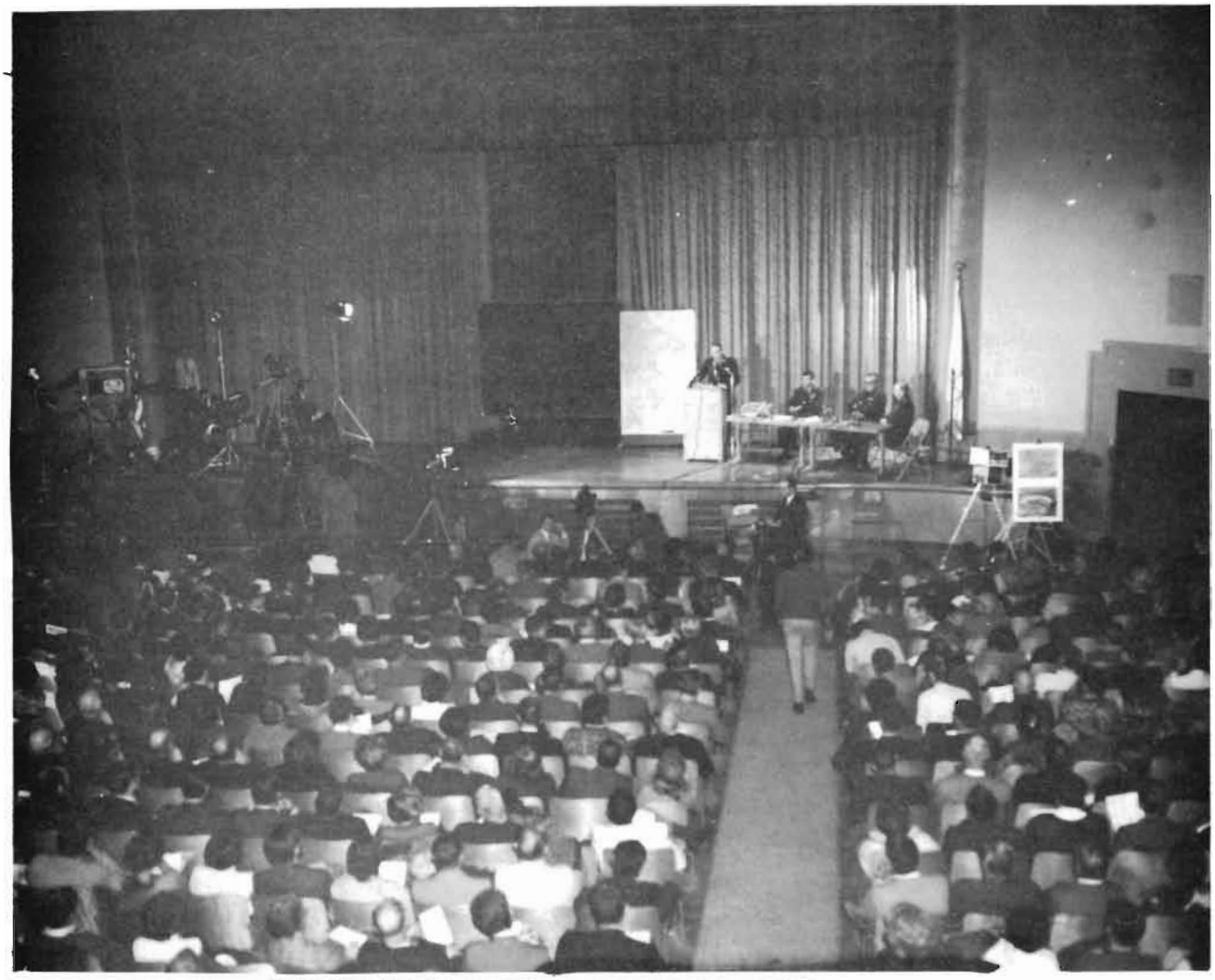
CHAPTER II

TRANSITION TO SAFEGUARD

Throughout the fall of 1968, opposition to the deployment of the SENTINEL ABM System steadily grew more extensive and more vocal, becoming a significant citizens' movement in the north-central and New England states as well as in some smaller isolated enclaves on the West Coast. The anti-BMD movement especially began to make itself heard after the adjournment of Congress in late October and the Presidential election of early November. The change in national leadership from Democratic to Republican after Richard Nixon's election seemed to make no difference to opponents of BMD, and during December and the first month of the new year the anti-BMD current continued to swell in number and clamor, without as yet noticeably affecting public policy. Throughout most of 1968 and before, the opponents of BMD had mostly been drawn from the academic and scientific community, clustering around the American Federation of Scientists and such figures as Dr. Herbert York, Dr. Jerome Wiesner, Dr. George Rathjens, Dr. Hans A. Bethe, and Dr. Richard L. Garwin. [1] A number of these men, such as Wiesner, who had been Director of the Office of Science and Technology under Presidents Kennedy and Johnson, and York, who had twice served on the President's Science Advisory Committee, had been official advisors in Government agencies. Others, like Bethe and Rathjens, were highly placed in academic circles, or, like Garwin, directed private research "think tanks." Now, in part because of their leadership, in part because of widespread local concern about the worth and dangers of the SENTINEL, the anti-BMD movement spread to the grass roots of American life. One general indicator of the nature and appeal of the movement can be seen in the fact that **Scientific American,** a distinguished semi-popular journal bridging the academic and lay communities, published no less than three articles related to strategic arms and the BMD question between March 1968 and August 1969.[2]

Interest in BMD was particularly strong in the New England area, where SENTINEL construction had gotten underway in September 1968. Here the escalation of public attention in the three months between September 1968 and January 1969 can be gauged by two public relations meetings sponsored by the Corps of Engineers to explain SENTINEL constuction around Boston. The first meeting held by the Corps at North Andover, Massachusetts, on 25 September to inform residents about the PAR site at Sharpner's Pond had resulted in some local newspaper publicity and an attendance of about 100 persons. The tone of this assembly was concerned but courteous, and it came and went without discernable consequences.

The Corps' second meeting, held in the Reading High School auditorium at Reading, Massachusetts, on the evening of 29 January was a wholly different event in almost every way. Widely heralded by notices in local papers and in the Boston press, the Reading meeting was forecast by local police to attract as many as 5,000 persons. As it happened, attendance was considerably reduced by a sudden winter blizzard a few hours before the meeting which dumped several inches of snow on the area. Despite this inclemency, Dr. Rathjens and other out-of-state BMD opponents, together with an estimated crowd of between 1,000 and 1,300, packed into the auditorium and adjoining cafeteria to hear Huntsville Division Engineer General Young's presentation. By contrast with the earlier North Andover meeting, the audience was unsettled, dubious, and outspoken. On several occasions the General was interrupted by questions, comments, and catcalls, which interjections were often followed by loud and prolonged applause if they were to the liking of skeptics. General Young responded to the barrage of questions with answers from his own knowledge, "question-and-answer" briefings, and information from SENSCOM. The meeting lasted three hours and was widely covered by the national and local press as well as by radio and television, one three hour videotape recording later appearing on educational television. The **Boston Globe** reported the next day that some 500 residents had stayed after the meeting to organize a further local opposition effort.[3]



READING, MASS. MSR PRE-CONSTRUCTION MEETING 29 JANUARY 1969

A most important consequence of the Reading meeting became apparent soon afterwards when Massachusett's influential Senator Edward Kennedy was drawn into the opposition movement. As the **New York Times'** John W. Finney later reported, immediately after the Reading meeting "ended on an inconclusive contentious note," former Kennedy advisors Wiesner, Rathjens, and Richard N. Goodwin contacted the late President's younger brother by telephone and urged him to join the BMD opposition.[4] This Senator Kennedy did. The next day, 31 January, he wrote to Secretary of Defense Melvin R. Laird that the SENTINEL System was technically deficient, dangerously sited, unduly costly, and deleterious to domestic priorities as well as to prospects for an arms agreement with the Soviet Union.[5] The Kennedy letter touched off extensive Congessional debate on 4 February, which eventually culminated in threats by the House Armed Services Committee to cut off approval for SENTINEL land acquisition unless the Administration reviewed the entire BMD program. On 6 February, Secretary of Defense Laird announced just such a Presidential review. Pending the outcome of the review, all SENTINEL activities were suspended.

The Presidential review lasted five weeks, during which time the President and his chief advisors weighed the fate of the SENTINEL System. Their

principal options were to expand the SENTINEL into a "thick" anti-Soviet system, to continue the Johnson Administration's "thin" SENTINEL unchanged, to modify the SENTINEL deployment by concentrating it in Midwestern ICBM fields, or to terminate any kind of BMD deployment altogether. The first two choices were politically and economically untenable under prevailing conditions of the Vietnam War and socio-political criticism. The last seemed ill-advised because of the military advantages offered at the time when the Soviets were introducing their silo-cracking SS-9 missile with multiple warheads and most especially because the United States would have need of such a system as a "bargaining chip" in arms limitations discussions with the Soviets. The possibility of such negotiations had often been broached during 1968, but their probability looked increasingly good early in 1969.

At his fourth news conference called at the White House on 14 March President Nixon announced the long awaited results of the review and his decision to significantly modify the nations BMD deployment scheme. He noted that after a study begun in February, he had concluded that the previously adopted SENTINEL program should be redirected into a terminal defense network primarily oriented towards protection of the country's strategic forces. The new deployment, the President said,

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

The President likewise noted some things that the new system would not do. It would not provide a city defense, because "there is no way that we can adequately defend our cities without an unacceptable loss of life." Under either a "thick" or "thin" area defense, prohibitive civilian casualties were to be expected, and accordingly, the best alterntive was to defend the deterrent forces. Other alternatives, those of continuing research and development, of doing nothing, or delaying for some months, could not be countenanced because of the lead time necessary in meeting the Soviet threat that would exist in 1973. Also, increasing the nation's strategic capability through additional submarines, MINUTEMEN, or bombers had been rejected because, the President reasoned, it would prove provocative and might escalate the arms race. Lastly, the new system differed significantly from SENTINEL in one other way. Unlike the former program, which was dependent upon a fixed deployment schedule, the new system was to be subjected to an annual reappraisal in the light of changes in the threat to the nation, progress in arms control, and advances in BMD techniques.[6]

As usual with such conferences, the President did not further elaborate on details of the new system's cost, deployment schedule, site locations, or equipment provisions. Many of these questions, however, were answered later in the day at a Pentagon press briefing offered by Deputy Defense Secretary David Packard.

Standing before a large national map entitled "Modified SENTINEL," Packard pointed out that the new BMD system would involve a total of twelve sites, each of about 300 acres. The first two would be located at Grand Forks AFB, North Dakota, and Malmstrom AFB, Montana, with follow-on sites in the upper Northwest; central and southern California; Warren AFB, Wyoming; Whiteman AFB, Missouri; the Michigan-Ohio area; southern New England; Washington, D.C.; Dallas, Texas; and the Florida-Georgia area. Additional sites might be added later to generate a limited area defense for all fifty states.

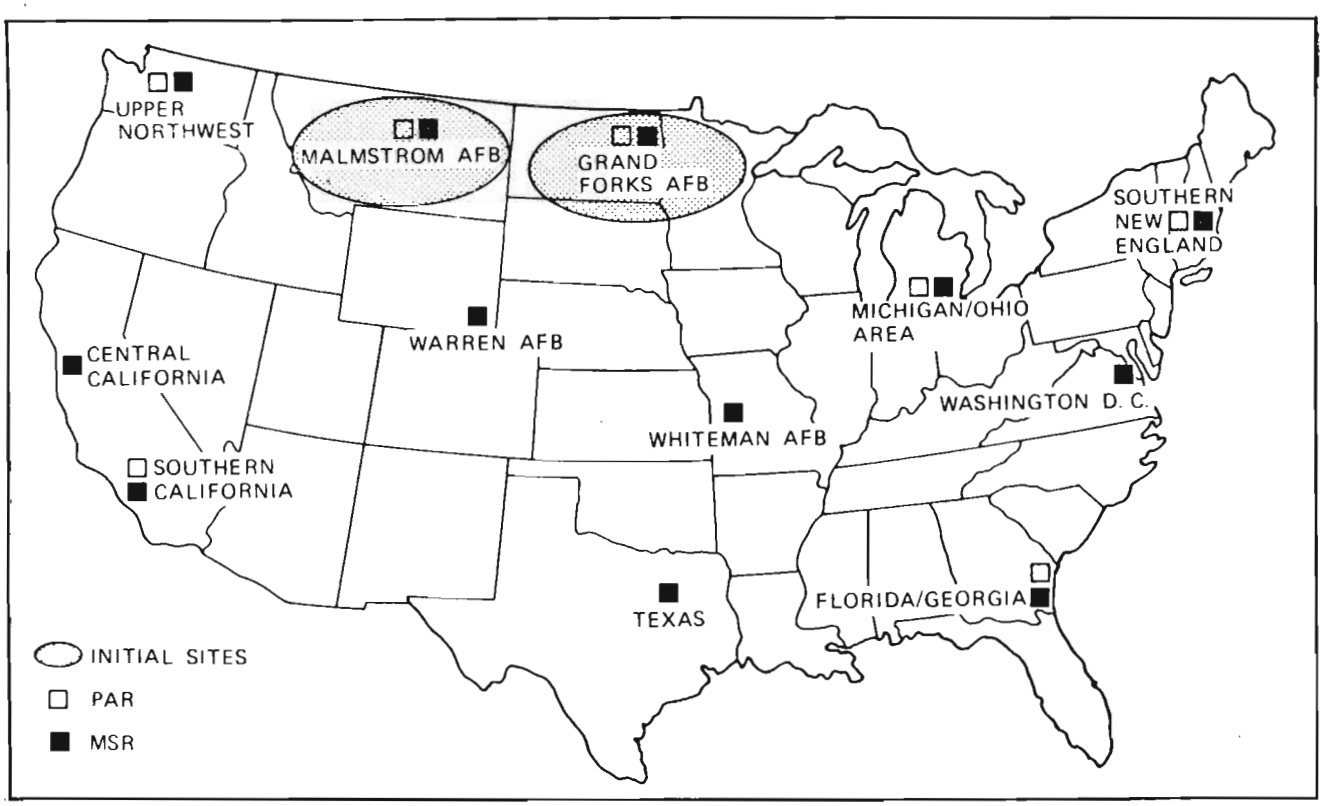
The "Modified SENTINEL" featured two kinds of installations: SENTINEL-type PAR's close by MSR's, and MSR's sited by themselves. Seven PAR's with a total of eleven faces located around the periphery of the country would generate an all-around search capability, with special surveillance against submarine launched attacks that were formerly an Achilles Heel of the SENTINEL System. These seven PAR sites were combined with an MSR facility in the near vicinity to defend both the PAR and the region's deterrent forces. Five other sites, mostly in the interior of the country, featured MSR's only. All twelve MSR's were to have four active faces for 360 degree coverage and all twelve were to be armed with both SPARTAN and SPRINT missiles, but none of these were to be in proximity to heavily populated urban areas. The single exception, an MSR near Washington, D.C., was necessary to protect the "National Command Authorities" of civilian and military leaders.

Construction of all twelve sites promised no great savings over SENTINEL, in part because of inflation. Packard estimated that to complete ail twelve sites soon after 1975 would entail a ballpark cost of between

$6 and $7 billion, or $1.5 billion more than the SENTINEL System. Initial deployment was to begin with construction of a single face PAR and a four face MSR near the MINUTEMAN fields at Grand Forks AFB, North Dakota, and Malmstrom AFB, Montana. About $2.1 billion would be needed for these two sites, with about $800 million already in hand for SENTINEL work. These figures did not include the cost of warheads, which had to come out of funding for the Atomic Energy Commission, or costs of research and development, already accomplished in large measure.

The two initial sites at Grand Forks and Malmstrom comprised an intermediate Phase I, beyond which lay multiple options for Phase II in conformity with the annual evaluation promised by the President. If the Soviet ICBM force continued to grow, Phase IIA could be chosen by building the planned MSR sites at Whiteman AFB, Missouri, and at Warren AFB, Wyoming, and by beginning a PAR-MSR complex at Washington, D.C. Phase IIB called for the activation of all twelve sites if the Soviet threat seemed to be materializing around submarine launched missiles, and Phase IIC also involved twelve sites with fewer missiles to counter a Chinese ICBM expansion.[7]

Probably taking their cue from the working of the President's remarks, the press and media began referring to the "Modified SENTINEL" as the SAFEGUARD System, and the military followed suit officially on 25 March.[8] The BMD program thus launched would stretch across the next six years, ultimately producing two construction starts and one site completed after implementation of the "Agreement on ABM Systems" signed with the Soviet Union in May 1972. Though nearly as abortive as its predecessor, in retrospect the inauguration of the SAFEGUARD program represented a shrewd effort on the part of the Chief Executive and the military to balance out diverse social and political criticisms with economic and diplomatic considerations while still giving the country an effective BMD system. The resulting SAFEGUARD defense focus was shifted to terminal or point protection for national strategic forces with area defense for the population a secondary benefit. This objective was a retrenchment from the ambitious goals of SENTINEL, but it appeared more feasible and attainable and could be advertised as such. SAFEGUARD should have been more effective in dealing with sea-based assaults, and it did move controversial nuclear warheads away from



populous centers while costing about the same as its antecedent. Additionally, the flexible deployment schedule also helped to take the wind out of some anti—BMD forces which had criticized the rigidity of SENTINEL programming. Finally, construction of SAFEGUARD preserved a BMD program-in-being which strengthened the American hand at any future arms limitation talks.

Despite its apparent advantages over SENTINEL, the SAFEGUARD program immediately encountered stormy weather which mounted to hurricane proportions during Congressional debates of the spring and summer. No sooner had the SAFEGUARD decision announced that the **New York Times** indicted it editorially, deeming it "the useless 'Safeguard'" and "an unconvincing package" as "wasteful as the pyramids and not much more useful." "It is not necessary," the **Times** went on, "for a majority of the Senate to remain in bondage to the Pentagon pyramid-builders in order to show that they care about the defense of this country."[9] Pugent sentiments like those of the **Times** could be heard in every quarter in 1969, but as Benson Adams has written in **Ballistic Missile Defense,** it should be understood that at this time the BMD issue was rarely weighed objectively on its own merits or faults.[10] This was an era of draft-card burning, campus protests, "flower children," outspoken clergy, and wide social discontent; in it, BMD was a tangible issue to be grasped and argued amid a powerful flux of despair, frustration, and questioning surrounding the Government, the military, national priorities, the arms race, inflation, and the values of a technological society. As much as for its intrinsic worth, BMD was debatable because it cut across all these sensitive areas as few other issues did.

The traditional American political forum for such controversies is the Congress, and debate there over BMD and the proper way to implement it began to heat up in early February. The Presidential review, 14 March news conference, and announcement of SAFEGUARD did nothing to quench Congressional interest, which mounted throughout the spring and early summer to reach a climax with decisive votes in August. During this period those pro and con continued to organize their forces and lobby their elected representatives; two typical organizations in the thick of things were the Citizens Committee for Peace with Security and the National Citizens Committee Concerned about the Deployment of ABM. Each of these and others like them also continued to have the support and encouragement of prominent personages from all walks of life, many of whom were heard in prolonged spring hearings before both the Senate Armed Services Committee and the Senate Foreign Relations Committee.[11] The hostility of influential Senators in the latter committee made Senate passage of necessary authorizations and appropriations unpredictable until the final votes were taken.

Since both houses of Congress had to approve both authorizations and appropriations bills, this gave BMD opponents four chances to halt the program. Additional opportunities could have come in the conference committee had the House and Senate been unable to pass identical bills. The crucial Senate debate began on 9 July with consideration of the FY 1970 Defense Authorization Bill. On 17 July, the entire Senate met in a rare closed session to allow opponents to introduce classified Pentagon information bearing on the Soviet SS-9 threat. By the fourth week of debate, it was clear that the rest of the country, like the Senate, was closely divided on the issue--a Gallup poll of late July showed that 58 percent of the sample described themselves as either uninformed or undecided on the issue.[12]

On 6 August voting began. Senator Margaret Chase Smith's first amendment to bar all SAFEGUARD spending was defeated 11 to 89; her second amendment, effectively cancelling SAFEGUARD but permitting other BMD research, was narrowly defeated by a 50 to 51 vote in which Vice-President Spiro Agnew cast the deciding ballot. A similar Cooper-Hart Amendment was also defeated 49-51, and the next day, 7 August, an amendment by Senator McIntyre was defeated 27 to 70. After defeat of these amendments in the Senate, the bipartisan coalition opposing SAFEGUARD steadily lost ground. In reality, the 6 August vote was the highwater mark of BMD opposition in the Congress. On 18 September 1969, the Senate finally approved the $20 billion Military Authorization Bill, followed in October by the House of Representatives. Later, both House and Senate passed a $69.9 billion Defense Appropriations Bill containing $1.5 billion in funds for SAFEGUARD expenditures in FY 1970.[13]

Closely linked with the Great Congressional BMD Debate of 1969 was another development that would become even more crucial for the future of SAFEGUARD. As early as 1 July 1968, when signing the Nuclear Proliferation Treaty, President Johnson agreed to hold arms limitations talks with the Soviet Union, with BMD to be on the agenda. However, because of Vietnam, the Czech invasion, and presidential elections, these talks had never gotten off the ground. On the day of Nixon's inauguration, the

Soviets renewed their interest in starting strategic arms negotiations. Preliminary discussions were delayed during the Congressional debates, but on 25 October 1969, near the end of the Congressional actions, the Soviets agreed to come to the table. The first preparatory talks commenced at Helsinki, Finland, on 17 November 1969. Thus, having weathered the test of Congressional approval during the summer, the SAFEGUARD program's future remained cloudy because of diplomatic considerations at the highest level.

The Presidential review, Congressional actions of the summer and fall, and the opening of preliminary arms talks had important consequences for the entire Army infrastructure that was carrying out the development and deployment of the United States' BMD system. The outcome of the Presidential review as announced on 14 March made it clear that the SENTINEL program was now a thing of the past and that its SAFEGUARD successor would demand a certain redirection of effort to accommodate the revised tactical approach and modified scheduling. Whether or not the new BMD program would actually materialize, however, was contingent upon Congressional confirmation for the Chief Executive's decision, and as has just been seen the necessary final funding votes were not taken until the mid-fall of 1969. Hence, the SAFEGUARD program was inaugurated under an atmosphere of suspense and uncertainty, an atmosphere that persisted strongly up to the crucial Senate votes of 6 August and to a diminishing degree thereafter. In effect, during the spring, summer, and fall, members of the SAFEGUARD community had to assume that their program would be authorized by the Congress and proceed in that belief while refraining from major decisions and commitments until their assumptions were vindicated by legislation. At Huntsville Division, the constraints and delays due to Congressional debate were acknowledged to an attentive staff a few days after the historic Senate vote of 6 August, when Division Engineer General Young wrote in the unit's "Information Bulletin" that

> The delay incurred in reaching a vote in the Senate has in turn caused delays in some of our planned activities and we are now faced with getting those things done in a compressed period of time. Furthermore, we will continue to be constrained in some desired actions until the Congress has actually passed and sent to the President the legislation covering the authorization and appropriation bills. None the less, we will be expected to meet schedules which were established with earlier Congressional approval in mind.[14]

In the next issue of the "Bulletin" in September, General Young again observed the importance of the debates and votes then being carried on in the houses of Congress and outlined to Division personnel the complex legislative process essential to the passage of DOD budgetary requests from their introduction to Presidential signature.[15]

Even without the assurance of final Congressional approval, though, the Army could, and did, initiate several steps to expedite the smooth transition to SAFEGUARD. Fortunately for all concerned, the adjustment was not nearly as rude as that which might have come from a more radical deployment scheme. Ten days after the Presidential announcement, the Department of the Army officially named the modified BMD system the "SAFEGUARD Ballistic Missile Defense System" and instituted corresponding changes in organizational acronyms throughout the SENTINEL infrastructure. In most cases, the former "SEN-" prefix was replaced with "SAF-" in acronymic references. The former SENTINEL System Manager, for example, now became SAFSM, while his System Office was designated SAFSO and the former SENTINEL Systems Command became SAFSCOM. In terms of organizational or personnel changes, however, the new designations were merely cosmetic, for the basic structure, command relationships, and mission assignments remained very much the same as under the former SENTINEL program. This was certainly true at Huntsville Division, which continued to serve SAFSCOM in the same way that it had previously served SENSCOM. As will be seen shortly, the Division's organization and personnel also remained almost unaffected, while its manpower requirements were somewhat reduced from SENTINEL projections.

A significant part of the Division's mission under the SENTINEL program had been concerned with site selection and validation, and most of this responsibility was uninterrupted by either the Presidential review or the new deployment under SAFEGUARD. Immediately after the President's review was announced in early February, the SENSM directed that in the interim site validation and surveys should continue at Chicago, Detroit, Grand Forks AFB, Malmstrom AFB, Albany, Seattle, San Francisco, and Los Angeles--all understood to be likely candidates in any future BMD network. Correspondingly, the work at Oahu, Hawaii; Dallas,

Texas; and in Alaska was suspended in the likelihood of having little utility and low priority in the eventuality of a modified SENTINEL effort.[16] These judgements were largely confirmed after the announcement of SAFEGUARD sites on 14 March. The emphasis of ARADCOM reconnaissance teams, Huntsville Division, and the Omaha District then turned towards completing the investigations and surveys at Grand Forks and Malmstrom for early construction there.

Likewise, after 14 March, it was necessary to close down construction at the Sharpner's Pond PAR site at Boston, now redundant to SAFEGUARD, and to commence contract termination procedures there. Upon receiving notice of the Presidential review of 6 February, Huntsville Division directed George Brox, Inc., to suspend all operations except those necessary to maintenance of the access road, the site, and attendant office buildings. After the decision for SAFEGUARD was announced, the SAFSM directed Huntsville Division to terminate the Morrison-Knudsen contract for Phase II and to freeze the Brox contract for the excavation and access road until further notice. The Brox contract was then about 90 percent complete and the Morrison-Knudsen contract scarcely underway. About $3 million had been spent on Boston construction by the time of termination. Total SENTINEL termination expenses for Huntsville Division were estimated in May 1969 at $16.5 million.[17] The closeout plan was largely left to OCE and the New England Division since it basically

SHARPNER'S POND AFTER SUSPENSION OF WORK, MARCH 1970

involved real estate negotiations.[18] Local residents exhibited considerable interest in restoration of the site and its alteration into a recreational area, and in May a proposal to this end was made by the town of North Andover and the Massachusetts Department of Natural Resources. The proposal was forwarded to OCE for consideration, and ultimately the former BMD site became a Massachusetts State Park. The excavation for the PAR Building, now filled with water, became a peaceful playground for anglers, boaters, and swimmers rather than a bastion in the country's defense.[19]

Early in the transition to SAFEGUARD, Huntsville Division also had to examine the implication of the new program for its long-range procurement practices, especially those in the extensive GFP operation previously mapped out for SENTINEL procurement. Of particular concern were the complications introduced in standardization and procurement by SAFEGUARD's phased concept, annual program review, and extended deployment schedule. In view of these factors, SAFSCOM was requested to reaffirm that standardization remained an objective of the revised program. This reaffirmation for standardization was soon forthcoming, along with renewal of authority from OCE for use of multi-year procurement contracts.

In connection with this, steps had to be taken to revise the large diesel engine generator contract awarded the past November for SENTINEL power plants. On 28 March, two weeks after commencement of SAFEGUARD, Cooper-Bessemer was asked to cease preparation and submittal of their shop drawings and were advised that a delay of about twelve months was to be expected in delivery of the first year's requirements. They were also informally requested to extend the Government's option for additional generators by one year. Discussions then ensued to conclude a supplemental agreement covering the revised delivery schedule, special escalation clause, options, and progress payments. On 6 June, the Company submitted a proposal in the amount of $879,000 to realign its supply contract, and it agreed to extend pressing option deadlines until 1 October to allow for Congressional action on the BMD program. After long and complex negotiations, an agreement was consummated by Contract Modification 008 on 21 October 1969. Savings due to the reduced number of units required were offset to a degree by inflation and other factors so that the net change in contract amount was a small decrease.[20]

The announcement of President Nixon's review and the subsequent transition to SAFEGUARD also had significant, but not profound, influence on the design of BMD facilities. While awaiting news of the review's impact on facility design, Huntsville Division's engineering staff continued with work on SENTINEL-type designs required for the Boston PAR and MSR. The hectic pace of the past few months, however, abated during February and March as overtime was slashed to reduce costs pending outcome of the review. Despite the uncertainty surrounding the continuation, modification, or even cancellation of SENTINEL, substantial progress was made in completing design of the PAR Building. On 18 February 1969, the SENTINEL System Configuration Control Board "baselined" the PAR Building's criteria, in effect giving them the stamp of final approval. Despite this formalization of general agreement on a design, though, several major design features remained either unresolved or in need of more effective solutions.

One of the thorniest problems still lingering in PAR Building design was the antenna face wall, or "A" wall, and in particular the manner in which power cables from the exposed antenna elements would be fed back through the thick concrete wall to the phase shifters inside. "Can it be built?" and "There must be a better way!" were typical remarks emanating from those who saw the preliminary design and scale model originally favored by BTL, the prime weapon system contractor. BTL had proposed an extremely complicated scheme requiring about 6,300 individual four-inch steel conduit tubes penetrating a ten and one-half foot thick concrete wall which incorporated a dense matrix of no. 11 reinforcing rods. This arrangement had been nicknamed the "Bent Tube Scheme" because each tube had to have a "S" shape with double bends to accommodate the 25 degree inclination of the "A" wall. To satisfy this design there had to be at least forty-five different tube configurations, and the tolerances were extremely tight on tube placement and PAR face alignments as the tubes passed through the forest of reinforcing rods. If this original "Bent Tube Scheme" had ultimately been adopted, it would have been extremely time consuming to form and pour and probably could not have been accomplished within the approved construction interval. It was little comfort to know that with better prior planning and coordination, the problem might have been alleviated or avoided altogether. As the Division Historian later assessed it,

> The face difficulty arose because the WSC [BTL] had not approached the design of the face as a systems problem. It appeared that GE designed their part of the system and then

asked that the structure be designed to fit their design and to meet requirements that their design had not properly considered. HND strongly objected to this approach both to SENSM and SENSCOM and as a result a review of alternate schemes was underway [in early 1969]. However, the WSC was well along in design and it would be more difficult to achieve improvements than if a systems approach had been considered from the beginning.[21]

During late February Ammann & Whitney, at the direction of the Division, worked to find an alternative to the "Bent Tube Scheme" which would simplify the construction and ease the tolerance at the interface between the Corps and the WSC. BTL also reviewed the problem from its end, but after three weeks of scrutiny, it reported that the "Bent Tube Scheme" was cheaper than other choices by about $1.5 million per installation. The Corps' best alternative was a variation on the bent tube theme that used about 90 percent straight tubes and 10 percent bent tubes of one pattern only, saving about $750,000 per PAR face. This amount, however, was offset by increased WSC costs. "As a result," the "Historical Summary" notes, "there was an extremely tough construction task on the PAR face. Forming the tubes and rebar (around them) would be exacting and time consuming because of the maze of rebar and embedments."[22] Thus far frustrated in the search for improvement, the Division then proposed the construction of a model research and development test section of the "A" wall at Redstone Arsenal to identify problems and work out techniques.

The projected mock-up would have stood forty-four feet wide, twenty-five feet high, and ten and one-half feet thick. But before construction could begin, a remarkable breakthrough in design was accomplished by a value engineering task force made up of the Systems Engineering Division, Facilities Engineering Division, and Construction Division in conjunction with SAFSCOM, the WSC, BTL, GE, the Atomic Energy Commission, and Ammann & Whitney. This study resulted in a novel design for the "A" wall using only straight tubes and unique floor slots permitting the passage of cable bundles through the "A" wall-floor intersection. Because straight tubes could be easily and uniformly placed through a symmetrical rebar pattern, the "A" wall thickness could be reduced by three and one-half feet while maintaining the desired structural strength. On 29 August 1969, Ammann & Whitney was directed to proceed with redesign for the straight tube penetration system in all future PAR Buildings. This value engineering effort reduced the cost of each PAR Building "A" wall by $921,000 and saved the $225,000 allocated for the wall mock-up which then did not have to be built.[23]

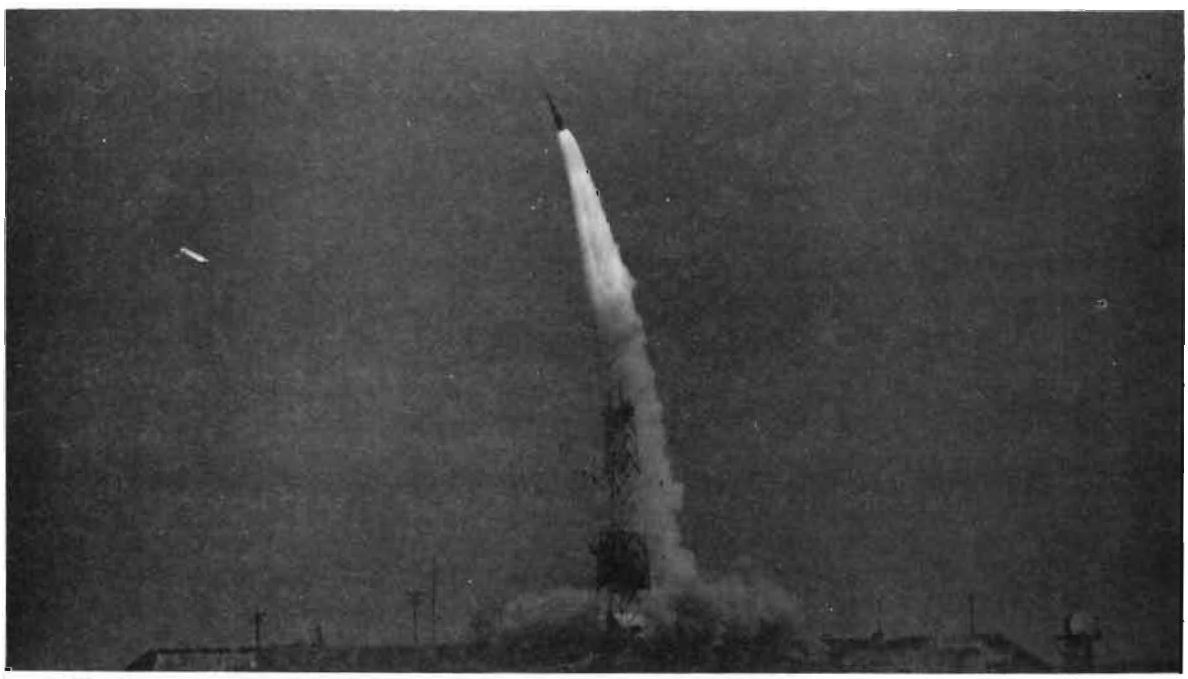
The results of the Presidental review and the inauguration of SAFEGUARD fortunately did not significantly change the PAR Building design. Essentially the SAFEGUARD deployment scheme simply called for relocation of SENTINEL-type facilities at strategic locations away from urban areas and minimized the amount of redesign necessary to accommodate the change. The first two SAFEGUARD sites at Grand Forks and Malmstrom AFB's called for single face PAR's and during the spring and summer of 1969 immediate priority was given to completing the one face design. Thrust towards the two face design was minimized until the need for it was clarified, and as it eventually transpired, the two face design was abandoned altogether.

Unlike the PAR, the SAFEGUARD deployment did mandate some significant design changes in the MSR. Since the Boston MSR had just two active faces, an enlarged turret, the so-called "mini-turret" was now required to accommodate the standard four antenna faces and the equipment for continuous duty operation envisioned under SAFEGUARD. In conjunction with this, hardened cooling towers were discarded and replaced by soft ones with a sealed recirculating heat sink system for emergency use. Additionally, some alterations to the SPARTAN cells were necessary to accept the advance model missiles to be used for SAFEGUARD. These engineering changes were denoted by a change in designation: the former MSR officially became the MSCB, or Missile Site Control Building. Actually, the redesignation never took hold completely and this essay retains use of the term MSR. for the SAFEGUARD building.

Testing of the facilities and weapons system to be employed in SAFEGUARD was little affected by the transition, since these activities were being conducted under previous SENTINEL contracts and were essential to the effectiveness of any future BMD deployment, or even to future research and development. For Huntsville Division, this generally meant a continuation of the same type of shock testing and dynamic analysis performed for SENTINEL facilities and equipment. By 1969, however, it was being discovered that in many cases the testing techniques used earlier were not adequate to realistically simulate the postulated shock motions transmitted through the facilities and tactical support equipment. The test facilities available in 1967 and

1968 were found inadequate in size and capacity to handle the research job, and in 1969, Huntsville initiated efforts to develop both advanced testing techniques and facilities to implement them. Among the results of this effort were sophisticated computer programs for complex waveform synthesis (WAVSYN), hydraulic transient pressure analysis (HYTRAN), and shock isolation system design (ISOL, ISIP), along with installation of the Biaxial Shock Test Machine (BSTM) at the Corps Construction Engineering Research Laboratory (CERL).[24]

SPARTAN TEST FIRING



SPRINT TEST FIRING

Testing of the SAFEGUARD weapon system components outside of the Division also continued during the transition to the new deployment. The last of fourteen SPARTAN developmental test flights was made in December 1969 with all missile and warhead objectives achieved. The first attempt to integrate the SPARTAN with a full system at Meck Island (Mission M1-1) took place on 14 April 1970, but it failed. The rerun of this test on 24 June 1970 proved wholly successful when the SPARTAN completed its intercept under guidance from the Meck Island MSR prototype and its data processing system.

SPRINT testing, too, proceeded during 1969. An extended range SPRINT was flight tested at White Sands Missile Range for the first time on 22 July 1969, and the same type missile with a warhead kit flew in November 1969. Unfortunately, the SPRINT program was struck by a series of premature ignitions and structural failures during October and December 1969 which resulted in an investigation and subsequent modification to the missile's launch tube equipment and first stage. Successful flights were resumed in May and June 1970, and forty-one of the planned forty-two SPRINT developmental flights were accomplished by the end of FY 1970. Until early FY 1971 all of these SPRINT tests were conducted at White Sands. The program then moved to Meck Island to be coordinated with the MSR and data processing equipment there. By this time, the Meck Island MSR had been fully shaken down. In late November 1969, the MSR had acquired and tracked satellite "targets of opportunity," and in December 1969, it successfully acquired and tracked an ICBM launched from Vandenburg AFB, California, using the MSR softwave in an automatic mode.[25]

While termination of SENTINEL projects and adjustments to the new SAFEGUARD orientation went on during 1969, Huntsville Division experienced a transition to greater stability and maturity. Several events and milestones of the year indicated that not only was the Division adjusting to the SAFEGUARD mission, but that it was also leaving behind the temporary and the makeshift characteristic of its infancy. One very evident sign of this was the Division's April 1969 move into modern quarters in a two story brick annex adjoining the new SAFEGUARD headquarters building in Huntsville's Cummings Research Park near Technology Drive. Another sign was the adoption of a permanent unit logo emblematic of the Division's BMD mission. Following a contest open to all Division employees during April and May 1969, Gertrude Desaussure of the Facilities Engineering Division was declared first prize winner and walked away with a $40 award. Her design depicting BDM facilities in the form of the traditional Corps castle launching an ABM can be found on the cover of this **History**.[26] A third sign of

SAFEGUARD SYSTEM COMMAND AND HUNTSVILLE DIVISION HEADQUARTERS BUILDING

HUNTSVILLE DIVISION LOGO

maturation came with the first command inspection led by Maj. Gen. C.H. Dunn on 27 and 28 May 1969, followed a month later by the first annual general inspection of the Division by Lt. Col. Franklin O. Mikle, Inspector General, OCE, during the period 16-20 June. As General Dunn's inspection report later noted, the inspector emerged from these tours with the impression that the Division's personnel remained enthusiastic about their mission despite the uncertainties associated with the SAFEGUARD program. Moreover, the inspectors found "that the dual Engineering Division organizational concept in HND is sound and is working" and that "facilities occupied are excellent and adequate for the current strength."[27]

Huntsville Division's transition into the SAFEGUARD era was accompanied by continued manpower growth, but it was not the kind of extraordinary expansion seen earlier, nor did it necessitate reworking the Division's organization. On 1 May 1969, the Division's strength stood at 354 civilian employees with one position committed and twelve military personnel assigned to the Executive Office (see Appendix I).[28] The inauguration of SAFEGUARD warranted a reappraisal of the Division's manpower needs under Phase I, and while this was being formulated the Division operated under a self- imposed hiring restraint lasting throughout the first half of FY 1970. Under this restraint, the Division's manpower growth was severely restricted in the expectation that peak needs for the SAFEGUARD deployment would almost certainly be less than for the larger SENTINEL program. So it was that by the end of the fourth quarter of FY 1970 (June 1970), the Division's manpower ceiling reached just 376 civilians, 11 officers, and 2 enlisted men, or roughly 10 percent more than at the beginning of SAFEGUARD a year previously. The manpower review conducted for SAFEGUARD indicated that during FY 1971 the Division's needs would rise slightly to a peak in the first quarter of FY 1971, when 385 civilians, 12 officers, and 2 enlisted men would be on the unit's rolls. After this time, a diminution of 30 to 40 per quarter could be expected, with total deactivation

to come in the first quarter of FY 1975. These figures, of course, were for Phase I; a subsequent deployment following any of the Phase II variants would have resulted in other manpower profiles. In effect, then, to carry out the initial SAFEGUARD deployment, Huntsville Division estimated that it would require about 150 fewer employees at peak than for SENTINEL, barring unforeseen changes for Phase II. The Division's Management Analysis Branch did not recommend significant changes in organization during 1969 or 1970 since the internal task assignments for SAFEGUARD were quite similar to those for SENTINEL. A few changes in designation and a slight reorganization of the Facilities Engineering Division were more the result of progress in the Division's mission than the consequence of SAFEGUARD.

As has been seen, until August or September 1969 Congressional debate over SAFEGUARD funds acted as a log jam severely limiting Huntsville Division in the major actions it could take towards executing the SAFEGUARD mission. However, after the landmark Senate vote of 6 August, it became more and more evident that funds necessary for the new program would indeed be forthcoming. The probability of a favorable outcome in the Congress became firmer as the fall wore on, and by November the long-delayed authorizations and appropriations had all been approved and sent to the White House. As a result of this legislation, Huntsville Division was empowered to spend $208.4 million to continue SAFEGUARD facilities design and construction during FY 1971. This total included $16.9 million for design purposes and $191.5 million for construction, mainly for the first two sites at Grand Forks and Malmstrom AFB's. The Division's office operating budget amounted to approximately $6.9 million for FY 1970.

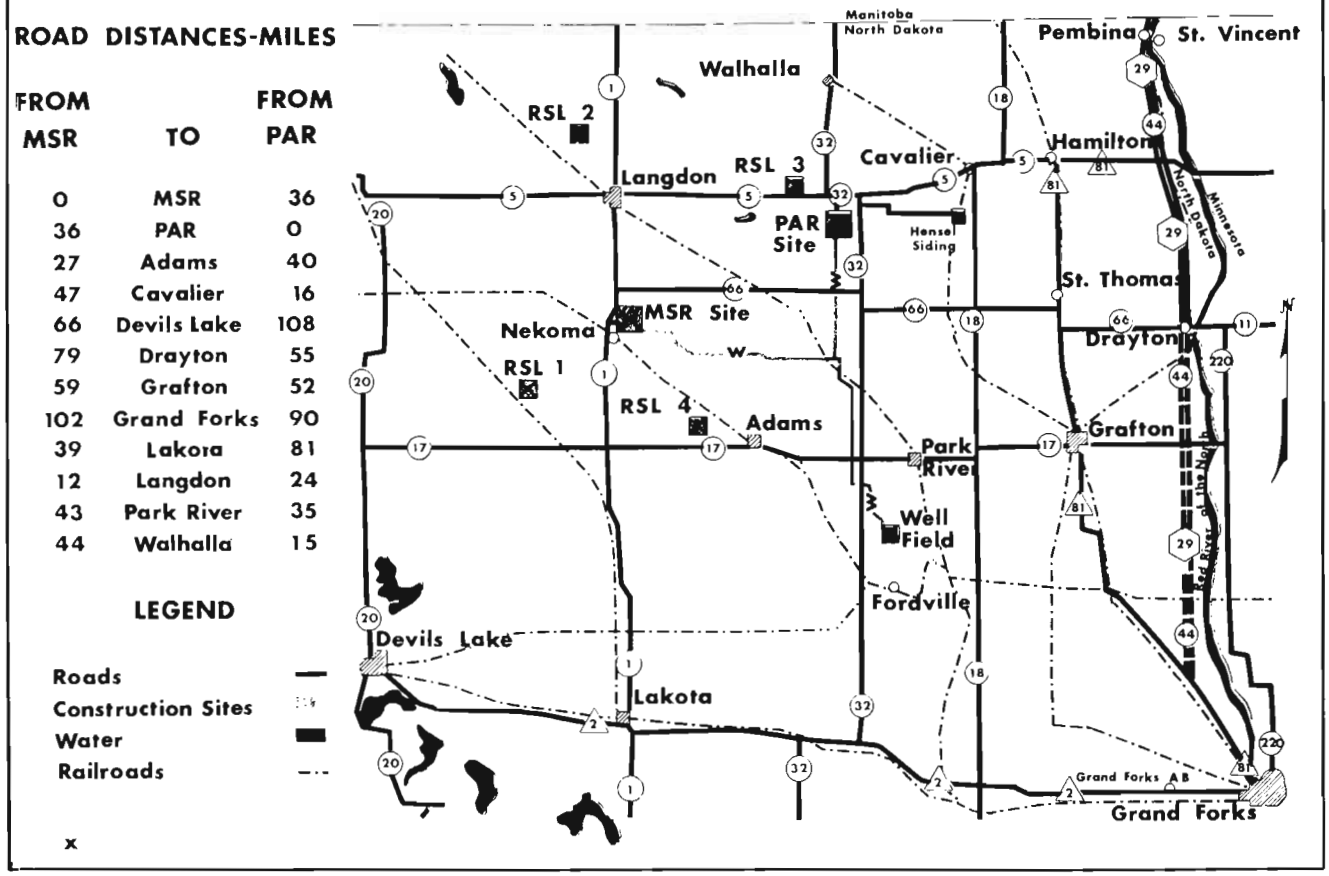
With these funds in hand, it became possible to proceed with the steps leading to construction at the first SAFEGUARD site at Grand Forks AFB, North Dakota. This site had already received high priority under SENTINEL, and it went to the top of the list in the 14 March announcement of the SAFEGUARD deployment. Consequently, the area had been thoroughly reconnoitered and by early fall 1969 preliminary investigations and surveys were nearly completed. Title X property actions were initiated even before the Congressional debate closed, and the real estate proposal was submitted to Congress on 14 October 1969. Omaha District began acquisition of land in January 1970.

The general area chosen for the first SAFEGUARD base was located in the flat wheatlands of northeastern North Dakota close to the Canada-Minnesota border in order to protect nearby Grand Forks AFB, a key MINUTEMAN installation. The 279 acre PAR site was ninety road miles northwest of Grand Forks and twenty-four miles east of the nearest large community of Langdon, while the 433 acre MSR site lay 102 miles northwest of Grand Forks and close to the tiny farming hamlet of Nekoma. About twenty-five air miles separted the PAR from the MSR. The two major installations were complemented by four Remote Launch Sites of thirty-six to forty-five acres each dispersed around the central MSR in a rough circle having a radius of about twenty miles. The entire region had a level black earth topography with a Continental climate and low rainfall perfectly suited to the grain farming that supported the local economy.[29]

As with all SENTINEL and SAFEGUARD installations, planning for the Grand Forks site had to take into account the geographic, topographic, and demographic conditions prevailing in the area. Unlike some other sites, though, several peculiarities of the North Dakota location demanded special attention. One of the most outstanding of these was the question of water supply. The region in which the sites were located had an annual average precipitation of twenty-four inches, sufficient in normal years to sustain the wheat crop together with the sparse human and animal population. Ecologically, then, the land lay in a delicate moisture balance, and the preservation of this balance was naturally of vital concern to local inhabitants who drew their water almost exclusively from wells. Under these conditions, the Army's impact looked a bit threatening: for the Grand Forks site, the Corps intended to introduce a water demand of 1,000 gallons per minute into the area.

Plans for developing an extensive water system yielding the requisite flow without disturbing the regional water table were set in motion even before SAFEGUARD commenced, and a design for such a system was ready by the end of May 1969 in time for that year's construction season. The water was to be drawn from the Fordville aquifer approximately forty-six miles from the MSR site and thirty-five miles from the PAR site. The Fordville aquifer was a curved sand and gravel subsurface formation some three miles wide and nine miles long, having an average water bearing thickness of twenty feet and containing a capacity of 38,000 acre feet (12,383,136,000 gallons) of water. In later hearings on the Corps' proposal, Roger Schmidt of the North Dakota State Water Commission estimated that the Fordville aquifer could be pumped at the rate of 1,000 gallons per minute for twenty-three years without additional

VICINITY MAP - GRAND FORKS SAFEGUARD SITES



recharge.[30] Evidently the Corps' design, which called for ten spaced wells, three booster stations, fifty-eight miles of pipe, and on-site reservoirs, would make no noticeable inroads on the region's below-ground water supply.

The merits of the Corps' plan, however, had to be demonstrated before State authorities as well as local inhabitants in open public hearings before a water permit could be granted by the State. The Congressional debate of 1969 delayed initiation of these proceedings until January 1970, when representatives of the Corps, the U.S. Geological Survey, and the State Water Commission held an open meeting in Fordville to discuss water usage. Here Water Commission members testified to Senator Quentin Burdick and 300 attendees that the Army's needs would have no significant impact on the total water supply, nor would it affect other users of the aquifer. On 9 March 1970, the State of North Dakota issued Conditional Water Permit 1679 to the Corps for use of the Fordville aquifer, with the understanding that,

> if diversions under existing permits to withdraw water from the Fordville aquifer are or will be adversely affected as a result of the exercise of rights created under this permit, the State Engineer reserves right to hold public hearings to assist in determining the rights of the respective users in accordance with State Law.[31]

Permit in hand, the Army awarded a $3,845,000 contract to Zurn Engineers of Upland, California, on 31 March 1970 for construction of the water system. It was completed in about seven months.

In addition to the question of water supply, the Army had to identify other environmental impact factors before breaking ground. Environmental studies indicated no unusual hazard from liquid wastes, solid residues, radio frequency interference, noise, or radiation, but a potential problem did arise in

the case of air pollution from the facilities' diesel powerplants. Early in December 1969, the Office of Counsel at Huntsville Division drafted a legal study of the implications of building the Grand Forks site with reference to its conformity with air pollution regulations. In the North Dakota situation, State pollution laws presented a minor obstacle: contemporary computations indicated that in the worst possible case contaminants would exceed the State maximum allowable standard 8 percent of the time over a plume area roughly two miles downwind of the Government reservation. The report furnished other details of the State law and relevant factors of interpretation, then observed that the Corps as a federal agency did not have to voluntarily comply with a State law. The Corps was, however, subject to federal law, particularly to the "Clean Air Act" of 1963 and Executive Order No. 11282 mandating compliance by federal agencies. Here again, however, Counsel reported "an exception is given in extraordinary cases of public interest, and the Secretary of HEW may exempt any Federal agency."[32] Finally, it was suggested that the Corps first determine with greater precision the possibility and potential of the problem of diesel exhaust fumes, followed by determination of possible remedies and cost. Then, the brief concluded, "if full compliance is not feasible, technical advice and/or an exemption permit should be obtained by the Secretary of HEW."[33] On 23 December, the SAFSM was apprised of the problem, and the assistance of other Government agencies was solicited. Six months later, on 24 June 1970, no better solution had been found and Cooper-Bessemer, makers of the offending engines, was contracted to come up with a method of suppressing the NOX emissions from their product.[34]

In addition to the impact on the environment, the Army also had to assess and assuage the effects of construction on the human community. Once again the situation in North Dakota was somewhat out of the ordinary. The population of the area was very thin; Langdon, the county seat of Cavalier County and the largest community in the immediate vicinity of the sites, had only 2,151 inhabitants in 1970 and other villages in the area were even smaller. The introduction of a thousand or more construction workers and several hundred service personnel later would present a substantial intrusion on the locality's schools, shopping outlets, recreational facilities, utilities capacity, public service authorities, and transportation net. Forecasting this impact, in May 1969, Huntsville Division organized a planning group to work with SAFSCOM on a full time basis to develop practical solutions to the community impact problem. Beginning in November 1969, a Community Impact Team from Omaha District studied the resources of all communities within fifty miles radius of Langdon and all settlements over 10,000 within 100 miles. The report was published in April 1970.[35]

A few figures selected from the community impact report will illustrate the magnitude of the problem. The reconnaissance team estimated that the temporary population increase due to SAFEGUARD would peak at 8,100 in the fall of 1971. This influx would mingle with an established population of about 25,000 in the affected circular area to generate a rise of one-third in two years' time. The permanent population increase would be less, about 2,200. School enrollments would be increased by 1,505 during 1970-1971 to a peak of 2,505 in 1973-1974, and this increase would demand additional plant facilities for 950 students by 1973-1974. Public utilities were deemed "adequate," except for the Langdon sewer system; three additional police officers and four permanent fireman would have to be added to existing forces in the area surveyed.

It is important to note that even though the Department of the Army was responsible for creating the impact problem, it could not legally give relief in the form of funds. Much federal money was available for community impact relief, but it came from several federal agencies outside the military and was granted only after application from local authorities. Thus, Public Law 874 of the 81st Congress provided for federal assistance to local educational systems affected by military presence; Langdon, which needed a new sewer system, could apply through Public Law 660, 84th Congress; and Public Law 90-351 provided matching grants to assist states and local governments in law enforcement. After protests in North Dakota and Montana that these funds were inadequate and/or too slow in coming, Congress acted through Public Law 91-511, Section 610, authorizing military construction for FY 1971 to provide additional assistance to local communities near SAFEGUARD construction in North Dakota and Montana. The SAFEGUARD System Manager was made responsible for overall administration.[36]

A large part of SAFEGUARD's impact on North Dakota communities revolved about heavy demands on the area's transportation network, especially during the actual period of construction. The region between Grand Forks and Langdon was well supplied with railroads, but the line nearest the PAR site was thirteen miles away as the crow flies to Hensel, and this crossing had no delivery siding. Additionally, the

accidents of geography meant that existing roads linking Hensel with the PAR and MSR sites were two lane unsurfaced county section line roads intended solely for light farm traffic, not for heavy construction trucks weighing tens of tons. Nevertheless, it was known from reconnaissance of the area that local arteries would bear a heavy burden of construction traffic:

> At the outset of the Grand Forks SAFEGUARD Project, it was a well-known fact that no suitable aggregate for concrete existed in North Dakota. This had been determined by geological parties from the Missouri River Division of the Corps. Further, these parties found suitable aggregate could be obtained from Minnesota. Consequently, all such materials had to be shipped in by rail. The Contractor received as many as forty-two hoppers a day on many days.[37]

The destructive pounding of such traffic was compounded by the harsh cold of the region which further eroded damaged surfaces by splitting and frost heave.

Planning to remedy this situation began in April and May 1969, but action was delayed until after the Congressional Debate was nearly concluded. In particular, a rail spur siding had to be constructed at Hensel and thirteen miles of access roads bolstered between the siding and the sites. Time did not permit formalization of a contract for the rail siding before the start of construction in the spring of 1970, so on 19 September 1969 OCE authorized a letter contract with the Great Northern Railroad to be administered by the Omaha District. The letter contract was issued on 19 October. The estimated cost was $150,000. Work on the siding began late in the year and was completed the next spring.[38]

Likewise, during the summer of 1969 the North Dakota Road Department prepared designs for light haul road improvements, and on 4 November the Department was able to contract for the work. This was handled by Military Traffic Management and Terminal Service with State road officials under authority of the "Fulbright Amendment" (see Chapter I). Despite the winter season, the improvements were completed during December. As it turned out, the Army underestimated the degree of strengthening and improvement needed, and the Hensel haul road gave constant trouble until it was hard surfaced in the spring of 1971.[39]

Three final human concerns related to Grand Forks construction lay in the areas of housing, labor relations, and the hiring of minorities for construction work. Local housing for transients was quite limited in and around Langdon, so most of the construction workforce commuted to the jobsite, many from as far away as Grand Forks. Others were accommodated in the traditional hard hat's dwelling, the mobile home. Soon after the main construction contract was awarded in March 1970, the contractor purchased a tract of land near Langdon and developed a trailer park for supervisory personnel and their families. By June 1970 some 100 trailers were lodged in the contractor's trailer park.[40]

The same critical housing shortage faced the 300-odd Government employees from both the Corps and SAFSCOM that were assigned to a region in North Dakota without sufficient housing accomodations for all. As the Huntsville Division's "History of the Office of Counsel" dryly records, "No regulations covered this situation, and the solution proved to be long and complicated with many differences of opinion."[41] Originally, a 1969 plan was devised to issue a contract for 180 mobile homes in two mobile home parks to be owned and operated by the housing contractor and located at Langdon and possibly Cavalier. Unfortunately, this scheme bogged down in legal questions of whether it could be done through Military Construction Appropriations without the specific approval of Congress. Finally, on 16 January 1970 the Corps received tentative authority to enter a contract, and the Omaha District was delegated responsibility to issue the IFB and administer the contract. The District advertised for furnishing temporary mobile homes, constructing a park, and maintenance, but all the bids received on 31 Marsh 1970 far exceeded Government expectations. Accordingly, the IFB was cancelled and an award was made through RFP negotiations with Cavalier Estates, Inc., on 2 July 1970 for the first increment of thirty mobile homes. Each mobile home cost $7,000, but the total acceptable offer was $419,643. A second increment of eighty-five mobile homes was awarded to Western States Construction Company, Inc., on 8 October 1970 for the total amount of $1,098,300. The contract amounts were in addition to the rents to be collected by the contractor, of which 90 percent was guaranteed. The "Cavalier Estates," as the parks came to be known, alleviated but did not wholly solve Government employees' housing worries. Satisfactory housing, especially for those with dependents, remained a pressing concern of transfers to Grand Forks until the work was in its second or third year.[42]

The low population density of North Dakota ensured that many workers would have to be attracted

from, outside sources, while the remoteness and severe climatic conditions tended to promote unusually high wage rates. Furthermore, limited housing on or near the work place required many workers to commute over long distances, and this posed the question of per diem allowances for such travel. All of these factors were of great interest to local labor unions, as well as to their national organizations which regarded issues at Grand Forks as setting the tone for future BMD work across the nation. An additional element of concern to all parties was the influence of inflation which promised to play an important role over three years of construction.

A foundation for good labor relations at Grand Forks began with the Corps working through the Grand Forks AFB Missile Sites Labor Relations Committee, an organization which replaced the President's Missile Sites Labor Committee of the ICBM era. On 6 November 1969, Huntsville personnel conducted a project briefing before a regularly scheduled meeting of the Committee in Fargo, North Dakota, for representatives of the Government, Air Force, labor unions, and contractors. This initial briefing was followed by other conferences with the Committee and with the North Dakota Chapter, Associated General Contractors of America, Labor Committee in Fargo on 7 and 8 January. At the Associated Contractors meeting on 7 January, Huntsville Division's Labor Relations Officer, Stephen V. Rohr, explained the advantages of a comprehensive project labor agreement, an agreement thought to be in the best interests of the Government and contractors alike. Next day, 8 January, Rohr and Federal Mediation and Conciliation Service representative Gordon Preble again met with the Grand Forks AFB Missile Site Labor Committee. In addition to Rohr and Preble, about fifteen local labor representatives appeared. Several questions such as "When would contracts be let?" and others concerning a Navy project at Lamoure, North Dakota, were submitted by local labor attendees. During this visit, Rohr collected copies of previous local labor agreements, together with the approximate number of members, location, and current wage rates, as well as rates prevailing in Minneapolis and St. Paul, urban areas against which the Corps would be competing. These January meetings produced substantial data, along with the unsettling revelation that inflation might well escalate wage rates by more than 40 percent during the life of the Grand Forks project.

As a result of this inflationary prospect, the Huntsville Division Labor Relations staff, working through the auspices of the North Dakota Chapter of the Associated General Contractors, prodded contractors interested in bidding on the Grand Forks project to negotiate a blanket long-range project agreement with construction trades unions for all North Dakota BMD activity. Discussions for such a pact were conducted in Fargo during February and March 1970 between labor and the management of three interested joint ventures, together with Government and Corps observers. The final "Project Agreement" provided a fixed wage and fringe benefit schedule over the entire three year construction period. This provision eliminated the necessity for contractors to include contingencies in their bids to cover anticipated wage escalation and had a tremendous stabilizing effect on labor relations for the Grand Forks project. Other issues sensitive to labor, such as travel and subsistence, health and safety, grievance settlement, and dues check-off, were also resolved in the "Agreement."[43]

One important requirement for labor arrangements in North Dakota emerged only after Invitations for Bids were mailed out on 23 January. In that Invitation, Huntsville Division included what heretofore had been considered a routine Equal Employment Opportunity Clause. On 13 February, however, the Department of Defense notified Huntsville Division that certain specific goals for the employment of minorities should henceforth be incorporated in affirmative action plans submitted by federal contractors as part of compliance to Title VII of the 1964 Civil Rights Act and subsequent Executive Orders 10925, 11114, and 11246. This change of policy was, in fact, the result of an Office of Federal Contract Compliance effort to make SAFEGUARD a pilot program for extending the limited "Philadelphia Plan" of 1969 into federal contracts on a nationwide basis.

The need to implement specific equal employment opportunity goals was outlined to potential SAFEGUARD contractors and subcontractors at a pre-bid conference held at Huntsville on 26 February. Not long after, on 2 March, Huntsville Division formally issued Para. 14 of Amendment 005A to "Instructions to Bidders" in the Grand Forks IFB that stated:

> The bidder shall deliver to the Contracting Office, Huntsville Division, Corps of Engineers, on or before 20 March 1970, an Affirmative Action Program which will express the bidder's good faith efforts to carry out his affirmative action obligations in equal employment opportunity as required by

WAGE RATES

GRAND FORKS AREA

TRADE	CURRENT RATES HOURLY	NATIONAL AVERAGE OCT 1960 HOURLY	1 JUNE 1970 HOURLY	1 JUNE 1971 HOURLY	1 JUNE 1972 HOURLY	OVER 1973 HOURLY	1 JUNE TIME HOURLY	TRAVEL AND/OR SUBSISTENCE DAILY
I. SIGNED AGREEMENT								
Laborer	$3.65	4.29	4.40	5.10	5.55	6.00	1 1/2	8.00
Carpenter	4.55	5.92	5.60	6.30	6.90	7.50	1 1/2	8.00
Iron Worker	5.95	6.70	7.05	7.90	8.65	9.15	2	10.00
Cement Finisher	4.75	5.00	5.80	6.50	7.10	7.70	1 1/2	8.00
Oprtng Engr	4.62	7.40	5.42	6.17	6.90	7.52	1 1/2	8.00
Truck Driver	3.65	4.40	4.65	5.15	5.65	6.20	1 1/2	8.00
II. PROJECTED AGREEMENTS								
Electrician	6.15	6.26	7.00	7.75	8.50	9.25	2	
Plumber/Fitter	5.37	6.83	6.40	7.25	8.15	9.00	1 1/2	10.00

NOTES: 1. Projected figures include fringe benefits: $.55 for Iron Workers and $.25 for Operating Engineers

2. Current travel and subsistance allowance ranges from $4 to $10.

General Provision 21 and Executive Order 11246, and which has been determined to be acceptable by the Contracts Compliance Office, Defense Contracts Administration Services.[44]

It was unofficially understood by all parties that this unspecified "good faith" effort should amount to about six to ten percent of the work force, but potential contractors for Grand Forks believed these figures to be excessive in view of the fact that North Dakota's population included only 2 percent minorities, most of which were untrained Indians isolated on scattered reservations. In Cavalier County itself there were no non-whites, and in adjoining Grand Forks, Trail, and Stelle, counties there were only 168 minority residents of all kinds. Accordingly, early in March the Associated General Contractors protested the Corps' amendment on the grounds that the U.S. Comptroller General had previously found ambiguities like the "good faith" clause in bidding documents illegal in his decision 47 CG 666. Despite these feelings, and a generally gloomy outlook for immediate fulfillment, three joint ventures interested in Grand Forks submitted EEO Affirmative Action Programs that were found acceptable by the Defense Contract Administration Services in mid-March. Two significant features of these Affirmtive Action Programs were the "good faith" goals of 6 to 10 percent minorities employment overall and satisfactory weekly reporting procedures on progress made towards these goals. Not surprisingly, the ultimate fulfillment of even 6 percent minority employment was later found difficult, and affirmative action goals were later revised to a more flexible scheme of 6 to 10 percent of minority labor hours put in on the job. Compliance personnel in Defense Contract Administration Services later found that these goals were generally met by all contractors on the project.[45]

In the meanwhile, having set the necessary preliminaries in motion for Grand Forks construction, only preparation of the bid package and its award remained before ground-breaking could take place. Early in September 1969, recommendations were made to the SAFEGUARD Systems Manager and to OCE concerning the desirability of combining the technical facilities at Grand Forks--the PAR and the MSR--into a single contract bid package to mitigate the impact of multiple major contracts on limited community resources, as well as to minimize the prospect of intensive competition for skilled labor in the area. The less demanding, smaller scale RLS's were to be split off from the main package, as were the Non-technical Support Facilities. The recommendation was accepted, and on 23 October Advanced Notices of Invitations for Bids for the North Dakota SAFEGUARD technical facilities were put into the mail.

The contractual policies followed for this and other SAFEGUARD sites remained very much the same as under SENTINEL. As noted above in Chapter I, standardization and procurement of Government Furnished Property were confirmed early in the spring of 1969, and the same continuity was maintained in contractor prequalification. Contractors who considered themselves candidates for any job had to prequalify their firms with Huntsville Division several weeks before Invitations for Bids were sent out. As earlier, this policy of prequalification aided the Corps in sizing up the capabilities and performance potential of contractors before bidding was opened. If this had not been done, it was possible that some bids might have been submitted and awards won by firms without the resources to fulfill the rigid scheduling and precise techniques required to complete the facilities. The delay and cost penalties so incurred would have been intolerable for a vital national defense program.

Prequalification for Grand Forks in early December and January produced a total of fifty-six applications, of which thirty-seven were accepted. Of these thirty-seven prequalified applications, ten were from prime contractors, eleven from joint venture sponsors, and sixteen from joint venture members. The relatively limited number of approved contractors came from all over the nation, indicating the small number of firms capable of taking on a construction project as large and as sophisticated as Grand Forks under North Dakota weather conditions. Moreover, the number of contractors actually interested in preparing and submitting bids for such a challenge proved to be even less. By the time bids were opened in March, only three joint ventures, each a consortium of several large firms, came forward with offers to do the job.

A few general figures will illustrate the magnitude of the Grand Forks project. In the PAR and MSR Buildings and their powerplants alone, over 238,000 cubic yards of concrete and over 27,500 tons of reinforcing steel had to be emplaced in the main buildings. This included enough cement to lay a normal two lane concrete road twenty-four feet wide, eight inches deep, and thirty-two miles long. Enough earthwork would have to precede this to build up a mound three stories high and one-quarter mile on each side; enough reinforcing steel was required to erect a normal four story building covering two acres of land,

or almost 300 feet on each side. Without including the radar or weaponry, enough wire was needed to stretch 2,273 miles, or about the distance from Huntsville to San Francisco. At the peak of construction during the summer and fall of 1972, about 3,200 persons would be employed; this included over 2,900 hard hat artisans, craftsmen, operators, and laborers, together with 300 Corps, SACom, and WSC employees.

The scheduling was impressive, too. The PAR Building was to be completely roofed in by September 1971, and it had to be essentially ready for the WSC in August 1972 (a deadline called the Benficial Occupany Date, or BOD). The MSR Buildingwas to be roofed in by October 1971 and occupied by the WSC a few months later. Thus, a total of about two and one-half to three years was allowed for the major portion of the construction, some of which would be under severe climatic conditions. The immediate goals for the first construction season ending in December 1970 were to have the first and second levels of the PAR and MSR Building shells closed in to permit more or less normal interior work during cold winter conditions outside.[46]

The Area Engineer and his staff at the job site bore the heaviest responsibility in seeing that this construction schedule was met. On 6 November 1969 Col. Roy Beatty, previously Area Engineer for the Boston SENTINEL project, was named Area Engineer for Grand Forks. Col. Beatty did not join the job until after ground-breaking on 6 April 1970, but a temporary area office was opened in Langdon, North Dakota, on the day after his appointment. This area office at first occupied one room in the Langdon Masonic Temple but later expanded to take in all of the basement and the entire first floor. The first Civil Service examinations for staffing the office were administered at the Post Office in Devil's Lake, North Dakota, on 8 January, and permanent clerical personnel arrived soon thereafter. The office transferred its operations to the PAR site when an office building was completed there during the summer of 1970.[47]

Contracting for the Grand Forks job moved into high gear during early January 1970 with the preparation of the largest bid package ever printed by the Corps of Engineers in its 195 year history. The total printing job amounted to 2,626,200 pages of architectural drawings and 4,340,000 pages of specifications, enough paper to make a single column reaching 2,500 feet, or twice the height of the Empire State Building. If assembled in one place, the bulk would have amounted to sixty-five tons. Individual sets of plans offered to contractors were roughly the size of an office desk and weighed 200 pounds. Each set cost bidders $40, with reductions for subsequent sets. The Procurement and Supply Division distributed 172 such full sets of plans and specifications, together with ninety-six sets of specifications and 147 volumes of plans.[48]

From the inception, Huntsville Division required considerable assistance in preparing this package to meet the 23 January issuance deadline. Six Corps of Engineers districts, Redstone Arsenal, and commerical printers shared certain assigned printing tasks. Commonality throughout was ensured by using microfilm masters on which the original drawings were reduced thirty times, sent to distant points for printing, then enlarged fifteen times to make a positive offset printing plate of 15 x 21 inches. Except for certain drawings mailed by Los Angeles District, final copies were assembled in Huntsville and prepared for mailing in a large warehouse on Redstone Arsenal, where an assembly line boxed, wrapped, sacked, and sorted the sets according to destination.[49]

To deal with the deluge of questions sure to pour in from bidders on a project of this size, Huntsville Division established a "hotline" to an Inquiry Informational Center in Facilities Engineering Division. Further, unresolved questions were fielded in Huntsville on 26 February 1970, when the Division sponsored a pre-bid conference at the Sheraton Motor Inn. Over 250 conferees representing prime contractors, subcontractors, suppliers, associated construction industries, and Governmental agencies heard Col. Robert W. McBride describe the SAFEGUARD System and related construction factors. Written inquiries submitted beforehand were answered, and the entire conference was taped and transcripts provided conferees.[50]

Bids were opened at St. Paul Municipal Auditorium, St. Paul, Minnesota, at 11:00 AM on 26 March 1970. Of three bids received, a joint venture comprised of Morrison-Knudsen, Inc., Peter Kiewit Sons' Co., Fischbach & Moore, Inc., and C.H. Leavell & Co. submitted the low bid of $137,858,850. The Government estimate had been $126,119,014, but the low bid of Morrison-Knudsen & Associates was formally accepted on 31 March 1970 as the lowest competitive bid. This award constituted the largest single construction contract awarded by the U.S. Army Corps of Engineers up until that time. Morrison-Knudsen & Associates received notification to proceed at the beginning of April, and with this notice the actual construction of SAFEGUARD facilities got underway. The transition to

SAFEGUARD was complete, one year and two weeks after the close of the Presidential review on 14 March 1969.[51]

A $137,858,850 contract for construction of the Nation's first SAFEGUARD ballistic missile defense system facilities being installed in the area of Grand Forks, N.D. was signed by Colonel Robert W. McBride, Huntsville Division Contracting Officer. Looking on were Brigadier General R.P. Young, Huntsville Division, Engineer; Joe Leas, Executive Vice President, C.H. Leavell & Co., El Paso, Texas; E.M. Armstrong, Vice President for Business Development, Morrison-Knudsen Co., Inc., Boise, Idaho; Lee Rowe, Vice President, Peter Kiewit Sons' Co., Omaha, Nebraska; S.E. Davidson, Regional Vice President, Fischback and Moore, Inc., Los Angeles, California; and Colonel Bates C. Burnell, Huntsville Deputy Division Engineer.

APRIL 1, 1970 -- Final review of bid documents was made by Emil Vuch, Chief Legal Counsel of the Huntsville Division, prior to contract award to Morrison-Knudsen Company and Associates.

CHAPTER II FOOTNOTES

[1]In 1969 Dr. Herbert F. York was Professor of Physics at the University of California at San Diego and a member of the general advisory committee of the U.S. Arms Control and Disarmament Agency. He had formerly been Chancellor of U. of C. San Diego, director of defense research and engineering in the office of the Secretary of Defense (1958-61), and twice a member of the President's Science Advisory Committee. Dr. Jerome B. Wiesner was in 1969 Provost of Massachusetts Institute of Technology, having served on the faculties of several engineering schools and as a member of the staff of Los Alamos Science Laboratory. Dr. George W. Rathjens was director of the Weapons Systems Evaluation Division of the Institute for Defense Analysis at M.I.T. in 1969. Rathjens had formerly been chief scientist in the Advanced Research Projects Agency of the Department of Defense (1961-62), and from 1962-65 he held various posts with the U.S. Arms Control and Disarmament Agency. Dr. Hans A. Bethe was serving on the physics faculty of Cornell University in 1969. He had been at the university since 1935. In 1968, he won a Nobel Prize in physics for contributions to the theory of nuclear reactions. In 1969, Richard L. Garwin was director of applied research at the Thomas J. Watson Research Center of the International Business Machines Corporation.

[2]These three articles constitute a significant part of the literature on the BMD question. See Richard L. Garwin and Hans A. Bethe, "Anti-Ballistic Missile Systems," **Scientific American**, CCXVII, No. 3 (March, 1968), pp. 21-31; George W. Rathjens, "The Dynamics of the Arms Race," **Scientific American,** CCXX, No. 4 (April, 1969), pp. 15-25; and Herbert F. York, "Military Technology and National Security," **Scientific American,** CCXXI, No. 2 (August, 1969), pp. 17-29.

[3]**Boston Globe**, 30 January 1969, p. 1.

[4]Halt of SENTINEL is Traced to a Memorandum," **New York Times**, 9 February 1969, p. 1.

[5]**IBID.**; Senator Edward Kennedy to Secretary of Defense Melvin Laird, letter of 31 January 1969 reprinted in the **Congressional Record,** 4 February 1969, p. 2500.

[6]I have used the text of the Presidential news conference as it was reproduced in the USAEDH "Information Bulletin," II, No. 1 (7 April 1969), 1-7, and in the USEDH "Historical Summary FY 1969," II, Documents, 98-103. The behind-the scenes story of how President Nixon made the decision announced on 14 March is described by reporter Robert B. Semple in the **New York Times** article "Nixon Staff Had Central Role in Missile Decision," 19 March 1969, p. 22. According to Semple, the President's decision was highly internalized, made through "a controlled but intense dialogue limited to his own staff and principal foreign policy advisers." Nixon did not solicit opponents or advocates of the system outside the White House, did not rely principally on scientific advisers, and did not make friendly contacts in universities as President Kennedy liked to do. The President's decision was largely shaped by considerations of foreign policy, in particular relations with the Soviets, rather than domestic political considerations. Apparently, Semple reported, there were two Presidential decisions. In making the first decision, Nixon relied on the opinions of his chief foreign policy adviser Henry Kissinger and Deputy Secretary of Defense David Packard. In February, Nixon received from Kissinger a 40 page briefing book containing arguments pro and con for SENTINEL and from Packard Defense Department presentations on four options. One of these was a "thick" SENTINEL, preferred by the JSC; the second, a "thin SENTINEL reduced to about 15 urban sites; the third, a modified SENTINEL System called Plan 1-69, shifting deployment from cities to MINUTEMAN sites; and fourth, no system at all. Sometimes over the weekend of 7-8 March while the President was at Key Biscayne, Florida, he decided to move ahead with Plan 1-69, a SENTINEL System modified to protect the Nation's deterrent forces. The second decision, amplifying and implementing the first, was taken in Washington after Nixon's return to the White House. Upon returning to Washington, the President again conferred with Kissinger, Packard, and Dr. John Foster, head of defense engineering and research, to decide on implementing Plan 1-69. Again, there were four choices, of which the President selected the fourth. This was a phased deployment with the great advantage of flexibility, especially worthwhile in view of the approaching arms talks with the USSR.

[7]U.S. Department of Defense News Release No. 190-69, "Statement by Deputy Secretary of Defense David Packard, March 14, 1969"; **New York Times,** 15 March 1969; Adams, Ballistic Missile Defense, pp. 198-200.

[8]Teletype message, DOD to USAEDH, 24 March 1969, "Redesignation of SENTINEL BMD System to SAFEGUARD." For unknown reasons this message does not appear in the Division's "Historical Summary FY 1969," II, Documents, nor is it mentioned in Vol. I, Narrative, at the appropriate period. I have utilized instead a copy found in USAEDH-OC, "History of the Office of Counsel," Vol. I, Ex. 20.

[9]"The Useless 'Safeguard,'" editorial in the **New York Times,** 15 March 1969.

[10]Adams, **Ballistic Missile Defense,** p. 247. Adams writes, "Despite all the seriousness attached to the 'Great BMD Debate' in the scientific/academic community and the Congress, as well as in the Executive Branch whose BMD proposal hung in the balance, the author believes the BMD was only symbolic, except to the long-time opponents of deployment, of a mood then prevalent in the country. That mood was one of despair and frustration with the military, its influence, military spending overruns and costs, the war in Vietnam, the belief that U.S priorities were mistakenly reversed and dislocated, inflation, and the arms race. Missile defense was something to grasp. If it could be defeated, then it was a start to altering the mood, the milieu, and the priorities."

[11]The most important of these Congressional hearings in document form is U.S. Senate, Hearings Before the Subcommittee on International Organization and Disarmament Affairs of the Committee on Foreign Relations, **Strategic and Foreign Policy**

Implications of ABM Systems, Pts. I, II, and III, 91st Cong., lst Session, 1969. These three green paperback volumes contain most of the relevant arguments pro and con the ABM presented in the 1969 Congressional forum.

[12]Adams, **Ballistic Missile Defense,** pp. 215-221.

[13]Ibid., pp. 220-221.

[14]USAEDH-PAO, "Information Bulletin," II, No. 5 (12 Aug. 1969), p.1.

[15]USAEDH-PAO, "Information Bulletin," II, No. 6 (5 Sept. 1969), p.1.

[16]USAEDH-PAO, "Historical Summary FY 1969," II Documents, pp. 121-122.

[17]OCE, Command Inspection Report, U.S. Army Engineer Division, Huntsville, 28-29 May 1969, pp. 2, 5.

[18]The Boston Phase II contract with Morrison-Knudsen was settled on 26 October 1970 for $251,242.92. The "Historical Summary" does not give the final negotiated settlement amount of the George Brox, Inc., contract.

[19]**Boston Sunday Globe,** 9 July 1972, p. 46-A.

[20]USAEDH-OC, "History of the Office of Counsel," Supp. 2 (Apr. 1969 - Feb. 1970), p. 18.

[21]USAEDH-PAO, "Historical Summary FY 1969," I, Narrative, pp.88-89.

[22]Ibid., p. 93.

[23]USAEDH-PAO, "Information Bulletin," IV, No. 6 (2 April 1971), p. 2.

[24]USAEDH-PAO, "Information Bulletin," VII, No. 4 (12 Apr. 1974), pp. 1-2.

[25]BMDSCOM, "Summary of the SAFEGUARD Program FY 1970," pp. 2-3.

[26]USAEDH-PAO, "Information Bulletin," II, No. 2 (9 May 1969), p. 3, and II, No. 4 (14 July 1969), p. 1.

[27]OCE, Command Inspection Report, U.S. Army Engineer Division, Huntsville, 28-29 May 1969, p. 2.

[28]The "Historical Summary" indicates that on 1 May 1969 strength of the Executive Office stood at twenty-two. I have concluded that this is a miss-print. USAEDH-PAO, "Historical Summary FY 1969," I, Narrative, p. 99.

[29]USAEDH-PAO, "SAFEGUARD: A Step Towards Peace," p. 1.

[30]USAEDH-PAO, "Information Bulletin," III, No. 2 (30 Jan. 1970), pp. 3-4.

[31]USAEDH-PAO, "Historical Summary FY 1970," II, Documents, p. 83, reproduces the text of the North Dakota Water Permit.

[32]USAEDH-PAO, "Historical Summary FY 1070," II, Documents, pp. 77-79, reproduces the text of the Office of Counsel brief on air pollution.

[33]USAEDH-PAO, "Historical Summary FY 1970," II, Documents, p. 79.

[34]This was Contract DACA87-70-C-0019 in the amount of $31,000. USAEDH-PAO, "Historical Summary FY 1970," I, Narrative, p. 21.

[35]U.S. Army Engr. Dist. OMAHA, "U.S. Army SAFEGUARD System Command Community Impact Report Grand Forks Deployment Area," April 1970.

[36]Ibid., passim; USAEDH-OC, "History of the Office of Counsel," Supp. 4 (Oct. 1970. 1971), p. 20.

[37] USAEDH-GF, "History of the Grand Forks Office," FY1970, p. 7.

[38]USAEDH-OC, "History of the Office of Counsel," Supp. 2 (Apr. 1969 - Feb. 1970), p. 15.

[39]Ibid.

[40]USAEDH-GF, "History of the Grand Forks Office," FY 1970, p. 15; USAEDH-PAO, "Historical Summary FY 1970, "I, Narrative, p. 30.

[41]USAEDH-OC, "History of the Office of Counsel," Supp. 2 (Apr. 1969 - Feb. 1970), p. 15.

[42]Ibid., pp. 15-17, and Vol. I, Ex. 79, Memoranda 9 May - 13 February 1970, "Concepts and Legality of Government Furnished Temporary Housing."

[43]USAEDH-PAO, "Historical Summary FY 1970," II, Documents, pp. 61-69, reproduces the trip reports, agenda, and roster of attendees at the preparatory labor meetings in North Dakota. I have also referred to the trip report filed on 5 March 1970 by Ralph J. Thayer, Labor Relations Representative, USAEDH, after a February 16-17 visit to North Dakota. This report is not in the "Historical Summary" or in the "History of the Office of Counsel," but it can be found in USAEDH Office of Counsel file, "Labor Relations--North Dakota." Additional information concerning the formulation of a project agreement for Grand Forks was generously provided by

conversation with Stephen V. Rohr, then Labor Relations Officer for the Huntsville Division, on 5 January 1978.

[44]Amendment 005A to Invitation for Bids DACA87-70-B-0001, issued 23 January 1970. This IFB was modified by a total of ten amendments dated 9 Feb., 12 Feb., 21 Feb., 27 FEb., 2 Mar., 7 Mar., 13 Mar., 16 Mar., 19 Mar., and 20 Mar. 1970.

[45]USAEDH-OC, "History of the Office of Counsel," Supp. 3 (Feb. 1970 - Oct. 1970), 41-42; Memorandum for Record: "Summary of Conference to Plan EEO Procedures for the Grand Forks Construction. 26 February 1970," in USAEDH-OC, "History of the Office of Counsel," Vol. III, Ex. 172; Topic Outline for Division Engineers Conference on 29-30 April, 1 May 1970: "Affirmtive Action Program Required of Construction Bidders to Carry Out Equal Employment Opportunity," in USAEDH-OC, "History of the Office of Counsel," Vol. III, Ex.172; USAEDH-PAO, "Historical Summary FY 1970," II, Documents, p. 80. Additional information concerning the problems of minority employment in Grand Forks was generously provided by Stephen V. Rohr, Huntsville's Labor Relations Officer, by telephone conversation on 5 January 1978, and by Emil Vuch, the Division's Chief Counsel, in several personal conversations with the author.

[46]USAEDH-PAO, "Information Bulletin," III, No. 6 (27 Mar. 1970), p. 3; III, No. 9 (8 May 1970), pp. 1-4; VI, No. 11 (14 Dec. 1973), p. 2; VII, No. 3 (17 Mar. 1974), p. 1.

[47]USAEDH-PAO, "Historical Summary FY 1970," I, Narrative, p. 28; USAEDH-OC, "History of the Office of Counsel," Supp. 2 (Apr. 1969 - Feb. 1970), p. 2; USAEDH-GF, "History of the Grand Forks Office," FY 1970, pp. 5-7. It is typical of the great haste prevailing at this period that OCE General Order No. 1, dated 13 January, officially established the Grand Forks, North Dakots, Area Office retroactively to the 25th of November 1969.

[48]USAEDH-PAO, "Historical Summary FY 1970," I, Narrative, pp. 22-23; USAEDH-PAO, "Information Bulletin," III, No. 1 (16 Jan. 1970), p. 1 and V, No. 10 (16 Oct. 1972), p. 2.

[49]USAEDH-PAO, "Information Bulletin," III, No. 2 (30 Jan. 1970), p. 3.

[5‡]USAEDH-PAO, "Information Bulletin," III, No. 4 (27 Feb. 1970), p. 4.

[51]USAEDH-PAO, "Historical Summary FY 1970," I, Narrative, pp. 26-27; USAEDH-PAO, "Informatin Bulletin," III, No. 7 (10 Apr. 1970), p. 1.