
Russia's Nuclear Weapons Infrastructure
Operational Strategic Nuclear Weapons Facilities
Silo-based Inter-Continental Ballistic Missiles (ICBMs)
Road-mobile ICBMs
Rail-mobile ICBMs
Anti-Ballistic Missiles (ABMs)
Submarine-Launched Ballistic Missiles (SLBMs)
Heavy Bombers carrying Air-Launched Cruise Missiles (ALCMs) or Gravity Bombs
SOURCES: START Memorandum of Understanding on Data (MOU), September 1990–January 1998.
Locations with Weapons-Usable Fissile Material for One or More Nuclear Bombs
Plutonium Production
Uranium Enrichment/Processing
Warhead Assembly/Dismantlement
Research Institute/Research Reactor
Fuel Storage
SOURCE: Monterey Institute of International Studies, Monterey, CA; Natural Resources Defense Council, Washington, DC; U.S. Department of Energy, Washington, DC.
Murmansk
Nerpich'ya
Yagel'naya
Barents Sea
Ostrovnoy
Novaya Zemlya
Nuclear test site
FINLAND
ESTONIA
LATVIA
LITHUANIA
St. Petersburg
Arkhangel'sk
Severodvinsk
KALININGRAD
BELARUS
Vypolzovo
Moscow
Dubna
Obninsk
Kostroma
Kozel'sk
Podolsk
Teykovo
Yur'ya
Ryazan
Yoshkar-Ola
Sarov
Lesnoy
UKRAINE
Zarechniy
Volga River
Kazan
Bershet
Yekaterinburg
Dmitrovgrad
Nizhniy Tagil
Novouralsk
Tatishchevo
Engels
Ural Mtns.
Yenisey River
Ob River
Tobol River
RUSSIA
Snezhinsk
Trekhgornyy
Ozersk
Kartaly
Dombaroskiy
Tomsk
Severs k
Tom River
Novosibirsk
Uzhur
Barnaul
Aleysk
Sayan
Black Sea
Caucasus Mtns.
Mozdok
GEORGIA
ARMENIA
AZERBAIJAN
Caspian Sea
Aral Sea
KAZAKHSTAN
0
500
Miles
IRAN
UZBEKISTAN
TURKMENISTAN


Carnegie Endowment for International Peace, *Tracking Nuclear Proliferation*, 1998

# RUSSIA Chart 1: Nuclear Weapons Systems[a]

| TYPE | WEAPONS SYSTEMS (START I MOU/Current) | WARHEADS (START I MOU/Current) | CURRENT LOCATIONS | COMMENTS |
|---|---|---|---|---|
| **ICBMs** | | | | |
| **Total** | **1064/751** | **4278/3610** | | |
| SS-11 | 326/0 | 326/0 | | All SS-11s were dismantled by the end of 1995. |
| SS-13 | 40/0 | 40/0 | | All SS-13s have been dismantled. |
| SS-17 | 47/0 | 188/0 | | All SS-17s have been dismantled. |
| SS-18 | 204/180 | 2,040/1,800 | Uzhur: 52<br>Aleysk: 30<br>Kartaly: 46<br>Dombaroskiy: 52 | START I requires Russia to reduce its SS-18 deployment to 154 silos. START I attributes 10 warheads to each SS-18; some may carry fewer. START II requires elimination of all SS-18 ICBMs. |
| SS-19 | 170/165 | 1,020/990 | Tatishchevo: 105<br>Kozel'sk: 60 | START II would limit Russia to 105 deployed SS-19s, down-loaded to one warhead each. |
| SS-24 | 43/46 | 430/460 | Bershet: 15<br>Kostroma: 12<br>Krasnoyarsk: 9<br>Tatishchevo: 10 | Of the 46 SS-24s, 36 are rail-based and 10 are silo-based. Rail-based SS-24s were removed from alert status under the October 1991 Gorbachev initiative. START II requires elimination of these 10-warhead ICBMs. |
| SS-25 | 234/360 | 234/360 | Irkutsk: 36<br>Kansk: 45<br>Novosibirsk: 45<br>Yoshkar-Ola: 36<br>Nizhniy Tagil: 45<br>Yur'ya: 45<br>Teykovo: 36<br>Vypolzovo: 18<br>Barnaul: 36<br>Drovyanaya: 18 | To replace MIRVed ICBMs, whose elimination START II requires, Russia's land-based leg will rely more on single-warhead SS-25s, still being deployed, and on a new single-warhead ICBM, the Topol-M (SS-27), which was declared ready for deployment in July 1997; Russia expects to deploy 10 SS-27s by the end of 1998.[b] |
| **BOMBERS**[c] | | | | |
| **Total** | **79/75** | **570/816** | | |
| Bear-H | 28/64 | 448/734 | Mozdok: 21<br>Ukrainka: 43 | 40 Bear-H bombers were transferred from Kazakhstan to Russia. |
| Blackjack | 2/6 | 24/72 | Engels: 6 | |
| Bear-G | 49/5 | 98/10 | Ryazan: 5 | 5 additional Bear-Gs are awaiting elimination at Engels. |

## RUSSIA Chart 1 (cont'd.)

| TYPE | WEAPONS SYSTEMS (START I MOU/Current) | WARHEADS (START I MOU/Current) | CURRENT LOCATIONS | COMMENTS |
|---|---|---|---|---|
| **SLBMs**[d] | | | | |
| **Total** | **940/384** | **2804/1824** | | |
| SS-N-6 | 192/0 | 192/0 | Rybachiy:<br>1 Yankee I sub | Although 16 SS-N-6s are accountable under START I, none are operationally deployed.[e] |
| SS-N-8 | 280/0 | 280/0 | Ostrovnoy:<br>3 Delta I subs<br>Rybachiy:<br>2 Delta I subs<br>Yagel'naya:<br>2 Delta I subs<br>3 Delta II subs<br>Pavlovskoye:<br>5 Delta I subs | Although 192 SS-N-8s are accountable under START I, none are operationally deployed.[f] |
| SS-N-17 | 12/0 | 12/0 | | All SS-N-17s have been destroyed. |
| SS-N-18 | 224/192 | 672/576 | Rybachiy:<br>9 Delta III subs<br>Yagel'naya<br>4 Delta III subs | Although 208 SS-N-18s are accountable under START I, only 192 are operational.[g] |
| SS-N-20 | 120/80 | 1,200/800 | Nerpich'ya:<br>6 Typhoon subs | Although 120 SS-N-20s are accountable under START I, only 80 are operational.[h] |
| SS-N-23 | 112/112 | 448/448 | Yagel'naya:<br>7 Delta IV subs | |
| **OTHER NUCLEAR WEAPONS** | | | | |
| Tactical Nuclear Weapons | | Estimates of the total number of tactical nuclear warheads in Russia range from 15,000 to upward of 20,000; the number deployed may be considerably lower.[i] | The number of tactical nuclear weapons deployment sites were reduced for security reasons in 1994.[j] | Approximately 4,000 tactical nuclear weapons were withdrawn to Russia from Belarus, Kazakhstan, and Ukraine.[k] |
| Strategic and Tactical Weapons in Storage and Dismantlement Facilities | | The exact number of warheads in storage or dismantlement facilities is unknown. | Dismantlement Facilities:<br>Sarov<br>Zarechniy<br>Lesnoy<br>Trekhgornyy | Russia has told the U.S. Department of Defense that it is dismantling over 2,000 warheads per year.[l] |
| Anti-Ballistic Missiles | 100 | 100 | ABMs deployed within a 100-km radius of Moscow. | Nuclear warheads on ABM interceptors near Moscow may have been replaced with conventional ordnance.[m] |

## NOTES (Russia Chart 1)

[a]The original "START I" numbers for Russia in this chart are derived from the September 1990 START Memorandum of Understanding (MOU) on Data, an annex to the START treaty that declared "baseline" numbers and locations of the strategic offensive forces of the United States and the Soviet Union as of September 1990. See "START-Related Facilities by Republic as Declared in MOU Data Exchange, Sept. 1, 1990," *Hearings on the START Treaty*, Committee on Foreign Relations, U.S. Senate, 102nd Cong., 2nd Sess., February 6, 1992, p. 497. The MOU data were updated by the five START parties after the treaty entered into force in December 1994, and at six-month intervals thereafter.

"Current" numbers indicate the effects of reductions under the first phase of START I implementation (although, in some cases, the current numbers may increase due to Russia's ongoing ICBM modernization or the withdrawal to Russia of moveable strategic systems from Belarus and Kazakhstan). The current numbers reflect the status of deployed operational systems in Russia as of July 1997, but may exclude deactivated sytems, even if they have not yet been eliminated in treaty terms. The START I counting rules count deployed delivery systems and their attributable warheads as "deployed," until the systems have been eliminated (i.e., until missile launchers and heavy bombers slated for elimination are actually destroyed), even if the systems are known to be no longer operational. Current figures have been derived from subsequent START MOU updates, the latest available being that of January 1998, and various other open sources. See, for example, Carnegie Endowment for International Peace and Monterey Institute of International Studies, *Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Materials, and Export Controls*, No. 5, March 1998; International Institute of Strategic Studies, *The Military Balance 1997/98* (London: Oxford University Press for IISS, 1997); "NRDC Nuclear Notebook," *The Bulletin of the Atomic Scientists*, March/April 1998, pp. 70-71.; and Thomas B. Cochran, et al., *Nuclear Weapons Databook—Volume IV: Soviet Nuclear Weapons*,(New York: Harper and Row, 1989).

The START I treaty parties were, as of December 1997, two full years ahead of the treaty reductions schedule, according to Robert Bell, the senior NSC official for defense and arms control, in his February 17, 1998 presentation to the Arms Control Association in Washington, D.C.

[b]Russia stationed two experimental Topol-Ms in refurbished SS-19 silos at Tatishchevo in December 1997. Neither missile is thought to be armed with a nuclear warhead. See "DOD sees only one Russian SS-X-27 missile potentially operational," *Aerospace Daily*, January 13, 1998; "Russia inaugurates first Topol-M ICBM in refurbished silo," *Aerospace Daily*, January 7, 1998, p. 25.

[c]Current totals reflect 64 Bear-H, 6 Blackjack, and 5 Bear-G bombers. Current bomber loadings are calculated using START II counting rules, and thus reflect the number of warheads for which the heavy bombers of a listed variant are actually equipped, rather than the number of warheads attributed to each aircraft by the START MOUs. The START MOUs intentionally undercount bomber loadings.

[d]The Yankee I, Delta II, Delta III, and Delta IV class submarines have 16 tubes each. The Delta I class submarine has 12 tubes and Typhoon class submarines have 20 tubes. Under START I counting rules, SLBMs are accountable until their associated launch tubes are destroyed.

[e]Robert S. Norris, "NRDC Nuclear Notebook," *The Bulletin of the Atomic Scientists*, March/April 1996, p. 62.

[f]Ibid., p. 62.

[g]"NRDC Nuclear Notebook," op. cit., pp. 70-71.

[h]Two Typhoon submarines with 20 tubes each are inoperable. Ibid.

[i]See Deputy Secretary of Defense John Deutch, U.S. Defense Department Briefing, September 22, 1994; and "Estimated Russian Nuclear Stockpile, September 1996," *The Bulletin of the Atomic Scientists*, September/October 1996, p. 17. Unfortunately, there is no authoritative baseline information on the number of tactical nuclear weapons deployed and stockpiled by the former Soviet Union as of 1991. Information released subsequently has been fragmentary and allows no reliable estimates either of the numbers or of the status of Russia's tactical nuclear weapons, whether deployed on launchers, stored but operationally ready for use by military units, retired from service but stored, or both retired and dismantled.

Alexei Arbatov, Russian Duma member, published a report listing the number of Soviet tactical nuclear weapons at 21,700 in 1991. Of these, 13,700 were, he suggested, subject to elimination under the 1991 reciprocal unilateral reductions declared by Presidents Gorbachev and Bush. An additional 4,200 from outside Russia would also have been subject to elimination. Arbatov claims that of the remaining weapons, perhaps 4,000, most are in storage. *Yadernye Vooruzheniya Rossii*, Alexei Arbatov, ed., (Moscow: IMEMO, 1997), p. 56. The U.S. Defense Department recently reported, however, that most Russian warhead dismantlement appears to have been of strategic rather than tactical nuclear warheads, and that relatively few of the 15,000 tactical warheads that were estimated to have been withdrawn from service under the 1991 unilateral initiative, and presumably subject to dismantlement, actually were dismantled. The report states that "Russia has not divulged specific information on warhead reductions." Office of the Secretary of Defense, *Proliferation: Threat and Response*, November 1997, p. 43.

[j]"Tactical Nuclear Arms Removed from Vessels," *ITAR-TASS*, February 4, 1994, in *FBIS-SOV-93-022*, February 4, 1994, p. 1.

[k]Testimony of Assistant Secretary of Defense Ashton Carter, before the Senate Armed Services Committee, April 28, 1994.

[l]Ashton Carter testimony, op. cit. These figures include the dismantlement of both tactical and strategic nuclear warheads. See note 9 above reflecting current Department of Defense skepticism that Russia's warhead dismantlement thus far has included a significant fraction of the tactical nuclear warhead inventory.

[m]In oral remarks, Col. Gen. Alexander Yesin, Deputy Secretary of the Security Council of the Russian Federation (and former chief of staff of the Strategic Rocket Forces) indicated at the Carnegie Endowment for International Peace, April 21, 1998, that Russia has been replacing nuclear with conventional warheads on the ABM system deployed around Moscow. This has not yet been confirmed publicly by official U.S. sources.

# RUSSIA Chart 2: Locations with Weapons-Usable (Fissile) Material[a]

| NAME/ LOCATION OF FACILITY | ACTIVITY | PLUTONIUM | WEAPONS-GRADE URANIUM | COMMENTS |
|---|---|---|---|---|
| Sarov (Arzamas-16) | Weapons R&D, warhead assembly/ dismantlement, research reactors. | Yes | Yes | 4 research reactors and more than a ton of fissile material. |
| Baltiyskiy Zavod, St. Petersburg | Construction of nuclear icebreakers and other ships. | | Yes | Fresh fuel in storage for up to a year. |
| Beloyarsk, near Yekaterinburg | BN-600 fast breeder reactor. | Yes | Yes | Spent fuel plutonium present. |
| A.A. Bochvar Institute, Moscow | Research on weapons-grade materials. | Yes | Yes | In early 1994, parts of the facility were closed due to lax plutonium protection arrangements. |
| Ozersk, Mayak Production Association (Chelyabinsk-65) | Plutonium and tritium production reactors, reprocessing, MOX fuel production, warhead component production. | Yes | Yes | All plutonium production reactors closed, but reprocessing and tritium production continue. |
| Snezhinsk (Chelyabinsk-70) | Warhead design, prototype warhead fabrication, research reactors. | Yes | Yes | More than a ton of weapons-usable material present. |
| Scientific Research Institute for Atomic Reactors, Dmitrovgrad | Research and plutonium production reactors, MOX fuel fabrication, reprocessing, hot cells. | Yes | Yes | More than a ton of weapons-usable material present. |
| Joint Institute of Nuclear Research, Dubna | Research reactors. | Yes | No | About 100 kg plutonium. |
| Elektrostal Machine-Building Plant, Moscow | Fuel fabrication for naval propulsion, fast breeder, VVER and RBMK reactors. | No | Yes | Produces fuel assemblies for VVER and RBMK nuclear power reactors. |
| Institute of Physics and Power Engineering, Obninsk | Research reactors, research on weapons-grade materials. | Yes | Yes | 4 research reactors and up to 18 critical assemblies; approximately 1,000 kg plutonium and 7 tons of HEU present. |
| Karpov Institute of Physical Chemistry, Obninsk | Research reactor. | No | Yes | VVR-Ts tank reactor and ''substantial amounts'' of HEU.[b] |
| Khlopin Radium Institute, St. Petersburg | Research on reprocessing technologies. | Yes | Yes | Current research on using ex-weapon plutonium as fast reactor fuel.[c] |

## RUSSIA Chart 2 (cont'd.)

| NAME/ LOCATION OF FACILITY | ACTIVITY | PLUTONIUM | WEAPONS-GRADE URANIUM | COMMENTS |
|---|---|---|---|---|
| Zheleznogorsk (Krasnoyarsk-26) | Plutonium production reactor, spent fuel reprocessing. | Yes | Yes | Russia will convert the core of the ADE-2 plutonium producing reactor by 2000 so that it no longer produces weapons-grade plutonium.[d] |
| Zelenogorsk (Krasnoyarsk-45) | Uranium enrichment, LEU production. | No | Yes | Former HEU producer for weapons, now blends down ex-weapon HEU into LEU reactor fuel. |
| Krylov Central Scientific Research Institute, St. Petersburg | Research reactor and critical assemblies. | No | Yes | Research and design of nuclear submarine reactors, and testing of other naval reactors. |
| Kurchatov Institute, Moscow | Research reactors, critical and subcritical assemblies. | Yes | Yes | Nuclear energy research facility; estimated to possess hundreds of kgs of HEU for the 6 operable research reactors. |
| Luch Scientific Production Association, Podolsk | HEU fuel fabrication for space-based reactors, research reactors. | | Yes | More than a ton of weapons-usable material present. |
| Lytkarino Research Institute for Instruments, near Moscow | Research reactors. | Possible[e] | Yes | Five pulse research reactors and 90% enriched HEU. |
| Moscow Engineering Physics Institute | Research reactor. | No | Yes | Pond-type research reactor and kilograms of 90% enriched HEU. |
| Moscow Institute of Theoretical and Experimental Physics | Heavy-water research reactor and critical assembly. | | Yes | Heavy-water research reactor shut down, but critical assembly still operating. |
| Novosibirsk Chemical Concentrates Plant | Fuel fabrication for VVER-1000 reactors, research reactors, and Pu-production reactors. | No | Yes | Produces LEU fuel for VVER civilian power reactors and HEU fuel for research, and plutonium and tritium production reactors. |
| Zarechniy (Penza-19) | Component fabrication, warhead assembly and disassembly. | Yes | Yes | Manufactures nuclear warheads components and has on-site storage. |
| Scientific Research and Design Institute of Power Technology, Moscow | Research reactors, subcritical assemblies. | | Yes | Designs reactors for power generation, naval propulsion, heat production, research, and space-based applications. |
| Sverdlovsk Scientific Research and Design Institute of Power Technology, Yekaterinburg | Research reactor, critical assemblies, hot cells. | | Yes | Designs RBMK reactors and conducts safety tests; 15 MW pool reactor fueled with 1.7 kg 90% enriched HEU. |

## RUSSIA Chart 2 (cont'd.)

| NAME/ LOCATION OF FACILITY | ACTIVITY | PLUTONIUM | WEAPONS-GRADE URANIUM | COMMENTS |
|---|---|---|---|---|
| Nuclear Physics Institute (formerly Lenin Institute of Physics), St. Petersburg | Research reactors, critical assemblies. | | Yes | 18 MW pool reactor fueled with 90% HEU; a 100 MWt tank reactor is under construction.[f] |
| Novouralsk Urals Electrochemical Integrated Plant (Sverdlovsk-44), Yekaterinburg | Former HEU for weapons production site, LEU production. | No | Yes | Produces and exports blended down LEU for nuclear power reactors; converts former weapons HEU to 4% LEU.[g] |
| Elektrokhimpribor Combine (Sverdlovsk-45), Lesnoy | Final warhead assembly and dismantlement. | Yes | Yes | One of Russia's largest dismantlement and storage sites; dismantles approximately 1500 warheads per year.[h] |
| Siberian Chemical Combine (Tomsk-7), Seversk | Plutonium production, uranium enrichment, reprocessing, dismantled weapons storage. | Yes | Yes | Large quantities of fissile material including tens of tons of plutonium and HEU from dismantled weapons; 2 operating plutonium production reactor cores will be converted by 2000.[i] |
| Tomsk Polytechnic University | Research reactor. | | Yes | 6 MW tank research reactor and HEU fuel; 1 kg of 90% HEU was discovered missing in 1995, and was possibly diverted.[j] |
| Trekhgornyy Instrument Making Plant (Zlatoust-36) | Final warhead assembly and dismantlement. | Yes | Yes | In addition to warhead dismantlement and storage, also produces ballistic missile reentry vehicles.[k] |
| Northern Fleet Naval Shipyards, Murmansk | Fresh and spent fuel storage, submarine refueling, submarine construction and decommissioning. | No | Yes | Large stocks of fresh and spent naval reactor fuel, including HEU enriched up to 92%. |
| Pacific Fleet, Kamchatka Peninsula and Vladivostok | Fresh and spent fuel storage, naval reactor maintenance, submarine decommissioning. | No | Yes | Large stocks of naval reactor fuel, HEU enriched up to 90%. |

**Abbreviations:**

| | | |
|---|---|---|
| HEU | = | highly enriched uranium |
| LEU | = | low-enriched uranium |
| nat. U | = | natural uranium |
| MWe | = | millions of watts of electrical output |
| MWt | = | millions of watts of thermal output |
| KWt | = | thousands of watts of thermal output |

## NOTES (Russia Chart 2)

[a]Weapons-usable fissile material includes uranium enriched to 90 percent or more in the isotope U-235 (referred to below as highly enriched uranium or HEU) and all forms of plutonium (Pu). About 15 kg of HEU or 5 kg of Pu are required for a nuclear weapon. None of these facilities are under IAEA safeguards.

Principal sources for this chart: Carnegie Endowment for International Peace and Monterey Institute of International Studies, *Nuclear Successor States of the Soviet Union: Status Report on Nuclear Weapons, Fissile Materials, and Export Controls*, No. 5, March 1998, Table I-E,; the NIS Nuclear Profiles Database, Center for Nonproliferation Studies, Monterey Institute of International Studies, 1997; *United States/Former Soviet Union: Program of Cooperation on Nuclear Material Protection, Control, and Accounting*, Department of Energy Nuclear Material Security Task Force, December 1996; and Department of Energy, Office of Nonproliferation and National Security, *MPC&A Program Strategic Plan*, January 1998.

[b]From an interview conducted by the Center for Nonproliferation Studies with a Russian nuclear official in August 1997 as reported in *Nuclear Successor States of the Soviet Union*, No. 5, op. cit.

[c]This project is funded by an ISTC award. "Summary of 26 New ISTC Awards," *Post-Soviet Nuclear & Defense Monitor*, July 7, 1995, pp. 7-10. See section I-F in *Nuclear Successor States of the Soviet Union*, No. 5, op. cit. for more on the ISTC.

[d]For more information on the terms and status of the reactor core conversion agreement, see the section on Cessation of Production of Plutonium at the Zheleznogorsk and Seversk Reactors in Table I-D, *Nuclear Successor States of the Soviet Union*, No. 5, op. cit.

[e]According to an article in *Nucleonics Week*, there may be an inventory of separated plutonium at the Lytkarino facility. Mark Hibbs, "Gosatomnadzor Warned U.S. of Insider Threat at Lytkarino Lab," *Nucleonics Week*, August 14, 1997, p. 5.

[f]Construction on the reactor is expected to be complete by the end of 1998. It will be fueled with about 30 kg of 90 percent HEU. U.S. General Accounting Office, *Nuclear Safety: Concerns With Nuclear Facilities and Other Sources of Radiation in the Former Soviet Union (Letter Report)*, GAO/RCED, November 7, 1995, Appendix II, pp. 23-25.

[g]Countries that have imported Russian LEU from Novouralsk include England, Belgium, Germany, Spain, France, Finland, and South Korea. "Uralskiy Elektrokhimicheskiy Krupniy Plan," *Atompressa*, Number 16, April 1997, pp. 2-3.

[h]According to Viktor Mikhailov, head of Minatom, in *Megaoplis-Ekspress*, July 22, 1992, p. 12.

[i]See note 4.

[j]Investigations by the Tomsk Polytechnic faculty and Gosatomnadzor were inconclusive. The missing HEU in the form of a fresh fuel assembly, may have been accidentally shipped to Tomsk-7, but it was deemed impossible to find there. See *Nuclear Successor States of the Soviet Union*, No. 5, op. cit., Table I-E note 256 for more detail.

[k]"Russia: Nuclear Weapons Facilities," NIS Nonproliferation Project, Center for Nonproliferation Studies, Monterey Institute of International Studies, August 1997.