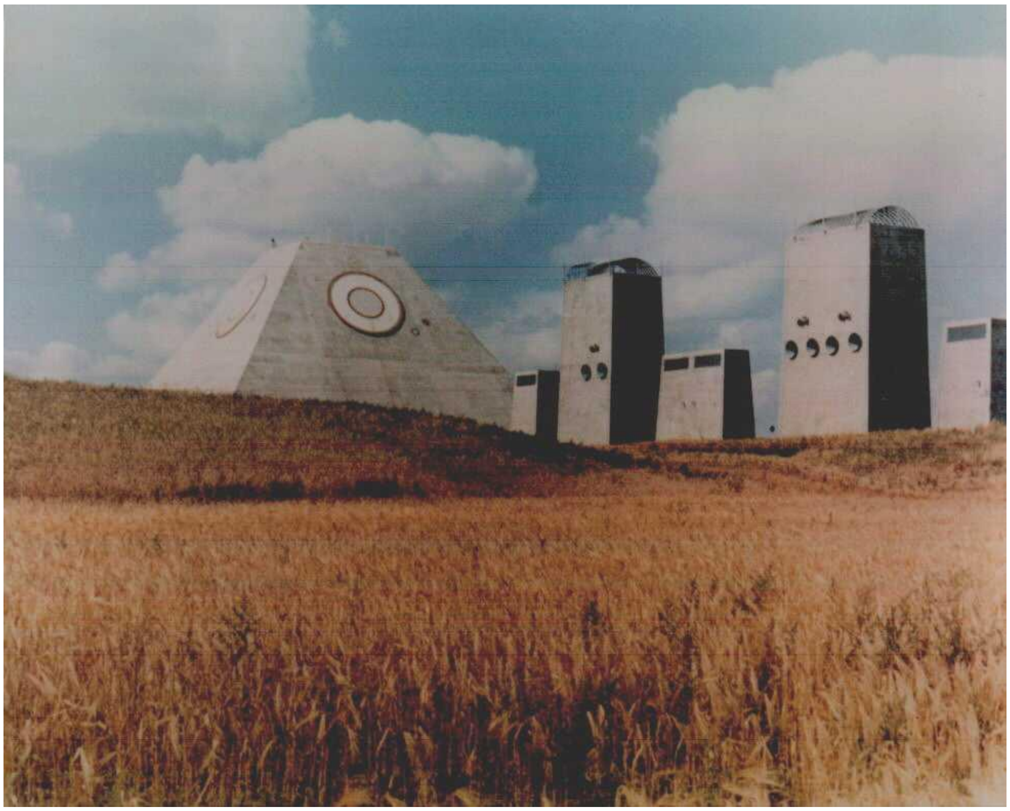
SAFEGUARD:
North Dakota's Front Line in the Cold War



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Abstract

North Dakota has a 50-year history of being on the front lines of the Cold War. The most visible evidence of this is the two Air Force bases in the state, along with their accompanying bombers, tankers, and missiles. What is less evident to many people is a long-abandoned complex in northeastern North Dakota. This was the home of SAFEGUARD, the only anti-ballistic missile system ever deployed by the United States to defend the nation against intercontinental ballistic missiles. SAFEGUARD was controversial, both domestically and internationally. It was also a technological marvel for the time, although its effectiveness was questionable. SAFEGUARD put North Dakota on the map through domestic politics and in arms control talks with the Soviet Union. While the system was deployed, it only remained operational for a short period of time. The legacy of SAFEGUARD is more than just some large concrete structures rising above the prairie. Its impact on arms control, strategic planning, military space, and missile defense policy is still felt today.

Introduction

The Cold War was the genesis of the military space program, and in many respects, our national space program as a whole. Intercontinental ballistic missiles (ICBMs) were a high priority for both the United States (US) and the Union of Soviet Socialist Republics (USSR) because they could quickly deliver nuclear weapons in a "knockout blow." The development of these weapons led to the need for better intelligence, both for targeting and to prevent another Pearl Harbor. This need further fueled the military space program, beginning with CORONA and leading to the development of a robust system of intelligence, weather, early warning and communications satellites. While the capabilities of these systems led to more stability during the Cold War, both sides still relied on a doctrine of deterrence as the primary means of preventing a nuclear attack. Preserving this doctrine meant retaliatory weapons and command and control systems had to survive a first strike. One method of protecting them was to disperse and physically harden these facilities to withstand the effects of a nearby nuclear burst. Another method was to employ an active defense against the delivery system; either aircraft or missiles.

The threat of Soviet bombers flying over the North Pole armed with nuclear bombs was challenging, but the technology of the time provided ample solutions. Air defense was accomplished by the North American Air Defense Command (NORAD), which employed a system of radars and interceptor aircraft, and by the Army Air Defense Command (ARADCOM), which deployed numerous ground-based anti-aircraft units using guns and later guided missiles. The other threat, Soviet ICBMs, was more problematic. Defeating an incoming reentry vehicle (RV) is an extremely difficult technical problem in and of itself, but designing an integrated system to defend against multiple RV's and their countermeasures was a daunting task. However, considering the ramifications of doing nothing, the US embarked on one of the most polarizing issues of the Cold War.

Since the idea of defending against incoming ballistic missiles was first proposed, it has been a controversial topic. This is especially true when it relates to defending the United States against ICBMs, which can reach strategic targets in a half-hour or less. The evolution of American Anti-Ballistic Missile (ABM)[1] systems is a complex mixture of politics, threat, and technology. With the brief exception of the SAFEGUARD system in the early 1970s, the US has not operationally deployed an ABM system. Rather, the program has been repeatedly reverted from potential deployment back to research and development status. This process has repeated itself in a cyclical manner, responding to the prevailing politics of the time. Currently, the ABM program, both tactical and strategic is on an upswing, with a planned deployment of the Ground-Based Midcourse Defense (GMD) in 2004 leading the way.

ABM systems have been an integral part of the US military space program since its inception. The predominant reason for this is that ABM systems use much of the same technology as other military space systems. The targets of ABM systems (ICBMs) share a common lineage with space launch vehicles, and, in several cases, ICBMs have become space launch vehicles. Modern ABM systems rely very heavily on military space systems to support their operations. These include sensors and communications assets installed on various satellites, ground-based sensors that are primarily looking into space, and on intelligence collected by space-based platforms. ICBMs travel through space for the majority of their flight time, and many ABM intercepts occur above the atmosphere. Unlike the tactical systems that provide missile defense within a theater of operations, ICBM defense is considered a strategic program, as is the military space program in general. Thus, it is logical that ICBM defense systems fall

[1] The terms Anti-Ballistic Missile (ABM) and Ballistic Missile Defense (BMD) are often used interchangeably.

within the realm of military space operations rather than conventional air defense or theater missile defense operations, although they do share some similarities with their tactical counterparts.

In the early 1960s, the Army continued developing the Nike-Zeus system, which had several successful intercepts during testing. One of these tests, conducted in 1963 as part of "Operation Mudflap", included the successful intercept of an AGENA D satellite. Meanwhile, after a campaign full of "space and missile gap" rhetoric, President John F. Kennedy took office. The Cold War was raging, and Kennedy saw the civil space program as a way to compete with the Soviets, in what he characterized as "…a battle…between freedom and tyranny."[2] While there was a great deal of focus on the civil space program, several events in the early 1960s kept ABM systems in the spotlight. The first was the Cuban Missile Crisis in 1962, during which President Kennedy revealed to the public that the USSR was stationing nuclear-armed missiles just 90 miles off the Florida coast. The second event was the discovery, in 1964, that the Soviets had begun construction of an ABM system around Moscow known as GALOSH.

Secretary of Defense Robert S. McNamara was opposed to the Nike-Zeus system, questioning whether or not it would be effective against multiple targets due to its use of mechanical radars. He also worried an ABM system would be potentially destabilizing to the doctrine of mutual deterrence with the Soviets. Never the less, he ordered the Army to develop a "layered" system, known as Nike-X to address the technical shortcomings. Nike-X used an upgraded Nike-Zeus missile known as the Spartan, and was the first ABM system to make use of a phased-array radar, which had been recently developed by the Advanced Research Projects Agency (ARPA). Electronically-steered, phased array radars capable of simultaneously tracking

[2] US Congress. President John F. Kennedy. Special Message to the Congress on Urgent National Needs. May 25, 1961.

many targets and high-reliability, high-throughput data processors were the two technological improvements that made Nike-X and all subsequent ABM systems effective.[3] The threats posed by the Cuban Missile Crisis and Soviet ABM developments, combined with the success of the Nike-X program, caused the Joint Chiefs of Staff to unanimously recommend to Secretary of Defense McNamara that he request funding for additional Nike-X components. Additionally, the Chinese threat was beginning to play into the debate. The Chinese detonated their first nuclear device in 1964, and flight-tested a nuclear-armed guided missile in 1966. Shortly thereafter they announced that they had detonated a hydrogen bomb. Now US planners had two nuclear-armed foes to contend with.

While there was growing political support to deploy an ABM system, there was also a great deal of debate about strategic doctrine, especially regarding the relationship between missile defense and nuclear deterrence. Opponents of ABM felt that having a defensive system would undermine the doctrine of mutual deterrence and cause the Soviets to build more missiles to compensate for the US's new defensive capability. These critics also argued that a country with an effective ABM system would be more disposed to launching a first strike, since an ABM system could defend against any retaliatory strike. Overall, arms control advocates considered ABM systems destabilizing to the tenuous nuclear balance between the US and the Soviet Union. In the 1967 summit between President Lyndon Johnson and Soviet Premier Alexei Kosygin, the Soviet leader defended his own ABM program by advocating that ICBMs were morally wrong, while ABM systems, which are designed to protect people, are morally defensible.[4] This concept was echoed by US ABM advocates, who felt it was better to do something than nothing at all.

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[3] Bell Laboratories. *ABM Project History. (*Whippany: US Army Ballistic Missile Defense Command, 1975), p 2-1.
[4] Lonnquest, p 112.

While an ABM system probably could not be built to defeat an all-out Soviet strike, defending against the more limited threat posed by the Chinese missiles seemed achievable. McNamara, who had become a strong proponent of mutual deterrence[5], favored a “thin” defensive system that could defeat a limited Chinese attack, but would pose no threat to Soviet deterrence. This new system, to be called SENTINEL, was designed to defend against a potential ICBM threat from both China and the USSR during the 1970s. SENTINEL had evolved from the NIKE-X program, and used many of the components developed for that system. The Chief of Staff of the Army directed the formation of a major command known as US Army SENTINEL System Command (SENSCOM) be established to produce and field the SENTINEL system.

In September 1967, President Johnson decided to deploy the SENTINEL ABM system to counter the Chinese threat. McNamara considered the deployment of a larger system destabilizing with regard to the Soviets, with whom the administration had been negotiating earlier in the year to limit their ABM deployment. The SENTINEL system was designed to defend population and industrial centers from a Chinese attack, and could be expanded to include protection for the ICBM fields. The planned initial deployment consisted of 6 Perimeter Acquisition Radars (PAR), 17 Missile Site Radars (MSR), 480 Spartan missiles, and 192 Sprint missiles. An additional MSR and 28 Sprints were planned for Hawaii. Other components were planned for defending ICBM fields after the initial deployment. Had it been deployed, the SENTINEL system would have defended most of the continental US, along with Hawaii and portions of Alaska.[6]

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[5] This theory was known as Mutually Assured Destruction (MAD), which was based on the premise that neither the US nor the USSR would launch a first strike because each side was capable of swift and devastating retaliation.
[6] Bell Labs, p 3-2.

As President Richard Nixon took office, support for the SENTINEL deployment was declining, as was the economy. The growing back-lash against the Viet Nam War, along with the fact that the interceptor missiles were nuclear-armed, led to intense public criticism of the SENTINEL program. The administration also learned through intelligence sources that the Chinese ICBM program was not as advanced as previously thought. In spite of these problems, President Nixon specifically wanted to have and ABM system as a "bargaining chip" with the Soviets during arms control talks because, at the time, the Soviets were introducing their "silo-cracking" SS-9 ICBM. The SS-9, known as the R-36 in the USSR, was the Soviet answer to the US Titan-II ICBM. It carried an 18-megaton warhead, which would have been effective against US Minuteman ICBM silos and Launch Control Centers, or devastating against population centers.[7]

In several areas of the country where SENTINEL components were to be constructed, there was uproar from environmental groups and those strongly opposed to the Vietnam War. This opposition was especially strong in the New England area, where ABM opponents were able to significantly affect policy on the SENTINEL system. The US Army Corps of Engineers conducted a series of public relations meetings to inform the local population about the construction. One such meeting was held in Reading, Massachusetts on January 29, 1969 to discuss plans for construction in the Boston area. The audience was described by the Boston press as unsettled, dubious, and outspoken. Unlike previous meetings, the Reading meeting deteriorated from a civil discourse into a series of shout-downs, prolonged applause, and cat-calls aimed at the presenters. Immediately after the meeting, former Kennedy presidential advisors Dr. George Rathjens, who attended the meeting, along with Dr. Jerome Wiesner and Richard N. Goodwin contacted the former President's brother, Senator Edward Kennedy, and

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[7] Steven J. Zaloga. The Kremlin's Nuclear Sword: The rise and Fall of Russia's Strategic Nuclear Forces, 1945-

urged him to join the opposition movement. He did, and wrote a very strongly worded letter to Secretary of Defense Melvin Laird the next day. Kennedy was reacting to the widespread local concern about the worth and dangers of SENTINEL, and to the growing grass roots anti-Ballistic Missile Defense (BMD) movement led by Rathjens, Wiesner, Goodwin and other notable scientific figures such as Dr. Hans Bethe.

In the letter, Senator Kennedy described the SENTINEL system as "technically deficient, dangerously sited, unduly costly, and deleterious domestic priorities as well as to prospects for an arms agreement with the Soviet Union." The Kennedy letter touched off extensive Congressional debate, culminating in the House Armed Services Committee threatening to cut off funding for SENTINEL unless the Nixon administration conducted a review of the entire BMD program.[8] A small group of opponents succeeded in rallying more widespread support, changing the course of the program. Senator Kennedy's letter proved to be the catalyst for this change, and he remains a staunch opponent of missile defense systems to this day.

Declining public and congressional support, coupled with a questionable threat, convinced the administration to stop the deployment until the strategic concepts associated with the program could be more closely examined.[9] A five-week review was conducted, and Nixon's staff subsequently provided a report containing four options for an ABM system. The options presented were to expand SENTINEL, to leave the program unchanged, to modify the deployment to concentrate on protecting the ICBM fields in the Midwest, or to scrap the program all together. The first two options were not politically or economically viable, and the last option was disadvantageous because of the Soviet SS-9 deployment. President Nixon decided to deploy a limited system called SAFEGUARD, which would defend the Minuteman ICBM fields,

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2000. (Washington: Smithsonian Institution Press, 2002) pp 111-113.

[8] James H. Kitchens, III. *A History of the Huntsville Division, US Army Corps of Engineers 1967-1976* (Huntsville: US Army Corps of Engineers, 1978), pp 32-33.

[9] Walker, p 33.

beginning with Grand Forks Air Force Base (AFB), North Dakota and Malmstrom AFB, Montana. The complete system was to have twelve sites deployed in two phases, and was designed to defeat a Chinese attack or an accidental launch or a limited attack by the Soviets targeted at the Midwestern ICBM launch sites. A debate over the program raged in Congress, which passed the funding package for two of the twelve SAFEGUARD sites in August 1969.

The first two SAFEGUARD sites were under construction in 1972, while talks were ongoing with the USSR on strategic arms and ABM systems. The US and USSR signed the Anti-Ballistic Missile (ABM) treaty as part of the Strategic Arms Limitation Talks (SALT), limiting each country to two sites: one at the respective national capital and one at another location within each country. Each of the two sites was allowed a maximum of 100 launchers and 100 missiles. The intent of the treaty was to prevent either side from establishing a nationwide defense or the base for deploying such a defense. The ABM Treaty also codified the principle of "non-interference" with verification using "national technical means," thus protecting the legal right of satellite over-flights. In 1974, the signatories added a protocol, limiting each country to just one site and reducing the total number of interceptors allowed from 200 to 100.[10] The Soviets kept their GALOSH system around Moscow, and the US kept the nearly completed Safeguard site in North Dakota. The rapid progress of construction at the Grand Forks Site and the perceived capabilities of the SAFEGUARD system to provide point defense of an ICBM field are generally regarded to have played a key factor in the Soviet's cooperation during the ABM Treaty negotiations. While the system served its purpose as a bargaining chip in arms control talks, the debate over ABM continued in the US even after the treaty was signed, with cost and the destabilization of mutual deterrence being the core themes.

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[10] Federation of American Scientists. *Anti-Ballistic Missile Treaty Chronology.* March 27, 2002 (http://www.fas.org/nuke/control/abmt/chron.html)

The SAFEGUARD System

The SAFEGUARD system was a technological marvel for its time. Threat re-entry vehicles (RVs) were detected by satellites, then picked up and tracked by the Perimeter Acquisition Radar (PAR), a phased-array system with multi-megawatt output. The PAR characterized the threat attack, and provided track information for the intercept solution. This information was relayed to the Ballistic Missile Defense Center in Cheyenne Mountain, Colorado. Once the threat RV's came within range, the tracks were "handed off" to another phased-array radar, the Missile Site Radar (MSR), which provided the final fire control solutions for the system, and guided the interceptors toward their targets. The system provided a layered defense, using the Spartan missiles for long range exoatmospheric intercepts and the Sprint missiles for close-in, endoatmospheric intercepts. Spartans were fired first at long range, with the goal of detonating their large warhead close to, and destroying a number of, RV's while they were still above the atmosphere. Surviving RV's would continue on their ballistic path. Once they began to reenter the atmosphere, the atmospheric drag would quickly separate the decoys and debris from the RV, making the actual targets easier to track. They would then be engaged at short range with the Sprint, which would intercept them within about 25 miles of the launch site. Both missiles were nuclear-armed, using nuclear weapons effects such as blast, heat, radiation, and electromagnetic pulse (EMP) to destroy their targets. Command and control of the system was exercised at the MSR Complex and from the Ballistic Missile Defense Center (BMDC) located within the Cheyenne Mountain Complex in Colorado.[11]

The SAFEGUARD system components heavily leveraged research, development, and testing from the NIKE-X and SENTINEL systems. In fact, all of the components, except for the

[11] Bell Laboratories. *ABM Project History. (*Whippany: US Army Ballistic Missile Defense Command, 1975), p 116.

PAR, had been extensively tested either at White Sands Missile Range, New Mexico or at Kwajalein Atoll in the Pacific. The system components were state-of-the-art at the time and had been tested, but putting all of the components together in an integrated system remained a challenge. The Army abolished SENSCOM, and, in its place, established the SAFEGUARD System Command (SAFSCOM) whose primary purpose was production and deployment of the SAFEGUARD System. Considering the complexity of the system, the developers did a remarkable job in deploying a workable system in a relatively short amount of time.

Missile Site Radar

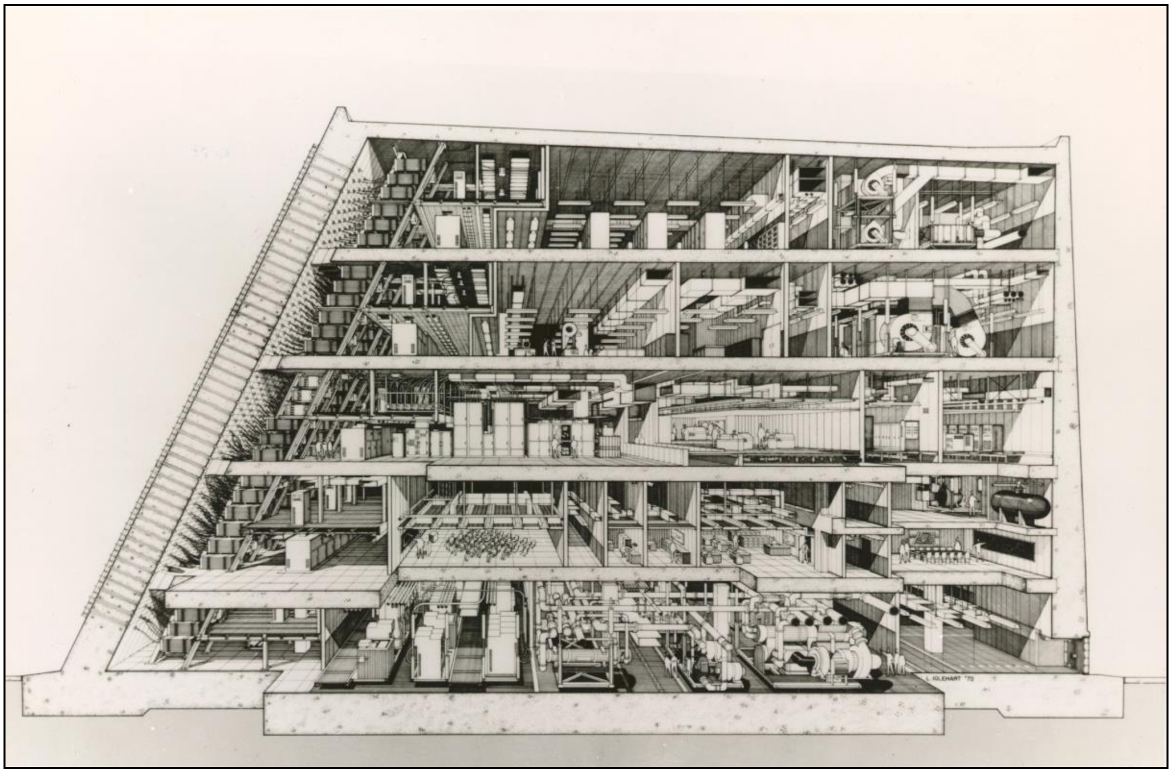
The Missile Site Radar was a four-face, single-beam, phased array radar operating in the S-band. Its purpose was to acquire and track incoming missiles, and guide the Sprint and Spartan missiles to intercept. The MSR could also launch and guide Spartan missiles using data from the PAR. The MSR was designed to operate in a nuclear effects environment, so it was housed in a reinforced concrete structure that was shielded against electro-magnetic pulse (EMP). This structure, known as the Missile Site Control Building (MSCB), housed the tactical support equipment (to control engagements) in addition to the radar. The MSCB contained about 127,000 square feet of floor space; much of it, including the power plant, was underground. The above-ground portion resembled a truncated pyramid, 79 feet tall, with a circular phased array on each of the four sides. About 800 soldiers and civilians were required to man the system on a 24 hour per day basis.

The MSR was developed in three phases: prototype at Meck Island (part of the Kwajalein Atoll), the Tactical Software Control Site in New Jersey, and the Tactical Site in North Dakota. The original concept for the MSR was as a short range target and missile tracking radar developed during the NIKE-X program. Known as the Multi-function Array Radar (MAR), the intent was to design a radar that was capable of tracking a large number of targets at a relatively short range. The MAR was intended to be used in conjunction with the Sprint missiles, which were for point defense. The prototype was tested on Meck Island, and modified for use with the SENTINEL System. Among the modifications was increased power and added capabilities allowing the MAR to be used with both Sprint and Spartan missiles. This configuration, with newer software, became the MSR for the SAFEGUARD system.

Perimeter Acquisition Radar

The Perimeter Acquisition Radar is an Ultra High Frequency (UHF), phased-array radar designed to do initial target detection, discrimination, and tracking for long-range Spartan intercepts. The PAR also had a collateral mission of tracking space objects. It did not control SAFEGUARD intercepts; rather, it passed track data to the MSR for Sprint and Spartan engagements. Like the MSR, the PAR was designed to operate in a nuclear effects environment, and was a hardened structure with an underground power plant. The 128-foot tall PAR building has a single north-facing antenna array containing 6888 elements, sloping at a 25 degree angle. It has been described as the most solidly constructed building aside from the Egyptian pyramids, with the north face wall being seven-foot thick reinforced concrete.[12] A 400-man Army Surveillance Battalion manned the PAR.

[12] Lonnquest, p 194.



PAR Cutaway (Courtesy of US Army)

Unlike the MSR, there was no prototype PAR. The deployed system is the only one that was ever built. Originally conceived as an early warning radar for the NIKE-X system, the PAR leveraged research done for both that program and the SENTINEL program. The basic phased-array design was based on the MAR, but one significant change was in the operating frequency of the radar. The initial design was for a very high frequency (VHF) early warning radar. Since the NIKE-X system had to work in a nuclear perturbed environment, it was imperative that the radar be able to track targets after nearby nuclear detonations, such as those from the Sprint missiles. Through testing, the developers determined that the “nuclear blackout” was significantly less in the UHF range than it was in the VHF range, so the PAR was re-designed as a UHF radar.[13]

Spartan Missile

The Spartan missile was designed to conduct engagements at long range, above the atmosphere. The Spartan was the first "layer" in the layered defense SAFEGUARD was envisioned to provide. The deployed missile resulted from the extensive development work done during the Nike-Zeus and Nike-X programs. Originally known as the "Zeus-Nike X," it was renamed the Spartan in 1967. A study conducted in 1965 concluded that Zeus-type missile with a large nuclear warhead could provide a large-volume exoatmospheric kill capability against RV's in the mid-course phase of their flight. Formal design work on the Spartan began in 1965, heavily leveraging previous research and development (R & D) work done during Nike-X. As a result, only 15 developmental flight tests were needed to finalize the production missile design. As part of the overall SAFEGUARD integrated testing, only 20 Spartans were fired.[14]

The final version of the Spartan missile was a three-stage, solid-fueled booster controlled by ground radar. The missile was 55 feet long and weighed 28,100 pounds at launch. At booster burnout, the missile achieved a speed of approximately Mach 10, and the Spartan had a maximum range of about 465 miles. The maximum engagement altitude was approximately 330 miles, and the weapon contained a 5-megaton nuclear warhead.[15] The Spartan was "hot-launched," meaning that its rocket motor fired while still inside the launch cell. The 76-foot deep launch cell contained a launch chamber with the missile, an exhaust duct to vent the hot exhaust gasses and prevent their damaging the missile, and two vaults containing auxiliary equipment. The launch cell protected the missile from environmental and nuclear effects, and provided the ground interface equipment connecting the missile to the MSR prior to launch. After launch, the missile received guidance commands from the MSR, and maneuvered to an

[13] Bell Labs, p 8-1.
[14] Ibid, p. 10-1.
[15] Lonnquest, p 185.

intercept point at which time the nuclear warhead detonated, destroying any RV's in the vicinity. The MSR site contained 30 Spartan missile cells, each with one missile.

Sprint Missile

The Sprint missile was the second "layer" in the SAFEGUARD system, and was designed to defeat close-in RV's during their terminal phase of flight. Once the target complex reenters the atmosphere, any decoys and other penetration aids are quickly stripped away by atmospheric drag, leaving only the RV. Because this happens just moments before impact, a very quick-reacting, high-velocity, highly maneuverable interceptor was required. Developing the Sprint to meet these requirements began in 1963 under the Nike-Zeus program, and continued through Nike-X and Sentinel. Because the missile had to have very high acceleration and operated within the atmosphere, there were a number of technical challenges that had to be overcome. First, a high burn-rate propellant had to be developed, which was an order of magnitude increase over other solid propellants in use at the time. With that solved, the engineers had to develop ablative heat shielding to protect the missile while in flight. Due to atmospheric friction, the skin of the missile glowed white-hot, actually getting hotter than the interior of the rocket motor. The ablative material and rocket motor fuel could not have any contaminants that, when burned, would interfere with radar or guidance communications. Lastly, the missile had to be able to operate in a severe nuclear environment.[16]

[16] Bell Labs, pp 9-3 to 9-9.

Sprint Launch Stations at the MSR Site (Courtesy of US Army)

Flight testing for the Sprint was conducted between 1965 and 1970 at White Sands Missile Range, and then testing was moved to Kwajalein Missile Range for integration with the rest of the SAFEGUARD system. The two-stage missile was conical in shape, and was 27 feet long and 4.4 feet wide at the base. The launch weight was about 7600 pounds, and the missile had a range of about 25 miles. It was armed with a low-yield nuclear warhead. Unlike the Spartan, the Sprint was "cold-launched", meaning it was ejected from its launch station prior to the rocket motor igniting. The Sprint launch station was eight feet in diameter, and 31 feet deep. The missile rested on a launch-eject piston, which was supported by a series of springs for shock isolation. Upon launch, the protective cover over the launch station was explosively cut, and the gas generator fired, propelling the piston and the missile upward. The first stage motor ignited once the missile cleared the launch station. Sixteen Sprint missiles were deployed at the MSR site. Additionally, there were four Remote Launch Sites (RLS) located within twenty miles of the MSR. RLS #1 through 4 contained 12, 12, 16, and 14 Sprint missiles respectively.

Deployment

The "Modified SENTINEL" system, which became known as SAFEGUARD, consisted of twelve sites, and was, as President Nixon put it:

> …a safeguard against any attack by the Chinese Communists that we can foresee over the next 10 years. It is a safeguard of our deterrent system, which is increasingly vulnerable due to the advances that have been made by the Soviet Union since the year 1967 when the SENTINEL program was first laid out. It is a safeguard also against any irrational or accidental attack that might occur of less than massive magnitude which might be launched from the Soviet Union.[17]

Phase I consisted of the initial two sites located at Grand Forks AFB, North Dakota, and Malmstrom AFB, Montana to protect the ICBM fields there. The cost of Phase I was estimated at $2.1 billion, not including the cost of the warheads and research and development. There were multiple options for Phase II, consisting of follow-on sites which were to be in the upper Midwest, central and southern California, FE Warren AFB Wyoming, Whiteman AFB Missouri, the Michigan-Ohio area, southern New England, Washington, DC, Dallas, Texas, and the Florida-Georgia area. All of the sites were planned to be away from heavily urban areas, except for the Washington, DC site, which was necessary to protect the "National Command Authorities".[18]

On August 6, 1969, by only a one-vote margin, the Senate voted to deploy SAFEGUARD at two of the twelve sites planned, Grand Forks and Malmstrom. The fiscal year 1970 Defense Appropriations Bill contained $1.5 billion for SAFEGUARD expenditures. Bids were opened on

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[17] James H. Kitchens, III. *A History of the Huntsville Division, US Army Corps of Engineers 1967-1976* (Huntsville: US Army Corps of Engineers, 1978) p 33.
[18] Ibid, p 34.

March 26, 1970, and of the three bids received for the construction work, the low bid was submitted by a joint venture comprised of Morrison-Knudsen, Inc., Peter Kiewit Sons' Co., Fishbach & Moore, Inc., and C.H. Leavell and Co. This $137,858,850 bid was formally accepted on March 31, 1970 and, at the time, constituted the largest single construction contract the US Army Corps of Engineers had awarded to date.[19] Ground was broken at the PAR site on April 6, 1970. While work progressed rapidly at Grand Forks, there were problems at Malmstrom, where labor disputes caused serious delays in construction. When the ABM Treaty was signed in 1972, the Grand Forks site was 85 % complete, while the Malmstrom site was only 10 % complete. Since the treaty only allowed one ICBM field to be protected, work was stopped on the Malmstrom site. All useable materials were salvaged, and the foundations of the unfinished structures were covered with topsoil. Today, only the first story of the Perimeter Acquisition Radar building is visible on the site.[20]

Located near Grand Forks, ND, the Stanley R. Mickelsen Safeguard Complex (SRMSC) consisted of three major elements: The Perimeter Acquisition Radar (PAR) located near Concrete, ND, the Missile Site Radar (MSR) complex located 12 miles south of Langdon, ND, and the four Remote Sprint Launch (RSL) sites clustered within 20 miles of the MSR. A well field, located north of Fordville, ND, provided a water supply for all of the elements. The only portion of the system located outside of North Dakota was the Ballistic Missile Defense Center (BMDC) in Cheyenne Mountain, Colorado. The BMDC integrated SAFEGUARD within NORAD and allowed the Continental Air Defense Command (CONAD) to exercise operational command and nuclear release authority for the SAFEGUARD system.[21] The SRMSC had 30 Spartan and 70 Sprint missiles.

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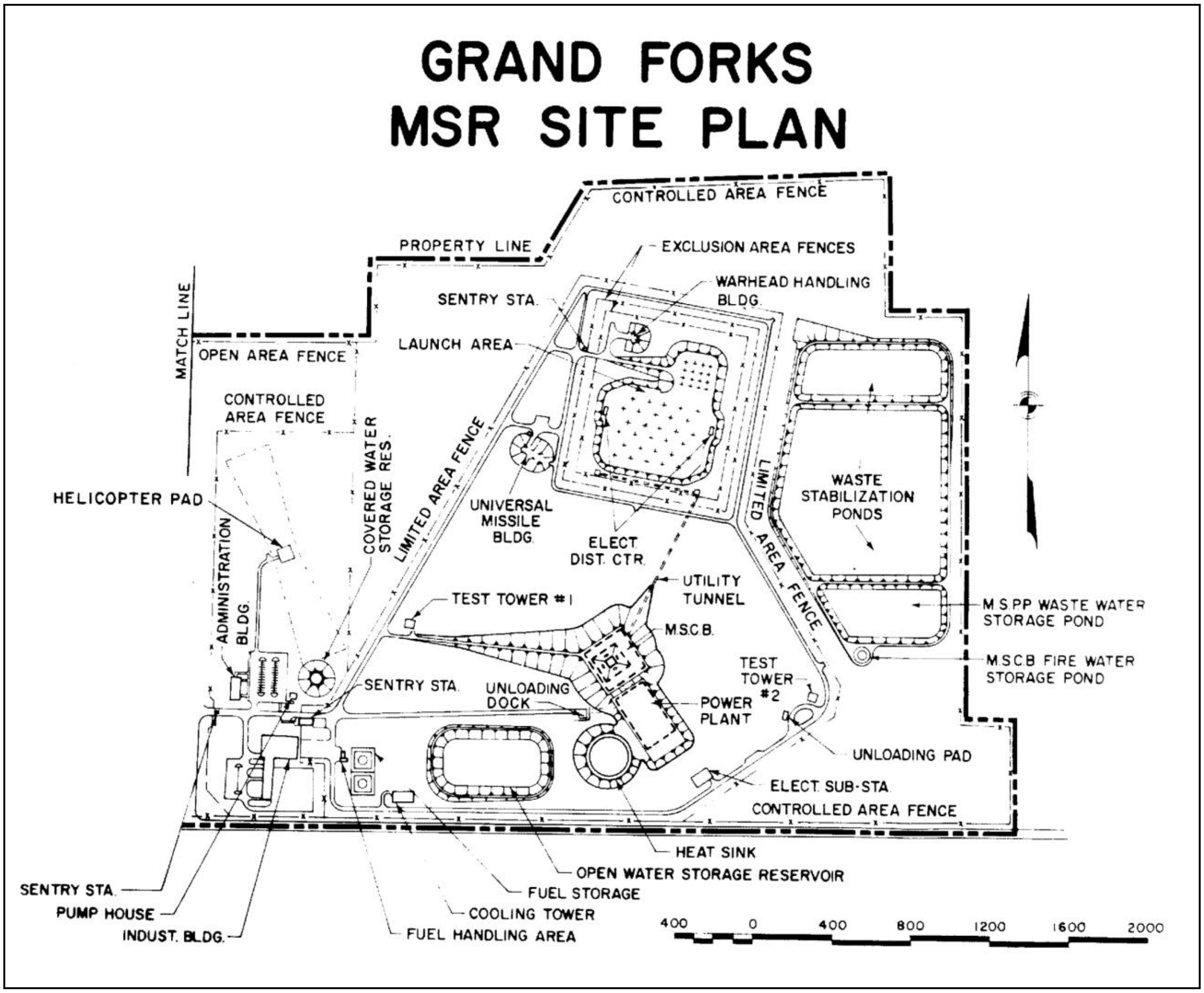
[19] Ibid, p 50.
[20] Lonnquest, p 115.
[21] Ibid, p 187.



MSR Site Layout (Courtesy of US Army)

Construction of the SRMSC was an immense undertaking, and had to be done quickly. Numerous problems had to be solved, such as environmental impacts, adequate water supply, suitable aggregate for concrete, the local transportation system and the impact of 3200 construction workers and their families on the local infrastructure and housing. Due to the low population density of the area, hiring workers in accordance with federal guidelines for Equal Employment Opportunity and Affirmative Action (EEO/AA) was a significant problem for the contractors. At the time, there were no minorities living in Cavalier County, and in the adjoining counties of Grand Forks, Traill, and Steele, there were only a total of 168 minorities of all kinds.

This made the "good faith" goal of six to ten percent minority workers very difficult. This goal was later revised to six to ten percent of the hours worked on the project being done by minority workers, a goal that was generally met by the contractors[22]. Despite the problems and North Dakota's notorious winter weather, work progressed rapidly.

To put the size of the project into context, just the PAR and MSR buildings along with their power plants required over 238,000 cubic yards of concrete, and 27,500 tons of reinforcing steel. This amount of concrete would construct 32 miles of two-lane highway. Not including the radar or weaponry, there were 2,273 miles of wiring on the site. A single set of construction plans was about the size an office desk, and weighed over 200 pounds. In spite of the amount of work, by October 1971, both the PAR and MSR buildings were substantially complete and ready for equipment installation.[23] The site construction was completed in 1974, followed by the installation and checkout of the mission equipment. While the construction population declined, the soldiers, civilians, and contractors who would operate and guard the site arrived to take their place.

Command and Control

Once the system reached its initial operational capability, responsibility for the system passed from the developer to the war fighter. The Ballistic Missile Defense Program Manager (BMDPM) was the senior Army officer who exercised command, less "operational command", over the SAFEGUARD system. Operational command of the system resided with the Commander-in-Chief, Aerospace Defense Command (CINCAD), who also commanded the North American Air Defense Command (NORAD) from the Cheyenne Mountain Operations Center in Colorado Springs, Colorado. The BMDPM was responsible for discipline, internal

[22] Kitchens, p 49.
[23] Ibid, p 50.

organization, administration, logistics, and unit training for Army BMD Forces. He also served an advisor to CINCAD on BMD matters, and as the Army Component Commander to Aerospace Defense Command, he was an intermediary between CINCAD and SAFEGUARD Command (SAFCMD), the operational Army unit that manned and operated the SRMSC.

On 23 October 1975 Major General R.C. Marshall, the BMDPM, signed the SAFEGUARD Operations Plan which outlined how the Army would operate the SAFEGUARD system both during peacetime and wartime. The mission statement read:

> a. To provide BMD forces to support CINCAD in the protection of a portion of the US land-based deterrent force and to gain experience in the test and operation of a deployed SAFEGUARD BMD system for application to future BMD systems.
> b. To perform other missions within system capability as directed by CINCAD.

In support of this overall mission, SAFCMD had a number of supporting tasks which included "Defend selected retaliatory missile sites against a ballistic missile attack…and support ADCOM's SPADATS mission to include anti-satellite operations as directed by CINCAD."[24]

The authority to fire a Sprint or Spartan missile resided with the President, since both types of the missiles were nuclear-armed. Once the decision to use the system was made, the "National Command Authority" sent the authorization to CINCAD and nuclear employment authority was entered into the system. The firing command passed through the CONAD command center in Cheyenne Mountain to the Ballistic Missile Defense Center (BMDC), also located within Cheyenne Mountain. From there, the commands passed over data links to the SAFCMD Missile Direction Center (MDC) located at the SRMSC, which actually fired and guided the missiles.

Deactivation

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[24] Ballistic Missile Defense Master Plan, pp 2-3. (ADCOM:Air Defense Command, SPADATS :Space Detection and Tracking System,)

The Stanley R. Mickelsen Safeguard complex received its nuclear certification in February 1975, and achieved its initial operational capability (IOC) with the deployment of 28 Sprint and 8 Spartan missiles on April 1, 1975. Operational control was turned over to CINCAD once IOC was declared. Constructed at a cost of $5.9231 billion in then-year dollars, the site reached full operational capability on September 28, 1975, three days ahead of schedule.

When the SAFEGUARD program was scaled back from twelve sites to one, the Army quickly realized that a single site would be overwhelmed in a large-scale attack, but it decided to maintain the SRMSC for a year to gain operational experience for potential future BMD systems. When the Army's plan to cease operations after a year reached Congress, it moved quickly to cut appropriations. On October 2, 1975, the House voted to deactivate the system due to the high operating costs and its limited effectiveness. On February 10, 1976, the Joint Chiefs of Staff ordered the termination of the mission. With that, the only ABM system in the free world ceased to exist after less than five months of operation.

Following the decision by Congress to eliminate funding for SAFEGUARD, the Army quickly moved to deactivate the site. While the PAR was to be turned over to NORAD for surveillance and tracking duties, SAFCMD was ordered to "…expeditiously terminate all portions of its Ballistic Missile Defense mission."[25] By March 1976, SAFCMD had developed a two-phase plan to deactivate the site. Phase I began immediately upon release from the ballistic missile defense mission. This involved removing the missiles and warheads along with some of the associated launch equipment, and declassifying and removing all hazardous materials from the tactical facilities. Phase II included preparing the tactical and non-tactical facilities and equipment for "disposition", and base closure of the MSR Complex and the remote Sprint

[25] SAFEGUARD Command OPLAN 1-76, Change 2, p 1.

Launch Sites.[26] By 1977, all work was complete and the site was in a "caretaker status." In 1982, the non-technical facilities were declared excess property, and were turned over to the Department of the Interior. In 1984, the Army reacquired these facilities in order to provide timely support to the Strategic Defense Initiative Organization (SDIO) in the event that the decision was made to deploy another ABM system at the site.

Since the site was one of two ABM sites allowed under the ABM Treaty, there was a great deal of concern about what could be done at the site while remaining in compliance with the treaty. Specifically, the Army and SDIO were concerned that building new facilities in the vicinity of SRMSC could be considered another site, because the SRMSC was still in caretaker status. Since the site was constructed to withstand nearby nuclear blasts, tearing it down was not going to be an easy process. Army technical and treaty compliance experts developed a plan that would partially destroy key structures on the site, which would satisfy the "reasonable observer" that the site could not be used as an ABM system. The plan included equipment removal and partial demolition of the radar faces on the MSR and PAR buildings and demolition of the Sprint and Spartan silos to a depth of 16 feet 6 inches below the surface, preventing easy reconstruction. The cost to implement this plan was was estimated at $15,649,000 in 1989 dollars, but the work was never put under contract.[27]

In 1991, the Army studied ways in which existing structures at the site might be renovated and adapted for use by the new ABM systems under development as part of SDI. They concluded that the SAFEGUARD technology was too old to use, and that the facilities built to house the SAFEGUARD missiles and radar would not accommodate the new system. The Strategic Defense Initiative was never deployed, and the SRMSC was never demolished. It remains under the control of the Army in a caretaker status even today, and was considered as a

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[26] Ibid, pp 2-5

possible site for the National Missile Defense system prior to the US withdrawal from the ABM Treaty in 2002. With the construction of the Ground-Based Midcourse Defense (GMD) system at Fort Greely, Alaska, there are no current plans to re-use the SRMSC in any missile defense capacity and the US Army Space and Missile Defense Command intends to declare the facilities excess once again. The PAR continues to serve as a surveillance and space tracking radar operated by the US Air Force in support of NORAD. Because of its importance in the Cold War and its unique technological and architectural features, the SRMSC is eligible for listing on the National Register, and protection under the *National Historic Preservation Act of 1966*.[28]

Conclusion

The legacy of SAFEGUARD is more than a collection of abandoned facilities on the prairie. It is a symbol of national resolve and of national debate. Would the SRMSC been effective in protecting the North Dakota ICBM fields had the Soviets launched a massive strike over the pole? As a single site, certainly not, but if all twelve sites had been built, perhaps it would have been. As built, the SRMSC might have saved a few Minuteman silos, but it would have been overwhelmed by a full-scale Soviet attack. Would it have been effective against a limited attack? Quite possibly, but the system was limited by radar and computer performance. So what good was it? At the very least, it led to the development of advanced of technology that we still use today, such as phased-array radar, missile guidance and control systems, computer and communications technology, and the like. It was a technological marvel for its time. In terms of policy, it framed the debate on whether or not the American people wanted to spend the money on an ABM system, or if they wanted to continue to use deterrence and seek a political solution to arms reduction. At the time the system was maturing, the country was getting more

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[27] Ibid, p 7.
[28] Mark Hubbs, *A Pyramid on the Prairie: Preserving a Cold War Landmark*. (Unpublished Paper, 2002) p 2.

and more immersed in the negative wave of public opinion over the Vietnam War, and the increase in anti-nuclear and pro-environmental groups. The construction and activation of the site is generally recognized as being instrumental to the success of US negotiations with the USSR on the ABM and Strategic Arms Limitation Treaty (SALT) treaties.[29] In the long run, it might have done its job without ever firing a shot.

Aerial View of Completed MSR Site (Courtesy US Army)

[29] Ibid, p 1.

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