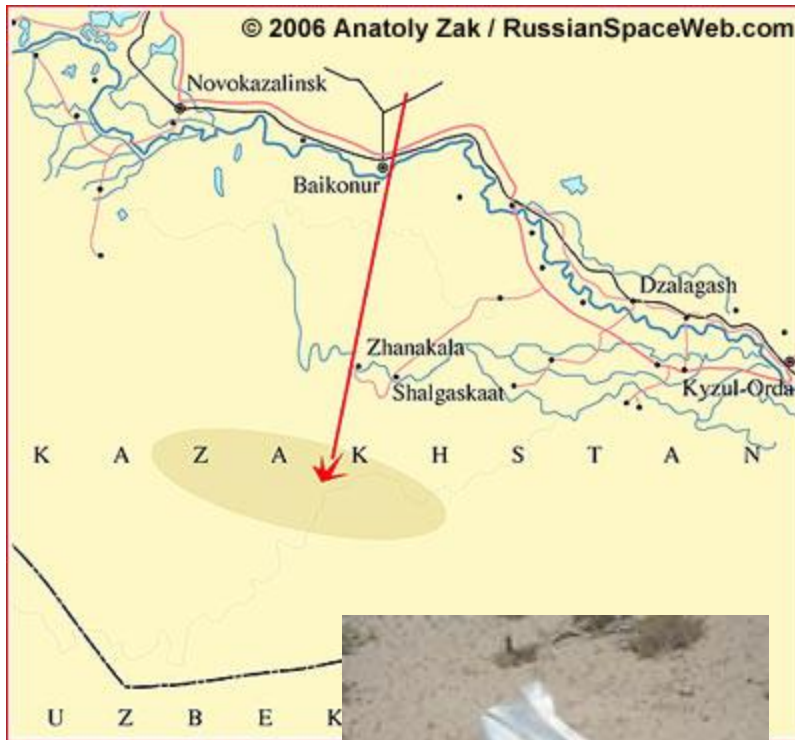


A string of successful and economical launches started a beneficial cash flow

# Mid-2006 – the big ‘oops’

A Dnepr launching southward into a ‘sun-synchronous orbit’ suffers early engine shutdown and impacts in remote pastureland -- no destruct system, so intact (half-fuelled) impact and massive crater.

**Booster grounded half a year.**



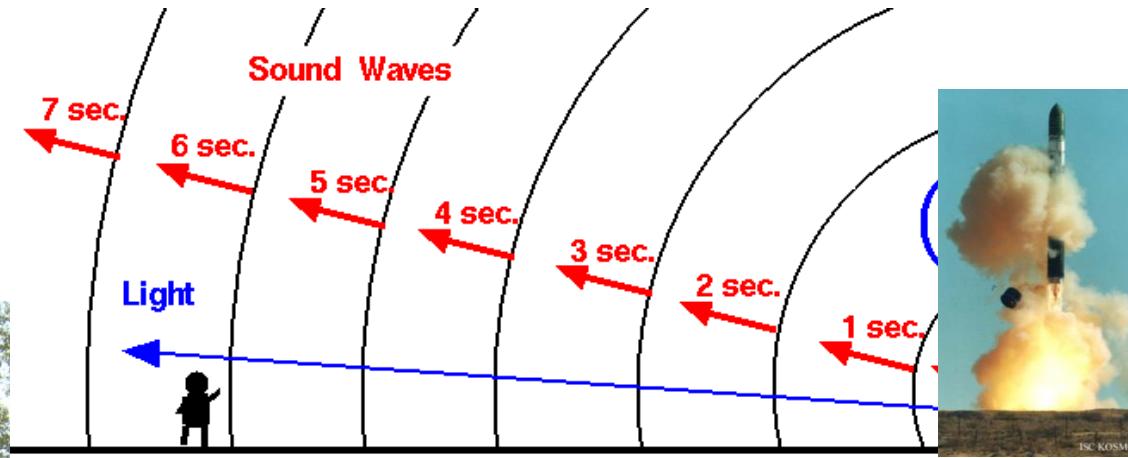
Can't say where I got these photos. Don't ask.

By June 2007, rocket cleared for flight, and a launch from Baykonur verifies the fixes (sort of). Next in line: Robert Bigelow (center) attends the launch of Genesis-II



Viewing point was a knoll (actually, an old ammunition bunker roof) on southwest corner of the compound. Weather was absolutely splendid.

# Waiting for the thunder...



No pictures allowed looking west during launch, but images weren't on my acquisition list -- a precise time of flash to roar delay WAS. I audio and video-taped the sequence for later analysis.

# Genesis-I launch sequence (same pad, previous year)

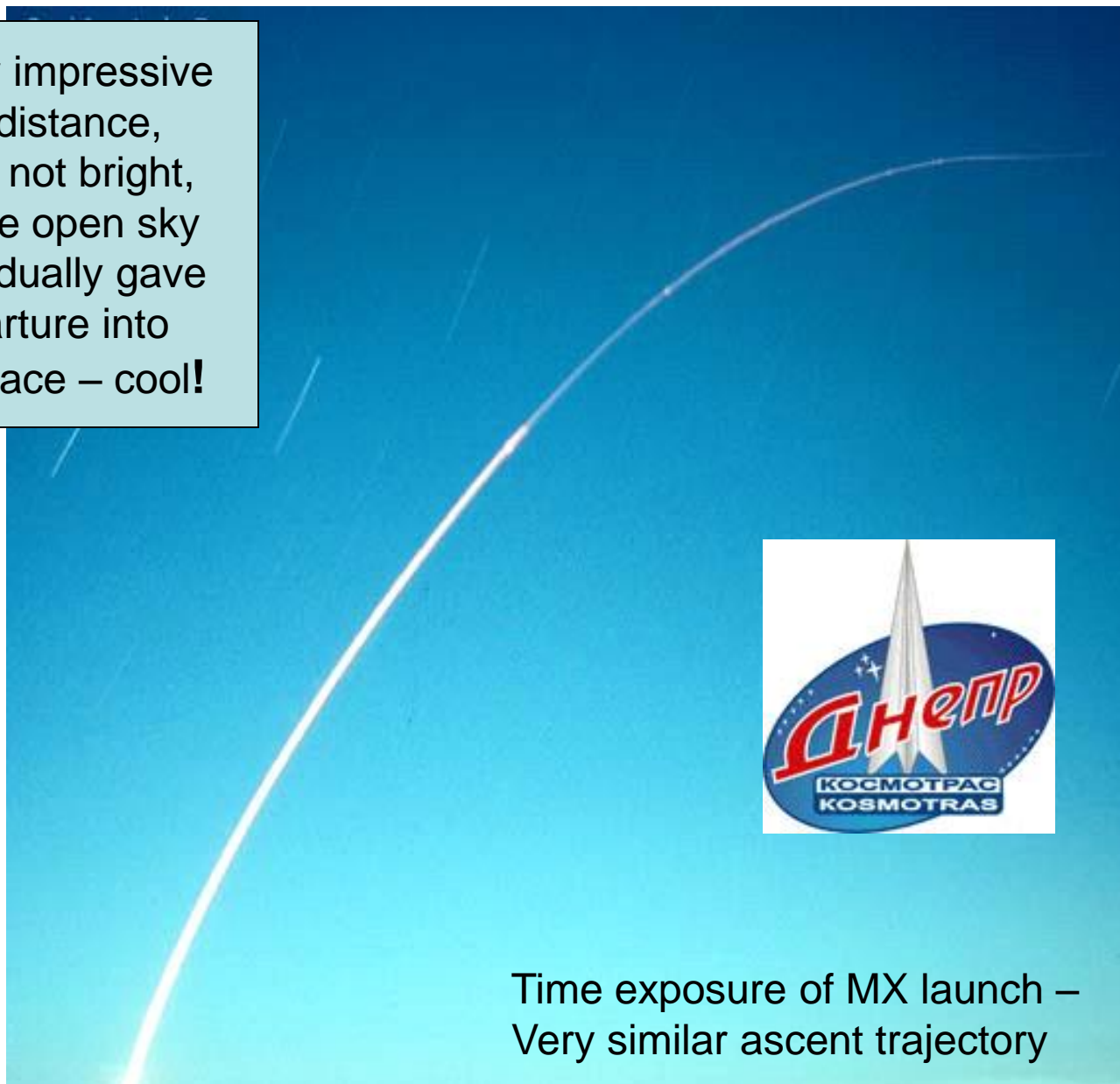
SOMEWHERE UNSEEN,  
A BUTTON IS PUSHED





# 9:02:10 PM local [15:02:10 UT] -- LAUNCH

Launch wasn't particularly impressive visually due to significant distance, and the engine flame was not bright, but the wide arc across the open sky with the light dimming gradually gave a vivid impression of departure into high three-dimensional space – cool!



Time exposure of MX launch –  
Very similar ascent trajectory

What we didn't see – crash of expended first stage, recovery of scrap metal, paying off the neighbors



[http://www.kosmotras.ru/upload/programma\\_dnepr.pdf](http://www.kosmotras.ru/upload/programma_dnepr.pdf)











Back in the hotel courtyard, officials had gathered to follow the launch reports



Bigelow Aerospace's team (right) relayed updates via mini-cam to Mission Control in Las Vegas; other table (above) of Kosmotras officials relayed booster performance reports from launch control bunker.





# Celebrations -- after a comm drop-out scare



Kosmotras official Solovey hugs and lifts Bigelow Aerospace counsel Mike Gold, who then miraculously overcomes Earth gravity to hug and lift Solovey in turn.

# Celebrations

in the dining hall, same food as dinner but lots of good booze added, officials exult over high precision booster performance report



Vladimir Andreyev,  
General-director,  
Kosmotras

Ref. No. 113/126 of 28.06.07

To: Bigelow Aerospace  
e-mail: [mgold@bigelowaerospace.com](mailto:mgold@bigelowaerospace.com)

Copy: ISC Kosmotras  
e-mail: [solovey47@mail.ru](mailto:solovey47@mail.ru)  
fax: +7 495 228 34 34

Title: GENESIS-2 SC ORBITAL PARAMETERS AT SEPARATION

We inform you that Genesis-2 SC launch was performed. Please find below the following orbital parameters in coordinate system relating to standard epoch J2000.0.

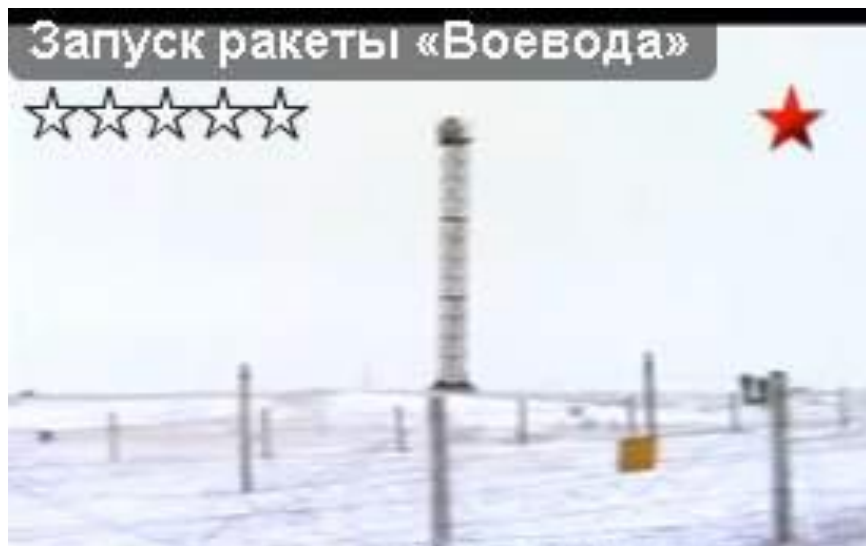
Parameter	Unit	Value
Separation time	UTC	2007-06-28 15:16:56.546
Longitude of the ascending node	deg	165.78
Inclination	deg	64.50
Eccentricity	1	0.00001
Focal parameter	km	6928.15
Argument of perigee latitude	deg	154.39
Argument of SC latitude	deg	103.39

We ask you to acknowledge (by fax and e-mail) receipt of these data:  
e-mail: [info@yuzhnoye.com](mailto:info@yuzhnoye.com)  
fax: +38 056 770 01 25, +38 056 770 31 72

Best regards,  
Deputy Head of department *[Signature]* 28.06.07. V. Izhko

**Orbital eccentricity – essentially ZERO**

Запуск ракеты «Воевода»



# What else we never got to see



- Local television program (December 2009) of Voevoda recertification launch by RS-20 combat crew.



# A vast underground network



Heading topside.....



Winter is the time of year it's better to stay underground. Summer, too.



# A prelaunch appeal to heaven



New orthodox churches in classical Russian style have been built at all the space centers and military bases. We didn't look for the one at Yasniy but no doubt it's there somewhere. Most local priests are retired military officers.

# Rocket men at work



- “Strategic Rocket Forces” (NOT the “Space Troops”) own the missile and get the commission



Some doors remain closed to us, but for others are opened



**СТОЙ! НАЗАД! ЗАПРЕТНАЯ ЗОНА**



# WHAT was it that just went into orbit??



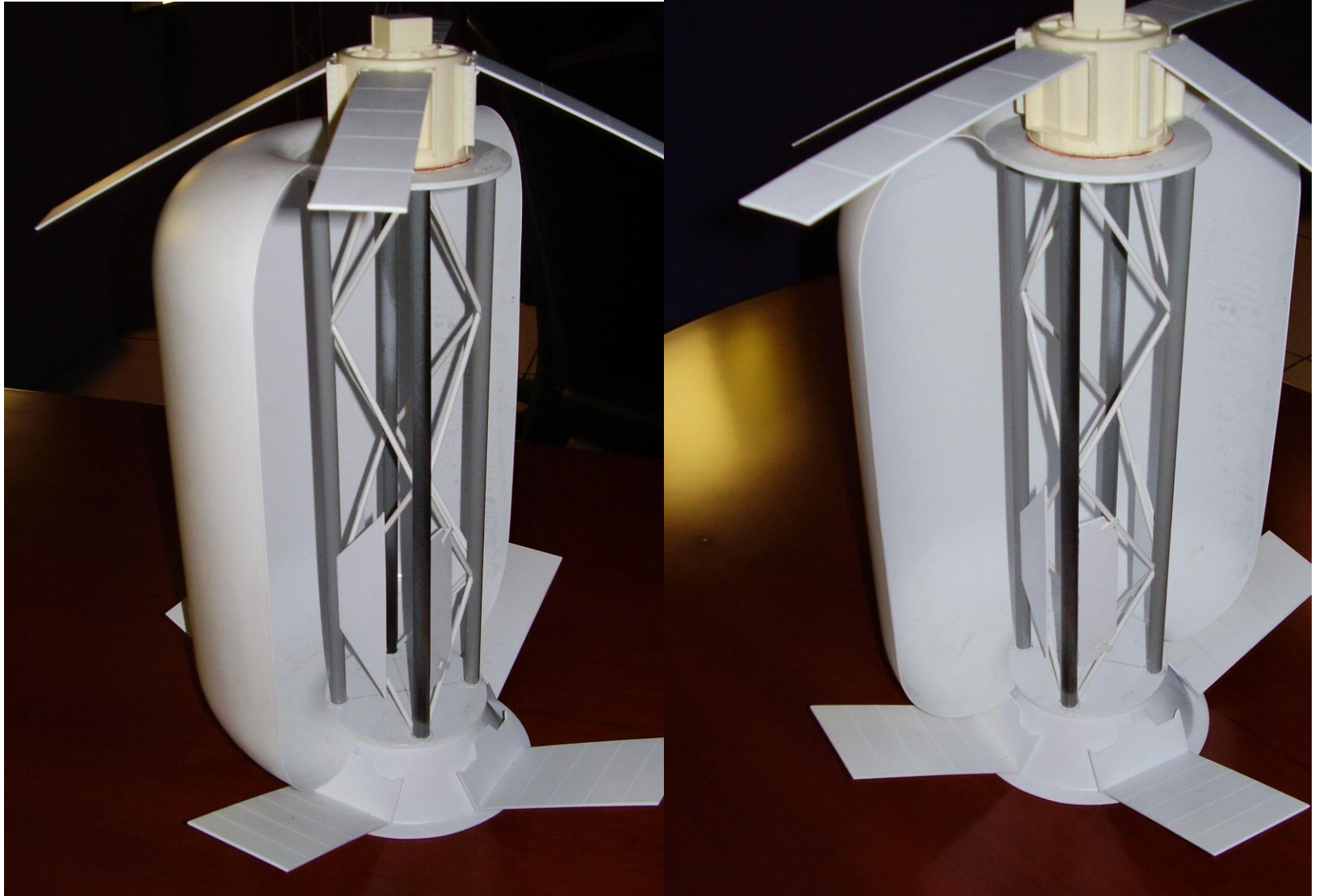
Las Vegas, Nevada, June 2006



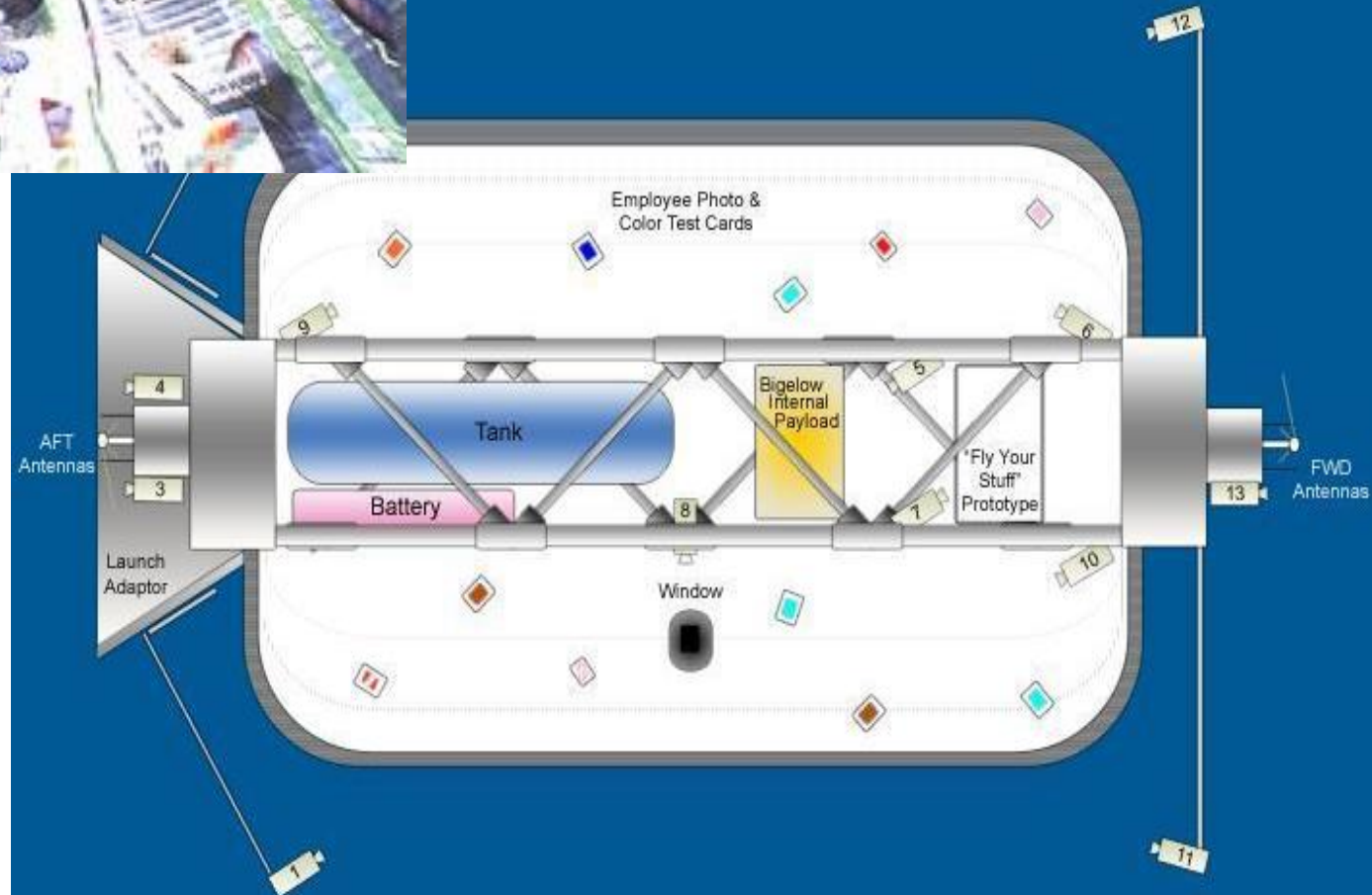
Flexible hull folded against keel



# “Genesis” inflatable habitat prototype model



# GENESIS spacecraft and contents, plus TV views







GENESIS 2

GALAXY

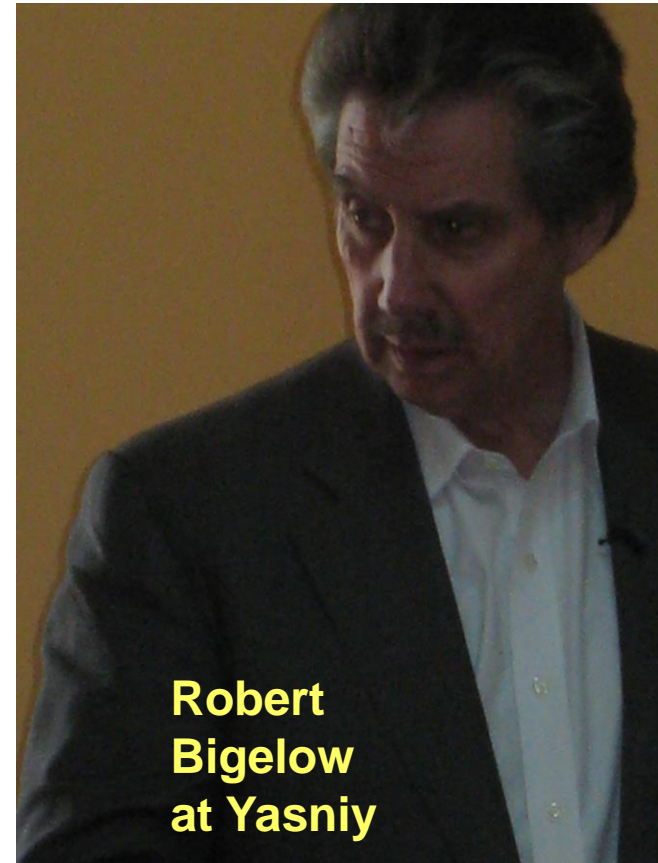


SUNDANCER



BA 330

Succession of larger and more sophisticated vehicles planned to lead to a habitable orbital outpost in the mid-2010's, for many commercial purposes -- including as a hotel



Robert Bigelow  
at Yasniy



# Habitat

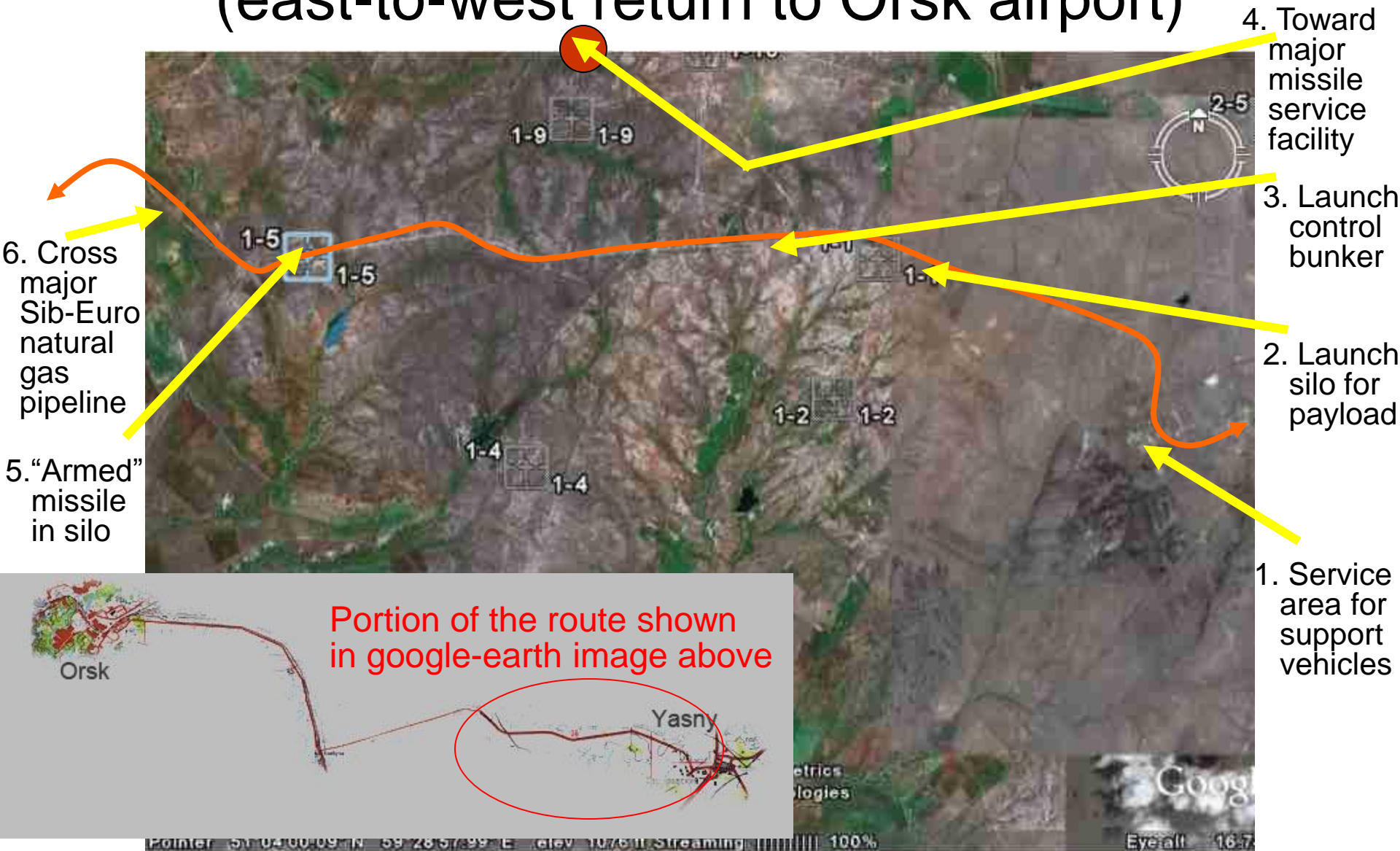
**Bigelow Aerospace is using leased NASA patents for a special foldable thick fabric hull that is stronger and more protective than current metal hulls but allows the launch of more than twice the usable internal volume for the same payload weight. His plant in Nevada has experimented with fabrication of the multi-layer 'sandwich' and has tested it to several times the expected pressure in space. The small team now is two-for-two on its test payload deployments.**

“Morning after” – and return to Moscow  
by a new route right across “Area-1” of the base

Observation point  
and line of sight  
to the launch pad.



# The road through the missile field (east-to-west return to Orsk airport)



Portion of the route shown  
in google-earth image above

Width of region imaged— about twenty miles

# Unmarked entry onto missile base (no visible fences or guards)

БАЗА = "BASE"





Very wide & well-maintained thoroughfare obviously laid for heavy-weight traffic such as (not seen) examples below

Oberg photo, 2007,  
with permission



FILE PHOTOS  
(left & right)





Images from another traveler's visit to Yasnyy military missile complex.

[I didn't see such a sign]

**"Стой. Стреляют без предупреждения!"**

STOY!  
STREL-YA-YOOT  
B'YES PREDOO-  
PREZH-DENN-IYA

STOP! THEY SHOOT  
WITHOUT WARNING!

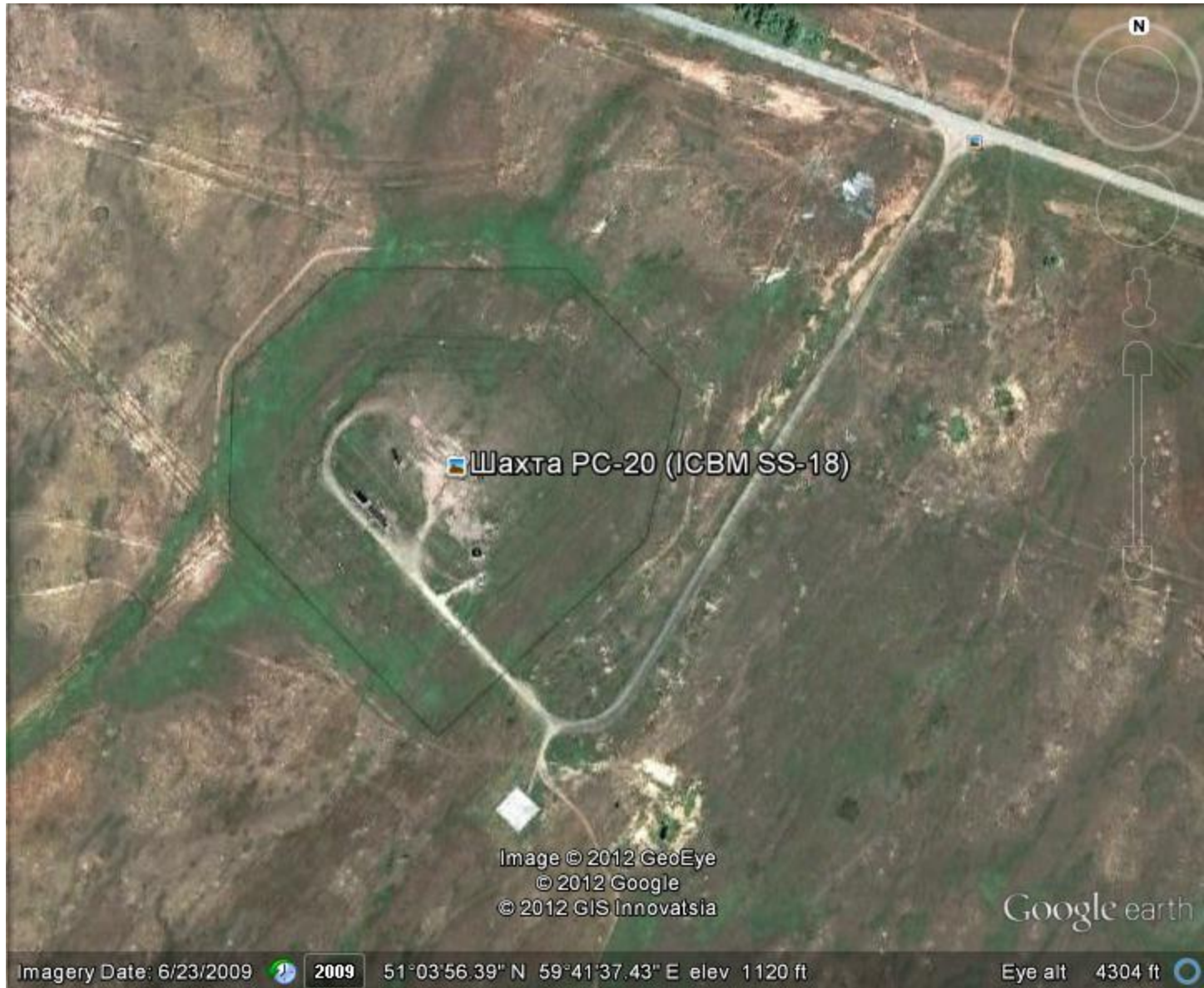


<http://static.panoramio.com/photos/original/23971394.jpg>

Typical RS-20 ICBM silos in hi-res regions of Dombrovskiy area; "Pad 1-1" is in lower res area but looks much like these, with fences, plus the recent radio tower.



# Google 2009 imagery shows precise launch pad



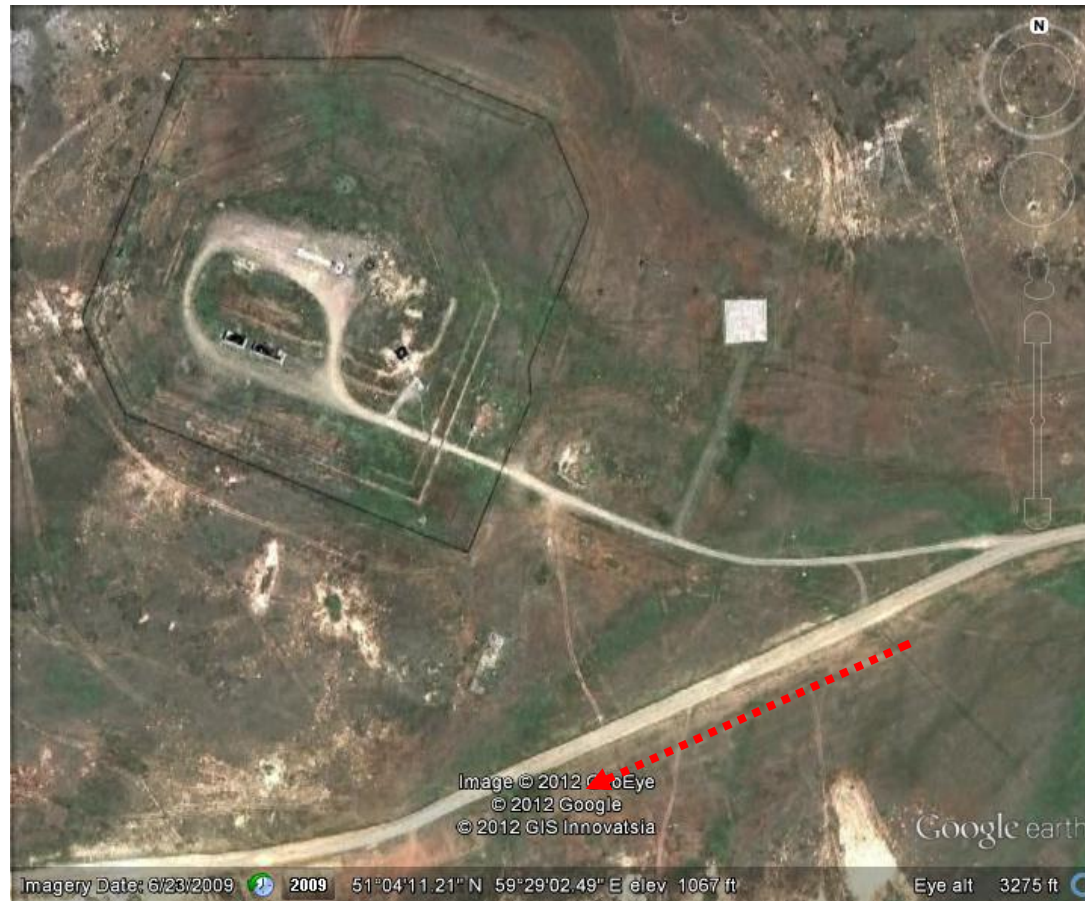
Vladimir Andreyev: “See that big building on the northern horizon? I was stuck in the mud on that road for a whole day back in 1985, they had to send tractors to haul our truck out.



After initially giving me permission for unlimited photography on the drive, Andreyev then quietly remarked, ‘You know, perhaps we better not have any photographs’. Making sure he could see me from the back seat, I scrolled through all recent shots and deleted them – I was a guest this time. But NEXT time????

Google image [2009] of assembly building

Vladimir Andreyev: “Uh, Dzheem, better not take any photos off in that direction now. That silo is armed.”



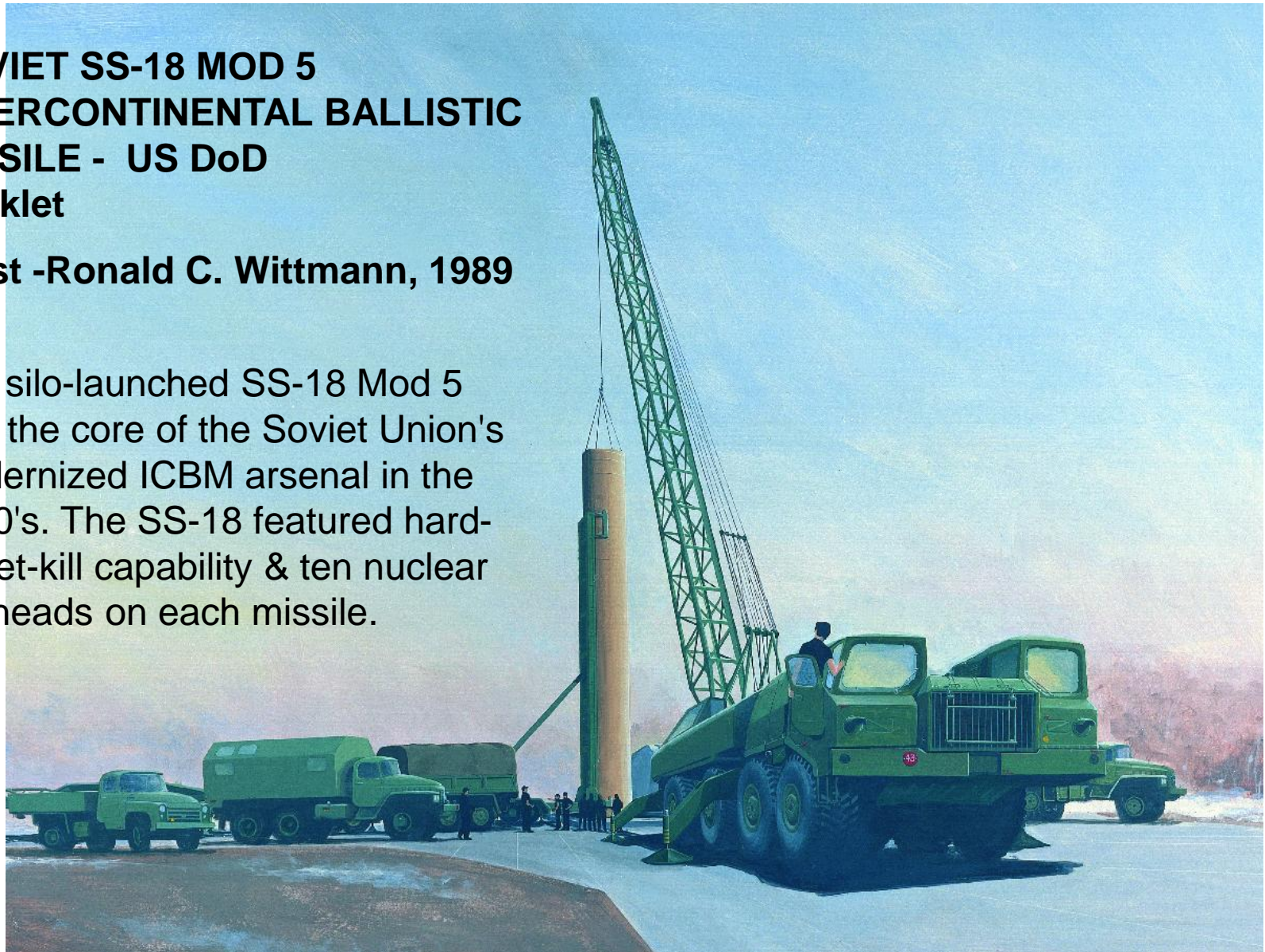
Google image [2009] of armed silo. We drove from right to left [westward] directly across bottom of this image.

# Servicing the silo

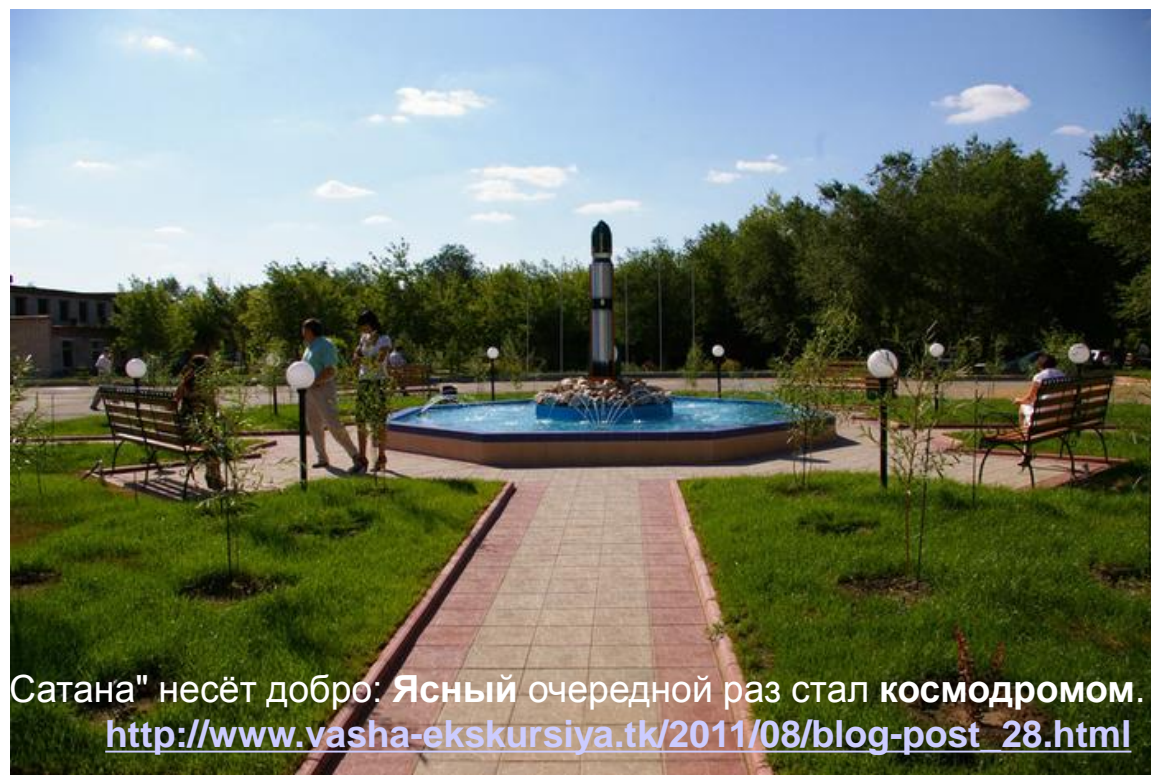
**SOVIET SS-18 MOD 5  
INTERCONTINENTAL BALLISTIC  
MISSILE - US DoD  
booklet**

**artist -Ronald C. Wittmann, 1989**

The silo-launched SS-18 Mod 5 was the core of the Soviet Union's modernized ICBM arsenal in the 1980's. The SS-18 featured hard-target-kill capability & ten nuclear warheads on each missile.



New construction  
by 2011



"Сатана" несёт добро: Ясный очередной раз стал космодромом.  
[http://www.vasha-ekskursiya.tk/2011/08/blog-post\\_28.html](http://www.vasha-ekskursiya.tk/2011/08/blog-post_28.html)





Google imagery June 23, 2009 [newest available]





**2006 image**



**2009 image**

# Why is 'Dnepr' such a bargain?

- Hardware is in storage waiting to be scrapped anyway
- Design philosophy was for minimal maintenance
- Vehicle stored fuelled in environmentally-controlled 'can'
- Rocket is not a specially-manufactured upgraded 'variant' of former military missile, it IS one of the on-line military missiles
- 'Yasniy' area has in-place launch facilities and launch crews that require minimal additional training and other preparation
- Strategic Rocket Forces WANT to launch rockets for crew training
- Russia NEEDS to launch rockets for lifetime extension verification made critical by delays in next-generation missile development
- Conversion program from the start (early 1990s) enjoyed TOP level political support (country's new president had been factory director)

Transitting airspace  
in comfort – and in  
deep contemplation



Above – AEROFLOT's  
tourist-class seats were not  
so bad, with leg room

Left – Charter flight to/from  
Orsk had smaller seats but I  
was invited into VIP cabin

What does it mean? It reminded me of Isaiah chapter 2, “They shall beat their swords into plowshares, and their swords into pruning hooks...” Sort of, a little.



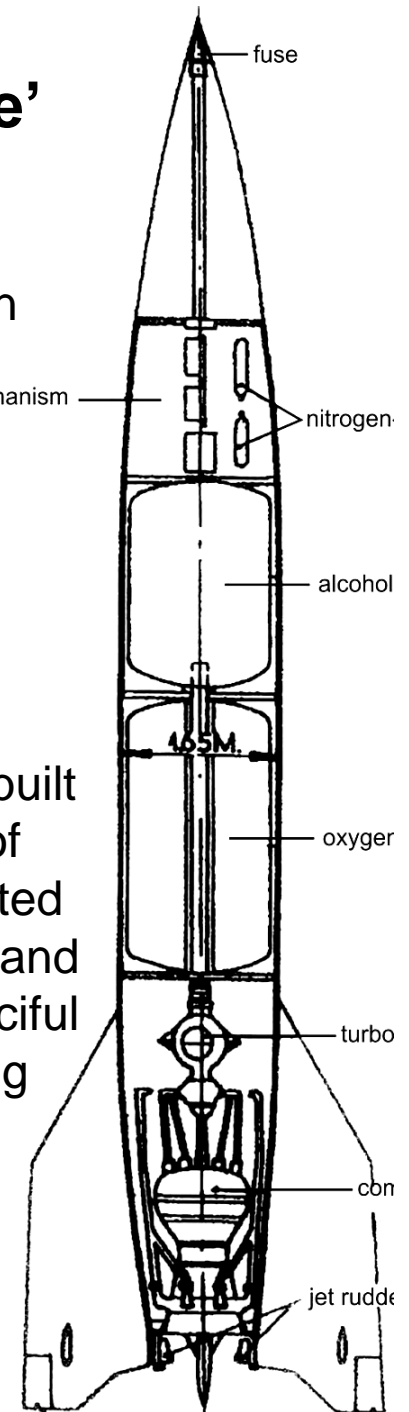


## Was the 'Space Age' "born in sin"??

An often-thrown accusation is that rockets were first made to kill, and that this 'original sin' taints all later uses of them everywhere.

# NO!

Even when rockets were built deliberately as weapons of war (WW2), they bankrupted the nations building them and had the unintentional merciful consequence of shortening the war – and thus saving many, many lives. Later, building too many rockets [that were never used] bankrupted the USSR.



# Moscow – a city under construction in a Russia undergoing reconstruction

So far, the Dnepr and the Yasniy base seem to be a win-win-win situation for all parties, and there are high hopes for expanded commercial development in space activities along those lines.

The old city is looking more 'modern', but foundations still go way, way back, and deep – so they shape the direction of the new growth, and we better not forget it.

We saw how the RS-20 ('Satan') and Yasniy have very deep foundations of their own, and who knows how these will affect the future?

