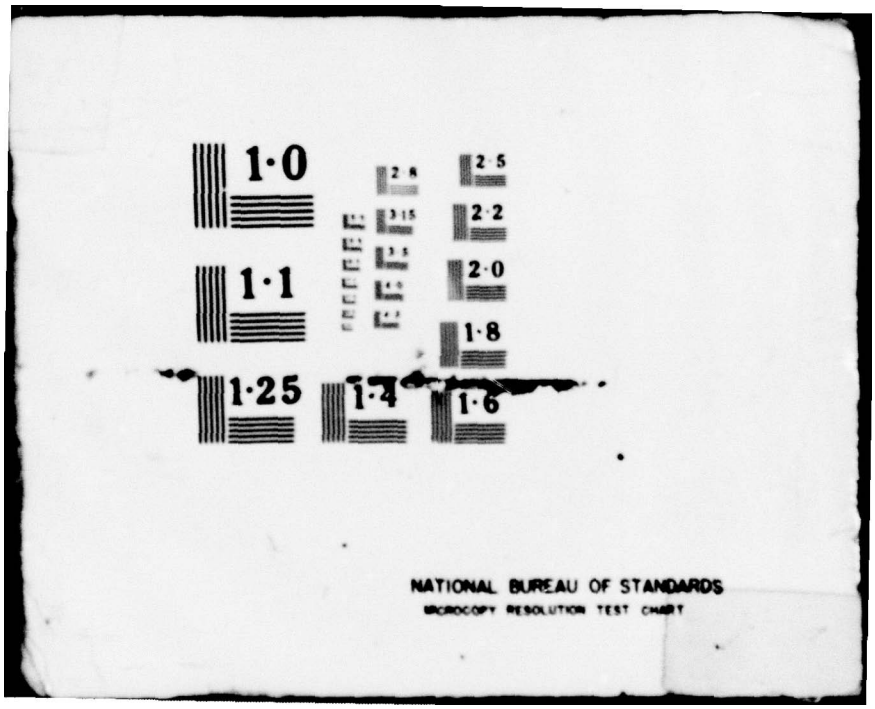
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OPERATION SANDSTONE

NUCLEAR EXPLOSIONS

1948



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Sandstone REPORT 1

ATOMIC WEAPONS TESTS, OPERATION SANDSTONE, 1948

VOLUME 1

REPORT TO JOINT CHIEFS OF STAFF

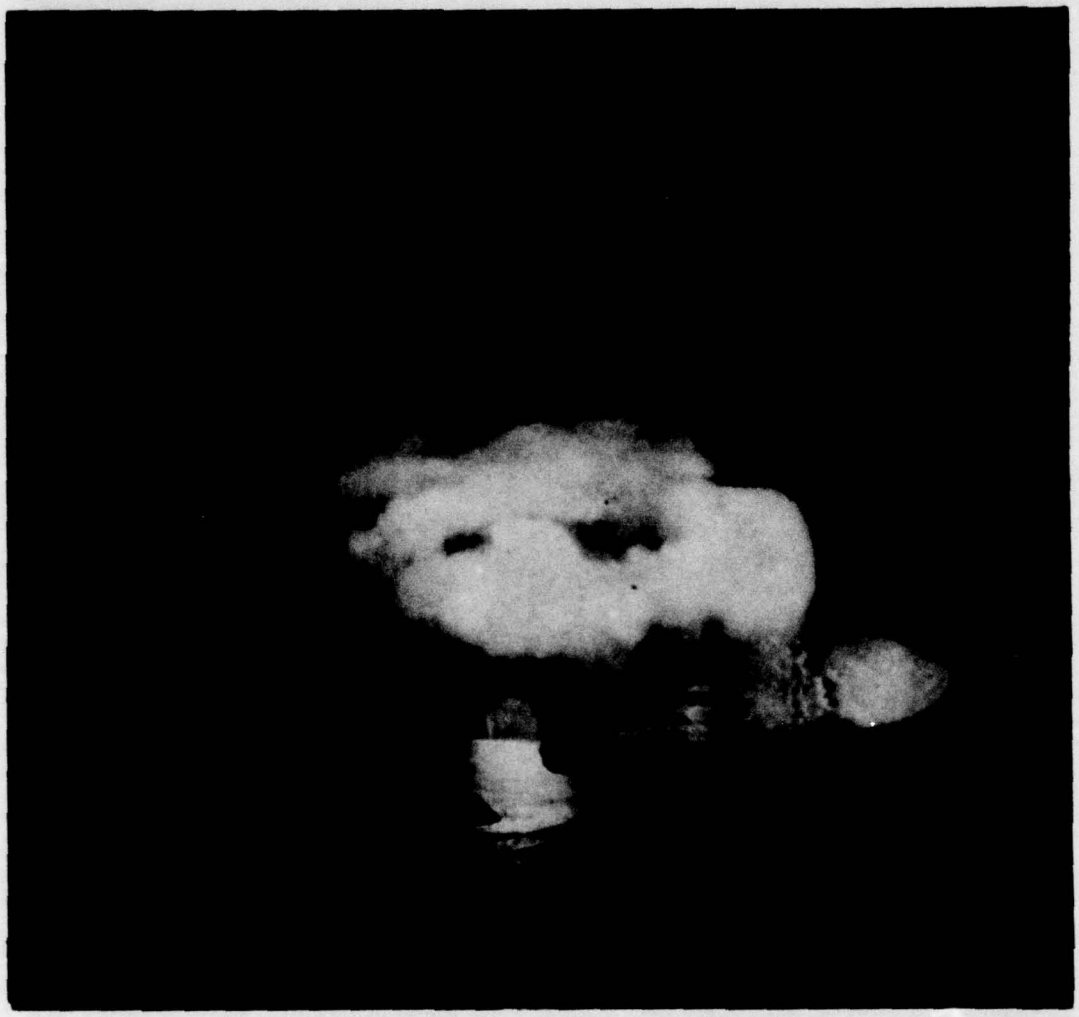


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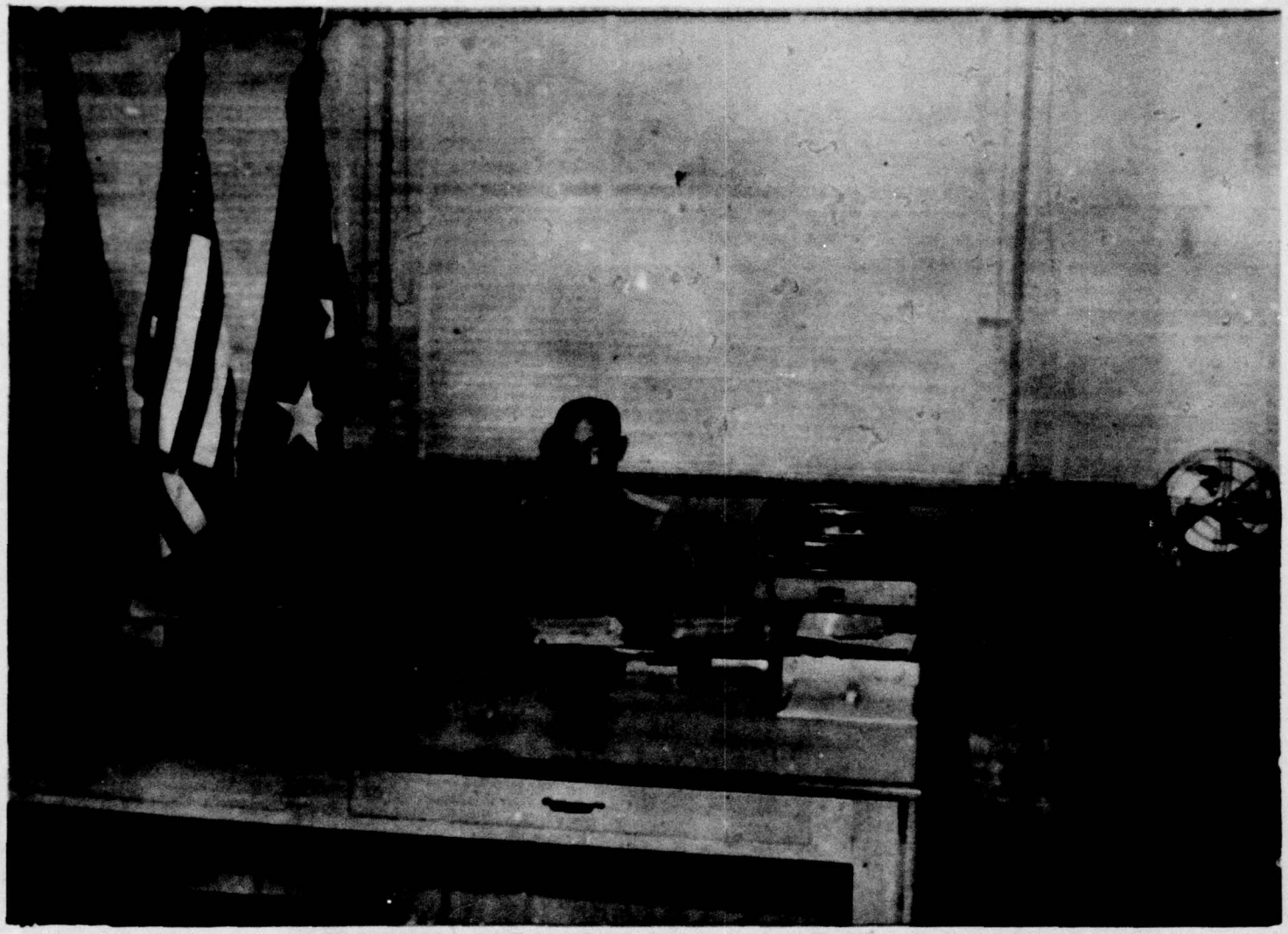


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Lieutenant General J. E. Hull, U.S.A., Commander, Joint Task Force Seven

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Preface

HEADQUARTERS JOINT TASK FORCE SEVEN
APO 958, % POSTMASTER
SAN FRANCISCO, CALIFORNIA

370.2 16 June 1948

SUBJECT: Report of the Commander, Joint Task Force Seven, on the 1948 Tests of Atomic Weapons

TO : The Joint Chiefs of Staff

Submitted herewith is the Operational Report of Joint Task Force Seven on the 1948 tests of atomic weapons, Operation Sandstone. This report covers the operations of Joint Task Force Seven necessary to the accomplishment of its assigned mission: the construction of an atomic weapons proving ground and the conduct of tests of atomic weapons early in 1948 at the Eniwetok proving ground. The tests consisted of statically detonating by remote control three atomic bombs of new design, located on the top of 200-foot steel towers.

The scientific and technical aspects of the tests, which involved measurement of the explosions and their effect by instrumentation, are not covered in detail in this report. A full report of these scientific and technical aspects, prepared by the Test Director, Captain James S. Russel, USN, for presentation to the Atomic Energy Commission, will be made available to the Joint Chiefs of Staff through the Military Liaison Committee.

In the fall of 1947, when the plans for Operation Sandstone were being developed, it was estimated that the total cost would be $27,500,000. Of this amount $20,000,000 was estimated to be the cost of participation by the Armed Forces above their normal operating expenses. The remainder of this sum, $7,500,000, was the estimated requirement of the AEC to cover obligations directly contracted for by the Atomic Energy Commission. There were of course additional costs carried by the Services as a result of this operation.

The estimate of the cost to be met by the AEC for military support of the operation proved to be more than ample. As the tests neared completion, these estimates were revised downward to $10,000,000 (Army: $2,740,000; Navy: $5,100,000; Air Forces: $2,160,000) for the Fiscal Year 1948. Accordingly, $8,000,000 was returned to the AEC by 1 May along with a statement that the Departments should be prepared to return an additional $2,000,000 at a later date. At the same time it was requested that $4,000,000 be made available to the Services by the AEC for use during the Fiscal Year 1949 (Army: $1,422,000; Navy: $703,000; Air Forces: $1,875,000). It is estimated that this amount will cover the expenses of the Armed Forces in closing out details of the operation so far as Joint Task Force Seven is concerned.

In mounting this operation the following fundamental considerations were of primary influence in the formulation of plans and organization:

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a. The tests would provide the Armed Forces with an invaluable opportunity to participate in atomic weapon development; would therefore prove an excellent training vehicle; and would, from the overall viewpoint, be of inestimable value in the gain to national preparedness and security.

b. Although the Commander, Joint Task Force Seven, was charged with responsibility for the conduct of the entire operation, Sandstone was primarily a scientific test with the Armed Forces in a supporting role.

c. The security requirements imposed by the Atomic Energy Act of 1946 would be a controlling factor in the conduct of the operation.

d. The major expenditure of effort by the Armed Forces in support of this operation would be logistical in nature.

e. The international political situation would be an influencing consideration in conducting the operation.

The fact that Operation Sandstone was conducted for the fundamental purpose of scientific proof-testing an improved design of atomic weapons by the Atomic Energy Commission, but was under the command of a military officer, posed a special problem of organization within the Task Force. This problem was solved by the organization of Task Group 7.1, to which all AEC members of the Task Force, both civilian and military, were assigned. The Test Director and Commander of Task Group 7.1, Captain Russell, and the Scientific Director, Doctor Darol K. Froman, who also headed Task Unit 7.1.1 within Task Group 7.1, were not subject to staff direction of the Joint Task Force Staff. By mutual agreement the channel between this Task Group and the Task Force Commander was direct. This solution did not impair the command function of the Commander, Joint Task Force Seven, while at the same time it provided the freedom of action necessary to the scientific elements of the Task Force. Viewed in perspective, it might be said that the Task Force existed and operated to support one of its own subordinate elements.

The security provisions of the Atomic Energy Act of 1946 served to make the personnel of Joint Task Force Seven security conscious to a high degree. Throughout the operation, extreme care was exercised to prevent unauthorized access to any data or material of a nature classified as "Restricted Data." The provisions of the Atomic Energy Act were an important consideration in arriving at the establishment of post-test safeguards at the proving ground. All individuals assigned to or associated with the Task Force during this operation were appropriately screened by the FBI of the Department of Justice. The results of these screenings are noteworthy. A total of over 13,000 persons, including 1,873 who were given the full AEC "Q" clearance, were investigated. Of this number, 11 were rejected because of Communistic tendencies and 20 were rejected for character reasons.

Efficiency and economy in the solution of administrative and logistic problems dictated the decision to rely on the existing command channels of the respective Armed Services for this operation. This solution proved to be eminently satisfactory. Normal Zone of the Interior supply installations and ports for all three Services, and the existing Pacific Command channels, namely CincPacFlt, Pacific Air Command and ATC, and US Army Pacific, were utilized for this purpose. Support provided by the Services was unfailingly of the highest order at all times. Designation of an Executive Agent for the Joint Chiefs of

Staff proved to be exceedingly helpful in the administration of the Operation. Important policy matters were processed through that office with the utmost speed.

At the outset it was considered advisable to keep the Task Force small in personnel and material and to function without fanfare. The time permitted the Task Force Commander and Staff to plan and carry out the tests in the spring of 1948 precluded accomplishment of the mission with fewer personnel and ships than were used. Had a full year been allowed for the preparation for and carrying out of the mission, it could have been accomplished with a material saving in the personnel, materiel and shipping required for Sandstone with the resultant saving in money cost.

During the fall and winter of 1947-48, important international negotiations, both in the Security Council of the United Nations and in the Four-Power Foreign Ministers' Conference in London, were in progress. Public release of information that the United States was conducting firing tests of new atomic weapons could have had deleterious effects if misinterpreted. Operation Sandstone therefore had to be developed under a cloak of security, which imposed additional difficulties that would not normally have been encountered.

As to the selection of the test site in Trust Territory, it was confirmed by the State Department that the terms of the Trusteeship Agreement would permit the tests to be conducted at Eniwetok without violation of the agreement, but that proper notification must be made to the Security Council of the United Nations as to the decision to declare Eniwetok Atoll and the territorial waters thereof a "closed area." Since delivery of this notification would nullify, to all practical purposes, the "Top Secret" classification on the existence of the Task Force, a press release was made on 1 December 1947 which resulted in greatly simplified operations due to the lowered classification assigned the project thereafter. The decision to make the press release was hastened by clandestine information as to the project which was already in the hands of the press. Two other press releases were made later in December. Thereafter, it was considered that no further release was necessary or desirable, except for the possibility of some unforeseen emergency. This policy on the release of public information proved sound and was condoned by the press. Declaration of a danger area (150 x 200 nautical miles) around the atoll was a unilateral action on the part of the United States, and due notification to foreign powers was made accordingly. This action gave the Task Force Commander a legitimate reason to warn foreign vessels away from the atoll in case of a close approach to the closed area, and was therefore an aid to enforcement of the necessary security restrictions.

Since considerations of national security warranted the exercise of extraordinary precautions to deny information of the tests to agents of a foreign power, The Commander, Joint Task Force Seven, sought authority from the Joint Chiefs of Staff to take steps to warn submerged submarines found in the danger area by dropping depth charges, not aimed to hit, but accepting the risk of a possible hit. This authority was granted and augmented to the extent that if submerged submarines failed to respond to warnings, during actual test periods, depth charges might be dropped closer aboard to intensify the warning.

Fortunately, occasion to take such steps did not materialize. Although it is considered certain that submarines were in the "danger area" during the preparatory period, contact

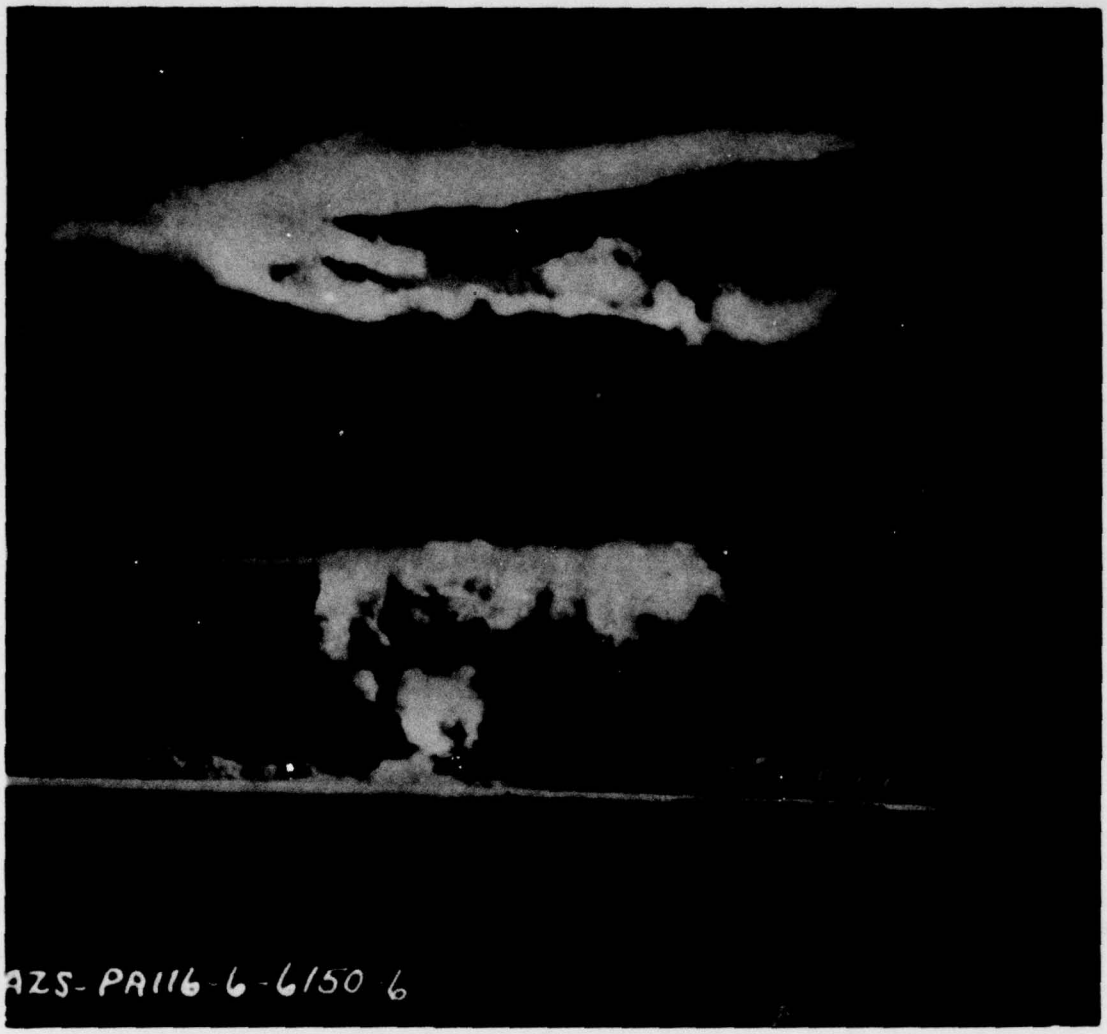
was never held long enough to permit putting into effect the warning measures. To the best of our knowledge the "closed area" was never violated.

In addition to the benefits derived from the tests of atomic weapons, the Armed Services gained substantially from Operation Sandstone. Valuable command and staff training in joint operations was one of the derivatives. A satisfactory common ground was found on which scientists and members of the Military Services worked in harmony. Commanders and key staff officers increased their value to the Services through a better understanding of atomic weapons.

The security policies of Operation Sandstone prohibited the presence of newspaper and radio correspondents. Furthermore, decision was reached by the War Council on 2 March 1948 that "no one should attend (the tests) except persons who have some genuine technical justification for doing so." On 4 March the Secretary of Defense, Mr. Forrestal, advised the Secretaries of the Army, Navy and Air Force of this decision and added: "In my opinion non-participating observers should be limited without exception to individuals whose current assignments will require a first-hand knowledge of, or direct action with respect to, the results of the tests." These were the limitations imposed on all observers.

I have been honored by the Joint Chiefs of Staff in being designated to command Joint Task Force Seven. I now wish to report that the mission assigned the Task Force has been successfully accomplished. Operation Sandstone was a success in every respect. Test number two was the most powerful explosion of fissionable materials yet to occur. The military atomic energy potential of the United States has been greatly increased.

J. E. HULL
Lieutenant General, USA
Commanding



The Yoke Fireball, partially obscured by cloud fingers

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PART I

Introduction

Operation Sandstone was designed to conduct tests of atomic weapons to determine the desirability of stockpiling certain weapons of improved design and performance and to establish fundamental data upon which to base future weapon design. The operation was conducted at the behest, and under the auspices, of the Atomic Energy Commission.

Joint Task Force Seven was organized and commanded by Lieutenant General John E. Hull at the direction of the Joint Chiefs of Staff.

The mission assigned the Joint Task Force by the Joint Chiefs of Staff was to construct an atomic proving ground at Eniwetok Atoll for the Atomic Energy Commission and to support the Atomic Energy Commission in the conduct of the initial test operations.

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PART II

Report to the Commander, Joint Task Force Seven, by the Deputy Commander and Commander Air Forces, Major General William E. Kepner, USAF.

Comments by the Deputy Commander, Rear Admiral William S. Parsons, USN.

Summation by the test director, Captain James S. Russell, USN.

REPORT TO THE COMMANDER, JOINT TASK FORCE SEVEN, BY THE DEPUTY COMMANDER AND COMMANDER AND COMMANDER, AIR FORCES, JOINT TASK FORCE SEVEN

I. Organization:

At the close of Sandstone operations which were conducted under your command with outstanding success, I believe that the following comments are pertinent. They are offered with the hope that they will be of advantage to those who may be charged with the next operation of a similar nature.

Every effort should be made to have representatives from all three departments report at the same time. The Staff should be assembled completely with all members present so that policies and principles may be enunciated to all, and so that internal instructions can be accomplished without the necessity of repeating each time a new Staff Officer arrives. This Staff should, insofar as possible, be composed of people who have had experience in Sandstone or Crossroads, or at least should be composed of individuals with some experience in joint operations. It is believed that all operations of one type should be under one subordinate commander. For example, air operations are identical in the Army, Navy or in the Ground Forces. Generally speaking, the problems of training and maintenance within the squadrons and groups are very similar in each service. A great deal of time will be saved if one headquarters can make all decisions pertinent to the overall plan. In the long run, I believe that a more efficient operation can be conducted.

II. Deputy Commanders:

These should have specific duties and responsibilities. They should have supervision for the accomplishment of the assigned duties under the joint commander as well as those of a general advisory nature which the joint commander may avail himself of if he deems it advisable. Their functions should be set forth in publications so that the joint staff members may be fully aware of their responsibilities. If deputy commanders represent their respective departments, they should be empowered to act for that department when matters of joint interests arise. If they are to be instructed before acting in each case, then communications of an appropriate type should be provided for that purpose.

III. Security:

During Sandstone, the maximum possible security was obtained and results were highly satisfactory. However, the carrying out of these security measures was endured at the at the expense of a great deal of extra work and with some loss in efficiency at the lower levels. I believe this to be dangerous and impractical in actual war operations. Therefore, it cannot be taken as a pattern for combat even though it did succeed in Sandstone. Here we could afford the loss of time incurred in each instance, while in combat we could not.

Moreover, those who are charged with interpreting the Atomic Energy Act of 1946 should be fully educated as to what its implication is on commanders in the field. One who knows nothing about a commander's duties and responsibilities can unwittingly prevent the success of the task force, if he does not really appreciate the effect of a wrong, or an unsound military interpretation on matters of security. For instance, a prohibition against cameras in the area should state specifically **what cameras**. Such a prohibition should never be the cause, or excuse, for arbitrarily removing an expensive camera installation from an instrument set up in an airplane. Certainly a camera used only to photograph a "radar scope" does not involve restricted data under the Atomic Energy Act, in the same way it might if used to photograph the explosion, or parts of the bomb.

IV. Technical Data:

All services should have full and free access to all data affecting its military use immediately. It must be presumed that since they share in the conduct of the test, they must share equally in the responsibility in getting the results, especially where these are of value to their respective military services.

V. Requirements:

When the requirements of the services were submitted, these were considered secondary to the interests of the Atomic Energy Commission. The effect of this was to prevent the military from obtaining all that was requested. I believe that some of these have since developed into very important requirements. Tests conducted only at long intervals of time must, of necessity, endure the burden of a great many requirements, or we will not derive full value from them.

VI. Timely Information:

When a test is to be conducted, it should be known to all the defense departments at once, so there will be ample opportunity to fully and completely consider every possible defense requirement. This requires time for flexibility and intelligent consideration of all possible use to which the test can be put.

VII. Observers:

In my opinion, the limiting of observers was too restrictive. The services should be fully educated on all possible use of atomic energy or the future of this science will remain in the hands of a limited few. This will result in slowing down the practicable application of one of the most important and far-reaching phases of our probable future life. Atomic energy needs the intelligent evaluation of everyone, or it will remain a mystery. Being a mystery, once it appears as a weapon in the hands of our enemy, there is likely to be a tendency to hysteria.

VIII. Time of Explosion:

The time of all three explosions was geared to the requirement of one type of photography. This required a risk of many other failures. Further, some other tests involving important defense requirements could not be conducted. It would seem that at least one shot could have been scheduled during daylight.

IX. Area Location:

This area seems to have been accepted as the only suitable one for atomic tests. The expense of logistics and the difficulty of plans and operations are too large if another site would answer. Water and air transportation to such a distant area are not only expensive, but time consuming at a cost in efficient results. A study of other and more accessible areas should be made at once. It is believed we now know enough to undertake the solution of this problem with more certainty than was the case for Crossroads or Sandstone.

X. Headquarters Location:

If other tests are run at the same location, I believe the commander would do well to consider using the island of Eniwetok instead of a ship. While there are many advantages in the USS Mt. McKinley, there are a greater number of disadvantages particularly for ground and air facilities so vital to a joint task force. The ship is entirely too congested for providing all facilities. This results in inefficiency in proper use of personnel. The great volume of communications involved often interfere with each other. If a ship is used, it seems to necessitate following Navy procedure. While this occasions very little difficulty to Navy personnel, it is confusing to others. Some serious study should be devoted to a better scheme that will incorporate the advantages of all three departments and eliminate the undesirable or unnecessary disadvantages. When a solution is found for such a joint task force, it might well be the start of a better, and a common communication system for use in all defense departments.

W. E. KEPNER
Major General, USAF
Deputy Commander and
Commander, Air Forces

COMMENTS BY DEPUTY TASK FORCE COMMANDER (NAVY)

I. General Observations

Operation Sandstone followed the pattern successfully established by Operation Crossroads, of cooperative effort between military personnel of all three services and civilian scientific personnel, participating in a large-scale scientific expedition at a considerable distance from the United States. Operation Sandstone marked a departure from Crossroads experience in that the coordination extended to the merging of the effort of two major agencies of the government: the National Military Establishment and the civilian Atomic Energy Commission. The organizational structure followed in Operation Sandstone, in which the lines of scientific and operational logistic responsibility and authority were clearly delineated, can well serve as an example for future operations of this kind. Its success is due partly to the sound organizational approach, but mainly to the spirit of cooperation that emanated from the responsible individuals, both military and civilian.

It is natural to compare Operation Sandstone with Operation Crossroads. There are several points of similarity. First, of course, the two operations were conducted in the same area. Second, the transportation and assembly of the bombs used were carried out in seaplane tenders which had been specially modified for this purpose. Third, the logistic support of these technical operations carried out in a remote tropical setting, was similar in scope, but the magnitude of the instrumentation of Operation Crossroads was considerably greater than that of Sandstone.

The two operations differed in that in the case of Crossroads, the atomic bombs used were of the so-called standard Nagasaki design, whereas in Sandstone, new and previously untested experimental designs were used.

Operation Crossroads was essentially a proving ground test of a standard weapon against military equipment, with scientific observations on the performance of the bomb as a nuclear assembly, being taken on the basis of non-interference with the primary military aspects. In the case of Operation Sandstone, the reverse was true.

Another important difference between the two operations was the presence at Crossroads of large groups from the press and many foreign observers, whereas Operation Sandstone was conducted in relative privacy. This privacy, in my opinion, gave Sandstone a great advantage as a technical operation.

The staff planning and execution, in my opinion, have been first-rate, both on the military and technical sides.

One of the factors which added greatly to the smoothness and success of the operation, was the excellence of communications in the broad sense of the word. The effectiveness of all individuals in the performance of important functions was greatly increased by their ability to converse and to move about with practically no "red tape," whether they were on board ship or on one of the islands of the atoll. In my opinion, the radio-linked ship and shore dial telephone system was tremendously useful and saved as many key-man-hours as the L–5 planes, helicopters, AVR's and other rapid transportation system.

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II. Logistc Effort

The total instrumental effort involved in the experiments conducted at Eniwetok was an order of magnitude less than the similar effort of the Crossroads expedition. Taking into account the further dissimilarities existing between the two operations, with respect to their aims, it is apparent that the logistic effort, in terms of personnel, services and expenditures involved, were of approximately the same order of magnitude. This is believed to be due to the fact that the locale chosen for these experiments, due to its remoteness from the United States, imposes a fixed requirement for major logistic support.

It appears that, regardless of any success that may be achieved in simplification of experimental procedures, the irreducible minimum of the overhead, in terms of logistic support, for subsequent tests in the Marshall Islands, will be essentially the same as that of Crossroads and Sandstone.

In the interest of economy of personnel, materiel and money expenditures, a reexamination of the possible locations for a permanent atomic proving ground appears to be indicated. I have, by separate memorandum, brought to the attention of the Commander, Joint Task Force Seven, certain aspects of this problem which are considered pertinent.

III. Military Tests

Although the proof-testing of certain weapons and the accumulation of data on nuclear reaction were acknowledged to be the primary purpose of the Sandstone tests, it was obvious in the planning stage that these tests could also yield a considerable amount of information regarding the effects of the nuclear explosion, valuable from a military point of view. A certain number of experiments were therefore included which were calculated to yield information valuable to the Military Establishment for offensive and defensive purposes. It is possible that in planning future tests, a closer integration of experiments designed to achieve these diverse but related objectives could be made with consequent additional profit to both the military and the scientific groups. In order to provide continuous planning within the Military Establishment for future tests of this nature and to avoid the necessity for independent sets of tests to serve one purpose or the other, it is recommended that a permanent group composed of interested and competent representatives of the Military Establishment be assigned the responsibility for planning future tests in coordination with the Atomic Energy Commission. It appears that this would properly be the function of the Military Liaison Committee, with the staff support of the Armed Forces Special Weapons Project.

W. S. Parsons

W. S. PARSONS,
Rear Admiral, USN.

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SUMMATION BY THE TEST DIRECTOR

Operation Sandstone was a unique operation in many ways. It was not only "joint" with respect to the Services but "joint" in that two independent government agencies, the National Military Establishment and the U. S. Atomic Energy Commission collaborated.

The requirement to test weapons was an AEC requirement. The National Military Establishment made the conduct of tests possible.

Operation Sandstone was unique in demonstrating a close, harmonious blending of scientific and military personnel.

Operation Sandstone was unique in that a very complicated technical program was carried out on schedule and with more than gratifying results.

Operation Sandstone is a milestone in the nation's atomic weapon development program. Laboratory theories have now been proven. New design information is now available. This makes possible increased facility in designing weapons to meet military requirements. Furthermore the national stockpile potential has been greatly increased as a result of these tests.

The purpose of Operation Sandstone should be kept clearly in mind in reviewing this report. We did not test the military effectiveness of the weapons detonated; we were interested primarily in determining whether they would work and, if so, how efficiently. Some tests of military effectiveness were made by Service groups but these tests were secondary and were designed so as not to interfere with the primary purpose. The fact that these Service tests were relatively few is due primarily to the shortness of time permitted for the various Service agencies to prepare experimental programs and the urgency of the primary purpose.

It is the stated intent of the Commission to conduct tests again as a normal activity in the weapons development program. It is presumed that the Services will have an opportunity then again to carry out corollary experimental programs. Planning these programs well in advance will permit full advantage to be taken of the opportunities offered.

The success of Operation Sandstone indicates that Eniwetok was a good choice for a Pacific proving ground. The technical installations left in preservation there will be of considerable value in subsequent tests.

As representative of the Atomic Energy Commission it is gratifying to report complete success. This success is due both to the Los Alamos Laboratory and the personnel of groups from outside agencies under contact to the Laboratory, and to the support rendered by the military personnel of Joint Task Force Seven and the supporting Services.

If the full benefits of Operation Sandstone are to be realized the planning and technical agencies of the Armed Services must study carefully the results obtained and must present a concrete statement of requirements for new and better weapons to the Atomic Energy Commission.

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PART III

Narrative

SECTION 1

Synopsis

This section discusses the background of Operation Sandstone. It includes the development of the decision to hold atomic proof tests during 1948, Presidential approval of preliminary plans and the early implementation of these plans. Formation of the Proof-Test Committee, approval by the Joint Chiefs of Staff of the Committee's plan and approval of the organization of Joint Task Force Seven are contained in this section.

SECTION 1

BACKGROUND OF OPERATION SANDSTONE

Pressure of time imposed a dominant weight upon Operation Sandstone from the moment of its conception on 3 April 1947 until its consumation just a little more than a year later when the final test was successfully completed on 15 May 1948. Actually, the compulsion of time was even greater than is indicated, for Joint Task Force Seven, which conducted the operation, did not come into being until 18 October 1947.

The General Advisory Committee to the Atomic Energy Commission on 3 April 1947 concurred in the recommendations of the Los Alamos Scientific Laboratory that new atomic weapons be developed to the point where tests could be conducted in early 1948. This proposal was placed before President Truman on 27 June 1947 by Mr. David E. Lilienthal, Chairman of the Atomic Energy Commission and Brigadier General James McCormack, Jr., Director of the Division of Military Application of the AEC.[1] A preliminary test program was approved by the President on that date. Subsequently, in the July semiannual report to the Congress by the Atomic Energy Commission, it was announced that an atomic weapon proving ground would be established in the Pacific.

Continuing developments resulted in Mr. Lilienthal's addressing a letter on 28 July to Lieutenant General L. H. Brereton, Chairman of the Military Liaison Committee, requesting assistance from the Armed Forces in connection with the projected proof-testing.

Mr. Lilienthal specifically asked that this assistance include recommendations regarding the designation of a test site, the designation of a planning group or commander within the Armed Forces with whom plans could be made for the conduct of the tests; and the readying of certain units to assist in conducting the operation.[2]

PRELIMINARY RECOMMENDATIONS FOR ORGANIZATION

General Brereton replied for the MLC in a memorandum to the AEC on 7 August 1947,[3] in which it was noted that the AEC had established a security policy which placed the target date for a particular test in a TOP SECRET classification. The location of the test site and the general time for conducting tests were classified SECRET. The fact that routine tests will be made and that a proving ground is being established in the Pacific area was unclassified. In compliance with Mr. Lilienthal's request, this paper recommended that the Joint Chiefs of Staff appoint a special committee to draft the necessary policy instructions to the components of the Armed Forces. The memorandum also presented detailed specifications and characteristics deemed essential in the selection of a test area. These specifications provided that the location to be selected should be available as a permanent proving ground. It was also specified that the location be in an area not usually exposed to storms and that prevailing winds and currents be such as to minimize the deposit of radioactive particles on nearby inhabited land masses. Bikini was ruled out at once as a prospective site. Roi-Namur of the Kwajalein Atoll, and Eniwetok Atoll were viewed as possibilities. Other recommendations were made concerning the conduct of the tests. This memorandum was referred to the Joint Staff Planners.

[1] AFC files.
[2] JCS 1795 series.

The Joint Staff Planners substantially approved the recommendations of the MLC as contained in General Brereton's memorandum and recommended that the Joint Chiefs of Staff authorize the formation of a joint organization to provide Armed Forces participation in the proof-testing operation.[4] It was further recommended that a commander of the Joint organization be designated and that a deputy from each of the other components of the Armed Forces be designated, these three to serve as a Joint Proof-Test Committee pending the actual formation of the joint task organization. It was also provided that this committee have two ex-officio members, one to be appointed by the Military Liaison Committee to the AEC and the other by the Atomic Energy Commission. Approval of the security policy previously enunciated by the AEC was recommended. The Joint Chiefs of Staff approved this paper on 10 September.

JOINT PROOF-TEST COMMITTEE FORMED

The Joint Chiefs of Staff on 17 September nominated Lieutenant General John E. Hull, Major General William E. Kepner, and Rear Admiral William S. Parsons to serve as the Joint Proof-Test Committee pending organization of the Joint Task Force. Shortly thereafter Captain James S. Russell, USN, was designated by the AEC as its representative on the Joint Proof-Test Committee and Colonel John H. Hinds, USA, was designated as the MLC representative.

Meantime, General Eisenhower, on 17 September had advised General Hull at his Headquarters at Fort Shafter, to report to Washington not later than 27 September for preliminary discussion of the project.

It was now abundantly clear to all concerned that time was to be a controlling factor in every aspect of the operation. This urgency stemmed from the pressing necessity to conduct full scale experiments in the AEC's weapons program in order to permit the weapons program to progress in step with theoretical developments. Consequently, an early test date, 15 April 1948, had been decided upon. When General Hull arrived in Washington on 25 September, he was immediately engaged in a two-fold task. First, there was the necessity to become completely conversant with the nature and details of the projected operation. At the same time there was the pressing problem of immediate procurement of key personnel, developing prliminary plans, and securing approval of these plans so that the necessary operations could proceed.

On 30 September General Hull was formally notified of his designation as Commander of the Joint Task Organization. General Kepner and Admiral Parsons were designated as Deputy Commanders at the same time. This was the same day that Brigadier General Claude B. Ferenbaugh reported for duty as Chief of Staff of the joint organization, a typical illustration of the telescopic type of procedure that the pressure of time had forced upon General Hull and the Joint Proof-Test Committee. It was necessary to proceed with the procurement of a staff for the Joint Force prior to the time the organization existed, even on paper. This staff actually functioned as the staff of a Joint Force and prepared the basic plan of operation and organization which General Hull presented to the Joint Chiefs of Staff for the Joint Proof-Test Committee on 15 October 1947.[5] It was approved on 18 October. This, then, was the activation date of Joint Task Force Switchman (code

[4] JCS 1795 series.
[5] JCS 1795/6.

[redacted]

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name). Later, the organization was designated Joint Task Force Seven. It was considered undesirable from a security standpoint to designate the Task Force JTF–2, since it would be reminiscent of JTF–1. The number seven was the only other low number available at that time and it was a distinctive number. Thus, number seven was selected.

In its notification to General Hull of his selection to command the Joint Task Force, the Joint Chiefs of Staff directed that, pending organization of the Task Force, the Joint Proof-Test Committee perform these functions:

1. Delineate the organization of the Joint Task Force.
2. Outline the participation of the several components of the Armed Forces.
3. Outline the recommended action on all aspects of the test which are of concern to the Armed Forces.

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SECTION 2

Synopsis

Details of the tasks confronting the Proof-Test Committee prior to formation of the Joint Task Force and the preparation of the basic plan to be presented to the JCS are contained in this section.

[redacted] UNCLASSIFIED [redacted]

SECTION 2

TASKS LAID BEFORE PROOF-TEST COMMITTEE

A basic concept of requirements for the operation was enunciated by Chairman Lilienthal of the AEC in his memorandum of 28 July 1947 to the Military Liaison Committee which envisioned the following:

1. Recommendations regarding a location for the test.
2. A unit of the Armed Forces Special Weapons Project to assist in the transportation, assembly, and final placement of the weapon.
3. An airplance drone unit to provide eight drone aircraft to take chemical samples of the bomb cloud immediately after detonation, and transport aircraft to carry samples from test location to Los Alamos Laboratory.
4. The designation of a planning group or commander with the Armed Forces with whom plans could be made for logistical support, surface and air transportation, service personnel, ships, landing craft, etc.
5. Engineer troops to engage in the preparation of detonation, control and instrument sites.
6. A unit to engage in both high speed and general photography.
7. A health unit to monitor radiations and to ensure the safety of those employed in the vicinity of radioactive materials.

From this concept, a basic policy* was evolved by the Military Liaison Committee, and approved by the Joint Chiefs of Staff. This policy provided:

1. Suggested responsibilities of the Atomic Energy Commission to include responsibility for instrumentation for the tests and technical responsibility for the operation.
2. Emphasis on the need for security.
3. A statement that Air Force components expected to participate in the test would require at least six months of preparation between the submission of a directive and the execution of it.

It was also pointed out in the basic policy that, since proof testing of atomic weapons carries with it the handicap imposed by radioactive contamination, the tests should be conducted outside the continental limits of the United States. This was in conformance with a Presidential directive of 28 July which specified that the tests would be conducted in the Pacific Ocean area.

This policy of the Military Liaison Committee further emphasized that one of the main reasons for requesting proof-testing at this time was to enable the scientists to carry on instrumentation to determine:

1. Blast characteristics.
2. Peak temperature.
3. Instantaneous intensities of gamma rays and of neutrons.

The Military Liaison Committee's statement of policy anticipated many other requirements, some of which were general in nature and other which were specific.

Ground and air photography should be obtained, but the requirement therefor should not influence the timing of the shot. The interests of safety demanded that the meteoro-

* JCS 1795 series.

logical service to be provided during the tests should approach the absolute in dependability. Communications would be required to furnish a secure radio-teleype network with stations at the airfields, firing control station, bomb assembly ship, and operational and technical headquarters in addition to the usual communications facilities available to the Armed Services.

Ground support would be necessary for construction of sites, guarantee of security, operation of base facilities, etc. Necessary naval participation by forces both ashore and afloat would include ships for security and logistics, a bomb assembly ship, a laboratory ship, a command ship and other surface craft adaptable to the peculiar character of the project. Air support would be required to furnish drone aircraft for air sample collection, overseas air transportation for personnel and equipment, air photographic operations, and meteorological reconnaissance.

Armed Forces Special Weapons Project would be called upon to furnish senior personnel and trained groups to assist in handling and assembling the atomic bombs. Instrumentation and technical supervision would be responsiblilities of the Atomic Energy Commission. The requirements of radiological safety would have to be determined. An organizational structure for the force charged with the conduct of the tests would have to be developed in a manner which would definitely fix responsibility for success or failure, yet which would provide the flexibility required in any scientific undertaking of great magnitude.

Upon these premises was based the task confronting General Hull and the Proof-Test Committee in early October of 1947. Basically, these problems confronted the Committee for immediate solution:

1. Formation of a Joint Staff.
2. Formulation of a basic plan for presentation to the Joint Chiefs of Staff.
3. Commence formation of a Task Force organization.
4. Determination of the test site.

The attack on these problems went on simultaneously as the Joint Staff came into being. Brigadier General Claude B. Ferenbaugh joined as Chief of Staff on 30 September, and Rear Admiral Augustus J. Wellings joined as J–4 at the same time. Lt. Col. Curtis J. Herrick reported at the time as assistant to Admiral Wellings. On 3 October Colonel Thomas J. Sands and Lt. Col. Peter Schmick reported as J–2 and J–1, respectively. Col. David H. Tulley reported as Staff Engineer on the same date. Lt. Col. Garlen R. Bryant reported at the same time as Adjutant General. First member of the J–3 section to report was Lt. Col. J. K. Woolnough on 9 October.

Lt. Col. Alfred D. Starbird had accompanied General Hull from Oahu, T. H., on 25 September and was assigned as Deputy Chief of Staff. Assembly of key staff members was completed with the arrival of Major General (then Brigadier General) John DeF. Barker on 14 October as J–3.

Sufficient staff was available by 8 October to permit General Hull to set 15 October as the target date for presentation of the Joint Proof-Test Committee basic plan to the Joint Chiefs of Staff.

The stated purpose of this paper, as drafted, was to recommend to the Joint Chiefs of Staff the policies and outline plan for the organization and operation of the Joint Task Force to conduct proof-tests of atomic weapons. In addition, General Hull directed that

the paper would specifically cover the estimated overall cost of the project over the normal operating expenditures of the Services concerned. The selection of a suitable test site and the question of relationship and responsibility as between the Task Force Commander and the directors of AEC activities also had to be determined before the paper could be presented to the Joint Chiefs of Staff.

Eniwetok Atoll was agreed on by the Joint Proof-Test Committee as the site which more nearly met the specifications of availability as a permanent proving ground—not normally exposed to storms and with favorable prevailing winds and ocean currents with respect to inhabited land masses so as to minimize the deposit of radioactive particles.[1]

As to the relationship between the Commander, Joint Task Force Seven, and the AEC Test and Scientific Directors, it was decided that the latter should be within the command of Joint Task Force, but with a direct channel to the Commander and not subject to direction of the Joint Staff.

This latter question had been raised by Chairman Lilienthal of the AEC in a letter dated 7 October.

The various Appendices to the paper were prepared by the respective general and special staff sections, while the Chief of Staff and J–3 drafted the basic paper. The completed draft was gone over in detail on 10 October by the Joint Proof-Test Committee and by Dr. Darol K. Froman, who had been named Scientific Director for the tests by the Atomic Energy Commissions's Los Alamos Scientific Laboratory. General Hull approved the paper on 13 October, and presented it to the Joint Planners on the following day. As previously stated, formal approval of the paper by the Joint Chiefs of Staff on 18 October 1947 marked the activation date of Joint Task Force Seven.

[1] Daily Record, Joint Task Force Seven.

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SECTION 3

Synopsis

Section three deals with the organization and command structure of the Joint Task Force. Emphasis is placed on the command relationship between the Commander, Joint Task Force Seven, and the Test Director and Scientific Director. The section points up the unique character of the organization with respect to the scientific group.

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SECTION 3

ORGANIZATION—COMMAND STRUCTURE

The organization and command structure of Joint Task Force Seven in most respects followed standard, war-tested form. In some respects it was unique.

The overall command structure, staff organization, and subordinate commands were representative of the best experience gained from joint war operations.

The inclusion of an essentially civilian unit within the command structure with a direct channel to the Commander, presented a unique element in military organization.* Further, this essentially civilian unit included personnel of elements of the military establishment such as the Naval Research Laboratory, which developed certain test instruments, and the Army Ordnance Department which developed a remotely-controlled tank for collection of ground radiological samples from the test site. Personnel of the Ordnance Department also assisted in blast measurement tests. It was apparent that the necessary elements of adjudication had to be exercised by all concerned to make this arrangement function with the required efficiency.

Command authority was vested in General Hull as Commander, Joint Task Force Seven, for the conduct of the operation with complete responsibility. He was charged with procurement of military personnel, was responsible for the security of the operation; and for its logistical support. Further, the Commander, Joint Task Force Seven, was charged with the construction of a proving ground at Eniwetok Atoll, and with the proof-testing of atomic weapons; the tests to be directed by representatives of the Atomic Energy Commission.

The Atomic Energy Commission provided the necessary funds for this operation and the scientific personnel and equipment to conduct the firing of the weapons and to make the necessary observations. Not more than three bombs were to be detonated statically in succession at approximately two-week intervals. Early discussion as to the number of detonations contemplated the possibility of firing of but two bombs. The decision to make three detonations resulted from a directive by President Truman.

Two Deputies were designated to assist the Commander, Joint Task Force Seven, Rear Admiral Parsons, USN, and Major General Kepner, USAF, both of whom had served in a similar capacity during Operation Crossroads. In addition to his assignment as Deputy, General Kepner also was designated as Commander, Air Forces, with overall responsibility for the operation of all aircraft.

From the date of its formal activation on 18 October 1947 until 8 March 1948, Joint Task Force Seven maintained two Headquarters, Joint Task Force Main at Washington and Joint Task Force Forward at Fort Shafter. However, on 15 February 1948, the two Headquarters were switched and Joint Task Force Main opened at Fort Shafter while the echelon in Washington became Joint Task Force Rear.

On 8 March 1948 the Headquarters was organized into three echelons. Joint Task Force Main opened aboard the USS Mount McKinley and remained there until the close of the Operation. Joint Task Force Seven, Oahu Echelon, with Lt. Col. L. J. Lincoln in charge,

* Organization Chart, Task Group 7.1 and JTF Seven.

opened coincidentally with the movement of the Main Headquarters aboard the Task Force Command Ship, USS Mount McKinley. The Rear Headquarters continued in Washington in charge of Lt. Col. Curtis J. Herrick.

Seven subordinate commands were organized within the Task Force:

Task Group 7.1 was the unit designed to direct the technical and scientific tests. Captain James S. Russell, USN, Head of the Weapons Branch, Division of Military Application, U. S. Atomic Energy Commission, commanded this unit. On 17 October Captain Russell had been designated by the AEC as Test Director. Dr. Darol K. Froman was placed in charge of Task Unit 7.1.1, which was the Scientific Unit of Task Group 7.1. Dr. Froman was also "J" (or Proof-Test) Division Leader of the Los Alamos Laboratory. He was designated by the AEC on 18 September 1947 as Scientific Director for Operation Sandstone. Task Group 7.1's channel to the Commander, Joint Task Force Seven, was direct. Task Group 7.1 was charged with the classification of documents and photographs in accordance with the Atomic Energy Act of 1946 (Public Law 858).

Task Group 7.2 was commanded by Brigadier General David A. D. Ogden. This command was designated on 15 October and carried with it command of Eniwetok Atoll. Task Group 7.2 was charged with responsibility for construction at the Eniwetok test site and with the military security of the atoll. The unit also was charged with responsibility for billeting, sanitation, hospitalization, transportaton and general housekeeping for all units ashore at Eniwetok Atoll.

Task Group 7.3 was the Naval Task Group. Rear Admiral Francis C. Denebrink, USN, was designated Commander of this unit on 23 October 1947. This command was responsible for the security of the atoll against surface, submarine or air attack and the operation of all Naval forces of the Task Force, including water transportation for the logistical support of the operation. Task Group 7.3 provided off-shore patrol, communications afloat, submarine cable-laying and boat-pool transportation service within the lagoon.

Task Group 7.4, the Air Task Group, was commanded by Major General Roger M. Ramey, USAF, who was designated to this command on 16 October 1947. This unit was responsible for collection of air samples through the operation of drone aircraft passing through the atomic cloud on test days and also to measure shock wave.* In addition, this unit operated photographic aircraft to obtain photographic documentation (both still and motion picture). Operation of aircraft on long-range weather reconnaissance and of aircraft used in tracking the radioactive cloud was charged to Task Group 7.4 as was the provision of air-sea rescue; inter-island air transportation; emergency aerial evacuation from Eniwetok and the operation of aircraft to transport radiological safety monitors and samples of radioactive material.

Task Group 7.5 was the Joint Security Group with responsibility for safeguarding documents and material on shore which were classified as "Restricted Data" within the meaning of the Atomic Energy Act of 1946. Lt. Col. Philip Cibotti, USA, was designated to command this group on 18 October 1947.

Task Group 7.6 was the Joint Radiological Safety Group, commanded by Commander Frank I. Winant, USN, who was so designated on 18 October 1947. This unit was responsible for the operational detection and determination of types and intensities of radioactiv-

* One shock wave measurement was an Air Force test.

ity, and for keeping the Radiological Safety Officer informed as to radioactive areas. It furnished monitors to accompany all parties entering areas of possible radioactivity. These in turn were responsible for informing party leaders when any member of the party reached etsablished tolerance limits and to report violations of radiological safety regulations to Headquarters, Joint Task Force Seven.

Task Group 7.7 was a command unit at Kwajalein for Joint Task Force Seven. Captain J. P. W. Vest, USN, Island Commander at Kwajalein, within the Naval Command structure, was given dual status as Commander of Task Group 7.7. He was responsible to Commander, Joint Task Force Seven, for support of Operation Sandstone at Kwajalein, including preparation of the base for Task Group 7.4.

The Staff of Joint Task Force Seven was organized in conventional form with the exception of certain adaptations dictated by the operation. The Staff Radiological Safety Officer, Colonel James P. Cooney, Medical Corps, USA, the Staff Photographer, Brigadier General Paul T. Cullen, USAF, and the Staff Fiscal Officer, Commander Robert Whittemore, USN, represent such variations.

As Radiological Safety Officer, Colonel Cooney was the policy advisor to the Commander, Joint Task Force Seven. His duties included the determination of radiological hazards to all personnel, the institution of protective measures and safety regulations.

The Staff Photographer was responsible for the photographic documentation of the operation, both still and motion picture, including technical as well as non-technical aspects of tests.

The Staff Fiscal Officer was responsible for handling and accounting for AEC funds which financed the operation and for auditing expenditures.

The Task Force's channel of Communications to the Joint Chiefs of Staff was through the Chief of Staff, U. S. Army, who was designated by the J.C.S. on 4 November 1947, as the Executive Agent for the Joint Chiefs of Staff for the Joint Task Force.

The Joint Proof-Test Committee had recommended in its basic plan (J.C.S. 1795/6) that one of the Joint Chiefs of Staff be designated as the Executive Agent as a means of facilitating operational control. Inasmuch as the Commander, Joint Task Force Seven, was an Army officer, it was deemed appropriate that the Executive Agent should be the Chief of Staff, U. S. Army. (Note: For detailed discussions of functions and operations of Task Groups and Staff Sections see Annex 1, of this report.)

JOINT TASK FORCE SEVEN AIR FORCES

The command structure of Joint Task Force Seven Air Forces merits more detailed scrutiny. It was considered necessary, in order to effect closer coordination between the dispersed air units and the other operating units of the Joint Task Force, to have an overall commander. Further, it was necessary that this commander be readily available to General Hull as air advisor.

In view of these considerations, Major General William E. Kepner, one of the Deputy Commanders, was given dual status on 14 October 1947 as Commander Air Forces, Joint Task Force Seven. In this capacity he was made responsible for all air operations, military security within the Air Task Group, weather service, inter-island air transportation, air rescue and aerial photography. In addition, this office carried responsibility for the opera-

tional planning of the air units assigned to it in accordance with directves of the Commander, Joint Task Force Seven, and the requirements of the Scientific Director.

During actual test periods he commanded and/or operated all aircraft operating from Kwajalein and Eniwetok, including helicopters, except offshore patrol. On 15 March 1948, a system of air traffic control in the Kwajalein-Eniwetok area, under the direction of the Commander, Air Forces, was instituted by General Hull.

The Office of Air Commander was established on 12 November 1947 at staff level in the Joint Task Force Headquarters. This office was divided into two main sections; one, an Air Force Section, which functioned throughout the operation; and the other, a Naval Section, organized to effect close relationship with Task Group 7.3 for the operation of the Naval Air Units during actual test days. This last section was operative immediately before, during and after test days.

An analysis of the function of the Air Forces in Operation Sandstone showed that two definite types of activity would be necessary. First, the problem of staff operations in Headquarters Joint Task Force Seven which would be concerned with the direction of operations as they pertained to other units of the Task Force; and second, operations in the field. The Office of the Air Commander was designed to perform the first of these two functions, and Task Group 7.4 was established to accomplish the second. This Task Group reported to the Commander, Air Forces, Joint Task Force Seven.

Organization Charts and Tables, Joint Task Force Seven

Headquarters, Joint Task Force Seven

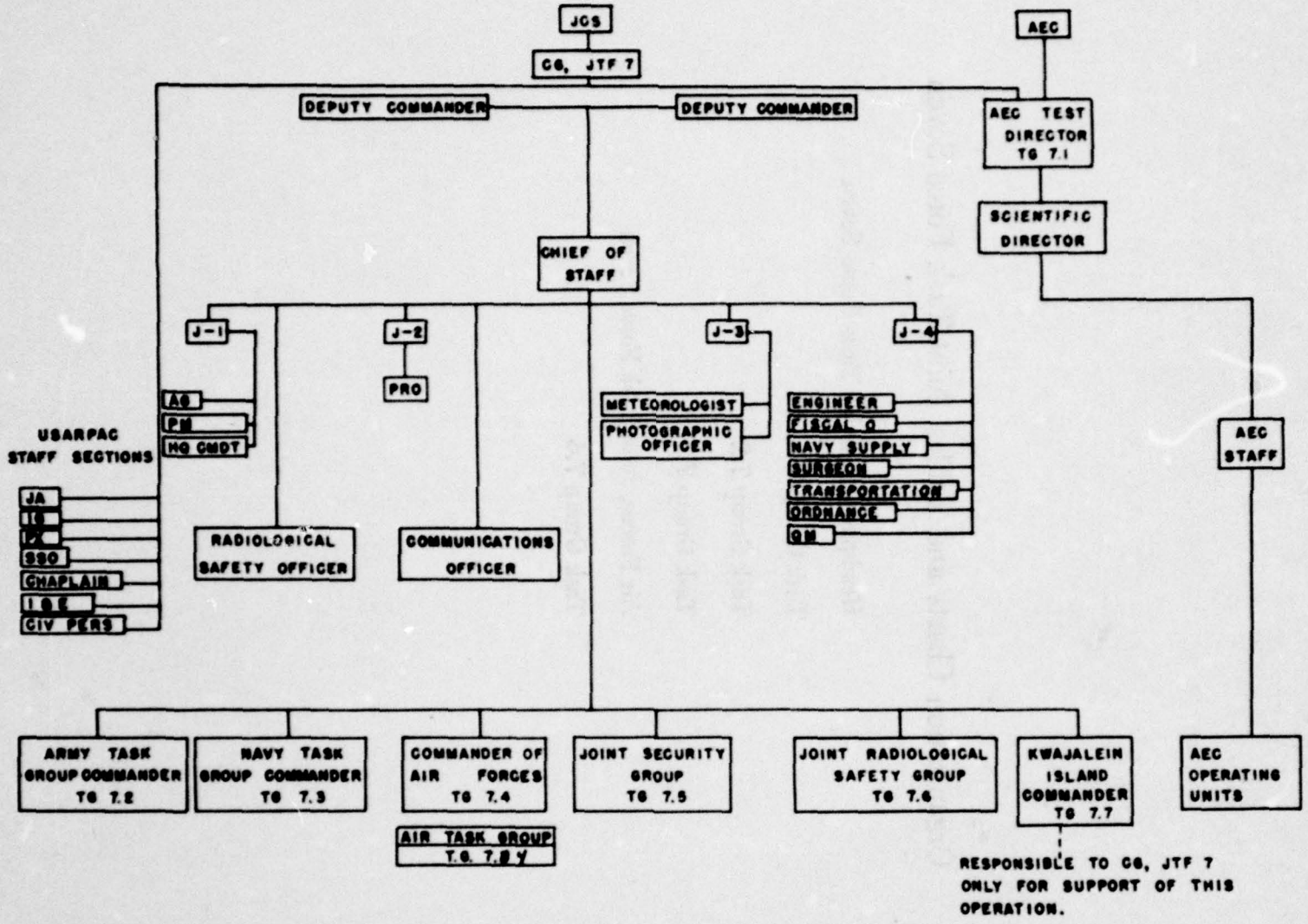
Task Group 7.1

Task Group 7.2

Task Group 7.3

Air Forces, Joint Task Force Seven

Task Group 7.4



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COMMANDERS, JOINT TASK FORCE SEVEN, AND GENERAL AND SPECIAL STAFF SECTIONS

HEADQUARTERS JOINT TASK FORCE SEVEN

COMMANDER, JOINT TASK FORCE SEVEN

Lieutenant General J. E. Hull, U. S. Army

DEPUTY COMMANDERS

Maj Gen William E. Kepner, USAF

R Adm William S. Parsons, USN

CHIEF OF STAFF

Brig Gen Claude B. Ferenbaugh, USA

Deputies to the Chief of Staff

Lt Col Alfred D. Starbird, CE
Lt Col Lawrence J. Lincoln, CE

SECRETARY TO THE GENERAL STAFF

Maj Jesse D. Willoughby, Inf

Assistant Chief of Staff, J–1
Lt Col Peter Schmick, GSC (CAC)

Assistant Chief of Staff, J–2
Col Thomas J. Sands, GSC (FA)

Assistant Chief of Staff, J–3
Maj Gen John DeF. Barker, USAF

Assistant Chief of Staff, J–4
R Adm Augustus J. Wellings, USN

Adjutant General
Lt Col Garlen R. Bryant, AGD

Communications & Electronics Sec
Cdr Christian L. Engleman, USN
Col Carl H. Hatch, SC

Engineer Officer
Col David H. Tulley, CE

Meteorological Section
Col Benjamin G. Holzman, USAF
Maj Delmar L. Crowson, USAF

Fiscal Officer
Cdr Robert N. Whittemore, USN

Staff Photographer
Brig Gen Paul T. Cullen, USAF

Radiological Safety Officer
Col James P. Cooney, MC

Surgeon
Capt Harry H. Haight, USN

Transportation Officer
Lt Col James H. Brown, TC

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ORGANIZATION TASK GROUP 7.1

U. S. ATOMIC ENERGY COMMISSION PROVING GROUND GROUP

Test Director (Commander TG 7.1) . . . . . Capt James S. Russell, USN
Deputy Test Director . . . . . Col Paul T. Preuss, USAF

REAR ECHELON

Fiscal and Property Officer . . . . . James L. Wallace (Wash., D. C.)
AEC Liaison, Washington . . . . . Louis B. Gettman (Wash., D. C.)
AEC Liaison, Honolulu . . . . . Nelson B. Fry (Honolulu)

TU 7.1.1—SCIENTIFIC UNIT

Scientific Director (Commander TU 7.1.1) . . . . . Darol K. Froman
Deputy Scientific Director . . . . . Alvin C. Graves
First Asst Scientific Director . . . . . Robert W .Henderson
Second Asst. Scientific Director . . . . . John C. Clark
Advisor on Gamma Ray Exposure . . . . . Col James P. Cooney
Classification Consultant . . . . . Ralph C. Smith
Classification Consultant . . . . . Philip F. Belcher

MEASUREMENTS SECTION

LAJ–1 Section—Theoretical Physics

Section Leader . . . . . F. Reines
Alternate Section Leader . . . . . J. F. Mullany, E. J. Zadina

LAJ–2 Section—Radiochemistry (AV–4)

Section Leader . . . . . R. W. Spence
Alternate Section Leader . . . . . M. G. Bowman

LAJ–3 Section—Measurement of Neutrons (AV–5)

Section Leader . . . . . G. A. Linenberger
Alternate Section Leader . . . . . W. E. Ogle, A. N. Carson

LAJ–4 Section—Neutron Generation (AV–5)

Los Alamos Liaison . . . . . R. Taschek
Alternate Los Alamos Liaison . . . . . W. E. Ogle (1)
Second Alternate Los Alamos Liaison . . . . . G. A. Linenberger (2)

(a) Subsection A—Method 1

Subsection Leader . . . . . E. H. Krause

(b) Subsection B—Method 2

Subsection Leader . . . . . H. E. Grier

LAJ–5 Section—Gamma Ray Spectrum

Section Leader . . . . . F. Shonka
Los Alamos Liaison . . . . . L. D. P. King

[redacted] [redacted]

LAJ–6 Section—Gamma Ray Appearance

Los Alamos Liaison . . . . . N. Nereson

(a) Subsection A—Method 1

Subsection Leader . . . . . E. H. Krause (3)

(b) Subsection B—Method 2

Subsection Leader . . . . . H. E. Grier (4)

LAJ–7 Section—Technical Photography (AV–4)

Technical Advisor . . . . . Brig Gen Paul T. Cullen (Photo Off, JTF–7)
Los Alamos Liaison . . . . . B. Brixner
Special Photographers . . . . . H. G. Sweeney, E. C. Udey

LAJ–8 Section—Blast (AV–5)

Section Leader . . . . . G. K. Hartmann
Los Alamos Liaison . . . . . J. C. Clark (5)

FIRING AND ENGINEERING BRANCH

Branch Leader . . . . . R. W. Henderson (6)
Technical Assistant . . . . . W. E. Treibel
Safety Officer . . . . . E. L. Brawley
Assistants . . . Capt J. A. Cushman, USA, C. H. DeSelm, Lt Col G. M. Dorland, USA, L. M. Jercinovic

LAJ–9 Section—Assembly

Section Leader . . . . . A. B. Machen
Alternate Section Leader . . . . . R. T. Bush, I. D. Hamilton, C. G. Kunz

LAJ–10 Section—Engineering

Section Leader . . . . C. E. Runyan, W. J. Howard (AV–5), Cdr R. S. Mandelkorn, USN, W. T. Moffat, J. O. Muench, W. M. Smalley

LAJ–11 Section—Communications

Technical Advisor . . . . Cdr C. L. Engleman (Communication Officer, JTF–7)
Los Alamos Liaison . . . . . L. A. Hopkins
Alt. Los Alamos Liaison . . . . . Lt Col J. P. Scroggs, USA (AV–4)

LAJ–12 Section—Timing and Firing

(a) Subsection A—Firing Circuits and Timing

Subsection Leader . . . . . H. E. Grier

(b) Subsection B—Firing (AV–4)

Subsection Leader . . . . . W. O. McCord

LAJ–13 Section—Construction

Section Leader . . . . . R. W. Carlson, L. M. Jercinovic (7)

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SERVICES SECTIONS

LAJ–14 Section—Logistics

Section Leader . . . . . H. S. Allen

LAJ–15 Section—Administration

Section Leader . . . . . A. W. Kelly, G. B. Barber

LAJ–16 Section—Circuit Diagrams and Maps

Section Leader . . . . . C. A. Hedberg, J. Cooper, Lt Cdr J. A. Dare, USN, R. Mingo, Lt Cdr W. A. Rowen, USCG, S. Simmons

NOTES

(1) W. A. Ogle . . . . Primary duty with LAJ–3; Los Alamos Liaison with LAJ–4.

(2) G. A. Linenberger . . Primary duty with LAJ–3; Los Alamos Liaison with LAJ–4.

(3) E. H. Krause . . . . Section Leader LAJ–4A and LAJ–6A.

(4) H. E. Grier . . . . Section Leader LAJ–4B, LAJ–6B and LAJ–12A.

(5) J. C. Clark . . . . Primary duty as Second Assistant Scientific Director (Scientific Director's representative Eniwetok): Additional duty as Los Alamos Liaison with LAJ–8.

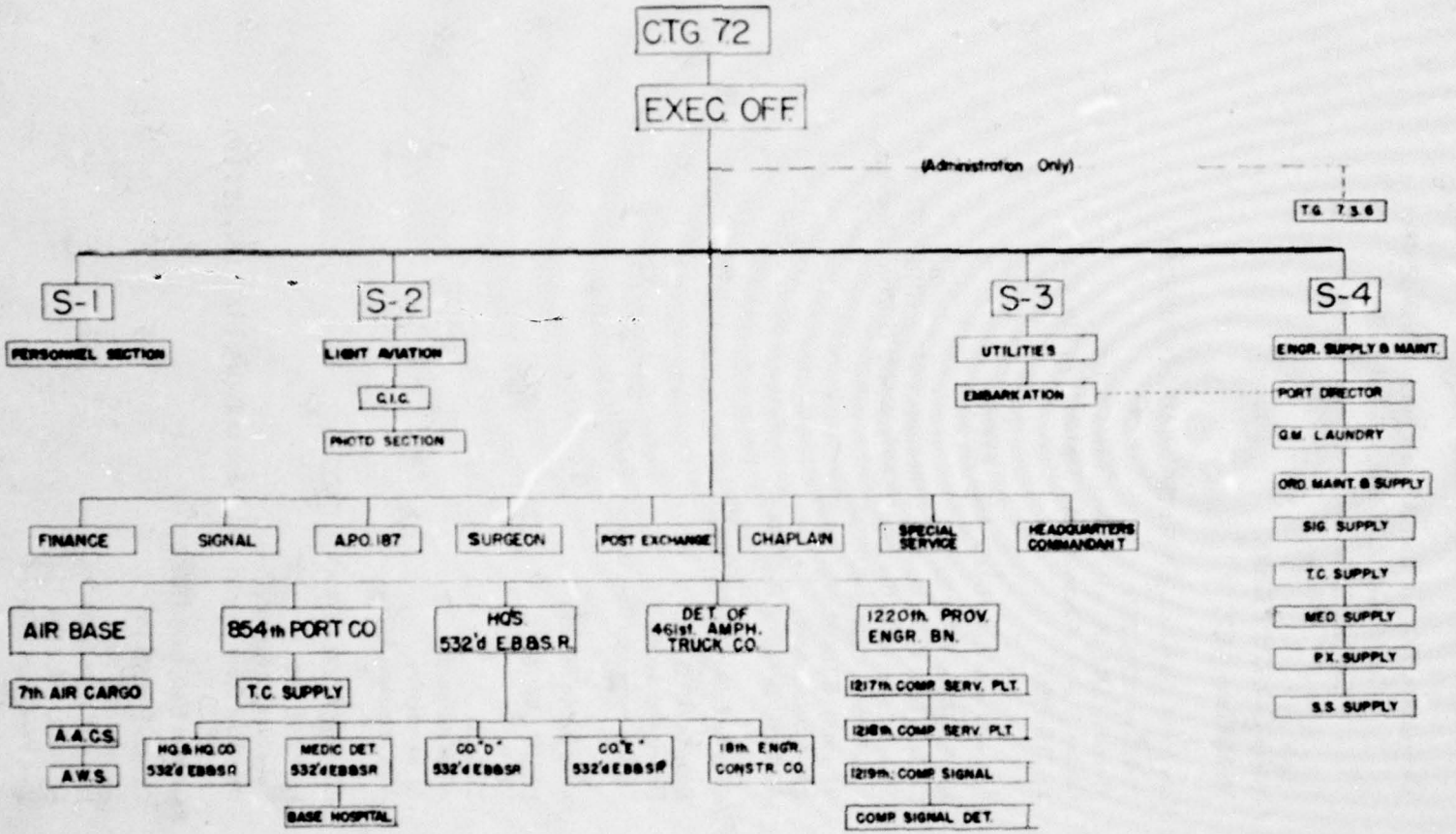
(6) R. W. Henderson . . First Assistant Scientific Director and Branch Leader of Firing and Engineering Branch.

(7) L. M. Jercinovic . . Assistant to R. W. Henderson, also assistant to R. W. Carlson (LAJ–13).

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ORGANIZATION TASK GROUP 7.3 (NAVAL)

Commander, T.G. 7.3, Rear Admiral Francis C. Denebrink
Capt. Donald E. Wilcox, Chief of Staff
Capt. H. S. Persons, Operations Officer

T.U. 7.3.1 *Flagship Unit*, CAPT WARE

Mt McKinley (AGC 7)

T.U. 7.3.2 *Main Naval Task Unit*, ENIWETOK, RADM DENEBRINK

Pickaway (APA 222)
Warrick (AKA 89) (1), Yancey (AKA 93)
Curtiss (AV 4), Albemarle (AV 5), LST's 45, 219, 611
FS 211, 370

T.U. 7.3.3 *Off-Shore Patrol Unit*, CAPT ASHCRAFT

Gardiners Bay (AVP 39)
Tucker (DDR 875), Rogers (DDR 876), Perkins (DDR 877)
Spangler (DE 696), George (DE 697), RABY (DE 698), Marsh (DE 699), Currier (DE 700)
VP (MS)-6 Detachment
VX-4 Detachment
AVR #C-26638, #C-26653

T.U. 7.3.4 *Helicopter Unit*, CAPT HARRIS

Bairoko (CVE 115)
Helicopters assigned
1 DE as required (from Offshore Patrol)

T.U. 7.3.5 *Service Unit*, CDR EPPS

PASIG (AW 3)
YW 94
YOG 64
AO as assigned
AF as assigned
AOG as assigned

T.U. 7.3.6 *Cable Unit*, LCDR ROWAND, USCG

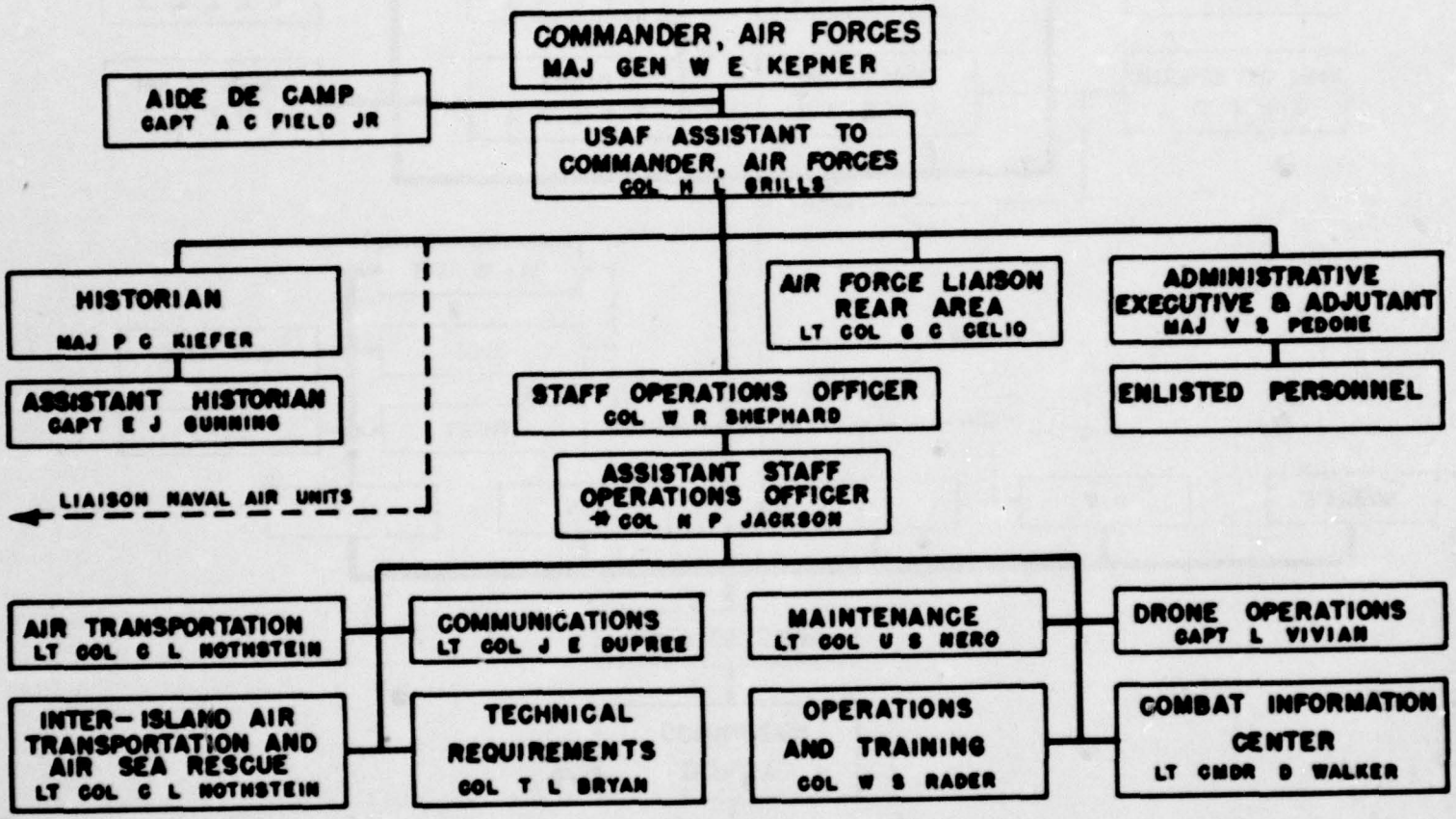
LSM 250, 378
Navy Signal Unit No. One
Boat Pool boats assigned (2 LCM, 1 LCP (L), 1 LCP (R), (2 PPB).

T.U. 7.3.7 *Boat Pool Unit*, CDR HUFF

Comstock (LSD 19)
Askari (ARL 30)
LCI 549, 1054, 1090
LCT 472, 494, 1194, 1345
Boat Pool boats assigned

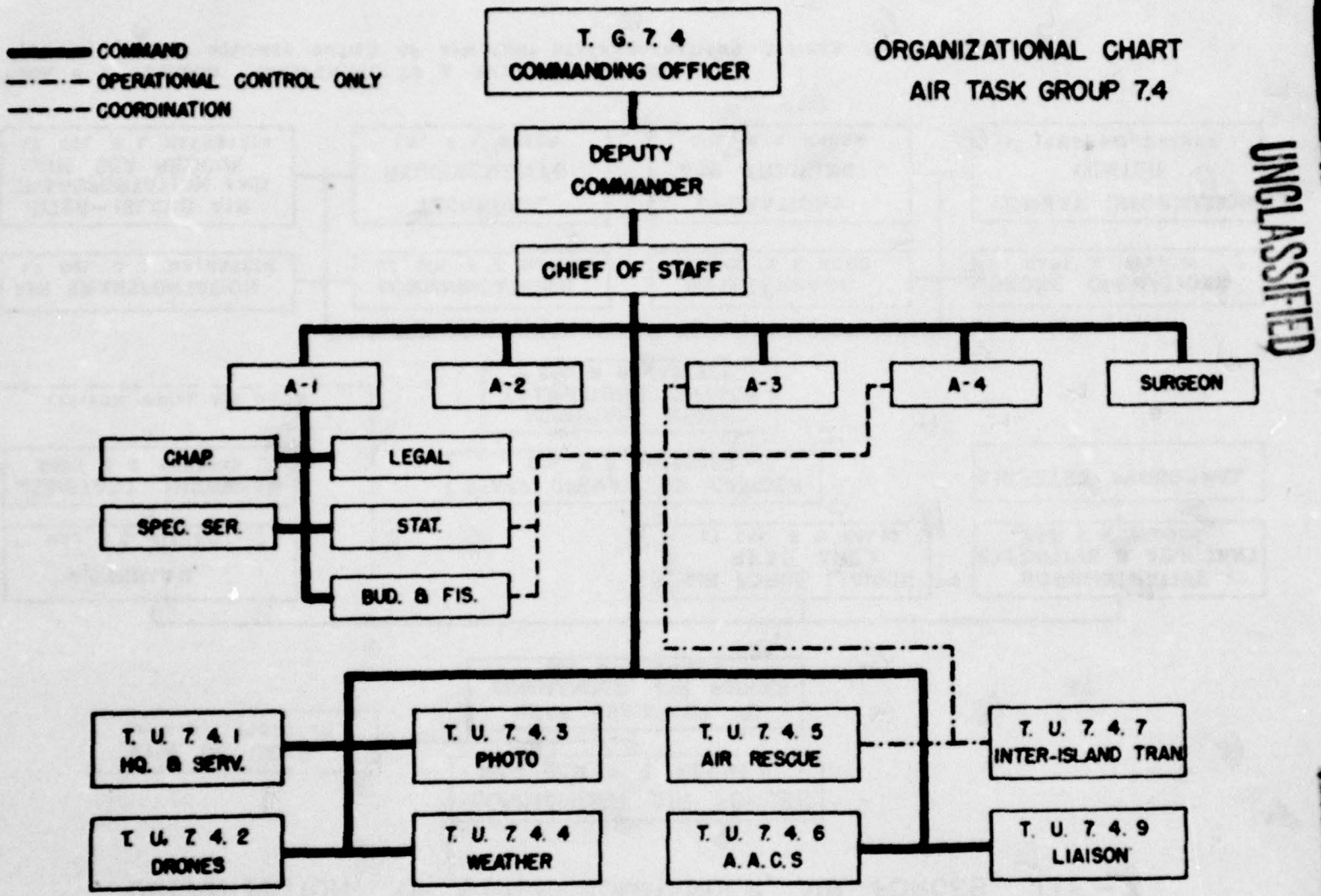
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ORGANIZATION OF STAFF COMMANDER, AIR FORCES, JTF-7



*COL N P JACKSON TRANSFERRED TO A RELATED PROJECT.
COL W S RADER ASSUMED DUTIES OF ASSISTANT STAFF OPERATIONS OFFICER ON 17 MARCH 1948.

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COMMAND
OPERATIONAL CONTROL ONLY
COORDINATION
T. G. 7. 4
COMMANDING OFFICER
ORGANIZATIONAL CHART
AIR TASK GROUP 7.4
DEPUTY
COMMANDER
CHIEF OF STAFF
A-1
A-2
A-3
A-4
SURGEON
CHAP.
LEGAL
SPEC. SER.
STAT.
BUD. & FIS.
T. U. 7. 4. 1
HQ. & SERV.
T. U. 7. 4. 3
PHOTO
T. U. 7. 4. 5
AIR RESCUE
T. U. 7. 4. 7
INTER-ISLAND TRAN
T. U. 7. 4. 2
DRONES
T. U. 7. 4. 4
WEATHER
T. U. 7. 4. 6
A. A. C. S
T. U. 7. 4. 9
LIAISON

SECTION 4

Synopsis

Planning and the initial implementation of plans by the Staff of Joint Task Force Seven are included in this section. Initial reconnaissance of the test site by General Hull and an account of the coordination with concerned Services are a part of the section. The period covered here was one of procurement of personnel and supplies, hampered by security restrictions. The initial construction force was prepared for shipment and an operating plan in the form of a Field Order was developed.

SECTION 4

PREPARATION FOR CONDUCT OF THE OPERATION

With the completion of the basic plan (JCS 1795/6) and its submission to the Joint Chiefs of Staff on 15 October 1947, Operation Sandstone passed into its second phase.

At the daily staff meeting on 15 October 1947 General Hull instructed the staff to proceed on the assumption that the Joint Chiefs would approve the paper, their actions to be taken on the basis of a strict military classification of "SECRET" or "TOP SECRET."[10]

This was a period of particular difficulty for the staff and for Task Group Commanders who shortly after 15 October 1947 set about the organization of their units. Procurement of personnel, equipment and material and the drafting of orders all had to be accomplished under these security restrictions, thereby doubling and tripling the complications of their tasks. The international situation at this time stayed the release of a public announcement which had been planned for early issue.[11] Until this statement could be made, the mere mention of the operation was highly classified.

On the following day General Hull was informally advised that the Joint Chiefs of Staff had agreed to approve the paper and that formal approval would be given on 18 October 1947. This proved to be the case.

At the staff meeting of 17 October 1947, General Hull reviewed the situation for the staff, stating that the immediate steps to be taken were:

1. Reconnaissance of the site.
2. Development and completion of the details of the plan.

At the same time General Hull announced that he would depart Washington for the forward area on 20 October 1947 with a side trip to the AEC Los Alamos Scientific Laboratory for further familiarization with the scientific aspects of the operation. On this trip General Hull was accompanied by Captain Russel, Dr. Froman, Dr. Graves, Deputy Scientific Director, Captain Tom B. Hill (Representing Admiral Parsons) and Colonel Cooney. At Oahu he was joined by General Kepner, Admiral Denebrink and Colonel Tulley and in this company proceeded to the site.

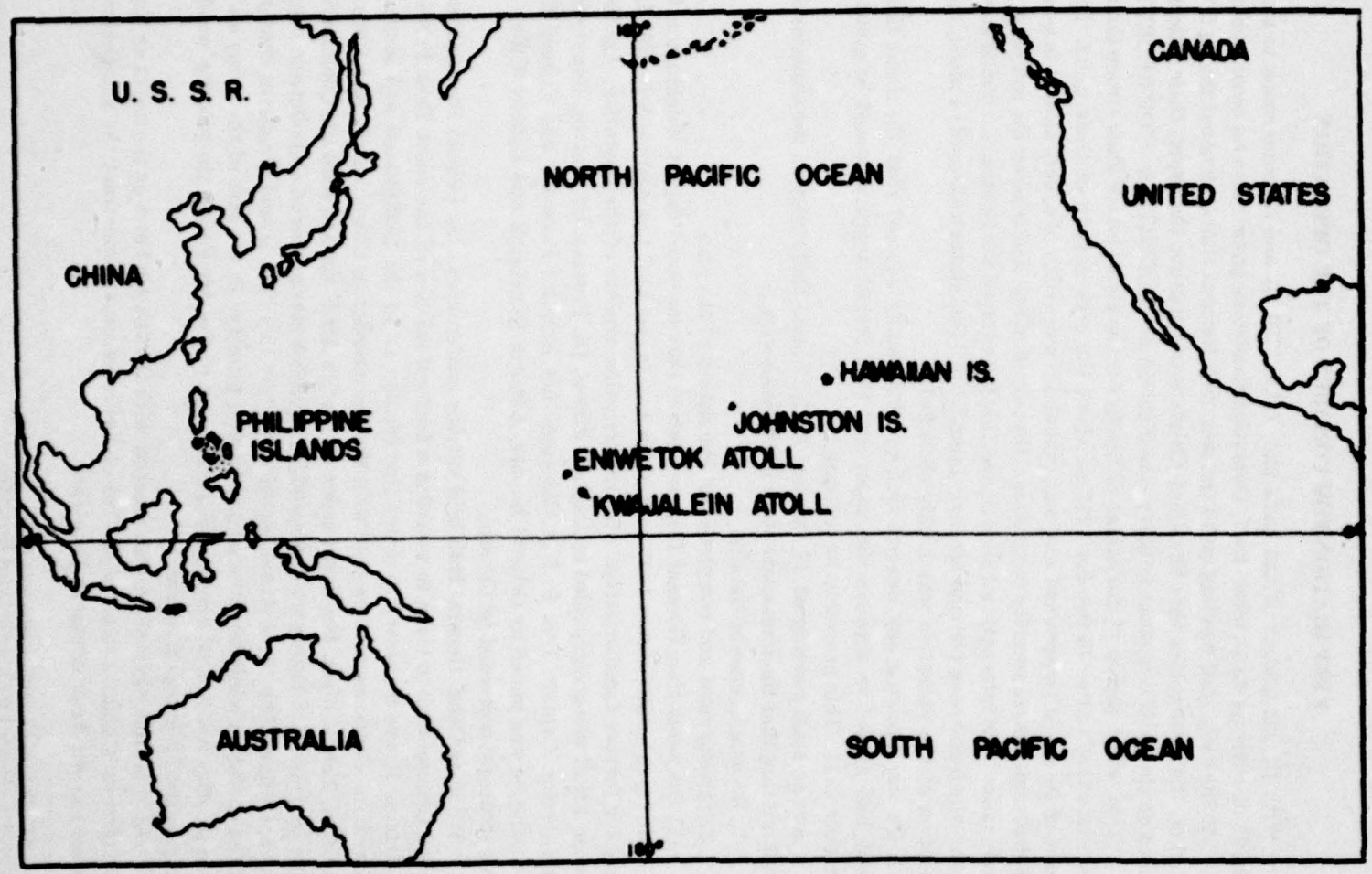
While at Oahu, General Hull held various conferences. Lt. Colonel Starbird had preceded General Hull to Oahu to establish a forward echelon of the Joint Task Force Headquarters. It was necessary to orient this echelon as to the background and scope of the operation. Conferences were held with the Commander in Chief, Pacific and Commander in Chief, Pacific Fleet, the Commander of the 7th Air Force and with the Commander, Pacific Division, Air Transport Command, to establish procedures on shipping and support of the operation. The three Armed Services had by this time issued directives that support of the operation would be given second highest priority. In the case of the Army and Navy this priority was second only to occupation, and in the Air Forces the priority was second only to the 55-group program.

At this time agreement was reached with the 7th Air Force on the use of an Engineer Aviation unit under command of Colonel Keith Barney to construct the establishment to house the Air Task Group at Kwajalein.

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[10] Daily Record, Joint Task Force Seven.

[11] See Chapter 8 for more detailed discussion.



Eniwetok Atoll, the test area, lies 4,500 miles from the West Coast of the United States.

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[redacted] UNCLASSIFIED [redacted]

At this time it was also decided that the initial construction force for Eniwetok would be a Provisional Battalion, primarily Engineers and Stevedores, plus Naval and Air attachments, to be commanded by Major William A. Hussey, who also accompanied General Hull's reconnaissance party. It was further established that USARPAC would make issue of equipment and supplies to the initial force with provision that USARPAC could requisition "on port" the items needed from the Zone of Interior.[14]

General Hull's party arrived at Kwajalein on 25 October. The Island Commander, who was also to serve as a Task Group Commander for Joint Task Force Seven, and the local Air Commander were oriented as to the general nature of support which would be required of them.

On 27 October the party arrived at Eniwetok where it was found that facilities existed to accommodate a force of 4,000 to 5,000 men. These facilities, however, were in a bad state of repair and deterioration. An initial plan of work for Major Hussey's provisional battalion was laid out. Later this was implemented by General Hull in a Letter of Instructions.

All islands of the atoll were reconnoitered and zero islands for the tests were selected on the spot. The island of Engebi was selected as number one zero island, Aomon-Biijiri as number two, Runit as number three and Parry as the firing and control station.

On the return trip General Hull again conferred with the Kwajalein Island Commander and arranged to place a Joint Task Force Liaison Officer there to receive personnel enroute to Eniwetok and to receive Sandstone shipments of supply and equipment.

The party returned to Oahu on October 29 and additional conferences were held to clarify new details of support for the operation. General Hull enunciated at this time a general policy that all construction, repair and rehabilitation in the forward area must be for the purpose of supporting the operation, but that proper relation to long-range development would be observed.[15]

Meanwhile, Colonel Barney had gone to Kwajalein to make estimates of supplies and equipment required to meet the needs of Task Group 7.4. These supplies were to be procured locally insofar as possible and the remainder were to come from the Zone of Interior.

During this period the staff in Washington was concerned with step number two—the development of details and completion of the plan. Specifically, this involved:

1. Initiation of a personnel procurement program; establishment of an efficient personnel administration system; and the adoption and inauguration of personnel policies.

2. Establishment of adequate security policies and measures.

3. Drafting of an overall plan to cover the entire Operation.

4. Establishment of procurement and shipping procedures and policies and their inauguration.

5. Finalizing the status of funds for the operation.

6. The establishment of service tests desired by the Army, Navy, Air Forces and Armed Forces Special Weapons Project.

Upon General Hull's return to Washington the bulk of these matters was well along toward solution. The personnel program had been initiated. General Ogden's Second Engineer Special Brigade had been alerted and procurement of additional personnel to augment

[14] [15] Daily Record, Joint Task Force Seven.

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the force to permit organization of Task Group 7.2 was in process. (Note: For detailed information on Staff problems see Staff Special Reports, Annex 1, Vol II of this Report.)

The system of security clearances was in effect and overall security policies had been promulgated.

Procurement of supplies and equipment for the initial force at Eniwetok and for construction at Kwajalein was in progress, based on earlier estimates for these projects. At the outset the Joint Task Force had proceeded on the premise that the most economical and practical method for providing administrative and logistical support was to work through the existing command channels of the Armed Services. Commands principally involved were Commander in Chief, Pacific and Commander in Chief, Pacific Fleet; US Army, Pacific; 7th Air Force and the Pacific Division, Air Transport Command. Western Ocean Division, Corps of Engineers, Department of the Army, at Sausalito, California, through the Chief of Engineers, was the Task Force agent for procurement, construction and negotiation of certain contracts. The Naval Supply Centers at Oakland and Port Hueneme, California, and the San Francisco and Seattle Ports of Embarkation were selected as the Zone of Interior shipping agencies for the Task Force. The Naval Supply Center at Pearl Harbor, T. H., supported the Task Force at that echelon.

To insure the proper movement of the initial force forward (the 1220th Provisional Battalion), Admiral Wellings had departed Washington on 17 October 1947 and remained at Pearl Harbor during the period this force was organized until it sailed on 15 November 1947.

During the period of organization and equipment of the initial force, USARPAC was drawing on its own funds. As time went on the Commanding General became increasingly concerned over this matter. Aware of this predicament, Joint Task Force Headquarters in Washington exerted every effort to speed the clearance of funds. On 23 October 1947 the Atomic Energy Commission was able to transfer five million dollars to the Navy Department, which was the agency designated to handle the allottment for the operation. With this action, the Staff Fiscal Officer walked the necessary papers through the Governmental finance channels, namely the General Accounting Office and the Treasury Department and on 25 October 1947 the Task Force became solvent. On 31 October 1947 the AEC transferred fifteen million dollars to the Navy Department for the Joint Task Force, thus completing the transfer of funds, since the figure twenty million dollars was the estimated cost of the military Services' support."

General Barker, J–3, had decided to issue the operating plan in the form of a Field Order. A draft of this order with four of its Annexes was ready for General Hull's approval. With certain modifications this order was approved, published and distributed as Field Order Number One on 14 November 1947.

November 1 had been set as the target date for finalizing service test requirements. The urgency attached to this project was occassioned by the necessity of procuring required materials and allocating shipping space to them for movement to the site. This date was not met due primarily to three factors: The high security classification of the information desired; the lack of adequate direct liaison with the concerned Service agencies which resulted in the unfamiliarity of the Services with the purpose of the test; and finally, the

" JCS 1795/6. See Section 9 for additional details. This estimate was substantially reduced.

lack of technical knowledge of nuclear physics on the part of the Joint Task Force Staff. Ultimately, these obstacles were overcome through direct contact of concerned individuals in conference.

Eleven service tests were finally approved by the Joint Proof-Test Committee (this Committee continued in existence at this time, even though the Joint Task Force had been authorized). These tests necessarily had to meet the policy initially laid down by General Hull—that only those tests which could be performed without interferring with the basic mission of testing atomic weapons would be approved. All tests were to be under the technical control of Commander, Task Group 7.1, with all scientific reports from the tests to be submitted through the Scientific Director, Dr. Froman. The tests approved were:

Service Test No.	Requested by	Description	Conducted by
1	Corps of Engrs, US Army	Exposure of 2 reinforced concrete structures to determine structural damage.	CTG 7.2
2	Corps of Engrs, US Army	Exposure of 2 reinforced concrete structures without collective protectors.	CTG 7.2
3	Corps of Engrs, US Army	Exposure of an earth barricade to determine shadow effect from blast.	CTG 7.2
4	BuDocks, USN	Exposure of 175 varied units for evaluation.	CTG 7.3
5	US Air Force	Determination of blast accelerations by accelerometers installed in aircraft.	Cmdr Air Forces
6	Signal Corps, US Army	Detection of the explosion by visual observation of the moon.	Cmdr Air Forces
7	BuMed, USN	Exposure of small packets containing biological assay material.	CTG 7.6
8	BuShips, USN	Exposure of small sample of materials with various coatings for purpose of establishing surface effects produced.	CTG 7.6
9	BuShips, USN	Field test and evaluation of several radiological instruments of new design.	CTG 7.4
10	BuShips, USN	Exposure small steel plate samples to obtain shielding data applicable to estimating radiological effect of atomic bomb against any type of structure.	CTG 7.6
11	Chemical Corps	Exposure of one (1) Field Collective Protector E24R1 in each of two (2) concrete structures (Tests 1–3) on ENGEBI ISLAND.	CTG 7.6

SECTION 5

Synopsis

The period covered by this section was one during which the Task Force's effort was directed toward moving construction units and supporting supplies and equipment to the forward area. Initial work on construction of the proving ground was started. It was a period of transition from plans to operations.

SECTION 5

TRANSITION FROM PLANNING TO OPERATING STAGE

The period of 15 November to 15 January was one of transition from a planning to an operational stage. During this time the Task Groups were engaged in completing their organizations and in initiating training.

The initial force of the Joint Task Force embarked from Pearl Harbor on 15 November to prepare the way for the arrival of General Ogden's Task Group 7.2. This latter force sailed from Port Hueneme on 15 December. General Ogden, who preceded the main body, arrived at Eniwetok and assumed command of the atoll on 19 December 1947. Preliminary construction was underway at Kwajalein on facilities for housing the Air Task Group, Task Group 7.4, by 15 November. Colonel Barney had secured the services of one Aviation Engineer Company already based at Kwajalein. This unit was reinforced by a second company from Oahu on 12 December. This project missed a serious complication by a 10 day margin. When Colonel Barney was assigned to the project on 24 October, the Engineer Company was engaged in a removal program on Kwajalein and was preparing to tear down the ATC mess and Headquarters, both of which were well suited for JTF purposes. With Colonel Barney's arrival this project was stopped.

General Hull returned to Oahu on 10 November, later making an inspection trip to Eniwetok during the period 1–4 December. He arrived there two days after the arrival of the 1220 Provisional Engineer Battalion in late November. The Battalion was well settled and the tasks at hand were already commenced.

During the period General Hull was at Oahu constant liaison was maintained between the main Headquarters at Washington and the Forward Echelon at Fort Shafter, apprising the Commander of the progress of affairs from the standpoint of the staff in Washington. At Oahu numerous details were being finalized and agreements firmed between the co-operating Services supporting the operation. Security was one of the primary concerns of this time.

On his inspection trip of 1–4 December to Eniwetok General Hull was accompanied by Major General Ralph C. Wooten, Commanding General, 7th Air Force, and members of the staff of the Forward Headquarters of the Task Force.

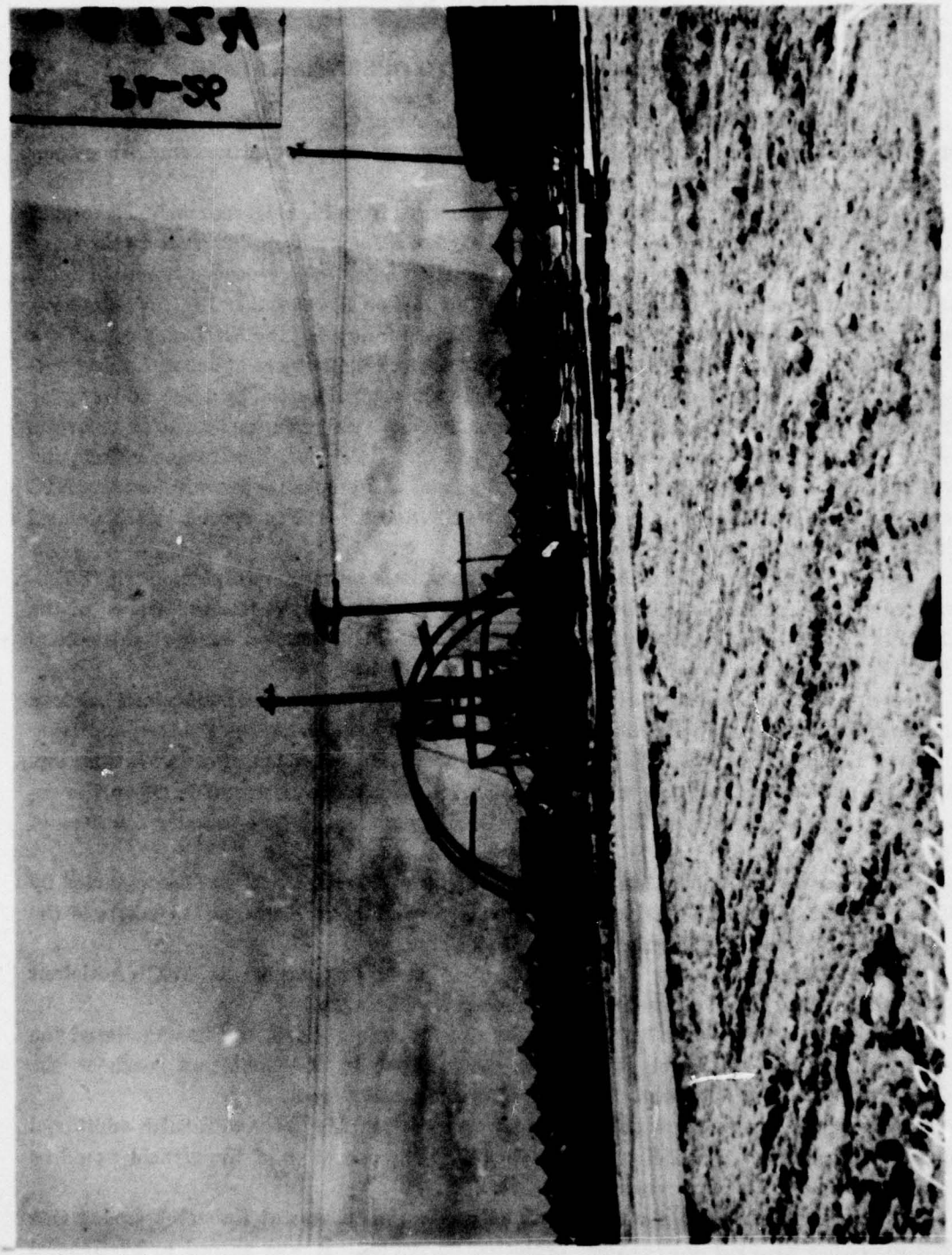
Colonel Tulley and Doctor John C. Clark, field representative of the AEC (Assistant Scientific Director), had arrived to begin the survey of Engebi.

Admiral Denebrink, who had been at the site for several days, had reconnoitered the landing possibilities at Engebi. His findings showed that an LST could not beach on the island, thus necessitating landing of materials from smaller craft.

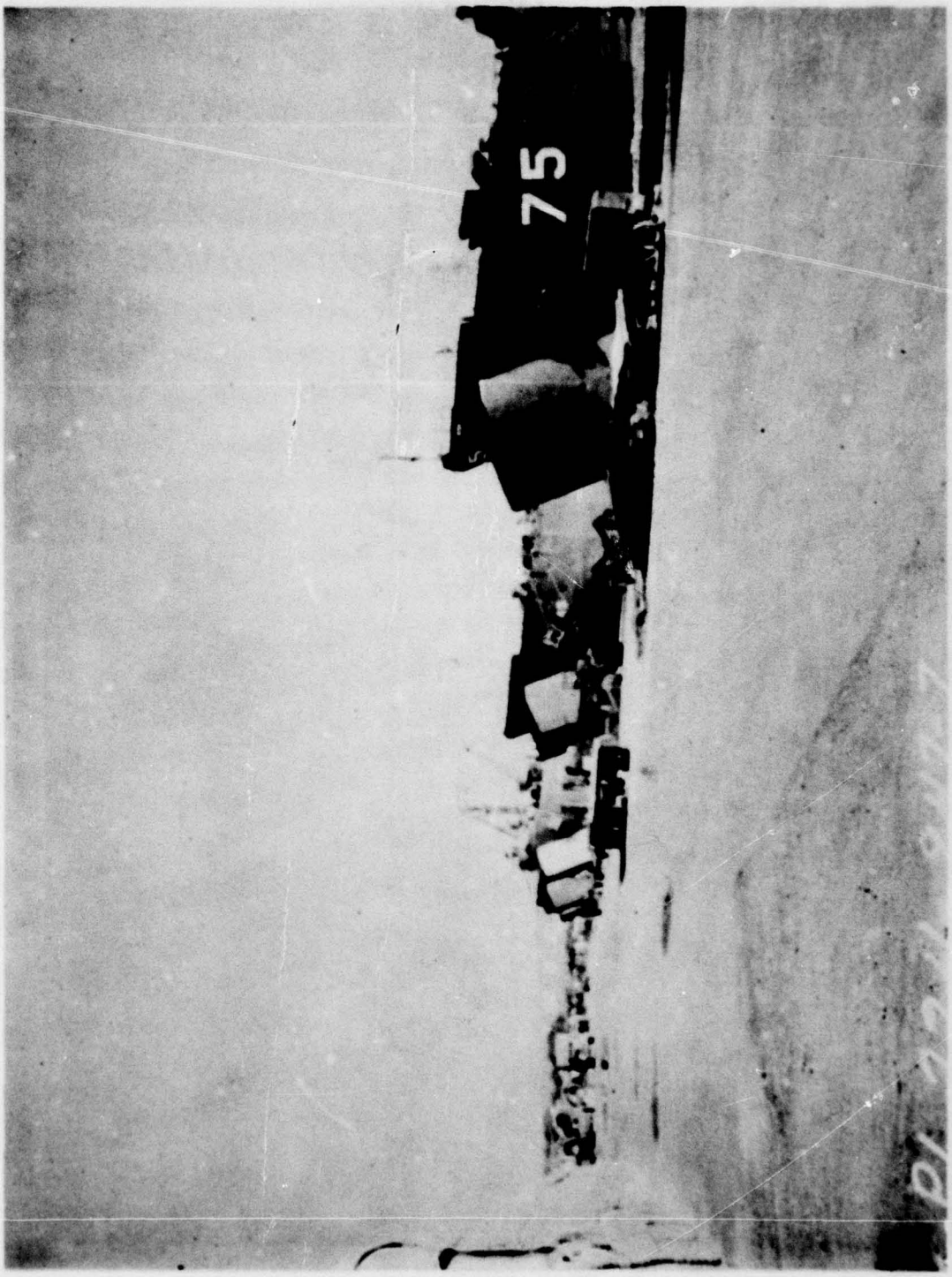
Arrangements were made during this trip for the 7th Air Force to furnish additional operational personnel. Decision was made then that the operation of the airfield would be carried out by Air Force personnel.

Captain J. P. W. Vest, Island Commander at Kwajalein, was at Eniwetok during this time to discuss with the natives their projected movement. It was agreed to by General Hull that one of the Task Force LST's would move them.

On the return trip the party surveyed the site for the location of housing for the Air Task Group at Kwajalein. At this time the communications at Kwajalein were building up



Task Group 7.5's tent camp under construction on Kwajalein.



Loading the 1220th Provisional Engineer Battalion at Pearl.

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Troops of the 1220th embark for Eniwetok.

and it was determined that additional personnel would be required. The entire situation on Kwajalein was reviewed during this inspection.

At JTF Main in Washington during this period the staff was involved in a multitude of tasks almost as varied as they were numerous. Much of the planning was completed by early December. The jobs at hand were final perfection of these plans and checking them through to successful execution, all pointed toward the delivery of supplies, material and equipment to construct the proving ground, the final assembly of the Joint Task Force at the test site and the safe delivery of the weapons to be tested.

To illustrate, there are listed here some of the problems that were discussed and resolved. These are drawn from the Daily Record of the Joint Task Force:

1. Planning and arranging the movement of the 2nd Engineer Special Brigade and procuring and moving the augmenting forces of special troops, such as port, signal and amphibious truck units. (Note: This first water shipment of troops and supplies was scheduled to begin loading on 1 December, approximately 45 days after formal activation of the Joint Task Force. Appreciation of the magnitude of this problem is heightened when it is recalled that during wartime it required, with all stops open, 60 days to lay down supplies at a Zone of Interior port for water shipment after receipt of a theater request.)

2. Planning and arranging transportation for the shipment of some 39,000 measurement tons of supplies and equipment to Eniwetok and Kwajalein.

3. On 25 November the AEC and the Joint Task Force had drafted a suitable letter for presentation to the President, asking approval of the plan for proof-testing the weapons at Eniwetok and requesting approval of the removal of the 142 natives from the atoll. The paper was processed through the State Department and Presidential approval was secured.

4. On 26 November a question of some standing was settled in conference when agreement was reached that drone planes would take off from Kwajalein on test days and land at Eniwetok where samples would be recovered for immediate return to New Mexico. (Note: Further study of this problem on the grounnd however, resulted in a decision to fly the crewed drone planes from Kwajalein to Eniwetok on the day immediately prior to a shot and their final take-off as drones was accomplished from Eniwetok.)

5. During the period 28 November to 1 December, due to the imminence of a breach of security, a press release was agreed on, cleared with the Secretary of State, Mr. George C. Marshall, at that time in London attending the four-power Foreign Ministers conference, and published on 1 December.

6. Arranged to inform the Security Council of the United Nations on 2 December of the decision to declare Eniwetok Atoll and the territorial waters thereof a "closed area."

7. Preliminary discussion of the roll-up plans for the operation were opened at the staff conference on 5 December. On this date the Air Forces of the Joint Task Force and the scientists of Task Group 7.1 began a series of tests to determine H-Hour for the tests. Determination of this matter rested on a compromise between the Air Forces's requirement of sufficient light to permit the mother planes for the drones to operate and on the scientific requirement of sufficient darkness to permit the scientific instruments to function properly. This determination was finally arrived at on the test site itself.[15]

[15] See Section 11 for Details.



Troops of the 2nd ESB board the Pickaway at Port Hueneme, enroute to Eniwetok.

8. Air patrol requirements were determined and forwarded to Admiral Denebrink on 8 December 1947.

9. Preliminary plans for attendance of official observers at tests were commenced on 12 December. Also, on this date the specially contrived drone-controlled tank for recovery of radiological ground samples was successfully tested at Aberdeen.

These and many other problems of equal diversity continued to occupy JTF Main during the remainder of December and January.

One of the problems that created considerable concern on the part of everyone, and the Navy in particular, was that of moving the 142 natives from the island of Aomon, one of the zero islands.

With approval of the President, the Secretary of Defense, Mr. Forrestal, on 25 November 1947 directed the Secretary of the Navy to have the natives removed.

Negotiations were opened with the natives on 3 December 1947 under the direction of the Deputy High Commissioner of Trust Territory, Pacific Islands. On 4 December the two native chieftains, Abraham and Johannes, were flown to Ujeland Atoll and made a detailed inspection of the new village site on Ujelang Island.

The move was agreed upon with full satisfaction being expressed by the two chiefs. Ujelang presented definite advantages. It provided a 200-acre tract against 130 acres at Eniwetok. There were an abundance of coconut and fish. Breadfruit and pandanus were to be had, whereas neither grew at Eniwetok. The two chieftains were returned to Eniwetok on 5 December and the removal was accomplished on 20 December. The 142 inhabitants with their belongings were placed aboard the LST 857 and moved to their new homes without incident, except for one, of which they probably were little aware. Overnight they had become special wards of the United States Government.[14]

Another matter that had to be cleared concerned the removal of surplus property at the site which had been purchased by the Chinese. It was felt that the Chinese would not attempt physically to possess the property but rather would attempt to resell it for American dollars in an attempt to bolster the Chinese economy. Decision was reached on 17 December to exclude all activity of the Chinese or their agents from Eniwetok. This was necessary for security reasons. Substantial quantities of this surplus were used by Joint Task Force Seven.

By Christmas, 1947, construction material was arriving at Engebi, Runit and Aomon in sufficient quantity to keep the construction program on schedule. Rehabilitation of living and messing facilities at Eniwetok was well in hand and hospital facilities were available. Radio-telephone communication from Engebi to Eniwetok was in operation. The first increment of the 2nd Engineer Special Brigade arrived on Christmas Eve. The 18th Engineer Construction Company of the 1220th Provisional Engineer Battalion commenced preliminary construction on Engebi on 27 December and in early January commenced AEC technical construction. The other two zero sites, Aomon and Runit, followed roughly two weeks behind these activities in construction.

By the end of December the footings for the 200-foot towers on the test-firing islands and also for the land photographic towers had been installed. These 200-foot towers were to

[14] Joint Task Force Daily Record. Letter by Mr. Lilienthal to President Truman.



Construction troops prepare the ground on Aomon Island for the placement of technical installations.

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be the firing platforms for the weapons. Construction of the causeway to link the islands of Aomon and Biijiri was in preliminary stage.

In the meantime, agreement had been reached with the State Department on 19 December that a danger area would be declared around Eniwetok, extending 100 miles east and west and 75 miles north and south from the center of the atoll. This was the area that had been decided upon as offering a reasonable safeguard against dangerous radioactive contamination and unwanted observation. This action was publicly announced on 30 December. All foreign governments were formally advised of this action, as were domestic agencies such as the Hydrographic Office.

General Hull returned from the Forward Headquarters at Fort Shafter to Washington on 13 December. After orienting the staff, he stated at the regular conference that the Task Force had now passed from a planning to an operating stage.

At the staff conference on 19 December, General Hull announced that he would return to Oahu that day and would again visit the forward area early in January. At that time he announced that JTF Main would close in Washington on 15 February and open at Fort Shafter, Oahu, T. H., at the same time. A Rear Echelon would open on 16 February in the control section of the Plans and Operations Division, Department of the Army.

On 6 January 1948 agreement was reached between the Joint Task Force and the Atomic Energy Commission which settled finally and for all the quetsion of command responsibility. This question revolved around a proposal raised during the early formaiton days of the Task Force that the Scientific Director have the final authority in controlling the amount of radiological exposure to which an individual could be exposed.

Replying to the AEC on this proposal, the Joint Task Force pointed out that such a split command authority was neither feasible nor desirable since the Commander, Joint Task Force Seven, held ultimate responsibility.

AEC agreement to this philosophy constituted, in fact, a final approval of the Task Force's basic plan, although general agreement had been indicated on 27 October when the exception was made.

General Hull did not return to Washington after his departure on 19 December until after completion of the operation. During the period 4 to 9 January 1948 he again inspected the progress of construction at Kwajalein and Eniwetok.

At Kwajalein various details were gone over with Captain Vest, Island Commander. It was decided that Captain Vest should be furnished a Letter of Instructions to include:

1. An outline of construction to be undertaken and priority of accomplishment. (Some construction was underway at this time.)

2. An outline of the command and responsibility agreements. (Colonel Barney was to be a Deputy to Captain Vest.)

3. Call for Iscom Kwajalein to give maximum support to the Rongerik-Majuro weather detachments.

Means of tightening security were discussed and arrived at during these conferences.

Meanwhile, construction had gone ahead on tent camps for the construction crews, clearing of construction sites for housing the Air Task Group and renovating the mess hall for the Task Group. A major shipment of material and equipment had arrived on 28 December 1947, including lumber, cement, vehicles and graders, permitting construction to

proceed as scheduled. Agreement had been reached at this time for a civilian contracting agency (the Byrnes organization) employed by the Navy to assist in the Kwajalein project.

Operational work at Eniwetok was found to be up to schedule, although progress at Aomon was behind that of the other two test sites, Engebi and Runit. General Hull directed that special attention be given to Aomon to correct this lag. Morale was exceptionally high and the troops were willingly working long hours each day. Preliminary consideration of roll-up was undertaken at this time also.

into their niches automatically. Matters inevitably went awry, due primarily to insufficient coordination and liaison and to the high security classification of nearly everything relating to the project. One rather humorous, but vexing, incident may serve to point this up. One shipment of supplies to the tropical area of operations included an assortment of arctic clothing and personnel equipment. JTF Main was duly notified of this in a somewhat aggrieved and accusatory message by the Zone of Interior Port Commander, who had stopped the shipment.

The point remains, however, that the Operation was on schedule as the Task Force prepared to move forward in late January and early February.

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Construction troops go ashore at Engebi Island to begin preliminary work on the proving ground.

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SECTION 6

Synopsis

Section six deals with the movement of the Joint Task Force to the test area. Consideration of roll-up plans occupied the attention of the Staff. The period covered saw the final arrival of all elements of the Task Force at forward bases. Security of the weapons in transit was a matter of prime concern.

SECTION 6

FORWARD DISPLACEMENT OF JOINT TASK FORCE SEVEN

Begining in early January, 1948, the Main Headquarters of Joint Task Force Seven gradually closed out and moved to Fort Shafter as the business of the various Staff Sections permitted. On 24 January, the Office of the Chief of Staff closed and a skeleton force remained in the Washington Headquarters under the direction of General Barker to clean up the final details. By 15 February both Deputy Commanders and the Staff had assembled at Fort Shafter, where the Main Headquarters was then opened, absorbing the Forward Headquarters. Simultaneously, Joint Task Force Seven, Rear, opened in Washington.

Primary business matters from 15 February to 8 March, when the Headquarters embarked for Eniwetok, were the formulation of roll-up plans and preparation for the move to the area of operations.

Lt. Co.l L. J. Lincoln was designated to prepare plans on the roll-up for submission to the Joint Chiefs of Staff. Representatives of the Armed Services and the AEC were detailed to assist Lt. Col. Lincoln, the group constituting a "Roll-up Board." Field Order Number Two, establishing directives and policy for the roll-up was evolved by the board. A paper was prepared for submission to the Joint Chiefs of Staff on "Post-Sandstone" responsibilities at Eniwetok, based on a directive to General Hull by the Joint Chiefs of Staff that the details of establishing a permanent atomic proving ground be worked out between the Joint Task Force and the AEC. This directive resulted from a memorandum by Mr. Lilienthal to the JCS, confirming that the AEC desired to make the Eniwetok test area a permanent establishment."

The principal question involved in working out these details was that of determining the most effective means of denying foreign agents access to the area, or denying such agents the opportunity to obtain useful information regarding fissionable material. The subsidiary questions of whether to attempt to obliterate the radiologically contaminated areas to prevent access to information or to post a guard, or both, were involved. A full dress conference of AEC scientists and Joint Task Force staff members on 7 March failed to reach final conclusions. This matter was destined to be a major consideration during the remainder of the Operation.

Development of a military check list for the operation was effected during the period the Main Headquarters was at Fort Shafter. This check list detailed, step by step, the actions to be taken during the test periods and later proved to be invaluable.

Meanwhile, the major elements of the Naval Task Group had assembled at Terminal Island and the Air Task Group was in the process of staging at Hamilton Air Force Base, California, for movement to Kwajalein, where it was based for test operations.

On 28 February the USS Bairoko (CVE 115) departed from San Diego, where it had taken aboard the helicopters for the operation and proceeded to Terminal Island. In company with the Command ship, the USS Mount McKinley (AGC–7), and the USS Curtis (AV–4), the Bairoko sailed on 29 February, escorted by the SS Duncan (DD–874).

" Detailed Discussion contained in Section 13.

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The Chief of Staff, Joint Task Force Seven, goes over plans for the movement from Oahu forward.

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On 1 March, the USS Albemarle (AV–5) sailed from Terminal Island, escorted by the USS Rogers (DD–876). The Scientific Group boarded the Albemarle at Terminal Island and joined the Task Force at Oahu.

Prior to the sailing of Task Group 7.3, the weapons to be tested were transported from the Los Alamos Laboratory by rail under special security provisions. At Terminal Island they were loaded onto the ships. From that time on security became the responsibility of the Commander, Joint Task Force Sevn. The Test Director, however, was the accountable officer to the AEC for all weapons.

While underway a Destroyer screen and air cover provided round-the-clock security. Normal Naval precautions such as darken ship and zig-zag were taken by the Task Force. Military guard was maintained over the weapons at all times. Access to the weapons was controlled by entry lists which were limited to those whose duty required such access.

The movement from Terminal Island to Pearl Harbor was marred by a gas explosion on the Duncan which resulted in the death of one crew member and injury to six others. The Bairoko escorted the Duncan back to port and rejoined the Task Group on 3 March, the same day the Albemarle joined. The USS Tucker (DDR–875) was dispatched as replacement for the Duncan on 4 March. On 7 March the Task Group arrived at Pearl Harbor.

Task Group 7.4 moved by water and air, closing into Kwajalein during the latter part of March.

An advance air echelon arrived at Kwajalein on 17 February. The main water movement of Task Group 7.4, comprising the ground echelon, sailed from Oakland aboard the Pickaway (APA 222) on 10 February and arrived at Kwajalein on 22 February. The main echelon moved from Hamilton Air Force Base in unit aircraft during early and mid-March. During March the weather detachment of the 514th Weather Reconnaissance Wing arrived at its base at Guam. By the end of March the Air Task Group build up of personnel on Kwajalein was complete, totaling approximately 1,500. During the final two weeks of February the bulk of its supplies and equipment, amounting to approximately 3,500,000 pounds had arrived and was off-loaded.

Headquarters of the Joint Task Force moved aboard the USS Mount McKinley on 8 March. The four major vessels of the Task Force with a screen of five destroyers and continuous air cover sailed that afternoon.

During the period 10-12 March, enroute to Eniwetok, the Task Force conducted a Command Post Exercise aboard the Flagship. The purpose of the CPX was to test internal communications, to familiarize the Commanders and Staff with communications facilities available and to bring out typical situation that might be encountered during test operations. As a result of the exercise, a re-study of Field Order Number One was made and necessary changes were accomplished to bring it up to date with current decisions.

At 1230 on 16 March (east longitude) the USS Mount McKinley passed through the Deep Entrance to Eniwetok Lagoon and proceeded to berth.

Construction of the proving ground at this time was roughly 85 per cent complete. Engebi, the number one test site was, for all practical purposes, complete. The scientists were able to proceed with the installation of test instruments the day of their arrival, so far as construction was concerned.

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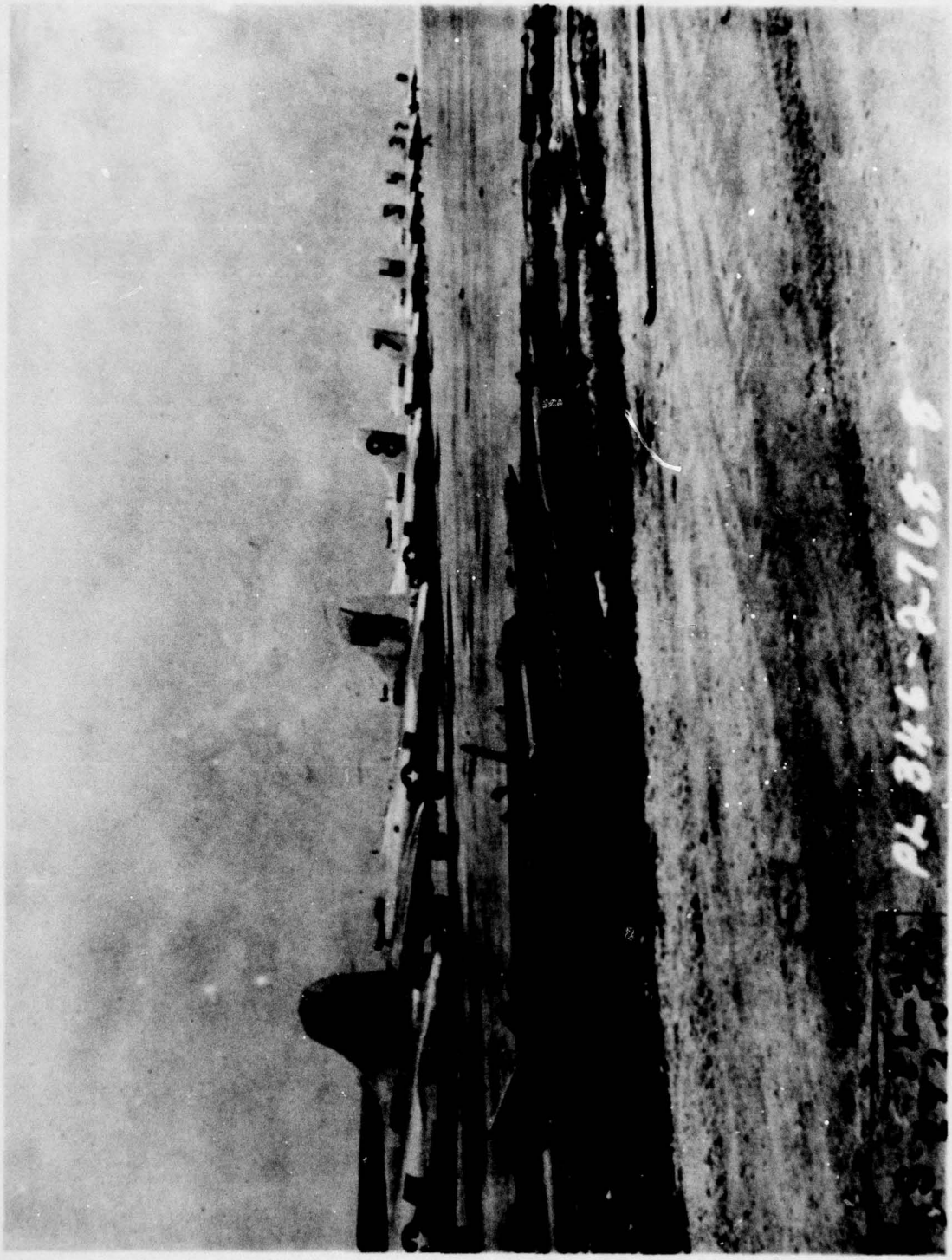
The Task Force moves forward—the U.S.S. Bairoko gets underway at Terminal Island.

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Eniwetok Island, looking east. The chapel is in the foreground and to the right is the Island Command Headquarters building.

Task Group 7.2, by the date of the Task Force's arrival, was at its peak strength. By the end of December, 1947, the population of Eniwetok numbered 1,481 military and civilian personnel. This number had increased to 1,884 on 15 March. Later the peak shore-based population of the atoll reached a total of 2,124, which was 176 under the original planning figure of 2,300. The figure 2,124 included some 40 observers and a Naval signal unit of 100 men on Parry Island.



Drone aircraft on line at Kwajalein

SECTION 7

Synopsis

Section seven discusses personnel and administration policies and procedures of the Joint Task Force. Consideration is given to procurement problems, pay differentials and morale problems involved. Health and morale of the organization is also treated here.

SECTION 7

PERSONNEL

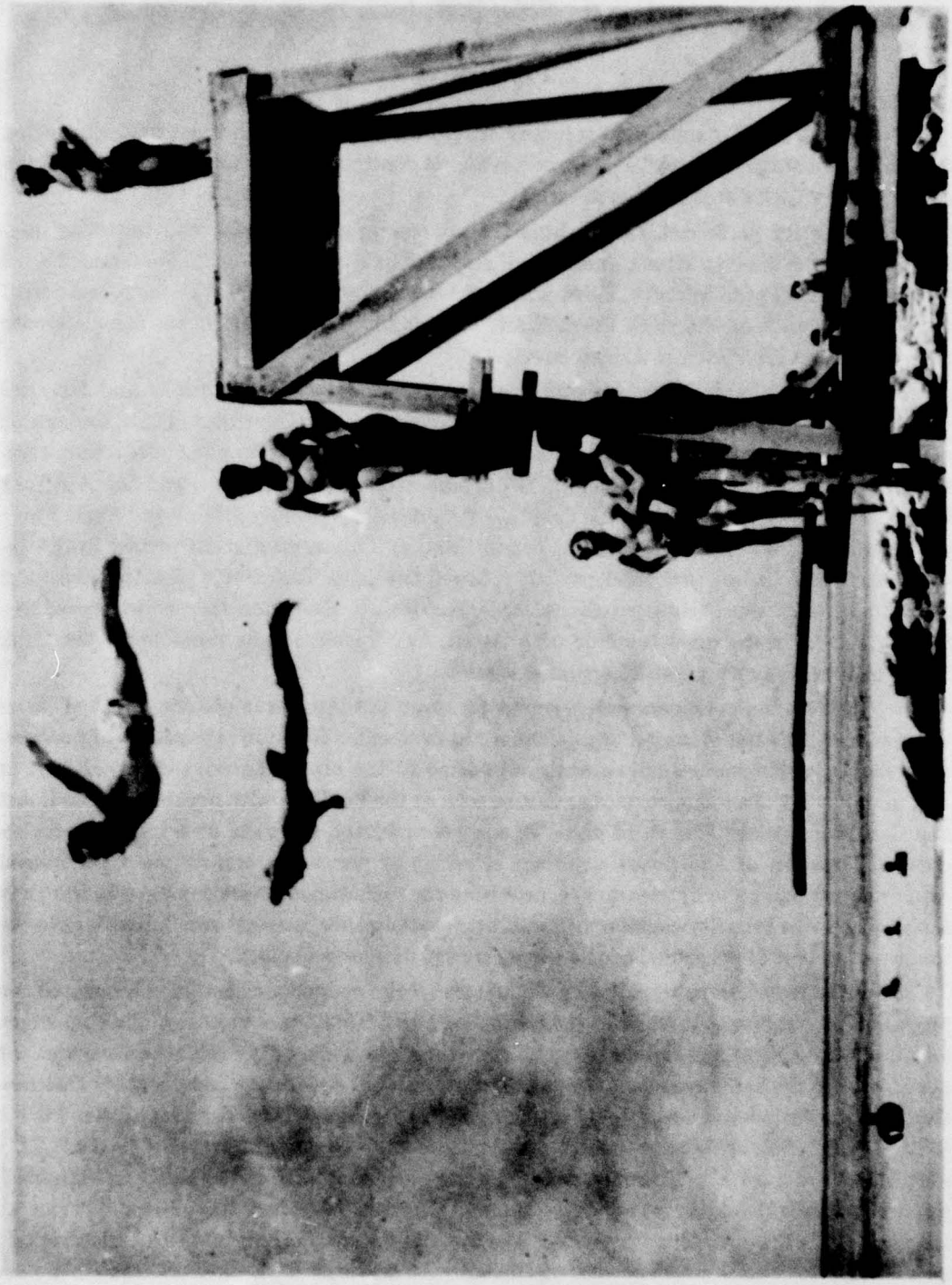
Personnel, the elemental factor in any organization, was of immediate urgency during the formative stage of Joint Task Force Seven. It continued to be a matter of major concern until the Task Force was inactivated.

Planning for personnel, establishing the sources of procurement and initiating procurement began shortly after General Hull's arrival in Washington on 25 September. On 3 October Lt. Col. Peter Schmick, USA, who had been designated J–1, set about formation of the personnel unit of the Task Force Staff. By 29 October this section was complete with representatives from all the Armed Services.

As in other phases of the operation, existing permanent organizations and facilities were called upon to aid in implementing the personnel and administration plan. Under this plan the Army Task Group, TG 7.2, was attached to USARPAC for personnel administration. Likewise, the Naval Task Group, TG 7.3, was attached to CinCPac, and the Air Task Group, TG 7.4, was attached to the Pacific Air Command. Other units of the Task Force were similarly attached to permanent organizations. This arrangement served in the interest both of economy and efficiency. It relieved the Joint Task Force of many personnel and administrative problems peculiar to each Service. It also placed personnel procedures in the hands of those most familiar with them. As a result, it was possible for the Task Force to function with a small personnel section.

In general, the personnel procurement program fell into three phases. First of these three phases was the planning of personnel requirements. Secondly, the source of procurement had to be determined and requests submitted to the proper agency—Army, Navy, or Air, and in some cases non-service agencies, uch as the Public Health Service and the Coast and Geodetic Survey. The third phase in the procurement program was follow-up on requests, initiation of additional requests, selection of personnel, arrangement for special examinations and security clearances, provision for replacements who were lost to the Task Force because of security considerations, illnesses and other reasons and follow-up checks to assure arrival of personnel at the proper destination as scheduled.

Security restrictions imposed by the nature of the operation constantly harrassed the procurement program. It was sometimes difficult to obtain the services of the competent and specialized personnel required when adequate explanation of the job to be done was not possible. For the same reason, the issuance of movement orders was complicated. Destination could be included in orders only in such general terms as "Hawaii and/or other Pacific Ocean areas." Secret orders were not used because of the danger of security "leaks." This difficulty was removed when some aspects of the operation was downgraded in classification on 20 December 1947, permitting issuance of orders classified "Restricted." Prior to that time one of the solutions arrived at was to write "Secret" orders and issue "Restricted" extracts authorizing air travel west of Hawaii with destination shown as Kwajalein, a normal terminal for the Air Transport Command and the Naval Air Transport Service. Other variations of this kind were used to preserve security and yet provide normal assurance that individuals would arrive at the proper destination.



The swimming hole at Ranit Island. The swimmers are from the Engineer Construction Company on that island.

Travel was also hampered during the early stages by lack of funds since the operation was not solvent until late October. The Finance Department, U. S. Army, provided a temporary allotment which alleviated the situation.

In the case of certain special staff functions, the Task Force was able to draw on USARPAC staff officers who were placed on additional duty with the Headquarters at Oahu. In this manner the Chaplain, Inspector General, Civilian Personnel Officer, Special Service Officer, Exchange Officer, Troop Information and Education Officer and the Judge Advocate General of USARPAC became available to the Task Force and directed the respective functions of those offices as applied to Task Force needs.

Compensation for civilian personnel necessary to the operation was a matter of prime importance. Financial inducements had to be adequate in order to attract the necessary numbers of highly-skilled scientists. At the same time, however, a serious morale problem was inevitable if substantial differences in civilian pay scales were established for the same types of siklls. Such differentials would have been automatic between Civil Service and non-Civil Service employees.

This problem was solved after considerable negotiation. Navy policy permitted per diem payments of $4.00 per day to civilian employees when ashore and $2.00 when afloat. Other agencies allowed $7.00 per day with small deductions when occupying quarters. Deductions varied, however, serving to give some individuals an advantage over others.

Eventually, uniform payment of $7.00 per diem was arrived at and a $200 a month differential in pay was allowed. For Civil Service employees this latter was accomplished by the authorization of 26 hours over-time per week.

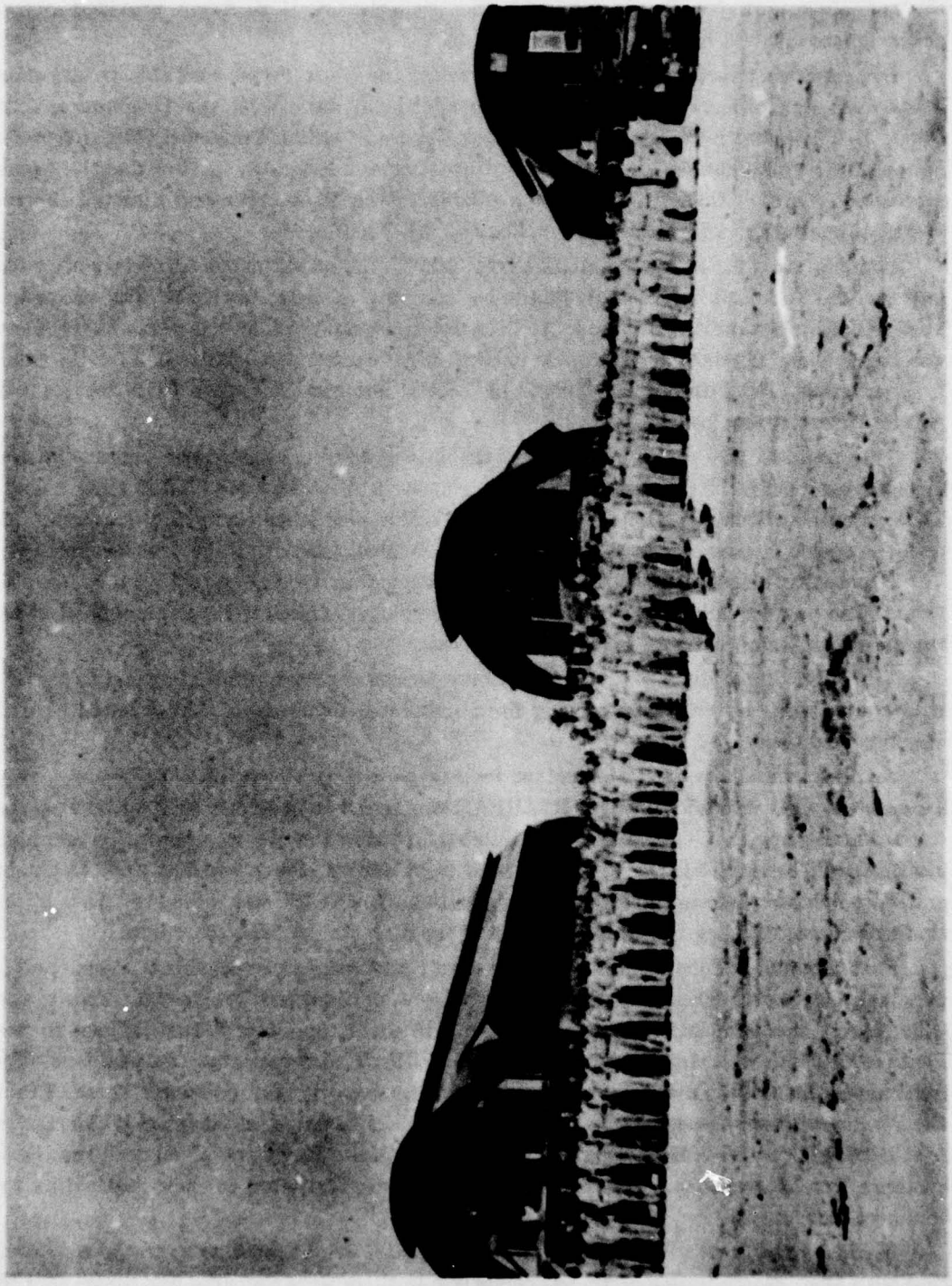
Variations in per diem payment to military personnel were notable. In general, personnel based ashore received $4.00 per day for a maximum of 60 days. Those based aboard ship received none.

As always, mail was most important from a personnel viewpoint. For security reasons a new APO was undesirable. USARPAC was found to have one APO number not in use and it became the Joint Task Force number. During the stages when no geographic location could be given for the APO some mail went astray. Some pouches went to Guam and were held there since the geographical location of APO 187 was unknown. This situation was corrected after relaxation of some of the high security classifications.

Fast communications for individuals in emergency cases were provided. From the ZI, personal telegrams addressed to APO 187 were sent by commercial radio companies to the Chief, Army Communications Service Division, Office of the Chief Signal Officer, in the Pentagon. These were transmitted through USARPAC to appropriate destinations. By reverse process, Joint Task Force personnel could send emergency messages home. From the Pentagon these messages were forwarded by collect commercial telegram if the sender so indicated. Otherwise, they were forwarded by Air Mail. Naval personnel used the Navy system whereby messages were sent to San Francisco and thence to their destination by commercial means.

In order to inform as many members of the Task Force as possible as to their connection with Operation Sandstone, three orientation lectures were prepared and copies sent to the major Task Groups. These lectures were entitled: "Why Are We Here?", "Something About The Atom," and "Atomic Energy and National Defense." The lectures were deliv-

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The 18th Company of Engineers—the construction troops for Engebi Island, number one test site.

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ered in the forward area by officers from USARPAC. In addition, the story of the Battle of Eniwetok was prepared and delivered to the units. Three films dealing with the atomic bomb were shown—"Tale of Two Cities," "Operation Crossroads," and "Atom Strikes."

Arrangements were made with the Army Central Welfare Fund and USARPAC for the handling of motion picture films. It was agreed that the film would be financed from post exchange profits and that surplus profits, if any, above non-appropriated expenses would revert to the Army Central Welfare Fund. If profits were insufficient to finance the film, the Welfare Fund would make up the difference.

The Joint Task Force made arrangements with the State Department so that civilian employees and contract personnel need not have passports. Identification cards of the Armed Services were issued and honored instead of the passport, thus saving much administrative effort. Agreement was reached with the Navy Department for the Commander, Joint Task Force Seven, to issue authority for civilians to travel by Naval Air Transport Service. The Department of the Army issued invitational travel orders for all civilian personnel of Operation Sandstone using this authority, except contract employees of the Navy Department.

Agreement was reached with the three Services in March that entry of service with Joint Task Force Seven in the conduct of Operation Sandstone would be made on Officers' Qualification Cards and on Enlisted Men's Service Records. Instructions to this effect were subsequently issued. In addition, a decorations board was designated to pass on recommendations for decorations and awards. This board functioned at Fort Shafter at the close of the Operation.

HEALTH AND MORALE

Opearting in a tropical climate, the personnel of Joint Task Force Seven were singularly free of the diseases generally attendant under such conditions. There were no cases of dysentery. The Staff Surgeon, Captain Harry H. Haight, USN, observed that there was less fungus infection than would normally be encountered in Oakland, California.

Aboard ship the normal medical and operating facilities were available. At Eniwetok hospital facilities were established complete with operating facilities, X-ray and laboratory, operated by Army Medical personnel. Medical officers were also placed with construction detachments on the test islands. At Kwajalein, an 100-bed hospital and dispensary was established. Air evacuation was provided from Eniwetok and Kwajalein to Hawaii for serious cases. These facilities proved more than ample, due to the low sickness and accident rate. For an operation of this character, operational accidents were minimal.

Morale, both at Eniwetok and at Kwajalein, was of high order, keeping pace with the generally high health average. This statement is based on the gauge of work, performed under less than good conditions, in a willing and efficient manner. During the early and peak stages of construction, an eight-hour day was the exception. More often it was "sun to sun," and voluntary in great part.

SECTION 8

Synopsis

Joint Task Force Seven security requirements and the measures taken to satisfy these requirements are dealt with in this section. A basic security policy was enunciated by the AEC for Operation SANDSTONE in the summer of 1947 which subsequently was agreed to by the Joint Chiefs of Staff. In addition, rigid security requirements were imposed by the Atomic Energy Act of 1946. The tense international situation added further to the burden of responsibility for the security of the operation.

SECTION 8

SECURITY—INTELLIGENCE—PUBLIC INFORMATION

The security policy established by the Atomic Energy Commission, in the late summer of 1947, for Operation Sandstone required The Commander, Joint Task Force Seven, by direction of the Joint Chiefs of Staff, positively to prevent the disclosure of the existence of the Task Force or of the operation, as such, for a period of approximately two months.

The security policy placed the target date for a particular test in a "Top Secret" classification, and the location of the test site and the general time for conducting tests were classified secret.[17] The practical result of this policy was to place a blanket of secrecy over the entire operation from the beginning of October until 1 December 1947, when it became necessary to announce to the public the existence of the Task Force.

With the formation of the Joint Proof-Test Committee in late September 1947, it had been planned to make an early public announcement concerning the operation, which would relieve the early complications of the high security classification. Due to the international situation at that time, however, it was considered by the Department of State to be detrimental to the national interest of the United States to make such a disclosure. The Security Council of the United Nations was then in session and General Hull, therefore, made a commitment to the State Department to attempt to maintain absolute security for six weeks. This situation was further complicated, however, by an unexpected extension of the Security Council's session to the point where it overlapped the convening of the Four Power Foreign Ministers' conference in London. It was felt by the State Department that public disclosure of the operation might also have an adverse effect on this conference.

Through the exercise of rigorous security measures, secrecy was maintained during the six-week period to which General Hull committed the Task Force (14 October to 1 December 1947). By the end of November, however, it became apparent that secrecy as to the existence of the Task Force could not be maintained further and, with State Department concurrence, a brief public announcement was made on 1 December.

This in no way relieved the Task Force of the necessity to maintain the basic security policy, however, nor did it diminish any of the requirements of the Atomic Energy Act of 1946 (Public Law 585, 79th Congress) to protect the security of atomic information classified by this Act as "Restricted Data," and defined as being:

"All data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the (AEC) Commission from time to time determines may be published without adversely affecting the common defense and security."

Viewed against the background of international tension that prevailed throughout the conduct of Operation Sandstone, the responsibilities of the Commander, Joint Task Force Seven, for maintenance of security were not to be regarded lightly. The Commander would have been remiss had he not contemplated and prepared for all conceivable eventualities, including the ultimate step, the use of armed force to protect the security of the operation.

[17] JCS series 1795.

The Joint Proof-Test Committee early envisaged the requirements that the security policy would demand of the Joint Task Force. General Hull outlined these requirements to the Assistant Chief of Staff, J–2, Colonel Thomas J. Sands, USA, during the first week of October 1947, and directed that the necessary plans be devised.

Lines of action open at this time to an unfriendly power, in order of their relative probability, were estimated by J–2 to be as follows:

a. **Reconnaissance**: Observations in the operational area conducted by:

(1) Submarines with or without small landing parties.

(2) Surface vessels.

(3) Aircraft.

Such reconnaissance missions could be expected to attempt the collection of information by visual observation, photography, or other methods of instrumentation and/or by the theft of classified material.

b. **Espionage**: Injection into the Joint Task Force of agents with missions of visual observation, photography, the theft or seizure of significant documents, fissionable materials or weapon components; interrogation of Task Force personnel by agents outside the Joint Task Force operational area; and the accumulation of intelligence from gossip, personal letters and other sources.

c. **Sabotage**: Destruction or crippling of critical scientific apparatus or installations by saboteurs; sinking of major Joint Task Force Seven ships by sabotage methods which would delay indefinitely or force the abandonment of the costly and long-planned experimentation.

d. **Conventional methods of collecting intelligence**: Monitoring of Task Force radio communications; analysis of newspaper or other public media releases or comment dealing with Task Force operations; and monitoring of amateur radio stations, if any, in the forward areas.

In accordance with this estimate of the situation, the first step in the implementation of the security policy was the selection and screening of personnel who were to participate in the operation. Personnel who were to have access to AEA Restricted Data were subjected to a complete background investigation by the FBI, termed by the AEC as "Q" type clearance, which consisted of a file and fingerprint check by the FBI. No person was to be permitted in the operational area who had neither type of clearance. This program had to be conducted concurrently with the mounting of the operation. Since about 60 days were required to complete a "Q" clearance, interim or temporary clearances of this type had to be granted to commanders and key staff officers in order to permit the planning of the operation to go forward.

A positive intelligence plan was necessary as a second step in the implementation of the security policy. Initially, this plan was designed to provide a constant flow of information to the Task Force Commander on such subjects as Russia's knowledge of the operation or the interest of satellite nations in the subject and the knowledge or interest of any other foreign power relative to the operation. Following the limited disclosures to the public in December, this plan was broadened by formal initiation of a collection request which, through the Intelligence Division of the Department of the Army, was transmitted to all appropriate governmental intelligence agencies. Semi-monthly summations of infor-

mation received from contributing intelligence agencies were provided the Task Force Commander by the Intelligence Division of the Department of the Army.

A comprehensive counter-intelligence plan was an essential step in the Task Force's security program. This plan was devised to include a continuing security control of personnel within the Task Force, and the establishment of rigid travel control within the operating areas, including Kwajalein, which was the gateway to the test area itself, Eniwetok. Security control of documents, photographs, and material and security control of information and communications were included in the counter-intelligence plan.

The implementation of the security plan was a function of all units and personnel, subject to staff direction by the J–2 Section. The various Task Groups were assigned specific security missions within their respective capabilities. Voluntary censorship was decided upon early in the operation and appropriate indoctrination measures were instituted to insure an appreciation on the part of individuals of the importance of their position in maintaining security.

Of primary concern in the security program was the physical security of AEA Restricted Data during all phases of the operation.

Preparation for the movement of fissionable materials, weapon components and related equipment from the Pacific Coast to the Marshall Islands were, of necessity, made in considerable detail. Accomplishment of the other elements of the physical security mission involved the establishment of control points at Washington, D. C., Long Beach, California, Fort Shafter, Oahu, T. H., Kwajalein, and Eniwetok. Security detachments were required aboard the four major ships of the Task Force. Thus, security protection was established at points extending over a distance of 7,000 miles.

As the scope of the physical security requirement became apparent, it was realized that a special operating unit was required. Carefully selected officers and men had been assembled to perform this mission and, as the realization for the need of a special unit grew, these personnel were organized into a Joint Security Group and designated Task Group 7.6. Lt. Col. Philip R. Cibotti was placed in command of this unit.

As materials and components of the weapons were moved aboard ship for the movement to the test area, "exclusion" and "restricted" areas were established where these items were stored. Marine guards were employed to enforce security in these areas.

Essentially, the responsibilities assigned to TG 7.5 after the Task Force moved forward were:

1. The protection of AEA "Restricted Data" ashore. This included the numerous installations of the proving ground and all other materials of a classified nature.
2. The conduct of periodic security surveys of the island.
3. Continuance of the "Q" clearance and "P" approval personnel security clearance program.
4. Conduct of air and water travel controls.
5. Continuance of the personnel security indoctrination program.

In the accomplishment of its mission, TG 7.5 placed guards on all zero islands and other sensitive islands, controlling both entry into and exit from these islands. All islands of the atoll, aside from Eniwetok Island, were subjected to weekly inspections or security sweeps.



The Scientific Director, Dr. Darol K. Froman; the Test Director, Captain James E. Russell, USN; and Colonel Thomas J. Sands, Assistant Chief of Staff, J-2, during an inspection of the travel control measures imposed by the Joint Task Force at Hickam Field, T. H.

Great care was exercised by the Task Force in the control of photography and photographs. Except for official photographers, no one was authorized to have in his possession photographic equipment of any kind west of Hawaii. Travel control points screened all arrivals and departures for such equipment, as well as screening for unauthorized documents. A strict accountability system was devised for photographs, photographic film and for documents. Only J-2 cleared personnel were authorized to serve as official couriers.

Early in the planning phase of Operation Sandstone, it had been agreed by the Joint Proof-Test Committee that a system of compartmentation would be placed in effect as test periods neared and the installations and equipment which would be placed on the Zero Islands just prior to test days would become more critical. This system of compartmentation was designed to exclude individuals from these sensitive installations unless their duties required that they be admitted.

Thus, as test days neared, the Zero Island concerned was declared a "restricted area," and certain installations on the island were declared "exclusion areas." Persons whose duties did not require their presence on the island were not permitted to land. Persons on the island who had no interests within the "exclusion area" were not permitted within those confines.

Control of "restricted" and "exclusion" areas was a function of TG 7.5 under the staff direction of J-2. Special guards were posted at these areas, such as zero towers and timing stations, to enforce the compartmentation plan and to insure security protection.

To facilitate this system, badges were issued to Task Force personnel in various gradations, based on the individual's probable need to enter restricted or exclusion areas. For instance, a green badge holder was entitled to access to restricted and exclusion areas if his duties required, in which case his name was placed on an entry list. A red badge holder was required to have a special permit, issued by J-2, in order to enter such areas.

While the Commander, Joint Task Force Seven, bore heavy responsibility for the security of the operation, it was not possible for him to ignore the obligation to make public such information concerning the operation as was possible.

In planning the operation, a basic principle had been established that no news media representatives would be permitted to observe the tests. In order to assure full coordination at the policy level regarding the release of information concerning Operation Sandstone, a procedure was established that required the concurrence of the State Department, the Secretary of Defense and the Atomic Energy Commission in the release of any public announcement. In all such cases, it was required that the Task Force Commander be consulted.

The public information policy devised by the Joint Task Force in coordination with the AEC contemplated the release of a minimum of public information, consonant with the security policy. In addition to the initial release of 1 December, two other releases were made during that month. Thereafter, it was considered neither necessary nor desirable to issue further statements, except in case of emergency, until the completion of the tests. This policy was adhered to throughout the operation and proved to be sound. It was well received by the press in general.

Thus far this section has dealt with the security measures devised by the Joint Task Force to implement the basic security policy initially stated by the AEC and agreed to by the Joint Chiefs of Staff.

It is not the purpose here to consider the details of the execution of the Task Force security. However, the execution of these measures, as previously stated, was a function of all echelons of the command. Naval, Air and ground security measures were exercised by the concerned Task Groups, 7.2, 7.3 and 7.4. These actions are considered to some extent in Section 11 of this report. More detailed discussions are to be found in the individual reports of these units which are contained in Part Two of Annex One to this report. An overall consideration of security and intelligence is presented in the report of the Assistant Chief of Staff, J–2, contained in Part One of Annex One to this report.

To summarize briefly the effectiveness of the security provisions devised and executed by the Task Force, the following can be stated:

1. There was no evidence of intrusions of foreign aircraft into the operational area during the course of the operation.

2. No verified reports were received at Joint Task Force Headquarters as to the presence of any foreign surface vessels within the danger area during the period of operations.

3. No evidence was developed during Operation Sandstone which indicated that any AEA Restricted Data or classified military information under Task Force control was obtained by a foreign power on unauthorized person.

4. The entire operation, from its inception to its completion, was free of any incidents of sabotage.

5. Submarine reconnaissance of the test area apparently was conducted by an unidentified foreign power. (Discussion of this effort is contained in Section 11 of this report). It is conceivably possible that submarine crew members or passengers may have been able to study the more prominent structures of the proving ground, such as Zero Towers, Timing Stations, and Photographic Towers. However, it is believed improbable that observations of this type were productive of any serviceable intelligence information which would be classified AEA Restricted Data.

SECTION 9

Synopsis

The logistical support of Operation Sandstone provided by Joint Task Force Seven is presented in this section. The procedures of supply, involving assistance from the armed services are considered together with a discussion of fiscal procedures.



An L-5 taken off from the flight deck of the USS Bairoko upon arrival at Eniwetok—a new experience for this Field Artillery Liaison pilot.

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SECTION 9

LOGISTICS—SUPPLY—FUNDING

The core of Operation Sandstone was logistical. Construction of the proving ground and the successful completion of the test of Atomic Weapons rested on a basic requirement: the assembly of supplies, material and personnel at the prescribed place at the appointed time. A reading of the foregoing portions of this report fully demonstrates that the thread of logistics was twined in practically every aspect and consideration of the operation.

Normal service supply agencies in the United States and in the theater were made responsible for mounting units, ships and individuals with initial supplies and equipment as requisitioned by the Joint Task Force, and approved in principle by the Department concerned.

The Atomic Energy Commission was responsible for procurement of technical supplies, equipment and materials not common to any service. It was provided, however, that the services could procure for the AEC. In such case reimbursement was made to the procuring service by the AEC.

Pacific Area agencies of the services that were called upon to support the Joint Task Force were Commander in Chief, Pacific Fleet; (including Naval Air Transport Service), U. S. Army, Pacific; 7th Air Force (later Pacific Air Command); and the Air Transport Command.

Responsibilities for resupply and support were placed on these agencies on the basis of what each was best able to provide. CINCPACFLT, for instance was responsible for the complete logistical support of Naval Units of the Task Force, afloat and ashore. In general, USARPAC was responsible for the logistic support of land based Army Units and for resupply of Army type items to Air Force Units. However, rations, POL and POL (Aviation), were a CINCPACFLT responsibility.

Resupply of Army type items from Oahu was practicable because of the presence of substantial amounts of such items in excess and surplus of both Army and Navy. In practice, requisitions were processed by Oahu Headquarters, Joint Task Force Seven, to USARPAC, or if unavailable at USARPAC, they were passed to the Navy Supply Center, Pearl Harbor. Army type items not available at either USARPAC or Pearl Harbor were passed to the Washington Headquarters, Joint Task Force Seven, for ZI procurement. The 7th Air Force (PacAirCom) was responsible for normal support service to aircraft and for furnishing assistance in the rehabilitation at Kwajalein for Task Group 7.4. The normal supply channel was through Task Group Commanders to the Supply agencies, however, requisitions for Army type items and requirements were submitted to J–4, Joint Task Force Seven, for approval and processing.

Variations in this procedure were common and various expedients were used to meet special deadlines. In general, however, the supply program was as stated. The bulk of materials and equipment for camp construction and rehabilitation was procured from available Army and Navy stocks or excess on Oahu. As in the case of resupply, items not

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T.C. 7.2 rehabilitating this quonset-type building for use as Gen. Ogden's headquarters at Eniwetok.

available on Oahu were requisitioned from the United States. Materials and equipment for technical construction for the proving ground were procured both in the United States and Oahu.

Procurement of supplies and equipment through Army sources in the United States was accomplished under an "Operational Project." The title AFS–1–OP was used to designate supplies for Kwajalein and BP–1–OP was used for those furnished Eniwetok. The "Operational Project" is a directive from the Logistics Division, Department of the Army, to a technical service requiring that supplies be laid down at the designated port at a specified time. The supply priority assigned by the Department of the Army to Operation Sandstone was 1–A–1. (The Department of the Army gave Operation Sandstone an overall priority second only to occupation.)

Due to the many aspects of the operation which involved logistical considerations, the J–4 Section of the Joint Task Force Staff was concerned in many projects. To illustrate, this section was involved in computing the troop basis requirements. This was due to the fact that construction was one of the major considerations in arriving at a troop basis.

The time schedule for the operation was also a J–4 matter. The planned schedule contemplated the movement of the initial construction force from Oahu to Eniwetok on 15 November; movement of the main construction force from the United States on 15 December; movement of the Air Forces from the United States on 15 February and movement of the major vessels of the Task Force on 25 February. Completion of the proving ground by 15 March was planned.

The above schedule was adhered to, essentially, although the major vessels did not move until about 1 March. The proving ground was substantially completed by mid-March.

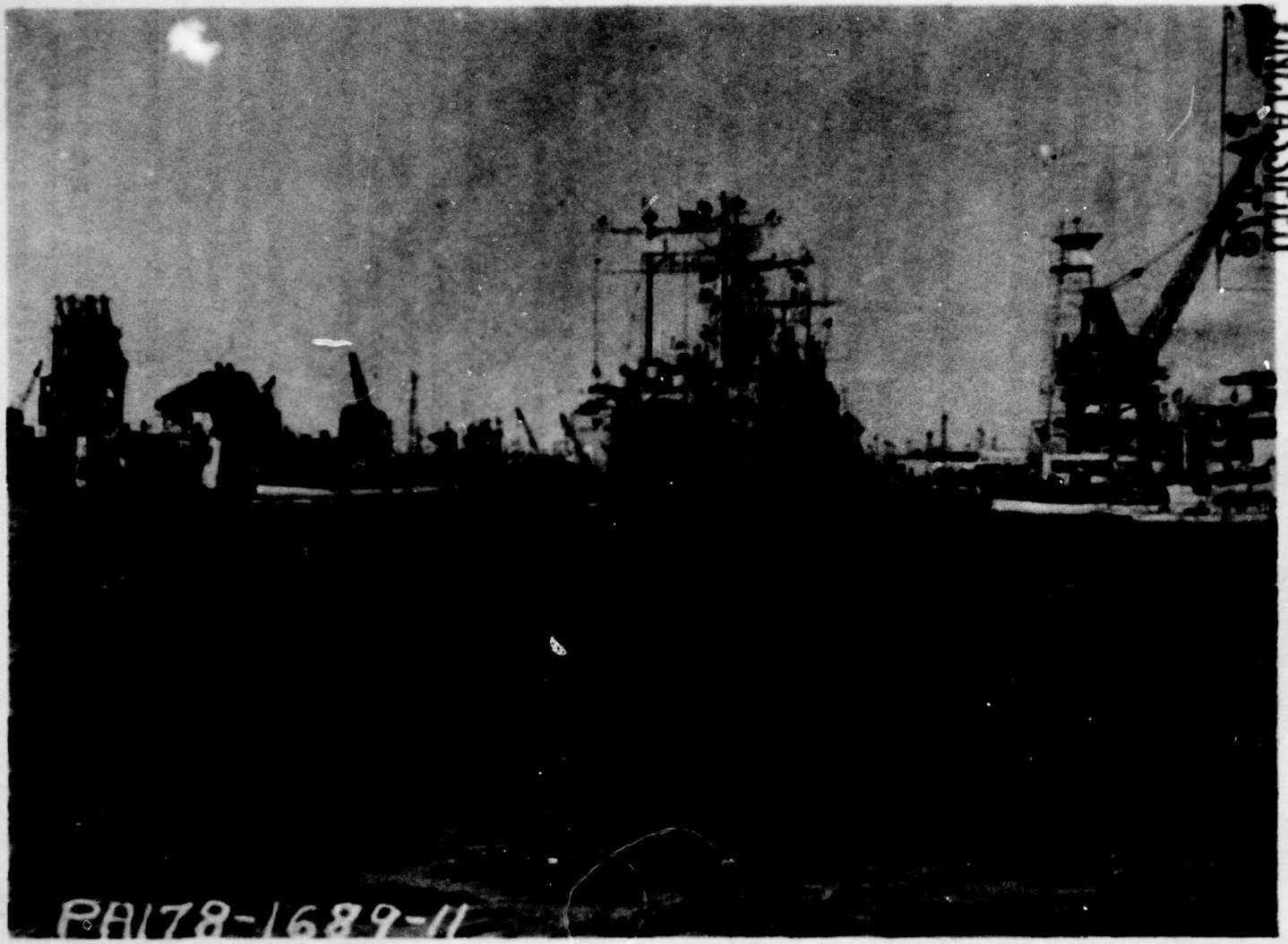
A total of approximately 55,000 measurement tons o equipment and supplies went into the operation. Of this amount, 30,000 measurement tons of equipment and supplies came from the States and 25,000 from Oahu.

Shipping agencies that supported the Joint Task Force in the United States were the Naval Supply Center at Oakland, the Naval Advance Base Depot, Port Hueneme, and the San Francisco and Seattle Ports of Embarkation. The Naval Supply Center at Oakland procured and shipped numerous hurry-up items on a last-minute call. From Oahu forward, shipping originated from the Naval Supply Center at Pearl Harbor. Able support was forthcoming from all of the above agencies at all times.

Although specific vessels were earmarked for Task Force shipping, the scheduled movements were not sufficient to handle all cargo. The Task Force Transportation Officer eased this situation by arranging space on vessels of opportunity. Vessels sailing from the Naval Supply Center at Oakland to Kwajalein during January and February helped alleviate the heavy shipping during that period. Space was also obtained by the Oahu Echelon on ships making scheduled sailings from there.

Late arrival of equipment at the port, arrival of shipments at the port without documents and without advance information, imposed an added burden on the shipping agencies. More detailed instructions from the Joint Task Force to the supply agencies probably would have prevented this situation. The difficulty also may partially be laid to the high security classification of the project.

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The logistical support of Operation Sandstone received ample aid from the Services. Here the Command ship moves out to sea.

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The Air Transport Command provided the bulk of airlift for the Task Force, augmented by the Naval Air Transport Service. Operation Sandstone placed a considerable burden on the Air Transport Command, both in numbers of personnel and tons of cargo air-shipped from the Unite dStates to the forward area. The Naval Air Transport Service from the United States was used to a great extent for shipments of special AEC material requiring expedited handling, although a considerable number of personnel were transported by this service. In both cases the Task Force was served in superior fashion.

Every effort was made to hold air shipments to the minimum. Requests for air transport were carefully screened and where possible these requests were diverted to surface shipping in order to ease the burden on the air transport services.

All requests for air movement, personnel or cargo, were processed through the Joint Task Force Headquarters. An exception to this procedure permitted the Los Alamos Scientific Laboratory of the AEC to move a limited amount of cargo by direct contact with the ATC at the Fairfield-Suisun, California, Port of Aerial Embarkation. This permitted urgent shipments of equipment to be made without loss of time.

Normally, priority numbers were assigned by the Task Force for air shipment. A daily status report was received from the Fairfield-Suisun ATC base listing the amount of personnel and cargo lifted together with a listing of the backlog. In this manner, the Task Force was enabled to check items moved and those delayed. Opportunity was thus afforded to expedite movement of items delayed, either in reaching the air terminal or after their arrival at the terminal.

A special Task Force shipping Channel was established by the ATC, designated 19X. The priority suffix "CPX" was assigned this channel. NATS provided no special channel but high priority was given Task Force shipments.

Estimates were submitted to the Air Force for tonnage requiring air lift by the ATC from 30 to 60 days prior to the month in which the lift would be generated. A portion of the allocation was reassigned to the Task Force Forward Headquarters at Oahu to cover shipments from that point forward. Experience developed that a schedule of 5 round trip flights per week from the ZI to Kwajalein would meet the Task Force requirements. Since a C–54 type aircraft has a normal payload of approximately 7,500 pounds from San Francisco to Oahu and 12,000 from Oahu forward, the increased payload from Oahu forward normally was sufficient to handle Oahu generated traffic.

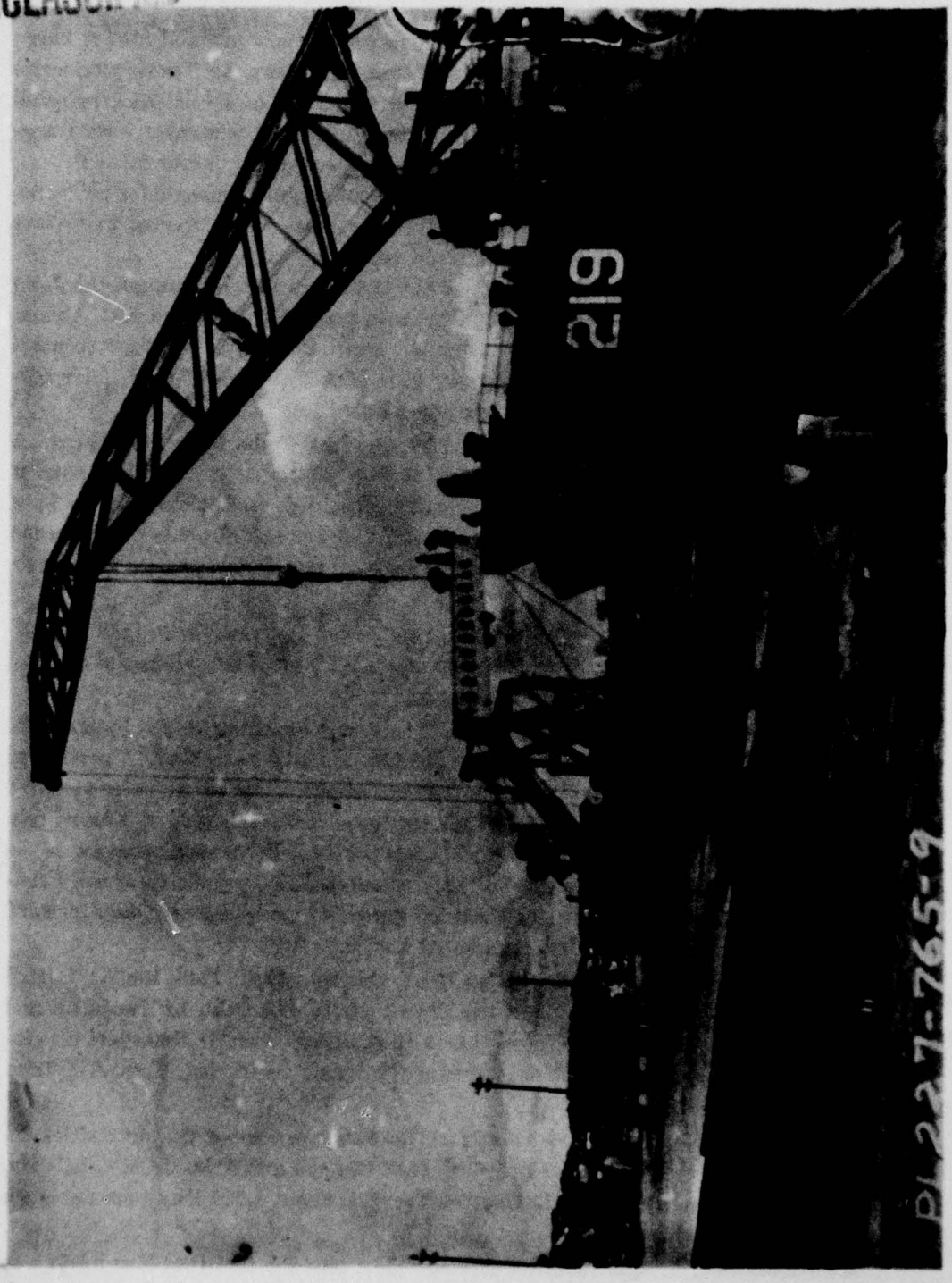
During the six-month period, November, 1947, through April, 1948, the ATC lifted 4,151 persons and 530 tons of cargo from the United States and Oahu to Kwajalein and Kwajalein to Eniwetok and from the forward area back. The Naval Air Transport Service moved 83 tons of cargo and personnel in excess of 100 during this period. Total ATC trips during this period numbered 360.

Discharge of cargo from surface vessels at Eniwetok presented the difficulties inherent in any unloading project where no dock facilities are available. LCM's, LCVP's, LCT's and DUKW's were employed. During peak periods about 1,500 long tons per week were handled at Eniwetok.

At Kwajalein some docking facilities existed. This, plus the fact that Kwajalein was an established port, eased the discharge problem there. About 1,000 long tons per week were handled there during peak periods.

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Loading the LST 219 at Pearl Harbor

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Task Group 7.3, the Naval Task Group, shared to a considerable degree in the shipping effort. Operational control of surface craft was placed in this unit. Local services were provided at the test site, such as the small boat pool and provision of a water tender and others. Local travel at Eniwetok was augmented by the use of liaison-type aircraft.

Allied with Operation Sandstone was the Air Force Special program, known by the code name "FITZWILLIAM." This program was not a part of Sandstone, but certain logistical support was provided by Joint Task Force Seven. Only in this respect is this report concerned with "FITZWILLIAM."

In January 1948, request was made that the Task Force make available to the special program out of its funds, $1,500,000. However, General Hull felt that the estimates for Operation Sandstone were not sufficiently firm at that time to make such a commitment. As a result, the AEC made the sum available. As it developed, the Task Force was able to turn back to the AEC more than enough to cover the funds made available to "FITZWILLIAM."

General Hull agreed that the Task Force would give all possible aid to the Air Force special program, short of interference with its assigned mission. This assistance included logistical support for a number of small detachments, the exercise of operational control over five naval vessels made available by the Navy, transport of a limited amount of equipment and supplies, and the provision of certain construction at Eniwetok. In addition, special communications facilities were provided by the Task Force.

As in all operations involving long-distance water and air shipping, the problems of logistical support for Operation Sandstone were continually harrassing. Unorthodox solutions were arrived at. The plan did not always fit the situation. The fact that the proving ground was constructed, and on time, however, attests to the adequacy of the support.

The total estimated cost of the operation in the beginning was placed at $27,500,000. Of this amount, $20,000,000 was estimated to be the cost of the participation of the military services, over and above normal operating expenses. The remaining $7,500,000 was estimated to be the requirement of the AEC to cover procurement of equipment and to provide for personal services, transportation, etc., directly contracted for by the AEC.

The AEC provided the funds required in accordance with the fiscal agreement reached with the Departments of the National Military establishment. This agreement provided that the funds would be transferred to the Navy Department which in turn would make cash transfers to the other services.

In general, required items not common to the Armed Services were chargeable to AEC funds. Unit equipment supplied for and manned by military personnel, which was used for the main purpose, benefit and operation of the Task Force, was not charged unless it required replacement for immediate use elsewhere by the supplying source, Army, Navy or Air Force. Equipment furnished by the services which was used by service personnel and returned upon completion of the operation, with fair wear and tear incident to use, was not charged to AEC funds. Purchases made to provide necessary equipment were chargeable to the AEC and reimbursement was made for damaged or destroyed equipment furnished by the services. Normal operating expenses, such as subsistence, clothing, pay and allowances, including overseas differential, and the operation of ships and aircraft were borne by the respective Armed Services. Materials for base construction, maintenance

and operation were charged against AEC funds. Construction materials and installations for the proving ground were paid for by the AEC. The estimated cost of the participation of the military services proved to be more than ample. As the operation grew to a close, a recapitulation showed that this expense for the Fiscal Year 1948 was approximately $10,000,000. (Army $2,740,000; Navy $5,180,000; Air Forces $2,160,000). Accordingly, $8,000,000 was returned to the AEC by 1 May 1947 and an additional $2,000,000 was marked for later return. With the return of this sum, it was requested that $4,000,000 be made available to the Task Force during the Fiscal Year 1949. This latter sum was required to close out the operation and to place the proving ground in a standby condition.

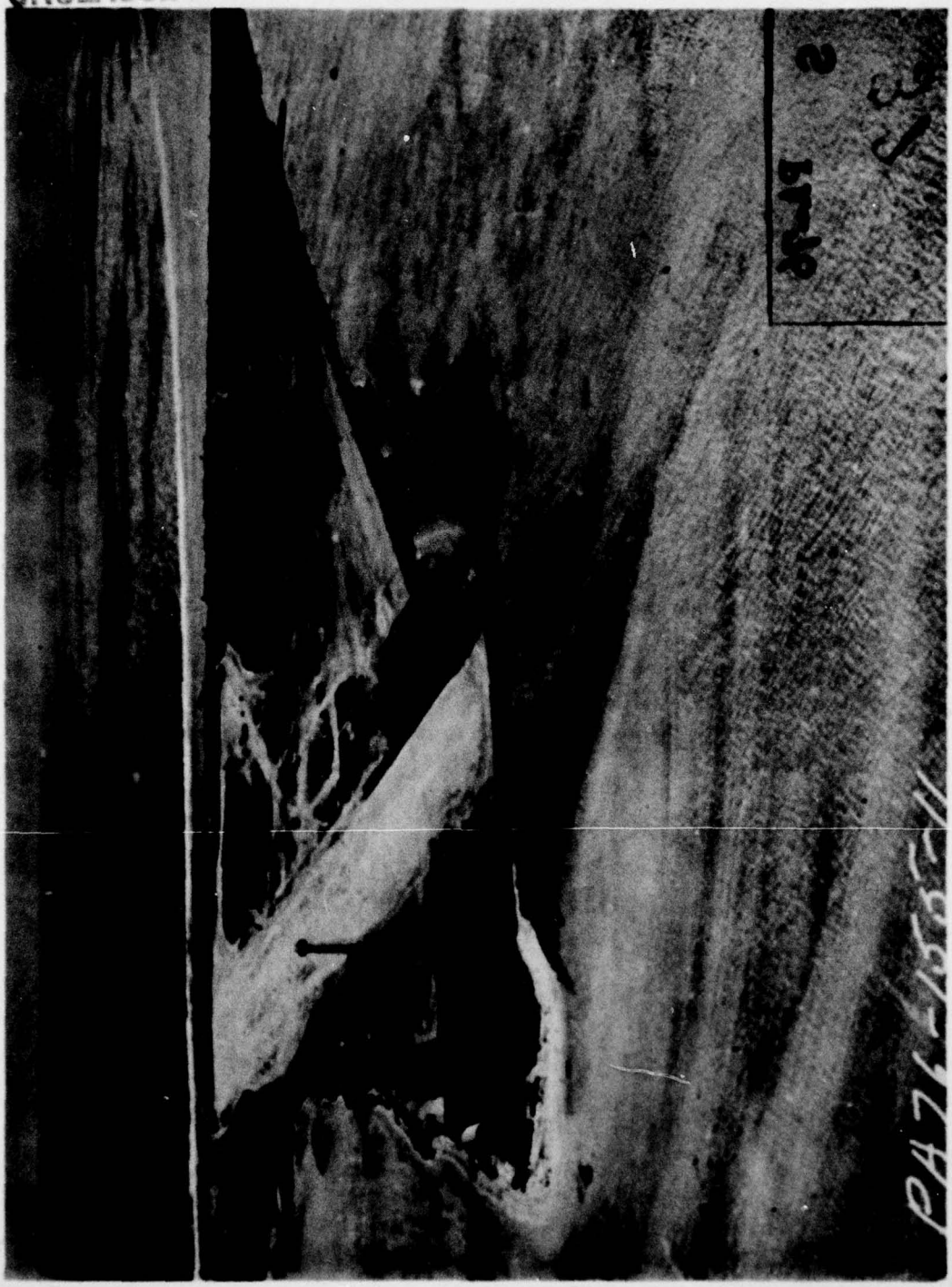
To sum up: The logistical support required of Joint Task Force Seven included the maintenance of approximately 9,800 men; construction and rehabilitation for housing and caring for the land based components of the force; the movement of personnel, supplies, equipment and material to support the force and for construction needs, both for housing and for the proving ground (55,000 M/T) and for maintenance of operations. Support was also provided for the "FITZWILLIAM" program. Oahu, some 2,500 miles distant was the nearest base of supply. The larger portion of shipping came from the West Coast of the Mainland, some 4,500 miles from Eniwetok. On no occasion did the logistical effort of the Joint Task Force fail to provide the support necessary to the execution of Operation Sandstone, either as planned or scheduled.

SECTION 10

Synopsis

This section presents the details of the planning and designing of the proving ground and the construction thereof. It includes discussion of the coordinated effort of military and civilian technical and scientific personnel of the Joint Task Force necessary to the successful completion of this part of the Task Force's assigned mission. Discussion of communications that were necessary to the operation of the proving ground is also contained in this section.

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Aerial view of Engebi Island, site of the first Test.

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SECTION 10

CONSTRUCTION OF THE PROVING GROUND

Construction of the atomic proving ground at Eniwetok Atoll with the attendant problems of procurement of personnel, materials and supply and their delivery to the test site occupied a major proportion of the Joint Task Force's attention from the outset. In the main, the Task Force's effort was directed toward this objective—the first part of its assigned dual mission. During the early formative conferences between General Hull and the Atomic Energy Commission representatives, April 15 had been set as the target date for the first test. Consequently, a rigid deadline was imposed on the construction job.

The Engineer Section of the Staff of Joint Task Force Seven was organized for the express purpose of directing and co-ordinating the construction of the proving ground in conjunction with the AEC's scientific and engineering representatives.[18]

Colonel David H. Tulley, USA, reported to General Hull as the Staff Engineer on 3 October 1947. After an initial briefing on that day, Colonel Tulley set about organizing the section and the procurement of personnel. Lt. Col. Wilber A. Stevens, USA, who had pioneered with the Manhattan Engineer District, joined the Task Force on the same day as Colonel Tulley. On 7 October, Lt. Col. Arthur H. Frye joined. Around this nucleus the Engineer Section was built. By the end of October a working staff was assembled.

It is not the purpose of this report to discuss the technical and scientific aspects of the tests. However, it is pertinent to touch upon the part played by Task Group 7.1 in the construction of the proving ground.

Task Group 7.1 was the Task Force organization of the AEC's scientific and technical personnel. The principal role played by the scientific group in the construction phase of Operation Sandstone was to present to the Staff Engineer complete technical requirements for the proving ground. These technical requirements consisted of requirements for preparation of terrain and normal field engineering projects such as docks, roads and prepared beaches and also the construction of specially engineered structures such as towers, blast footings, blast shelters and gamma stations. The design engineering of the special facilities such as gamma stations, timing stations and blast shelters was the responsibility of the Los Alamos Laboratory, and was performed by the Jackson and Moreland Company of Cambridge, Mass., under a subcontract to Edgerton, Germeshausen and Grier, one of the principal contractors to the AEC for certain installations and experiments for Operation Sandstone. Design drawings were reviewed by the Scientific Director's staff before submission to the Staff Engineer as a requirement for construction.

Limitations of island real estate and the tropical climate resulted in many problems which could only be solved after discussions between the Scientific Director and the Staff Engineer. To facilitate co-ordination at both the staff level and the field level either Dr. Froman or one of his immediate assistants, Dr. A. C. Graves or Mr. R. W. Henderson, was present in Washinton from the initiation of planning until the date of sailing of the scientific group. Dr. J. C. Clark represented the scientific group in the field. Through these contacts it was possible to make available Los Alamos specialists and consulting engineers to assist the Staff Engineer in the solution of many construction problems. An example was

[18] Sec. XVI of Annex 1 to this report contains the detailed Engineer report.

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One of the 200-foot firing towers, pictured shortly after its erection. The coax cable has not yet been run in to this tower.

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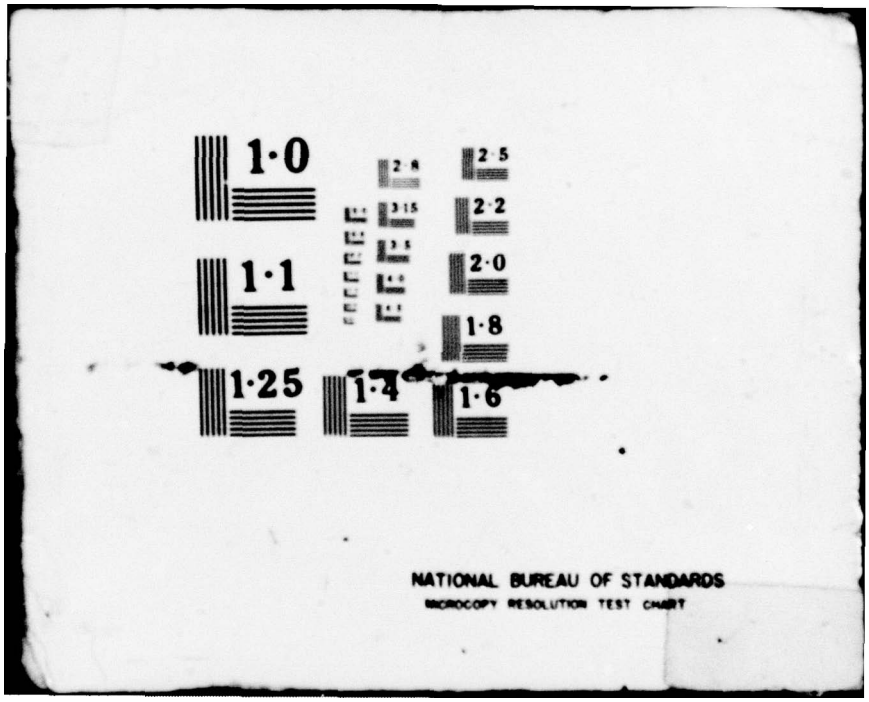
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Dr. R. W. Carlson, an expert on special concrete mixes, who was made available to supervise the special limonite mix, used in the gamma stations.

These continuous contacts not only expedited construction but also facilitated introducing many changes in details which developed as individual scientific groups progressed with plans for the instrumentation which was to be installed in these special facilities.

Preparation of layout plans and detailed designs for test construction was the responsibility of AEC engineers. Corollary tests were conducted for the Armed Services, plans and designs for which were prepared by the respective participating Services. Plans for construction and rehabilitation of housing and utilities were the responsibility of the Joint Task Force, as was the construction of drone airplane facilities.

Procurement responsibility for test construction materials was divided, by agreement, between the Task Force and the using services. In general, all common construction materials were procured by the Joint Task Force, using normal service channels and facilities of the Western Ocean Division of the Corps of Engineers, U. S. Army.

By agreement with the AEC, the Corps of Engineers, the Medical Department, and the Chemical Corps, USA, the Bureau of Medicine and Surgery, the Bureau of Ships, the Bureau of Yards and Docks, and the Bureau of Aeronautics, USN, the AFSWP, and the Coast and Geodetic Survey participated. Details of their participation were worked out in consultation with the AEC and incorporated into test construction plans.

Early planning for the laying of communications and electronics cable was charged to the Staff Communications Officer, Commander Christian L. Engleman. Operational responsibility for laying submarine cable necessary to instrumentation of the proving ground was vested in the Commander of the Naval Task Group, TG 7.3. This involved the laying of 914,050 feet of submarine cable. Some ground cable was laid as well, and assistance was given AEC technicians in tying in their instruments.

The over-all plan of the proving ground required the preparation of three test-firing sites involving the erection of one 200-foot tower on each site plus prescribed instrumentation and housing for the instruments. Photographic towers had to be erected in positions which permitted the placement of cameras to photograph each of the tests. A control station where firing instruments were located and housing and certain recording instruments were located had to be constructed.

The three test-firing sites determined upon were the islands of Engebi, Aomon-Biijiri-Rojoa, and Runit. Parry island was designated as the location for the control station. Photographic towers (75-foot) were located on the islands of Aomon, Runit, and Aniyaanii. These were located to permit the photographing of each shot in succession from the next succeeding tower in the order of the islands named above. Thus, from the tower on Aomon the shot on Engebi was photographed, and so on. In addition, a photographic tower was located on a coral shoal in the north-central part of the lagoon, located so as to permit photographing all three tests.

In the case of the Aomon test-firing site, the single island, Aomon, did not have the requisite operating area. The island of Biijiri was adjacent to Aomon, separated by a 700-foot channel. In order to extend the operating area, a 30-foot-wide causeway had to be constructed to connect the two islands. Across this causeway the drone-controlled ground sample recovery tank was directed from Biijiri to the explosion area on Aomon just after the firing of test number two.

The Coral head photographic tower, located in the north central part of the lagoon, nearing completion.

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As an integral part of the proving ground, aside from considerations of housing, utilities, etc., facilities for drone plane operations were constructed on Eniwetok island. These facilities involved construction of a radiological-chemistry laboratory for the handling and dispatching of air radiological samples, drone plane arrester gear, drone control installations and a parking area for the contaminated drone planes. Also, on Eniwetok, a reinforced vault for temporary storage of bomb parts was constructed and an air-conditioned film storage space was provided.

In general, these were the tasks that developed and confronted Joint Task Force Seven as the planning stage of Operation Sandstone progressed through October and November 1947, passing into the operating stage in the latter part of November.

In the beginning, during the period of preparation for construction, the job broke down into four segments of development, the burden of which was upon the Engineer Section and J–4. One group of Engineers worked closely with the AEC Engineers and participating Services in developing test construction designs and accompanying bills of material. A second group concerned itself with construction and materials estimates for housing and utilities and the formation of construction and equipment lists. A third group developed and, through J–4, put into operation the Engineer procurement plan. The mapping and survey requirements of the operation were developed and the organization of the field forces which would perform the construction of the proving ground was devised by still another group. Operational planning and the equipping of the field construction force occupied the attention of the Task Force Engineer.

By 7 October, 11 days prior to the actual activation of Joint Task Force Seven, decision had been reached by General Hull to contract for the erection of all towers and to perform the balance of the work with soldier labor, pending examination of the test site.

The Western Ocean Division of the Corps of Engineers completed an agreement with the contractors, Morrison Knudsen-Peter Kiewit Sons, Inc., for tower construction on 13 October. By 14 October, the Task Force commander had completed arrangements to use the 18th Engineer Construction Company and the 2nd Engineer Special Brigade as construction troops.

One bit of foresight at this time later paid off in substantial savings in time. The AEC had previously purchased the three 200-foot towers and had them in storage at Sandia, N. M. These towers had been especially designed for the proving ground and had no record of previous erection. Test erection of one of the towers was made at Sandia, resulting in a familiarity with the component parts that greatly helped in the construction at the test site.

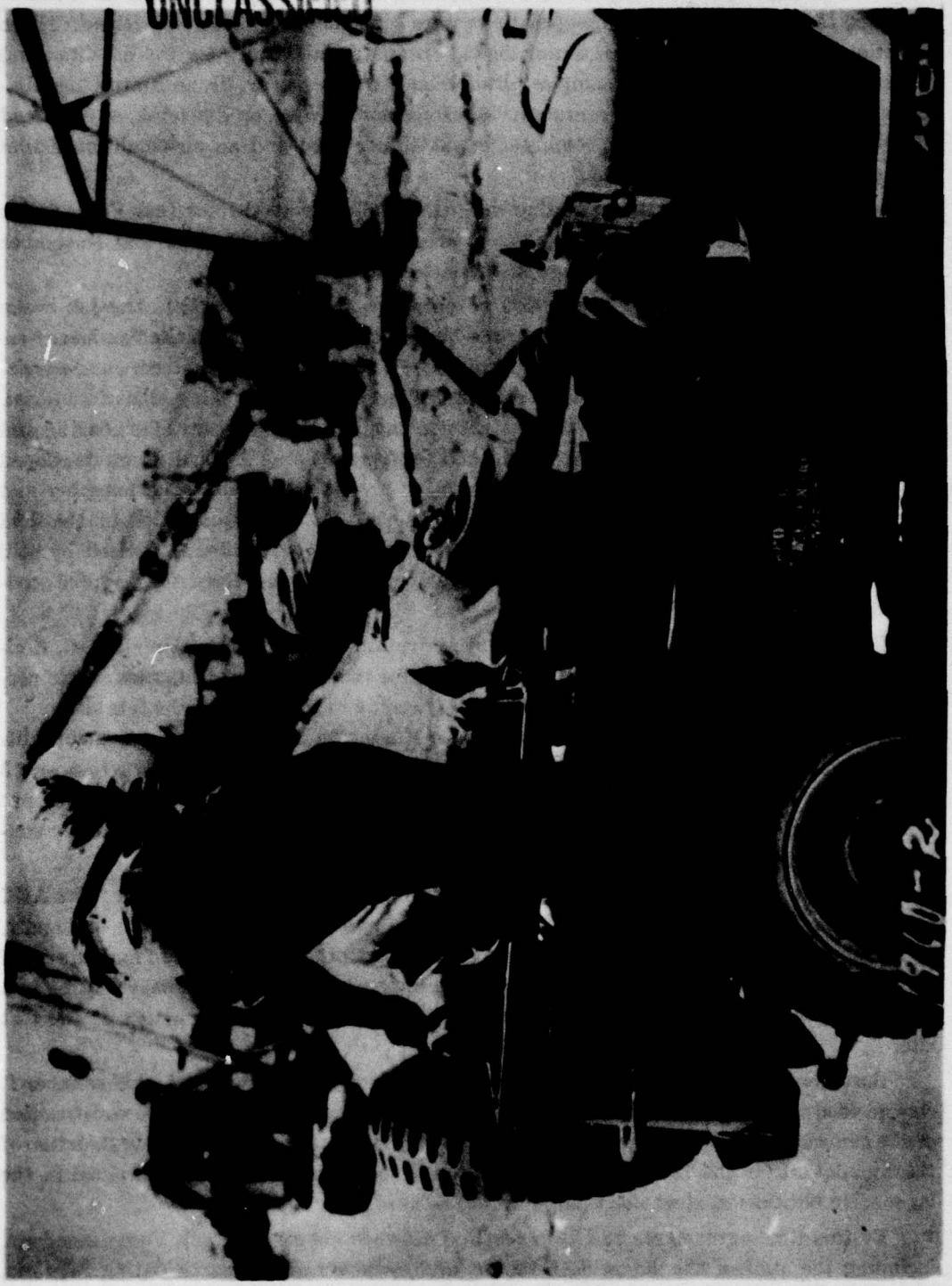
Based on a reconnaissance of the forward area during the latter part of November it was decided to contract with the Hawaiian Dredging Company, Ltd., for the construction of the connecting causeway between Aomon and Biijiri islands as well as for construction of the foundation for the 75-foot photographic tower to be placed on the coral shoal in the lagoon. In both cases, steel sheet piling was to be used.

By this time agreements had been reached between concerned Task Force members, including the staff of the Scientific Director, and members of the participating Services, which laid the basis of co-ordination for all future work and for the control of all subsequent construction operations. From these agreements was evolved the test construction

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Brig. Gen. David A. D. Ogden, CTG 7.2, inspects the progress of construction at one of the Zero Islands.

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directive by the adoption of a plan to incorporate in a series of general layout maps, cross referenced to detailed drawings, all test construction requirements.

On 1 December 1947, Colonel Tulley arrived at Eniwetok to begin construction of technical facilities required for the proving ground. He was accompanied by Lt. Col. Daniel Kennedy who, with selected members of the Coast and Geodetic Survey on loan to Joint Task Force Seven, set about the accomplishment of a first order triangulation net to cover the test construction.

The initial construction force, the 1220th Provisional Engineer Battalion, had arrived at Eniwetok from Hawaii on 28 November and was in the process of unloading supplies and equipment and had started rehabilitation of island facilities.

During December construction and survey crews were based on the LST 45. When New Year's Day arrived, tower foundations on Engebi, Aomon, Runit, and Aniyaanii were completed and survey operations were well along. The first increment of the 2nd Engineer Special Brigade had arrived from the ZI and General Ogden had assumed command of the atoll. The 18th Company of Engineers had commenced preliminary construction on Engebi.

Initial plans called for the housing of about 1,600 officers and men on Eniwetok, with establishments on Engebi, Aomon, Runit, and Parry for 200, 200, 200, and 100 personnel, respectively. As the job progressed this over-all figure of 2,300 was reduced to about 2,100. Construction and rehabilitation of housing and facilities was carried out under the direction of General Ogden, as distinct from the construction duties of the Task Force Staff Engineer at the test sites.

Troop construction forces for the proving ground consisted of an Engineer Construction Battalion, made up of four provisional companies plus a maintenance company and a battalion staff. A company was located on each of the test-firing islands and the fourth on Eniwetok. Resident engineers, representatives of the Task Force Engineer, were placed on the construction sites and working arrangements were developed by them in co-ordination with respective troop commanders.

Dr. John C. Clark, senior AEC representative, accompanied Colonel Tulley to the proving ground site to make on-the-spot decisions for the AEC. This arrangement continued throughout the construction period to be the point of contact between the Joint Task Force Engineer and the AEC in the field.

Three technical consultants to Dr. Clark were present during the period of construction, Dr. R. W. Carlson, Mr. C. Hedberg, and Mr. L. Jercinovic.

Col. Lynn C. Barnes, USA, served as project officer for the erection of steel towers.

Construction and installations of the proving ground at the three test-firing sites were substantially the same. Each site provided a 200-foot firing tower placed so that the necessary area and distance for the placement of instruments were available. Each island, save Engebi, had a 75-foot photographic tower. Generators had to be installed at each firing tower, at each timing station, at the control station, and at each photo tower. On Engebi two gamma stations were constructed and on the other two islands three such stations housed the scientific instruments to measure gamma ray intensity.

Gamma stations were limonite concrete structures. This unusual type of concrete was a mixture of standard cement plus limonite and metal. The finished structure had a rust colored appearance.



A member of the 18th Company of Engineers assists the scientific group in laying the coax cable.

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Each test site included construction of concrete timing stations, in which lead brick coffins housing certain of the scientific instruments were built. At these stations generators and air-conditioners were installed. Footings for the installation of blast-measuring instruments and structures for housing recording instruments were included at each site.

A tank revetment was built on each test site to house the ground sample recovery tank during the blast. The test structures of the Corps of Engineers and the Bureau of Yards and Docks were located so as not to interfere with the AEC's instrumentation structures.

Laying of ground cable to the various instrumentation installations was performed in part by the scientific groups and partly by the Naval Task Unit 7.3.6, commanded by Lt. Commander Harry E. Rowand, USCG. Ditching for this cable was a part of the construction work.

Cable laying by Task Unit 7.3.6 was commenced on 5 January 1948. The last submarine cable was laid on 9 March and underground connections were completed by 17 March. The Task Unit assisted personnel of the Scientific Task Group (TG 7.1) in laying and splicing type RG–18U coaxial cable on the three test-firing islands.[19]

The cable system was extensive, tying in all test-firing stations and instruments of the proving ground with the control station on Parry island. Photographic towers were tied into the system. This permitted cameras in the towers to be actuated by an electrical impulse just before detonation time and record the blast phenomena.

The nature of the soil at the test site was such that it was feared that the bomb blast would create such dust clouds as to blank out some of the test instruments and prevent the recording of necessary data.

To obviate this possibility, sand blankets were laid along the vista from the firing tower to the gamma stations. Cement soil stabilization was also used as a means of dust control, as was surface oiling and paving.

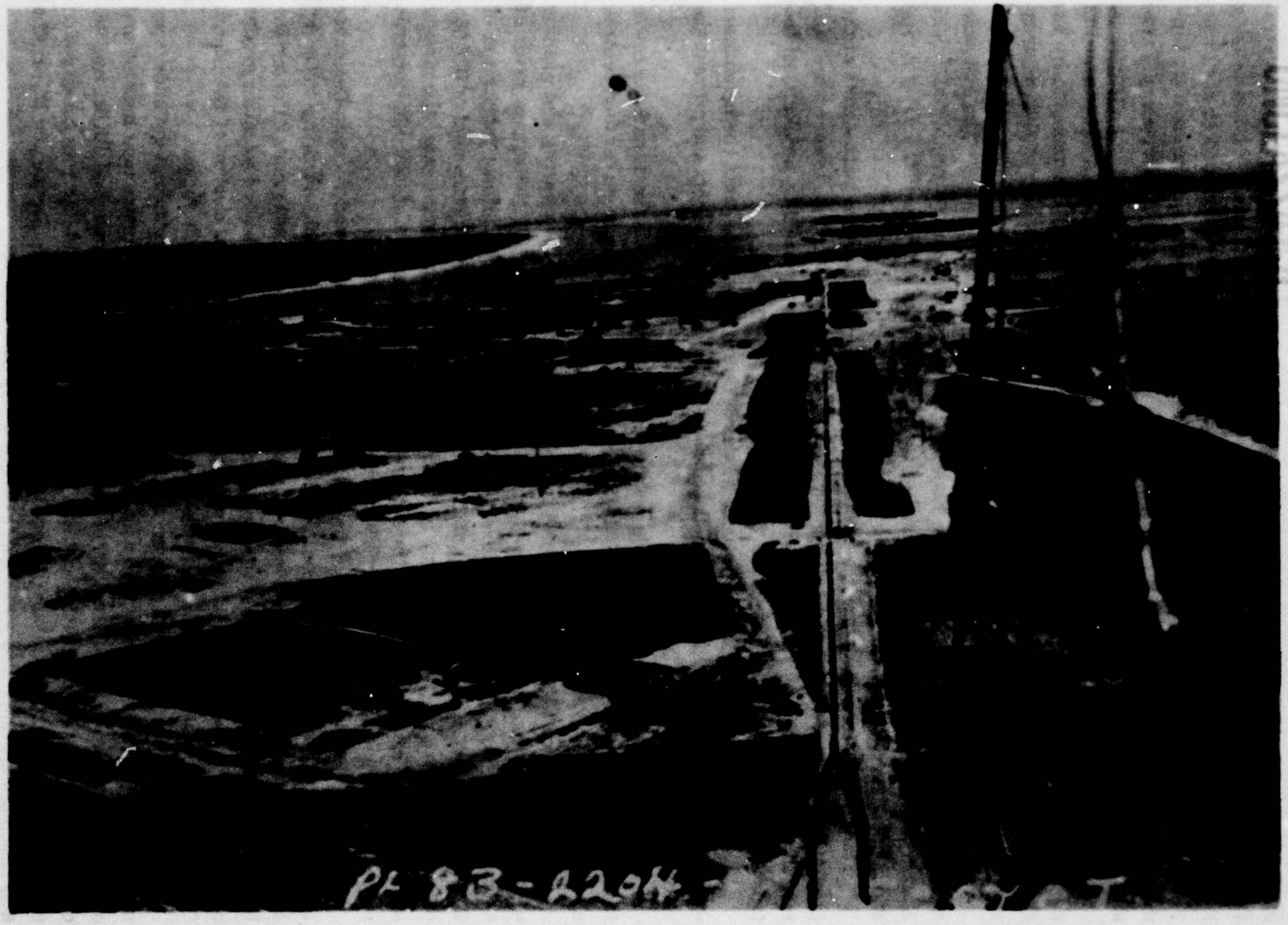
The over-all construction performed by troop labor included the clearing and grading of 221 acres; laying of 16,605 square yards of bituminous paving; 89,190 square yards of surface oiling; laying of 30,000 square yards of cement soil stabilization; fabrication of 27,566 square feet of forms; pouring of 2,534 cubic yards of concrete; placement of 222,655 pounds of reinforcing steel; quarrying of 1,069 cubic yards of coral aggregate; the placing of 156 three- to six-ton test cubes; the construction and stabilization of seven liaison-type plane landing strips; and backfilling 7,643 cubic yarsd of earth.

On Engebi, which was the site of the first test, construction got under way in December 1947 and by 14 March was 98 per cent complete. Erection of the 200-foot firing tower by Morrison-Knudsen-Peter Kiewit Sons, Inc., required a total time of nine days. During the latter part of March and the first week of April, Engineer troops assisted scientific groups of TG 7.1 in the installation of technical equipment and completed cleanup of the island. On 6 April 1948, Engebi island was turned over to the scientists ready for use.

Due to the presence of 142 natives on Aomon, construction there did not get under way until the latter part of December. In addition to the construction of instrument housing and other installations, the construction of the causeway linking Aomon and Biijiri was required. This job was done by the Hawaiian Dredging Company, Ltd., as was construction of the foundation for the lagoon photographic tower. In addition to Aomon and Biijiri, the neighboring island of Rojoa was used for certain test installations.

[19] Details contained in Sec. VII, Annex 1.

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Engebi Island, the number one Zero Island, viewed from the top of the Zero tower. The special coax cable catenary, visible at the lower right, extended from the top of the tower. This cable extended along the ditch seen in the right center and was used to connect the various measuring instruments used in the experiments of the first test.

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The task of carrying on construction on three islands, although they were separated by but narrow channels, served to complicate construction. The use of DUKW's to negotiate these channels was a saving factor. Despite the delay in starting construction at this site, completion time was on schedule. The island was turned over to the scientists by mid-April.

Construction on Runit, the site of the third test, was less complicated than that of the Aomon site. Runit is a narrow island two miles in lenth, presenting some 50 acres of clearance of trees and brush as against 135 acres at Aomon-Biijiri. By 3 April, Runit was completed.

Construction on the island of Aniyaanii, exclusive of erection of the photographic tower, was accomplished by the Runit crew. This entailed erection of a generator housing and seismograph housing, the installation of two generators and the laying of pierced plank to complete the light aircraft landing strip.

On Parry an air-conditioned control station was constructed. An existing tower was converted to permit installation of telemetering equipment, which recorded data from the three explosions. Two seismograph stations also were installed. This work was completed in sufficient time to meet the scientific requirements for the first test.

INSTALLATION OF COMMUNICATIONS

It may be said that the electronics equipment and scientific measuring instruments were the nerve center of the proving ground. The communications system served to coordinate the test operations. This system was installed by the Communications and Electronics Section of Joint Task Force Seven, to the specifications of Task Group 7.1.[20]

The first task in the implementation of the Communications and Electronics plan was dealt with earlier in this section, the laying of submarine cable. It is worthwhile to note, however, that the paucity of experienced personnel available for this job fostered early consideration of contracting with some commercial company. Security considerations excluded this solution.

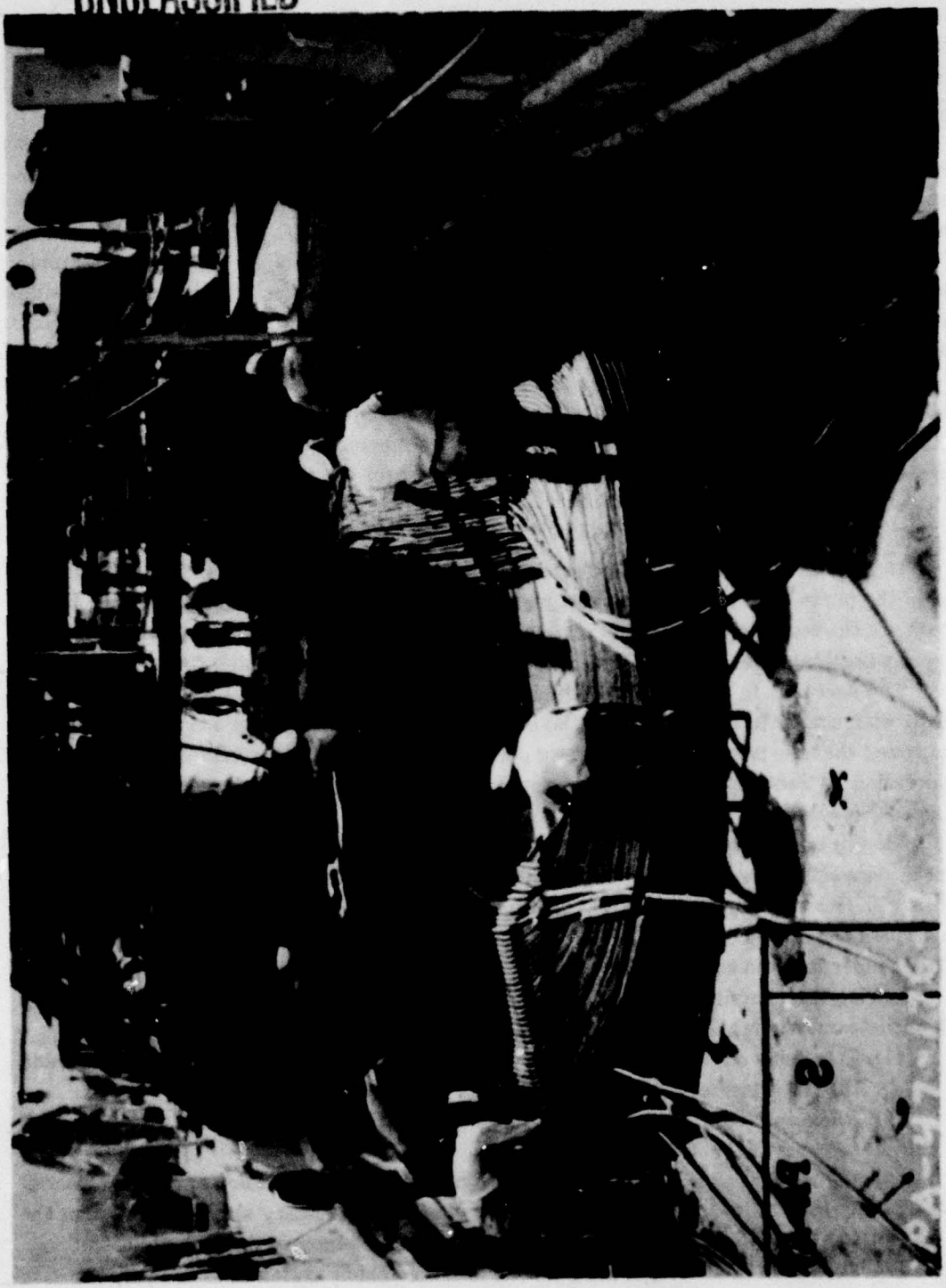
Examination developed that among the uniformed services, only the Coast Guard offered personnel experienced to do the operation. Accordingly, the services of Lt. Cmdr. Harry E. Rowand were requested and secured, along with enlisted technicians. Upon formation of the cable-laying unit, Task Unit 7.3.6 of Admiral Denebrink's Naval Task Group, Commander Rowand assumed command.

During the planning stages of communications it was determined that the following facilities would be required for the test firing phase of the operation:

(1) Telephone circuits (radio and wire) between the various shore installations and the three primary ships;
(2) Radio intercom facilities between the offices of the scientific group and main staff sections of the Joint Task Force;
(3) Radio teletype and coding systems to provide for transmission of Atomic Energy (AEA) "Restricted Data" messages between the primary ships and between the ships and the Atomic Energy Commission installations in the United States;
(4) Technical radio nets to back up the radio telephone system.

At this time, AN/TRC–1 radio telephone equipment was to be used in the primary com-

[20] Sec. IX of Annex contains the detailed Communications report.



Members of Task Unit 7.3.6 laying submarine cable in Eniwetok Lagoon from an LSM.

munication network between principal points ashore and SCR–608 (10-channel voice) radio sets for voice communications between ships, and between ships and shore. Navy MBF radio sets were to be installed in the cabins of the test and scientific directors and the key command and staff officers of the Joint Task Force to provide an intercommunication system for exclusive use.

On 28 October 1947, first consideration was given to the possibility of installing AN/TRC–1 equipment on the main ships to provide VHF radio telephone and teletype service between the ships and between the ships and the Army Shore system. This installation would permit an individual at any ship's service telephone to call his ship's switchboard and be connected to any ship's service telephone on the other ships or to any telephone at the main shore locations. The need for such a flexible radio telephone system interconnecting the U.S.S. Albemarle (AV–5), U.S.S. Curtiss (AV–4), U.S.S. Mt. McKinley (AGC–7), Eniwetok Island, Control Island (Parry), and the three Zero Islands (Engebi, Aomon/Biijiri/Rojoa and Runit) was discussed with all the principal key personnel concerned. It was agreed that these radio telephone circuits would be a highly desirable feature in the communications system.

The radio telephone plan that was finally evolved included the following circuits: AGC–7 and AV–5, 2 channels; AGC– and AV–4, 1 channel; AV–4 and AV–5, 2 channels; AGC–7 and Eniwetok, 7 channels; Eniwetok and Engebi, 8 channels; Eniwetok and Aomon, 4 channels; Eniwetok and Runit, 4 channels; Eniwetok and Parry, 8 channels.

All the equipment for this system was to operate within a radius of approximately ten (10) miles and considerable time was devoted by the Communications Section to the selection of the fifty-two (52) frequencies required in the band of 70–100 megacycles.

Final requirements for a land-line telephone system were laid down at a conference held on 16 December 1947. These requirements were plotted on maps of the planned island installations and included:

a. Eniwetok
   (1) Radio Chemistry;
   (2) Security;
   (3) Others.

b. Parry
   (1) Control Station (3);
   (2) Telemetering Tower (LAJ–8 installation);
   (3) Beach;
   (4) Cable Terminal;
   (5) Communications Building and Guard.

c. Each Zero Island
   (1) Top of Tower (2);
   (2) Tower Base;
   (3) Timing Station (4);
   (4) 400-ft. Station;
   (5) 1000-ft. Station;
   (6) Gamma "A";
   (7) Gamma "B";
   (8) Gamma "C" (Runit only);



Sealing the joints of the coax cable (Type RG-18U) to tie in measuring instruments with the firing tower.

(9) Beach;
(10) Communications Building;
(11) Photo Tower (Aomon and Runit)
(12) Causeway on Aomon/Bijiri;
(13) Blast Building (2);
(14) Blast Footings;
(15) Blast Footing Common.

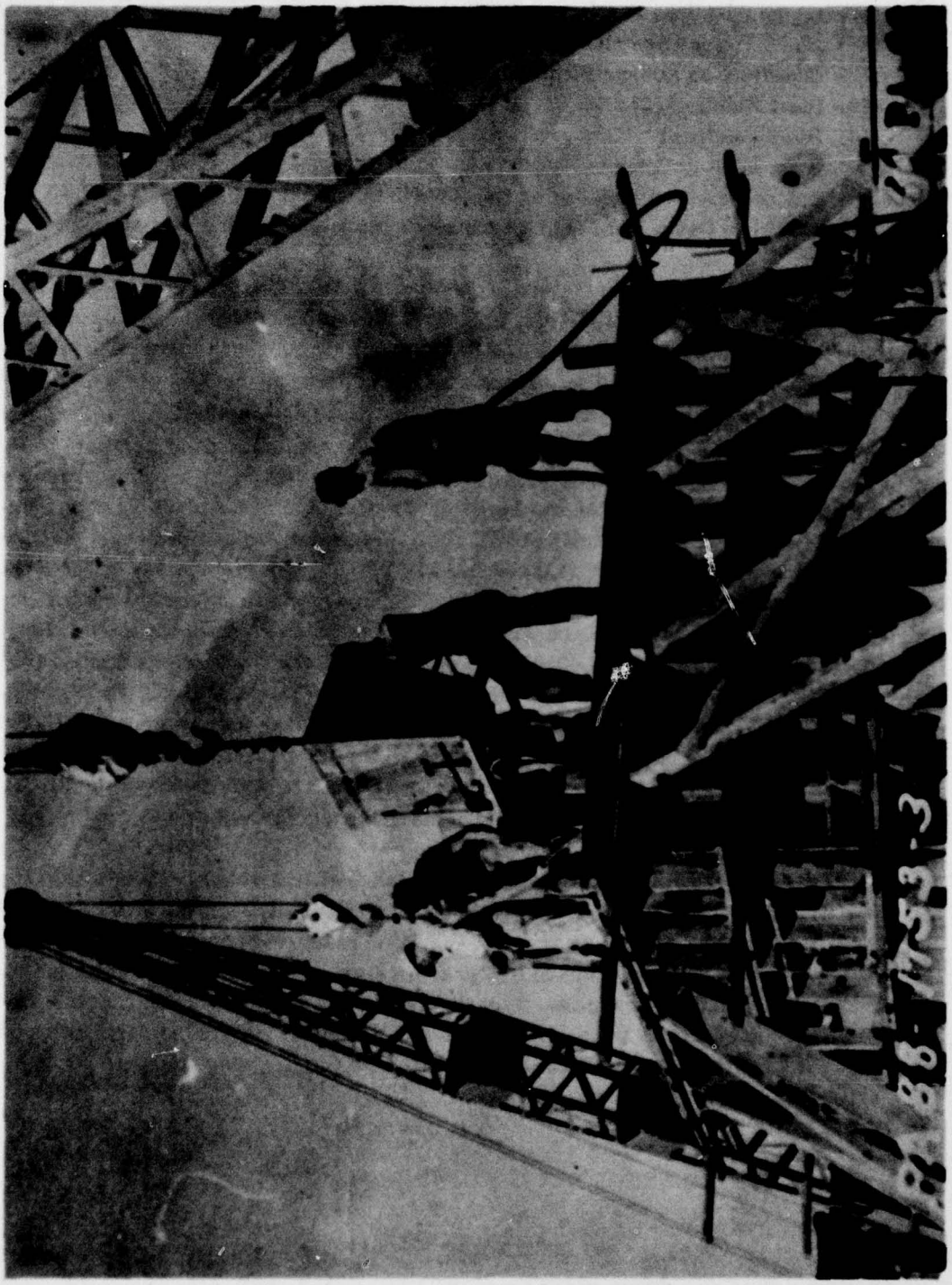
Telephones had already been installed on the AV's in Shops No. 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 15, Admiral's Cabin and Flag Office. No further modification was therefore required.

Coincident with the decision to employ shipboard radio telephone circuits between ships and shore was the formulation of a plan for VHF carrier teletype between the three primary ships and between AGC–7 and Eniwetok. The permanently installed HF radio teletype equipment would be used only to back up the VHF circuits and to provide communication with Hawaii during movements to and from the forward area.

It was decided to employ the one-time tape (SIGTOT) cryptographic system for classified message traffic between Atomic Energy Commission activities in the United States and the forward area. This decision was based on the fact that the Atomic Energy Commission approved of and had been using SIGTOT; consequently, trained personnel and the necessary equipment were already available. SIGTOT would also provide one of the most secure means of transmitting classified information. Through conferences with Commander R. J. Schmidt of the Communication Section, Commander James Hargraves, Lieutenant J. M. Jones and Mr. John Kelly of the Department of the Navy, it was decided that three (3) SIGTOT equipments would be required on each AV and five (5) SIGTOT equipments on the AGC–7. This provided the necessary coding facilities for a three-way SIGTOT conference. One SIGTOT could be used to transmit to the other two ships and one SIGTOT used to receive from each of the other ships. The two remaining equipments on the AGC–7 could be used simultaneously to encode other messages while the conference was in progress.

The Technical Net consisting of SCR–608's installed at important stations within the task force was, until 28 October 1947, planned to be the primary intra-task force voice communication system. The decision to install AN/TRC–1 radio telephone equipment on the three main ships reduced the Technical Net to a "back-up" status. The communication requirements of the photographic group were determined on 5 November 1947, and it was decided that communications to the photo towers could best be supplied by their inclusion in this net. The final plan for the Technical Net called for the following stations:

(1) AV–4
(2) AV–5
(3) AGC–7
(4) CVE–115
(5) LSM–250
(6) LSM–378
(7) Boat Pool Base (LSD–19)
(8) LCM (6) Tank Control Boat



Construction troops of T.G. 7.2 begin pouring the special heavy concrete at one of the gamma stations.

(9) Each Zero Island
(10) Parry
(11) Eniwetok
(12) Photo Tower at Aomon
(13) Photo Tower at Runit
(14) Photo Tower Aniyaanii
(15) Photo Tower Coral Head

The requirements for the Radiological Net were determined by 6 November 1947. The plan was to employ approximately twelve (12) radiological safety (RADSAFE) parties after the shot, operating from boats in conjunction with the scientific teams who would be returning to the Zero Island to gather their records and data. It was decided that each RADSAFE party would be equipped with an SCR–300 "Walkie-Talkie," enabling them to communicate with their respective boats. There, messages would be relayed from the boats by Navy TCS (high frequency, voice) radio sets to the Radiological Safety Centers on the AGC–7 and CVE–115. Two (2) special SCR–608 circuits were to be provided between the Radiological Safety Centers. In addition, circuits were planned for communication between the Radiological Safety Centers, helicopters and aircraft to be used in the initial radiological survey immediately following the shot.

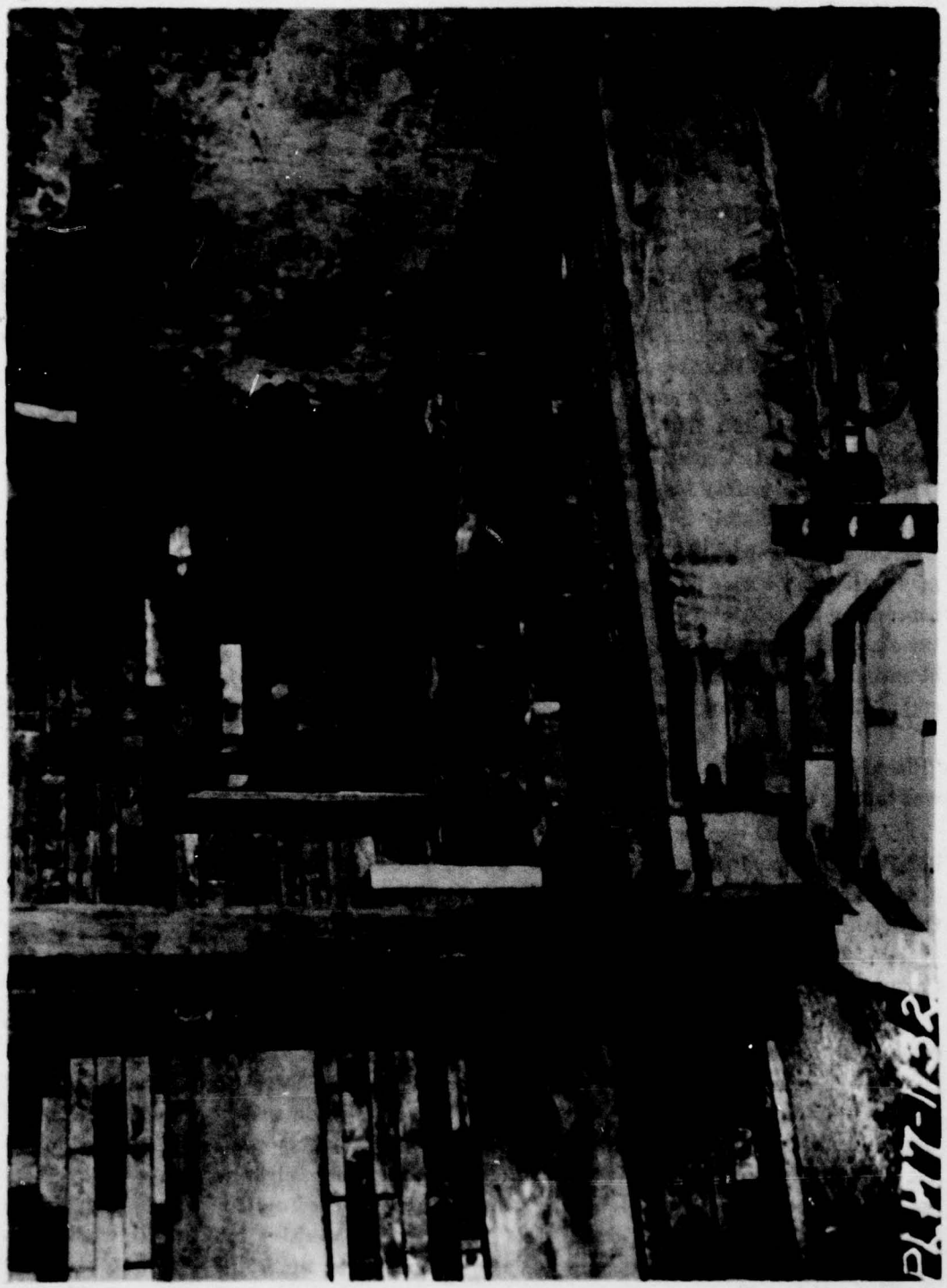
On 4 November 1947, a requirement developed for a frequency band of 150 to 160 megacycles to be used by six (6) blast telemetering equipments. Later, discussion arose concerning the possibility of employing six (6) channels in the vicinity of 80 megacycles for the same purposes. It was decided in the end that a band of 156 to 180 megacycles would be satisfactory with the understanding that a concentration would be effected in the high end of the band to avoid possible interference with the 100 to 156 aircraft VHF band.

On 16 December 1947, a requirement developed for two (2) SCR–300 nets termed "Blast Nets" to aid in the installation and testing of blast measuring equipment. One net was to have eight (8) SCR–300's and the other, thirteen (13).

An additional requirement for a Voice Time Signal Broadcast had arisen by 1 November 1947. The purpose of this broadcast was to inform all land stations, ships and aircraft of the time of the test. The original plan was to transmit the signals from the AGC–7 after they had been relayed from the Control Station on Parry Island over the radio-telephone system. This was later changed in the interest of reliability to a direct broadcast from the Control Station.

It was decided on 15 January 1948 that AVR air-sea rescue boats would be employed to evacuate the final personnel from the Zero Island before each shot. A communication circuit was therefore required for use between the AVR's, the Control Station and the AGC–7 (Command Ship). This circuit was to employ Navy TCS equiment and would share one of the frequencies of the Radiological Net since radiological safety personnel intended to use the AVR's after each shot. It was planned to provide communications to the final personnel on the Zero Island by connecting telephones at the Tower Top, Tower Base and Timing Station in parallel to an unattended AN/TRC–1 system working into the Eniwetok telephone switchboard. The communications equipment left on the island was to be expended at the time of the shot.

The communications requirements of the Radio Chemistry Group (LAJ–2) were



Construction of the lead lined coffin inside one of the timing stations is partially completed.

worked out at several conferences with scientists of Los Alamos and the Military Applications Division, Atomic Energy Commission. The first of these was held on 14 November 1947. Briefly, this group planned to operate a radio-controlled tank on the Zero Island directed from a helicopter. A spare tank was to be carried in a specially fitted LCM(6). In case the helicopter equipment failed a second helicopter would be called into service. If the control equipment in the second helicopter also failed, the tank could be controlled from the LCM where the operator would be voice-directed from the helicopter. SCR–300 communication was planned between the LCM and the island party required to start the tank. VHF equipment was to be used between the LCM, helicopters and the CVE–115. The LCM was also equipped with an SCR–608 in the Technical Net for general communications.

The communications required by the Neutron Measurement Group (LAJ–3) to aid in collection of their water cable and land cable samples after the shot were obtained from discussions with Mr. G. A. Linenberger and Mr. William Ogle in early January. VHF communication was planned between the AVR's, CVE–115, AV–5, LSM cable recovery ships and four (4) helicopters. Although this net was established mainly through incorporation into other nets, twelve (12) SCR–300's were also provided for miscellaneous use.

It became evident soon after the main ships of the task force arrived at Eniwetok on 16 March 1948 that additional radio telephone circuits would be required between the two AV's and the Zero Island to be used for the first test in order to handle the large amount of ship-to-shore telephone traffic. Accordingly, two channels between the Albemarle and the Zero Island and one channel between the Curtiss and the Zero Island were provided. After each test was completed, similar channels were provided to the next Zero Island.

Substantially, this was the task performed by Joint Task Force Seven in meeting the communications requirements for the tests. It was a continuing project that ended when the tests ended. (Note: It is intended to discuss in this section only the activities of the Communications Section of the Task Force directly involved in establishing the proving ground. A complete report of the Communications and Electronics Section of Joint Task Force Seven is contained in Annex 1, Sec. IX, of this report.)



Construction troops clear debris from one of the Zero Islands.

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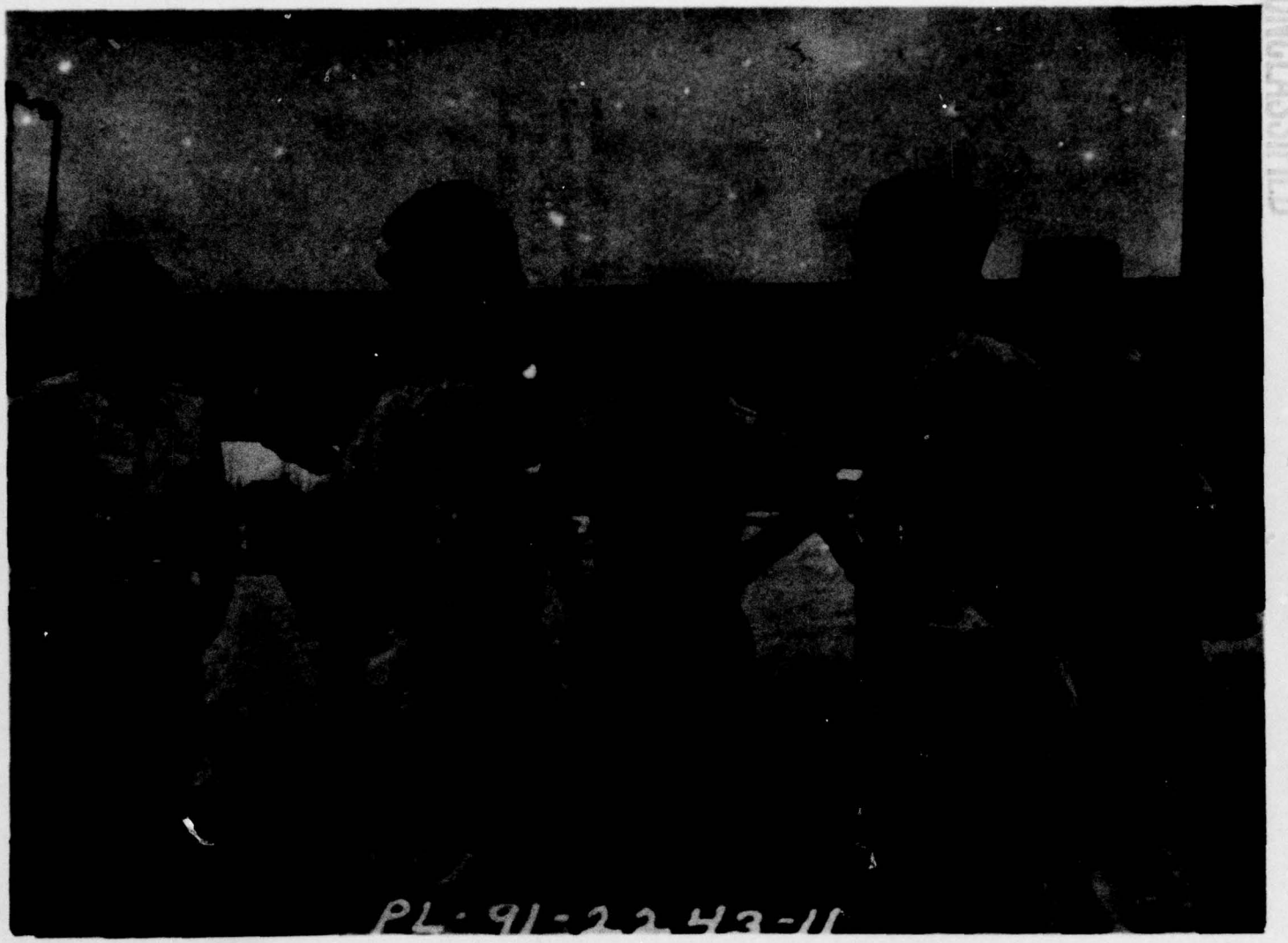
SECTION 11

Synopsis

Section Eleven deals with the training and operations of the Task Force prior to the conduct of the Tests. It is concerned primarily with the period from the time the Task Force arrived at Eniwetok on 16 March until 15 April. Operating plans were developed and a full scale rehearsal of the Test Operation was conducted during this period.

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Major General William E. Kepner, U.S.A.F., during an inspection of installations at Kwajalein. In the center is Lt. Col. Payne Jennings, Chief of Staff, T.G. 7.4.

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SECTION 11

PRE-TEST TRAINING AND OPERATIONS

The dual character of the mission assigned to Joint Task Force Seven demanded the execution of two parallel, but distinctly separate, lines of endeavor. While the construction of the proving ground was being carried on to completion by the construction elements of the Task Force, the operating elements, Air, Naval, and Radiological units and staff sections such as the Meteorological and Communications units were engaged in the pre-test training and operations necessary to the accomplishment of the second part of the mission; participation in the conduct of the tests of atomic weapons.

This pre-test period of training and operations, while it extended backward in some respects to the time before the Task Force left the United States, covered essentially the period from mid-March when the Task Force arrived at Eniwetok and Kwajalein until Peter-Xray Day, 8 April 1948.

Peter-Xray Day was the culmination of this pre-test period: a full dress rehearsal of the operation as it was to be conducted on test days, Xray, Yoke and Zebra Days.

Prior to sailing from Terminal Island at the end of February, the major ships of the Task Force were especially fitted out there at the Navy Yard for the mission. Laboratories for technical personnel and special communications were installed. Approximately 6,500 Naval personnel (TG 7.3) were checked for security purposes.

Earlier, in November, an advance group of ships consisting of the Comstock (Landing Ship Dock), four LST's and two freight ships had arrived to support the construction operation and to establish and maintain a small boat pool for lagoon travel.

During February offshore patrol, both air and surface, was established at Eniwetok Atoll. This patrol consisted of Destroyers and Destroyer Escorts and aircraft of VP (MS)–6 type with the USS Gardiners Bay acting as seaplane tender. Due to submarine contacts made within the danger area, the surface patrol was augmented almost immediately, to make a total of five surface craft, DD/DE. In March it was decided that the situation was such as to require further augmentation of the patrol and the strength was increased to a total of eight Destroyer and Destroyer Escort. Daylight aerial searches were flown by VP (MS)–6 aircraft, using one plane daily for six days a week and a five-plane search one day a week.[21]

During this early part of the operation the advance Naval unit continued to support the construction force as it built up. The unit surveyed small boat channels and installed channel buoys at the islands of the atoll which were important to the operation. Small craft landings were constructed and navigational aids were checked, improved and relocated where necessary, and correct hydrographic information was provided.

Meanwhile, the Air Forces of the Task Group were in training and were conducting tests at Eglin Air Force Base, Florida, to lay the ground work for later tests at Eniwetok for the purpose of determining the minimum light conditions as related to dawn, in which the drones could operate efficiently. Drone aircraft were being readied at this time for use in collecting radiological samples from the radioactive cloud. Twenty-four B–17 aircraft

[21] Special report of T.G. 7.3, Sec. VII, Annex 1, of this report contains details.

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The Task Force weather center aboard the USS Mt. McKinley. Major Delmar L. Crowson, U.S.A.F., who directed the weather center, discusses a forecast with an assistant.

were required, twelve of which were radio-controlled drones and twelve were mother, or drone-control aircraft. This number allowed fifty per cent spares.[22]

Photographic aircraft also had to be provided. Three F–13's, B–29's modified to accomplish the specialized aerial photographic mission required for Operation Sandstone, were secured. In addition, two C–54's were especially equipped for photography. In effect, these planes were aerial camera platforms. Primary mission of these aircraft was to record the visual aspects of test phenomena for scientific use.

Task Group 7.6, the Radiological Safety unit of the Joint Task Force, while enroute to the forward area conducted daily classes. These classes covered the general nature of the operation as well as the specific mission of TG 7.6. Considerable time was devoted to additional instruction of the Radsafe monitors, who would later have the acute responsibility of guarding personnel of the Task Force from over-exposure to radiological contamination. Daily exercises in the calibration of the instruments to be used in monitoring were conducted. During the movement to the forward area detailed plans were drafted for carrying out the various projects assigned to TG 7.6. Pre-test reports for each project were started, designed to be incorporated into final reports. These reports were to include the details of method of making measurements and the nature of results.

During the pre-test period, certain personnel of TG 7.6 received radiological exposures incident to instrument calibration work. These exposures were detected and recorded in a file. This procedure served as a test of the record system of dosage that was maintained on all personnel exposed during test operations.[23]

The success of an operation of the character of Operation Sandstone could stand or fall on the accuracy and dependability of the weather information given to the Commander. Upon the advice of the Meteorological Section, along with that of the Radiological Safety Officer, Col. James P. Cooney, the Commander, Joint Task Force Seven, had to base his decision whether or not to proceed with a test on the appointed day.

By 20 March the Weather Center of Joint Task Force Seven was in routine operation aboard the Command Ship, USS Mt. McKinley. All meteorological communications facilities had been installed. The technical procedures for the collection of weather observations, the analysis of data and the formulation of the forecast and briefing presentations had been tested.

The Weather Center operated under the Staff Meteorologist, Colonel Benjamin G. Holzman, USAF, and was directed by Major Delmar L. Crowson, USAF, Assistant Staff Meteorologist.[24]

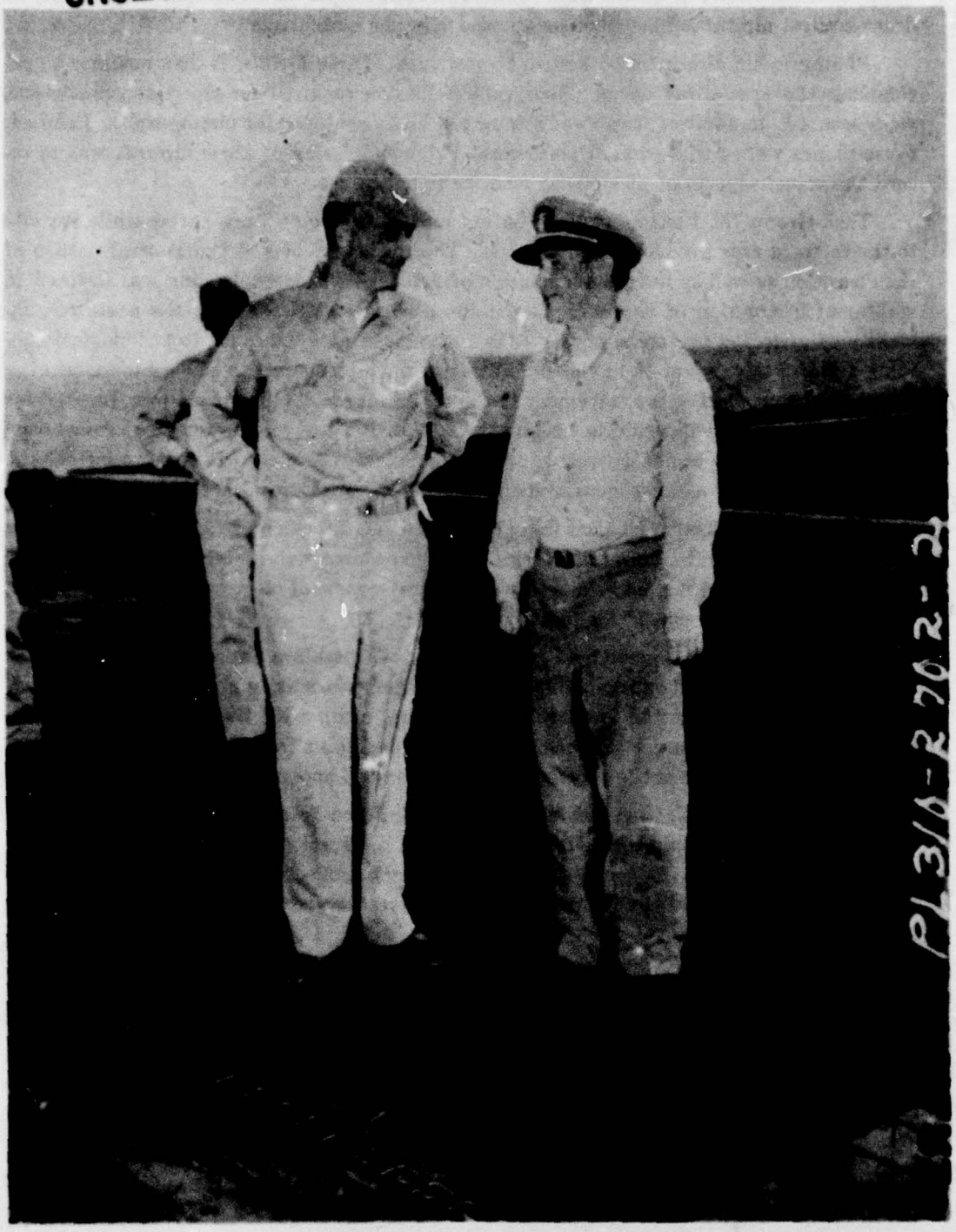
Communications traffic flowed into the Weather Center over its special circuits in great volume. A total of 50,000 groups (five character) per day with a traffic precedence of "Operational Priority" were handled routinely.

Two teletype circuits terminated in the aerological office of the Command Ship, thus avoiding serious delays in weather transmission by eliminating the transmission relays of normal ship administrative traffic.

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[22] See Air Forces report, Sec. VIII, Annex 1, for details.
[23] Details are contained in Sec. IX, Annex 1, to this report.
[24] A detailed Meteorological report is contained in Sec. XII, Annex 1.

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Rear Admiral William S. Parsons, Deputy Commander, observes the radiological safety instruction for monitors aboard the USS Bairoko, directed by Commander Frank I. Winant, USN, Commander, Task Group 7.6 (Rad-safe unit).

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Two facsimile weather map receivers (telephoto) were used in the Weather Center. They received and reproduced two surface weather charts and four upper-air charts daily from the Fleet Weather Centrals at Guam and Pearl Harbor.

At the outset of the Operation there were but two weather stations in the test area, Kwajalein and Wake Island. Insufficiently equipped and manned to record and transmit the data required for Operation Sandstone, these stations were augmented by the Task Force to make them serviceable. Additional stations at Eniwetok, Rongerik and Majuro were established. These stations formed the basic weather network. Kwajalein and Eniwetok provided a forecast and briefing service for local Commanders and aircraft of the Task Force.

Augmenting the weather service of the island stations, eight B-29 aircraft especially equipped for weather reconnaissance were furnished by the 511th Weather Reconnaissance Squadron at Guam. Training presented no problem here as the personnel were well trained and the need for preparation was minor. Data from these aircraft was received by the Base Weather Office of Task Group 7.4 at Kwajalein and was then relayed by radioteletype to Eniwetok and thence on to the Task Force Weather Center on the Command Ship. Reconnaissance tracks for the weather aircraft were planned specifically for Operation Sandstone.

A warning network for the immediate vicinity of Eniwetok was established to provide forecasts of the time of beginning and ending of showers as well as their speed and direction. Sources of data for this warning service were weather reconnaissance aircraft reports, radar reports from these aricraft and the radar reports from the Task Force ships.

During the pre-test period the Meteorological Section made daily analyses and forecasts and during the early stages of this period briefings were presented to the Commander, Join Task Force Seven, for familiarization, looking toward the time when briefings would be "for record."

Documentary photography, both technical and non-technical, constituted a part of the pre-test operation as it did during the later test periods. Seven photographic teams operated throughout the test area, taking both still and motion pictures.

A small film processing laboratory was operated aboard the USS Curtiss. The purpose of this laboratory was to give rapid service in printing technical photographs urgently needed in the Operation.

Basic photographic requirements for Operation Sandstone called for four types of operating units in the test area: an aerial photographic unit; an organization to install cameras and allied timing equipment in the photographic tower plus the technical and documentary teams and the processing laboratory already mentioned.[25]

Practice runs for familiarization and orientation on the target were made by the aerial photographic unit during the pre-test days. Installation of photographic equipment in the photographic towers proceeded in parallel as conditions permitted. In order to assist the aerial photographers in aiming their cameras at the target position, a horseshoe-shaped string of red lights was placed around the firing towers on the test-firing islands.

The arrival of the Headquarters of Joint Task Force Seven at Eniwetok on 16 March marked the assembly of the Task Force as a unit for the first time. Despite the fact that

[25] Sec. XVIII, Annex 1, contains the detailed photographic report.



A "dry run" of the drone tank, especially devised to recover radiological ground samples. The tank was radio-controlled from the helicopter.

the Air Task Group, Task Group 7.4, was based at Kwajalein, some 360 miles from Eniwetok, its mobility and ever-present aircraft prevented the feeling of separation. This was due in part, too, to the presence of the Commander, Air Forces, Joint Task Force Seven, on the Command Ship. The major elements of the Naval Task Group arrived with the Task Force Headquarters. Approximately one month of preparation was available before the first test was scheduled. During the first part of this remaining month communications had to be tied into all operating areas from the ships.

During the period prior to the first test, operating units devised and perfected their operating plans based on the requirements of the Scientific Operating Plan. The Scientific Operating Plan was a completely detailed plan for the day-to-day conduct of the scientific operations. These plans served to crystalize the concept of operations more clearly for operating personnel.

One of the problems that still remained to be solved was that of determining the time of detonation, or H-Hour, in relation to dawn. During the latter part of March this problem was resolved.

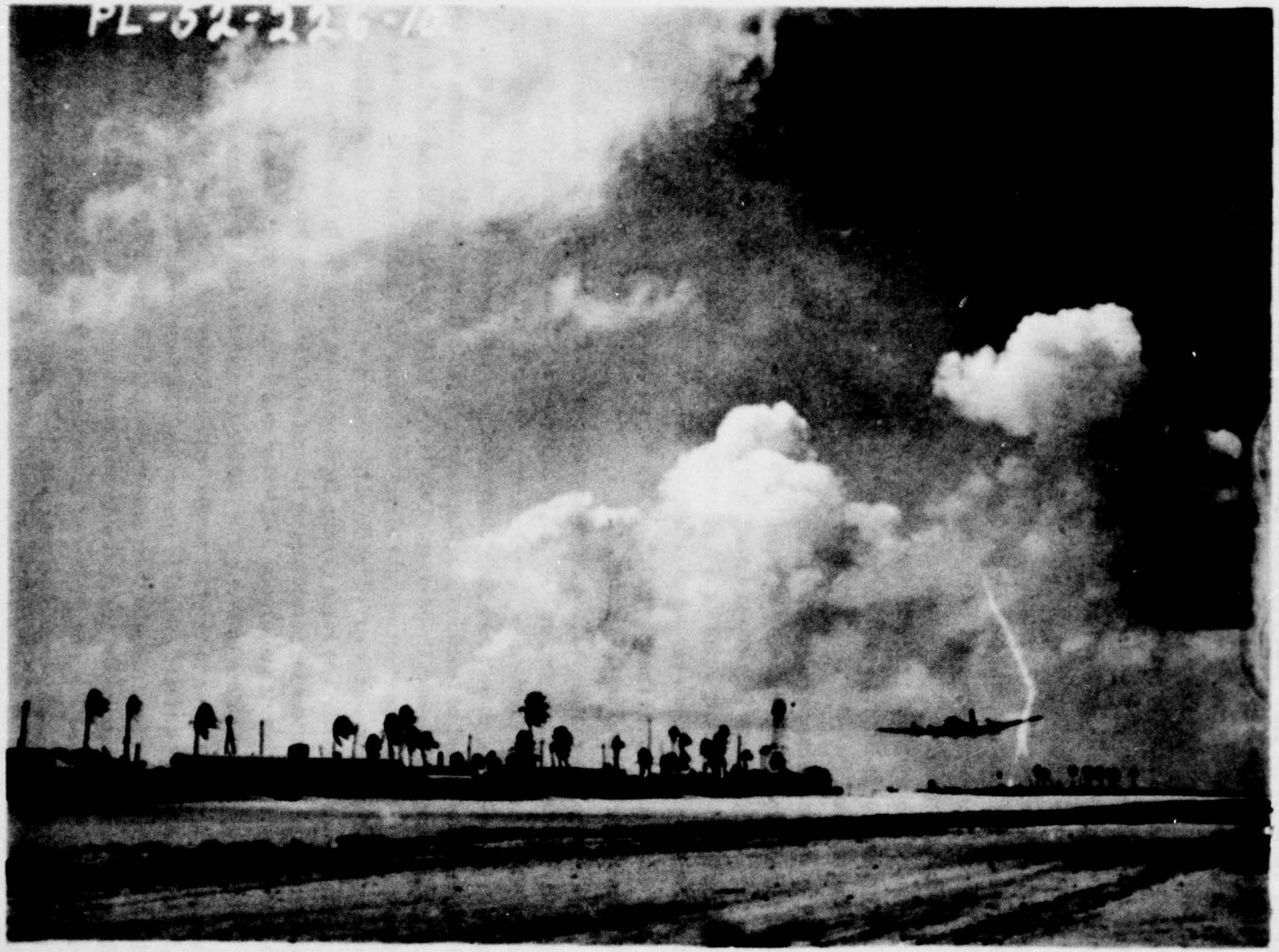
The requirements were simple. The pilots who would operate the drone aircraft from the mother aircraft had to have sufficient light to permit proper control of the drones as they made their passes into the radio-active cloud. Dr. Froman, the Scientific Director, however, required a minimum of light for one important experiment. The time of the shots was a compromise between these two conflicting requirements.

It had been observed that at an altitude of approximately 20,000 feet it was light about 10 minutes earlier than on the ground.

On several mornings B-17 aircraft operated over the test area to determine the visibility at specific times and at the various altitudes at which the drones would operate. On 22 March General Kepner flew over the area with the Commanding Officer of the drone unit, Colonel Kilgore, in an attempt to determine the earliest time at which a successful drone operation would be feasible. Simultaneously, Captain Russell and Dr. Froman on the USS Albemarle, and Colonel Grills on the USS Mount McKinley observed the light conditions on the surface. The effect of light at ground level at this time on the equipment to be used in the experiment was observed by Dr. Edgerton and a time that was suitable for both operations was selected. The rapid change from darkness to light in the Eniwetok area also permitted helicopters to operate almost immediately after the detonations. (Helicopters were required to retrieve ground and water samples immediately after detonation).

Training operations of the drone and mother planes over the target area during the early morning hours prior to the test period provided exercises for the development of effective methods of aircraft control in the area by the personnel of the Combat Information Center. At the same time, the "beeper pilots" aboard the mother planes were provided the opportunity to perfect control of the drone aircraft under conditions which were to be expected on test days. Practice landing of drone aircraft was conducted at Eniwetok. A valuable by-product of these practice runs was the opportunity provided to test and perfect the communications system involved in air operations.

During the pre-test period consideration continued to be given to the desirability of operating the drone aircraft from Eniwetok on test days. It was first planned to operate all aircraft from Kwajalein where more extensive maintenance facilities were available



The air strip at Eniwetak. Here the radiological air samples were brought in by drone aircraft.

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for electronic and other maintenance work. Also, rehabilitation work at Eniwetok would thus be reduced. The drone aircraft were to land at Eniwetok after each operation where the radiological chemists would retrieve the air samples.

The objection to this plan was that good drone operating weather had to prevail at both Kwajalein and Eniwetok to permit the conduct of a test. Another factor was the possibility of a malfunction of the drone-control system, the prospect of which would be aggravated by the two and one-half hour flight from Kwajalein.

In view of these objections, tests were made to determine the feasibility of flying the drones manually to Eniwetok the afternoon before each test, after a final checking of all electronic equipment had been completed before take-off from Kwajalein. This plan was proved feasible during the Peter Xray practice and so was adopted.

Briefings were held during this period aboard the USS Mt. McKinley, designed to acquaint the personnel of the Task Force with the parts the operating units were to play in the test operation. These briefings included discussion of the Air, Naval and Radiological safety operations to be conducted. Similar briefings were conducted at Kwajalein by Task Group 7.4.

Task Group 7.3, the Naval Task Group, utilized the time remaining before Xray-Day to coordinate with Task Group 7.1 the tasks assigned to it for support of the tests. These included the movement of the personnel of the firing party from Parry Island to Engebi, and return. Other major assignments of the Naval Task Group included provision of a special surface security screen during actual test time and responsibility for evacuation of the lagoon. Maintenance of the air patrol during the tests also rested with Task Group 7.3.

Other operations of the Naval Task Group were the maintenance of the small boat pool; operation of helicopters (during test periods helicopter operational control passed to the Commander, Air Forces); and operation of the LCM carrying a spare ground-sample recovery drone tank. In the operation of these tanks, control instruments were operated from a helicopter with spare equipment in the LCM in case the helicopter control failed. Test runs of the tank operation proved the feasibility of the helicopter control.

During this pre-test period the international situation apparently became sufficiently grave as to raise the possibility of abandoning the tests.[26] Consideration also was given to accelerating the tests. These questions confronted the Commander, Joint Task Force Seven, because of a need to return the Task Force ships to Naval use, particularly the two AV's. General Hull recommended to Washington however, that the tests proceed as scheduled. This recommendation was adopted.

The tenseness of international affairs was reflected in the security aspects of the operation. It has already been stated that the surface and air anti-submarine screen was twice augmented. A total of eleven submarine contacts within the danger area were reported prior to test time. Evaluation of these contacts presented these conclusions: one actual submarine contact; two probable contacts; seven doubtful contacts and one report of own forces.

On 10 March General Hull radioed the Chief of Staff, US Army, who was the Executive Agent for the Joint Chiefs of Staff for the Joint Task Force, pointing out that his

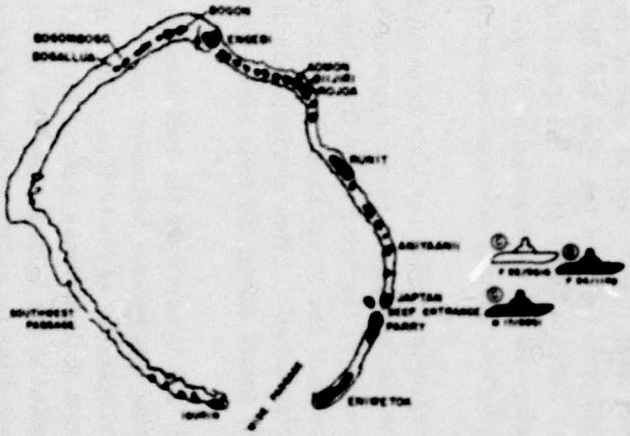
[26] Daily record, Joint Task Force Seven.

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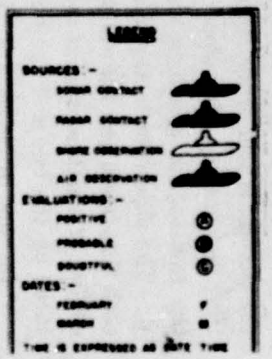
THE SUBMARINE SITUATION IN THE ENIWETOK AREA

DURING OPERATION SANDSTONE

1 DECEMBER 1947 TO 1 JUNE 1948







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patrol plans provided "that positive offensive action with all means at my disposal will be taken to prevent unauthorized entry within (the) closed area." In the case of intruder submarines, both when submerged and on the surface, this action will be taken without identification, General Hull stated. In the case of surface vessels or aircraft, the plan provided that positive identification would be made to determine the character of intruders prior to taking offensive action.

Outside the closed area, but within the danger area, General Hull stated in the radio, instructions provide for reconnaissance, tracking and warning to craft to leave the danger area. The radio message continued:

"Experience to date indicates that these measures will not be effective in the case of foreign submarines which remain submerged; and may also create embarrassing delays in the case of unauthorized surface vessels. I know of no way to warn such a submerged submarine except by the dropping of depth charges in the vicinity but not aimed to hit."

General Hull, in his message, then asked that authority be granted him to take such action if necessity to do so should arise.

On 11 March the Joint Chiefs of Staff approved General Hull's plan, including authority to warn submerged submarines within the danger area by use of depth charges not aimed to hit, but accepting the risk of doing so. Additional authority was given that, as test days neared and if a submerged submarine failed to respond, warning could be intensified by aiming closer aboard. This action was concurred in by the State Department.[27]

Although it is certain that submarines did come into the danger area, no occasion arose in which the warning action was taken. The closed area was never entered.

Perfection of the evacuation plan was one of the goals of the Task Force at this time. This plan demanded the coordination of all Commanders and individuals as well. Two musters were to be taken on test minus one days, to account for all personnel. Results of these musters were channeled into the Task Force Headquarters immediately. A "Red Alert" for emergency search and a "White Alert" for search for unauthorized persons was devised. For personnel whose duties required them to remain ashore during tests, water and air emergency evacuation was provided.

Initially, it was planned that all surface craft would move out of the lagoon into the open sea in an up-wind position during tests. This plan was modified prior to Peter Xray Day to provide that the four major ships of the Task Force, plus necessary small craft, would remain in the lagoon. All other surface craft were evacuated to the open sea.

The Peter-Xray test began on 4 April 1948 (PX–4) with the dispatch of a message announcing the weather briefing conference to be held on PX–3 day at 1500. The purpose of this conference was to provide the Commander, Joint Task Force Seven, with the necessary information upon which to base his decision whether or not to proceed with the evacuation plan, the first step to be undertaken in setting the test machinery in motion. (The decision for PX Day was to be affirmative regardless of conditions). The state of readiness of Task Groups proved to be the determining factor in this decision since the 72-hour weather outlook provided no firm basis. Weather predictions became a major factor on test day minus one.

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[27] JCS series 1795.

All operations during the practice test were carried out in the manner planned for the conduct of the actual tests. It was a complete rehearsal with no omissions except the firing of the actual shot, which at H-hour was simulated by the firing of flash bulbs.

Weather briefings for the Commander and the Test and Scientific Directors were held on PX–1 and at 0245 on PX Day, 8 April, an informal briefing was presented. At 0445 a final formal briefing was given and the finall decision to go ahead was made.

All air and naval operations were accomplished in coordination with the movement and actions of units of Task Group 7.1. The placement of a practice bomb in the tower on Engebi Island, and the enactment of the step-by-step procedure of the firing party under Dr. Graves, The Deputy Scientific Director, served to heighten the realism of the practice run.

This rehearsal was a test of Joint Task Force plans. A general critique was held on 10 April attended by appropriate Commanders, The Test and Scientific Directors, and Staff officers. Minor changes and adjustments were made as a result of this critique.

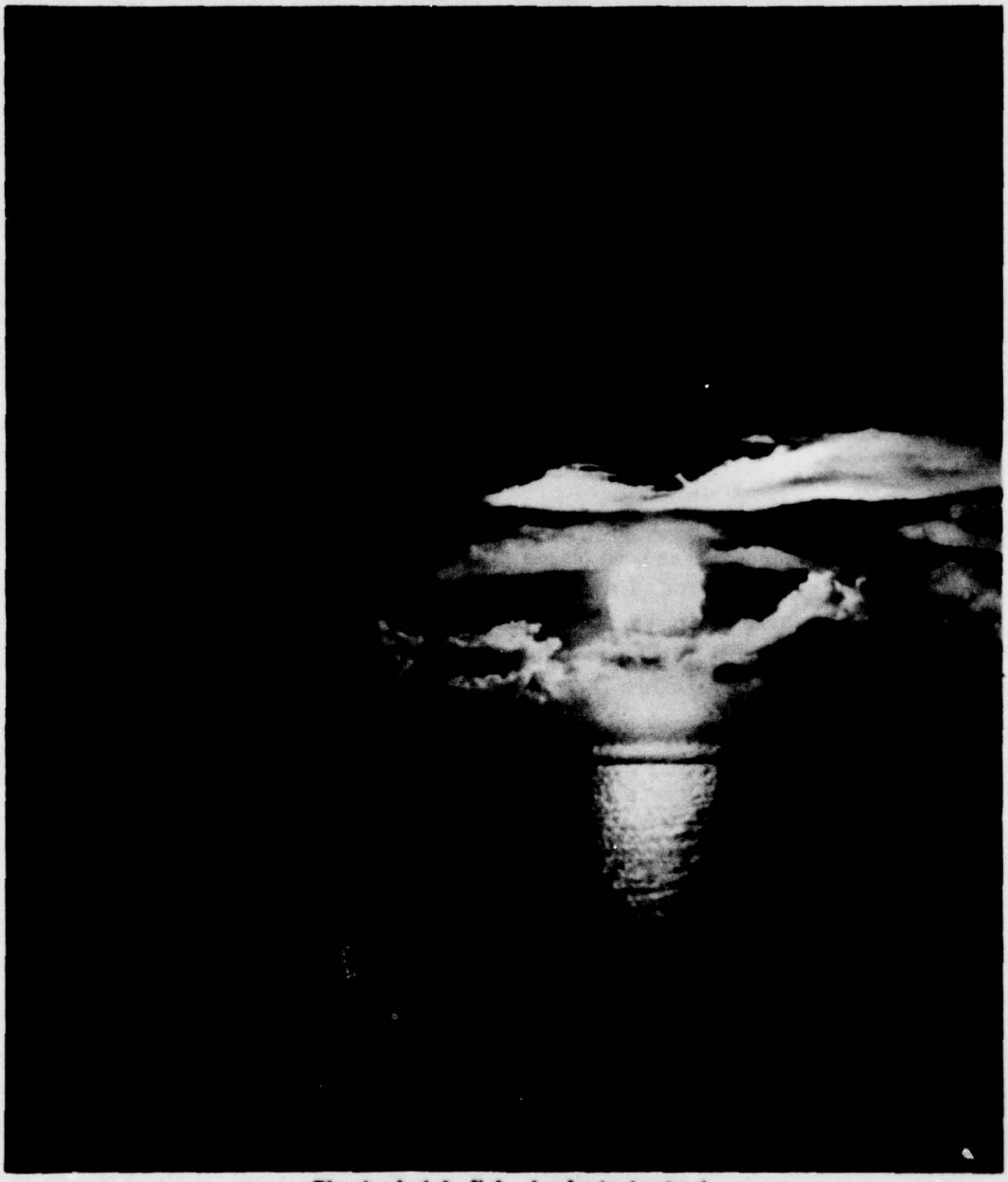
Satisfied that the Task Force was ready, General Hull gave the decision that the first test would proceed as scheduled.

SECTION 12

Synopsis

Discussion of the high points of the test operations is presented in this section. Emphasis has been placed on the part played by the Scientific unit of the Task Force, T. G. 7.1, in the conduct of test experiments. No attempt has been made to consider the details of these experiments in this report. A complete report of the scientific and technical aspects of the operation is being prepared by the Test Director for the Atomic Energy Commission.

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The cloud of the Yoke shot beginning its rise

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SECTION 12

TEST OPERATIONS

It is not intended to discuss in this report the details of the experiments conducted or their results. However, it is believed worthwhile to review the basic objectives of the tests and to outline the scope of experiments conducted.

Since the close of the war the Atomic Energy Commission's Los Alamos Scientific Laboratory has been carrying out a number of complicated calculations and an extensive program of experimentation in an attempt to design new and improved weapons. It was believed that better weapon designs than those of Hiroshima and Nagasaki were available, but it was not certain how much better these new designs were. One of the principal objectives of the Sandstone tests was a measurement of the efficiency and yield from these new designs.

The achievement of this objective required a primary program of experiments. A secondary program of experiments resulted from a desire of the Services to take advantage of these tests by exploring problems of particular concern to the Armed Forces.

Individual experiments were conducted by groups from the Los Alamos Laboratory or by groups from outside agencies under contract to the Los Alamos Laboratory. Contract groups were used to avoid withdrawing talents from the Laboratory to such an extent that the major programs of the Laboratory would suffer. Liaison between the Scientific Director and the contract groups was effected by Los Alamos liaison personnel.

The experiment of highest priority was the radiochemical work done under the leadership of Dr. Roderick Spence at Los Alamos with Dr. Melvin G. Bowman responsible for operations at Eniwetok. The drone aircraft of the 1st Experimental Guided Missiles Group obtained air samples for this work. Drone tanks were used for collection of ground samples. All analysis was done at Los Alamos Laboratory, samples being rushed back by C–54 aircraft after each shot.

A second experiment was to measure the number and the energy of neutrons as a function of distance. This group, drawn from Los Alamos, was under the direction of Mr. G. A. Linenberger, assisted by Dr. William Ogle.

Experiments measuring the spectrum of gamma radiation were done under the direction of Dr. Francis Shonka by a group from the AEC's Argonne National Laboratory. Dr. L. D. P. King was the Los Alamos Laboratory liaison man with this group.

The consulting engineering firm of Edgerton, Germeshausen and Grier, of Boston provided another contract group. This group was responsible for the complicated timing signal and remote control firing circuits which were necessary in order to fire the bomb and to switch on all of the self recording experimental equipment at the right instant with respect to the time of detonation. This same group also made measurements of the rate of growth of the nuclear reaction in its early stages. Dr. H. E. Grier assisted by Dr. H. E. Edgerton was in charge of this group. Earlier in the planning phases of Sandstone this group supervised the design engineering of special shelters and other instrumentation installations.

The blast measurement group was drawn from the Naval Ordnance Laboratory, Aberdeen Proving Ground, and the David Taylor Model Basin. Dr. G. K. Hartmann of the Naval



The radioactive cloud of the Yoke Test rises over Aomen Island.

Ordnance Laboratory headed this section, with Dr. C. W. Lampson of Aberdeen as his principal assistant. Dr. J. C. Clark was the Los Alamos liaison man.

The Naval Research Laboratory group was headed by Dr. E. H. Krause, with Dr. C. V. Strain assisting. This group made three measurements; the rate of increase of released energy, the time interval between the firing signal and the nuclear reaction, and the quantity of heat and light radiation.

Photography was used extensively as a method of measurement. This type of photography was performed by a group of Air Force technicians under Brigadier General Paul T. Cullen. Mr. Berlyn Brixner acted as the Los Alamos liaison man.

The Rad-Safety group TG 7.6 conducted measurements of radiation as a function of distance for the Scientific Director. These measurements were in addition to TG 7.6's primary responsibility to ensure radiological safety.

The overall technical engineering phases of the above experimental program, including tower installations, power supply and safety devices, were accomplished by a group from the Sandia branch of the Los Alamos Laboratory under Mr. R. W. Henderson, an Assistant Scientific Director.

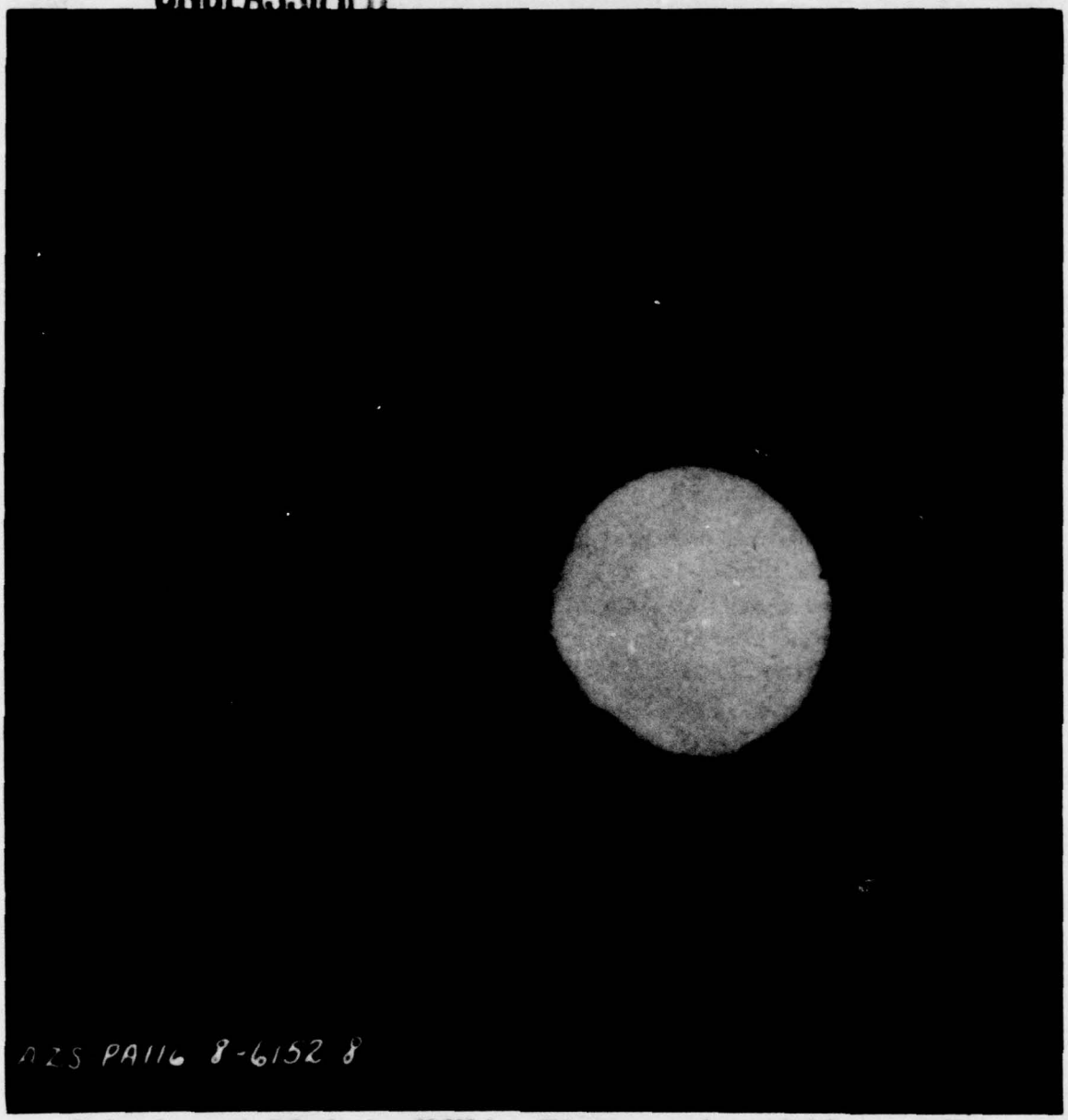
Bomb assembly and movement operations were performed by another group from Sandia also under Mr. Henderson.

Special procurement of technical equipment and technical supplies required in the above program was handled by a group from procurement office of Los Alamos Laboratory headed by Mr. Harry S. Allen.

The operations of all of the above groups was facilitated by the assignment of officers and men from AFSWP to the individual groups. This assignment had the dual purpose of familiarizing AFSWP personnel in techniques of instrumentation and with the new bomb design elements being tested.

The above groups, together with an administrative group, formed Task Unit 7.1.1 with Dr. Darol K. Froman, the Scientific Director, in charge. Dr. Froman's immediate staff consisted of Dr. Alvin C. Graves, Deputy Scientific Director, Mr. R. W. Henderson, First Assistant Scientific Director and Dr. John C. Clark, Second Assistant Scientific Director. Task Unit 7.1.1 was the only unit of Task Group 7.1. Captain James S. Russell, USN, the Test Director, was the Commander of Task Group 7.1 and Colonel Paul T. Preuss, USAF, was Deputy. These two officers were assigned from the Atomic Energy Commission's Division of Military Applications. Commander Don W. Wulzen, USN, on loan to the AEC from the MLC, was Chief Staff Officer. It was this group which was responsible to the AEC for the technical conduct of the tests but under command of the Commander, Joint Task Force Seven, for operational and necessary administrative matters.

In addition to the primary program of experiments discussed above a secondary program of experiments were conducted by the Armed Services but under the technical supervision of the Scientific Director. This arrangement was necessary to insure complete coordination and to assist the Service groups in conducting their various experiments. In addition to technical supervision of the experiments of the Service groups, the Scientific Director was also responsible for coordinating those experiments of project "Fitzwilliam" which were conducted within 20 miles of the test site.



Looking down on the Yoke shot from 30,000 feet. This picture was photographed during an Air Force experiment with a drone plane directly over the target at 30,000 feet.

The number and complexity of experiments performed by the Armed Forces were limited primarily because there was insufficient time after notification to the technical agencies to permit the preparation of detailed plans. All experiments were screened by the Joint Proof-Test Committee and any experiments which involved duplication, showed insufficient planning, or involved excessive logistics were eliminated. In spite of the lack of time and this screening, a fair program was carried out.

The Bureau of Yards and Docks exposed to the blast approximately 150 concrete structures at various distances to determine the damage suffered by these structures. The Office of the Chief of Engineer's program consisted of constructing four reenforced concrete buildings and an earth revetment and making observations similar to those of the Bureau of Yards and Docks. In addition, the blast measurement group of TU 7.1.1 measured the blast behind this revetment and at an equal distance in the open to determine the effect of the revetment in reducing blast effect. Similarly the neutron measurement group of TU 7.1.1 made neutron measurements behind the revetment and inside some of the structures.

The Bureau of Ships exposed a large number of panels of different materials coated with various paints and resins for decontamination studies. In addition to these experiments gamma ray dosages were measured behind a number of thicknesses of concrete and steel by means of film badges.

The Chemical Corps made measurements with cascade impactors to determine the size of the particles in the radioactive dust and to prove the efficiency of the Chemical Corps' collective protectors.

The Air Force carried out a fairly extensive program of experiments in drones and in other planes to determine accelerations and stresses involved in aircraft at known distances from atomic explosions. Gamma ray dosages as a function of distance in the air, and also the dosages obtained by airplanes passing through radioactive clouds at various times, were measured.

The Bureau of Medicine and Surgery made tests on the effects of radiation on various biological and agricultural samples. They also tested animal containers for suitability for use in future tests. No animals were deliberately exposed for experimental purposes.

Reports of Service group experiments are being submitted to the Scientific Director for review in order to check conclusions against the complete findings of the Los Alamos Laboratory. Upon review by the Scientific Director these reports will be submitted to the chiefs of the military agency having primary interest.

All scientific operations were conducted in accordance with the Scientific Director's Operating Plan (SCOP). The SCOP formed the basis not only for movements of TG 7.1 personnel but it enabled all other task groups to prepare operating plans to insure complete support.

Because of the complexity of the operations and the requirement for absolute control of all movements, detailed check lists based on the SCOP were prepared for each test.

The following tabulation of events indicates the plan of operating at the time of the test.



The Yoke shot fireball

D–3 DAY

Evacuation of vehicles and heavy equipment from Zero Island was started.

D–2 DAY

Scientific installations on the Zero Island and last rehearsals of all experiments were completed. Evacuation of personnel from unused Zero Islands was completed.

0800 A physical search for unauthorized personnel was made on all islands other than Eniwetok and Parry. Photo tower teams left the USS Curtiss by LCPL for the photo towers.

1700 Two DUKW's were stationed on an island adjacent to the Zero Island by TG 7.2 for use as standby transportation on Zero Island for the reentry party on D–Day.

D–1 DAY

0001 A mobile armed reserve was established on Eniwetok by TG 7.2.

0600 A muster of all JTF–7 personnel in the atoll was made and reported to CJTF–7. From this time until H-Hour a personnel roster was maintained current.

0630 to 1000. The bomb was transported from the USS Curtiss to the Zero tower and hoisted to position. Upon completion of the bomb installation and tower instrumentation the firing party made its preliminary check of the tower to ascertain that the weapon and firing circuits had been left in a safe condition. The firing party consisted of Dr. Graves, firing supervisor; Colonel Preuss, AEC representative; Mr. Henderson, in charge of bomb installation; and Dr. Grier, in charge of firing circuits.

0700 Patrol planes departed on offshore patrol. Upon completion of mission they proceeded to emergency moorings at Kwajalein. An LCPL left the USS Curtiss for the photo towers to pick up photo tower personnel who had completed loading and checking of cameras.

0800 All ships of TG 7.3 not required for actual operations evacuated the lagoon.

0830 General Hull, Captain Russell and Dr. Froman made a final inspection of the Zero Island.

1100 Weather briefing was conducted. After this briefing the decision to proceed with the test was made and the Joint Chiefs of Staff, the Atomic Energy Commission and Los Alamos Laboratory were advised.

1200 Two air-sea rescue boats (AVR's) departed from Parry for the Zero Island. On this trip buoys were lighted in preparation for the night trip of the firing party.

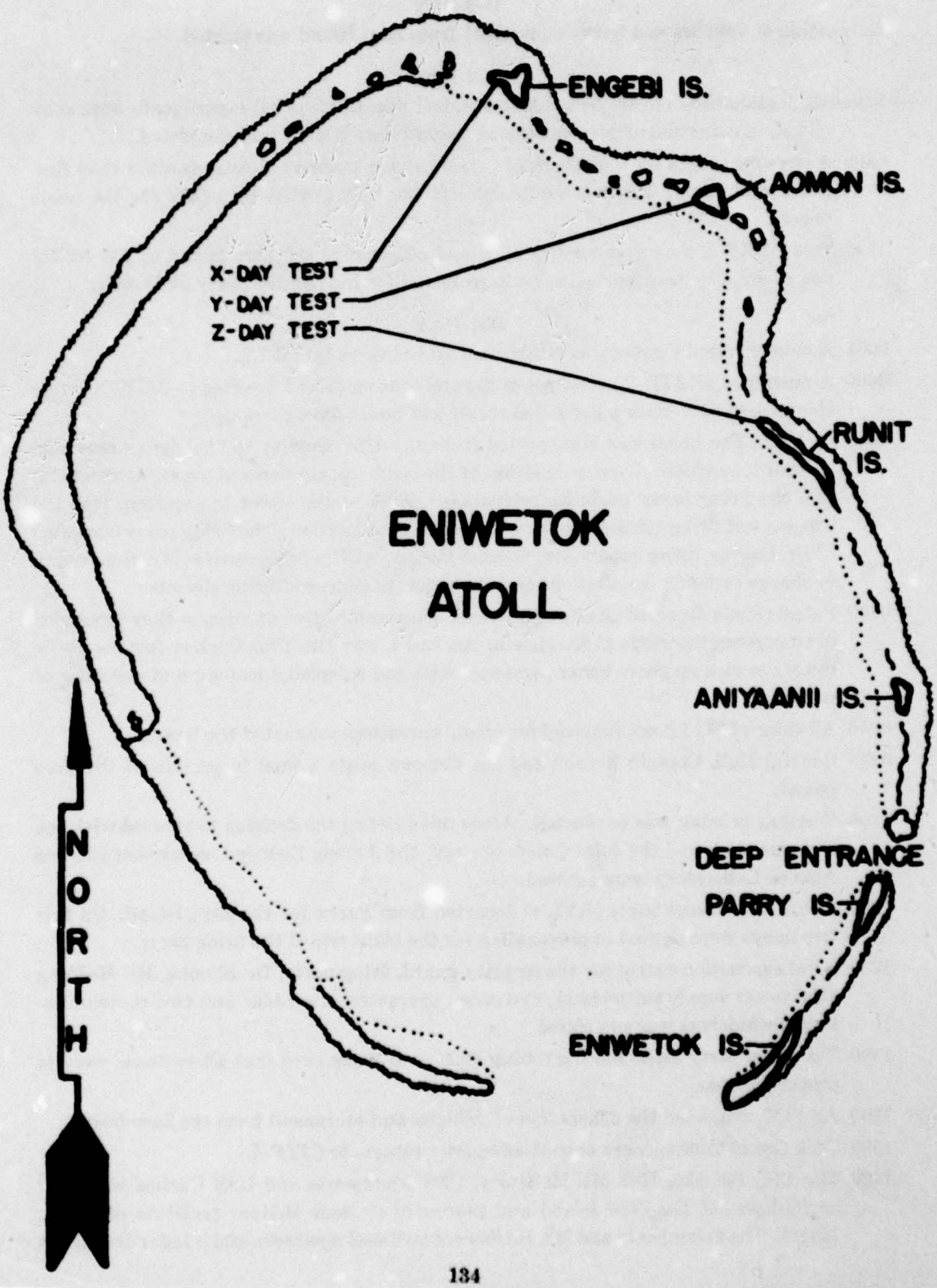
1230 Final evacuation except for the security guard, firing party, Dr. Shonka, Mr. Hedberg (the power supply supervisor), two diesel operators, one radar and two communications technicians was completed.

1300 The firing party inspected the timing station to make sure that all switches were in proper position.

1300 An LCT completed the evacuation of vehicles and equipment from the Zero Island.

1330 Task Group Commanders submitted muster reports to CJTF–7.

1400 The USS Bairoko, USS Mt. McKinley, USS Albermarle and USS Curtiss left their anchorages off the Zero Island and proceeded to their H-Hour positions off Parry Island. The firing party and Mr. Hedberg, two diesel operators and a radar technician


ENGEBI IS.
AOMON IS.
X-DAY TEST
Y-DAY TEST
Z-DAY TEST
RUNIT IS.
ENIWETOK ATOLL
ANIYAANII IS.
DEEP ENTRANCE
PARRY IS.
ENIWETOK IS.
NORTH

left the Zero Island and proceeded to Parry by way of each intermediate Zero Island. At each intermediate Zero Island the timing stations were checked and all power turned off.

1800 Evacuation of the lagoon was completed except for the USS Mt. McKinley, USS Albemarle, USS Curtiss, USS Bairoko, two AVR's and a few miscellaneous small craft. The final muster of personnel was made and reported to CJTF–7. After checking control circuits in the control station on Parry the firing party plus Mr. Hedberg and his two diesel opeartors and a medical officer returned to the Zero Island on the AVR's.

2330 The firing party made final adjustments to experimental equipment at the timing station. Dr. Shonka made final adjustments of equipment at the gamma stations.

D–DAY

0015 The firing party proceeded to the tower cab; closed the safety switches; tested the patch cords; inspected the firing, arming, and power-on relays, and connected the patch cables and various experiment cables to the bomb. Upon completion, the tower cab was locked.

0100 All vehicles to be used by the re-entry party were parked at the end of the island in prepared shelters.

0130 The final safety switch on the Zero Island was closed.

0200 All personnel were evacuated from the Zero Island by the AVR's to Parry.

0300 The firing party arrived at the Control Station. Firing and timing circuits were energized and the control station clocks were synchronized.

0445 A final weather briefing was held for General *Hull*, Capt, Russell and Dr. Froman. The firing party was cleared to proceed with final operations.

H—70 mins. to H—1 min. Colonel Preuss broadcast a test radio call on the Task Force time signal frequency of 3000 kcs. and gave time signals at minus one hour, minus thirty minutes, minus ten minutes and minus one minute.

H—60 mins. The USS Tucker, a destroyer which had been keeping surveillance over the Zero Island, departed its station off Zero Island. Minus one hour signal was given to Hartmann's equipment.

H—30 mins. Final safety switch was closed.

H—15 mins. Upon instructions from Dr. Froman, who had received General Hull's approval, Dr. Graves started the sequence timer. Mr. Henderson gave the minus 15-minute signal to the Fitzwilliam group.

H—5 mins. All task force personnel were instructed to put on goggles or face away from Zero Island.

H—30 secs. to H—10 secs. Colonel Preuss broadcast the minus 30 seconds, minus 20 seconds and minus 10 seconds time signals by means of a gong operated by the sequence timer.

H—25 secs. Power-on contactor was closed.

H—5 secs. Arming contactor was closed.

H–Hour. Firing contactor was closed and the bomb detonated.



The rising radioactive cloud of the Yoke shot

H—5 mins to H+2 hrs. Eight drone planes began entry into cloud, and after three passes through the cloud landed at Eniwetok. Upon landing the filter papers were removed by Dr. Bowman and his assistants, loaded upon two ATC courier planes and flown to Los Alamos.

H+10 mins. to H+90 mins. The re-entry party, with Colonel Preuss in charge, consisted of one medical officer, two DUKW crews, two LCVP crews, five members of the neutron measurement group, three members of the gamma measurement group, and six rad-safe monitors. This party proceeded to the Zero Island on the AVR's. Near the Zero Island the re-entry party transferred to LCVP's which had been moored to a buoy. DUKW crews proceeded to the DUKW's. The re-entry party's mission was to collect data. Upon completion of the mission the party was transported to the ships by the AVR's.

Helicopters were used to transport monitors and other neutron measurement group personnel to the Zero Island to collect samples and to return the more critical samples to the USS Albemarle as quickly as possible. Less critical samples were returned by AVR.

One LCM with three photographers and one monitor left Eniwetok and proceeded to to the coral head photo tower to recover film and to radiologically clear the tower for subsequent entry.

H+30 mins. Four liaison aircraft were dispatched from Eniwetok to the island photo tower to recover film. During this period a rad-safe monitor checked the contamination of the island and cleared it for subsequent entry.

H+45 mins. One airplane reported the position of the cloud every fifteen minutes.

H+1 hour. One aircraft was dispatched to conduct an aerial radiological survey. At sunrise the USS Bairoko returned to its anchorage near the Zero Island. The USS Albemarle, USS Mt. McKinley, and USS Curtiss got underway at fifteen-minute intervals and anchored off the next scheduled test island.

H+3 hours. The tank controlled LCM with a party of 5 radiochemistry group personnel and 2 monitors proceeded to the Zero Island. This party landed on the Zero Island and started the radio controlled tank. Dr. Bowman having completed processing filter samples at Eniwetok joined this group by helicopter. The tank, directed by helicopter, went into the crater, obtained ground samples and returned. Ground samples were transported to Eniwetok and loaded on an ATC courier plane for shipment to Los Alamos.

H+5 hours. Other measurement groups were transported from the USS Albemarle to the Zero Island via AVR to complete the collection of critical scientific data.

While there has been nothing beyond preliminary evaluations of the success of the tests as of the time this report was prepared, these evaluations have been sufficient to substantiate the conclusion that the tests were an unqualified success. These preliminary results indicate that the theories and calculations of the Los Alamos Laboratory are qualitatively correct and when the data has finally been evaluated, quantitative checks of these ideas will be available.

This section covers only the highlights of test operations. A complete report on the operations of TG 7.1 and of the findings of the scientific group is under preparation by the Scienitfic Director and the Test Director and will be made to the Atomic Energy Commission. Access to this report can be had through the Military Liaison Committee.

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SECTION 13

Synopsis

This section discusses the decisions arrived at in establishing the proving ground on a permanent basis and the responsibilities of the Joint Task Force in placing the installation in a standby status. The roll-up of Operation Sandstone was concerned with Post-Sandstone requirements at the proving ground involving the establishment of a security garrison; determination of the types and amount of equipment to be left at Eniwetok and that which would have to be returned; and the accomplishment of measures necessary to assure the preservation of the installations of the proving ground. The normal roll-up of Task Force equipment was accomplished in addition to the above considerations.

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SECTION 13

ROLL-UP—POST-SANDSTONE REQUIREMENTS

Plans for roll-up of Operation Sandstone were established on a progressive basis early in the planning stage. Field Order No. 1, dated 14 November 1947, took cognizance of the roll-up requirements that later would be imposed on the Task Force and directed attention to the need to provide progressive plans therefor.

Field Order No. 2, dated 8 March 1948, established a framework of plans and procedures upon which the subordinate units of the Task Force based their roll-up activities.

During the period of approximately four months between the issuance of the two field orders, the staff of the Joint Task Force gave consideration to the problems of closing out the operation concurrently with plans for the execution of the Task Force's mission in Operation Sandstone.

The Chairman of the Atomic Energy Comission, Mr. David E. Lilienthal, on December 1947, in a memorandum to the Joint Chiefs of Staff, reaffirmed the view of the AEC that a proving ground would be required so long as atomic weapons are being developed and produced. Mr. Lilienthal stated that a two-year interval between tests may meet the more urgent requirements of proof-testing. He suggested in this memorandum that the Commander, Joint Task Force Seven, and the staff of the Atomic Energy Commission work out the details as to the degree of permanence of the proving ground and the disposition of property.

On 20 February 1947, the Joint Chiefs of Staff directed the Commander, Joint Task Force Seven, to implement this latter suggestion. As a result of this, the Task Force responsibilities for closing out the operation were extended to encompass the following:

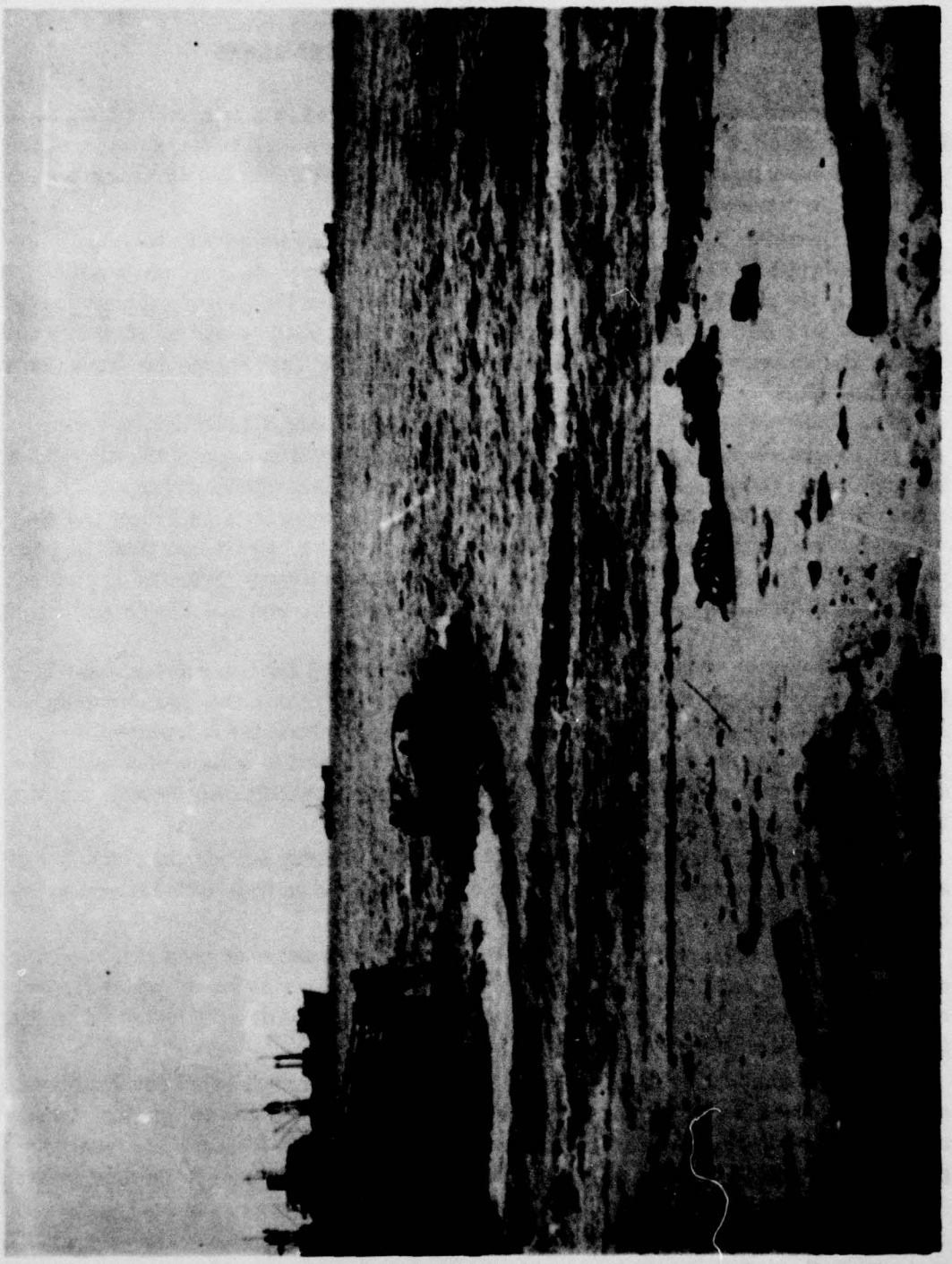
1. To place the proving ground in a standby condition and in a state of preservation sufficient to permit minimum maintenance and minimum rehabilitation upon return of a large body of personnel within a two-year period.

2. To devise plans for the maintenance of adequate security against the possibility of a foreign agent entering the area and securing information on fissionable materials residual from the tests.

Additionally, roll-up plans had to provide for the disposition of property, including decision as to which equipment could profitably be left at the proving ground and that which could more profitably be returned to another locality. This consideration extended to the installations at Kwajalein as well.

During December 1947, and January 1948, General Hull anticipated the Post-Sandstone requirements for a permanent proving ground and directed that the matter be made a continuing study. General Barker, the Assistant Chief of Staff, J–3, early in January prepared a standby plan for the proving ground, based on assumptions as to its permanence.

Prior to the time the Joint Chiefs of Staff directed that details as to the permanence of the proving ground be worked out between the Commander, Joint Task Force Seven and the AEC staff, a roll-up board was organized within the Task Force. Headed by Lt. Col. L. J. Lincoln, U. S. Army, this board included representatives of the AEC and of the armed services. On the basis of reconnaissance at the forward area by members of this board,



The Operation rolls up at Eniwetok.

conclusion was reached that it would be more economical in the majority of instances to return equipment rather than to attempt to preserve it for a two-year period. This particularly applied to equipment with metal paarts subject to rusting or corroding and, to a lesser degree, to other materials.

Field Order No. 2, evolved by the Roll-Up Board, established basic policy and plans for closing out the operation and provided detailed procedures for disposition and for return of property and for the return of personnel.

In addition, Field Order No. 2 fixed the responsibilities of the Task Group Commanders for the various aspects of the roll-up. CTG 7.2 was made responsible for preparations ashore for future tests on Eniwetok Atoll, and was directed to assist CTG 7.1 in its roll-up activities. TG 7.2 also was made responsible for disposition of its own personnel, property and records prior to departure from Eniwetok. This last requirement also was placed on Task Groups 7.3 and 7.4. TG 7.7 was directed to assist TG 7.4 in packing and crating and was made responsible for surface shipping from Kwajalein. All Task Group Commanders were required to submit withdrawal and roll-up plans based on Field Order No. 2.

At the time of issuance of Field Order No. 2, on 8 March, preliminary conclusions indicated that a Post-Sandstone garrison would be required at Eniwetok if the area was to be given surveillance against intrusion. The Field Order contemplated this eventuality and made provisions therefor. An assumption was made that a 50-man garrison would provide a reasonable degree of security and plans were included for the housing and other needs for a garrison of this size.

Plans for a larger garrison were later considered but discarded when it was decided that a physical guard on each of the three zero islands would not be required. As time went on, and the actual tests were conducted, it was developed that the recovery of any substantial amount of fissionable material by a foreign country would involve a considerable effort and for this reason physical occupation of the target islands was not considered necessary.

During the remainder of March and April, development of Post-Sandstone requirements continued to be perfected. On 28 April, General Hull, through the Plans and Operations Division, Department of the Army, recommended to the Joint Chiefs of Staff that it be noted that preparations for the reception of a small garrison force were being accomplished by Joint Task Force Seven as a part of Sandstone roll-up. General Hull further recommended that the Joint Chiefs of Staff:

1. Approve the transfer of overall Post-Sandstone military responsibility for the Eniwetok Atoll to the Commander in Chief, Pacific, on or about 1 June 1948.

2. Obtain the concurrence of the AEC in a directive to CINCPAC effecting the transfer of responsibility and, thereafter, to issue the directive for implementation.

3. Make financial arrangements with AEC to defray the cost of housing the garrison and of any special items not normally borne by the armed services as a part of routine operations.

In making these recommendations, General Hull pointed out to the Joint Chiefs of Staff that since the nature of future tests was undetermined, only limited preparations appeared to be justified. Only such tasks for future tests which could be foreseen as meeting a reasonably firm requirement were recommended.

The Joint Chiefs of Staff received concurrence of the AEC in these recommendations, and in early May directed CINCPAC to assume overall military responsibility for Eniwetok Atoll and the atomic weapons proving ground. The directive required that CINCPAC accomplish the following:

1. Establish a garrison on Eniwetok Atoll.

2. Maintain the status of Eniwetok as a closed area.

3. Maintain the existing standby facilities as turned over by the Commander, Joint Task Force Seven.

4. Maintain housing and messing facilities for the support of Post-Sandstone scientific and survey parties, not to exceed 50 men at any one time.

5. Provide necessary safety measures to protect members of the garrison forces from radiological hazards.

In conformance with the conclusions reached by the Task Force, the directive stated that only general surveillance of the entire atoll would be required to maintain the status of the closed area. It was required that this surveillance be such as to prevent the removal of significant samples from the zero islands and to prevent unauthorized photography, trespassing, or the removal of smaller samples. It was stated, however, that a permanent guard on the contaminated islands need not be maintained normally.

This directive was in accord with the plans devised by the Task Force. Post-Sandstone responsibility was given to CINCPAC since the Marshall Islands sub-area is a part of that command.

Following the JCS directive to CINCPAC, decision was reached by CINCPAC that the Eniwetok garrison should be made up of Army personnel drawn from U. S. Army, Pacific, supplemented by a small number of Naval personnel to handle local water transportation. By a later decision a small Air Force detachment was added. After some study, it was agreed between CINCPAC and USARPAC that a limited number of dependents of garrison personnel would be permitted at Eniwetok. On 4 May, a tentative Table of Organization was drawn up by the Task Force which provided for 8 officers and 41 men of the Army garrison and seven Naval enlisted men.

On 19 May, the Commander in Chief, Pacific, and Commander in Chief, Pacific Fleet, issued a letter of instructions to the Commander of the Army garrison, designating this officer as Atcom Eniwetok. The LOI provided that the command would report to the Commander, Marshalls sub-area, for operational control. The tasks assigned included the establishment of the Eniwetok garrison; maintenance of the closed area; maintenance of the standby facilities; maintenance of facilities for Post-Sandstone scientific and survey parties not to exceed 50.

One radiological-medical officer plus necessary Rad Safe monitors were designated as part of the command to provide radiological safeguards.

The LOI also provided that USARPAC, PACAIRCOM and Iscom Kwajalein would provide logistic support as directed by CINCPAC.

General surveillance only of the entire Atoll was directed in accordance with the directive issued by the Joint Chiefs of Staff. It was further directed that removal of samples and the making of photographs or other trespass would be denied unauthorized agents.

With this action, Joint Task Force Seven was relieved of further responsibility for Post-Sandstone requirements. One project remained to be done; T.G. 7.2 was charged with providing the necessary living accommodations for the garrison. This was accomplished concurrently with the Task Group's normal roll-up responsibilities. In addition, the Army Task Group performed the following tasks in placing the technical installations of the proving ground in a standby status:

1. Accomplished the destruction of certain test structures and contaminated materials which might provide information or samples of value to an intruder.

2. Completed surveys of the three crater areas to determine the location of the materials which previously filled the craters.

3. Coated all gamma stations with a protective covering of asphalt and sand to prevent deterioration of the structures.

4. Greased and cosmolined all metal parts of the gamma stations and timing stations.

5. Removed and stored certain equipment such as winches, generators, spare cable, and storage batteries.

6. Disposed of by dumping into deep water contaminated equipment, such as motors, compressors and condensors.

7. Bulldozed certain extraneous materials in the vicinity of the blast hut into the lagoon.

8. Removed and disfigured blast footings and moved test structures of the Bureau of Yards and Docks to new positions to prevent possible disclosure of information.

9. Cleaned up or moved all miscellaneous items that might expose restricted data.

In the accomplishment of the roll-up the Task Force required considerable shipping. Approximately 35,000 measurement tons of cargo were landed at Eniwetok and about 24,000 tons of this amount required return to the United States or Oahu. Of the approximately 20,000 measurement tons landed at Kwajalein, about 8,000 tons required return.

Return shipments commenced on 15 March. By 1 May some 9,000 measurement tons were loaded out of Eniwetok and about 1,000 tons out fo Kwajalein. The remainder of the out-shipments were phased out during the month of May and the first half of June with the last shipment from Eniwetok scheduled on 15 June and from Kwajalein on 12 June .

Personnel were moved both by air and water. From Eniwetok, 5,263 persons were returned by unit surface vessel, 355 by military aircraft and 1,925 by surface vessel. The Air Task Group moved approximately 602 by unit aircraft. In addition, 357 persons were returned from Kwajalein by air and 648 by surface craft.

Return of personnel was commenced in April when part of the 18th Engineer Company departed, having completed its assigned tasks on Engebi. The policy of returning personnel as they became available was followed throughout the roll-up period.

The major ships of the Task Force departed Eniwetok Lagoon on 20 May, West Longitude Time. Headquarters of the Task Force had moved to Fort Shafter two days earlier.

General Hull returned to Oahu on 18 May with selected members of the staff to complete his report on the Operation for submission to the Joint Chiefs of Staff. Deactivation during the latter part of June was scheduled and so recommended to the Joint Chiefs of Staff.

One of the problems of the roll-up was that of identifying service-furnished property which had been charged against AEC funds. A Task Force Advisory Audit Team assisted property officers in making these determinations. The identity of many items charged to the AE Chad to be established in Washington, which complicated the task. As items were identified, notification was made to the AEC property representative, who then issued instructions for its disposition.

In general, AEC property was returned to the Naval Supply Center at Oakland, California, for inventory and further disposition. AEC property on Kwajalein was transferred to the custody of the Island Commander for use in future operations. Items of military equipment were returned to the Zone of Interior or to Oahu, as designated by the respective services.

Appendix

OFFICIAL SANDSTONE OBSERVERS

Following are the official observers who witnessed the three tests of Operation Sandstone:

XRAY TEST

AEC from Washington
Dr. John A. Derry
Dr. John Z. Bowers
Dr. R. F. Bacher
Dr. J. B. Fisk
Brig. Gen. James McCormack, Jr.
Mr. Fred B. Rhodes
Commander E. B. Hooper
Mr. W. T. Golden

U. S. Representatives
The Hon. W. S. Cole
The Hon. Melvin Price

CINCPAC
Admiral Ramsey
Vice Adm. Sallada

JCS
Colonel J. B. Knapp

MLC
Lt. Gen. L. H. Brereton
Col. H. D. Aynesworth
Lt. Col. W. J. Burke
Lt. Col. W. P. Leber

AEC from Los Alamos
Dr. J. M. B. Kellogg
Mr. D. W. Mueller
Mr. E. Morgan
Mr. R. M. Underhill
Mr. J. C. Franklin
Dr. N. E. Bradbury

AFSWP
Lt. Col. C. B. Page
Maj. J. C. Healey
Capt. E. M. Strieber
1st Lt. N. D. Mallory

Army
Lt. Col. G. W. Beeler
Lt. Col. B. E. Powell

Air Forces
Col. R. O. Cork
Col. N. T. Perkins
Col. F. A. Cook

Pacific Air Command
Lt. Col. Vaughn

YOKE TEST

AEC from Washington
Dr. R. P. Johnson
Mr. A. V. Peterson
Lt. Col. K. E. Fields
Dr. Paul McDaniel
Mr. W. G. Sheehy

MLC
Lt. Col. R. L. Mushen

Navy
Capt. H. A. Schade, USN

Army
Col. W. S. Biddle
Col. D. Z. Zimmerman
Lt. Col. M. D. Kirkpatrick
Maj. J. E. Gay

AFSWP
Col. S. J. Gormly, Jr.
Lt. Col. J. B. Lampert
Lt. Col. D. H. Parker
Lt. Col. R. J. Clarke
Lt. Col. H. J. Crumly

YOKE TEST (Continued)

AEC from Los Alamos
Mr. P. J. Larson
Mr. S. W. Burriss
Dr. D. P. MacMillan
Dr. J. H. Roberts
Dr. B. E. Watt
Dr. F. J. Willig
Dr. F. C. McLean
Dr. Richard Taschek

Air Forces
Maj. Gen. L. C. Craigie
Col. M. F. Summerfelt
Col. J. E. Moore
Col. D. C. Doubleday
Col. D. E. Hooks

Pacific Air Command
Brig. Gen. R. F. Travis

ZEBRA TEST

AEC from Washington
Mr. J. K. Pickard
Dr. L. R. Donaldson
Dr. D. B. Langmuir
Dr. P. C. Aebersold

AEC from Los Alamos
Mr. J. H. Hanley

Army
Lt. Col. G. M. Jones
Lt. Col. C. A. Finley
Major C. E. Ray

MLC
Lt. Col. P. J. Long

AFSWP
Col. A. W. Nielson
Col. K. F. Hertford
Lt. Col. J. A. Ord
Lt. Cdr. J. K. Sloatman, Jr.
Cdr. Slaydon
Cdr. Fonick
Lt. Col. W. S. Cowant, Jr.

Air Forces
Col. L. I. Davis
Col. D. E. Darrow
Lt. Col. J. F. Babcock
Col. G. Y. Jumper

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BIBLIOGRAPHICAL NOTE

This report is based on the historical files maintained in the Office of the Adjutant General, Joint Task Force Seven, the files maintained in the Division of Military Application of the Atomic Energy Commission, and upon the special reports of the General and Special Staff Sections and the Task Groups of Joint Task Force Seven.

With the exception of the files of the Atomic Energy Commission and the Joint Chiefs of Staff papers, series 1795, the above data has been deposited with the Armed Forces Special Weapons Project, where it is available to interested and authorized persons. The reports of the General and Special Staff Sections and Task Groups of Joint Task Force Seven are contained in a separate volume as Annexes to this report. One of the most valuable files to the preparation of this report was the Task Force's Daily Record which contains the account of all major conferences conducted by the Commander and Deputy Commanders as well as the Staff and Task Group Commanders. Major decisions are contained in this file.

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