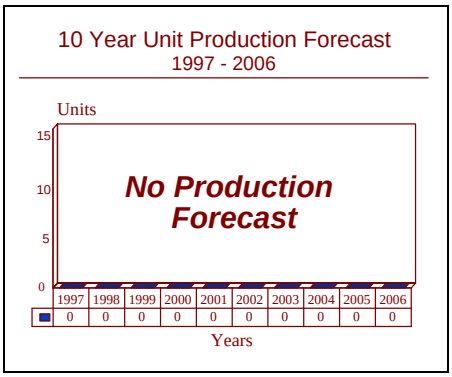
MGM-118A Peacekeeper - Archived 1/98

Outlook

- Production of the Peacekeeper has been completed.
- The Peacekeeper is in service with the United States as part of its land-based nuclear deterrent force. The START II agreement could mean the retirement of Peacekeeper by 2003.
- No major upgrades of the Peacekeeper missile are anticipated, although various maintenance work will be performed to keep this ICBM operationally effective.



Orientation

Description. Strategic intercontinental ballistic missile.

Sponsor. The United States Department of Defense through the United States Air Force, Ballistic Missile Office, Norton AFB, CA. With the establishment of the Space Systems Division, the Pentagon based Program Executive Office (PEO) has taken over management of the Peacekeeper program. Control of this missile system has now been transferred to the US Strategic Command, Offutt Air Force Base, Nebraska.

Contractors. Originally designated as the follow-on to Minuteman II/III. The USAF is acting as its own prime contractor. Martin Marietta, Denver Division; Denver, CO, USA, is responsible for the design, development, integration, assembly and testing for the US Air Force.

Major Subcontractors. Aerojet-General Corporation, Aerojet Liquid Propulsion Co, Autonetics/Strategic Systems Division, Avco Systems Division, Bell Aerospace Textron, Fiber Materials Inc, General Electric Re-entry Systems Division, Hayes International Corp, Hercules Powder Company, Honeywell's Avionics Division, Lawrence Livermore Laboratory, Thiokol Corporation/ Wasatch Division, Norden Systems, Northrop, Rockwell International, Rocketdyne Division, Sylvania Systems Group of General Telephone & Electronics, Systems Division of Computer Sciences Corp, Tracor Aerospace, and United Technologies Chemical Systems Division.

Status. Production of previously awarded units has been completed. Procurement has been concluded. The Peacekeeper Rail Garrison program has been terminated. Flight testing of the MGM-118 from railcars had been planned to begin in 1991. Up to five missiles were to be launched from Vandenberg AFB, California, during 1991-92 concept definition stage of the Rail Garrison.

Total Produced. Approximately 143 missiles (including 27 RDT&E units) were produced over the life of this program.

Application. Strategic intercontinental ballistic missile with multiple independently targeted re-entry vehicles to maintain a stabilizing deterrent posture. Increased reliability of components and accuracy will enable the Peacekeeper to be a main element of the strategic land-based ICBM force out to the turn of the century.

Price Range. The Fiscal 1990/91 budget documents list the Peacekeeper unit cost at $76,533,333. This price is in Fiscal 1989 dollars and based on a buy of 12 missiles. The 1991 budget documents have a per unit price of $152,477,166 in Fiscal 1991 dollars.

Technical Data

Dimensions	**Metric**	**US**
Missile Length	21.6 m	70.87 ft
Missile Diameter	234 cm	7.68 ft
Missile Weight	88.45 tonnes	194,998.6 lb
Performance		
Speed	Hypersonic	Hypersonic
Altitude	Ballistic-exoatmospheric	Ballistic-exoatmospheric
Range	11,100 km	5,993.56 nm
CEP	less than 121.92 m	less than 400 ft

Propulsion. Four-stage solid/storable liquid rocket propulsion. The first-stage solid rocket motor and nozzle is being produced by Thiokol Corporation Wasatch Division, Brigham City, UT. The first stage is fabricated from Kevlar fiber wound into the rocket case and weighs 2,345.45 kg (5,160 lb). Its average thrust level is 2,237.4 kN (497,200 lb) in a burn of 75 seconds which boosts the missile to about 23 km (75,459 ft) altitude. The propellant weighs 33,681.81 kg (74,100 lb) and is composed of hydroxyl-terminated polybutadiene (HTPB). The nozzle has a 34.29 cm (13.5 in) throat, weighs 1,190.90 kg (2,620 lb) and has a maximum vector of 8^o and a 5^o roll. It is manufactured by Avco of three-dimensional carbon/carbon which has been successfully tested. The second stage is being produced by Aerojet-General Corporation, Sacramento, CA. The solid rocket engine is 167.64 cm (66 inches) in diameter and is composed of Kevlar fiber. Aerojet has developed a new high-energy Class 7 propellant (polyethyleneglycol binder and energetic plasticizer) for this stage. A new extendable nozzle exit, which increases performance for the second and third stages by 5 percent, was first tested successfully in January 1978. The third stage, being produced by Hercules Powder Company, Wilmington, DE, is also fabricated from Kevlar, which is as strong as steel or titanium but half the weight. Additionally, it has a thrust termination system. This is being done to give Peacekeeper additional flexibility against targets at short ranges. Hercules is also responsible for the Class 7 solid propellant, the highest-class propellant for energy release. It is a cross-linked, double base nitroglycerin and nitrocellulose mixture. Successful tests are continuing. The fourth-stage (also known as the post-boost vehicle) development and production are the responsibility of Aerojet Liquid Propulsion Co, Sacramento, CA. This stage uses a storable liquid bi-propellant propulsion system. New control systems are being developed for the fourth stage utilizing the axial-flow engine and attitude control engines to obtain variable velocities and a maneuvering capability. Additional development continues on propellant feed systems by Bell Aerospace Textron, Buffalo, NY, and United Technologies Chemical Systems Division, Sunnyvale, CA.

Control & Guidance. Rockwell International Corporation, Autonetic Strategic Systems Division (now part of Rockwell Defense Electronics), Anaheim, California, is the prime contractor for the Peacekeeper guidance and control system. The Autonetics/Strategic Systems Division of the company is responsible for the development, engineering and production of the Peacekeeper guidance and control system, while the Rocketdyne Division is responsible for full-scale engineering development and production of the missile's fourth stage which houses the guidance and control components. Northrop Electronic Systems Group, Precision Products Division, provides the AIRS (Advanced Inertial Reference System), an all-attitude, floating inertial platform, with zero gimbal restraints. Honeywell's Avionics Division provides the main Peacekeeper memory subsystem, while Sylvania Systems Group of General Telephone & Electronics provides the Peacekeeper C^3 (Command, Control, Communications) system. Major subcontractors are Norden Systems, Hayes International Corp, and the Systems Division of Computer Sciences Corporation.

The Air Force issued a Request For Proposals (RFP) in March 1986 to General Electric Ordnance Division, Honeywell Space and Strategic Avionics, Litton Guidance and Control Systems, Raytheon, Rockwell International Autonetics Strategic Systems and Singer Kearfott to compete for second source on the Peacekeeper's inertial measurement unit (IMU) developed and produced by Northrop. In July 1986, the Air Force announced that Rockwell International Autonetic Strategic Systems Division, Anaheim, CA, received a $9.7 million contract to qualify itself as a second source for the Northrop-built inertial measurement unit, also called the Advanced Inertial Reference Sphere (AIRS), for the MGM-118. The second source is expected to result in a 20 percent reduction in unit cost of the IMU currently estimated at $3.8 million. During 1986 Northrop was scheduled to deliver the first 34 production units of the Advanced Inertial Reference Sphere (AIRS) for the Peacekeeper

missile. When the contract deliveries were scheduled to end in 1988, Northrop was to have provided 102 AIRS guidance systems.

But Northrop was faced with an investigation concerning improprieties in the testing and inspection of parts for the Inertial Measurement Unit (IMU). This investigation was later concluded, when Northrop submitted a guilty plea concerning several other charges, but not related to the manufacturing of the inertial measurement unit. Northrop's Precision Products Division, Norwood, Massachusetts, remains under a US government contract work suspension but this suspension was not expected to last much longer.

Launcher Mode. President Reagan decided to abandon the MPS system of deployment for Peacekeeper in late 1981. After several other plans were evaluated, on April 18, 1983, President Reagan endorsed the Scowcroft commission plan to deploy the Peacekeeper missiles at Francis E. Warren AFB, Wyoming, Colorado and Nebraska in existing Minuteman silos. In December of 1986, the Reagan Administration gave the go-ahead for the development of this missile in a rail mobile deployment mode.

Warhead. Avco Systems Division and General Electric Re-entry Systems Division are both producing the Mk-21 re-entry vehicle which carries ten W87 warheads each rated at 300 kT with possible upgrade to 475 kT. The W87 uses oralloy special nuclear material with insensitive high explosive as the initiator. The W87 incorporates the latest advances in nuclear geometry so it needs less nuclear material than the W78 of the Mk-12A. Five modes of fusing are employed: high altitude, airburst, low airburst, surface/proximity burst and surface/contact burst. Avco Systems Division and Fiber Materials Inc produce the carbon-carbon nose tip for the Mk-21. Avco Corp is responsible for the entire re-entry system including the actual Mk-21 re-entry vehicle as well as developing the replica ICBM decoy package. Tracor Aerospace is producing the window dispensers and penetration aid deployment system. Two new warheads for Peacekeeper have been designed at Lawrence Livermore Laboratory. One warhead, Calmendro, is rated at 580 kT, while the other, Munster, is rated at 800 kT. However, these warheads were dropped from consideration as they would have reduced the number of warheads per missile to eight or nine.

Variants/Upgrades

The Peacekeeper Rail Garrison was the only alternative being considered for this missile system. No other missile variants are being considered, although continuous upgrades are underway. For additional information please see the pertinent entries under the Program Review section.

Program Review

Background. The basic contract structure for the then-designated Missile Experimental (MX) program was in place in 1979. The MX missile, type designated MGM-118 and named Peacekeeper by the Reagan administration, proceeded methodically through full-scale engineering development with only minimal problems encountered in the test flights to date. The first flight took place in June of 1983, with the seventeenth flight conducted in March of 1987. In October of 1983, the Air Force stated that it expected to complete only 16 of the originally planned 20 test flights before the missile was deployed in December 1986. The remaining four flights were to be completed in 1987. This was reiterated in testimony on the Fiscal 1986 budget in early 1985.

Basing. While the Reagan administration has accepted the Scowcroft Commission's basing plan, a brief review of the main basing system options which have been proposed for the missile is still of value in any review of this important program.

Multiple Protective Shelter System (MPSS). This is the system proposed by former President Carter. Basically, the system had four components: the missile, a trans-porter/launcher, shelter, and roads. The missiles (200 were proposed for deployment) would be stored in a specific shelter (4,600 proposed) over 99 percent of the time. Periodic maintenance would require the removal of the missile to the main operating base. When the missile is put back on alert status, it would be emplaced in a different shelter within its original complex of 23 slots. This deceptive basing mode transfer would occur approximately once every several months.

In order to maintain the prelaunch survivability of the missile, it could be moved by a transporter within some 20 to 25 minutes to any shelter in the complex. This operational reconfiguration ability effectively negated the vertical MPS system.

This essential change has allowed a smaller shelter and transporter/launcher to be fabricated and a simpler linear road network to be constructed. According to DoD

spokesmen, the road network involves many thousands of miles, but the roads will be of simple gravel-aggregate construction in a straightforward design.

Originally, the MX system was conceived as having a racetrack pattern of roads, but cost-effectiveness has demonstrated the linear network to be the better option. The linear concept would have provided a 20 percent reduction in required roads, public access to main roads, and would be less obtrusive. The deployment scheme also permitted a decrease in acreage for construction purposes, which was estimated to save $2.0 billion over the racetrack concept.

The MX missile system would have been operated through redundant remote control (air and ground). Upon activation, the shelter door would be opened and the missile/launcher would egress for a cantilevered positioning prior to launch.

After many months of study, the Reagan administration canceled this deployment plan on October 2, 1981, for the following reasons:

1. Excessive cost - The cost of the MPSS deployment had continually risen from the time it was proposed to its termination in September 1981. The Office of Technology Assessment estimated a cost of $43.5 billion for a horizontal MPSS deployment through 2000.
2. The fact that the former Soviet Union could easily produce and deploy the additional warheads needed to target the 4,600 shelters. The cost of this deployment was considered to be much less than the cost to the United States of the MPSS deployment.

The SUM concept. This basing concept, which has been largely discarded, was to put four of the new missiles aboard each of 51 moderate-sized diesel-powered submarines which would operate off the coasts of the United States. SUM, meaning Shallow Underwater Missile, would involve a relatively unsophisticated (as compared to an Ohio-class) submarine. Proponents stated that the shallow underwater missile concept can be designed so that it does not present a first-strike (preemptive) threat to the former Soviets. The Soviet perception of a US first-strike capability could result in an escalation of the arms race.

The SUM system would need a midcourse guidance update to give it the required accuracy to strike semi-hardened targets. Basically, the lack of inherent guidance accuracy mandates that the encapsulated missiles launched at sea be used in a retaliatory role only. They would not possess the necessary accuracy to be targeted against fixed and hardened targets. This feature, according to SUM proponents, clearly illustrates that the SUM system is a retaliatory force. Therefore, SUM advocates conclude, the missiles do not pose a destabilizing counter-silo force and the system would necessarily reduce the probability of nuclear conflict.

The SUM operating areas would be the 4,680 nm of coastline within the 200 nm exclusive economic zone of the United States. The submarines would operate approximately 185.19 km (100 nm) off the east coast of the US and as close as 10 nm on the west coast. These distances would allow the submarines to avoid and negate the Van Dorn effect (induced pressure wave through nuclear barrage) since the waters exceed 100 fathoms (600 ft) in depth.

Hostile antisubmarine warfare threats, present and projected, can more easily be thwarted within relatively shallow waters. Acoustical detection can be countered through noise buoys emplaced around the general operating areas. While advocates of blue-green lasers claim that detection in the future will rely on laser beams and infrared signature rather than acoustics, SUM proponents state that the size, weight, and power plant of small submarines offer the best alternative of avoiding this technology, since they operate in relatively shallow water where sea-clutter would be paramount. Further, the SUM system would operate in the 200 nm exclusive economic zone where unauthorized commercial and military operations are banned.

In their continuing efforts to establish a credible base for the SUM concept, Drs. Sidney Drell and Richard Garvey (architects of the SUM option) have testified extensively on the deficiencies of land-based missiles as follows:

1. No land-based weapon system could be a good solution to long-range vulnerabilities.
2. MX depends for its effectiveness on more shelters or hardened aim-points as an adversary increases warhead inventories. The MX equation being open-ended and worst-case analysis indicates that the competition would drive costs to increasingly higher levels.

3. ABM defenses, while technically helpful to the US, was also open-ended in that the former Soviets would expand their present operational ABM system.

4. MX would be perceived by the former Soviets as a preemptive (first-strike) force and would inevitably accelerate the arms race.

USAF/DoD Response to SUM Critics. The Department of Defense responded to the SUM proponents with this statement: Fixed land-based ICBM resources have the required accuracy and secure communications that no other leg of the Triad possesses. Strategic deterrent policy was not one of capabilities but of a disparity of forces which allow responsible options to national security. The US did not have a declared policy of preemption, nor were Launch On Warning (LOW) and Launch Under Attack (LUA) considered responsible courses of action. It would be considered reckless to adopt this posture (first strike) as policy even while the option exists. MX deters convincingly, and it was not the policy of the United States to preempt any adversary.

Primarily, the Defense Department rejected SUM as unfeasible for the following reasons:

1. SUM will not be cheaper than MX.

2. SUM must operate in deep waters as a short-range submarine with no apparent advantage over submarines such as (the Ohio class with) Trident. Therefore, substituting SUM for MX would represent an abandonment of the Triad in favor of a Dyad of bombers and submarines, not the creation of a Quadrad.

3. SUM was unlikely to be available before the 1990s.

4. The submarines would make additional demands on Navy manpower, already at critical levels.

CAP Basing. The CAP (meaning Continuous Airborne Patrol) deployment concept involves deploying the new ICBM aboard a fleet of aircraft, a certain percentage of which would always be airborne. While a number of aircraft were studied, the final choice of aircraft for this concept apparently would be a new turboprop or diesel engine driven, long endurance aircraft designated Big Bird, which was proposed by BK Dynamics Inc and evaluated for the Townes Panel by Boeing. This aircraft would carry one missile, a crew of three and stay aloft up to six days. This concept was, until mid-1983, under study by the Reagan Administration as one of the future deployment options for Peacekeeper.

Deep Basing. This concept, developed by the Lawrence Livermore Laboratory, involves digging a hole several thousand feet deep and placing encapsulated Peacekeeper missiles at the bottom of the hole. Up to 243.84 m (800 ft) of debris filled in at the top of the hole would further insulate the missile against nuclear warhead shock. When needed, gas generators would push the missile up through the debris. By mid-1984, this concept was largely discarded.

Mesa Concept. This plan involves basing the Peacekeeper inside some of the many mesas of the southwestern United States. One facet of this plan would place the missiles inside the southern face of these mesas to complicate Soviet targeting and to further enhance the system's survivability. Due to design changes in the Peacekeeper and other technical problems which reduced range, this basing concept for the missile was abandoned in 1983.

White Mountains. A relatively little known plan for basing the Peacekeeper which gained favor since 1983 was known as the White Mountain Plan. This deployment would house the missiles in silos dug into the southwest sides of various mountains of the White Mountains chain in New Hampshire. As of late 1986, this plan was discarded.

Peacekeeper in Superhard Silos. This plan would put the missile in either new or updated existing silos that have been hardened against overpressures of (50,000 in^2) or more. This concept was eventually abandoned.

Other Options. The carrying of ICBMs by surface ships which would drop the containerized missile into the water when needed has not found favor due to accuracy, cost and security considerations. There remains one means of enhancing the survivability of Peacekeeper that has gained favor of both the services and some members of Congress: ballistic missile defense. Known properly as the Strategic Defense Initiative, this all-encompassing program continues in development with some level of deployment possible by the mid-to-late nineties.

The Townes Panel Report. In March 1981, as a part of the new administration's review of the then-designated MX system, a panel of distinguished citizens was formed to review all aspects of the program, including basing options. This panel was chaired by Dr. Charles Townes, Professor of Physics at the University of California and a Nobel Laureate. Although the report seems very similar to President Reagan's plans for the modernization of US strategic forces announced on October 2, 1981, the Townes report was only declassified on March 23, 1982. The broad recommendations of the panel were as follows:

1. The most important deficiency of the US strategic forces involves not the missiles but the command, control and communications aspects of the force.

2. The existing US ICBM silos would become highly vulnerable in the near future.

3. The US should not opt for an MPSS basing plan as the former Soviets can readily compete with such a plan by increasing the number of their warheads.
4. A larger, more accurate SLBM be deployed.
5. A vigorous investigation of fratricide effects on various basing plans including deep basing options be made.
6. A continuous airborne patrol basing mode appears to be the most promising option.
7. BMD research and development should be intensified.
8. Research on a new small ICBM and the deployment options of such a system was recommended.
9. In addition, a majority of committee members recommended the immediate deployment of Peacekeeper in land-based shelters for the near-term augmentation of US strategic forces by 1,000 warheads.

It can be seen that the President's strategic force modernization plan announced on October 2, 1981, closely follows the Townes Panel recommendations except for one point, that of the immediate basing for Peacekeeper. The President modified the plan to place 40 Peacekeepers in Minuteman II shelters - actually silos. This plan was predicated on the fact that this deployment is best suited for BMD protection of both Peacekeeper and Minuteman II/III. This plan was rejected by Congress shortly after the announcement was made. The rejection was reaffirmed in early 1982. In mid-1982, the Congress zeroed Peacekeeper procurement funding for Fiscal 1983, along with a demand that a new basing plan be developed. This led to the creation of another committee, headed by various members of the Defense Department, which eventually came up with a new basing plan which was presented to Congress in late November of 1982. Originally, three plans were submitted to the President: placing Peacekeeper in existing Minuteman silos at a cost of $17 billion; placing Peacekeeper in widely based, superhard (5,000 psi) silos at a cost of $30 billion; and closely based Peacekeepers in superhard (5,000 psi) silos at a cost of $25 billion. This last plan was called dense-pack. All the plans involved the production of 100 missiles. The Air Force preferred the dense-pack option which was selected by the President and presented to Congress.

Basically, dense-pack envisioned 100 Peacekeeper missiles in 100 superhard silos in a rectangular area approximately 22.7 kilometers by 1.4 kilometers in size. The silos would be 548.64 meters (1,800 feet) apart. The densepack plan relied on the concept of fratricide as a passive defense. It was felt that the detonation of the first incoming warhead at one point in the field would damage the rest of the incoming warheads by prompt radiation, blast, heat and debris carried aloft. If the Soviets attempted to circumvent this by appropriately timing the detonations, a significant portion of the Peacekeeper force could still be launched. It was felt that there was no way the Soviet Union could destroy enough densepack Peacekeeper missiles to render that portion of the Triad impotent. However, again Congress did not agree, effectively killing this plan.

In January of 1983, President Reagan formed a new committee to study the modernization of all US strategic forces including the newly redesignated Peacekeeper. Headed by Lieutenant General Brent Scowcroft, who served under President Ford as national security adviser, the committee was composed of a number of people highly knowledgeable in national defense. On April 18th, the committee's basing plan was presented to Congress by President Reagan. The new plan called for Peacekeeper to be immediately deployed in 100 existing Minuteman silos at Francis E. Warren Air Force Base in Wyoming, Colorado and Nebraska. The committee felt that this deployment is the best in terms of near-term survivability, cost-effectiveness and political risk. Concurrent with the continued development and deployment of Peacekeeper, a new, smaller single-warhead missile will be developed. In June, Congress approved the Scowcroft plan and released the money for continued development and flight testing of the Peacekeeper. Shortly thereafter, funding for the production of the first 21 missiles was approved.

Rail Garrison Basing. On December 19, 1986, President Reagan announced a new basing plan for the MGM-118. As a result of the Congressional demand for a new, survivable basing plan for the missile, the various basing options were again considered and the rail mobile plan adopted. The missiles were to be placed in specially modified rail carriages which were to look the same as conventional rolling stock. The Mobile Rail Garrison plan was to have Francis E. Warren AFB as its operating center. Also, 10 other US Air Force facilities located around the country were to be used as garrison locations. In times of crisis, the trains were to be dispersed throughout the United States' vast rail network, although the dispersal was to mainly be in the western two-thirds of the country. The US Air Force had selected the following bases as sites for the Rail Garrison: Barksdale AFB, Louisiana; Dyess AFB, Texas; Fairchild AFB, Washington; Grand Forks AFB, North Dakota; Little Rock AFB, Arkansas; and Wurtsmith AFB, Michigan. The estimated cost of developing and deploying this system with the already funded missiles was put at $2.5 billion. But in 1991, the US Government decided to stop the development of the Peacekeeper Rail Garrison system.

Rail Garrison Contracts. The US Air Force awarded Boeing Aerospace Company a design and development contract for Basing Test and System Support (BTSS) for the Peacekeeper Rail Garrison basing project. The contract was valued at $235.5 million, and covered the definition of operational and testing concepts and system requirements, development of the maintenance car and modification of the locomotive.

The US Air Force also issued a RFP for design and development of a 239-ton missile launch car. The missile, approximately 22 meters long and weighing some 89 tons, was to be erected on this car, and stabilizing feet extended from the train. A cold launch was to be used, with the missile main rocket engine lighting after ejection from the launcher.

A third contract was to be for the launch control car, the security car, and power and systems development. Rockwell International was expected to bid against a GTE/Boeing team. Each launcher was to carry an inertial reference unit to provide precise launch coordinates. Boeing and Westinghouse were teamed against General Dynamics in the competition to provide this unit.

Rockwell International's Autonetics Electronics Systems Division was eventually awarded the development contracts for the missile's launch car (valued at $162 million). Westinghouse Electric's Marine Division received the award for the launch control system and launch car ($167 million). These development contracts called for completion of the work by July 1992. Initial testing, involving the launch of three test vehicles from a rail car to certify loading stability and launch reactions, began in the summer of 1989. A system test program involving five missile flights was to have begun in 1991 at Vandenberg AFB, California.

The Rail Garrison trains were to have included six railcars and two locomotives. The makeup of the trains was to be as follows: a maintenance car, two missile-launch cars, two security cars, and a launch-control car. The Rail Garrison locomotives may have been planned to use a computerized system called Advanced Railroad Electronics System (ARES). This system was used on the Burlington-Northern Railroad in Minnesota and was developed by Rockwell International Autonetics ICBM Systems Division. The ARES could have been used as a computerized automatic pilot for the Rail Garrison trains. The computer system would monitor the health of the locomotive as well as information on terrain changes for proper steering of the train. The system could have provided information to the train commander on the position of other trains on the track.

Sea-Based MGM-118 Peacekeeper? Some sources have suggested that the United States was considering basing its MGM-118 missile force at sea. This basing mode, proposed during the Reagan administration by now retired Admiral Thomas H. Moorer, would have allowed the continued control of the at sea Peacekeeper missiles by the Air Force. The new plan would use the so-called Hydra method - the vertical floating, underwater ignition, lift-off from the sea with the water acting as an indestructible gantry and launching pad. Supposedly, this basing mode would provide the United States with a considerably less expensive means of deploying nuclear-armed ballistic missiles, possibly by as much as a factor of 10. This may also provide the United States with an additional option for meeting possible START treaty limitations, since a sea-based Peacekeeper could be theoretically quickly replaced by a smaller system equipped with fewer nuclear warheads. Furthermore, sea-based Peacekeepers could be dispersed over a greater area than silo or mobile land-based systems. Although the risk does exist concerning losses to antiship missiles, air attack, surface engagements and submarines, the force supposedly offers a substantial survival factor, far greater than any fixed land installation. Ships could be obtained from the 100 vessels in the Ready Reserve Fleet.

Another sea-based option for the Peacekeeper would be incorporation into small diesel-electric submarines. These would be 25-man boats outfitted with two encapsulated missiles externally in a horizontal position. Once a launch order was received, the missiles would be released to float to the surface and fired as they floated vertically. This mode is also considered far less expensive than the current generation of US nuclear ballistic missile submarines.

De Jure and De Facto SALT II Contingencies. The de facto recognition of SALT II by signatories allowed the former Soviet Union to build a MIRVed ICBM arsenal in excess of current US inventories through 1986. The United States, on the other hand, has had to reduce specific categories of weapons, such as the UGM-73 Poseidon missile, as the AGM-86 ALCM and UGM-96 Trident I systems reached operational service. While the retiring of the Titan II force accomplished some of this requirement, the advantage still favored the former Soviet Union. Proponents and opponents of the Peacekeeper were in general agreement that the unratified SALT II treaty was not in the long-term interest of the US and represented a step towards further strategic disparities. In 1986, the Reagan administration stated that the United States would no longer be bound by SALT II and the country broke out of the agreement later that year.

The SALT II treaty dealt with launchers and not missiles or warheads. Therefore, it was not clear whether the former Soviets would ever agree with the US that a vacant silo shelter was not a launcher; in fact this question remained on the table at the on-going arms negotiations at Geneva. The US position was that any silo or shelter was a potential launcher but in operational essence remained a

concrete garage. The Soviet response to a deployed US Peacekeeper system without SALT II ratification was seen as leaning towards a mobile mix of land- and sea-based ICBMs. The Soviets, due to the nature of their society, apparently favored a road-mobile system and a dramatic increase in submarine-launched ballistic missiles. Information initially released in early 1984 and subsequently in early 1985 tended to support this contention.

Regarding an ABM defense for Peacekeeper placed in silos, the arguments against were not plausible in that the investment of the former Soviet Union had no clear military or economic advantage. The construction of a limited ABM defense surrounding present or future US land-based ICBMs, under present or future ABM treaty parameters would force the former Soviet Union to invest in the defense of its vulnerable ICBM resources. The ABM treaty expired in 1983, although it is still being observed by the United States. Since, as we have stated previously, the cost/benefit ratio appeared to be leaning toward the defense, it was evident that the United States allowed the treaty to lapse while pushing for a new meaningful, realistic and equal treaty for the reduction of strategic weapons. In the interim, the US appeared to be opting for the near-to-mid term development and deployment of some sort of a limited ABM system of the terminal defense type.

Political Contingencies. The Reagan administration stated in 1981 and repeatedly thereafter that it was not legally bound by either of two treaties (SALT I, 1972, and SALT II, 1979) with the Soviet Union on strategic weapons reductions/limitations. The announcement was seen in part as a reaction to legal opinions that were given by the Arms Control & Disarmament Agency and the State Department. Officials of these agencies cited international law and the Vienna convention of 1970 as binding on parties to the treaties unless they were formally canceled.

The State Department issued a further clarifying statement that in the absence of flagrant violations by the Soviet Union, the US would give de facto recognition to the SALT II treaty. However, the spokesmen also related that since the 1972 accord had expired and the 1979 SALT II treaty was not ratified by the Senate. The United States has no legal obligation to abide by either agreement. This action was made official by the breakout of the United States from the SALT II limits in 1986.

It appeared that the SALT II treaty was now dead while the United States negotiated with the former USSR at the Strategic Arms Reduction Talks at Geneva. The Reagan administration had stated forcibly that arms negotiations demand quid pro quos. We anticipated no departure by the Bush administration from this policy.

One additional fact which seems to have escaped most observers: the United States has never announced that it would not launch on warning or launch under attack if a nuclear strike with missiles were to be conducted against the country. With the sensing and surveillance technology that is available and in place today, research indicates that all the talk of a window of vulnerability and survivability of a land-based ICBM system is moot. Of course, the United States can never announce such a strategy due to the fact that it is necessary to keep that doubt in place in the minds of the Soviet strategic planners. However, it appears that there is no doubt that an American president, faced with overwhelming technical information that an attack is under way, would go ahead and launch our strategic forces in retaliation.

Funding

With the cancellation of Rail Garrison and the potential decision to end Peacekeeper missile procurement after Fiscal Year 1991, funding for this program rapidly diminished.

US FUNDING

	FY94		FY95		FY96		FY97 (Req)	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
USAF								
Proc								
MGM-118	-	-	-	-	-	-	-	-
Mods	-	0.2	-	-	-	-	-	-
RDT&E								
Proj - 1	-	20.5	-	4.5	-	3.7	-	2.8
Proj - 2	-	-	-	-	-	-	-	-

All $ are in millions.

Proj - 1 PE#0603311F Ballistic Missile Technology (formerly Advanced Strategic Missile Systems).

Proj - 2 PE#0604312F ICBM Modernization.

Recent Contracts

No additional procurement projects are anticipated after 1991-92. In March 1996, Rockwell International, Anaheim, California, received a $9-million cost plus fixed fee contract to provide for engineering service in support of the guidance and control systems on the Minuteman and Peacekeeper missiles. Work will be completed by December 1998. Contract Number F42610-96-D-0013.

In March 1995, Rockwell International was awarded $9.7 million for repair services on a Peacekeeper guidance and control system. Work was completed in September 1995. Contract Number F04704-88-C-0096. In February 1995, Northrop Grumman Electronics Division received $9.9 million to provide the Peacekeeper Inertial Measurement Unit Weapons System Support. Contract was completed in September 1995. Contract Number F04704-88-C-0028.

In August 1994, Boeing Defense and Space Group, Space and Missile Division, Seattle, Washington, was awarded a $15.1-million contract increase for continuous engineering and technical services in support of the Minuteman and Peacekeeper ICBMs. Contract work was completed in September 1995. Contract Number F42160-93-C-0060 P00011. In July 1994, TRW Incorporated, Defense Systems Group, Ballistic Missiles Division, Redondo Beach, California, was awarded a $9.7-million contract increase for continuous engineering services/technical assistance in support of the Minuteman III and Peacekeeper ICBMs. Work will be completed in September 1994. Contract Number F42610-92-C-0010 P00031. Also in July, TRW Incorporated received a further $37.5 million for continuous engineering services technical assistance in support of the Minuteman III and Peacekeeper. Contract work was completed in September 1995. Contract Number F42610-92-C-0100 P00034.

In 1993, Rockwell International, Autonetics Division, Anaheim, California, received a $17.2-million face-value increase to a fixed-price incentive fee contract for the Peacekeeper Support Program, consisting of engineering databases, weapon system effectiveness analysis, and upgrades to the Peacekeeper ICBM guidance and control system. Contract work was completed in September 1994. Contract Number F0474-88-C-0096.

In 1991, Boeing was awarded $14 million-contract for engineering and technical services in support of the Minuteman and Peacekeeper missiles. Contract No. F42610-91-D-0382. Northrop received two contracts, one for $14.4 million, another for $8.8 million, for Peacekeeper inertial measurement unit components. These missiles are deployed in Minuteman silos. Another contract awarded to Northrop and also related to the Peacekeeper's inertial measurement unit was worth $7.7 million and focused on potential improvements. Contract No. F04704-88-C-0028. Rockwell International is also continuing its work on the Peacekeeper program with a $51.3-million contract related to guidance and control subsystems engineering. Rockwell is also working on the Peacekeeper's Operation Ground Program and Operational Flight Program software update under a $7.9-million contract. Contract No. F04704-88-C-0096.

In August 1990 Litton's Guidance Control Systems division was awarded a $12.3-million contract to produce 143 specific force integrating receivers (SFIRs). The SFIR is an accelerometer used in the Peacekeeper's guidance system. Also in August, Avco Corporation was awarded $6.2 million for sustaining engineering support and technical manual maintenance for the Peacekeeper in Minuteman silos re-entry system. On August 14, 1990, Boeing Aerospace and Electronics was awarded $9.6 million for ground operations supporting flight tests of the Peacekeeper Rail Garrison system.

In July, the General Electric Company was awarded $6.2 million for sustaining engineering support for the Peacekeeper's Mk 21 fuze.

Timetable

Jun	1979	FSED entered - major contract awards made
May	1980	Basing mode review - environmental impact statement released
Sep	1980	Environmental Impact Study period extended to April 1981 for debate/discussion
Feb	1981	Reagan administration undertook MX basing mode analysis
Sep	1981	MPSS deployment abandoned, procurement of 100 missiles announced
Jan	1982	Plan to place 40 MX in Minuteman silos announced
Jan	1983	Scowcroft Commission formed
Apr	1983	Scowcroft plan announced

Jun	1983	Congress approved Scowcroft deployment; released testing funds
Jun	1983	First test flight
Thru	1986	Development and testing continue
Sep	1986	First missile installed at Warren AFB
Dec	1986	Initial operating capability
Dec	1986	Rail Garrison basing plan given go-ahead
	1988	Full-scale engineering development on Rail Garrison commenced
Dec	1991	US gov't decided to cancel Rail Garrison
	1991	Peacekeeper procurement to be terminated after FY91 buy

Worldwide Distribution

The Peacekeeper intercontinental ballistic missile has not been offered for export by the United States. All Peacekeeper missiles manufactured by the United States remain in US hands.

User Country(s). The MGM-118 Peacekeeper is in service exclusively with the **United States Air Force**.

Forecast Rationale

No further production of the MGM-118 Peacekeeper is planned or anticipated. Funding will be provided to maintain the operational status of the Peacekeeper, but no additional procurement will take place. With the signing, the United States began to study new options for fulfilling its nuclear deterrent force needs of the next century. Until a replacement system is available or new strategic arms reduction treaties go into affect, the Peacekeeper will remain on active duty as part of the land-based leg of the US nuclear deterrent triad.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level			Good Confidence Level				Speculative			
Missile	(Engine)	thru 96	97	98	99	00	01	02	03	04	05	06	Total 97-06
MARTIN MARIETTA AEROSPACE													
MGM-118A (a)	UNSPECIFIED	143	0	0	0	0	0	0	0	0	0	0	0
Total Production		143	0	0	0	0	0	0	0	0	0	0	0

(a) Thru years include 20 RDT&E missiles.