U.S. Nuclear Forces, 2002

AFTER ONE YEAR IN OFFICE, IN JANUARY 2002 the Bush administration completed the Nuclear Posture Review (NPR). Although classified, the review was leaked in early March. It outlines the Pentagon's nuclear strategy, force levels, and infrastructure for the next 10 years and beyond. It also endorses revisions in strategy to allow the Pentagon to generate new nuclear attack plans that could be approved quickly in a crisis.

Not since the resurgence of the Cold War in Ronald Reagan's first term has U.S. defense strategy placed such emphasis on nuclear weapons. The plans call for revitalizing the U.S. nuclear force, along with all its supporting elements, within a so-called "New Triad" of capabilities that would combine nuclear and conventional offensive forces, missile defenses, and a revamped nuclear weapons infrastructure.

Currently we estimate that there are more than 10,600 nuclear warheads in the U.S. stockpile (see table). Almost 8,000 of these are active or operational; nearly 2,700 inactive. In addition to intact warheads, about 5,000 plutonium pits and 5,000 canned subassemblies (thermonuclear secondaries) are stored as a "strategic reserve" at Pantex and Oak Ridge, respectively. Another 7,000 pits at Pantex, from warheads dismantled during the Bush senior and Clinton administrations, have been declared excess. The Bush administration's planned "reductions" do not include the intact warheads or the strategic reserve pits, but the plan does revise how they will be categorized and counted.

The NPR introduces new terminology. The active warhead inventory will include three categories: "deployed warheads," which are "operationally deployed warheads" and warheads associated with weapon systems in overhaul; "responsive force warheads," which are active warheads not on deployed systems or in overhaul, yet are available for return to the operationally deployed force; and "spares." Finally, "inactive" warheads are those that do not have limited-life components (such as tritium reservoirs or batteries) or may not feature the latest modifications.

The Bush administration's proposed "reductions" are to be implemented in two phases: By 2007, operationally deployed warheads will be reduced to about 3,800; and by 2012, to between 1,700–2,200 warheads. To reach these levels, the MX/Peacekeeper will be retired, four Trident submarines will be removed from strategic service, and warheads on deployed intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) will be downloaded.

Unlike the counting rules agreed to in the SALT and START treaties, only operationally deployed strategic warheads will be counted. Warheads removed from weapon systems in overhaul are not included in the projected levels.

ICBMs. The United States deploys 550 ICBMs of two types, 500 Minuteman IIIs and 50 MX/Peacekeepers. These missiles are maintained at a high alert rate (above 98 percent) and can be launched on short notice. To meet the third and final phase of reductions required by the START I Treaty, warheads have been removed from part of the ICBM force. The 150 Minuteman III missiles at F. E. Warren Air Force Base (AFB) that formerly carried three W62 warheads each now carry one. Under the Bush plan, the W62 is the only warhead type slated for dismantlement—but not until 2009. (The W62 pits and secondaries will presumably be kept.)

The Minuteman missile force continues to be modernized under a $5.5 billion, five-part plan to improve the weapon's accuracy and reliability and extend its service life past 2020:

- Missile alert facilities were equipped with new consoles in 1996 to reduce targeting time by 50 percent. A $55 million Service Life Extension Program to correct deficiencies in the consoles is scheduled before 2005.
- The ongoing, $1.9 billion Guidance Replacement Program (GRP) replaces the NS-20 guidance system with the new NS-50, improving accuracy and extending service life. Initial operational capability was achieved by the system at Malmstrom AFB on July 20, 2000, when the first 10 sets installed on missiles passed the 30-day on-alert requirement. The new guidance system was expected to increase the accuracy of the Minuteman III to nearly that of the current MX—a circular error probable of 100 meters—but it may not achieve that goal, according to Pentagon progress reports. Despite these setbacks, installation of the NS-50 continues.
- The Propulsion Replacement Program (PRP) involves re-pouring the missile's first and second stages and remanufacturing the third stage, incorporating the latest solid-propellant and bonding technologies, and replacing obsolete or environmentally unsafe materials and components. Nine missiles underwent propulsion replacement in 2001; 33 are scheduled for 2002; 86 in 2003; and 96 in 2004.

◉ The Propulsion System Rocket Engine Life Extension Program is designed to refurbish the fourth, post-boost, liquid-propulsion stage.

◉ The Safety Enhanced Reentry Vehicle (SERV) program beginning this year will replace all remaining W62 and some W78 warheads on Minuteman IIIs with the newer W87 warhead from deactivated MX missiles. More than $250 million is earmarked through 2006 to design, develop, and test modifications needed to implement the program. Before the new Minuteman III/W87 is deployed, it will be flight-tested. We believe that the 150 missiles at Warren AFB and 50 at Malmstrom AFB will be equipped with the W87, while the other 150 Minuteman IIIs at Malmstrom and the 150 at Minot AFB will retain the W78.

The first experimental launch of a combined GRP/PRP Minuteman III took place November 13, 1999, from Vandenberg AFB in California to the Kwajalein Missile Range in the Pacific Ocean. Usually, three full-scale test launches are conducted per year, but there were four in 2000. In 2001, one missile was launched in February; two more were scheduled for September but were canceled after the terrorist attacks. For 2002, test launches were scheduled for February, June, and September.

All 50 MX/Peacekeeper missiles are operational, but beginning October 1, they will be deactivated over three years. Their withdrawal will coincide with the Trident II missile's introduction into the Pacific-based submarine fleet. Current plans call for the MX silos to be retained, rather than destroyed as specified in the SALT and START treaties. MX booster stages will also be kept for potential use as space launch or target vehicles. The majority of the W87 warheads will arm Minuteman III missiles, and the balance will be placed in the responsive force.

A new ICBM, to be ready in 2018, is being considered. The Pentagon says it needs new ICBMs with extended range and the ability to hit mobile, hardened, and deeply buried targets.

Nuclear-powered ballistic missile submarines (SSBNs) and SLBMs. Eighteen *Ohio*-class (Trident) subs constitute the current SSBN fleet. By 2007, the number will be cut to 14 (two in overhaul will not be counted as part of the operationally deployed force). The four oldest SSBNs—the *Ohio*, *Michigan*, *Florida*, and *Georgia*—will be converted to carry up to 154 conventional cruise missiles each, and may also be used to support Special Operations Forces. The 2003 budget earmarks $1 billion to begin their conversion. The submarines would remain accountable under START I, though they will not carry SLBMs or the 768 warheads attributed to them. To balance the future 14-submarine fleet, three subs may be moved from Kings Bay, Georgia, to Bangor, Washington, establishing seven on each coast.

The navy has extended the Trident's hull life to 44 years. The first of the 14 remaining SSBNs will be retired in 2029; the Pentagon is studying two options for a new SSBN to be introduced the same year. One option is a variant of the Virginia-class nuclear-powered attack submarine (SSN). The other is a dedicated SSBN—either a new design, or a Trident derivative. The new project would begin in 2016.

Type	Name	Launchers	Year deployed	Warheads x yield (kiloton)	Warheads (active/spares)
ICBMs					
LGM-30G	Minuteman III				
	Mk-12	150	1970	1 W62 x 170	150
	Mk-12	50	1970	3 W62 x 170 (MIRV)	150/15
	Mk-12A	300	1979	3 W62 x 335 (MIRV)	900/20
LGM-118A	MX/Peacekeeper	50	1986	10 W87 x 300 (MIRV)	500/50
Total		**550**			**1,700/85**
SLBMs					
UGM-96A	Trident I C4	168/7	1979	6 W76 x 100 (MIRV)	1,008
UGM-133A	Trident II D5	264/11			
	Mk-4		1992	8 W76 x 100 (MIRV)	1,728/156
	Mk-5		1990	8 W88 x 475 (MIRV)	384/16
Total		**432/18**			**3,120/172**
Bombers*					
B-52	Stratofortress	94/56	1961	ALCM/W80-1 x 5–150	430/20
				ACM/W80-1 x 5–150	430/20
B-2	Spirit	21/16	1994	B61-7, -11, B83-1 bombs	800/45
Total		**115/72**			**1,660/85**
Non-strategic forces					
Tomahawk SLCM		325	1984	1 W80-0 x 5–150	320
B61-3, -4, -10 bombs		n/a	1979	0.3–170	800/40
Total		**325**			**1,120/40**
Grand total**					**7,600/382**

ACM: advanced cruise missile; ALCM: air-launched cruise missile; ICBM: intercontinental ballistic missile (range greater than 5,500 kilometers); MIRV: multiple independently targetable reentry vehicles; SLCM: sea-launched cruise missile; SLBM: submarine-launched ballistic missile.

* Bombers are loaded in a variety of ways depending on mission. B-52s may carry cruise missiles, gravity bombs, or a combination of both; B-2s carry only bombs.
** An estimated 2,700 additional warheads are retained in the "inactive" stockpile.

Trident subs carry two types of SLBMs. Seven Pacific-based subs carry the Trident I C4, and 10 Atlantic-based subs carry the Trident II D5. The newly converted Trident II sub, the *Alaska*, completed its refit last November and is expected to conduct its first D5 test launch this spring. It is already counted as a Trident II sub under START I. The other three subs slated for Trident II refit are, in order of conversion, the *Nevada*, *Henry M. Jackson*, and *Alabama*.

Although the Trident I C4 missile is being retired, flight tests continue. On December 9, 2001, the *Ohio* launched four C4s. Between 1976 and 1986, 570 C4s were produced, and 222 have been launched in 117 different flight tests, involving one to four missiles each. Of the 222 attempted launches, 188 were successful; the remaining 34 failed or did not launch. Until the early 1990s, C4 flight tests were conducted in both the Atlantic and Pacific, but since July 29, 1993, all SLBM flight tests have been conducted at the Atlantic Test Range off the Florida coast.

Procurement of the Trident II D5 continues at a rate of 12 missiles per year. Through 2001, 384 Trident II missiles had been purchased. Because four Trident I C4-equipped SSBNs are being upgraded, the number of D5s to be bought will increase from 390 to 425, at an additional cost of $2.2 billion. Twenty-eight other missiles were bought for R&D. The total cost of the Trident II D5 program is now $27.2 billion—or $60 million per missile. Of the 425 missiles, 288 will arm 12 operational subs, and 137 are scheduled for flight tests through 2014.

Compared to the Trident I C4 program, the Trident II D5 test program has been extraordinarily successful. Of the 116 D5 flight tests since 1987, only five missiles failed or did not work. The program's record of 94 consecutive successful launches since 1989 makes the D5 the most reliable strategic nuclear missile ever built. Despite its proven reliability, the Pentagon says the current flight test level (set by Strategic Command) is the "minimum acceptable to meet weapon system reliability requirements."

The command center of the *Alabama*, one of the missile submarines that will be refitted to carry Trident II D5s.

Because the service life of *Ohio*-class subs was extended from 30 to 44 years, the current Trident II D5—scheduled to begin retiring in 2019—will be unable to arm the fleet for its entire lifetime. So the navy has begun a program to extend the D5's service life. The upgraded missile, the Trident II D5A, is considered a "variant" of the existing D5 rather than a new missile. Plans call for approximately 300 D5As—enough to arm 10 subs. Funding is expected to begin in 2005; purchase of motors is planned for 2010–2012; and missile production is slated to start in 2015.

The State Department declared in December 2001 that the SSBN force carried a total of 3,120 warheads—a reduction from 3,456 warheads the previous year. The reduction was called for by START I and involved reducing the loading of Trident I C4s from eight to six warheads each. Further SLBM downloading will be necessary after 2007 to meet the 2012 reductions for the operationally deployed strategic forces.

The SLBMs carry two types of reentry vehicles (RVs) and warheads: either the Mk-4 with the W76 warhead, or the Mk-5 with the W88 warhead. The W76/Mk-4 combination is by far the more common, with as many as 2,736 warheads deployed on 16 submarines. Lockheed Martin's Missile and Space Operations has manufactured more than 5,000 Mk-4 reentry body assembly kits for the U.S. and British navies since 1976. To ensure that the W76/Mk-4 reentry body can support SSBN operations until 2040, the W76 is scheduled for refurbishment starting in 2007.

The Mk-5 carries the W88, the most powerful missile warhead in the U.S. arsenal. It is estimated that 400 of these warheads were produced before production ceased in 1989, when Rocky Flats, where the pits were made, was forced to close for safety and environmental reasons.

President George Bush announced in February 1992 that no more W88s would be built, but in the late 1990s small-scale pit production resumed at Los Alamos National Laboratory's TA55 facility. By February 2000, four "development pits" had been fabricated to replenish those

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destroyed in reliability testing. Under current plans, TA55 is expected to produce 20 pits per year starting in 2007, with an eventual goal of 50 pits annually. The first "war reserve" pits are scheduled to enter the stockpile late in the decade.

The navy is designing a new SLBM warhead as part of its SLBM Warhead Protection Program (SWPP). The program maintains the capability to develop replacement nuclear warheads for both the W88/Mk-5 and W76/Mk-4.

Bombers. The United States has two types of long-range heavy bombers for nuclear missions: the B-2A Spirit and the B-52H Stratofortress. Neither is maintained on day-to-day alert. The B-52 can deliver cruise missiles, gravity bombs, or a combination of both; the B-2 carries only bombs.

Twenty-one B-2A bombers are deployed with the 509th Bombardment Wing at Whiteman AFB in Missouri, where the first B-2 was delivered December 17, 1993. The B-2 is scheduled for replacement around 2040, and a follow-on bomber program was begun in 1998. Of the 21 aircraft, all of which are assigned nuclear missions, 16 are maintained at a higher degree of readiness. The B-2's nuclear weapons include B61-7, B61-11, and B83-1 bombs. Each B-2 can be armed with either B83s or B61s, but reportedly cannot mix the two.

The B-2 is the only carrier of the new B61-11 "earth-penetrating" nuclear bomb introduced in November 1997. The B61-11 is a modified B61-7: An additional 450 pounds were added to the B61-7's original weight of 763 pounds. Its substantial kinetic force allows the B61-11 to "penetrate" to a depth of 30 feet at most. The resulting explosion—of even a low-yield bomb—would not be contained and would cause widespread dispersal of radioactive debris, contaminating the surrounding area.

The bat-winged B-2 has been plagued by technical problems, partly due to its sensitive radar-absorbing surface. In March, the air force announced that cracks had developed on titanium plates behind the rear exhausts on 16 of the bombers. During 2001, the average B-2 was available for combat duty just 31 percent of the time—half of the air force's goal of 60 percent.

Entering service in 1961, the B-52H is the air force's "workhorse of nuclear weapons employment" and will remain in operation until 2044. Of the 94 B-52s, all of which are assigned nuclear weapons missions, 56 are maintained at a higher degree of readiness. Only the B-52 carries the AGM-86B air launched cruise missile (ALCM) and the AGM-129A advanced cruise missile (ACM).

ALCMs are equipped with the W80-1 warhead. Although only about 400 ALCMs are deployed, hundreds more are held in reserve. According to the air force, there are a total of 1,142 ALCMs in the inventory, a reduction of 251 from March 1997. This reduction is a result of the conversion of some ALCMs to conventional roles. Two hundred ALCMs are also kept in long-term storage; full reconstitution of these missiles would take about six months.

Designed with stealth features to permit use against heavily defended targets, the ACM has a longer range and greater accuracy than the ALCM and is also equipped with the W80-1 warhead. Originally, the Pentagon planned to produce 1,461 ACMs, but in January 1992 it announced that production would stop at 640.

Programs are under way to extend the service life of both the ALCM and the ACM to 2030.

Operational test launches for ALCMs and ACMs (minus warheads) are conducted from B-52H aircraft of the Second Bomb Wing at Barksdale AFB, Louisiana, and the Fifth Bomb Wing at Minot AFB, North Dakota. About half a dozen tests are conducted each year at the Utah Test and Training Range or at the Tonopah Test Range in Nevada.

Although the B-1B bomber was described as a "conventional-only" aircraft for years, the air force maintained it in a "nuclear rerole" status. This meant that if necessary, the bombers could return to nuclear missions within months. Under the new NPR, the remaining 92 B-1Bs will be removed from "rerole" status.

Non-strategic forces. Although the number of non-strategic (tactical) nuclear weapons has declined dramatically compared with Cold War levels, the NPR announced no new reductions to this force.

The United States has approximately 1,620 non-strategic nuclear weapons, consisting of 1,300 B61 gravity bombs of three modifications and 320 Tomahawk land-attack cruise missiles (TLAM/N), a portion of which are in reserve or inactive. The B61 tactical nuclear bombs, for various U.S. and European NATO aircraft, are mostly stored at Kirtland AFB, New Mexico, and Nellis AFB, Nevada, for delivery by F-16C/D Fighting Falcon and F-15E Strike Eagle.

Approximately 150 B61 bombs remain in forward deployment at 10 air bases in seven European NATO nations. The Weapons Storage and Security System that is used to store the weapons at these locations was installed between 1990 and 1998. Plans are under way to modernize the security system before 2005 to maintain it for another decade.

A service life extension study for the B61 began in 1999.

All of the approximately 320 Tomahawks (with W80-0 warheads) were removed from their previous storage areas at Naval Air Station North Island in San Diego, California, and Naval Weapon Station Yorktown in Norfolk, Virginia. They are now stored at the Strategic Weapons Facilities alongside strategic weapons for the SSBNs. The

Yorktown weapon station was decertified in August 1997 after it shipped its complement of Tomahawks to the Strategic Weapons Facility Atlantic at Kings Bay, which was certified to receive the missiles in April 1997. North Island's nuclear certification expired in April 1998 after all of its Tomahawks were airlifted to the Strategic Weapons Facility Pacific in Bangor.

As a result of the 1994 NPR, surface vessels are no longer equipped to carry nuclear-armed Tomahawk missiles. But the option to re-deploy them on attack submarines was retained. While most U.S. attack submarines were credited with some nuclear capability during the Cold War, most SSNs do not have nuclear missions today. Fewer than half of the Pacific Fleet's SSNs regularly undergo nuclear certification. The reduced nuclear requirement is also illustrated by the fact that after passing inspections, SSNs are subsequently de-certified to save resources for more urgent, non-nuclear responsibilities. If necessary, however, Tomahawks can be redeployed in only 30 days. To ensure training and force integration, Tomahawk operations are now included in Stratcom's annual Global Guardian nuclear exercises.

As directed in the 2002 NPR, the Pentagon will evaluate the Tomahawk's future and decide whether to replace, retire, or retain and enhance the missile.

The F-117A Nighthawk is considered nuclear-capable but is not normally listed in the air force budget for nuclear weapons support. The air force maintains the Nighthawk at a lower level of nuclear readiness than the other aircraft. Air Combat Command recommended de-nuclearizing the F-117A in 1992 to free resources for training and onboard computer capacity, but the Air Staff intervened. The Pentagon is considering whether to extend the life of the dual-capable F-16s and F-15Es or to upgrade to the Joint Strike Fighter (JSF). The JSF is being designed to permit future nuclear capability after its entry into service in 2012.

Allied aircraft assigned nuclear missions include U.S.-supplied F-16s and German and Italian Tornado bombers. Several NATO countries currently assigned strike missions with U.S. nuclear bombs are considering purchase of the Joint Strike Fighter.

Missile defenses. The administration wants to supplement its offensive forces with a robust series of missile defenses. It believes that deploying missile defenses will increase the U.S. ability to "counteract [weapons of mass destruction]-backed coercive threats" by defeating small-scale missile attacks intended to force the United States into abandoning an embattled "ally or friend."

According to the NPR, missile defenses will be integrated into the New Triad. This will supposedly enhance U.S. capability "to use its power projection forces" by "improving the ability to counterattack an enemy" and may also provide the president with "an option to manage a crisis" involving "one or more" opponents with weapons of mass destruction. The administration asserts that missile defenses can have a "dissuasive effect" on potential enemies by making it "more arduous and costly for an adversary to compete militarily with or wage war against the United States."

An "emergency missile defense capability" for 2003–2008 is being considered by the administration. This system would consist of a single aircraft with an airborne laser for "limited operations" against "ballistic missiles of all ranges"; a "rudimentary" Alaska-based midcourse interceptor system against "longer-range threats"; and a sea-based Aegis system with "rudimentary midcourse capability" against "short-to-medium range threats."

The review maintains that the United States could deploy operational capabilities between 2006 and 2008. These capabilities would include two to three airborne lasers, "additional" ground-based midcourse interceptor sites, four sea-based midcourse ships, as well as "terminal" defense systems, such as the PAC-3 (an upgraded version of the Patriot "Scudbuster" missile that missed most of its targets in the 1991 Persian Gulf War) and the Theater High Altitude Area Defense (THAAD) system.

Intelligence and nuclear command, control, and communication. The new NPR calls for improving intelligence and command, control, and communication systems. Measures include expanding the current architecture to "a true national command and control conferencing system" to supplement programs begun before the NPR was completed.

The designated Extremely High Frequency (EHF) system on Milstar satellites is scheduled to take over the nuclear command and control function from the Defense Satellite Communications System (DSCS) in 2003. In 2003, the Defense Department will initiate the EHF communications satellite program "primarily for national and strategic users requiring protected communications in the mid-latitude and polar regions." The first satellite is scheduled for a 2009 launch. The polar capability will complement the Navy Polar EHF satellites currently being deployed, which are designed to provide command and control (including nuclear) in high-latitude areas. The first operational test of Navy Polar EHF was conducted with the USS *Scranton* during a deployment to the Arctic Ocean in June 2001.

A constellation of Advanced Extremely High Frequency (AEHF) Military Satellite Communications (Milsatcom) satellites is being developed to enhance existing Milstar satellites. Pathfinder, the first AEHF, is scheduled for launch in December 2006, and three other

AEHF spacecraft are planned to achieve initial operating capability in 2008. These satellites will "provide nuclear-survivable (e.g. against high-altitude electromagnetic pulse), anti-jam, low and medium data rate communications to strategic and tactical users." The NPR identifies the Advanced Wideband System, set for first satellite launch in 2009, as the replacement satellite for the AEHF.

The Milsatcom Terminals program is developing equipment to integrate all these command and control capabilities. Users will be able to communicate via Milstar, AEHF, Ultra High Frequency (UHF), the Wideband Gapfiller System, DSCS, and other military satellites—as well as commercial satellites—to support Aerospace Expeditionary Force requirements and maintain essential strategic connectivity for nuclear forces. This program will cost more than $2.3 billion.

Nuclear command and control aircraft are being extensively modernized. Sixteen E-6B Tacamo ("take charge and move out") aircraft serve as the primary relay stations for emergency action messages from the National Command Authority to SSBNs at sea. Tacamo (also known as the Airborne Launch Control Center) can—under restricted conditions—launch any missile within the Minuteman force. Modernizations will transfer the EC-135 Airborne National Command Post to the E-6B, thereby consolidating command and control of all strategic forces to a single platform.

The nuclear complex. According to the NPR, the administration plans to revitalize U.S. nuclear infrastructure by upgrading existing systems, developing and fielding entirely new systems, and introducing a rapid-production capability for nuclear weapons.

The Bush administration believes that the current arsenal—a subset of what was in place at the end of the Cold War—is not what is needed for the future. To accomplish new military missions, significantly modified—and quite possibly new—nuclear warheads will be required. The NPR calls for a revitalized nuclear weapons complex that could, if ordered, design, develop, manufacture, and certify new nuclear warheads. The new arsenal would have the capability to target and destroy mobile and relocatable targets as well as hardened and deeply buried targets. The administration argues that development of this arsenal must begin now because it will take more than a decade to complete.

The B-52 Stratofortress can deliver several types of nuclear weapons.

Plans are already under way to expand the capability and capacity at the Pantex nuclear weapons plant near Amarillo, Texas, to meet a planned workload of some 600 warheads (for assembly or dismantlement) per year, up from the current capacity of 350.

The NPR projects the long-term need for a "modern production facility" to deal with large-scale replacement of plutonium components as well as new production. The National Nuclear Security Administration (NNSA), part of the Energy Department, is accelerating preliminary design work on a modern pit manufacturing plant so that new production capacity can be "brought on line when it is needed."

The NNSA plans to expand capacity and capability at the Y-12 Plant at Oak Ridge, Tennessee. The seven to eight-year project will allow the facility to fulfill the planned workload for replacing nuclear warhead secondary stages and other uranium components. Advanced warhead concept design teams are being reestablished by the NNSA at the three national design labs (Los Alamos, Sandia, and Lawrence Livermore). This initiative will focus on "evolving [Defense Department] requirements," including the design of nuclear weapons to defeat hardened and deeply buried targets, the design of "agent defeat weapons" for attacking chemical and biowarfare sites, and reduction of collateral damage via improved accuracy and variable and reduced yields.

The NNSA also wants to shorten the time it would take (now two to three years) to resume nuclear testing at the Nevada Test Site.

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