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COMPLETION REPORT

U. S. ATOMIC ENERGY COMMISSION

CONTRACT NO. AT-(29-1)-507

[redacted]

ENIWETOK
PROVING GROUND FACILITIES

VOL. IV
COLLATERAL SERVICES

HOLMES & NARVER, INC.

LOS ANGELES, CALIFORNIA

1 September 1951

Unclassified

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Section 7

SECURITY

CAUTION
"This document contains information affecting the National defense of the United States... transmission or the disclosure of its contents in any manner to an unauthorized person is prohibited and may result in severe criminal penalties under applicable Federal Laws."

CHAPTER 7.1

GENERAL

The security provisions of the Contract required that Holmes & Narver conform to all security regulations and requirements of the Atomic Energy Commission and included specific provisions concerning unauthorized disclosure of information, the safeguarding of classified information, the clearance of personnel, and the release of information. These security requirements necessitated the provision of a full scale security organization to cover security at the Home Office, at the Honolulu Office, and at the Jobsite. Because Holmes & Narver had established no formal security organization prior to this contract, it was necessary to hire qualified security personnel and to build an organization as the needs of the job required. Personnel and facilities were provided for the following:

1. Personnel Clearance. It was required that all employees engaged in AEC contract work be processed for either a "Q" clearance or "P" security approval, according to the access that their job would require. During the period from the commencement of the Contract, January 1, 1949, until June 30, 1951, approximately 2900 new "Q" clearances and 4100 "P" approvals were granted. In addition, approximately 1500 cases were processed which did not result either in clearance or formal denial of clearance. In this category were those individuals who withdrew their job applications, those who were found to be physically unqualified, or those who for any other reason were found to be unavailable before clearance processing was completed. Once the processing was initiated, the work involved for the Holmes & Narver Security Division was practically the same whether the individual received a "Q" clearance, a "P" approval, or no clearance at all.

2. Physical Security. Included in physical security were the establishment and maintenance of security safeguards at the Home Office, Honolulu Office, and Jobsite as required by Atomic Energy Commission General Manager's Instructions No. 37 and No. 153.

3. Information Security. Information security entailed the development and installation of office procedures for the control and accountability of classified documents and material. It included all phases of classification and the procedures which applied to the preparation, transmission, receipt, storage, and destruction of Restricted Data and other classified information. As part of the program of information security, it was necessary that all employees at all locations be indoctrinated in the basic fundamentals of security and that individuals be given specific security instruction in accordance with the needs of the job in which they were engaged.

In addition to the basic security responsibilities outlined above, there were numerous other continuing and recurrent activities of importance to the maintenance of an adequate security program. These included:

1. The provision of travel orders and Navy identification cards for Holmes & Narver personnel and others travelling overseas. Until July 1950, when Joint Task Force Three established a facility for issuing travel credentials, Holmes & Narver arranged for necessary overseas credentials for Los Alamos personnel and others.

2. Maintenance of liaison with AEC, military, FBI, civic, and other officials. This included attendance at meetings of security interest locally, in Washington, Los Alamos, Honolulu, and Eniwetok.

3. Advice to subcontractors on security matters, including clearance of consultant and subcontractor employees.

4. Arrangements for the security notification required when Holmes & Narver personnel visited AEC and AEC contractor installations.

5. Arrangements for and supervision of classified teletype service.

6. Dissemination of information of security interest as appropriate to Holmes & Narver employees.

At the commencement of the Contract, all security activities were placed under the general supervision of the Chief Fiscal Officer, and the security organization consisted of one Assistant Security Officer and three clerical assistants. In August 1949, a full-time Chief Security Officer was appointed, and the security organization was expanded as the contract requirements increased. At the peak of operation, the Security Division consisted of:

Home Office - 1 Chief Security Officer

1 Assistant Chief Security Officer

1 Senior Security Assistant

1 Security Assistant

1 Interviewer

1 File Clerk

1 Identification Clerk

1 Secretary

1 Clerk Typist

Honolulu Office - 1 Security Officer

1 Interviewer

Jobsite - 1 Security Officer

1 Assistant Security Officer

In addition to the above, additional clerical assistance was provided as the work load required.

For the most part, this organization proved to be adequate in numbers. This was fortunate, as the office space available in the Home Office would not permit any additions.

CHAPTER 7.2

PERSONNEL CLEARANCE

The personnel clearance program under the Contract was, because of the large numbers of personnel involved and the extent of the paper work required, by far the most involved and greatest time consuming activity of the Security Division.

TYPES OF CLEARANCES

Every person hired or considered for hire for overseas or Home Office work required some form of AEC security clearance. The minimum requirement for employment in any capacity was a "P" approval. This was a formal security approval for hire and permitted the holder access to AEC and military information classified as high as SECRET but not containing Restricted Data, as defined in the U. S. Atomic Energy Act of 1946.

This approval was granted after an examination of the personnel security questionnaire and a satisfactory search of official government files which might contain derogatory information concerning the individual. The usual requirement was a search of the Federal Bureau of Investigation fingerprint and individual files in Washington, D. C., but under special circumstances a search of local files in the vicinity of the applicant's home address was considered acceptable.

The other type of security approval was an AEC "Q" clearance based on a full scale investigation by the FBI. This permitted the individual access to all types of classified information, both AEC and military and including AEC Restricted Data. The extent of such access was dependent upon whether it was necessary in order that the individual might properly perform his job. It was, and is, a cardinal principle that no person is entitled to more access to classified information of any kind than his work requires.

In addition to the two basic types of clearances described above, there were a number of combinations and variations of these which were used to fit particular circumstances.

The "QP" clearance, as the name implies, was a combination of "P" approval and "Q" clearance initiated in one submission. In this case the "P" approval was issued after the file search was completed, and the "Q" clearance was later granted after the completion of the full investigation. This procedure permitted the individual to proceed to the Jobsite when the "P" approval was received. The "Q" clearance followed later prior to the time that it was required by security regulations. This procedure was advantageous in that it provided two required clearances in one submission and permitted the employee to proceed to Jobsite earlier than if he were required to wait for a "Q" clearance. In some cases, however, unneeded expense of a "Q"

investigation resulted when the employee terminated his employment before a "Q" clearance was required.

The "QR" clearance was a reinstatement of a "Q" clearance which had been previously active but had been terminated because of nonemployment on AEC work requiring clearance.

The "QE" clearance was a "Q" clearance granted under emergency conditions by the Manager of the Atomic Energy Commission, Santa Fe Operations Office, or the Commanding General of Joint Task Force 3. It was granted only in cases of real emergency when it was essential that the individual be employed or given access to Restricted Data prior to the completion of a full investigation by the FBI. This clearance was used very sparingly and was requested only in cases of extreme need. Throughout the entire operation, only 13 were requested. All of these were granted, and none resulted in later repercussions of any kind.

PROCESSING PROCEDURES

After a prospective employee had been interviewed in the Personnel Department and was considered acceptable for employment, he was given the forms to be completed for security clearance processing. These consisted of a personal history questionnaire, a security acknowledgment, a fingerprint card, and an extract of the Atomic Energy Act of 1946. In the case of overseas employees, there was added a Navy identification card and a Navy identification file sheet.

The personnel security questionnaire was the only one filled out in detail by the applicant. It was rather troublesome because it required a large amount of detailed information on the background of the applicant, including past employment, former home addresses, citizenship status, organization memberships, etc. Furthermore, it was almost invariably filled out incorrectly, and it was usually necessary that a security interviewer go over individual entries with the applicant in order that acceptable detail would be included. The interviewer verified the citizenship of the applicant by viewing birth certificate, naturalization papers, or whatever acceptable evidence of citizenship was available and marked on the application that he had examined the military discharge for military service claimed by the applicant. The applicant was then photographed and fingerprinted, and, for overseas employees, the information required for the Navy identification card was obtained.

An initial security lecture was given at the time of completion of the questionnaire. Later, usually at the time of actual hiring, a second security lecture was given. This lecture varied with the job status of the applicant and was different for Home Office and Jobsite employees. At the time of the second lecture, Jobsite employees were shown a motion picture based on security activities and requirements of the Sandstone Operation.

After the security forms had been completed in the rough they were typed by the stenographic pool of the Personnel Department and forwarded to the Los Angeles Atomic Energy Commission Security Branch Office.

The above basic procedure was followed in all cases involving "P" approval, "Q" clearance, or "QP" clearance. In case of a "Q" clearance reinstatement, a "Q" emergency clearance, or the submission for a "Q" clearance after a "P" approval had been received, the procedure varied somewhat; but in all cases the personnel security questionnaire, the security acknowledgment, the extract of the Atomic Energy Act of 1946, and the fingerprint card were required to be completed and submitted.

CHRONOLOGICAL HISTORY OF CLEARANCE REQUIREMENTS

The processing of overseas employees varied considerably, depending on requirements imposed by the AEC, and on conditions at Jobsite at the time of processing. At the commencement of recruiting of overseas employees in January 1949, all were submitted for a "QP" clearance but were permitted to proceed overseas upon the granting of a "P" approval. This approval was based on a check of the local files of the Federal Bureau of Investigation and such police and other files as were available in the Los Angeles area.

This "P" approval usually did not require more than a few days' processing time and was therefore operationally advantageous, but it was unsatisfactory from a security standpoint in that the checks covered only records of the Los Angeles area and did not include information which might be on record elsewhere. This shortcoming was evident when reports of full investigations by the FBI on "QP" processings were received. Reports revealed considerable derogatory information concerning men already sent to the Jobsite on the basis of local check approvals.

In August 1949, it was decided by AEC security officials at Los Alamos that, except in special cases, no further local check "P" approvals would be granted and that "P" approvals would thereafter be based on checks made of the central files of the FBI in Washington. Checks were to be made of both the fingerprints and the name of the individual. This procedure resulted in a much better security basis for "P" approval but usually required at least 30 days for the granting of the approval.

On about September 15, 1949, a directive was received from the Director of Security at Los Alamos that thereafter "QP" submissions for clearance would not be required for new employees unless it was reasonably certain that they would remain at Jobsite beyond November 1, 1950, which was then considered as the limiting date prior to which a "Q" clearance would not be necessary.

In compliance with the above directive, a general rule was established by Holmes & Narver to the effect that any employee sent to the Jobsite more than a year prior to the then established limiting

date would be submitted for a "P" approval only. It was assumed that his work contract would have expired before a "Q" clearance would be required, and in cases of renewal or extension of contract, later submissions for "Q" clearance were to be made necessary.

The object of this procedure was to effect economies in clearance costs and to reduce the work load in the AEC and FBI Offices concerned with Holmes & Narver clearances. At that stage of the operation (more than one year before the limiting date), a substantial savings in clearance costs could be effected without materially affecting any other phases of the clearance program.

By November 1, 1949, although the tentative limiting date (November 1, 1950) had not been changed it was considered by the Chief Security Officer, Holmes & Narver, that submission for "P" approvals only should be continued until a reasonably good estimate of the number of "Q" cleared persons to be required in the various job classifications could be made, based on later considerations of job progress and job requirements.

On January 6, 1950, a security meeting was held in the Holmes & Narver offices in Los Angeles to determine pertinent security procedures. This meeting included security representatives from the Office of the Director of Security at Los Alamos, the AEC Los Angeles Security Branch Office, the Washington Area AEC Security Office, and security and other officials of Holmes & Narver. At this meeting, it was announced that special clearance arrangements had been made for the clearance of personnel hired in the Hawaiian Islands. These arrangements permitted the granting of local check "P" approvals by an AEC security representative stationed in Honolulu for all persons who had resided in the islands for a period of at least 10 years. This procedure greatly accelerated the receipt of "P" approvals and the hiring program in the Hawaiian Islands. It did not affect the time required for a "Q" clearance. At this meeting it was also announced that the limiting date, although still tentative, probably would not be later than November 1, 1950, and might be earlier.

Shortly after the meeting, the Holmes & Narver Chief Security Officer decided that in order to insure a sufficient nucleus of cleared personnel by the limiting date, all personnel departing from the United States for the Jobsite should be submitted for a "Q" clearance upon departure and that persons already at the Jobsite with a "P" approval should be submitted for a "Q" clearance as soon as Jobsite Management could determine with a reasonable degree of certainty that the men would remain beyond the limiting date.

Beginning about February 1, 1950, all "P" approval personnel sent to the Jobsite were processed for a "Q" clearance. This was continued until about April 25, 1950, when oral instructions were received from the Chief, AEC-NME Test Security Branch to discontinue processing "Q" until June 1, 1950, and thereafter to process only those men whose services would be needed after the establishment of the new limiting date.

These instructions were confirmed by letter (LAB-J, D-T), dated May 11, 1950, from the Chief, AEC-NME Test Security Branch, Santa Fe Operations Office. This letter emphasized the necessity for economy in clearance costs and the necessity for careful consideration as to the need for clearance before initiating processing.

The deferment of clearance submissions at this time, in view of the uncertainty as to the number of "Q" clearances to be required, was disadvantageous to the Holmes & Narver clearance program in that it increased the number of "P" approval personnel at the Jobsite who would later have to be submitted for a "Q" clearance. The extent of the disadvantage of deferred submissions was apparent in the fall of 1950, when the time came to insure that all persons who were expected to remain at the Jobsite after January 15, 1951, were submitted for "Q" clearance. By this time, because of greatly expanded construction requirements, it was found necessary to process all "P" approval men then at the Jobsite for "Q" clearance, except those whose contracts were to expire, in order to insure the presence of enough "Q" cleared personnel to complete the job. As a result, approximately 430 men with "P" approvals had to be processed for "Q" clearance, and each one had to sign a new personnel security questionnaire. Because of the number of men involved and their distribution in all parts of the Atoll where work was in progress, it was a major and time-consuming task to locate them and to complete their processing. As a result, clearance submissions were delayed in many cases and it was not until the middle of November that all needed clearances of men at the Jobsite had been submitted. Furthermore, the submission of this large number of "Q" clearance requests over a short period of time placed an overload on the investigative and other clearance agencies and resulted in a considerable increase in clearance time required.

In July 1950, Jobsite management was requested by the Security Division, Holmes & Narver, to submit names of men at Jobsite who would probably be needed on the job after January 15, 1951, although at that time it was difficult to make accurate predictions as to what personnel would actually be needed. It was then expected that all basic construction would be finished by January 15, 1951, but the many increases in the scope of the Project had not as yet been made. In August 1950, it was estimated that approximately 950 employees would be required on January 15, 1951; but on that date there were actually 1826 employees at the Jobsite. As the job work progressed in the fall, it became increasingly apparent because of increases in job requirements that the number of clearances in process would not be adequate to provide the added number of cleared personnel needed on the limiting date of January 15, 1951.

On October 11, 1950, it was recommended that "P" approval personnel be permitted at Jobsite until March 1, 1951[1]. This recommendation

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[1] Letter, CHN991, dated Oct. 11, 1950 addressed to Manager, AEC Santa Fe Operations Office.

was based on a then expected required Holmes & Narver personnel total of 1467 during January 1951, and 1430 during February 1951. By the middle of November, everyone at Jobsite was in process for "Q" clearance except those definitely known to be leaving through contract completion prior to January 15, 1951.

In November, additional men were being hired as rapidly as possible to meet urgent construction deadlines. For example, on about November 15, 1950, it was determined that 70 laborers would be needed immediately for an extremely urgent grouting job that had to be completed prior to January 31, 1951, to avoid the jeopardizing of certain test experiments. At that time there were few cleared laborers available with even a "P" approval. To meet this situation, arrangements were made with the Director of Security at Los Alamos to grant local check "P" approvals to newly recruited laborers so that they could be sent to the Jobsite with a minimum of delay. A special recruiting party was sent to Dallas, Texas, for the purpose of utilizing the favorable labor market there. An AEC security representative and a Holmes & Narver security officer accompanied the party to process local check "P" approvals. As a result, "P" approvals were received quickly, and the personnel requisition for laborers was filled in a minimum of time. However, there was little possibility that these men could be given a "Q" clearance until a considerable time after the limiting date of January 15, 1951.

On December 14, 1950, it was requested of the Manager, AEC, Santa Fe Operations Office, that the limiting date be extended to March 1, 1951, because it was apparent that there would not be sufficient "Q" cleared personnel at the Jobsite by January 15.[1] Extension was granted to February 15, 1951[2]; and for employees on Parry and Eniwetok Islands only, extension was later granted to March 1, 1951[3].

During the period between November 1, 1950, and January 15, 1951, approximately 580 new employees were sent to Jobsite, and on January 31, 1951, a peak number of 1841 Holmes & Narver employees was reached.

After January 31, 1951, and until the end of the operational period job personnel requirements continued to be considerably in excess of previous estimates and shortages developed in several job categories, including the messing, marine and power, and water distillation operations. This was due largely to the excessive over-all population. Instead of the 2000 expected, there were actually 2800. In addition, the time required to process "Q" clearances had increased to approximately 90 days.

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[1]Letter, CHN-1133, dated December 14, 1950.
[2]Letter, AEC, SFOO, ER-1, SD6511, dated January 3, 1951.
[3]Letter, AEC, SFOO, dated February 5, 1951.

After March 1, 1951, by order of the Commanding General, Joint Task Force Three, who had assumed control of the test operation, the limiting date for "P" approval personnel on Parry Island was advanced to March 15, 1951, and later to April 2, 1951. On April 2, 1951, a total of 31 "P" approval personnel concerning whom derogatory information had been developed were removed from the Jobsite, and the remainder of the noncleared personnel, both military and civilian, were limited to Parry and Eniwetok Islands (not including exclusion areas). Uncleared boat personnel were permitted to operate their boats but could not land except on Eniwetok and Parry Island. These regulations remained in effect until the end of the operational period.

CLEARANCE STATISTICS

Table 7.2-1 shows clearance statistics by months; Table 7.2-2 shows submissions, receipts, and average times required for "P" approval and "Q" clearances; and Table 7.2-3 gives an analysis of over-all clearance activities. The total number of cases partially or completely processed for all types of clearance action was 8462. The total number of "P" approvals received was 4072. The total number of "Q" clearances received was 3237, including 350 "Q" reinstatements and 13 "QE's." It should be noted that in a large majority of cases the same individual was processed for a "P" approval and later for a "Q" clearance.

The discrepancy between the receipts and submissions is accounted for in part by the fact that many men were processed whose clearance did not proceed to the point where a clearance was granted or denied. These included those whose employment processing was stopped because of failure to qualify physically, loss of interest in the job because of the time required to obtain clearance, stoppage of clearance because of unfavorable reference checks, uncompleted processing, orders to military services, etc. Also included were cases where clearance was denied for security reasons.

In addition to the number of men recorded as being not available for hire after being processed, there were many more who lost interest in the job upon being informed that clearance was necessary and that any type of clearance would require at least 30 days. There were also 1065 men who were not available for hire after clearance was finally received. The great majority of these were "P" approval cases.

As shown, the time required to fully process a "P" approval averaged about 30 days, throughout the operation. This average included approximately 900 local check "P" approvals in Honolulu and elsewhere which averaged less than one week each.

The over-all average time required appears excessive in view of the fact that Holmes & Narver clearances were assigned a high priority and presumably had special handling in transit. Its adverse effect on hiring, especially in the earlier stages of the operation when "P" approvals only were required, was considerable.

TABLE 7.2-1 CLEARANCE SUBMISSIONS

	Month	"QP"	"Q"	"QR"	"P"
1949					
	January	5	20	37	2
	February	5	6	5	12
	March	6	5	3	7
	April	44	16	5	16
	May	46	11	8	15
	June	17	10	10	15
	July	27	6	8	13
	August	54	17	13	34
	September	33	12	13	98
	October	11	3	5	106
	November	13	14	10	108
	December	17	2	9	157
1950					
	January	45	14	9	308
	February	54	133	8	445
	March	59	117	15	304
	April	69	100	10	227
	May	22	11	8	241
	June	39	8	21	360
	July	27	94	37	360
	August	27	122	12	449
	September	33	172	6	353
	October	101	432	20	253
	November	400	382	7	60
	December	467	120	13	44
1951					
	January	31	182	21	4
	February	6	55	7	0
	March	12	231	8	1
	April	2	263	14	1
	May	32	82	8	3
	June	21	53	5	2
	Total	1,725	2,693	355	3,998

TABLE 7.2-2 "P" APPROVAL AND "Q" CLEARANCE RECEIPTS AND PROCESSING TIMES

	Month	"P's" Received	Average Days	"Q's" Received	Average Days
1949					
	January	2	30	7	79
	February	7	30	3	60
	March	8	28	9	66
	April	20	29	11	76
	May	57	29	11	74
	June	64	28	29	70
	July	23	35	26	84
	August	60	28	64	83
	September	51	28	76	74
	October	135	26	28	66
	November	95	28	61	67
	December	71	27	18	84
1950					
	January	147	27	13	53
	February	295	25	18	61
	March	414	30	35	57
	April	180	30	122	65
	May	288	37	163	61
	June	165	27	87	87
	July	237	27	31	68
	August	322	26	45	53
	September	262	28	55	59
	October	227	31	99	60
	November	311	32	91	70
	December	441	30	145	75
1951					
	January	158	33	444	80
	February	4	38	517	82
	March	8	36	334	90
	April	--	--	111	94
	May	2	52	71	87
	June	18	39	163	92
	Total	4,072		2,887	

The time required for full processing of "Q" clearances showed a general increase as the operation progressed. During most of 1950, the time averaged approximately 60 days; in November 1950, it reached 70 days; and it climbed steadily thereafter. During 1951, the average time required was approximately 90 days, and 213 cases required more than 120 days.

TABLE 7.2-3 SUMMARY OF CLEARANCE SUBMISSIONS AND RECEIPTS

SUBMISSIONS		
"P"	3,998	
"QP"	1,725	
"Q"	2,693	
"QR"	355	
"QE"	13	
Total		8,784
RECEIPTS		
"P"	4,072	
"Q"	2,874	
"QR"	350	
"QE"	13	
Pending, June 30, 1951	455	
Uncompleted (men not available for hire)	568	
Processing stopped (derogatory information)	367	
"Hold" cases surplused before denial	63	
Clearance denied	22	
Total		8,784

SECURITY DENIALS AND REVOCATIONS

During the course of the job there were 22 cases in which formal denials of clearance were received from the Manager, Atomic Energy Commission, Santa Fe Operations Office. In these cases, the men concerned were removed from the Jobsite as directed by the Manager, Santa Fe Operations Office. Some were removed immediately and others were permitted to remain until the completion of their contracts or until a specified date.

Other security undesirables were disposed of variously. If, prior to the departure of the man from the United States, derogatory information was discovered (usually as a result of the file checks), he was not considered for hire and the case was discontinued. There were 367 cases of this type. In 63 other cases men had been sent to Jobsite on apparently favorable "P" approval checks, and later during the FBI investigation it was developed that serious derogatory information existed. These cases presented a troublesome problem in that it was necessary under current directives to remove the men from Jobsite without revealing that their removal was in any way due to security considerations.

Some of these employees were discharged for bad conduct or poor work performance on the job; others were removed because of falsification of the personnel security questionnaires or job applications; and others quit voluntarily for normal reasons. There remained however a relatively large number whose work performance and conduct were above reproach and who were, in fact, badly needed at the Jobsite. In the cases of these men, Hoomes & Narver felt that their removal would not be justified, and, in addition, removal of men with excellent job performance in the face of an obvious need for their services might have resulted in legal repercussions.

At the security meeting of January 6, 1950, this situation was exhaustively explored, and it was decided by the AEC security representatives that in the absence of a formal security denial employees might remain at the Jobsite until their contract expired or until the security limiting date, whichever occurred earlier. They were not to be rehired without a full "Q" clearance. This solution was extremely helpful.

By the time the limiting date was reached, the status of the Jobsite work was such that the remaining men in the above category could be surplused without impairment of the job and without indication that their removal was for security reasons. The last of these men, a group of 31, left the Jobsite on April 2, 1951.

Throughout the entire operation there were no known cases of serious security violations either at the Jobsite or at other Holmes & Narver installations. One "Q" cleared individual was removed from the Jobsite and his clearance revoked as a precautionary measure based on the development of serious derogatory information after the granting of the clearance, and another was surplused because of loose talk in letters to a person in the United States. The information leading to these actions was discovered by the Holmes & Narver Security Division and forwarded to the AEC.

CHAPTER 7.3

PHYSICAL SECURITY

At the beginning of the operation, physical safeguards for Holmes & Narver, Inc. premises were below AEC security requirements. Therefore, in order that the company could maintain and store classified documents and material and in order to set up a limited area for classified AEC work, it was necessary to establish physical controls which would conform to AEC General Manager's Instructions No. 37, covering the handling, transmittal, and storage of classified matter and No. 60 (later No. 153), covering AEC physical security standards. These latter instructions took into consideration the scope of physical security in proportion to length of contract, highest classification and quantity of documents or work which would be involved, and type of security areas which would be necessary for proper progress of the work.

HOME OFFICE

It was determined that the establishment of a limited area at 824 South Figueroa Street would be adequate for the engineering operation. This type of area is defined as an area in which uncontrolled movement would permit access to classified matter but in which access could be prevented by escort and by other internal controls. Safeguards would be more rigid than in a controlled or restricted area and not as rigid as in an exclusion area.

Accordingly, a 24-hour, 7 days per week guard control was set up at 824 South Figueroa Street, attended by General Plant Protection Company's trained guards, all of whom had been granted AEC "Q" clearance. A Watchclox system of area patrol was installed, certain physical barriers were erected, and a communication system was established for guards to phone or receive phone calls from their control at General Plant Protection Company's main office.

For entrance control, an identification badge was issued to each AEC "Q" cleared person requiring access to the limited area. These badges, closely controlled by the Security Division, were tamperproof plastic and showed the person's photograph, number, physical description, a signature, and a counter-signature by the Chief or Assistant Chief Security Officer. Badges were worn by employees entering, working in, or leaving the limited area, and close scrutiny of these badges was made by guards at the entrance to the area. No person without an AEC "Q" clearance and without an identification badge was admitted to the area.

In conformance with requirements of AEC General Manager's Instructions No. 37, "Storage of Classified Matter," there were at 824 South Figueroa Street adequate 3-way combination steel repositories meeting AEC specifications.

At 816 South Figueroa Street, two limited areas were established, a central file room and a communications room because it was considered that most if not all of the Restricted Data maintained by Holmes & Narver, Inc., would be kept at 824 South Figueroa Street. However, the central file room would have classified correspondence and the communications room would handle "Sigtot" one-time tapes classified "Secret." Hense, the two areas mentioned above were established. Admittance to these areas was monitored by the clerks on duty and was confined to only those "Q" cleared personnel who required access to the areas in line of duty.

In addition, at 816 South Figueroa Street, additional physical controls were set up. A 24-hour, 7 days per week guard control was established. During office working hours, one guard was posted at the main entrance as a receptionist-informationist and another acted as general supervisor of guards in both buildings. This guard also acted as a courier to the Navy Headquarters at Long Beach, the Army Communication Center in the Federal Building, and the Los Angeles AEC Security Office; did finger printing, photography, and badge laminating; burned classified waste; changedfile and safe combination as necessary; and did other work incidental to the activities of the Security Division. During nonworking hours, one guard patrolled the entire building. Eleven Watchclox stations were strategically installed so that complete coverage of the building was given by the guard during his hourly patrols. One-hour heat resistant 3-way combination steel cabinets were installed in the central file room, communication room, and other offices where a small number of classified documents might be temporarily stored. Only those "Q" cleared employees whose duties required such access were given combinations to any of the repositories. Duplicate combinations to these vaults were under the close control of the Security Division.

These physical controls have been closely inspected every six months by the AEC Inspection Branch, and have always proved satisfactory. No additional physical controls have been recommended.

HONOLULU OFFICE

The Honolulu office had no special areas. For use in the storage of classified material, it had a large, heavy-walled, 3-way combination steel safe controlled by "Q" cleared personnel. However, except as a repository for classified matter in transit, little or no classified matter was kept there.

JOBSITE

At the start of the operation and until about November 1, 1950, there were no limited or exclusion areas at the Jobsite. Physical security measures were limited to the provision of adequate storage facilities for classified documents. The storage consisted of 3-way combination safes and file cabinets in buildings secured against unauthorized entry after working hours by screening and locks and bars for doors and windows. In addition, a system of patrols was maintained by camp police.

On about November 1, 1950, the first exclusion area was set up on Parry Island to provide protection for a scientific laboratory. The group of buildings involved was completely fenced, and night illumination was provided. Access to the area was limited to "Q" cleared personnel required to enter in connection with the work within the area. The area was guarded by military police provided by Commander Task Group 3.2. Entrance was limited to those on an approved list, with identification provided by signature and Navy identification card. Later, in January 1951, AEC identification badges were used.

On January 15, 1951, an exclusion area was established on Parry Island to include the main offices of Holmes & Narver, the Headquarters Offices of the AEC representatives, and the Headquarters of the Commander Joint Task Force 3. This area was fenced and was guarded by military police. Entrance was limited to those to whom exclusion area identification badges had been issued.

Later, additional exclusion areas were established both on Parry and on other islands. The regulations concerning these areas were similar to those previously established for other exclusion areas.

When the office exclusion area was established on January 15, 1951, the AEC badge system was initiated. Access to areas of different security importance was controlled by different colored photo identification badges. These badges were produced, issued, and controlled by AEC Security Officers. Also, at this time military police assumed responsibility for the patroling, guarding, and control of all areas. The normal police functions incident to the control of Holmes & Narver personnel remained with the Holmes & Narver camp police force.

With the assumption of security control by the AEC, assisted by the military police, the function of the Holmes & Narver Jobsite Security Officer and his staff was largely to render assistance to the AEC security staff in so far as Holmes & Narver personnel were concerned. At this time and for the remainder of the operating period, an important activity of Holmes & Narver security was to insure that Holmes & Narver personnel were kept supplied with the proper badges to permit their access to areas where they were required to perform necessary work and to insure that unnecessary access to security areas was denied. This included preparation of badge requests after careful checking of the individual's clearance and the need for the access requested. In cases where access was requested but the person concerned did not have the proper clearance, it was necessary to arrange for a special pass and the provision of an escort in the area.

CHAPTER 7.4

INFORMATION SECURITY

Because Holmes & Narver, Inc., was engaged in classified work for the U. S. Atomic Energy Commission, it was necessary not only to obtain clearances for its personnel and to establish physical security standards, but to establish, as well, an information control program to prevent unauthorized dissemination of classified information.

When a prospective overseas employee was first processed through the Security Division, his final step in the processing procedure was a thorough 40 minute security lecture in a lecture room provided for that purpose. Everything expected of him in the control of information to which he would have access was carefully explained to him. He was familiarized with the Atomic Energy Act of 1946 and with the penalties for its violation. The personnel clearance procedure was explained to him, as were the responsibilities placed on a cleared employee. Finally, a question and answer period was held in order that all points could be clarified. (An outline of the lecture is presented as an exhibit at the end of this section.)

When the overseas employee was finally cleared by AEC and put on a flight list for overseas, he was again called into the lecture room, where a 45-minute secondary security lecture was given him, reviewing information given him in the first security lecture and admonishing him to control his letter writing at the job and his participation in "scuttlebutt" sessions there. At the close of the second lecture, another question and answer period was held and a 16 mm sound film "Operation Sandstone" was shown. "Operation Sandstone" as shown in this instance, consisted of a depiction of a part of that operation which emphasized security aspects, which in general would apply to present and future operations. (An outline of this lecture is presented as an exhibit at the end of this section.)

To meet the different circumstances found in the Home Office the first lecture given prospective Home Office employees was somewhat varied in emphasis from that given the overseas employee. More stress was laid on storage, handling, and transmittal of classified documents and on the control of special areas; and he (or she), like the overseas employee, was thoroughly indoctrinated in the control of classified information.

When the Home Office employees had received their AEC clearances, they were called to the lecture room in groups for a second security lecture. These groups were called at convenient times and in numbers calculated to cause the least interference with work. This lecture, for the most part, consisted of a thorough explanation of GM-37, "Storage, Handling and Transmittal of Classified Documents." For this, special charts were used, as well as the 16 mm Oak Ridge security sound film. At the conclusion of the lecture a question and answer period served to clarify any points in question.

At the Jobsite, similar instruction was given to office employees with the purpose of familiarizing them with the handling of classified documents. In addition, the Jobsite Security Officer gave instructions to supervisory employees at staff conferences.

When an employee terminated from the Jobsite or the Home Office, a thorough termination security interview was held, stressing control of whatever classified AEC information to which he may have had access. A security termination statement was then signed by him, and he was required to turn in his identification card and anything else of an official nature which he may have had. Finally, if the terminating employee was not to be rehired, the security termination statement was forwarded to the AEC and the person's clearance was terminated. (An outline of this interview is presented as an exhibit at the end of this section.)

At a very early stage of the operation of the Contract, a Security and Correspondence Manual was prepared and issued by the Security Division. It proved to be extremely useful in the indoctrination of employees, particularly those in key positions and those engaged in secretarial work. This manual contained the more important of the AEC General Manager's Instructions, such as GM-37, "Procedures for Handling Classified Matter"; GM-153, "Physical Security Standards for AEC Facilities"; GM-2, "Transmittal - Documents and Materials"; GM-59, "Responsibility for Security"; and GM-19, "Top Secret Control." Also included were applicable directives issued by the Santa Fe Operations Office, such as SF-122, "Administration of Contract No. AT-(29-1)-507"; SF-3, "Personnel Security Clearance Policy and Procedure"; SF-181, "Downgrading of Classified Documents"; and bulletins and notices issued by the Holmes & Narver Security Division covering a variety of subjects and intended in general to clarify current directives and to disseminate new security requirements and information.

Among the subjects covered in Holmes & Narver Security Bulletins were classification, guard orders, special instructions on handling of classified documents, special instructions on handling of classified teletypes, visits to AEC and other classified installations, news releases, Jobsite nomenclature, reprints of AEC Security Newsletters, visitor control, etc.

In addition to the above, the manual contained complete instructions on the marking, preparation, transmission, and handling of classified and other correspondence. These instructions contained samples of all types of correspondence, with the markings required for the various security classifications. Included were letters, interoffice correspondence, cover sheets, routing slips, receipt forms, inner envelopes, and outer envelopes. These instructions were used extensively by secretarial personnel and found to be very helpful both at the Jobsite and in the Home Office.

Visual media were found to be of considerable value in constantly reminding all employees of the ever present need for vigilance in the preservation of security. Security reminders were made by means of

posters, signs, slogans, articles in the Jobsite daily newspaper, and notices distributed and posted on bulletin boards.

The Jobsite was particularly well covered by posters, and well executed signs were continuously displayed in prominent places such as mess halls, post offices, offices, etc. Frequent slogans and articles on security appeared in the Jobsite paper, the "Coral Island Breeze."

EXHIBIT A

Outlines of Security Lectures

INITIAL SECURITY LECTURE

1. Need for Security on Operation Greenhouse
   a. Type of work on Project
   b. Holmes & Narver function
   c. Importance of security
2. Security forms to be executed
   a. Forms to be filled out
   b. Methods of filling out forms
   c. Details of forms
      (1) Correspondence of addresses and employment
      (2) Information about organizations and arrests
      (3) Certification
   d. Penalties for falsifications
3. Processing of security forms
   a. Function of FBI in "P" approvals and "Q" clearances
      (1) Loyalty
      (2) Associations
      (3) Character
      (4) Habits
   b. Functions of AEC in "P" approvals and "Q" clearances
   c. Function of Holmes & Narver Personnel Department after approval is received
4. Processing of applicants employed
   a. Notification of second security lecture
      (1) Purpose of lecture
      (2) Content of lecture
   b. Further processing

c. Security obligations

d. Restrictions at Jobsite

(1) Cameras

(2) Firearms and explosives

(3) Binoculars

(4) Radio transmitters

e. Suggested clothing list

f. Mail address

5. Jobsite conduct

a. Restricted areas

b. Mail restrictions

c. "Scuttlebutt" sessions

d. Classified materials

6. Termination

a. Official materials and documents

b. Termination interview

c. Termination statement

d. Responsibilities of terminated employees

e. Security requirements

7. Summary

a. Cost of security control

b. Value of security to nation

SECOND SECURITY LECTURE

1. Purpose of meeting
   a. Refresher on security regulations
   b. Film on security in Operation Sandstone
   c. Personnel processing
2. Security processing review
   a. Security acknowledgment significance
   b. Responsibilities pertaining to "P" approval and "Q" clearance
      (1) Mail
      (2) Scuttlebutt
      (3) Information dissemination
3. Proposed security measures
   a. "Q" clearance processing
      (1) Cost
      (2) Responsibilities of employee
      (3) Penalties for falsifications
   b. Control of classified information
4. Termination processing
5. Summary
   a. Importance of security
   b. Reporting of infractions
   c. Over-all responsibilities
6. Film "Operation Sandstone"
   a. Introduction and comments on site, security, and results
   b. Film showing
   c. Questions and answers

TERMINATION SECURITY INTERVIEW

Termination interviews vary with the type of employment of the terminating employee and the degree of access to classified information Following are the steps in the interview:

1. Pick up badges and identification cards.
2. Pick up any official documents or other items the terminating employee may have.
3. Remind terminating employee that he is still bound by security acknowledgments and by the provisions of the Atomic Energy Act, even though he is no longer on the Project.
4. Explain regulations for dissemination of information through Information Control Service, Washington, D. C.
5. Explain restrictions on dissemination of information pertain- to Jobsite.
   a. Use of names of islands, official designations, etc.
   b. References to events before or after tests
   c. Discussion of scope, type, or location of construction
6. Explain necessary AEC clearances of speeches, press releases, and radio releases.
7. Witness signature of termination statement.
8. Explain reinstatement possibilities of clearance or approval for other AEC work.
9. Answer questions.

Section 8

PERSONNEL

CHAPTER 8.1

GENERAL

Personnel activities related to Contract AT-(29-1)-507 were those normally associated with an offshore construction project but were characterized as well by the extraordinary requirements imposed by personnel security clearance requirements, preemployment medical examination requirements, and the impact of increases in the scope of work. Thus, the first activities of the Personnel Department were related to the establishment of job classifications and wage schedules, the preparation of manual and nonmanual employment agreements, the determination of transportation facilities available and applicable procedures, and the survey of potential labor markets for recruitment of personnel for the Project. Organizationally, the department was integrated into the Operations Division and the department was functionally divided into 5 sections with duties as follows:

Employment Section

1. Analysis of personnel requisitions for the various H & N Divisions engaged in work under the Contract.
2. Establishment of recruiting programs and methods designed to fulfill these requisitions.
3. Accomplishment of interviews with all applicants.
4. Complete checking of qualifications, military status, and background employment records.
5. Decisions on hiring, job classifications, and rate of pay.

Processing Section

1. Preparation of all questionnaires.
2. Preparation of all personnel security clearance forms.
3. Preparation of all overseas employment agreements.
4. Preparation of all hiring forms.

Transportation Section

1. Determination of mode of transportation to be employed and space allocations available.
2. Procurement of invitational orders for use of military transportation services.
3. Procurement of identification cards required by emigration regulations.

Claims Section

1. Processing of all claims arising out of employment.

Records Section

1. Maintainance of complete personnel files.

In order to meet the difficulties imposed by the continual upward revision of the scope of work to be performed by H & N and the requirement that all personnel shipped to the Jobsite have at least a "P" approval type of security clearance, the tempo of Personnel Department activities was maintained at a high level in the period between January 1, 1949 and July 1, 1951. During this period, 30,000 applicants were screened; 17,000 interviews were held; more than 6,200 applicants were processed for medical and security clearances; and arrangements were made for the movement of more than 3,300 employees overseas. A chart of the H & N forces at the Jobsite as a consequence of these efforts is shown in Figure 8.1-1, and a tabulation of manual and nonmanual Jobsite and Home Office personnel is given in Table 8.1-1.

A "Manual of Standard Operating Procedures" covering all phases of personnel activities was prepared at the inception of the Project. This manual prescribed in great detail the personnel practices which were to be followed, the use of all forms required by the government and by H & N policies, and the handling of all other matters which came to the attention of the Personnel Department. Thus, for example, in connection with interviewing, the procedure prescribed that after the interviewer has decided that an applicant possesses sufficient qualifications for a position and has informed the applicant that he will be considered, subject to completion of reference checks, security investigations, and medical examination,

> "100.10
>
> A- The interviewer shall select the past employers who are to be checked and shall mark them with a large red check on the left side of the application.
>
> B- The application is then given to a clerk who shall send out the Reference Check Forms. The clerk shall enter, beside the red check made by the Interviewer, the date on which the Reference Letters are sent.
>
> C- A numerical file with numbers from 1 to 10 inclusive shall be set up, in which all applications shall be filed as soon as Reference Letters are sent.
>
> D- A clerk shall file the returned Reference Letters each day. As they are matched with the proper application, the letter "R" shall be entered over the red check on the application to designate the Reference Letter has been returned.

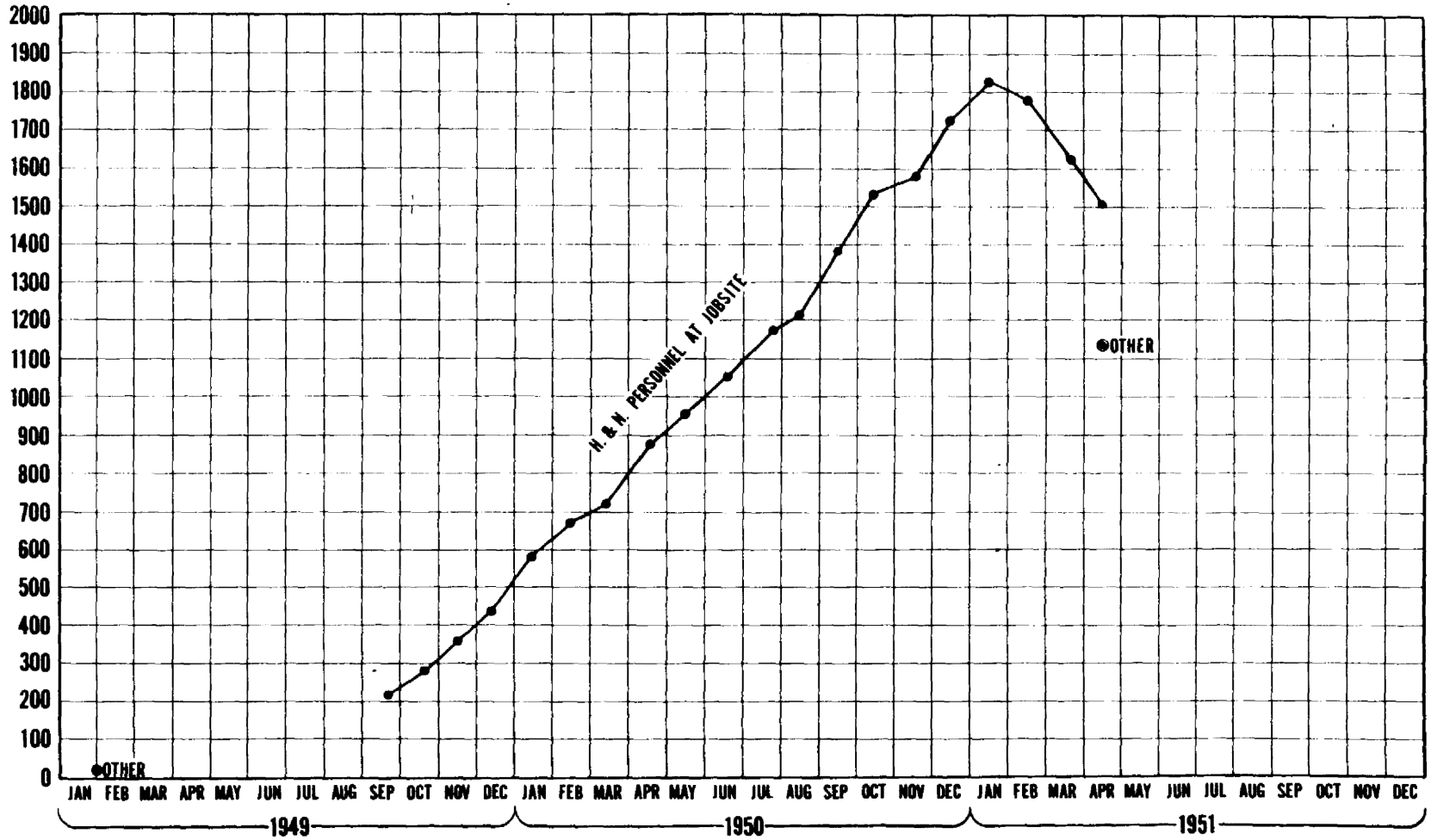


Figure 8.1-1 Holmes and Narver Personnel at Jobsite

TABLE 8.1-1

H & N JOBSITE AND ON-CONTINENT PERSONNEL, CONTRACT AT-(29-1)-507

	Jobsite Non-Manual	Jobsite Manual	Jobsite Total	On-Continent*
1949				
Jan.	3	6	9	35
Feb.	8	9	17	29
Mar.	13	9	22	45
Apr.	16	11	27	63
May	38	35	73	103
June	70	45	115	145
July	112	52	164	145
Aug.	106	61	167	175
Sept.	114	61	175	177
Oct.	202	76	278	191
Nov.	256	100	356	188
Dec.	320	115	435	197
1950				
Jan.	357	124	481	203
Feb.	437	140	577	227
Mar.	565	154	719	257
Apr.	697	183	880	285
May	778	279	1057	304
June	750	300	1050	295
July	806	358	1164	386
Aug.	895	410	1305	447
Sept.	990	491	1481	440
Oct.	1033	501	1534	401
Nov.	1050	531	1581	409
Dec.	1174	547	1721	434
1951				
Jan.	1256	570	1826	436
Feb.	1210	573	1783	355
Mar.	994	508	1502	229
Apr.	804	437	1241	235
May	432	278	710	180
June	296	183	479	212

*On-Continent employees include Contractor's employees who worked part-time on Contract AT-(29-1)-507.

E- When the "R" is entered over the last red check, the application and returned Reference Letters are given to the Employment Interviewer for his consideration. Each morning, the clerk handling the Reference Letters shall move the last file in the numerical file to the front and its contents shall be given to the Interviewer. He shall then decide, after a careful study of the applications, whether any are to be retained for the return of additional Reference Letters, rejected or hired. As he makes his decision, he shall so indicate on the application, and then see that they are appropriately filed.

100.12

A- When, in the judgment of the Employment Interviewer, sufficient references have been received to warrant a decision, he shall make the decision and, if he decides to go on with the original offer, send for the applicant."

Similar detailed instructions covered all subjects of personnel cognizance. During the course of the Project there were instances in which the prescribed procedures had to be waived in order to meet the deadlines established. A situation requiring such action occurred in December of 1950 when a substantial number of laborers were urgently required at the Jobsite for a short period of time in connection with the foundation grouting of Structure 3.1.1. To shift forces from other work in progress would have meant delaying completion of work beyond deadlines. As a consequence, a concerted effort was made on a high priority basis to recruit personnel and move them to the Jobsite for the particular program. In view of the urgency of the requirement, the low job classification of the personnel involved, and the short duration of their stay, it was felt that the most expeditious action could only be based upon spot reference checks to the degree consistent with early fulfillment of requirements. This was done, and as a result of such action, the program was completed on schedule.

Such instances are a reflection of the major difficulties encountered in planning the work of the Personnel Department which arose out of the interaction of increased requirements for personnel at the Jobsite, the security clearance requirement, and a tightening labor market introduced by the Korean War. Of these factors, the 30 day to 100 day period required for security clearance established a barrier to efficient planning. Personnel would be interviewed looking toward the fulfillment of a particular requisition or estimated requirement, and a tentative offer of employment made, subject to a security check. In many cases, by the time security approval had been obtained, the prospective employee had taken other employment. As a consequence, throughout the Project, it was necessary to anticipate on a long range basis the classifications of personnel that would be required and the number of individuals in each classification in order to permit the establishment of a pool of applicants in process and reduce the time lag in fulfilling Jobsite personnel requisitions. See Table 8.1-2 and Figure 8.1-2.

TABLE 8.1-2
NUMBER OF PERSONNEL IN PROCESS

Month	1949	1950	1951
January	0	562	553
February	0	608	348
March	0	555	335
April	0	646	562
May	19	559	529
June	49	461	546*
July	42	436	
August	113	579	
September	126	487	
October	122	400	
November	71	529	
December	248	600	

*Number personnel in process remained constantly high to meet Jobsite requisitions. During April 1951, Jobsite cancelled requisitions covering 360 personnel.

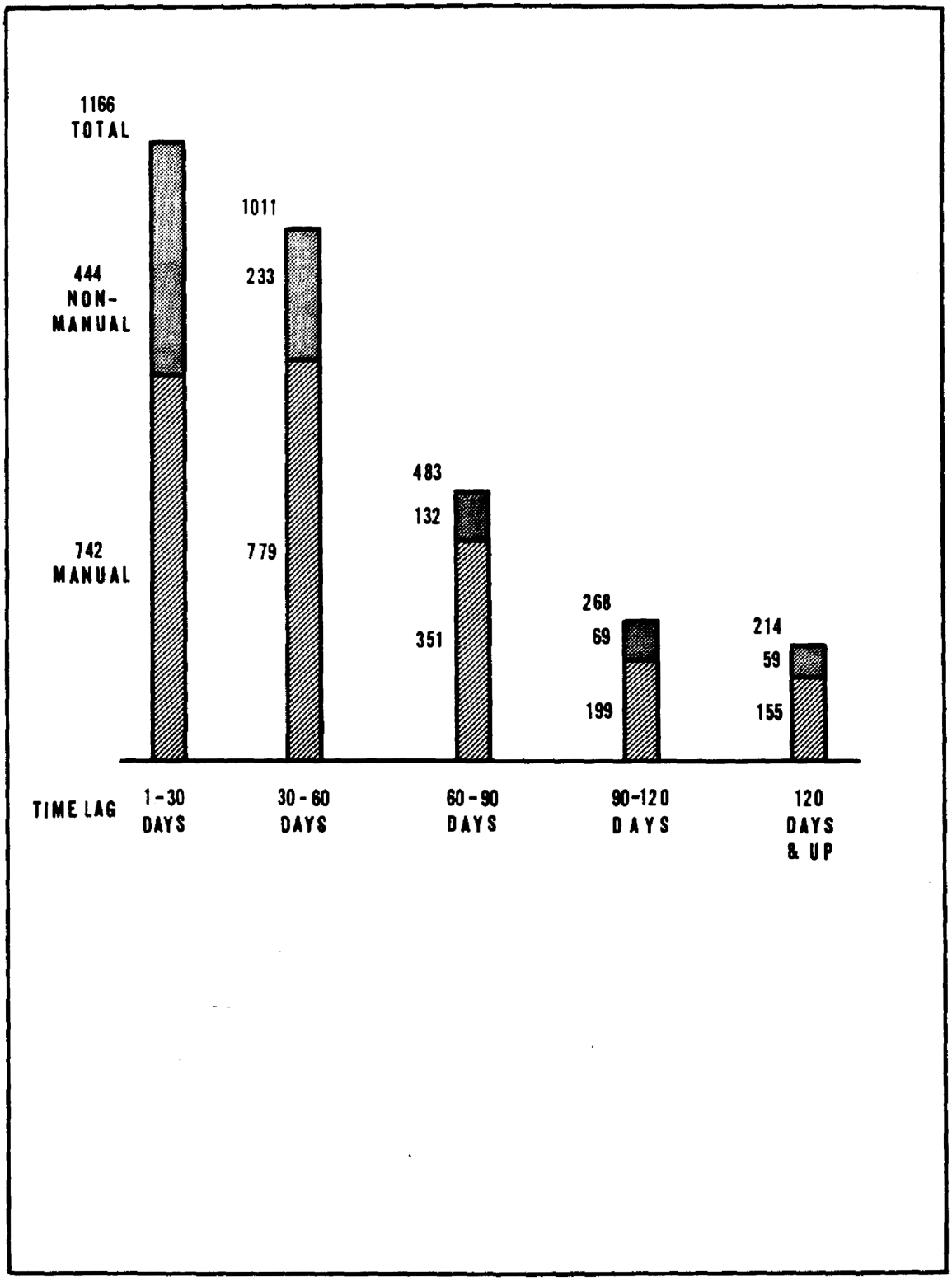


Figure 8.1-2 Time Lag in Fulfilling Jobsite Personnel Requirements

The Jobsite Personnel Office was the focal point of all personnel and labor relations activities. All personnel actions at the Jobsite, including changes of classification, wage changes, and terminations were initially processed by the Jobsite Personnel Office and forwarded to the Personnel Department at Los Angeles for approval. Personnel requisitions emanating from the Jobsite were screened through the Personnel Office, and close liaison was maintained between that office and the Home Office Personnel Department to maintain a current picture of the status of all requisitions.

CHAPTER 8.2

RECRUITING

In order to recruit sufficient personnel to meet Jobsite requirements various means of recruitment were utilized. In the early part of the Project most applicants were referred to the Contractor through the Overseas Craftsmen Association (not an agency or union) and this contact point was invaluable throughout the entire Project. The type of applicant secured through this association was above average in capabilities and one who had proved his ability to adjust himself to the conditions prevalent with foreign employment. Newspaper advertisements were used quite extensively as a medium, and during the peak recruiting period advertisements were run in newspapers in a number of West Coast cities.

In January 1950, in order to take advantage of a favorable labor market a branch personnel office was established in Honolulu. The location of this office and the formulation of an expedited security clearance program which made clearance possible within a nominal period of time were both significant advantages to be realized. When Jobsite experience indicated that no real problem would result from the hiring of native Hawaiians, this area became an important recruiting center.

To meet special emergencies and to meet Jobsite peak demands for personnel, recruiting teams conducted recruiting programs at various locations during the project, including:

1. Richland, Washington. This source of supply was used on several occasions when specific skilled classifications were required at the Jobsite on an emergency basis. Nearly all applicants from this area formerly worked at the AEC Hanford Project and had been previously cleared by security. This permitted immediate utilization of these applicants and enabled the Personnel Department to meet urgent Jobsite requirements, and valuable employees were secured with only nominal expense involved for security clearance.

2. El Centro, California and Yuma, Arizona. A recruiting team conducted an extensive campaign at El Centro and Yuma to provide employees in the lower classifications. To meet Jobsite requisitions, this program was very essential, as the wage schedules being offered were below the prevailing rates in the Los Angeles area and difficulty had been encountered in recruiting personnel for unskilled classifications.

3. Dallas, Texas. To meet special emergency Jobsite requests, recruiting teams were sent to Dallas on one occasion to employ pipefitters and on another (noted above) to employ laborers. These recruiting trips were motivated by the availability of the particular classifications of personnel in the area.

4. San Bernardino, California. A recruitment program to secure applicants of all classifications was conducted at this location on almost a continuing basis in order to meet the shortage of available personnel to meet job requirements.

5. San Francisco, California. A recruiter made several trips to San Francisco to interview applicants submitted through the Construction Men's Association, a national organization, which did primary screening on the basis of criteria supplied by H & N.

6. Other Locations. Many trips were made throughout the outlying districts of Los Angeles by recruiters in search of specific skills. For example, extensive recruitment for marine personnel was conducted in the port cities such as Long Beach, Newport Beach, etc.

In interviewing applicants the work history was of paramount importance and all records of employment were investigated. Reference checks with former employers as to the applicant's ability, soberness, integrity, and patriotism were made on substantially all applicants. All applicants were instructed as to the terms and conditions set forth in the employment agreements and the basic procedure necessary to secure security clearance. Applicants with work histories reflecting broken contracts on other foreign work were eliminated unless supporting evidence of justification for their action could be submitted.

All applicants were required to pass prescribed medical examinations prior to being put into process for security clearance. This eliminated any further action on employees who failed to meet medical requirements and thus relieved the work load on the Security Division.

CHAPTER 8.3

WAGES, WORKING HOURS, AND OVERTIME

In making a determination of the wage structure necessary to cover the many classifications of personnel required on the Project, numerous factors had to be considered. To be in position in a competitive labor market to recruit sufficient personnel for the Project's requirements made it imperative that a wage structure be established to meet all contingencies.

The original wage schedules were established and approved by the AEC following an extensive review of wage rates existing throughout the Pacific Ocean Area and California. In analyzing various wage schedules, every benefit set forth was considered, including the hourly rates, the scheduled work week, vacation provision, sick leave provision, etc.

A review of existing wage schedules revealed many standard provisions as well as specific provisions to provide for the many ramifications of specific projects. A number of the wage schedules examined provided for the payment of accrued vacation leave; others provided for the payment of an incentive bonus, and still others provided various benefits including free subsistence, insurance, wage differential, etc. Projects in the Pacific Ocean Area operating under jurisdiction of Western Ocean Division were permitted to grant ten per cent "incentive" increase to employees who had completed one year of service.

In setting up a wage structure, full consideration had to be, and was given the many provisions of other wage structures and the competition faced in the recruitment of adequate manpower. In promulgating the overseas wage schedules H & N made every effort to adopt wage rates considered the minimum that would permit H & N to meet Jobsite personnel requirements.

The wage schedules as adopted and approved by AEC in 1949 represented a compromise between the Los Angeles American Federation of Labor wage schedules and those prevalent in the Pacific Ocean Area. The hourly rates established were comparable to those approved by the Joint Army-Navy Wage Board but were approximately forty cents per hour below the rates recognized by the Los Angeles A F of L and also were lower than the rates established for projects in Greece, Arabia and Alaska.

It was recognized that some benefit provision would have to be provided in lieu of accrued vacations, free subsistence, etc., as an incentive for contract completion at the isolated location of the Project. It was finally agreed that the payment of an incentive bonus for contract completion was the type of provision that would at least match the various benefits offered on other overseas construction jobs when taken together with the $10.50 weekly subsistence charge. On this basis, a completion of contract bonus providing for the payment of an additional sum of $25.00 per week for manual employees and a sum equal to 20 per cent of the gross base salary or $25.00 per week, whichever was the greater, to nonmanual employees was incorporated in the approved wage schedules.

The hourly rates established, based on a forty hour work week returned to H & N overseas employees a gross pay check that was $16.00 less than the wages being paid to employees under Los Angeles A F of L rates. Furthermore, under the terms of the employment agreement, a weekly deduction for subsistence and a weekly deduction to cover return travel expense of defaulting employees, reduced net "take-home" pay to the point at which recruiting of high calibre personnel became a rather serious problem. However, by establishing a basic work week of more than 40 hours and including the incentive weekly bonus, a competitive total net pay was achieved for an employee who satisfactorily completed his contract.

In order to ascertain that the interests of all government agencies participating in construction projects in the Pacific Area were protected, a meeting of representatives of the Army, Navy, AEC, and H & N was held on July 15, 1949. The subject of discussion was the comparison of the provisions of the H & N wage schedule with similar provisions approved by the Joint Army-Navy Wage Board for work in the Pacific area. The results of this meeting were broadly expressed in a letter written by the Chief of the Industrial Relations Branch, AEC, (Reference PR 120) on July 26, 1949, in which it was said, "We had some discussions as to the wages to be paid, on completion of contract bonus and other arrangements, and I would say that our general conclusion was to the effect that we had offered certain advantages on the Holmes & Narver contract although on the whole the advantages proffered by each of us seemed to be counterbalanced by other advantages and disadvantages so that the net result was that our working conditions, our pay schedule, etc., were not at odds with those of Army or Navy overseas contractors."

Repercussions of the difference in provisions between the H & N type of overseas employment agreement and the type used by Army and Navy contractors in the Pacific Area came to light in January of 1951. However, reference to the above noted meeting of the interested parties held in July of 1949 clarified the situation.

At the time the original wage schedules were approved it was estimated that the maximum manpower requirements for overseas employment would not exceed 600. At the peak of employment in January 1951, the number of employees at the Jobsite was three times the original estimate. To meet Jobsite requirements and to properly classify employees, new job classifications had to be secured and new wage rates had to be established for all new classifications. Inequities existing in original wage rates were adjusted from time to time in order that all rates reflected the proper differential between the various classifications. All such additions, deletions, and modifications of original wage rates as approved in an original "Appendix A - Contract AT-(29-1)-507" were accomplished by the submission of Reimbursement Requests to the AEC at Los Alamos, New Mexico, and securing prior approval of all revisions, in the form of Reimbursement Authorizations.

During the early part of 1950, it became apparent that existing approved wage schedules, because of unfavorable wage differentials,

represented an increasingly serious handicap in the procurement of qualified men for employment at the Jobsite. Wage rates, as recognized by the Los Angeles Building and Construction Trades Council, had been revised upwards several times since the establishment of H & N schedules for this Project. On August 4, 1950, a request was made (Letter HN-5408) for an immediate review of wage schedules to bring them into line with the rates existing in the Los Angeles area. During the next two months, a number of conferences were held to discuss the possible solution but no definite decision was reached. However, on November 14, 1950, revised wage schedules were presented to the AEC for consideration and by letter (SD 6453) received on December 18, 1950, notification of their approval was received. On January 22, 1951, a Reimbursement Authorization was received reflecting approval of the revised wage schedules and setting the effective date of the revision as January 29, 1951.

The revised wage schedules provided in the main an hourly rate increased by $.48 per hour for manual employees and a reduction in the contract completion bonus from $25.00 to $10.00 per week. As an incentive for manual employees to renew their contracts, an additional bonus of $10.00 per week was provided for completion of renewal agreements.

Basic considerations of the economies to be realized by such action prompted the provision for the payment of a contract renewal bonus. These economies were inherent in the fact that a personal security clearance had been obtained for the employee, the employee had proved his ability to adjust himself to Jobsite living conditions, and the employee had also proved himself qualified for the work that he was doing. With respect to nonmanual overseas employees, the revised wage schedules provided for time and one-half overtime for specified categories, and increased the maximum limit of salary ranges in other catagories. This revision was necessary in order to maintain a proper pay differential between manual employees and supervisory personnel, who did not receive overtime premium pay. In order to place the new wage schedules in effect, revised employment agreements embodying the new wage provisions were prepared.

A minimum work week of 48 hours for overseas employees was approved at the inception of the Project and was incorporated into overseas employment agreements. By October of 1949, it was apparent that substantial economies could be realized by the authorization of a 54 hour week at the Jobsite, and approval was granted on October 24, 1949. The economies were achieved in the obviating of the substantial expense involved in the recruiting, security clearance, movement overseas, and support of employees at the Jobsite. In order to minimize the capital investment in facilities and the number of employees necessary for housing and feeding operations, it was necessary to minimize the total number of employees at the Jobsite. Furthermore, certain operations, such as power generation, water distillation, boat pool, and mess hall operations, could only be carried out on schedules which involved a considerable amount of overtime if the total number of employees at the Jobsite was to remain a minimum.

Other activities of an emergency nature, such as stevedoring, which had to be done on an around-the-clock basis to meet sailing schedules of ships calling at the Atoll, and emergency preparations to meet unusual weather conditions, such as storms and typhoons, also required overtime work.

CHAPTER 8.4

CLAIMS

Numerous claims and suits have been instituted by returning employees. These claims fall into the following categories:

1. Claims based upon allegations that discharges for cause were unjustified.

2. Claims for bonuses in cases of voluntary termination because of physical condition.

3. Claims for refunds of employees' travel fund.

4. Claims arising out of alleged personal injuries.

A total of 146 formal claims were entered during the period between the inception of work and July 1, 1951. Of these, 41 were settled, 52 were rejected, and 53 are pending. Settlements involved the payment of $6,795. The total value of all claims, including those settled, rejected, and pending, was approximately $286,000, including $250,000 claimed as compensation for alleged personal injuries arising out of employment at the Jobsite. In carrying out the responsibility of handling all personal claims arising out of employment under Contract AT-(29-1)-507, the Personnel Department maintained close liaison with the AEC and provided a constant flow of claims information to the AEC officials concerned.

One of the most prolific sources of claims was connected with return travel funds withheld to assure contract completion. By the terms of the original employment agreement, specific weekly amounts, up to a total of $250, were withheld from each overseas employee's wages as a contingent fund to pay for the cost of return travel in the event of the failure of the employee to complete his contract by reason of fault or voluntary termination. The $250 sum established was intended to cover the cost of commercial transportation from Honolulu to the West Coast of the United States, and no provision was made for recoupment of the cost of MATS transportation from Eniwetok to Honolulu. However, on August 29, 1950, the AEC directed Holmes & Narver[1] to recover from defaulting employees the cost of transportation furnished by MATS from Eniwetok to Honolulu, or from Eniwetok to the West Coast. The amounts involved were $312 and $480, respectively. Under the terms of the directive, H & N retained all moneys due to defaulting employees necessary to cover the travel cost shown. Such action appeared to the defaulting employees involved to be in contravention to the terms of the employment agreements which provided a $250 maximum travel fund. A test case was brought before the Labor Commissioner of the State of California during December 1950 and was defended at the direction

[1] AEC letter SD 6004, dated August 29, 1950.

of the AEC. A decision was rendered in favor of the contesting employee and the matter was deferred to the AEC in order to obtain authorization to pay the claim. The entire subject was referred to the Controller General of the United States for decision, and at present 40 claims are being held in abeyance pending final action by the Controller General and the AEC.

CHAPTER 8.5

PERSONNEL TRANSPORTATION

Personnel movement to and from the Jobsite was dependent to a major extent on Government transportation facilities. Although during the early stages of the Project, proposals were discussed concerning the use of commercial transportation facilities to Wake Island, the feasibility of such proposals was difficult to establish. As a consequence of the heavy traffic burden carried by government transportation systems, the desired flexibility in moving personnel to the Jobsite was never available. Transportation backlogs accumulated at Los Angeles, San Francisco, and Honolulu awaiting transportation by MATS.

By May of 1950, the air transportation situation became critical and, in order to absorb accumulated backlogs, surface vessel transportation was utilized. This practice was followed periodically through the following year, even though it was a source of difficulty in maintaining a high standard of personnel relations. The facilities employed for transportation of personnel to and from the Jobsite and the extent of utilization is shown in Fig. 8.5-1.

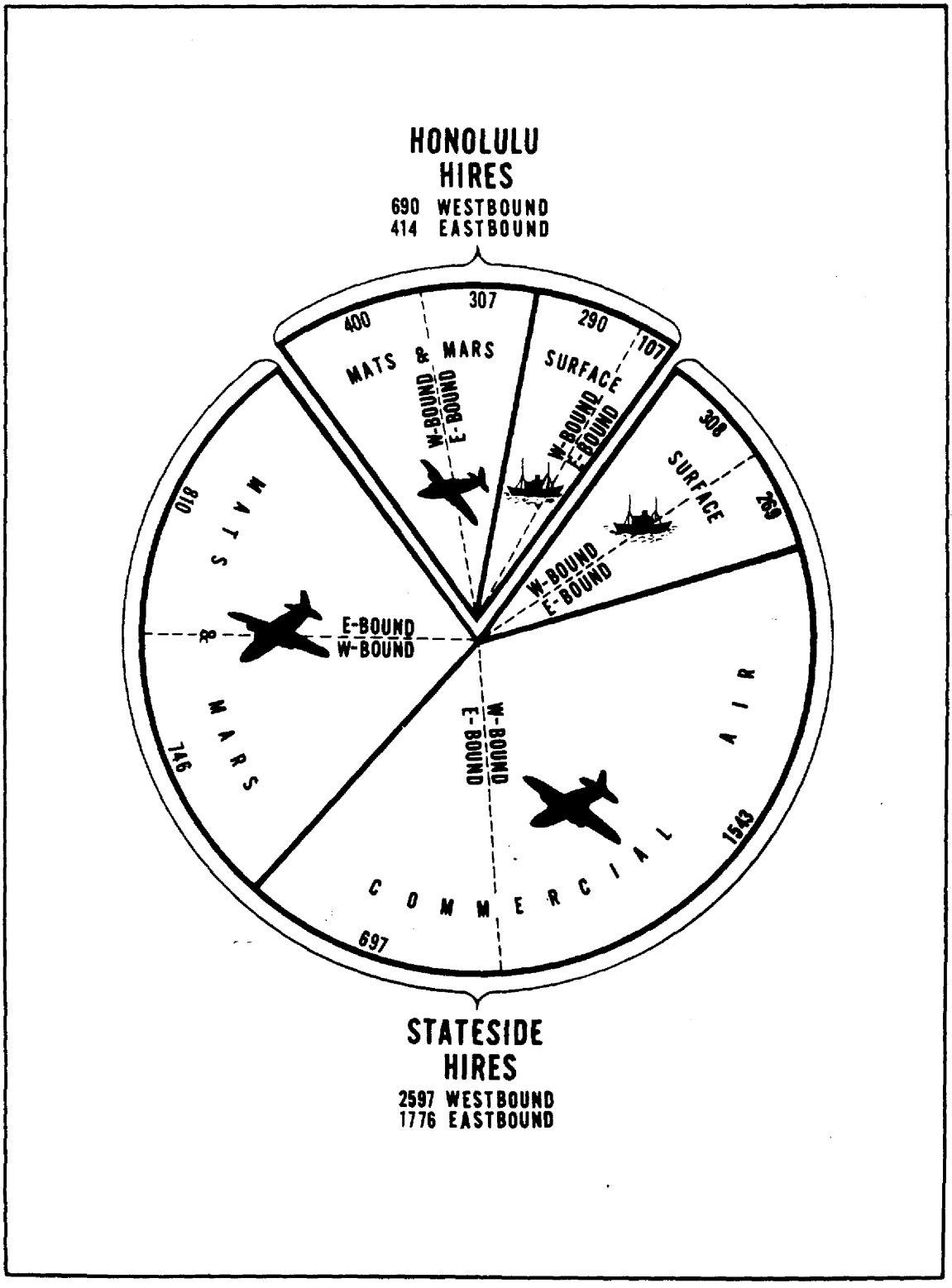


Figure 8.5-1 Personnel Transportation to and from Jobsite

Section 9

LABOR RELATIONS

SECTION 9

LABOR RELATIONS

In any overseas construction project, the labor relations function involves a closer personal relationship than comparable functions in a domestic organization. The isolation of the Jobsite, the virtual absence of means of rapid communication, and the long contract term utilized all tended to create anxieties on the part of employees and their families and many other problems of a personal nature not normally encountered. The need for a comprehensive labor relations program was apparent at the inception of the Project and early cooperative planning between H & N and the AEC resulted in a policy which had a material bearing on the low labor turnover experienced.

The first steps in the program included the establishment of reasonable and competitive wage schedules, the approval of morale aids, such as day rooms, recreation centers, libraries, and theatres for Jobsite personnel, and fringe benefits, including sick leave, insurance plans, and the like.

During the course of the Project, continual efforts were made to promote good working relationships between employees and management. At the Jobsite, a constructive morale aid and recreation program was pursued, which provided church services, reading material, records, gymnasium equipment, motion picture films, athletic equipment, fishing and hobby equipment, and educational classes in various subjects. A Recreation Council was formed at the Jobsite to coordinate all phases of the recreation program and to maximize the benefits to all personnel. Prizes, trophies, and other awards were established; talent shows and luaus were arranged; and many other activities were fostered through the efforts of the Recreation Council and personnel assigned to recreation duties. Above all, one of the greatest moral boosters was the planned program of serving good food in an appetizing manner.

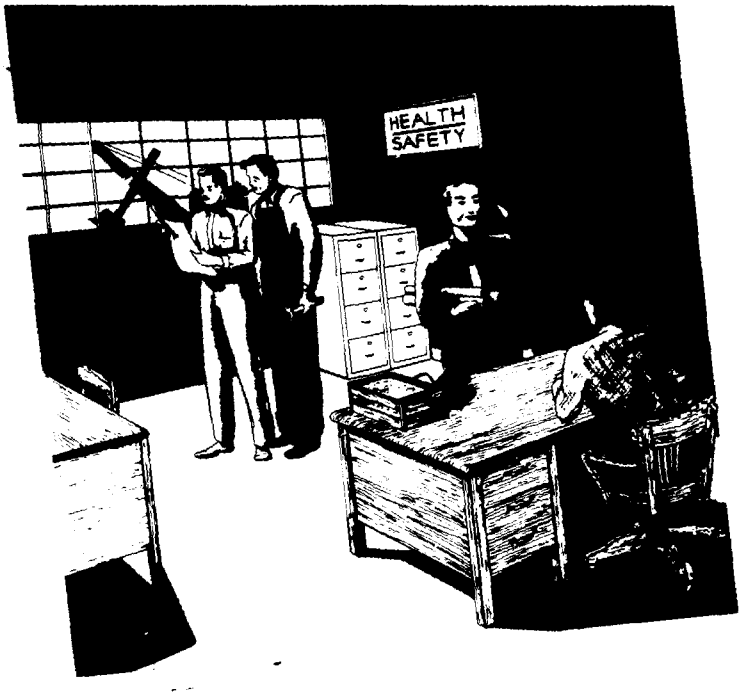
From the inception of work under this Contract through July 1, 1951, no strikes occurred nor was there any shutdown of work on the basis of personnel grievances. During the summer of 1950, there was a brief threat of a walkout by a group of carpenters at the Jobsite, reflecting similar action by West Coast carpenters at the same time. The basis of the threat was a demand for an increase in the hourly rate of pay. The demand was not met and the walkout failed to materialize.

The results of labor relations activities are apparent in the following relevant statistics:

Year	Completed Contracts	Voluntary Termination	Medical Termination	Discharged	Deceased
1949		68	11	9	
1950	436	368	60	31	2
1951 (to 7/1)	1341	149	20	18	
	1777	585	91	58	2

Section 10

HEALTH AND SAFETY


HEALTH
SAFETY

CHAPTER 10.1

GENERAL

The health and safety record established at Eniwetok Atoll during the period between January 1949 and June 1951 is impressive. Much has been said about reports concerning unsanitary camp conditions at various times during this period, but the record speaks for itself. Certainly cases existed in which sanitary and safety measures were ignored or neglected. However, none of these cases indicated a continous course of neglect over periods of time, and investigation always revealed that the lapses were invariably attributable to special circumstances.

Generally, the health conditions on Parry Island and the islands to the north were on a par with any well regulated stateside community. The incidence of the usually encountered illnesses was normal. This condition is not surprising when one remembers that a complete physical examination of each overseas employee was required prior to employment and that the record of examination was approved by LASL personnel before execution of employment agreements. This procedure was established at the inception of the project and, while at times it caused difficulty in mobilization, it appears to have been well worthwhile.

The single job-incurred fatality which happened during the Project was the result of an unusual chain of circumstances. A worker on an M-Boat coming along side a tug had two toes crushed between the deck of the M-Boat and the strake of the tug. A tourniquet was immediately applied to the involved leg and the man removed to the Eniwetok Island Hospital. Upon arrival there the tourniquet was removed in preparation for surgery by H&N and Army surgeons. Shortly thereafter the man died. An autopsy performed thereafter in Honolulu revealed that crushed bone particles had, upon removal of the tourniquet, travelled through the blood stream causing pulmonary and cerebral embolism.

Such a record, details of which are given hereinafter, is not a matter of chance. It is the result of a well conceived and well executed program which took into account the type of personnel employed, living conditions, the availability of recreational facilities, insect control, and the whole host of other related factors. The necessity for dust control, for proper sewage and trash disposal, for radiological safety education, for the provision of recreational facilities and moral aides and for rigid control on the dispensing of liquor had been foreseen and all been recognized as necessary, and were in the plans and executed.

CHAPTER 10.2

HEALTH

Throughout the period of activities at the Proving Ground, the general health of all personnel was good and compared favorably with normal standards. This is not considered to be unusual in view of the requirement that all overseas employees pass a preemployment physical examination which included personal examination by a physician, complete laboratory tests and an x-ray examination. No epidemics were encountered and the incidence of intestinal ailments was consistently normal indicating good general sanitary control. No specific tropical diseases were prevalent; however, it was noted that fungus conditions of the skin and feet and other skin diseases usually found under similar climatic conditions were common ailments but never reached unusual proportions. Time lost due to such ailments was minimal and care was taken in treatment and medical supervision to eliminate malingering. Mention should be made of the fact that infections of any type fail to respond to treatment as readily as under climatic conditions usually found in the United States, and considerable treatment beyond normal was required in such cases.

Initially, by agreement with the Military Establishment, medical services were provided for H&N personnel by garrison medical personnel; unusual and dental cases were transported to Kwajalein or Oahu for treatment. Recruitment of suitable medical personnel proved difficult by reason of the isolated nature of the site, the pay scales offered and the standards of competence established as necessary. However, by July 1949 a suitable candidate was employed and after interview and indoctrination at Los Alamos and indicated approval, was sent to the jobsite, arriving there in August. Unfortunately this man became mentally ill and ultimately took his own life. His successors, chosen on even more stringent standares, undertook and carried out their duties without difficulty.

An H&N dispensary was established on Eniwetok Island on June 26, 1949 with one head nurse in attendance. On October 19, 1949 the Medical Department moved to Parry Island and established a three-bed dispensary. As the population at the Jobsite increased it became necessary to provide medical service on all the other principal islands north of Japtan. At Eniwetok Island the Army maintained a hospital adequately staffed with physicians and surgeons. At Parry the dispensary continued to operate until April 19, 1950, at which time a well-equipped hospital was established, staffed by a physician and a minimum of four aidmen. The hospital was equipped to handle X-ray, laboratory study, and diathermy and had facilities for six bed-patients, with additional facilities available to meet emergencies. The adjacent barracks, occupied as living quarters by the aidmen could be converted into additional hospital space should the need arise. The hospital provided 24-hour daily service with at least three aidmen on duty during the day and one aidman on night duty. In July 1950 dental facilities were added to meet the increasing need for such service.

As the construction work progressed on the outer islands, first-aid stations were established on Engebi on March 1, 1950, on Biijiri on May 15, 1950, and on Runit. Navy requirements at Japtan were met through the Army hospital. The first-aid stations were staffed by one first aid man, with the exception of the one at Engebi, and were equipped to treat all minor complaints and emergencies. A dispensary was established at Engebi on December 1, 1950, with one doctor and one aidman in attendance. The medical service on the so-called operational islands was maintained until the islands were evacuated.

The following statistics show the use of the medical services provided by H & N personnel for the period from June 26, 1949 to June 1, 1951:

Average daily sick calls	79
Total out-patient treatments	44,831
Total hospital patients	670
Average hospital days per patient	4
Major operations performed	14
Immunizations completed	2,745

During the operational period, facilities were made available to the Army Atoll Surgeon for a military dispensary adjacent to the hospital at Parry to meet the medical needs of Task Force military personnel; however, H & N personnel provided medical services to military personnel on a reciprocity basis when the Army surgeon was not available. On the operational islands, Task Force personnel were treated at the H & N medical stations and approximately 750 treatments were rendered. The Army assigned hospital corpsmen to assist the H & N staff at these islands during the peak period of the operational phase.

On Eniwetok Island the Army Medical Corps rendered the following services to H & N personnel during the period from March 17, 1950 through June 1, 1951:

Consultations	122
Physical examinations	23
Out-patients treated	216
Total Out-patient treatments	441
Patients hospitalized	19
Total hospital days	140
Major operations performed	10
Immunizations completed	38

The H & N medical department held sick call twice daily, morning and evening, and while these hours were the ones most frequently used, patients were allowed to call at any time medical service was required. The number of patients on occasions ran abnormally high, particularly in the early days of the Project. The ease of availability and the lack of cost for treatment were the prime reasons for the high number of sick calls. Many of the complaints, if Stateside, would not have required treatment and in the main would not have been referred at such an early date. Stringent steps against malingering soon reduced sick-call attendance to normal.

Year	Man Hours Worked	Lost Time Injuries	Days Lost	Frequency Rate	Severity Rate
From Aug.1 1949	480,441	5	332	10.41	0.69
1950	3,821,720	15	6301*	3.92	1.65
Thru May 31 1951	2,271,509	5	318	2.20	0.14
	6,573,670	25	6951	3.80	1.05

*Includes 6,000 days lost - Penalty set by National Safety Council in Case of Death of Worker.

During the project there was one fatal accident at the Jobsite and no accidents resulting in permanent total disability or amputation of an entire member. The improved frequency and severity date during the peak construction period, as reflected above speaks well for the safety program at the Jobsite. To properly evaluate the above accident ratios the following table of comparisons is offered:

	Year	Frequency Rate	Severity Rate
Construction - Nat'l. Safety Council	1949	19.48	2.15
AEC-Construction Santa Fe Operations Office	1949*	19.63	4.09
	1950*	11.78	1.83
(May 31)	1951*	11.02	2.98
Holmes & Narver	1949	10.41	.69
	1950	3.92	1.65
	1951	2.20	.14

* The percentages shown above for H & N are included in the rates reflected for the Construction Division of the Santa Fe Operations Office and contributed to reducing these percentages.

Among unique safety problems confronted on construction jobs was that encountered in connection with the Phase I activities devoted to decontamination of the Sandstone shot islands. Considerable discussion among personnel of the AEC and H & N revolved around ways and means of working the radioactive ground around the old zero points. After determining the degrees of contamination present, it was initially decided that if the grading and filling could be done without raising a dust, men could work in the areas for an unlimited time.

CHAPTER 10.3

SAFETY

Initially, in our overseas activities, the functions of safety supervision and control were carried out by personnel of the Resident Manager's Office. However, as activities at the Atoll expanded and the tempo of construction increased the establishment of a Safety Department under the Project Manager was effected in accordance with established plans. The function of this department was to assist the Project Manager in providing safe and healthful working conditions and in protecting Government or Contractor property against loss or damage as a result of fire, accident, misuse, or abuse. A safety engineer to head the department arrived at the Jobsite on December 23, 1949, and assumed his duties as responsible to the Administration Manager for effective planning, organizing, directing, coordinating, and controlling the activities of the H & N Jobsite Safety Department. The numbers of personnel fluctuated to meet Jobsite requirements. At peak load one Safety Engineer, one Assistant Safety Engineer, and three Fire Chiefs were employed.

The activities of the Safety Department may be broken down into three major categories, Accident Prevention, Fire Protection, and Camp Sanitation, and will be discussed in that order.

ACCIDENT PREVENTION

The "Manual of Accident Prevention in Construction", issued by the Associated General Contractors of America, Inc., and "Standard Safety Requirements of the AEC, Regulations -- Safety #3" were the basic guides used in formulating the accident prevention program. Frequent inspections of the entire Jobsite were made to detect, and to promote appropriate action to eliminate conditions which might cause injury, illness, or damage to property. Many meetings were held at which employees, both individually and by groups, were orientated to safe working practices. All accidents were investigated and analyzed to determine the cause, and action was initiated to eliminate the causes and to prevent any recurrence of the accident.

Safety education was promoted by the utilization of signs designating hazardous locations, safety bulletins, posters and directives as required, to effect optimum results. On the first working day of each week, a report was submitted to the Resident Manager reviewing the Safety Department's activities for the previous week. A monthly Summary of Accident, Occupational Disease and Fire Experience and other reports, as required, were prepared for the Los Angeles office, to be forwarded to the Atomic Energy Commission after the inclusion of Home Office totals. A recapitulation of these reports for the twenty-two month period, August 1, 1949, through May 31, 1951, shows that for a total of 6,573,670 man hours worked there were 25 occupational injuries involving lost time as follows:

A system was conceived of sprinkling the ground by employment of a "Rainmaker" sprinkler array while carrying out earth-moving operation, and a token quantity of this equipment was sent to the Jobsite for trial purposes. A demonstration proved highly successful, and AEC officials gave unqualified approval. This method of preventing dust during the period of grading "shot areas" was used on all shot islands with excellent results, and latent contamination and radioactivity levels were reduced to well below tolerance.

During these operations, continuous surveillance was exercised by "rad-safety monitors" for airborne radioactive particles and for radiation and no hazardous practices were tolerated. Educational lectures by rad-safety personnel to those engaged in the operation helped to avoid unwarranted fears and to engender respect for the safety procedures prescribed. As an additional precaution, all personnel entering or working in contaminated areas were required to wear protective clothing and carry standard film dosimeters. A record of all exposures to radioactivity was kept at the Los Alamos Scientific Laboratory. No exposures beyond tolerance were recorded.

FIRE PROTECTION

A Fire Department was organized to provide fire protection and prevention, and was placed under the supervision of the Assistant Safety Engineer. The department had three units of mobile apparatus — two 1-1/2 ton Chevrolet trucks, one with a 500-gpm pump and the other providing 300-gpm pumping capacity, and one American La France 4 x 2 Ford truck with 300-gpm pumping capacity. This equipment was located at Parry, Engebi, and Biijiri, where the greatest fire hazard existed. All buildings, structures, marine craft, and hazardous locations were provided with an adequate number of the appropriate type fire extinguishers. Four jeeps, obtained from the Army, were equipped with 150 pounds of CO_2 and other fire-fighting equipment and stationed at the various air strips for use as crash trucks. One Fire Chief was utilized exclusively for making fire prevention inspections, checking fire extinguishers, etc., throughout the Jobsite. During the seventeen-month period (January 1, 1950 through May 31, 1951) a total of forty-six fires occurred with a fire loss totaling $1,473.61.

CAMP SANITATION

In view of the importance of insect control throughout the Atoll it is considered to be appropriate to set forward at length the steps followed in the insect control program.

1. The daily spray of fog smoke was used at Parry Island to control flies. This spray was discharged through the exhaust of a specially equipped truck. "No Spray", an oil-base insecticide containing 5 per cent DDT, was used approximately one-half the time and a lindane insecticide solution of one part of insecticide to twenty parts of water was used the balance of the time. The two insecticides were used in order to avoid a build-up of insect resistance to either one.

2. Another spray truck was used for Runit, Aomon, and Engebi, and for an occasional operation at Japtan. At these sites, semiweekly schedules were followed using the solutions mentioned above in connection with Parry Island.

3. During the period between July 1950 and May 1951 the entire Atoll was sprayed from the air, employing a L-5 airplane equipped for this purpose. An oil-base insecticide containing 15 per cent DDT was used. This type of spraying was carried on on calm days with the airplane operating at an altitude between 75 and 100 feet.

4. The interiors of all mess halls were sprayed with a "D Part" vaporizing spray which contains no ingredient harmful to humans. Mess halls were sprayed a minimum of once weekly with pressure-type hand sprayers.

5. The ground around all buildings and tents was sprayed monthly with an insecticide solution of "L & C" spray to control ants and earwigs.

6. The interior of all tents and barracks at all camp locations were sprayed with both "L & C" spray and "D Part" spray on an average of once every two months.

7. All garbage racks were screened. All garbage cans were steam-cleaned and scrubbed after being emptied. All garbage was dumped at sea daily.

8. Beaches were inspected periodically and materials which would provide incubation breeding spots for flies were removed.

9. All latrines were screened and sprayed regularly.

10. During the roll-up period, all marine life washed up on the beaches after the detonations was removed and dumped at sea.

Section II

FISCAL

CHAPTER 11.1

GENERAL

After the issuance of the Letter-of-Intent on September 16, 1948, and immediately after a week of conferences between personnel of the Atomic Energy Commission and of Holmes & Narver on the scope and nature of the projected work, the Chief Fiscal Officer of H & N proceeded to Los Alamos to confer with the AEC Director of Finance and others about Documentary Audit Requirements, Accounting Procedures, Fiscal Records, Funds, and other fiscal problems, pending the execution of the Definitive Contract.

As a result of this meeting of September 25, 1948, together with subsequent conferences and the exchange of correspondence, forms, etc., a very satisfactory understanding and agreement was reached for the adequate and timely processing of all fiscal records prescribed by the Commission. This agreement, in turn, permitted the Contractor to set up appropriate standard procedures, basic accounting records, and books in a satisfactory manner and available at any time for audit by the Commission's auditors.

In addition to the customary Documentary Audit Requirements, Books of Account and Record, and basic supporting data for voucher assemblies, such as Payrolls, Purchase Orders, Invoices, Receiving Reports, Travel Records, Per Diem Records, Employment Records, Property Records, Cost Records, Certifications, etc., a number of special matters were discussed and agreed upon.

Among such matters was the advisability of introducing a mechanical tabulating system of accounting control for the fiscal operations under this contract. After a joint review by the Commission's fiscal representatives and those of the Contractor's staff, it was decided to defer introduction of the mechanical tabulating system because: (1) The Project, as contemplated early in 1949, was to be of comparative short duration; (2) The total overseas force was then estimated as not likely to exceed a maximum of 600 for a limited peak period; (3) The tabulating equipment was not available for immediate delivery. Hence, decision was made to operate fiscal accounts and records under the manual system, with semimechanical payroll, addressograph, and other office reproduction equipment.

As time progressed, particularly during the latter part of 1949 and early 1950, the scope of the work under this contract was greatly expanded. The overseas force was increased to an estimated 900, then to 1400, and finally to 1800 workers at the Jobsite as a peak force to meet engineering-construction, operation, maintenance and support requirements.

Consideration was again given to the introduction of mechanical tabulating equipment, but the idea was abandoned because of the potential hazards of changing a trained major accounting operation in the midst of

peak-load production schedules involving both personnel and procurement disbursements, as well as timely periodic financial reports, statements, tax returns, accountability reports, etc. However, for greater economy and efficiency, a mechanical tabulating system supplied by the IBM Service Bureau was employed in processing the voluminous payroll tax returns.

The decision not to use a mechanical tabulating system may well be deemed to be justified by the facts that all employees, or their family allottees, received their pay checks on schedule every week throughout the history of the Project; that all vendors' invoices were discounted and promptly paid, except for a few disputed cases; and that all financial statements and reports required by the Commission, by other authorized agencies, and by Holmes & Narver, Inc., were invariably issued on schedule each month, despite various changes or revisions required by the greatly augmented scope of the work. Such a record of production and services involved in a most unusual and complicated project, speaks for itself, in spite of the accepted superior value of hindsight.

As a result of the preliminary conferences dealing with the Documentary Audit Requirements of the Commission, and as a result of the study and development of appropriate fiscal procedures and methods of control, the Contractor and the Commission were well prepared to formulate and jointly agree upon the permanent fiscal provisions of the Definitive Contract, which was negotiated and processed during the period from January to May 1949.

The special fiscal requirements and responsibilities under the terms of this A-E-C-M Contract are summarized as follows:

> The A-E-C-M shall organize offices at the site of work overseas, for construction, maintenance, operation, and special services and shall organize its central office for the engineering and design work, together with procurement, purchasing, expediting, and other services required. (Art. II - 1)
>
> In addition to the Fixed Fee, reimbursement to the A-E-C-M shall include actual expenditures in performance of the work under the contract, including salaries, transportation, travel, materials, supplies, equipment and freight, storage and cartage thereon; all subcontracts or services; Federal Social Security, applicable state or local taxes; insurance, losses, rentals, permits, licenses, claims, counsel fees, office space and facilities, Home Office overhead allocation; and other charges as approved or ratified by the Commission. (Art. V - 1)
>
> Payments to the A-E-C-M shall be made from funds advanced by the Commission, based on audit not less often than once each three month period. (Art. VI)
>
> The A-E-C-M shall keep Records and Books of Account at a place mutually agreeable, showing the actual cost of all items of labor, materials, equipment, supplies, services, and other expenditures for which reimbursement is authorized under the provisions of the

> contract. The system of accounting and internal auditing procedure set up and maintained shall be satisfactory to the Commission. Such books, records, and supporting data are the property of the Commission and shall be delivered to the Commission upon the completion or termination of the contract. (Art. VIII)
>
> The A-E-C-M shall make such fiscal reports to the Commission, and in the form prescribed, as may be required from time to time. (Art. VIII)

In order to observe the fiscal requirements and responsibilities set forth in these provisions of the A-E-C-M Contract, and in order to render appropriate fiscal services to the Commission, to the Contractor, to vendors, and to a large force of workers, both overseas and on-continent, the Fiscal Division was required to solve many problems peculiar to this Project.

For example, owing to the time and distance factors between two widely separated operating locations, it became necessary to establish and coordinate the functions and services of two fiscal divisions. The Jobsite Fiscal Office was set up to originate, administer, and process the basic financial documents and records for timekeeping, payroll, costs, inventories, requisitions, revolving fund accounts, and cashiering. These basic documents and reports were then either communicated or forwarded to the On-Continent Fiscal Office audit, permanent recording in the Books of Account and Record, processing for payment, and reimbursement from the Contract Advance Fund Account.

To make possible prompt weekly payment of wages and salaries for a large overseas payroll, the regular work schedule was teletyped each week to the On-Continent Fiscal Office for payroll preparation in accordance with the Employment Agreements, and for mailing of pay checks to the families or allottees of the overseas employees. This teletype report was followed by an airmail report and time record of overtime worked each week, to be similarly processed for payment to the allottees, on a current schedule.

In the interests of maintaining good will and morale, these and other related fiscal policies, such as the provision of advance funds for subsistence while in travel status and the provision of cash token payments at the Jobsite for personal requirements, were established on a current ready-to-serve basis to employees at, or en route to and from, the Jobsite.

Problems or requirements in the format of statements, reports, analyses, procedures, methods, adjustments or recommendations, etc., have, at all times, been consistently resolved between the Commission and the A-E-C-M fiscal representatives, always on a high plane of coordination and constructive cooperation.

During the initial stage of the work under the Letter-of-Intent contract and before the execution of the Definitive Contract, a problem of financing the Project arose. Owing to the delay in processing the necessary documents for the authorization of Contract funds, the progress

of the work was delayed. This delay affected procurement of materials and personnel and set back the Project work schedules for a corresponding period.

In the advance planning of functional operations and basic records, the H & N Fiscal Division endeavored to give full consideration to the complexities of record and report requirements peculiar to Cost-Plus-Fixed-Fee Contracts with government agencies, particularly in overseas-on-continent operation. Guided by extensive past experience, it was anticipated that many complicated problems would be encountered in efforts to comply not only with the fiscal requirements of the AEC but with those of the numerous governmental agencies associated with the Commission in a "joint-venture" arrangement on this Project. As an Integrated Contractor of the AEC, it was the desire of Holmes & Narver to function effectively as a member of the team engaged in this important phase of the work. To this end, the constant efforts of the entire fiscal staff were always directed, and to this end the splendid cooperative efforts of governmental fiscal agencies were similarly directed.

CHAPTER 11.2

FISCAL ORGANIZATION

Under date of April 6, 1949, the Chief Fiscal Officer of H & N addressed a communication to the Chief Project Auditor for the AEC, outlining in considerable detail the basic fiscal organizational planning, both on-continent and overseas. Attached was a projected organization chart reflecting the anticipated numerical requirements by classification at both locations. (See Chart, Figure 11.2-1.) This chart reflected a total of 45 fiscal employees, excluding the Chief Fiscal Officer. Full use was made of the only guide available in projecting fiscal personnel requirements--specifically, the then-known and contemplated scope of work and estimated total personnel requirements, material requirements, and related service requirements.

In October 1949, the Chief Fiscal Officer required that a survey be made of the fiscal organization and work load for the Contract. This survey was performed on an independent basis by an auditor attached to the Corporate Office of the Chief Fiscal Officer and not connected with project fiscal organization. By this time two island locations had been added to the original scope of work as reflected by Contract Appendix "D". The Project fiscal personnel strength at the time of the survey totaled 45.

In January 1951, the Project fiscal organization reached its peak strength - a total of 89 employees. (See Figures 11.2-2 and 11.2-3.) It should be noted that this peak strength is almost exactly double the estimated fiscal personnel requirements as originally projected; whereas, due to the greatly increased scope of work, the total Contract costs approximated two and one-half times the estimated cost of the original scope of work under the Contract, and overseas employees at the peak almost tripled the number of originally estimated employees at Jobsite.

The Chief Fiscal Officer of the Contractor is solely responsible for all receipts and bank deposits in behalf of this contract and retains the authority for signing all disbursement checks. He also retains the authority of approving all basic payroll documents, including changes of status and rates of pay, in accordance with authorized schedules approved by the AEC; and he retains ultimate authority for direction in all major fiscal policies, exceptions to established procedures, and fiscal relationships with the AEC and with other agencies concerned.

Subordinate to the Chief Fiscal Officer is the Controller, who is in charge of all fiscal personnel and operations for this Contract. He is responsible for the processing and auditing of records and payments for all commitments, based upon established procedures and upon documents originating in the several production and operation departments of this Project.

Originally, Jobsite fiscal operations were performed by a subordinate of the Controller; but when the fiscal operations became greater

and more complex as a result of the expansion of the Project, a separate Controller was appointed to head the Jobsite Fiscal Office. He was made subordinate to the Project Manager at Jobsite, but acted in conformity with standard operating procedures and basic fiscal policies established and approved by the Chief Fiscal Officer, and issued through the Controller at the Home Office.

ON-CONTINENT FISCAL ORGANIZATION

The On-Continent Controller, aided by an Assistant Controller, is assigned duties which include the supervision of the fiscal office, files, and secretaries as well as the supervision of the six Fiscal Sections: Internal Audit, General Accounting, Property Accounting, Payroll, Accounts Payable, and Cost Accounting. (See Chart, Figure 11.2-4.)

Through these sections, the On-Continent Fiscal Office audits, records, and processes for disbursement or entry, and for reimbursement, all purchases or charges of material, supplies, equipment, and services. This office also processes all labor payrolls, taxes, petty cash, travel, per diem, transportation, and other authorized expenses for recording on the permanent Books of Account and Record and for the compiling of statements and reports required by the Commission or by the Contractor.

JOBSITE FISCAL ORGANIZATION

The Jobsite Controller, aided by a Chief Auditor, is assigned duties which include the supervision of office personnel as well as supervision of the five Jobsite Fiscal Sections: Timekeeping and Cost Distribution, Cashiering, Personnel Facilities Accounting, Property Accounting, and Cost Accounting. (See Chart, Figure 11.2-5.)

Through these sections, the Jobsite Fiscal Office prepares and audits, in accordance with standard procedures, all basic timekeeping and cost distribution data, material issues, token payments, travel advances, cashiering records, inventory records, and other fiscal documents for transmittal to the On-Continent Fiscal Office.

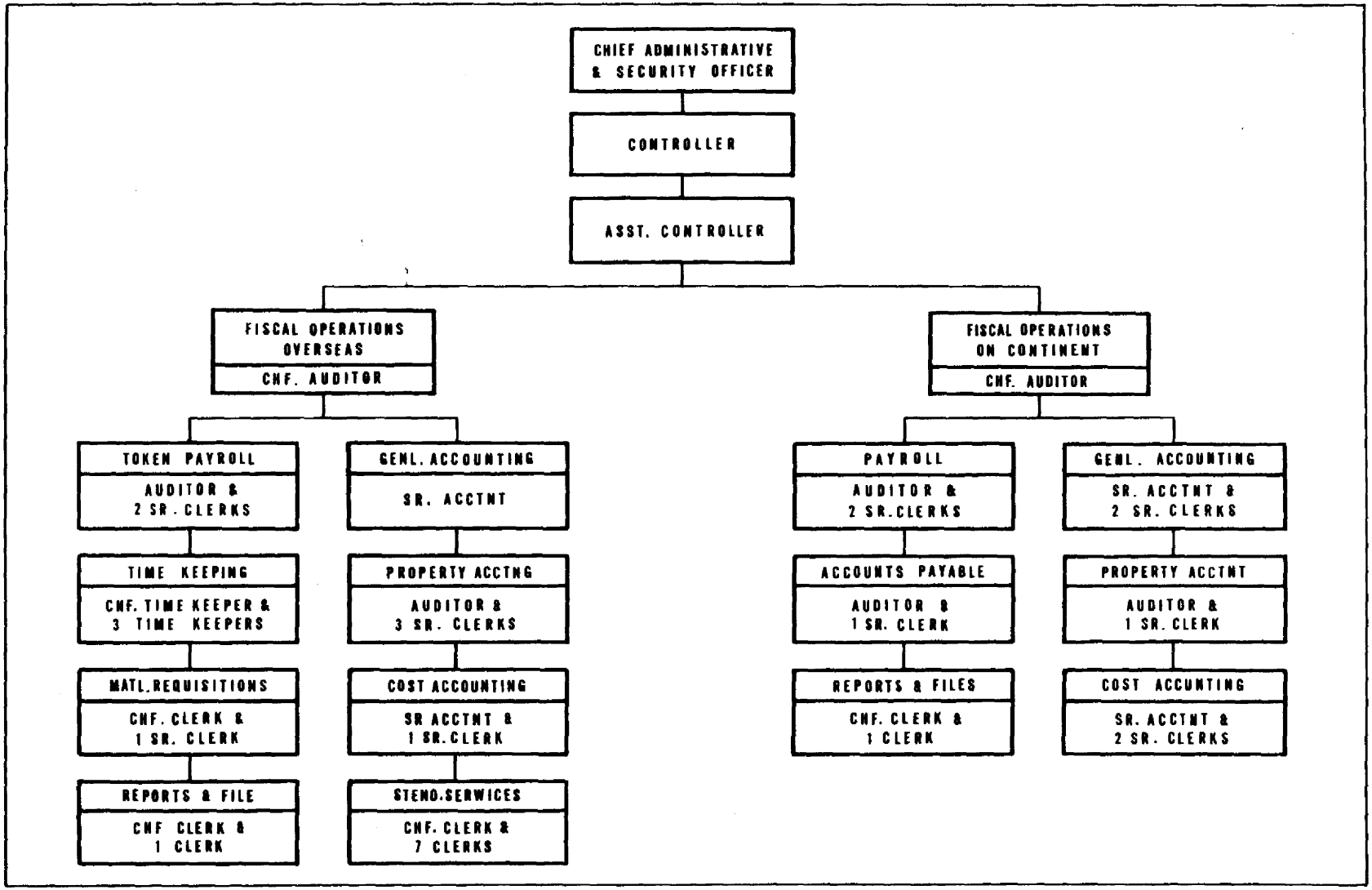


Figure 11.2-1 Original Projected Fiscal Organization Chart, April 6, 1949

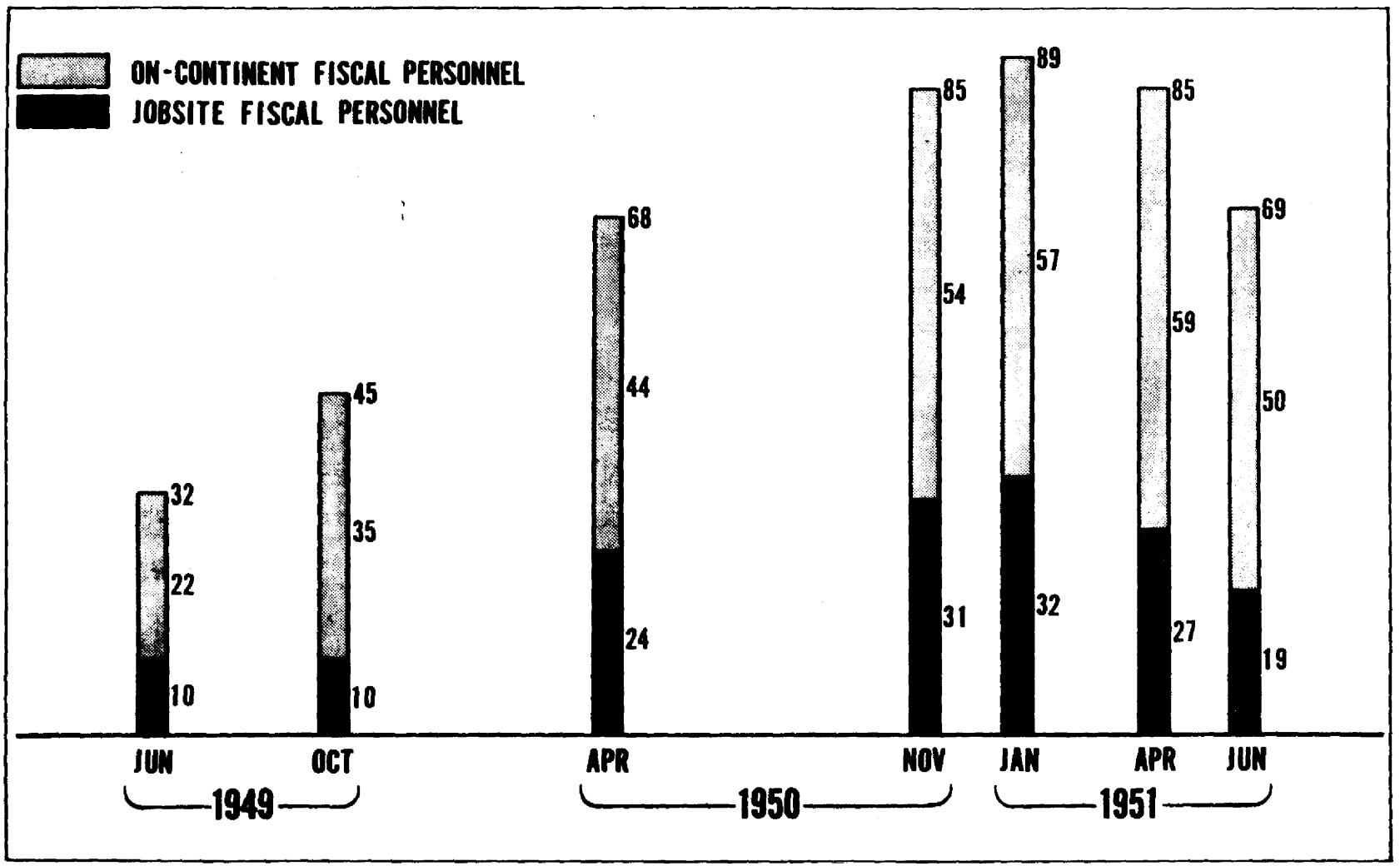


Figure 11.2-2 Jobsite, On-Contenint, and Total Fiscal Personnel

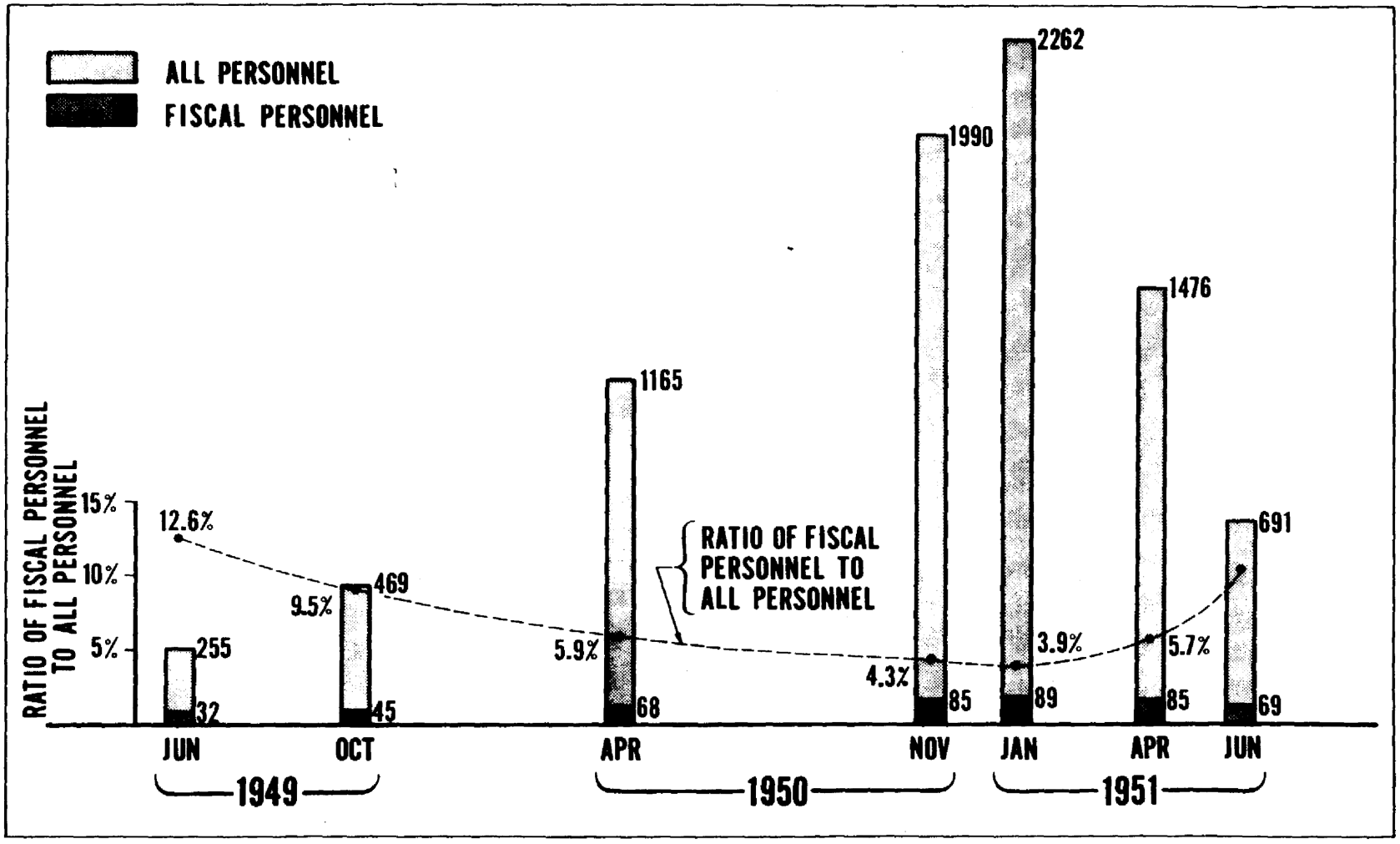


Figure 11.2-3 Relationship of Fiscal Personnel to Total Personnel.
(Totals Include Both Jobsite and On-Continent Personnel.)

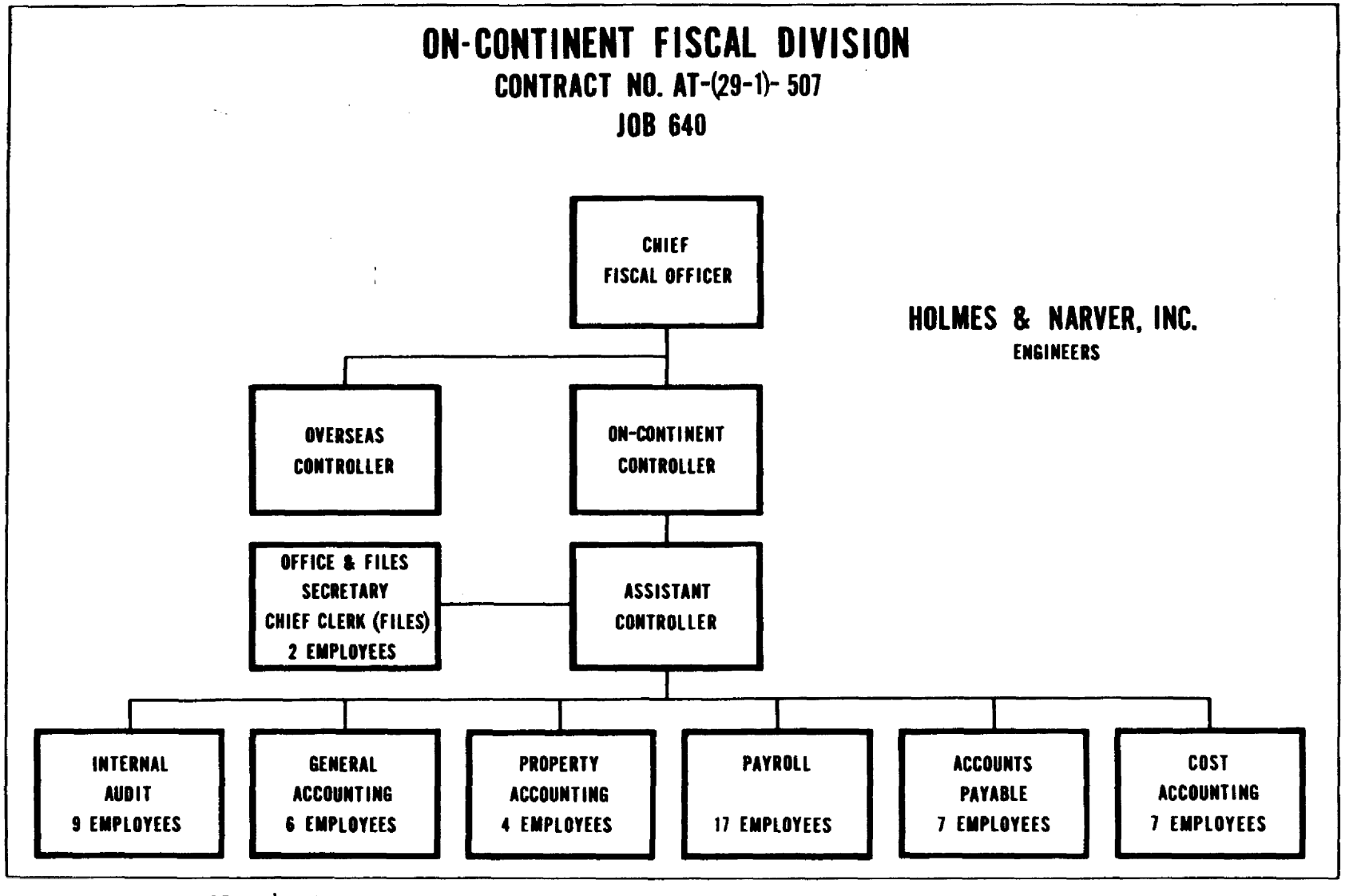


Figure 11.2-4 On-Continent Fiscal Organization at Peak Personnel Strength

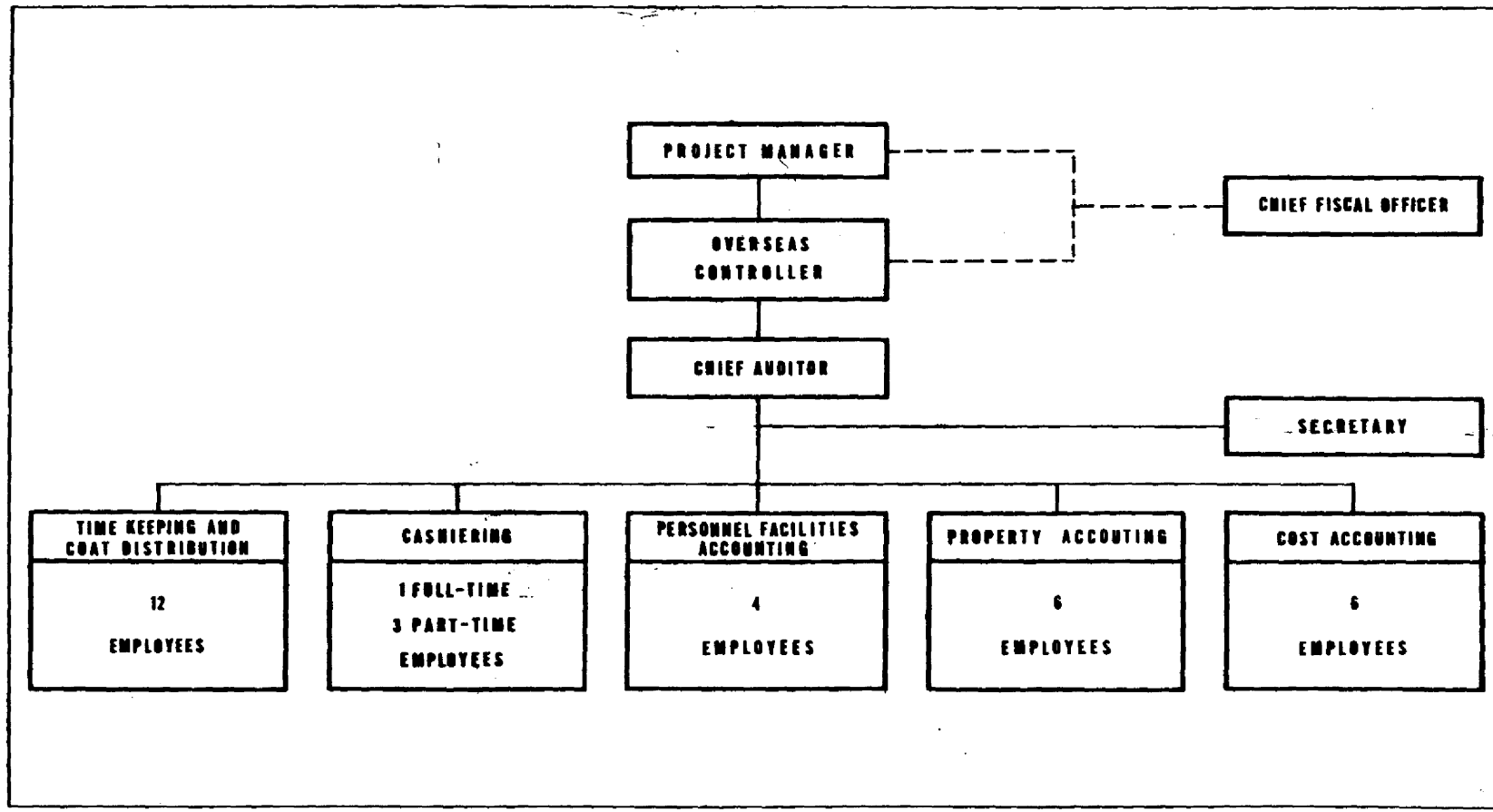


Figure 11.2-5 Jobsite Fiscal Organization at Peak Personnel Strength

CHAPTER 11.3

METHODS AND PROCEDURES

In conformance with the terms and conditions of the Contract, as set forth in Chapter 11.1; in accordance with requirements and directives of the Commission's Director of Finance; and through audit-procedure reviews and consultations with the Commission's Local Auditor and General Accounting Office Field Auditors, the Contractor's fiscal officials have compiled and issued various and necessary Controller's Bulletins for the guidance of operating departments. These methods, procedures, and processes, together with sample exhibits of forms, reports, and statements, are reviewed and described in the following subsections:

PROCUREMENT AUDIT

The Fiscal Division audit of procurement documents (Purchase Orders, Abstracts of Bids, Requisitions, pertinent correspondence, quotations, etc.) was initially performed on a selective post audit basis under which approximately 10 per cent of all Purchase Orders issued were audited. This selective post audit was considered adequate in view of the abilities and qualifications of the top-level procurement personnel, and in view of the established Procurement Procedure.

It became apparent to H & N that selective audit was not adequate because of the customary and natural inclination of buyers to expedite procurement and delivery while neglecting compliance with governmental reimbursement documentation requirements. In March 1950, during a review of procurement practices with AEC personnel, it was agreed that more stringent measures were necessary to insure compliance with the established Procurement Procedure.

As a result, immediate steps were taken to organize and staff a Procurement Audit Unit, under the general supervision of the Chief Internal Auditor, reporting directly to the Office of the Controller. This unit immediately assumed responsibility for the pre-audit and for audit approval of all currently issued Purchase Orders, in order to verify adequacy of the documents with respect to:

1. Basis of award.

2. Approval by proper authority. (For example, orders in the amount of $50,000.00, or more, required prior approval by officially designated representatives of the AEC.)

3. Propriety of items purchased, for use in performance of the work under the Contract, and for reimbursement from government funds.

4. Conformance of items specified on Purchase Order to specifications reflected by the Requisition. (In numerous instances it was necessary to obtain confirmation from engineering, or other technical personnel.)

5. Quantity requirements, as reflected by the Requisition.

6. Propriety of terms, FOB point, and delivery schedule, as reflected by vendor's quotation.

7. Propriety of method of shipment, and/or special inspection fees authorized by the Purchase Order.

As soon as it was possible to staff the unit with an adequate number of qualified workers, a 100 per cent post audit was made, in conformance with the above outlined procedure, on the 4,651 Purchase Orders issued prior to the inauguration of the pre-audit procedure. This phase of the assignment was completed in October 1950. The special Procurement Audit Unit was then disbanded, and the personnel transferred to other Divisions, or reassinged within the Fiscal Division. The pre-audit of all Purchase Orders was continued as one of the assigned functions of the Internal Audit Section, under the general supervision of the Chief Auditor.

As of June 30, 1951, audit of 13,124 Purchase Orders had been completed, including 1,406 audited revisions to Purchase Orders. The total dollar amount of these Purchase Orders was approximately $16,600,000.00; an average of $1,265.00 per Purchase Order or revision.

ACCOUNTS PAYABLE, VENDORS

The Accounts Payable procedures developed were predicated upon familiarity, through experience, with the customary requirements of government agencies administering Cost-Plus-Fixed-Fee Contracts, and the requirements of the General Accounting Office in the performance of its post audit of expenditures from government funds.

Problems arising were those usually encountered in processing vendor payments for materials and services under CPFF Contracts. With the exception of a negligible number of invoices requiring adjustment or justification on the part of the vendors, all payments were made promptly and no cash discounts were lost.

From September 16, 1948 through June 30, 1951, 27,229 invoices, totaling approximately $16,500,000.00[1] (after deduction of cash discounts in excess of $83,000.00) were processed and paid by issuance of more than 14,000 checks.

WORK AUTHORIZATIONS, WORK ORDERS, AND CHANGE ORDERS

The Jobsite Fiscal Division and others concerned with proper accounting, audit, and control of costs, as well as final entry on the Books of Account and Records and preparation of financial statements rendered to the Commission and to the Contractor's Management, make constant use of the basic documents of work order authority.

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[1] This figure includes costs of services as well as materials and should be distinguished from the amount totaled for Purchase Orders.

In addition to the basic Work Authorization Letters originated by the Commission's Contracting Officer the Contractor's Project Manager issues various forms of work orders. These work orders may be described as follows:

1. Engineering Work Orders are issued by the Jobsite Engineering Manager to the Jobsite Construction Manager to proceed with work outlined, in accordance with approved plans and specifications.

2. Change Orders are initiated at the Jobsite to cover or meet practical field conditions, to meet changed requirements, or to achieve economy and efficiency. All Change Orders are subject to approval of both the Contractor's Resident Manager and the Commission's Resident Engineer, together with formal submittal of Cost Estimates to the Commission's Contracting Officer for review and approval as modifications to the Contract, if necessary.

3. Extraordinary Maintenance Work Orders are issued to cover unusual or large maintenance items which could not be anticipated in preparation of the original Job 4 Estimate. Here, likewise, formal estimates are submitted to the Commission for review and approval.

4. Job No. 5 Work Orders cover requests of "Users" for Contractor's services. These requests are approved by the Commission's Representative at the Jobsite.

Samples showing the form of the various types of work orders are presented as exhibits at the end of this section.

GENERAL ACCOUNTING AND COST ACCOUNTING

The initial Charts of Accounts and the early financial and cost statements, reports, and records conformed to Contract Appendix "D" and to other specific, written instructions of the AEC.[1] These written instructions were furnished in detailed clarification and confirmation of oral instructions given to the On-Continent Controller by representatives of the AEC Finance Division, at Los Alamos, on May 16 and 17, 1949.[2] Except for minor revisions and additional reports required by the Commission in accordance with various directives in the form of Controller's Releases, GM Bulletins, SF Bulletins, and others, all fiscal records, statements, and reports were maintained and submitted in accordance with these instructions, through December 31, 1949.

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[1] AEC letters, May 18, 1949 (HN-747 and -748); AEC letter, undated (HN-775).

[2] Controller's Trip Report, May 18, 1949.

It became apparent very early in the history of the contract that because fiscal reports and statements, as prescribed by the AEC, were modeled after those required of AEC On-Continent Integrated Operating Contractors, some of them did not present an adequate factual picture of Overseas A-E-C-M activities. Notable among these was the "Cost Report - Projects in Progress."

For example, the Cost Report required that all indirect costs be distributed at the end of each calendar month. This requirement resulted in an inequitable distortion of the costs reported for the work under Phase I and in the early construction projects under Phase II. Further, by this method no mobilization costs could be distributed to subsequent major construction projects for the various agencies, all of which benefited from the mobilization program.

Therefore, in order to provide a more equitable and realistic distribution of costs for both Holmes & Narver Management and the AEC, it became necessary to revise and supplement the Cost Statements for ready interpretation and analysis. On January 19, 20, and 21, 1950, when the On-Continent Controller and members of his staff attended a meeting at Los Alamos to obtain instructions about additional reporting requirements required by the Joint Technical Planning Committee (the planning predecessor of Joint Task Force Three) in Washington, the Controller emphasized that a seriously distorted cost picture was resulting from some of the mandatory reporting requirements, such as distribution of all indirect costs, including mobilization, on a monthly basis. It was also emphasized that this method would result in absorption of all mobilization costs by the AEC on the earlier increments of work and that construction for the Department of Defense and for other agencies would bear no portion of this major item of indirect cost.

Pending decision on this matter and in order to meet the reporting deadline of the 10th of the subsequent month, it was necessary to submit the "Cost Report - Projects in Progress" for the month of January 1950, on the previously prescribed basis. But discussion of this matter, and of other related accounting and reporting problems, was resumed in the H & N offices in Los Angeles on February 7 and 8, 1950, with the AEC (Los Alamos) Director of Finance, members of his staff, and representatives of the AEC Controller, Washington, D. C. During these conferences, H & N was authorized subject to subsequent official confirmation from Los Alamos, to rearrange Cost Statements and Records to parallel the original estimate, as revised. H & N was also authorized to apportion indirect costs to Jobs in Progress by predetermined rates, using the original estimate ratio of indirect costs to direct costs as a basis for the initial rates. It was also agreed that these predetermined rates might be adjusted from time to time, as indicated to be necessary by experience as to their adequacy or inadequacy, without retroactive application of any rate adjustments. Also discussed was the treatment of H & N field engineering services as a direct engineering expense, rather than as an indirect construction cost, as would have been the case if the construction contract had been awarded to another contractor. This

matter was not settled at this meeting, but was later corrected as a result of further discussions at Los Alamos on February 27, 1950.[1]

Revised statements through January 31, 1950, were then prepared; and after careful review by Messrs. Holmes and Narver, the Chief Fiscal Officer, Budget Director, Chief Estimater, and Controller, they were submitted to the Commission.[2] They were then reviewed with the AEC Contracting Officer, Contract Administrator, Deputy Director of Finance, a representative of the Commission's Washington Controller, and subsequently with the Deputy Manager. By letter the Atomic Energy Commission Contracting Officer approved the proposed method of presentation, with the addition of three items by his office.[3]

Subsequent "Cost Reports - Projects in Progress" have been presented in strict conformance to the original estimate as revised and supplemented from time to time; and Charts of Accounts and Records have similarly been revised from time to time to conform to the items and features of these estimates. Subsequent modifications were made to the Contract, also conforming to the arrangement of estimates.

Further illustrations of the difficulties encountered and cooperatively surmounted in adhering to the reporting requirements of the Commission's Finance Division while at the same time attempting to present a realistic picture of costs in relation to estimates may be found in the following accounts of the handling of specific problems such as field engineering costs, indirect costs, depreciation, and others:

During meetings at Los Alamos, February 27 through March 2, 1950, the H & N Controller pointed out to a representative of the AEC's Washington Controller that the arrangement of reports required by Controller's Release No. 9 resulted in distorting the reflected cost of "Engineering Design and Inspection" inasmuch as items of field engineering normally performed by the construction contractor were being included in this item of cost. It was acknowledged that because Holmes & Narver was the only AEC Integrated Architect-Engineer Contractor performing construction work, the AEC standard reporting requirements for exclusively A-E contractors resulted in reflecting distorted and untrue engineering design costs. The AEC Controller's representative advised that he was not authorized to approve deviation from the standard requirements as prescribed by CR-9, but that H & N was authorized to continue qualifying the report by means of a footnote such as that appearing on the January 31, 1950, Statement. That footnote was as follows:

> Overseas costs in the amount of $57,949.43 covered direct expense of Topographical and Other Surveys and Maps, Supervision,

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[1]Controller's Trip Report, Section 1, Los Alamos Meetings February 27 and 28, 1950.

[2]H & N letter HN-3267, February 24, 1950.

[3]AEC letter SD-5364, March 3, 1950 (HN-5898).

Inspection and Materials Testing and indirect items such as Progress Reports, Clerical, Blueprinting, etc.

The H & N Controller was later advised that the information supplied by means of the report required by Controller's Release No. 9 was a mandatory requirement of the Bureau of the Budget, which had proved reluctant to approve various revisions proposed by AEC.

At the February 17 - March 2 meetings, approval of the proposed method of allocating indirect expense to Jobs in Progress was secured, with one exception. H & N was advised by the representative of the AEC's Washington Controller that new instructions to be reflected by revised AEC Controller's Release No. 9 classified salaries of the Personnel and Procurement Departments as "Administrative," to be distributed to cost through indirect expense, rather than following direct labor and direct materials cost in accordance with the H & N proposal, based on the original estimate. The H & N Controller expressed extreme reluctance to continue deviating from the basis of the original estimate, inasmuch as this practice compromised internal control of job costs and created an untenable position in the event that, as a result of being combined with other estimate items, an estimate item over-ran the estimated cost. The Controller was then informed that it was not mandatory that the change be effected immediately and that the matter would be discussed further after official issuance of the revised CR-9. It was conceded that if the change became mandatory, it would probably be desirable to indicate by footnote a reconciliation between H & N proposed Cost Statements and the CR-9 Report.

During these meetings instructions were issued, effective March 1, 1950, requiring all integrated contractors to reflect equipment depreciation. The Controller suggested that because of the climatic conditions prevailing at the overseas project, normal Stateside depreciation rates would prove inadequate. This was readily recognized, and it was recommended that depreciation be computed on the basis of the anticipated life of the equipment, or the anticipated length of the construction contract, whichever was the shorter. Subsequent authorization was obtained to depreciate new equipment on a 4-year basis and used equipment on a 2-year basis, with provisions for necessary adjustments at the end of the construction phase by surveying off equipment no longer usable, or repairable, on an economic basis. Authorization was also given to reflect depreciation on construction equipment in the "Equipment Usage" column of the "Cost Report - Jobs in Progress", in conformance with the original estimate. Approval was also granted to reflect depreciation on marine or automotive equipment in indirect costs for proration to the Jobs in Progress, in accordance with the approved formula.

Information was furnished by the AEC Contract Administrator to the effect that revision of Appendix "D" of the Contract to conform to the original estimate was in progress.

During the Los Alamos conferences of January 19, 20, and 21, 1950, it had been specifically agreed that the Construction Battalion would be

responsible for distribution of cost of materials procured by Holmes & Narver and delivered to the Battalion for construction on Eniwetok Island. As reflected by the Controller's report on his trip to Los Alamos, June 25 to 27, 1950, no record of the end-usage of the construction materials delivered to the Battalion was maintained by them.

The AEC Los Alamos Director of Finance recommended distribution of these material costs on a Bill of Material basis at the time of delivery to the Construction Battalion, and the Contracting Officer suggested an alternate method of making the distribution after completion of the Eniwetok Island construction. But the H & N Controller advised that the latter method would result in an interim inflation of inventories by inclusion of materials no longer in H & N custody. The Contracting Officer stated that either method was acceptable to his office. It was then pointed out by the H & N Controller that charging the materials to the Eniwetok Island Jobs in Progress on a pre-use basis would result in a non-factual relation between the material costs reflected by H & N statements and the reported percentage of completion, as furnished H & N by the Battalion. This was acknowledged by the Contracting Officer, who stated, however, that because this appeared to be the best solution of the matter, the AEC could not object to the distorted picture. He advised that the Commission was not interested in labor costs of the Battalion as reported by the Military to the Joint Technical Planning Committee, and that he recognized the impossibility of presenting any comparable costs for structures on Eniwetok Island and similar or identical structures erected by H & N on other locations. He also stated that the only costs of interest to AEC were actual expenditures from AEC funds. Subsequently request was made to distribute these material costs on the basis of the original estimate.[1]

In addition to these major problems, there were many other complexities of General and Cost Accounting reporting peculiar to the Project:

During meetings at Los Alamos from July 26 through July 29, 1950, the H & N Controller expressed concern over the requested continued delay in closing books as of June 30, 1950, because this delay interfered with processing of internal reports for the month of July. (On August 2, 1950, telephonic instructions were received to close the books and submit the reports on the basis of H & N records, despite the fact that the AEC records reflected a material difference in the AEC equity accounts.) Also discussed was the method of handling AEC billings to the Department of Defense covering the construction services performed by H & N for the Military. This was subsequently resolved by AEC, by rescinding its previous instructions to bill the Commission by processing an Interoffice Transfer. This method would have resulted in understating contract costs; although admittedly the result obtained by this method, insofar as AEC books were concerned, was correct. Specifically, H & N was authorized to continue to report these costs as currently reflected on the "Cost

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[1] AEC letter SC-6419, December 6, 1950 (HN-10843).

Report - Jobs in Progress", enabling AEC to bill the Department of Defense without distorting the true contract costs on H & N Statements.

On April 9, 10, and 11, 1951, conferences were held in Honolulu to formulate policies governing cut-off and close-out of construction costs to completed facilities to be transferred to permanent Property Records, in conformance with the AEC Property Unit Catalog. These conferences were attended by the AEC Contract Administrator, four representatives of AEC's Los Alamos Finance Division, and the Controller of JTF-3; Holmes & Narver was represented by both the On-Continent Controller and the Jobsite Controller. Agreements were reached in connection with fiscal problems related to the continuations of Contract Jobs 4 and 5.

The Cost Accounting records were designed to provide a cumulative record of direct costs for the 35 Contract items, subdivided into 187 Contract features, on 21 island locations. Indirect costs were accumulated in 7 indirect cost centers, consisting of 160 cost accounts, for distribution to the Contract features.

The Direct Cost Accounts, required for accumulation of costs by individual work orders, change orders, and island locations, totaled 2,316 accounts.

During the Project, it was necessary to distribute many of these cost accounts to reflect the costs incurred in work for the 18 prime Users and 59 sub-Users. As of May 31, 1951, the AEC requested that costs of Job 5 Support and Roll-Up Services also be distributed by prime User and sub-User. This requirement had previously been applicable to construction costs only.

PROPERTY AND MATERIALS ACCOUNTABILITY

Because it was recognized that many intricate problems would arise in accounting for equipment and materials, by virtue of the logistics involved, the unavoidable delays in communications, and the large number of agencies to be supplied from stockpiles in H & N custody; Property and Materials Accounting Sections were organized at the Jobsite and in the On-Continent offices. Inasmuch as the functions of property and materials accounting must, of necessity, be carefully synchronized with receiving and warehousing operations, the accountability procedures were developed in conjunction with representatives of the Jobsite and on-continent warehousing organizations. The Jobsite Receiving and Warehouse Procedures were drafted concurrently with the Jobsite Property and Material Accounting Procedures in order that adequate accounting controls could be maintained at all times without hampering, or overlapping, the functions of the warehouses.

It was necessary to provide for On-Continent Receiving Reports in order to process vendors' invoices for payment in a timely manner, in compliance with government requirements whereby payment of vendors' invoices without a corresponding Receiving Report is not permissible. Jobsite Receiving Reports were prepared at the time of receipt of equipment

or materials at the site. Test checks indicate that the average lapse of time between on-continent receiving and Jobsite receiving on shipments made by surface vessels was approximately 53 days.

It was found necessary to adopt the usual accounting control for items in transit to overseas locations by setting up an Inventory in Transit Account. The procedure provided that upon receipt at Jobsite the items should be cleared from the Inventory in Transit Account by appropriate charge to either the applicable warehouse inventory account, or the Work Order number applicable to the feature of work, to which many items of materials were delivered directly from the ship or the dock. In the latter type of transaction, this system required issuance of a summary Stores Issue Slip (supported by a copy of the official receiving report reflecting in detail the items involved) from Inventory in Transit to the applicable Work Order number.

The procedures provided for Stores Issue Slips indicating end-usage of all items transferred from warehouse stocks.

In addition to on-continent furniture, fixtures, and equipment record cards, provision was made for the maintenance of stock record cards on all material items received at Jobsite; record cards on all items of equipment, installed and non-installed; and records of Jobsite furniture and fixtures.

The Jobsite equipment record cards were duplicated at the Los Angeles Office and reconciled monthly with the Jobsite equipment record cards by means of a Jobsite monthly report listing additions to, and retirements from, equipment accounts. Periodically, as determined necessary, complete perpetual inventory equipment listings were originated at the Jobsite for use in the Los Angeles Office in effecting a 100 per cent reconciliation of the on-continent equipment records with the corresponding Jobsite records. Periodically, physical inventories of Jobsite equipment were taken and copies furnished the On-Continent Controller. Copies of the monthly listings of additions to, and retirements from, equipment inventories; of the periodic complete listing of equipment perpetual inventory; and of the periodic physical inventories were also required by AEC at Los Alamos. Approximately 50,000 material and equipment items were recorded on stock record cards at Jobsite, and, in addition, equipment card records were maintained on more than 1,500 on-continent items.

Copies of all invoices were furnished the Jobsite Property and Materials Accounting Section for use in pricing out, and clearing from, the Inventory in Transit Account all items actually received and transferred to work in progress or to warehouse inventories. Pricing was done on a first-in-first-out basis in order to reflect market trends and because of communications time lag. At the end of each calendar month, Jobsite prepared a summary statement of transfer from the Inventory in Transit Account, supported by journal vouchers indicating the offsetting charges to other accounts; warehouse inventory accounts or end-usage account. The Los Angeles Property and Materials Accounting Section then prepared a statement of reconciliation, listing in detail the items

included in the Inventory in Transit Account on the on-continent books at the end of the applicable accounting period, and submitted this statement to Jobsite for information and required action. For example, materials paid for and received on-continent were immediately charged to the Inventory in Transit Account on the on-continent records, but might remain on the docks at Oakland, and/or in transit for one or more months after payment.

When shipping schedules were normal, these reconciling items were normally cleared from the Jobsite Inventory in Transit Account during the subsequent month; however, items uncleared from the account at Jobsite for 60 days were not uncommon. Items not cleared from the Inventory in Transit Account within 90 days were given preferred attention by both Jobsite and On-Continent Fiscal Divisions, in order that their identity might not be lost. In many instances - especially in connection with items obtained from other government agencies - invoices, shipping documents, and related identifying documents were not furnished by the respective agencies on a current basis. In some instances, copies of these documents might be received at Jobsite with no documentation furnished the Los Angeles Office, or vice versa, by reason of inconsistent mailing practices on the part of the various agencies involved.

Jobsite also furnished monthly summaries of all inventories by classification, including the Inventory in Transit Account, reflecting total dollar amount of each inventory category, as reflected by the Jobsite Inventory Control Accounts. These summaries were reconciled with on-continent inventory controls by the On-Continent Property and Materials Accounting Section by addition of the amounts paid for items not received at Jobsite as of the end of the applicable month.

Receiving records were consistently good. Some loss and damage was sustained on items in transit by Navy surface vessel. In view of the fact that cargoes were loaded aboard vessels carrying cargoes for installations at Hawaii, Johnston Island, Kwajalein, and the Orient, these losses in the amount of $55,322.26, through June 30, 1951, were considered negligible. This amount constituted approximately 0.33 per cent of items charged to the Inventory in Transit Account (including items furnished by the government), in the approximate total amount of $16,600,000.00. Relief of accountability was accomplished by processing Over, Shortage, and Damage Reports at Jobsite upon receiving or inspection of the shipments. Practically all adjustments or claims with vendors and on-continent carriers resulting from over- and under-shipments or damage in transit were accomplished by coordinated effort on the part of the on-continent procurement and fiscal organizations. Over, Short, and Damage Reports were prepared by the on-continent warehousing personnel at time of receipt of shipments. Normally, it was considered that on-continent receiving reports indicating receipt of items in good condition, supported by export packing records and evidence of transshipment as reflected by the shipping manifests and bills of lading, precluded the possibility of claims against vendors or on-continent carriers. There were, however, a negligible number of claims against vendors for defective equipment or inadequate export packing which could not be ascertained prior

to installation or erection at Jobsite. Without exception these claims (including the item cost, on-continent freight, Jobsite direct labor, and a reasonable allowance for supervision and overhead) were settled in a satisfactory manner, adequately protecting the government from financial loss by reason of established negligence on the part of the vendors.

Materials and equipment expended at Jobsite by loss, destruction, or normal wear and tear were cleared from accountability records by means of reports of survey containing full information as to the circumstances under which expended. These were adequately documented and certified by responsible Contractor personnel and authorized representatives of the various government agencies, all in accordance with established formal procedure, as approved by the AEC Chief of Supply at Los Alamos. Because many of the surveyed items of major equipment had been almost or entirely depreciated out prior to the date of survey, it was possible to charge appreciable amounts to the General Ledger Account, "Reserve for Depreciation."

Until approximately November 1949, Property and Materials Accounting Procedures were generally adhered to in a satisfactory manner, and the Jobsite and On-Continent Fiscal Offices were able to maintain adequate accountability control. During late 1949, Jobsite Stores Issue Procedures were abandoned or disregarded in practically all the construction materials warehouses. In a concerted effort to regain projected construction schedules which were some 60 days behind by reason of the shortage of funds in May and June of 1949, and by reason of the inadequacy of government furnished shipping, it was erroneously concluded at Jobsite that materials accountability should be sacrificed to construction speed.

Without the knowledge of on-continent administrative and fiscal organizations, the Jobsite Superintendent of Warehouses was instructed by Jobsite Management to relinquish his administration of practically all the construction materials warehouses to the various craft superintendents. This arrangement precluded any possibility of the maintenance of accountability controls by the Jobsite Warehouse Superintendent and the overseas and on-continent fiscal personnel. As was to be expected, the customary disinclination of construction or operating personnel to be hindered in their work by "non-essential paper work," resulted in a complete breakdown in accountability records because large quantities of construction materials were used without the preparation of Stores Issues.

Some effort was made to retain accountability by means of charging shipments, as received, directly to the Jobs in Progress, in most instances based on the end-usage indicated by the applicable Field Requisition. Ever changing priorities of the many features of work and the normal inclination of construction superintendents to meet their individual construction schedules without due regard for the propriety of their methods resulted in major diversions of materials in the field. In many instances large quantities of materials charged directly from the Inventory in Transit Account to specific Jobs in Progress reappeared on subsequent physical warehouse inventories.

Because Jobsite personnel apparently did not attach sufficient importance to Property and Material Accounting Procedures to notify on-continent adminsitrative and fiscal authorities, and because of normal time lag from the time of on-continent receiving until issuance from Jobsite inventories (60 to 90 days), this violation of Fiscal Procedures was not ascertainable from the on-continent records until late January 1950. By this time it became evident that the monthly Summary of Stores Issues was not being received on a current basis. It was considered possible that Jobsite warehousing or fiscal personnel were dilatory in processing and recording the Stores Issues as required by the established procedure.

In early February, the On-Continent Assistant Controller was instructed to proceed to Jobsite for a few weeks to survey the situation, as well as to review other routine fiscal matters. From his reports to the Chief Fiscal Officer and Controller and from oral information obtained by questioning returning Jobsite employees, the seriousness of the actual situation became obvious. The Assistant Controller, on temporary duty at the Jobsite, was instructed by teletype to remain at Jobsite pending the arrival of senior management officials of the Corporation, early in March 1950, and to place himself at the disposal of such officials for the length of time necessary to resolve the situation.

Conferences were held with Jobsite management, warehouse, and fiscal personnel and the On-Continent Assistant Controller, for the purpose of determining the extent of defection in accountability control and for the purpose of devising remedial action. The Assistant Controller was assigned the administrative responsibility for rectifying the condition, and Jobsite personnel were directed to assist and cooperate in every way possible in reestablishing adequate accountability records and controls.

Complete physical inventories were taken. However, because of the inadequacy of warehousing space, the difficulty of ready accessibility to materials stored in open storage areas, and the lack of orderly arrangement of many stores items, the result of the physical inventories taken at this time was not conclusive. These inventories were used, however, as a basis for establishing decentralized stock record cards at various warehouse locations; and the difference between the total dollar amounts of the physical inventories, plus the Stores Issues processed prior thereto, and the total dollar amount of materials receipts to the date of the physical inventories were recorded in a suspense account "Inventory Variance Account."

By means of subsequent analyses performed by a special group of engineers and accountants under the direction of the Jobsite Controller, and by means of subsequent complete and accurate physical inventories, the Inventory Variance Account was reduced to a negligible amount, and Jobsite Materials and Equipment Receipts were satisfactorily accounted for, and the costs properly distributed.

Shortly after the dismantling of shot island construction camps and facilities and their return to salvage inventories, all materials and

equipment were physically inventoried and properly stored in an orderly manner; at that time, accountability controls and stock records reflected a variance of approximately $2,000.00 or .0122 per cent of the approximate total charges ($16,400,000.00) to the Inventory in Transit Account.

Considerable difficulty was encountered in establishing costs of equipment and materials delivered into H & N custody at Jobsite by the military agencies, for which they reimbursed themselves from working funds advanced to them by the Commission. In accordance with agreements between the Commission and the respective military agencies involved in these transactions, charges against the AEC advanced working funds were to be covered by properly documented billings furnished AEC on a current basis. The charges were in turn to be transferred to H & N by the Commission by means of Inter-Office Transfers. (See sample form presented as an exhibit at the end of this section.)

Non-conformance to this procedure on the part of the military was consistent throughout the Construction and Test phases of the Project. Inter-Office Transfer billings covering these transactions seldom if ever were furnished H & N in less than 90 days; and in some instances, billings of items transferred at costs well in excess of $100,000.00 were not received by H & N until more than a year after delivery. Thus H & N was unable to apply exact costs to Materials and Equipment Record Cards and was compelled to process Stores Issues indicating quantities used only and reflecting no unit price, or dollar value. Much later, upon receipt of the priced Inter-Office Transfers, it was necessary to complete a voluminous quantity of such unpriced Stores Issues and to prepare cost distribution journals many months after consumption, or use, of the items involved.

H & N was repeatedly advised by AEC that every effort was being made to secure the necessary documentation from the military agencies to make possible transfer of these costs to H & N. Inasmuch as AEC was never successful in resolving the situation, it was ultimately mutually agreed that all items received from these military sources would be set up on H & N accountability records at estimated prices, based on the most recent military billings available on identical items; and that they would be costed out on this basis at time of issuance from stock. Any variances resulting from the use of estimated prices were costed into a variance account for subsequent proration to the cost features of the work.

Agreements were reached during Los Alamos Meetings of January 19, 1950, whereby all other participating agencies (excluding AEC) were to designate Property Accountable Agents and station them at the Jobsite to receive and maintain custody and accountability records in connection with items acquired by or for these other agencies. This would relieve Holmes & Narver of any responsibility or accountability for items not delivered into H & N custody. These agreements conformed to prior agreements at Washington levels, as confirmed by "Secret" letters from General Gerhart, acting on behalf of "The Chairman, Joint Technical Planning Committee," addressed to "The Chief of Naval Operations (Op-40)," and

"to the Departments of the Army and Air Forces," dated 9 December, 1949, requesting assignment of Property Accountable Officers "to Joint Task Force Three at the earliest practicable date."

Before the arrival at Jobsite of any of the agreed upon Property Accountable Officers, H & N was required to transship and receive at Jobsite, a few shipments of items procured by or for other agencies. At a meeting in the Office of the Chief, Supply Branch, AEC, at Los Alamos on November 29, 1950, attended by representatives of AEC, Los Alamos Scientific Laboratories, and the H & N Controller's Office, clarification of responsibility and accountability was requested in connection with shipments by or for other agencies. The H & N Controller explained that H & N was willing to assume accountability and responsibility as required by the AEC, but that there was grave concern over the possibility of being called upon to account for technical equipment and instruments acquired by and for use of other agencies, after the fact, as a result of the failure of other agencies to render the proper accounting. An example cited was the material cost distribution covering items used by the Construction Battalion at Eniwetok. It was learned that after the January 1950 Meetings it had been determined that only one Property Accountable Officer would be required by Joint Task Force Three, and that his appointment had been deferred for various reasons. Advice was given, however, that the Joint Task Force Three Property Accountable Officer had been appointed, and that his operations had been established in Washington! In the meantime, a Warrant Officer had been stationed at Oakland and assigned the responsibility for receiving and transhipping technical equipment and instruments furnished by and for other agencies; and an enlisted man had been assigned to Jobsite to assume the responsibility for receiving, warehousing, and accountability for these shipments, pending the arrival of the designated Property Accountable Officer. These accountability records were maintained by the Military Property Accountable Officer, and H & N did not assume any responsibility therefor.

STATEMENTS AND REPORTS

Monthly fiscal reports originally required by AEC Finance, as prescribed by letters and attachments, H & N file Nos. HN-747; HN-748; and HN-755, were:

1. Statement of Estimated Cash Requirements.

2. Statement of Cash Receipts and Disbursements. (These reports duplicated information furnished as support for 1034 Public Vouchers used in securing advances of additional funds, in accordance with the provisions of Contract Article VI.)

3. Balance Sheet.

4. Operating Statement.

5. Statement of Entries to and Balance in Current Account, supported by a Register of Receipts and Issues by Receiving Report Number and Shipping Memo Number.

6. Reconciliation of Summary Statement of Cash Receipts and Disbursements with Operating Statement.

7. Report of Obligations, Expenditures, and Reimbursements.

8. Cost Report - Projects in Progress.

New reports have been added to the required list from time to time. On July 8, 1949, Bulletin GM-88 and Bureau of the Budget Circular A-30 were received. These required submission of annual reports of costs of maintenance and operation of AEC motor vehicles. On September 16, 1949, AEC Controller's Release No. 9 and AEC Controller's Release No. 17 were received. These required submission of a monthly report, "Cost Report on Changes in Plant and Equipment." By the end of October 1949, the fiscal reporting requirements of all AEC Divisions had increased to a total of 20 reports, including: the Annual Motor Vehicle Report, 3 semi-monthly statements, and 16 monthly reports and statements. These were in addition to 6 internal reports prepared for the guidance of H & N Management in the administration of all company matters, including government contracts.

At the request of the AEC Contracting Officer, the various report requirements of the AEC and H & N internal reports were reviewed by the Chief Fiscal Officer and the Controller. This analysis, reprinted at the back of this section, was furnished to the AEC Contracting Officer under date of November 18, 1949.

Additional report requirements continued to be made. On December 6, 1949, in the AEC Controller's Office, Washington, D. C., the H & N Controller was given a copy of AEC Controller's Release No. 14, which required submission of an additional monthly report, "Cost and Budget Report." The first report was furnished as of February 28, 1950. At the Los Alamos meetings of January 19, 20, and 21, 1950, instructions were given for the preparation of a special report required by the Joint Technical Planning Committee in Washington. The first report was submitted as of January 31, 1950.

Because H & N cost ledgers and accounts, as revised, were designed to furnish cost classifications paralleling the revised estimates and Contract features, as modified for the purpose of the Cost Report - Projects in Progress, it was necessary each month to regroup and reclassify practically all cost ledger accounts three times, in order to conform to the varying requirements of the reports requested by Controller's Releases No. 9 and 14, and the Joint Technical Planning Committee.

On February 7 and 8, 1950, during discussions at the H & N Home Office among the Los Alamos AEC Director of Finance, members of his staff, two representatives of the AEC Washington Controller's Office, the H & N Chief Fiscal Officer, and the H & N Controller, a review was made of all fiscal reports being furnished AEC. Analysis of the arrangement and content of the various reports revealed that some of them were of questionable value and, from a management standpoint, misleading. One of the

representatives of the Washington Controller was delegated to spend additional time with H & N fiscal personnel in revising the Balance Sheet to reflect a more realistic picture, and in formulating recommendations for the discontinuation or consolidation of various other reports and schedules. The Balance Sheet was revised in accordance with the agreements reached at these meetings. With the exception of minor revisions in the arrangement of the Statement, resulting principally from the increased participation of other agencies in the operations at the Project, no further changes in the Balance Sheet presentation have been necessary.

It was also mutually agreed that some of the reports might well be discontinued or consolidated, with no detrimental effect on the financial reporting insofar as AEC at Los Alamos and Washington was concerned.

During the H & N Controller's visit to Los Alamos on March 1, 1950, this matter was further discussed (in conjunction with the proposed revised Cost Report - Projects in Progress) with the AEC Contracting Officer, the AEC Contract Administrator, the Deputy Director of Finance at Los Alamos, and the representative of the Washington AEC Controller's Office. As a result, authorization was given to discontinue all previously required financial statements, reports, and schedules, except the following:

1. Balance Sheet (as revised on January 31 for the purpose of presentation at this conference).

2. Cost Report - Projects in Progress, to conform generally to the revised report of January 31.

3. Report required by Controller's Release No. 9.

4. Report required by Controller's Release No. 14.

5. Report required by JTPC (JTF-3). In connection with this report permission was granted to substitute "Structures" for the sub-heading previously classified as "Buildings."

6. Monthly report of Obligations, Expenditures, and Reimbursements.

7. Monthly Statement of Contractor's Earned Fee. This statement actually constitutes detailed billing for earned fee and services, as a basis for payment from AEC advance funds to the Holmes and Narver treasury, following approval of the Contracting Officer as required by the Contract.

8. Annual Motor Vehicle Report.

9. Analysis of Inter-Office Transfers.

Although this reduction materially lessened the multiple handling of fiscal data, it was still necessary to make three regroupings of accounts for the reports required by Controller's Release No. 9 and No. 14 and for the report for JTPC.

On March 2, 1950, the revised schedule of fiscal reports was reviewed with the AEC Deputy Manager, who commended the projected revisions, especially the discontinuation of the numerous reports and schedules, stating that these statements would be satisfactory to the AEC Manager's Office so long as they were adequate for the management requirements of the Contracting Officer and of Management of Holmes and Narver, Inc.

In conferences at the H & N Home Office on April 4 and 5, 1950, the AEC Director of Finance and his Chief Auditor requested resumption of the preparation and submission of the following statements and schedules which had been discontinued as a result of the Los Angeles conferences of February 7 and 8, 1950, and the Los Alamos conferences of March 1, 1950:

1. Cash Receipts and Disbursements.

2. Statement of Entries to and Balance in Current Account.

3. Reconciliation of Summary of Cash on Hand and Disbursements and Estimated Cash Requirements.

4. Operating Statements from Inception of Contract.

5. One additional Reconciliation Schedule to be requested by letter from the AEC Chief Auditor, indicating desired arrangement.

Following a review of the notes on the Los Angeles meetings of February 7 and 8, 1950, and of the Controller's Report of the Los Alamos meetings of March 1 and 2, the Chief Fiscal Officer and the Controller of H & N advised that H & N would continue to furnish required reports and statements in accordance with the terms of the Contract. It was emphasized, however, that none of the discontinued reports served any useful purpose insofar as H & N Management was concerned, and that the discontinuation had been officially ratified at the Los Alamos meeting of March 1, 1950. It was further advised that assurance had been given by the AEC Contracting Officer and by H & N Management that the reports being furnished in accordance with the agreements of March 1, 1950, were adequate for management purposes.

Upon a subsequent visit of the AEC Deputy Manager to the H & N Home Office, he was presented with the views of the Fiscal Division on the reinstatement of these requirements. Later, in a letter, dated April 25, 1950, H & N was advised that reinstatement of the discontinued reports would not be required.[1]

Other statistical reports submitted by the Fiscal Division, in accordance with Commission requirements, are listed below:

1. Monthly Personnel Status Report (Form SFO-58).

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[1]AEC letter, April 25, 1950 (HN-7357).

2. Quarterly Personnel Status Report (Form SF-135).

3. Monthly Report of Contractor Employment.

4. Monthly Report of Change in Vehicle Levels.

5. Quarterly Report of Motor Vehicle Operation.

The following internal statements and reports were prepared by the On-Continent Fiscal Division for the guidance of Holmes & Narver Management and Fiscal Administrators:

1. Daily Summary of Reimbursible Expense and Cash Position.

2. Weekly Statement - Status of Commitments and Commitments Paid.

This latter report was developed during the early days of the Project (May 1949) to supply H & N Management and Fiscal Administrators with current, basic financial information essential to sound Contract financial administration; and to insure at all times adherence to the provisions of Contract Article VI governing the obligation and advancing of Contract funds by the Atomic Energy Commission.

Close surveillance of Contract financial position was effected by careful review of this Weekly Commitment Report, which proved to be an extremely useful and informative tool of Management throughout the project, serving as a basis for notifications to the AEC when commitments exceeded 85 per cent of the total funds obligated, as required by Contract Article VI. (By Contract Modification No. 20, dated January 24, 1951, this percentage was subsequently increased to 95 per cent of the total amount obligated.) The report also served as basis for requesting monthly advances of funds to insure adequate funds on hand at all times to pay current invoices and payrolls.

In March 1951, the Controller of the Joint Task Force and the Atomic Energy Commission Director of Finance at Los Alamos requested that copies of this theretofore exclusively internal report be furnished them.

PAYROLL AND TIMEKEEPING

The payrolls for all employees were prepared and paid by the Los Angeles Fiscal Division on a weekly basis, in accordance with job classifications and rates, as contained in the Contract. Overseas employees worked under terms of signed Employment Agreements which guaranteed 48 hours work per week, and which provided for a Contract Completion Bonus.

The on-continent payroll, supported by employees' time cards, was prepared immediately following the close of the weekly pay period and checks were delivered within two days. The overseas payroll was completed and checks were mailed within five days after the close of the weekly payroll period. To accomplish this, the On-Continent Fiscal Division prepared overseas payrolls and checks on a current basis for the

normal regularly scheduled work week, except for employees working fewer hours, as shown by a weekly teletype from Jobsite. Overtime was paid on the second successive payroll after receipt of the time cards from Jobsite.

The manual payroll system originally used was altered to meet changing requirements brought about by the increase in number of Jobsite employed from 500 to 600 as originally planned to more than 1800. The Todd Protectograph Payroll System and Addressograph were used effectively to complete all payrolls on schedule during the entire Project. This record contributed greatly to high morale of personnel at Jobsite and relatives at home.

In addition to the normal payroll deductions and records, special deductions were made for Return Travel Fund, Subsistence and Quarters, Token Payments, etc. Net payroll earnings, less token cash payments, were sent by check to designated allottees.

During the early days of the project, currency for payment of payroll token payments was obtained by an arrangement whereby the pilots of shuttle planes between Kwajalein and Eniwetok delivered checks drawn on the Jobsite Revolving Fund Account to the custodian of the Commissioned Officers' Mess at Kwajalein and hand-carried the equivalent in currency on their next flight to the Jobsite. The shuttle flight schedules were not maintained with regularity, and upon two occasions it was necessary for Jobsite staff members to supplement the Jobsite petty cash from their personal funds in order to effect the token payment.

In early July 1949, the Jobsite Petty Cash Fund was augmented by shipment of currency from Los Angeles by registered mail. By mid-August, requirements had increased so that they exceeded the cash resources available from the Kwajalein Officers' Mess and from Jobsite facilities. At this time, regular weekly transmittals of currency by registered mail from Los Angeles were begun. Substantial quantities of coins were hand-carried to Jobsite for change funds in commissaries and other facilities.

During a visit of the On-Continent Controller to Jobsite, in May 1950, arrangements were made with the Military Finance Officer at Eniwetok to cash Revolving Fund Checks in amounts sufficient for Jobsite petty cash requirements, effective June 1, 1950, at which time the regular weekly transmittals of cash by mail were discontinued.

Timekeeping for on-continent employees was handled in the routine manner common to most business organizations. Because physical control was close, no problems of any importance developed. Procedures are covered in Standard Operating Procedures of Holmes & Narver, Inc. (See exhibit at end of this section.)

Timekeeping for overseas employees was handled in the routine manner common to most construction companies. The various foremen and timekeepers filled out time sheets. These were reviewed; checks were made with the dispensary; routine field checks were made at varying times and intervals. All time sheets were reviewed by the Jobsite Controller's Office.

The timekeeping for employees working in the restricted buildings offered a problem in that timekeepers could not enter, but the log in and out offered a check. On the whole, timekeeping was effective, and it is clear that additional timekeepers would not have justified their additional cost. On the other hand, procedural changes appeared to be warranted. As of May 25, 1951, Jobsite timekeeping procedure was formally revised, incorporating changes and improvements which had been developed through experience. Bulletins No. 281 and 282, outline these changes. (See exhibit at end of this section.)

The payroll and timekeeping functions as of January 1951, served a peak of 436 employees on-continent, including part time employees, and 1,826 overseas. The total number of pay checks processed through June 30, 1951, was 143,118, amounting to $16,596,158.89.

ALLOTTEES PAYMENTS

Because of the isolated location of the Jobsite, with no banking facilities, it was not deemed practical or desirable for Holmes & Narver to pay net payroll earnings directly to the overseas employees. Consequently, wage payments made directly to employees at Jobsite were limited to cash token disbursements, usually $5.00 or $10.00 per week, sufficient for purchase of supplies for personal requirements. Allottees were formally designated by the employees as recipients of the balance of their net weekly earnings in accordance with Section 17 of the Employment Agreements. Pay checks reflecting the names of the employees were made payable to the designated allottees, usually relatives or banks, and corresponding pay check stubs were then sent to the Jobsite employees as their statements of weekly earnings and deductions.

An important duty of the On-Continent Payroll Section (in addition to making payments on schedule) was to aid in maintaining Jobsite morale by supplying payroll information to employees and allottees upon request. This usually involved answering innumerable questions, of allottees, relating to pay checks. These questions, almost without exception, were attributable to deductions of payroll advances to employees, failure of employees to work the usual number of overtime hours, changes of designated allottees, or unreported changes of address by allottees.

PAYROLL WITHHOLDING AND SOCIAL SECURITY TAXES

In accordance with determinations of the United States Treasury Department, Withholding Taxes were deducted from the earnings of Jobsite employees, although the site location was a Trust Territory of the United Nations and some doubt existed as to whether or not incomes of Jobsite personnel were taxable. Any claims for refund of taxes were initiated independently by employees who believed they could qualify under various sections of the Internal Revenue Code, and no record of decisions is available. A total of over $2,000,000.00 was withheld from the wages of overseas and on-continent employees, prior to June 30, 1951.

Prior to January 1950, the earnings of overseas employees were not subject to the provisions of the Social Security Laws, whereas those of

the on-continent employees were. Subsequent to that date, Old Age Benefit Taxes (F.I.C.A.) were deducted from the overseas earnings under the amended provisions of the law. The overseas earnings, however, continued to be exempt from State Unemployment Taxes.

As of June 30, 1951, a total amount of $281,824.84 of employees' and employer's Social Security Taxes had been paid, or accrued for payment, on overseas and on-continent employees' earnings.

PER DIEM AND TRAVEL

Processing of Per Diem and Travel Expense payments was designated as a function of a Travel Unit of the Accounts Payable Section. Procedures were developed adhering to established company policy, as reflected by Appendix "A" of the Contract. Unusual circumstances not specifically covered by the provisions of Contract Appendix "A" were resolved by application of the rules contained in the government pamphlet "Standardized Government Travel Regulations."

No problems of appreciable complexity were encountered in processing Per Diem and Travel payments. Extreme caution in processing Per Diem payments was necessary, however, because of the varying Per Diem rates at different locations, as prescribed by Contract Appendix "A." Another factor contributing to the difficulty of processing Per Diem payments was the number of time zones (including the International Date Line) entered, or crossed, in travel necessary in connection with the Contract. The periodic adoption of Daylight Saving Time in only a few of the zones further complicated the matter. These difficulties were resolved by the simple expedient of converting departure and arrival time, as reflected by the traveler's itinerary, to the equivalent of prevailing time at Los Angeles (i.e., Pacific Standard Time or Pacific Daylight Saving Time).

From September 24, 1948, date of issuance of Travel Order No. 1, through June 30, 1951, payments were processed by 5,312 checks, in an amount approximating $600,000.00 and covering 6,285 Travel Expense Statements. These were exclusive of transportation by military and naval surface craft and planes.

TRUSTEE FOR TRAVEL FUND

In accordance with the provisions of Contract Appendix "A" and Section 2(c) of the Employment Agreement executed by each overseas employee at the time of hire, defaulting Jobsite employees were required to assume the cost of all return transportation to the point of hire and all living and other expenses in connection therewith, from the date of termination. The Contract Appendix and the Employment Agreement also provided for weekly payroll deductions as partial security to guarantee compliance on the part of the employee. It was also stipulated that upon satisfactory completion of the designated term of employment, all amounts withheld for this purpose automatically reverted to the employee for payment from the "Trustee for Travel Fund" Account at the time of final termination.

All amounts withheld as security for defaulting employees' return travel were deposited weekly to a special bank account entiteld "Holmes & Narver, Inc., Contract No. AT-(29-1)-507, Trustee for Travel Fund Account." These deposits through June 30, 1951, totaled $982,007.16. The corresponding credits were entered to the individual employee's Return Travel Fund Account on the records. In the event of default on the part of the employee, the balance contained in his Return Travel Fund Account was applied to the costs incurred in connection with his return travel, by drawing a check on the Trustee for Travel Fund Account and depositing it to the Contract Advance Fund Account.

At the inception of the Contract, the maximum amount of return travel fund payroll deduction stipulated by Contract Appendix "A" and the Employment Agreement was $250.00. As directed by the AEC,[1] this amount was increased to $450.00, and Appendix "A" of the Contract was revised accordingly. In accordance with later instructions[2] the amount was increased to $480.00 on on-continent hires. The latter revision was incorporated in Revised Employment Agreements, execution of which was required by all new hires on and after October 16, 1950. The revised Employment Agreements were also submitted to all Jobsite employees for execution at Jobsite, bearing an effective date of February 5, 1951. Because of the inclusion of provisions for increased hourly rates in the Revised Employment Agreements, most of the manual employees found the Revised Agreements acceptable and executed them, thus rescinding the Employment Agreements previously signed. Inasmuch as the Revised Employment Agreements contained essentially no additional benefits for non-manual employees, efforts to obtain their signatures were, in the main, unsuccessful.

In compliance with specific written instructions of the AEC, H & N withheld payment of amounts due defaulting employees at time of termination, in addition to and in excess of the $250.00 maximum Return Transportation Fund prescribed by the original Employment Agreements, but not exceeding $450.00. Subsequently, claims were filed with the State of California Labor Commissioner by some of these defaulting employees, protesting withholding of wages and other amounts due them, in compliance with the Client's instructions requiring collection of $450.00 return travel costs instead of $250.00. The Labor Commissioner ruled, on February 1, 1951, File No. 63055-M, that in his opinion withholding of amounts in excess of $250.00 from defaulting employees whose executed Employment Agreement specified a maximum Return Travel Fund deduction of $250.00 was not permissible. As of June 30, 1951, H & N had received a number of communications from the Labor Commissioner pressing for information as to the disposition of amounts withheld in excess of the $250.00 prescribed in Employment Agreements as a maximum Return Travel Fund deduction.

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[1]AEC letter SD-6099, September 21, 1950 (HN-9811).

[2]IOC from Director of Procurement to H & N Controller, dated October 19, 1950, recording instructions received by the Director of Procurement and the Chief Fiscal Officer at a Los Alamos meeting on October 17, 1950.

Although contacts with the Labor Commissioner in this matter had been closely coordinated with those of AEC Legal Counsel, who was thoroughly familiar with the developments, this opinion of the Labor Commissioner was officially referred to the AEC on February 8, 1951 (HN-8034), together with an additional letter from the Labor Commissioner, dated February 5, 1951, requesting an answer in this matter. Under date of April 3, 1951, the Labor Commissioner again requested an immediate reply to his inquiry of February 5, 1951. This request was also referred to the AEC by letter (HN-8643) dated April 4, 1951. On the same date the H & N Assistant Chief of Operations discussed the matter with the AEC Contracting Officer by telephone. Under date of April 6, 1951, H & N was advised by the Contracting Officer that the matter was being referred to the Comptroller General of the United States, with a request that a decision be rendered as to whether or not refunds made in accordance with the opinion of the Labor Commissioner would be reimbursible from government funds.[1]

As of May 31, 1951, no decision had been furnished as to the proper disposition of claims of this nature.

FRINGE BENEFITS

In accordance with the Contractor's established policy, all employees of the Contractor's Home Office participate in Employees Fringe Benefit payments. These benefits include prescribed annual allowances for vacation, sick leave, holiday pay, severance pay, supplemental compensation, and a Group Life Insurance Plan.

To provide, in part, for these payments, the Contract, Appendix "A", stipulates that an amount will be paid the Contractor equal to a percentage of the reimbursible on-continent payroll. This percentage is reviewed and/or adjusted with the approval of the Commission, at the beginning of each calendar year. It is based on the previous calendar year's record of experience, covering the actual amount of fringe benefits paid in relation to the total on-continent payroll as defined in Appendix "A" of the Contract. During the past three calendar years, the Fringe Benefit percentages as approved by the Commission, have been: 1949, 13.5 per cent; 1950, 9.18 per cent; and 1951, 11.646 per cent.

The Fringe Benefit policy is administered by the Contractor's Management, through the office of the Chief Fiscal Officer, as Chairman of the Salary Committee, in accordance with the established company policies as reflected in Fiscal Bulletin No. 1 and Fiscal Bulletin No. 1, Revisions 1 and 2. Copies of these bulletins are reproduced as an exhibit at the end of this section.

INSURANCE

Under the terms of the Contract, reimbursement of premiums paid for insurance and bonds could be secured only on "such bonds and insurance policies" as had been "approved or required by the Commission." H & N was advised, prior to the actual issuance of the Definitive Contract,

[1] AEC letter, April 6, 1951 (HN-13776).

that it was not the policy of the Commission to approve or require any bond or insurance coverage on the part of its integrated contractors except Workmen's Compensation and Public Liability. H & N was also advised that the nature of the work at the Project site would bear a security classification precluding both the designation of job classifications conforming to the Compensation Insurance Manuals and the normal audit of payrolls by the Insurance Auditors. Representatives of the Commission advised that an established arrangement existed between the various integrated contractors of the AEC and the major casualty insurance companies, whereby provisional premiums were paid and at periodic intervals adjusted to actual claims paid, plus direct costs of administering and processing the claims, and plus percentage factors to cover fees.

Effective January 31, 1949, just prior to the departure of the first contingent of employees for Jobsite, the Insurance Carriers issued binders serving as temporary overseas Jobsite Workmen's Compensation and Comprehensive Liability policies, pending negotiation and issuance of a definitive policy with endorsements as required by the AEC.

It ultimately became obvious that it was impractical to handle the insurance negotiations by correspondence between the Carrier's San Francisco Office, the AEC at Los Alamos, the Chief of the AEC Insurance Branch in Washington, the H & N insurance advisor, and H & N in Los Angeles. In December 1949, the H & N Controller travelled to Washington for a conference with representatives of the Commission and the Carrier in order to expedite the issuance of formal policies conforming to the requirements of all concerned. It was also necessary to obtain the concurrence of the Director of the Bureau of Employees' Compensation, Federal Security Agency, the governmental bureau charged with responsibility for administering claims in accordance with the provisions of the Longshoremen's and Harbor Worker's Act, as amended and extended by the Defense Base Act in Public Law 787 - 77th Congress, the governing statute on compensation insurance coverage for overseas projects.

Agreements were reached satisfactory to the government agencies involved, the Insurance Carriers, and H & N Management. Early in 1950, the formal overseas policies were issued, dating from January 31, 1949, the effective date of the interim binders.

No problems were involved in securing on-continent coverage where the classifications of employees and payroll statistics and records were unclassified and could be made available to the Insurance Auditors. This eliminated the necessity for a cost-plus-percentage arrangement for on-continent casualty coverage. Standard policies were issued, effective September 17, 1948, covering both Workmen's Compensation and Comprehensive Public Liability.

Required coverage, as specified above, was continued throughout the life of the project, and as of June 30, 1951, the claims ratio was, according to the Carrier, extremely low for a project of this nature, on-continent or elsewhere.

Although disallowed as a reimbursible item of expense by the AEC, a Blanket Position Bond has been maintained continuously in force during

operations to date, the premiums for which were paid from corporate funds on a non-reimbursible basis. The bond premiums were considered a justifiable corporate expense as an added precaution against loss of government funds (normally reimbursible under the terms of the Contract) and in consistent continuation of established company policy.

REVENUE PRODUCING FACILITIES

Operation of facilities necessary to provide adequate subsistence and quarters for the personnel of all agencies, contractors, and others (except for certain military detachments) stationed at Jobsite was an integral part of the scope of H & N work under terms of the Contract. During the early negotiations, representatives of the AEC indicated willingness to furnish subsistence and quarters without charge to Jobsite personnel and to adjust pay scales accordingly. This suggestion did not conform to established H & N policy in connection with other overseas projects, and, based on the firm request by H & N, authorization was given to collect $1.50 per day both from Jobsite employees and from regular on-continent employees visiting Jobsite on temporary assignments. Subsequent authorization was also given to collect the same amount from the personnel of all other agencies, contractors, subcontractors, and others who were furnished subsistence and quarters at facilities operated by H & N. The extent of activities involved may be seen from the fact that through June 30, 1951, meals served to jobsite personnel totaled 2,335,173.

The terms of the Contract also required that H & N operate other revenue producing facilities, such as Commissaries (similar to Military PX and Ship Store Operations); Bars serving both beer and liquor; Snack Bars; etc. Prices charged for items sold in these merchandising facilities were based on cost, plus a very nominal markup (e.g. in the Commissaries, the markup ranged from approximately 10 per cent on necessity items such as clothing, shoes, gloves, and sundries essential to the comforts and welfare of the employees, to 30 or 35 per cent on so-called luxury items commonly obtainable from Military PX's and Ship Stores in similar locations). It was contrary to H & N policy to merchandise strictly non-essential items and, in the main, this policy was adhered to despite the receipt of a considerable volume of Field Requisitions for items of a non-essential nature. This was accomplished by screening the requisitions upon receipt at the Los Angeles offices. H & N employees were, however, permitted to visit Military PX installations at Eniwetok Island to purchase any items available in the PX stocks.

In accordance with the requirements of Article V of the Contract, all revenues derived from the operation of these facilities were applied as credits to the cost of the work under the Contract. They were deposited monthly to the Contract Advance Fund Account, and thus reverted to the government.

From inception, unusually rigid internal control was exercised over the stocks and revenue derived from these facilities. As a consequence, no significant shortages or thefts occurred. One reported loss by theft was presented to the bonding company as a claim and was paid in full.[1]

[1]See discussion of Blanket Position Bond under "Insurance."

As of June 30, 1951, recorded revenues from all these revenue producing facilities totaled $1,939,395.12, all of which had been deposited to the Contract Advance Fund Account and applied as a credit to the cost of the work under the Contract.

OVERHEAD - METHOD OF PAYMENT

Under the terms of the Contract, Article VI - Method of Payment, Modification 18 thereof, and Appendix "C", provision is made for a quarterly determination and payment of the Contractor's allowable Home Office overhead. Allowable Home Office overhead bears the same relation to total Home Office overhead as total basic wages of this Contract, as defined by the Contract, bear to the total basic wages of all the Contractor's operational activities.

In Part I, of Appendix "C" are set forth the following general account classifications which describe the items of expense that make up the Contractor's Home Office overhead, as determined by the Report of Audit of Records of the Contractor, prepared by Douglass McKenzie, C.P.A., as of December 31, 1948:

> Salaries, Accounts Receivable Written Off, Advertising, Blueprints, Contributions, Depreciation, Insurance, Legal and Accounting Fees, Licenses and Permits, Memberships, Miscellaneous Expense, Moving and Storage, Office Cleaning and Maintenance, Office Rent, Office Changes and Installation Expenses, Office Supplies and Expenses, Office Utilities, Outside Typing, Payroll Taxes, Post Contract Audit, Promotion and Research, Repairs, Subscriptions and Dues, Taxes - Personal Property, Telephone and Telegraph, Travel and Entertainment.

In Part II, of Appendix "C", the following categories of Promotion and General Expense classifications are eliminated from the Contractor's Home Office expenses as non-allowable under the terms of the Contract:

1. Advertising (except Help Wanted)
2. Contributions and Donations
3. Extra-ordinary Legal Fees
4. Expenses of Litigation
5. Accounting Fees Pertaining to Tax Returns
6. Licenses and Permits
7. Memberships
8. Entertainment
9. The salaries of James T. Holmes, D. Lee Harver, and the Project Manager and that portion of the salaries of other corporate

officers which is attributable to the performance of their functions as corporate officers.

10. Interest Expense

11. Taxes on Net Income

12. Public Relations Expense

13. Excess Profit Taxes

14. Capital Stock Taxes

15. Stock Transfer Fees and Taxes

16. Unusual and extra-ordinary expenses already applicable to the Contractor's prior or future fiscal years except as otherwise agreed by the Contractor and the Commission.

17. Any item listed in the Miscellaneous Expense Account shall be excluded herefrom or included herein as the Contractor and the Commission may agree.

18. Other salaries, wages and expenses of employees not regularly engaged in Home Office Administration.

19. Any other expenses not properly chargeable to Home Office administration expense.

20. Of any item charged to overhead expense, that portion which is handled as a direct charge to operations under this or any other contract.

From January 1, 1949, through June 30, 1951, the allocation of Home Office overhead, including fringe benefits, on the prescribed formula has been as follows:

Calendar Year	Allowable Overhead	Non-Allowable Overhead
1949	$ 99,482.67	$ 224,548.00
1950	162,148.54	268,679.46
1951 (6 mo.)	128,590.26	135,492.52
TOTAL	$ 390,221.47	$ 628,719.98

Thus, of the total overhead for the period, the Contract absorbed 38 per cent and all other Holmes & Narver, Inc., operational activities bore 62 per cent, exclusive of federal corporation taxes. The allowable overhead has amounted to 1.19 per cent of the total Contract costs.

AUDIT AND CONTROLS

The On-Continent Internal Audit Section was organized in the early days of the Project, under the direct supervision of the Chief Auditor, who reported to the On-Continent Controller. This section performed all internal audits normal to any extensive business and financial transactions, and in addition performed special audits and exercised controls designed to protect the government from financial loss resulting from unjustifiable and unauthenticated charges by vendors. These controls included auditing of records of subcontractors performing technical services on a cost-plus basis.

The Internal Audit Section was given responsibility for determination that all expenditures under the Contract conformed to the reimbursement and documentary audit requirements of the AEC and the General Accounting Office. This responsibility required the auditors to have intimate knowledge of applicable decisions (both current and past) of the Comptroller General of the United States.

It is noteworthy that as of June 30, 1951, out of total expenditures of $35,557,395.46, no non-reimbursibles had been sustained.

CHAPTER 11.4

FISCAL SUMMARY

The financial statements and reports presented at the end of this section are intended to provide an over-all factual picture of Project costs and of the magnitude of the effort involved in maintaining the requisite financial records. Financial statistics and amounts considered to be of unusual significance or import have been extracted from these statements and reports and have been illustrated by means of graphs. (See Figures 11.4-1 and 11.4-2.)

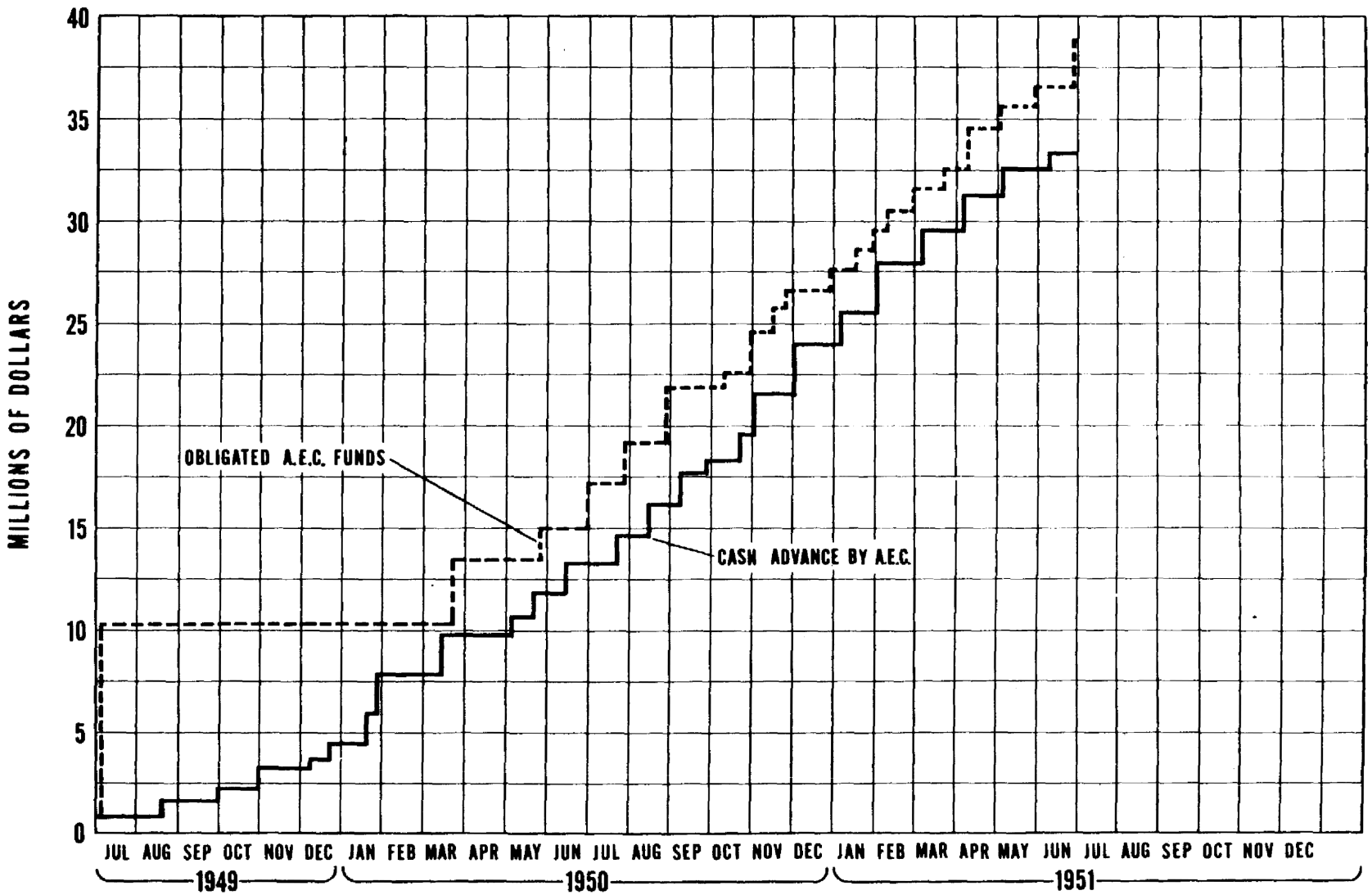


Figure 11.4-1 Obligated AEC Funds and Cash Advances by AEC, Cumulative by Months

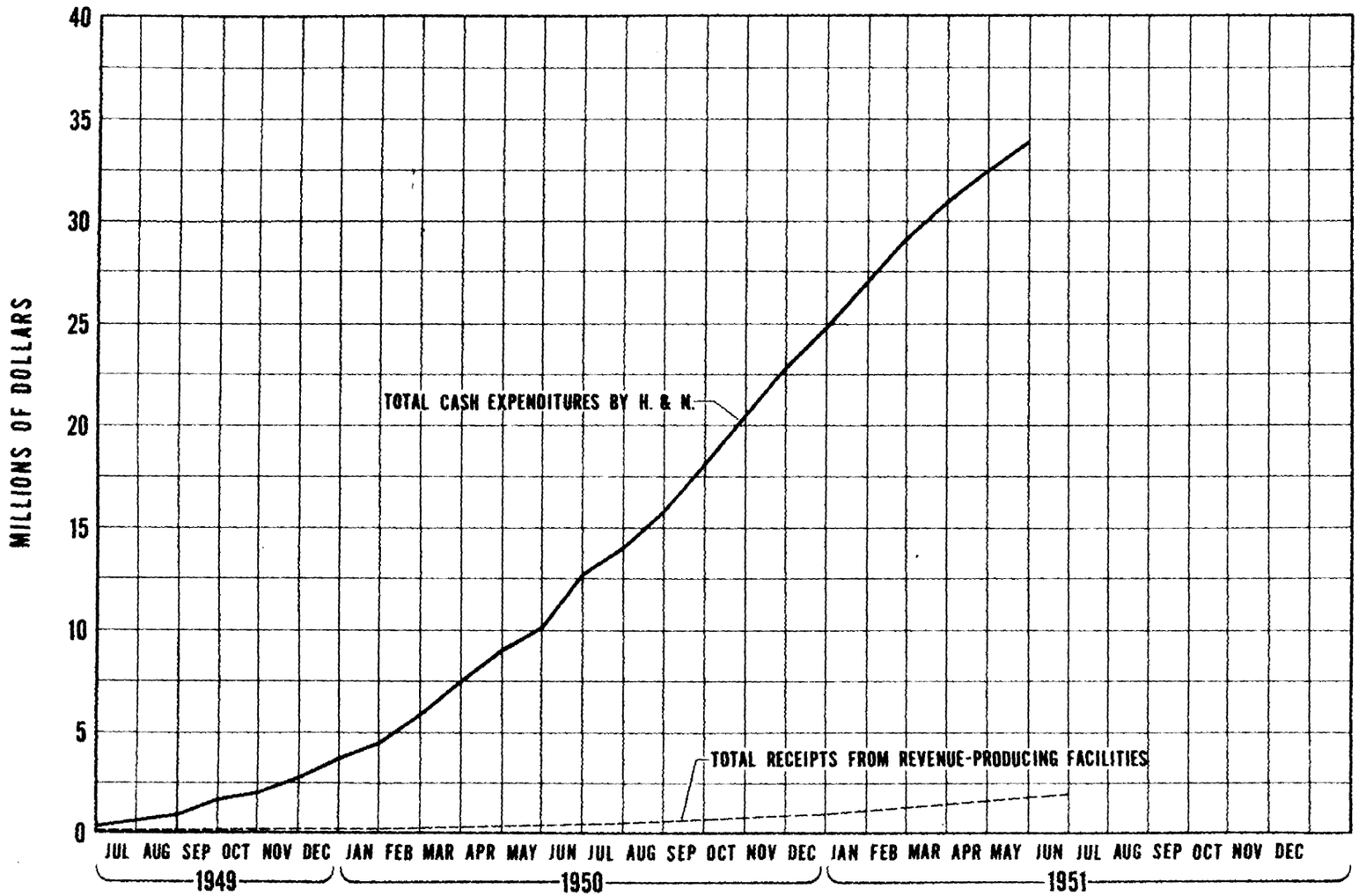


Figure 11.4-2 Cash Expenditures by H & N and Cash Income from Revenue Producing Facilities, Cumulative by Months

EXHIBIT A

Sample Forms

Form No. O/S 139 (Rev. 2)

HOLMES & NARVER
Incorporated
APO 187

ENGINEERING WORK ORDER

TO: CONSTRUCTION MANAGER CONTRACT NO. AT-(29-1)-507

WORK ORDER NO.

SUBJECT:

REFERENCE:

ENCLOSURES:

APPROVED BY_____ Date_____

DISTRIBUTION:

P. W. Spain	AEC	(2)	Chron File	OS	(1)	Cost Code:
Chief Engineer	HO	(1)	Central File	OS	(1)	
Operations	HO	(1)	Eng. Div. File	OS	(1)	
Construction Manager	OS	(2)	Fiscal	OS	(3)	
Service Operations	OS	(2)	Warehouse	OS	(1)	
Inspection	OS	(2)				
Chief Estimator	HO	(1)				

Form No. O/S 100

Dwg. No._____ HOLMES & NARVER Contract No._____
Order No._____ INCORPORATED Project No._____
Type F.S. No._____ Job No._____
Date:_____ CHANGE ORDER Sheet No. of_____
Title:

Location	Kind of Change	Detailed Description of Change	Authority for Change
		TENTATIVE COST ESTIMATE AT JOBSITE...	

Reason for Change: Affects Dwg. Nos.

Proposed By:_____ Date:_____

Recommended By:_____ Date:_____

Approved By:_____ Resident Manager, H & N Date:_____

Approved By:_____ Resident Engineer, AEC Date:_____

REIMBURSEMENT AUTHORITY

Approval of the above change in work or services, by the undersigned, constitutes reimbursement authority, covering the cost incurred in the performance of the work, as revised.

Any change in the scope or character of the work necessitating adjustment of the total estimated contractual cost, and/or an adjustment of the Contractor's fixed-fee, will be authorized subsequently, by formal modification to the contract, in accordance with the provisions of Article XIII, Contract AT-(29-1)-507.

Approved By:_____ Contract Administrator Date:_____

Approved By:_____ Contracting Officer Date:_____

Remarks: DISTRIBUTION

A. E. C.	2	Construction Mgr.	6	Cost Code
Los Angeles	3	Service Operations	1	
Engineering Div.	Orig & 1	Const. Off.	1	
Fiscal	3	Insp. Off.	1	

Form O/S 277

Dwg. No._____ HOLMES & NARVER Contract No._____
Order No._____ INCORPORATED Project No._____
Type F.S. No._____ Job No._____
Date:_____ EXTRAORDINARY MAINTENANCE Sheet No. of_____
Title: WORK ORDER

Location	Kind of Change	Detailed Description of Change	Authority for Change
		TENTATIVE COST ESTIMATE AT JOBSITE.....	

Reason for Change: Affects Dwg. Nos.

Proposed By:_____ Date:_____

Recommended By:_____ Date:_____

Approved By:_____ Resident Manager, H & N Date:_____

Approved By:_____ Resident Engineer, AEC Date:_____

REIMBURSEMENT AUTHORITY

Approval of the above change in work or services, by the undersigned, constitutes reimbursement authority, covering the cost incurred in the performance of the work, as revised.

Any change in the scope or character of the work necessitating adjustment of the total estimated contractual cost, and/or an adjustment of the Contractor's fixed-fee, will be authorized subsequently, by formal modification to the contract, in accordance with the provisions of Article XIII, Contract AT-(29-1)-507.

Approved By:_____ Contract Administrator Date:_____

Approved By:_____ Contracting Officer Date:_____

Remarks: DISTRIBUTION

A. E. C.	2	Construction Mgr.	6	Cost Code
Los Angeles	3	Service Operations	1	
Engineering Div.	Orig & 1	Const. Off.	1	
Fiscal	3	Insp. Off.	1	

Form No.: O/S 210
(Revised 1/23/51)

HOLMES & NARVER, INC.
ENGINEERS

CONTRACT NO. AT-(29-1)-507

JOB NO. 5 WORK ORDER

DATE REQUIRED: _____ WORK ORDER NO.: _____
PIORITY: _____ DATE ISSUED: _____
SITE: _____
USER: _____ REQUESTED BY: _____
COST CODE: _____ Group Leader
AEC APPROVAL: _____

DETAIL OF REQUIREMENT

DISTRIBUTION:

_____	( )
ACTION COPY	
Engineering Division	( )
Construction Division	(5)
Service Operations	( )
Administration Division	(1)
Fiscal Division	(3)
O/S Chronological	(1)
H/O Operations	(1)
AEC Resident Engineer	(5)
User	(1)

_____
HOLMES & NARVER, INC.

STATEMENT OF INTER-OFFICE TRANSFERS

For Period_____, 19__ to_____, 19__ No._____

Issuing Organization_____ Receiving Organization_____

Preliminary Statement_____ Preliminary Final Statement_____ Final Statement_____

Line No	Order No.	Shipping Document No.	Debit Amount	Debit Acctg. Class (a)	Credit Amount	Credit Acctg. Class (A)	Remarks
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22	TOTAL						
23	NET TRANSACTIONS						
24	CUMULATIVE TOTAL LAST STATEMENT						
25	CUMULATIVE TOTAL THIS MONTH						

(a) For Receiving Organization

FOR RECEIVING OFFICE USE:

Audited By_____

ter to Accounts for Month of _____

FOR ISSUING OFFICE USE:

Prepared by_____

Approved_____

Date_____

EXHIBIT B

Analysis of Reports Furnished AEC
as of November 5, 1949

ANALYSIS OF FISCAL REPORTS FURNISHED A.E.C.
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507 — Job 640

Item No.	Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial Yes	No	Commercial, Field or Branch Yes	No	Other Gov't Agencies Yes	No	Comments
1	Annual Motor Vehicle Report	X		X		X		This report is a mandatory requirement of the Bureau of the Budget, (B of B Circular A-30), and all Government agencies are required to furnish identical reports.
2	Issues Journal	X		X		X		So-called journals are in effect nothing more than "Journal Vouchers" in use almost universally as necessary accounting documents. All Government agencies require some form of documentation, (usually called shipping documents), and some record of transactions between agencies. These so-called "journals" are much simpler and more practical than those in use by other Government agencies.
3	Receipts Journal	X		X		X		
4	Accounts Payable Journal	X		X		X		
5	Balance Sheet	X		X		X		Standard Financial Statements in the Commercial World. Other Government agencies require monthly reports titled "Status of Allotment Reports" and various other reports bearing similar nomenclatures. Separate detailed Balance Sheet are also required by other Government agencies from Contractors having cash advances.

ANALYSIS OF FISCAL REPORTS FURNISHED A.E.C.
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507

Job 640

Item No.	Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial Yes	No	Commercial, Field or Branch Yes	No	Other Gov't Agencies Yes	No	Comments
6	Analysis of Cash Receipts and Disbursements		X	X			X	This information is included on "Status of Allotment Report" by some Government Agencies.
7	Statement of Entries		X	X		X*		* Usually incorporated in "Status of Allotment Report" by other Government agencies except where cash advances are outstanding in which event an additional report is required.
8	Register of Receipts from A.E.C. or A.E.C Integrated COntractors		X	X		X		Recapitulation of Receipts Journal. Similar reports required by other Government agencies covering all property transfers.
9	Reconciliation of Cash on Hand and Disbursements with Total Advances		X	X		X		Information necessary when Contract is operated from "Advance" or "Revolving" Fund allocations.
10	Projects in Progress Statement (Costs by Job Feature)	X		X		X		Accumulation of costs by Job feature is not new on A-E-Construction Contracts. Successful Major Contractors required similar reports for Management purposes 25 years ago. Some other Government agencies, during the war years, required a much more detailed breakdown of costs than is required by A.E.C. for the purpose of this report.

(Cont'd)

ANALYSIS OF FISCAL REPORTS FURNISHED A.E.C.
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507

Job 640

Item No.	Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial Yes	No	Commercial, Field or Branch Yes	No	Other Gov't Agencies Yes	No	Comments
11	Operating Statement - A.E.C. Funds	X		X		X		This is merely a statement of costs by General Classification, e.g. Labor, Materials, Freight, etc. Accumulation of costs in this manner is required of all Government agencies operating from appropriated funds in order to substantiate their requests for Fund Appropriations. The Bureau of the Budget and Congressional Appropriation Committees take a very dim view of appropriation requests not substantiated by statistics based on experience. For strictly commercial enterprises annual schedules, arranged in this manner, are required when submitting Income Tax Returns. Small construction concerns centralized at one location frequently prepare such a report annually by rearrangement of their "Cost by Feature" reports, (Reference Item No. 10 above.)
12	Statement of Estimated Cash Requirements	X		X		X		Combined with Item No. 9 above, this Statement, or a similar one, constitutes the basis for supplementing Operating Advances or Revolving Funds.

(Cont'd)

ANALYSIS OF FISCAL REPORTS FURNISHED A.E.C.
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507

Job 640

Item No.	Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial Yes	No	Commercial, Field or Branch Yes	No	Other Gov't Agencies Yes	No	Comments
13	Report of Obligations, Expenditures and Reimbursements		X		X	X		Most commercial firms would not require this as a separate report, but Management of large concerns requires a daily report of Cash and Inventory positions. This form is an exact duplicate of a form long in use by U. S. Engineers.
14	Statement of Estimated Commitments		X	X			X	Furnished R. E. Cole, Director of Engineering and Construction; is considered customary and necessary for information and control purposes.
15	Statement of Contractor's Fees		X		X	X		Required by all Government agencies from Cost-Plus type A-E-C-M Contractors, as a basis for Fee Payments. Required by General Accounting office in every instance where Contractor's Fee is based on percentage of work completion.
16	Overtime Reports		X		X	X		Usually, barring abuse, Commercial Contractor's permit the Field Superintendents to determine necessity for overtime. Other Government agencies customarily require reports in much greater detail and prior approval by the Contracting Officer or his authorized representative. This report is not required by A.E.C. Finance.

(Cont'd)

ANALYSIS OF FISCAL REPORTS FURNISHED A.E.C.
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507

Job 640

Item No.	Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial Yes	No	Commercial, Field or Branch Yes	No	Other Gov't Agencies Yes	No	Comments
17	Changes in Vehicle Levels		X		X		X*	* To the best of our knowledge this report is not required by other Government agencies. It is furnished A.E.C. in accordance with the request of Mr. Geo. Udell, Chief, Supply Division, S.F.O.O.
18	Fringe Benefit Claims		X		X	X		Serves as a documentary basis for payment of this item on a percentage basis, (in lieu of individual directly reimbursed items of this nature) as provided by the Contract. Is also used as an audit document by auditors of the respective Contracting Government agencies and General Accounting Office.
19	Bank Balance (A.E.C. Funds) (Telegram)	X			X		X	Information is essential, but customarily is included in other regular monthly reports of status of Government advances or Commercial Field Revolving Funds.
20	Cost Report on Changes in Plant and Equipment		X	X			X	Budgetary information customarily required in commercial, Field Operations and contracts of other Government agencies and is frequently combined with Items 9 and 12 above.

ANALYSIS OF INTERNAL FISCAL REPORTS FURNISHED H&N MANAGEMENT AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507 — Job 640

Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial		Commercial, Field or Branch		Other Gov't Agencies		Comments
	Yes	No	Yes	No	Yes	No	
Work Progress Report	X		X		X		Chart of all major work assignments indicating deadline dates and completion dates. A customary tool of management to determine adequacy of personnel and procedures and to insure expeditious processing of mandatory work. Is required by some other Government agencies. No copies are furnished A.E.C.
Status of Commitments	X		X			X	Weekly summary of contractual commitments for the assistance of management in determining that Contractual Budgetary limitations are not exceeded. A.E.C. and other Government agencies usually require Budgetary and Commitment reports monthly and/or quarterly. No copies are furnished A.E.C.
Daily Analysis of Reimbursable Expenditures, Bank Balances and Cash on Hand	X		X			X	To afford Chief Fiscal Officer and Management the daily status of all funds on hand and also daily Receipts and Disbursements for overall Fiscal control and administration. No copies are furnished A.E.C.

(Cont'd)

ANALYSIS OF INTERNAL FISCAL REPORTS FURNISHED H&N MANAGEMENT
AS OF NOVEMBER 5, 1949

Contract AT-(29-1)-507

Job 640

Title	WOULD SIMILAR REPORT BE REQUIRED ON FOLLOWING TYPES OF PROJECTS? Small, Centralized, Commercial		Commercial, Field or Branch		Other Gov't Agencies		Comments
	Yes	No	Yes	No	Yes	No	
Balance Sheet (Corporate Funds)	X		X		X		Reflects status of "Contract Fund" used in financing operation of the contract prior to inception of the use of Government Advance Funds at June 1, 1949. Information is necessary and required by all successful commercial concerns. No copies are furnished A.E.C.
Trial Balance (General Ledger) (Corporate Funds)	X		X		X		Furnished in lieu of "Operating Statement" as all pertinent information appears on the Trial Balance. Not a "Formal" accounting statement, but a copy of the informal listing of month-end ledger balances prepared by all accountants prior to preparation of Formal "Operating Control Statement" and "Balance Sheet". No copies are furnished A.E.C.

EXHIBIT C

Timekeeping Bulletins

HOLMES & NARVER, INC.
ENGINEERS

BULLETIN NO. 281

25 May 1951

TO : ALL DEPARTMENT HEADS, SUPERINTENDENTS & FOREMEN

SUBJECT: REVISION TO TIMEKEEPING PROCEDURE

The following method of timekeeping shall become effective Monday, 5-28-51:

1. "Check in check out" system. The "check in check out" system to be used will be the standard brass system normally used on large construction jobs. This applies to all employees except those whose contracts limit their pay to the standard work week.

A. A timekeeping office will be established at a central location on each site.

B. The timekeepers shall have a brass check on which the employee's payroll number is stamped.

C. Each day as employees report to work, they will go to the Timekeeping Office and pick up their brass check. The timekeeper will note the time when each employee picks up his check as the starting time for the day.

D. At the end of the shift, each employee will check out at the time office by depositing his brass check with the timekeeper. The timekeeper will note the time that each employee has checked out and figure the elapsed time on the time check sheet.

E. The time check sheet will then be checked against the foreman's time sheets for control purposes. No time will be paid in excess of that shown on the time check sheets.

2. Overtime Authorization.

A. All overtime in excess of standard work shifts must be approved in advance by the Division Managers.

B. Each foreman must report his overtime requirements in advance to his Division Head for approval prior to the end of the normal shift.

C. A list (2 copies) of employees approved for overtime by the Division Manager must be furnished to the time office prior to 1400 each day. Approved overtime for Sundays must be submitted to the time office prior to 1700 each Saturday.

Proposed Revision to Timekeeping Procedure (Cont'd)

3. Reporting of Time.

A. The Timekeeping Department will furnish foreman time sheets daily which list the foreman and his crew.

B. The foreman will fill in the hours worked for himself and each of his men showing the description of the work at the top of the time sheet in order that the proper cost accounts can be shown thereon by the Timekeeping Department.

C. Each foreman shall have his time sheets ready for the timekeeper not later than 0800 of the day following the work performed.

4. Timekeeper's Checking Responsibility.

A. The timekeeper will not submit time for payment in excess of that shown on the "check in check out" sheet.

B. The timekeeper shall not submit overtime in excess of standard day for payment without written prior approval of the overtime. In extreme emergencies, the written overtime authorization may be submitted by the Department Managers the following day.

C. The timekeeper shall make a complete field check of all employees at least once a day verifying that each man is on the job and that the time is being charged to the proper account.

D. The timekeeper shall make frequent field audits of employees working overtime.

E. The timekeeper shall prepare audit work sheets of all field checks made indicating; all irregularities discovered; adjustments made to correct any discrepancies.

F. The findings of the field audits will be submitted to the Jobsite Controller who will refer all irregularities to the Division Managers and the Resident Manager for any corrective action required. All audit reports will be maintained as permanent records.

NEIL H. DURKEE
PROJECT MANAGER

TDE/ci

HOLMES & NARVER, INC.
ENGINEERS

BULLETIN NO. 282

25 May 1951

TO : ALL EMPLOYEES

SUBJECT: REVISED TIMEKEEPING PROCEDURE

Effective Monday, May 28, 1951, all employees, except those whose contracts limit their pay to the standard work week, will check in before going to work and check out after their day's work is completed.

The system to be used for checking in and out will be the standard brass system used on large construction jobs.

Each employee will pick up his brass check at the Timekeeping Office each morning as he goes to work and return it each evening at the completion of his shift. Brass checks will be stamped with the employee's payroll number and each employee should call for it by number. Employee's payroll number will be shown in red pencil in the lower right hand corner of check stubs for week ending May 6.

The Timekeeping Office is located at the Northeast corner of the Beer Hall and will be open from 0530 to 2400. Foremen who have employees who will check in or out at other hours can make special arrangement with the Timekeeping Office. Employees working split shifts will check in and out before and after each shift.

NEIL H. DURKEE
PROJECT MANAGER

JHS/ci

11-60

HOLMES & NARVER, INC.
ENGINEERS

March 21, 1951

SUBJECT: TIME -- PAYROLL EXPENSE DISTRIBUTION

This bulletin is issued to all department heads for their administrative guidance in the preparation of employees' time cards, overtime approval requests, requisitions, travel requests, etc., for the proper segregation and distribution to the proper accounts and recording of costs for the different types of contracts.

The contract and job cost records are divided into three main categories, as follows:

(1) CPFF contracts, including Contracts -507, -759, and -1107. These contracts are for the Atomic Energy Commission, and all work or operations performed, both direct and indirect, are directly chargeable to the respective CPFF contract operations. The only exceptions to this contract policy are the prorations of administrative, utilities, rents, etc. overhead, which is handled by the office of the Chief Fiscal Officer.

Therefore, in every instance separate time cards, overtime requests, requisitions, etc., must be issued and processed as separate documents.

(2) All other Holmes & Narver Home Office private and/or government Navy contracts, such as Inyokern and Kwajalein, carry charges for direct production operations only. This includes direct labor for engineering design, specifications, blueprints and transportation costs. All direct time on such H & N private or lump sum jobs will be recorded on a single time card for cost distribution purposes. However, travel requests and requisitions for blueprints, specification work, etc. are issued separately as a direct charge to the respective job.

All other items of overhead for direct or indirect services or supplies are chargeable to the general administrative overhead account--Series 70. Such indirect overhead charges in total are distributed to the various jobs on a direct cost ratio basis by this office. For example, all time worked by employees of the personnel, procurement, security, operations, fiscal, administrative, and office service departments is chargeable to Account Series 70 instead of directly to the job concerned.

(3) In some instances, we negotiate a contract with the Navy or Army on a CPFF basis. In such instances only direct engineering production time and expenses are chargeable to the respective CPFF job. Overhead or service items as described above are charged to the administrative account Series 70, and not to the CPFF job, as is the case with AEC CPFF jobs.

It is important for all concerned to digest and thoroughly understand the various types of contracts under which we operate. Careful consideration is necessary to see that our basic financial and cost records are adequately processed. If there is any doubt or question as to the proper distribution of various items of cost, it is requested that inquiry be made to Mr. R. L. Christopher regarding job 640; to Mr. R. M. Chapman regarding Jobs 759 and 777; and to Mr. C. H. Thompson regarding all lump sum contracts, whether with government or private agencies.

HOLMES & NARVER, INC.
ENGINEERS

March 28, 1951

SUBJECT: EMPLOYEES' WEEKLY TIME CARDS

It is requested that department heads review carefully the following required information when approving time cards:

1. Correct work or Job Order Number, or Account Number, to be recorded daily at close of business.

2. Signature by the employee.

3. Signature by the department head.

4. Total hours worked, or accrued, to be paid.

5. Notations of time not worked, or tardiness.

6. Signed and approved time cards must be received by 8:30 A. M. Monday.

EXHIBIT D

Fringe Benefit Bulletins

Contract AT-(29-1)-507

OVERTIME, HOLIDAY, VACATION AND SICK LEAVE POLICIES

Fiscal Bulletin No. 1, January 25, 1950

TO: THE STAFF

FROM: C. H. THOMPSON, CHIEF FISCAL OFFICER

The following Overtime, Holiday, Vacation and Sick Leave Policies are effective for all On-Continent employees of Holmes & Narver:

WORK SCHEDULE AND COMPENSATION:

(a) Salaried employees' regular weekly compensation (up to and including Chiefs of Departments) is based on a 40-hour work-week schedule. Work in excess of 8 hours per day, or 40 hours per week is payable at time and one-half rate (except for the Executive Staff), when authorized in writing by the Management.

(b) Hourly wage employees' compensation is based on straight time rate up to 8 hours per day or 40 hours per week with time and one-half rate for time worked in excess of 8 hours per day or 40 hours per week, when authorized in writing by the Management.

HOLIDAYS WITH PAY:

The following holidays are non-work days, but are paid for as work days:

New Year's Day	Labor Day
Memorial Day	Thanksgiving Day
Independence Day	Christmas Day

To qualify for Holiday pay, employees must be at work or receive leave pay for the work days proceding and following the holiday.

VACATION LEAVE WITH PAY:

All employees will be credited with 5/6 of a day vacation leave per month after each calendar month of service. The vacation year period for the purpose of accruing vacation leave with pay, begins with the month of May and ends with the month of April. For the first month of employment, vacation leave will be accrued only when the employee is hired prior to the 16th of the month, in such case 5/6th of a day of vacation leave will be granted.

Accrued vacation leave with pay is granted for the purpose of taking vacations during each year of employment. The period of taking vacations is from May 1 thru September 30. Such annual vacations cannot be accrued to a succeeding year, either for extended vacation or payment in cash. In case of termination, for any reason, accrued vacation leave to month of termination, will be paid in any one vacation year of employment.

ACCRUED SICK LEAVE:

Each employee will be credited with 1/2 of one 8-hour day, after each anniversary month of employment during a work year of 12 months, or a normal maximum of 6 work days per annum.

Payment of accrued sick leave will be made only in case of absences for sickness or accident. At the close of the anniversary year of employment, the sick leave that has accrued, but was not used during the year, shall be carried forward to the following year only. Accrued sick leave is not payable in whole or in part for any that is not used, nor payable on termination of employment except in the case of sickness.

Payment for holiday, vacation and sick leave is charged to Account No. 29A Fringe Benefits. In all cases, time card records must indicate the reason for any absences and must be approved by Department Heads. The Payroll Department will furnish on request a statement showing the status of accrued vacation leave or accrued sick leave.

Exceptions to the above leave policies may be made at the discretion of the Management.

C. H. Thompson
Chief Fiscal Officer

Contract AT-(20-1)-507
OVERTIME, HOLIDAY, VACATION, AND SICK LEAVE POLICIES

Fiscal Bulletin No. 1, Revision No. 1
March 29, 1950

TO: THE STAFF

FROM: C. H. THOMPSON, CHIEF FISCAL OFFICER

Reference is made to Controller's Bulletin No. 8, dated July 5, 1949, cancelled and replaced by Fiscal Bulletin No. 1, dated January 25, 1950, which is hereby supplemented.

The brief 1949 Vacation Leave granted Job #640 employees, by extension of the "vacation year period" to July, in lieu of April 30, as provided by Controller's Bulletin No. 8, was authorized for the sole purpose of extending to employees of the new Project office a measure of good will and recognition of their services. By virtue of the discretionary authority extended us, under the terms of Contract AT-(29-1)-507, the above referenced deviation from our policy, as established for our permanent employees, was intended as an added "fringe benefit" for the new employees on Job #640. It definitely was not our intent to reduce the 1950 Vacation Leave of Job #640 employees to compensate for the two or three days Vacation Leave allowed during 1949.

Fiscal Bulletin No. 1 is also hereby supplemented to provide that in accordance with our established policy, a minimum of six months employment is required before Vacation Leave accrued as of April 30, at the rate of 5/6 of a day per calendar month, will be authorized.

Upon termination, however, earned accrued Vacation Leave will be paid, regardless of term of employment, except that employees discharged for cause, or causes as determined by the Management, prior to six month's service, will be considered as having automatically forfeited any Vacation Leave accrued, in accordance with established company policy.

In accordance with established company policy, discretionary authority is vested in this office to approve Excused Leave with pay for employees absent due to a death, or serious illness, in the family, Religious Holidays, working conditions considered detrimental to the health of employees, or for other reasons deemed proper and justifiable.

The above will clarify and supplement Controller's Bulletin No. 8 and Fiscal Bulletin No. 1, in order that they will accurately reflect the intent and policy of the company with respect to Vacation Leave.

C. H. Thompson
Chief Fiscal Officer

CHT:RLC:vp
cc: Controller (3)
Auditor in Charge

11-68

HOLMES AND NARVER
ENGINEERS

Contract AT-(29-1)-507

FRINGE BENEFIT POLICIES

Fiscal Bulletin No. 1
Revision No. 2

April 4, 1950

TO: THE STAFF

FROM: C. H. THOMPSON, CHIEF FISCAL OFFICER

Fiscal Bulletin No. 1, as revised, is hereby supplemented to incorporate therein the following Fringe Benefit Provision conforming to our previously established policy:

At the discretion of our management, payment of premiums on short term life, health or accident insurance policies, secured for executives and key personnel engaged in hazardous assignments and/or assignments of an unusual nature, voiding or limiting the protection provided the employee by his personal insurance coverage.

For several years our management has considered inauguration of:

(a) Group Insurance Plan (with employees and employer participating jointly in the premiums payments)

(b) Employees Pension Plan (on a joint employee-employer cost participation basis)

Subject Fiscal Bulletin is hereby amended to provide that immediately upon installation of either (or both) plans (a) and (b) above, such plans shall automatically become an integral part of our established employee Fringe Benefit Program.

CHT:RLC:vp

C. H. Thompson
Chief Fiscal Officer

cc: J. W. Carlson
Auditor in Charge

C. H. Thompson
Controller (3)

EXHIBIT E

Fiscal Reports

HOLMES & NARVER, INC.
ENGINEERS

Contract No. AT-(29-1)-507

RECONCILIATION OF CASH BALANCE
WITH CASH ACCOUNTABILITY AND CURRENT ACCOUNT
JUNE 30, 1951

Cash Balance		$1,325,837.63
Cash Accountability	$11,323,031.72	
Current Account	(9,997,194.09	$1,325,837.63

HOLMES & NARVER, INC.
ENGINEERS

Contract No. AT-(29-1)-507

RECONCILIATION OF INVESTMENT ACCOUNT WITH NET ASSETS
JUNE 30, 1951

Investment Account		$12,154,654.95
Net Assets:		
Deposits and Trust Funds	$ 213,916.90	
Accounts Receivable (Net)	53,851.68	
Inventories	3,039,388.69	
Plant (Net)	10,105,410.61	
Accounts Payable	(357,063.66)	
Payrolls Payable	(123,926.39)	
Accrued Liabilities	(536,196.46)	
Funds Held for Others	(240,726.42)	$12,154,654.95

HOLMES & NARVER, INC.
ENGINEERS

Contract No. AT-(29-1)-507

STATEMENT OF ENTRIES TO AND BALANCE IN INVESTMENT ACCOUNT
JUNE 30, 1951

July 1, 1950 Opening Balance			$13,414,984.28
Deduct - Adjustments Decreasing AEC Equity:			
Prior Year's Adjustment - Reserve for Expendable Construction	$708,248.00		
Decrease in Net Assets	584,328.47	$1,292,576.47	
Add - Adjustments Increasing AEC Equity:			
To Reverse Adjusting Entry No. 6 to June 30, 1950 Balance (1)		32,247.14	1,260,329.33
JUNE 30, 1951 - CLOSING BALANCE			$12,154,654.95

(1) Refer Director of Finance Ltr., serial SD-6106 dated September 21,1950.

Contract No. AT-(29-1)-507

BALANCE SHEET
JUNE 30, 1951

ASSETS

Cash In Banks and On-Hand		
AEC Advances - General Fund	$ 1,207,634.13	
Overseas Revolving Fund	73,154.21	
Payroll Account	10,000.00	
Petty Cash Funds	35,049.29	$ 1,325,837.63
Deposits and Trust Funds		
Deposits	$ 3,256.00	
Trustee for Travel Fund	210,660.90	213,916.90
Receivables		
Accounts Receivable (3)	$ 60,851.68	
Less: Reserve for Bad Debts	7,000.00	53,851.68
Inventories - Current Use & Standby (At Cost)		3,039,388.69
Plant		
Completed Plant (2)	$11,752,540.00	
Less: Reserve for Depreciation	1,647,129.39	10,105,410.61
TOTAL ASSETS		$14,738,405.51

LIABILITIES AND AEC EQUITY

Accounts Payable (3)		$ 357,063.66
Payrolls Payable		123,926.39
Accrued Liabilities		
Overseas Employees' Bonus (Estimated)	$ 348,574.31	
Overseas Employees' Return Transportation (Estimated)	125,508.49	
Funds Due Treasurer of United States (Estimated) (1)	62,113.66	536,196.46
Funds Held for Others		
Employees' Tax Deductions	$ 25,245.21	
Overseas Employees' Return Transportation Deductions	214,203.53	
Employees' Insurance Premium Deductions	78.49	
Garnishment of Wages	1,199.19	240,726.42
AEC Equity		
Cash Accountability	$ 5,600,344.35	
Current Account	(4,274,506.72)	
Investment Account	12,154,654.95	13,480,492.58
TOTAL LIABILITIES AND AEC EQUITY		$14,738,405.51

(1) Represents collections from defaulting overseas employees for Government furnished transportation.
(2) Includes $58,606.35 installation cost on CMR equipment furnished by University of California.
(3) There are no outstanding Inter-Contractor receivables or payables.

[illegible]

HOLMES & NARVER, INC.
ENGINEERS
CONTRACT NO. AT-[illegible] - TOTAL SCOPE
STATUS OF TOTAL COMMITMENTS AND COMMITMENTS PAID ON CONTRACT NO. AT-[illegible]
THRU JUNE 28, [illegible]

		ISSUES				GOVERNMENTAL AGENCY COMMITMENTS			
		Increase during week	Total thru June 21, 1951	Total thru June 28, 1951	Paid thru June 28, 1951	Unpaid Commitments	Increase during week	Total thru June 21, 1951	Total thru June 28, 1951
PURCHASE ORDERS	(1)	$ [illegible],226.45	$16,598,966.90	$16,607,193.35	$16,482,028.83	$ 125,164.52	-	$1,292,603.58	$1,292,603.58
PAYROLL									
On-Continent		$ [illegible]	$ [illegible],891.42	$ 2,170,698.[illegible]					
Overseas		38,773.2[illegible]	13,[illegible].22	13,0[illegible].42					
Accrued Overseas Bonus		6,000.00	2,108,384.31	2,114,384.31					
SUB-TOTAL		$ 63,5[illegible].44	$17,301,134.95	$17,364,715.[illegible]	$16,596,159.8[illegible]	$ 768,556.5[illegible]			
TRAVEL AND MISCELLANEOUS		$ [illegible],500.[illegible]	$ 1,189,743.9[illegible]	$ 1,1[illegible],242.9[illegible]	$ 1,066,734.96	$ 124,[illegible].04			
OTHER CONTRACTUAL COMMITMENTS									
Home Office Overhead		$ 17,616.08	$ 173,408.91	$ 191,024.99	$ 191,024.99	$ -			
Fringe Benefits		-	184,162.83	184,162.83	184,162.83	-			
Contractor's Fee		10,761.20	859,818.60	870,579.80	870,579.80	-			
SUB-TOTAL		$ 28,377.28	$ 1,217,390.34	$ 1,245,767.62	$ 1,245,767.62	$ -			
GRAND TOTAL		$101,684.17	$36,307,236.0[illegible]	$36,408,920.[illegible]	$3[illegible],390,740.30	$1,01[illegible].96	$ -	$1,292,603.58	$1,292,603.58

Less: Jobsite Facility Income	1,939,395.12
Net Contractual Disbursements	$33,451,345.1[illegible]

DISTRIBUTION:
Manager, AEC, Los Alamos
Chief Fiscal Officer
Operations
Controller
Budget Director
Chief Engineer
Chief Auditor - E&P

Contract No. AT-(29-1)-227

COST REPORT - PROJECTS IN PROGRESS
AS OF JUNE 30, 1951

o.	Description (2)			COSTS INCURRED CUMULATIVE - TO DATE Total (3)	Direct Labor (4)	Direct Material (5)	Equipment Usage (6)	Indirect (7)	Camp Operation (8)	Engineering Design (9)	Total Estimated Cost (10)		Percentage of Physical Completion to Date (11)
	PARRY ISLAND - BUILDINGS & FACILITIES												
)	Blading & shaping	(Roads)		$ 73,981.80	$ 23,270.46	$ 2,315.33	$ 17,067.91	$ 22,850.72	$ 7,024.86	$ 1,452.71	$ 47,240		100.0
)	Asphalt surfacing	(Airstrip)		26,606.95	8,409.32	917.15	6,188.53	8,263.37	2,538.61	343.87	18,715		100.0
)	Dust palliative	(Site Prep.)		158,083.25	49,832.03	5,434.87	36,672.54	48,967.15	15,043.31	2,073.42	121,765		100.0
			(c)	258,672.00	81,511.71	8,667.35	59,949.18	80,091.24	24,606.78	3,845.95	187,720	(a)	100.0
)	Aluminum buildings			2,300,808.67	587,809.97	885,894.24	30,257.40	598,834.60	177,448.34	29,654.12	1,999,100		100.0
)	Frame storage vault			1,727.88	432.10	590.78	114.02	438.65	130.45	21.88	1,715		100.0
)	Tents, including slab			94,946.35	30,510.63	22,766.85	1,839.16	30,483.19	9,210.56	135.96	106,030		100.0
)	Refrigeration plant			127,746.55	10,095.15	93,304.74	24.40	12,301.54	3,047.53	8,973.19	86,825		100.0
)	Water facilities			530,438.42	115,306.54	248,284.41	6,150.96	119,393.58	34,808.78	6,494.15	652,475		100.0
	Sewer facilities			108,434.44	32,236.95	23,412.87	5,862.18	32,191.38	9,731.70	4,399.36	130,465		100.0
)	Fuel facilities			182,121.74	52,997.64	54,461.04	3,047.14	52,453.39	15,727.25	4,335.28	464,570		100.0
)	Electrical facilities			406,779.91	76,862.24	206,484.83	6,802.48	80,645.15	23,203.21	12,782.00	388,948		100.0
	Telephone submarine cable			837,103.41	167,080.79	430,770.50	13,976.76	174,836.95	50,438.41	-	1,358,105		100.0
	Telephone facilities			67,773.59	12,140.56	36,995.67	-	12,851.24	3,664.99	2,081.13	73,975		100.0
)	Control & signal system (included in Bogallua estimate)			-	-	-	-	-	-	-	-		-
	Radio back-up system (Equipment furnished by Military)			16,689.96	6,385.56	-	-	6,256.74	1,927.67	2,119.99	11,095		100.0
)	Public Address system			840.38	-	-	-	-	-	840.38	1,885		100.0
	Furniture for all buildings			146,912.74	12,633.35	114,201.45	-	15,292.18	3,813.76	972.00	101,275		100.0
	Equipment for all buildings			498,154.40	31,076.71	411,413.49	6.63	40,938.11	9,381.45	5,338.01	76,320		100.0
)	Piers			154,611.70	50,708.76	28,304.70	9,398.81	50,416.92	15,307.98	474.53	109,255		100.0
	Rehabilitation of existing warehouses			158,366.77	61,509.59	17,382.27	188.62	60,717.75	18,568.54	-	106,360		100.0
	Initial rehabilitation		(b)	-	-	-	-	-	-	-	-		-
	C.M.R. Area Facilities			459,769.60	134,707.82	139,417.12	4,556.28	135,591.48	40,665.65	4,827.25	335,140	**	100.0
	Underground Shelter Area			29,897.34	10,164.13	5,806.57	846.71	10,109.07	3,068.35	102.51	27,895		100.0
	Miscellaneous Structures & Facilities			58,278.28	23,797.83	10.50	3,967.83	23,318.03	7,184.09	-	101,240		100.0
	TOTAL			$ 6,449,120.22	$1,497,068.03	$2,728,169.38	$146,788.56	$1,537,161.19	$ 451,935.49	$ 87,997.57	$ 6,254,785		100.0
	ENIWETOK ISLAND - BUILDINGS & FACILITIES												
	Blading & shaping	(Roads)		$ 3,098.60	$ 107.39	$ 1,994.67	$ 20.51	$ 156.11	$ 32.42	$ 787.50	$ 9,030		100.0
	Asphalt surfacing	(Site Prep.)		1,068.81	119.95	-	23.59	117.55	36.21	771.51	3,115		100.0
	Dust palliative	(Asphalt Roads)		46,980.40	4,700.72	32,320.38	1,898.95	5,867.34	1,419.05	773.96	30,300		100.0
	Modification of runway	(Runway Shift & Surfacing)		60,957.23	17,571.50	17,103.00	2,918.04	17,221.44	5,304.52	839.63	132,540		100.0
			(c)	112,105.04	22,499.56	51,418.05	4,861.09	23,362.44	6,792.20	3,171.60	174,985	(a)	100.0
	Plane parking areas			23,304.35	6,029.28	9,308.46	-	6,146.49	1,820.12	-	31,765		100.0
1)	Air Force Living Camp, Aluminum Bldgs.			171,178.48	242.99	161,124.63	-	4,346.79	73.36	5,382.71	197,175		100.0
(2)	Tents, including slab			73,465.75	106.54	70,599.84	-	1,907.25	32.17	719.95	98,140		100.0
(1)	Army Living Camp, Aluminum Bldgs.			93,967.27	643.54	87,322.05	-	2,857.43	194.27	2,950.08	106,735		100.0
2)	Tents, including slab			40,994.49	59.30	39,450.06	-	1,064.07	17.90	403.16	54,895		100.0
	Aluminum Bldgs., Army Service Center			109,974.48	154.07	102,171.23	-	2,756.34	46.51	4,846.33	131,240		100.0
(1)	Aluminum Bldgs., Common Services			997,367.85	162,611.59	599,064.68	38.09	174,547.18	49,089.25	11,917.06	766,235		100.0
2)	Tents, including slab			54,504.63	448.32	51,639.66	-	1,756.18	135.34	525.13	71,560		100.0
	Aluminum Bldgs., Air Force Operational			182,854.09	1,841.11	168,660.06	-	6,105.21	555.79	5,691.92	226,455		100.0
	Aluminum Bldgs., Transmitter & Receiver Bldgs. & Power Houses			79,811.68	15,403.86	42,109.60	713.86	16,170.68	4,650.13	763.55	80,485		100.0
)	POL Facilities - On Shore			95,410.42	159.53	88,651.83	-	2,416.95	48.16	4,133.95	129,445		100.0
c)	POL submarine lines			10,778.27	3,288.90	11,967.98	-	3,528.54	992.85	-	36,930		10 .0
1)	Electrical Generation Facilities			238,915.07	28,981.78	168,216.82	273.68	32,693.75	8,749.04	-	313,915		100.0
)	Electrical Distribution Facilities			221,857.52	55,127.75	82,446.20	1,354.88	56,131.56	16,641.99	10,155.12	281,890		
	Telephone Facilities			164,287.41	1,810.11	154,919.07	-						
1)	Sewer Facilities												

(e)	Frame storage vault		1,727.98	432.10	590.78	114.02	438.65	130.45	21.88	1,715
(f)	Tents, including slab		94,946.35	30,510.63	22,766.85	1,839.16	30,483.19	9,210.56	135.96	106,030
(g)	Refrigeration plant		127,746.55	10,095.15	93,304.74	24.40	12,301.54	3,047.53	8,973.19	86,825
(h)	Water facilities		530,439.42	115,306.54	248,284.41	6,150.96	119,393.58	34,808.78	6,494.15	652,475
(i)	Sewer facilities		108,434.44	32,236.95	23,412.87	5,862.18	32,191.38	9,731.70	4,999.36	130,465
(j)	Fuel facilities		182,121.74	52,007.64	54,461.04	3,047.14	52,453.39	15,727.25	4,335.28	434,570
(k)	Electrical facilities		406,779.91	75,862.24	206,484.83	6,802.48	80,645.15	23,203.21	12,780.00	[illegible]
(l)	Telephone submarine cable		837,103.41	167,080.79	430,770.50	13,976.76	174,836.95	50,438.41	-	1,388,325
(m)	Telephone facilities		67,733.59	12,140.56	36,995.67	-	12,851.24	3,664.99	2,081.13	73,975
(n)	Control & signal system (included in Bogallua estimate)		-	-	-	-	-	-	-	-
(o)	Radio back-up system (Equipment furnished by Military)		16,689.06	6,385.56	-	-	6,256.74	1,927.67	2,119.99	11,695
(p)	Public Address system		840.38	-	-	-	-	-	840.38	1,695
(q)	Furniture for all buildings		146,012.74	12,633.35	114,201.45	-	15,292.18	3,813.76	97[illegible].00	101,275
(r)	Equipment for all buildings		498,154.40	31,074.71	411,413.49	6.63	40,938.11	9,381.45	5,338.01	73,320
(s)	Piers		154,611.70	50,708.76	28,304.70	9,398.81	50,416.92	15,307.98	474.53	109,255
(t)	Rehabilitation of existing warehouses		158,366.77	61,509.59	17,382.27	188.62	60,717.75	18,568.54	-	106,000
(u)	Initial rehabilitation	(b)	-	-	-	-	-	-	-	-
(v)	C.M.R. Area Facilities		459,765.60	134,707.82	139,417.12	4,556.28	135,591.48	40,665.65	4,827.25	335,140 **
(w)	Underground Shelter Area		29,897.34	10,164.13	5,806.57	646.71	10,109.07	3,068.35	132.51	27,895
(x)	Miscellaneous Structures & Facilities		58,278.28	23,797.83	10.50	3,967.83	23,318.03	7,184.09	-	101,340
	TOTAL		$ 6,449,120.22	$1,497,068.03	$2,728,169.38	$146,788.56	$1,537,161.19	$ 451,935.49	$ 87,997.57	$ 6,254,735
2.	ENIWETOK ISLAND - BUILDINGS & FACILITIES									
(a)	Blading & shaping (Roads)		$ 3,998.60	$ 107.39	$ 1,994.67	$ 20.51	$ 156.11	$ 32.42	$ 787.50	$ 3,030
(b)	Asphalt surfacing (Site Prep.)		1,018.81	119.95	-	23.59	117.55	36.21	771.51	3,115
(c)	Dust palliative (Asphalt Roads)		46,980.40	4,708.72	32,320.38	1,898.95	5,867.34	1,419.05	773.96	38,380
(d)	Modification of runway (Runway Shift & Surfacing)		60,257.23	17,571.60	17,103.00	2,918.04	17,221.44	5,304.52	859.53	132,440
		(c)	112,135.04	22,499.36	51,418.05	4,861.09	23,352.44	6,792.20	3,171.50	174,885 (a)
(e)	Plane parking areas		23,334.35	6,029.28	9,308.46	-	6,146.49	1,820.12	-	31,765
(f) (1)	Air Force Living Camp, Aluminum Bldgs.		171,173.48	242.99	161,124.63	-	4,346.79	73.36	5,382.71	197,175
(2)	Tents, including slab		73,469.75	106.54	70,899.84	-	1,907.25	32.17	719.95	98,140
(g) (1)	Army Living Camp, Aluminum Bldgs.		93,987.37	643.54	87,322.05	-	2,857.43	194.27	2,959.08	107,775
(2)	Tents, including slab		40,904.49	59.30	39,450.06	-	1,064.07	17.90	403.16	54,805
(h)	Aluminum Bldgs., Army Service Center		100,974.48	154.07	102,171.23	-	2,756.34	46.51	4,846.33	131,540
(i) (1)	Aluminum Bldgs., Common Services		997,397.85	162,611.59	599,064.68	38.09	174,547.18	49,089.25	11,917.00	766,255
(2)	Tents, including slab		54,594.63	448.32	51,639.66	-	1,756.18	135.34	525.13	71,900
(j)	Aluminum Bldgs., Air Force Operational		182,854.09	1,841.11	168,660.06	-	6,105.21	555.79	5,691.92	226,495
(k)	Aluminum Bldgs., Transmitter & Receiver Bldgs. & Power Houses		79,911.68	15,403.86	42,109.60	713.86	15,170.68	4,650.13	763.55	80,485
(L) (1)	POL Facilities - On Shore		95,410.42	159.53	88,651.83	-	2,416.95	48.16	4,133.95	129,445
(2)	POL submarine lines		10,779.27	3,288.90	11,967.98	-	3,528.54	992.85	-	36,930
(m) (1)	Electrical Generation Facilities		238,915.07	28,981.78	168,216.82	273.68	32,693.75	8,749.04	-	313,915
(2)	Electrical Distribution Facilities		221,257.93	55,127.75	82,446.20	1,394.88	56,131.56	16,641.99	10,155.12	281,880
(n)	Telephone Facilities		164,287.42	1,810.11	154,919.07	-	5,724.43	546.43	1,287.37	195,500
(o) (1)	Sewer Facilities		57,839.44	80.81	53,412.71	-	1,441.21	24.39	2,880.32	94,145
(2)	Sewer Outfall (only)		15,478.73	3,994.33	6,205.61	-	4,072.98	1,205.81	-	32,195
(p)	Water Facilities		87,869.59	11,363.86	55,407.38	-	12,550.27	3,430.53	5,108.55	124,385
(q)	Water Distillation Plant (only)		290,772.68	6,386.40	181,524.60	-	10,887.73	1,927.93	-	245,440
(r)	Cargo Pier		20,978.38	30.49	20,168.28	-	544.17	9.20	226.24	45,740
(s)	Personnel Pier		45,435.27	13,715.49	10,416.56	3,228.74	13,707.79	4,140.44	228.25	105,565
	TOTAL		$ 3,108,[illegible].35	$ 334,979.71	$2,216,295.36	$ 10,470.34	$ 384,819.44	$ 101,123.81	$ 60,389.29	$ 3,615,230
	Miscellaneous Services for the Construction Battalion									* 145,000 (Tentat
										$ 3,760,230

* This estimate has not been formally submitted to A.E.C. for negotiation.

** Costs incurred include additional Electrical Facilities for C.M.R., part of which are covered in the estimate of 1(k). Also additional labor costs chargeable to U.C.R.L. on an inter-office transfer.

CHAPTER 12.1

GENERAL

The Estimating Department of Holmes & Narver in the latter part of 1948, functioned within the Engineering Division in close coordination with all departments of engineering design which were in a position to supply design criteria, quantity take-off, and detailed specifications for bills of material. This organizational arrangement was also important in enabling the Estimating Department, through the preparation of cost analyses and estimates, to assist the engineering design departments in their study of, and economical application to the AEC's specific requirements.

Upon completion of the design of any particular feature and transmittal of this design to the AEC for approval, the Estimating Department was required to supply a cost analysis for further engineering investigation; and, upon design approval by the AEC, a final and revised cost estimate was in every case necessary to determine the dollar effect which the final and approved design would have on the Contract estimated cost of each particular feature of the Contract. During the early stages of design work, upon completion and approval of design features it was the Estimating Department's responsibility to prepare, in conjunction with the engineering design groups, complete bills of material and requisitions of this material for transmittal, and action by the Procurement Department.

By January 1950, as the expanding scope of construction and the supplementary duties of the Estimating Department required closer ties with construction functions, the department was transferred to the Operations Division. Carried over in the transfer were the responsibilities for the preparation of all estimates required in connection with the design work being performed under the Contract, the development of cost estimates for new work contemplated for additions to the Contract scope, and the collation of progress reports. Additional functions of the Estimating Department and the proportion of the total time (35,000 man hours to June 30, 1951) spent on each are shown in Table 12.1-1.

All cost estimates in connection with Contract No. AT-(29-1)-507 were prepared on a uniform basis under four general headings: material, labor, equipment and transportation. During the entire period of the Contract, all cost estimates were based on the going stateside costs at the time the estimate was prepared; at no time during the period of the Contract were the overseas construction factors changed from the factors applied in the Reconnaissance Report of January 1949.

The basic thinking in the application of cost to these four features was as follows:

TABLE 12.1-1

ESTIMATING DEPARTMENT DUTIES

Item of Work	Proportion of Total Work Load	Estimated Man-Hours to June 30,1951
Economic Exploration of Materials and Equipment	2%	700
Studies on Availability of Materials or Equipment	2%	700
Tentative Engineering Cost Estimates	6%	2,100
Formal Engineering Cost Estimates	21%	7,350
Construction Labor Analyses	2%	700
Construction Materials Tonnage Analyses	2%	700
Construction Unit Special Analyses	2%	700
Change Order Estimates	15%	5,250
Budget Control Summaries	8%	2,800
Fiscal Division Studies	13%	4,550
Construction Progress Reports	2%	700
Construction Progress Charts	2%	700
Narrative Reports	1%	350
Cumulative Unit Cost Analyses	5%	1,750
Special Studies for AEC	2%	700
Analysis of Job 5 Work Orders	2%	700
Analysis of Certificates of Completion	1%	350
Continuing Property Record Completion Reports	8%	2,800
Special Economic Studies	4%	1,400
TOTAL WORK LOAD	100%	35,000

Material Costs. From schematic drawings, estimated quantities of materials, and from approved design drawings, actual take-off quantities of materials were established for the particular item of construction involved. The estimated or actual quantities determined for each feature of the contract were increased in accordance with normal estimating practice to cover lap and waste in actual construction.

However, because of the location of this Project, involving an abnormal shipping problem, material quantities estimated in accordance with normal practice were increased in the amount of 15 per cent to cover loss, waste, breakage, and other similar unpredictable items.

After arriving at the estimated quantities of materials needed for any feature of the Contract in accordance with the above procedure, the unit cost was applied from quotations and catalog prices supplied by the manufacturers or vendors. In the majority of instances this quotation was FOB the Oakland Naval Supply Center.

Labor Costs. Cost estimates for direct labor included the labor directly chargeable to specific items of work plus the cost of handling materials at the Jobsite from a central warehouse to the specific location of any structure or facility. The labor rates applied to the various classes of construction labor were the rates effective within the Building and Construction Trades Council, American Federation of Labor, as applied in both the Los Angeles and San Francisco areas.

Equipment Costs. Equipment costs were determined from a detailed estimate of the equipment necessary to complete the construction of each work feature, and the costs supplied were based on the estimated time the equipment would be in operation on each work feature. In the absence of specific information as to the type and amount of construction equipment that would be purchased new or be supplied in various states of repair by Government agencies, the equipment costs on all cost estimates reflect an equipment rental rate which was established on a cost per day basis from "Average Owners Expense Schedules" of the Associated General Contractors of America, Inc., combined with equipment rental rates established by Maximum Price Regulation No. 134, which included the items of amortization, normal maintenance and repair, fuel and lubricants.

In addition to the equipment costs that were established in this manner, there was added a factor of 50 per cent to cover the variables of climatic and Jobsite conditions that were known to exist in the humid climate and sea-level location of the construction project. Therefore equipment costs as they have appeared in all Contract No. AT-(29-1)-507 cost estimates might be more accurately described as equipment rental.

All cost estimates were submitted in a form that would reflect a provisional deduction to be made should any appreciable amount of

Government-furnished equipment be supplied without charge to this contract. A review of the equipment at the Jobsite was made in February 1950, on the basis of Government-furnished equipment at the Jobsite. A determination was made with the approval of all concerned that the estimated equipment rental rates estimated as above should be reduced by 49 per cent as representative of that portion which the total Government-furnished equipment at the Jobsite bore to the total equipment procured. [1]

Transportation. The original thinking of the Atomic Energy Commission, which was in effect throughout the Contract, was that transportation of personnel and materials would be provided by other Government agencies at no cost. On the basis of this thinking during the negotiations leading to the Definitive Contract, the entire estimated cost of transportation was deducted from the Reconnaissance Report estimate at the insistence of the Atomic Energy Commission. It was not until February 1950 that it was brought to the attention of the Atomic Energy Commission that the estimated transportation costs included transportation of personnel and materials in the United States as well as the water transportation between Oakland, California, and Eniwetok Atoll. At this time the Atomic Energy Commission reinstated in the Contract that portion of transportation which had been estimated in excess of the Government-furnished water transportation. All estimates submitted after February 1950 provided for the deduction of Government-furnished water transportation from the total estimated transportation cost.

Transportation costs as reflected in all cost estimates were established from the estimated tonnage of all items of materials and supplies. Because there was no definite determination as to whether or not Government water transportation would be supplied, or land transportation would be under Government bills of lading, all cost estimates were prepared on the basis of all materials being delivered by common carrier on both land and water from the FOB point, Z. I., to the Jobsite central warehouse.

In February, 1950, when it was definitely determined that water transportation would be supplied for all materials, there was inserted in all cost estimates a feature of provisional deduction for Government-furnished water transportation at the average estimated cost of $27.00 per ton.

[1] H & N letter CHN-346, February 14, 1950.

CHAPTER 12.2

ORIGINAL RECONNAISSANCE REPORT ESTIMATES

On the basis of the information secured during the reconnaissance survey in October of 1948, supplemented by aerial photographs, maps, and charts, the Estimating Department was instructed to assemble a cost estimate for inclusion in the Reconnaissance Report submitted to the Atomic Energy Commission in January 1949. This estimate was prepared in accordance with the procedures described in Chapter 12.1, and was based on the following criteria:

1. The proposed development of the Eniwetok proving ground was to be made up of five phases. Phase I was to constitute the preparation of the Reconnaissance Report to be submitted in January 1949. Phase II was to constitute a period of time between February 1, 1949, and July, 1949, when personnel would be sent to the Atoll to prepare preliminary surveys and general rehabilitation to accommodate a construction camp. Phase III was the construction program between July 1949, and December 1950. Phase IV was to be the experiment period between December 1950, and May 1951. Phase V was to be the roll-up and maintenance period after the experiment ending in May 1951.

2. The construction camp was to accommodate a total force of 900 men, of whom 600 were to be construction workers and 300 were to handle the operation of the several camps.

3. Quartermaster supplies were to be made available for this job.

4. Boats, vehicles, and aircraft were to be available from other Government agencies to the contractor on memorandum receipt, at no cost.

5. Transportation of personnel and materials to and from the Jobsite was to be provided by MATS at no cost.

6. Construction materials were to be transported to the job by Navy water transportation at no cost.

7. During the Phase IV or the experiment period, it was assumed that the Atomic Energy Commission would have 200 people based ashore, and that Holmes & Narver would make available a support crew of 100 mechanics and helpers to aid this group. It was assumed that all other visitors, guards, etc. would be quartered aboard ship or on Eniwetok Island, without service by Holmes & Narver.

8. The initial interim construction camp was to be established on Eniwetok Island using rehabilitated facilities until such

time as a permanent camp could be established on Parry Island. At such time as the Parry Island camp was established, construction crews were to be quartered in the permanent buildings on Parry Island as well as the camp facilities on the islands of Runit, Aomon, Biijiri, and Engebi.

9. Permanent construction was to be accomplished on the islands of Parry, Eniwetok, Runit, Aomon, Biijiri, and Engebi. Temporary construction camp facilities installed on Eniwetok were to be turned over to the military users upon occupancy of the Parry camp.

10. The estimate was to include activation of the island of Bogallua. However, because of the fact that the Atomic Energy Commission had not definitely decided to activate Bogallua, this feature of the estimate was to be brought up separately in order that it could be either included or deleted from the Contract estimate.

The cost estimate in accordance with the above criteria was presented in the Reconnaissance Report of January 1949 in the total amount of $16,694,400, which included the activation of Bogallua. The cost figures applied to the estimated quantities were based on going construction costs both direct and indirect, existing in the western portion of the United States during 1948. To this figure was added the factors of indirect costs that would be incurred to do this same work on Eniwetok Atoll.

The indirect costs were worked up in detail by Holmes & Narver personnel with recent experience in Pacific Island construction work on Okinawa. On the Island of Okinawa, experience had shown that construction costs were 2.6 times the comparable stateside construction costs. However, at this time, the general thinking of CINCPAC in Honolulu was that the Eniwetok construction would possibly be higher than the Okinawa construction and that the differential between stateside construction cost and Eniwetok Atoll construction costs should be a factor of 3, or slightly less.

When the Reconnaissance Cost Estimate was finally assembled in detail, it was determined that it reflected an overseas cost of construction at Eniwetok Atoll which was, on the average, 1.96 times the comparable domestic cost, and this factor was used in the preparation of all subsequent estimates. The AEC was advised of this comparison early in 1949. The differential between domestic construction costs and Eniwetok construction costs was based upon the following factors:

1. Increased material costs including:

   a. Transshipment warehousing cost at port of embarkation

   b. Export packing costs

c. Shipping costs

d. Stevedoring costs at Jobsite

e. Lightering costs at Jobsite from ship to warehouse

f. Intra-Atoll water movement of materials from warehouse to construction site

2. Increased labor costs including:

a. Higher recruiting cost due to requirement for security and medical clearance

b. Security and medical clearance costs

c. Overseas pay bonus

d. Cost of standby time awaiting shipment, and of travel time between West Coast and Jobsite, including travel expense and per diem allowances

e. Cost of commuting time, i.e., time used by personnel in intra-Atoll travel

f. Cost of loss in time and efficiency due to climatic conditions.

g. Higher cost of insurance premiums for offshore construction

3. Increased equipment costs including:

a. Costs attributable to extraordinary maintenance due to climatic conditions

b. Costs attributable to short lifetime of equipment under conditions prevalent at Eniwetok Atoll

4. Increased camp operation and maintenance costs including:

a. Cost of operating separate camps at major site locations within the Atoll

b. Cost of maintenance and repair of navigational aids, piers, channels, airstrips, and equipment required for the intra-Atoll movement of personnel and materials for work at a multiplicity of sites

c. Cost of recreational and medical facilities for construction personnel

TABLE 12.3-1. TABULATION OF DOLLAR COST ESTIMATES SUBMITTED UNDER CONTRACT AT-(29-1)-507
IN SUPPORT OF TOTAL CONTRACT NEGOTIATIONS AS OF JUNE 30, 1951, - INDICATING A.E.C. AUTHORIZATIONS OF INCREASED CONSTRUCTION INVOLVING COST ONLY AND SCOPE ONLY

Note: All Estimated Costs shown hereon are net costs after Deductions have been made for Government Furnished Labor, Equipment and Water Transportation.

Item	Feature	Est. Scope Reconn. Report Jan. 1949	Defined Scope Mod. #7 5-19-50	Added Scope Mod. #13 10-12-50	Modification # 24 Added Cost 3-20-51	Modification # 24 Added Scope 3-20-51	Deletions from Mod. # 7 & # 24 Cost 7-7-51	Deletions from Mod. # 7 & # 24 Scope 7-7-51	AEC Authorized Additions Cost	AEC Authorized Additions Scope	AEC Authorized Change Orders Added Cost	AEC Authorized Change Orders Added Scope	Total Authorization Involving Added Cost Only	Total Authorization Involving Added Scope Only	Total Estimate of Cost and Scope
1.	B-Parry Island	4,669,190	5,190,555		34,849	537,110		(84,825)	23,075	68,130	205,435	280,455	263,359	5,991,425	6,254,784
2.	A-Eniwetok Island	5,055,160	3,432,040					(67,790)	8,475		93,530	148,975	102,005	3,513,225	3,615,230
3.	L-Japtan Island	-0-	843,605		12,570	19,270		-0-	-0-	-0-	30,010	45,290	42,580	908,165	950,745
4.	C-Runit Island	1,208,970	1,343,835		24,900	5,000	(2,900)	(57,185)	-0-	-0-	16,090	59,470	16,090	1,351,120	1,367,210
5.	D-Aomon Group Is.	1,473,300	1,637,500		24,900	5,470		(52,265)			56,980	93,385	81,880	1,684,090	1,765,970
6.	E-Engebi Island	1,264,540	1,405,435			196,105		(65,020)	-0-	-0-	16,665	328,600	16,665	1,865,120	1,881,785
7.	F-Bogallua Island	723,880	804,040					(747,340)						56,700	56,700
8.	Miscellaneous Is.	623,260	694,370					(266,135)			5,945		5,945	428,235	434,180
9.	Military Struct.		3,484,545		236,150	37,860					2,120		238,270	3,522,405	3,760,675
10.	8.2 Program		165,140											165,140	165,140
11.	Loran Station		100,000						170		100		270	100,000	100,270
12.	Towers		294,200		42,900								42,900	294,200	337,100
13.	Job 4-Maint.& Oper.		1,511,000							5,375,030	8,655		8,655	6,886,030	6,894,685
14.	Job 5-Support & Roll-Up		1,000,000							2,172,900				3,172,900	3,172,900
15.	N.O.B.L.			215,520						-11,460				226,980	226,980
16.	J-7			6,090							490		490	6,090	6,580
17.	N.B.S.			1,143,080						(3,220)				1,139,860	1,139,860
18.	E.G.G.			191,660	159,990	3,635				53,560		430	159,990	249,285	409,275
19.	N.R.L.			202,510		52,960				(54,615)	1,265		1,265	200,875	202,140
20.	J-3			144,855	109,465							40,455	109,465	185,310	294,775
21.	LD-50			83,800		18,480				18,680				121,000	121,000
22.	T-B			57,500					1,940	4,900	610		2,550	62,400	64,950
23.	M-D			16,610						1,500				18,110	18,110
24.	A.M.C.			3,600					3,110	6,450			3,110	10,050	13,160
25.	All Users			336,290										336,290	336,290
26.	U.C.R.L. & N.R.L.K.			576,310		241,490			(57,465)	47,275	420		(57,045)	865,075	808,030
27.	O.S.C.O.			180		7,550								7,730	7,730
28.	METEOR			7,680					8,145				8,145	7,680	15,825
29.	RAD-CHEM			57,000	38,600	375,920				1,590			38,600	434,510	473,110
30.	N.R.D.L.			1,800		1,275				23,635	1,835		1,835	26,710	28,545
31.	A.F.O.A.T.			37,520						(9,150)				28,370	28,370
32.	A.C.C.			950										950	950
33.	B.R.L. - A.P.G.			1,000										1,000	1,000
34.	A.E.C.			-0-		330				6,755				7,085	7,085
35A.	Grouting Program									530,375				530,375	530,375
35B.	Drilling Program									118,860				118,860	118,860
36.	E-Plus								24,900	721,525	1,765	1,430	26,665	722,955	749,620
	TOTALS	15,018,300	21,906,265	3,083,995	684,324	1,502,475	(2,900)	(1,340,560)	12,350	9,095,640	441,915	998,490	1,113,689	35,246,305	36,359,994

4. Detailed analyses and breakdowns of each feature contained in every cost estimate which the Atomic Energy Commission approved for construction, in order to provide the Jobsite Management and particularly the Construction Department with the estimated total quantities to be used in connection with the preparation of progress reports.

CHANGE ORDER ESTIMATES

Change Orders in connection with this contract constituted orders covering those changes in approved plans which the Atomic Energy Commission Resident Engineer at Eniwetok determined were necessary. It should be recognized that these field changes were made and Jobsite engineering change orders were issued only after an extensive review of Jobsite conditions indicated that a change in design, an addition to design, or a deletion from design was advisable in the best interests of the over-all Contract.

A copy of the Change Order containing Jobsite estimated costs of materials, labor, and equipment usage was forwarded to the Estimating Department, Los Angeles; upon the basis of this information, a formal estimate including all direct and indirect costs was prepared in accordance with standard estimating practice. The estimate for each particular Change Order was assembled in order to show the total net direct and indirect costs divided between material, labor, equipment, and transportation; and it was then formally transmitted to the Atomic Energy Commission at Los Alamos.

During the period covered by this Completion Report, more than three hundred change orders of this type were issued involving a total of $1,440,405.

SUMMARY

All of the above noted types of estimates were periodically summarized for the purpose of contract modification. Table 12.3-1 shows such a tabulation for June 30, 1951, indicating AEC authorizations of increased construction involving cost only and scope only.

CHAPTER 12.4

ESTIMATES FOR JOBS 4 AND 5

It should be noted in connection with the estimates prepared for work under Jobs 4 and 5 of the Contract, that definitive criteria were established by the AEC in August 1950, as follows:

"In order that you may have at hand definite criteria on which to base your revised estimate of cost for Job Nos. 4 and 5 of the Contract, information is given below which is believed to be sufficiently comprehensive to form a good basis for such an estimate.

1. Assumptions:

(a) The date of the first shot is on or about April 15, 1951; the second May 1, and the last May 15.

(b) The order of shots will be Site "E", "D", and "C".

(c) All construction, aside from incidental work by the so-called labor pool, will be completed not later than March 1, 1951.

(d) Scientific and task force personnel will arrive at and depart from the jobsite as shown on the graphs presented to you in our letter SD-5912 dated August 4, 1950, but with the understanding that the fourth shot and one Krause-Hall experiment are omitted.

(e) Your post-operation maintenance and roll-up forces will be based on Eniwetok Island together with the military garrison force.

(f) No preparation will be made for any further series of tests.

2. Requirements for Job No. 4: Camp Operation, Maintenance and Management.

(a) Undertake to perform this job on sites "B", "C", "D", and "E" as described in the Contract and on Site "A" as described in the Memorandum of Agreement for Construction on Eniwetok Island, between AEC and JTF-3. These duties are to be assumed at each site as construction is completed and as required to support operational, as distinguished from construction, activities, since the cost of camp operation, maintenance and management during construction is already included in the construction cost estimates.

(b) Job. No. 4 will cease on each shot island at the time their respective shots are fired. It will cease on Japtan Island

as soon as Program 2 personnel depart from the Jobsite. On Parry Island it will cease as soon as Scientific and Task Force personnel depart from the Jobsite, crating and shipment of scientific and other equipment to Z.I. is completed, and transfer of your roll-up and maintenance personnel to quarters on Eniwetok is accomplished.

(c) On Eniwetok Island your limited Job No. 4 duties as described in paragraph 2(a) above will cease when Task Force personnel have departed (October 1, 1950) and will be replaced by full Job No. 4 duties as described in the Contract with the exceptions listed below, which exceptions are predicated on CINCPAC approval of a proposed memorandum of agreement for military support during the roll-up period.

(1) Provide messing facilities only for your own personnel. The garrison will provide its own mess.

(2) Provide quarters and administration space for the garrison but not housekeeping or supplies for such quarters and space, except beds and mattresses.

(3) Provide one-half of the stevedoring crew required, also lighters and operators, fork lifts and operators, and cranes and operators, from hold to warehouses. The garrison may be assumed to total not more than 125 men, and will furnish one-half of the stevedoring crew, also trucks and operators, from hold to warehouse.

(4) Provide operation and maintenance only for your own boats, vehicles and equipment.

(5) Except as noted above, the garrison will supply all personnel required for its own support, but you will operate all utilities and maintain all facilities including buildings, roads, and utilities.

3. <u>Requirements for Job No. 5: Support and Roll-Up Services</u>:

(a) Provide a labor pool to assist the Scientific personnel in installation and removal of instrumentation and equipment, and other work incidental to the actual tests. More detailed information concerning these requirements may be found in the following letters.

(1) H & N Inter-Office Memo from Bowen to East, dated July 13, 1950.

(2) SD-5837 dated July 13, 1950, subject: "Estimated Labor Pool Requirements for Greenhouse-Hall and Greenhouse-Krause".

(3) SD-5777 dated June 26, 1950, same subject as (2) above.

(4) SD-1902 dated May 26, 1950, subject: "Labor Pool Requirements".

(5) NRL letter 3120-75MS/50 dated June 16, 1950, subject same as (2) above.

(6) Inter-Office Memo from H. S. Allen to Duncan Curry, J-4-522, dated May 29, 1950, subject: "Estimate of Labor Pool Requirements."

(7) SD-1901 dated May 9, 1950, subject same as (6) above.

In interpreting the referenced data, please bear in mind the omission of a fourth shot, omission of one Krause-Hall experiment, and the 45-day postponement of D-day.

(b) Beginning after the first shot, crate and ship scientific instruments and equipment as required by Division J-4, LASL.

(c) Assume that all construction equipment and motor vehicles except that belonging to TG 3.2, will remain at the Jobsite. It will be necessary to place all such equipment in "mothball" status except for such items needed for roll-up purposes. It should be placed under covered storage, either in warehouses, under tarpaulins, or in the B-50 hangar. Painting and other anti-corrosive measures should be provided as required. Tired vehicles should be blocked up, and all batteries placed in trickle charge status.

(d) Tugs, LSUs, and barges will be returned to the Navy except for a minimum number required for roll-up lightering. All smaller craft except as needed for roll-up will be pulled out above high tide, blocked up, and provided with necessary painting and other anti-corrosive measures required to maintain them in standby status. It is suggested that an open shed be constructed over these craft which will consist of a roof and a wall on the windward side to protect against salt spray.

(e) Warehouse all items not required for the roll-up period. It is not anticipated that more warehouses will be constructed, and you should count on using all types of buildings to provide the necessary square footage.

(f) "Mothball", insofar as possible, all generator, distillation, pumping facilities, and other equipment. This should be done where applicable, in accordance with recommendations of the manufacturers.

(g) Clean up and dispose of all debris and severely damaged or destroyed structures on the shot islands, including military

and scientific structures and camp facilities. Camp facilities are not to be reconstructed, but portions which are not too severely damaged should have sufficient work performed thereon to prevent further deterioration in order that they may be used for future tests. All scientific structures which are not destroyed or damaged beyond further usefulness are to have appropriate protective maintenance. It is anticipated that military structures will be removed and disposed of as a security measure, and a separate cost estimate should be made for such structures so that NME funds may be requested to cover the cost.

(h) All cleanup, salvage, and maintenance work on test islands will be done with the assistance of radiological monitors to be provided by this office.

(i) All buildings and other structures will be maintained by painting or other preventive measures to avoid more than normal deterioration.

(j) The roll-up and maintenance period contemplated herein extends to December 31, 1951.

"The basic criteria presented herein will not, in all cases, apply if additional tests should be scheduled; however, you are requested to prepare your estimates on the assumption that such tests will not be scheduled. In preparing your estimates, items will undoubtedly come to your attention which have not been specifically discussed herein; in such cases please call on us for advice.

"We wish to reiterate our requirements in these matters for absolute economy in operations consistent with satisfactory maintenance of proving ground facilities for future use."

On the basis of this directive and a series of discussions on the subject, estimates were submitted for Job 4 and Job 5, totaling $4,537,720 and $1,463,490, respectively. These estimates were considered high at the time however in the light of the criteria ultimately developed for these phases of the work (which differed radically from those given above), the final estimates for Jobs 4 and 5 were much greater than the amounts given above. These final estimates were $6,894,685 for Job 4, and $3,172,900 for Job 5.

CHAPTER 12.5

COST ESTIMATE COMPARISONS

Two studies have been prepared in connection with cost estimates on this project which point up certain relevant facts. In the first of these studies, estimated costs for each of the various features of work performed at the Eniwetok Proving Ground were compared with the actual costs incurred as collected in the various cost centers established by fiscal procedures. The second study constituted an analysis of the actual costs of major features of construction and a comparison of these costs to estimates of costs of comparable construction at a West Coast location in order to establish an empirical multiplying factor for construction at Eniwetok. The results of these studies are set forth at length hereinbelow.

COMPARISON OF ESTIMATED COSTS WITH ACTUAL COSTS AS OF JUNE 30, 1951

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
PARRY ISLAND - BUILDINGS AND FACILITIES				
Blading & shaping	176,850	252,010.19		
Asphalt surfacing	-	300.17		
Dust palliative	10,870	6,361.73		
	187,720	258,672.09	153,974.07	104,698.02
Aluminum bldgs.	1,999,100	2,309,898.67	1,533,615.73	776,282.94
Frame storage vault	1,715	1,727.88	1,158.78	569.10
Tents, including slab	106,030	94,946.35	55,252.60	39,693.75
Refrigeration Plant	86,825	127,746.55	112,397.48	15,349.07
Water facilities	652,475	530,438.42	376,236.06	154,202.36
Sewer facilities	130,465	108,434.44	66,511.36	41,923.08

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Fuel facilities	434,570	182,121.74	113,941.10	68,180.64
Elec. facilities	359,040	406,779.91	302,931.55	103,848.36
Telephone submarine cable	1,352,305	837,103.41	611,828.05	225,275.36
Telephone facilities	73,975	67,733.59	51,217.36	16,516.23
Control & signal system (included in Bogallua estimate)				
Radio back-up system (Equipment furnished by Military)	11,095	16,689.96	8,505.55	8,184.41
Public Address system	1,885	840.38	840.38	-
Furniture for all buildings	101,275	146,912.74	127,806.80	19,105.94
Equipment for all buildings	76,320	498,154.40	447,834.84	50,319.56
Piers	109,255	154,611.70	88,886.80	65,724.90
Rehabilitation of existing warehouses	106,060	158,366.77	79,080.48	79,286.29
Initial rehabilitation				
C.M.R. Area facilities	335,140	459,765.60	283,508.47	176,257.13
Underground Shelter Area	27,895	29,897.34	16,719.92	13,177.42
Misc. structures & facilities	101,640	58,278.28	27,776.16	30,502.12
Total	6,254,785	6,449,120.22	4,460,023.54	1,989,096.68

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
ENIWETOK ISLAND - BUILDINGS AND FACILITIES				
Blading & shaping	9,690	3,482.57		
Asphalt surfacing	30,300	63,760.92		
Dust palliative	2,455	2,169.11		
	42,445	69,412.60	61,616.78	7,795.82
Modification of runway	132,440	42,692.44	20,333.62	22,358.82
Plane parking areas	31,765	23,304.35	15,337.74	7,966.61
Air Force Living Camp - aluminum bldgs.	197,175	171,170.48	166,750.33	4,420.15
Tents, including slab	98,140	73,465.75	71,526.33	1,939.42
Army Living Camp - aluminum bldgs.	106,725	93,967.37	90,915.67	3,051.70
Tents, including slab	54,895	40,994.49	39,912.52	1,081.97
Aluminum Bldgs. - Army Service Center	131,240	109,974.48	107,171.63	2,802.85
Aluminum Bldgs. - Common Services	766,365	997,367.85	773,631.42	223,736.43
Tents, including slab	71,860	54,504.63	52,613.11	1,891.52
Aluminum Bldgs. - Air Force Operational	226,455	182,854.09	176,193.09	6,661.00
Aluminum Bldgs. - Transmitter and Receiver bldgs. & Power Houses	80,485	79,811.68	58,990.87	20,820.81

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
POL Facilities - On Shore	129,445	95,410.42	92,945.31	2,465.11
POL Submarine lines	36,930	19,778.27	15,256.88	4,521.39
Electrical Generation facilities	313,915	238,915.07	197,472.28	41,442.79
Electrical Distribution facilities	281,880	221,857.50	149,083.95	72,773.55
Telephone facilities	195,600	164,287.41	158,016.55	6,270.86
Sewer Facilities	94,145	57,839.44	56,373.84	1,465.60
Sewer Outfall (only)	32,195	15,478.73	10,199.94	5,278.79
Water Facilities	194,385	87,860.59	71,879.79	15,980.80
Water Distillation Plant (only)	245,440	200,716.66	187,901.00	12,815.66
Cargo Pier	45,740	20,978.38	20,425.01	553.37
Personnel Pier	105,565	45,435.27	27,587.04	17,848.23
Total	3,615,230	3,108,077.95	2,622,134.70	485,943.25
Misc. Services for the Construction Battalion	145,000			
Total	3,760,230			
JAPTAN ISLAND - BUILDINGS AND FACILITIES				
Aluminum Buildings-Quarters	52,450	65,548.59	46,960.72	18,587.87
Aluminum Bldgs. - Mess Hall	36,070	104,865.56	72,729.34	32,136.22
Aluminum Bldgs. - Small Animal Quarters	75,920	98,838.32	79,685.71	19,152.61

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Aluminum Bldgs. - Large Animal Quarters	221,470	185,590.18	127,227.32	58,362.86
Aluminum Bldgs. - Animal Food Warehouse	8,795	12,664.03	8,562.20	4,101.83
Aluminum Bldgs. - Laboratory	36,325	81,603.26	48,690.66	32,912.60
Autopsy Building	18,595	16,147.38	9,016.53	7,130.85
X-Ray Building	5,445	7,616.16	3,727.87	3,888.29
Pumphouse	18,605	13,770.20	8,450.14	5,320.06
Greenhouse	750	667.25	370.14	297.11
Roads and Parking Areas	2,840	7,949.54	4,467.99	3,481.55
Telephone Facilities	61,245	27,898.94	16,612.90	11,286.04
Elec. Facilities	158,610	119,594.29	79,758.35	39,835.94
Water Facilities	136,095	159,280.78	111,112.53	48,168.25
Sewer Facilities	58,570	38,583.19	22,239.14	16,344.05
Pier Rehabilitation	4,960	11,407.50	5,315.59	6,091.91
Service Station	3,250	5,105.56	2,491.58	2,613.98
Incinerator	325	266.00	179.04	86.96
Infirmary Bldg. - Wood Frame	7,715	10,057.20	5,385.37	4,671.83
Cargo Pier	39,445	61,631.79	36,429.73	25,202.06
Tents	2,155	645.06	333.47	311.59
Thermal Bldg. and Exposure Units	1,110	955.96	418.86	537.10
Total	950,745	1,030,686.74	690,165.18	340,521.56

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
RUNIT ISLAND - BUILDINGS AND FACILITIES				
Blading & shaping	38,165	71,464.90		
Asphalt surfacing - Roads	70	18.67		
Asphalt surfacing - Other areas	167,050	118,870.35		
Dust Palliative	11,010	98.90		
Total	216,295	190,452.82	129,011.07	61,441.75
Aluminum Bldgs.	93,555	141,521.40	90,144.07	51,377.33
Concrete Building	181,235	98,271.73	53,291.02	44,980.71
Tents, including slab	56,950	28,997.62	16,016.88	12,980.74
300-foot Tower, complete	197,900	240,083.00	144,761.55	95,321.45
Water Facilities	178,850	178,928.70	128,616.57	50,312.13
Sewer Facilities	72,980	16,140.54	10,067.14	6,073.40
Elec. Facilities	197,685	169,698.32	132,093.05	37,605.27
Telephone Facilities	7,780	10,340.87	8,270.31	2,070.56
Control & Signal Equipment	53,505	38,276.92	21,966.00	16,310.92
Radio Back-up Equipment (Equipment furnished by Military)	10,950	1,661.31	797.38	863.93
Public Address System	1,855	48.89	48.89	-
Equipment (not installed)	5,050	66,767.46	60,758.60	6,008.86
Furniture	4,880	4,725.72	2,300.72	2,425.00

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Cargo Pier	87,740	133,845.01	78,848.44	54,996.57
Initial rehabilitation				
Total	1,367,210	1,319,760.31	876,991.69	442,768.62
AOMON GROUP - BUILDINGS AND FACILITIES				
Blading & shaping	57,530	85,359.30		
Asphalt Paving, Roads	26,070	2,082.64		
Asphalt Paving, Other Areas	306,115	190,921.72		
Dust Palliative	8,305	752.47		
	398,020	279,116.13	174,081.84	105,034.29
Aluminum Bldgs.	84,850	110,382.86	69,357.66	41,025.20
Concrete Building	179,670	109,105.64	57,393.21	51,712.43
Tents, including slab	66,725	48,671.30	25,484.10	23,187.20
200-foot Tower, complete	224,305	449,358.54	248,800.01	200,558.53
Water Facilities	176,020	203,274.47	141,755.96	61,518.51
Sewer Facilities	72,560	14,615.76	10,152.02	4,463.74
Elec. Facilities	194,290	187,694.84	146,628.56	41,066.28
Telephone Facilities	7,720	10,307.75	8,285.39	2,022.36
Control & Signal System	52,215	22,150.43	13,723.13	8,427.30
Radio Back-up System (Equipment furnished by Military)	10,875	817.45	427.12	390.33

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Public Address System	1,775	48.60	48.60	-
Furniture	4,875	6,310.29	5,408.33	901.96
Equipment (not installed)	5,105	60,265.39	51,461.93	8,803.46
Causeway & Pier	286,965	351,181.10	213,595.33	137,585.77
Initial rehabilitation				
Total	1,765,970	1,853,300.55	1,166,603.19	686,697.36
ENGEBI ISLAND - BUILDINGS AND FACILITIES				
Blading & shaping	21,405	80,069.37		
Asphalt Paving, Roads	19,410	11,378.67		
Asphalt Paving, Other Areas	243,600	120,606.54		
Dust Palliative	6,465	4,543.18		
	290,880	216,597.76	140,713.25	75,884.51
Aluminum Bldgs.	292,230	226,273.23	132,651.06	93,622.17
Concrete Building	178,050	134,828.77	73,306.99	61,521.78
Tents, including slab	190,065	80,579.74	43,595.81	36,983.93
300-foot Tower, complete	93,650	278,761.97	173,797.97	104,964.00
Water Facilities	194,370	194,304.62	139,878.21	54,426.41
Sewer Facilities	73,790	25,830.55	16,257.86	9,572.69
Elec. Facilities	207,770	275,004.66	199,443.03	75,561.63
Telephone Facilities	7,720	18,451.09	13,630.41	4,820.68

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Control & Signal System	49,790	59,748.51	46,321.60	13,426.91
Radio Back-up System (Equipment furnished by Military)	10,860	1,437.60	699.04	738.56
Public Address System	1,855	48.72	48.72	-
Furniture	12,215	7,680.48	6,398.28	1,282.20
Equipment (not installed)	9,170	136,850.70	120,776.10	16,074.60
Pier & Channel	269,370	345,222.35	194,017.96	151,204.39
Initial rehabilitation				
Total	1,881,785	2,001,620.75	1,301,536.29	700,084.46
BOGALLUA ISLAND - BUILDINGS AND FACILITIES				
Blading & shaping	20,850	20,111.37	14,873.39	5,237.98
200-foot Tower, complete	-	20.54	20.54	-
Service Buildings	-	985.27	985.27	-
Tents, including slab				
Concrete Power Plant Bldg.				
Concrete Timing Station				
Water Facilities	-	651.56	651.56	-
Elec. Facilities	-	1,190.63	1,190.63	-
Communications System, including submarine cable	26,400	25,113.17	19,149.53	5,963.64

Feature	Estimated Total Cost	Incurred Cost Total	Incurred Cost Direct	Incurred Cost Indirect
Control & Signal System, including submarine cable	5,420	5,888.12	4,769.69	1,118.43
Pier & Channel	4,030	3,737.38	1,979.94	1,757.44
Furniture				
Equipment (not installed)				
Total	56,700	57,698.04	43,620.55	14,077.49
MISCELLANEOUS ITEMS AND SITES M, N, P & Q AND FACILITIES				
Blading & shaping	18,045	20,114.29	14,457.13	5,657.16
Asphalt Handling Facilities	95,010	83,820.80	50,778.42	33,042.38
Dust Palliative	-	545.76	440.50	105.26
Tents, including slab				
75-foot Towers	213,215	209,280.08	135,427.78	73,852.30
Elec. Facilities	99,515	72,299.64	59,260.73	13,038.91
Radio Facilities	2,380	-	-	-
Control & Signal System	6,015	-	-	-
Water Facilities	-	1,732.36	1,732.36	-
Latrines				
Piers	-	226.25	226.25	
Furniture				
Total	434,180	388,019.18	262,323.17	125,696.01

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
MILITARY STRUCTURES, PROGRAM 3, INCLUDING INSTRUMENTATION				
Structure 3.1.1	1,356,545	1,221,981.82	674,326.73	547,655.09
Structure 3.1.3	86,400	72,558.21	42,759.26	29,798.95
Structure 3.2.1a	58,560	49,618.17	29,740.12	19,878.05
Structure 3.2.1b	74,140	71,106.91	45,375.09	25,731.82
Structure 3.2.2a	48,770	35,543.34	22,794.22	12,749.12
Structure 3.2.2b	66,080	42,295.84	27,507.50	14,788.34
Structure 3.2.3a & b	155,165	117,621.14	86,382.53	31,238.61
Structure 3.2.4a	59,765	39,974.04	25,606.05	14,367.99
Structure 3.2.4b	78,750	43,377.49	28,372.05	15,005.44
Structure 3.2.5	78,940	46,140.62	30,065.96	16,074.66
Structure 3.2.6	42,175	34,296.77	21,376.43	12,920.34
Structure 3.2.7a	38,690	31,000.44	18,330.70	12,669.74
Structure 3.2.7b	37,695	42,187.63	25,540.17	16,647.46
Prefab Spare Parts	30,000	-	-	-
Structure 3.3.3	536,420	460,242.17	267,363.99	192,878.18
Structure 3.3.4	192,815	170,737.11	93,803.16	76,933.95
Structure 3.3.5a & b	248,480	233,293.49	121,325.32	111,968.17
Structure 3.3.8a thru h	571,285	390,561.51	239,513.18	151,048.33
Total Program Three	3,760,675	3,102,536.70	1,800,182.46	1,302,354.24
MILITARY STRUCTURES, PROGRAM 8.2 - TOTAL	165,140	141,800.84	82,671.46	59,129.38

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
MILITARY STRUCTURES, LORAN STATION - TOTAL	100,270	56,080.94	40,637.83	15,443.11
TOWERS				
Two 300' Towers & one 200' Tower (stored at Jobsite)	319,100	213,905.72	195,447.43	18,458.29
Mock-up Section of 200' Tower (delivered to Los Alamos)	18,000	18,221.13	17,768.91	452.22
Total	337,100	232,126.85	213,216.34	18,910.51
TOTAL - ITEMS 1 - 12	20,834,790	19,740,829.07	13,560,106.40	6,180,722.67
SCIENTIFIC STRUCTURES				
N.O.B.L. Program	246,715	260,339.13	167,621.13	92,718.00
J-7 Program	7,150	10,456.97	5,305.65	5,151.32
N.B.S. Program	1,238,980	818,198.85	596,564.19	221,634.66
E.G.G. Program	444,865	354,744.24	206,163.02	148,581.22
N.R.L. Program	219,715	297,748.20	189,369.05	108,379.15
J-3 Program	320,405	229,043.40	145,279.99	83,763.41
LD-50 Program	131,520	131,230.57	69,433.15	61,797.42
T-B Program	70,600	98,649.55	55,003.27	43,646.28
M-D Program	19,685	20,239.26	11,069.74	9,169.52
A.M.C. Program	14,305	7,555.33	3,381.38	4,173.95
All Users				
U.C.R.L. & N.R.L.K Program	878,295	659,843.83	440,832.76	219,011.07
O.C.S.O. Program	8,400	8,087.35	4,419.40	3,667.95

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
Meteor Program	17,200	19,551.37	9,288.80	10,262.57
Rad-Chem Program	514,250	415,479.95	280,183.24	135,296.71
N.R.D.L. Program	31,025	41,107.42	20,504.83	20,602.59
AFOAT Program	30,835	26,040.84	14,633.40	11,407.44
A.C.C. Program	1,035	1,675.86	790.98	884.88
BRL-APG Program	1,085	11.67	11.67	-
A.E.C. Program	7,700	10,189.29	6,757.92	3,431.37
Total	4,203,765	3,410,193.08	2,226,613.57	1,183,579.51
GROUTING PROGRAM				
Military Program	530,375	648,801.20	314,263.92	334,537.28
Scientific Program	-	23,847.00	10,448.74	13,398.26
Total	530,375	672,648.20	324,712.66	347,935.54
DRILLING PROGRAM				
Military Program	53,390	65,473.24	37,240.82	28,232.42
Scientific Program	65,470	74,055.83	39,343.81	34,712.02
Total	118,860	139,529.07	76,584.63	62,944.44
E-PLUS PROGRAM - TOTAL	749,620	783,457.96	482,341.20	301,116.76
TOTAL CONSTRUCTION COSTS DISTRIBUTED TO PROJECTS IN PROGRESS	26,437,410	24,746,657.38	16,670,358.46	8,076,298.92
Less: Radio Back-up System Costs	-	(31,724.62)		
TOTAL	26,437,410	24,714,932.76		

Feature	Estimated Total Cost	Incurred Cost Total	Direct	Indirect
JOB 4: CAMP OPERATION, MAINTENANCE AND MANAGEMENT	6,894,685	5,844,512.10	-	-
JOB 5: SUPPORT AND ROLL-UP	-	2,382,847.58	-	-
Plus: Radio Back-up System		31,724.62		
Total Job 5	3,172,900	2,414,572.20	-	-

As pointed out in Chapter 12.1, cost estimates in connection with the construction at Eniwetok Atoll were first developed for inclusion in the Reconnaissance Report. The procedure used at that time was based upon the determination of domestic unit costs for each feature of construction, material, labor, equipment, and transportation. To the domestic costs thus determined, there were added the costs attendant upon the performance of services at Eniwetok Atoll. Upon the completion of the Reconnaissance Report Estimate it was found that the cost of construction at Eniwetok was a factor of 1.96 greater than the costs of performing comparable services on the West Coast of the United States, and this multiplier was used in the development of subsequent cost estimates.

The total estimated cost of construction, including costs of design engineering and fees, was $32,466,371. From this total, deductions were made for government-furnished water transportation, government-furnished equipment, and government-furnished labor for construction on Eniwetok Atoll, in the amounts of $1,819,196, $1,819,000, and $2,390,765 respectively. Thus, the net total estimated construction cost (including engineering costs and fees) was $26,437,410. The actual cost of construction performed by H & N at Eniwetok Atoll as of June 30, 1951 was $24,714,932, including the cost of all engineering services and allocable fees.

If one divides the net estimate as given above by the factor 1.966, thus reversing the estimating process used in developing estimated construction costs at Eniwetok, to arrive at an estimated domestic cost of construction for comparable facilities constructed in a comparable manner, (i.e., using the same proportions of government-furnished equipment, transportation, and labor), the resultant estimated domestic cost is $13,442,523. Division of the actual cost of construction at Eniwetok by the estimated domestic cost thus arrived at ($24,714,932 divided by $13,442,523) results in a factor of 1.838.

An alternative multiplying factor can be arrived at by assuming that the contingency factor used in the preparation of those estimates which

were not based on definitive criteria should not be included in the preparation of an estimate of cost of comparable domestic construction. Such an assumption would appear to be justified on the basis that communications, timely procurement of materials and transportation of them to the Jobsite, and recruitment of labor present only relatively minor problems in a domestic construction job. On the basis of such an assumption, therefore, the net estimated cost of domestic construction of $13,442,523 should be reduced by ten per cent to eliminate contingency allowances, thus yielding an estimated domestic cost of $12,098,271.

Comparison of this latter figure with the total actual cost of construction at Eniwetok results in a multiplying factor of 2.043. On the basis of these computations, it will be seen that an average multiplying factor can be said to lie between 1.8 and 2.1. It should be remembered that such an average multiplying factor applies to the program of work performed and is not applicable to specific, specialized structures erected at Eniwetok or to construction work involving the employment of extraordinary techniques, equipment or material.

Section 13

PROCUREMENT

CHAPTER 13.1

GENERAL

The formal initiation of procurement operations for the Project, which were ultimately to involve the expenditure of approximately $16,000,000, was substantially coincident with the approval of the Reconnaissance Report of January 7, 1949. An analysis had been previously made of the main problems presented by the special nature of the work so that over-all planning could be made at all company levels in scheduling the work progress. Site survey teams of both Management and Engineering personnel had taken note of the engineering and construction obstacles; the problems posed for communication and transport by the remote project location; and the requirements of security.

It was apparent that procurement operations, involving as they must the acquisition of large quantities of materials for use at a site far removed from the sources of supply, would be of major importance. To assure the necessary flexibility in procurement activities, the Contract provided:

Job No. 2, Engineering, Design and Inspection - Title II

6. Procure all materials, equipment, supplies and facilities (not furnished by the Commission) required for the effective prosecution of the work under this Title; and procure any special materials, equipment, supplies and facilities which the Commission may request. Provided that any single purchase at a cost of $50,000.00 or more must have the prior approval of the Commission.

Job No. 3, Construction Services

2. The A-E-C-M shall schedule and coordinate the construction work; negotiate and award subcontracts; direct and supervise work of subcontractors; store material and equipment for use in connection with the project; procure all materials, equipment, supplies and facilities (not furnished by the Commission) required for the work under this contract; and procure any special materials, equipment, supplies and facilities which the Commission may request. Provided that any single purchase in excess of $50,000.00 must have the prior approval of the Commission.

Job No. 4, Camp Operations, Maintenance & Management

1. The A-E-C-M shall furnish all labor, equipment, materials, tools and supplies for, and manage, operate and maintain the facilities including but not limited to housing, messing, commissary, medical services, (first aid and emergency treatment) and recreational facilities as are necessary to adequately meet the requirements of the Commission, the Los Alamos Laboratory, other authorized parties and the A-E-C-M at the site.

Job No. 5, Support and Roll-Up Services

1. The A-E-C-M shall provide installation crews and equipment and accomplish such engineering and construction as may be required by the Commission in connection with instrumentation and other scopes connected with actual test operations and provide other labor, materials, equipment and assistance as may be required by the Commission. After test operations the A-E-C-M shall rehabilitate certain structures and facilities as determined by the Commission in order to place same in stand-by condition, and shall perform salvage, storage and demobilization operations.

ARTICLE XXIX - EQUIPMENT AND SERVICES TO BE FURNISHED BY THE GOVERNMENT

1. It is the intention under this contract, in order to effect economies in the work specified, where practical and feasible in the judgment of the A-E-C-M contractor, to utilize equipment, supplies and material from the Armed Forces. If, in the opinion of the A-E-C-M contractor, procurement from the Armed Forces stores is impractical or not feasible, they will initiate procurement of equipment or negotiate for the use thereof through such other sources as may exist.

3. The Commission will acquire or lease adequate warehousing space in the continental United States to facilitate supply of the operation. Operational control of such warehousing shall be delegated to the A-E-C-M contractor. Costs in connection with the warehousing operation shall be reimbursible.

4. The Commission reserves the right to furnish any materials, equipment, tools or services necessary for the completion of the work.

It is the understanding under this Contract that:

(a) The military will furnish all necessary small craft, vehicles and airplanes, including the crews for maintenance and operation of aircraft; and will supply all outside communications and station guards.

(b) Other agencies involved in the Project will, without cost to this contract, furnish all ocean and stateside transportation for their own supplies and personnel.

It followed that the successful performance of these operations would require, as part of the organization assigned responsibility for offshore activation related to Contract AT-(29-1)-507, an adequately staffed procurement unit, operating in accordance with government requirements and established procedures. The organization of the unit was of primary importance and it was necessary to substantially enlarge the existing H & N procurement group.

The Procurement Department for this contract, with full purchasing responsibility, was established under the Operations Division in February 1949. Figure 13.1-1 shows the functional organization of the department in its ultimate form. The Purchasing Section, which included sub-sections for traffic, expediting, and material control, functioned within this department, and supervision of stateside warehousing facilities was later added as a unit of material control. The purchasing of office supplies and equipment, plant protection services, engineering and surveying supplies, medical examinations, and advertising for recruitment of personnel was begun, and the work involved in formulating the necessary procedures for the procurement of equipment and materials, from the time of original engineering requirement to final delivery at the construction site, was also begun.

In preparing procurement methods and procedures for the Project, the policy was to adhere as closely as practicable to the established procedures of the AEC and normal Federal Government procurement practice, using as criteria current government purchasing manuals and codes. At the same time, these procedures were designed to be of sufficient breadth and flexibility to cover the contingencies that could be expected to develop in a project of the nature of that under consideration. There procedures, submitted to AEC in July of 1949 and subsequently approved, are reproduced as Exhibit B at the end of this section.

In the early stages of the Project, in order to expedite procurement of long-term delivery items, the responsibility for requisitioning all construction materials resided in the Engineering Division. This practice permitted the preparation of purchase order specifications, and the processing of requisitions for certain items of equipment and materials, long before completion of detail design and approval of drawings for construction. On items such as diesel generator units, which were normally offered on six to nine-month delivery schedules, the saving in time was important. Likewise this system of initiating requisitions prevented the build-up of abnormally high warehouse stocks on standard items of construction materials such as cement, reinforcing steel, lumber and the like. The need for standard stocks of these items was, of course, recognized and, as will be seen later, this type of procurement was begun as soon as conditions permitted. Warehousing space and stevedoring at the Jobsite were initially limited, necessitating care in scheduling shipments of bulk materials and supplies in order to prevent overtaxing these facilities and services and to prevent material deterioration and loss. Procurement of materials and equipment required by beachhead, and later by construction, forces was initiated by field requisitions on those items not normally requisitioned by the Engineering Division under its material take-off responsibility.

It is apparent from an examination of the established procurement procedure that the procedures for processing both engineering and field requisitions were established with a view to keeping all interested groups of the Holmes & Narver organization informed on procurement status of all items under requisition and in maintaining material control.

Actual procurement of materials, equipment, and supplies, and accomplishment of delivery to the Jobsite, was regulated by the established

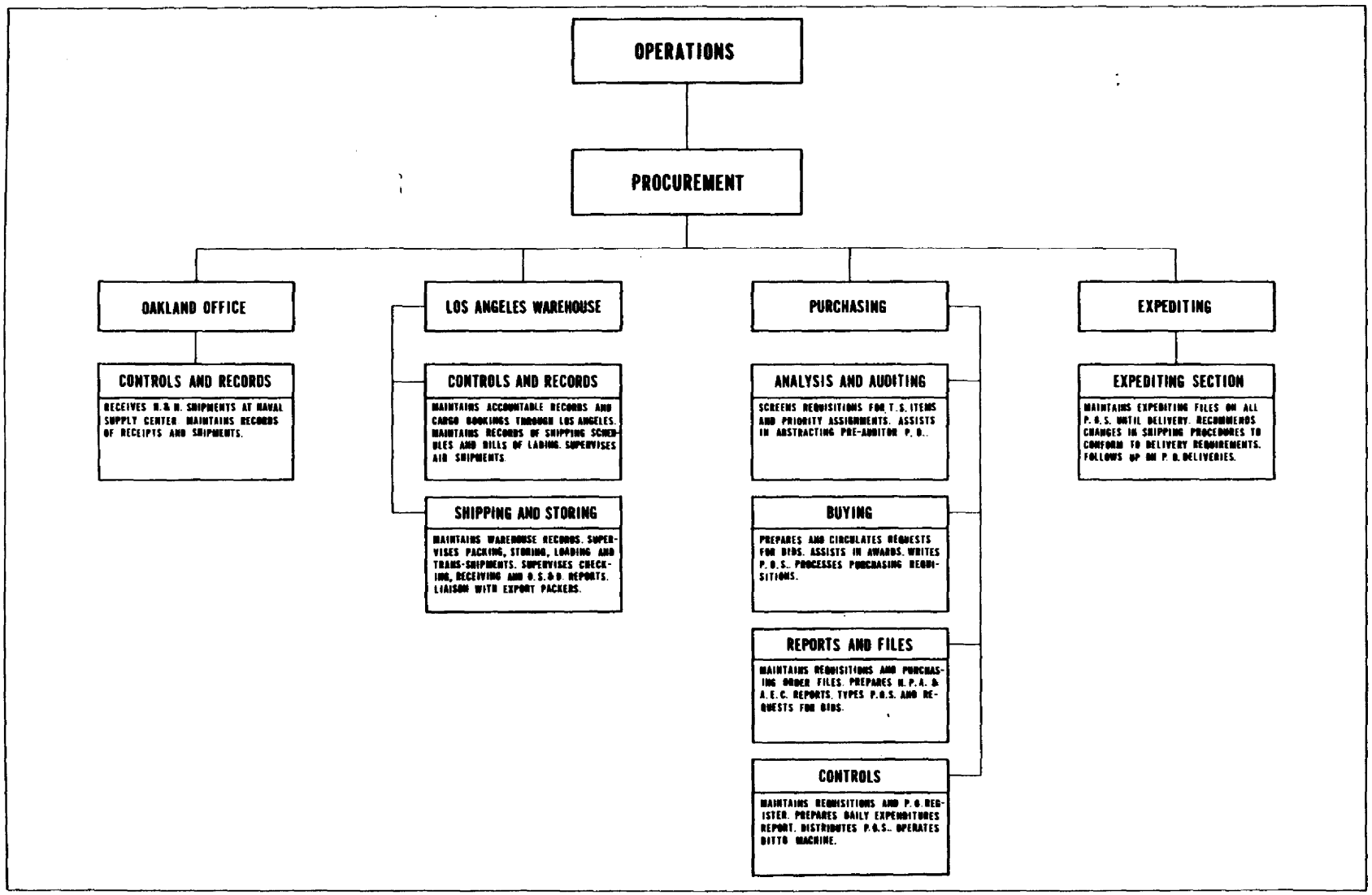


FIGURE 13.1-1 Procurement Department Organization Chart

procedures and was carried out by the procurement organization described above. Requisitions were checked to assure that mandatory treasury supply items (e.g., typewriters) were not included for normal procurement and to insure that normal stock levels were not being exceeded. Sources of supply were then determined and note made of the qualifications of potential suppliers for the purpose of issuing invitations to bid on such items for which bidding procedures were prescribed. During this check, the availability of the items involved in Government surplus stocks was also determined in order to minimize expenditure of funds allocated to this project. Subsequent bidding and formal purchase order issuance was in accord with standard practices except that note was made on each purchase order of the fact that the purchase involved was under AEC Contract AT-(29-1)-507 and, in proper cases, that the items involved were for export shipment.

CHAPTER 13.2

1949 PROCUREMENT ACTIVITIES

In view of the nonavailability of funds for extensive procurement of construction materials and supplies, the primary problems that required the attention of the Procurement Department during the first quarter of 1949 were home office space and equipment; warehousing facilities; export packing arrangements; and shipping facilities. Provision of additional office space and office equipment for the growing department followed a schedule calculated to keep pace with the estimated personnel increases.

Holmes & Narver at this time submitted a plan for centralizing the control and supervision of purchasing, receiving, warehousing and exporting functions within the limits of the greater Los Angeles area. Warehouse and export packing facilities were available at the Port of Los Angeles, Wilmington, California, within easy access of shipping and port facilities and close to sources of supply. This proposal was not approved for cogent reasons given hereafter, and it was determined that all material destined for the project should be shipped through the Naval Supply Center in Oakland, California. In accordance with this decision, it was deemed expedient to establish only a small warehouse in the Los Angeles area for local shipments and to create a cargo liaison office to be located at the Fright Transshipment Branch of the Oakland Supply Center.

The H & N group at the Supply Center included an Office Manager, an assistant, and two clerks. One function of this office was to procure fresh and frozen fruits and vegetables for use at Jobsite. These provisions were obtained through Navy sources at the General Depot, and the operation involved the coordination of H & N procurement requests with those sources. The Oakland office also acted as a branch of the Procurement Department in expediting purchases from suppliers in the Oakland-San Francisco Bay areas. A third function was the coordination of material receipt and handling at the Supply Center. Navy regulations required all material for transshipment loading to arrive fully and correctly packed for export on a precise delivery schedule, as there were no facilities available for storage of any but regular Naval Supplies. This office was also required to resolve the difficulties that arose in vendor or carrier failure to meet shipping schedules.

The Oakland branch worked in cooperation with the staff of the Naval Supply Center in spotting Jobsite material in incoming shipments, checking the various pieces through proper channels, seeing that all necessary loading and shipping permits were correctly typed and approved for scheduling, and performing allied expediting services. This office also assisted the Joint Task Force liaison office at the Naval Supply Center in the assignment of priority requests and designations. Daily records were furnished the Task Force office for use in adjusting allocations and in assigning priorities for transport space.

Daily reports of shipments received from the various sources of supply were furnished to the Los Angeles warehouse by the Oakland office.

This office was also responsible for maintaining records of temporarily on-hand materials as well as actual shipping data. Extra copies of packing lists were forwarded from the Los Angeles warehouse home office to be marked at the Oakland office with advance shipping information. This information was then forwarded to Jobsite to aid in construction scheduling.

The Los Angeles warehouse was the focal point for correlation of all shipping information. Receiving reports covering each purchase order and shipment, regardless of origin, were prepared at this office and forwarded to the Jobsite for use in work-programming. Certified true copies of all bills of lading and packing lists were required to be sent to the Los Angeles warehouse office immediately upon shipment of any material by any vendor consigning material directly to the Naval Supply Center. These bills were then checked against purchase orders and the information relayed to all interested departments. The warehouse office documented over, short, and damage reports for ultimate credit and claim action; acted as an agent in traffic matters; expedited special orders within its province; and compiled various current-status reports on both water and air cargo shipments.

It soon developed that the original plan to have the bulk of material export packed and shipped directly to the Naval Supply Center by the vendor would have to be modified. It was found that individual vendors lacked the experience and facilities to satisfy the packing requirements of Naval Export Specifications, and were subjected to exorbitant charges when they had this work contracted. Because the Los Angeles warehouse export packing facilities were not sufficient to supply this added need, an experienced packing concern was selected to handle the export packing for such vendors as required this service, and warehouse personnel were assigned to supervise receiving records and packing.

Air lift quotas were established early in the program, and priority items were transhipped via Naval Air facilities through the Naval Supply Center, Oakland, California. Originally, air freight quotas were necessarily small due to prior military commitments. At this time quotas were to be held to a maximum of 3000 pounds per month with the request that this maximum not be used except when absolutely necessary. While the press of emergencies sometimes necessitated increased quotas, all emergency requests for air priority shipments were carefully screened in compliance with this request. With the same request in mind Holmes & Narver inaugurated a plan to transport many critical small items by air making use of unused baggage weight allowances of personnel departing via air for the Jobsite. Thousands of items of various types were hand-carried; the total weight of items thus transported was in excess of five tons as of May 1951.

During the early part of 1949 while the establishment of the stateside procurement facilities was in progress, the work of satisfying the camp equipment needs of the first small group of Jobsite personnel was also in progress. Arrangements had been made for the initial personnel to be housed and fed at the Army garrison during the preliminary phase of construction, and therefore the first shipment of Holmes & Narver subsistence supplies was not made until May 1949. The formula for this operation was to provide not only the immediate requirements for the initial

camp, but also to establish large quantities of supplies, equipment, and small tools to be available at the Jobsite as personnel arrived to use them. The services of newly hired superintendents and other key personnel whose Jobsite duties placed them in material requisitioning capacity were utilized by the Procurement Department in helping estimate basic material requirements for their respective departments while awaiting security clearances and overseas transportation. This device served the dual purpose of facilitating the preparation of these detailed estimates while at the same time acquainting these men with such phases of the work as security regulations permitted.

A record was kept of the quantities of various types of items ordered and accumulated requirements were later deducted from the bills of materials taken off the drawings as they were completed. Quantities of materials and equipment were thus stockpiled in advance of actual need for use in construction of camps, power houses, underground utilities, etc., at the Project site, and this accomplishment proved extremely valuable in getting the Jobsite operations underway.

The first purchases, in volume, of construction items such as cement, lumber, reinforcing steel, and other items necessary to support a construction project of this magnitude were initiated in May 1949 and reached a peak in July of the same year. This trend in procurement activity is reflected in the charts shown in Figures 13.2-1, 13.2-2, and 13.2-3. During this same period, arrangements were made for the inter-agency transfers (involving various Federal Government agencies) of a substantial quantity of heavy earth-moving and construction equipment.

During the early part of this period in construction activity, and more particularly immediately prior to the close of fiscal year of 1949, procurement progress suffered a delay occasioned by fund limitations. Because the allocated funds for this fiscal period were not sufficient to cover all desired commitments, it was necessary to suspend certain important purchase awards such as on aluminum buildings until the main bulk of the funds became available.

By the close of the second quarter of 1949, all sewer pipe and cast iron soil pipe had been ordered for the facilities at Camp Parry. Invitations to bid had been placed for pipe fittings and plumbing shop equipment, supplies, and small tools; however, purchase orders were not actually awarded until July. Aluminum pipe and fittings were also on suspended order. The first sixteen aluminum buildings for permanent housing had been bid and awarded and expediting action was under way to secure the aluminum stock for the fabricator by July 5, 1949. Repair parts for renovating cold storage boxes already at the Jobsite had been secured and larger capacity units were in the process of design. Arrangements had been made for obtaining fresh and frozen food from the General Supply Depot of the U. S. Navy, and July subsistence requirements had been shipped by June 15, 1949. All designs for the over-all electrical distribution system were completed and bids had been advertised on the equipment and fittings.

The first shipment of power poles was made June 10, 1949, but the procurement of fixtures and hardware for them was delayed through lack

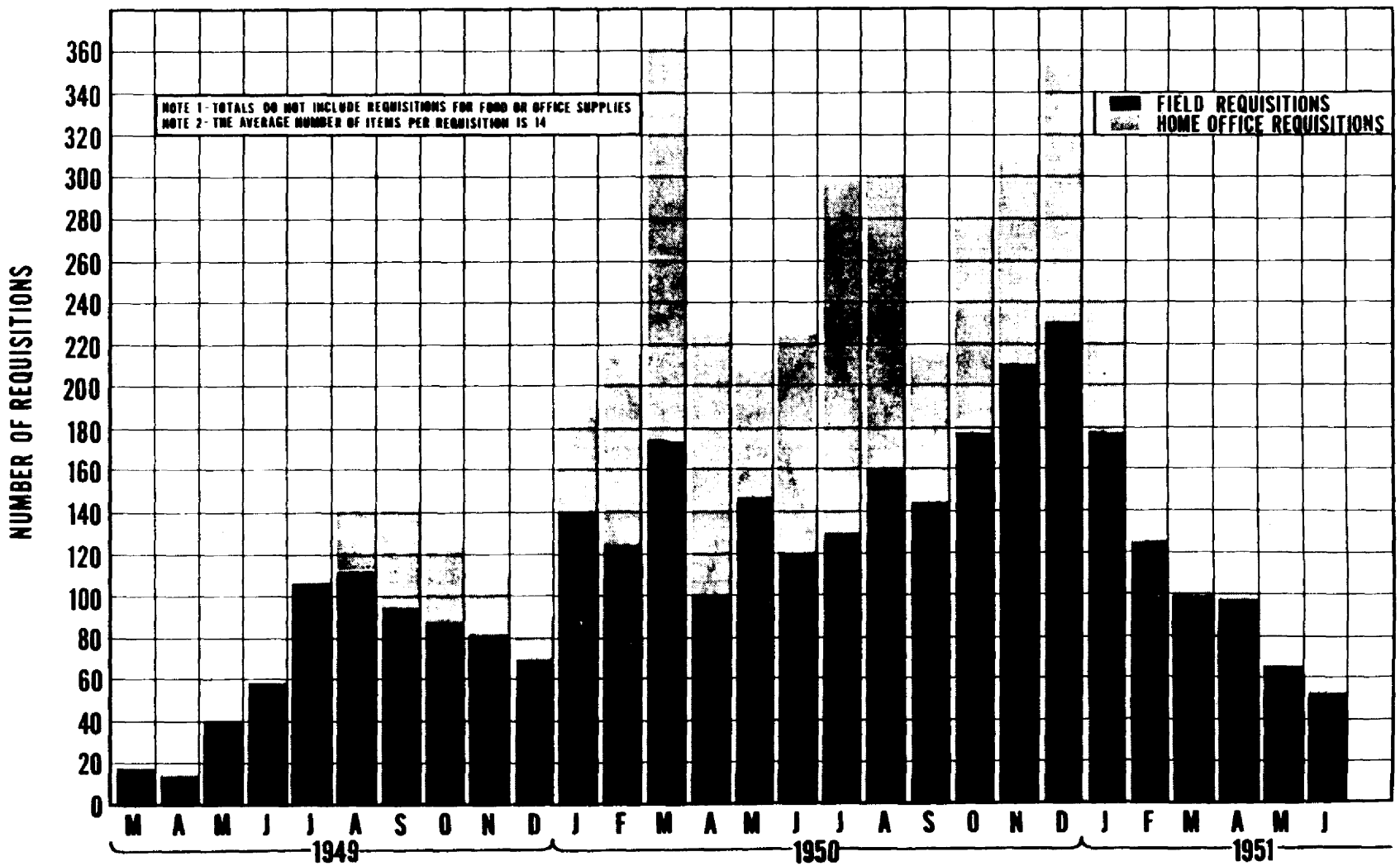


FIGURE 13.2-1 Total Monthly Requisitions

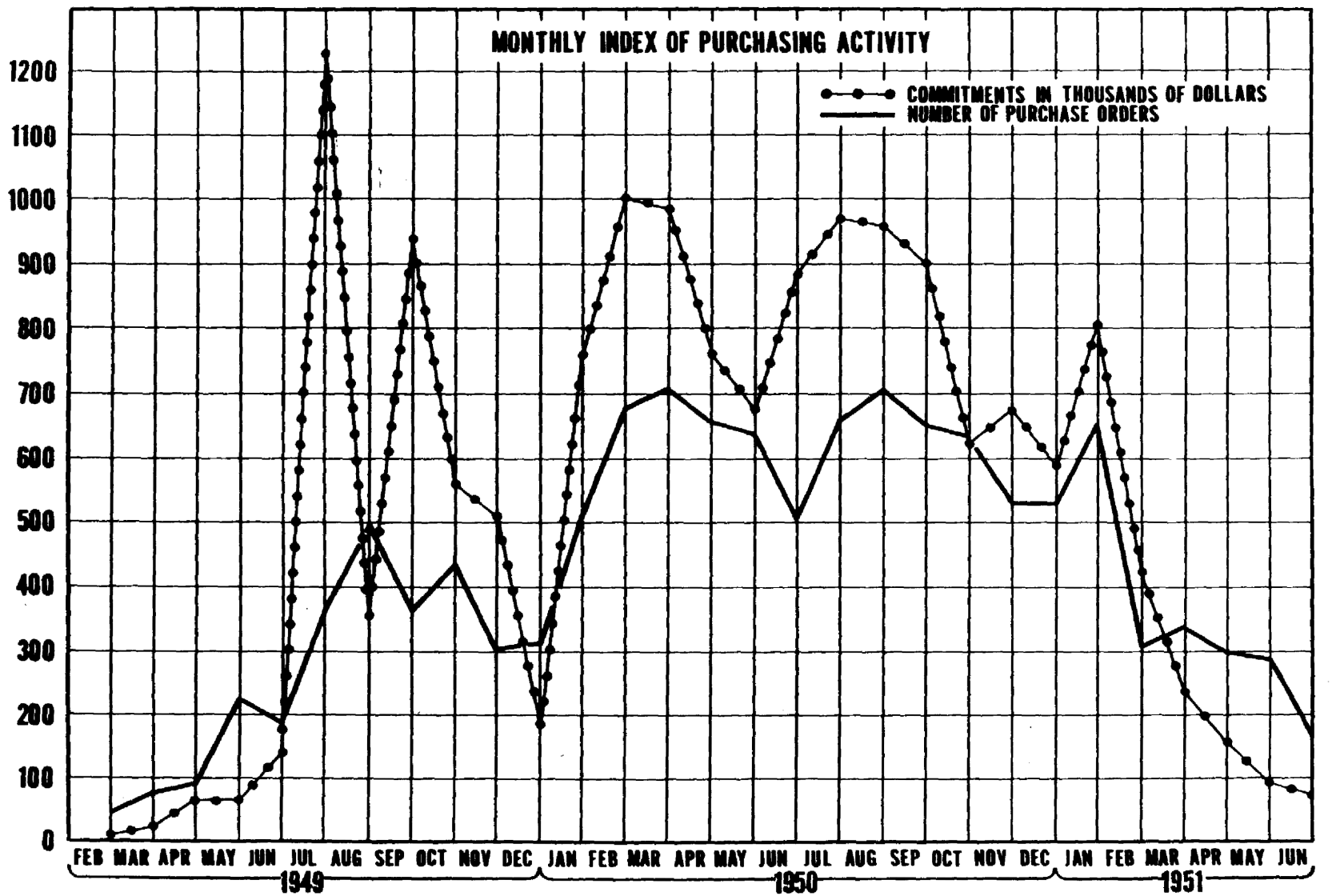


FIGURE 13.2-2 Monthly Index of Purchasing Activity

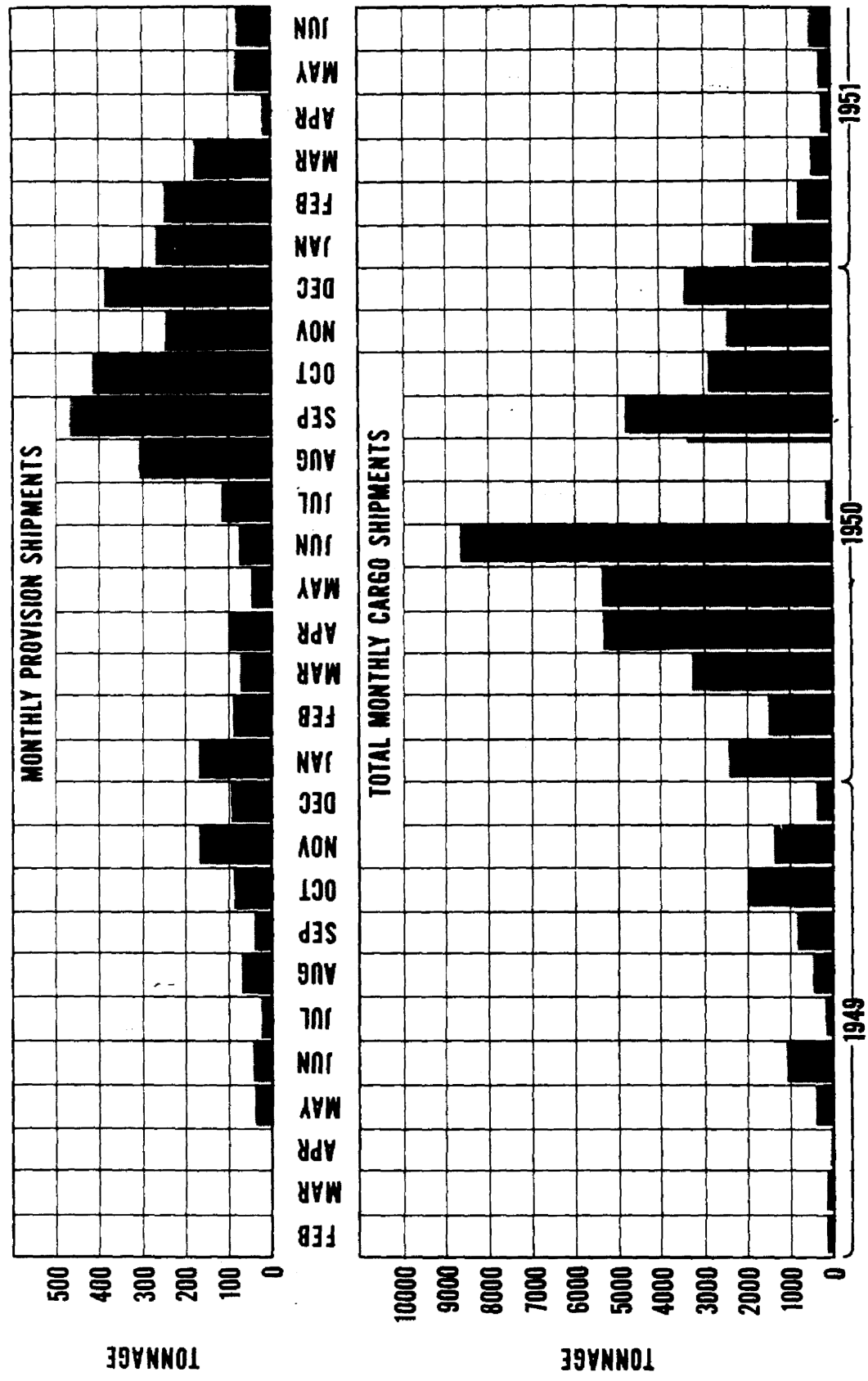


FIGURE 13.2-3 Monthly Provision Shipments and Total Monthly Cargo Shipments

of funds. The Engineering Department had completed the designs for interior power and lighting requirements, and bids had been advertised and received on the basis of the complete bill of materials, but no award could be made for these items until later. A check survey of transformer requirements against Los Alamos and Oak Ridge excess listings was in process. Power generating units were designed and competitive bids had been received, but the award was withheld. The first orders for water distillation units to augment the capacity of the rehabilitated water stills located on-site, were awarded in May for estimated delivery in July. All non-critical replacement motors, clutches, and compressors required for maintenance of the existing water stills had been shipped complete on June 23. All critical small repair parts for the stills had been previously forwarded via air.

Personnel transport vehicles were secured for Jobsite use during the second quarter. An order for fourteen new dump trucks had been placed by the Atomic Energy Commission for delivery July 27 to the Naval Supply Center. The camp maintenance planning was underway and the Engineering layout for laundry facilities had been approved and advertising for bids for equipment and materials was accomplished.

The third quarter of 1949 was a period of continued expansion in the Procurement organization. (See graph, Figure 13.2-4.) Likewise during this quarter, procurement operations continued at an accelerated pace. All primary plumbing and piping facilities had been secured, with considerable quantities being furnished from surplus supplies at the Los Alamos and Hanford Atomic Energy Commission bases and charged to Contract AT-(29-1)-507. Supplemental quantities of electrical materials were ordered, and the first fuel handling equipment orders had been scheduled for shipment September 1. Arrangements had been made to obtain monthly allocations of fuel from the U. S. Navy, and storage facilities were being prepared.

The initial orders for diesel-electric power generating plants had been placed for fourth quarter delivery, and repair parts had been furnished to maintain temporary output of the 75-kw generating plants located at the Jobsite. Several additional 75-kw plants were obtained from Pearl Harbor to augment these temporary power facilities. A similar situation existed regarding refrigeration facilities, and miscellaneous equipment had been purchased and shipped to maintain the eleven 650 cubic foot capacity portable units that were the property of the government on-site at Eniwetok. Requisitions had been placed with U. S. Navy at Port Hueneme for walk-in type refrigeration boxes, and these units were scheduled for shipment in early September. Two steam boilers for campsite facilities had also been purchased for September shipment, as well as the necessary replacement parts for the smaller type temporary boilers already located at the Jobsite.

Materials and pile-driving equipment for the first test pier had been shipped by August. All laundry equipment, mess hall and bakery equipment, and their respective supply requirements had been purchased for September shipment. Additional temporary housing consisting of sixteen tents had been provided, and orders for the initial stock of dormitory furnishings and lockers had been placed.

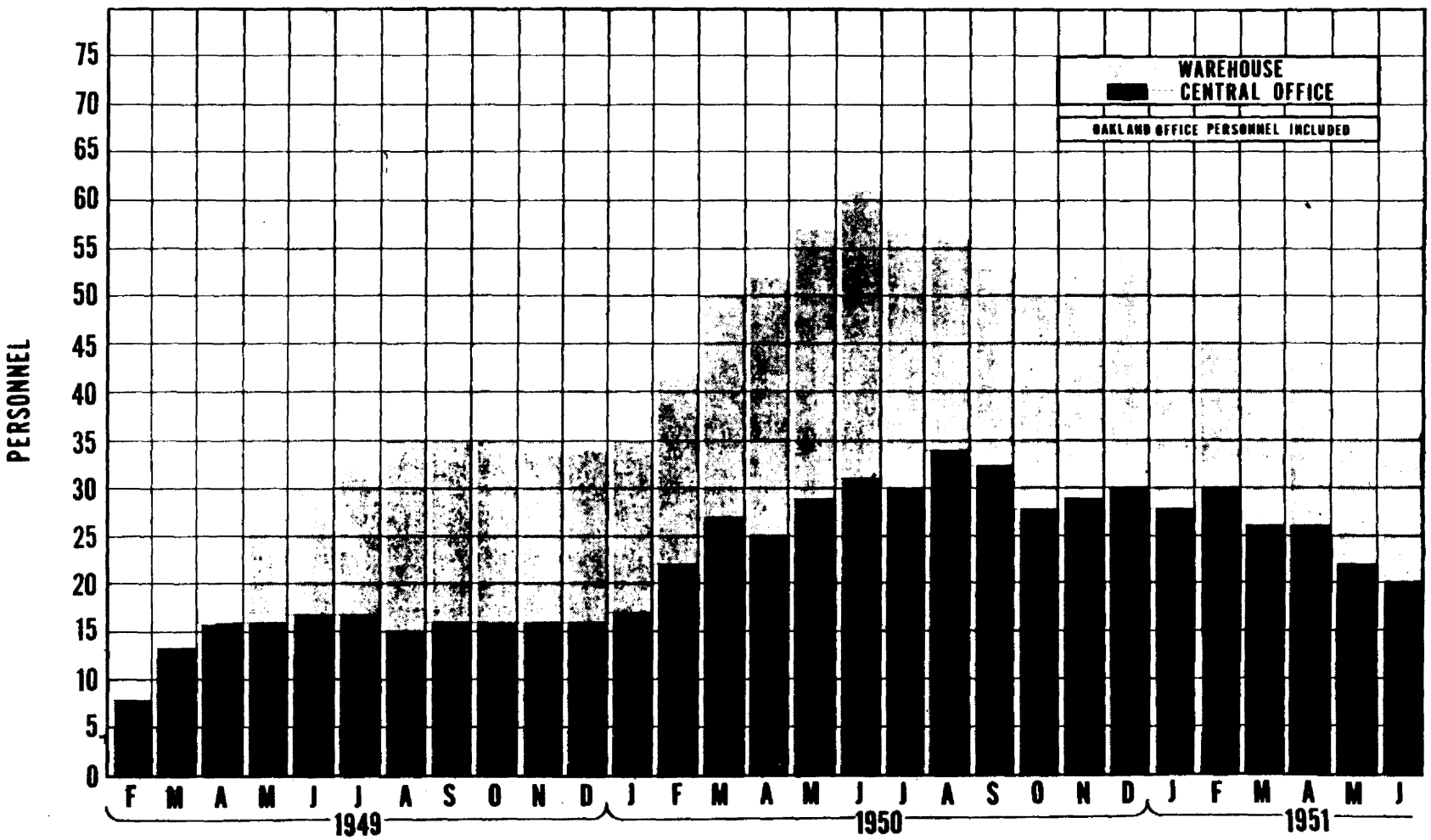


FIGURE 13.2-4 Total Procurement Personnel

Campsite hospital, snack bar, and canteen equipment had also been purchased and shipped during this quarter. Two film projectors and a screen had been provided for the theatres, plus a public address system, portable record players, and radio receiving sets. Fire protection and miscellaneous safety equipment was also purchased during this period. Initial procurement for the various campsite shop facilities including the pipe, plumbing, carpenter, sheet metal, welding, and automotive repair shops were also completed at this time.

The first large purchase orders for general building materials in anticipation of new building construction were placed, and stocks of reinforcing steel, structural grade lumber, masonite, plywood, hardwood, roofing paper, and galvanized nails had been secured. A contract for the fabrication of the first 300-foot tower had been awarded, with estimated delivery in December.

The materials testing laboratory and necessary testing equipment was completely purchased and shipped. The original request for inter-island communications equipment had been completed by securing four portable radio sets from military surplus stock at Pearl Harbor. Bids were awarded for 710,000 feet of submarine cable for inter-island communication with delivery estimated between seventeen and twenty-nine weeks. Additional surplus jeeps were procured from AEC Hanford Operations at Richland, Washington, and from the Navy at Pearl Harbor.

As procurement for campsite facilities and operational headquarters was completed, the requirements for the Scientific Structures Program became more pressing, and large quantities of raw materials including limonite ores and steel scrap punchings for the foundation program were purchased and shipped during the last months of the year. Permanent storage facilities of all types were ordered during this period for the original campsite facilities. These included warehousing facilities for all types of materials, food and provisions, petroleum, oil, and lubricants.

The procurement of food supplies was a vital operation and one that continually increased in volume as additional personnel arrived at Jobsite. As the size of the camps increased, so did the requirements for all types of subsistence supplies, medical and dental equipment, drugs, and supplies, general PX supplies, kitchen and mess equipment, bakery and laundry equipment and supplies, and similar equipment and supplies required to satisfy the needs of enlarged personnel groups.

The first indications of the great changes that were to be made in the original plans of the Atomic Energy Commission for developing the Proving Ground were evidenced during the last quarter of 1949. Preliminary cost estimates were requested for several additional facilities on various locations, and authorization for a general expansion of the original campsite facilities was granted in anticipation of later need. In addition, authorization was given to activate Japtan Island as a camp, laboratory, and animal breeding colony for the Bio-Medical Program. These changes required that the original plans for a small construction force capable of moving from one location to the next as construction needs were completed be revised to permit a larger construction force.

Also, the original plan of procuring provisions through Navy channels was now found to be inadequate to meet the increased requirements and was therefore abandoned. The basic reason for this move was that the increased H & N requirements for provisions were found to be overtaxing both the facilities and supplies of the Naval Supply Center, with resultant delays in shipping. To remedy the situation it was decided that H & N should contract with commercial sources of supply for dry provisions as well as for fresh and frozen foods, and make arrangements with vendors through its Oakland office to deliver directly to the Naval Supply Center.

With the further increase in procurement activity it became necessary to expand the facilities for export packing in the Oakland-San Francisco Bay areas. Arrangements were made with the Pacific Ports Industries, Crate-Rite Division, to establish receiving and packing facilities for materials and supplies. This firm, located in Oakland, had held previous contracts with military agencies for export packing of all types of material, and was acquainted with all phases of export packing requirements; in addition, it had rail spur facilities and was readily accessible to the Naval Supply Center.

The close of the first calendar year of Contract operations found the Procurement Department engaged in constantly increasing activity and making plans for the upswing anticipated in the first months of 1950.

CHAPTER 13.3

1950-51 PROCUREMENT ACTIVITIES

With the beginning of 1950, the decision was made firm that H & N would be responsible for the procurement of materials for and the construction of buildings and facilities required for the Military Structures Program. Shortly thereafter, it was decided to shift the responsibility for material take-off and requisitioning from the Engineering Division to the Operations Division.

Procurement operations involved in the expansion of facilities on both the support islands and the experiment islands were underway early in 1950. The transportation program was an extremely important part of the total project because of the distances separating the individual islands, and additional LCM and LCT vessels were secured at this time to facilitate transport. Three "water-taxis" were also purchased to alleviate bottlenecks in inter-island transfer of personnel. In line with the communications program development, two gasoline driven cable laying hoists were secured for use aboard the cable barges; also, delivery of submarine communications cable was 50 per cent completed at this date. Telephone station and handset equipment and accessories were again heavily ordered throughout this period.

There was a continuing need also for more water distillation equipment, together with additional requests for miscellaneous construction equipment such as air-compressors, portable gasoline-driven electric welding machines, and various types of pneumatic-powered construction equipment. Fuel oil storage facilities were also expanded at the various locations with the purchase and delivery of additional tanks and fuel-handling equipment. Procurement was made of insecticides in connection with pest and insect control programs.

Also during the early part of 1950, procurement activities became increasingly engaged with experiment construction requirements as plans and drawings became available and Jobsite construction schedules approached the needs for the materials involved. The first orders for dehumidification equipment were placed and procurement was initiated for explosion-proof doors and other similar items of special design. Contracts were awarded for the fabrication of six 75-foot steel towers to be delivered knocked-down ready for shipment at the Naval Supply Center by April 15, and the contract for the fabrication of a 300-foot aluminum tower was also awarded during this first period of 1950. Foundation and building materials together with necessary operating equipment for the additional power houses and water distillation plants for operational island installations were also purchased and shipped at this time.

Procurement of the balance of the materials for the construction program to be carried out by the Construction Battalion on Eniwetok Island was in progress during this quarter. Requirements for the fresh water system, salt water system, miscellaneous plumbing fixtures, cement,

lumber and hardware for tent frames, and POL storage facility equipment were purchased and shipped in conjunction with and in addition to H & N programmed requirements. Copies of all receiving reports were forwarded to the Supply Officer of the Seventh Engineer Brigade immediately upon receipt of materials, and the first shipment of these supplies in excess of those available at the Jobsite was scheduled for March 3, 1950.

This period also marked the beginning of the paving construction work with the purchase and shipment on April 10, 1950, of 850,000 gallons of bitumuls, together with the necessary handling and transfer equipment. The second tanker load of 900,000 gallons of bitumuls followed in June.

The 75-foot and 300-foot steel towers and the 300-foot aluminum tower were all completed in this quarter. Additional requirements for construction machinery, plant conveyors, and heavy-duty low-bed trailers were placed on the procurement schedule. Because of the greatly increased volume of active orders and the urgency of the need for augmentation in the flow of supplies, four members of the Purchasing Department were placed on full time expediting of materials orders.

Early in the third quarter of 1950, a major transportation problem arose as a result of the outbreak of hostilities in Korea. A year earlier, in July 1949, a similar unforseen transportation setback had occurred when 60,000 cubic feet of Holmes & Narver cargo space was cancelled and allotted to the U. S. Post Office Department as the result of the maritime strike in the Territory of Hawaii. Despite this setback, the shipment of the required equipment and supplies had continued on an increasing scale and efforts were being continually made to enlarge space allocations. As shown in Figure 13.2-3, the total monthly weight of June 1950 shipments had risen to over seventeen million pounds of freight when hostilities began in Korea.

The Navy Department was forced to cancel all allocated shipping space, and a total of six vessels were scheduled and cancelled before cargo space finally became available again for an August 25th sailing. The outbreak of the Korean War occurred at the time when the peak of material shipments had been scheduled and the facilities made available to H & N at Naval Supply Center quickly became jammed with materials scheduled for Eniwetok; whereupon the Center was forced to refuse receipt of any additional quantities. To relieve the situation, Holmes & Narver obtained other storage space in the Oakland area and temporarily suspended shipment of its material by means of telegram and telephone notification to the various vendors. The expeditors had to completely reverse their field of action in an effort to halt the flow of all the scheduled material.

Some precautions had been taken against contingencies of this nature, including the provision at Jobsite of refrigerated storage space sufficient for a full month's supply of food. In addition, shipments of food supplies prior to July 1950 had been so scheduled that this space was filled to near capacity at all times. This circumstance proved of great value during the shipping shortage, as H & N's total allocation of shipping space during this period was confined to 240,000 pounds shipped

July 1st. By revising menus and conserving provision stores the emergency period was bridged without serious food shortage. As an added measure, minor procurement authority was delegated to the Holmes & Narver Honolulu office to aid in providing essential items that could be shipped directly from the Territory of Hawaii.

On August 19th, H & N was notified that the USS PRIVATE J. S. MERRILL would be made available for limited cargo loading for sailing on August 25. A priority system was established so that the most critically needed items would be shipped first, and in sufficient quantities to expedite construction activities. It was extremely difficult to determine the proper priorities, since by this time almost all of the material collected in the Oakland area was needed at once as construction scheduling was daily becoming more complex. Special screening was required at this time to ascertain priority requirements, and almost the entire Purchasing Department together with key personnel from various other departments were engaged in coordinating the shipping requirements. With this united effort, H & N was able to segregate and load 3,745 measurement tons of critical materials aboard the PRIVATE MERRILL within 4 days and to dispatch more than 6,000 tons on the CRAIN shortly thereafter.

With the resumption of normal shipping schedules, procurement operations for the Scientific Structures and Military Structures Programs were continued. The Procurement Department worked closely with the design groups in the Engineering Department to control the delivery of the required materials and equipment to coincide with the schedules that had been established for construction at the Jobsite.

It was necessary to emphasize expediting these orders from their point of origin to the shipping point because not only did large quantities of basic construction commodities have to be transported to the Jobsite at regular dates, but it was also desirable that many thousands of items of special hardware, tools, and equipment as well as large quantities of technically designed and specially fabricated parts and structures follow on coordinated schedules. Of the various scientific stations there were a great many that included items that were required to be fabricated in accordance with detailed drawings and technical specifications. These items ranged in type from small steel rods to large stainless steel collimator tubes, precision machined to exact tolerances, and multi-ton castings also requiring special machining operations.

As time was a vital factor in this procurement, many contracts were negotiated, and in some instances fabricating plants were authorized to work around the clock and on week-ends so as to meet the delivery schedules. A number of design changes were encountered during the fabrication of special units and this circumstance further complicated procurement work. Close liaison had to be maintained between the Purchasing Department inspectors and design engineers to keep abreast of all specification and design alterations. These changes ranged from minor dimensional variances to drastic over-all changes of entire units. In several instances work had to be stopped and new negotiations entered into with the

fabricators, which required that adjustments be made for the work previously performed. In some cases, a change in plans called for the outright cancellation of work that was in progress, and time was spent in arriving at an equitable settlement with the fabricator in each case.

Some of the fabricated material requirements were of such nature that few fabricators in the United States had the facilities to meet the requirements. One case that may be cited as an example called for some cast steel units weighing nine tons each, which, when cured, were to be machined to close tolerances. The design was completed on these units on November 6, 1950. The castings were purchased from the Baldwin Locomotive Works in Philadelphia, Penna., and the machining was subcontracted to the Patterson Foundry and Machine Company, East Liverpool, Ohio, and to The National Roll & Foundry Company, Avonmore, Penna., in the same area. Bids also had been received from the National Foundry Company (with Allen Machine Company to perform the machining), which was the only company in Southern California with facilities to handle castings of this size. However, by awarding the contract to the Baldwin Locomotive Works, savings of approximately $70,000.00 were realized, and this company, by making two sets of patterns, was able to deliver the castings in time to meet the deadline delivery date of January 28, 1951. The transportation of these units was arranged in advance, and they were expressed through to the Pacific Coast on a non-stop basis, arriving at the Naval Supply Center just in time to meet the scheduled sailing.

Many of the fabricated items were in this category, and in some instances the work was of such urgency that procurement could not wait upon completion of the design drawings. It was sometimes necessary, therefore, to negotiate a contract with a reliable firm which had all the essential requirements of fabricating skill and experience, together with adequate plant facilities and sufficient materials on hand to start work immediately. It is gratifying to state that most of the fabricators willingly set aside their normal production schedules and made men and materials available for the desired work when they were informed that this was work of high priority required for the Atomic Energy Commission.

The lack of shipping facilities for the two-month period following the outbreak of hostilities in Korea had resulted in a large backlog of material requirements, some of which were on order and others on requisition. This backlog, together with daily new material needs, presented a problem that strained the facilities of the Procurement Department to the utmost. The Department had barely succeeded in reducing the accumulation of procurement requests to a point where normal procurement procedures were in prospect when a new complication born of the war situation arose. It developed that the Korean War had made new and greater demands on industry for materials and supplies, and with the advent of the National Production Authority under the U. S. Department of Commerce, all outstanding orders for materials and equipment had to be immediately converted to the applicable Defense Order Priority Ratings. The impact of this requirement was the greater because of the order backlog yet remaining.

Procurement activity in all its phases reached a high point during the latter part of 1950 and the early months of 1951. As construction

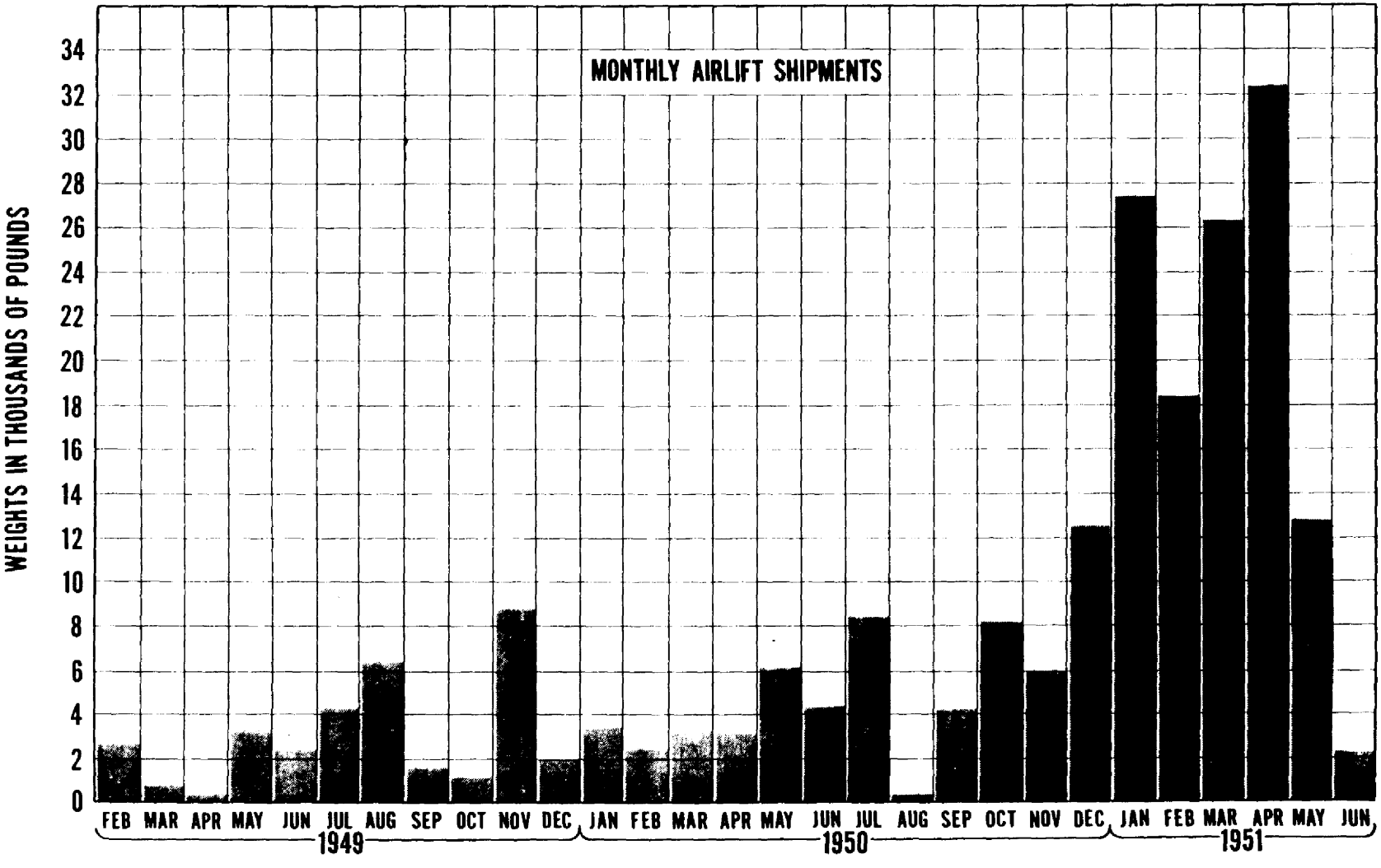


FIGURE 13.3-1 Monthly Airlift Shipments

programs, particularly those of the scientific structures and instrumentation, neared completion, activity was centered on securing all remaining items of materials and equipment required for the experiments.

The re-scheduling of construction work that had been necessitated by the delays incurred during the period when shipping space was unavailable resulted in certain equipment and material being in such vital need at this time that it became necessary to request increased airlift allotments. Figure 13.3-1, showing the extent of airlift shipments, graphically illustrates the situation.

At this time H & N air freight was routed through the Naval Supply Center for transshipment to the Travis Air Force Base which served as the port of embarkation for Jobsite shipments. Approval was later obtained to consign all shipments directly to Travis Air Force Base and to station an H & N expeditor at the Base. The Procurement Department had a major part in the preparation of procedures designed to provide controls and facilitate the flow of air freight. The procedures are presented in connection with "Logistics" section of this Completion Report.

By means of intensive expediting during the final months prior to the experiments, all essential materials and equipment were on hand at the Jobsite in time to fulfill requirements for the tests to be conducted as scheduled. It was during this period that the experience which had been gained and the procedures which had been perfected through the two years of procurement activity paid their dividends. From the time prior to the experiments to July 1, 1951, procurement operations declined sharply with resultant reductions in facilities and personnel. The scope of these later activities was confined largely to the provision of subsistence and maintenance supplies for Jobsite personnel and the procurement of materials for use in the roll-up operations.

Figure 13.3-2 presents an over-all picture of procurement personnel, requisitions, and commitments throughout the Project from February 1949 to July 1, 1951.

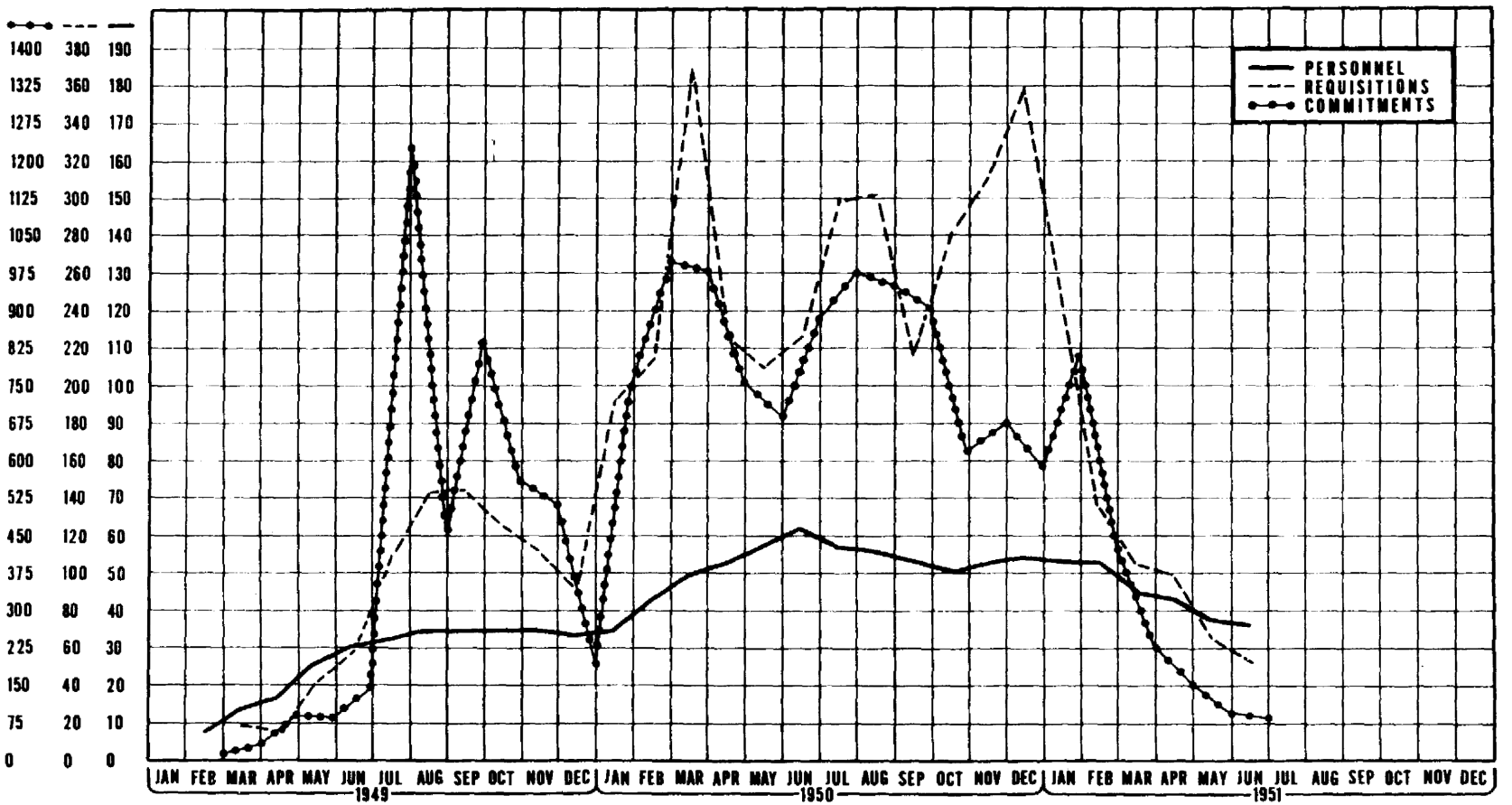


FIGURE 13.3-2 Procurement Personnel, Requisitions, and Commitments

CHAPTER 13.4

SUMMARY

The foregoing chronicle of procurement operations develops, it is believed, the value of establishing procedures that: (1) are in full accordance with all governing regulations, (2) are adapted to the available facilities, and (3) are of sufficient flexibility to operate under the abnormal conditions to be expected on a project of this nature. It follows that the personnel operating under these procedures should be thoroughly familiar with their provisions, and that the procedures should embody a means of checking for compliance therewith. In this connection note should be taken of the fact that, under date of March 22, 1950, an Inspection Report prepared by the Controller's Investigation Staff of AEC was issued, in which current procurement practices of H & N were reviewed. The Report covered the period of August 1, 1949 to January 31, 1950, from which period a total of 200 purchase orders, selected at random, were chosen for detailed investigation.

The findings of the Inspection Report were generalized under three headings as follows:

1. That although the company procedure provided for written justification of awards made on the basis of less than three bids, the files for approximately 20 per cent of the awards thus made did not contain such justifications; in addition, it was indicated that in some instances improper justifications had been utilized.

2. That although overseas shipments were made from Oakland, California, a majority of the purchases were made in Los Angeles for delivery to Los Angeles.

3. That no enidence was developed indicating favoritism, collusion or other irregularities in the making of purchases.

The result of this investigation revealed that, while it was not indicated that the Procurement Department was under-staffed, there were definite peaks of activity during which procurement personnel were pressed for time in order to keep abreast of the requisition load. During such periods there was a tendency to short-cut company procedures or to leave to a later time the accomplishment of certain of the detailed paper work involved. As a consequence awards had been made based on expediency rather than approved procedure, and in some instances where apparent deviations were justified the justification had not been reduced to the form of a written record. In the few remaining instances, the deviations from procedures were indicated as being the result of carelessness on the part of Procurement Department personnel.

Among the remedial steps taken was the establishment of a pre-audit unit to check completed purchase order files against procedures. A

broadening of the market area, with particular emphasis on standard procurement items including basic construction materials, was achieved, with the result that purchases in this category rose by 50 per cent for the Oakland-San Francisco region. In addition, some changes in personnel were effected.

A later investigation of procurement activities requested by H & N showed that the previous deficiencies had been eliminated, and the findings further stated that current purchasing operations were in compliance with the AEC approved procedure.

It has recently been indicated by State of California Officials charged with the responsibility of administering State Sales and Use Tax laws that a substantial claim may be asserted for taxes in connection with the procurement and shipment of approximately four million dollars worth of materials and equipment to the Jobsite. It will be noted that, by the terms of Contract AT-(29-1)-507, title to all materials and equipment and the like passed immediately to the United States Government. Furthermore, at the inception of the Contract the question of Sales Taxes had been raised by H & N representatives in discussions with AEC Fiscal and local representatives. The results of these discussions were inconclusive inasmuch as the Contractor was faced with a situation in which most vendors and suppliers were either unable to package materials for export or quoted prohibitive prices for this service. As a consequence it was necessary to contract for the services of an export packing organization. It would have been desirable if the packing services could have been rendered on the Oakland Supply Center premises. However space was not available at that location and as a consequence, export packing was done at the premises of the subcontractor. Opinions differ as to whether this procedure has legal significance in fixing tax liability and at present the matter is under review by all parties concerned.

In conclusion, attention should be called to the list of suppliers presented as Exhibit A at the end of this section of the report. This list reflects a cross-section of United States industry - a situation not normally encountered in a construction procurement program. In the procurement activities under this Contract, which involved the expenditure of more than $16,000,000 through the issuance of purchase orders and subcontracts, the entire gamut of materials was covered in order to permit construction of the base facilities, scientific stations, and military structures, and to sustain life and morale.

EXHIBIT A

List of Principal Suppliers and Subcontractors,
Contract No. AT-(29-1)-507

LIST OF PRINCIPAL SUPPLIERS AND SUBCONTRACTORS
CONTRACT NO. AT-(29-1)-507

GENERAL CONSTRUCTION PROGRAM:

Principal Suppliers

Abar Refrigeration Co.
Acme Steel Co.
Air Conditioning & Supply Co.
Air Reduction Pacific Co.
Air Transport Mfg. Co.
Allied Supply Co.
Allis-Chalmers Mfg. Co.
Almquist Bros. Co.
A. S. Aloe & Co.
American Laundry Machinery Co.
American Optical Co.
American Radiator & Standard Sanitary Corp.
American Wholesale Electric Co.
Ames Iron Works
Ansonia Electric Corp.
Ansul Chemical Co.
Armco Drainage & Metal Products Co.
Authorized Supply Co.
Automatic Controls Co.
Automatic Electric Sales Co.

Charles M. Bailey Co.
Baker & Hamilton Wholesale Hardware Co.
Baldwin Locomotive Works
Barker Bros. Inc.
Bausch & Lomb Optical Co.
Bearing Sales Co.
Bethlehem Steel Corp.
Blue Diamond Corp.
Braun Corp.
Brown-Bevis Equipment Co.
Charles Bruning Co., Inc.
Brunswig Drug Co., Inc.
Buehler Tank & Welding Works

Cal-Metal Corp.
California Dental Supply Co.
California Metal & Engineering Co.
California Nut & Bolt Co.
California Steel Products Co.
California Wholesale Electric Co.
California Wholesale Hardware Co.
Canvas Specialty Mfg. Co.

Charles W. Carter Co.
A. M. Castle Co.
Chanslor & Lyon Co.
Chicago Pneumatic Tool Co.
Cleaver-Brooks Co.
Clements & Co.
Coast Valve & Supply Co.
Cobbledick-Kibbe Glass Co.
Columbia Structural Steel Corp.
Colyear Motor Sales
C. P. Concrete Equipment Co.
Consolidated Western Steel Corp.
Continental Western Sales & Service
Control Corp.
Crane Co.
Crook Co.
Crown Surgical Supply Co.
Cyclone Fence, Division of American Steel & Wire Company of New Jersey

Dames & Moore, Inc.
Diamond T Truck Co.
Ducommun Metals & Supply Co.
W. E. Dunham Co.

Eccles-Germain Machinery Co.
Electric Corp. of California
Electric Tool & Supply Co.
Eng-Skell Co.
Evju Products Co.

George E. Failing Supply Co.
Fairbanks, Morse & Co.
Franklin Engineering Co.

Gardner-Denver Co.
Garlinghouse Brothers, Inc.
Gaudette Mfg. Co.
Garrett Supply Co.
General Cable Corp.
General Chemical Division, Allied Chemical & Dye Corp.
General Electric Co.
General Electric Supply Corp.
General Pacific Corp.
Ben C. Gerwick, Inc.
Gilmore Steel & Supply Co.
Gladding, McBean Company
The Globe Ice Machine Co.
Gough Industries, Inc.

Graybar Electric Corp.
Grinnell Company of the Pacific

Hammond Mfg. Corp.
Harnischfeger Corp.
Harper & Reynolds Co.
Harron, Rickard & McCone Co. of Southern California
Haydite Products Co.
Hazard Insulated Wire Works
Hercules Equipment & Rubber Company, Inc.
Hercules Powder Co.
Hobbs Battery Co.
Hoffman & Heartt Co.
R. M. Hollingshead Co.
Hollywood Wholesale Electric Co.
Honolulu Iron Works
Horton & Converse Co.
Frank L. Howard Engineering Co.
Howard Supply Co.
Hunt Process Co.
Hyster Company

Industrial Equipment Co.
Industrial Power Tool Co.
International Derrick & Equipment Co.
International Harvester Co.
Interstate Resturant Supply Co.

Johns-Manville Co.

Kay & Burbank Co.
Keenan Pipe & Supply Co.
Kellogg Switchboard & Supply Co.
Kewaunee Mfg. Co.
Kierulff & Company
W. S. Kilpatrick & Company
Kinnear Mfg. Co.
H. Kohnstamm & Co,, Inc.

Lacy Mfg. Co.
Ladco Electric Corp.
Lambert Co., Ltd.
E. Lietz, Inc.
E. C. Livingston Co., Inc.
Loop Lumber Co.

Ralph E. Mains Co.
MacCallum Steel Corp.
Mahl Steel Supply Co.

Master Fan Corp.
McKesson & Robbins Co., Inc.
Minnesota Mining & Mfg. Co.
Modern Metal Fabricators Co.
Monarch Lumber Co.

National Lead Co.
National Steel & Supply Co.
Neal Supply Co.
Nigg Engineering Corp.

Oregon Steel Mills, Inc.

Pacific Clay Products Co.
Pacific Iron & Steel Company
Pacific Portland Cement Co.
Pacific States Steel Corp.
Pacific Telephone & Telegraph Co.
Pacific Wire Rope Co.
Palmer Electric Mfg. Co.
Permanente Cement Co.
Pickens, Mather & Co.
Pope & Talbot, Inc.
Precision Sheet Metal Inc.

W. S. Rockwell Company

Santa Cruz Portland Cement Co.
Max Schlassberg Co.
Seacraft Co.
E. H. Sheldon & Co.
Shepherd Tractor & Equipment Co.
Shields, Harper Co.
Sinclair Paint Co.
Smith, Booth, Usher & Co.
Snap-on-Tools Corp.
Socony Paint Products Co.
Southwestern Engineering Co.
Square D Company
Stancal Asphalt & Bitumuls Co.
Standard Steel Works, Div. Baldwin Lima Hamilton Corp.
Stauffer Chemical Company
Steel Framing & Building Corp.
Super Concrete & Emulsions, Ltd.
Sutorbuilt Corp.

Timm Industries, Inc.
Triangle Steel & Supply Co.

Principal Suppliers (Continued)

Troy Laundry Machinery Div., American Machines & Metals, Inc.

Union Hardware & Metals Co.
Union Steel Co.
U. S. Plywood Corp.
U. S. Rubber Co.
U. S. Steel Supply Co.

Victor Equipment Co.
Vinnell Company, Inc.

Waldrip Sales Co.
Warren Southwest, Inc.
Washington American Iron Works
Wells All-Steel Products
Western Fire Protection, Inc.
Western Surgical Supply Co.
Westinghouse Electric Supply Corp.
Whitney Corp.
Wholesale Lumber Distributors, Inc.
E. K. Wood Lumber Company
Worthington Pump & Machinery Corp.

Yankee Motor Bodies Corp.

SCIENTIFIC STATIONS:

Principal Suppliers

Air Conditioning & Supply Co.
Alhambra Foundry Co., Ltd.
Allen Machinery & Tool Co.
American Blower Corp.
American Wholesale Electric Co.
Anchor Post Fence Div.
Angelus Welding & Manufacturing Co.
Associated Piping & Engineering Co.
Automatic Electric Sales Corp.
J. H. Baxter & Co.
Bethlehem Steel Export Corporation
Blue Diamond Corp.
Braun Corp.
Bruce Engineering Co.
California Metals & Engineering Co.
Cal-Metals Corp.
California Nut & Bolt Co.

California Wholesale Hardware Co.
A. M. Castle & Co.
Consolidated Western Steel Corp.
Construction Tool & Threading Co.
Controlair Mfg. Co.
Crane Co.
Cyclone Fence Div., American Steel & Wire Corp.
Ducommun Metals & Supply Co.
E. I. Du Pont de Nemours & Co., Inc.
Electric Corp. of Calif.
Electric Tool & Supply Co.
Fairbanks-Morse & Co., Inc.
Flintcoat Co., Pioneer Div.
Garlinghouse Bros. Equipment Co.
Gaudette Mfg. Co.
General Cable Corp.
General Electric Corp.
General Electric Supply Corp.
Ben G. Gerwick, Inc.
Girdwood Shipping Corp.
Glenmart Co., Inc.
Globe Ice Machinery Co.
Gough Industries, Inc.
Graybar Electric Co.
Grinnell Co. of the Pacific
Hammond Manufacturing Co.
Hazard Insulated Wire Works
C. J. Hendry Co.
Herco Pipe & Supply Co.
Hercules Equipment & Rubber Co.
Howard Supply Co.
Hunt Process Co.
Industrial Power Tool Co.
Jackson Iron Works
Jumbo Steel Products Co.
Keenan Pipe & Supply Co.
C. M. Kemp Mfg. Co.
Kewaunee Mfg. Co.
W. S. Kilpatrick & Co.
Kinnear Manufacturing Co.
Kyle Steel Construction Co.
Lacy Manufacturing Co.
Loop Lumber & Mill Co.
Mahl Steel & Supply Co.
Marine Engineering & Supply Corp.
Master Builders Co.
Master Fan Corp.
Maydwell & Hartzell Co.

Modern Metal Fabricators Co.
Monarch Lumber Co.
McCallum Steel Corp.
National Lead Co.
National Steel & Shipbuilding Corp.
Neal Supply Co.
Otto K. Oleson Co.
Pacific Corrugated Culvert Co.
Pacific Metals Co., Ltd.
Pacific Precision Products Co.
Palmer Electric Mfg. Co.
Permanente Cement Co.
Harold E. Peterson Co. Inc.
R. J. M. Co.
Raybestos-Manhattan, Inc.
Rehco Corp.
Reliance Steel Co.
Republic Supply Co.
W. S. Rockwell Co.
John A. Roeblings & Sons, Inc.
Santa Fe Engineering & Equipment Co.
Sarco Co., Inc.
Southwestern Engineering Corp.
Supergrate Open Steel Flooring Co.
Triangle Steel & Supply Co.
Union Hardware & Metals Co.
Union Steel Co.
U. S. Generator Co.
U. S. Plywood Corp.
U. S. Steel Supply Corp.
Vinnell Co., Inc.
VitaVar Corp.
Waldrip Mfg. & Sales Co.
Wells All-Steel Products Co.
Western Metal Spinning & Mfg. Co.
Westinghouse Electric Supply Corp.
E. K. Wood Lumber Co.
Worthington Pump & Machinery Corp.

SPECIAL MILITARY STRUCTURES:

Subcontractors

ARMY (730.1):

American Pipe & Construction Co.	Precast Concrete Pipe
Bethlehem Pacific Coast Steel Corp.	Re-inforcing Steel
Consolidated Western Steel Corp.	Structural Steel & Misc. Iron

Subcontractors (Continued)

ARMY (730.1):

H. H. Robertson Co.	V-Beam Siding
Seaman Products Co.	Fiberglass Sealing Strips
Western Asbestos Co.	Corrugated Asbestos Siding

NAVY (730.2):

Barrett & Hilp Co.	Precast Concrete Structures, Cells, Panel, etc.
Bethlehem Pacific Coast Steel Corp.	Steel Trusses
Nigg Engineering Co.	Steel Trusses & Misc. Iron
Soule Steel Co.	Reinforcing Steel & Misc. Iron, Trusses, etc.

AIR FORCE (730.3):

Bethlehem Pacific Coast Steel Corp.	Structural Steel & Misc. Iron
Jumbo Steel Products Co.	Structural Steel & Misc. Iron
Seaman Products Co.	Fiberglass Sealing Strips
Soule Steel Co.	Steel Sash
E. K. Wood Lumber Co.	Millwork

Principal Suppliers

Acrow, Inc.
Armco Drainage & Metal Products Co.
Baker & Hamilton Wholesale Hardware Co.
California Nut & Bolt Co.
Ceco Steel Products Co.
Chicago Pneumatic Tool Co.
Cobbledick & Kibbe Glass Co.
Continental Drilling Co.
Ducommun Metals & Supply Co.
Gilmore Steel Supply Co.
Gladding, McBean & Co.
Graybar Electric Co.
Hammond Manufacturing Co.
Haydite Concrete Products Co.
Hohmann & Barnard, Inc.
Hunt Process Manufacturing Co.
Industrial Power Tool Co.
Lincoln Electric Co.
Maas Steel Corp.
Mahl Steel & Supply Co.
Monarch Lumber Co.

Principal Suppliers (Continued)

Monarch Steel Products Co.
L. P. McNear Brick Co.
National Lead Co.
Oregon Steel Mills, Inc.
Pabco Products Co.
Pacific Coast Aggregates, Inc.
Pacific Portland Cement Co.
Pacific Precision Products Co.
Parffine Companies, Inc.
Permanente Cement Co.
Pioneer Rubber Mills
Plannett Mfg. Co.
Joseph T. Ryerson & Sons Steel Co., Inc.
Santa Cruz Portland Cement Co.
Sinclair Paint Co.
Standard Oil of California
U. S. Plywood Corp.
Waldrip Manufacturing & Sales Co.
West & Co.

INSTRUMENTATION:

Principal Suppliers

Allen Machine & Tool Supply Co.
Ansonia Electric Corp.
Braun Corp.
Bruce Engineering Co.
Cal-Metal Corp.
Crane Co.
Ducommun Metals & Supply Co.
Electric Tool & Supply Co.
Fischer & Porter Co.
Food Machinery Corp., Peerless Pump Div.
General Cable Corp.
Graybar Electric Co.
Hollywood Wholesale Electric Co.
Industrial Power Tool Co.
Jumbo Steel Products Co.
Milligan Wire Co.
Nigg Engineering Co.
Pacific Corrugated Pipe Co.
Pacific Precision Products Co.
W. S. Rockwell Co.
U. S. Rubber Corp.
Vulcan Pipe & Engineering Co.
Wells All-Steel Products Co.
Westinghouse Electric Supply Corp.

EXHIBIT B

Procurement Division Procedure

PROCUREMENT DIVISION PROCEDURE

PURCHASING DEPARTMENT

INTRODUCTION

The following outlined procedures and functions are herein proposed to apply to the Atomic Energy Commission Contract (No. AT-(29-1)-507) of Holmes & Narver, Incorporated and at any subcontractors, the procurement activities of which may be at the direction of Holmes & Narver, Incorporated. The following procedures described herein are based upon the present existing scope of work to be performed and may be revised at any time in order to further accomplish governmental requirements or to conform with additional changes in applicable procedures and policies.

OUTLINE

DEPARTMENTAL PROCEDURE AND SCOPE OF FUNCTION

PART I	PURCHASING
PART II	TRAFFIC
PART III	EXPEDITING
PART IV	MATERIAL CONTROL

PART I PURCHASING

MONETARY LEVEL OF PURCHASE CLASSIFICATION

A. PETTY CASH PURCHASES - MINOR EMERGENCY PURCHASES

B. PURCHASES FROM $10 TO $100 (Purchase Level Class B)

C. PURCHASES FROM $100 to $50,000 (Purchase Level Class C)

D. PURCHASES IN EXCESS OF $50,000 (Purchase Level Class D)

GENERAL SCOPE OF PROCUREMENT

A. MATERIAL REQUISITION -- PREPARATION AND DISTRIBUTION

B. BIDDING AND AWARD PROCEDURE

C. FORMAL PURCHASE ORDER

D. SERVICE CONTRACTS AND SUBCONTRACTS

A. MATERIAL REQUISITION -- PREPARATION AND DISTRIBUTION

1. Material requisition copy is originated by section or department head utilizing the requested materials or supplies.

2. Requisition copy is checked by the originator for accuracy and detailed description of item nomenclature, item quantity, proposed use cost coding reference, segregation of item classification, and the necessary required delivery date of the material requested.

3. Requisition copy is then screened against previous requisitions to avoid duplication of order and/or over supply.

4. Requisition copy is approved by field and/or engineering department supervisory personnel and distributed for purchase action.

5. Numerical sequence Requisition Register is maintained reflecting cross reference to Purchase Order, Requisition date, and material commodity classification.

6. Distribution of the Field Requisition is as follows:

Original	--	Purchasing Department (Purchase Order File)
Copy - 1 Blue	--	Procurement Director (Purchasing Department)
Copy - 2 White	--	Receiving Department
Copy - 3 White	--	Warehouse File
Copy - 4 White	--	Central File (Purchasing Department)
Copy - 5 White	--	Engineering Central File
Copy - 6 White	--	Originator of Requisition (Retained before transmittal)
Copy - 7 White	--	Retained by Originator for category file or commodity file

B. BIDDING AND AWARD PROCEDURE

1. SURVEY FOR PROCUREMENT ACTION

(a) Requisition is screened by Purchasing Department for deletion of items on mandatory or optional government TS contracts and price schedules.

(b) Requisitions for standard stock materials are screened against present existing stock levels and inventories to insure against excessive supply levels.

(c) Requisitions for materials and equipment which require special fabrication or special design are referenced to the Engineering and Design Section for further advisement. This technical information is applied to the requisition prior to bid action.

(d) Materials and equipment items of patented composition or exclusive manufacture are deleted from the requisition and are not included in the general category ear-marked for competition bidding. Examples of these items of exclusive manufacture: Caterpillar Tractor parts, Willy's Jeep parts, International Harvester repair parts, surveyors instruments, etc.

Note: It is often necessary to purchase material of one particular manufacturer's design in order that the requested material will match other existing allied machinery or equipment.

(e) A general cost estimate is approximated of each item to ascertain purchase cost group level classification prior to bid action.

2. SELECTION OF BID SOURCES

(a) A procurement library is maintained for the selection of prospective bidders and for reference use of technical nomenclature of materials. This library includes manufacturers' catalogs, distributors' sales pamphlets, manufacturers' brochures, and various groups of sales literature, and classified telephone directories of all major cities of the United States. These catalogs are shelved and segregated by material commodity classification reference.

(b) A complete reference file is maintained on Atomic Energy Commission and other governmental agency surplus materials stock lists and all requisitions are screened to these lists prior to being channeled to the commercial market.

(c) To reduce freight, storage, handling and shipping costs, a survey is made to find the market offering the closest location to the place of transhipment (Oakland, California)

3. BIDDING AND AWARD PROCEDURE -- PURCHASE LEVELS

(a) PETTY CASH PURCHASES, PURCHASE LEVEL CLASS A

(1) Scope and Limitations

a. Cost limitation of materials or services shall not exceed monetary value of ten dollars ($10) for each individual purchase from any one source of supply.

b. Petty Cash purchases shall be limited to such items required for emergency use. It is to be further confined to the purchase of items the value of which would not warrant the cost of writing a formal purchase order.

c. No competitive bidding shall be required.

(2) Authorization and Receipt

a. Petty cash expenditures will be made only with the approval of the Purchasing Agent.

b. All Petty Cash expenditures shall be supported by three signed copies of the seller's sales slip and/or invoice. One copy of the invoice to be filed in the Purchasing Department "Petty Cash Expenditures" file, chronologically by date of purchase, one copy

to be filed same manner in the Accounting Department, the original copy to be forwarded to AEC Audit Group attached to the formal purchase order and voucher.

(3) Payment and Billing

a. Payment of Petty Cash purchases shall be made by the Purchasing Department from an established Petty Cash Fund and/or company check at the option of the Chief Accountant.

b. Overall weekly accumulated Petty Cash expenditures shall be covered by a Petty Cash Voucher on a weekly basis. The voucher shall indicate the description of item and/or service, name of seller and total cost of each individual petty cash expenditure.

(b) PURCHASE LEVEL $10 TO $100 -- PURCHASE LEVEL CLASS B

(1) Scope and Limitations

a. No competitive bids required.

b. Inquiries for this level of purchase shall be secured either on telephone invitation (with telephone record sheet maintained) or by formal request for quotation.

c. Seller shall furnish two signed copies of his bid quotation which shall include the following: item nomenclature, complete description, quantity, size, unit cost of material, extended unit cost, and total cost of complete sales quotation. The seller shall also include f.o.b. point of delivery, sales terms, taxes, (wherever applicable), and proposed delivery date.

d. Notification of award shall be made to the selected supplier via advance telephone communication and/or mailing of formal purchase order.

(c) PURCHASE LEVEL $100 TO $50,000 -- PURCHASE LEVEL CLASS C

(1) Scope and Limitations

a. Competitive bids shall be required from three or more representative and reputable suppliers.

b. No competitive bids shall be required when purchase is made on governmental TS contract price schedule.

(2) Bid Quotation Request

a. A printed formal request shall be forwarded to three or more prospective major suppliers. This formal bid quotation request shall contain the following information as supplied to the prospective bidder: date of issuance, bid return dead-line date, number of signed bid copies required, material requisition reference number, item number, item quantity, complete item description and nomenclature, along with complete packaging, crating and marking requirement.

b. All quotation requests are checked and proof read to the corresponding requisition to assure complete accuracy prior to being forwarded to prospective bidders.

c. A list of the prospective bidders is attached to the "Request for Quotation" and both sheets are clipped together and filed in the "Active Quotation File" until such time as the returned signed copies of the vendors' bids are received.

(3) Tabulation of Bids

a. Upon the receipt of all bids, the bids are then tabulated on a prepared tabulation sheet in order to gain a basic comparison of bids on the points of overall cost, material quality, and bidders' delivery dates.

b. Vendors' sales slips and/or sales quotation copies shall be computed for accuracy of all prices and charges involved. This computation procedure shall apply to all purchase level classifications.

(4) Award Procedure

a. Bid award is normally made on the basis of "lowest cost price."

b. Awards shall be made on the basis of "best delivery date" whenever necessary to conform with construction use requirements.

c. "Split bid" awards will be made only in such cases where the difference in cost or the difference in delivery date of individual items, or total group of items, is of sufficient consequence to warrant the splitting of such items, and/or group of items.

d. A "no bid" as returned by the bidder will be considered a competitive bid when supported by a written letter and reason for "no bid".

e. Notification of award will be made by advance telephone or telegraph notification and will always be followed by the mailing of a formal purchase order.

f. The basis of award shall be indicated on the bid tabulation sheet. Reasons for award shall be one or more of the following:

1. Lowest Price
2. Best Delivery Schedule
3. Better Quality
4. Required Design
5. Only Available Source (Proprietary Item)
6. Negotiated Price
7. Subcontract Award
8. Emergency Procurement
9. Non-Competitive TS Contract Schedule
10. Negotiated Fabrication Contract

g. No prior approval of purchase action is required by the Atomic Energy Commission.

(d) PURCHASE LEVEL $50,000 AND OVER -- PURCHASE LEVEL CLASS D

(1) Scope and Limitations

a. Competitive bidding required same as Purchase Level Class C.

(2) Bid Quotation Request

a. Same as Purchase Level Class C.

(3) Tabulation of Bids

a. Same as Purchase Level Class C.

(4) Award Procedure

a. No award of this Purchase Level Class D ($50,000 or more) shall be made without prior written approval of purchase action by the Atomic Energy Commission.

b. An abstract tabulation sheet of the bids shall be forwarded to the Atomic Energy Commission for approval of Contractor's tentative bid award. The Contractor shall include his tentative selection of awardee on abstract form, the name of the tentative bid awardee being encircled in red pencil.

a--When tentative bid award is indicated for any reason other than "lowest bid price",

a supporting letter listing reason for selection shall accompany the abstract form.

c. The Atomic Energy Commission shall return the complet abstract folder file with signatory approval indicating concurrence of Contractor's selection of successful bidder. One copy of the bid abstract sheet shall be retained by the AEC for reference file.

d. Exceptions and recommended changes of awards (at the option of the Atomic Energy Commission) shall be noted by separate memorandum letter, a copy of which shall be attached to the abstract folder file upon return of same.

e. A separate transmittal file shall be maintained covering the mailing and return receipt of the abstract file folder reflecting purchase order file number and date of transmittal.

f. Notification of awards to awardee shall be handled in the same manner as purchases of the Purchase Level Class C.

C. FORMAL PURCHASE ORDER -- COMPILATION

1. Purchase orders shall be written from bidder's bid quotation.

2. Purchase orders shall be visually proof read to the vendor's bid sheet to assure accuracy prior to printing and mailing purchase order to the vendor.

3. SPECIAL CLAUSES AND PROVISIONS

(a) Special Escalator on Price Clauses

(1) While firm prices are favored, it may be necessary to accept the current and normal commercial sales practice of applying escalator price clause.

(b) Special Tax Clauses

(1) All purchase orders shall contain California Sales Tax Exemption Certificate Number.

(c) Returnable Reel Containers Wherever Applicable

(d) Other Special Clauses Necessitated by Sales Terms and/or Agreements

(e) Governmental TS Conctract Reference Numbers Shall Be Initialed and Shown Whenever Used.

4. INVOICING INSTRUCTIONS

(a) Vendor's invoicing instructions shall be typed upon the face of the formal purchase order.

5. PURCHASE ORDER REVISIONS AND CANCELLATIONS

(a) All purchase order revisions shall be written on the Purchase Order Change Form and revisions are to be numbered from the number one consecutively, and reflect the original purchase order number.

(1) This revision form shall cover all cancellations and revisions due to price changes, escalator clauses, quantity amounts, typographical errors, etc. The Purchase Change Order shall also indicate reason for the revision and/or cancellation and further reflect monetary increase or decrease as effected by the change.

(2) All cancellations initiated at the request of the contractor shall be accepted by the vendor in two (2) signed letter copies inscribed, "referenced cancellations are herein acknowledged and accepted at no cost to the buyer."

6. SPECIAL INSPECTION OF MATERIAL

(a) Special inspection requirements of material shall be aforestated on the bid quotation request and be further incorporated into the formal purchase order copy.

(1) Material inspection shall be accomplished by contractor's engineering personnel as requested by the Procurement Division.

(2) Commercial inspection service shall be authorized whenever necessary as directed by the Procurement Division.

7. PURCHASE ORDER FILING AND DISTRIBUTION

(a) Purchase Order File

(1) Purchase order numerical file folder shall contain the following data, filed in the following order, top to bottom: bid abstract form, purchase order copy, awardee bid quotation, material receiving reports, other bidders' quotations, other correspondence, telephone memos, telegrams, etc., and material requisition copy.

(2) An alphabetic file shall be maintained of purchase orders and be filed by alphabetic reference of the vendor's name. A separate file shall be maintained numerically of purchase order master ditto copies.

(3) An extra ditto copy purchase order file shall be maintained on numerical basis.

(b) Distribution of Purchase Order Copies

(1) Distribution shall be made by Purchasing Department as follows:

Original		Mailed to Vendor
Copy 1	Buff	Purchasing P. O. File
Copy 2	Pink	Accounting Department (Attn. Chief Administrative Officer)
Copy 3	Gold	U. S. Government, Atomic Energy Commission Los Angeles (Transmitted by Purchasing Department)
Copy 4	Blue	Accounting Department (For transmittal to U. S. Government).
Master Ditto		Purchasing Department, Master Ditto Numerical File

Ditto Copies:

(1) U. S. Government -- Manager, Santa Fe Operations Office
Los Alamos, New Mexico
Attention: Mr. R. E. Cole

(2) Receiving Department -- Los Angeles
(3) Jobsite -- Attention: Resident Manager
(1) Accounting Department
(1) Purchasing Department -- Vendors' Aphabetical File
(1) Oakland Receiving Department
(1) Engineering Department -- Los Angeles

8. COST CODING OF PURCHASE ORDERS

(a) Cost coding identification symbol numbers are assigned each individual purchase order in accordance with the cost code schedule of accounts formulated by the Fiscal Division.

(1) Overseas Project Symbols

a. All orders for materials, supplies and equipment purchased for transhipment to the project site are assigned a general suspense code symbol. Upon the receipt of these materials at the jobsite, direct cost code symbols are assigned in accordance with the use of the materials involved.

(2) Los Angeles Area

a. All purchase orders for materials, supplies and equipment procured for the Los Angeles. Area Office use are assigned individual cost code identification numbers in accordance with the established coding procedure formulated by the Fiscal Division.

NOTE: The above referenced Material Cost Coding Procedure and Charge of Accounts Index, submitted by the Fiscal Division of Holmes & Narver, Incorporated, has been approved by the Finance Division of the Santa Fe Operations Office of the U. S. Atomic Energy Commission, Los Alamos, New Mexico.

D. SERVICE CONTRACTS AND SUBCONTRACTS

1. SERVICE CONTRACTS

(a) Contracts for services rendered shall be handled on a purchase order basis. These services shall include janitorial service, blueprinting service, automotive service, equipment repair service, etc.

(1) Invoices shall be rendered on a monthly basis. All invoices are to contain a breakdown of charges with dates charges were incurred.

2. RENTAL AGREEMENTS

(a) All property or machinery rental agreements shall be entered into with prior approval of the Atomic Energy Commission.

(1) Rental agreements to be carried on separate forms other than purchase order forms.

3. SUBCONTRACTS

(a) All subcontracts and the proposals thereof shall be at the direction of the Director of Procurement.

(b) The subsequent awarding of such referenced subcontracts shall be made with prior approval of the Atomic Energy Commission.

P A R T 1 1 T R A F F I C

A. SCOPE AND JURISDICTION

1. All functions of traffic activity shall be under the direction of the Purchasing Agent.

B. TRAFFIC PROCEDURE

1. F.O.B. terms of delivery and routings shall be given at the time of purchase order award and all terms incorporated in the purchase order copy.

   (a) Changes in routings and/or f.o.b. terms shall be accomplished by Purchase Change Order revision.

   (b) All requests for quotations and purchase orders shall be written on a basis of "f.o.b. destination", with the vendor absorbing the freight charges and including same in his "delivered bid price."

C. FREIGHT CHARGES AND PAYMENTS

1. EXCEPTIONS AND PAYMENTS -- FREIGHT CHARGES

   (a) In such cases where individual freight charges are for the account of the contractor (buyer), the seller shall prepay the freight charges and invoice the buyer for same. Seller's invoices covering freight charges shall show all freight charges as a separate invoice item. Seller's invoices for freight charges must be supported by two copies of the shipper's original bill of lading and four copies of the carrier's "prepaid" waybill charges, including all taxes.

2. CONTRACTOR'S SHIPMENTS

   (a) Freight charges covering shipments originated by the contractor shall be paid immediately by company check upon receipt of the freight bills.

(1) Freight bills (four copies each) shall be submitted to the Accounting Department for checking against shipper's bill of lading copy for accuracy of items, weights, and rates. The required number of freight bill copies, along with the shipper's bill of lading copy, will accompany Accounting Department voucher transmittal.

D. BILLS OF LADING

1. DISTRIBUTION -- HOLMES & NARVER BILL OF LADING COPIES

(a) Two copies of contractor's (shipper's) bill of lading copy shall be forwarded to the Accounting Department for subsequent payment action.

(b) One copy of bill of lading shall be forwarded to company representative in Oakland, California.

(c) One copy shall accompany shipment (picked up by carrier).

(d) Three copies shall be retained by Shipping Department.

2. GOVERNMENT BILLS OF LADING -- DISTRIBUTION

(a) Government bills of lading copies are to be signed and returned to proper consignees by the Receiving Department.

(1) Separate transmittal letter to accompany each government bill of lading returned.

3. COMMERCIAL BILLS OF LADING -- DISTRIBUTION

(a) One copy of shipper's bill of lading is attached to copy of shipper's packing list and forwarded to Holmes & Narver, Incorporated Receiving Warehouse, Los Angeles. This procedure applies on all shipments (prepaid or collect) made direct to transhipment point by the supplier.

(b) In all instances where freight charges are for the account of the buyer, the shipper shall attach one copy of bill of lading to prepaid copies of freight bills and forward to Holmes & Narver, Incorporated, Accounting Department.

PART III MATERIAL CONTROL

A. ENGINEERING DEPARTMENT - FIELD GROUP

B. ENGINEERING DEPARTMENT - DESIGN GROUP

C. PURCHASING DEPARTMENT - TRAFFIC CONTROL

A. ENGINEERING DEPARTMENT - FIELD GROUP

1. It shall be the responsibility of Field Engineering Groups to ascertain material requirements in accordance with the scope and volume of work to be accomplished.

   (a) These requirements shall be forecast in sufficient time to allow for purchase and delivery to location of operations.

   (b) Standard stores stock, repair, maintenance, and subsistence items shall not be ordered in excess of amounts normally required for a ninety-day operational period.

   (c) Amounts of materials ordered shall not exceed the storage facilities required for same.

      (1) Prorated and retarded delivery schedules shall be indicated wherever necessary for field operations.

   (d) Material requisition files shall be maintained and referred to for formulating daily, weekly, monthly, and yearly use and consumption requirements on all items of continuous stock use.

   (e) Standard stock levels shall be maintained for emergency, whenever necessary to practical performance of work scope.

   (f) Formal cancellation of field material requisitions shall be accomplished immediately upon decision to effect same.

B. ENGINEERING DEPARTMENT - DESIGN GROUP

1. Advance ordering shall be initiated wherever possible on all priority items of special design or manufacture.

   (a) This shall apply to critical items in short supply through commercial supply channels and also to items of long term

delivery due to special design or fabrication.

(b) Items of special design should be ascertained in sufficient time to provide adequate delivery time to conform with construction schedules.

2. Field material requistion files shall be maintained and referenced.

3. Close contact shall be maintained with field units regarding the quality and performance of materials and equipment utilized in the scope of work.

4. Engineering Design Group shall ascertain minimum and maximum quantities of material and equipment to be used for field test and experimental purposes.

C. PURCHASING DEPARTMENT - MATERIAL CONTROL

1. The Purchasing Department shall initiate all necessary action to effect delivery of materials and supplies to conform with field use schedules and requirements.

(a) This shall include premium payments for advance delivery and/or priority manufacture.

(b) The securing of any necessary technical data from manufacturers without delay.

P A R T I V E X P E D I T I N G

A. EXPEDITING

1. All material expediting activity shall originate within the Purchasing Department and the scope of the expediting function shall remain under the direction of the Purchasing Agent.

   (a) Expediting Requirements

   (1) The necessity for expediting the delivery of materials contained on each purchase order shall be ascertained by the buyer of the order involved.

   (2) Receiving reports shall indicate whether receipt of the order was "complete" or "incomplete". The receiving reports shall be filed in the corresponding numerical purchase order file. Upon the receipt of a receiving report marked "complete", the file clerk shall prepare a green colored file tab with the purchase order number typed on the face and attach same to the purchase order file. This action shall indicate that all the materials contained on the subject purchase order have been delivered and that the order is completed. Incomplete purchase orders shall be designated by the original, numerically numbered white tab.

   (3) Each buyer shall carry a numerical purchase order listing of the orders purchased by his direction. As these orders are completed, they are to be scratched or checked from this list.

      a. It shall be the responsibility of the buyer to ascertain that the individual suppliers maintain delivery schedules as required or as promised.

      b. When "best delivery" was the basis of purchase award selection, close follow-up action shall be initiated to support basis for premium payment award.

         a--Vendor's notification of shipment by telegram and/or advance copy of bill of lading may be requested wherever necessary.

   (4) Expediting Action to Suppliers

      a. Telegram, telephone, or letter copy contact may be used

as a method to gain shipping information or delivery status as required by the urgency of the individual purchase order.

(5) Prorated Delivery or Shipment

a. Schedules may be formulated as required by the retardment or accelleration of the work program.

a--Notification shall be made to suppliers to withhold shipments until further notified (to conform with vessel sailings).

(6) Continuous delinquency by the supplier on delivery schedules shall be referred to the Purchasing Agent for action.

a. Supplier will be requested to show cause.

b. Suspension of the vendor from the "competitive list of suppliers" shall be made at the direction of the Procurement Director.

c. Non-performance of delivery promise by vendor will be just cause for order cancellation.

a--Cancellation of orders shall be made by the Purchasing Agent.

(7) Changes in Routings

a. Changes in routings shall be effected whenever necessary to conform with air or water departure schedules.

a--Routing changes to higher classified routings, (i.e. air express, railway express), shall be for the account of the buyer, unless previously acknowledged by the seller in written letter copy.

b--Payment of charges for higher classified tariff routings shall be made in accordance with established federal tariffs and commodity rate classifications.

c--Changes in routings shall be accomplished by formal purchase order revision.

EXHIBIT C

Material Stock Record Procedure

MATERIAL STOCK RECORD DEPARTMENT

STANDARD OPERATING PROCEDURE

I OBJECTIVE:

A. Install and maintain complete record accountability of all material for construction, Jobsite services, and overall maintenance arriving on the project, regardless of place of unloading on the Atoll or specific job allocations, (Eniwetok Army consignments excepted.)

B. Maintain current records on all trades and categories of materials and facility supply replacements to aid procurement in maintaining minimum and maximum inventory levels.

a. Material Stock Records Department Chief Auditor shall design and have produced for use a take-off form or schedule, (see Exhibit "J") to be used in abstracting material stock information from Kardex Cards pertinent to re-order points and stock levels. Included in this "Take-off" form shall be:

(1) Nomenclature and description, if any.

(2) Unit, i.e. each, pair, set, weight, measure, etc.

(3) Order Point, i.e. inventory balance on hand at which point notification form will be prepared. Note: This may or may not be used. It is meant to emphasize the average of 90 days required to bring material to Jobsite after requisition is initiated.

(4) Minimum Level, i.e. the lowest stock level on hand determined to be operationally safe by the responsible maintenance superintendents and foremen. (The difference between "order-point" and "minimum level" indicates the time element required to prepare requisitions after accumulating Notification Forms.) (Exhibit "K")

(5) Use experience, i.e. material usage, or Issues, is recorded on Kardex for periods of:

(a) 60 days - 2 months

(b) 90 days - 3 months

(c) 180 days - 6 months

(6) Unit Price, i.e. list price per each, pair, set, weight, measure, etc. as shown on Kardex.

(7) Dollar Quota i.e. estimated amount alloted for replenishment over a six months period to be set up by superintendents and foremen based on unit prices obtained from Kardex.

(8) Material Requisition, i.e. a space provided for quantities ordered, to be filled in by superintendents and foremen at such times of re-order.

b. The Material Stock Records Department Chief Auditor shall design and have produced for use, a notification form, (See Exhibit "K") which shall be the information medium to advise the Service Operations Departments that stock re-order levels have been reached. Included in this "notification form" shall be:

(1) Division, Department, or Facility responsible for initiating the Material Requisition.

(2) Item to be re-ordered, i.e. "Sealing-Fitting, Female, EYS8, 3", "Union-Male, UNY305, 1", "Screw Pin Shackles, Galv., 3/4", "Wire Rope Thimbles, Galv., 1/2".

(3) Order point, i.e. the re-order point established by the superintendents and foremen concerned. Note: This may or may not be used.

(4) Minimum Level, i.e. the lowest stock level on hand determined to be operationally safe by the responsible superintendents and foremen concerned.

(5) Actual balance on hand, i.e. the quantity inventory balance showing on Kardex after the current Issue Slip has been deducted.

c. Procedure. The foregoing descriptions contained in 3a and b hereof has been elaborated upon for the purpose of clarity in introducing material control forms new to the Project. The following will deal with the handling of said forms by Material Stock Record personnel and those other departments, facilities, and agencies concerned.

(1) Take-off forms (Exhibit "J") are furnished by Material Stock Record Department to the superintendents, foremen, and authorized personnel designated by Project Management to work with Kardex personnel of this department in taking-off information from the Material Stock Records.

(2) Authorized personnel who shall present themselves to Mateial Stock Records Department, for the purpose dealt with herein, shall be given "take-off" forms (Exhibit "J") and instructed in the use thereof including:

(a) Kardex operator under whom he shall abstract information to the take-off form.

(b) Commence from the first card of the first drawer and abstract from cards in natural sequence as set up. Any cards omitted shall be items not included in Operational or Maintenance planning, and shall likewise follow in sequence. At no time shall abstracts be commenced at hap-hazard starting points, the reason being that reference back from time to time must insure the ready and easy identification of the abstract to the Kardex.

(c) Nomenclatures and descriptions, if any, shall be carefully noted on the take-off form so that catalogue numbers, stock numbers, serial numbers, etc. shall be readily available in later planning.

(d) Unit, meaning each, pair, set, weight, measure, etc.

(e) Order Point, (This column shall be blank at this time).

(f) Minimum Level, (This column shall be blank at this time).

(g) Use Experience shall be carefully analyzed to show, if possible, the usage or withdrawal from stock for a two month period, a three month period, and six month period. This information will be effectively screened on both department and division level as determined by Management, due consideration being given to that portion of usage which went into construction rather than facility and general maintenance. This analysis will be largely responsible for determining the re-order points and minimum level.

(h) Unit Price will be picked up as shown on Kardex, and if there are several prices over a period of time either the last price, or an average price, may be used for the purpose of this take-off.

(i) Dollar Quota, (This column shall be blank at this time).

(j) Material Requisitions, (This column shall be blank at this time).

(3) Upon completion of the abstracting of information from Kardex to take-off forms the authorized individual for each department concerned will return to his department with take-off schedule. It will then be the responsibility of the department as directed by policy established by Management, to complete the take-off schedule as concerns:

(a) Order Point

(b) Minimum Level

(c) Dollar Quota

(d) Material Requisition (quantity to be ordered).

(4) When the take-off schedule is completed as to (a) and (b) above (Order Point and Minimum Lever), (c) and (d) being for the convenience of the using department or agency, said take-off schedule is returned to the Material Stock Record Department, for the following treatment:

(a) Transfer the "Order Point" figure to Kardex card on Item line, above Unit. (See Exhibit "L")

(b) Transfer the "Minimum Level" figure to Kardex card on Item line, above Unit. (See Exhibit "L")

(c) Return the take-off schedule to the department or using agency concerned without alterations, deletions, or additions.

(5) Notification form, Exhibit "K", is the information medium by which the department or using agency is advised that any material, supply item or commodity has been reduced to the established Order Point, and shall be used by the Kardex operators in the following manner:

(a) Date of posting the Material Issue Slip which reduces the item to "order point" shall be used on the Notification form.

(b) Department or using agency shall be filled in.

(c) Item to be ordered shall be noted showing complete nomenclature and description.

(d) Order Point figure shall be shown if one has been set up.

(e) Minimum Level figure shall be shown.

(f) Actual balance on hand shall be shown.

(g) At close of business each day all pertinent Notification forms shall be assembled by the Kardex Group Leadors and hand carried to the Department Kardex Supervisor who shall in turn segregate them promptly for distribution to the departments and using agencies concerned.

d. It is recognized that specific expendable items and supplies, of which there are many, are charged to direct overhead upon arrival at Jobsite, and, therefore, no Kardex accountability exists. These items. in some instances, are so-called free issue, in others they are under close custody of storekeepers and shop foremen as in the case of tool expendables and paint brushes and supplies. Inventories of this nature are very essential to operation and maintenance, but since absence of Kardex accountability procludes reordering of these materials on the above described basis, a substitute plan is offered herewith:

(1) Lists of expendables as defined above will be maintained at Material Stock Record Department, based on the recommendation of the Warehouse Department. These lists shall be segregated to include:

(a) Tool Crib

(b) Paint Shop

(c) Machine Shop

(d) Automotive Repair Shop

(e) Marine Repair Shop

(f) Lubrication Rack

(g) Electric Shop

(h) Radio and Office Machine Repair Shop

(i) Sheet Metal Shop

(j) Carpenter Shop

(k) Rigging Loft

(l) Camp Building and Office Supplies

(m) Tire Shop

(n) Welding Shop

(o) Battery Shop

(p) Plumbing Shop

(2) The above lists of expendables shall be made available to the using departments and agencies in the same manner as the Kardex records, but no order points or stock levels will be maintained. It is suggested that these expendables be maintained at adequate levels by storekeepers and shop foremen who shall be charged with responsibility for notifying Service Operations Manager concerning re-ordering.

C. Establish rigid controls on cost distribution to effect accurate job cost accounting summations.

D. Spot check inventories against record keeping to insure relative accuracy of physical inventories to controls on a basis jointly satisfactory to Home Office Management and Client.

E. Have available at all times control figures of materials in stock which may be balanced or reconciled to the General Ledger in Fiscal at the conclusion of any designated period, with the exception of materials that are released directly by the Warehouse Department to using Agencies, - for example:

1. Mess Hall supplies carried on separate stock records and receipted for on arrival.

2. Commissary supplies carried on separate records and receipted for on arrival.

3. Materials and property turned over to the Corps of Engineers at Eniwetok.

4. Infirmary supplies carried on separate records and receipted for on arrival.

5. Beer Hall, Post Exchange, Bar and all other resale items carried on separate records and receipted for on arrival.

6. Items of equipment carried on separate records and receipted for on arrival, to include:

   (a) Automotive Equipment such as: jeeps, petroleum carriers, passenger cars, trucks including truck tractors, trailers, and busses.

   (b) Marine Equipment such as: ducks, M-boats, T-boats, water taxi craft, etc.

   (c) Heavy construction equipment such as: bulldozers, tractors, cranes, cement mixers (mobile and stationary), jack hammers, air compressors, etc.

   (d) Machinery and Equipment such as: lathes, millers, drill presses, tools, etc. (costing over $ 50.00 each).

   (e) Engineering Equipment such as: surveying instruments, drafting equipment, etc. (costing over $ 50.00 each).

II GENERAL COMMENT:

A. DOCUMENTS REQUIRED: This S. O. P. outlined herein is predicated upon the flow of material receiving and issuing documents into Material Stock Record Department from:

   1. Holmes & Narver Procurement Division, i.e. Purchase Orders received in advance of material deliveries.

   2. Warehouse Department at Jobsite releasing promptly to Material Stock Record Department the Packing Lists and Material Issue Slips at the time materials are checked in and issued out. (Receiving Reports are typed by Warehouse Department and passed to Material Stock Record Department as indicated in Paragraph IV, Section G, hereof.)

B. PERSONNEL:

   1. Only personnel experienced in inventory record keeping will be utilized in the operation of the department.

2. Individual performance will be closely supervised by the Chief Auditor of the department and the Senior Accountant in charge of operations.

3. Any changes or modifications to this S. O. P. will be determined by the department head after careful review of the matter in question with the Senior Accountant.

4. Policy revisions will be initiated only upon approval and direction of top side echelons.

C. PRICING OF MATERIALS:

1. When pricing from Purchase Orders it is necessary to give full consideration to any "Revisions" to the original Purchase Order. These "Revisions" can affect the quantity, unit cost, extension of item (s), or the including of a trade discount. Should any of these factors be ignored the result will be an inaccurate cost.

2. Prices in many instances are quoted per dozen, per hundred, or per thousand while the quantities are shown in other units.

   In order to obtain a unit price when Purchase Order reads per (c), meaning one-hundred, and (m) which means one-thousand, it is only necessary to move to the left the decimal two places and three places respectively:

   Example: $10.05 per (c) equals .1005 each
   $10.05 per (m) equals .01005 each

3. Discounts are of two kinds; cash and trade.

   (a) A cash discount is one which is earned either by prompt payment of an invoice or by meeting the terms as set forth by a vendor which may read 2% or 5% if payment is made within ten days or thirty days. Taking advantage of a discount of this type is money earned and therefore not deducted from list price.

   This method of absorbing cash discounts is recognized by the project and accordingly all cash discounts will be ignored in pricing computations. Do not confuse cash discounts with trade discounts, the latter being a reduction in the cost of material and therefore figured in computations.

   (b) A trade discount is generally one of more than 5% and might be given for one of the following reasons; to meet competitors price or if sufficient quantities are purchased over a period of time. A discount of this type is always deducted from the list price.

Example:	List Price	$10.00
	Trade Discount	8%
	Actual Cost	$ 9.20

4. Standard export and packing charges are not to be considered in cost of materials and should be watched for and excluded. Those charges are debited to a separate account by the Fiscal Department.

5. RETURNABLE ITEMS: REELS, SPOOLS, CARBOYS, OXYGEN AND ACETYLENE TANKS.

   (a) Returnable items which have a direct bearing on material costs have had specific handling on this project. Curently carboys and oxygen and acetylene tanks are carried in a returnable account and therefore will not be included in the price of the acid and the gas.

   (b) Spools and reels, with very few exceptions, must be treated as part of the cost of the wire and cable. Careful analysis of Purchase Orders is required to disclose exceptions.

D. INFORMATION TO SECURE GREATER ACCURACY:

1. Whenever materials or supplies are issued for use and can be identified by a "Purchase Order" number or "Drawing" number, such information is to be shown on the "Issue Slip". This will be of asistance in identifying such material and also in charging it to the proper job.

2. Nomenclature of an item should be made as clear and accurate as possible. Where a stock number, part number or trade name, is available such information is to be shown on "Issue Slip".

3. Purchase Orders must be carefully perused for description of material indicating Instrumentation and Special Structures designated by locations, drawing numbers, and usage descriptions. These materials will be set up on Kardex Cards indicating their special usage and these cards will be placed in separate Kardex drawers so that they may be referred to readily by interested parties to determine when and where material issues clear inventories.

E. P. O. L.:

1. These facilities include the receiving, storing and distribution of oils, greases, gasolines, diesel fuel and other similar items.

2. Most of these items are normally supplied by Naval Supply Center, Pearl Harbor, and thisshould be so designated on the Kardex Cards. Up to the present time no prices on these Navy items have been received or been available. Army Issue Slips covering these items should be posted in the same manner as those that are priced, ex-

cept that a notation should be made to the effect that such items are Navy supplied at no price. The term "Free Issue" is both misleading and incorrect, therefore this term is not to be used. All Navy stock will be carried on separate Kardex cards. Other P.O.L. purchased from vendors will be posted to Kardex indicating the supplier and quantity and cost. This latter group will be maintained in separate drawers of P.O.L. Kardex cabinet.

F. SPARE AND MARINE PARTS:

1. A fairly large amount of these items are supplied by Naval Supply Center, Hawaiian Ordinance Depot, Hawaiian Air Depot, and other Government Agencies.

2. These items are to be established on Kardex cards noting the name of the supplier and showing it at no price.

3. Issue Slips are also to show the name and no price and will be posted in the same manner as any that are priced.

G. FIELD AUDIT SECTION: Field Audit Section shall be responsible for:

1. Witnessing physical inventories of materials made by Warehouse Department.

2. Spot checking material in warehouses and outside storage areas to verify records.

3. Initiate field audits to determine correctness of material charging.

III PROCEDURE:

A. PURCHASE ORDERS (PREPARED BY MANAGEMENT DIVISION IN LOS ANGELES)

1. Received from Los Angeles through Jobsite Fiscal Office. (two copies)

2. File one copy for permanent reference in Material Stock Record Department, central file.

3. Route one copy to Kardex Section responsible for recording the materials listed, i.e., Electric, Plumbing, Construction, etc.

4. Use Kardex Section copy to:

(a) Prepare new Kardex cards (materials new to the Project).

(b) Post "due in" materials to Kardex showing "Date" blank, "Purchase Order" number, "Voucher" blank, "Supplier" and "Quantity" in space provided for "Supplier", "Quantity" blank, "Cost" blank, and "Unit Cost" as given in Pur-

chase Order minus Trade Discount plus Excise Tax, if any. Each Purchase Order unit should be placed immediately after price on upper portion of Kardex card to catch instances where different vendors use different units for same items. (See Kardex card, - Exhibit B)

(c) Check nomenclature.

(d) File in Kardex Section for reference.

B. PACKING LISTS:

1. Received from Warehouse Department with special number given which will correspond to Receiving Report number. (Receiving Report to be prepared at a later date by Warehouse Department).

2. Enter in Receiving Register indicating Receiving Report number, date registered in, and classification of material, i.e., Electric, Commissary, Tools, etc.

3. Route to Kardex Section concerned with material listed, i.e., Electric, Plumbing, Construction, etc.

4. Post to Kardex card indicating:

   (a) Date stamped on document (this is usually the date vessel arrived).

   (b) Receiving Report number (written in red pencil on the face of the document).

   (c) Quantity received.

   (d) Extension of Cost (Quantity times unit cost). (See Exhibit C.)

5. Price Packing List from Kardex showing:

   (a) Unit Cost.

   (b) Unit.

   (c) Extension.

6. Total posted Packing List.

7. Kardex Section Chief (i.e., Parts group leader, Construction group leader, etc.) will prepare a detailed schedule in duplicate of each days Packing Lists posted to the Kardex, Listing:

   (a) Packing List number, i.e. the Receiving Report number given by the Warehouse Department.

   (b) Total amount of each Packing List.

(c) Total each detailed schedule and attach adding machine tape thereto.

8. Distribute detailed schedule above as follows.

(a) Retain original in Section Files for control purposes.

(b) Pass duplicate with Packing Lists and adding machine tape attached to Department Supervisor of Kardex.

9. Department Supervisor will enter Packing List money totals on Receiving Register.

10. Department Supervisor will "out date" Receiving Register and return Packing Lists to Warehouse Department (Where Receiving Reports will be made using Receiving Report number indicated on Packing List in red pencil).

11. Department Supervisor will prepare, from duplicate schedules of Packing Lists posted to Kardex, a numbered transmittal in duplicate showing money total only, and giving same number to schedule. (See exhibit "D")

12. Forward original transmittal to Accounting Section, Fiscal Department.

13. File duplicate detailed schedule by number for control purposes.

14. File duplicate transmittal by material grouping, i.e. Plumbing, Electrical, etc. for control purposes.

C. RECEIVING REPORTS. (SEE EXHIBIT "E"):

1. Received from Warehouse Department.

(a) Pink copy for Material Stock Record Department.

(b) Blue copy for Accounting Section, Fiscal Department.

2. Check through Receiving Register noting and indicating:

(a) Registered in.

(b) Comparison of amount shown on register with that of amount shown on Receiving Report to determine accuracy of typing. (This is a quick and thorough method of proof-reading the receiving document to the priced Packing List.)

3. File Material Stock Record Department copy (Pink) in central files of department for reference.

4. Transmit blue copies by buck sheet to Accounting and Facility Accounting Sections of Fiscal Department.

D. MATERIAL ISSUE SLIPS (PREPARED BY WAREHOUSE STOREKEEPERS), (SEE EXHIBIT "F"):

1. Received from Warehouse Superintendents Office.

2. Audited by Department Supervisor of Kardex for:

   (a) Correct Cost Coding information.

   (b) Complete identification by description if job numbers and codes are missing.

3. Department Supervisor will return incorrect or incomplete Issue Slips to Warehouse Superintendents Office for correction and/or completion.

4. Department Supervisor will distribute approved issues to Kardex Section groups, i.e., Electric, Construction, Plumbing, etc.

5. Post to Kardex card (see exhibit "G") indicating:

   (a) Quantity withdrawn.

   (b) Quantity remaining.

   (c) Money balance.

6. Price Issue Slips from Kardex cards, using first in, first out method, and showing:

   (a) Unit cost.

   (b) Extension.

7. Total posted Issue Slip if more than one item appears thereon.

8. Kardex Section Chief (i.e., Parts group leader, Construction group leader, etc.) will prepare a detailed schedule in duplicate of each days Issue Slips posted to Kardex, listing:

   (a) Issue number.

   (b) Total amount of each Issue Slip.

   (c) Total each detailed schedule and attach adding machine tape thereto.

9. Distribute detailed schedule above as follows:

   (a) Retain original in central files for control purposes.

   (b) Pass duplicate with Issue Slips and Adding Machine tape attached to Department Supervisor of Kardex.

10. Department Supervisor will prepare, from duplicate schedules of Issue Slips posted to Kardex, a numbered transmittal in duplicate showing money total only and giving same number to schedule. (See Exhibit "H")

11. Forward original transmittal with Issue Slips and adding machine tape attached to Accounting Section, Fiscal Department.

12. File duplicate detailed schedule, by number, for control purposes.

13. File duplicate transmittal by material grouping, i.e. Plumbing, Electrical, etc. for control purposes.

E. CONTROL LEDGER:

1. Shall be maintained showing detailed schedule totals of Receipts and Issues posted for each Kardex group.

2. These controls shall be grouped to conform to the General Ledger accounts maintained in Fiscal Department.

3. Periodic reconciliations will be made to the General Ledger.

"B"

HOLMES & NARVER

RECEIPTS

DATE	P/O#	VOUCHER	SUPPLIER	Due In	QUANTITY	COST	UNIT COST
	5471		Gough Industries, Inc.	12			3.85

	ISSUED					RECEIVED		BALANCE	
DATE	REQ. NO	A/C	QUANTITY	UNIT COST	AMOUNT	QUANTITY	AMOUNT	QUANTITY	AMOUNT

ITEM	ACCOUNT	UNIT	SIZE	PART NO.
COILS, Magnetic, Trumbull		Each	220V	#20973-A-5

"C"

HOLMES & NARVER

RECEIPTS

DATE	P/O #	VOUCHER	SUPPLIER	Due In	QUANTITY	COST	UNIT COST
5/31	5471	RR 5948	Gough Indistries Inc.	12	12	46.20	3.85

			ISSUED				RECEIVED			BALANCE		
DATE	REQ. NO.	A/C	QUANTITY	UNIT COST	AMT.		QUANTITY	AMOUNT		QUANTITY	AMOUNT	
5/31	5948			3.85			12	46	20	12	46	20

ITEM	ACCOUNT	UNIT	SIZE PART NO.
COILS, Magnetic, Trumbull		Each	220V #20973-A-5

(EXHIBIT "D")

TRANSMITTAL # 1
ELECTRICAL

TO: Fiscal Department
Attn: Property Accounting Section

DATE: _____

FROM: Material Stock Record Department

SUBJ: TRANSMITTAL OF RECEIVING REPORTS

Transmitted herewith are Receiving Reports in the amount of $ 46.20 for material delivered to the Electrical Warehouse.

G. L. LONGTHORNE
Material Stock Record
Department

"E"

HOLMES & NARVER, INC. - Engineers
(Contract No. AT-(29-1)-507) RR 5948
824 SOUTH FIGUEROA STREET LOS ANGELES 14, CALIF.

PROJECT RECEIVING REPORT

RECEIVED FROM GOUGH INDUSTRIES, INC. P.O.No. 5471
SHIPPING POINT LOS ANGELES, CALIF DATE

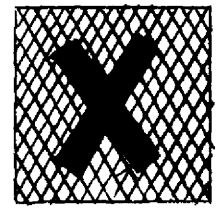
CAR INITIAL & NO.	FREIGHT BILL NO.	FREIGHT CHARGES	VIA

1	12 Ea.	COILS, Magnetic, Trumbull, 220V, #20973-A-5	$ 46.20	$3.85
		DELIVERED TO THE ELECTRICAL WAREHOUSE		

Received by W. D. BROWN

Approved
For U. S. Government

ORIGINAL



"F"

Contract No. AT-(29-1)-507 Job No. 640

HOLMES & NARVER

STORES ISSUE SLIP

Hq., Task Force Bldg.

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
12 Ea.	Coils, Magnetic, Trumbull, 220V, #20973-A-5	3.85	$ 46.20

Debit Acc't. No. _____

Job Order No. _____

_____

Signature (Person Receiving Material)

"G"

HOLMES & NARVER

RECEIPTS

DATE	P/O#	VOUCHER	SUPPLIER	Due In	QUANTITY	COST	UNIT COST
5/31	5471	RR5948	Gough Industries, Inc.	12	12	46.20	3.85

			ISSUED			RECEIVED		BALANCE	
DATE	REQ. NO	A/C	QUANTITY	UNIT COST	AMT.	QUANTITY	AMOUNT	QUANTITY	AMOUNT
5/31	5948			3.85		12	46 20	12	46 20
~~7/1~~	~~1~~		~~12~~		~~46 20~~				

ITEM	ACCOUNT	UNIT	SIZE	PART NO.
COILS, Magnetic, Trumbull		Each	220V	#20973-A-5

(EXHIBIT "H")

TRANSMITTAL # 1
ELECTRICAL

TO: Fiscal Department
Attn: Property Accounting Section

DATE: _____

FROM: Material Stock Record Department

SUBJ: TRANSMITTAL OF STORES ISSUE SLIPS

Transmitted herewith are Stores Issue Slips in the amount of $ 46.20 for material issued from the Electrical Warehouse.

G. L. LONGTHORNE
Material Stock Record
Department

"J"

NOMENCLATURE	UNIT	Order Point	Minimum Level	USE EXPERIENCE			Unit Price	Dollar Quota	Mat. Reg.	Mat. Reg.	Mat. Reg.	
				60 Days	90 Days	6 Months						1
												2
												3
												4
												5
												6
												7
												8
												9
												10
												11
												12
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												26
												27
												28
												29
												30

"K"

DATE:_____

TO:_____Department.

You are herewith informed that_____

_____

have reached the re-order point established at

_____, minimum level at _____.

Actual balance on hand is_____.

MATERIAL STOCK RECORD SECTION

DATE:_____

TO:_____Department.

You are herewith informed that_____

_____

have reached the re-order point established at

_____, minimum level at _____.

Actual balance on hand is_____.

MATERIAL STOCK RECORD SECTION

DATE:_____

TO:_____Department.

You are herewith informed that_____

_____

have reached the re-order point established at

_____, minimum level at _____.

Actual balance on hand is_____.

MATERIAL STOCK RECORD SECTION

DATE:_____

TO:_____Department.

You are herewith informed that_____

_____

have reached the re-order point established at

_____, minimum level at _____.

Actual balance on hand is_____.

MATERIAL STOCK RECORD SECTION

"L"

RECEIPTS				HOLMES & NARVER		
Date	P/O#	Voucher	Supplier	Quantity	Cost	Unit Cost

ISSUED						RECEIVED		BALANCE	
Date	Req. No.	A/C	Quantity	Unit Cost	Amount	Quantity	Amount	Quantity	Amount

ITEM	Amount	Unit	Size	Part No.

Section 14

LOGISTICS

CHAPTER 14.1

GENERAL

The isolation of the Project, though important for scientific purposes, led to the major handicap in supply. Logistics were greatly complicated by the fact that the Project site was not located on any established commercial maritime route nor on any commercial air route. The avenues of supply were limited to either military surface and air transportation facilities or to the use of privately chartered merchant shipping and chartered air carriers. It was, however, the policy of the AEC that the Contractor make maximum use of transportation facilities of the military establishment; and although the Contract permitted the supplemental use of commercial facilities, maximum emphasis was placed on the use of military transport. The distance of the site from adequate sources of supply of personnel or material was such, however, that their delivery by military surface shipping required a period of fifteen to twenty days from the time of departure from Oakland to the time of arrival at Eniwetok. Also, under postwar conditions of maximum military economy and under the later duress of Korean war conditions, there was frequent conflict among all agencies for available space on established military transportation facilities. The logistic problem was further complicated by the absence of any established commercial communication facility, but perhaps the most serious complication of all resulted from the radical and sometimes unanticipated changes in the scope of the Project. These changes, which were usually of the greatest degree of urgency from the point of time and which at times altered the entire logistic schedule as applied to both personnel and material, provided uncertanties of long range forecasting and scheduling.

Since it was realized that logistics would constitute an important factor in the success of the entire Project, and since many of the problems connected therewith would require a thorough knowledge of military shipping procedures and a close liaison with various military headquarters in the Pacific area, the firm obtained on July 5, 1949, the services of a retired Navy Commodore who had served as Chief of Operations on CincPac's staff during the war, and who was well equipped to supervise transportation operations and other problems which might arise in connection with H & N relations with military authorities.

AVENUES OF SUPPLY

Because of the nature of the Marshall Islands with their sparse population, undeveloped resources, and insignificant value as trade centers, no steamship line has considered them sufficiently attractive from the point of view of revenue to justify their inclusion as a regular port of call for cargo or passenger service. They are so far removed from the regular trade routes between the United States and Japan or between the United States and Australia that it has not appeared economically feasible to divert commercial steamers from either of these routes to Eniwetok.

The normal commercial air routes across the Pacific run along the Honolulu-Wake-Guam route to Japan and the Honolulu-Samoa-Fiji Island routes to Australia and New Zealand. The former route might have been utilized to Eniwetok by the inclusion of a 600 mile connecting service between Wake and Eniwetok. However, this would have constituted an expensive operation and would have entailed the establishment of air-sea rescue services and the establishment of a Holmes & Narver traffic agent at Wake Island.

In comparison with other off-continent locations in which construction projects are in progress, Eniwetok is unique insofar as the feature of its location is concerned. Such locations as Alaska, the Philippines, Arabia, Guam, North Africa, and Iceland are all on direct steamship routes, on regularly scheduled air routes, or on both.

Availability of commercial cargo ships and commercial aircraft was investigated. These were found available for charter and could have been utilized either as regular means of transportation or as temporary means of meeting emergency situations. During the later phases of the program, one shipping firm offered to discharge minimum shipments of 500 tons at Eniwetok at commercial rates.

DISTANCE FROM SOURCES OF SUPPLY

Eniwetok Atoll is approximately five thousand nautical miles from the United States and approximately twenty-five hundred nautical miles from the Hawaiian Islands. It was found desirable to recruit about one-third of H & N personnel from the Hawaiian Islands, with the remainder coming from all parts of the continental United States. Certain emergency purchases of supplies were made in Honolulu, but the most of the supplies came from the continental United States. Military shipments usually sailed westward from San Francisco in a wide circuit of the Pacific, calling in sequence at Honolulu, Kwajalein, Guam, and sometimes Okinawa and Japan. Although this was obviously efficient from the standpoint of military servicing of a number of peacetime installations, from the standpoint of this Project, the route produced an indirect and interrupted schedule. It resulted in extending the time required for the voyage from San Francisco to Eniwetok to a period of fifteen days and upward, and served to increase the time interval between initiation of procurement on any item and its availability for use at the Jobsite.

Air shipment via the MATS system was, of course, much more rapid, but the volume of cargo utilized on this Project was such that only a minute fraction could be handled as air cargo. The average interval of time from departure of cargo from San Francisco via MATS until its arrival at Eniwetok was approximately four days, much of which time was consumed in unloading and reloading in Honolulu. MATS service was, however, invaluable for the transportation of critical items which were in urgent demand from time to time.

COMMUNICATIONS FACILITIES

Communication facilities between the Home Office and the Project were limited to air mail and teletype service. Airmail was carried by military planes, being transshipped at several points. During the initial phases of the Project, there was no teletype equipment assigned to Holmes & Narver, nor was there a radio circuit from Los Alamos to the Project. It was agreed with CINCPAC that H & N messages would be accepted by the Terminal Island Naval Base, from which point they entered the Naval Communication circuit and were transmitted from Long Beach to the Joint Military Communication Center at Oahu, retransmitted to the Army Communication Station on Eniwetok Island, and thence handcarried to the Contractor's Resident Manager.

Because of security restrictions at that time, almost all communication traffic was classified and could not, therefore, be transmitted from the Home Office to Terminal Island by telephone or commercial telegraph. It was necessary to send a security guard at least once a day, and frequently twice a day, to the Terminal Island Naval Base as a courier to take and receive the accumulated traffic. This system naturally extended the normal transmission interval.

In February 1950, the Terminal Island Naval Base was so reduced in personnel that it became necessary to discontinue the handling of H & N communication traffic. H & N was therefore directed to send and receive messages through the Army Communication Center in Los Angeles, from which point they were transmitted to the 6th Army Headquarters, San Francisco, and thence through the Joint Communication Center, Oahu, as before. This system required the utilization of messenger service between the Home Office and the Army Communication Center, Los Angeles.

In April 1950, a teletype machine was allocated to H & N. This permitted the transmission of unclassified messages between the Home Office and the 6th Army Headquarters, or between the Home Office and the AEC Office at Los Alamos. This installation provided considerable acceleration in unclassified traffic, but it continued to be necessary that all classified traffic be handcarried to the Army Communication Center.

On June 30, 1950, a cryptographic machine was allocated to the firm, and a direct radio link was established between the Santa Fe Operations Office, Los Alamos and the Army Communication Center, Eniwetok. This permitted the transmission of all communications direct from the H & N Home Office to Los Alamos and thence to Eniwetok. H & N was also able to utilize this channel to any other agencies which utilized the same system.

CONFLICTING DEMANDS FOR MILITARY TRANSPORTATION FACILITIES

Inasmuch as the military transportation services, both surface and air, were charged with the responsibility of servicing all military bases in the Pacific Area, including the war effort in Korea, the demands

on these services were always heavy and were subject to radical variations. As a result, it was necessary that both MATS and MSTS allocate all space on a monthly basis. In the case of MATS, such allocations were prorated on a daily basis which could not be carried over or accumulated. On both facilities, varying priority assignments were initiated, which meant that the shipper was never quite sure whether or not his cargo or personnel would be carried until it was actually loaded on board. There were frequent instances in which scheduled H & N cargo and personnel had to be deferred to a later carrier.

CHANGES IN SCOPE

Large changes in the scope of the Project, such as the introduction of the Bio-Medical Program, the Military Structures Program, and the increased scope of the Scientific Structures Program, occasioned complete revisions in personnel estimates and cargo estimates, which in turn created additional demands upon the established military transportation services. These upward revisions in requirements were particularly difficult to meet when they occurred at about the beginning of the Korean war, when the transportation services were already heavily overloaded.

There were numerous specific changes in design or in construction requirements which frequently required new equipment. Many of these changes involved the highest priority of shipment in order to avoid unnecessary delay for construction.

WAREHOUSING

At the beginning of fiscal year 1949-50, with the certainty of available funds with which to prosecute procurement and supply to the jobsite, careful consideration was given to the physical storage and handling of materials. It was considered desirable that a central warehouse be established in the Los Angeles area because due to the security classification then existing, vendors were not to be advised of the Project location. Such a central warehouse would provide an innocuous distinction for deliveries from all parts of the United States. At such a warehouse, deliveries from a variety of vendors could be consolidated and grouped into export lots which related to a given unit of construction, export packed, assigned priorities and shipping sequence in accordance with the construction schedule, and consigned to the Navy for overseas shipping in an orderly manner, according to Project requirements.

Because of major policy considerations, this desirable objective was not achieved. Foremost among these considerations was the technicality that to direct vendors to ship to such a warehouse would constitute a California destination, and, as such, make all materials subject to state sales tax, inasmuch as Holmes & Narver was technically the ultimate consumer. No source existed for allowable funds for such a tax, and it would possibly have amounted to a half million dollars. It was thus desirable to design a modified procedure.

Essentially, the procedure was adapted to a Navy code designation for destination and the Naval Supply Center at Oakland for a delivery point. Warehousing and material control functions were effectively set up at both Los Angeles and Oakland, and although major export packing was subcontracted, much consolidating and repackaging was done at these points. In Los Angeles, the space acquired was adjacent to the AEC general warehouse, and although the general warehousing was not connected primarily with this Project, the liaison thus provided was, however, beneficial. Similarly, the fact that operating space in Oakland was set up in the Naval Supply Center afforded valuable liaison, in that Navy cargo planning sections could anticipate the character of H & N cargo, and H & N could obtain current information on type and amount of space available and could influence the selection of deferred cargo in such a way as to minimize impact on construction progress.

CHAPTER 14.2

MATERIAL TRANSPORTATION

The transportation of materials was a major logistic problem because of the isolated location of the Jobsite, the magnitude of the Project, the changes in scope of the work, and the unanticipated diversion of transportation facilities to meet requirements of the war in Korea.

SURFACE SHIPMENT

Because of the high tonnages involved, the basic transportation channel for material was, of necessity, surface shipping. At the beginning of the Project, estimates were made of cargo requirements, but, because of the greatly increased scope of the work, these were greatly exceeded. Table 14.2-1 shows a comparison of estimated and actual cargo tonnages by months.

It will be noted that after March 1950, the estimated cargo requirements were 300 measurement tons per month, which included dry provisions and and chilled and frozen provisions. This was considered to be a maintenance figure which would obtain for the remainder of the Project, as it was expected that all basic construction equipment and material would be at the site by that date. It will also be noted that as of March 1950, the actual and estimated cumulative cargo were in agreement within 7 measurement tons. From that date forward, the actual tonnage soared upward radically because of the addition of the Military Structures Program, the Scientific Structures Program, and a general increase in the scope of the Project. For the twenty-four months from June 1949 to May 1951 inclusive, the total tonnage actually shipped averaged 2810 measurement tons per month.

Throughout the Project, because of limitations on warehousing space and the shortage of personnel to devote to stevedoring, it was necessary that cargo be so scheduled that it would arrive at the Project at intervals of not exceeding thirty days. It was accordingly arranged with Naval personnel at the conferences at CincPac in June 1949 that one general cargo ship and one refrigerator ship would sail from Oakland at intervals of approximately thirty days, each carrying H & N cargo. It was anticipated that the space allocated to H & N would be adequate for requirements. It was necessary that items of equipment and construction material arrive at Oakland on a schedule as designated to accommodate the construction schedule. After negotiation with Naval authorities, the Western Sea Frontier was designated as the liaison channel for Navy logistic support on the West Coast. Working arrangements were made with the warehousing and ship loading agencies of the Navy at Oakland, and later with MSTS when it was established.

In actual practice, certain difficulties developed in the shipping arrangements. These were unanticipated and caused serious dislocations in the orderly progress of construction. Most of these difficulties

Equipment Being Off-Loaded From Ship to Barge in Lagoon Near Parry.

Transferring Pallets of Cement from Barge to Trailer on Pier.

TABLE 14.2-1

ESTIMATED AND ACTUAL SURFACE SHIP CARGOS IN MEASUREMENT TONS

Month	Estimated Monthly Cargo	Actual Monthly Cargo	Estimated Cumulative Cargo	Actual Cumulative Cargo
1949				
May	420		420	
June	930	515	1350	515
July	1010	2940	2360	3455
Aug.	1480	593	3840	4048
Sept.	1850	794	5690	4842
Oct.	3140	1881	8830	6723
Nov.	3380	3175	12210	9898
Dec.	2920	2079	15130	11977
1950				
Jan.	1640	637	16770	12614
Feb.	810	3200	17580	15814
Mar.	300	2073	17880	17887
Apr.	300	4135	18180	22022
May	300	6956	18480	28978
June	300	5622	18780	34600
July	300	6655	19080	41255
Aug.	300	197	19380	41452
Sept.	300	3001	19680	44453
Oct.	300	6716	19980	51169
Nov.	300	4498	20280	56667
Dec.	300	3959	20580	59626
1951				
Jan.	300	3480	20880	63106
Feb.	300	2450	21180	65556
Mar.	300	797	21480	66353
Apr.	300	1158	21780	67511
May	-	173	-	67684

stemmed from the demands imposed on the armed services by the Korean War. As the war situation became acute, greater logistic support was required of MSTS by all military services. This resulted in withdrawal of ships from the normal trans-Pacific schedule, repeated cancellations or delays in sailings and imposition of shipping priorities. All of these measures seriously impaired the scheduled rate of shipment of cargo to Eniwetok. The period during which shipping difficulties became most acute was the summer of 1950 when procurement of material and prefabricated installations for the Military Structures Program and for the Scientific Structures Program had generated a particularly heavy shipping volume of critical items urgently needed by the Jobsite. Construction progress on these structures could not be delayed if completion was to be effected by the scheduled date.

A review of changes in cargo ship sailing schedules which took place at this time is of interest. The schedule with revisions for July and August 1950, follows:

Ship	Type	Original Schedule	Revised Schedule	Arrival Date
Yancey	Cargo	10 June	17 June	1 July
Thuban	Cargo	25 June	Cancelled	
Warrick	Cargo	25 June	29 June	14 July
Achenor	Cargo	20 July	Cancelled	
(Unnamed)	Cargo	27 July	Cancelled	
(Unnamed)	Cargo	10 August	Cancelled	
Albert M. Cole	Cargo	15 August	Cancelled	
Merril	Cargo	19 August		6 Sept.

On July 20, 1950, a verbal statement was received from Los Alamos that all MSTS ships were tied up in the Far East and that nothing would be available for JTF.3, including Holmes & Narver, until August 15, but that a cargo ship would be obtained earlier if possible. This particular series of changes in schedule resulted in a gap of fifty-four days between successive arrivals of cargo ships, and the uncertainty of cargo movement under these circumstances created a situation which appeared to threaten the planned completion of the entire program. Therefore, an investigation was made as to the availability of commercial charter ships which might be utilized as an emergency means of logistic support. It was found that a British, Norwegian, or Panamanian ship could be obtained with owner's guarantee of availability of 9,000 long tons dead weight and 12,000 measurement tons cargo capacity from San Francisco or Los Angeles to Eniwetok at about $77,000, with all stevedoring and cargo handling to be performed by the charterer. It was ascertained

that stevedoring charges in San Francisco would amount to about $2.25 per measurement ton, or about $27,000 for the maximum 12,000 measurement ton load. There were indications that an American ship could have been privately chartered for about $100,000, plus the same stevedoring charges. H & N discussed the chartering of such a ship with members of CincPac's staff on July 19, 1950 and found that there was no objection on their part to this action, provided procedures for security were set up by AEC, and provided AEC approved. As a result, discussions proceeded with Los Alamos on July 20. It was found that the AEC preferred that H & N continue to rely on military shipping facilities for reasons of AEC security and other policies. Military facilities were augmented as rapidly as possible, and ultimately a cargo ship was made available on August 19, 1950, for the transportation of Eniwetok cargo.

The uncertainty of MSTS ship assignment as a result of the Korean War prevented the adherance to a normal, planned schedule of sailings. It became a normal procedure for the H & N representative at the Naval Supply Center in Oakland to telephone the Home Office daily with information as to changes in designations of ships, changes in sailing dates, and changes in allocation of space. Frequently a tentative sailing date would be established but the designation of a particular ship could not be made; H & N would therefore attempt to book cargo on an "unnamed ship" designated for a specified loading date.

The nature of this Project required the procurement of unusual types of equipment and materials which were frequently obtainable only from sources of supply distant from the West Coast. For example, limonite ore was obtained from Michigan; motors, generators, and other electrical equipment for the towers were obtained from Ohio and Wisconsin; wagon drills were obtained from Oklahoma; extruded sections for the aluminum tower from Indiana; and cable from New Jersey. Many items of this nature were difficult to procure, and by the time the vendor could deliver them they were so urgently needed as to require shipment by fast freight or by express in order to meet a particular sailing schedule. Under these circumstances involving premium charges for expeditious delivery, it was particularly disheartening to discover that the shipping schedule had been cancelled or delayed.

There were occasions resulting from changes in shipping schedules when on-continent freight shipments accumulated on freight cars which could not be unloaded at Oakland because of other accumulations of cargo at that base by Holmes & Narver and by the military services. This delay in unloading of freight cars resulted in the payment of demurrage.

There were frequent occasions when cargo which had accumulated at the Naval Supply Center in Oakland had to be moved from one location to another because space on the loading dock was required for handling other cargo. There were still other occasions when because of congestion, it was found necessary to remove cargo entirely from the Naval Supply Center. All of these delays and movements involved additional labor and additional expense.

During the peak period of shipping activity, it was necessary to increase the staff of the H & N Oakland Shipping Office from two to five employees, whose duties were to receive, record, and supervise the handling of each item of Holmes & Narver cargo. During those periods in which shipping space was at a premium, it was necessary for the H & N representatives to determine which items of cargo might be deferred. Each such decision was difficult, as all items were urgently needed; each deferred item caused a delay in some particular construction item at the Jobsite, or a revision of construction schedules.

At times, because of the necessity of adjusting the overall cargo to the loading requirements of the vessel, certain types of cargo had to be deferred even though they were urgently required. For example, it was sometimes requested that utilization of a large proportion of allocated tonnage be made in heavy concentrated items of cargo which could be loaded in the lower holds of ships to provide stability; at other times, it was found to be impossible to load items which required deck space.

There were particular types of cargo which presented unusual problems. One such problem was the shipment of paving material. At an early period in the Project, it was determined by comparative tests that the most acceptable type of asphalt paving material was asphalt emulsion, which could be shipped either in steel drums or in bulk. The former method was considerably more expensive because of the cost of the drums, and because of additional labor required for stevedoring, and handling at the Jobsite. The latter method presented difficulties of stowage at the Jobsite, and Naval personnel feared that asphalt would foul the cargo tanks on oil tankers.

The timely arrival at Honolulu of a commercial tanker loaded with emulsion served to demonstrate to the naval authorities that this method of shipment presented no difficulties. As a result, the USS Mispillion was made available for the shipment of approximately 900,000 gallons of asphalt emulsion, loading directly from the vendor's tanks at Wilmington, California on April 10, 1950 with direct sailing to Eniwetok. CincPac also made available two YCV's (aircraft barges) with compartmented steel double bottoms which were utilized for asphalt storage at the Jobsite. At a later date, when increased paving requirements demanded additional asphalt, the USS Mispillion made a second trip on June 30, 1950 with approximately 600,000 gallons of emulsion. This entire shipping operation was completed with exceptionally pleasing results. The Mispillion also transported a water taxi which otherwise would have presented some difficulty, and in addition, made available cargo carrying capacity for the transportation of certain critical items whose arrival at Eniwetok was urgently needed at that particular time.

The transportation of marine craft was itself difficult of accomplishment. Large craft such as LSU's and tugs were generally sent out from Pearl Harbor under their own power; barges were towed from Pearl Harbor as suitable towing facilities became available; smaller craft, such as LCM's and water taxis had to be deck-loaded on ships from

Pearl Harbor or from the United States, as deck space became available. Since deck cargo space was usually at a premium, the shipment of these craft was difficult to arrange.

Any project of this magnitude is naturally subject to a multitude of problems connected with the shipment of unusual items. In general, it may be stated that for this particular Project, the use of MSTS shipping facilities presented the most acceptable means of logistic service from the point of view of economy and availability. The highest degree of cooperation was received from the Navy and from MSTS in providing every possible facility which could be made available for this service.

The interposition of the Korean War, with its extremely heavy and unanticipated demands on all logistic services, caused unavoidable disruption of schedules and disruption of cargo space availability which could not be foreseen and for which no prior counter-measures could have been taken. The energetic reactivation of cargo type vessels accomplished by the Navy as a result of this unusual demand ultimately provided the space necessary to meet the over-all shipping requirements. During the period in which lack of sufficient cargo vessels was most acute, there was a serious disruption in construction progress because of cancellations, delays, and deferment of needed items. If this condition had extended over a longer period of time, it would have been essential that commercial vessels be chartered or that the operational phase be deferred.

Upon the activation of the Joint Task Force Three Command, H & N was directed to submit estimates of shipping through SFOO, Los Alamos, six months in advance. These estimates contained predictions of tonnages of general cargo and chilled and frozen cargo to be shipped by surface ships each month and of pounds of cargo to be shipped by MATS aircraft each month. From these estimates, tentative allocations were made by CJTF 3 in Washington. A representative of the J-4 Section of CJTF 3 was stationed in Oakland for the purpose of supervising the actual allocation. The ships designated were not utilized solely for Eniwetok cargo, however, for at times the available capacity was limited or the type of cargo which could be accepted was specified. These limitations affected all shipping agencies concerned, each of which found it necessary to accept reductions in their predicted requirement. A close working relationship was maintained between the H & N Oakland representative and CJTF 3 representative.

AIR SHIPMENT

As previously stated, a complementary and essential facility for the shipment of certain items of cargo was provided by the MATS system. This was particularly effective for the transportation of mail and relatively small items of equipment and material which were urgently required at the Jobsite.

The MATS terminal located at Travis Air Force Base, (Fairfield-Suisan), California, constituted one terminal of the San Francisco-

Honolulu Section of the Pacific Division of MATS. At Honolulu, MATS aircraft from San Francisco turned around for their return flight. Therefore, cargo or personnel booked at San Francisco for points beyond Honolulu were required to off-load at the MATS terminal at Honolulu and later be reloaded on an outgoing flight from Honolulu to Kwajalein and Eniwetok. The San Francisco-Honolulu leg of the trip connected with the principal trans-Pacific leg from Honolulu to Guam, Okinawa and Japan; therefore the plane loading from San Francisco was normally heavy and subject to rigid priorities.

In the initial arrangements concerning the use of MATS service by H & N, it was expected that only items of cargo of an urgent nature would be transported by this means. Allocations of cargo space were not made far in advance but on a month-to-month basis, depending upon demands of other agencies. Monthly allocations were in turn prorated on a daily basis in order that cargo booking officials could be assured of a justifiable load for each flight. The daily allowance was not subject to accumulation if unused.

Table 14.2-2 shows air cargo shipments over six consecutive months during the construction period and indicates the normal allocation of air cargo space for H & N requirements and the types of cargo for which this allocation was utilized. The average monthly cargo shipped was 4172 pounds.

TABLE 14.2-2

AIR CARGO SHIPMENTS, FEBRUARY-JULY, 1950

Month	Pounds of Cargo	Types of Cargo
February	2719	Medical supplies, radioactive cobalt, pressure gauges, submarine cable testing equipment.
March	7618	Engineering and radio supplies, electrical appliances, small tools.
April	3200	Office supplies, medical supplies, recording instruments.
May	5848	Medical supplies, hospital equipment.
June	3329	Engineering and construction tools and supplies, splice cable units.
July	2318	Refrigerator spare parts, steel door frames and accessories.
Total	25032	

The rescheduling of Jobsite work that had been occasioned by the delays incurred throughout the period of lack of sufficient shipping space placed certain equipment and material in such vital need that it became necessary to initiate requests for increased airlift allotments. These allotments were obtained simultaneously with the establishment of a liaison office for the Joint Task Forces at Travis Air Force Base, California, in September of 1950, but Holmes & Narver air freight continued to be routed through the Naval Supply Center for transshipment to the Travis Base.

The Travis Air Force Base terminal was the Pacific Coast Headquarters for all the Korean airlift operations for the Army, Navy, and Air Force, in addition to serving as the Port of Embarkation for all air priority material and equipment of the Joint Task Force operations, including those of the Los Alamos Scientific Laboratory and Holmes & Narver. The warehousing jam occasioned by the vital needs of all the military services during the dark period of temporary reversals in the Korean War situation at the close of the calendar year of 1950 was so great that Holmes & Narver took steps to alleviate the conditions insofar as possible within its jurisdiction.

On January 1, 1951, Holmes & Narver obtained permission from the Joint Task Force Liaison Office to send its own representative to help alleviate conditions by supervising Holmes & Narver air shipments and general coordination of effort in accordance with the MATS procedures in effect at the Travis terminal. This expediting office was set up in the first week of January 1951 and immediately started work to eliminate the bottlenecks of Holmes & Narver air freight that had accumulated material shipments throughout various warehouse facilities at the terminal. This office functioned in close coordination with the military personnel at all times, in a manner similar to that of the Oakland office at the Naval Supply Center, and exerted continual effort in facilitating material flow, through close follow-up of all shipments and through physical and paperwork handling procedures established by the Air Force. Much thought was given to methods and procedures that might be devised to speed and increase the flow of Holmes & Narver air freight, and several steps were suggested and approved to save time in shipping and monitoring of materials.

It was standard operating procedure to obtain directly from the Joint Task Force Liaison Office at Travis Air Force Base air priority assignments in advance of actual shipment for all shipments scheduled for airlift, regardless of the point of origin of the shipment. Planning control in the MATS flight space allotment office could thus be maintained in allocating space requirements for the various military services and Joint Task Force Groups.

Holmes & Narver airlift materials had been consigned through the Naval Supply Center for transshipment to Travis prior to this time, and the expediting office was able to eliminate all the transshipment delay and extra handling by suggesting and securing approval of a plan to consign all the shipments directly to the Port of Embarkation at Travis.

Thorough and close control of all phases of the airlift problems from the initial requests for priority assignment through the monitoring aspects of receiving, handling, and eventual relaying to the Jobsite of advance flight information by routine teletype was worked out and incorporated in Holmes & Narver procedures. The backlog of vitally needed shipments was cleared in the first week of operation of the new expediting office, and when additional airlift space became available shortly thereafter, the volume of monthly air freight shipments jumped to ten times the previous amounts until the final days just prior to test time.

This monitoring system included stations at transfer points at Hickam Field in Hawaii and at Kwajalein Island and was highly efficient in keeping accurate track of all shipments, in addition to eliminating holdover delays that had totaled as high as thirteen days at a single transfer terminal. The results of this expediting program were so effective that H & N were asked by the University of California Director of Procurement at its Los Alamos Office to include all 3.1 program air shipments under this monitoring plan.

As the operational period approached and as the experimental features of the Project developed, the need for additional air cargo allocation increased. Fortunately, the MATS system was able to meet this demand and the H & N average monthly shipments for the months of January to April 1951, inclusive, amounted to 25,688 pounds, or about 856 pounds per day.

In utilizing military transocean air facilities, it was necessary that cargo be export-packed in strict accordance with joint Army-Navy-Air Force packing specifications designed for safety and accessibility and ease of handling in airlift. Most of the items shipped by this method were of a highly urgent nature and were ordered from manufacturers and vendors located throughout the entire United States. Original plans to have these items export-packed and shipped directly to the Aerial Port of Embarkation by the vendor had to be modified to a large extent. Many vendors lacked the facilities and experience to meet the necessarily strict military export packing specifications. Those who were so equipped imposed exhorbitant charges for performing this service.

A subcontract was made in September 1949, with an experienced export-packing firm in Oakland, California, to alleviate these conditions. H & N shipments which were designated for shipment by air were received, checked, export-packed, and delivered by this subcontractor to the MATS terminal at Fairfield-Suisan, California, for transshipment.

The need for a system of marking the cargo of the various military services and Government agencies became apparent; therefore, each package destined for Eniwetok was marked in the following manner:

Holmes & Narver cargo	Blue X
Military Services cargo	Orange X
Task Group 3.1 cargo	Green X

This system of marking was particularly helpful at the Honolulu transfer point, at which terminal all cargo was unloaded including much that was destined for Guam, Okinawa, and Japan. It was equally helpful at Kwajalein to assist in differentiating Eniwetok cargo from that which was to be off-loaded at Kwajalein.

Because of the necessity of expediting the shipment of air cargo at Honolulu by every possible means and of avoiding the misloading of cargo on planes scheduled for other destinations, it was found desirable to designate one individual in the H & N Honolulu Office to exercise specific supervision over all Holmes & Narver and Task Group 3.1 air cargo. With this method, there were no instances of unusual delays or mis-shipments.

CHAPTER 14.3

PERSONNEL TRANSPORTATION

The transportation requirements of personnel were, of course, directly influenced by the changing personnel requirements at the Jobsite and by fluctuations in the rate of personnel procurement and medical and security clearance.

On this Project, Jobsite personnel requirements changed radically in total numbers and in particular classifications, because of changes in the scope of the Project and particularly because of the addition of the Military Structures Program and the extensive Scientific Structures Program.

The rate of procurement of personnel also varied radically. Procurement was affected by changes in the over-all employment situation in the United States, by increases in the on-continent wage rates, by increase in armed forces as a result of the Korean War, and by changes in the rate of security processing. The variable result of these factors imposed radical fluctuations in the flow of personnel and required a system of transportation which afforded a maximum of flexibility. Since there were no scheduled commercial facilities available beyond Hawaii, H & N was dependent upon the facilities offered by MSTS ships and by MATS. It might also be noted that MATS westbound traffic originates normally at San Francisco and, barring close cooperation of MATS personnel at Hawaii, entry into the MATS system at that point is extremely difficult. However, as will be seen from the statistics which follow, commercial air transportation to Hawaii was used when MATS space from Travis was not available and a turn-around flight from Hawaii to Kwajalein was instituted because of H & N requirements.

Table 14.3-1 indicates the number of individuals transported to the Jobsite and the method by which they were transferred.

The total of 2724 transported by MATS from Honolulu includes all of those individuals transported from the United States via commercial aircraft and via MATS plus those individuals who were hired in Honolulu and entered the MATS system at that terminal. The total of 3348 individuals shipped westward is obtained by combining the last three columns. It will be noted that 81 per cent were transported from Honolulu by the MATS system.

Personnel travel during the first half of the calendar year of 1949 consisted principally of individuals on initial reconnaissance missions or for the establishment of a camp.

TABLE 14.3-1

PERSONNEL TRANSPORTATION TO JOBSITE

Month	Commercial Air to Honolulu	MATS to Honolulu	MATS from Honolulu to Jobsite	Surface Ship from U.S. to Jobsite	Surface Ship from Honolulu to Jobsite
1949					
Jan.	9		9		
Feb.	20		20		
March	7		7		
April	3		3		
May	46		46		
June	49		49		
July	55		55		
Aug.	11		11		
Sept.	85		85		
Oct.	104		104		
Nov.	83		83		
Dec.	73		73		
1950					
Jan.	95		95		
Feb.	118	52	200		
March	12	82	148		
April	52	14	107		
May	98	23	165	40	
June	84	28	114	60	49
July	133		109		108
Aug.	47	46	104	107	72
Sept.	13	136	174	18	47
Oct.	64	71	166		
Nov.	35	75	174	3	
Dec.	141	88	251	13	16
1951					
Jan.	87	61	170	38	22
Feb.	1	20	21		
March	3	64	75		
April	9	35	69		
May	3	15	18		
Total	1543	810	2724	308	316

TABLE 14.3-2

ESTIMATED AND ACTUAL PERSONNEL TRANSPORTATION TO JOBSITE

Month	Estimated Number	Actual Number	Estimated Cumulative Number	Actual Cumulative Number
1949				
July	28	28	55	55
Aug.	20	48	11	66
Sept.	62	110	85	151
Oct.	65	175	104	255
Nov.	67	242	83	338
Dec.	70	312	73	411
1950				
Jan.	72	384	95	506
Feb.	75	459	200	706
March	77	536	148	854
April	75	611	107	961
May	65	676	205	1166
June	60	736	223	1389

After June 1950, it had been estimated that a monthly flow of 60 employees westward would maintain a population of 604 individuals which was expected to be the maximum number required.

As the scope of the Project increased and as the Military Structures Program and the Scientific Structures Program were added, the total of H & N personnel at the Jobsite increased to a maximum figure of 1846 employees in March 1951.

It will be noted that there was no travel by MATS from the continent during July 1950. This was due to the unusual demands made upon MATS by the Korean War. It was necessary, therefore, that greater use be made of commercial air facilities from the continent to Honolulu during that month. This was a parallel to the similar disruption which occurred in the availability of cargo ships during the same month and serves to indicate the extent of the impact of the war on the logistic problem.

The movement of personnel eastward presented problems similar to those encountered in the westward movement; the same transportation systems were utilized and the same degree of supervision was required.

Table 14.3-3 indicates the extent of this travel by months and by transportation systems.

TABLE 14.3-3

PERSONNEL TRANSPORTATION FROM JOBSITE

Month	MATS Jobsite to Honolulu	MATS Honolulu to U. S.	Commercial Air Honolulu To U.S.	Surface Ship Jobsite to U. S.	Surface Ship Jobsite to Honolulu
1949					
Jan.	3		3		
Feb.	3		3		
March	3		3		
April	3		3		
May	9		9		
June	5		5		
July	7		7		
Aug.	9		9		
Sept.	15		15		
Oct.	14		14		
Nov.	20		20		
Dec.	19		19		
1950					
Jan.	18		15		
Feb.	25		25		
March	26	11	11		
April	44	14	21		
May	55	9	30		
June	88	1	74		
July	32	4	20		
Aug.	84	37	39		
Sept.	130	93	19		
Oct.	117	91	9		
Nov.	106	47	44		
Dec.	85	49	27		
1951					
Jan.	101	61	32		
Feb.	148	50	74		
March	193	78	53	17	
April	141	84	40	23	42
May	247	117	54	229	65

SURFACE SHIP TRANSPORTATION

In addition to scheduled MSTS cargo ship and refrigerator ship sailings on which there were no spaces for civilian passengers, a schedule of MSTS personnel transports was designed for the transportation of military personnel to various Pacific bases. H & N was authorized to utilize this service for the transportation of employees on a space available basis. This service was utilized in varying degree throughout the course of the Project but it was not considered to be the most desirable method of transportation and was, therefore, utilized only when the MATS system was unable to provide sufficient space to meet requirements.

Arrangements for passengers aboard military transports is such that cabin spaces are limited and most accommodations are troop-class. There is a considerable differentiation between the two types of accommodations and a difference in the privileges accorded aboard ship. This distinction is well established in the military services where all personnel are indoctrinated as to the various privileges to be expected under these circumstances but it is difficult to establish a similar rigid line of distinction among civilian employees, who have become accustomed to first class accommodations as a matter of course. This imposition of class distinction generated considerable ill will on the part of several employees and resulted in a definite morale problem which was particularly unfortunate for groups arriving at the Jobsite to begin a twelve months contract.

In addition to the morale problem, transportation aboard surface ships also imposed a delay in the arrival of personnel at the Jobsite. The normal ship transportation time from San Francisco to Eniwetok via Honolulu and Kwajalein is approximately fifteen days, or about 13 days longer than that required for air travel. This delay in arrival at the Jobsite amounted to a loss of productive effort of about 108 man-hours for each individual so transported. In certain cases, this delay in the arrival of particular groups caused serious delays in construction progress. Viewed from the standpoint of financial outlay, it would appear that in wages alone a loss of more than $200.00 was incurred in the transportation of each individual by this means.

AIR TRANSPORTATION

Prior to February 1950, all personnel transportation from the continent to Honolulu was performed by commercial air carriers and from Honolulu westward, all travel was arranged over MATS facilities. In general, there were three MATS flights per week from Honolulu, which were designed to accommodate military personnel to Johnston Island, Kwajalein, and Eniwetok, as well as Holmes & Narver employees. Commencing in February 1950, transportation of personnel from the continent was performed by MATS facilities insofar as space was available the excess being transported by commercial aircraft as far as Honolulu, at which point they were transferred to MATS for the remainder of the trip.

Limited space on MATS aircraft out of Travis Air Force Base was allocated to Holmes & Narver on a month-to-month basis, but allocations were subject to priority systems which introduced continuous problems of uncertainty as to whether or not personnel would be accepted on any particular day. This difficulty was seriously increased at the beginning of the Korean War at which time the demands upon the MATS system were greatly increased.

The need for increased numbers of employees at that time because of additional work required for the Military and Scientific Structures Programs made it mandatory that large increments of personnel be shipped to the Jobsite without delay. This problem of increasing air transportation space requirements which arose concurrently with the increasing demand upon MATS by reason of international developments indicated the need for some other means by which to provide increased personnel to the Jobsite.

Investigation revealed that commercial aircraft of the C-54 type, capable of transporting 45 men or 10,000 pounds of cargo or any equivalent combination of these, could be chartered for the round trip from Los Angeles to Eniwetok and return for approximately $18,000. Under the circumstances, it was felt that use of this service was the only means of insuring completion of the Project on schedule. However, the Santa Fe Operations Office, Los Alamos, preferred continued dependence upon MATS for this service; therefore, no use was made of chartered commercial aircraft. It is mentioned here as a possibility, however, in case emergency situations preclude the use of military facilities in the future.

The use of MATS facilities imposed certain inconveniences and some expense because it was necessary that the personnel scheduled for a particular day's flight be assembled on the previous day in Los Angeles, be transported to San Francisco, and accommodated at the hotel overnight, and be assembled at Travis Air Base on the morning of the flight. This involved an expense of approximately $30.00 per man, exclusive of wages during the period concerned. The supervision of these personnel departing from Travis Air Base and the supervision of returning employees at the same terminal necessitated the establishment of a personnel representative on full-time duty at that base.

Since Honolulu is a division terminal in the MATS system, it was necessary that all passengers from San Francisco disembark and be booked for outgoing passage on planes to Eniwetok. This usually involved a layover of at least 24 hours in Honolulu while awaiting the departure of the MATS plane westward. Quarters were available in a barracks building at Hickam Field for the use of personnel during this indefinite layover.

The supervision of employees in Honolulu under these circumstances presented a continuing problem. It was found to be essential that a representative meet each incoming MATS plane from Travis Air Base and usually the incoming commercial planes as well. It was also necessary

that a representative meet each incoming MATS plane from Eniwetok in order to supervise returning employees. As the arrival of planes was frequently delayed, this service sometimes entailed an almost continuous vigil at the various airports throughout a 24 hour day. Upon the arrival of a group, it was necessary that the H & N representative personally supervise the arrangement of accommodations for each man in order to insure that each man was available for scheduled departure. Unexpected delays in Honolulu usually involved the disbursement of funds. During the operational period, extending from February through June 1951, this service was extended to include all scientific personnel as well as to those of Task Group 3.1. These demands upon the Honolulu Office, combined with the requirements imposed by local hiring, security clearances, and minor purchasing activities, required at one time an organization of nine employees in that office.

The manager of the Honolulu Office maintained the closest possible liaison with all three military headquarters in the area. This relationship was of inestimable value in the resolution of various problems, including those involving the acquisition of naval craft at the Project as well as those concerned with surface ship transportation and air transportation.

Section 15

REPORTS AND

SPECIAL STUDIES

SECTION 15

REPORTS AND SPECIAL STUDIES

The contract between the AEC and Holmes & Narver involved architectural lay-out, engineering design, construction, maintenance, and management of complete Proving Ground facilities at Eniwetok Atoll. Inherent in a project of such magnitude and complexity are requirements for the accomplishment of many special studies and the preparation of many special and periodic reports to assure the flow of information to concerned agencies, to answer questions raised, and to serve the interests of both the government and the contractor. The studies and reports required, may be readily categorized under the headings of Planning, Design, Progress, Fiscal and Property, and Miscellaneous.

It will be seen from the brief review given of the reports and special studies in each of the categories that the effort required in research, collation, and mechanical preparation was substantial. In certain divisions personnel were assigned a primary responsibility for the continual accumulation of data for periodic reports required by the AEC. Thus, for example, statistical engineers at the Jobsite and at the Home Office were engaged to a great proportion of their time in accurately charting progress in engineering design and construction. Likewise, administrative personnel in the Operations Division, were designated as responsible for continuously collecting pertinent information for monthly narrative progress reports.

PLANNING

The fundamental planning report for the project was the result of the first phase of work authorized by the Letter-of-Intent issued by the AEC in September 1948. The activities of the reconnaissance group are detailed in Chapter 5.5, Engineering, Vol II, of this report; the Reconnaissance Report is reproduced in Appendix A, Vols V and VI. It will be seen that the Reconnaissance Report contains a detailed analysis of the many factors involved in the construction and operation of the Proving Ground at Eniwetok, recommendations looking toward the accomplishment of the proposed program of construction and operation, and estimates of costs. The document proposed the basic criteria and philosophies for construction and operational programs followed throughout the course of the project.

Other planning studies performed included special surveys, determination of methods for reducing radioactivity contamination, the determination of the condition of installed submarine cables at the atoll, the preparation of estimates of cost and transportation requirements, and determinations of the most economical courses of action with respect to many phases of the project.

DESIGN

Many of the planning studies, briefly mentioned above, contributed to the engineering or design of facilities ultimately constructed at the Proving Ground. In addition, a number of special studies were carried out on specific design problems, of which the examples given in the following paragraphs are illustrative.

The initial design study assigned to Holmes & Narver was required in connection with the submission of recommendations on and designs of zero towers. The basic criteria for the towers included a requirement that the mass of steel employed should be minimized. Analysis of the problem indicated that, if a guyed, three-legged tower could be utilized, a significant reduction in the mass of steel required for a given height could be realized in comparison to a free-standing, four-legged tower. As a corollary, a higher tower could be provided in the three-legged design in which the mass of steel required would still be within tolerance limits, and the added height would be useful for scientific purposes.

In connection with the dehumidification and air conditioning of various buildings, special studies were carried out directed towards the determination of the most suitable dehumidification equipment and vapor sealing materials.

One of the most interesting problems encountered in the course of design work arose out of consideration of the extremely corrosive atmospheric conditions at the Jobsite and the fact that salt water was being used for many purposes. Thus, corrosion studies and others directed towards the elimination of electrolytic action were required. For example, in connection with the choice of clad aluminum sheathing for all semi-permanent buildings, extensive laboratory testing was required to determine the corrosion resistance of the materials involved. This same consideration preceded the design of many other prefabricated items shipped to the Jobsite.

During the course of the Project, the many revisions in population estimates, established the necessity for re-examination and re-analysis of housing availability, power generation capacities, and water system capacities. Thus, for example, on September 15, 1950, a report on power and water facilities at Eniwetok and Parry Islands was prepared and subsequently transmitted to the AEC. Likewise, a new analysis of warehousing and food storage facilities was deemed appropriate and was accomplished.

Other design studies prepared in the course of the project related to such subjects as the preparation of high strength coral concretes, design mixes for limonite and limonite-steel-aggregate concretes, paving materials and mixes and radio back-up systems.

PROGRESS

Various directives concerning progress reports were issued from time to time by the AEC in order to assure that current information on the various phases of the work involved was available to all interested agencies and personnel. The preparation of progress reports presented some difficulty in view of the fact that increases in the scope of work required almost continuous re-evaluation of the weights given to each feature of construction covered by the various reports required. Monthly progress reports submitted to the AEC included:

1. A narrative report of all important features at the Jobsite, a summary of the personnel and procurement situations, and a chronological record of events of interest at the Jobsite

2. A chart of progress of construction on base facilities, showing the status of each feature of the program

3. A chart of progress of construction on Military Structures, showing the status of each feature of the program

4. A chart of progress of construction on Scientific Structures, showing the status of each feature of the program

FISCAL & PROPERTY

The subject of fiscal reports is discussed in Section 11, Fiscal Vol IV, and mention is made of the fact that a great expenditure of time was required to prepare the great variety of statements and reports requested. By the end of October 1949, the fiscal reporting requirements of various AEC divisions had increased to a total of twenty reports, including an annual motor vehicle report, three semi-monthly statements, and sixteen monthly reports and statements. These were in addition to six internal reports prepared for the guidance of H&N management in regard to the Proving Ground project. Subsequent changes in the requirements tended to diminsh the numbers of reports required, and final agreement was ultimately reached that the following list of reports, statements, and schedules would govern:

1. Balance Sheet

2. Cost Report - Projects in Progress (Monthly)

3. Report required by AEC Controller's Release No. 9

4. Report required by AEC Controller's Release No. 14

5. Cost Report required by JTF-3

6. Monthly report of obligations, expenditures, and reimbursements

7. Monthly statement of Contractor's earned fee

8. Analysis of inter-office transfers

Other statistical reports prepared by the Fiscal Division for submission to the AEC included:

1. Monthly Personnel Status Report, Form SFO-58

2. Quarterly Personnel Status Report, Form SF-135

3. Monthly Report of Contractor Employment

4. Monthly Report of Change in Vehicle Levels

5. Quarterly Report of Motor Vehicle Operation

6. Annual Motor Vehicle Report

For the internal use of H&N management, the Fiscal Division was required to prepare a daily summary of reimbursible expense and cash position, and a weekly statement on the status of commitments and commitments paid. It might be noted here that the latter statement, known as the Weekly Commitment Report, was extremely valuable in coordinating activities related to contractual matters. At the request of the Controller of JTF-3 and the AEC Director of Finance, SFO, copies of this internal report were furnished to their offices.

MISCELLANEOUS

Miscellaneous reports and studies included such subjects as a monthly report on motor vehicles, heavy equipment, and material disposition, for use in planning movements in the event of emergencies, a weekly report of aircraft utilization, semi-annual reports of organizational structure and personnel distribution, a quarterly report on allotments of critical materials made and used by the AEC (AEC Form 304), a monthly report of purchase order contracts, over and under $25,000, given to large corporations and small businesses during the month (AEC Form 158 and 160), a copy of all purchase orders, and intermittent Security Clearance requirement estimates.

Section 16

SERVICE OPERATIONS

CHAPTER 16.1

GENERAL

In accordance with preliminary organizational plans, the Service Operations Division of Holmes & Narver was established as a separate division under the Resident Manager on about June 1, 1950. Prior to that date service functions had been performed by the several divisions at the Jobsite. By June 1, 1950, however, the scope of service operations and maintenance functions had increased to the point where separate control was necessary, practical, and desirable.

The following departments were placed under the direction of the administrative head of the Service Operations Division: marine operations, mechanical and machine shops, communications, power generation and water distillation, camp facilities, and maintenance. In addition, the Service Operations Division was made responsible for air travel dispatching for the U. S. Air Force inter-island plane transportation between the islands of Eniwetok, Parry, Runit, Biijiri, and Engebi.

The administrative organization of the Service Operations Division consisted of the following: Service Operations Manager, Assistant to Service Operations Manager, and superintendents of camp facilities, marine operations, power and water distillation, mechanical and machine shops, maintenance, and communications, together with necessary office personnel consisting of an office manager and clerical and stenographic assistants. The office of the Service Operations Manager correlated and coordinated the efforts of all departments.

The Service Operations Division was confronted with certain specific difficulties in connection with this Project as follows:

1. The extensive time lag between ordering of supplies and equipment and their receipt.

2. The lack of trained specialists such as power and distillation personnel, cooks, bakers, and laundrymen.

3. Radical and unanticipated changes in the total population of the Atoll as the scope of the work was changed.

4. Constant movement of personnel between islands, frequently without prior notification. This was particularly true of scientific groups during the operational phase.

5. The absence of any source of immediate commercial supply for such essential commodities and services as food, fresh water, inter-island transportation, electrical power, laundry, or housing. Each function of the Service Operations Division had to be completely self-sufficient and self-supporting.

CHAPTER 16.2

TRANSPORTATION SERVICES

The varied Jobsite transportation requirements for personnel and freight were met by three branches: the Marine Department for water transportation, the Mechanical Department and Motor Pool for land transportation, and the U. S. Air Force for air transportation.

Operating units for all forms of transportation were at all times under the control of a central departmental dispatcher who was assisted during the operational period by assistant dispatchers on the more important islands such as Runit, Biijiri, and Engebi. Certain priority measures became necessary for each form of transportation, and priorities were assigned in accordance with importance of requirements.

Equipment for water and air transportation appeared to be adequate for the most part during the entire period, but land vehicles for personnel and freight transportation were limited, and at times some delay was experienced.

MARINE TRANSPORTATION

The efficiency of operation of water transportation during early phases of the Project was largely attributable to the ingenuity of the personnel of Marine Operations.

In August 1949, the available marine equipment consisted of six LCT's (later classified as LSU's), four LCM's, one whaleboat, one LCVP, and two DUKW's.

Of the LCT's, one had been off-loaded in very bad condition. Its engine room had flooded, damaging the electric system beyond repair. This LCT was used as a towed barge. Later, another LCT took a bad gash in its bottom directly below the starboard engine while landing garrison supplies at the so-called "Navy Pier" on Eniwetok. Through quick action by its skipper, it was towed to the Parry ramp and successfully beached. With tractors, the stern was raised on the ramp and repairs effected in two days.

The LCVP was found abondoned and was refitted for service. After two months, during which time the hull proved to be in bad shape, a storm sent it to the bottom of the lagoon at its mooring, in water too deep for it to be salvaged.

Of the two DUKW's, one had been salvaged from the Eniwetok airstrip revetments. It was put to good use for some six months before it was considered unfit for further use and cannibalized.

During the first half of 1950, two light YTL wood tugs, four wood barges, a second whaleboat, and two Seacraft water taxis were acquired.

The two Seacraft water taxis proved invaluable for rapid transportation of personnel and small freight between islands. Daily schedules were maintained, relieving the load on the L-5 and L-13 liaison planes. On occasion, other craft, such as DUKW's, LCM's, and LSU's were also used to transport personnel.

With this fleet of twenty-three assorted craft, available in June-July 1950, and with the stevedores furnished by the Engineer Brigade under CTG 3.2 of Joint Task Force 3., ship off-loading and inter-island transportation proved adequate. Freight was transported between ships and sites by means of LCM's, LSU's, and barges under tug tow.

In August 1950, a YCV-7 steel barge was delivered with packaged POL supplies aboard. This vessel was fitted out as a cable-laying barge and was used as such during the entire cable-laying operation, being towed by YTL's, LCT's, and LCM's, as required.

No flat-deck power barge was available for use in laying the submarine outfall sewers. Since such a craft was necessary, a steel barge was built of salvaged Navy cubes and powered with a gasoline "mule" salvaged from a dump on Parry. This power barge became the workhorse of marine operations and proved invaluable in laying all submarine outfall sewer lines.

It was originally planned to build an aluminum shelter amidships on an LCT for use as a floating construction camp in the establishment of a beachhead on the upper islands. This idea was later abandoned because portable buildings, equipment, and tents were found available for temporary construction camps and used successively on Bogallua, Engebi, Runit, and Biijiri.

One LCT was, however, fitted up with complete galley equipment and bunks and was extensively used by the surveyors before the construction of the camps on the outlying islands, especially in their triangulation work, which necessitated frequent movement from site to site.

Because of the age and condition of all marine craft on delivery and because of their constant use, a group of mechanics and shipfitters was continually engaged in repair of hulls, superstructures, and especially engines. Overhaul and replacement of the Gray marine engines was a continuous operation which paid dividends in rendering maximum marine craft service. All demands on the fleet were met, despite the fact that at times, such as upon the arrival of the Battalion's equipment and supplies, the available craft were in use around the clock.

Inasmuch as the bottoms of the LCT's(LSU's) were in bad condition, having had no attention other than the plugging of leaks since their delivery in the spring of 1949, the use of a floating drydock was requested of Cincpac. In May 1950, a floating drydock, the USS COMSTOCK, arrived with additional marine craft aboard. Because its call was limited to twenty days, the repair of the LCT's was rushed on a day-and-night schedule. Bottoms were reinforced by welding on new plates; screws, shafts, bearings, and guards were reconditioned or replaced; bottom paint was

TABLE 16.2-1A. SUMMARY OF MARINE FACILITIES

Week Ending	Number of Craft Operating					No. of Personnel
	LCM's	LSU's	Tugs	DUKW's	Taxis	
8-26-50	12	5	2	6	1	---
9-2-50	11	5	2	6	2	---
9-9-50	12	5	2	6	2	---
9-16-50	12	5	2	6	2	---
9-23-50	12	5	2	6	2	---
9-30-50	12	5	2	6	2	---
10-7-50	12	6	3	6	2	---
10-14-50	12	6	3	6	2	---
10-21-50	12	6	3	5	2	---
10-28-50	12	6	3	5	2	---
11-4-50	12	6	3	5	3	---
11-11-50	12	7	3	5	3	---
11-18-50	12	7	3	5	3	---
11-25-50	12	7	3	6	3	---
12-2-50	12	7	3	6	3	117
12-9-50	12	7	3	6	3	120
12-16-50	12	7	3	6	3	123
12-23-50	12	7	3	6	3	124
12-30-50	12	7	3	6	3	128
1-6-51	12	7	3	6	3	123
1-31-51	12	7	3	6	3	122
1-20-51	12	7	3	7	3	121
1-27-51	12	7	3	7	3	123
2-3-51	12	7	3	7	4	131
2-10-51	12	7	3	7	3	132
2-17-51	12	7	3	7	3	136
2-24-51	12	7	3	7	3	134
3-3-51	12	7	4	7	4	125
3-10-51	12	7	4	7	3	126
3-17-51	13	7	3	7	4	131
3-24-51	13	7	3	7	4	132
3-31-51	14	7	3	7	4	138
4-7-51	14	7	3	7	3	136
4-14-51	14	7	3	7	3	137
4-21-51	14	7	3	7	3	135
4-28-51	14	7	3	6	3	137
5-5-51	14	7	2	5	3	133
5-12-51	14	7	3	5	3	130
5-19-51	12	7	2	5	3	122
5-26-51	12	7	3	5	3	116

TABLE 16.2-1B SUMMARY OF MARINE OPERATIONS

Week Ending	Passengers Carried	Measurement Tons Hauled	Hours Operated
8-26-50	2295	2668	1431
9-2-50	3152	3480	1640
9-9-50	2800	1645	1481
9-16-50	3475	9584	1725
9-23-50	3605	7207	1917
9-30-50	2735	5965	1437
10-7-50	3625	10114	1654
10-14-50	3191	8439	1820
10-21-50	4085	4898	1728
10-28-50	3555	7607	1816
11-4-50	3436	12035	1889
11-11-50	3624	5759	1758
11-18-50	3657	5189	1704
11-25-50	2871	3975	1609
12-2-50	3708	4521	1802
12-9-50	3992	6777	1873
12-16-50	4129	19975	1918
12-23-50	3994	22873	2025
12-30-50	4081	15255	1626
1-6-51	3869	15297	1755
1-13-51	4688	18964	2200
1-20-51	4380	22153	2003
1-27-51	4888	17378	1847
2-3-51	4954	17868	1938
2-10-51	5026	31889	2121
2-17-51	4628	29402	2185
2-24-51	4298	21985	2040
3-3-51	4088	27253	2145
3-10-51	6074	37557	2056
3-17-51	5988	28259	2145
3-24-51	4928	31664	2161
3-31-51	4909	22316	2196
4-7-51	6002	18632	1554
4-14-51	5924	25419	2407
4-21-51	6338	37974	2738
4-28-51	4663	20719	2422
5-5-51	3994	28135	2366
5-12-51	3283	13789	2183
5-19-51	3389	18543	1835
5-26-51	2359	17746	1910

applied in record time; and all five LCT's were placed in better condition than when originally received in early 1949. Drydocking of the LCM's for repair to bottoms was not required, as it became the practice to place these on shore by means of cranes.

By early 1951, when the peak period of activity was reached, the marine operations "fleet" had grown to a total of 53 craft, consisting of the following:

Craft	No.	
LSU's	7	
LCM's	19	
YTL's (Tugs)	4	(1 steel, 3 wood)
Water Taxis	3	
MWB's	2	
Pontoon Barge (self-propelled)	1	
Barges	8	(2 steel, 6 wood)
YCV-7 (Cable Barge)	1	
YCV-17 (Emulsion Barge)	1	
DUKW's	7	
Total	53	

Table 16.2-1 shows marine operations by weeks from the assumption of control by the Service Operations Division through May 26, 1951.

These craft and marine operations personnel not only provided transportation for personnel and freight but served as well in channel blasting, channel marking, cable-laying and recovery, repairs to POL lines and underwater sewer lines, and many other tasks.

LAND TRANSPORTATION

Land transportation of personnel was handled by buses, pickup trucks, jeeps, and Army vehicles such as personnel carriers. On the two principal islands, Parry and Engebi, motor pools were established and vehicles were on call as required. On other islands, vehicles were assigned for personnel transportation. Freight transportation was handled by flat-bed trucks, dump trucks, trailers of various kinds, fork lifts, and other vehicles.

Although equipment in operation varied from month to month, the figures for January 1951 are representative. During that month, gasoline-powered vehicles in operation were the following: 55 jeeps; 12 Cushman scooters; 9 cargo trucks; 19 pickup trucks; 26 weapons carriers; 3 fire trucks, 21 dump trucks; 5 tank trucks, 47 miscellaneous trucks; 7 tractor trucks, 2 37-passenger buses; and 1 ambulance.

By months, the over-all numbers of vehicles in operation were as shown in Table 16.2-2.

TABLE 16.2-2. VEHICLES IN OPERATION

Month	Heavy Equipt.	Light Equipt.	Gasoline Consumption (Gallons)
1950			
September	58	78	40,323
October	72	94	37,919
November	78	107	42,565
December	82	128	51,310
1951			
January	82	125	53,497
February	79	85	60,421
March	81	85	61,581
April	83	97	62,166
May	83	84	42,790

AIR TRANSPORTATION

Air transportation was by U. S. Air Force L-5's, L-13's, and H-5 or H-15 helicopters and was used for transportation of personnel, mail, and small packages. The L-5 has a capacity of pilot, one passenger, and twenty-five pounds of cargo; the L-13, pilot, three passengers, and one hundred pounds of cargo; the H-5 or H-15 helicopter, pilot, three passengers, and seventy-five pounds of cargo.

During the construction phase of the Project, it was necessary to use only three or four Model L-5's at any one time. However, after arrival of the scientific and military personnel, and immediately preceding and following each "shot," as many as thirteen L-13's, five L-5's, and four H-5's or H-15's were required simultaneously during the course of a day's operations.

All aircraft were based on Eniwetok Island. However, each morning at approximately 7:45 a.m., the required number of aircraft for the day's operation would arrive at Parry Island, from which point all dispatching was done. The number of aircraft required was determined by the dispatcher at Parry and reported the previous evening to the operations officer of the Liaison Unit at Eniwetok. This number was based on the advance reservations already booked, together with a general estimate of the requirements for the following day. As a rule, the requirements were met as requested; however, because of maintenance and overhaul schedules, it was sometimes necessary to reduce the number of planes, and this reduction resulted in considerably tighter schedules if standby planes were not available.

The five main airfields were located on Eniwetok, Parry, Runit, Biijiri, and Engebi, with emergency auxiliary strips on two other small islands. Dispatching the 1-passenger L-5's was relatively simple, but

the 3-passenger L-13's created more of a problem. In order to utilize the aircraft to maximum capacity between islands and still meet the time schedules requested by the various activities, departure times were staggered and passengers grouped into threes, insofar as possible. Because the peak load occurred between 8:00 and 10:00 a.m. on outbound trips from Parry, and between 3:00 and 5:00 p.m. on return trips, the maximum number of aircraft were in operation during these critical periods.

Because of the prevailing wind conditions and the flight characteristics of the planes, it was sometimes necessary to "ground" the L-13's, and occasionally the L-5's as well, during periods of adverse surface winds. The winds aloft, of course, except when of typhoon proportions, created few problems.

Very often the visibility between islands, particularly during heavy rain squalls, would drop so low as to require instrument flying. Precautions were taken by flying up the chain of islands on the ocean side at 700 feet altitude and back down on the lagoon side at 500 feet. As a further safety precaution, a strict pattern was required on all take-offs and landings. All passengers and pilots were required to wear life jackets or "Mae Wests", and safety belts were securely fastened at all times during flight.

Although the final decision rested with the pilot it was the responsibility of the dispatcher to determine that no cargo was placed aboard an airplane which might create a safety hazard or in any way affect the stability of the aircraft. This, in some cases, meant stripping and re-rigging the aircraft, inasmuch as certain heavy instruments and equipment could not be delivered to the upper island by means other than air transport.

Occasionally it was necessary to transport an injury case from some northern island to Parry or Eniwetok for immediate medical attention. For this purpose, a "litter ship" was kept in readiness at all times. This was an L-5 with the aft seat removed. A litter could be placed horizontally in it, with a minimum of discomfort to the patient. In cases where it was thought advisable for an aid man to accompany the injured man, an L-13 could be stripped and converted for such a mission within a few minutes. In such instances, it was the responsibility of the H & N dispatcher not only to dispatch the L-13 with a minimum of delay, but also to make arrangements for an ambulance to meet the aircraft upon arrival.

Aircraft communications were of prime importance, particularly for continuous contact with aircraft in flight. Because of the nature of the terrain, an aircraft could go down on a reef without being observed by anyone; hence, the necessity for constant communication between pilot and control. This communication was accomplished by means of 2-way radio operating on 4765 kc, with transmitters located at the Parry and Eniwetok control towers. (This frequency applied to conventional aircraft only; helicopters operated on vhf and could be contacted only from Eniwetok.) All pilots were required to call "Parry Control" upon landing or taking off from any airstrip. A running record was kept of each flight, with

the estimated time of arrival (ETA) noted for each destination. Hence, if a pilot failed to call Parry Control" within a matter of minutes after his ETA, immediate steps were taken to ascertain that no engine trouble had occurred. In the case of malfunctioning or "rough" engine, the pilot would call "Parry Control", the airstrip would be cleared, and necessary fire-prevention and "crash" precautions set up for an emergency landing.

Radio was also used to good advantage in modifying flight plans of planes in flight. For example, an airplane enroute from Parry to Engebi could be stopped at either Runit or Biijiri in order to pick up additional passengers. By this method, transportation could be furnished from any point on the Atoll to any other point within 15 or 20 minutes of the time such request was received by the Parry dispatcher.

It was found that telephone contact between the Parry airstrip and Eniwetok was inadequate. Therefore, an Army field phone was installed between Parry Control and the Air Force Liaison Unit at Eniwetok. This precluded the necessity of operating through two separate switchboards and provided instant communications between these two key points at all times. Later, another field phone was added to provide contact with the "Rad-Safe" center, through which clearance had to be obtained for all flights immediately following "shot" days in order to avoid excess exposure of personnel and equipment to radioactivity. A direct-line "intercom" was required for contact with "Operations Control Center" and other activities from which clearance had to be obtained for each flight during critical operational periods.

Adequate safety precautions (for personnel and equipment) were taken at all times. For example, each airstrip was monitored by a fire-prevention or crash jeep during take-offs and landings. This jeep was manned by an H & N employee who had been thoroughly instructed in fire-prevention methods by the H & N Fire Department as well as by Air Force instructors.

During peak operations, the Liaison Unit furnished an officer and two enlisted men to assist at Parry airstrip. The H & N dispatcher was in over-all charge, taking care of all reservations and scheduling. It was the officer's duty to operate the radio and assist in getting the actual flights underway - a considerable task during peak loads. The two crew chiefs assisted in embarking the passengers, and in checking wheels, tying down wings, etc. They were also charged with operating the ground starting motor, which was used to start the L-13's. These aircraft carry a relatively weak battery which had to be conserved for starting on the upper islands where a starting motor was not available. It was not uncommon for an aircraft to average a landing every 10 or 12 minutes, and because the engine had to be cut during loading or unloading of passengers, the drain on the aircraft battery was excessive.

After various systems of dispatching were tried, standardization was made on the following: Airplanes were dispatched from the two most distant islands, Parry and Engebi, on the hour and on the half-hour, with pick-ups at Runit and Biijiri at 15 and 45 minutes after the hour. This sched-

ule was varied as the need arose, but it formed a basis of operations. For the sake of standardization in making out the Pilots' Log, the following flying times were used:

Parry to Eniwetok	5 minutes
Parry to Runit	10 minutes
Parry to Biijiri	15 minutes
Parry to Engebi	20 minutes
Between adjacent islands	5 minutes
Around entire atoll	55 minutes

It was also necessary to allow for time spent in loading and unloading. For example, although the flying time from Parry to Engebi was only 20 minutes, 5 minutes at either end for loading and unloading of passengers and cargo brought the actual elapsed time to approximately 30 minutes.

Schedules had to be flexible because of unavoidable delays caused by engine trouble, sudden squalls, etc. However, passengers were requested to be on hand at least 10 minutes before flight time, and the policy was adopted of waiting a maximum of 5 minutes for late arrivals. This of course applied only to routine flights, as special or top priority flights were tailor-made strictly to the requirements and convenience of the requesting party.

Normally, the first scheduled flights of the day left Parry at 8:00 a.m. and the first south-bound flight left Engebi at 8:30 a.m. Insofar as possible, all aircraft returned to Eniwetok by 12:00 noon, so that the planes could be fueled and then return to Parry with new pilots for the afternoon flights, which began at 1:00 p.m. Planes returned to Eniwetok by 5:00 p.m., if possible. However, it was necessary to make special flights almost daily from Parry to Eniwetok as early as 6:45 or 7:00 a.m.. in order for passengers to catch MATS or other early flights out of Eniwetok. This meant that the dispatcher's day began at approximately 6:30 a.m., which allowed him just sufficient time to inspect the condition of the airstrip before arrival of the first airplane. The importance of this inspection can not be too highly stressed, as very often objects were found and removed from the runway which would have created a serious safety hazard to aircraft landing in the semi-darkness. During test periods, runway lights were kept burning all night as a precautionary measure, but these runway lights served merely as boundary markers and were of little value in illuminating the center of the runway.

Very often, flights would continue on through the noon hour, and it was not unusual for special reconnaissance and weather flights to be made until as late as 11:00 p.m.

During the early phases of the Project, aerial "drops" were made on the island of Japtan. These drops usually consisted of mail, newspapers, or small parcels which would not be damaged. Drops were always made from a plane with no passengers aboard at sufficient altitude to insure the complete safety of both plane and pilot.

After the arrival of the helicopters, they were used in making landings on Japtan. However, these landings were difficult because when the

aircraft descended below the tops of the coconut trees, it suddenly lost its lift and dropped the last 10 or 12 feet too rapidly. Later, it was decided to discontinue aerial landings on Japtan and make all contact with that island by means of water transportation.

During the period from February 1949 through May 31, 1951, inter-island air transportation carried 33,001 passengers 815,536 passenger miles in seven L-5's, sixteen L-13's, and four H-5 or H-15 helicopters. Pilots flew more than 10,065 hours, and 35,008 landings were made.

CHAPTER 16.3

COMMUNICATION SERVICES

The Communications Department provided a telephone system, radio nets, intercommunications systems, public address systems, amplifiers and speakers for moving picture theatres, and other equipment and services. These facilities were provided throughout the Atoll, including the marine fleet operated by H & N and ships calling or stationed at the Atoll.

The Telephone Section of the Communications Department maintained telephone communications at all times between the islands of Eniwetok, Parry, Japtan, Runit, Biijiri, and Engebi. Telephone switchboards were installed on all of these islands except Japtan, which was directly connected to the Parry board. This telephone system used land lines on each island, submarine cables between islands, and submarine cables to certain mooring buoys at which operational craft were moored. In addition to the main telephone system, a great many special temporary telephone and intercommunication hookups were also installed during the operational period to meet the demands of the Users.

The Radio Section maintained numerous radio installations for communication from land to marine craft afloat, ships at anchor in the lagoon, dispatcher stations on various islands, and special stations required by Users during the operational phase. In addition to normal radio communications services, the Radio Section was called upon to supply such services as public address systems, amplifiers and speakers for motion pictures, and other equipment and services.

Many special problems resulted from unexpected demands placed upon the Radio and Telephone Sections by Users during the operational period and from such untoward incidents as the accidental tearing up of cables by heavy construction equipment.

The maintenance of the buried neoprene wire on outlying sites was a major problem because of the sharp coral and wet ground. It was used because individual pairs offered the flexibility necessary for the constantly changing requirements and because, even with added maintenance costs, analysis had shown that for short term usuage it was more economical than multiconductor cables. However, for future operations multiconductor cables should perhaps be considered if communication plans can be established sufficiently in advance, particularly for wiring serving the tower and the major test stations.

The Communications Department worked very closely with the communications officers and men of JTF-3, 3.1, 3.2, 3.3, and 3.4. No single group could have furnished these services without the full cooperation of the others. This cooperation was fully and mutually maintained on the part of all agencies.

TELEPONE SECTION

The Telephone Section furnished telephone service for the entire Atoll, except subscriber's loops and switchboards on Eniwetok, which were operated by the Communications Section of TG-3.2. The telephone system service accounted for about half of the work done; the other half was special services required by the Users. These special services included connecting, wiring and installing telemetering, teletype, sound power, and intercommunications systems as well as direct lines, private lines, timing circuits, public address systems, radio back-up, and siren warning network. Many of these services were of a type that had to be done anew for each experiment.

The extent of the work performed by the Telephone Section may be seen from the following list. The Telephone Section:

1. Connected telemetering circuits for various scientific groups.

2. Connected all cable pairs and wired the circuits through for all teletype circuits between Eniwetok and Parry; between Eniwetok and Parry and the buoys off Runit, the Aomon-Biijiri-Rojoa group, and Engebi; and between Eniwetok and Parry and the USS CURTISS (AV-4).

3. Operated sound powered telephones and intercommunications between stations.

4. Furnished direct lines for Rad-Safe to the outside of Building No. 69 on Runit, the Aomon-Biijiri-Rojoa group, and Engebi after each shot and extended these lines to the pier areas as soon as possible after each shot.

5. Furnished direct lines (in addition to telemetering circuits) from the top and base of each tower to Control Building No. 311 and to the CMR area on Parry.

6. Furnished direct lines from the CURTISS' buoys to the Command Post, Operations Center, and Control Building by rigging switches in the Parry telephone office.

7. Furnished ten direct lines from Task Force Building No. 221 on Parry to the switchboard on Eniwetok.

8. Connected private telephone line circuits between the Task Force Commander, his chief staff officers, TG-3.1, the Telemetering Building, Rad-Safe, Air Operations, and Marine Operations.

9. Connected a net work of private telephone circuits for the Firing Party between the powerhouses, piers, tops and bases of towers, Station No. 69 on Runit, the Aomon-Biijiri-Rojoa group, and Engebi.

10. Connected circuits for TG-3.2 (Building No. 15) on Eniwetok with JTF-3 (Building No. 221) on Parry.

11. Installed special public address system at the Officer's Beach Club on Parry and made connections to wire cable pairs to the Officer's Beach Club on Eniwetok for timing circuits and loudspeakers to furnish information to personnel at each shot time.

12. Connected weather circuits from Air Operations Center on Eniwetok to Control Building No. 311, Command Post, Operations Center, TG-3.1 on Parry, and the USS CURTISS.

13. Furnished cable pairs and wired circuits used for a radio backup of all telephone trunking and teletype lines between the telephone office and the Communications Center (Building No. 221, on Parry). Regular telephone equipment was tied into the AM/TRC for use in emergency such as damage to submarine cable, (no such emergency occurred).

14. Connected about 35 special circuits from Control Building No. 311 on Parry to other sites.

15. Reinstalled telephone service after each shot. The reinstallation between the first shot on Engebi and the E-Plus shot included 20 telephones and two 10-pair cables between Station No. 69 and the top and base of the E-plus tower for telemetering and for private lines direct to Parry.

Table 16.3-1 shows telephone installations by months for each site.

TABLE 16.3-1. TELEPHONE INSTALLATIONS

Date	Parry	Runit	Aomon Biijiri Rojoa	Engebi	Japtan
1950					
2 July	30	---	---	---	2
30 July	80	---	---	4	2
2 Sept.	95	2	2	12	6
30 Sept.	110	2	3	12	6
31 Oct.	141	3	6	12	6
30 Nov.	141	7	7	12	6
31 Dec.	162	8	12	35	6
1951					
31 Jan.	185	13	16	35	6
20 Feb.	214	28	24	73	9
31 Mar.	214	28	36	73	9
30 Apr.	300	5	54	30	8
30 May	150	2	2	5	3

No traffic surveys were made of telephone operation, but an estimate for the pre-operational period, December 1, 1950 to February 1, 1951, indicates:

Site	Calls per hour
Eniwetok	Army operated-no data
Parry	600
Runit	175
Aomon-Biijiri-Rojoa	225
Engebi	350

For the operational period, February 1, 1951 to May 25, 1951, the estimate indicates:

Site	Calls per hour
Eniwetok	Army operated-no data
Parry	1200
Runit	350
Aomon-Biijiri-Rojoa	425
Engebi	550

RADIO SECTION

The Radio Section was responsible for the installation and maintenance of equipment for a marine net, an aircraft net, an AEC net, public address systems, recreational radios, and record players. In addition, the Radio Section operated the movie equipment and recorded music programs. During the operational period, the section aided as well in the repair of Geiger counters and other equipment for Users. The main difficulties encountered were shortages of spare parts and the withdrawal of loaned equipment by the Army when the Korean action began.

The following tabulations show the extent of activity in the establishment and maintenance of radio facilities for the Project:

TABLE 16.3-2. MARINE RADIO NET EQUIPMENT

Radio-Equipped Stations	June-Oct. 1950	Oct.-Dec. 1950	Dec. 1950 Feb. 1951	Feb.-June 1951
LSU's	5	7	7	7
LCM's	-	-	-	5
Tugs	2	4	5	5
Water Taxis	1	3	3	3
Marine land station	1	2	3	4
Control station	1	1	1	1
Visiting ships, drydock, etc.	4	6	6	9

Equipment used: SCR 608, SCR 619, SCR 508, and RA 83 transmitter receivers. Net: Ship to ship, shore to shore, point to point, ship to shore.

TABLE 16.3-3. AIRCRAFT RADIO NET EQUIPMENT*

Location	No.
Parry	1
Runit	1
Biijiri	1
Engebi	1

*Equipment used: TCS 12 transmitter-receiver.

TABLE 16.3-4. AEC RADIO NET EQUIPMENT

Location	No.	Type
Parry		
Bldg. 212A	1	TCS 12
	1	SCR 510
Bldg. 323	1	TCS 12
	1	SCR 508
	1	SCR 510
	1	RCA intercom
Bldg. 221	1	TCS 12
	1	SCR 508
Bldg. 209	1	SCR 510
	1	intercom
Bldg. 311	2	SCR 543
	1	SCR 508
	1	RCA intercom
		Sound phones
JTF-3 Hdqtrs.	1	SCR 508
	1	SCR 510
Marine Oper.	1	RCA intercom
Air Dispatch	1	RCA intercom
Japtan		
Headquarters	1	SCR 508
Runit		
Bldg. 69	1	SCR 508
	1	RA 83
Sta. 18A	1	TCS 12
Tower	1	SCR 608
	1	RA 83
Biijiri		
Bldg. 69	1	SCR 508
	1	RA 83
Sta. 18A	1	TCS 12
Tower	1	SCR 608
	1	RA 83
Engebi		
Bldg. 69	1	SCR 508
	1	RA 83
Sta. 18A	1	TCS 12
Tower	1	SCR 608
	1	RA 83
Mobile Stations		
Truck (6x6)	1	SCR 510
Truck (6x6)	1	SCR 510
Truck (6x6)	1	SCR 510
Truck (6x6)	1	TCS 12
Weapons Carrier	1	SCR 510
Weapons Carrier	1	SCR 510
Weapons Carrier	1	SCR 510
Jeep	1	SCR 510
Jeep	1	SCR 508
Ship Stations (In addition to H & N Marine Net)		
Curtiss	1	SCR 508
LCPL	2	SCR 508
LST	1	SCR 508
Mowrer	2	SCR 508
	2	SCR 510
Working Parties		
All sites	50	SCR 300

TABLE 16.3-5. PUBLIC ADDRESS EQUIPMENT*

Location	June-Oct. 1950	Oct.-Dec. 1950	Dec. 1950-Feb. 1951	Feb.-June 1951
Parry	3	5	5	5
Japtan		2	2	2
Runit		3	3	3
Biijiri		3	3	3
Engebi	1	4	4	4

*Equipment used: 10-, 15-, and 30-watt amplifiers; Speco Max Mixers; Eicor and Sound Recorders; Jensen speakers; National (HRO) and Super-Pro receivers; miscellaneous microphones and 78 and 33-1/3 rpm turntables.

TABLE 16.3-6. MOVIE EQUIPMENT*

Location	No.
Parry	2
Japtan	2
Runit	2
Biijiri	2
Engebi	2

*RCA No. 400, 16-mm projectors and Jensen speakers.

TABLE 16.3-7. RADIO SECTION PERSONNEL

Job Title	June-Oct. 1950	Oct.-Dec. 1950	Dec. 1950-Feb. 1951	Feb.-June 1951
Supervision				1
Supervision and Repair	1	1	1	
Installation and Repair		1	1	
Repair	1	1	1	2
Installation				*5
Movie, operation and repair	1	1	1	1

(*Three installation men loaned by AEC)

CHAPTER 16.4

UTILITIES

Utilities for the production of power, for the distillation of water, for the disposal of sewage, and for fuel handling and storage were very important components of the operation and required a great amount of detailed effort on the part of all concerned in order to maintain the best possible service under the existing conditions.

Many special problems were encountered. Power and water distillation plants as originally designed for Parry and Eniwetok were inadequate to meet the demand of a population which increased far beyond the original and even later estimates. Difficulty was experienced in the sanitary sewage system because of low gradient. Original fuel storage facilities were inadequate in the light of increased requirements for fuel due to major expansion of power generation and water distillation facilities.

POWER GENERATION

Power plants for the generation of electrical energy were operated on the islands of Eniwetok, Parry, Japtan, Runit, Engebi, and Biijiri. Auxiliary power plants were installed on smaller islands for supplying electrical energy to photographic tower installations, and in addition the Army Communications Section, Radar Section, and other Users furnished their own power generating equipment. During the operational period additional small power generator sets were used for special purposes by the various Users. The following is a list of power plant equipment and capacities, by site.

Eniwetok

Generator Units	5 diesel, 142 kw 1 diesel, 195 kw	
Auxiliary Eqpt.		5 Caterpillar, 75 kw 3 International, 30 kw

Parry

Generator Units	6 diesel, 142 kw	
Auxiliary Eqpt.		3 Caterpillar, 75 kw 4 Palmer, 5 kw 1 Onan, 5 kw 1 Onan, 10 kw

Runit

Generator Units	3 diesel, 118 kw	
Auxiliary Eqpt.		2 Caterpillar, 75 kw

Biijiri

Generator Units	2 diesel, 118 kw 1 diesel, 195 kw	
Auxiliary Eqpt.		2 Caterpillar, 75 kw

Engebi

Generator Units	2 diesel, 118 kw 1 diesel, 195 kw	
Auxiliary Eqpt.		2 Caterpillar, 75 kw

Japtan

Generator Units	1 diesel, 118 kw	
Auxiliary Eqpt.		1 Caterpillar, 75 kw

Table 16.4-1. shows the kilowatt hours of electricity generated during representative months.

TABLE 16.4-1. POWER PRODUCTION, OCT. 1950-May 1951

Month	Eniwetok	Parry	Runit	Biijiri	Engebi	Japtan
1950						
October	344,700	252,400	———	———	26,200	38,500
November	316,100	252,800	———	———	87,200	34,500
December	320,800	281,800	15,800	6,500	92,400	36,800
1951						
January	312,500	343,200	52,200	30,600	102,400	39,900
February	370,700	345,100	64,200	41,300	96,100	41,800
March	459,700	437,100	92,400	79,700	154,300	49,500
April	481,200	525,800	18,200	111,500	93,400	56,800
May	469,900	415,500	———	30,100	60,800	50,200

WATER DISTILLATION, STORAGE AND DISTRIBUTION

Water distillation plants were established on the islands of Eniwetok Parry, Japtan, Runit, Biijiri, and Engebi for the production of distilled water for drinking purposes, bath and washroom facilities, mess halls, and other Users' requirements such as photographic laboratory, C.M.R plant, etc. The main distillation plants on each island were augmented by auxiliary Army field distillation units when demand exceeded capacity of installed plants. Prior to completion of the permanent plants on each of the islands mentioned, the water was supplied by batteries of Army field units, Cleaver-Brooks model 17-A, and Badger units.

A great deal of difficulty was encountered in both fresh and salt water distribution systems because of breaking and fracturing of transite

pipe and because of electrolysis which caused perforations and leakage in copper piping, especially in salt water systems.

Table 16.4-2 shows the number of gallons of water distilled at each site, by months.

TABLE 16.4-2. WATER PRODUCTION, SEPT. 1950-MAY 1951

Month	Eniwetok	Parry	Runit	Biijiri	Engebi	Japtan
1950						
September	———	1,178,200	202,918	166,419	468,372	117,180
October	1,772,400	933,008	155,202	231,110	430,109	102,325
November	1,510,200	867,215	165,019	209,814	389,092	104,916
December	1,750,118	133,310	222,214	288,034	517,410	148,212
1951						
January	1,617,004	1,220,811	176,132	240,109	444,617	119,913
February	1,617,201	1,489,612	215,029	276,181	462,912	134,243
March	2,640,121	2,106,237	268,193	392,212	605,319	191,812
April	2,843,610	1,964,003	25,375	252,014	334,996	160,400
May	2,334,810	1,851,614	———	90,102	205,204	148,206

A list of water distillation, storage and distribution equipment; by sites, is presented below:

Eniwetok (intake direct from lagoon)

Distillation	8 Cleaver-Brooks 60E, 600 gph 8 Badger, Army field, 150 gph
Fresh water storage	1 elevated steel tank, 21,000 gal 5 ground level steel tanks, 42,000 gal
Fresh water distribution	transite mains 3", 4", 6", 22,565 linear feet
Salt water storage	1 elevated steel tank, 42,000 gal
Salt water distribution	transite mains 4", 6", 22,000 linear feet 3 electric, 1 gasoline driven 50 gpm pumps

Parry (salt water well, twenty-four and one-half feet deep)

Distillation	4 Cleaver-Brooks 60E, 600 gph 18 auxiliary Cleaver-Brooks 17A, 150 gph
Fresh water storage	1 elevated steel tank, 21,000 gal 2 ground level steel tanks, 21,000 gal 1 concrete reservoir, 187,000 gal
Fresh water distribution	transite mains 3", 4", 9,110 linear feet

Salt water storage	1 elevated steel tank, 42,000 gal
Salt water distribution	transite mains, 4", 6", 10,238 linear feet

Runit (salt water well, sixteen feet, one inch deep)

Distillation	1 Cleaver-Brooks 60E, 600 gph 2 Cleaver-Brooks model 80E, 85 gph 3 Badger, Army field, 150 gph
Fresh water storage	1 elevated steel tank, 5,000 gal 1 ground level steel tank, 5,000 gal
Fresh water distribution	transite mains 3", 4", 1,353 linear feet
Salt water storage	1 elevated steel tank, 5,000 gal
Salt water distribution	transite mains, 3", 4", 1,353 feet

Biijiri (salt water well, sixteen feet, one inch deep)

Distillation	1 Cleaver-Brooks 60E, 600 gph 2 Cleaver-Brooks 80E, 85 gph 3 Badger, Army field, 150 gph
Fresh water storage	1 elevated steel tank, 5,000 gal 1 ground level steel tank, 5,000 gal
Fresh water distribution	transite mains, 3", 845 linear feet
Salt water storage	1 elevated steel tank, 5,000 gal.
Salt water distribution	transite mains, 3", 912 linear feet

Engebi (salt water well, sixteen feet, one inch deep)

Distillation	1 Cleaver-Brooks 60E, 600 gph 2 Cleaver-Brooks 80E, 85 gph 4 Badger, Army field, 150 gph
Fresh water storage	1 elevated steel tank, 5,000 gal 1 elevated pontoon, 1,285 gal 1 ground level steel tank, 21,000 gal
Fresh water distribution	transite mains, 3", 4", 1,790 linear feet
Salt water storage	1 elevated steel tank, 5,000 gal
Salt water distribution	transite mains, 3", 4", 1,610 linear feet

Japtan (salt water well, fourteen feet, five inches deep)

Distillation	5 Cleaver-Brooks 80E, 85 gph
Fresh water storage	1 elevated steel tank, 5,000 gal 1 ground level steel tank, 5,000 gal 1 ground level pontoon, 1,285 gal
Fresh water distribution	transite mains, 3", 3,300 linear feet
Salt water storage	1 elevated steel tank, 5,000 gal
Salt water distribution	transite mains, 3", 4", 3,380 linear feet

SEWAGE DISPOSAL

Underground sewage disposal systems were established and maintained on the islands of Eniwetok, Parry, Japtan, Runit, Engebi, and Biijiri, with proper outfall lines leading into the lagoon or the ocean. Table 16.4-3 shows equipment and installations by sites.

TABLE 16.4-3. SEWAGE DISPOSAL INSTALLATIONS

Site	Mains, 6- and 8- in. (linear ft)	Branches, 6- in. (linear ft)	Manholes	Outfalls (linear ft)	Culverts, 8- in. Corrugated
Eniwetok	12,267	—	43	1,440	Single
Parry	10,950	—	29	1,000	Double
Runit	1,182	318	5	500	Single
Biijiri	780	200	—	220	Single
Engebi	1,990	610	8	500	Single
Japtan	3,143	—	15	300	Single

FUEL HANDLING AND STORAGE

Fuel handling and storage facilities for POL products (gasoline, diesel fuel, oils, greases, etc.,) were maintained by the Service Operations Division at Eniwetok for Army requirements and at Parry for Holmes & Narver requirements. The requirements on the islands of Japtan, Runit, Biijiri, and Engebi were supplied from Parry by tank trucks; storage on these upper islands was in Army 1000-gallon cubes.

Gasoline storage facilities at Parry consist of one 42,000-gallon and four 10,000-gallon steel cylinder tanks, interconnecting 4-in. pipe and fittings to and from the pump house, to the truck loading rack, and to the refueling buoy between two mooring buoys in the lagoon. Total storage capacity is 82,000-gallons.

Diesel oil storage consists of five 42,000-gallon and five 10,000-gallon steel cylinder tanks, interconnecting 4-in. pipe and fittings through the pump house and to the refueling buoy. Total storage capacity is 260,000 gallons.

The POL pump house is a prefabricated aluminum building with a concrete floor, 825 square feet in area. Equipment consists of four 50-gpm electric pumps, two air eliminators, four 300-gpm dehydrators, and gauges, meters, valves, and connected piping. All the facilities, tanks and pump house, are surrounded by a 6-foot chain-link, barbed-wire fence and by a fire safety berm outside the area and equal in capacity to the tank storage.

Adjacent to the enclosed area is the fire-protection pump house, a one-story wood frame structure on a 120-sq. ft. concrete floor. An electric motor driven 3-in. pump connects to the 4-in. salt water line to provide high pressure to the two 3-in. underground lines feeding fire hydrants located on the south and east sides of the enclosure.

Table 16.4-4 shows POL disbursements of products by months.

TABLE 16.4-4. POL PRODUCTS HANDLED, SEPT. 1950-MAY 1951

Month	Bulk Mo-Gas	Drum Mo-Gas	Bulk Diesel	Drum Diesel
1950				
September	63,464	-	133,577	1,761
October	59,713	517	162,232	306
November	63,818	900	140,460	7,701
December	67,300	583	145,718	-
1951				
January	52,997	-	120,232	-
February	82,422	1,325	171,416	1,378
March	94,949	1,431	150,034	-
April	86,583	371	187,404	-
May	60,000	106	161,676	-

Note: In cases where "Drum" stock has been converted into "Bulk" stock, the quantities are shown under "Bulk".

CHAPTER 16.5

CAMP FACILITIES

The provision of camp facilities for complete services to a peak load of more than 2000 men was a major problem of service operations. The principal difficulties involved were caused by insufficient capacity of facilities originally designed for much smaller loads and by insufficient qualified personnel for service operations. Service facilities provided were housing, messing, laundry, barber shop, post exchange, recreation, and post office.

HOUSING

Housing facilities on Eniwetok, Parry, and Japtan consisted of aluminum buildings augmented by 4- and 8-man tents as required to meet the demand beyond originally anticipated numbers. On Runit, Engebi, and Biijiri, all personnel were housed in 4-man tents. For each 100 men an aluminum building latrine-shower was provided. Table 16.5-1 shows the housing provided at each site.

Housing as provided by aluminum buildings and by tents was in all respects satisfactory, although there were inconveniences because of unavoidable overcrowding during periods of peak population. Interviews with a representative cross section of employees indicate that the two general types of housing accomodations were equally satisfactory. It was found that tents deteriorate after about one year's use in the Eniwetok area and are seldom in usable condition after once being dismantled.

TABLE 16.5-1. HOUSING FACILITIES BY SITES

Site	Parry	Runit	Engebi	Biijiri	Japtan
4-man tents	50	54	179	70	-
8-man tents	50	-	-	-	-
18-man barracks	16	-	-	-	2
36-man barracks	12	-	-	-	2
100-man latrine-shower	6	3	5	3	in quarters
Planned capacity	1320	216	716	280	108
Overload*	406	-	-	-	108

*Twenty-five 8-man tents housed 12 men each; ten 18-man barracks housed 27 men each; two 18-man barracks housed 36 men each; four 36-man barracks housed 54 men each; and six 36-man barracks housed 72 men each.

MESS FACILITIES

Mess facilities for all islands of the atoll other than Eniwetok Island were provided and operated by H & N. This service was initiated with the activation of the interim mess hall on Eniwetok Island in June

1949 and ultimately involved mess facilities at Parry, Japtan, Runit, Rojoa, Engebi, and aboard an LST used for living purposes. From inception through June 30, 1951, approximately 2,300,000 meals were served by these facilities and the average number of persons served per day throughout the entire period was close to 1100. It will thus be seen that considerable expansion of this activity took place during the course of the project, involving an increase in size of each of the facilities provided and concomitant increases in personnel required, storage space, intra-atoll transportation of food, and the like.

Original planning contemplated cafeteria style service and space allocations for mess facilities were planned accordingly for the population levels which formed the basic criteria. As the project expanded in scope requiring additional construction personnel over planned levels, it became apparent that changes would be necessary to meet the new loads.

Thus, in the Spring of 1950 a study was made of the situation and the alternatives were considered of either increasing the capital investment in mess hall structures by increasing the size and serving facilities, or changing the type of service to permit more efficient space utilization. The latter alternative included the use of "plate-service" methods or family style service. It provided additional advantages in reducing waste and in practically eliminating long queues of personnel awaiting service.

Although either plate service or family style service would result in more efficient space utilization (and lower capital investment), the use of plate service methods appeared to require more kitchen and serving personnel. Thus, the choice was made to change from cafeteria style service to family style service, which in effect avoided expansion of mess hall facilities at that time. Such an expansion was ultimately required (in the early Spring of 1950) in order to accommodate still further increases in population which developed as time went on.

It might be noted that interviews with returning personnel in all classifications reveal that morale considerations weigh heavily in favor of family style service. These considerations include avoidance of waiting in line to be served, more appetizing appearance of the food, quantities can be chosen by the individual and greater sociability. While these factors cannot be evaluated in the monetary sense they definitely have an influence in reducing labor turnover and this is reflected in the low turnover rate experienced by H & N on this project.

The normal diet, arrived at after consultation with expert personnel in the field provided 5800 calories per man per day. The average cost of raw food per man per meal experienced throughout the project was seventy cents which compares favorably with recent data from a catering contractor to the effect that three on-continent contract yielded an average cost of seventy-three cents per man per meal for a supposedly similar diet served family style.

Other relevant statistics on mess hall operations for the period from inception through April 30, 1951, are as follows:

Number of meals served	2,155,893
Cost of Raw Food	$1,515,230
Dining hall direct labor (total of all sites - maximum equals 6)	$ 975,132
Income (@ $1.50 per man per day)	$1,076,937

To still further increase the understanding of the complexity of the mess hall operation in the face of increasing population levels it is believed desirable to tabulate the equipment and storage space provided. (See Tables 16.5-2. and 16.5-3.)

TABLE 16.5-2 GALLEY EQUIPMENT BY SITES

MAJOR EQUIPMENT ITEMS	PARRY	RUNIT	ENGEBI	BIIJIRI	JAPTAN
Kitchen range, oil, 2-oven	4	1	-	-	-
Kitchen range, oil	-	-	2	1	-
Range, electric	-	-	1	-	-
Oven, bake and roast	-	1	-	1	-
Oven, oil, 4-shelf	1	-	-	-	-
Oven, bake, oil	-	-	4	-	-
Oven, oil, traveling rotary	1	-	-	-	-
Steamer, vegetable, 4-shelf	1	-	-	-	-
Steamer, stock, 30-gallon	1	-	-	-	-
Steam cooker	-	1	2	1	1
Stock pot, steam 30-gallon	4	-	-	-	-
Kettle, steam-jacketed	-	1	3	1	-
Fryer, deep-fat	4	2	4	2	2
Mixer, food, 60-quart	2	1	2	1	-
Mixer, dough, 2-barrel	1	-	1	-	-
Griddle, electric	-	-	2	2	-
Potato peeler	1	1	1	1	1
Meatgrinder, electric	-	-	-	-	1
Food chopper	-	-	-	1	-
Doughnut machine	-	-	-	1	-
Slicing machine	-	-	1	-	-
Ice machine	2	-	2	-	1
Freezer, ice cream	2	-	-	-	-
Storage cabinet, ice cream	6	-	-	-	-
Dishwashing machine	2	1	2	1	-
Refrigerator	10	10	14	9	5
Total Refrigerator capacity, cubic feet	4,835	2,805	5,965	2,525	1,640

TABLE 16.5-3. REFRIGERATED WAREHOUSE SPACE

Unit	Capacity (cu ft)	No.	Total Capacity (cu ft)
Reefer, building No. 217	12,000 (approx)	1	12,000 (approx)
Outside supplementary	675	13	8,775
Outside supplementary	150	8	1,200
Chill storage, building No. 238	16,700 (approx)	1	16,700 (approx)
			39,675

Personnel required to operate all mess facilities during the peak operational period included:

Bakers	10	Dishwasher	14
Butcher	7	Kitchen helpers	25
Cook, first	25	Steward	10
Cook, second	29	Waiter, head	12
Dishwasher, head	5	Waiter	40

The planned mess hall capacities, peak messing loads, and number of seatings required are shown in table 16.5-4.

TABLE 16.5-4. MESS HALL CAPACITIES AND LOADS BY SITES

	Parry	Runit	Engebi	Biijiri	Japtan
Seating capacity	648	144	304	144	128
Operational Period Messing Load	1712	272	613	431	131
Seatings	3	2	2	3	1

In addition to the regular seatings shown in this Table; there were various groups whose duties required their being served before and after regular meal hours.

Under the direction of the Service Operations Division, the Camp Manager prepared all monthly requisitions for food 90 days in advance of requirements. Food consumption was estimated on the basis of manpower forecasts (both H & N and Task Force personnel fed by H & N), with the intent of maintaining a 60 day maximum supply of dry stores and a 30 day supply of frozen stores on hand at all times insofar as was possible. Some chill stores, such as lettuce, could not be kept in good condition more than 30 days; therefore shortages sometimes existed when the monthly refrigerated ship was delayed. Issues of food to the camps on Japtan, Runit, Rojoa, and Engebi were made from Parry warehouses normally twice a week, based on the anticipated population at each site. Daily movement of personnel (both H & N and Users) from site to site during the

operational phase made meal planning difficult and often resulted in the preparation of excess quantities of food.

Menus for each day were carefully planned and considerable effort was directed toward avoiding frequent repetitions of foods and stereotyped menus for each day of the week. The following are typical menus:

	Weekday	Sunday
Breakfast:	Fruit juice or canned fruit Hot or cold cereal Hot cakes or French toast Sweet rolls Coffee	Fruit juice Fresh fruit Cold cereal Ham and eggs Toast Coffee
Lunch:	Soup Beef stew Boiled potatoes Green vegetables Bread and butter Cold drink Ice cream or pie Coffee	Cold meats and cheese Potato salad Bread and butter Cold drink Pie Coffee
Dinner:	Salad Baked ham Sweet potatoes Green vegetables Bread and butter Pickles Ice cream, pie, or canned fruit and cake Coffee	Soup Salad Roast turkey Cranberry sauce Dressing Mashed potatoes Green vegetables Bread and butter Pickles or olives Ice cream and cake Coffee

LAUNDRY FACILITIES

A laundry facility was operated at Parry Island by the Service Operations Division for personnel stationed at Parry, Japtan, Runit, Engebi, and Biijiri. Regular days for pick-up and delivery of laundry were established and the entire operation was on a scheduled basis.

Prior to the operational period, it became evident that the laundry facilities at Parry as originally designed and installed would be inadequate. Therefore, increased laundry equipment (washers, extractors, driers, and pressers) was obtained and installed. With the completion of this added installation the facility was able to carry the load demanded by the increased personnel, including TG-3.2 MP detachments stationed on other islands. Table 16.5-5 shows laundry services rendered from July 1950 through May 1951.

TABLE 16.5-5. LAUNDRY SERVICES BY MONTHS

Month	Rough Dry Bundles	Finished Bundles	Sheets	Pillow Cases	Trousers	Shirts
1950						
July	3,800	590	11,800	5,800	960	1,400
August	3,880	865	12,900	6,500	1,480	1,875
September	5,360	1,445	17,700	8,880	2,650	2,825
October	4,442	1,517	15,120	7,878	2,808	2,915
November	4,550	1,859	15,480	7,670	2,870	2,620
December	6,275	2,540	20,700	9,370	3,830	3,350
1951						
January	5,890	2,995	17,070	8,800	4,340	3,895
February	5,705	4,220	19,310	8,960	5,530	5,035
March	9,270	5,880	28,720	13,680	8,570	8,310
April	7,430	6,740	25,590	12,620	12,070	11,450
May	5,120	5,380	17,220	8,470	11,670	9,720

The original laundry plant was equipped with the following machinery:

1 Washer, American, 36 x 18-in., 35-lb. capacity
1 Washer, Troy, 30 x 18-in., 20-lb. capacity
1 Washer, American, 42 x 54-in., 215-lb. capacity
1 Extractor, American, 20-in., 20-lb. capacity
2 Estractors (1 American, 1 Troy) 30-inc., 85-lb. capacity
4 Tumblers (Dryers), American, 36 x 30-in., 30-lb. capacity
1 Pants Pressing Unit, American, (3 pcs)
1 Shirt Pressing Unit, American, (4 pcs)
1 Shirt Folder, Bishop
1 Flatwork Ironer, 120-in.
2 Markers
1 Sewing Machine
1 Starch Cooker
1 Soap Cooker

In February and March 1951 additional equipment was added as follows:

1 Washer, American, 42 x 64-in., 265-lb. capacity
1 Extractor, Troy, 30-in., 85-lb. capacity
2 Tumblers, American, 36 x 30-in., 30-lb. capacity
1 Pants Pressing Unit, American, (3 pcs)
1 Shirt Pressing Unit, American, (3 pcs)
1 Shirt Folder, Bishop
2 Markers

BARBER SHOP

A four-chair barber shop was operated at Parry. The shop had a floor area of 288 square feet and was equipped with standard barber shop facili-

ties. The number of barbers varied with demands for service. On the other islands, hair cutting was done by non-professional "experienced" volunteers.

The following table shows gross receipts from the beginning of Holmes & Narver operation of this facility in February 1951:

Month	Gross Receipts
February	$ 633.00
March	744.00
April	1,122.00
May	1,059.00

POST EXCHANGE

Post exchange units were established and operated for the convenience of personnel on Parry, Runit, Engebi, Biijiri, and Japtan. These units stocked necessary items of clothing, towels, toiletries, magazines, candy, fishing tackle, watches, stationery, and other supplies. The main store at Parry, after being enlarged in March 1951, occupied a floor area of 1344 square feet, a third of which was used as customer area and the remainder for storage of stock. The Parry P.X. supplied stock for other stores, which were set up in makeshift locations. Table 16.5-6. shows the volume of sales for each site.

TABLE 16.5-6. POST EXCHANGE SALES BY SITES

Month	Parry	Runit	Biijiri	Engebi	Japtan
1950					
September	$ 9,044.00	$ 1,203.00	$ 1,612.00	$4,405.00	——
October	9,212.00	1,452.00	1,962.00	4,666.00	——
November	13,310.00	1,916.00	2,176.00	5,625.00	——
December	11,817.00	1,399.00	1,965.00	7,780.00	——
1951					
January	11,671.00	1,729.00	2,141.00	5,993.00	$ 774.00
February	17,599.00	2,197.00	3,656.00	6,630.00	1,122.00
March	18,655.00	1,956.00	3,576.00	6,663.00	154.00
April	22,556.00	34.00	2,720.00	2,746.00	1,526.00
May	30,420.00	——	768.00	2,977.00	2,284.00

CHAPTER 16.6

MEDICAL SERVICES

General health conditions on the Atoll were excellent. At the beginning of the Project there was no doctor provided by the Contractor; first aid treatment was provided by male nurses or first aid men and more serious cases were treated by the military doctor on Eniwetok. It was difficult to obtain the services of a licensed civilian physician because of isolation of the Project and because of the relatively low salary specified as compared with that obtainable on the continent.

Holmes and Narver established a dispensary at Eniwetok on June 26, 1949, with one head nurse in attendance. The first doctor arrived at the Jobsite on August 18, 1949. In October 1949, the Medical Department moved to Parry and set up a three-bed dispensary in a quonset hut. The permanent six-bed hospital, which was equipped with facilities for X-Ray, laboratory study, and diathermy, was completed and occupied on April 19, 1950. It cared for the majority of H & N employees requiring hospitalization or extended treatment. Dental facilities were added in July 1950.

As construction work progressed on the outer islands, first aid stations were established as follows: Engebi, March 1, 1950; Biijiri, May 15, 1950; and Runit, July 18, 1950. These first aid stations, with the exception of Engebi, were each staffed by one first aid man and treated only minor casualties. All other cases were referred to the Parry hospital after receiving first aid treatment on the outer islands. For the most part, a two- or three-man staff was in attendance at Engebi. A three bed dispensary was established at Engebi about December 1, 1950. The dispensaries on the off islands were maintained until the islands were evacuated.

The following treatment statistics cover all sites for the period June 26, 1949 to June 1, 1951:

Outpatient treatments	44,831
Average daily sick call	79
Hospital patients	670
Average hospital days per patient	4
Major operations	14
Minor operations	350
Immunizations	2,745

In addition, the Army Medical Corps installation on Eniwetok rendered the following services for H & N personnel:

Outpatient treatments	441
Hospital patients	19
Average hospital days per patient	7
Major operations	10
Immunizations	38
Physical examinations	23
Consultations	122

In turn, during the operational period, facilities were made available to the Army for a military dispensary adjacent to the Parry hospital. Also, Task Force personnel were treated at the H & N dispensaries on the outer islands and at the H & N hospital when the Army Surgeon was not available. Approximately 750 such treatments were rendered to Task Force personnel by the H & N staff.

CHAPTER 16.7

MAINTENANCE SERVICES

Marine equipment, vehicles, heavy equipment, and machine shop equipment were maintained by the operating sections of the Service Operations Division. Extraordinary machine shop maintenance and maintenance of buildings, utilities, laundry and galley facilities, etc., were the responsibility of the Maintenance Section. Special groups within the sections were formed for refrigeration service, construction painting, maintenance painting, and office machine service.

Periodic inspection of the hulls of marine craft was required. Operating crews kept constant check, and small repairs were made without beaching. Scaling, scraping, and painting were continuous operations. Maintenance crews made periodic inspections of all mechanical parts of vessels. Inspections included checking propellers for damage and proper pitch; checking shaft alignment, strut settings, and bearing alignment; checking engines, etc. Engines were taken out, overhauled, and repaired or replaced as necessary. Checks were also made of ramp hoists, anchor winches, pumps and other auxiliary equipment.

Maintenance crews made weekly or bi-weekly inspections, depending upon the equipment concerned, on all trucks, light hauling equipment, and personnel carriers, including pick-ups, weapon carriers, jeeps, and motor scooters. As a result of these inspections, necessary repairs were made on vehicle bodies, mechanical equipment, and electrical equipment. Routine service such as lubrication and tire service was included as a matter of course on each inspection.

Daily inspection and maintenance service was provided for all heavy construction equipment such as cranes, tractors, earth moving equipment, crushing plants, batch plants, road graders, road rollers, and ditchers. Repairs were made on this equipment whenever inspection indicated needs. Continuous inspection and service was also provided for all fixed heavy equipment such as lathes, drill presses, air compressors, and power tools.

All buildings required continuous preventive maintenance. Shower stalls and fittings required removal, cleaning, painting, and replacement periodically; window shutters were oiled at intervals of not more than sixty days to prevent corrosion and freezing; doors, door hardware, toilets, and mirrors required periodic check and attention; building roofing required continual checking to take care of leaks developing at bolt holes, and periodic sealing was necessary at base lines to prevent seepage. Continual check was also necessary around the bases of concrete foundation slabs to guard against wind and rain erosion and resultant undercutting. This inspection was made atleast every two or three months and necessary corrective measures taken.

Telephone instruments, electrical fixtures, plumbing and piping were under continual observation; and, as required, repairs were made.

Beds, tables, chairs, lockers, bedding, mattresses, pillows, mattress covers, sheets, and pillow cases required continuous unkeep, and for this work a continuous inspection and replacement program was established. Barracks cleaning and cleaning and maintenance of washroom facilities were carried on both by barracks' attendants and by maintenance crews operating on pre-established schedules.

Continual care and protection against deterioration was necessary in the upkeep of mess hall facilities such as tables, chairs, serving equipment, coffee urns, dishwashing facilities, and drinking fountains, as well as other miscellaneous units. This was done by operating personnel and by a roving maintenance group. All kitchen facilities such as stoves, bake ovens, deep fry units, steam kettles, meat processing units, potato peelers, hot water facilities, ice cream equipment, and allied facilities, required continual care as well as considerable maintenance to keep units free from dirt and to guard against improper operational procedures. Cleaning, steaming, and repair of garbage facilities was a daily function.

Refrigeration units, distributed throughout various buildings, required inspection and general maintenance as well as adjustment, cleaning, painting, and recharging; this was accomplished by a refrigeration crew on continuous duty.

All laundry machinery and equipment such as boiler house units, washers, dryers, and presses had to be maintained in a high state of efficiency for maximum output. Considerable adjustment and replacement of parts became necessary in order to maintain the desired standard of operation.

Fresh and salt water pipe lines had to be constantly checked; outlets, hydrants, and lines required continuous hydrostatic testing because leaks developed through deterioration of materials, particularly from electrolysis in copper piping. Elevated water tanks, towers, and accessories of these facilities required periodic cleaning, rust removal, and painting. Throughout the entire area, this became a continuous operation for a limited number of personnel. Ground storage tanks for both fresh water and petroleum products required constant checking; as rust and corrosion developed, necessary scraping, sand blasting, and painting was done. Portable fresh water systems were checked daily; water was tested against bacterial contamination and chlorinated as prescribed.

Because of the level terrain of the entire Atoll and the consequent low gradient of the sewer systems at all sites, it was necessary that they be closely watched to protect against clogging, which would result in backing up in the lines and flooding of quarters. Periodic pressure flushing of the systems was practiced to maintain free flow through the outfall; this flushing was done at least every two weeks.

The diesel operated prime movers and direct connected generators of the power and water distillation plant required constant observation and maintenance. Periodic cleaning, lubrication, and oil replacement were on a fixed schedule, depending on hours of unit operation. Periodically, as necessitated by engine performance, fuel injectors were removed, reworked,

and replaced. Auxiliary units were checked and necessary adjustments made. Diesel unit performance was checked continuously and, when found advisable, the units were overhauled or replaced. Fuel consumption records materially assisted in checking as to the need of these replacements. Electric generators were cleaned and checked periodically; continuous records were kept on output. Collector brushes were checked, adusted and replaced as required to retain satisfactory operating efficiency. Continuous observations were made of engine lubricating oil and exhaust temperatures, as well as of generator operating temperatures. Fuel tanks and lines were inspected to maintain satisfactory cleanliness and freedom from foreign matter. All panel board instruments were continuously checked, and adjustments, repairs, and replacements were made as needed.

Distillation units required constant observation to detect loss in efficiency of operation. Evaporators were cleaned on periodic cycles based on hours of operation. Compressor units received constant care, cleaning, and adjustment. Heat exchangers were watched for efficiency drops; difficulties were corrected as they arose. Fresh water, salt water, and acid systems required a large amount of maintenance, repair, and adjustment. This was especially important for acid circulating systems, in which pumps were constantly in need of repair and replacement. Storage tanks, both for water and for fuel oil, were maintained and protected against rust, corrosion, and deterioration by frequent cleaning, scraping, sand blasting, and painting.

In the electrical outdoor distribution system, all lines, switches, insulators, transformers, and poles were checked on a regular schedule; necessary corrective measures were taken as needs became apparent. These included cleaning of insulators, switches, and transformers, and periodic painting of transformers.

Electrical motors, auxiliary generators, and miscellaneous electrical equipment were inspected and necessary lubrication and adjustment given. When repairs were necessary, they were accomplished by exchange of units, and replaced units were given complete and careful overhaul.

Telephone systems required maintenance and upkeep of cables, lines, switchboards, instruments, and accessories; this phase of maintenance was continuous and heavy because of local climatic conditions. Radio communications equipment required considerable care, upkeep, adjustment, and replacement, and constant general supervision.

The Paint Shop personnel, under the direction of the Maintenance Superintendent, did all painting for new construction and all painting required in maintenance of buildings and facilities. Sand blasting, spray painting, and brush equipment were used as appropriate. Personnel attached to the paint shop varied with demand; a maximum of 25 painters were employed in the paint shop at one time. A sign painter was continuously employed in making necessary signs and notices required throughout the Project by the Contractor and by the various Users.

Office equipment such as typewriters, adding machines, and calculators, together with motion picture equipment, were maintained by person-

nel of the Maintenance Department with assistance from the Radio Department. The maintenance of office equipment was a continuous operation because there was an enormous quantity of equipment of this type and because weather conditions made for an abnormal rate of deterioration.

CHAPTER 16.8

RECREATION FACILITIES

Recreation facilities were provided on all islands where personnel were quartered. These included dayrooms, libraries, gymnasiums, athletic fields, hobby equipment, educational classes, beer halls, beach clubs, and snack bars.

The dayroom on Parry was 1960 square feet in area and provided lounge chairs, settees, reading lamps, newspapers, magazines, dart boards, card games, puzzles, writing desks, card tables, and ping pong tables. Later, a recreation hall was erected on Parry. It was a prefabricated aluminum building, 3473 square feet in floor area, containing four ping pong tables, three pool tables, and one billiard table, in addition to the recreation director's office and supply room. During the peak months, this facility remained open and in use from 10:00 a.m. until 11:00 p.m.

The dayroom on Runit was an 8-man tent equipped with essentially the same facilities as the Parry dayroom, except that it had no ping pong table. Biijiri had an 8-man tent for a dayroom, and two ping pong tables in a vacant tent nearby. Engebi had a 20 x 50 ft. quonset which served as a dayroom and provided similar facilities.

At all sites but Parry, the library took up a portion of the dayroom and the assistant recreation director acted in the capacity of librarian. At Parry only, the library was a separate room in the dayroom, measuring 100 square feet, and a part-time librarian was on duty every evening. Library hours generally were between 6:00 and 8:00 p.m. every evening.

Gymnastic equipment was available on all sites, but location of gymnasiums changed with the availability of structures on the various sites. Parry had a 20 x 50 ft. quonset available, containing a 20 x 20 foot mat, stall bars, parallel bars, punching bag, speed bags, lateral bar, skip ropes, and four barbell and weight sets. Biijiri used an 8-man tent to house punching bags and a weight lifting set. At Runit and Engebi punching bags and weight sets were installed outdoors.

Athletic activities in which inter-departmental and inter-island teams participated included softball, baseball, volleyball, basketball, swimming, horseshoes, ping pong, boxing, wrestling, judo, shuffleboard, miniature golf, and croquet. Of these, softball proved the most popular sport, both in participation and in spectator interest. All sites but Runit had softball fields; Parry had two, one lighted for night games. League play was held as often as interest demanded, with teams from all sites meeting as often as possible. Refreshments were sold, and games were announced over loudspeakers. In August and September 1950, Biijiri and Engebi combined for a four-team league; at the same time Parry had a six-team league, including teams from Runit and Japtan. In October 1950, a play-off was run, with six teams representing all sites. After this, transportation shortages and increased security requirements made it difficult to hold inter-island competition.

Because suitable buildings could not be spared, no hobby shop was set up but equipment was available for check-out from the recreation office at Parry. Equipment consisted of woodcarving sets, leather tooling kits, vibra-tool kits, and shell polishing kits. All were used continually.

Educational classes were held on all sites for irregular periods during the year. Spanish, navigation, first aid, swimming, art, Bible history, shorthand, and English were studied on various sites. Instructors were volunteers, some of whom received payment from the class members. Classes depended as much on the instructors' availability as on the interest of the class.

Beer halls and beach clubs were maintained at Parry. On the islands of Japtan, Runit, Engebi, and Biijiri no club facilities were established, but provisions were made for dispensing beer and liquor at specified periods each day. The Parry facilities consisted of one building with an area of 3472 square feet, 672 square feet of which was reserved for officers and staff; and three beach clubs, each with a floor area of 1504 square feet. The facilities on other islands were temporary and consisted mainly of tables and benches under sheds or canvas shelters.

Table 16.8-1 shows gross sales at each site.

TABLE 16.8-1. BEER HALL AND BEACH CLUB GROSS SALES BY SITES

Month	Parry	Runit	Biijiri	Engebi
1950				
September	$11,317.00	$2,543.00	$3,651.00	$6,683.00
October	12,455.00	2,263.00	4,072.00	7,343.00
November	13,780.00	2,440.00	4,372.00	9,147.00
December	11,808.00	2,460.00	3,592.00	8,089.00
1951				
January	12,176.00	2,116.00	2,901.00	8,279.00
February	19,684.00	4,250.00	5,097.00	9,783.00
March	18,578.00	4,106.00	4,927.00	7,497.00
April	22,514.00	—	4,562.00	4,902.00
May	21,622.00	—	1,440.00	3,910.00

A snack bar was established on Parry only. It was housed in an aluminum building with a floor area of 672 square feet. Of this area, 384 square feet were allotted to customer space, and 288 square feet to galley and fountain.

The following shows gross sales by months:

Month	Gross Sales
September 1950	$1,650.00
October 1950	1,588.00
November 1950	1,944.00
December 1950	1,501.00
January 1951	1,801.00
February 1951	2,374.00
March 1951	2,986.00
April 1951	4,142.00
May 1951	3,925.00

Outdoor movie theatres on all sites provided the following approximate seating capacity:

Site	Capacity
Parry	800
Runit	150
The Aomon-Biijiri-Rojoa Group	150
Engebi	250
Japtan	100 (in mess hall)

Attendance figures for the 12-month period ending May 31, 1951, are listed below:

Month	Attendance	Month	Attendance
June 1950	15,570	December 1950	22,476
July 1950	17,612	January 1951	27,654
August 1950	24,917	February 1951	25,956
September 1950	21,366	March 1951	26,952
October 1950	21,974	April 1951	25,617
November 1950	23,171	May 1951	24,430

Recreation facilities were coordinated by the Recreation Council, formed in November 1950, which united all operations working in behalf of personnel. The staff for recreation varied in size according to manpower at Jobsite. In June 1950, there were three men: a director, an assistant director, and a senior clerk. At the peak of operations six additional personnel were required to assure the desired service.

The Recreation Department organized various activities. Fishing parties went out from all four sites almost every Sunday. Two "fishing derbies" were held at Parry; each drew more than 100 entries for the all-day event. Lobster hunting was also popular, as was shell hunting. On Runit, Biijiri, and Engebi, shell hunts went out almost every week; on Parry, shell hunts were held once a month, averaging 110 men each trip. After February 15, 1951, shell hunts were curtailed because of security regulations.

Luaus were popular; two were held on Parry, two on Japtan and one on Runit. Hawaiian personnel handled all the food preparation and entertainment for these events.

Talent shows were staged as often as possible. All holidays were celebrated with local talent shows, and in November a group from Parry toured, showing at Eniwetok and Engebi. In January Engebi personnel presented a show at Parry. Jam sessions and sings were encouraged and were held frequently.

Tournaments were staged on all sites in such games as cribbage, chess, checkers, and bridge, with inter-island competition between all sites in cribbage, chess, and checkers, and between Parry and Eniwetok in bridge.

Trophies and awards were given to winners of tournaments in the many activities. The Special Services Branch of JTF-3 made a large donation of trophies for presentation in events in which the several armed services were entered.

Music was provided in the mess halls on all sites at noon and evening meals. Also, two 15-minute recorded programs were presented before the movies on all sites. Music records for check-out purposes were available at all times at the recreation office on Parry. There was a wide assortment of records for both 78 rpm and 33 1/3 record players.

Army Chaplains held Catholic services on Parry and Engebi every week and Catholic Mass on Runit and Biijiri every third week. Protestant services were held every week on Parry and Engebi.

POSTAL FACILITIES

Post office facilities operated through the Army post office on Eniwetok, APO 187. A central H & N postal facility was established on Parry, and it served branch offices at other sites. All mail, incoming and outgoing, and all money orders were routed from outlying sites to the central facility. Total area of the Parry post office was 576 square feet; personnel consisted of three full-time employees and part-time help as needed for distribution. From December 1, 1950 through May 31, 1951, there were 128,638 pounds of incoming mail and 116,379 pounds of outgoing mail. Post Office fees handled were as follows:

Money orders	$132,041.00
Money order fees	462.00
Registration fees	950.00
Insurance fees	1,845.00
Stamps	7,475.00
	$142,773.00

Section 17

SUPPORT OF SCIENTIFIC OPERATIONS

SECTION 17

SUPPORT OF SCIENTIFIC OPERATIONS

The support of scientific operations by H & N personnel was authorized pursuant to contractual provision which defined Job No. 5 of the A-E-C-M Contract. However, the full appreciation of the scope of the support rendered to scientific groups during the operational period in the spring of 1951 depends upon an understanding of the interrelationship between the support activities required by Job No. 4 and those required by Job No. 5. Article III, Title III, of Contract AT-(29-1)-507 defines the services to be rendered by H & N on Job 4 and Job 5 as follows:

JOB NO. 4 - CAMP OPERATION, MAINTENANCE & MANAGEMENT

1. The A-E-C-M shall furnish all labor, equipment, materials, tools and supplies for, and manage, operate and maintain the facilities including but not limited to housing, messing, commissary, medical service, (first aid and emergency treatment) and recreational facilities as are necessary to adequately meet the requirements of the Commission, the Los Alamos Laboratory, other authorized parties and the A-E-C-M at the site.

2. The A-E-C-M shall also maintain and operate all other facilities necessary to conduct the operations of the entire project including utilities, laundry, transportation, communications, etc.

JOB NO. 5 - SUPPORT AND ROLL-UP SERVICES

1. The A-E-C-M shall provide installation crews and equipment and accomplish such engineering and construction as may be required by the Commission in connection with instrumentation and other scopes connected with actual test operations and provide other labor, materials, equipment and assistance as may be required by the Commission. After test operations the A-E-C-M shall rehabilitate certain structures and facilities as determined by the Commission in order to place same in stand-by condition, and shall perform salvage, storage, and demobilization operations.

2. The A-E-C-M shall perform such other services as are related to the work outlined under Job No. 5.

The fulfillment of these defined duties is covered in this report in Section 16, Service Operations and in Section 18, Roll-Up, as well as in this section, Support of Scientific Operations, in order to categorize the relevant performance data. However, due to the interrelationship between these categories of duties, the most efficient and economical approach

to the accomplishment of the duties during the operational phase in 1951 required simultaneous consideration of all requirements throughout the planning, mobilization, and performance phases.

PLANNING

The planning for the support of scientific operations suffered in its early stages from the paucity of available criteria. True, it was known by June of 1949 that a Task Force Group would have to be supported on Parry Island. It was also conjectured, at that time, that the major construction effort would have been largely completed by December of 1950, and that as a consequence the H & N forces required for complete support would be somewhere in the neighborhood of 400 to 600 people; however, it was not until immediately prior to overseas movement of Joint Task Force 3 that many of the requirements for camp operation, maintenance, and mangement were resolved.

During the year and one-half preceding January 1951, the impact that the increase of construction requirements would have on Job 4 and Job 5 planning was not fully appreciated in some quarters. This situation was further complicated by the fact that firm criteria for various construction programs added to the scope of work during the course of the Project were delayed.

The planning difficulties that resulted from ignoring the obvious interrelationship between construction activities and Job 4 and 5 activities may be seen in the various attempts to fix a firm estimate of cost for these two Jobs. In July of 1950, H & N submitted an oral estimate of the cost for Jobs 4 and 5, based upon information gained at meetings at Los Alamos on June 28 and 29, 1950. This estimate was slightly in excess of $8,500,000. It was drawn in the light of knowledge of the over-all picture of the Project and based upon an interpretation of the criteria available at the time, as well as knowledge of the required magnitude and flexibility of organization which would have to play so important a part in the success of the actual test activities.

However, the Korean War and its impact on Department of Defense support of activities at Eniwetok Atoll had resulted in the formulation of an operational philosophy which limited activities to the barest possible essentials. In view of this philosophy, the estimate submitted was considered to be too high, and in order to assist in properly planning and estimating for Jobs 4 and 5, a letter stating new criteria dated August 23, 1950 was directed to H & N by the AEC[1]. The criteria established at this time were, in general, that three detonations would be effected during the 1951 tests, that the detonations would occur in order on Engebi, Aomon, and Runit, that Job 5 Work Orders would be incidental in number, and that roll-up activities would involve only a small standby crew in residence at the Military Garrison on Eniwetok.

[1]See Section 12, for full statement of the criteria established.

A new estimate totaling slightly more than $6,500,000 and based upon the criteria thus established was submitted for discussion purposes, and agreement was reached on the limited scope of activities for Jobs 4 and 5 late in October of 1950.

By January of 1951, however, it was apparent that the operational philosophy which sharply limited support activities would have to be abandoned. New requirements for support by H & N forces were being imposed. The four-detonation program, the first shot scheduled for Runit, was finally frozen, and the population levels which could be expected during the operational period were reasonably firm. Thus, at this late date, the magnitude of H & N activities under Job 4 and Job 5 was clear to all concerned, and definite planning was possible along the lines anticipated at the time of the submission of the eight and one-half million dollar estimate in July of 1950. It might be noted that the actual costs incurred as of June 30, 1951, on Job 4 and Job 5 were $5,844,512 and $2,414,572 respectively.

MOBILIZATION

In the light of the planning difficulties discussed above, the mobilization of a flexible organization to meet the wide variety of requirements imposed was not a simple task. It must be remembered that the requirement existed that all personnel be "Q" cleared prior to the operational period. This placed a long range limitation on any mobilization effort which is evidenced by the fact that it was ultimately necessary to relieve the security requirement with respect to approximately thirty H & N personnel for whom complete security clearances were not available at the operational deadline date.

In addition to manpower considerations in the mobilization effort for the support program, it was necessary to bear in mind that a wide variety of skills would be required. Furthermore, to afford flexibility, anticipation of the peak demands for personnel in each category was necessary, and materials and equipment availability for support activities under Jobs 4 and 5 was an additional factor to be considered in the mobilization effort.

PERFORMANCE

At the end of 1950, it was apparent from the fact that a great number of scientific groups would require support by H & N personnel in connection with experiments that a firm procedure for screening and establishing priority on Job 5 Work Orders would be required. Such a procedure was cooperatively established by AEC and H & N personnel at the Jobsite and provided that:

1. Work Orders were to be initiated by the scientific group requiring labor or materials.

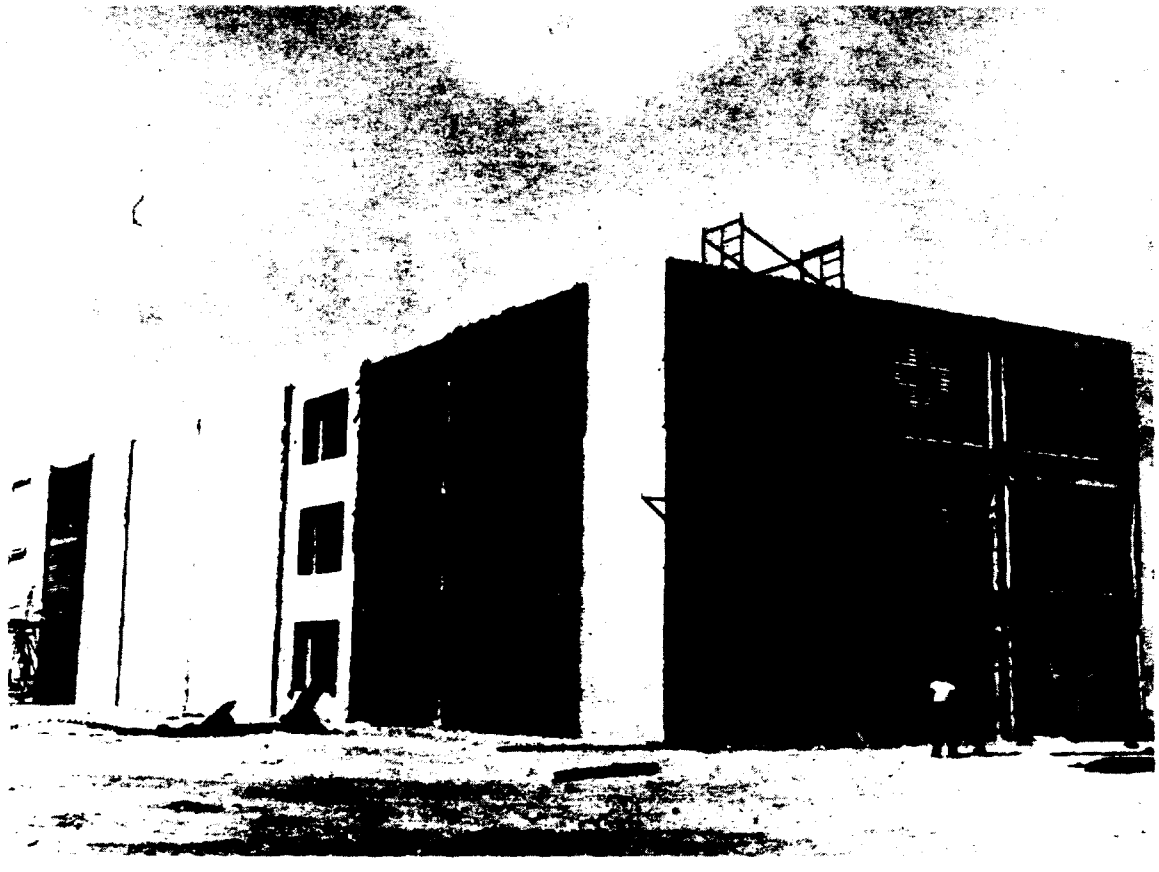
2. Work Orders would be channeled through the AEC Resident Engineer for approval and determination of the relative urgency of the work.

3. Approved Work Orders were to be forwarded by the AEC Resident Engineer to the H & N Resident Manager's Office for assignment to the proper department within the H & N organization and authorization to proceed.

4. Copies of Work Orders and Authorizations were to be forwarded to interested departments and divisions including the department responsible for the work, the Fiscal Division, and others as required.

The processing procedure from the preparation of the initial request by the User to scheduling by the responsible H & N department, as illustrated in Figure 17.1 normally took approximately half of a day. Urgent orders were handled orally and were followed by confirming paper work.

During the operational period, 1,123 Job 5 Work Orders were executed, involving the expenditure of approximately 286,680 manhours. These Work Orders are tabulated at the end of this section. The variety of requirements in terms of types of materials and classification of labor reflected in the 1,123 Work Orders processed is shown in Table 17-1, and an analysis of Users by programs is presented as Figure 17-2. It should be noted, as well, that a portion of the support services rendered included roll-up activities such as the recovery, cleaning, packing, and shipping of instruments and similar tasks related to putting the experimental portion of the Proving Ground into standby condition. The total costs involved in the support and roll-up program (Job 5) to June 30, 1950, were $2,414,572.20, of which $668,517.26 was attributable to Scientific Programs 2, 3, 4, 5, 6, 7, and 8.



Post-shot Survey of Damage to Army Station 3.1.1. Portable Scaffolding was Used to Assist Survey Crews.

Job 5 Support & Roll-up Program Incuded Disposal of Damaged Structures Such as This Station 3.3.8.

TABLE 17-1. ANALYSIS OF JOB 5 WORK ORDERS

ITEM	NUMBER
Labor (and Incidental Materials)	
Electrical	144
Carpentry	183
Plumbing	122
Repair of Office Equipment and Instruments	43
Heavy Equipment Labor	105
General Labor	137
Miscellaneous	64
Total Labor	798
Materials Only	
Electrical and Communication	77
Fuel - Oxygen, Acetylene, & Chemical	13
Tools and Equipment	54
Instruments	27
Construction Materials	144
Miscellaneous	10
Total Materials	325
Total of all Job 5 Work Orders	1123

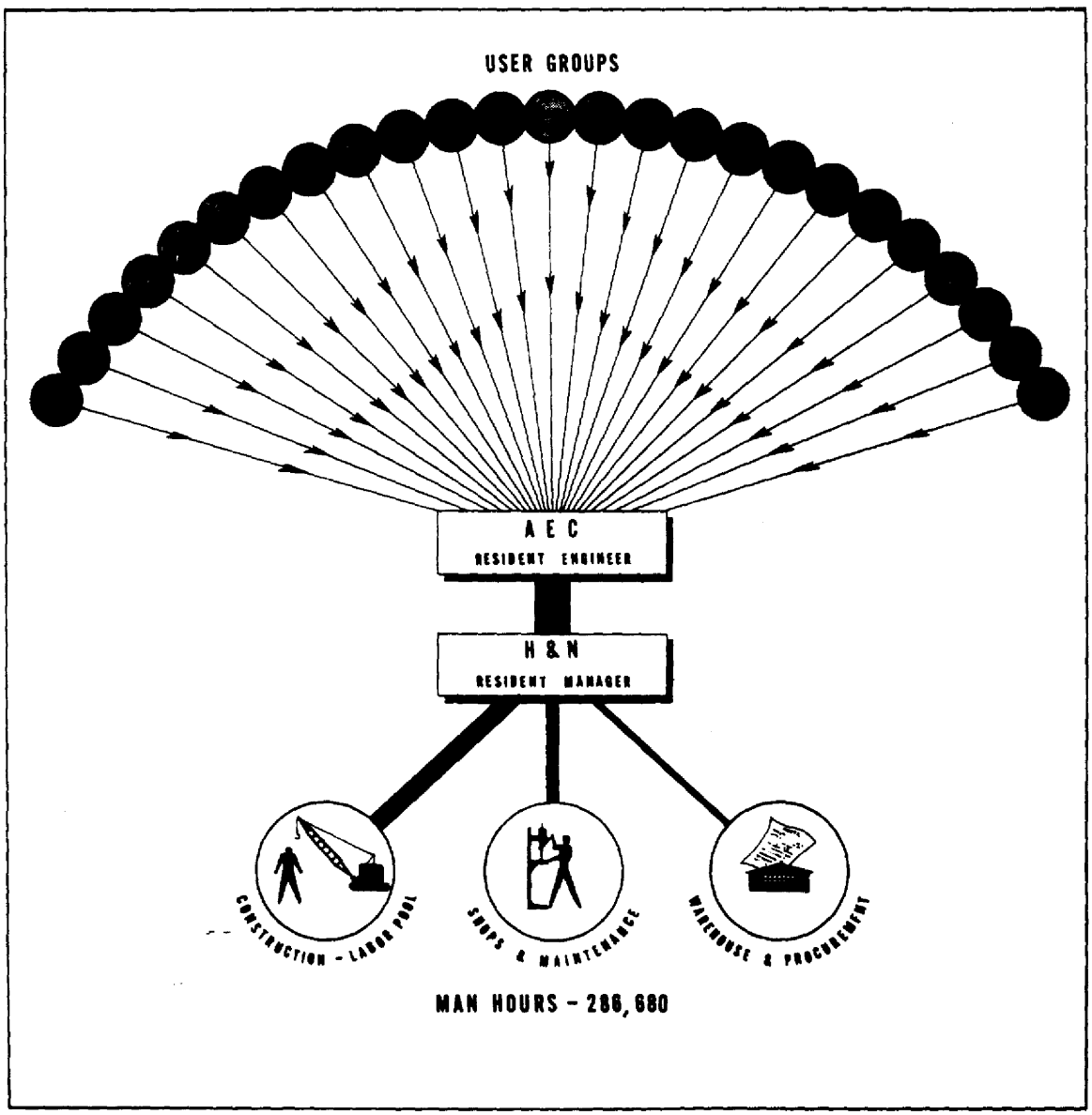


FIGURE 17-1 Flow of Job 5 Support Requirements

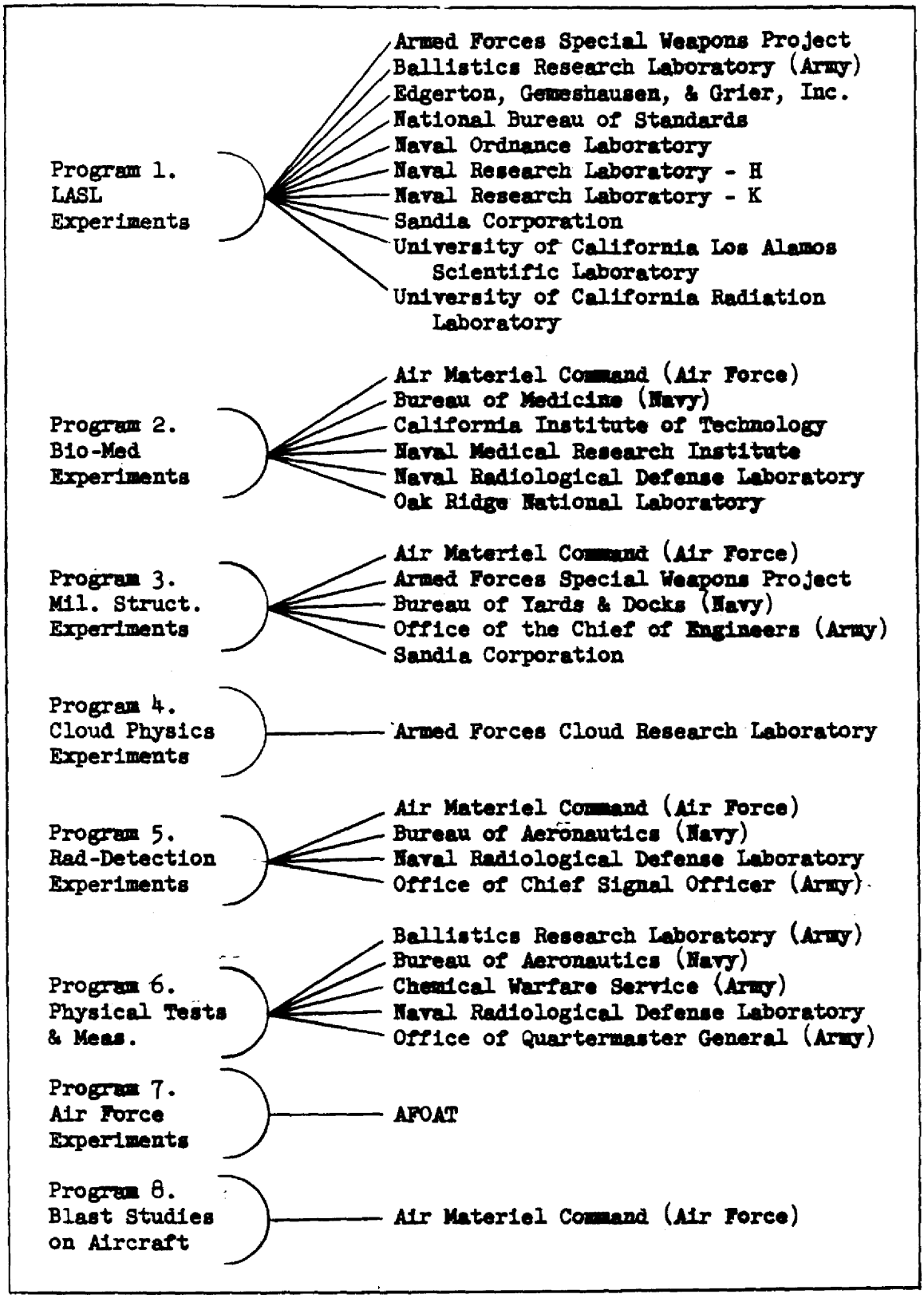


Figure 17-2. Principal Users, by Programs.

TABULATION OF
JOB 5 WORK ORDERS

AEC W.O. No.	Description	Date Issued	Site	User
1	Labor requisition.	12/15/50	B	Aero Jet
2	Supply two barrels of meter oil.	12/16/50	E	APG
3	Inspect and service vehicles	12/16/50	ALL	NRL
4	Furnish a reach-in refrigerator.	12/18/50	L	BIO
5	Furnish 300 gallons of gasoline per week.	12/18/50	E	APG
6	Fabricate 48 sheet metal shims.	12/20/50	B	Aero Jet
7	Furnish axes and tar swabs.	12/20/50	E	Prog. 3
8	Procure, pack, and ship tower area samples.	12/23/50	ALL	NRDL
9	Labor requisition.	12/26/50	B	Aero Jet
10	Furnish electrical wiring.	12/26/50	L	M-D
11	Furnish six pieces of angle iron.	12/27/50	B	Aero Jet
12	Labor requisition.	12/28/50	B	Aero Jet
13	Furnish steel channels.	12/28/50	B	Aero Jet
14	Labor requisition.	12/29/50	B	Aero Jet
15	Fabricate and weld grates and brackets.	12/30/50	B	Aero Jet
16	Construct coaxial cable rack for vehicle.	12/30/50	B	NBS
17	Repair electric mimeograph machine.	1/4/51	B	D-4, TG 3.1
18	Labor requisition.	1/9/51	E	NBS
19				
20	Labor requisition	1/15/51	E	NBS
21	Install flourescent light fixtures.	1/15/51	L	BU MED
22	Erect a 16' x 32' tent, without slab.	1/16/51	B	NRLK-UCRL
23	Perform modification of two IBU's.	1/17/51	ALL	BuMed

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
24	Perform necessary alterations to three LCM's.	1/17/51	ALL	All Users
25	Repair typewriter.	1/18/51	B	JTF-3
26	Requisition of plywood.	1/22/51	B	AMC
27	Requisition for piece of pipe.	1/22/51	B	Proj. 4.2
28	Perform alterations in Fire Station Bldg.	1/22/51	B	D-2
29	Fabricate film tank, frame, and reels.	1/24/51	B	D-2
30	Activate one each 24V Exide Aircraft Battery.	1/25/51	B	Proj. 4.2
31				
32	Metal work on Stations 121 A-E.	1/25/51	E,V	J-10
33	Material Requisition	1/25/51	B	Proj. 4.2
34	Regrind points for Whittemore gauge.	1/25/51	E	Sandia
35	Electrical work - Building 335a.	1/25/51	E	3.4
36	Make 12 signs,"DANGER HIGH VOLTAGE".	1/25/51	ALL	NBS
37	Place markers in tower and at ground zero.	1/25/51	E,V, C	All Users
38	Machine one stainless steel connector.	1/29/51	B	4.2
39	Relocate exhaust ventilation in Stations 54.	1/25/51	E,C	NBS
40	Move eight limonite concrete blocks from E to C.	1/25/51	E,C	LASL
41	Provide material and construct four "A" frames.	1/27/51	B	D-4
42				
43	Determine extent Stations 52 & 53 are settling.	1/30/51	C,E	NBS

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
44	Labor Requisition.	1/30/51	C	NBS
45	Requisition for plywood.	1/31/51	B	4.2
46	Requisition for Romex clamps.	1/31/51	B	D-4
47	Request for materials and labor.	1/31/51	B	D-4
48	Trench and provide labor to move cables.	1/31/51	E	NBS
49	Relocate Battery Racks on Stations 54 and 57.	1/31/51	C	NBS
50	Machine 14 pressure retainers.	1/31/51	B	D-4
51	Make and install shelving in Bldg. 211.	1/31/51	B	NBS
52 *	Labor requisition.	2/1/51	C	NRLH
53	Labor requisition.	2/1/51	C	NRLH
54	Assemble collimator blocks; lay lead brick.	2/1/51	C	J-3
55	Manufacture three wrenches.	2/2/51	B	D-2
56	Requisition for plywood.	2/1/51	L	2.3
57	Labor requisition.	2/2/51	D	NRLK
58	Requisition for plywood and washers.	2/2/51	B	4.2
59	Requisition for signs.	2/2/51	B	D-1
60	Install hasp bolt and supply padlock.	2/3/51	B	NOBL
61	Install hasps, locks, tool board, and hot locker.	2/2/51	B	LASL
62	Remodel and add benches in Machine Shop.	2/3/51	B	LASL
63	Construct monorails on 3 COE 2-1/2 ton 6x6 trucks.	2/3/51	B	TU 3.2.1

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
64	Furnish labor & material for scaffold & brackets.	2/3/51	E	NRLK
65	Requisition for labor and material.	2/3/51	E	NRLK
66	Provide bulletin boards, signs, incinerator.	2/2/51	B	JTF-3
67	Equipment and labor requisition.	2/3/51	M	All Users
68	Labor requisition.	2/3/51	E	NBS
69	Furnish and install hasp and locks.	2/3/51	E	NBS
70	Furnish and install hasp and locks.	2/3/51	C	NBS
71	Labor requisition.	2/8/51	B	LASL
72	Labor requisition; install bolt and lock.	2/5/51	B	NRLK
73	Modify eight welding head fixtures.	2/4/51	None	NRLK
74	Erect 14' x 28' tent over Tomb.	2/5/51	C	NBS
75	Erect temporary scaffold at 25' level on tower.	2/5/51	E	NRLK
76	Construct and place wooden coax braces.	2/5/51	E	NRLK
77	Labor requisition.	2/5/51	L	2.3
78	Locate and dig ditches; lay cable.	2/5/51	C	NOHL
79	Labor requisition.	2/5/51	E	NRLK
80	Modify 4" double strength steel pipe support.	2/6/51	B	4.2
81	Move and place eight limonite concrete blocks.	2/6/51	E,C	1.5.1
82	Furnish and install small air compressor.	2/6/51	B	LASL
83	Construct storage locker for drill press.	2/ /51	B	LASL
84	Construct work bench & install duplex outlets.	2/7/51	E,C,D	NOHL

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
85	Erect two 14' x 14' tents near Stations 123.	2/7/51	E,V	LASL
86	Surveying, stabilization, concrete & equipment.	2/7/51	C	4.2
87	Requisition for canvas.	2/6/51	E,C	NBS
88	Construct four wedge-shaped platforms.	2/7/51	C	NBS
89	Dig trenches between stations.	2/6/51	E	NBS
90 *	Dig trenches and pull cable.	2/6/51	C	NBS
91	Stabilize the floor areas of tents #592a, #592c.	2/7/51	C	NBS
92	Request for stabilization & excavation.	2/7/51	E	NBS
93	Install butane gas and remodel Bldg. 212A.	2/8/51	B	LASL
94	Provide materials & construct vehicle "A" frame.	2/7/51	B	Sandia
95	Construct rough benches and cutty stool as required at Sta. 6a.	2/8/51	C	NRLK
96	Furnish cherry picker for 30 days.	2/8/51	E,S	Prog.3.4
97	Requisition for metal stock.	2/9/51	B	LASL
98 *	Perform maint. on dehumidification units, etc.	2/9/51	ALL	All Users
99	Manufacture one set of shelves.	2/8/51	B	JTF-3
100	Alterations to Building No. 221.	2/8/51	B	JTF-3
101	Repair of Friden & Monroe Calculators.	2/9/51	L	2.1
102	Install hasps and locks on Building 211.	2/9/51	B	Prog. 3
103	Requisition for labor, material, and services.	2/9/51	E	NBS

* Supplements.

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
104	Requisition for labor, material and services.	2/9/51	C	NBS
105	Paint and install two signs.	2/9/51	B	NOBL
106	Construct and install shelf and rack.	2/9/51	B	NOBL
107	Install relay on receptable circuits in Bldg. 212A.	2/9/51	B	LASL
108	Install power in Station 133.	2/10/51	E	UCRL
109	Manufacture mail distribution box.	2/8/51	B	JTF-3
110	Make & install table shelf & 6 book shelves.	2/7/51	B	JTF-3
111	Repair typewriters.	2/10/51	L	Med-Bio
112	Construct four lockers of plywood.	2/10/51	B	NRLK
113	Install add. shelving & socket type outlets.	2/10/51	B	NRLK
114	Erect 14' x 28' tent over vault.	2/10/51	E	NBS
115	Install temporary field wire, and telephone.	2/10/51	E	NBS
116	Install temporary field wire, and telephone.	2/10/51	C	NBS
117	Erect four tents, 16' x 32'.	2/12/51	E,V	NRLK
118	Manufacture one spring tension gauge.	2/10/51	B	NRLK
119	Erect work benches; make dry boxes and shelves.	2/10/51	E,D	UCRL
120	Pour cement pad; erect work bench, dry box, shelf.	2/10/51	E,V, D	UCRL
121	Make bench; install outlets; stabilize floor.	2/12/51	E	NOBL
122	Manufacture three sheet metal messages trays.	2/12/51	B	JTF-3

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
123	Supply 5 pcs. bar steel, 10 pcs. round steel rod.	2/12/51	B	4.1
124	Drill 8 holes in 108 4" pipe flanges.	2/12/51	B	Prog. 4.1
125	Request for 100 board feet of lumber.	2/13/51	A	D-4
126	Increase depth of holes.	2/13/51	E	Prog. 4.2
127	Furnish 48 lag bolts with washers.	2/13/51	B	D-4
128	Furnish one crane from 16 Feb. thru 3 March.	2/13/51	E,S	Proj. 8.2
129	One 14' x 14' tent near Station 335A.	2/13/51	E	ABG
130	Miscellaneous radio maintenance.	2/13/51	B	NRL
131	Manufacture one incinerator.	2/12/51	B	JTF-3
132	Manufacture and install one outgoing mail box.	2/12/51	B	JTF-3
133	Miscellaneous radio installation & maintenance.	2/ /51	B	EG & G
134	Adjustment & maintenance of 12 SCR 300 sets.	2/ /51	B	NOHL
135	Miscellaneous radio installation & maintenance.	2/13/51	Misc.	Med Bio
136	Install plumbing, cooling system, & chimney-pipe.	2/14/51	B	NRLH
137	Install pierceway with 4 to 6 outlets.	2/14/51	B	3.1.6
138	Put new top cover on small folding table.	2/14/51	B	Prog. 1
139	Hang 2 mirrors, place 1 paper towel dispenser.	2/13/51	B	TU 3.1.5
140	Construct one table	2/13/51	B	TU 3.1.5
141	Construct two tables.	2/13/51	B	TU 3.1.5

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
142	Construct one bulletin board of beaver board.	2/13/51	B	TU 3.1.5
143	Miscellaneous radio installation & maintenance.	2/14/51	B	TU 3.1.4 WA
144	Construct one plywood blackboard for Bldg. 323.	2/13/51	B	TU 3.1.5
145	Repair typewriters.	2/14/51	B	JTF-3
146	Construct and install 72 bins in Reefer Bldg.	2/14/51	B	3.1.6
147	Recharge & activate 2 Exide Aircraft Batteries.	2/15/51	B	Prog. 4.2
148	Manufacture and install signs.	2/13/51	B	JTF-3
149	Supply bushings, light bulbs, & telephone wire.	2/15/51	C	NBS
150	Install locking bolt and lock in Building 211.	2/15/51	B	NRL
151	Supply 1 auxiliary power unit beginning 23 Feb.	2/15/51	S	Proj. 8.2
152	Install phones in Building 211.	2/15/51	B	Prog. 1
153	Modify forms to provide freeway for wiring.	2/15/51	E,V	1.7
154	Supply 75' 16 gauge, 4 wire rubber covered cable.	2/15/51	B	AMC
155	Request labor & materials for miscellaneous work.	2/15/51	B	LASL
156	Construct 23 wooden dosimeter racks.	2/15/51	B	RAD-SAFE
157	Fabricate four metal shields for oscilloscopes.	2/15/51	E	Sandia
158	Install squad tent, 16' x 32', with wiring.	2/12/51	B	JTF-3 (J-5)

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
159	Mfgr. & install cabinets, locking bars, hasps.	2/15/51	B	JTF-3
160	Install airstrip lighting & wind socks.	2/16/51	B,E	All Users
161	Install plywood in Rms. A-5, A-9, A-11, Bldg. 209.	2/16/51	B	D-3
162	Deliver 4 14' x 14' wall tents to E Warehouse.	2/23/51	E	Proj. 8.2
163	Mount 2 stud bolts on outside wall of Bldg. 69	2/17/51	C,D, E	TU 3.1.5 RAD-SAF
164	Provide wood table in entrance of Bldg. 69	2/17/51	C,D, E	RAD-SAF
165	Construct one heavy duty table.	2/16/51	B	NRLH
166	Construct 5 pcs.rough wooden shelving.	2/16/51	E	NRLK
167	Furnish & install tent outside of Bldg. 211.	2/16/51	B	NRL
168	Construct 2 lab benches; install outlets.	2/17/51	E	Prog. 6.3
169	Install temporary outlet in Bldg. 119c.	2/17/51	A	NRLH
170	Miscellaneous surveying.	2/17/51	B	NRLH
171	Overhaul electric motors to vacuum pumps.	2/17/51	C	NBS
172	Construct and install blackboards and runner.	2/10/51	B	TG 3.1
173	Install telephones in Tent #66 & Sta. 134.	2/17/51	E	UCRL
174	Deliver lumber to Station 53.	2/17/51	C	NBS
175	Construct two shelves & blackboard in Bldg. 211.	2/17/51	B	NBS
176	Locate & dig cable ditches; assist in laying.	2/17/51	E,D, V	NOBL

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
177	Install convenience outlet strip in Bldg. 232.	2/17/51	B	NRLK
178	Requisition for plywood.	2/17/51	B	CTU 3.1.3
179	Install anchor for a one inch nylon rope.	2/17/51	C	J-7
180	Request for miscellaneous work.	2/19/51	B	NRLH
181	Install power & lighting; relocate MP shack.	2/19/51	B	D-2
182	Bolt four 2 x 4's across ceiling of working space.	2/19/51	E,V	NRLK
183	Install add. coaxial line; dig trenches.	2/17/51	E,V	NRLK
184	Increase rating of utility circuits in Bldg. 212A.	2/19/51	B	LASL
185	Paint and install office designator shingles.	2/19/51	B	TG 3.1
186	Install add. electrical power outlet.	2/19/51	B	JTF-3
187	Secure misc. materials & supplies from Honolulu.	2/19/51	B	NRLK
188	Manufacture & install bulletin boards.	2/19/51	B	JTF-3
189	Supply 200 linear feet of 1" pipe.	2/17/51	E,V	1.7.1.2
190	Repair heavy shipping crate.	2/19/51	B	NRLK
191	Request 10 shts.1/2" plywood 28" x 28".	2/20/51	B	AFORL
192	Reinforce two anchors nearest zero.	2/20/51	E	AFORL
193	Locate reinforcing anchors for forward cables.	2/20/51	C	AFORL
194	Manufacture cabinet.	2/19/51	B	JTF-3
195	Install partitions in Building 221.	2/8/51	B	JTF-3
196	Supply lumber for tent frames, acetylene, oxygen.	2/19/51	E	Proj. 8.2

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
197	Install 3 lights inside commercial reefer.	2/20/51	B	TU 3.1.6
198	Furnish table & 2 chairs; install butt hinges.	2/21/51	S	Air Force
199	Remove siding from TF Bldg. & install window set.	2/20/51	B	JTF-3
200	Paint hot locker cabinets & tool board.	2/21/51	B	T.G. 3.1
201				
202	Seal doorway connecting Rm. A-5 & A-2, Bldg. 209.	2/21/51	B	T.G. 3.1
203	Provide tarpaulins with grommets in corners.	2/21/51	D	NBS
204	Provide tarpaulins with grommets in corners.	2/21/51	E	NBS
205	Provide tarpaulins with grommets in corners.	2/21/51	C	NBS
206	Paint interior of metal lined cavities.	2/21/51	E,V	Prog. 1.7
207	Supply 55 gal. drum of kerosene at Station 123.	2/21/51	E,V	Prog. 1.7
208	Erect one 14' x 14' tent with frame.	2/22/51	E	APG
209	Uncrate and erect 4 tables in Bldg. 209.	2/22/51	B	D-4
210	Spray dust palliative oil in and around tents.	2/22/51	C,E, D	NBS
211	Install control wires & add outlets in Sta. 135.	2/22/51	E	UCRL
212	Misc. carpentry & electrical work.	2/22/51	E	UCRL
213	Construct & deliver 2 soldering tables.	2/22/51	V,E	UCRL
214	Allocate warehouse space for instrument crating.	2/22/51	B	Sandia

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
215	Build an A frame; build one "hot" cabinet.	2/22/51	V	NRLK
216	Erect telephone relay racks in Stas. 132 and 141.	2/22/51	E	NRLK
217	Establish wiring freeway in 4-inch pipe.	2/23/51	E	LASL
218	Move 4 boxes from tower area to Sta.132.	2/23/51	E	NRLK
219	Requisition for the services of a crane.	2/23/51	E,S, Q,P	Proj. 8.2
220	Repair costumer - Reattach leg of tree.	2/23/51	B	JTF-3
221	Construct and paint one rack.	2/23/51	B	D-3
222	Furnish labor to open, empty, reassemble boxes.	2/23/51	E	UCRL
223	Erect one 14' x 14' tent with hot locker.	2/23/51	B	NRLH
224	Rewire lighting in office & lab; change outlet.	2/23/51	B	NRLH
225	Furnish labor to stretch 100,000 feet of cable.	2/23/51	E,D	NRLK
226	Supply one generator for auxiliary power.	2/23/51	V	NRLK
227	Construct four incinerators.	2/24/51	B	All Users
228	Furnish carpenter to build target at Sta. 132b.	2/24/51	E	NRLK
229	Furnish one welder for four days work.	2/24/51	E	AMC
230	Remove two secondary poles as an obstruction.	2/23/51	B	NRLH
231	Install buckets inside of doors in Stas. 54 & 57.	2/24/51	C,E	NBS
232	Manufacture 300 flanges for 7/8 cable.	2/23/51	B	NRLK
233	Run pipe from tank to tent; attach pump.	2/24/51	V	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
234	Furnish three pieces of plywood.	2/24/51	B	D-3
235	Remove partition between Rms. A-5 & A-9, Bldg. 209.	2/24/51	B	D-3
236	Supply varnish and paint.	2/24/51	L	MED-BIO
237	Furnish 4 laborers and 2 carpenters for misc. work.	2/24/51	E,V	NRLK
238	Make nine box handling hooks.	2/24/51	B	3.1.1.8
239	Fabrication of one set "Box Hooks".	2/ /51	B	D-4
240	Furnish 1 cherry-picker crane operator for 1 day.	2/26/51	L	Prog. 2
241	Install and maintain misc. radios and antenna.	2/26/51	B,C	RAD-SAF
242	Furnish one electric arc-welding rig.	2/26/51	S,Q, P	Proj. 8.2
243	Dig five holes and pour concrete.	2/26/51	E,S, Q,P	Proj. 8.2
244	Furnish & set up one 14' x 14' tent with frame.	2/26/51	C,E, D	NRLH
245	Mfgr. & paint tables; mfgr. & install signs.	2/24/51	B	JTF-3
246	One truck & two laborers to pick up empty boxes.	2/26/51	B	D-4, TG 3.1
247	Construct four "A" frames for vehicles.	2/26/51	B	D-4
248	Sheet metal repair-photocell containers.	2/27/51	B	NRLH
249	Furnish necessary labor & equipment.	2/27/51	B	LASL
250	Survey measurement.	2/27/51	B	Prog. 8 Gen
251	Provide tent flies; furnish labor for misc. work.	2/27/51	E,V	3.1.1.8

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
252	Cancelled	2/27/51	E,C	NBS
253	Supply one tent 14' x 14' and lumber.	2/27/51	E	Proj. 8.2
254	Furnish 100 feet of 2" x 4" lumber.	2/28/51	B	AFGRL
255	Furnish 5 gallons of linoleum cement.	2/28/51	B	Prog. 8
256	Provide 2 pieces of plywood, screws and bolts.	2/28/51	B	G/S TG 3.1
257	Install electrical outlets in Bldg.330.	2/28/51	B	CMR
258	Provide 5 sheets of plywood, box 8 penny nails.	2/28/51	B	EG & G
259	Install sink in Building 330.	2/28/51	B	CMR
260	Furnish one laborer with two shovels.	2/28/51	B	UCRL
261	Mfgr. 8 plywood benches and 3 racks.	2/27/51	E	NRLK
262	Reshape nail puller.	3/1/51	B	UCRL
263	Install two telephones in Bldg. 120.	2/28/51	B	JTF-3
264	Make up signs for Rad-Safe Building.	3/1/51	B	3.1.5
265	Provide & install lamps in plywood lockers.	3/1/51	E	UCRL
266	Install electrical wiring, switch, & outlets.	3/1/51	B	UCRL
267	Remodel two doors in Building 221.	2/24/51	B	JTF-3
268	Install sink & fresh water; repair power outlet.	3/1/51	B	J-3
269	Make sign; paint floor in JTF-3 Bldg.	2/27/51	B	JTF-3
270	Install & maint. radio set & intercom stations.	3/1/51	B,D, E	TU RAD-SAF
271	Mfgr. 30 sheet aluminum separator plates.	3/1/51	B	NRLH

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
272	Request material to install autoclave.	2/28/51	L	2-Med Bio
273	Mfgr. one plywood rifle stowage locker.	3/1/51	B	JTF-3
274	Dig cable trench; back fill & stabilize.	3/1/51	E,V	LASL
275	Request for lumber and brackets.	3/2/51	B	NBS
276	Request for two signs.	3/1/51	B	EGG
277	Install 3 drop light cords & 3 bench outlets.	3/2/51	V	UCRL
278	Procure & hang four sheets of plywood.	3/2/51	B	TU RAD-SAF
279	Furnish materials for shelving in Bldg. 232.	3/2/51	B	UCRL
280	Request for construction of Mail Box, HQS TG 3.1.	3/1/51	B	CTG
281	Request for misc. services of 2 men.	2/28/51	V	NRLK
282	Requisition for 4 telephone pairs in Bldg. 69.	3/2/51	D,E	All Users
283	Install 3 tents with one work bench ea.	3/2/51	C,D,E	EGG
284	Supply four radio tubes, type 117L7/M7-GT.	3/3/51	B	NBS
285	Inspect & adjust processing unit, Bldg. 210.	3/3/51	B	NBS
286	Perform misc. work on photo lab.	3/3/51	B	EGG
287	Requisition for electric & plumbing materials.	3/3/51	E	Proj. 6.3
288	Splice Submarine Cable.	3/3/51	B	EG & G
289	Build 3 benches & 1 cabinet for Stas. 132c, b.	2/28/51	V	NRLK
290	Furnish electrical wiring at Sta. 132b.	3/3/51	E	NRLK
291	Furnish five riggers for tower work.	3/2/51	E	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
292	Request to dismantle and store camp.	3/6/51	C,D,E	All Users
293	Request to store marine equipment.	2/27/51	All	All Users
294	Mothball generators, stills, pumps, etc.	2/27/51	All	All Users
295	Grade and cleanup area for storage.	2/27/51	B	All Users
296	Crate & ship instruments (Military & Scientific).	2/27/51	All	All Users
297	Store construction equipment.	2/27/51	All	All Users
298 *	Cleanup, disposal & protective maint. of Sc. Sta.	2/27/51	All	Sc. Prog.
299 *	Cleanup, disposal, protective maint. of Mil. Struct.	2/27/51	All	Mil.Prog.
300	Warehouse excess materials (all types).	2/27/51	All	All Users
301	Construct mail distribution box.	3/3/51	B	T.G. 3.1
302	Manufacture electrical connectors.	3/3/51	E	Proj. 6.3
303	Furnish one gallon battery acid.	3/3/51	V	NRLK
304	Mfgr. & install 2 signs, Building 120.	3/3/51	B	JTF-3
305	Request for shelving & window louvers.	3/3/51	B	JTF-3
306	Repair Monroe Calculators.	3/3/51	B	NRLH
307	Supply tanks of acetylene and oxygen.	3/5/51	B	D-3
308	Cut 65 Steel Plates.	3/ /51	B	Proj. 8.2
309	Repair Calculator in Bldg. 212 A.	3/ /51	B	LASL
310	Cancelled	3/5/51	B	NBS
311	Furnish one flatbed trailer and one forklift.	3/5/51	V,D	EGG

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
312	Install 2 Plywood Bulletin Boards in J-5 office.	3/3/51	B	JTF-3, J-5
313	Construct two wooden tables.	3/5/51	B	JTF-3
314	Connect 1 switch box & provide 3 outlets.	3/5/51	E	NRLK
315	Request for cutting Plywood.	3/6/51	B	NOHL
316	Construct shelter & complete safety rail.	3/6/51	B	NRLH
317	Repair of 12" Underwood typewriter.	3/6/51	A	ACC
318	Furnish carpenter to assemble & place hinges.	3/6/51	E	EG & G
319	Labor requisition.	3/6/51	V	NRLK
320	Request for miscellaneous supplies.	3/6/51	B	NBS
321	Furnish cable for underground installation.	3/6/51	C	NRLH
322	Furnish geog. positions of working and zero pts.	3/6/51	A,C, D,E	USC & GS
323	Furnish labor and equipment.	3/6/51	M,N, P,Q	EG & G
324 *	Request for 750 lead disks.	3/6/51	B	NBS
325	Labor requisition.	3/6/51	V	NRLK
326	Furnish 3 riggers to install & lash cables.	3/6/51	V	NRLK
327	Request for 3 electric hoists & 4 tackle blocks.	3/7/51	L	Prog. 2
328	Telephone & intercom. install. & maint.	3/7/51	B	JTF-3
329	Install two telephones & two extensions.	3/5/51	B	JTF-3
330	Furnish and install two plotting boards.	3/6/51	B	J-3 Div

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
331	Erect a tent behind Building 212B.	3/7/51	B	J-3
332	Furnish 200 feet of wire.	3/7/51	E	Prog. 6.3
333	Request for electrical supplies.	3/7/51	E	1712
334	Furnish labor to open and handle boxes.	3/7/51	B	NRLH
335	Mfgr. one stainless steel developing tank.	3/7/51	B	NRLH
336	Furnish 6 combination open end & box wrenches.	3/7/51	B	Prog. 1.5
337	Furnish 2500 feet of cable in 250 feet coils.	3/7/51	C	AFCRL
338	Recharge one 24 volt aircraft battery.	3/7/51	B	AFCRL
339	Provide stabilization & fill on Stas.132a.	3/7/51	V,E	UCRL
340	Mfgr. 4 adapters for acetylene cylinders.	3/7/51	B	NRLK
341	Perform miscellaneous carpentry.	3/5/51	B	JTF-3
342	Furnish & install plywood bulletin board.	3/7/51	B	T.G. 3.1
343	Pour concrete floor in Stations 101.	3/7/51	S,T	EG & G
344	Furnish labor to ream steel camera cover mounts.	3/7/51	E	EG & G
345	Furnish tent w/work bench & electrical outlets.	3/8/51	C	Prog. 6
346	Manufacture hot locker.	3/8/51	B	D-4
347	Request for one tent w/tarpaulin or wood floor.	3/8/51	C,E	Prog.8.2B
348	Erect guard shack w/light & telephone.	3/8/51	B	D-2
349	Construct marker by Structure 3.3.8h.	3/8/51	S	3.3.8H(AF)
350	Purchase 50 gallons of Rusticide.	3/8/51	B	NRLK
351	Provide additional telephone conductors.	3/8/51	B,C, D,F	EG & G

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
352	Install circuit breaker in station 132C.	3/8/51	V	NRLK
353	Cancelled by AEC Work Order No. 324-1.	3/9/51	E,C	NBS
354	Install two field phones.	3/9/51	E	APG
355	Fabricate two dust-free boxes.	3/ /51	A	6.1
356	Manufacture plates per sketch.	3/9/51	B	NRLH
357	Mfgr. & install shelving; perform maint.	3/9/51	B	UCRL
358	Install temporary power from 142a, b to 142c.	3/9/51	V	NRLK
359				
360	Furnish and erect tent.	3/9/51	B	D-4
361	Install hasps on two doors.	3/8/51	B	JTF-3
362	Cut holes in walls; install conduit.	3/9/51	V	LASL
363	Modify ramps of two LSU's.	3/9/51	B	TU 3.1.4
364	Furnish eight pieces of canvas.	3/10/51	B	AMC
365	Install collimators & lead brick wall.	3/9/51	C	LASL - J-3
366	Furnish miscellaneous metal stock.	3/10/51	B	Prog. 2.3
367	Construct a mail distribution box.	3/ /51	B	CTU 3.1.3
368	Furnish labor to install electrical equipment.	3/10/51	C,E	NOHL
369	Install shelving in Building 211.	3/10/51	B	NOHL
370	Paint 75 photocell containers with aluminum.	3/10/51	B	NRLH
371	Install power & switches to vacuum pumps.	3/10/51	V	NRLK
372	Assemble and adjust one Ditto Machine.	3/10/51	B	JTF-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
373	Remove & reinstall doors; furnish sealing liquid.	3/10/51	B	UCRL
374	Requisition for labor.	3/12/51	E	NOHL
375	Dig trench for NBS inter-communicating cable.	3/12/51	C	NBS
376	Erect barricade on road.	3/12/51	B	NOHL
377	Run check surveys on the NOHL stations.	3/12/51	C, D,E	NOHL
378	Activate three 24 volt batteries.	3/12/51	B	NOHL
379	Install addl. outlets in Building 211.	3/12/51	B	Proj. 5.1
380	Furnish miscellaneous electrical work.	3/12/51	B	T.G. 3.1.1.6
381	Furnish one electrician to connect pumps.	3/12/51	V	UCRL
382				
383	Furnish one laborer.	3/12/51	V	NRLK
384	Install two steel boxes at stas. 92a and 92d.	3/12/51	P	Proj. 8.2B
385	Mfgr. four bins & shelves of plywood.	3/ /51	B	D-4
386	Furnish & install 4 machine gun mounts.	3/12/51	B	D-2
387	Paint three signs.	3/12/51	B	D-2
388	Wire two plotting boards for electricity.	3/10/51		JTF-3
389	Perform misc. work at collimators.	3/12/51	E	LASL, J-3
390	One electrician to run service to station 144.	3/12/51	V	NRLK
391	Back fill front & sides of stations 55.	3/13/51	E,C	NBS
392	Misc. work at airstrip experimental area.	3/13/51	B	Prog. 8.3
393	Install two receptacles; connect regulators.	3/12/51	B	TU. 3.1.5

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
394	Perform necessary wiring for safelights.	3/12/51	B	TU. 3.1.5
395	Construct supports & deliver to Bldg.211.	3/13/51	B	JTF-3
396	Straighten frame for Corona Shroud.	3/13/51	B	UCRL
397	Furnish & connect fire hose with nozzle, Sta. 18.	3/13/51	C	T.G. 3.1.5.1
398	Connect wire grip to wire rope.	3/13/51	B	T.G.3.1.5.1
399	Supply dynamite & technician for instruction.	3/13/51	C	NOBL
400	Dig narrow ditch from 301j to camera stations.	3/12/51	E	Prog. 3.4
401	Erect & position reflectors on telephone poles.	3/13/51	C, D,E	EG & G
402	Change power system in 212A.	3/13/51	B	Group J-3
403	Install air conditioning unit in Building 212A.	2/27/51	B	1.5.1
404	Furnish crane & operator to lift vaults.	3/13/51	C,E	Proj. 4.2
405	Supply paper drinking cups to 3.1 Whse.	3/13/51	B	All Users
406	Manufacture one stainless steel tray.	3/13/51	B	NRLH
407	Install & maintain communications set and antenna.	3/14/51	B	CTG 3.1, D-3
408	Provide labor to place equipment.	3/14/51	E	NOBL
409	Furnish locksmith to open file safe in Bldg. 210.	3/14/51	B	TU 3.1.6
410	Repair typewriter & return to Bldg. 211.	3/14/51	B	NOBL
411 *	Install wiring & communication equipment.	3/14/51	B	Prog. 1
412	Misc. location surveys of sci. stations.	3/14/51	C, V,E	ATCU 3.4.3

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
413	Provide mechanic & portable banding machine.	3/14/51	C,E	NBS
414	Make 100 wood tripods with folding legs.	3/14/51	E	NBS
415	Sand-fill cover on tunnel at Stations 57.	3/14/51	C,E	NBS
416	Sand-fill cover on tunnel at Stas. 54.	3/14/51	C,E	NBS
417	Place fill over vaults & coax cable Stas. 52, 53.	3/14/51	C,E	NBS
418	Move shack to No. end of L; repair; elec. serv.	3/14/51	L	T.U.3.1.4
419	Furnish one laborer to NRLH.	3/14/51	B	NRLH
420	Furnish labor to excavate & backfill for cable.	3/14/51	C	NOEL
421	Provide waterproof covers for generators.	3/14/51	B	NOEL
422	Adjust Marchant calculator.	3/14/51	B	NBS
423	Bulldoze passage to tunnel entrance of Stas. 57.	3/14/51	C,E	NBS
424	Back fill front & sides of Station 56.	3/14/51	D	NBS
425	Purchase one roll manila rope.	3/14/51	B	NRLK
426	Issue tanks of oxygen, propane, acetylene.	3/14/51	B	Prog. 3.1.1.10
427	Rewire transformer bank IT-3; check voltage.	3/13/51	C	SBN 2.4
428	Install electrical outlet in Bldg. 211.	3/14/51	B	Prog. 5
429	Request for three signs.	3/14/51	B	TU 3.1.5
430	Construct 5 cabinets for Lab, Bldg. 211.	3/15/51	B	NOEL
431	Furnish carpenter to construct battery box.	3/15/51	D	UCRL
432	Manufacture ten brass cones.	3/14/51	V	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
433	Construct & install book shelf, Bldg.209.	3/14/51	B	TG 3.1
434	Furnish labor & material to construct hot locker.	3/14/51	D	UCRL
435	Manufacture or furnish 4 hot lockers.	3/14/51	V	NRLK
436	Furnish & perform misc. iron work.	3/14/51	C, D,E	LASL
437	Support to conduct Project 8.2 dynamite tests.	3/15/51	P,Q	Proj.8.2A
438	Install submarine cable between Site A and Buoy.	3/8/51	A	JTF-3
439	Fabricate 10 aluminum, non-magnetic tent pegs.	3/15/51	B	Prog. 7
440	Movement of steel boxes from Sta. 95a thru 95h.	3/15/51	C, P,S	Proj. 8.2
441	Furnish material, cut 50 blocks, and plywood.	3/15/51	B	TU. 3.1.5
442	Furnish lumber, plywood & hardware for cabinet.	3/14/51	B	TU. 3.1.5
443	Repair Calculators.	3/15/51	B	3.1.1
444	Install electrical wiring at Sta. 132b.	3/12/51	V	NRLK
445 *	Assist in Structures Program damage survey.	3/15/51	E	Prog. 3
446	Construct platform for radar antenna; and mount.	3/15/51	B	NOBL, AFSWP
447	Provide electrician to wire vacuum pumps.	3/15/51	E	NRLK
448	Furnish heavy-duty, 4-ton dump truck.	2/15/51	B	T.U.3.1.4
449	Provide salt water line to sinks in labs 6 and 7.	3/15/51	L	SBN 2.0

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
450	Carpenters to make battery racks, etc. at Sta. 60.	3/15/51	M	EG & G
451	Furnish carpenters for work in Bldg.210.	3/15/51	B	EGG
452	Furnish outline maps & med. scale outline maps.	3/15/51	B	TU.3.1.5
453	Furnish one piece of plywood.	3/16/51	B	Prog. 5
454	Furnish constr. plans; elevations for Sci. Sta.	3/16/51	A,C, D,E	USC & GS
455	Furnish steel plate & materials for protector.	3/12/51	C	NRLH
456	Furnish electrician for work in misc. stations.	3/16/51	E, C,D	NOBL
457	Furnish misc.plumbing fixtures for Bldg. 232.	3/16/51	B	UCRL
458	Mfgr. & install sign over door on Bldg. 222.	3/15/51	B	JTF-3
459				
460	Repair dark room trailer.	3/16/51	B	NRLH
461	Request for six grinding wheels (saucer shape).	3/16/51	E	RAD CHEM
462	Provide & install tent near Bldg. 229.	3/16/51	B	3.1.1.6
463	Furnish miscellaneous items from stock.	3/15/51	Various	NRLK
464	Move Sta. 26c to approx. 600' S. of zero tower.	3/16/51	C	NOBL, AFSWP
465	Request for various work at Sta. 313.	3/16/51	E	ACC
466	Furnish labor for work at Station 132b.	3/16/51	V	NRLK
467	Supply plywood for fabricating tables in Labs.	3/15/51	L	SBN 2.0
468	Provide & install red warning light at Bldg. 229.	3/16/51	B	NOBL

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
469	Furnish portable shower, tent, & shelving.	3/16/51	B	RAD SAFE
470	Provide two lead shielded cargo trucks.	3/16/51	B	TU. 3.1.1
471	Supply 40 ozalid each, of 7 sheets.	3/17/51	B	D-3,TG 3.1
472	Furnish electrician to move outlet Station 144a.	3/17/51	E	NRLK
473	Furnish labor & materials for valve seat rings.	3/17/51	B	UCRL
474	Supply 8 pieces of plywood, 16" square.	3/17/51	B	NBS
475	Request for 200 wood strips.	3/17/51	C,E	NBS
476	Request for three pieces of canvas.	3/16/51	B	Proj. 4.2
477	Sheet Metal Shop to make two film hangar racks.	3/17/51	B	TU 3.1.6
478	Supply 1 single line switch box and 12 6 Amp fuses.	3/17/51	C	NBS
479	Mfgr. & install rank plate brackets on vehicles.	3/16/51	B	JTF-3
480	Install double electrical convenience outlet.	3/17/51	B	JTF-3
481	Furnish labor for erecting panels and structures.	3/17/51	E	6.2
482	Make sign for J-3 Division.	3/16/51	B	JTF-3
483	Fabricate three cadmium shields.	3/17/51	L	SBN 2.4
484	Crew of four to do work for indefinite period.	3/ /51	E, C,D	NOBL
485	Modify auxiliary generator installation.	3/17/51	E,S	Proj.8.2
486	Build plywood base mounting for calculators.	3/17/51	B	CTG 3-1, J-7
487	Dig hole about 18" diameter and 27" deep.	3/19/51	B	Proj.5.1

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
488	Level and pave around various stations.	3/19/51	E	NOEL
489	Furnish electrical materials & plywood.	3/19/51	B,K	EG & G
490	Furnish misc. carpentry & welding.	3/19/51	E	UCRL
491	Insulate cable in switch box, Bldg. 232.	3/19/51	B	UCRL
492	Place steel pegs in concrete base at various Stas.	3/19/51	E,V	1.7
493	Install water facilities in Radiological Lab.	3/19/51	B	5.1
494	Reproduce forms in 120 copies.	3/19/51	B	Proj. 4.1
495	Install 1/2" pipe curtain rod in Bldg. 210.	3/19/51	B	3.16
496	Request for 100' of galvanized steel pipe.	3/19/51	A	1.7
497	Furnish air compressor to dry coaxial lines.	3/19/51	C	NRLH
498	Supply pipe, plywood sheets and disks.	3/19/51	C, E,D	NBS
499	Replace time switches w/manual switches.	3/19/51	All	D-2
500	Supply labor to recover collimator cameras.	3/19/51	D,E	1.5.2
501	Supply surveyors & electrician for misc. work.	3/19/51	E	1.5.2
502	Construct and mount small wood shelf.	3/19/51	B	D-3
503	Remove fence; move elect. equip.; install phone.	3/19/51	C, E,S	NOEL
504	Deliver 24 feet of 1/2 inch brass angle.	3/19/51	B	SBN 2.4
505	Make two wooden signs.	3/19/51	B	Proj. 5.1
506	Furnish carpenter to construct cable clamp.	3/19/51	V	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
507	Construct concrete blocks, supply sandbags.	3/19/51	E,V,D	1.7
508	Make & buoy wood battery box; run signal cable.	3/19/51	C	EG & G
509	Relocate signal cable.	3/19/51	C	EG & G
510	Furnish one generator set to Bldg. 211.	3/1/51	B	EG & G
511	Furnish one electrician.	3/19/51	E	NRLK
512	Transport 2 MG sets, gasoline tank and 10 boxes.	3/19/51	B,K	EG & G
513				
514	Furnish 12 pieces of masonite for clip-boards.	3/19/51	B	5.1
515	Furnish 2 pieces of plate glass.	3/19/51	B	UCRL
516	Furnish connectors & plastic light outlets.	3/19/51	B	NRDL
517	Erect one 14' x 14' tent with wood frame.	3/19/51	B	CMR
518				
519	Furnish one rigger at tower.	3/19/51	C	TU 3.1.6
520	Repair Monroe Calculator.	3/19/51	B	NRLH
521	Make five ozalid prints.	3/19/51	B	NBS
522	Sharpen and set one handsaw.	3/20/51	B	3.1.1.7
523	Electrical work; this cancels AEC - 511.	3/20/51	E	NRLK
524	Install 2 shelves; weatherstrip darkroom doors.	3/20/51	B	TU 3.1.6
525	Furnish as needed 15 bottles prestolite.	3/20/51	B	NRLK
526	Erect tent w/frame on existing concrete slab.	3/20/51	B	EG & G
527	Request one piece of plate glass.	3/19/51	B	JTF-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
528	Construct power outlet shelter on Sta. 131a.	3/20/51	V	UCRL
529	Mfgr. inner conductor connectors for coax cable.	3/20/51	V	NRLK
530	Eliminate light leaks around darkroom door.	3/19/51	E	1.5.2
531	Increase fuse capacity in power lines.	3/20/51	P,Q	AMC
532	Weld boiler plates.	3/20/51	E	1.5.2
533	Furnish two 6 volt storage batteries.	3/20/51	B	NRLH
534	Connect M-B-100 diffusion pumps.	3/20/51	V	UCRL
535	Provide assistance to line collimators.	3/20/51	V	LASL
536	Furnish 24 pieces of 1/2" plywood.	3/20/51	B	NBS
537	Stabilize a road.	3/20/51	B	All Users
538	Construct tent & frame, & photo projector stand.	3/19/51	B	UCRL
539	Remove casters from 2 dollies & weld on 2 racks.	3/20/51	C	NBS
540	Assemble & install 2 vacuum frame fume hoods.	3/20/51	B	CMR
541	Construct one reflector frame.	3/21/51	B	NOBL
542	Furnish one EE8 field phone.	3/21/51	K	EG & G
543	Furnish laborers to open boxes.	3/21/51	V	NRLK
544	Construct airlock at entrance to Bldg. 212-A.	3/21/51	B	LASL
545	Furnish labor & forklift to store rockets.	3/21/51	V	LASL
546	Construct four hot lockers in Bldg. 211.	3/21/51	B	D-3
547	Erect and supply tent & tent frame.	3/21/51	B	EG & G

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
548	Repair Yagi antenna assemblies.	3/21/51	B	TU 3.1.1.6
549	Furnish material for use by Med-Bio.	3/20/51	L	SBN 2.4
550	Fabricate & install steel strips on blast doors.	3/21/51	E	Proj. 3.1
551	Smooth & stabilize an area in front of 3.3.8f.	3/21/51	E	Proj. 3.3
552	Provide steamfitter, electrician, and materials.	3/21/51	B	CMR
553	Transport and erect two radar reflectors.	3/21/51	D	Prog. 8
554	Furnish labor for one day to move boxes.	3/21/51	V	NRLK
555	Repair one Monroe Calculating Machine.	3/22/51	B	EG & G
556	Assign & connect cable pairs in Phone Exchange.	3/20/51	B	JTF-3
557	Furnish data for rocket launcher installations.	3/22/51	E, D,V	NOHL
558	Remove & relocate outlet strip in Bldg. 210.	3/22/51	B	EG & G
559	Furnish 2 wood frames & 2 pcs. galv. screen.	3/22/51	B	TU 3.1.6
560	Install locking bar & locks on 2 file cabinets.	3/21/51	B	Proj. 5.1
561	Procure two hand magnifying glasses.	3/22/51	B	D-2
562	Install 6 outlets in Finishing Rm. of Bldg. 210.	3/22/51	B	TU 3.1.6
563	Furnish 44 pieces of plywood.	3/22/51	E	NRLK
564	Ozalid 15 copies of drawings.	3/22/51	B	TU 3.1.1
565	Perform necessary measurements in tower cab.	3/22/51	E,F, V,C	Prog. 1
566	Provide auxiliary power outlets.	3/22/51	B	TU 3.1.1

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
567	Install two blackboards.	3/22/51	B	TU 3.1.1
568	Mfgr. plywood container for transmissometer.	3/22/51	B	NRLH
569	Construct wood stand & secure to top of vault.	3/23/51	E	Prog. 7
570	Weld two 55 gallon drums together.	3/23/51	E	Proj.6.10
571	Dig hole near concrete shelter 3.1.3.	3/23/51	E	Proj.6.10
572	Construct small watertight box.	3/23/51	B	J-3
573	Panel or plank area on So. end of Bldgs. 329 & 330.	3/23/51	B	CMR
574	Furnish lumber.	3/23/51	B	5.1
575	Place reference points.	3/23/51	C,E, V	Prog. 1
576	Four ozalid copies of report.	3/23/51	B	EG & G
577	Fabricate rack.	3/23/51	B	CMR
578	Furnish one piece of brass.	3/24/51	V	NRLK
579	Install light with reflector.	3/24/51	B	D-2
580	Install ten telephones in Bldg. 221.	3/24/51	B	JTF-3
581	Place marsden matting on the north beach.	3/24/51	T	Prog. 2
582	Reface and regroove gasket plate.	3/24/51	V	UCRL
583	Design timbering and make sand fill.	3/26/51	E,C	NBS
584	Furnish labor to build collimating walls.	3/24/51	V	NRLK
585	Mfgr. & deliver partitions for Bldg. 222.	3/22/51	B	JTF-3
586	Repair eight typewriters.	3/26/51	B	D-4
587	Drill & open safe file; make repairs.	3/26/51	B	D-2
588	Repair Friden Calculator.	3/26/51	B	NOBL

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
589	Furnish services of clerk-secretary.	3/26/51	B	TG 3.1
590 *	Install chain link fence w/gate and lock.	3/26/51	B	TG 3.1
591	Install electric lamps in two calculators.	3/26/51	B	NBS
592	Remove & store windows and frames.	3/26/51	T	Proj. 3.5
593	Cut I beams, erect tent, & smooth black top.	3/26/51	E	3.1, 1.6, 4.2
594	Supply plywood and standard iron pipe.	3/26/51	B	NBS
595	Paint three signs.	3/26/51	B	D-2
596	Straighten and weld SK-Antenna.	3/27/51	B	NOBL
597	Make connections to allocate telephone pairs.	3/27/51	E,D, C	TU 3.1.5
598	Supply electrical materials.	3/26/51	B	JTF-3
599	Put piles of dirt along cable line.	3/27/51	C	J-3
600 *	Install magnetic switches w/push button.	3/27/51	Tower	All Users
601	Cut stencils for alphabet and numbers.	3/27/51	L	SBN 2.3
602	Miscellaneous mechanical work.	3/27/51	B	UCRL
603	Install lights in covers of 20 calculators.	3/24/51	B	TU 3.1.1
604	Make post-shot residual strength test on columns.	3/27/51	E	3.3.8
605	Make post-shot strength test on pre-cast concrete.	3/27/51	S	3.3.4
606	Furnish a direct line.	3/ /51	A,B	TG 3.1,D-3
607	Purchase 30 large bottles Prestolite.	3/27/51	Various	NRLK
608	Manufacture and install 24 feet of duct.	3/27/51	V	NRLK

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
609	Labor and material for coax project.	3/26/51	E	NRLK
610	Provide two direct lines with EE-8 Phones.	3/27/51	B	Prog. 1
611	Fabricate 2 pieces of plywood; provide 6 stakes.	3/27/51	B	8.2B
612	Chart made by Engineering section.	3/28/51	B	D-5
613	Furnish extension off MP phone to wooden tower.	3/27/51	B	NRLH
614	Ozalid 12 copies of graph.	3/28/51	B	D-5
615	Construct five wooden dosimeter racks.	3/27/51	B	TU 3.1.5
616	Construct box for film dryer.	3/28/51	B	NOBL
617	Extend two rods.	3/27/51	B	JTF-3
618	Insert lead disks.	3/28/51	C,E	NBS
619	Drive eight 2 1/2" pipes.	3/28/51	C	NBS
620	Make test placement of inner doors.	3/28/51	C,E	NBS
621	Drill four holes in limonite.	3/28/51	E	NRLK
622	Furnish telephone pair for telemetering.	3/28/51	B,C	Prog. 1
623	Machine work on gasket face.	3/28/51	B	UCRL
624	Construct temporary plywood doors.	3/28/51	E,V	UCRL
625	Machine expansion engine valve stem.	3/28/51	B	CMR
626	Two photo. auto. adjustable enlarging easels.	3/29/51	B	TU 3.1.6
627	Provide 1 3-dimensional Radex Plotting Device.	3/24/51	B	JTF-3
628	Furnish plywood, stove bolts & misc.tools.	3/28/51	B	JTF-3
629	Furnish stripping on panels in Conference Room.	3/28/51	B	JTF-3

JOB 5 WORK ORDERS (Continued)

AEC W.O. No.	Description	Date Issued	Site	User
630	Mount eight blackboards in Bldg. 209.	3/29/51	B	TG 3.1
631	Make two light boxes for classification of film.	3/29/51	B	TG 3.1
632	Furnish projector condensing lenses.	3/29/51	B	D-2
633	Fold up 10' aluminum angle; make 12 brackets.	3/29/51	B	EG & G
634	Modify Air Operations Building.	3/26/51	B	TG 3.1, TG 3.4
635	Survey two radar reflectors.	3/29/51	C,D, K,M	Prog.8
636	Miscellaneous electrical wiring.	3/29/51	V	NRLK
637	Provide cable pair.	3/29/51	B	JTF-3
638	Make cross connections & terminations.	3/29/51	B	JTF-3
639	Change extension on line 156 to ext. 157.	3/29/51	B	JTF-3
640	Supply 6 pieces of plywood.	3/30/51	B	J-3
641	Labor, equipment & material for misc. work.	3/30/51	D,P	TG 3.1 (8.2B)
642	Haul 1/2 cubic yard of sand.	3/29/51	C	SBN 2.4
643	Remove fences around transformers.	3/29/51	C	All Users
644	Dispose of Pylons and Structures.	3/29/51	E,S, Q,P	8.2
645	Furnish lumber to build shelves.	3/29/51	B	3.1.5
646	Furnish one carpenter to block up batteries.	3/30/51	E	NOHL
647	Weld camera mount component.	3/30/51	B	EG & G
648	Drill & open safe; make repairs & repaint.	3/30/51	B	D-3
649	Purchase 100 lbs. 1/8" Silfoss silver solder.	3/30/51	V,E	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
650	Install selector switch and bracket on phone.	3/30/51	B	Prog. 1
651	Furnish benches from theater at C to USNS Mowrer.	3/27/51	C	Prog. 3
652	Connect gasoline drums to generators.	3/30/51	K	EG & G
653	Install two lights in Gun Locker.	3/30/51	B	JTF-3
654	Recharge one battery.	3/30/51	B	4.2
655	Deliver two portable generators.	3/30/51	A	ACC
656	Move Station 174 to closest dry land.	3/30/51	D	EG & G
657	Furnish material for permanent shelves.	3/30/51	B	TU 3.1.5
658	Furnish carpenter to build shelves in Sta. 141b.	3/30/51	V	NRLK
659	Machine two vacuum tank cover plates.	3/30/51	B	UCRL
660	Furnish two carpenters to make relay boxes.	3/31/51	E	EG & G
661	Chip concrete grouting.	3/29/51	E	NBS
662	Print signs on light weight cardboard.	3/31/51	B	D-3
663	Repair two Friden calculators.	3/31/51	B	TU 3.1.1
664	Fabricate three steel plates.	3/31/51	B	NRDL
665	Furnish and manufacture six tarps.	3/31/51	B	D-3
666	Install & wire fan; install door latches.	3/30/51	V	NRLK
667	Construct two wooden camera carrying racks.	3/31/51	C	EG & G
668	Furnish two plywood signs.	3/30/51	E	NRLK
669	Install EE-8 phone in Building 209.	3/31/51	B	D-3
670	Fabricate & weld steel plates & helmets.	3/31/51	B	NRS

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
671	Mfgr. 12 covers for lead film carrying cases.	3/31/51	B	NRLH & NRLK
672	Protect dehumidification equipment.	3/31/51	C	NRLH
673	Furnish 2 cranes, 1 tractor and 3 operators.	3/31/51	C	NRLH
674	Ship 48 jars Handy Flux.	3/31/51	E,V	NRLK
675	One laborer to cut 22 pcs. used canvas.	3/31/51	B	J-3
676	Fasten face plate to blockhouses; move generator.	3/31/51	S,T	Proj. 6.2
677	Install lead shielding; sandbag transformers.	3/31/51	E	NRLK
678	Furnish 36 pieces of plywood.	4/5/51	B	NBS
679	Construct record storage box.	4/5/51	B	NORL
680	Mfgr. four shielded film carrying cases.	3/31/51	B	NRLK
681	Run conduit for control wires; reconnect 3 phase.	4/2/51	V	UCRL
682	Remove casters from 2 dollies & weld to racks.	4/2/51	E	NBS
683	Dig hole 18" x 18" x 24".	4/2/51	B	Proj. 5.1
684	Fabricate two pipe plates, & two sections	4/2/51	B	NBS
685	Install water filter; furnish filter cartridges.	4/2/51	B	TU 3.1.5
686	Install pipe between spigots; add one spigot.	4/2/51	B	TU 3.1.5
687	Manufacture paper cutter.	4/2/51	B	Proj. 5.1
688	Install elec. line to provide lights in trailer.	4/2/51	B	JTF-3
689	Install telephone in Photographic Trailer.	4/3/51	B	JTF-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
690	Recharge one battery.	4/3/51	B	Proj. 4.2
691	Hang door in Room A-13, Bldg. 209.	4/2/51	B	D-2
692	Move dural and steel racks at Sta. 624.	4/3/51	S	Proj. 6.2
693	Replace J-5 Office Tent with new tent.	4/3/51	B	JTF-3
694	Pitch a 14' x 14' tent with side frames.	4/3/51	B	Prog. 7
695	Furnish operator for Rad-Safe shower pump.	4/3/51	B	RAD-SAF
696	Maintenance for radio equipment.	4/3/51	A	Prog. 6.1
697	Construct pigeonhole sorting bin.	4/3/51	B	D-4,TG 3.1
698	Install & maintain radio equipment.	4/3/51	B,E	Prog. 3
699	Erect a barricade in coax cable trench.	4/3/51	E	UCRL
700	Rout 40 masonite sheets.	4/3/51	L	SBN 2.4
701	Move five lead shields.	4/3/51	C,E	SBN 2.4
702	Install two plywood bulletin boards.	4/4/51	B	TG 3.1
703 *	Furnish cherry picker operator.	4/4/51	C	J-3
704	Install light outside door of Bldg. 212A.	4/4/51	B	J-3
705	Install shielding in 200' tower.	4/4/51	V	NRLK
706	Fabricate two 9" x 3" copper cylinders.	4/4/51	B	UCRL
707	Mfgr. one stainless steel developing tray.	4/4/51	B	NRLH
708	Furnish 12 pieces soft pine lumber.	4/4/51	B	Prog. 1.7
709	Install slide bolt, staple, and hasp.	4/4/51	B	TG 3.1
710	Construct a brass overflow pipe.	4/4/51	B	TU 3.1.5
711	Manufacture three crank handles.	4/5/51	B	NBS

* Supplement.

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
712	Move jeep shelter; connect sentry box light.	4/ /51	C	TG 3.1
713	Spot a trailer & cat at base of one photo tower.	4/5/51	N	EG & G
714	Fabricate 2 pcs. diaphragm rings from steel plate.	4/5/51	B	UCRL
715	Fabricate a stand from 1/4" steel plate.	4/5/51	B	UCRL
716	Move relay boxes to collimators; wind cable.	4/10/51	E	1.5.2
717	Install aluminum partition in AEC Day-room.	4/5/51	B	TG 3.1
718	Loan of bulldozer operator & mechanic.	4/5/51	B,C	Prog. 1
719	Construct low pressure manifold rack.	4/5/51	V	NRLK
720	Recharge motorcycle storage batteries.	4/5/51	B	NRLH
721	Manufacture three lead film boxes.	4/5/51	B	NRLH
722	Furnish two gasoline fingerlifts.	4/6/51	L	Prog. 2
723	Survey distance & azimuth to zero for Sta. 627.	4/6/51	T	NRDL
724	Loan of H & N welding equipment to J-3.	4/6/51	C	J-3
725	Help install portable lighting and generators.	4/6/51	D	All Users
726	Change electrical wiring in AEC Dayroom.	4/6/51	B	TU 3.1.1
727	Construct one plate holder box.	4/6/51	B	EG & G
728	Move telephone extensions.	4/5/51	B	JTF-3
729	Finish & paint table in Building 232.	4/10/51	B	NRLK
730	Erect radar reflectors.	4/7/51	P,Q	Prog. 8
731	Provide crane & labor to load box aboard a 6x6.	4/7/51	B	J-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
732	Connect line on diffusion pump circuit.	4/7/51	V	UCRL
733	Furnish copper tubing from refrigeration stock.	4/6/51	V	NRLK
734	Construct two plywood boxes.	4/7/51	B	NBS
735	Fabricate and install sign.	4/7/51	B	TG 3.1
736	Modify phone service & switchboard connection.	4/7/51	C	All Users
737	Dig 2 holes; fill 2 old holes; move Sta. sign.	4/6/51	E	Proj. 5.1
738	Material and equipment to rework tie rods.	4/7/51	E	3.3.8h
739	Labor & material for activation of Photo Towers.	3/9/51	P,Q	EG & G
740	Furnish rigger to install pipe thru tower roof.	4/9/51	E	TU 3.1.4
741	Assign maintenance carpenter.	4/9/51	B	CMR
742	Perform miscellaneous work in Bldg. 232.	4/9/51	B	NRLK
743	Dirt or sandbag fill on sides of collimator sta.	4/9/51	E	1.5.2
744	Supply labor to help handle radioactive sources.	4/9/51	E	NBS
745	Check & repair one ditto duplicating machine.	4/9/51	B	D-4
746	Furnish labor to move 2 mahogany tables.	4/9/51	B	Prog. 1
747	Install additional phone in RAD-SAF, Bldg. 323.	4/9/51	B	TU 3.1.5
748	Supply plywood & build film-viewing box and table.	4/ /51	B	EG & G
749	Connect direct phone between Bldgs. 310 and 209.	4/9/51	B	Prog. 1

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
750	Fabricate & install vent pipes in 22 vaults.	4/9/51	C	4.2
751	Wash down Bldg. 212A with fire hose.	4/9/51	B	J-3
752	Move three fission cameras.	4/9/51	C	J-3
753	Construct windbreak & flies over collimators.	4/9/51	E	J-3
754	Move three new fission cameras.	4/9/51	E	J-3
755	Move boiler plates on collimators from C to E.	4/9/51	C,E	J-3
756	Modify winch blast shield and bracing.	4/9/51	E	J-3
757	Modification and relocation of winch.	4/9/51	C,D	J-3
758	Dig holes for installation of storage batteries.	4/7/51	E	SBN 2.3
759	Reproduce forty-five copies of chart.	4/9/51	B	JTF-3
760	Erect eight tents (ridge poles only; no frames).	4/9/51	E	NRLH
761	Construct eight bins with shelves.	4/ /51	B	D-4
762	Repair typewriter.	4/9/51	B	D-4
763	Disassemble aluminum structures.	4/9/51	P	NML
764	Install & wire vent for film lacquering machine.	4/9/51	B	EG & G
765	Concrete work & duckboards at Rad-Safe Bldg.	4/9/51	B	RAD-SAF 3.1.5
766	Erect tent; clear airstrip of debris.	4/9/51	C	D-3
767	Furnish plywood sheets, disks and wire.	4/10/51	B	NBS
768	Install a phone in the telemetering shack.	4/10/51	L	Prog. 1.9
769	Fabricate and place pipe stakes.	4/10/51	E	NBS

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
770	Install transformer; change electric service.	4/10/51	B	NRLH
771	Construct plywood extension on face of Sta. 131.	4/10/51	V	UCRL
772	Scrub roof & sides of Building 212A.	4/10/51	B	J-3
773	Remove dies. gen., gas & oil; close tower.	4/10/51	K	EG & G
774	Erect tent with floor; place cots; supply lumber.	4/10/51	B	D-3
775	Cover Building 212A with tarpaulin.	4/10/51	B	J-3
776	Furnish 26 sheets of plywood.	4/10/51	L	SBN 2.3
777	Remove sand cover at tunnel entrance to Sta. 57.	4/10/51	C	NBS
778	Check one Ditto Duplicating Machine.	4/10/51	B	D-4
779				
780	Furnish labor to SBN from 16 Apr. thru 28 Apr.	4/10/51	L	SBN 2.3
781	Install lead, steel plate & sandbags at Sta. 11.	4/10/51	E	1.5.2
782	Repair hinges on steel locker in Bldg.211.	4/10/51	B	Proj. 5.1
783	Fabricate and letter signs.	4/10/51	B	TU 3.1.5
784	Provide trunk line from Bldg. 310 to low tower.	4/10/51	B,P	LASL, Prog.1.3
785	Provide trunk line; modify phone circuits.	4/10/51	B,E	LASL, 1.5.2
786	Sandbag back of Station 132B.	4/10/51	E	NRLK
787	Erect radar reflectors.	4/11/51	E,C	Prog. 8
788	Drive twenty-five pipes into ground.	4/11/51	E,S	NBS

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
789	Replace sash & panes; re-work flashing and siding.	4/11/51	S	Prog.3.3.3
790 *	Sandbag Site "E" Stations.	4/11/51	E	Prog. 1
791	Move tables, desks & safes; provide a dark room.	4/11/51	B	Prog. 1
792 *	Sandbag Site "V-D" Stations.	4/11/51	V-D	Prog. 1
793	Dig 1 ditch 60 feet long between Stas. 6A & 6B.	4/11/51	V	NRLK
794	Make three Ozalid prints of diagram.	4/11/51	B	TU 3.1.1
795	Request for additional survey work.	4/11/51	E	TU 3.1.1
796	Modify WO.NO. AEC-769; add plywood strips.	4/11/51	E	NBS
797	Relocate two 4' pipes from Engebi to Muzin.	4/11/51	E	NBS
798	Miscellaneous electrical work at tower.	4/11/51	V	UCRL
799	Recover lead bricks from "C"; Distribute on "E".	4/11/51	C,E	8.2B, LCDR
800	Install fluorescent fixture and wiring.	4/12/51	B	EG & G
801	Turn armature down.	4/12/51	V	NRLK
802	Connect 3 phase power to Photographic Trailer.	4/12/51	V	NRLK
803	Wire pressure actuator switch on water system.	4/12/51	B	CMR
804	Cut grooves in two pieces of plywood and sand.	4/11/51	B	Proj.5.1
805	Remove coax cable from tower on Site E.	4/12/51	E	TU 3.1.1
806	Fabricate two duck boards & two benches.	4/12/51	B	TU 3.1.5
807	Water stabilization around misc.structures.	4/11/51	E,S	EG & G

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
808	Move desk & safe; make dark room in Bldg. 209.	4/12/51	B	Prog. 1
809	Install plywood sheets and paint.	4/12/51	B	JTF-3
810	Provide & install 4 window wind deflectors.	4/12/51	B	JTF-3
811	Make twelve wooden plugs.	4/12/51	B	Proj. 6.1
812	Dig ditches around Stations 51 and 50.	4/12/51	D	NBS
813	Furnish one carpenter to work at control tower.	4/12/51	B	NRLH
814	Mfgr. one photomultiplier tube mount.	3/12/51	B	NRLH
815	Protect air cond., Sta. 6A, 6B; seal roof holes.	4/12/51	E	NRLH
816	Make five lead discs.	4/12/51	B	UCRL
817	Make two 14 ft. extension cords with cube taps.	4/12/51	B	NOBL
818	Install line & phones from Bldg. 323 to airstrip.	4/12/51	B	TU 3.1.5
819	Make wood platform with solid floor for pumphouse.	4/12/51	E	J-3
820	Supply 30 ft. of suction hose w/connector	4/12/51	E	J-3
821	Furnish and install lock in Building 232.	4/12/51	B	NRLK
822	Surface area from Sta. 41 to waters edge.	4/11/51	S	3.1, 1.6, 4.2
823	Furnish lumber; install shielding.	4/12/51	E	NRLK
824	Brace batteries at Stations 54 and 57.	4/13/51	E	NBS
825	Wash down roof & side walls of Bldg. 232.	4/13/51	B	UCRL
826	Supply 28 pcs. of plywood & 80 pcs. of lumber.	4/13/51	B	UCRL

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
827	Perform misc. work at collimator block stations.	4/13/51	D-V	1.5.2
828	Deliver one 1 kw gasoline driven generator.	4/13/51	B	NBS
829	Furnish material for a tent frame.	4/13/51	B	D-2
830	Install plexiglass window in Bldg. 311.	4/13/51	B	TG 3.1
831	Make one plywood file box.	4/13/51	B	EG & G
832	Bulldoze down 25 palm trees.	4/ /51	D	EG & G
833	Make packing list & shipping document file box.	4/13/51	B	NRLK
834	Fabricate chain driven sprocket for sprayer.	4/13/51	B	JTF-3
835	Sandbag & lash transformers; remove planking.	4/13/51	E	TU 3.1.7
836	Move phone from Room A-8 to Room A-2.	4/13/51	B	D-1
837	Furnish reinforcing & splice plates for 3.2.2a.	4/13/51	E	Proj. 3.2
838	Request for survey to locate reflectors.	4/13/51	E,Q, V	Prog. 8
839				
840	Purchase in Hawaii 12 boxes Eastman cut film.	4/13/51	B	NRLH
841				
842	Furnish tracked vehicle for moving trailer.	4/13/51	S	Proj.3.4
843	Remove sandbags & fill from camera shelters.	3/13/51	E,S	Prog. 3
844	Install floodlight on top of tower.	4/14/51	E	Prog. 8
845	Remove air conditioning unit; install sandbags.	4/13/51	E	NRLK

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
846	Fabricate dosimeter mounts from aluminum sheet.	4/13/51	B	Proj. 5.1
847	Fabricate galv. sheet metal tank with drain.	4/14/51	B	Prog. 2.4.1.1
848	Remove alfasil bags from in front of blockhouses.	4/14/51	S,T	3.1.6.2
849	Request welder & equip. to cut steel on 3.3.8.	4/14/51	E	Prog.3.3.8
850	Requisition for laborers, & crane with operator.	4/14/51	C,B	NBS
851	Reproduce by Ozalid 4 copies of diagrams.	4/14/51	B	TU 3.1.1
852	Purchase film in Hawaii.	4/14/51	B	UCRL
853	Install ext. of phone 122 in Room 1 of Bldg. 122.	4/14/51	B	JTF-3
854	Furnish crane & operator to work on misc. sites.	4/14/51	B,P, N	NRLH
855	Furnish tractor & operator to move trailers.	4/14/51	E,D	NRLH
856	Furnish shoring beams & install tent.	4/14/51	D	NRLH
857	Machine 20 lead brick.	4/14/51	B	NRLH
858	Supply labor to help install NBS stas.	4/14/51	D	NBS
859	Construct aluminum caps.	4/15/51	B	NBS
860	Drill holes thru wall & file lead pieces.	4/14/51	V	NRLK
861	Build & install plywood exhaust hood assembly.	4/14/51	B	J-3
862	Install small light inside of calculators.	4/16/51	B	Prog. 1
863	Furnish & install one generator and gas tank.	4/16/51	B	TG 3.4
864	Repair Marchant ACTM Calculator.	4/16/51	B	UCRL

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
865	Run power lead from Control Bldg. to NRL tent.	4/16/51	B	EG & G
866	Remove partition separating A-10 - A-12, Bldg. 209.	4/16/51	B	D-1
867 *	Requisition for misc. equipment & labor.	4/16/51	E	All Users
868	Install hasp on inside door of control rack room.	4/16/51	D	TG 3.1
869	Erect pipe hand rail on ladder in control area.	4/16/51	B	NRLH
870	Furnish 150 Pipe Stakes.	4/16/51	E	TU 3.1.5
871	Requisition for signs and duck boards.	4/16/51	B	TU 3.1.5
872	Request for pump operator.	4/16/51	B	TU 3.1.5
873	Furnish two fabricated steel plates.	4/16/51	B	NBS
874	Supply one piece plywood, 8' x 4' x 1/2".	4/16/51	B	Proj. 5.1
875	Request for 6 copies of graph to be reproduced.	4/16/51	B	TU 3.1.1
876	Paint the word LABORATORY on two thermos jugs.	4/16/51	B	D-3 & TG 3.1
877	Mfgr. one work bench for packing tent.	4/16/51	B	NRLK
878	Fabricate gasket with eight bolt holes.	4/16/51	B	UCRL
879 *	Haul 1/2 cu. yd. of sand in front of misc. Stas.	4/16/51	E,D	SBN 2.4
880	Furnish labor to install lead shield in Sta. 132.	4/16/51	V	NRLK
881	Furnish cranes & operator; rigger; carpenters.	4/16/51	V	1.7
882	Furnish services of tractor, operator and dolly.	4/16/51	E	NRLK

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
883	Provide TP pair between Mar. Dispatch and Bldg. 323.	4/17/51	B	TU 3.1.5
884	Furnish crane & operator; flatbed trailer.	4/16/51	P,S, Q,E	8.2
885	Provide ten army cots at the tower base.	4/16/51	E	TG 3.1
886	Request for 24 rolls of photographers tape.	4/17/51	B	RAD-SAF
887	Initial charge 1 battery; recharge 2 batteries.	4/17/51	B	Proj. 4.2
888	Furnish cherry picker crane & operator.	4/17/51	E	J-3
889	Fabricate generator bracket for helicopter.	4/17/51	B	TG 3.4
890	Install elec. outlet in Bldg. 120 for food cart.	4/17/51	B	JTF-3
891	Paint and mount sign.	4/17/51	B	TU 3.1.1
892	Paint 60 base ball caps w/aluminum paint.	4/17/51	B	TU 3.1.5
893	Furnish eight pieces of canvas, 8' x 8'.	4/17/51	B	4.2
894	Erect 2 wood platforms for coax cable terminals.	4/17/51	V	UCRL
895	Clear all brush from land surface.	4/17/51	D	Prog.3.1.1
896	Remove plexiglass window in tower cab.	4/17/51	E	TU 3.1.1, TU 3.1.4
897	Survey new locations of rocket launcher stations.	4/17/51	E	NOBL
898	Relocate wall of Room 5 in Bldg. 122.	4/17/51	B	JTF-3
899	Fabricate filing cabinet drawer handle.	4/17/51	B	TU 3.1.5
900	Supply, maintain & install four radio sets.	4/18/51	Misc.	TU 3.1.5 RAD-SAF
901	Make three canvas camera covers.	4/18/51	B	EG & G

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
902	Remove tower cab sheeting; install canvas.	4/18/51	V	TU 3.1.1
903	Furnish one gasoline powered generator.	4/18/51	B	TU 3.1.5
904	Connect two lamps in Station 131.	4/18/51	V	UCRL
905	Requisition for labor.	4/19/51	D	NRLK
906	Cover J-3 cable with sand and sandbags.	4/19/51	E	J-3
907	Construct nine duckboards.	4/19/51	B	RAD-SAF
908	Repair safe in TU 3.1.7 office.	4/20/51	B	TU 3.1.7
909	Make up 75 four foot marking stakes.	4/20/51	B	TU 3.1.5
910	Furnish two pieces plywood.	4/21/51	B	NRLK
911	Install plywood partition with window and ducts.	4/23/51	B	All Users
912	Remove pipe film holders; cut; reinstall.	4/23/51	E,S, D	NBS
913	Request for removal of photographic equipment.	4/23/51	Q	EG & G
914	Furnish labor & equip. to recover equipment.	4/23/51	B,E D	UCRL - 3.1.1.8
915	Provide generator and three laborers.	4/23/51	E	NBS
916	Furnish 4 laborers and bulldozer and operator.	4/23/51	C	NRLK
917	Provide 8 tarpaulins for various stas.	4/23/51	D	NBS
918	Fabricate steel bench.	4/23/51	D	1.7
919	Remove air conditioning unit from station 132a.	4/23/51	V	UCRL
920	Make ozalid prints of graphs.	4/23/51	B	D-5
921	Assign additional telephone circuits.	4/23/51	E	Prog. 3
922	Move or remove power lines or poles.	4/23/51	D	1.7

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
923	Furnish 1 man to assist in instrument recovery.	4/24/51	C	NOBL
924	Furnish labor to SBN.	4/23/51	L	SBN 2.4
925	Check & repair 4 calculators; install lights.	4/24/51	B	D-4
926 *	Remove shields, spheres, and cylinders.	4/24/51	L	SBN 2.3
927	Reassign telephone circuits.	4/24/51	B,D	1.5.2 (LASL)
928	Repair stencil cutting machine.	4/24/51	B	D-4, TG 3.1
929	Procure misc. items from Honolulu.	4/24/51	L	Prog. 2
930	Mfgr. one photographic plate adapter.	4/24/51	B	NRLH
931	Reassign telephone circuits.	4/24/51	B,V	Prog.1.10
932	Construct wooden retaining wall.	4/24/51	D	UCRL
933	Perform misc. work at Stas. 6A and 6B.	4/24/51	D	NRLH
934	Requisition for labor.	4/25/51	B	NRLH
935	Furnish dry chemical & fire extinguisher.	4/25/51	E	Proj. 6.3
936	Change temperature control on reach-in reefer.	4/25/51	B	TU 3.1.6
937 *	Furnish standby labor during shot periods.	4/25/51	B	TU 3.1.6
938	Furnish laborers to handle lead brick at tower.	4/25/51	V	NRLK
939	Erect one tent for storage.	4/25/51	E	NRLK
940 *	Remove spheres, shields and cylinders.	4/25/51	L	SBN 2.4
941	Procure misc. items from Honolulu.	4/25/51	B	NRLK
942	Move three fission fragment cameras.	4/25/51	E	J-3

* Supplements

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
943	Supply two electricians for Stas. 50 & 51.	4/25/51	D-V	NBS
944	Furnish labor to uncrate equipment.	4/25/51	B	NRLH
945	Perform various work at Station 6B.	4/25/51	E	NRLH
946	Locate & install 2 twenty-five foot wood poles.	4/25/51	E	EG & G
947 *	Repair tops for fission fragment cameras.	4/25/51	B	J-3
948	Manufacture and deliver frames.	4/25/51	B	NBS
949	Install rope and wire guys on tower.	4/26/51	V	Prog. 1
950	Laborers for equip. install. & recovery work.	4/26/51	B	EG & G
951	Removal & relocation of vent pipes on vaults.	4/26/51	V,R, N,C	Proj. 4.2
952	Supply 100 three ft. lengths of scrap pipe.	4/24/51	B	TU 3.1.5
953	Supply binding machine, wire & wire-crimps.	4/26/51	D	NBS
954	Place limon. blocks, batt. racks & remove tents.	4/26/51	D	NBS
955	Modify telephone service.	4/26/51	B	Prog.1.10 - CMR
956	Paint ten signs.	4/26/51	B	Proj. 6.3
957	Make misc. phone installations and connections.	4/25/51	E	TU 3.1.5
958	Make wood platform with floor for J-3 pumphouse.	4/26/51	B	J-3
959	Cover Building 212A with tarpaulin.	4/26/51	B	J-3
960	Erect tent over 1000 yd. J-3 collimator.	4/26/51	V-D	J-3

* Supplement

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
961	Prepare schematic diagram of atoll cable system.	4/26/51	Atoll	D-3
962	Remove tunnel; clear entrance to Sta. 54.	4/26/51	C	NBS
963	Purchase misc. items in Honolulu.	4/26/51	B	NRLH
964	Make five aluminum trays.	4/27/51	B	EG & G
965	Furnish 12 pieces of wood, 2" x 2" x 4'.	4/27/51	B	6.3
966	Furnish welder and equipment and crane.	4/27/51	E	APG
967	Make seven 10' x 10' rafts.	4/27/51	D-V	J-3
968	Supply 12 pieces of plywood, 1/4" x 1 1/2" x 32".	4/27/51	B	NBS
969	Relocate tent frame; perform electric work.	4/27/51	B	UCRL
970	Provide DUKW equipped for J-3 recovery oper.	4/27/51	D	J-3
971	Excavate path thru causeway; build sand ramps.	4/27/51	D	J-3
972	Install control cable between tower and Sta. 135.	4/27/51	V	UCRL
973	Fabricate 250 cage lids in sheet metal shop.	4/27/51	L	SBN 2.4
974	Erect 16' x 32' tent at Station 144.	4/27/51	E	NRLK
975	Requisition for labor.	4/27/51	V-D	J-3
976	Furnish labor to assist in packing excess gear.	4/27/51	V	NRLK
977	Prepare truck for overseas shipping.	5/28/51	B	Prog. 6.3
978	Perform misc. work on and around tower.	4/28/51	V	CMR
979	Drill 2 holes per brick in 32 lead bricks.	4/28/51	B	NRLH

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
980	Supply lumber & plywood cut to size and shape.	4/28/51	B,D	NRLH
981	Replace 2 broken panels on instrument cover.	4/28/51	B	EG & G
982	Widen door opening in tower cab.	4/28/51	V	All Users
983	Install two tents behind Station 132b.	4/28/51	E+	NRLK
984	Install air conditioning at 132b.	4/28/51	E+	NRLK
985	Furnish 1 piece 4' x 8' x 5/8" plywood.	4/28/51	B	NBS
986	Remove fill & lead bricks; relocate lead bricks.	4/30/51	E+	NRLK
987	Place two CO_2 fire extinguishers in tower cab.	4/30/51	V	All Users
988	Locate, dig & backfill 12 holes for expos. units.	4/30/51	D	2.4
989	Cancel WO #641; perform misc. work on Scistat.	4/30/51	D-V	TU 3.1.9.4
990	Labor & equip. for recovery work in tower area.	4/30/51	E	NOEL
991	Remove I beam from tower.	4/30/51	V	J-3
992	Request for 12 each of FS #373 and #288 charts.	4/30/51	B	Prog. 4
993	Make three 1/4 inch thick steel plates.	4/30/51	V-D, B	NBS
994	Furnish labor & equipment to work on tanks.	5/1/51	B	Prog. 6.3
995	Furnish & weld 15 sample holders.	5/1/51	B	J-3
996	Machine 75 sample holders.	5/1/51	B	J-3
997	Furnish bulldozer & labor to recover J-3 equip.	5/1/51	C	J-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
998	Manufacture nuts and washers.	5/ /51	V	LASL
999				
1000	Move 4 rocket launchers from Site E to Site D-V.	5/1/51	E, D-V	NOBL
1001	Perform surveying as instructed.	5/1/51	D-V	NOBL
1002	Repair Underwood Portable Typewriter.	5/1/51	L	SBN 2.0
1003	Assign maintenance carpenter.	5/1/51	B	CMR
1004	Deliver 24 timbers, 4" x 6" x 15', to Sta. 6A.	5/1/51	E	NRLH
1005	Relocate collimator stations.	5/1/51	E+	J-3
1006	Ice & air ship specimen containers.	5/2/51	L	SBN 2.0
1007	Install telephone pole & appurtenances.	5/2/51	L	3.1.4
1008	Paint windows of tower; install flood-light.	5/2/51	V	3.1.1
1009	Supply 550 ft. wood stripping & 10 shts. plywood.	5/2/51	L	SBN 2.0
1010	Change phone connections between Site A and Site B.	5/3/51	B	All Users
1011	Prepare schematic sketches for 15 com. circuits.	5/3/51	All	D-3
1012	Furnish welder & equip. to work at Stas. 36 a-e.	5/3/51	V	NOBL
1013	Repair typewriter.	5/3/51	B	D-3,TG 3.1
1014	Repair Monroe Calculator.	5/3/51	L	SBN 2.0
1015	Provide small portable generator at Station 771.	5/4/51	E	Prog. 7
1016	Destroy installed equip. in Stas. 6101 - 6105.	5/4/51	S	Prog.6.10

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1017	Complete and return cable record forms.	5/4/51	B	D-3,TG 3.1
1018	Relocate tent and install cots.	5/4/51	V	All Users
1019	Request for equip. operators & mechanic.	5/4/51	B,V	D-3
1020	Polish seat in high pressure autoclave.	5/4/51	B	CMR
1021	Furnish labor to assist in insertion & recovery.	5/4/51	B	Prog.1.5.2
1022	Fabricate and install six pipe stakes.	5/4/51	E	NBS
1023	Provide nine pieces of plywood.	5/4/51	V-D	NBS
1024	Remove and relocate limonite covers.	5/5/51	V-D	NBS
1025	Modify sample can covers.	5/5/51	B	LASL 3.1.1
1026	Furnish & deliver to Sta. 6A 80 16' timbers.	5/4/51	E	NRLH
1027	Furnish 200 feet of sash chain.	5/5/51	B	NBS
1028	Weld broken pulley for generator PE-95.	5/5/51	B	JTF-3
1029	Relocate Station 73b.	5/5/51	V	2.5.5.5
1030	Install elec. wiring & fixtures at Station 144.	5/5/51	E	NRLK
1031	Manufacture ten coax fittings of brass.	5/5/51	E	NRLK
1032	Locate & recover crusher gages at misc. stations.	5/5/51	E	NOHL
1033	Place 2 cubic yards of sand at each Station 36.	5/7/51	V	NOHL
1034	Seal off 2 open end pipes within Sta. 313.	5/7/51	E	Prog.6.10
1035	Recover & relocate 8 pipes; drive 16 pipes.	5/7/51	E	NBS
1036	Assist in setting detonators and placing film.	5/7/51	D,E	NBS

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1037	Furnish pump man; erect 2 tents w/frames.	5/5/51	D	TU 3.1.5
1038	Repair Remington Typewriter.	5/7/51	L	SBN 2.0
1039 *	Dismantle & move photo tower from M to B.	5/7/51	M	EG & G
1040	Move two thermal stations & Onan generator	5/8/51	L	SBN 2.0
1041	Provide cat & trailer for clean-up operations.	5/10/51	B,N	EG & G
1042	Furnish crane & operator for recovery operation.	5/10/51	E	Prog. 1.7
1043	Furnish labor to assist in recovering material.	5/10/51	V	NRLK
1044	Furnish bulldozer and operator.	5/10/51	D	Prog. 1.7
1045	Burn end off four steel containers.	5/10/51	B	J-3
1046	Remove two fission fragment cameras.	5/11/51	D,B	J-3
1047	Install three flood lights on pole.	5/11/51	B	UCRL
1048	Furnish crane to load & unload trailer.	5/13/51	V,E	NRLH
1049	Supply water to photo trailer, Sta.132b.	5/11/51	E	NRLK
1050	Furnish rigging and welding.	5/11/51	E	NRLK
1051	Change backfill; restore radiation shield.	5/3/51	E	NRLK
1052	Assist in constructing Ganex shield and collimator.	5/11/51	E	NRLK
1053	Furnish 200 feet angle iron; 1 key hole saw.	5/11/51	E	NRLK
1054	Remove & process spheres, chassis and cylinders.	5/11/51	L,D	SBN 2.0
1055	Furnish 4 laborers to help remove equip.	5/12/51	V	NRLK
1056	Revise instrument rack.	5/12/51	B	CMR

* Supplement

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1057	Furnish 18 shts. plywood, 8' x 48 x 1/2".	5/12/51	E	NRLK
1058	Remove equip. in recording sta. 132a.	5/12/51	D	UCRL 3.1.1.8
1059	Provide generator & 24 hour supply of gasoline.	5/12/51	S	NBS
1060	Supply sheet metal for Bokon Photo Tower.	5/14/51	B,P	EG & G
1061	Mfgr. 80 pairs 2 wire wooden coax cable clamps.	5/12/51	E	NRLK
1062	Install steel rope guys for tower cab.	5/14/51	E+	3.1.1
1063	Remove water and debris from station 40.	5/14/51	E	TU 3.1.1
1064	Bulldozer, operator to assist in rocket recovery.	5/14/51	D	3.1.1.7
1065	Perform miscellaneous pipe and cable work.	5/14/51	E+	TU 3.1.1
1066	Repair exciter on generator.	5/14/51	B	Proj. 5.1
1067	Reproduce 30 each Ozalid copies of 2 tracings.	5/15/51	B	D-3, TG 3.1
1068	Drill, open, repair and repaint safe.	5/15/51	B	D-2
1069	Install pole steps on pole (Station 166).	5/15/51	E	TU 3.1.3
1070	Furnish one generator behind Station 6A.	5/15/51	E	NRLH
1071	Furnish 8 pieces of 8 or 10 gage 2" mesh.	5/15/51	L	SBN 2.0
1072	Manufacture lead block for Ganex detector.	5/15/51	E	NRLK
1073	Furnish 4 wooden plugs from 1/2" plywood.	5/15/51	E	NRLK
1074	Requisition for labor.	5/16/51	E	J-3
1075	Install 2 blackboards in analysis room.	5/16/51	B	TU 3.1.1
1076 *	Clamshell, operator to excavate at Sta. 120, 121.	5/16/51	E	RAD CHEM

* Supplement

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1077	Fabricate & deliver eight 2" pipe sections	5/16/51	B	J-3
1078	Drill holes in reef; survey work.	5/16/51	E	J-3
1079	Cover J-3 wire rope with sand & sandbags.	5/16/51	E	J-3
1080	Furnish wire rope to Station 18.	5/16/51	D,E	J-3
1081	Install doors on Building 12.	5/16/51	L	SBN 2.0
1082	Load two 1000 lb. spectrographs on truck.	5/16/51	N	NRLH
1083	Place four floodlights on tower.	5/16/51	E	CMR
1084	Wind wire rope onto a spool.	5/17/51	E	J-3
1085	Supply Station 57 with electric service.	5/17/51	E	J-7
1086	Furnish labor to assist in recovering equipment.	5/17/51	E	NRLK
1087	Perform miscellaneous work in tower.	5/17/51	E +	TU 3.1.1
1088	Mfgr. one plywood box with hinged top.	5/17/51	B	NRLH
1089	Move camera flare shield from Sta.#335a to #69.	5/17/51	E	TU 3.1.1
1090	Survey concrete footing, cable anchors for tower.	5/18/51	E	TU 3.1.1
1091	Cancels AEC WO. 1086; Requisition for labor.	5/17/51	E	NRLK
1092	Supply 4 5 ft. lengths of 3/4" galv. steel pipe.	5/18/51	B	3.1.1.7
1093	Mfgr. 17 boxes for couriering classified files.	5/18/51	B	JTF-3
1094	Place cameras on collimators;erect tents.	5/18/51	E	J-3
1095 *	Grade road; build gate; cover connection hole.	5/18/51	E+	Prog. 1
1096	Weld ten sample holders.	5/19/51	B	J-3

* Supplement

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1097	Dig eight foxholes for series 86 stations.	5/18/51	E	SBN 2.0
1098	Relocate lead bricks and sandbags.	5/19/51	E	TU 3.1.1
1099	Request for equip. operators & mechanic.	5/19/51	B,E	D-3
1100	Erect tents; cover 141a with canvas; place cots.	5/19/51	E+	All Users
1101	Cut 70 three feet long pipe stakes.	5/19/51	E	TU 3.1.5
1102	Install pipe frame-works on reef.	5/19/51	E	J-3
1103	Burn open three sample holders.	5/19/51	B	J-3
1104	Furnish caterpillar & operator to haul out pipe.	5/19/51	E+	TU 3.1.1
1105	Furnish pump man; erect tent with frame.	5/19/51	E	TU 3.1.5
1106	Furnish labor & equipment to remove Station 121.	5/21/51	V	Prog. 1.7
1107	Mfgr. box to hold 32 microscope slides.	5/19/51	B	TU 3.1.5
1108	Repair duplicating machine.	5/ /51	B	D-4, TG 3.1
1109	Modify nitrogen cylinder; install in tower.	5/21/51	E+	TU 3.1.1
1110	Make a wire rope "come-along".	5/22/51	B	J-3
1111	Gen. overhaul & replace motor in ditto machine.	5/22/51	B	TG 3.1
1112	Perform miscellaneous work on tower.	5/22/51	E+	TU 3.1.1
1113	Cover Building 212A with tarpaulin.	5/23/51	B	J-3
1114	Remove shielding on Sta. 132B for data recovery.	5/24/51	E	NRLK
1115	Remove 7 M-G sets from the back of Sta. 132b.	5/24/51	E,V	NRLK
1116	Burn open ten sample holders.	5/25/51	B	J-3

JOB 5 WORK ORDERS (Continued)

AEC W.O.No.	Description	Date Issued	Site	User
1117	Request for cherry picker, fork lift and operators.	5/25/51	B,E	NRLH
1118	Air clean and grease six M.G. sets.	5/26/51	B	NRLK
1119	Recover, pack and ship pipe.	5/28/51	E+	TU 3.1.1
1120	Move two fission fragment cameras from E to B.	5/29/51	B,E	J-3
1121	Install door with hasp; bar and hasp.	5/31/51	B	JTF-3
1122	Pack and ship one M.G. set.	6/1/51	B	NRLK
1123	Install aluminum vapor sheet in Bldg. 221.	6/1/51	B	Sig.Corps

Section 18

ROLL-UP, MAINTENANCE, AND SALVAGE

CHAPTER 18.1

ROLL-UP PLANNING

The authorization for roll-up, maintenance, and salvage operations (Job No.5) is contained in Article III, Paragraph I, of Contract AT-(29-1)-507. These operations were scheduled to begin as soon after the completion of experiments as safety considerations permitted.

The basic specifications covering these operations were prepared under date of April 19, 1951 and sent to the Jobsite. As furnished for use by field personnel, these specifications entitled "Guide Specifications for Procedures in Preparing Equipment and Materials for Storage", contained reproductions of applicable government standards. In addition, field personnel were furnished with a booklet, "Roll-up Procedure, Eniwetok Proving Ground Facilities", which included a supplement, "Materials on Hand at Jobsite for Use in Roll-up", and a supplement, "Property Lists Including Disposition by Surveys and Storage Location". This booklet; the "Guide Specifications for Procedures in Preparing Equipment and Materials for Storage", without the reproductions of government standards; and the supplement, "Materials on Hand at Jobsite for Use in Roll-up", are presented as exhibits at the end of this Section.

CHAPTER 18.2

ROLL-UP OPERATION

Except for delays caused by safety considerations, except for minor modifications of originally contemplated procedures to comply with instructions of the AEC Resident Engineer, and except for minor changes to meet unanticipated post experiment conditions, the published roll-up procedure has been or is being followed. Table 18.1-1 indicates the assignment of roll-up activities to departments of H & N and shows scheduled and actual completion by dates and percentages.

TABLE 18.2-1. ROLL-UP STATUS AS OF JULY 15, 1951

Item	Progress - % Scheduled	Actual	Scheduled Completion	Remarks
Design Dept.				
Damage Survey and Completion Report Data	100%	100%		Completed July 6
Survey Dept.				
Zero Area Crater Surveys			September 15	Delayed by radioactivity in zero area
High Tide Line Survey	67%	50%	August 5	
Existing Structures Survey	5%	10%	September 15	
Topo 1000' Radius Zero Areas for 1' Contour			October 1	To start July 15
Resurvey High Tide Lines at 4-Month Interval			November 30	To start Oct. 15
Revise Precise Control Field Sketches	37%	50%	September 1	

Item	Progress - % Scheduled	Actual	Completion	Remarks
Survey Dept.				
Revise Horizontal Control Field Sketch 47	37%	35%	September 1	
Survey of Thermal and Blast Damage	47%	75%	September 1	
Warehousing Dept.				
Move Material and Equipment to Eniwetok for Warehouse Storage	100%	100%		Completed July 14
Prepare Plot Plan Indicating Location of Various Stored Items	25%	25%	August 10	
Cleaning, Preservation, and Storage of Tools	90%	90%	July 21	
Cleaning, Preservation, and Storage of Electrical Equipment	25%	25%	September 1	
Cleaning, Preservation, and Storage of Auto Parts	35%	35%	July 31	
Cleaning, Preservation, and Storage of Marine Parts	50%	50%	July 31	
Cleaning, Preservation, and Storage of Hardware	100%	100%		Completed June 30
Cleaning, Preservation, and Storage of Plumbing	50%	50%	August 18	

Item	Progress - % Scheduled	Actual	Schedule Completion	Remarks
Marine Dept.				
Mothball M-Boats	65%	60%	August 1	
Mothball Water Taxi	63%	60%	August 1	
Power and Water Dept.				
Rehabilitate Plants on Runit, Rojoa, and Engebi	35%	35%	August 1	
Mothball Distillation Units on Runit, Rojoa, and Japtan	100%	100%		Completed July 14
Weekly Operation of Power Plants				On Schedule
Overhaul Stills and Diesel Units on Parry and Eniwetok	75%	60%	August 15	
Camp Dept.				
Move Out of Tent Area Parry Island	100%	100%		
Dismantle Tents Parry Island	100%	100%		
Storage of Camp Items (beds, mattresses)	12%	60%		
Roll-Up of Galley Equipment (not including paint)	100%	100%		
Construction Dept.				
Clean-up and Roll-up of Runit	100%	98%	July 9	Delayed by radioactivity
Clean-up and Roll-up of Aomon Group	60%	60%	September 1	
Clean-up and Roll-up of Engebi	70%	60%	September 1	
Clean-up and Roll-up of Japtan	100%	95%	July 10	
Clean-up and Roll-up of Piiraai	100%	100%		Completed July 14

Item	Progress - % Scheduled	Actual	Schedule Completion	Remarks
Construction Dept.				
Clean-up and Roll-up of Bokon	90%	85%	July 20	
Clean-up and Roll-up of Teiteiripucchi	90%	75%	July 20	
Clean-up and Roll-up of Aaraanbiru	100%	100%		Completed July 14
Clean-up and Roll-up of Muzin	75%	50%	August 1	
Mechanical Dept.				
Prepare Construction Equipment for Storage	25%	25%	September 1	
Prepare Transportation Vehicles for Storage	100%	80%	July 15	
Paint Dept.				
Vehicles	100%	80%	July 15	
Construction Equipment	25%	25%	September 1	
Camp Equipment			October 15	To start Sept. 1
Towers and Tanks on Parry and Eniwetok Islands			October 15	To start Sept. 1
Photo Towers			October 1	To start Sept. 1
Electrical Dept.				
Periodic Testing of All Submarine Cables	100%	90%		Next test Sept. 1 through Sept. 8
Clean, Repair, and Store Fans	37%	35%	September 1	
Clean, Repair, and Store Dehumidifications Units	25%	25%		*
Clean, Repair, and Store Electric Motors	25%	25%		*
Clean, Repair, and Store Water Coolers	50%	50%		*

Item	Progress - % Scheduled	Actual	Schedule Completion	Remarks
Electrical Dept.				
Clean, Repair, and Store Portable Generators	25%	40%	September 1	*

* Scheduled completion date not firm, but dependent upon manpower

The following list consists of items of work to be completed on each island as of the end of June 1951 and is intended to indicate the nature of the work remaining without attempting to define the exact scope of the unfinished operations.

ENGEBI

1. Continue to secure scientific structures and paint blast doors.
2. Pickup and ship to Parry collimator boxes for "E+"
3. Repair No. 20 blast walls sufficiently to obliterate the blast effects and paint exposed steel work.
4. Fill holes in the dock.
5. Continue overhaul of power generator units.
6. Continue work on water distillation units.
7. Make crater survey.

MUZIN

1. Complete dismantling of the remaining half of the 3.3.3 Hangar Building and ship salvaged steel to Parry.

AOMON GROUP

1. Pickup and ship the remaining collimator boxes to Parry.
2. Continue to secure the scientific stations and paint blast doors.
3. Prepare blast walls as for Engebi.
4. Continue overhaul of power generation units.
5. Continue work on water distillation units.
6. Make crater survey.

RUNIT

1. Pickup remains of collimator boxes which were damaged.

2. Prepare blast walls as for other sites.

3. Cut steel back stays on Station 52.

4. Continue to secure scientific structures and paint blast doors.

5. Pickup and secure the dock decking (now lying on the beach).

6. Make crater survey.

PHOTO TOWER SITES

1. Sandblast and paint all towers.

2. Pickup and ship any remaining power generator units to Parry.

3. Secure the tower cabs and other structures on these islands.

ALL EXPERIMENT ISLANDS

1. Recover and ship to Parry all salvable lead brick.

PARRY

1. Continue to clean, repair, and store remaining construction and automotive equipment; an estimated 75 percent of this work remains.

2. Load and dispose of in deep water the construction and automotive equipment which has been determined unfit for use.

3. Prepare and store the remaining tools and materials recovered from the experiment islands.

4. Store the dismantled towers recovered from Aniyaanii and from Site "M".

5. Repair and store electric motors; of approximately 1,000 motors there remains an estimated 75 percent to process.

6. Repair and store electric fans; an estimated 300 fans, or approximately 65 percent of the total, remain to be processed.

7. Repair and store the balance of the dehumidification units, an estimated 75 percent.

8. Repair and store transformers.

9. Process and store the remaining camp equipment including beds, mattresses, pillows, lockers, etc., an estimated 40 percent.

10. Complete repairs to and secure beached marine craft; this item is estimated at 60 percent complete. The processing of marine craft required to be placed in floating storage is awaiting the arrival of a dry dock.

11. Charge and store approximately 1,000 storage batteries. This item is awaiting a decision by AEC as to whether storage or replacement of these batteries will be more economical.

12. Repair personnel dock.

13. Close and secure the Rad-Safe Building.

14. Overhaul power plant equipment.

15. Move steel storage under cover and treat all plates and shapes with rust preventive.

16. Repair the concrete marine ramp.

ENIWETOK

1. Overhaul power plant equipment.

ROLL-UP PROCEDURE

ENIWETOK PROVING GROUND FACILITIES

U. S. Atomic Energy Commission
Contract No. AT-(29-1)-507

Holmes & Narver, Inc.
Engineers
824 South Figueroa Street
Los Angeles, California

In compliance with Article III, "Job No. 5", paragraph 1, of Contract No. AT-(29-1)-507, recommendations for the "roll-up" procedure to be employed on Eniwetok Atoll at the close of Operation GREENHOUSE are presented in the following pages. These recommendations are intended to cover the disposition of all facilities remaining at the end of the exercises, including both those which are to be stored on the Atoll and those to be shipped to the Zone of the Interior (Z.I.).

The general roll-up procedure is discussed under four major headings:

1. Structures on Experimental Islands
2. Structures on Support Islands
3. Equipment
4. Furniture and Fixtures

Under each of these major headings are a number of types of items which are discussed individually.

Immediately following the general procedure, three supplements are presented covering specific details of the roll-up. These are:

Supplement 1. Guide Specifications for Procedures in Preparing Equipment and Materials for Storage

Supplement 2. Materials on Hand at Jobsite for Use in Roll-up

Supplement 3. Property Lists Including Disposition by Surveys and Storage Location

Taken together, the general procedure and specific supplements are intended to give a detailed picture of Holmes & Narver's recommendations for the Operation GREENHOUSE roll-up.

NEIL H. DURKEE
Project Manager

CONTENTS

1. STRUCTURES ON EXPERIMENT ISLANDS

a. SCIENTIFIC STRUCTURES

All scientific structures which survive the blast shall be examined. Those which are seriously damaged shall be removed; all others shall be preserved for possible future use.

STRUCTURES TO BE REMOVED -- Damaged structures shall be removed if one or more of the following conditions exist:

(1) If the structure is dangerous to personnel.

(2) If there is a positive need to remove the structure for security reasons.

(3) If there is a positive need to make room for a new program in the near future.

Those structures which are to be removed shall be torn down to ground level, and the debris shall be disposed of by dumping into deep water or by other suitable means.

STRUCTURES TO BE PRESERVED -- All remaining structures are to be prepared for preservation, as follows:

(1) Blast doors shall be painted.

(2) Moving parts shall be lubricated and treated with a proper rust preventive.

(3) Structures shall be secured.

Under instructions from competent authority, certain damaged panels in designated structures shall be removed and destroyed.

b. MILITARY STRUCTURES

Although it was originally planned that all military structures in Program 3 were to be removed, it has subsequently been indicated that any military structures which are not seriously damaged shall be preserved. Accordingly, all military structures surviving the blast shall be examined and treated in the same manner as described above for scientific structures.

c. UTILITARIAN STRUCTURES

Utilitarian structures, consisting of power houses and communication buildings, shall be treated in the same manner as described above for scientific structures.

2. STRUCTURES ON SUPPORT ISLANDS

a. SCIENTIFIC STRUCTURES

All scientific structures on Eniwetok, Parry, and Japtan Islands shall be inspected, treated as necessary for preservation, and secured.

b. UTILITARIAN STRUCTURES

Certain utilitarian structures will remain in use after the exercises; these will require no special attention since they will be maintained as required. All other utilitarian structures shall be treated as necessary for preservation.

ALUMINUM BUILDINGS - - All aluminum buildings which are not to be kept in use shall be treated as follows:

(1) Roofs shall be examined for leaks, and necessary repairs shall be made.

(2) Furniture and light bulbs shall be removed and stored.

(3) Main electric switches shall be pulled and locked in open position.

(4) Main switches and panel switches shall be lubricated.

(5) Water shall be shut off and pipes drained.

(6) Salt water lines shall be flushed back to mains with fresh water to minimize internal corrosion.

(7) All openings shall be closed and secured.

QUONSET BUILDINGS - - All quonset buildings shall be carefully inspected with a view to rehabilitation for storage use. Estimates of cost shall be prepared for each building and submitted for approval before rehabilitation is undertaken.

FRAME BUILDINGS - - All frame buildings shall be inspected, repaired as necessary, painted, and secured.

TENTS - - All tents shall be treated as follows:

(1) Canvas shall be removed and inspected. That fit for future use shall be stored; the remainder shall be surveyed and, where possible, salvaged for wrapping and other purposes.

(2) Frames shall be left in place. They shall be placed on a maintenance schedule to be inspected and repainted as required.

c. SPECIAL USAGE STRUCTURES

The following special usage structures are considered in this procedure:

(1) Eniwetok Island: Air Force special buildings; Loran, radio transmitter, and radio receiver buildings.

(2) Parry Island: Laboratory buildings (Administrative Compound); CMR buildings.

(3) Japtan Island: Laboratory, autopsy, and X-ray buildings.

AIR FORCE SPECIAL BUILDINGS, ENIWETOK - - It is understood that the Air Force will be responsible for removing all equipment, furniture, and fixtures from their special buildings at Eniwetok. Some of these buildings, notably the B-50 hangar, will then be used for storage. These buildings, as well as those left vacant, shall be treated as described above for aluminum buildings.

LORAN AND RADIO BUILDINGS, ENIWETOK - - It is understood that the Loran, radio transmitter, and radio receiver buildings on Eniwetok will continue in operation; hence, no special treatment will be required.

LABORATORY BUILDINGS (ADMINISTRATIVE COMPOUND), PARRY - - The laboratory buildings within the administrative compound on Parry shall be prepared for dehumidified storage of sensitive and delicate equipment and precision tools.

CMR BUILDINGS, PARRY - - The plant building, No. 330, of the CMR structures on Parry shall be cocooned and dehumidified, using dehumidifiers removed from scientific structures on the experimental islands. Laboratory equipment shall be removed from the CMR laboratory building and stored in the plant building.

LABORATORY, AUTOPSY, AND X-RAY BUILDINGS, JAPTAN - - It is understood that the Med-Bio group will be responsible for all apparatus, equipment, and experimental items in the laboratory, autopsy, and X-ray buildings at Japtan. Any equipment, such as instrument cabinets, left in the building shall be thoroughly oiled. The stainless steel autopsy trays shall be removed, thoroughly oiled, and stored in the laboratory building. All openings shall be closed and secured.

3. EQUIPMENT

The following classes of equipment are considered in this procedure:

(a) Scientific

(b) Communication

(c) Power and Water Production

(d) Refrigeration

(e) Camp

(f) Construction

(g) Vehicular

(h) Marine

(i) Shop

(j) Office and Engineering

a. SCIENTIFIC

This classification covers scientific equipment used by the test groups. It includes gauges, recorders, cameras, test and calibration instruments, and other similar equipment. It is planned that all scientific instruments will be shipped to Z. I. All this equipment will be removed from its present location under Users' direction and transported to Parry, where its condition will be carefully checked by the Users. Under the direction of the various Users, it shall be boxed or crated, and shipped. Any scientific equipment to remain on the Atoll shall be carefully prepared and placed in dehumidified storage.

b. COMMUNICATION

Telephone switchboards shall be removed from the communications buildings on the experimental islands and returned to Parry for dehumidified storage. They shall be inspected and carefully cleaned before storing. Telephone instruments other than those in continued usage shall be collected, cleaned, and boxed before being placed in dehumidified storage on Parry.

Terminals for all submarine cables, both telephone and signal, shall be carefully inspected and treated with anti-corrosive materials. Those terminals which remain in place shall be given periodic inspection as part of maintenance operations. Unless required for use, any telephone terminal panels other than submarine cable terminals shall be removed from experimental islands, shipped to Parry, cleaned, and placed in dehumidified storage.

All submarine cable shall be tested immediately upon completion of this exercise and every two months thereafter. Procedure established in SANDSTONE experiments shall be followed, and records of these tests shall be submitted to AEC upon completion of each test.

All radio equipment which will not be used after the present exercises shall be removed from experimental islands and marine craft, cleaned, boxed, and placed in dehumidified storage. Motion picture projectors, loudspeakers, intercommunication sets, and public address systems that will not be used during the inactive period shall be handled in the same manner.

c. POWER AND WATER PRODUCTION

The equipment in the power plants at both Eniwetok and Parry will continue in operation and will be maintained as required. At Japtan and at the experimental islands, where it is intended that power equipment will remain in place at the conclusion of the present operating period, the equipment shall be carefully inspected and any necessary repairs shall be made. A program of periodic operation, preferably on a weekly basis, shall then be set up. It is deemed more economical to follow this practice than to attempt to effect "cocooning" for long time storage.

In the recommended periodic maintenance operations, crews shall be sent to Japtan, Runit, Rojoa, and Engebi each week to start up the engine-generator units, keep them running a sufficient period to insure that they are thoroughly dried out, and then shut them down again until the ensuing weekly run. For this operation, the electrical switch gear shall be maintained in such condition that it can be operated on very short notice. Supplementary equipment for the engine-generator units, such as air compressors for starting, pumps for water circulation, etc., shall also be operated and thus maintained in operable condition.

It is recommended that the distillation equipment on Japtan, Runit, Rojoa, and Engebi be shut down and that all moving parts be thoroughly cleaned. Heat exchangers shall be dismantled and the tubes cleaned and reassembled. Any tubes which are damaged shall be replaced. This equipment will not be operated until it is again required to distill water. However, the motors and compressors will be operated on a weekly schedule as are the other units in the power plant. An application of paint or rust preventive shall be given to all exposed metal surfaces.

The butterfly valves on the ventilators shall also be operated weekly.

Portable diesel engine-generator sets and portable distillation units shall be transported to Parry, thoroughly checked, cleaned, and repaired. All exposed metal surfaces shall be painted or treated with rust preventive. The units shall then be stored under cover.

d. REFRIGERATION

Under this classification the following types of equipment are included:

(1) Dehumidifiers

(2) Cold Storage Boxes

(3) Cabinet-type Refrigerators

DEHUMIDIFIERS - - Certain dehumidification equipment in unenclosed installations on experimental islands may, because of sheltered positions, survive the blast. If this equipment survives, it is desirable that it be carefully checked for radioactivity. If dangerous radioactivity exists, the equipment shall be surveyed and uncontaminated parts salvaged. If, on the other hand, dangerous radioactivity does not exist, the equipment shall be removed, transported to Parry, cleaned, and stored for future use.

The dehumidification equipment installed on Parry will continue in operation to provide necessary dehumidified storage.

COLD STORAGE BOXES - - All cold storage boxes except those required for mess hall operation during the roll-up period shall be carefully dismantled, cleaned, packaged, and stored under cover. Boxes shall be matchmarked to facilitate reassembly. Damaged panels shall be discarded and replacements ordered. Motors, compressors, and controls shall be treated like other electrical gear.

CABINET-TYPE REFRIGERATORS- - All cabinet-type refrigeration units not required during the roll-up period shall be cleaned, repaired, treated with rust preventive, and stored under cover.

e. CAMP

Under this classification the following types of equipment are included:

(1) Food Preparation

(2) Cooking

(3) Bakery

(4) Scullery

(5) Laundry

(6) Fire Protection

(7) Recreation

(8) Hospital and First Aid

(9) Marine

(10) Shops

(11) Office and Engineering

FOOD PREPARATION - - Food preparation equipment, both electrical and steam, shall be cleaned, inspected, given necessary corrosion prevention treatment, packaged, and stored under cover.

COOKING - - Oil fired stoves shall be completely dismantled, treated with rust preventive, reassembled, crated and stored under cover. Soup kettles, pressure cookers, and other steam-heated items shall be disconnected, cleaned given rust preventive treatment, crated, and stored. Electric hot plates shall be disconnected, cleaned, crated, and stored. Hoods and grease traps shall be removed, cleaned, crated, and stored. Because these hoods and traps are made of stainless steel or monel metal, rust prevention treatment of them is not required.

BAKERY - - Bakery equipment, which is fabricated of stainless steel or monel metal, shall be cleaned and sealed with a moisture inhibitor inside.

SCULLERY - - Dishwashing equipment, which is stainless steel, shall be dismantled and cleaned, crated, and stored. Electrical equipment shall be cleaned, inspected, given corrosion preventive treatment, boxed, marked, and stored.

LAUNDRY- - Laundry equipment is installed at Parry and Eniwetok only. It is recommended that only one plant be operated, as the capacity is more than adequate for the anticipated Atoll population. The equipment in the plant which is closed down, other than that which is portable, should remain in place and should be drained, cleaned, and painted. Each unit should be covered with canvas and tied. Portable items should be cleaned, treated with rust preventive, boxed, and left in the building. The building itself should be secured. The steam boiler should have all electrical gear removed, cleaned, treated with anti-corrosive material, and boxed. This gear should be stored in the laundry building. The boiler itself should be drained, cleaned, and painted; and the boiler house should be secured. The feed water treating column should be drained, cleaned, and painted.

FIRE PROTECTION- - Sufficient equipment for normal fire precautions shall be maintained in use. Other equipment shall be processed as follows:

(1) Fire trucks shall be cleaned, painted, and stored like other vehicles.

(2) Chemical wagons shall have their contents discharged, and the carts and tanks shall be cleaned, painted, and stored under cover

(3) Fire hose shall be removed from the fire trucks, rolled and tied in bundles, and stored.

(4) Extinguishers shall be discharged, cleaned, and stored.

RECREATION- -All recreation equipment shall be transported from the experimental islands to Parry and stored in an aluminum building.

HOSPITAL AND FIRST AID- -All hospital equipment, both surgical and therapeutical, shall be returned from the experimental islands to the hospital at Parry, where it will be either used or stored.

f. CONSTRUCTION

Construction equipment includes stationary equipment, mobile equipment and pneumatic tools. All three types of equipment will be accumulated progressively at Parry as exercises are completed on the experimental islands. After it arrives at Parry, the equipment shall be inspected, and worn-out items surveyed and disposed of in accordance with survey procedure. The remainder shall be cleaned, painted, and placed in covered storage, except that to be used for maintenance. Equipment on pneumatic tires shall be placed on blocks. Storage batteries shall be removed and placed in trickle-charge storage. It is suggested that the B-50 hangar on Eniwetok be used for the storage of all heavy construction equipment.

g. VEHICLES

This group includes all vehicles used for transportation of personnel. These vehicles shall be assembled at Parry in the motor pool as they are released from the experimental islands. The same procedure shall be followed as to survey, disposition, and storage as that outlined above for construction equipment, except that this equipment shall be stored under cover on Parry.

h. MARINE

The Holmes & Narver boat pool is made up of equipment obtained from the Navy and that purchased for the AEC by Holmes & Narver. It is proposed that the following craft be maintained in service after completion of the operations phase:

2 LCT

4 LCM

3 DUKW

1 Water Taxi

The remainder of the vessels shall be beached. The engine rooms and engines shall be steam-cleaned, and the hulls shall be scraped and painted. In the case of LSU's the quarters and galley shall be secured. The beached vessels shall be blocked up, and canvas lean-to shelters shall be provided.

i. SHOPS

All maintenance and repair shops will remain active after July 1, 1951. Although shops will not be staffed on a full-time basis, machines and tools will be used occasionally to meet maintenance needs. Periodic preventive maintenance procedures, including cleaning and lubricating of equipment and checking of motors, will assure adequate protection of machines and tools. Instruments, gauges, and cutting tools shall be kept in the hot lockers provided in the shops.

The shops involved are:

(1) Heavy Duty Repair Shop	(To remain active)
(2) Heavy Duty Machine Shop	"
(3) Battery Shop	"
(4) Tire Shop	"
(5) Blacksmith Shop	"
(6) Marine Engine Repair Shop	"
(7) Injector Shop - Marine	"
(8) DUKW Shop	"
(9) Carpenter Shop	"
(10) Sheet Metal Shop	"
(11) Electrical and Refrigeration Shop	"
(12) Plumbing Shop	"
(13) Office Equipment Repair Shop	"
(14) Radio Repair Shop	"
(15) Distillation Equipment Repair Shop	"
(16) Instrument Laboratory Shops	(To be closed)

j. OFFICE AND ENGINEERING

This equipment includes typewriters, adding machines, calculators, radios, record players, transits, levels, rods, tapes plumb bobs, etc. Equipment in excess of current needs shall be cleaned, treated with rust preventive, boxed, and stored. Engineering instruments shall be placed in the hot locker near the main entrance of Building #208.

4. FURNITURE AND FIXTURES

The following types of equipment are included:

(a) Housing

(b) Mess Hall

(c) Office

a. HOUSING

A certain portion of this equipment will remain in current use. This report deals with that which is excess to this requirement. This heading covers such items as beds, mattresses, pillows, tables, chairs, hot lockers, medicine cabinets, electrical lighting fixtures, etc. Considering each of the above items separately, the following practice is recommended:

BEDS AND BEDDING- -Beds shall be dismantled and cleaned. Bedsteads shall be repainted, crated, and stored under cover. Bed springs shall be cleaned, sprayed with rust preventive of a plastic base and stacked on end in some portion of the aluminum buildings to be used for storage. Stacks shall be covered with canvas. Hospital beds shall be similarly treated, and in addition all moving parts shall be lubricated. All mattresses shall be cleaned, sterilized, and, if necessary, re-covered. Innersprings shall be retied if necessary. Reconditioned mattresses shall be packaged and stored under cover, preferably in an aluminum building. Care shall be taken that they are off the floor enough to avoid water damage and to provide air circulation beneath them. Pillows shall be sterilized, repaired, if necessary, packaged, and stored with the mattresses. Both mattresses and pillows shall be stacked so as to provide air spaces between layers. Renovation before storage will, it is felt, result in substantial economy.

TABLES- - The small tables used in each room shall be cleaned, treated with rust preventives on the metal parts, packaged, and stored under cover. Recreation tables shall be processed in accordance with their types. Those requiring painting or oiling shall be gone over before storing. Those of metal and composition shall be repaired, treated either with paint or plastic coatings, packaged, and stored under cover.

CHAIRS -- The folding canvas chairs shall have the fabric cleaned, hinges lubricated, and the wooden parts revarnished if necessary; the chairs shall then be folded, packaged, and stored. Recreational chairs shall be repaired, treated with such preservation materials as each requires, packaged, and stored. Some chairs will not require packaging, as they can better be stacked and covered with canvas. Excess benches of the type used in the theaters shall be painted, stacked in covered storage, and put under canvas.

HOT LOCKERS -- The steel hot lockers borrowed from the Army on memorandum receipt shall be returned to TG 3.2; the aluminum hot lockers belonging to the AEC either will be left in place or stored "set-up". It is recommended that those now in aluminum buildings be left in place. Where this is not possible, they should be stored with the excess lockers from the experimental islands and with those from the tents at Parry. It appears that sufficient indoor space will be available for "set-up" storage; if not, outdoor storage may be used.

MEDICINE CABINETS -- It is recommended that all medicine cabinets now installed be left in place and that they be cared for as part of the maintenance program.

LIGHTING FIXTURES -- Reflectors and globes shall be removed from all electric fixtures not actually in use. These shall be cleaned, repaired, boxed in taped containers, and stored.

b. MESS HALL

The items covered in this section are:

FOLDING CHAIRS -- Folding chairs shall be cleaned, painted where necessary, packaged, and stored.

TABLES -- Tables shall be cleaned, painted or treated with plastic, packaged, and stored.

CARTS -- Carts shall be dismantled, cleaned, coated with rust preventive, packaged, and stored.

SILVERWARE AND CUTLERY -- Silverware and cutlery shall be cleaned, packaged, and stored.

CROCKERY, CHINA, AND GLASSWARE -- Crockery, china, and glassware shall be washed, suitably packaged, and stored.

POTS AND PANS -- Pots and pans shall be scoured until thoroughly clean, treated with rust preventive if necessary, packaged, and stored.

MISCELLANEOUS ITEMS -- Other miscellaneous items shall be treated as required and stored.

c. OFFICE

This group consists of desks, tables, chairs, stands, filing equipment, safes, drafting tables, map cases, waste baskets, electric fans, etc. Desks shall be refinished, covered, and stored. Chairs shall be overhauled, refinished, and their moving parts lubricated and coated; they shall then be covered and stored. All other furniture and fixtures in this group shall be given the same treatment except those items which have been damaged beyond economical repair. Such items shall be surveyed and destroyed.

GUIDE SPECIFICATIONS FOR PROCEDURES IN PREPARING EQUIPMENT AND MATERIALS FOR STORAGE

SECTION I

GENERAL

1-01. MATERIALS AND WORKMANSHIP. All operations prescribed herein shall be in accordance with the highest grade practices associated with this type of work. Materials used shall conform to applicable specifications. Materials which are not specifically described herein shall be of the best quality suitable for the purpose intended and shall be approved by responsible personnel.

1-02. PROCESSING AND STORAGE LOCATIONS. To obtain the maximum value of the procedures established by this specification it is preferred that all operations set forth herein be conducted at or immediately adjacent to the point of storage, thus preventing rupture of necessary preservative seals, condensation accumulations in closed systems, breakdown of preservative coatings, accumulation of foreign matter, damage to precision parts, and such undesirable effects as may occur in shipment.

1-03. PROCESSING CONDITIONS. Where practicable preparations for storage shall be conducted in buildings or areas within buildings which are controlled to prevent dust and condensation accumulation on equipment being processed. Equipment brought into processing areas from the outside shall be allowed sufficient time to approach room temperature prior to beginning the processing operations.

1-04. STORAGE CONDITIONS. Precision machinery and equipment, where possible, shall be stored in areas that can be atmospherically controlled. Items such as tanks, frames, etc., may be placed in covered or open storage at the direction of the responsible personnel.

1-05. TESTING FOR OPERABILITY. The power testing of machine tools to determine operability is not required. Moving parts may be operated manually when preferred.

1-06. DAMAGE, BROKEN, OR MISSING PARTS AND ASSEMBLIES. A comprehensive record shall be made to indicate the condition of each item and parts replacement and repairs necessary to put it in a serviceable condition. Wherever possible, parts to be replaced shall be identified by part number, make, model, and serial number of the item to which they apply. This information shall be recorded as specified in Section 6.

1-07. SUPERVISION. The importance of adequate supervision to carry out these instructions is emphasized. Supervisory personnel should be qualified to decide the extent of disassembly, the amount of work to be performed, and whether parts need replacement or can be repaired.

1-08. SAFEGUARDING OF ATTACHED PAPERS. All information pertinent to the individual item of equipment shall be consolidated and inserted in a substantial envelope of a permanent type. The envelope shall be conspicuously located and secured to the item in such a manner as to prevent damage or loss.

SECTION 2

APPLICABLE SPECIFICATIONS

FEDERAL SPECIFICATIONS:

P-S-661	Solvent; Dry-Cleaning

MILITARY SPECIFICATIONS:

JAN-P-106A	Packaging and Packing for Overseas Shipment - Boxes, Wood, Nailed.
JAN-P-115	Packaging and Packing for Overseas Shipment - Compound, Sealing, Dipcoating.
JAN-P-116	Packaging and Packing for Overseas Shipment - Preservation, Methods Of.
JAN-B-121	Barrier-Materials, Greaseproof.
JAN-P-125	Packaging and Packing for Overseas Shipment - Barrier-Materials, Waterproof, Flexible.
JAN-P-127	Packaging and Packing for Overseas Shipment - Tape, Adhesive, Pressure-Sensitive, Water Resistant.
JAN-P-132	Packaging and Packing for Overseas Shipment - Crates; Unsheathed, Wood; Nailed (for Maximum Net Load of 2,500 pounds).
JAN-P-140	Packaging and Packing for Overseas Shipment - Adhesive, Water-Resistant, Case-Liner.
JAN-C-149	Compound, Protective, Strippable (Hot-Dipping).
JAN-P-658	Packaging and Packing of Electric Equipment and Spare Parts (Electronic, Electrical and Electro-Mechanical).
MIL-C-972	Compound, Rust-Preventive, Thin-Film (Polar Type).

U.S. ARMY SPECIFICATION:

2-126	Oil, Engine Preservative.
3-182	Compound, Insulation, Ignition.

ORDNANCE DEPARTMENT TENTATIVE SPECIFICATION:

AXS-1759	Compound Rust Preventive, Soft-Film.

SECTION 3

PROCESSING INSTRUCTIONS

3-01. OPERATIONAL LAYOUT. Insofar as possible, items of equipment shall be segregated by type prior to preparing them for storage. Where possible, items of similar type or similar make and model should be assigned to particular groups in order that operators may readily become familiar with the disassembly and reassembly operations, and thereby obtain increased speed and proficiency. Sufficient benches or tables upon which parts or accessories may be placed, pending cleaning and preserving, shall be provided for each item. The tables or benches shall be covered with clean grade A barrier-material conforming to Specification JAN-B-121. Parts, accessories, precision units, assemblies, and/or parts of the item requiring cleaning and preserving may be put into baskets with identifying tags attached. Cleaning and spraying equipment used to clean and preserve should be assigned as required.

3-02. DISASSEMBLY. The degree of disassembly required will be governed by the type of equipment and the extent to which it has been used. In general, metal-working machine tools incorporating such devices as precision bearings, tool drive, hydraulic, oil-lubricating, and coolant systems will require the greatest amount of disassembly to accomplish adequate processing. The considerable use to which much of this equipment has been subjected and the previous minimum maintenance measures applied, will require that a high degree of disassembly be conducted to remove corrosion and corrosive sludge accumulations from all critical and bright metal surfaces and in order to determine the extent of damage that has occurred to internal parts and assemblies. Such decision shall be made by the responsible personnel, following a comprehensive inspection of representative machines disassembled sufficiently to permit thorough inspection of all critical mechanisms. Equipment, such as tank compressors, refrigerating units, lift trucks, jacks, etc., will not require the degree of disassembly prescribed for metal-working machine tools.

3-03. CLEANING. This specification prescribes certain basic operations for external and internal cleaning. It will be understood, however, that the many types of equipment to be processed are so diversified that it will be necessary for the responsible personnel to implement the instructions in certain instances to accomplish the basic requirements of thorough cleaning of all critical operating surfaces, which, in general, shall be considered all bright metal, unpainted working surfaces. Cleaning shall always be accomplished prior to application of preservatives and shall include the removal of rust, sludge, preservatives applied prior to receipt of equipment, or any harmful foreign matter. Non critical surfaces such as castings, frame members, pans, etc., do not require the degree of cleaning established for critical surfaces, with the exception of areas of corroded surface that are immediately adjacent to critical surfaces.

3-04. EXTERNAL CLEANING. All machine tool systems shall be drained prior to external cleaning operations. External cleaning usually will apply to cleaning various heavy or set-up types of preservative compounds from assembled machines. In no instance shall more than 60 hours elapse before the application of final preservative. Maximum results are obtained by removing inspection shields prior to washing.

3-05. Assembled machines may be cleaned by other methods such as washing with pressure with hot-water-base detergents, steam or combination of steam or water with detergents or alkalies. Precautions shall be taken to prevent penetration of the cleaning materials into critical operating parts of machines. All motors, control panels, boxes and similar units should be shrouded prior to cleaning, and care should be exercised to avoid direct application of the cleaning material to the shrouds.

3-06. Where only a small number of machines are being prepared for storage, hand cleaning of the external surfaces may be more practicable. Methods and materials shall conform to Specification JAN-P-116.

3-07. Following external cleaning, all removable accessories and attachments shall be detached. The basic machine shall then be disassembled as specified in 3-02.

3-08. INTERNAL CLEANING. Internal cleaning shall be conducted to remove from internal surfaces all contaminants, such as operating oils, coolants, corrosion and sludge accumulations.

3-09. CLEANING EQUIPMENT. Where large-scale cleaning operations are involved, use of equipment such as hot-solvent washers and vapor degreasers, is recommended. Cleaning equipment of this type will remove accumulations of lubricating, coolant, and similar residues, and most or all sludge accumulations. Where few machines are handled, the internal cleaning operations may be limited to hand cleaning with solvent conforming to Specification P-S-661, and to the use of small degreasers conforming to Specification JAN-P-116.

3-10. Where vapor degreasing is used the cleaned surfaces shall be covered immediately with a preservative coating, as trichlorethylene leaves surfaces devoid of oil film and subject to corrosion. Assemblies or parts containing organic materials such as fiber bearing retainers, packings, insulation, or plastics shall not be placed in vapor degreasers. Solvent hand cleaning shall be done by scrubbing with solvent-soaked rags and/or nonmetallic bristle brushes. Where solvent hand-cleaning methods are used, thorough cleaning of critical parts, such as bearings, can be accomplished only by the use of at least three solvent baths, two for cleaning and one for rinsing, as required. After cleaning, all parts shall be thoroughly dried.

CAUTION.

CARBON TETRACHLORIDE SHALL NOT BE USED AS A SUBSTITUTE FOR CLEANING SOLVENT.

3-11. SLUDGE. Sludge is formed by accumulations of coolants, cutting oils, metal turnings, dirt, previously used lubricants, water, and various other foreign matter. Accumulations will vary in consistency from liquids to hard, dense deposits, and may be either or both acid-or-moisture-saturated. Etching properties of these deposits result from the presence of acid and chlorinated cutting oils. Oxidation or the action of corrosion is attributable to the presence of high-moisture-content coolant solutions, condensation action, accumulation of moisture from exposure in shipment, and outdoor storage. The condition is aggravated where deposits are impacted with metal turnings around critical operating mechanisms, such as spindles, bearings, bushings, tool drive systems, etc. When flushing operations with rust-inhibiting oils, detergents, steam cleaning, or solvent-wash methods fail to remove dense sludge deposits, it will be necessary to employ nonmetallic brushes and scrapers.

3-12. RUST REMOVAL. Rust or any form of oxidation shall be removed from critical working surfaces. The nature of the operation involved will vary in control requirements from those essential to maintain operational limits of critical pieces, to such simple operations as the removal of incipient rusting from noncritical pieces by normal cleaning. Rusting observed on critical operating surfaces shall be removed.

3-13. Rust removal may be accomplished by the use of phosphoric-acid type rust remover (hot bath or local application), vapor blast with rust-inhibited liquid vehicle, buffing, nonmetallic brushes. Where only incipient rusting exists, vapor degreasing units or solvent wash methods may be used.

CAUTION.

METALLIC BRUSHES AND ABRASIVES SUCH AS EMERY PAPER, FILES, AND SAND BLASTING SHALL NOT BE USED ON CRITICAL SURFACES.

3-14. When phosphoric-acid type rust removers are used, a rinsing and neutralizing bath shall follow. The bath shall be cold water with continuous feed and drain. A second bath may be applied at a temperature of not less than 1800°F. to aid in drying of the treated parts. The second bath shall contain 8.5. ounces of chromic acid for each 100 gallons of water. This is not a costly bath and shall be renewed daily where used. Where local application of phosphoric-acid type rust remover is made, neutralization shall be accomplished with water-dampened rags, and the parts or assemblies shall be dried immediately. Dry rags, infra-red banks, dry-compressed or other motivated air may be used for drying operations. Grease and oil accumulation shall be removed from

all surfaces that are to be treated with phosphoric-acid type rust removers.

3-15. The following solution, mixed according to formula and in the order given is suitable for rust-removing purposes:

Analysis

	Percent
Phosphoric acid 75 percent	7.5
Wetting agent	.05
Water	Remainder

To make 100 gallons

Phosphoric acid 75 percent	5.0 gallons
Wetting agent	1.5 pounds
Water	Remainder

3-16. Suitable wetting agents are Dreft, Santomerse, Nacconol, Tergitol, Leather cleaner, or an approved equivalent. Heat to 180° to 212°F. As a substitute for the rust-removing solution specified in 3-15, manganese phosphelene No. 7, procurable from Western Reserve Laboratories, Cleveland, Ohio, or an approved equivalent, phosphoric-acid base compound may be used.

CAUTION!

PHOSPHORIC ACID CLEANERS MAY ATTACK THE SKIN. SAFETY GLASSES, RUBBER GLOVES, AND RUBBER APRON SHOULD BE WORN. DO NOT SPREAD PHOSPHORIC ACID SOLUTION INDISCRIMINATELY OVER AREAS WHICH CANNOT BE THOROUGHLY CLEANED. THIS WILL CAUSE FURTHER RUSTING IN STORAGE.

3-17. As an approved equivalent, vapor blast may be used for rust removal, polishing, and deburring. The methods of preparing the solution used in the vapor-blast unit are furnished by the manufacturer and in general consist of an emulsion of water charged with abrasive and a capsule, all of which comprises a liquid honing material with rust inhibiter. This solution is discharged through a nozzle at high velocity within a glass-window cabinet. The density of the material can be changed to meet the specific requirement, and this technique will be quickly developed through experience in application. At the discretion of the responsible personnel high precision surfaces may be cleaned by vapor-blasting, however, only the 5000-mesh abrasive shall be used on such parts. Abrasives of 250 to 500 mesh may be used on other noncritical surfaces. (The B-20 Dual Unit built by the Vapor Blast Manufacturing Company, Milwaukee, Wis., is well suited to the operations described herein).

3-18. HANDLING OF PARTS AND ASSEMBLIES. Throughout the processing operations care shall be exercised in the utilization of proper equipment and refined methods of operation. Particular emphasis shall be placed on the following points:

3-19. A sequence of operations best suited to the particular machine and to the economy and quality of the work shall be followed. In order to assure replacement of parts in their proper sequence, adequate identification of parts and accessories shall be accomplished by numbered tags where complicated drive systems, gear trains, etc. are being handled. Where match marks have not been made, such match marks shall be made on mating precision parts and parts shall be reassembled to the marks. Orderly laying out and palletizing of parts and assemblies on greaseproof paper is recommended to eliminate any possibility of improper assembly and to assist in inspection.

3-20. Jacks and wheel pullers shall be used to remove pressed, bushed, keyed, or shimmed fits. Pinch bars or similar systems of leverage shall not be used to remove critical operating parts.

3-21. Suitable overhead handling systems shall be provided in processing areas for removal of cast housings and assemblies. Where installed overhead cranes are not available, portable "A frames" shall be used. Care shall be exercised in rigging arrangements to avoid scoring of machine surfaces. Lift shall be applied slowly and uniformly, to avoid the harmful effects of snatching. In the process of removing heaving assemblies, care shall be exercised to avoid overloading over-hanging portions of the machine.

3-22. HYDRAULIC SYSTEMS. All used hydraulic oil, sludge accumulations, corrosion, and other foreign matter shall be removed from hydraulic systems. Organic type packing shall be removed and attached to the machine so that they will be available for reference at time of reactivation (neophrene packings need not be removed).

3-23. Care shall be exercised in the removal and reassembly of heavy pistons to avoid scoring of working surfaces. At the option of the responsible personnel, large pistons may be stored outside the cylinders when adequately identified, boxed, and stored with the machine.

3-24. Type P-3 preservative shall be applied throughout hydraulic systems. The systems shall be clearly marked with a waterproof tag, or equivalent, which is tightly secured to the machine in a conspicuous location. The tag shall contain the following information:

CAUTION!

REPLACE PACKING AND REFILL WITH SUITABLE HYDRAULIC OIL BEFORE EQUIPMENT IS PLACED IN OPERATION.

3-25. Valves and valve shafts will require careful handling and inspection to remove any evidence of corrosion, to free valves that have frozen in position, and to determine any damage that has taken place.

3-26. Pumps shall be dismantled, cleaned, and preserved in accordance with the general requirements of this specification, and pump motors shall

be processed as specified in 3-32. All lines shall be blown free with compressed air.

3-27. LUBRICATING AND COOLANT SYSTEMS. All lines shall be blown out with moisture-free compressed air. Preservative compounds shall not be permitted to enter these lines. Pumps shall be dismantled, cleaned, and preserved in accordance with this specification. Pump motors shall be processed as specified in 3-32.

3-28. AIR SYSTEMS AND CYLINDERS. Air cylinders and pistons shall be disassembled and cleaned in accordance with the general requirements of this specification. All organic packings (except neoprene) shall be removed and attached to the outside of the system for future identification purposes. Type P-3 preservatives conforming to Specifications AXS-1759 and MIL-C-972 shall be used in preserving these systems. Motors shall be processed as specified in 3-32. Compressor parts shall be processed as specified in 3-34. The following caution note shall be placed on a waterproof tag which shall be attached at a conspicuous place on the air system:

CAUTION!

REPLACE ORGANIC PACKING AND LUBRICATE SYSTEM WITH SUITABLE LUBRICANTS BEFORE EQUIPMENT IS PLACED IN OPERATION

3-29. GEARS AND GEAR TRAINS. Care shall be exercised to avoid any nicking or battering of teeth and worms during the processing of gears and gear trains. Cleaning and preserving shall be in accordance with the general requirements of this specification. In general, type P-2 preservative shall be used in the preservation of gears and gear trains. Type P-3 preservative may be used where gears are an integral part of a spindle assembly or are otherwise integral part of a spindle assembly or are otherwise integral with internal precision mechanisms.

3-30. THREADED PARTS. In the handling of precision threaded parts (excluding common hardware items), it will be necessary to carefully control alinement and engagement to prevent cross threading.

3-31. ELECTRICAL EQUIPMENT. Various items of electrical equipment (excluding motors) such as control panels, transformers, switch boxes, x-ray machines, electro-limit gages, comparators, etc., are of such fabrication as to place them in a separate category with respect to processing. The complexity of their design and system of circuit, particularly as pertains to control panels, necessitates their processing as assembled units. Alloys, copper insulation, and nonferrous members comprise the bulk of their fabrication. Emphasis shall be placed on solvent and compressed-air cleaning of the assembled units, and type P-3 preservative shall be applied when required by the responsible personnel. There shall be shrouding of the specific electrical equipment items to prevent dust accumulations. Where power hookup is maintained, all circuits from transformers through secondary lines to distributing panels, thence to each and every machine, and then all circuits through machines will be checked

to determine operability and power supply. Methods specified in Specification JAN-P-658 may be used at the discretion of the department concerned, for the processing of unattached electrical equipment.

3-32. Electric motors and generators. Disassembly, thorough cleaning, oven drying of windings, reinsulation, and application of preservative to all ferrous metal surfaces shall be conducted. Preservative shall not be applied to electrical insulation, or to associated parts, in quantities which will permit the preservative to flow or to be thrown on the insulation. All processed motors shall be tagged with the following notation:

> Lubricants normally used in operation are to be applied prior to use. Rotor and stator are to be freed by hand turning or jacking over, until free movement is obtained prior to application of power.

Processed motors shall be reassembled to the machine or stored on suitable dunnage and adequately tagged to properly identify them with the basic machine as determined by the responsible personnel.

3-33. AUTOMOTIVE AND ALLIED EQUIPMENT.

Step 1. (OFF RAMP) BATTERY, RADIATOR & GAS TANK PRESERVATION

Remove Battery - Clean and Grease Terminals. Drain gas tank - refill with PE 10 oil - remove oil from tank with hand pump. This leaves a film on tank. (In the case of Dodge Military Units remove drain plug and replace oil in storage tank for reuse). Drain radiator and engine block - refill with PE 10 oil - Drain and save oil.

Step 2. (OFF RAMP) STEAM CLEAN AND WASH RACK

Steam clean - Use Kelite, or equal, cutting compound, mixed with steam. Wash with clear water (this is for entire unit -- engine, chassis, bed and cab).

Step 3. (OFF RAMP) GLASS PRESERVATION

At this point, heavy grease is applied to all windows, reflector, lights and instrument on dash. Also, remove spark plugs. Loosen Fan Belt.

Step 4. (ON RAMP) LUBRICATION & OIL CHANGE

Lubrication - Complete chassis lubrication - do not change crankcase oil or add to gear oil. Drain all differential, transmission, gear cases, and crank case. Refill with PE 30 oil, do not drain. Pour approximately 4 oz. PE 30 oil in each cylinder through spark plug holes. (The vehicle should now be left in high gear for the purpose of turning the engine over slowly so the oil will be distributed through pumps and on cylinder walls).

Step 5. (ON RAMP) ELECTRICAL UNIT PRESERVATION

Insulate all wiring with ignition insulating compound, both in engine compartment and under dash. Seal all openings (i.e.) air cleaner, oil filter hole, generator, starter motor, tail pipe, with grease-proof paper cover with sealing tape compound. Then spray entire engine block with ignition insulating compound.

Step 6. (ON RAMP) THIN FILM APPLICATION

Spray entire chassis, under carriage, hood hinges, wheels inside and out, -- if hub caps, remove and spray.

Step 7. TOW TO STORAGE AREA. STORAGE SITE

Replace spark plugs. Wrap seats with water-proof paper. Put on blocks. Remove wheels and apply zinc chromate on brake drums. Depress clutch pedal and wedge in depressed position. All brakes in released position. Deflate tires to 50% normal pressure and cover tires with water-proof paper.

3-34. COMPRESSORS. Compressors shall be disassembled sufficiently to conduct the degree of processing required for metal-working machine tools. After performing the operations specified in 3-35 through 3-37, the compressors shall be reassembled.

3-35. Remove all organic packings (except Neoprene) and attach to outside of machine for reference at time of reactivation.

3-36. Remove connecting rods, crosshead, piston rods, pistons, piston rings, and compressor valves and clean and preserve internal surfaces and parts.

3-37. Disassemble oil pump, clean, preserve, reassemble, and remount. Drain all systems of the compressor and clean and spray all exterior and interior machined surfaces with type P-3 preservative.

3-38. ORGANIC PACKINGS. The removal of organic packings is specified throughout this specification. This is to prevent these materials from attaching ferrous metal surfaces or plunger shafts and cylinder walls. When the packings are neoprene they need not be removed, or when the metal surfaces that the organic packings come in contact with are non-ferrous (brass liners, etc), the packings need not be removed.

3-39. Preservative materials. All preservatives shall be applied full strength. The resultant coating shall be uniform, continuous, and in all cases shall comply with the applicable preservative specification. Preservatives shall be kept well mixed to assume uniform texture prior to application.

3-40. Preservative application. All surfaces shall be dry before preservatives are applied. Dry rags, infra-red banks, compressed air, or

other motivate air may be used for drying operations. In all instances where compressed-air is used, moisture traps shall be installed in the lines at a point adjacent to the expulsion jet.

3-41. Spraying is the most preferable method of applying type P-2 or P-3 preservative. Agitator-type pressurized containers should be used in conjunction with the spraying operation. Where types P-2 or P-3 preservatives are specified, one shall not be substituted for the other. Where manually operated agitator-type containers are used, they shall be activated at least once each hour when in operation.

3-42. Type P-3 preservatives shall be applied to the internal surfaces of hydraulic systems, spindle assemblies, and similar critical internal systems. Gear trains, shafts, ways, and similar less critical assemblies shall be preserved with type P-2 preservative. Following the application of either type of preservative, thorough ventilating is essential. Closed and confined systems shall be vented with low-velocity (fans) dry air for a sufficient period of time to vent off rapidly accumulating volatile material. Preservative application methods shall comply with Specification JAN-P-116.

3-43. All other unpainted or unprotected metal surfaces shall be preserved by covering with a uniform continuous coating of type P-2 preservative. Surfaces which are normally protected with paint may be preserved by repainting at the discretion of the responsible personnel. Name plates, serial numbers, and Government property tags shall be covered with tape during application of rust preventive. Tape shall be removed upon completion of the rust preventive treatment.

3-44. PROTECTION OF PRESERVATIVE. All finished surfaces of the equipment which have been preserved shall be protected from direct contact with any blocking or dunnage by the insertion of a greaseproof barrier-material between the finished surfaces and the blocking or dunnage. The paper shall be wax-free on at least one side, and the wax-free surface shall be placed next to the machine surface. Dunnage should be kept to a minimum consistent with good storage practice.

3-45. REASSEMBLY. In reassembly the same care shall be exercised in the handling of precision parts and assemblies as specified in 3-18 through 3-30. In the reassembly operations the preservative coatings on the various assemblies and parts will be disturbed in handling. As the work progresses, these areas shall be retouched and the final spray application so conducted as to seal off metal-to-metal close fits. Again, comprehensive ventilating shall be conducted to vent off volatiles and to permit the setting up of the preservative film. In those instances of metal to metal contact of heavy assemblies both mating surfaces shall be coated with preservative. Traversing of the moving unit shall be conducted, and that area of traverse on the stationary element again shall be sprayed with preservative after the traversing element has been returned to the position best suited to prevent overhang and to a well-supported position on the machine frame or casting. The traversing element shall then be locked or otherwise secured in position. Fittings shall be charged with type P-2 preservative.

3-46. Heavy loads will frequently be imposed on antifriction bearings in machines that are in storage. In certain instances excessively heavy loads of the ball or roller bearing on the races may occur when proper controls are not maintained. This condition involves assemblies, and fixtures that place much of their weight on these bearings, particularly when they are in an overhanging or improperly adjusted position. Improperly positioned assemblies and fixtures that impose such loads should be adjusted to proper position on the machine or should be removed from the machine and stored assembled to the skid, or skidded, or boxed separately, as specified in 4-04 or 4-07, whichever is the more practicable. This consideration shall be further extended to undue loads imposed in storage on such parts and assemblies as traversing bars, shafts, ways, spindle assemblies, etc. that might become misalined or warped in the absence of proper distribution of load or blocking or bracing. It is not practicable to set hard and fast rules and procedures, and the methods and degree of treatment employed shall be determined by the responsible personnel.

3-47. Motors and generators processed at the place of storage shall be reinstalled on the machine. Motors and generators that are not mounted on machines but are associated with the powering of specific machines shall be stored on suitable dunnage or skidded, and adequately identified, including the serial number, with the parent machine or machines.

3-48. Where storage conditions are such that ambient air is not heavily dust laden, free breathing of hydraulic systems and gear boxes may be accomplished by shimming gear box covers, and by the end plates and covers on hydraulic systems.

SECTION 4

PACKAGING, PACKING, SKIDDING, AND SHROUDING

4-01. PACKAGING. After reassembly and external preservation, accessories not attached to the production equipment shall be wrapped and sealed in greaseproof barrier-material conforming to grade A and/or grade C of Specification JAN-B-121.

4-02. Gages and measuring instruments. Gages and instruments incorporating intricate and delicate assemblies such as comparators, projectors, electro-limit gages, tool makers microscopes, etc., shall be wrapped with grade A greaseproof material and then over-wrapped and sealed in grade C greaseproof barrier material conforming to Specification JAN-B-121. When the grade C barrier material used has a wax-free interior surface, the grade A wrapping shall be omitted. At the discretion of the responsible personnel, and to accomplish additional protection, the packs may then be dipped in dip-coating sealing compound conforming to Specification JAN-P-115. All other gages and instruments shall be packaged as specified herein, or after thorough cleaning shall be dipped in compound conforming to Specification JAN-C-149.

4-03. Dies, jigs, and fixtures removed from items of equipment shall be wrapped when necessary for mechanical protection, or for protection of critical surfaces from hygroscopic blocking and dunnage. Wrapping material specified in 4-01 shall be used. Dies, jigs, fixtures, and accessories not attached to items shall be properly identified to the parent item.

4-04. PACKING. Dies, jigs, fixtures, accessories, and delicate equipment not attached to items of equipment and weighing less than 500 pounds shall be packed in crates conforming to Specification JAN-P-132, or in boxes conforming to styles 2, 2½, 4 and 5, for type 3 load of Specification JAN-P-106. Tops shall be attached with screws instead of nails. Strapping of boxes is not required. Only parts pertaining to the same item shall be packed together.

4-05. Equipment and parts packed in boxes shall be adequately blocked and braced. When blocking or bracing will contact preserved finished surfaces, grade C material conforming to Specification JAN-B-121 shall be placed between the blocking and preserved surfaces.

4-06. At the discretion of the responsible personnel, boxes shall be lined with waterproof case-liners or bags conforming to Specification JAN-P-125. All seams except top opening shall be sealed with waterproof adhesives conforming to Specification JAN-P-140. Top overlap shall be folded at least twice to prevent entrance of water, but the top closure shall not be sealed.

4-07. SKIDDING. Where it is necessary to skid or reskid items of equipment for extended storage, the amount of skidding to be accomplished

shall be determined by the responsible personnel. Tie-down bolts shall be loosened as necessary where heavy skidding members have been used, in order to prevent warpage of the skidding member from adversely affecting the stored item. The stored item shall also be leveled by shimming under the skids.

4-08. The length and width of the base shall exceed overall dimensions of the item of equipment not less than 2-inches on each side of four sides. The outside skids shall be the same length and parallel to each other.

4-09. Wood used in the construction of skids shall conform to group 11, 111 or IV of Specification JAN-P-132. Sizes of skids shall be determined from Table 1. One-piece skids shall be provided whenever possible. When one-piece material is not available, skids may be fabricated by lamination or splicing in the following manner:

4-10. Lamination shall be accomplished by using flat, full length material in a vertical plane, properly spiked or bolted together. For this purpose 2/4's, 2/6's and 2/8's are recommended. The breaking or joints shall be well distributed. In using 2-inch material, one extra lamination shall be added to compensate for the inherent weakness caused by the splicing. For example, a 6 x 6 member is made up of four layers of 2/6's with joints no closer than 4 feet apart.

4-11. Splicing (which is defined as joining short pieces to make a long piece) shall be permissible only when the member is built up by the lamination process.

4-12. The ends of all skids shall be beveled. The beveled cut shall be one-half the thickness of the skid, and shall be at a 45 degree angle downward from the end of the skid.

4-13. All equipment having four or more holes in the base shall be bolted to the skids with not less than four bolts. Use of lag screws for this purpose will not be permitted. Standard carriage bolt or step bolt shall be used, and the size of the bolt shall be determined by the diameter of the hole in the base of the machine. Bolts securing equipment to skids shall always pass through the skids. Bolting through floor boards only will not be permitted. A standard washer shall be used under the head and nut of each bolt.

4-14. Where it is considered essential to utilize tiering methods to conserve storage space, care shall be exercised in the selection of items of equipment to be tiered. In general, the following types of equipment shall rest on a solid base and shall not be placed on top of other equipment.

a. Equipment having leg-type, end-frame, or multiple-column machine bases.

b. Equipment weighing in excess of 10,000 pounds.

c. Small items having rectangular column or circular pedestal bases may be tiered or stored on top of items of the types specified in "a" and "b" provided suitable crating or dunnage is inserted between items so that the load is borne by the crating or dunnage, and not by the bottom layer of equipment. In order to avoid permanent distortion of frame members, all items, whether resting on the floor or tiered, shall be supported in such a manner that no undue stress or strain is set up in frame members.

4-15. SHROUDING. Shrouding is covering the equipment with water-proof barrier-material to provide protection from contamination normal to storage conditions. Shrouding materials shall conform to Specification JAN-P-125. These shrouds shall be formed as determined by the responsible personnel to facilitate inspection without injury to the shroud. Emphasis shall be placed on overhead protection, ease of removal, and replacement without injury to shroud. Care shall be taken not to seal the bottom of the shroud as this will interfere with free circulation of air and routine inspection. Shrouding should cover the upper portion of the machine to act as top covering, and shall extend not more than half way down the sides of the equipment, left loose, not fastened too tightly, using tape conforming to Specification JAN-P-127.

SECTION 5

HANDLING AND STORING PROCESSED EQUIPMENT

5-01. HANDLING. The use of fork-lift trucks to move heavy machinery without the additional aid of suitable dollies and lift jacks will not be permitted. Failure to use or misuse of adequate handling equipment can cause springing or distortion of the tables, ways, lead screws,gear trains, etc. Where gantry cranes or other suitable cranes are available they shall be used.

5-02. STORING. Machinery and equipment shall be placed in orderly storage arrangement to facilitate surveillance activities and accessibility. Boxed items shall be placed with or adjacent to the stored equipment. As far as it is practicable to do so, line makes and models of equipment should be stored together. The equipment shall be leveled and again checked to ascertain that tables and heavy moving assemblies are properly positioned and braced, where necessary, to support heavy overhang loads. At the discretion of the responsible personnel, a tag may be placed on each stored item of equipment conforming to the following:

> THIS MACHINE MUST BE RECHECKED AND LEVELED BEFORE OPERATION.

This tag should be red and conspicuously located.

SECTION 6

INSPECTION

6-01. ACCEPTANCE INSPECTION. Acceptance inspection shall be a continuous operation that shall comply in general with the following:

6-02. Completion of disassembly and clean operations. At this point, the inspector shall ascertain that all cleaning, handling, and recording of requirements for parts replacements have been complied with.

6-03. Preservative application and reassembly. At this point, the inspector shall ascertain that all material is preserved and reassembled as previously set forth.

6-04. Acceptance. Acceptance will be made at the time the completely processed equipment has been placed in the storage position, and final touch-up operations as may be necessary are completed.

6-05. INSPECTION CARDS. The condition of the equipment, particularly with respect to worn, broken or missing parts shall be observed as the item is being processed. Where necessary repairs and replacements are not made at the time the item is processed, a comprehensive record of all needed replacement parts and repairs shall be set forth on the data cards. A small card containing a brief statement typed in red shall be attached to the face of each item of equipment to show the condition of the item: The following are some examples of cards to be used.

> This machine is ready for operation after normal reactivation procedure. All necessary repairs and replacement of parts have been completed.
>
> Minor parts and replacement of parts are necessary before this machine can be operated.
>
> Major operations involving dismantling and/or replacement of parts must be completed before this machine can be operated.

6-06. A sufficient number of data cards shall be completed so that one may be attached to the item of equipment in a waterproof, grease-proof envelope. Additional copies shall be maintained in an established filing system and one copy shall be available for distribution to the user of the item prior to the time of reactivation.

SECTION 7

SURVEILLANCE

7-01. Surveillance is the continuous control of processed and stored tools and equipment to assure adequate preservation and accountability of such material. It shall further include any operations of repairing or renovating machinery that has been processed and stored, and related studies to determine repair and replacement parts requirements. Continuous inspection of storage conditions and processed equipments shall be made, selecting at intervals representative pieces of equipment for dismantling and inspection of critical surfaces. Represerving and touch-up shall be conducted as determined by the responsible personnel. In addition to the continuous control of preservation and storage conditions, surveillance shall include the completion and keeping of accurate inventories and identification data. Detailed records, interrelating all basic machines and equipment with accessories and spare parts, shall be maintained. Surveillance shall be an established program at each storage installation, all findings and reports of which shall be systematically and continuously recorded to assure maximum benefit.

MATERIALS ON HAND AT JOBSITE FOR USE IN ROLL-UP

The following materials are avilable at the jobsite for immediate use in cleaning and preserving of equipment, machinery, vehicles, and buildings. Additional stocks of these items and other items required to perform the roll-up in the manner described in the "ROLL-UP PROCEDURE" are currently being ordered.

Alcohol-solvent - Denatured "Isopropl"	108	Gallons
Compound - Tectyl, Rust Preventive Federal Spec. #506 - Grade #1	300	"
Compound - Rust Removing (Turco #1)	400	"
Fluid - Turbolator (Turco) Degreasing Compound	530	"
Manganese O Phospolene #7 Rust Removing	250	"
Ammonia - Double strength	0	"
Keystone - (Methyl Ethyl)	366	"
Lead - White (in oil)	109	Pounds
Oxide - Zinc Dust - Liquid, Vehicle only	158	Gallons
Preservative - Canvas - Paint Brown	25	"
" " " Buff	20	"
" " " Clear	5	"
Oil - Linseed - boiled	90	"
Sealer Primer - White	445	"
Sealer Plain - Clear	105	"
Thinner, Mineral Spirits	815	"
Thinner, Paint - Navy #52 T-725	195	"
Turpentine Gum Spirits	109	"
Plastic Coat	600	Pounds
Vapor Seal (Cocoon)	2000	Gallons
Zinc Dust-Dry	2160	Pounds

PAINTS - Varnish, Shellac, etc.

Anti-Corrosive, Navy Spec. #52-P-6510	2540	Gallons
" " (Socony-Vacuum)	3883	"
" " Ships Bottom - 1st coat	155	"
Anti-Fouling (Wooden) Navy	520	"
Corro Gard (all types)	720	"
Paint - Anti-Fouling Red Ship Bottom, 2nd Coat	325	"
Paint - Copper Bottom - Red	750	"
" Red Lead	757	"
Primer " " (shop coat)	250	"
" Red Oxide	100	"
" Zinc Chromate	1993	"
Varnish - all types - Spar, floor, bar flat - Marine, etc.	954	"
Shellac	0	

Adequate quantities of bleach, detergents, and soaps are available in addition to the above.

Section 19

RECORDS

SECTION 19

RECORDS

The permanent records kept in connection with the performance of work under Contract AT-(29-1)-507 were those required by Article VIII of the Contract, those required by various directives of the AEC, and those required by sound business and management practices. All records on this Project are the property of the Atomic Energy Commission and are to be turned over upon request.

The orderly retirement of files and records, as prescribed by government regulations, is in process; and the turnover to the Records Service Center, Los Alamos, has begun in accordance with procedures set forth in Bulletin SF-117. The remainder of the records are held in current files, under appropriate security safeguards, at the Los Angeles and Eniwetok offices of Holmes & Narver.

OPERATION GREENHOUSE

INFORMATION ON FACILITIES AND SERVICES

HOLMES & NARVER, INC.
CONSTRUCTION ENGINEERS

U. S. ATOMIC ENERGY COMMISSION
CONTRACT NO. AT-(29-1)-507

[redacted]

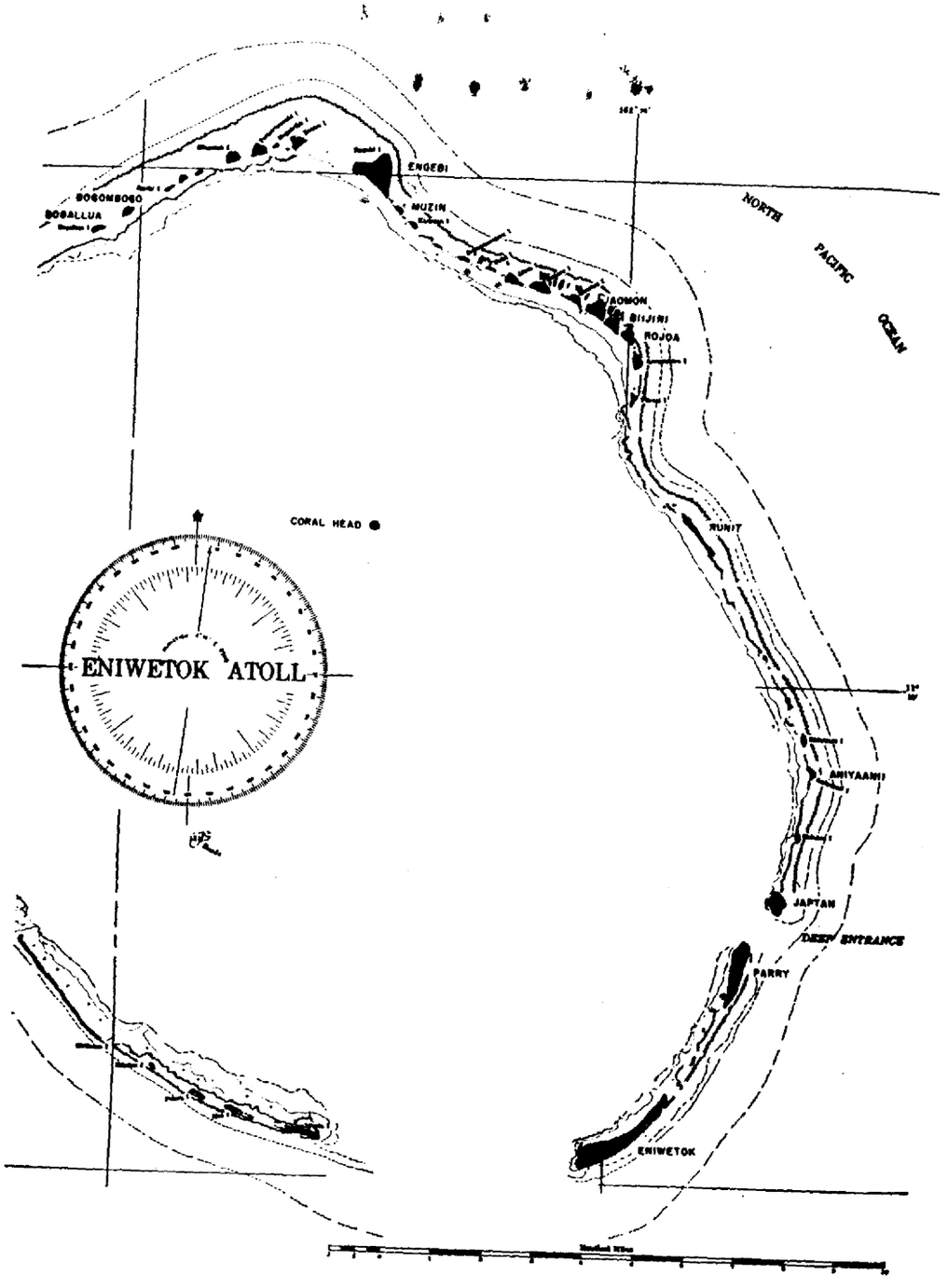
PREFACE

This booklet is distributed in the hope that it will serve to provide information which may be helpful to individuals arriving at Eniwetok Atoll for the first time. The information contained herein has been limited to that of a classification of "Official Use Only (Military Restricted)", in order that the distribution need not be limited, and that the information may be kept readily available. At the same time, no information regarding the job should be disseminated to anyone outside the Task Force. Those items of information which are of a more classified nature will be found in other correspondence which is available to those requiring it at the Administration Offices of CTF 3, CTG 3.1, or the Holmes & Narver Administration Building.

One of the features of the Holmes & Narver contract is that of administration. This is interpreted to include the provision of all possible facilities for the efficient operation of this project, and for the comfort and well-being of all individuals directly associated therewith.

Our organization at the home office at 824 South Figueroa St., Los Angeles, at our branch offices at the Naval Supply Base, Oakland, and at 1109 Bethel St., Honolulu, as well as at the jobsite, has been established and indoctrinated with the purpose of rendering the maximum service to all participants in this complex operation.

The privilege of being associated with elements of the nation's military services and outstanding scientific agencies is a matter of justifiable pride to us. We also feel some pride in our accomplishment in designing and constructing the physical features of this project. It is our earnest desire to accomplish equally well the administration of these facilities for the benefit of all agencies concerned, and indirectly for the benefit of our country.



Transportation from the United States to the Jobsite

There are three methods of transportation from the United States to the jobsite, as follows:

(a) By MATS aircraft, departing from Travis Field, San Francisco to Eniwetok, via Honolulu.

(b) By Naval surface ship, departing from Oakland or San Francisco, either via Honolulu and Kwajalein or direct to Eniwetok.

(c) By commercial aircraft to Honolulu, where passengers transfer to MATS aircraft.

Prior to boarding military aircraft or surface ship, it is necessary to obtain formal written orders authorizing passage. In the case of military, scientific, or AEC personnel, these orders are obtained from Task Group 3.1 in Los Alamos; in the case of Holmes & Narver employees, orders are obtained by Holmes & Narver through the Navy Port Director at Terminal Island.

Prior to entering either type of military transportation system, it is necessary that each individual have an immunization card, indicating recent immunization against typhoid, tetanus, and smallpox. It is also necessary that each individual be equipped with an identification card issued by the agency which authorizes the transportation; for civilians only, this card must indicate the fact of U. S. citizenship. The baggage allowance for passengers on either MATS or commercial airlines is 65 lbs. per person, and on Navy surface ships it is 350 lbs. hold baggage, plus approximately 50 lbs. of hand baggage per person.

The air trip from California to Honolulu takes about eleven hours. There is a two hour gain due to difference in time zones, so the clock time of passage is nine hours. Passage by surface ship takes about five days.

On Navy transports, certain individuals will be assigned cabin space; others will be assigned troop space. This assignment is a matter beyond the control of the contractor.

It should be observed, however, that those individuals assigned cabin space are also messed in the officers' mess, where it is required that white shirts, ties, and coats be included as wearing apparel during all meals.

Reception in Honolulu

It has been arranged that the Holmes & Narver representative in Honolulu will meet all personnel of whatever category arriving in Honolulu en route to Eniwetok. In the case of air travel, passengers will be met at

either the Honolulu Airport or at Hickam Field. In case their onward travel is scheduled without delay, they will be entered into the MATS system at Hickam Field, in which case they will proceed immediately via MATS aircraft to the jobsite. In case there is a layover in Honolulu, they will be provided automobile transportation to suitable quarters arranged at Hickam Field, or to a commercial hotel in Honolulu, as necessary. In the case of surface ship passengers, they normally will continue to live aboard for the one or two days the ship will remain in Honolulu, and will proceed on to the jobsite on the same ship.

It is highly important that our Honolulu office be notified, as far in advance as possible, of the arrival of individuals or groups from the United States. This may be done by the scientific agency concerned, by Task Group 3.1, Los Alamos, or by Holmes & Narver in Los Angeles. In any event, however, notification is sent by dispatch by the AEC representative at the MATS terminal, Travis Field, San Francisco.

Our Honolulu office can be reached by mail as follows:

Mr. A. W. Hand
c/o Holmes & Narver
1109 Bethel Street
Honolulu, T. H.

or by teletype addressed to:

Holmes & Narver, Honolulu

or by telephone:

Honolulu 67892

The office is normally open from 8 a.m. to 5 p.m., Mondays through Fridays, but representatives of the office meet all groups arriving either by aircraft or surface ship, at any hour, day or night, throughout the week.

Transportation from Honolulu to Eniwetok

The only means of air transportation from Honolulu to Eniwetok at present is via the MATS system. Planes normally leave Hickam Field in the late evening, and arrive at Johnston Island for a fuel stop about midnight. Thence they go to Kwajalein, arriving about 8 a.m. and departing about 10 a.m. for Eniwetok, where they arrive about noon. During this trip the International Date Line is crossed, which means that a departure from Honolulu at 9 p.m. Saturday would mean an arrival in Eniwetok at noon on Monday.

Arrival at Eniwetok

Upon arrival at Eniwetok Island, all personnel are required to submit identification cards for inspection by the Military Police, and all baggage is inspected to insure that no prohibited articles are introduced into the Atoll. These prohibited articles include:

Firearms

Cameras

Explosives

Radio Transmitters

Intoxicants

It is essential that all personnel register at the Camp Department Office on Parry Island upon arrival, in order that proper records may be maintained.

It is also emphasized that all individuals must adhere to the established rules and regulations which have been issued by proper authority. These have been developed after considerable experience as necessary for the safety and well-being of the individual, and for the orderly progress of the operation.

Conditions at Jobsite

The weather at Eniwetok is always warm, varying from about 75° F. at night to about 90° F. at noon. There is frequent rainfall, and the atmosphere is always inclined to be humid.

Requirements for clothing are limited to the following:

Some type of work trousers of either khaki or denim. (Shorts are permissible.)

A number of short-sleeved, open-necked shirts.

Two pairs of field shoes.

A hat or cap.

A normal supply of personal linen.

It is necessary that each individual bring his own bath towels and face towels. It is also desirable that individuals be equipped with swimming trunks and gym shoes. Bedding and bed linen are provided by the organization at the jobsite, and none is required from the individual. A lightweight raincoat might be found desirable.

Living Accommodations

The majority of visiting parties will be housed on Parry Island, either in aluminum buildings or in tents. The available living quarters of both types have been allocated by AEC among the three major catgories: i. e., the military, AEC, and Holmes & Narver. The assignment of each particular individual will be made by the designated authority for each of these major groups. Under normal conditions accommodations are not crowded, and living conditions are quite pleasant. There will, however, be short periods of a few days during which there will be concentrations on Parry Island, at which time there will be unavoidably crowded conditions. A certain number of people will be housed for varying periods on one of the other islands, at which location they will be assigned tents, which are mounted on concrete slabs, and equipped with comfortable beds. They are in all respects as pleasant as the aluminum buildings.

All things considered, it will be impracticable for people to retain accommodations at more than one location at the same time. This is especially applicable during periods of peak population. Therefore, when an individual moves from one site to another, even for a short period, it will be necessary to utilize his primary housing billet for the use of some other indvidual. He should, therefore, either take all of his belongings with him on these temporary trips, or arrange to store them in space which will be made available for this purpose.

In emergency cases, such as disruption of travel facilities, there will be temporary facilities for billeting transients who may become stranded on outlying sites.

In all cases in which an individual's billet assignment is transferred from one site to another, he should so notify the Camp Department Office, in order that records can be properly maintained, and various service facilities, such as quarters, bedding, laundry, and messing, can be efficiently regulated.

Laundry Facilities

Laundry facilities are provided and operated by the management, and are available for the use of personnel on all islands on the Atoll. Laundry is collected once each week, and is normally delivered three days later. During peak population periods it may be necessary to limit the amount of "finished" laundry for each individual.

All individuals should acquaint themselves with the proper procedure regarding preparation and delivery of laundry bundles, and the schedule of pick-up and delivery of laundry at various sites. This information is available in information bulletins which are posted.

Water Supply

Each of the occupied islands is self-supporting in the matter of fresh water, and all water used for drinking, cooking, and showers is fresh water which is distilled on the island. While the supply is considered adequate, it will be essential to limit the use of fresh water to a minimum during periods of peak population, and at all times everyone should make a conscious effort to conserve water and avoid waste.

Messing Accommodations

Aluminum buildings are provided on each island for use as a mess hall and kitchen. The seating capacity is designed for normal populations, and it will be necessary to use two or three seatings for each meal during peak population periods. There will also be short periods on Parry Island during which temporary mess tents and field kitchens will be employed. The supply of fresh and frozen food is adequate, and the variety has been considered excellent.

Each individual at the Atoll is charged $10.50 per week for all accommodations, including food, housing, and laundry, insofar as facilities permit. This charge is pro-rated for short periods at the rate of $.50 per meal. Collection of this fee will be made periodically by the Holmes & Narver Administrative Officer from individuals whose stay at the Atoll covers a prolonged period of time, and upon departure for temporary visitors. The acceptance of personal checks is not permitted; therefore payments must be made by cash, postal money order, cashier's check or traveller's check.

Medical Facilities

A small emergency hospital is provided on Parry Island, where there is a licensed physician and surgeon and a licensed dentist. There are also male hospital attendants or male nurses on Parry Island and on each of the other occupied islands, where first aid stations are maintained. These facilities should be utilized primarily for emergency treatment. In those cases requiring prolonged medical care the patient is normally transferred to Kwajalein, Honolulu, or the mainland, where more complete facilities can be provided.

Transportation within the Atoll

There are three types of personnel transportation facilities within the Atoll, as follows:

(a) *Aircraft.* CTG 3.4 provides a certain number of small personnel aircraft for transportation between the various islands. These are normally assigned to Task Group 3.1 on a day-to-day basis, the number depending;

on the availability of craft and the transportation requirements. Dispatching of these aircraft is centralized in the Air Dispatcher's office at the airstrip on Parry Island. Requests for air transportation can be made only by authorized and listed personnel, and should be telephoned to the dispatcher. (Telephone: Parry 56.) These requests should be made as far in advance of the flight as possible, and should be limited to the most essential needs, as the capacity of the aircraft is very limited, and as water transportation can be provided for normal requirements. Airstrips are provided on the major islands. There are Assistant Air Dispatchers at each of these sites, who can be reached by telephone. It is emphasized that this service is extremely limited, and therefore if requests become too numerous it may be necessary for them to be screened through CTG 3.1, with the probability that some passengers may find their requests denied at the last minute due to non-availability of space. Since water transportation facilities are considerably more certain, it is recommended that this latter service be utilized except in cases of the most urgent necessity.

(b) *Water Transportation.* There are two separate boat pools maintained to provide water transportation within the Atoll. One boat pool is operated by CTG 3.3, with headquarters on Eniwetok Island. This boat pool is provided primarily for transportation between Eniwetok Island and ships in the lagoon, and between Eniwetok Island and Parry Island. Another boat pool is maintained and operated by Holmes & Narver, under the direction of CTG 3.1, with headquarters on Parry Island. A head Marine Dispatcher is located in the Marine Operations office. (Telephone: 81.) Assistant dispatchers are located on all other occupied islands.

Various types of marine transportation and their characteristics are listed below:

Type	Length	Beam	Draft	Speed (Knots)	Personnel Capacity	Tons Cargo Capacity
LCM	56′	14′	4′	9	80	20
LSU (LCT)				7.5	200	150
YTL (Tug)	66′	17′	9′6″ (Loaded)	8.7	30	5
YC (Barge)	110′	30′	5′ (Loaded)	—	500	Wood-200 Steel-500
Water Taxi	46′	12′	3′	13.5	64	—
Whale Boat	30′	8′	3′	8.0	10	—
DUKW	30′	8′	4′	6.0	30	2.5

The travel time between various islands for these craft is as follows:

Leaving Parry	Will Arrive Personnel Pier Eniwetok in:	Will Arrive Freight Pier Eniwetok in:	Will Arrive Japtan in:	Will Arrive Runit in:	Will Arrive Biijiri in:	Will Arrive Engebi in:
Water Taxi	15 min.	24 min.	7 min.	40 min.	56 min.	1 hr. 21 min.
LCM	25 min.	35 min.	10 min.	60 min.	1 hr. 27 min.	2 hrs.
LSU (LCT)	30 min.	42 min.	12 min.	1 hr. 12 min.	1 hr. 44 min.	2 hrs. 24 min.
Tug (No Tow)	26 min.	36 min.	10 min.	1 hr. 2 min.	1 hr. 30 min.	2 hrs. 4 min.
Tug (Lt. Tow)	36 min.	50 min.	15 min.	1 hr. 26 min.	2 hrs. 4 min.	2 hrs. 51 min.
Tug (Hvy Tow)	45 min.	1 hr. 4 min.	18 min.	1 hr. 44 min.	2 hrs. 37 min.	3 hrs. 37 min.

Distances between sites in sea miles:

From	To Personnel Pier, Eniwetok	To Freight Pier, Eniwetok	To Japtan	To Runit	To Biijiri	To Engebi	To Engebi Main Channel
Parry	3.8	5.3	1.5	9.0	13.0	18.0	19.0
Japtan				7.7	12.5	17.2	
Runit					5.8	10.9	
Biijiri						6.8	

A regular marine schedule between all islands is established and maintained for normal transportation requirements. Schedules normally commence at 0730 daily, and end at 1715. Night boat trips are not made except in emergencies. Individuals should arrange their own requirements so that they can avail themselves of these regular trips whenever possible. Provision is made, however, for special trips for the purpose of filling emergency or unexpected needs. Such requirements should be anticipated and requests made to the Marine Dispatcher's office as far in advance as possible.

Marine equipment is also available for the transportation of cargo between islands. Requests for the transfer of cargo should also be registered with the Marine Dispatcher as far in advance as possible.

Marine equipment can be made available for recreational purposes whenever such employment does not interfere with more essential requirements. Requests for such use should be registered with the Recreation Director.

(c). *Land Transportation.* The small land area of each island limits the necessity for assignment of motor vehicles for the personal use of individuals, but a motor pool is maintained on each occupied island for the purpose of providing transportation as necessary. It is expected that regular bus schedules will be maintained around the principal roads on each site, and these should be utilized whenever possible. Special requests for transportation may be telephoned to the Motor Pool (Telephone: 12.)

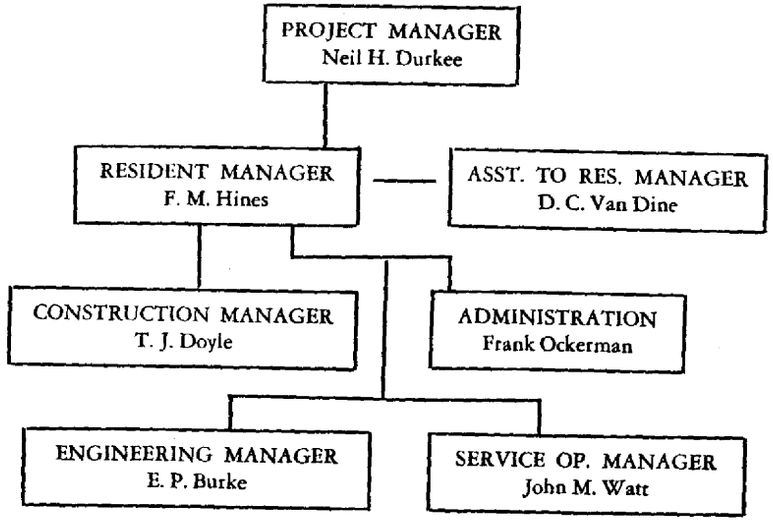
Daily Routine

The following normal daily routine is established on each site:

First call for breakfast	0615
Last call for breakfast	0645
Mess hall closes	0715
Commence work	0730
Lunch (first seating)	1145
Lunch (second seating)	1230
Commence afternoon work	1230
End of regular working day	1715
Dinner (first seating)	1730
Dinner (second seating)	1815
Mess hall closes	1830
Curfew	2300

Holmes & Narver Organization

The following outline organization chart will indicate the various divisions of the Holmes & Narver organization on the job site.



Labor Pool

A labor pool is maintained by Holmes & Narver, under the direction of CTG 3.1, to provide various specialized individuals to perform necessary work for scientific agencies. Requests for labor from these pools should be made by the head of each scientific group or Program Director to the AEC Administration official on Parry Island. (Telephone: 11.) These requests should be registered as far in advance as possible, and should state specifically the number of men of each classification required, the number of hours his services are required, and the nature of the work. It is expected that allocations will be made by CTG 3.1 to the Holmes & Narver Resident Manager, who will in turn transmit this requirement to the Area Superintendents at the particular site on which the work is to be performed. The Area Superintendent will assign individuals under a foreman or a leading man who will report to the scientific agency for the performance of work. It will be necessary that the contractor maintain records of the use of this service by each agency, for the purpose of allocating charges for labor and material utilized by each scientific group. It is expected that these records will be maintained and transmitted to CTG 3.1. The size of this labor pool has been specified by CTG 3.1. The number of individuals of each classification included therein is limited, and therefore requests for this service should also be limited. Upon completion of any particular assignment, the group of workers assigned should be returned to the Area Superintendent without delay.

Restricted Areas

There are certain areas on each site which are restricted. These may be classified as "Exclusion Areas" or "Limited Areas." These areas are posted, and certain ones are guarded by military police. They may not be entered without specific authority in each particular case. It should be understood that the military police are acting under strict orders, and have no authority to make exceptions as to entry into these areas.

Postal Facilities

A main post office is maintained on Parry Island, with branch offices on each of the other occupied islands. All postal matter, either first class mail or parcel post, is sent from the Atoll via MATS aircraft to Honolulu, where regular mail is forwarded by surface ship and airmail is transferred to the normal commercial airlines. Air mail to any point in the United States requires 6c postage per half ounce. Normal letter mail requires 3c postage, and parcel post is charged at the same rate as if it were mailed in San Francisco. It normally requires from four to six days for an airmail letter to reach a West Coast destination. Personal mail from the United States should be addressed to the individual, c/o Commander, Task Group 3.1, or c/o Holmes & Narver, APO 187 (HOW), c/o Postmaster, San Francisco, California.

Post Office Hours

Parry — 0945 to 2000

Engebi — 1200 to 1230
1715 to 1930

Runit — 1130 to 1230
1700 to 2000

Biijiri — 1100 to 1200
1700 to 2000

All post offices are equipped to sell stamps and postal money orders, and are equipped to offer postal registry service; all are also equipped to cash postal money orders for reasonable amounts.

Financial Arrangements

Commander Task Group 3.1 has issued the following instructions:

"(1) *Living expenses in the forward area.*

The cost of subsistence will be small in the forward area. A charge of $10.50 per week per person will be made for meals, quarters, and laundry. Persons travelling via Navy or MSTS vessels will be required to pay a mess bill in the amount stipulated by the mess regulations of the particular ship in which travel is performed. Such mess bills will approximate $1.50 to $2.00 per day.

"(2) *Funds*

Sufficient funds to cover living expenses for a reasonable period should be carried by the individual in the form of travellers' checks, postal money orders, etc., and arrangements should be made to receive additional funds from time to time. Since only small amounts of money will be needed in the forward area, it is suggested that arrangements be made to have pay checks deposited to the individual's bank account rather than having them sent overseas. Personal checks will not be cashed in the forward area; thus remittances should be in the form of postal money orders, express money orders, cashiers' checks, or certified checks."

Negotiable paper as described in the foregoing instructions for moderate amounts will be cashed by the Post Exchanges at Parry, Runit, Rojoa and Engebi. Also, the Accounting Department Cashier on Parry will be authorized to make these cash transactions.

Due to the limited transactions on Japtan, the officer in charge has agreed to handle these cash transactions. All check cashing transactions on Location "A" will be handled by military establishments on that site.

Travelers' checks, postal money orders, certified checks, etc., in excess of $100 must be approved by the Jobsite Controller prior to cashing by Holmes & Narver cashiers. It is emphasized that personal checks will not be cashed under any circumstances by Holmes & Narver cashiers.

Teletype Facilities

Teletype facilities are maintained on Parry Island, equipped to send official classified or unclassified dispatches by radio to any official agency in the United States. Such teletypes must be released either by an authorized member of the staff of CTF 3 or CTG 3.1, or by the Holmes & Narver Project Manager.

It is also possible to utilize this service for personal messages of an emergency nature. This latter service must be carefully controlled, since it is impracticable to overload the communication facilities. This service is permitted only because of the fact that there is no commercial means of transmitting personal messages. These messages will be transmitted to the Signal Center, USARPAC, in Honolulu, which will forward them to a commercial agency for retransmission collect.

As a matter of information, personal messages may similarly be sent from any point in the United States to individuals at the jobsite, by addressing them to APO 187 (Eniwetok), c/o Signal Center, USARPAC, Honolulu, T. H., but these also must be limited to emergency messages.

Recreation Facilities

The principal outdoor recreation facilities available at the jobsite include swimming, fishing, shell hunting, volley ball, baseball, ping pong, and horseshoes. Motion pictures are shown nightly on each of the occupied islands, to which admission is free. There are also beer halls on each of the islands where beer or hard liquor may be purchased by the drink. It is not permissible for hard liquor to be purchased by the bottle, nor is it permitted that intoxicants be carried away from the beer halls. All transactions at the beer hall are on a cash basis.

A Post Exchange is provided at each camp, where certain articles of clothing, candy, tobacco, cosmetics and writing material may be purchased on a cash basis. It is not expected that individuals will endeavor to purchase all the clothing required by them from this facility. They should limit their purchases to those needs which have unexpectedly arisen after their arrival.

A snack bar is also provided on Parry Island, where sandwiches and soft drinks may be purchased.

A barber shop is located at each camp.

Departure from Atoll

When preparing to depart from the Atoll for Honolulu or the United States, it is necessary that each individual receive written orders, which will be provided by CTF 3 in the case of military personnel, CTG 3.1 in the case of AEC and scientific personnel, and the Project Manager in the case of Holmes & Narver personnel. Prior to embarkation, either by ship or aircraft, it is necessary to undergo a baggage inspection, which is conducted by MP's at the air terminal at Eniwetok Island, or at the boat landing for those individuals traveling by surface ship. The return trip is similar in all respects to the westward trip.

It is emphasized that clearance cannot be obtained until all financial obligations have been settled. This includes the payment of the mess bill.

The Holmes & Narver representative in Honolulu is prepared to arrange for necessary transportation and living accommodations in Honolulu. Upon arrival in Honolulu it is necessary that all baggage be inspected by the Customs officials and by the Agricultural Department inspectors. These officials will not permit the bringing in of any plants. They inspect to see that all shells are thoroughly clean, and do not permit the bringing in of more than one gallon of liquor or more than 300 tax-free cigarettes.

In this connection, it is emphasized that the supply of liquor on the Atoll is insufficient to provide departing individuals with any stock for export.

The firm of Holmes & Narver, Inc., is prepared to provide every reasonable service to all personnel participating in Operation Greenhouse, and will welcome any inquiries or suggestions either at our Overseas Headquarters on Parry Island or at our Home Office at 824 South Figueroa St., Los Angeles, Calif.

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