[redacted] [redacted]

DOE Information downgraded to S/RD
NF Information downgraded to S[redacted]
8 Jan 97
- adp

HISTORY OF STRATEGIC AIR COMMAND

FY 1969

HISTORICAL STUDY NO. 116 (U)

VOLUME II

NARRATIVE

THIS DOCUMENT WAS REVIEWED BY ACC/DO & DOE UNDER F.O.I.A. PAGES DECLASSIFIED ARE MARKED - adp. 10 Sep 1997

SPECIAL HANDLING REQUIRED
NOT RELEASABLE TO FOREIGN
NATIONALS.
The information contained in
this document will not be
disclosed to foreign nationals
or their representatives

EXCLUDED FROM AUTOMATIC
REGRADING [redacted] 5200.10
DOES [redacted] APPLY

OFFICE OF THE HISTORIAN

HEADQUARTERS STRATEGIC AIR COMMAND

MARCH 1970

70-B-0001

(THIS PAGE IS UNCLASSIFIED) CY 1 OF 3 CYS

CHAPTER IV

INTERCONTINENTAL BALLISTIC MISSILES

Introduction

(S) A mixed force of bombers and missiles provided SAC's deterrent force. This chapter details the paramount part played by the missile force in that responsibility. Although the total number of missiles available remained fairly constant during the year, as a result of the actions it took to improve efficiency the command was able to reach an all time high of 1030 on alert.

(S) SAC stressed reliability and survivability, and consequently the improvement of missiles, crews, and facilities. SAC proposed, advocated, and undertook several programs to this end. Some were completed during the year, others were underway, and some still awaited approval at the end of the period.

(S) Significant improvements were the phasing out of all A model missiles and some of the earlier B models, both were replaced by the Minuteman F. Minuteman F DASO was completed and Operational Testing begun. Minuteman B was involved in follow on operational testing. Minuteman G, due to enter the SAC inventory in June 1970, underwent R&D testing. Three successful launches ended the Titan II follow-on testing program, and it was being debated whether or not bench testing without flight testing would suffice for the future.

(S) Along with the missiles, crews were evaluated and tested to insure their competence. Each organization was subjected to ORIs, Olympic Play exercises, and evaluations by the 3901st Missile Evaluation Squadron. All units underwent two ORIs in fiscal year 1969. Only one failed. It passed when retested three months later.

(S) While problems were encountered day by day with such technically complex weapons, the total picture of the missile force during the year must on balance be described as one of improved performance. The introduction of improved missiles led to a rise in missiles on alert from 978 to 1030. The importance of missiles in the strategic mission

and the command's confidence in them was summed up by General Holloway: "I consider the Minuteman the most important element of the strategic forces. We have 1,000 of them, they are in their silos, they work, and an average of 98 percent of them are on alert 24 hours a day."

Alert Force

(S) No new launch facilities were built in fiscal year (FY) 1969. A total of 1071 Minuteman and Titan II launch facilities existed at 10 bases in the CONUS. From August 1968 through February 1969 the ICBM force was stable with an average of 995 missiles required for alert and 975 actually on alert.[1] During the spring, the last squadron finished force modernization at Malmstrom AFB (341st Strategic Missile Wing (SMW) - Minuteman Wing I). It was not immediately followed by modernization at another base. As a result, the alert force increased sharply. At the end of June 1969 an all time high of 1043 missiles were required, and 1030 were on alert.[2]

(S) During FY 1969 the last Minuteman A's left the SAC inventory. They went off alert on 15 January 1969 at L flight of the 490th Strategic Missile Squadron (SMS), and the facilities were turned over to the contractors for modernization.[3] Five A models retained an emergency combat capability (ECC) in K flight, the last Minuteman I flight at Malmstrom, until February. Early in the morning of 12 February 1969 the last two Minuteman A's were removed from launch facilities K-2 and K-10.[4] Ogden Air Materiel Area (OOAMA) had stated that it would stop logistical support of Minuteman A when the last flight was dismantled in February 1969.[5] At the end of June 1969 Air Force Logistics Command (AFLC) said that the Air Force's last Minuteman A launch facility (at Vandenberg) would be converted to a Minuteman B configuration for the Safeguard System Target Program

in September 1969 and that in February 1970, OOAMA would begin the disposal of the 21 remaining Minuteman A missiles in storage.[6]

(S) After the last Minuteman I flights were removed from alert in January 1969, the Minuteman B alert requirement was set at 497 for the rest of the fiscal year. It had been as low as 489 in October and November 1968, and as high as 505 on 31 December 1968. The actual Minuteman B alert force fluctuated between a low of 482 missiles in November 1968 and a high of 499 on 31 December 1968. On 30 June 1969, 494 Minuteman B's were on alert.[7] The increase in the ICBM alert force was in Minuteman F's. This force rose from 384 required and 382 actual on 30 June 1968 to 490 required and 480 actual on 30 June 1969. The Titan II alert force was usually the maximum 56 required and actually on alert. The low for the year was 54 required and 52 actual on 30 April 1969.[8]

(S) Theoretically, 100 percent of the ICBM force was required for alert, but since some missiles were usually involved in maintenance recycles, modifications, special tests, and training, a portion of the force was always exempt from alert. Of the existing 57 Titan II launchers, only one at Vandenberg was not required for an alert mission.* Other planned degradations to the Titan II alert force were designated on a recycle schedule that was issued early in 1968. During FY 1969 the only scheduled recycles were for Follow-on Operational Tests (FOT) and the Service Life Analysis Program (SLAP).[9] Excluding operations and training requirements, Minuteman scheduled deviations were monitored through a master retrofit plan. In this plan the Space and Missile Systems Organization (SAMSO) grouped into blocks for incorporation into specific wings. Additional work, by SAC or OOAMA was included in this schedule.[10] Most missiles exempt from the SIOP were being modified or were associated with modification and training programs.[11] Of those sorties required for alert, there were usually between 10 and 20 off for maintenance. Between November 1968 and June 1969 the more usual figure was 20 because up to nine

---

* (S) The non-alert mission was rotated between two of the three silos, as dictated by the launch and refurbishment schedules.

sorties at a time undergoing the Phase II power modifications were not excluded from the SIOP.[12]

(~~TS-RD-NOFORN~~) Out of a total of 1071 authorized launchers at nine operational bases and Vandenberg at the end of June 1969,* 1043 Minuteman and Titan II were required for alert (97.39 percent) and 1030 were actually on alert (96.17). This was an increase of 55 required and 52 actual alert sorties since 30 June 1968. Total ICBM megatonnage required increased from 1620 to 1688.4, while the actual megatonnage on alert increased from 1591.6 to 1672.8.[13]

(~~S~~) Since November 1967 six sorties in the 510th SMS at Whiteman AFB (351 SMW - Minuteman Wing IV) had been deployed with Emergency Rocket Communications System (ERCS) payloads instead of warheads and therefore were excluded from the SIOP. The ERCS was a last resort method for transmitting the "go code" to SAC forces. The rapid growth of the Soviet ICBM force during the last two years led SAC and its numbered air force planners to consider all suggestions for increasing the number of sorties on alert. In August 1968 Eighth Air Force suggested putting warheads on the ERCS missiles when communications systems packages were not available.[14] At first SAC was not in favor of the plan,[15] but then agreed if 15 days of alert time could be achieved, if the warhead and guidance system used did not have to be taken from a SIOP committed sortie, and if a new target kit was not needed. If an ERCS payload was expected to be unavailable for at least 30 days a new target kit would be provided. Conversely, in DEFCON 3 or higher only five days need to be expected.[16]

(~~S~~) On 16 August and 10 September 1968 the last two Minuteman on-base launch facility trainers were accepted at F. E. Warren AFB (90 SMW - Wing V) and Minot AFB (91 SMW - Wing III), respectively.[17] These trainer facilities were supposed to release operational silos for alert, but in fact they did not. Because the on-base trainers could not be used to train Electro-mechanical Teams (EMT), and force

---

* (~~S~~) A few Minuteman silos were "owned" by SAMSO.

modernization required retraining of maintenance personnel, operational silos were still needed for training.[18] In October 1968 SAC's operations planners agreed to degrade one operational silo at each Minuteman I wing until the wing trainer was modified for EMT training,* and one at each wing undergoing force modernization for the duration of that program for maintenance retraining.[19] It was expected that the last of these facilities would be available by October 1971.[20] In January 1969 the 321 SMW at Grand Forks AFB, a Minuteman II wing, received permission to degrade a sortie for seven months for EMT training.[21] Thus, during the first half of 1969 all of the Minuteman wings, except the one at Whiteman AFB, had a sortie degraded for training. In May 1969 SAMSO said that if a contract were let in November 1969, the trainers at all six wings could be modified for EMT training by July 1972.[22]

(S) On 17 October 1968 OSD decided to cancel the Titan II FOT program after FY 1969.[23] Soon after the 1st Strategic Aerospace Division proposed a mission of three EWO sorties for its Titan II squadron, the 395 SMS.[24] By April 1969 SAC had decided to commit the third Titan II sortie at Vandenberg to alert in July or August 1969 if its rebuttal on the FOT cancellation was rejected. The additional alert sortie would require two more combat crews.[25] On 15 May 1969 the Air Staff reconfirmed the end of the FOT program,[26] and at the end of that month SAC decided against launching its last allotted FOT missile.[27] Therefore, Vandenberg would have three alert sorties in July 1969.[28]

(S) The FOT cancellation made SAC look at the size and future of the 395 SMS. The two main proposals were to reduce the manpower of the squadron or to merge it with the 394 SMS.**By March 1969 Vandenberg had identified 105 spaces for reduction.[29] This was cut to 97 when

---

* (U) Referred to as a Phase B configuration.

** (U) A Minuteman squadron.

two crews were added to support the third EWO sortie. In June 1969 it was evident that the Titan II mission for Vandenberg would probably be three EWO sorties and one Safeguard support launch a year. At the end of June 1969 the future of the 395th had not yet been determined, but it looked like the manpower reduction might be as high as 160 spaces.[30]

(S) In May 1968 Vandenberg requested help in the acquisition of a hardened communications system to support its Titan II alert sorties. Headquarters SAC told them to look at their own resources and forward recommendations. At the beginning of August 1968 Vandenberg presented a study with six options for improving communications. The recommended option was to use a 487L receiver in one of the three sites with interconnecting hardened cables to the other two.[31] Initially, SAC agreed to provide 487L receivers and hardened UHF transmitters and receivers at each site.[32] By the end of November 1968, however, it had become evident that the equipment would not be available until 1971. Also, all such projects costing over $100,000 required JCS approval. This one would cost $150,000. Efforts were then switched to the acquisition of hardened UHF systems.[33] Early in February 1969 Vandenberg submitted an emergency Communications Electronics Implementation Plan (CEIP) to SAC for the hardened UHF equipment. It was available at OOAMA. Fifteenth Air Force's airborne command post would adjust its orbit to cover Vandenberg.[34] On 5 May 1969 the Air Staff approved the installation of UHF radios during the first quarter of FY 1970 at a cost of a little over $57,000.[35]

Operational Testing and Evaluation

(U) In addition to maintaining an ICBM alert force, SAC was also responsible for operational flight test programs and for unit and crew personnel performance evaluations. The tests and evaluations provided a measure of how effective the ICBM force would be if it ever were called upon to retaliate to an enemy attack.

(S) Following research and development (R&D) tests, SAC conducted a Demonstration and Shakedown Operation (DASO) for each weapon

(S) Minuteman F/ERCS OT/FOT Program. On 26 December 1968 OSD reconfirmed its May 1968 decision not to buy any boosters for an ERCS FOT program.[215] This left SAC with five boosters for ERCS flight testing. One remained from the Category I/II program and four were approved for an OT program. SAC planned to begin the OT program in August 1969 and launch one each August and March.[216] To retain confidence in this important trans- and post-attack communications system it should be tested throughout its programmed life.[217] To that end the Air Staff had approved funds for additional ERCS transmitters. As a hedge against the absence of flight testing, the Air Staff asked AFLC to look into the feasibility of an ERCS flight simulator.[218]

Operational Base Launch Program

(S) The failure of Giant Boost in mid-August 1968 aroused considerable interest at OSD and OSAF in the Minuteman operational base launch (OBL) program. As the Nuclear Panel of the Air Force Scientific Advisory Board (SAB) had already scheduled an evaluation of the operational test programs for late September 1968, the opportunity would be used to examine OBL test planning.[219] Early in September 1968 the Air Staff asked AFSC to review the hazards of full range OBLs,[220] and asked SAC to update its launch plans.[221] Even before the SAB meeting the Secretary of the Air Force recommended to the Secretary of Defense that a Giant Boost-type missile with seven seconds of fuel be launched from each wing. These launches would begin in about five months. He endorsed the full range OBL program along with a continuation of the current Vandenberg program.[222]

~~(S-RD-NOFORN)~~ SAC gave the SAB a briefing on its programs for reducing uncertainties in missile accuracy and reliability. It was basically the same program that SAC had been trying to get approved for the past five years. In addition to the seven second launches, SAC wanted the following: variable range and azimuth launches from Vandenberg (including southerly launches), uninstrumented launches from Vandenberg (Giant Foot), and full range OBLs (Glad Game). SAC's program called

for an R&D launch from a Vandenberg silo which was in an OBL configuration in September 1969. This would be followed by another R&D launch from Malmstrom (WS-133B) in November 1969. This would be followed by two WS-133B and two WS-133A-M OTs from Malmstrom between January and June 1970. After that, one OT would be launched from each of the other bases each year. A similar program for Minuteman G would begin in 1971. As an interim measure SAC recommended the launching of one seven second missile from each base each year.[223] The SAB supported full range OBLs and recommended only changes to the weapon system (denuclearized warhead, isolated silo, retargeted to the Pacific Ocean). If a range safety system were deemed necessary, the SAB preferred one that could be placed in the R/V. The SAB considered the full range tests a good opportunity to test the national command control system. The main points still to be resolved related to hazard analyses and the range safety requirements.[224]

(S) Early in October 1968 SAC, SAMSO, OOAMA and the Air Staff agreed that a seven second launch could be made at each base during mid-March 1969, if approval and funding were available by 15 October 1968.[225] On 18 October 1968 the Air Staff told SAC, that it would be responsible for the development of specific plans for a series of six simultaneous limited range launches or a series spaced over 30 days. These would be done 24 weeks after authorization.[226] During October 1968 SAC surveyed sites for these launches,* and began to bring up to date its full range OBL operations plan (Glad Game).[227] At the end of October 1968 the SAB Nuclear Panel met again and repeated the need for full range OBLs. The panel said that a destruct system located entirely inside the R/V was feasible, and that the hazards involved were acceptable. The SAB proposed the early use of a destruct system developed for the AEC's High Altitude Test

---

* (C) In December 1968 the WS-133B site for Malmstrom was changed from R-21 to R-24.

Readiness Program; but it had a very short battery life, lacked an impact scoring capability, and would have affected missile accuracy.[228]

(S) On 1 November 1968 Lt General K. K. Compton, Vice Commander of SAC, approved the preliminary planning for the limited range OBL program (Giant Roar). The task forces would be made up of operational base personnel with the 3901st SMES providing quality control support. SAC wanted to launch these missiles by the ALCS.*[229] On 9 November Deputy Secretary of Defense P. H. Nitze approved Secretary Brown's September 1968 proposals for the limited range launches and for planning activity for the full range launches. He also asked for the development of additional confidence testing for the rest of the fleet.[230] Secretary Brown then directed action on the program along the lines suggested by the SAB. Full range launches with a minimum of changes would have to be preceded by launches with a range safety system. Precise plans, including hazard analyses, would again require approval by OSD for funding.[231] The Air Staff reconfirmed SAC's responsibility for limited range launches and for the full range program after the R&D phase. In addition to the hazard studies the Air Staff directed further study of the AEC destruct system and the already planned C-band Airborne Tracking Safety System (CATSS), which was an answer to SAC's Required Operational Capability 13-67.[232] The Air Staff also directed the development of an inexpensive method of confidence testing for the silos not used in the OBL program.[233] During November 1968 SAC conducted aerial and ground surveys at Malmstrom to select candidates for the full range launch sites. Two WS-133B and five WS-133A-M sites remained eligible.[234] On 1 December 1968 SAC issued an operations plan for limited range launches.[235]

(S) As part of its answer to OSD's request for additional confidence testing SAMSO proposed to use a whole flight at a representative wing for each of the three Minuteman configurations

---

* (C) Late in November 1968 SAMSO indicated that it could support these ALCS launches.

(WS-133A, B, and A-M). In addition to two seven second missiles (one as a backup), eight modified operational missiles (MOMs)* would be counted down and exercised in their silos. This way individual silos would not have to be isolated. There would be no motor ignition and the safe and arm and arm/disarm devices would be removed or disconnected.[236] In February 1969 SAC asked the Air Staff to amend the Giant Roar plans to include nine MOMs with each seven second missile at each wing while reiterating SAC's main goal of full range OBLs.[237] The Air Staff wanted more information. SAC was able to justify its one and nine by wing plan against SAMSO's two and eight by weapon system.[238]

(S) During March 1969 SAC and SAMSO examined several options for a full range OBL safety system. The AEC system was rejected again along with one which had the destruct ordnance in the operational raceway. The one selected had the beacon and ordnance in the R/V. Such a system would take 12 to 14 months to develop.[239] This is what SAC had originally asked for in SAC ROC 13 - 67 (Self Contained Range Safety Abort System [SCRSAS]). SAC did not want SCRSAS/CATSS development to be determined by the pace of the OBL program because such a system was needed for the Vandenberg OT/FOT programs as soon as possible.[240] The Air Staff said that a favorable response from the Secretary of the Air Force on the OBL program, and the Air Staff's action on it would be the final action taken on the SAC ROC.[241]

(S) At the end of March 1969 the Air Staff expressed renewed interest in an expanded and accelerated program of seven second and full range OBLs. The Air Staff proposed a seven second program of six launches from Grand Forks and three each from Malmstrom and Minot during October and November 1969. These would be followed by eight full range launches from Malmstrom during the winter of 1969-1970 using current range safety systems or none at all.[242]

---

* (U) Really ground test missiles.

These launches would give SAC little or no information regarding operational reliability or accuracy. For this reason General Holloway objected to the plan. He opposed the politically inspired concentration of most of the seven second launches at any one location, and particularly at Grand Forks. He also wanted to retain the MOMs concept. He also opposed full range launches without a range safety system at this time as it might jeopardize the whole program.[243]

(S) On 25 April 1969 the new Secretary of the Air Force, Dr. R. C. Seamans, Jr., presented a new OBL program to OSD. Six to eight full range OBLs would be flown from Malmstrom during the winter of 1969-1970 using the current Vandenberg range safety system. The R/V-only safety system would be developed to support SAC's full range program in 1970-1971. The seven second launches were deferred and MOM was back in the picture.[244] Late in May 1969 the SAB Nuclear Panel met again. It approved MOMs as opposed to the seven second launches and the R/V safety package. The panel did not see any value in full range launches with the current range safety system. It did not like the destruct system being designed for Minuteman G.[245] For Minuteman G SAC preferred an Improved Instrumentation System (IIS) that would be located in the post boost vehicle support structure or in the interstage between the post boost vehicle and the third stage.[246] On 3 June 1969 General Holloway decided that SAC should seek to become responsible for the 1969-1970 full range program even though it was R&D oriented.[247]

(S) On 6 June 1969 Secretary of Defense Laird approved the MOMs concept and asked for more detailed plans on the full range OBL program. He also asked that a backup plan for seven second launches be developed. These would be conducted in a short period of time and involve several silos of a flight. On that same day he informed the President of the full range OBL proposals.[248] Later in June 1969 SAC was made lead command for the Malmstrom launch program (Business Leader).[249] At the end of June 1969 SAC indicated

that its draft operations plan for Business Leader would be ready in a month.[250] The plans called for three WS-133B launches from Malmstrom site S-32 in January, February, and March 1970. Three WS-133A-M launches from site H-11 would take place in February, March, and April 1970. All flights would use the current Vandenberg range safety system. A ground test missile would be checked out in the silo before each launch. Five MOMs would be tested along with the first WS-133B ground test missile and four more during the launch. A similar pattern would be used with the third WS-133A-M test.[251] During June 1969 SAC and SAMSO conducted aerial and ground site surveys around Malmstrom sites S-32 and H-11 to identify areas needed for support activities.[252]

(S) On 2 July 1969 Secretary Seamans informed Secretary Laird of the Air Force's new seven second launch program. It would be done only if the full range program was rejected. It was prompted by the desire to make up for the Long Life II/Giant Boost failures. He proposed to use three seven second missiles and seven MOMS in a WS-133B flight at Grand Forks and a WS-133A-M flight at Malmstrom. All six missiles would be launched "over a short time span." These launches could be done six to seven months after authorization at a total cost of $13.26 million.[253]

(S) Although there was some planning for the flight of uninstrumented missiles from operational bases during FY 1969, SAC's Giant Foot plan for Vandenberg did not make much progress. A revised hazard study was completed by TRW Systems Group in July 1968,[254] but it still contained some questionable findings. A further revision would be necessary before it could be forwarded to AFWTR. Considerable insight on the hazard problem was gained through the SAC and SAB Nuclear Panel efforts for the OBL program.[255]

(S) On 22 July 1968 SAC deferred Giant Plow launcher closure testing for FY 1969 due to the high degree of success during the 1968 tests.[256] In April 1969 the question of FY 1970 Giant Plow testing was considered by the SAC staff. As Giant Roar would provide launcher tests, SAC again decided to defer Giant Plow for a year.[257]

(S) Since 1967 SAC has been advocating an improved electronic ground testing system for Minuteman, especially the OGE.[258] SAC was already preparing a ROC for the electronic simulation of launches when OSD indicated a desire for further confidence testing of launchers not exercised in the OBL programs.[259] SAC forwarded its ROC for a Minuteman simulated combat launch system to the Air Staff in April 1969.[260] The Air Staff asked for more information,[261] and SAC sent them a supplementary brochure in May 1969.[262] SAC wanted a system to measure launch reliability from key turn through first stage ignition in as close to an operational configuration as possible. This system would check all silo and control center OGE and critical circuits including the launcher closure.[263] AFLC accepted the ROC.[264] Early in July 1969 the Air Staff requested more information on the proposed system's relationship to MOMs and the bench test program.[265]

Minuteman G Flight Testing

(~~S-RD-NOFORN~~) The Minuteman G R&D flight test program began on 16 August 1968 with a successful flight on the Eastern Test Range. Although a modified Minuteman F guidance system was used, the new third stage and post boost vehicle were flown and three MK 12 test R/Vs were independently deployed.[266] As in earlier single MK 12 R&D flights, these small bodies seemed to be affected by unpredictable spinning. The R/Vs were supposed to spin at 60 revolutions per minute (rpm). Under certain conditions of heat and ablation the MK 12s slowed to zero revolutions and then began to spin again in the same or in the opposite direction. If the R/V had a "trim" angle of attack at zero revolutions it would behave like a lifting body and move off the programmed trajectory by as much as 3000 feet. The two instrumented MK 12s on this first multiple flight spun down to zero revolutions and then spun up again in the opposite directions. They had different CEPs, but as they were scored by different methods nothing could be proved. SAC proposed doubling the initial spin rate to 120 rpms to either eliminate spin through zero or to delay it until the R/V was too low to affect accuracy.[267] This modification would not be tested until the spring of 1970.[268]

USAF Inspection of Minuteman G Development and Acquisition

~~(S-RD-NOFORN)~~ In January 1969 the USAF Inspector General (IG) announced that during April through June 1969 it intended to look into the development and acquisition of Minuteman G.[330] SAC replied that it had no operational support problems as yet but there were parts of the program that might become a problem later.[331] The IG visited Headquarters SAC in April and June 1969.[332] The IG criticized the division of effort on the R&D test program effort between two ranges, neither of which could fully demonstrate the weapon system. This would affect SAC's DASO & OT programs. The decision to reduce the FOT program in favor of bench testing was also criticized. The Minuteman motor surveillance program was criticized for not providing techniques for adequate service life predictions. Also, the failure to develop and deploy the Minuteman Integrated Command and Control System (MICCS) would limit SAC in retargeting its force in a reasonable period of time. The IG also criticized efforts to provide for Minuteman F and G interchangeability at wings that were not scheduled to receive the G models.[333] SAC was told to reply to two of the findings. SAC agreed that the range lacked instrumentation and would not be able to support testing of the three reentry system configurations to be deployed at the first two wings. Also, a reduction in the FOT program and the substitution of ground tests would reduce confidence in reliability.[334] Both of these questions have already been covered in this chapter.

Operational Readiness Inspection/Operational Readiness Inspection Test

(S) The Operational Readiness Inspection/Operational Readiness Inspection Test (ORI/ORIT) was an EWO evaluation exercise conducted semiannually at all wings that had attained an initial C-2 rating (80 percent of its crews combat ready and 60 percent of its missiles on alert). WS-133A-M squadrons could be tested when two flights were on alert. The 395th SMS (Titan II) at Vandenberg was tested annually during the general inspection of the 1st Strategic Aerospace Division. It would not receive a mission effectiveness rating.[335]

(S) All operational wings were tested twice during FY 1969. One wing failed an ORIT and was retested. Vandenberg had one general inspection. Fifteen outstanding, three satisfactory and one unsatisfactory ratings were given. During the July through December 1968 training cycle the Titan II units had 54 effective sorties out of 55 evaluated. For Minuteman, 993 out of 1047 were effective. The WS-133A (Minuteman A and B) squadrons had 610 effectives out of 654. For WS-133B it was 190 out of 195, and for WS-133A-M it was 193 out of 200. Thus, the Minuteman F units had 383 effectives out of 395 sorties. During January through June 1969 the Titan II units had 49 effective sorties out of 51 evaluated. The Minuteman units had 957 effectives out of 967. For WS-133A (Minuteman B) it was 590 out of 592. WS-133B had 191 effectives out of 197 and WS-133A-M had 276 out of 278. The total for Minuteman F was 467 effectives out of 475 sorties evaluated. All of the non-effectives, except those at Minot in August 1968, were caused by materiel failures.[336]

(S) In August 1968 the 91 SMW became the first Minuteman wing to fail an ORIT. Four crews in the 741 SMS failed to launch a total of 36 sorties at the first available wave block commit time, primarily because the crew in the alternate command post conducted the conference improperly. All 36 sorties successfully completed their missile and sensitive command network tests. These sorties were considered operational failures.[337] The alternate command post crew, and another that was unready to launch at the proper time, were disbanded and the crew commanders were recertified as deputy commanders. The other two crews that were delayed by the improper conference were placed on probation and later returned to duty.[338]

(S) During the 321 SMW's ORIT in February 1969, a missile was found to be on the wrong target. Besides the danger of leaving an important target uncovered, such an occurrence could upset the control time launch/time on target calculations and produce fratricide in the target area. Investigations directed by SAC were held at Grand Forks and Headquarters Second Air Force in March 1969. No fault

could be found with the crews or maintenance personnel. The missile guidance and control unit failed a short time after the ORIT. During analysis, OOAMA found a malfunction in the targeting area of the guidance memory.[339] As recommended by the investigation board, SAC ordered the crews to make sure of their targets by checking their EWO documents with the target verification reply printouts, and to keep these printouts until they were superseded.[340]

(S) In March 1969 Second Air Force proposed a sliding scale for Minuteman unit mission effectiveness ratings, so that Minuteman F units with fewer missiles on alert could achieve outstanding ratings even if they had only one non-effective sortie in each squadron. It also called for the creation of excellent ratings for those crews scoring 100 percent on the written EWO knowledge test and on performance in the control center.[341] The other numbered air forces agreed with the crew proficiency recommendation, but Eighth did not favor a "loosening" of the scoring criteria, and Fifteenth favored a criteria based on weapon system launch reliability.[342] Second Air Force agreed that a plan based on launch reliability would be fair.[343] SAC decided to set up separate standards for Minuteman B and F. For the B wings .980 would remain the lower limit for outstanding while the passing score was raised from .950 to .960. The Minuteman F passing score remained .950 but the criterion for an outstanding rating was lowered from .980 to .975. Separate ratings would be given for the EWO written tests and crew performance in the control centers and missile procedures trainer. Units with all crews and individuals passing all tests would be rated excellent.[344] The Air Staff approved the changes effective 1 July 1969.[345]

Olympic Play

(S) Between the semiannual ORITs, wings conducted Olympic Play exercises to maintain a continuing proficiency. Each countdown in the scheduled "dash(-) 6" maintenance inspection cycle was scored according to ORIT criteria. Each Minuteman squadron was on a 30 day cycle and each Titan II site was on a 60 day cycle. During

each semiannual training cycle CINCSAC conducted a force-wide no-notice Olympic Play exercise. That exercise was not part of the maintenance cycle but could be used as a substitute for the next scheduled dash 6 inspection.[346]

(S) SAC's fifth force-wide no-notice exercise was held on 1 October 1968. Out of 982 sorties exercised 967 were effective (98.5 percent). All 48 Titan IIs were effective. Overall, 919 out of 934 Minuteman sorties were effective (98.4 percent). The WS-133A (Minuteman A and B) force was 99 percent effective (515 out of 520) and the WS-133B force was 97 percent effective (191 out of 197). WS-133A-M had 213 effectives out of 217 sorties (98.2 percent). Taking WS-133B and A-M together the Minuteman F force was 97.6 percent effective (404 out of 414).[347]

(S) For July through December 1968 the ICBM force was 98.7 percent effective. The Titan IIs were 99.4 percent effective and Minuteman was 98.7 percent effective. WS-133A, B and A-M were 99.4, 97.1, and 98.6 percent effective, respectively. The Minuteman Fs were 97.8 percent effective (2497 out of 2552).[348]

(S) The sixth no-notice exercise was conducted on 30 June 1969 to prevent interference with the IG and SMES schedules and SIOP retargeting. The SAC ICBMs were 99.2 percent effective (1023 out of 1031). The Titan IIs had 53 effectives out of 54 sorties for a 98.1 percent effectiveness. The Minuteman force was 99.2 percent effective (970 out of 977). WS-133A (Minuteman B) was 99.4 percent effective (491 out of 494) while WS-133B was 97.9 percent effective (189 out of 193). All of the 290 WS-133A-M sorties were effective. The Minuteman F force had 479 effectives out of 483 sorties (99.2 percent).[349]

(S) Cumulatively for January through June 1969 the ICBM force was 98.7 percent effective. The Titan IIs were 96.8 percent effective and Minuteman was 98.7 percent effective. WS-133A, B, and A-M were 99.2, 97.7, and 98.5 percent effective, respectively. The Minuteman Fs were 98.1 percent effective (2904 out of 2959).[350]

3901st Strategic Missile Evaluation Squadron Activity

(U) The 3901 SMES performed the standardization and evaluation function for the ICBM force. Each unit received a semiannual visit during which its operations, maintenance, munitions, communications, and civil engineering functions were evaluated. The 3901st also conducted individual proficiency testing. A few missiles were removed from alert for a detailed evaluation of the physical condition of the missiles and silos. Other missiles were evaluated during the OT/FOT programs.

(S) The increased complexity of the EWO procedures introduced on 1 January 1968 caused an increase in failures by crew members in 3901st and wing evaluations. During July through December 1968 the failure rate in crew member evaluations rose again from nine percent (203 out of 2336 evaluations) in January through June 1968 to 13 percent (253 out of 1986). The Titan II failure rate more than doubled from six to 13 percent (124 out of 952). The Minuteman failure rate rose from 11 to 13 percent (127 out of 1007). The ALCS crew failure rate declined from 11 to seven percent (two failures out of 27 evaluations). These personnel failures would have caused 26 Titan II and 17 Minuteman launch failures out of 4980 attempts. Of the 37 alert missiles evaluated, 14 were excellent, 15 were satisfactory, six were marginal and two were unsatisfactory. Two Minuteman and a Titan II were marginal for misalignment. This was an improvement. The other three marginal Titan IIs and the two unsatisfactory Minuteman had materiel problems.[351]

(S) The crew member failure rate for January through June 1969 was reduced to nine percent on a total of 1998 evaluations. The Titan II failure rate went down to eight percent (76 failures out of 961 evaluations) while Minuteman went down to 10 percent (99 out of 979). The ALCS crews had no failures in 58 evaluations. The improvement was credited to a simplification of EWO procedures on 1 January 1969 and better weapon system training. A total of 29 alert missiles were evaluated. Nine were excellent, 18 were

satisfactory, one was marginal, and one was unsatisfactory. The marginal Minuteman was misaligned while the unsatisfactory Titan II was due to incomplete maintenance.[352]

Minuteman Crews

(S) During 1968 SAC tried to get authorization for more higher grade officers for the crucial alternate (wing) and squadron command posts, and for EWO training duty. It wanted them because of the increasing complexity of Minuteman crew procedures due to the control time launch (CTL) concept. The Air Staff rejected this request three times.[353] In December 1968 SAC gave up on the increased grades for the command posts and decided to get the EWO training people from its own resources.[354]

(U) On 1 July 1968 General Compton approved a three month test (Oil Change) of the two man crew, 36 hour alert proposal for WS-133B and WS-133A-M at Grand Forks and Whiteman beginning on 1 September 1968. SAC had found that the three man crew, 24 hour alert system did not provide adequate crew rest, and that the dual qualification of crew members* was hard to maintain.[355] Eighth Air Force wanted a two man, 24 hour continuous duty tour, with one man allowed to sleep, as in WS-133A,[356] but SAC reconfirmed its intention to test the 36 hour tour (12 hour shifts with two crews alternating).[357] Second Air Force favored the 36 hour plan with two crew members awake at all times.[358] Most missile crews preferred the two man, 36 hour alert tour to the three man, 24 hour alert tour. Eighth Air Force and the 351 SMW continued to endorse the two man, 24 hour tour as a final solution. Second Air Force and the 321 SMW recommended a two man, 40 hour tour (eight hour shifts) that would allow the crews to travel in daylight. The new system shortened the crew work week, improved crew rest, eased the scheduling of crews, and improved training and standardization results through the elimination of dual qualification.[359] The 50 percent

---

* (U) In three man Minuteman F crews the commander and/or the alternate commander had to be able to perform at either crew position.

increase in the number of crews necessitated an increase in the number of wing standardization and instructor crews to 10 and 18, respectively, for the three-squadron wings.[360] On 19 November 1968 General Compton approved a two man, 36 hour tour at Whiteman and Grand Forks on 29 November 1968 and at Malmstrom on 1 January 1969. The wings were allowed to schedule alert tours of up to 40 hours with a maximum continuous alert duty of 12 hours. General Compton indicated that he was "leaning" toward the two man, 24 hour tour.[361] Second and Fifteenth Air Forces favored the 36 or 40 hour alert tours.[362]

Missile Combat Competition

(U) Early in September 1968 Lieutenant General J. J. Catton, the Fifteenth Air Force commander, recommended the missile and aircraft competitions be resumed in 1969, despite the austerity program. He also suggested that these events be combined with a conference of SAC commanders.[368] General Holloway asked Operations to evaluate the proposal.[369] Late in November 1968 General Holloway approved missile and aircraft competitions in 1969.[370] The missile competition (Olympic Arena) was scheduled for the latter part of May. Each wing would be represented by two combat crews, and maintenance and targeting teams.[371] In March 1969 a missile commanders conference was added to the competition.[372] The 321 SMW won the Blanchard Perpetual Trophy as the best missile wing. The 321 SMW was also selected as the best Minuteman wing. The 390 SMW won awards as the best Titan II wing, and for having the best Titan II crew, and the best Titan II maintenance team. The 91 SMW won the best missile crew and the best Minuteman crew awards. The 90 SMW won the best maintenance team and the best Minuteman maintenance team awards.[373]

Reliability, Accuracy and Penetrability

(S) After analyzing the results of operational flights from Vandenberg, tests of the deployed force, and AFLC and AEC R/V and warhead components tests, SAC prepared estimates of operational weapon system effectiveness. When approved by the JCS, these factors were used by SAC for SIOP planning.

it was clear that an area defense ABM was being deployed around Moscow with early warning radars to the north and northwest. At the same time the Soviets were strengthening their offensive missile forces. In FY 1969 they achieved at least equality with the U. S. in the number of land-based ICBMs. In addition to new penetration aids and MIRVs, the U.S. response to the growing Soviet threat included other improvements for the survivability of its ICBM force. In 1969 the main objective of the initial deployment option of the U.S. ABM system was changed from a light defense of the cities to a defense of a portion of the strategic retaliatory forces.

Vulnerability and Hardness Program

(~~TS-RD-NOFORN~~) The effects of nuclear explosions could be categorized as follows: in-silo blast and shock, electromagnetic pulse (EMP), and radiation; in-flight EMP, radiation (x-rays, neutrons and gamma rays), and thermal effects; and the effects on the R/V of dust, debris, and turbulence from previously exploded warheads. These were under study, as were the effects on the R/V of natural phenomena, such as rain and hail. During 1969 through 1967 test programs identified several specific weaknesses. Some modifications were already underway to correct them but much remained to be done. In mid-1967 many of the projects to correct these deficiencies were brought together under the Vulnerability and Hardness Program. These included High Explosive Simulation Technique (HEST), EMP, and radiation tests, and silo, control center and missile hardness improvements. This program of tests and modifications would be lengthy and expensive. Some of the modifications already programmed, and testing to the intensity of the expected nuclear effects would not be completed until 1970 at the earliest.[388] In July 1968 the Air Staff issued a regulation outlining the responsibilities of the major commands and the directorates of the Air Staff to insure that survivability (hardness) would be designed into all new systems and maintained throughout the operational life of a weapon system.[389]

(~~TS-RD-NOFORN~~) In-Silo. In 1965 an assessment of the launch facilities and the launch control facilities revealed deficiencies that reduced their hardness. This weakness led to the HEST tests and the Plan 1 hardness modifications. In three HEST tests prior to 1968 the facilities withstood the blasts. By the start of FY 1969 the hardness modifications had been completed at Whiteman (force modernization), Warren (UHF/Hardness program), and Ellsworth (UHF/Hardness); and were underway at Grand Forks* (Wing VI Update), Minot (UHF/Hardness), and Malmstrom (force modernization).[390]

(S) HEST V,** a 10 megaton, 300 psi simulated blast on a WS-133B silo (Grand Forks site L-16), was delayed about two weeks to 5 September 1968 by heavy rains during test preparation.[391] The test was accomplished successfully. The ground test missile remained on alert and a simulated launch was conducted almost six hours after the event. The launch tube, launch equipment room and launch equipment building seemed undamaged. The test missile was put on diesel power and returned to alert on 7 September 1968 for seven days.[392] A second electronic launch was then attempted. The silo lid opened and the umbilical retracted, but there was no ignition signal.[393] This was entirely due to the test configuration and would not have occurred in an operational missile.[394]

(S) HEST VI, scheduled for the summer of 1969, was to be similar test of a WS-133A-M site at Malmstrom. In December 1968 the Air Staff deferred HEST VI, but would consider it for FY 1971.[395] Based on the previous test results SAC chose to drop HEST VI.[396]

(S) The Plan 1 hardness modifications were completed as scheduled. The last two flights at Grand Forks completed the Wing VI Update in August 1968; Minot completed its UHF/Hardness program on 20 December 1968; and Malmstrom finished force modernization at the end of May 1969.[397]

---

* (S) Not considered part of the Plan 1 program.

** (S) HEST IV, on a WS-133B control center, had been deferred.

(TS) Early in 1969 SAMSO issued a new assessment of blast and shock hardness. Except for the Ellsworth control centers and one at Malmstrom, all control centers were expected to withstand 1000 psi from as much as a 50 megaton blast. The majority could take 1500 psi from a one megaton weapon. For the launch facilities, 119 out of the 1000 could not take a 300 psi overpressure from a 10 megaton weapon. Sixty four of these could not take 200 psi and two could not take 100 psi. Against a one megaton blast, 66 could not withstand 300 psi and two would not survive 200 psi. On the other hand, most of the Grand Forks silos would take up to 450 psi from a one megaton weapon.[398]

(S) SAMSO then proposed three options for further blast/shock hardening of the silos (its' so-called Plan 2). Option 2A called for hardening so that 75 percent of the force would survive at 600 psi. It would require a minimum number of changes and no new construction. If started in 1971, it could be completed in 1975 at a cost of $500 million. The hardening provided under option 2B would enable 75 percent of the missiles to survive blasts creating pressures of 1000 psi. It would call for major changes to the missile mount, closure and other systems. It would cost one billion dollars and could be completed in 1976 if started in 1972. The third option, 2C, would require a protective dome to provide 1500 psi protection. It would require new technology, cost more than $2.6 billion, and could take 10 years to complete if started in 1972.[399]

(TS-RD-NOFORN) Testing for damage to silo equipment by EMP coming through the intersite cable system or coming directly through the air had been done at SAC facilities since 1965 (Project Hardlook). The cable pulse tests indicated that EMP currents in the hardened intersite cables could shut down WS-133A and WS-133A-M silos. An EMP suppression fix (ECPs 1221, 1231 and 1141) was developed and tested in the 1967 EMP tests.[400] The modifications began at Malmstrom (during force modernization) in April 1968. At Ellsworth and Warren the work was combined with the inner zone security system modification

(ECP 53) and completed in February 1969. At Minot the work was done during the UHF/Hardness program. At Whiteman it was combined with the Phase II power modifications (November 1968 through June 1969).[401] Direct EMP testing continued in FY 1969 at Malmstrom site I-6, where threat level testing procedures were being developed in the SIEGE (Simulated EMP Ground Burst Environment) program. Early in October 1968 SAMSO asked SAC for permission to retain I-6 through April 1970; the alternative would be to select a new site in 1969.[402] SAC agreed.[403] In April 1969 SAMSO presented plans for 1969 and 1970. They included a plan for surveys at a small group of sites in 1969 and a larger group in 1970 to verify that the EMP findings applied to the entire force. WS-133B and WS-133A-M silos would be needed in 1970 for SIEGE threat level tests.[404]

~~(TS-RD-NOFORN)~~ Flash x-ray tests in 1967 showed that radiation could cause the guidance system in-flight radiation circumvention detector to shut down a Minuteman F in the silo. The problem could be solved by a change to the guidance programs. For WS-133B the change was incorporated into the -207 tape (available in March 1969) which provided for MK-1A deployment with WS-133B. WS-133A-M would get it with the -11 tape which contained the cancel launch in progress (CLIP) instructions (available in July 1969).[405] Even though CLIP would not be available until December 1969, the tapes could be used earlier.[406] The -207 tapes for WS-133B were delivered on time, but they contained a programming error which eliminated the secondary alignment mode.[407]

(~~TS-RD-NOFORN~~) In-Flight. The effects of EMP and radiation on the missile during powered flight were also dangerous. Periodic nuclear bursts of weapons as low as one megaton outside the atmosphere would create an environment which could destroy any Minuteman launched into it. To defeat such a potential "pindown" tactic, sensors would have to be developed which could detect such a condition. Missiles would also have to be hardened and their tactics altered. Project Insight EMP tests in 1966 and 1967 revealed that hardness

Current Materiel Problems

(S) By 1968 most of the Minuteman and Titan II problems affecting EWO performance had been solved. Problems identified in the flight test programs and hardness changes have already been dealt with in the preceeding sections.

Minuteman

(S) As already mentioned, force modernization at Malmstrom ended on 27 May 1969 when the last flight (K flight) was returned to SAC. This brought the Minuteman F force up to 500 missiles.[647] The completion of Malmstrom force modernization also marked the completion of the Plan I hardness program. In February 1969 the EMP cable suppression fix and the inner zone security system modification programs had been completed at Warren. The Wing VI (Grand Forks) update program was concluded in August 1968, although the ALCS UHF installation would not be done until FY 1970.[648]

(S) Efforts to improve electrical power for the Minuteman silos and control centers continued in FY 1969. Between April and August 1968 launch facilities at Malmstrom were improved. The Malmstrom control centers were done between November 1968 and March 1969. Modifications to the Ellsworth control centers were done in November 1968. The Ellsworth silos had been done in 1967.[649] The long awaited SAMSO Phase II power program for Whiteman, Warren, and Minot AFBs began at Whiteman (L flight) on 18 November 1968.[650] Although the silos in the Phase II power program would be in the hands of the contractor, they were reported as "A" cap SIOP required sorties because the time span in work for each sortie was too short to warrant a change to "L" cap (not required).[651] Whiteman completed the modifications, as scheduled, at the end of June 1969.[652] Power modifications at Warren would begin in July 1969 and be completed in June 1970. All sorties would remain "A" cap.[653] Minot would be done during force modernization.[654]

(U) In order to avoid motor generator failures due to worn bearings, SAC and OOAMA set up a program for inspection and repair as necessary (IRAN) for all WS-133A and WS-133A-M generators between

July 1968 and June 1971.[655] During the last half of 1966 the schedule changed frequently.[656] A firm schedule was developed in January 1969. Malmstrom was done during force modernization (August 1968 through April 1969). IRAN on some of the generators at Ellsworth was accomplished between August 1968 and March 1969; the rest would be finished between July and November 1969. Minot began in June 1969 and would finish in August 1970. Whiteman had part done between March and July 1969, during the Phase II power modifications, and would finish between October 1969 and June 1970. Warren would start in November 1969, during Phase II power modifications, and be completed in June 1971.[657]

(S) In March 1969 SAMSO asked SAC if its 1963 requirements for extending the life of the batteries in the silos at Ellsworth, and general improvements in survivability were still needed during force modernization.[658] SAC replied that because of new tactics which might require missiles to be withheld from launching for an extended period of time, the requirement to extend battery life from six to 20 hours was still valid.[659]

(S) SAC continued to cooperate with SAMSO and OOAMA in an effort to find out why the Minuteman F guidance and control units failed more often at WS-133B sites than at WS-133A-M sites.[660] C and G flights at Grand Forks operated on standby diesel power for 60 days between August and October 1968 to see if the guidance systems would perform better than they did on the uneven commercial power. They did not improve.[661] SAMSO Rapid Evaluation and Correction Teams (REACT) conducted thermal, power, OGE, and grounding tests at Grand Forks sites G-18, I-32, and N-34 during July 1968 and November 1968 through January 1969.[662] Changes made in the grounding of power systems were also tested at Vandenberg in October 1968.[663] In November 1968 SAMSO reported on a comparison study at Grand Forks WS-133B and Whiteman WS-133A-M equipment and procedures. Because of the differences in the weapon systems and procedures it was hard to really compare them. Some WS-133B programming tapes and technical orders would be changed but SAC and SAMSO agreed that commercial

power was not a factor in the guidance system failures and that there was no evidence that the OGE was responsible. A couple of minor modifications were approved to reduce transient power surges, but a larger group of grounding changes was considered premature.[664]

(U) Early in 1968 OOAMA developed a maintenance device to analyze Minuteman guidance system performance without disturbing the alert missile. The Data Transrecorder (DTR) was a tape recorder which transferred guidance performance data to a computer in a mobile van for analysis. This system was used by OOAMA in the Pacer Kite program. SAC accepted the DTR proposal in December 1968. Programming tape changes for Minuteman F and G would be available in 1970.[665]

(U) Testing and planning for the use of the portable alignment gyrocompass (PAG)* continued in FY 1969. The PAG would provide for all-weather alignment and reduce vulnerability to human errors by eliminating all above ground measurements and angle transfers to the autocollimator in the silo. During June through October 1968 and April-May 1969, tests were run at Warren and Grand Forks using two PAG system test models. The objective was to develop technical data, train combat targeting teams, and to gain operational experience with the equipment.[666] A contract for 49 PAGs was awarded to Honeywell Inc., in March 1969. The first PAG would be delivered to OOAMA for testing in November 1969. Between January and September 1970, SAC would get 40 for Minuteman and five for Titan II.[667] An azimuth verification facility for the storage and alignment of PAGs was needed at each Minuteman base and Vandenberg. Four would be built in 1969 and three in 1970.[668] MAC and SAMSO recommended that MAC's 1st Geodetic Survey Squadron own and operate all of the PAG facilities.[669] SAC felt that its wings should own the buildings, and that its combat targeting teams should participate in the instrumentation verification process. A meeting on this would be held in July 1969.[670]

---

* (U) Also referred to as the Azimuth Laying Set (ALS).

(S) In July 1968 SAMSO informed SAC of a proposed force modernization change for the last three wings. Several million dollars could be saved in the Minuteman G program by using a periscope to transfer the autocollimator light beam to the guidance system instead of lowering the autocollimator bench, in addition to other OGE changes.[671] SAC did not object but withheld approval pending testing and verification of the concept.[672] A technical feasibility demonstration with existing periscopes was successful in November 1968.[673] In March 1969 SAMSO stated that since Ellsworth was not scheduled for Minuteman G, and since the periscope alignment system might affect Minuteman F CEP, the periscopes would not be installed there and only some of the Minuteman F/G compatibility changes would be done. Modifications to the missile mount, the guidance umbilical retract, and the periscope would be done later if required.[674] SAC had to decide how much Minuteman F/G compatibility was needed at Minot, Ellsworth and Warren.[675] In May 1969 SAC agreed to the SAMSO proposals. Minot would get the periscope system but SAC asked that all changes necessary for Minuteman F compatibility be done. Ellsworth and the first squadron at Warren would not get the periscope, missile mount, or umbilical retract changes. They would be done by non-SAC personnel if and when necessary. A decision on the last three Warren squadrons (scheduled for Minuteman G) was deferred.[676] A contract for 153 periscopes was awarded in April 1969. No spares were ordered, however, and no plans were made to test an operational periscope with the Minuteman G guidance system and autocollimator prior to its' installation in an operational silo.[677]

(S) During the summer of 1968 SAC became concerned about a potential problem with the Minuteman G post boost vehicle (PBV). The PBV was designed as a "dependent" system in that if an R/V failed to deploy, the PBV shut down and would not deploy the remaining R/Vs. SAC wanted a more "independent" PBV that could continue its mission even if an R/V failed.[678] The Navy's Poseidon PBV was not as limited because of its "explicit" guidance programming. The

Poseidon's more advanced computer enabled the PBV to recompute a new flight plan after each R/V deployment, and it allowed for non-optimum PBV performance. Minuteman G and all previous ballistic missile inertial systems, including Polaris, used an "implicit" guidance system that was inflexibly tied to a preplanned trajectory.[679] SAC asked SAMSO and the Air Staff to look into making Minuteman G PBV deployment more independent. SAC also asked them to consider explicit guidance in future ICBM planning.[680] The Air Staff directed AFSC to study explicit versus implicit guidance.[681] At the end of October 1968 SAMSO said that the elimination of acceleration checks from the flight program would prevent the PBV from shutting down if an R/V failed to deploy. The probability of successfully continuing the mission with a hung-up R/V was considered good. New tapes and flight testing would be available in January 1970.[682]

(S) With the advent of Minuteman G and multiple independently targeted R/Vs (MIRV), the complexity of force application and targeting would increase considerably. SAC and SAMSO were already well along in developing computer programs that would lead to operational targeting materials. The first program, Minuteman (or MIRV) Allocation Program (MAP) 101, was delivered to SAC on 11 June 1968.[683] The FORTRAN version of MAP 102, an intermediate or master program, which added launch and reliability factors to MAP 101, and could identify missiles against specific targets, was delivered on 12 November 1968.[684] A JOVIAL version of MAP 102 was expected in March 1969.[685] A more advanced master program (MAP 103), integrating the previous data with other subordinate programs (MAP 104 through 111), was to be delivered to SAC in July 1969 so that the first Minuteman Gs could be targeted.[686] The first Minuteman G Operational Targeting Program (MOTP 301.01), would be delivered to SAC on 1 March 1970. It would include all six payload configurations, but would be limited in firing azimuths to ±60 degrees from North and to the test area azimuths (Kwajalein, Phoenix, Oeno). The second program, MOTP 302.02, with

full 360 degree coverage, variable spacing between chaff clouds, improved data, and reduced production time, would be delivered on 1 November 1970.[687]

(S) Late in December 1968 SAC asked SAMSO to look into the integration of the Naval Weapons Laboratory's (NWL) Poseidon application program with the Minuteman G program. The resulting "universal" program would be used by the JSTPS to apply the entire strategic missile force.[688] As NWL's program was considerably behind MAP, SAMSO would produce the universal program using inputs from the Navy. A first draft which included Minuteman, Titan II, Polaris and Poseidon was expected to be delivered by the end of 1969.[689] SAMSO asked for $10.3 million in FY 1970 for the MOTP, the Minuteman application program and the universal MAP,* but at the end of June 1969 it looked like only $5.75 million would be allocated. SAMSO warned that targeting programs, unlike hardware procurement, could not be diluted without making the whole program useless.[690]

(S) Four times prior to beginning of FY 1969 the memory tapes of the Minuteman F ground and airborne computers, with a total capacity of 6912 words, had been cleared of marginal and non-critical functions to make way for more important ones.[691] In July 1968 it was already evident that the Minuteman G memory (13,568 words) was already in trouble. With already planned additives such as HAF, EMPSS/CLIP, and in-silo survivability the number of words required was around 14,500. A SAMSO/TRW Systems Group committee was formed to identify about 1400 words for deletion.[692] At the end of October 1968 SAC approved the deletion of 1000 words for WS-133B and 1200 for WS-133A-M.[693] Early in December 1968 SAC approved another 500 words for deletion.[694] SAMSO estimated that the first operational memory tapes for WS-133B and WS-133A-M would use about 13,000 and 12,500 words, respectively.[695]

---

* (U) MAP now meant Missile Application Program.

(S) In order to relieve recurring Minuteman computer memory problems SAC had asked for memory augmentation in the form of a new airborne computer and/or a launch facility processor (LFP) which would allow the transfer of functions from the airborne computer to the launch facility. Because of the amount of memory space involved the Status Authentication System (SAS) for WS-133A-M and the Enable Command Timer/Airborne Command Entry (ECT/ACE) modifications were tied to LFP deployment. The LFP included a large random access weapon system computer (WSC) with a growth potential up to 32,000 words; a secure data unit (SDU); buffers; and ordnance monitor circuits. It would replace most of the weapon system OGE and become the main link between the control centers and the missile guidance system. The WS-133A-M SDU, providing two way secure communications between the control centers and silos, would replace the one way WS-133B SAS already deployed.[696]

(S) In July 1968 OSAF approved LFP/SAS development and planning for deployment beginning with Ellsworth force modernization in June 1971.[697] Soon after OSAF began to reconsider the adequacy of LFP in the light of future requirements for defense integration, hard rock silos, and advanced ICBMs.[698] OSAF and ODDR&E were seriously considering a new airborne computer in addition to the LFP for the above mentioned requirements.[699] As a result of this review, the LFP/SAS and defense integration items in the FY 1969 program change request were combined. A launch control facility processor (LCFP) was added for defense integration and secure communications and retargeting transmissions from the control center to the silo. The new system was called the Minuteman Integrated Command Control System (MICCS). Part of it (MICCS/LF) would be available in March 1972 with the third force modernization squadron at Ellsworth. The full system would be available two months later with force modernization of the first flight at Warren. Total program cost through FY 1974 was expected to be $530.9 million.[700]

(S) At the end of December 1968 OSD approved development of MICCS but removed most of the FY 1969 and some of the FY 1970 funds.

Although justification for deployment would be needed before June 1969, the proposed deployment would begin with force modernization of the second squadron at Warren in October 1972.[701] In this same action, OSD approved a second contractor for the production of the Minuteman G guidance and control unit. He would serve as a hedge against a repetition of the Minuteman F guidance problem. Included was authority to ask for proposals for a new airborne computer. ECT/ACE was still linked to MICCS.[702] SAC objected to the inclusion of ECT/ACE in MICCS because OSD and the JCS had already agreed to defer the undesirable ECT restraints.[703] The Air Staff agreed, and OSAF cancelled ECT with the provision that MICCS and CLIP be designed so that a permissive action link could be added later if needed. ACE was deferred until after LFP deployment.[704] SAC's command controllers wished to amend the MICCS design to allow for ALCS demand access to the MICCS computers by the use of secure codes after two way communications were provided (ALCS Phase III). This would counter a chemical/biological/radiological (CBR) threat to the control centers and provide more flexible control of the missile force.[705]

(S) In February 1969 SAC told Headquarters USAF that it supported the MICCS program. As justification for it, SAC emphasized that the memory augmentation and remote targeting functions rather than defense integration, were the main concerns with the advent of multiple independently targetable reentry vehicles. After June 1970, when MIRV would be deployed, manual retargeting and retiming of the force for SIOP revisions would require considerably more time and maintenance personnel. For that reason, SAC wanted MICCS IOC as close to MIRV IOC as possible.[706] General Ryan agreed with SAC's position on MICCS and operational priorities, but OSD and the Bureau of the Budget considered defense integration the main justification for MICCS even though the exact amount of integration had not been determined.[707]

(S) Early in March 1969 SAMSO asked for proposals from industry on the second source for the Minuteman G guidance system. It included the option for a new airborne computer with a memory of 6 to 8,000 words.[708]

(~~TS~~) As a result of the new administration's budget review in February and March 1969, MICCS funds for FY 1970 were cut from $36 to $20 million. This would delay MICCS until March 1973.[709] SAC and SAMSO hoped to restore half of the amount and accelerate the IOC date to mid-1972.[710] In May 1969 SAC sought to provide the additional justification needed for MICCS. The key point remained SIOP effectiveness with MIRV through an infinite ability to retarget missiles from the control center. It was true that with enough people and maintenance equipment, retargeting could be done cheaper manually, but for an operationally effective weapon system MICCS was the answer.[711] SAC's operations planners said that MICCS remote retargeting would provide pre-attack SIOP targeting flexibility, trans-attack battle management in association with Have Bird and 949; and post-attack reprogramming of surviving forces.[712] SAMSO presented its MICCS justification to various groups from OSD, OSAF, and the Air Staff during June 1969.[713] As MICCS would not be available until FY 1973, SAC expected the number of retargeting requirements to continue to grow during the next few years. During FY 1971 about 200 silos would be entered each month, with heavy burdens in the middle and at the end of each revision to the SIOP. Additional combat targeting teams would be needed to keep the time required to retarget the fleet down to 60 days. More teams would be needed if full retargetings were needed more frequently than semiannually.[714]

(~~S-RD-NOFORN~~) By the spring of 1969 SAC began to prepare for the acceptance of Minuteman G. To prevent a repetition of the reliability, accuracy and maintainability problems encountered with Minuteman F due to concurrent testing and deployment, and to prevent the replacement of proven weapon systems with an unproven one, SAC planned a careful evaluation of the performance during R&D of the infinitely more complex Minuteman G.[715] Proposals were made either to deploy some Minuteman Gs in F/G compatible silos prior to Minot force modernization, or to put G models in the first squadron at Minot and continue force modernization with Fs until the Gs proved

reliable.[716] A list of milestones, decisions, decision points and factors was developed in May 1969. For example, in November 1969 SAC would decide, based on R&D performance, whether it should allow the B models to be removed from alert for force modernization beginning in January 1970.[717] It was already too late to do anything about concurrency for Minuteman G, and it was unlikely that future systems would be acquired in any different fashion. Nevertheless, SAC was prepared to monitor Minuteman G performance closely and act to stop deployment if necessary.[718]

Titan II

(S) During FY 1969 only five Titan II recycles were accomplished. Two were for FOT launches, two were for SLAP, and one was for unscheduled maintenance.[719] Titan II recycles were becoming so rare that SAC had to authorize the removal of sorties from alert for R/V installation training.[720] A proposal for the recycling of one missile a year from each unit for training was under consideration.[721]

(U) Project Pacer Ebb, the addition of surge arrestors and filters in the silo to protect against EMP, was completed at Davis-Monthan (390 SMW) on 11 October 1968, about three weeks ahead of schedule. Little Rock (308 SMW) and McConnell (381 SMW) had been done in FY 1968.[722]

(S) In July 1968 a site (373-5) at Little Rock which had been operating on standby power for two weeks was found to have a large azimuth alignment error. The diesel exhaust had moved the autocollimator mount and the reference mirror on the silo wall. These circumstances were reproduced in tests at site 373-6 in August and September 1968.[723] The first modification tested, a combination of insulation and cooling, in late September 1968, was not successful. At the same time two sites at each wing were tested to see if this was a fleetwide problem. The results were inconclusive.
SAC operations planners recommended that sites should not be put on diesel power automatically at DEFCON 1. A new cooling and insulation fix was developed for testing in November 1968, and more tests would