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HISTORICAL RESEARCH PAPER NO. 12

NORAD'S UNDERGROUND COMBAT OPERATIONS CENTER, 1956-1966

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NORAD'S UNDERGROUND COC

Initial Requirement to Initial Operation

1956–1966

(Unclassified)

HISTORICAL REFERENCE PAPER NO. 12

Atch 1

NORTH AMERICAN AIR DEFENSE COMMAND

Ent Air Force Base, Colorado

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NORAD'S UNDERGROUND COC

Initial Requirement to Initial Operation

1956–1966

HISTORICAL REFERENCE PAPER NO. 12

JANUARY 1966

By
DAVID W. SHIRCLIFFE

Directorate of Command History
Command Public Affairs Office
HEADQUARTERS NORAD

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NORAD's Underground Combat Operations Center, 1956-1966,

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FOREWORD

The main purpose of this paper is to record the significant activities of the NORAD/CONAD quest for an underground COC from the first statement of a requirement up to the initial operation -- a period of about ten years. It includes the major ups and downs of the project and touches upon building construction and system development.

Another purpose of this study is to give the NORAD staff a timely account of the COC as it begins its initial operation.

No attempt is made in this paper to cover the history of the COC development as carried on by such organizations as the Air Force Systems Command or the Corps of Engineers except where necessary to the main story.

Colorado Springs, Colorado
January 1966

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CONTENTS

ILLUSTRATIONS

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CHAPTER ONE

THE TEN YEAR QUEST BEGINS - 1956 - THE SAC DESIGN

INTRODUCTION

(U) Almost ten years to the day after the CONAD/ADC commander first said that a new, underground combat operations center was needed, initial operation began in the new COC under Cheyenne Mountain near Colorado Springs, Colorado. In January 1956, General Earle E. Partridge, ADC Commander and CONAD Commander-in-Chief, told his staff that a new COC located underground was needed.*[1] The quest for such a center began. The story of these ten years of CONAD/NORAD-ADC planning and effort is the subject of this study.

(U) When the USAF Air Defense Command moved to Ent AFB in Colorado Springs in January 1951, it set up a tiny combat operations center in one of the office buildings by combining one room, a latrine with the plumbing removed, and part of a hallway. Control of the air battle from such cramped quarters became virtually impossible by 1952.

(U) A new concrete block COC, built on Ent AFB, became operational on 15 May 1954.[2] In comparison with the first COC, this new center was luxurious. Although this new COC had some 15,000 square feet of floor space, by the end of 1955 it was evident that even it would soon be inadequate.[3]

PLANNING STARTS FOR AN UNDERGROUND COC

(U) In response to General Partridge's directive, the CONAD/ADC staff began preliminary planning in January 1956 on a larger COC, located under-

*(U) At that time ADC and CONAD Headquarters were merged. The ADC staff served in a dual role as ADC and CONAD staff.

[redacted]

ground. The existing above-ground COC would eventually be too small to manage the growing air defense system and currently was highly vulnerable to attack and sabotage.[4] General Partridge gave a clear picture of the COC's vulnerability when he said:[5]

> The Combat Operations Center is a concrete block building of extremely light construction and is exposed to the traffic on the adjacent street so that a man with a bazooka passing in a car could put the establishment out of commission.

(U) The USSR was expected to have a significant ICBM capability by 1960 or earlier. To defend against this threat, CONAD wanted an automated defense system controlled from within an underground COC.[6] The advent of ICBM's, with their incredible speed, would greatly reduce the time available for defensive reaction and national strategic warning. Automation, wherever possible, was considered essential.

(U) CONAD/ADC based their plans for constructing a COC on facilities designed for the Strategic Air Command. Their plans also included computers and computer-operated displays of air traffic, weapon status, and ICBM attack warning data. Consideration was given to several sites in the Colorado Springs area, including Ent AFB, Peterson Field, and under a mountain.[7]

(U) On 14 September 1956, ADC, acting as executive agent for CONAD, sent the first requirements for an underground COC to USAF. The proposed building had an above-ground headquarters, a basement, and a three-story underground COC. ADC asked USAF to approve the facility in principle so that more detailed studies could be made and the technical details refined. The COC requirements included construction to insure 70 per cent probability of continuing to function against a five megaton weapon with a three mile

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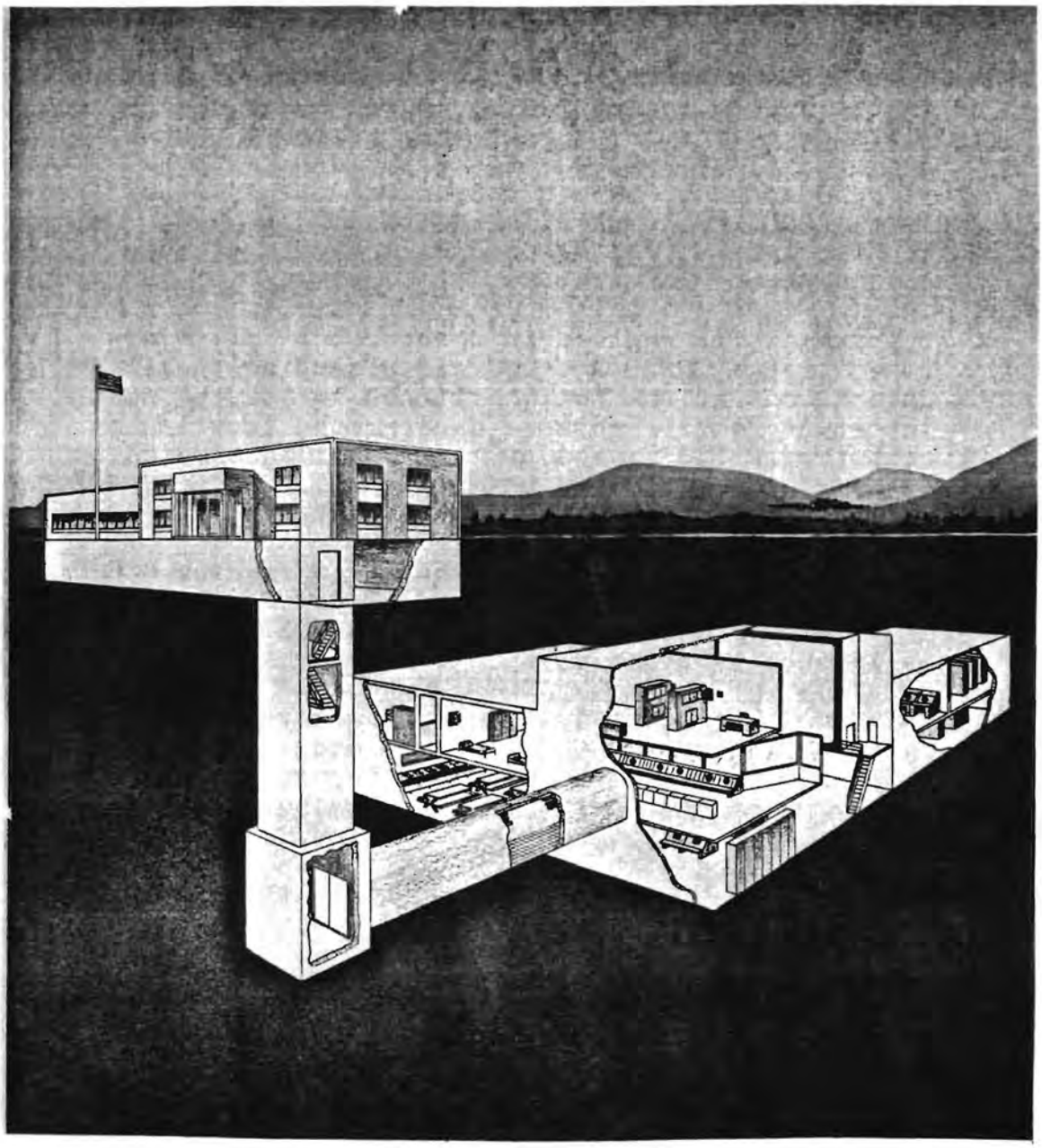

THIS IS AN ARTIST'S CONCEPTION OF THE UNDERGROUND COC AS PROPOSED BY CONAD/ADC IN 1956. BASED ON THE DESIGN FOR SAC, PROPOSED FACILITIES INCLUDED AN ABOVE-GROUND HEADQUARTERS, A BASEMENT, AND A THREE-STORY UNDERGROUND COC

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C.E.P., computers and computer-operated displays, about 120,000 square feet of floor space, self-sufficiency for brief emergency periods, backup communications and television intercom with related commands, emergency housing for personnel in the COC during battle conditions, and protection against fallout and biological and chemical warfare.[8]

(S) USAF replied in October that it recognized that a CONAD/ADC COC was essential to air defense operations but questioned two of the most important requirements -- underground location and computers. USAF asked ADC for detailed studies on these requirements and said they would be needed before any further action could be taken.[9]

(U) In the meantime, shortly after the COC requirement letter was sent to USAF, CONAD had separated from ADC. ADC now asked CONAD for assistance in planning and justifying a COC.[10]

(S) The first full year of activity -- 1956 -- on an underground COC drew to an end with Major General Harvey T. Alness, CONAD Deputy Chief of Staff, Plans and Operations, recommending to General Partridge a course of action. He said CONAD should design a COC based not on SAC's needs but on CONAD's needs.[11] After this, the SAC design was dropped.

[redacted]

CHAPTER TWO

1957 - EXPLORING THE REQUIREMENTS FOR A NEW COC

GENERAL REQUIREMENTS

(U) In December 1956, General Partridge directed his staff to give "immediate, continuing, and forceful action" to the COC project.[1] The following January, the CONAD staff prepared a list of requirements to help ADC design a COC. Major General Alness, CONAD DCS/P&O, said these requirements were based on the assumption that defense against the manned bomber threat would be decentralized and that control of weapons and the conduct of the defense against the ICBM threat would be centralized in an underground COC. The ICBM threat would exist by 1960 and would increase yearly thereafter. He repeated that computers would be needed to display both air traffic information and to process data and control weapons against ICBM's. CONAD's requirements included:[2]

(U) 1. Near 100 per cent probability of continuing to function against multi-megaton weapons (i.e., underground location).

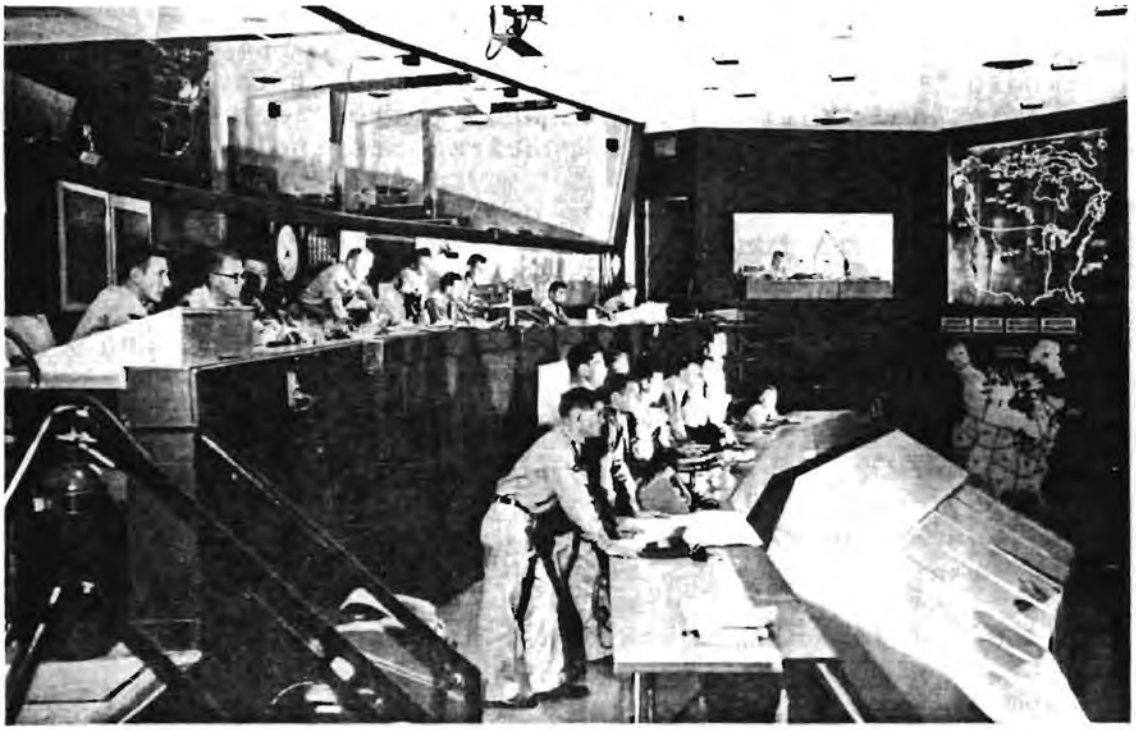
(U) 2. Duplexed large computers and enough floor space to accommodate more computers for anti-ICBM operations.

(U) 3. Displays of hostile ICBM status, weapon status, states of alert, aircraft and missile traffic, target damage, radioactive areas, and weather and jet stream information.

(U) 4. Communications, and backup facilities, with subordinate, lateral, and higher commands.

(S) 5.

COC AT ENT AFB
1954-1966



OPERATIONS AREA IN COC AT ENT AFB

completely independent water and power supply.

6. Protection against radioactive fallout, biological and chemical warfare, and all other external covert and overt actions.

7. Location within 10 minutes travel time of CONAD and component headquarters.

(U) By mid-1957, it was estimated that 175,000 square feet of floor space would be needed for the COC.[3] The thinking at that time was to put the COC under the plain, possibly at Peterson Field.

(U) However, while planning was advancing in CONAD and ADC, the COC was getting nowhere in higher headquarters. CONAD learned in May 1957 that the Office of the Secretary of Defense had disapproved the COC for the FY 1958 military construction program.[4]

PROPOSED LOCATIONS

(U) General Thomas D. White, USAF Vice Chief of Staff, had suggested to General Partridge in December 1956 that he consider moving CONAD Headquarters to a USAF base at either Gulfport, Miss.; Waco, Texas; Belleville, Ill., or to one of several other possible locations. This suggestion was rejected because it would have meant moving the COC to a target complex, a communications center, or a coastal area. Also, General Partridge wanted CONAD near its components' headquarters. The views on COC location stated by General Alness, and endorsed by General Partridge, became CONAD's position. General Alness said:[5]

> By remaining in the Colorado Springs area, use can be made of existing facilities and full advantage taken of the experience gained in operating here. Expansion and relocation in the Colorado Springs area will meet the CONAD requirements much more

readily than any other solution which is now apparent.

(U) In September 1957, ADC asked USAF to change the proposed location in the FY 1959 military construction program from Peterson Field to the Air Force Academy reservation located a few miles north of Colorado Springs. There, the COC could be constructed under a mountain of the Rampart Range. This change -- from location under the plain to under a mountain -- resulted from CONAD and ADC taking a critical look at the near 100 per cent survival criteria for hardening the COC. A re-evaluation had indicated that underground construction on a plain, as at Peterson Field, could not provide adequate protection without costing a prohibitive sum.[6]

(U) At this time, USAF was still not convinced of the need for a hardened COC. It was thinking about moving the COC to Lowry AFB in Denver, where the problem of hardening would be similar to that at Peterson Field.[7]

[redacted]

CHAPTER THREE

1958-1959 - A START IS MADE ON THE NEW COC

NEW EMPHASIS ON THE COC

(U) The COC received new emphasis in February 1958 when USAF asked the recently-established North American Air Defense Command where it wanted to put a Ballistic Missile Early Warning System (BMEWS) computer and display facility. NORAD replied that it wanted BMEWS equipment integrated in a new underground COC at Colorado Springs. This also gave General Partridge the opportunity to reaffirm other essential COC requirements. He told USAF he wanted the COC hardened to withstand several hundred pounds of overpressure, self-sufficiency for an indefinite period, multi-route communication facilities, and an adjacent command complex for NORAD and component staffs.[1] Next, General Partridge gave these requirements to the JCS and repeated them in April, adding that a study by RAND Corporation showed that the best solution and most reasonable coast would be to put the COC in the Colorado Springs area in a granite mountain.[2]

(U) The JCS asked General Partridge in June 1958 for his recommendations for a new headquarters and COC. They also provided certain criteria. These criteria were not intended to be restrictive and were very close to NORAD's desires, except for the degree of hardness for the COC. These criteria were:[3]

(U) 1. The headquarters should be near the COC site.

(U) 3. The COC, wherever located, will be a prime target. The site should be selected, as far as practicable, away from other key facilities so,

[redacted]

if attacked, a minimum "bonus effect" to the enemy would result.

(U) On 31 July 1958, General Partridge sent his recommendations to the JCS. He asked that a headquarters complex be built near the COC. [redacted] isolation from other key targets and population centers he said, made it a good location. General Partridge said a study by RAND Corporation had found that the required hardness could be gotten in the granite mountain formations in the Colorado Springs area with COC construction costing about the same as for above-ground, SAGE-type construction.* He named two potential sites: Blodgett's Peak, next to the Air Force Academy grounds, and Cheyenne Mountain, about seven miles south of Colorado Springs. To find the best site, General Partridge suggested that detailed studies be made of each location.[4]

(U) He also asked for two large computer systems, a display system, a communications system, a capability to operate for five days completely sealed up, and about 232,000 square feet of floor space -- an increase of some 57,000 over the previous proposal.[5]

(U) General Partridge also pointed out to the JCS the importance of a new COC. He described it as the "decision-making center for the entire North American air defense system." And he predicted:[6]

> During the time period when the new COC will be operational the air defense system will undergo a transition from the current, largely man-

(U) * During February and March 1958, RAND had found that Cheyenne Mountain or Blodgett's Peak offered the best location for the COC. RAND reached this conclusion after examining a number of mine sites in the Mid-West, Ohio Valley, and Colorado Springs area.

[redacted]

ual system to a more automatic system. In addition, the ballistic missile threat places a requirement for highly automatic defensive systems. The new COC will make provision for optimum employment of these systems and, in addition, give the commander enhanced decision-making capability because of the higher quality information which these systems make available.

CHEYENNE MOUNTAIN SELECTED FOR COC SITE

(U) As General Partridge had recommended, on 24 September 1958 the JCS directed USAF to make site surveys. These surveys were ordered after both USAF and NORAD had objected to a JCS working group recommendation that the COC be built at Ent AFB with only the basement and sub-basement hardened. Apparently, this recommendation was based on the assumption that it would be cheaper to build at Ent. USAF said if construction costs were to decide the exact location, detailed cost estimates should prove or disprove NORAD's contention that there would be little difference in cost between a "hard" or "soft" COC.[7]

(U) The JCS-directed study began in October. USAF told its Missouri River District Installation Representative to investigate all likely COC sites in the RAND study and any other studies made by ADC or NORAD in the Colorado Springs area. For this study, USAF provided these guidelines:[8]

(U) 1. The location of the COC should allow the construction of an above-ground headquarters nearby.

(U) 2. The COC must have the capability for future expansion.

(S) 3.

(U) USAF asked for cost estimates of the two best sites, and for cost comparison, wanted an estimate for constructing "an alternate site hardened

[redacted]

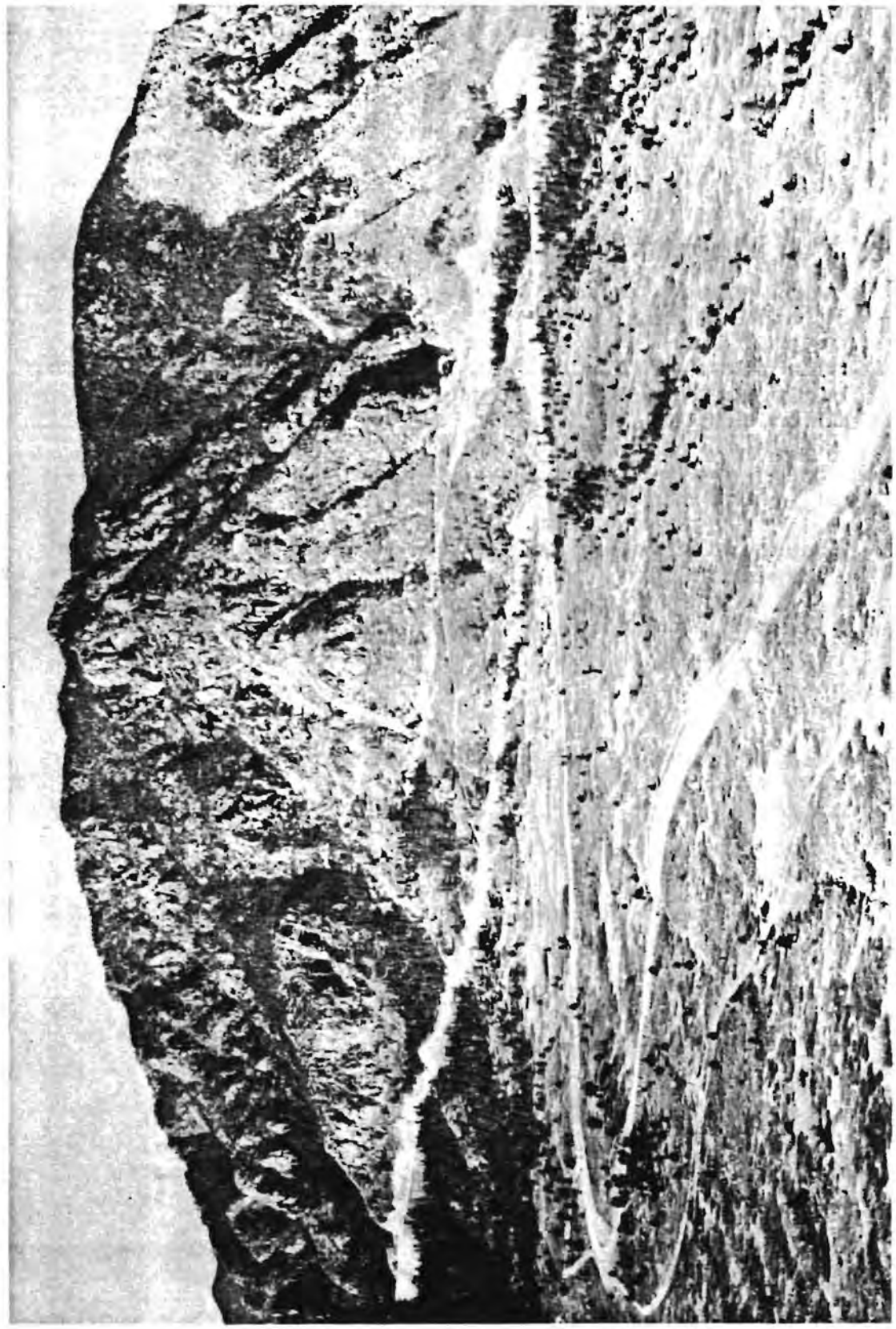
to 200 psi located in open terrain such as Ent Air Force Base or Peterson Field." Also, USAF asked ADC to prepare the functional layout of the COC. USAF said it wanted quick action so all facilities would be completely designed and ready to advertise to contractors by 1 August 1959.[9]

(U) The study, made by the firm of Parsons, Brinckerhoff, Hall and MacDonald, found that Cheyenne Mountain was the best site. Also, it said that to build a COC on the open plain would be too expensive. On 18 March 1959, shortly after the JCS had approved the COC in principle (see below), the JCS approved Cheyenne Mountain as the site for the COC.[10]

COMMAND AND CONTROL SYSTEM MANAGER

(U) With site selection and design planning progressing, NORAD wanted one agency to manage the development and production of the entire COC command and control system. In October 1958, General Partridge recommended to the JCS the selection of a single managing agency. He explained: "Having one such agency responsible for the entire COC implementation will result in a properly integrated system." Lack of a manager, he said, would "once again produce separate defense systems which will not work together and will require expensive modification to properly serve NORAD's needs." The manager would coordinate with subsystem (BMEWS, SAGE, Spacetrack, etc.) contractors to ensure that all would interconnect and work together.[11]

(U) On 11 February 1959, the JCS approved the COC in principle and assigned development and production management to USAF. In their approval, the JCS directed that, first, a study be made of the requirements. No emphasis was to be placed on future space defense systems. Also, a report on floor space requirements, growth capacity, and cost estimates would be submitted for JCS approval before construction could begin. USAF assigned full management responsibility to its Air Research and Development Command (later the Air Force Systems Command) and asked that it prepare the JCS-directed study and report.[12]



CHEYENNE MOUNTAIN AND ACCESS ROAD TO UNDERGROUND COC SITE

(U) Three months later, on 19 May 1959, ARDC sent a combined study-report to USAF. Thirty military, civil, and private agencies, including NORAD, helped in preparing the COC requirements. These included putting the COC under 2000 feet of granite rock for maximum protection so it could operate during and after a sustained thermonuclear attack, secure and hardened communications, a COC capable of expanding and growing to meet the changing needs of air defense, and 253,000 square feet of floor space* -- an increase of 21,000 over that proposed in July 1958. Total cost was estimated at $155 million. ARDC planned to establish a System Project Office to provide management guidance and to hire a prime system contractor who would develop, design, procure, install, and test the command and control system. With a good deal of optimism, ARDC set the COC beneficial occupancy date 1 April 1962. To meet that date, the contractor had to be hired within the next few months.[13]

(U) As it turned out, two years would pass before a system contractor was hired. Although ARDC was authorized in July 1959 to select a contractor, OSD made it impossible by withholding funds. Funds were released in September but, before a contractor could be chosen, USAF decided to postpone and restudy the COC project.[14]

*(U) This figure did not include the area reserved for the power plant and water and fuel reservoirs. However, the figure was less than that authorized (266,400 sq ft) by USAF for the COC.

CHAPTER FOUR

1960 - THE COC PROJECT IS STOPPED AND REORIENTED

USAF SUSPENDS WORK ON COC

(U) From July to November 1959, the proposed 425L System -- the command and control facilities for the NORAD COC -- came under close scrutiny, as did 400L systems in general. These systems aroused concern because of their unclear missions, duplication, underground location, and upward spiraling costs.[1] USAF told NORAD that expanding requirements and rising costs were endangering the concept of a hardened COC. USAF asked General Laurence S. Kuter, who had assumed command of NORAD/CONAD on 1 August 1959, to personally review COC planning and eliminate unnecessary items to cut costs.[2]

(U) On 24 November 1959, USAF suspended the COC project. USAF said it was reviewing the 425L System

*(U) USAF had authorized this figure on 20 May 1959, but was now proposing a sizeable reduction.

and told ARDC to postpone all action on it indefinately. From USAF's view point, there was considerable justification for reviewing 425L. In October, the JCS had turned down ARDC's report as a basis for approving the project because of not enough data on requirements and costs. They said that further study was needed.[5] Other important factors were an austere budget and, equally significant, the air defense threat was changing.

(U) Just prior to the COC being suspended, most of the land for the COC had been acquired. Additional land needed was acquired over the next few years. In all, a total of 451 acres were purchased for about $310,000 and perpetual easement on 68 acres was acquired for about $78,000.[6] During November 1959, an unpaved access road was built to the site for approximately $1 million.

AIR DEFENSES BEING REORIENTED

(U) Examination of the command and control systems was not an isolated case. The whole air defense system came under examination during 1959-1960 because of the changing threat, shifts in concepts and priorities, and budget limitations. The result was a considerable reorientation of the air defenses and an impact on the development of the NORAD COC.

(U) Heretofore, the threat had been purely manned bombers. But now the growing threat was ballistic missiles and with the possibility of a threat from space systems in addition. Emphasis on appropriate air defense systems was changed as proposed defenses against manned bombers were cut back or cut out.

(U) First off, the Secretary of Defense in June 1959 made major reductions in interceptor and BOMARC programs. USAF cancelled the F-108 long-range interceptor program, cancelled improvements to DEW Line radars, cancelled the requirement for an advanced AEW&C aircraft, and eliminated gap

filler radars from the Alaskan program. In 1960, programs for radars, interceptor squadrons, and BOMARC's were further reduced and plans to build hardened SAGE super combat centers were cancelled.[7] Use of the proposed NORAD COC against the dwindling bomber threat was a factor working against its justification.

(U) In March 1960, General Thomas D. White, USAF Chief of Staff, appeared before a Congressional subcommittee and testified about changes he was recommending in the air defense program. Essentially, General White recommended speeding up the development of space and ground systems to give warning against ballistic missile attack and cutting defenses against the manned bomber. One of these cuts dealt with hardened centers. This led Congressman H.R. Sheppard (D.-Calif.) to ask General White about the NORAD COC: "You have about a million dollar road running up the hill /Cheyenne Mt./ to nowhere." And the Congressman wanted to know what was going to happen to the COC. General White replied, "We intend not to build it as of now."[8]

(U) Budget limitations were also having a serious impact. Funds for building the COC were rescheduled to be used on "higher priority" programs. USAF felt that the cost to harden the entire air defense system would be prohibitive. And USAF reasoned that to control a soft air defense force there was no need for a hardened center.[9]

A COC FOR BOTH AIR AND SPACE DEFENSE

(U) Anyway, during 1960, 425L and the COC were studied intensively. On 1 February, a NORAD study group met to define more precisely system requirements and costs.* Shortly thereafter, this

*(U) This group consisted of representatives from 425L SPO, ADSID, ADC, AMC, ARDC, RADC, MITRE, and NORAD.

group formed the NORAD COC Sub-Panel when it joined with the Winter Study Group, a USAF-sponsored study of command and control systems. As this study progressed, it became evident that the COC was oriented mainly against the manned bomber threat. To justify the COC, a broader basis was needed.[10]

(U) In a letter to the JCS on 29 June 1960, NORAD formally updated its concept of the COC to include an integrated air and space early warning mission. In addition, NORAD asked for operational control of space surveillance and tracking systems as a natural extension of its mission to defend against air attack.* [11]

(U) This new concept was also in a USAF directive to ARDC on 30 June. ARDC's previous study of the COC had emphasized air defense requirements. Now USAF asked ARDC to submit a study by 1 August 1960 that included COC interface and technical compatibility with MIDAS, SAINT, Spacetrack, Nike Zeus, and BMEWS. This study, to be made in collaboration with NORAD, was also to re-examine the projected COC, including estimates of the development, procurement, installation, and operational costs.[12]

(U) ARDC's "NORAD COC Study," 1 August 1960, described the COC as a hardened center from which CINCNORAD would supervise and direct operations against space attack as well as air attack. The study described, in general terms, an evolutionary air and space defense system:[13]

> It will evolve from the current system /defense against air attack/

* (U) NORAD participation in space defense was assured in October 1960. The Secretary of Defense directed the JCS to assign operational command to CINCONAD and operational control to CINCNORAD of space surveillance and tracking facilities.

which has no space defense capability into a completely integrated, centrally controlled system which will have the capacity to provide total defense against aerospace attack.

(U) This was a solid study that remained the basis of COC planning for several years. But in 1960, the study still had to be approved. Congress had to reallocate the money so that construction on the COC could begin.

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CHAPTER FIVE

1961-1963 - WORK ON THE COC BEGINS ANEW

APPROVAL OF THE COC

(U) In October 1960, USAF approved ARDC's study of the COC. At the same time, OSD indicated its approval. DOD asked the JCS to reaffirm the need for the COC, which the JCS did on 6 January 1961. With but minor exceptions, the JCS approved the study. Only one stumbling block remained. That was getting Congress to reallocate the money for the COC. On 9 January, DOD asked Congress to release funds so that underground excavation in Cheyenne Mountain could start.[1]

(U) Congressional approval came shortly thereafter. On 31 January, the Senate Appropriations Committee approved the release of funds and on 24 February the House Military Construction Committee approved the project on its revised and reduced basis. On 2 March 1961, $8.531 million was released for excavation work in Cheyenne Mountain.[2]

RESPONSIBLE AGENCIES

(U) As mentioned before, the JCS had made USAF responsible for the COC project. Eventually, the responsibility for overall management of system acquisition was assigned to ARDC's (renamed Air Force Systems Command in April 1961) 425L System Program Director. The System Program Office came under the Electronic Systems Division (ESD).

(U) Other agencies were assigned or contracted for tasks as the COC and the 425L System began to physically emerge. Civil engineering for system acquisition was managed by the ESD Deputy for Civil Engineering. The Air Force Regional Civil Engineer, Missouri River Region, approved the COC design; also,

[redacted]

it was to keep close watch on construction. The Omaha District Engineer, Army Corps of Engineers, was responsible for design and construction of both the excavation work and the underground structures. ADC was CINCNORAD's representative on matters of design, construction, and scheduling.[3]

(U) On 21 July 1961, the Secretary of the Air Force announced that the Burroughs Corporation had been selected as the system hardware contractor. Also, AFSC named MITRE as the primary system designer and the System Development Corporation as the computer programming agent. In addition, a 425L System Configuration Control Group was set up with members representing the SPO, Spacetrack, MITRE, SDC, RADC, ADC, and NORAD.[4]

DIGGING THE HOLE IN CHEYENNE MOUNTAIN

(U) Excavation for the hardened COC in the 9,565-foot Cheyenne Mountain began on 19 June 1961 and was essentially completed by August 1962. It was completely finished on 1 May 1964. The Utah Construction and Mining Company contracted to dig the chambers for housing a COC of 154,500 square feet, access and exhaust tunnels, and fuel and water reservoirs (see p. 29 for general layout).[5]

(U) Shortly after work started, General Kuter asked USAF to authorize the digging of a larger hole. He felt that the planned excavation would support only an austere NORAD operation, but a larger hole would allow some flexibility for the eventual COC building configuration. He justified his request on the basis that the work could be done well within the funds already appropriated. Also, he said the Defense Communications Agency (DCA) might collocate some facilities with the COC in the underground center.[6]

(U) In November 1961, OSD approved collocation of a DCA-Continental U.S. Area Operations Center with the COC. DCA's space requirements -- 16,000 square feet -- were added to the scope of the excavation.[7]

CONSTRUCTING THE COC

(U) Building of the underground structures began on 4 March 1963. This work was done in two phases -- Phase II and IIA.* Phase II covered all internal construction except for the operations and technical areas. The contractor for this phase was the Continental Consolidated Corp. of Jacksonville, Fla. Phase IIA covered the operations and technical areas. This phase was done jointly by Graf Wallace, Inc., Denver Colo., and J.M. Foster, Inc., Gary, Ind.

(U) There was some slippage in the construction schedule because of slippage in the excavation work, redesigning, and repair of a geological fault. Phase II, scheduled for completion by mid-July 1964, was finished in January 1965. Phase IIA, scheduled for completion by 1 August 1964, slipped to December 1965.

(U) 1 August 1964 had also been the beneficial occupancy date. That date slipped to 15 February 1965, and then to 1 June 1965. This was caused by repair work to a geological fault in the area of the command post (B-2) intersection. Until this was done, the central building, where most of the technical equipment was to be installed, could not be finished. Also, there was a delay in opening contract bids on Phase IIA.[8]

(S)

*(U) Phase I covered buying the land, building the access road, excavation, and repairing a rock fault at the B-2 intersection.

(S)

(U) There are two main entrances, one at either end of the three-section, north-to-south access tunnel. The north section (29' wide, 22'6" high, and 1416' long) permits two-way vehicular traffic; under normal conditions, the north portal is the main entrance. The south section (15' x 17'6" x 2668') is the main air intake but, in an emergency, can be used for pedestrian and one-way vehicular traffic. From the central section (45' x 25' x 591'), passageways lead to the COC buildings.[10]

(U) Provisions were made so that, in an emergency, the COC could be operated for 30 days in a sealed condition. During that time, except for air from the outside that could be filtered for people inside the mountain, the COC would need no other outside support. Its resources include a built-in power plant, heating and air conditioning systems, dormitories, dining areas, maintenance and storage areas, and a dispensary. Southeast of the buildings there are three large underground reservoirs. These hold 350,000 gallons of diesel fuel; 1,375,000 gallons of drinkable water; and 4,125,000 gallons of water for industrial uses.[11]

DEVELOPING THE 425L SYSTEM

(U) In April 1961, USAF told AFSC that the 425L System should develop through a step-by-step evolution.[12] The 425L SPO described such a process in the document "Evolution of the NORAD COC - System 425L," 19 July 1961. It called for five evolutionary stages or phases lettered A through E and running from June 1961 to October 1965 (see p. 24). Phase E, December 1964, would see the start of operations with the system and, at the end of the phase, either the closing down or conversion to an-

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SUMMARY OF SYSTEM 425L PHASING PLAN

SYSTEM / PHASES / COMPONENT	A June 61 - Mar 62	B Mar 62 - Oct 62	C Oct 62 - Dec 63	D Dec 63 - Dec 64	E Dec 64 - Oct 65	F Oct 65 -
FUNCTIONS	- SPADATS	- BMEWS DIP - Auto. Inputs - Exec. Prog.	- Auto Air Defense - Auto Missile Warning - MSC Checking - Recording - Exercising - BA/NUDETS - Sys Ops Monitor - SAC Outputs - Data Corr.	- Auto Reporting - Damage Asses. - Fallout Pred. - Weapon Super. - Sensor Control - MIDAS - Credence - Attack Predict. - Full Exec. Prog.	- As per System 425L Perf. Spec. Revised by Experience	- Intell. - WX - Space Defense Weapons Integration
COMPUTERS	- P-2000 - DIP	- 2 P-2400 - DISC File	- 1 425L Processor - 1 425L 1/0	-1 425L Processor - 1 425L 1/0	(As Above)	(Not Defined)
DISPLAYS	No Change	No Change	- 10 425L Consoles - 3 425L Hard Copy	- 10 425L Consoles - 2 425L Hard Copy - 1 425L Lg. Bd.	(As Above)	(Not Defined)
INPUTS - OUTPUTS	- SPADATS Sensors	- BMEWS - SPASUR Sensors	- NORAD Regions - DEW - Barriers - BMEWS - BA/NUDETS - Status	- MIDAS - JCS (JWR) - SAC (465L)	(As Above)	(Not Defined)

NOTE: Phase capabilities are additive.

CHART 1

other use, of the current, exposed COC. A sixth phase, F, for the period October 1965 on, was added to emphasize that the system would continue to evolve.

(U) This plan categorized equipment for the several phases into groups. Group I equipment would consist initially of the original manual COC and the SPADATS data processing equipment for phases A and B. Group II equipment would consist of a simplex 425L prototype data processor and prototype display units. The Group II equipment would first be used in Phase C and would be used for tests, experimentation, design verification, orientation training, etc. for the final 425L System -- Group III.

(U) Because floor space was extremely limited in the current COC, this plan pointed out that it would be necessary to put the Group II equipment and personnel in another building nearby. Later, the Burroughs Corporation obtained a building, known as the Group II facility, next to Ent AFB. The plan said it was unnecessary to build a complete 425L prototype in this other building. Rather, it would be more in the nature of a "dual thread" prototype to prove out the 425L System design.

(U) Evolution was to be achieved, mainly, by the 425L SPO, MITRE, SDC, and RADC producing design documents describing each phase of development. Then, Group II equipment would be configured accordingly and tested. Plans called for continuously updating all documentation so that the final phase (Phase E -- Group III configuration) would reflect the best of what had been learned through testing and experience.[13]

(U) NORAD concurred with this evolutionary concept in a letter to ADC on 9 October 1961. In so doing, NORAD emphasized that there was one objective of highest importance. This was moving from the manual COC into Cheyenne Mountain with the best automated system available.[14]

[redacted]

(U) The original choice of data processing computers for 425L was primarily between the Burroughs D-825 and the Philco S-2000. AFSC selected the Philco computer because MITRE, the system designer, doubted the capability of the Burroughs computer. MITRE also doubted that Burroughs would be able to meet the 425L timetable.

(U) However, when Burroughs began to produce its D-825 in the summer of 1962 and the computer had partially demonstrated its capability, NORAD asked AFSC to re-examine the choice of computers. NORAD was interested in the D-825 because its modular design concept would allow it to handle more requirements as 425L evolved. AFSC said it still doubted that Burroughs could meet the 425L schedule. Furthermore, to change the choice of computers would take a considerable amount of time to work up a new program for the Burroughs computer. Therefore, AFSC said that selection of the Philco computer was firm.

(U) The Philco computer arrived on schedule. Installation began in the Group II facility on 26 October 1962 and 30-day acceptance tests started on 19 November.[15]

(U) System design specifications called for manning the Group II facility with NORAD and ADC personnel. On 6 November 1962, a 425L Military Operator Section was established, and within six months, 18 officers and six airmen were assigned. The MOS worked with MITRE, SDC, and ESD in developing, testing, and evaluating 425L. In this regard, the MOS was to see if the system would satisfy CINCNORAD's needs. If it did not, the MOS was to recommend changes.

(U) Also, these people received training in operating equipment, maintenance, and computer programming. They would serve in Group III as a nucleus of trained personnel which would assist in the transfer of air defense functions from Group I to Group III.[16]

[redacted]

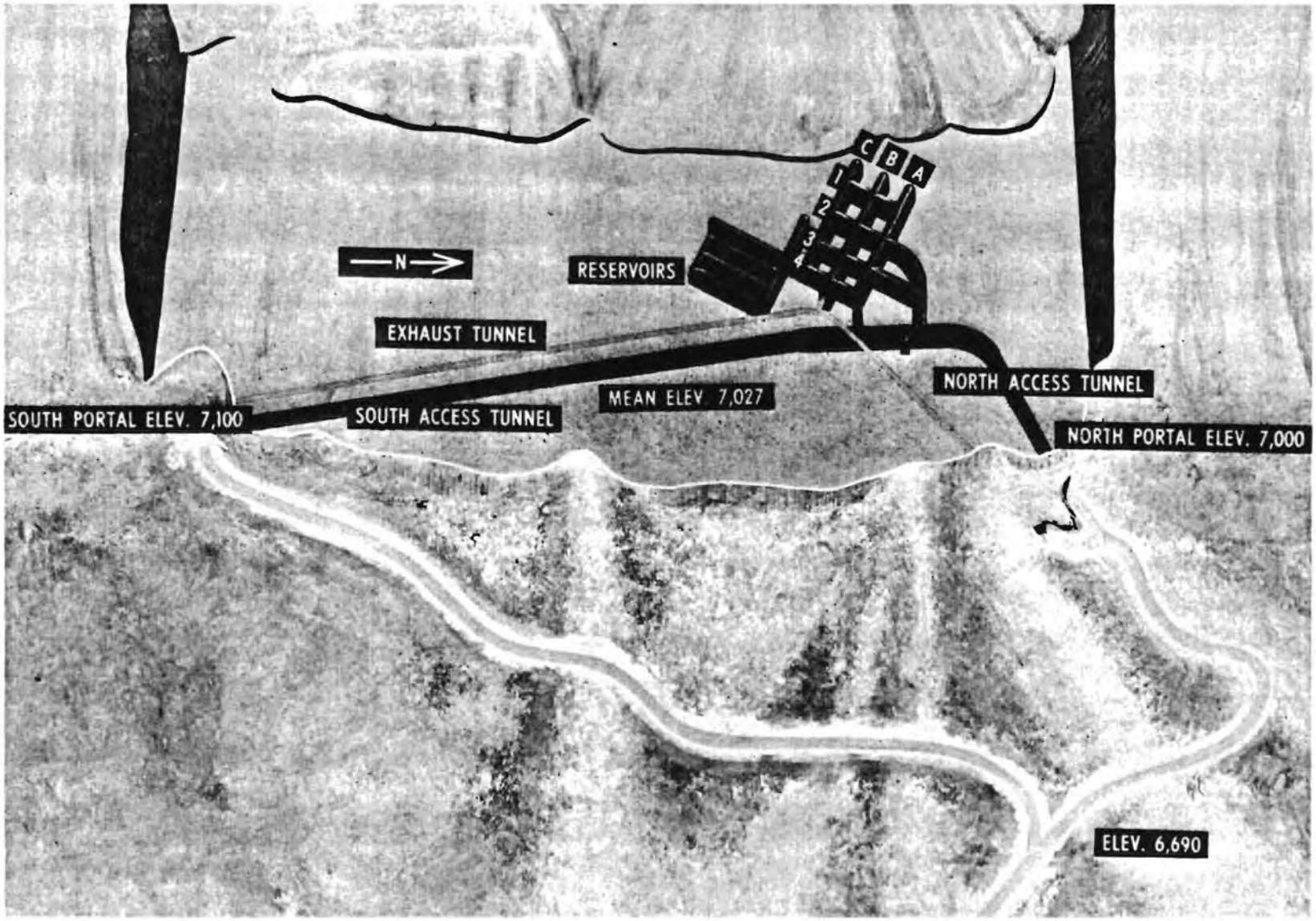
(U) Evolutionary development of 425L did not proceed according to plan, however. Delays in Group II equipment deliveries, delays in the production of computer programs, and equipment failures caused NORAD to express concern that the final design might result in an unproved system. These problems prevented functional experimentation in Group II. Nevertheless, the design specifications for the final phase were published, thereby negating evolutionary development.[17]

(U) To remedy this situation, on 13 April 1963 NORAD asked ADC to request a review of management procedures and reorientation of 425L development. NORAD wanted this done so that Group III on final occupancy would have a functionally tested system, and one that met the operational requirements of CINCNORAD.[18]

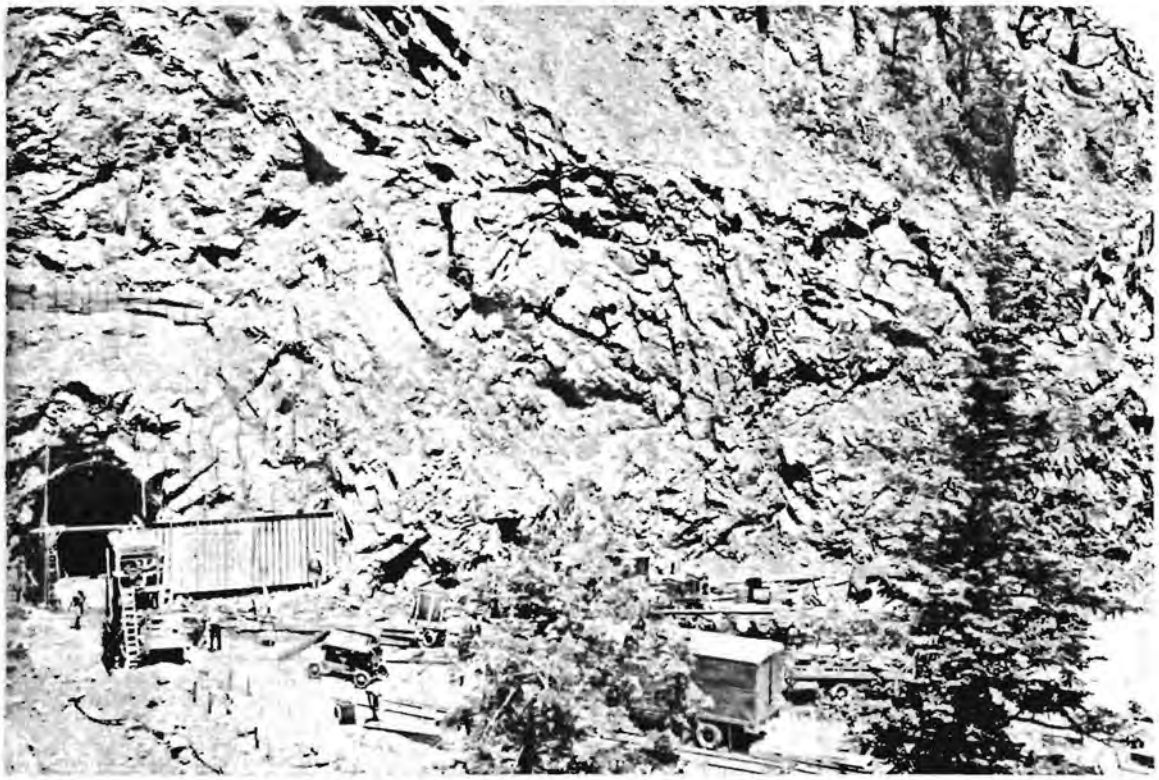
(U) ADC brought this matter to the attention of USAF in early June 1963 and recommended that the evolutionary program and facility receive top level attention. ADC pointed out the shortcomings in 425L development, that evolution must stop in the spring of 1964 because of the overall schedule and funding, and the probability that CINCNORAD would be unable to make any significant changes he might want in the system. ADC warned that USAF might lose the job of providing such systems if it could not be done punctually and efficiently.[19]

(U) By the summer of 1963, USAF, AFSC, ADC and NORAD had started to look for ways to solve the management and development problems. However, by this time DOD was also becoming concerned with rising costs, computer and other equipment proliferation, and the apparent lack of centralized planning for the Cheyenne Mountain Complex.*

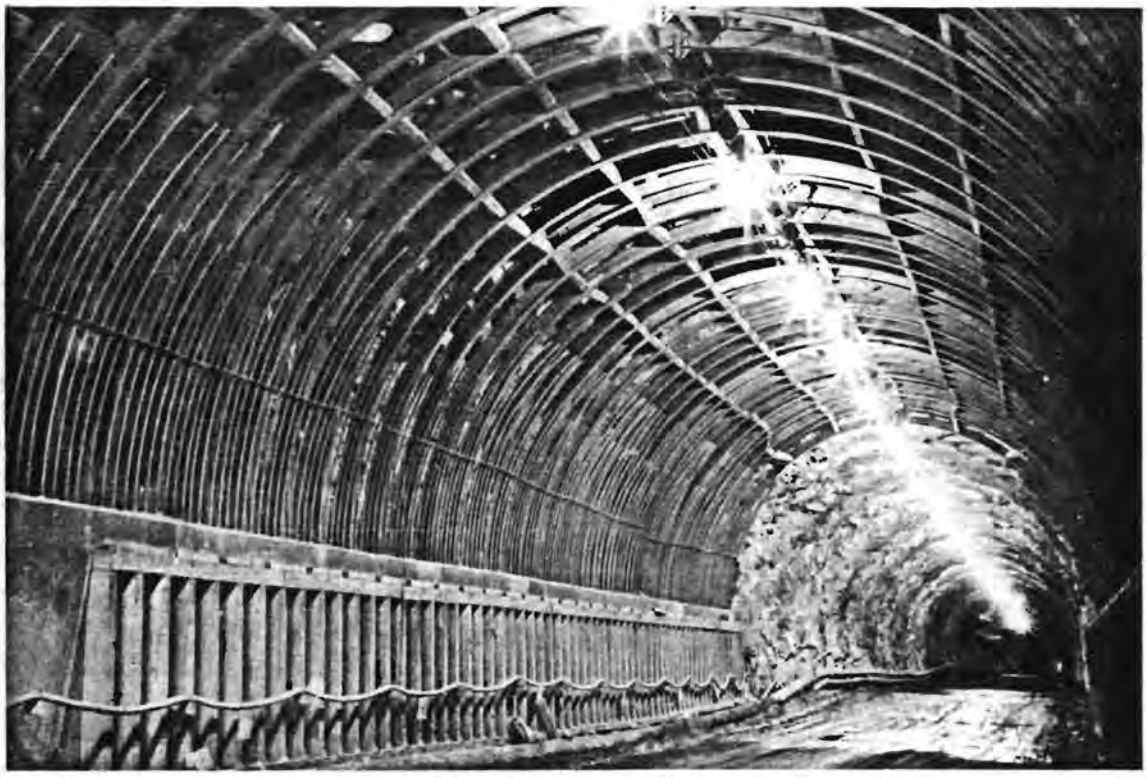
*(U) Cheyenne Mountain Complex was a term used to refer to the grouping of systems planned for the underground center. It included 425L, 496L, IDHS, Air Weather Service, and DCA-CONUS.



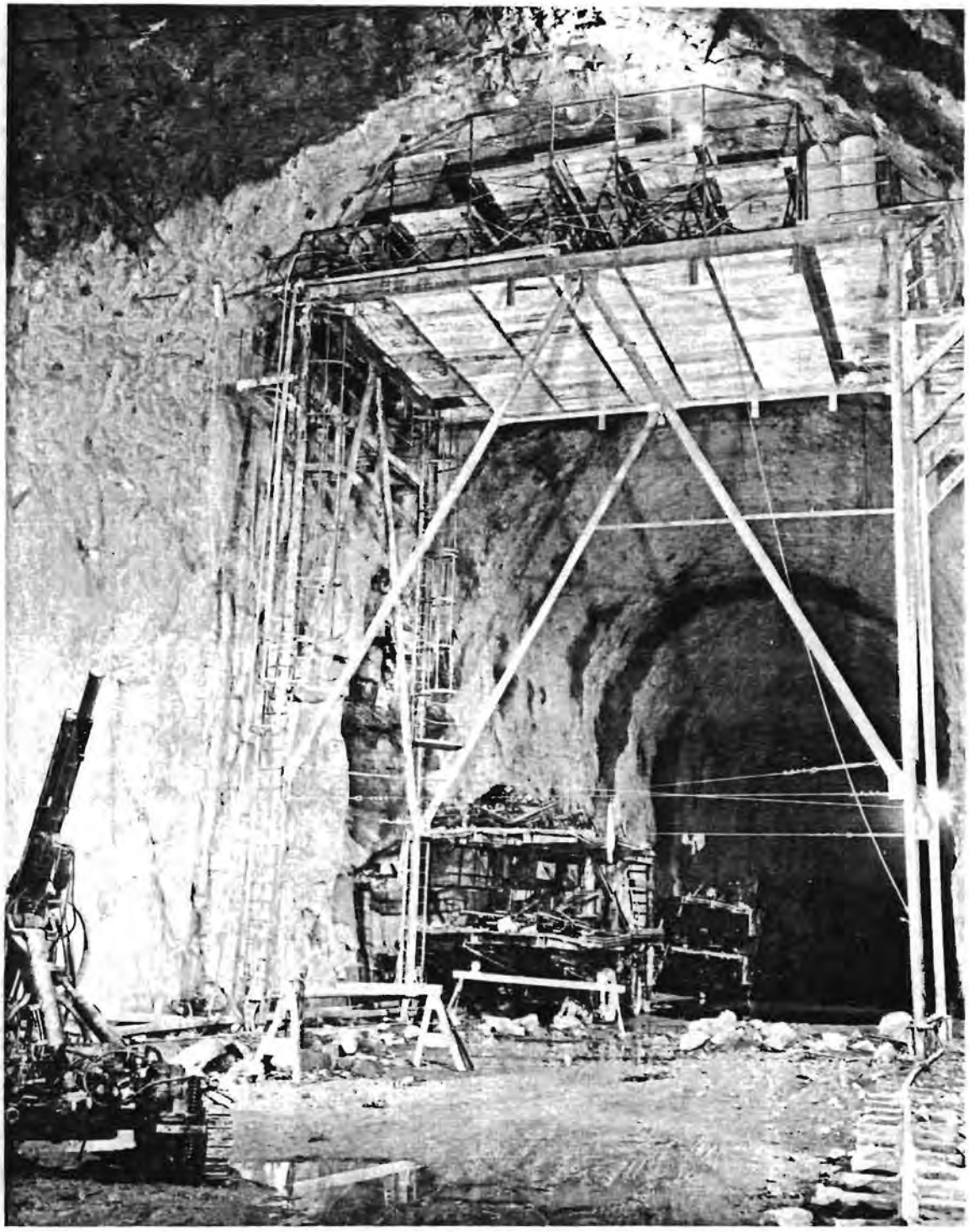
COC LAYOUT IN CHEYENNE MOUNTAIN



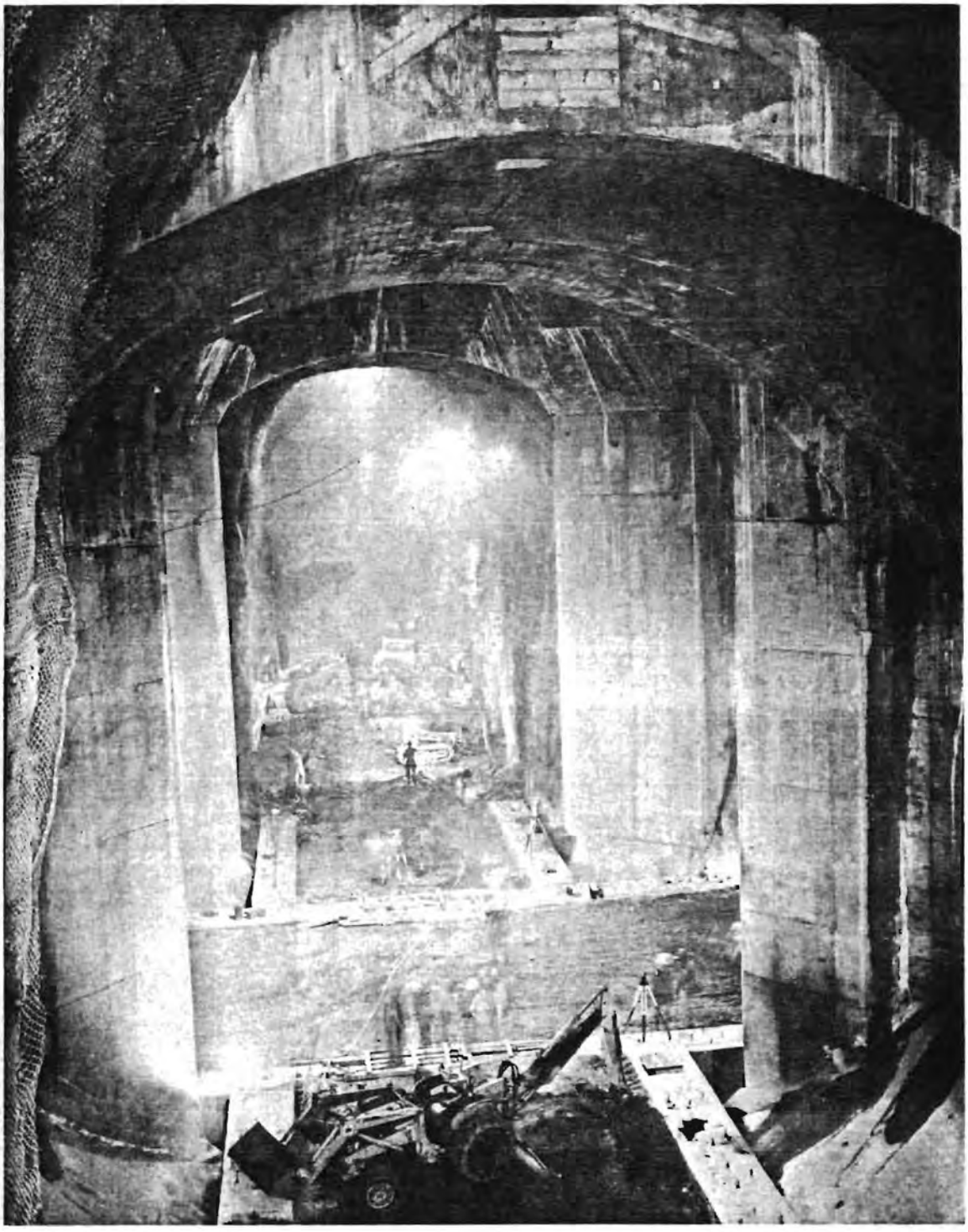
SOUTH PORTAL - MAY 1962



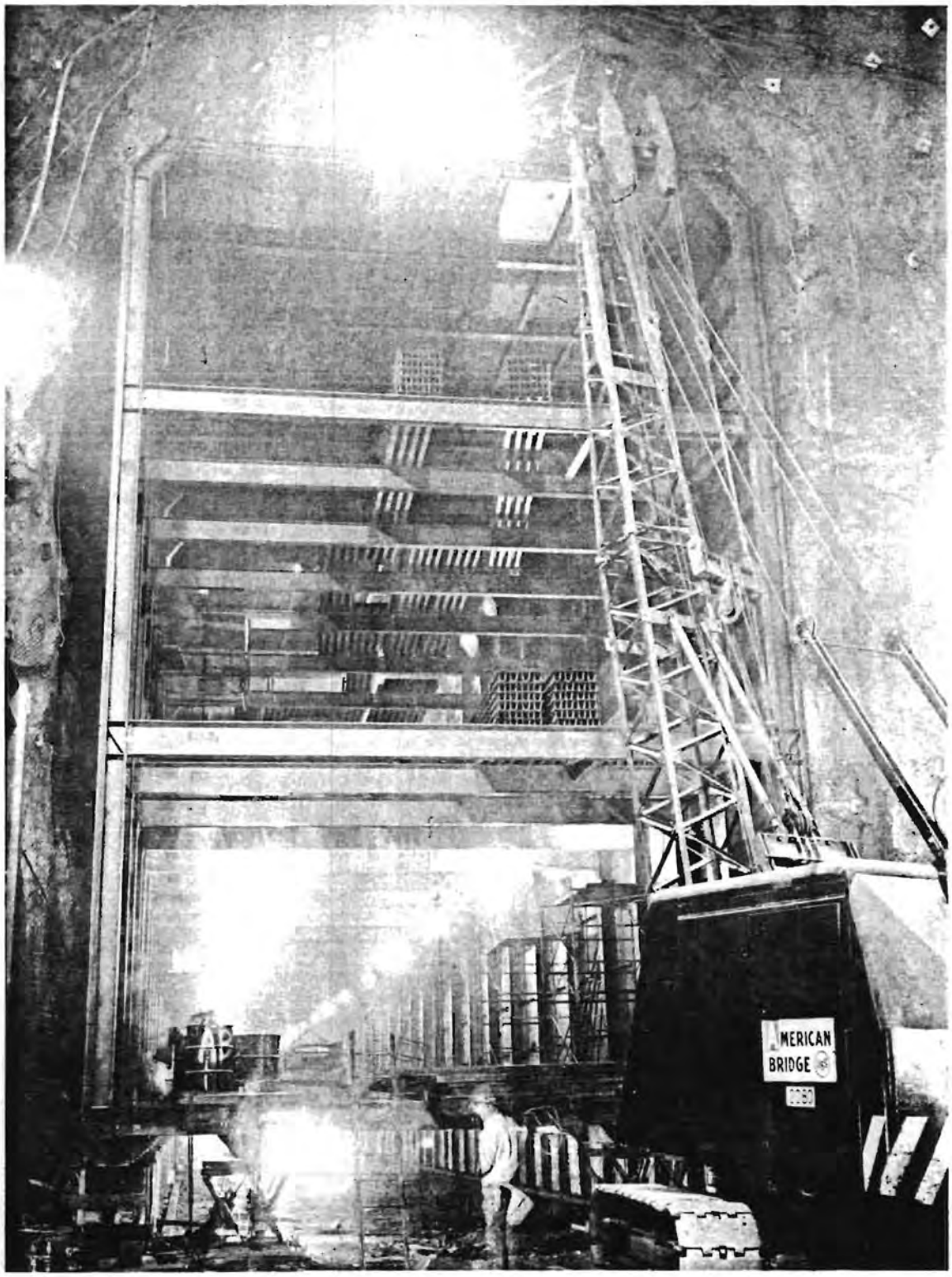
SECTION OF NORTH TUNNEL - MAY 1962



INSTALLATION OF STEEL WIRE MESH FOR ADDED SAFETY - MAY 1962

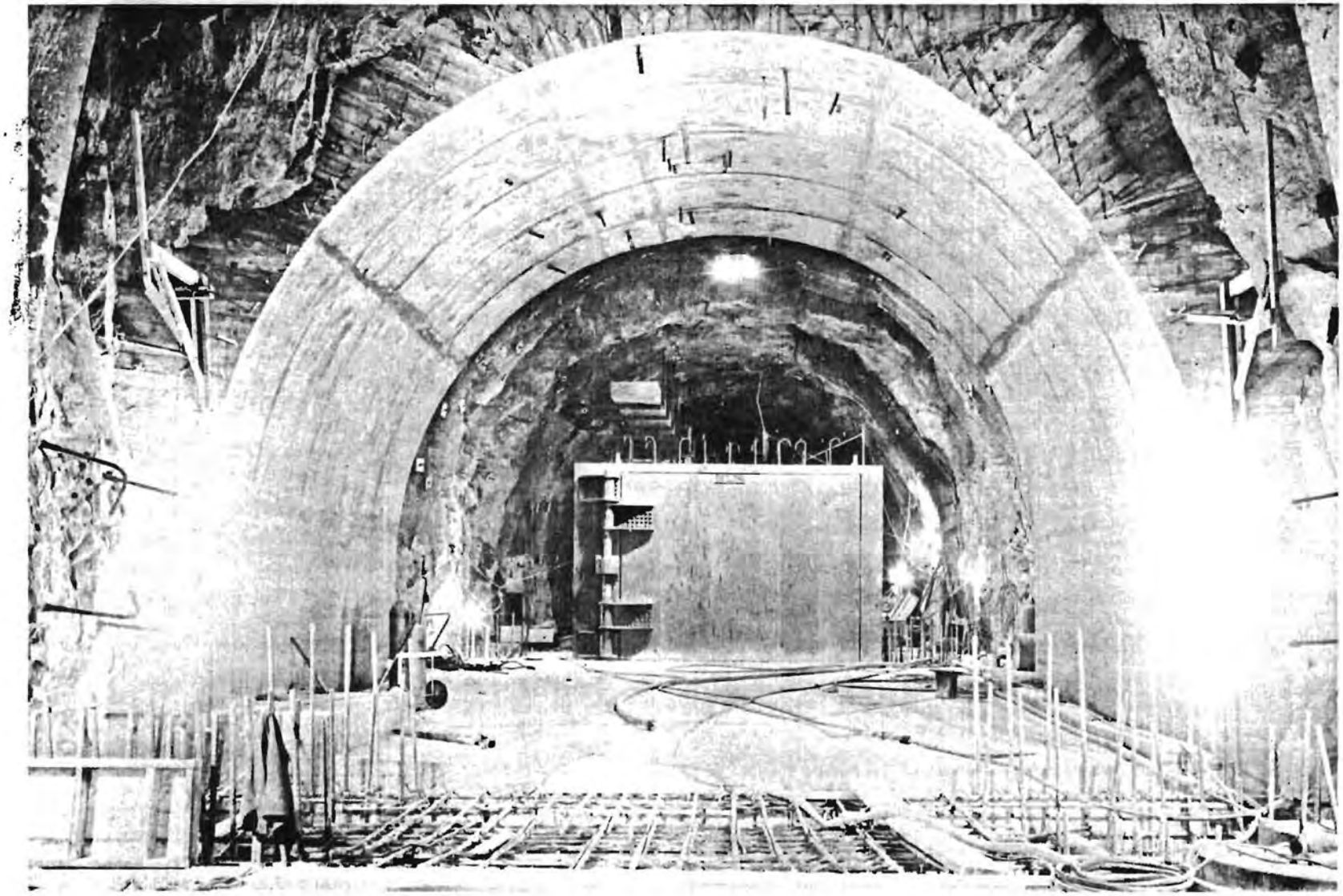


B-2 INTERSECTION - MAY 1964



BUILDING CONSTRUCTION IN CHAMBER#3 - DECEMBER 1963

INSTALLATION OF BLAST DOOR IN CHAMBER #2-JUNE 1965



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CHAPTER SIX

1964 - THE COC IS AGAIN EXAMINED

(U) During 1962 and 1963, the cost of the COC crept upward mainly because more and more equipment was being added. Originally, when the COC was approved, the cost was set at $64 million. In April 1962, the 425L System Program Director told the USAF Air Defense Panel that the system, as described in a revised System Package Program, would cost about $106 million. The Panel would not approve this amount and told the SPD to prepare two approaches to 425L: (A) a COC configuration costing $68.1 million (the amount on which current funding was based), and (B) a configuration meeting user, operator, and SOR requirements costing less than $106 million.

(U) The 425L SPO, in conjunction with NORAD, ADC, and MITRE, made two studies. The first, SPO Plan "A," would provide a system costing $68.1 million; but this plan was unacceptable to NORAD and ADC because it did not meet their requirements. Plan "B," as eventually worked out and accepted by NORAD and ADC, would provide a system costing $81.1 million. The major change under this plan was a cut in the number of consoles from 105 (in the revised SPP) to 62. This configuration, NORAD felt, would meet only its minimum operational requirements at IOC. At this time, the approved 425L configuration was two Philco computers, two large wall displays, and 24 consoles.[1]

(U) USAF approved Plan "B" in May 1962 and submitted a Program Change Proposal for the revised configuration and costs. DOD did not approve these changes and, in July 1963, USAF resubmitted them along with another signifcant configuration change: triplexed computers.[2]

(U) NORAD, ADC, and ESD had been pressing USAF

[redacted]

[redacted]

for an integrated, triplexed computer arrangement for 425L and SPADATS.* Planning had called for the SPADATS computer to operate independently (simplex). However, triplexing would electrically connect the two 425L duplexed computers and the SPADATS computer and their related equipment, thus giving greater reliability. SPADATS and 425L tasks would be combined, operational priorities established, and the higher priority tasks would continue during computer failures by using the triplex configuration. USAF finally accepted the triplexing arrangement and, in its PCP, proposed to buy a computer for SPADATS which was then using a leased computer at Ent AFB. USAF estimated that it would be cheaper to buy a computer rather than to lease one.[3]

(U) On 25 October 1963, DOD disapproved this PCP and cut back 425L funding. Also, DOD directed USAF to study several areas of concern and submit a new technical development plan for 425L.[4] However, the problems posed for this study were also directed to CINCNORAD the following December as a part of an overall study of the Cheyenne Mountain Complex (see below).

(U) In addition, DDR&E shared NORAD/ADC concern that there was a major management problem involved. On 29 October 1963, the Deputy Director of DR&E, Eugene G. Fubini, expressed his concern to CINCNORAD, General John K. Gerhart. Mr. Fubini's staff had said there appeared to be no single agency with the authority or the responsibility for coordinating the plans and requirements of the various independently managed systems that were to be installed in the underground facility. This caused

*(U) In November 1960, CINCNORAD had assumed operational control of SPADATS. The SPADATS Center in the NORAD COC at Ent AFB became operational in June 1961 using a leased Philco computer. Plans called for moving the SPADATS Center to the underground COC when it became operational.

the submission of independent proposals for funds, equipment, and requirements, making it difficult for reviewing officials in DDR&E to assess the overall costs and functional value.[5] Both NORAD and ADC had expressed these same views in the spring and summer of 1963.

(U) The DDR&E staff had recently reviewed several PCP's on the various computer systems and found that a better understanding was needed of CINCNORAD's requirements and plans.* The staff said it saw

> . . . a program at NORAD with an equivalent investment in computers alone of over $35 million which has no central purpose, guidance or authority beyond 'assisting' a command which has no knowledge of the program or plans for accepting and using it.

The staff recommended a thorough study of all systems, requirements, functions, etc., and the technical and management problems involved.[6]

(U) About 10 days later, on 9 November, two members of the DDR&E staff, Fred Payne and Robert Scherer, met with General Gerhart. They agreed that

*(U) NORAD officers were well aware of the shortcomings. One officer described the problem this way: ". . . one of the primary difficulties has been the development by agencies other than NORAD of uncoordinated detailed procedures to be employed by the NORAD staff in the operation of the hardened COC. These details have not been subject to correction by CINCNORAD or his staff. The picture has further been complicated by requirements stated by agencies other than NORAD, whose elements are planned for occupancy within the COC. Further, there has been no central coordinating authority empowered to arbitrate or make decisions in cases of apparent conflict."

DDR&E would try to get DOD to request General Gerhart to make a study of the NORAD Cheyenne Mountain Complex (NCMC).[7]

A COMPLETE EXAMINATION

DOD DIRECTIVE

(U) The Secretary of Defense, Robert S. McNamara, issued that request on 10 December 1963.[8] He asked General Gerhart to make a comprehensive study and analysis in depth of the requirements, technical design, operational plans, and acquisition management of the NORAD COC complex of systems in Cheyenne Mountain. This study was to be made under the provision in an earlier DOD memorandum for insuring that unified and specified commanders could have adequate influence over the development, acquisition, and operation of their command and control systems.* Although the implementing instructions were being prepared, the Secretary of Defense said there were several immediate problems of such importance that an over-all review of the entire NORAD/CONAD command and control system had to be started before these instructions were issued. These problems included the phasing and funding of Air Force programs, budget considerations, interim improvements at Ent AFB, and establishment of guidance for installation and integration of facilities in Cheyenne Mountain.

*(U) On 16 October 1962, a memorandum was issued establishing a concept for operation of the world-wide military command and control system. It said that the sub-systems of the unified and specified commands would be internally configured and operated in accordance with the prerogatives and policies of the commanders and headquarters they served. A second memorandum, issued 26 October 1963, was in implementation of the first one.

(U) The study was to be finished within 90 days and an over-all report submitted within two weeks thereafter. To make the study, General Gerhart was to set up a task force and name its chairman. The task force was to be composed of members from NORAD/CONAD and other appropriate agencies.9

(U) Once given the authority NORAD began organizing the study immediately. At NORAD's request, ADC rented a building to serve as the task force headquarters. NORAD asked for representatives from the various agencies which included DOD, JCS, DCA, DIA, ADC, AFSC, ESD, MITRE, SDC, RAND, AFLC, ATC, Air Weather Service, Air Force Communications Service, Air Force Regional Civil Engineer, and the Institute for Defense Analysis. Major General Dolf E. Muehleisen, commander of the 29th NORAD Region, was named chairman of the task force. The study began on 7 January 1964.10

NCMC TASK FORCE STUDY REPORT

(U) On 18 March 1964, the completed study report was sent to the JCS. General Gerhart concurred in the report and asked that it be forwarded to the Secretary of Defense. He said:11

> The task force recommendations will provide, in my opinion, the earliest possible demonstrated operational capability in Cheyenne Mountain. It will be a major step forward from my present capability in the existing, semi-automatic facility at Ent Air Force Base and will afford, at IOC in the mountain, a potential for growth to accommodate new requirements through 1970.

(U) General Gerhart also stressed that he concurred with the acquisition management proposals. He would be represented by a NORAD Deputy in the proposed Cheyenne Mountain Complex Management Office, by

NORAD representation on its Executive Council and Advisory Council, and by NORAD Operations personnel participating in the computer program configuration, test, and evaluation at the Group II facility.[12]

The report made the following recommendations:[13]

1. Implementation of configuration 1 (four different ones were considered) in the hardened facility -- the initial operational capability to be at least equal to that of the soft facility and to have sufficient inherent growth potential to insure fulfillment of the NORAD mission through the 1966-1970 time period. The system should achieve its initial operation not later than 1 January 1966.

2. The equipment configuration at IOC:

425L - 1 Philco 212 computer
SPADATS/437 - 1 Philco 212 computer
DCA - 1 IBM 1410 computer
BMEWS - the DIP computer
IDHS - 1 IBM 7090 computer
* 18 consoles
2 group displays
A closed circuit TV network

3. Separate space defense functions from 425L functions.

4. Develop the Group II facility to provide a near operational configuration to permit testing and experimentation with the proposed system using live inputs from Group I.

5. Establish a separate Battle Staff organization for operation of the hardened COC. Space functions to be consolidated in a Space Defense Center subordinate to the Director of the COC.

* Procurement was authorized for 15 consoles and one large board display by a DOD memorandum on 12 June 1964.

6. Direct the Department of the Air Force to establish a Cheyenne Mountain Complex Management Office and designate its manager. The Deputy Manager should be a NORAD officer. The Manager to be given responsibility for the over-all management of acquisition, installation, and integration of the NCMC, and given commensurate authority over NCMC subsystems.

7. The Secretary of Defense direct timely assignment of budget and manning resources for the recommended improvements to the NORAD command and control systems including organic (blue-suit) logistic support for the NCMC.

(U) The CMCMO that was recommended for acquisition management (item 6 above) would have a manager designated and responsible to ESD and a deputy manager designated and responsible to CINCNORAD. This office would absorb the 425L SPO and be responsible for all NCMC acquisition functions except those specifically the responsibility of 496L, IDHS, DCA-CONUS, AWS, ADC, AFRCE, and support agencies.*[14]

(U) The JCS approved and forwarded the NCMC study report to the Secretary of Defense on 28 April 1964, saying that they found it generally responsive to his 10 December memo. However, they withheld recommending one item while they studied it further. The Air Force had objected to the proposed Space

*(U) Certain actions needed to be started even before the CMC study was approved so ESD appointed Colonel Spencer S. Hunn as commander of the CMCMO and the office was set up at Hanscom Field in May. NORAD appointed Colonel Karl Seemann as Deputy Commander. In June, USAF advised that the JCS and DOD had approved setting up the CMCMO. On 14 July 1964, the 425L SPO was deactivated; the following day, the CMCMO was set up in Colorado Springs.

[redacted]

Defense Center (item 5 above) with the view that NORAD was taking upon itself too much of the responsibility that should be under ADC. Since 1961, NORAD had been attempting to strengthen its operational control of SPADATS and believed that the Space Defense Center was the best way to manage the system. It would provide for control of NORAD/CONAD space functions by NORAD/CONAD personnel, and for performance of necessary service, support, and technical functions by representatives of the services.[15]

(U) With the JCS acting as moderator, an alternate proposal by USAF for managing space defense was successfully rebutted by NORAD. On 29 August, the JCS recommended the establishment of a Space Defense Center.[16]

DOD APPROVAL AND GUIDANCE

(U) In a memorandum dated 24 September 1964, the Secretary of Defense issued his decisions on the NCMC study report. In effect, this memorandum approved the study's recommendations. It approved the Space Defense Center as proposed by NORAD; listed the computer and equipment configuration and functional objectives authorized for the COC; made 1 January 1966 the target date for turning over the COC to CINCNORAD/CINCONAD and 30 June 1966 the target date for change-over from Ent AFB facilities to the Cheyenne Mountain facilities; authorized centralized computer program control by NORAD; and gave authority for the already-established CMCMO.[17]

(U) This memorandum is significant because it was the final approval for completing the underground NORAD COC.

OPERATIONAL DATES FOR COC

(U) In accordance with the dates in the Secretary of Defense memorandum, in December 1964 NORAD set 1 January 1966 as the Initial Operational Capability (IOC) date for the new COC. Full Operational Capability (FOC) was to be reached not later than

[redacted]

[redacted]

30 June 1966. These dates were also established as the IOC/FOC dates for the Space Defense Center. In addition, NORAD set a target date for reaching an operational capability in Group III equal to that existing in Group I for transfer of operations to the Cheyenne Mountain Complex. The target date for equal operational capability (EOC) was 1 April 1966.[18]

[redacted]

[redacted]

CHAPTER SEVEN

1965 - MOVING INTO CHEYENNE MOUNTAIN

(U) To implement the NCMC Task Force Study recommendation for a separate battle staff, NORAD organized a study group in September 1964 to draw up a detailed plan for organizing and operating the COC. On 15 January 1965, NORAD issued an implementation plan (Operation Plan No. 390N-65) for the Cheyenne Mountain Complex.[1]

(U) This plan stated that, after transition to the separate battle staff, the Combat Operations Center would be a separate major staff agency and would operate with a full-time battle staff headed by a USAF major general. As director of the COC, he would report directly to CINCNORAD. The deputy chiefs of staff were to function, within the COC, only in an advisory capacity as required. This new battle organization became effective on 1 October 1965. Major General Joseph L. Dickman was also appointed director of the COC on that date.[2]

(U) The NCMC Implementation Plan described four main required actions:

1. Equipment Installation. Phasing of operations from Group I to the Group III facility was keyed to the availability of hardware and the completion of Category 2 testing. The CMCMO planned to discontinue testing in the Group II facility approximately 1 June 1965. During June 1965, the CMCMO would move the 425L computer, consoles and related hardware from Group II and install them in the Group III facility. The complete 425L internal system would be installed, checked out, and ready to resume testing in the Group III facility by 1 July 1965.

2. Transfer of COC Functions to Group III. The CMCMO would complete its test requirements and turn over a completed facility with all systems per-

[redacted]

forming in accordance with specifications on or about 1 January 1966. From 1 January 1966 forward, NORAD would operate the system contained in the NCMC through a shake-down period, the length of which would be determined by CINCNORAD on the basis of performance of personnel and equipment. When CINCNORAD, based on advice of the Director, COC, declared that Group III had attained equal operational capability (EOC) to that existing in Group I, operations would transfer to the NCMC. The target date for EOC was 1 April 1966. DOD guidance had directed that the Group I facility would be closed not later than 1 July 1966.

3. Personnel Training. Trained operator personnel for the system involving the air-breathing threat would be available in sufficient numbers to permit transfer of operational control from Group I to Group III as early as 1 February 1966, if directed by CINCNORAD. Procurement and training of personnel for command and control functions of the COC involved two general categories: technical maintenance personnel and operators.

4. Establish an SDC. DCS/Operations would establish, as a part of the NORAD Group III COC, an SDC which would have an operational capability equal to that of Group I by 1 April 1966.

(U) There was a significant change in plans for the Space Defense Center, however. As noted previously, the Secretary of Defense had approved in September 1964 the setting up of a NORAD SDC. A separate USAF Spacetrack Center was to be manned by ADC in the COC. These separate centers were of concern to an OSD working group -- the Detection and Traking of Satellites (DATOS) Group -- that was to recommend suitable reductions, consolidations, allocation of resources and organization of DOD's space detection, surveillance, and tracking systems.[3]

(U) NORAD learned in February 1965 that the DATOS Group would recommend against NORAD manning a separate center because the Group felt there would be considerable duplication and overlap of NORAD and

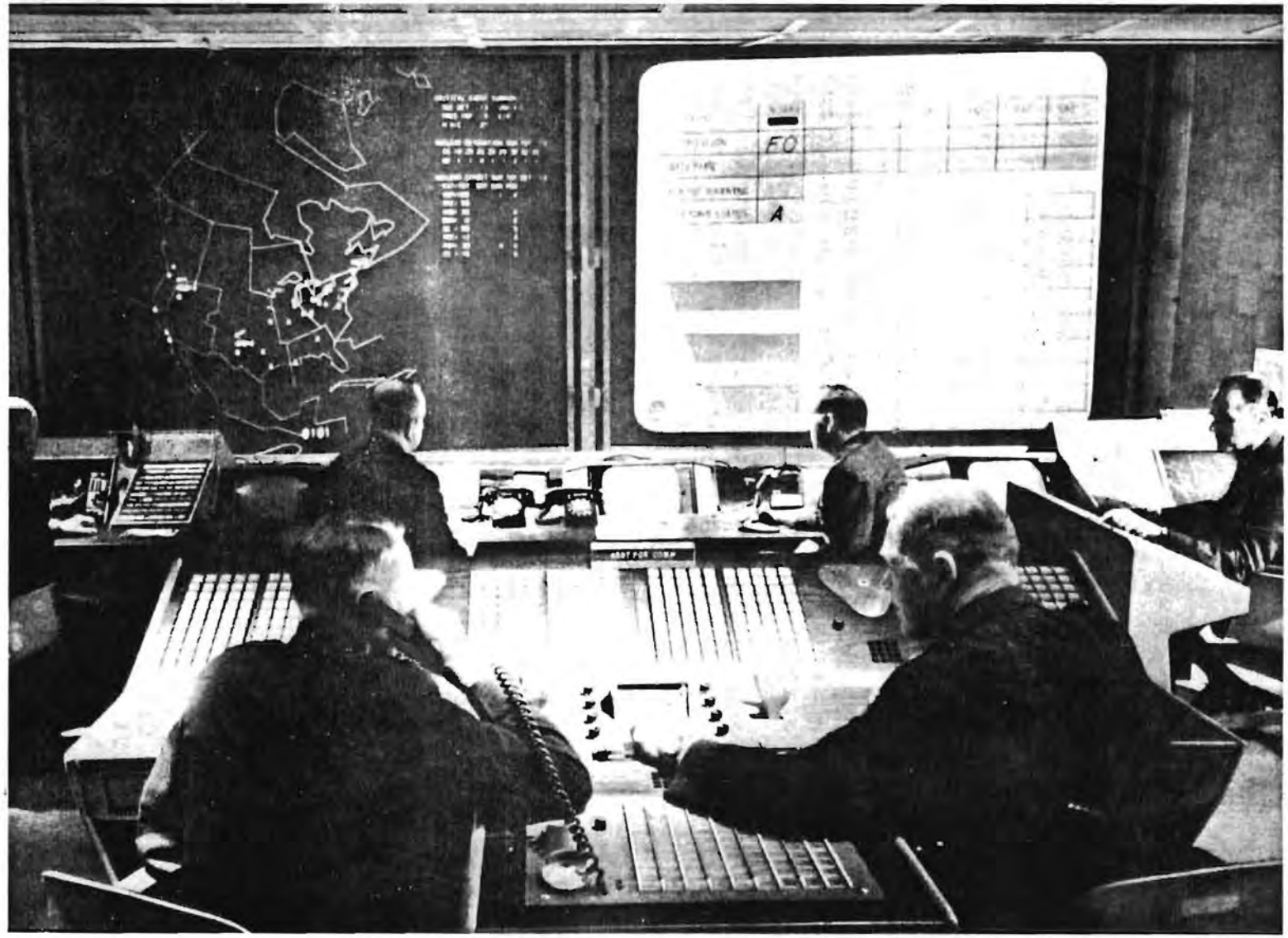
ADC functions. In March 1965, NORAD and ADC began planning for a single integrated Space Defense Center. NORAD told the JCS on 12 May 1965 that the SDC would be fully integrated, manning would be met with current authorizations, and increased NORAD/CONAD control and participation would be achieved by putting NORAD personnel in key supervisory positions in weapons control, space surveillance, and satellite classification and mission identification.[4]

On 2 February 1965, when the NORAD SPADATS Operations Division had been redesignated as the Office of the Chief of the Space Defense Center, the SPADATS Center in Group I became the Space Defense Center. Seven months later, on 3 September, the SDC was reorganized as a joint NORAD/ADC unit.[5]

During the spring and summer of 1965, 15 consoles, two Philco 212 computers, and a large board display were installed in the new COC. Except for four Type III consoles, all of this equipment had been operating in the Group II facility. A third Philco 212 computer was to be moved in January 1966 from the Spacetrack Center Alternate Facility at L. G. Hanscom Field to the new COC.*[6]

As the IOC date of 1 January 1966 neared, equipment was being tested, operator and maintenance personnel were being trained, and final pre-

*DOD had turned down a USAF proposal to buy a third computer for 425L/SPADATS functions in October 1963. The NCMC Task Force Study Report had recommended that only two computers be used and this was approved by the Secretary of Defense on 24 September 1964. In February 1965, NORAD raised the subject again. NORAD asked the JCS to approve a third computer for the NCMC on the basis that experience showed that there was a definite need for another one. The Air Staff and OSD supported the requirement and, in early April, the JCS confirmed approval of the third computer.



COMMAND POST IN THE UNDERGROUND COC

parations were being made. The Defense Communications Agency began moving into its Area Communications Operations Center in the NCMC on 15 September 1965. The Air Weather Service was expected to have the NORAD Forecast Center operational by early December. The IDHS computer was to be moved to the NCMC about 30 days before the Space Defense Center reached EOC. In November 1965, IOC for the SDC was changed from 1 January to 15 March 1966; EOC was set for not later than 31 May 1966.[7]

After IOC was reached, Category Three tests were to start. This would consist of testing and evaluating the operational systems under the control and direction of NORAD. These tests were to be made under as near operational conditions as possible and were to include all components, support items, personnel skills, technical data, and procedures.[9]

Group I and Group III facilities were also scheduled to be evaluated during exercise Desk Top VIII. Group I was evaluated during Part I of Desk Top VIII on 16 November 1965; Group III was to be evaluated during Part II on 15 December. These evaluations were to help in finding to what degree the Group III facility and its operational personnel were ready for air defense operations. Follow-

[redacted]

ing this, another evaluation of Group III was to be made on 15 February 1966 using Part III of Desk Top VIII. From these evaluations, NORAD would compare the Group I system with the Group III system to see if an equal or better capability had been reached in Group III.*[10] As noted above, the Implementation Plan called for transferring COC operations to Group III when it reached equal operational capability.

[redacted] NORAD reported to the Secretary of Defense on 30 September 1965 that "Satisfactory progress continues to be made on the over-all implementation of the NCMC. Although minor slippages have occurred, the 425L system IOC seems assured."[11]

*[redacted] On 18 May 1965, a Desk Top exercise had been successfully conducted in the Group II facility using the 425L operational program that was to be put in Group III. Except for only minor problems, the equipment and program worked effectively for the eight hour duration of the exercise.

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APPENDIX

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CHEYENNE MOUNTAIN COMPLEX COST FIGURES

COSTS TO END OF FY 1965 IN $ MILLIONS:

1.	Construction costs	35.5
2.	425L System (R&D, Investment, Operating)	53.3
3.	Communications (Investment and Installation)	10.8
4.	Spacetrack (Investment)	5.9
5.	Air Weather Service	1.0
6.	Defense Communications Agency	1.9
7.	AF Security Service	3.0
8.	Ground Electronic Engineering Installation Agency	.04
9.	Defense Intelligence Agency	2.3
10.	Air Force Logistics Command (Initial Spares and Depot Level Maintenance)	1.98
	TOTAL	$115.72

PROGRAMMED FUNDING FOR FY 1966 in $ MILLIONS:

1.	425L System	
	R&D	.4
	Investment	2.0
	Operation and Maintenance	10.2
2.	Spacetrack/SPADATS	1.94
3.	Air Weather Service	.34
4.	Defense Communications Agency	.98
5.	AF Security Service	.14
6.	Defense Intelligence Agency	7.51
7.	Air Force Logistics Command	2.16
	TOTAL	25.67

Source: NGAM

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GLOSSARY

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GLOSSARY OF ABBREVIATIONS

ADSID	Air Defense System Integration Division
AFLC	Air Force Logistics Command
AFRCE	Air Force Regional Civil Engineer
AFSC	Air Force Systems Command
AMC	Air Materiel Command
ARDC	Air Research and Development Command
ATC	Air Training Command
AWS	Air Weather Service
BMEWS	Ballistic Missile Early Warning System
CMC	Cheyenne Mountain Complex
CMCMO	Cheyenne Mountain Complex Management Office
COC	Combat Operations Center
DCA	Defense Communications Agency
DCS/P&O	Deputy Chief of Staff, Plans and Operations
DDR&E	Deputy Director Defense Research and Engineering
DIA	Defense Intelligence Agency
EOC	Equal Operational Capability
ESD	Electronic Systems Division
FOC	Full Operational Capability
IDHS	Intelligence Data Handling System
IOC	Initial Operational Capability
MIDAS	Missile Defense Alarm System
MITRE	Massachusetts Institute of Technology Research and Engineering
MOS	Military Operator Section
OSD	Office of the Secretary of Defense
PCP	Program Change Proposal
psi	Pounds per Square Inch
RADC	Rome (N. Y.) Air Development Center

SAGE	Semi-Automatic Ground Environment
SAINT	Satellite Interceptor
SDC	System Development Corporation; Space Defense Center
SPADATS	Space Detection and Tracking System
SPD	System Program Director
SPO	System Program Office
SPP	System Package Program

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